Bering Sea Non-Chinook Salmon PSC Management Measures

INITIAL REVIEW DRAFT
Regulatory Impact Review
Initial Regulatory Flexibility Analysis

April 2012

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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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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. 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.

Under the Magnuson-Stevens Act, the United States has exclusive fishery management authority over all marine fishery resources found within the exclusive economic zone (EEZ). The management of these marine resources is vested in the Secretary of Commerce and in the Regional Fishery Management Councils. The pollock fishery in the Bering Sea EEZ is managed under the Bering Sea and Aleutian Islands (BSAI) Fisheries Management Plan (FMP).

This RIR examines the costs and benefits of proposed alternatives which include eliminating the non-Chinook Salmon Savings Areas and, thereby, eliminating an exemption to the savings area for participants in the Voluntary Rolling Hotspot System (VRHS) Intercooperative Agreement (ICA), imposing a hard cap number of non-Chinook salmon that may be taken in the Bering Sea pollock trawl fishery, and/or implementing a new triggered closure area that would be managed by the National Marine Fisheries Service (NMFS). 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 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]

[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.

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 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 are 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, 81 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 fell slightly to 15 in 2009 and 2010. 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 droped to 14 catcher vessels delivering to two motherships in 2010.

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" (Sepez et al. 2005, p. 49, as cited in 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/).

2.1.1 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, which 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 20010. The sectors identified here are the Catcher Vessels (CV), Catcher Processor (CP) Mothership (M), and CDQ sectors.

Table 2-1 Bering Sea pollock sector allocations, catch, and number of participating vessels; 2003–2010[3]

Year/ TAC	Sector (# of vessels)	Allocation (metric tons)	Pollock Catch (metric tons)
2003	CV (86)	653,047	652,254
1,491,760	CP (16)	522,437	522,428
	M (10)	130,564	130,609
	CDQ	149,176	149,121
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

2.1.2 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

[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.

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, 2000-2009

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
2000	1,132,905,560	$ 134,707,191	$ 4,395,129	1,241,216,883	$ 150,668,204	$ 4,874,586	91%	89%	90%
2001	1,293,325,964	$ 143,045,862	$ 4,468,644	1,492,858,478	$ 166,756,270	$ 5,421,274	87%	86%	82%
2002	1,335,417,000	$ 157,355,961	$ 4,889,743	1,398,332,597	$ 164,102,179	$ 5,092,204	96%	96%	96%
2003	1,348,116,609	$ 145,173,409	$ 4,521,874	1,546,355,388	$ 165,544,818	$ 5,394,197	87%	88%	84%
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
2000	1,158,516,598	$ 127,436,689	$ 3,823,101	1,458,559,255	$ 160,441,383	$ 4,813,241	79%	79%	79%
2001	1,431,627,204	$ 157,483,994	$ 4,724,520	1,679,834,870	$ 183,295,391	$ 5,498,862	85%	86%	86%
2002	1,513,929,561	$ 181,667,682	$ 5,450,030	1,792,254,635	$ 213,521,553	$ 6,405,647	84%	85%	85%
2003	1,560,823,799	$ 156,621,765	$ 4,698,653	1,805,866,649	$ 181,172,076	$ 5,435,162	86%	86%	86%
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
2000	2,291,422,157	$ 262,143,881	$ 8,218,230	2,699,776,138	$ 311,109,588	$ 9,687,827	85%	84%	85%
2001	2,724,953,168	$ 300,529,856	$ 9,193,164	3,172,693,348	$ 350,051,660	$ 10,920,136	86%	86%	84%
2002	2,849,346,561	$ 339,023,643	$ 10,339,773	3,190,587,232	$ 377,623,732	$ 11,497,851	89%	90%	90%
2003	2,908,940,407	$ 301,795,174	$ 9,220,527	3,352,222,038	$ 346,716,895	$ 10,829,359	87%	87%	85%
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 transfered 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:

2.2 Market Disposition of Alaska Pollock

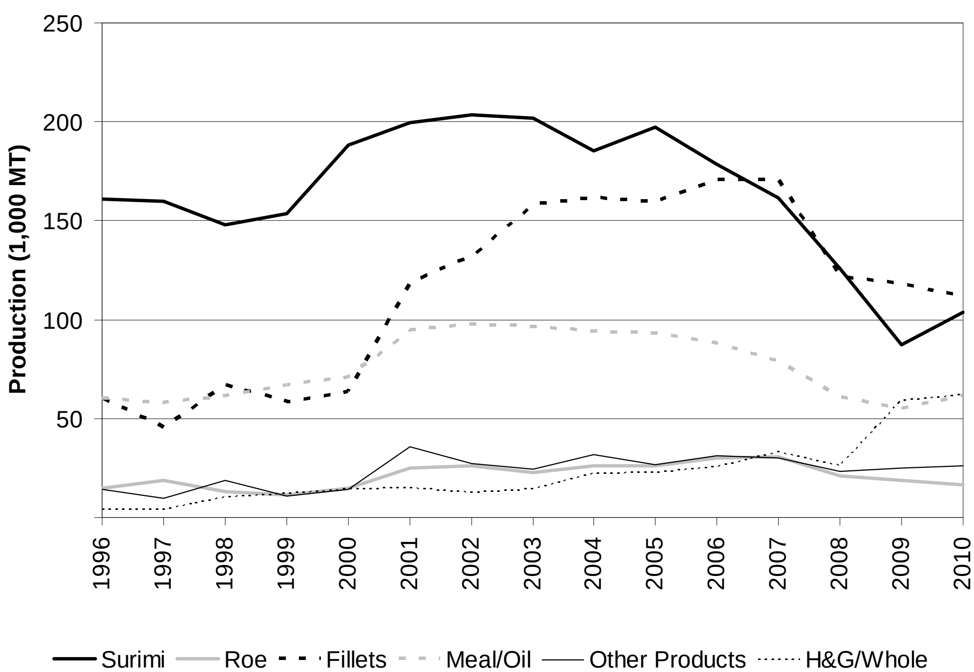
Production

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.

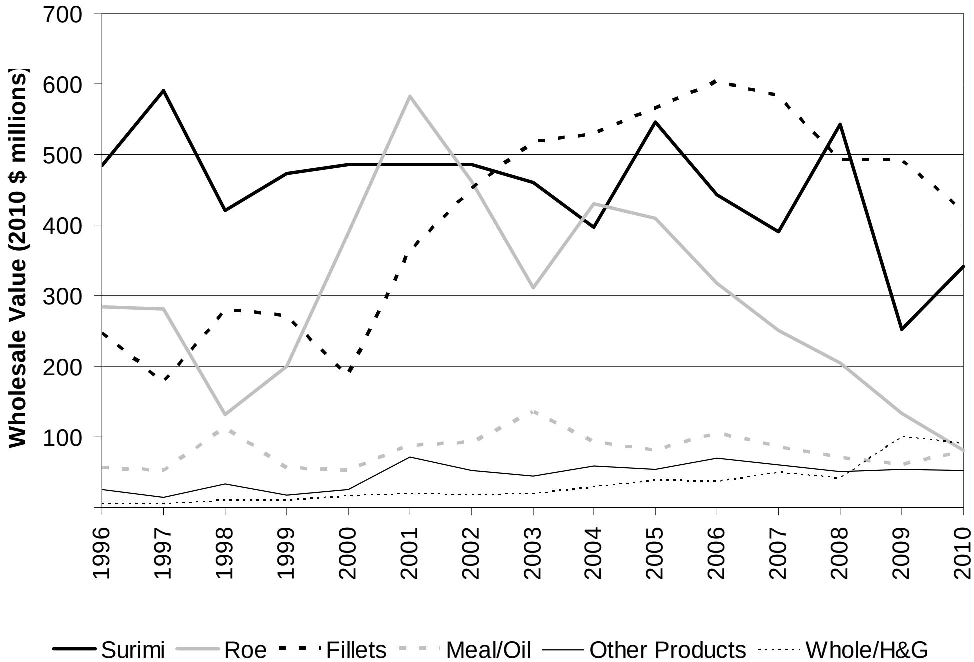
This shift in production practices led, as noted, primarily to a particularly rapid increase in fillet production during the early 2000s, to meet greater world demand for whitefish products created by several factors, including declining harvests in the Russian pollock fishery and a sharp decrease in 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



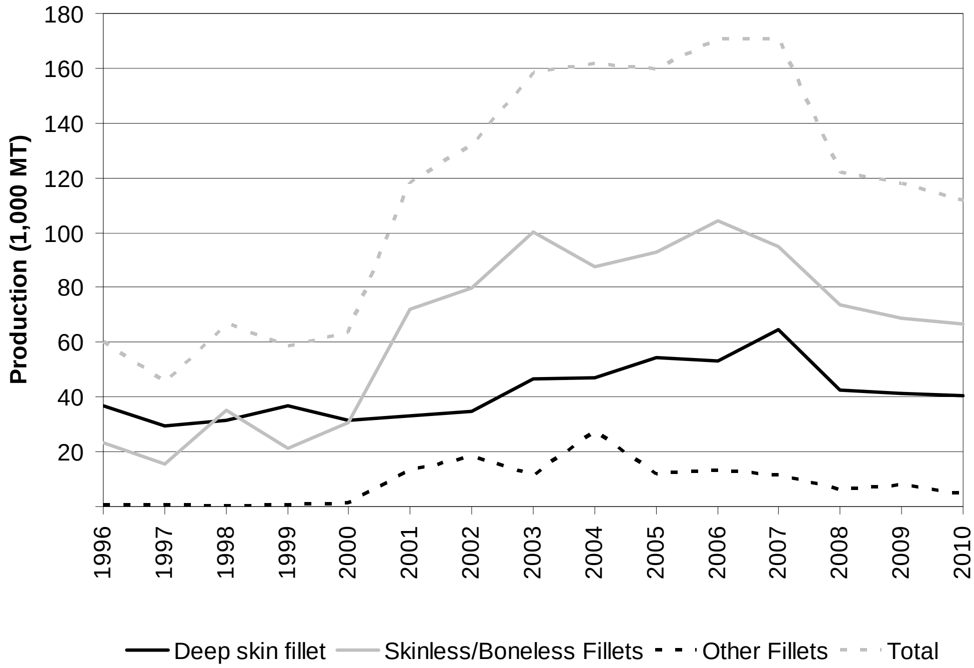
Note: Product types may include several more specific products.
Source: NMFS Weekly Product Reports and ADF&G Commercial Operator Annual Reports 1996-2009.

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

Fillet Production

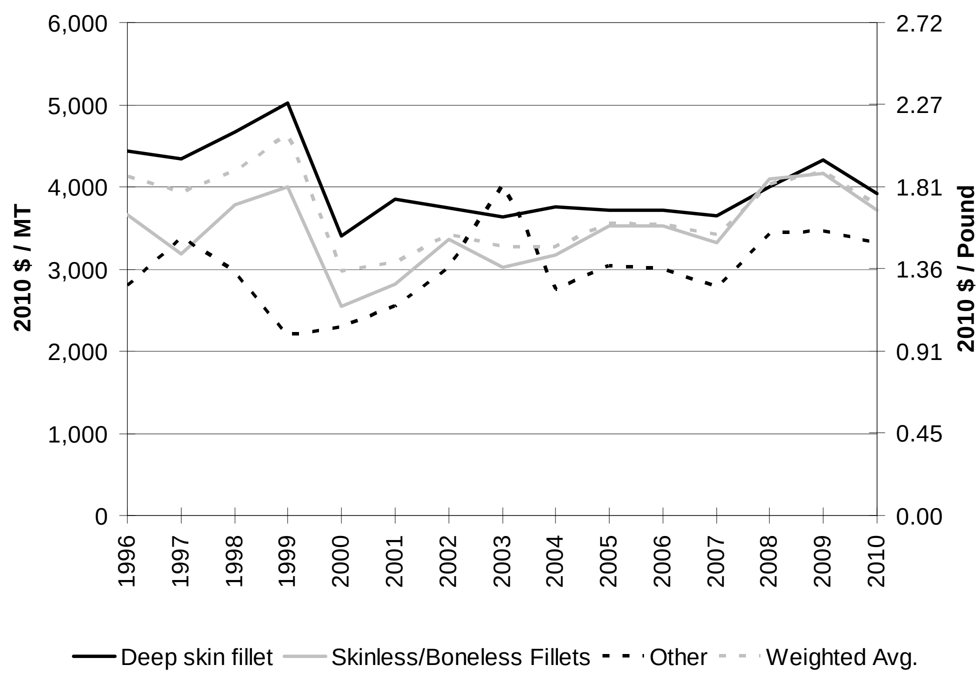
Pollock is a fragile fish that deteriorates relatively quickly after harvest, so little is sold fresh. Pollock fillets are typically frozen, as fillets and fillet blocks (frozen, compressed slabs of fillets used as raw material for value-added products, such as breaded items, including nuggets, fish sticks, and fish burgers). The price of pollock fillets also varies according to the freezing process: single-frozen and frozen-at-sea fillets fetch the highest prices, followed by single-frozen fillets processed by Alaska shoreside plants.

The following figures (Figure 2-3 through Source: NMFS Weekly Product Reports and ADF&G Commercial Operator Annual Reports 1996-2010.
Figure 2-5) show the primary production, wholesale price, and wholesale gross value of pollock fillets by fillet type from 1996 through 2010.



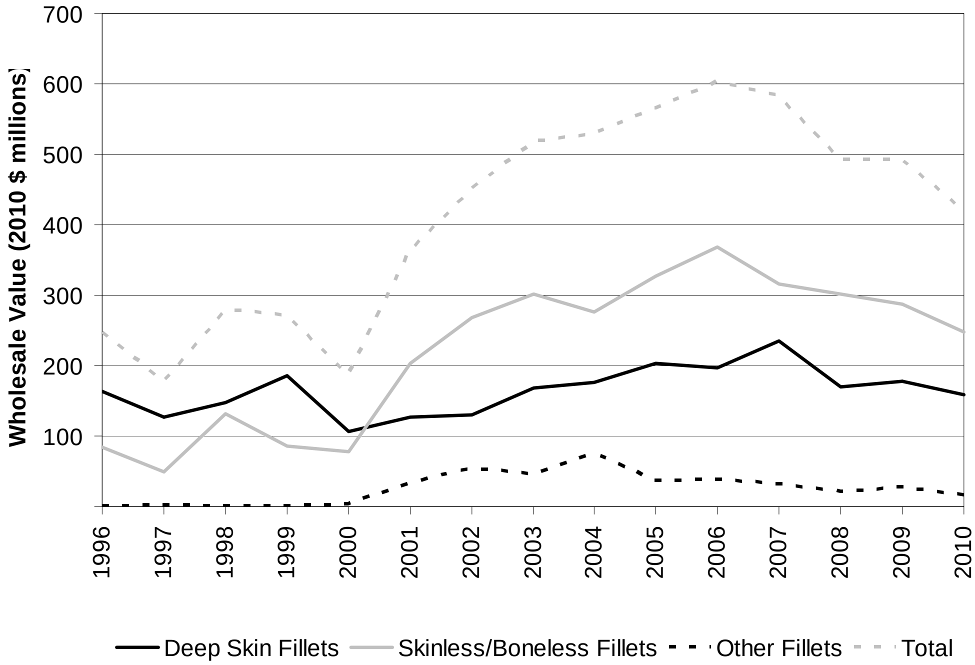
Source: NMFS Weekly Product Reports and ADF&G Commercial Operator Annual Reports 1996-2010

Figure 2-3 Alaska production of pollock fillets by fillet type, 1996-2010



Source: NMFS Weekly Product Reports and ADF&G Commercial Operator Annual Reports 1996-2010

Figure 2-4 Wholesale prices for Alaska production of pollock fillets by fillet type, 1996-2010



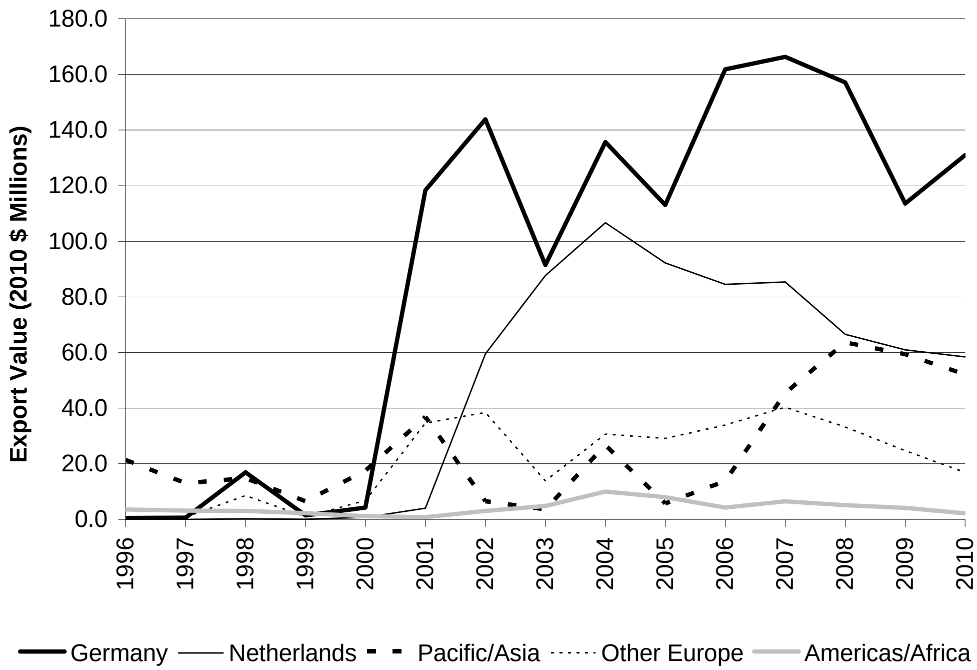
Source: NMFS Weekly Product Reports and ADF&G Commercial Operator Annual Reports 1996-2010.

Figure 2-5 Wholesale value of Alaska production of pollock fillets by fillet type, 1996-2010

Twice-frozen (also referred to as double-frozen or refrozen) pollock fillets, most of which are processed in China, have traditionally been considered the lowest grade of fillets and sell at a discount to single-frozen fillets frozen at sea. Twice-frozen fillets are reportedly greyer in color, and often have a fishy aroma, and can be stored for a maximum of six months, whereas single-frozen can be stored for nine to 12 months (Eurofish 2003, as cited in Hiatt et.al, 2007). However, industry representatives note that the acceptability of twice-frozen fillets is increasing in many markets, and the quality of this product is now considered, by some, to be similar to that of shoreside-frozen fillets, while still trailing at-sea product.

Historically, the primary market for pollock fillets has been the domestic market. Fillets made into deep-skin blocks were destined primarily for the U.S. foodservice industry, including fast food restaurants. Competition in this domestic market comes from imported twice-frozen pollock fillets and fillet blocks produced from pollock caught in Russia and reprocessed in China. However, with Russian-caught pollock in short supply due to declining harvests, twice-frozen fillets from China have become more expensive, and imports into the U.S. markets have subsequently declined.

Figure 2-6 shows the leading countries importing U.S.-produced Alaska pollock fillets from 1996 to 2010, along with the estimated gross export value to the U.S. economy. With high pollock prices, some species substitution is inevitable. Alaska-caught pollock competes in world fillet markets with numerous other traditional whitefish marine species, such as Pacific and Atlantic cod, hake (whiting), hoki (blue grenadiers), and saithe (Atlantic pollock). Price competitive whitefish fillets and products can also be prepared from freshwater species such as pangasius (basa catfish), Nile perch, and tilapia, so that while freshwater whitefish currently represent a relatively small sector of the total market, it can be anticipated that they will be used to both substitute for traditional whitefish marine species as well as to be used to grow the overall market (EU Fish Processors' Association 2006, as cited in Hiatt et.al. 2010).



Note: Data include all exports of Alaska pollock from all U.S. Customs Districts
Source: U.S. Census Bureau Foreign Trade Data available at www.st.nmfs.gov/st1/trade/

Figure 2-6 U.S. exports of Alaska pollock fillets to leading importing countries, 1996–2010

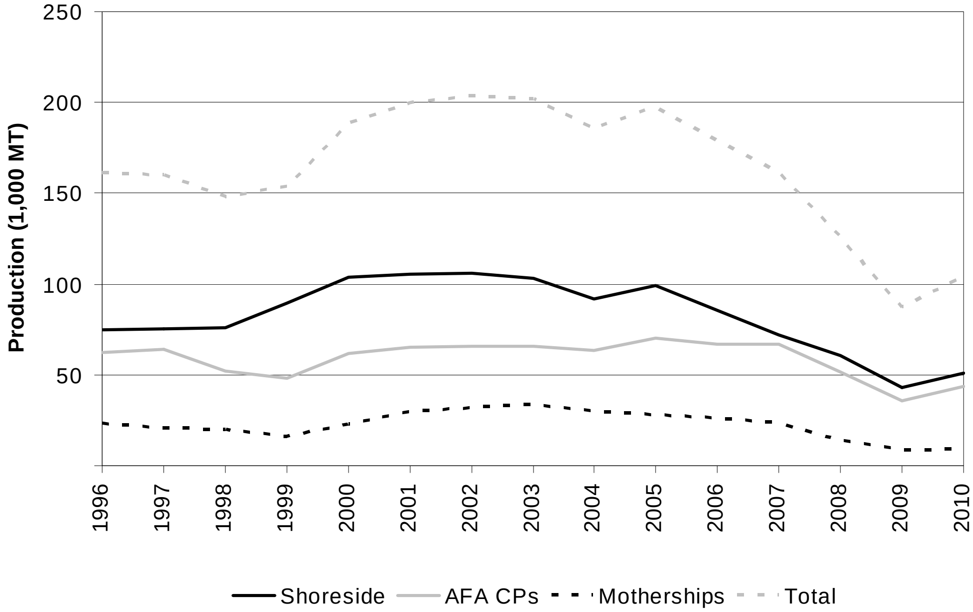
Surimi Production

World surimi production has almost doubled in the ten years from 1996-2005. The chief market for surimi is Asia, particularly Japan, and the U.S. is the leading exporter of Alaska pollock surimi to the Japanese market. Chile, India, and China are increasing surimi production from other whitefishes, which now represent 25 percent of the total volume of surimi production. Nevertheless, approximately a third of the surimi produced continues to come from Alaska pollock.

U.S. production of Alaska pollock surimi rose slightly in the late 1990s. As noted, the AFA's ending of open access occasioned the development of more efficient processing methods, which significantly increased product yields and allowed the volume and value of surimi from Alaska-caught pollock to remain fairly stable, while at the same time increasing pollock fillet production. Figure 2-7 through Figure 2-9 show the production, wholesale value, and wholesale price of U.S.-produced Alaska pollock surimi by sector for 1996 to 2009. As fillet production increased substantially both the volume and value of surimi production declined from 2005 to 2007. Production volume continued its decline in 2008 and 2009, while the value rebounded sharply in 2008, due to a large increase in the wholesale price, but then declined steeply in 2009.

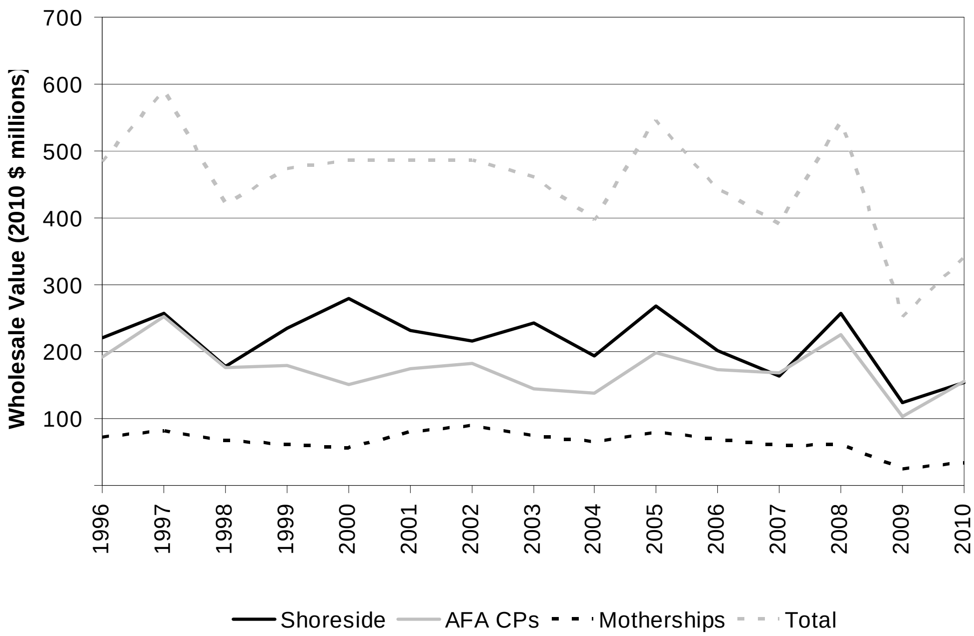
Alaska pollock surimi wholesale prices were relatively high in the late 1990s, declined in 2000, remained relatively stable through 2007, spiked dramatically upward in 2008, before declining again in 2009. Reductions in the BSAI pollock TAC are likely the most important factor in both the decline of surimi production after 2005 and the high prices in the late 1990s and in 2008. Industry representatives note that fluctuations in wholesale prices may also be influenced by changes in the grade of surimi being produced as well as differences in the prices by grade. Data indicating the grades of pollock surimi produced are not generally available. Industry representatives indicate that, overall, the pollock surimi produced in the

United States has shifted toward lower levels of quality (“recovery grades”), as a greater portion of surimi production utilizes flesh trimmed during the production of fillets.



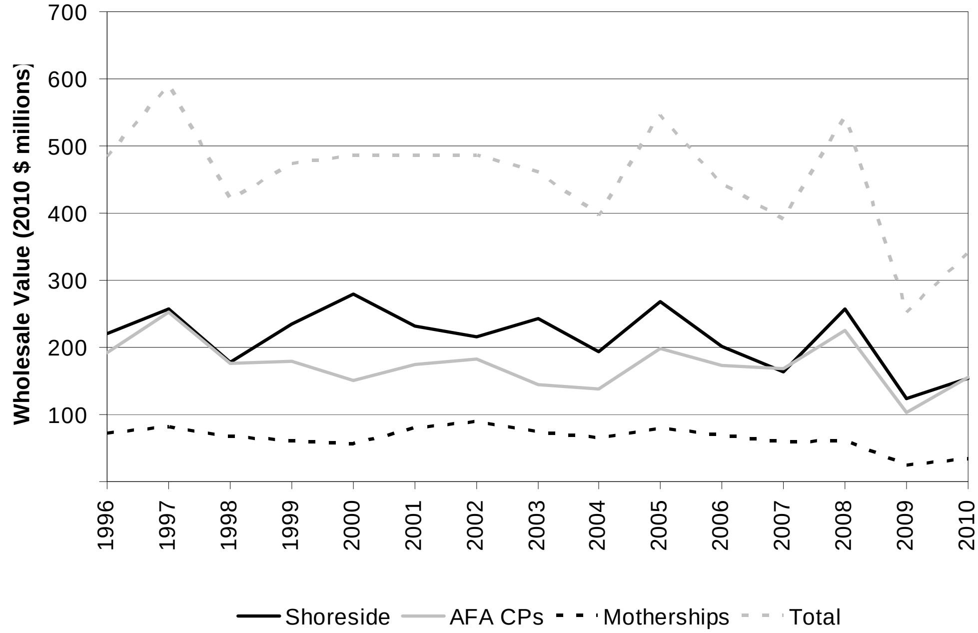
Note: Reported surimi production and value do not specify the grade of products.
Source: NMFS Weekly Product Reports and ADF&G Commercial Operator Annual Reports 1996-2010.

Figure 2-7 Alaska production of pollock surimi by sector, 1996-2010



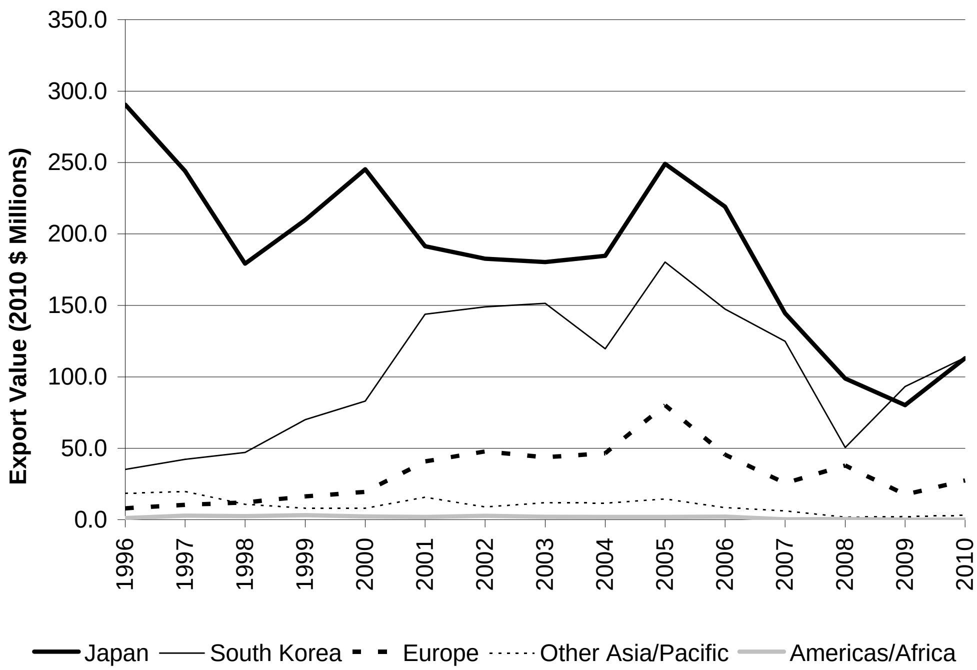
Note: Reported surimi production and value do not specify the grade of products.
Source: NMFS Weekly Product Reports and ADF&G Commercial Operator Annual Reports 1996-2010.

Figure 2-8 Wholesale value of Alaska production of pollock surimi by sector, 1996-2010



Note: Reported surimi production and value do not specify the grade of products and therefore the recent price declines shown here may be a reflection of higher volumes of lower grade surimi. Also note that AFA-eligible catcher/processors and motherships are treated as a single sector for the purpose of price calculations.
Source: NMFS Weekly Product Reports and ADF&G Commercial Operator Annual Reports 1996-2010.

Figure 2-9 Wholesale prices for Alaska production of pollock surimi by sector, 1996-2010

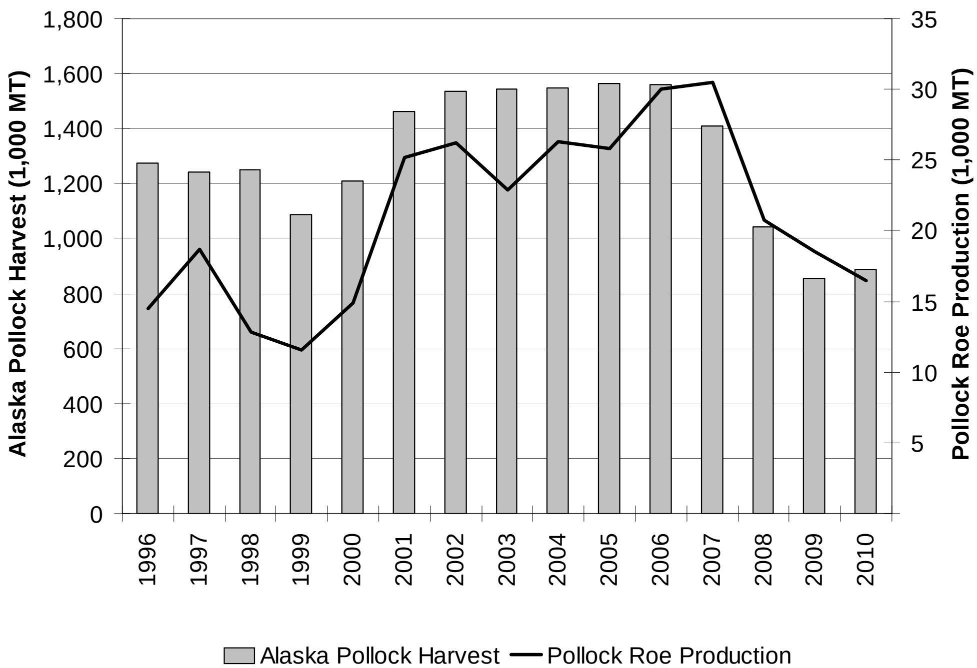


Note: Data include all exports of Alaska pollock from the U.S. Customs Pacific District.
Source: U.S. Census Bureau Foreign Trade Data available at www.st.nmfs.gov/st1/trade/.

Figure 2-10 U.S. exports of Alaska pollock surimi to leading importing countries, 1996–2010

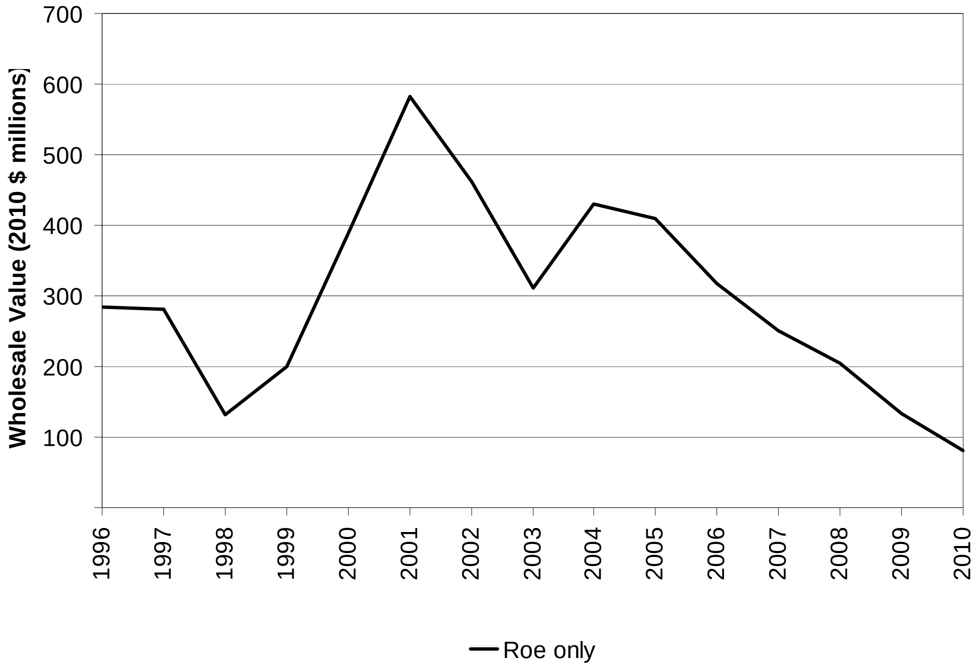
Roe Production

Roe is extracted from the fish after heading, separated from other viscera, and frozen. After being stripped of roe, the remaining fish can be further processed into surimi or fillets. Though it is one of the most important products of Alaska pollock, roe accounts for a small share of the total volume of pollock products. However, the high price of roe accounts for a large share of the total value, and for some producers their highest-margin business comes from pollock roe. U.S. pollock roe production has been significantly higher since 2001 as a result of increased harvests and roe yields following the implementation of the AFA. The value of this increased production, however, has been offset by a decline in Russian harvests of pollock and a subsequent reduction in Japanese imports of pollock roe. Figure 2-11 and Figure 2-12 exhibit the harvests, primary production, and wholesale value of roe from Alaska-caught pollock.



Source: NMFS Blend, Catch-Accounting System, and Weekly Production Reports 1996-2010.

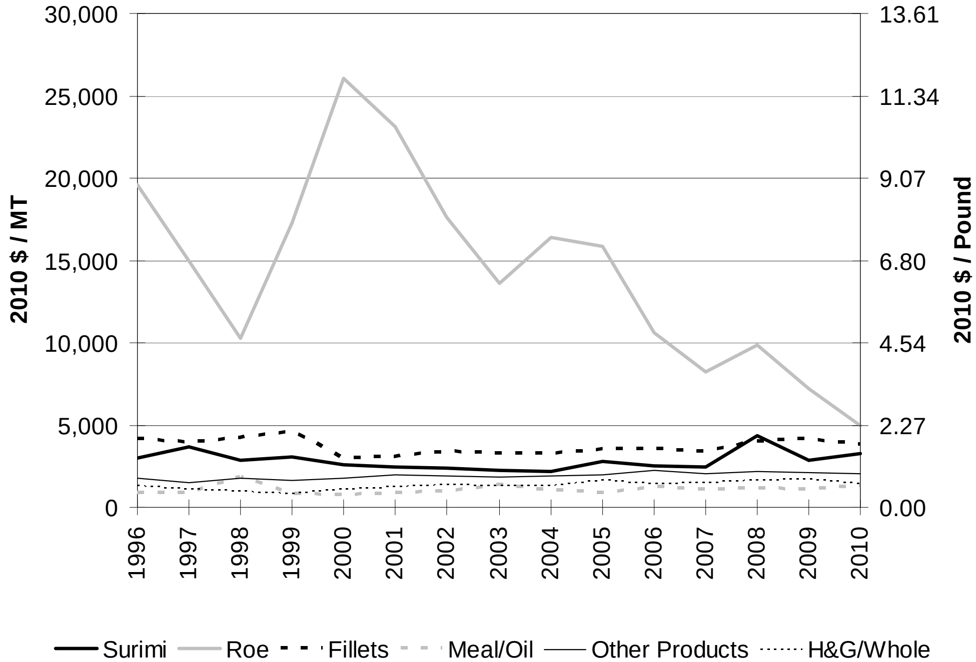
Figure 2-11 Alaska pollock harvests and production of pollock roe, 1996–2010



Note: Reported roe production and value do not specify the grade of products.
Source: NMFS Weekly Product Reports and ADF&G Commercial Operator Annual Reports 1996-2010.

Figure 2-12 Wholesale value of Alaska production of pollock roe, 1996–2010

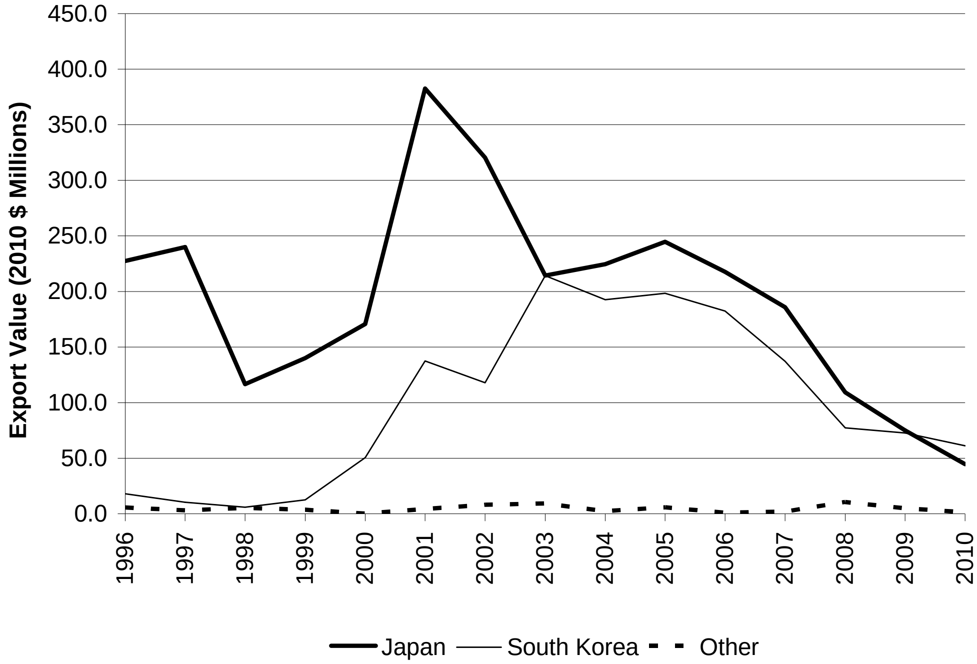
Almost all U.S. pollock roe production is exported, the primary buyers being Japan and South Korea. It is possible that a substantial amount of the pollock roe exported to Korea is subsequently re-exported from Korea to Japan.



Note: Reported roe production and value do not specify the grade of products.
Source: NMFS Weekly Product Reports and ADF&G Commercial Operator Annual Reports 1996-2010.

Figure 2-13 Wholesale prices for Alaska production of pollock roe by sector, 1996-2010

Catcher processors are more likely to produce higher quality roe because they process the fish within hours of harvest, rather than within days as is typical for fish delivered to shoreside processors. U.S. pollock roe commands premium prices in Japan because of its consistent quality, and the volume of U.S. exports to Japan is expected to remain high. As noted above, the decline in Russian production of Alaska pollock has reduced competition for U.S. roe producers and helped strengthen the markets. The factors that may affect the roe industry in the future are difficult to predict. Certainly, any change in the tastes and demands of Asian consumers or in Russian production will have an effect on the U.S. pollock, especially the roe industry. So, too may the relative value of the U.S. dollar, as compared to other currencies.



Note: Data include all exports of Alaska pollock from the U.S. Customs Pacific District.
Source: U.S. Census Bureau Foreign Trade Data available at www.st.nmfs.gov/st1/trade/.

Figure 2-14 U.S. exports of Alaska pollock roe to leading importing countries, 1996–2010

2.3 Voluntary Rolling Hotspot System

Amendment 84 to the BSAI FMP provides for the pollock cooperatives to enter into voluntary, 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 Voluntary Rolly Hotspot System (VRHS).

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.

A formal evaluation of the VRHS system appears in the accompanying EA. The summary of that evaluation is reproduced here.

2.3.1 Summary of Findings on Status Quo Chum PSC-reduction measures

Collectively, the Chinook and non-Chinook salmon PSC measures implemented through the VRHS system and Amendment 91 arguably represent the most extensive PSC reduction efforts that have ever been undertaken. Given the importance of the VRHS in the status quo as well as a component of the action alternatives, an extensive analysis of the efficacy of this system has been developed and is presented in Chapter 5 section 3 of the accompanying EA. What is presented here is a synopsis of the findings of that analysis.

Key findings of this analysis include:

- From 2003-2010, comparing chum PSC rates in the 1-3 days following RHS closures are approximately 8 percent lower
- Annual average chum PSC in the 5-days before closures were imposed from 2003-2010 ranged from 11-33 percent for CVs and from 2-30 percent for other sectors, with the majority of years being in the upper end of this range. The average percentage of pollock range from 7-21 percent for CVs and was less than 5 percent for other sectors.
- Evaluating the 1993-2000, an RHS-like system would likely have reduced chum PSC by 9-22 percent on average with about 4-10 percent of pollock fishing have been relocated to other areas.
- The pre-RHS analysis suggest that often ‘what’s good for chum is good for Chinook’ with the range of Chinook savings as 6-14 percent per year.

- Based on 1993-2000 data, large closures reduce salmon PSC more but at the cost of moving additional pollock. Also, closures based on the most recent information possible leads to larger average reductions and relatively small base rates appear on average to be more 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 provides 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. 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.
- 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 trigger this area could be actually increase chum PSC.
- In 2011, chum RHS closures were in place throughout the B season, whereas in previous years Chinook closures were explicitly given regulatory priority.

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.
- The system can adapt with new information. 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."
- Through regular reporting to the Council and independent audits of potential violations, there is transparency in whether vessels adhere to closures. The number of violations of the closures has been very limited and seemingly generally due to honest mistakes by vessel operators.

The Council's June 2010 motion requested an analysis of potential means to modify the chum rolling hotspot system. Options for adjusting the system include:

- Modifications of the RHS program to the vessel-level would follow the current shoreside and catcher-processor Chinook RHS programs. An individual-level system would increase the likelihood that vessels face consequences for high PSC. Because there may also be some advantages to having cooperative-level incentives, a RHS system could also include *both* individual and cooperative-level incentives.
- Sea State strives to have recent information available for deciding which areas to close. There is no easy technical fix to reduce the utilization of information. Shortening the approximately 24-hour delay between when closures are announced and implemented would improve the quality of data and could provide some additional incentive to avoid high-PSC areas immediately before closures are implemented. However, this would occur at additional cost to the fleet and historical simulation results suggest that the reduction in PSC would be relatively small.
- The RHS could be adjusted to focus on benefits to Western Alaska stocks by being more active early in the B season. However, if extremely large closures are imposed in this period so that fishing is slowed down significantly, it could have the unintended consequence of pushing a larger amount of fishing effort into October, when Chinook PSC is usually highest.
- Historical simulation results indicate that larger closures are likely to further reduce PSC, but at a decreasing rate as they get larger. Larger areas at high-PSC periods would allow more high-PSC areas to be closed.
- When PSC rates change quickly, the current 3-week moving basis for determining the base rate means that all cooperatives or few cooperatives are subject to closures. The base rate could be based on the most recent behavior to ensure that vessels or cooperatives with relatively high PSC rates in the most recent period would be subject to closures.
- Modifying the incentives associated with the tier system has the potential to significantly strengthen the effectiveness of the RHS system. Larger and longer closures or any other reward and penalty could be incorporated into the tier system. If a more stringent chum RHS is developed, vessels could be made exempt from some of the closures if they have relatively low *Chinook* PSC, further increasing the incentive to avoid Chinook PSC as well.

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. The program has continued to evolve and learn from new challenges.

2.4 Donation of Bycaught Salmon: Prohibited Species Donation Program[4]

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

[4] 2011 donation reports are not yet available.

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 2001, 52,262 pounds were distributed (SeaShare, personal communication 2011).[5]

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.

[5] Jim Harmon, Program Manager for SeaShare. Personal communication, April 19, 2011.

Table 2-3 Net weight of steaked and finished PSD salmon received by SeaShare, 1996-2010

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	

*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.

2.5 The Community Development Quota (CDQ) Program[6]

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 1). 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.

[6] 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	Percent of population in CDQ group(s) of this Region
Norton Sound (Nome census area, exclude Shishmaref)	Norton Sound Economic Development Corporation (NSEDC)	15	8,488	98
Yukon River and delta (Wade Hampton and Yukon-Koyukuk census, minus Takotna, McGrath, and Nikolai)	Yukon Delta Fisheries Development Association (YDFDA)	6	3,123	23
Kuskokwim River and delta (Bethel census area plus Takotna, McGrath, and Nikolai)	Coastal Villages Region Fund (CVRF)	20	7,855	47
Community of Saint Paul Island	Central Bering Sea Fishermen’s Association (CBSFA)	1	532	100
Aleutians East and, Aleutians West Boroughs	Aleutian-Pribilof I. Community Development Association (APICDA)	6	1,143	14
Bristol Bay, Lake and Peninsula, and Dillingham Boroughs	Bristol Bay Economic Development Corporation (BBEDC)	17	5,932	74

2.5.1.1 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.

2.5.1.2 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. 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. Pollock royalties have historically represented about 80 percent of the total annual royalties from the CDQ allocations in 2005, and the value reached nearly $49 million.

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*

*Calculated or estimated values due to incomplete data.

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. Therefore, specific information about total annual royalties by species for each CDQ groups has not been publically available. 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. A summary of the available royalty information, by species or royalty type, is presented in Table 3.

Although NMFS records the weight of pollock harvested by sector annually, insufficient royalty data are publicly available to estimate pollock royalties for 2006. The 2006, 2007 and 2008 estimates are based on the average of three of the six CDQ groups representing 60 percent of the CDQ pollock allocation: APICDA, CVRF, and NSEDC. For 2007 and 2008, the total value of pollock royalties was calculated from the total royalty statistics provided in the annual Western Alaska Community Development Association (WACDA) reports: in 2007, approximately 41 percent of total revenue ($170 million); and in 2008, approximately 35 percent of total revenue ($190 million). The average percent royalty was applied to the total royalties to estimate the total value of pollock royalties for the CDQ sector annually.

Table 2-6 Approximate percentage of CDQ royalty income by CDQ group and allocation type from 2005 through 2008

2008

CDQ group	(%) Pollock	(%) Crab	(%) Cod	(%) Sablefish	(%) Flatfish	(%) Other (including groundfish and market fees)
APICDA	45	13	12	<1	3	27
BBEDC	N/A	N/A	N/A	N/A	N/A	N/A
CBSFA	N/A	N/A	N/A	N/A	N/A	N/A
CVRF	60	33	5	N/A	N/A	2
NSEDC	65	20	11	1	2	1
YDFDA	N/A	N/A	N/A	N/A	N/A	N/A

2007

CDQ group	(%) Pollock	(%) Crab	(%) Cod	(%) Sablefish	(%) Flatfish	(%) Other (including groundfish and market fees)
APICDA	60	11	11	1	2	15
BBEDC	N/A	N/A	N/A	N/A	N/A	N/A
CBSFA	N/A	N/A	N/A	N/A	N/A	N/A
CVRF	81	12	4	N/A	N/A	3
NSEDC	75	14	7	N/A	N/A	2
YDFDA	N/A	N/A	N/A	N/A	N/A	N/A

2006

CDQ group	(%) Pollock	(%) Crab	(%) Cod	(%) Sablefish	(%) Flatfish	(%) Other (including groundfish and market fees)
APICDA	69	8	10	<1	2	11
BBEDC	N/A	N/A	N/A	N/A	N/A	N/A
CBSFA	N/A	N/A	N/A	N/A	N/A	N/A
CVRF	86	7	4	N/A	N/A	3
NSEDC	81	9	7	N/A	N/A	3
YDFDA	N/A	N/A	N/A	N/A	N/A	N/A

2005

CDQ group	**(%) Pollock**	**(%) Crab**	**(%) Cod**	**(%) Sablefish**	**(%) Flatfish**	**(%) Other (including groundfish and market fees)**
APICDA	76	12	8	1	1	2
BBEDC	82	7	7	<1	N/A	4
CBSFA	66	24	8	N/A	N/A	2
CVRF	85	8	5	<1	N/A	2
NSEDC	84	8	6	<1	<1	2
YDFDA	74	12	9	N/A	N/A	6

2.5.1.3 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 vessel. 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 59 to 65 percent of revenue annually. In 2008, the six CDQ groups had total revenues of approximately $190 million, of which approximately 65 percent, or $123 million, were derived from revenue sources other than royalties (WACDA 2008).

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 2008, the six CDQ groups held approximately $559 million in assets and they invested more than $180 million in fisheries and fishery related projects, primarily in the BSAI (WACDA 2008).

2.5.1.4 Vessel Ownership[7]

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 (see Table 2-7).

[7] There have been substantial changes in vessel owenership recently. Thus, this list will be revised prior to releasing the draft RIR for public review.

Table 2-7 CDQ group direct investments in fisheries

CDQ group	Company	Percent owned by CDQ	Target species	CDQ vessels (wholly owned or partially owned)
Norton Sound Economic Development Corporation (NSEDC)	Glacier Fish Company	38	BS pollock and cod	Northern Glacier 201' trawl C/P
				Pacific Glacier 276' FT
				Glacier Bay 154' C/P
				Norton Sound 136' C/P
			BS pollock	Alaska Ocean 376' C/P
	Siu Alaska Corporation	100	crab	Pacific Star 180' CV
			crab	Aleutian No. 1 105.3' CV
Yukon Delta Fisheries Development Association (YDFDA)	Alakanuk Beauty, LLP	75	BS pollock	American Beauty 123' CV and CDQ pollock quota for Golden Alaska
	Emmonak Leader, LLP	75	BS pollock	Ocean Leader 120' CV and CDQ pollock quota for Golden Alaska
	Golden Alaska, LLC	30.3	BS pollock	Golden Alaska 305' M/V
	Akukurak Fisheries, LLC	85%	Crab, cod, sablefish	Courageous 180’ C/P
	Kiska Sea Northern, LLC	45%	Crab	Kiska Sea 125’ F/V
	Romanzof Fisheries	41%	Crab, cod, sablefish	Baranof 182’ C/P
Coastal Villages Region Fund (CVRF)	Coastal Villages Seafoods	100	cod	Deep Pacific 125' FL
				Lilli Ann 141' FL
				North Cape 125' FL
			BS pollock and yellowfin sole	Northern Hawk 341' C/P
			crab	Wassilie B 107’ C/P.
	Sea Boats	100	crab	Arctic Sea 135' CV
				Bering Sea 110' CV
				North Sea 126' CV
	Silver Spray Seafoods	50	crab	Silver Spray 116' CV
	Iquique	3.64	other groundfish	Arica 186' C/P
				Cape Horn 158' C/P
				Rebecca Irene 140' C/P
				Unimak 185' C/P
Central Bering Sea Fishermen’s Association (CBSFA)	American Seafoods	8.91	BS pollock and cod	CBSFA has ownership interests in some portion of AFA C/Ps
	Multi-species Development Holdings, LLC (100% owned by CBSFA)	75	BS pollock, crab, cod	Starlite 123' CV
		30	BS pollock, crab, cod	Fierce Allegiance 166' CV
		30	crab	Early Dawn 108' CV
		75	crab, pollock, cod	Starward 123' CV
Aleutian-Pribilof I. Community Development Association (APICDA)	F/V Golden Dawn	25	BS pollock	Golden Dawn 148' CV
	F/V Barbara J.	50	crab and cod	Barbra J. 110' CV
	Prowler Group	20	cod and sablefish	Prowler 124' FL
				Bering Prowler 124' FL
				Ocean Prowler 155' (FL) C/P
	F/V Farwest Leader	50	crab and cod	Farwest Leader 110' CV
	Reagan	50	cod, sablefish, halibut	Reagan 58' FL
	Starbound	20	BS pollock	Starbound 240' CP
Bristol Bay Economic Development Corporation (BBEDC)	Defender Fisheries	49	BS pollock	Defender 200' CV
	Doña Martita Investment	50	BS pollock	Doña Martita 165' CV
	Arctic Fjord, Inc.	30	BS pollock	Arctic Fjord 275' C/P
	Neahkahnie	30	BS pollock	Neahkahnie 110' CV
	No partners listed	50	BS pollock	Morning Star 148' CV
				Morning Star 57'CV
				Arctic Wind 157' CV

These data originated in publicly available annual reports and personal communications with several officers of various CDQ groups.

2.5.1.5 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 2008, the economic activity generated by the CDQ Program contributed over $1.5 million in state and regional taxes and fees in addition to the aggregated community capital investments of $17.6 million (WACDA 2008).

2.5.1.6 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 2008, the CDQ administrative panel estimated that CDQ groups invested $1.7 million to create 700 scholarships, in addition to an estimated $800,000 to provide 500 training opportunities (WACDA 2008).

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

3.1 Management of chum salmon fishing

The State of Alaska manages subsistence, sport/recreational (used interchangeably), commercial, and personal use harvest on lands and waters throughout Alaska. The Alaska Department of Fish and Game (ADF&G) is responsible for managing subsistence, commercial, sport, and personal use salmon fisheries. The first priority for management 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.

3.1.1 State subsistence management

ADF&G, under the direction of the Alaska BOF, manages subsistence, personal use, and commercial chum salmon harvests in waters within the State of Alaska out to the three mile limit. The State has 82 local fish and game advisory committees that review, make recommendations, submit proposals, and testify to the Alaska BOF concerning subsistence and other uses in their areas.

The state defines subsistence uses of wild resources as noncommercial, customary, and traditional uses for a variety of purposes. These include:

> Direct personal or family consumption as food, shelter, fuel, clothing, tools, or transportation, for the making and selling of handicraft articles out of nonedible byproducts of fish and wildlife resources taken for personal or family consumption, and for the customary trade, barter, or sharing for personal or family consumption (AS 16.05.940[33]).

Under Alaska's subsistence statute, the BOF must identify fish stocks that support subsistence fisheries and, if there is a harvestable surplus of these stocks, determine the amount of the harvestable surplus that is reasonably necessary for subsistence uses, and adopt regulations that provide reasonable opportunities for these subsistence uses to take place. The Alaska BOF is required by the state subsistence statute to provide reasonable opportunities for subsistence uses; "reasonable opportunity" is defined in statute to mean an opportunity that allows a subsistence user to participate in a subsistence fishery that provides a normally diligent participant with a reasonable expectation of success of taking of fish (AS 16.05.258(f)). The BOF evaluates whether reasonable opportunities are provided by existing or proposed regulations by reviewing harvest estimates relative to the "amount reasonably necessary for subsistence use" (ANS) findings as well as subsistence fishing schedules, gear restrictions, and other management actions. Whenever it is necessary to restrict harvest, subsistence fisheries have a preference over other uses of the stock (AS 16.05.258). ADF&G, Division of Commercial Fisheries, manages subsistence fisheries in the area of potential effect. Subsistence and other uses may be restricted or closed to provide for sustainability based upon relevant adopted fishery management plans.

Alaska subsistence fishery regulations do not, in general, permit the sale of resources taken in a subsistence fishery. State law recognizes 'customary trade' as a legal subsistence use. Alaska statute defines customary trade as "…the limited noncommercial exchange, for minimal amounts of cash, as restricted by the appropriate board, of fish or game resources…" (AS 15.05.940(8)). This is applicable in certain regions of Alaska, including the customary trade in finfish (including salmon) within the Norton Sound-Port Clarence Area (5 AAC 01.188). Presently, the BOF has not received regulatory change proposals to allow customary trade in salmon resources under state subsistence regulations in other areas under consideration in this document.

ADF&G, Division of Commercial Fisheries, prepares annual fishery management reports (FMRs) for most fishery management areas in the state (Figure 3-1). Although FMRs focus primarily on commercial fisheries, most also routinely summarize basic data for programs that collect harvest information for subsistence fisheries. Detailed annual reports about subsistence fisheries harvest assessment programs are prepared for the Norton Sound/Kotzebue, Yukon River, and Kuskokwim areas; however, it is important to recognize the limitations associated with the effort to present a comprehensive annual report on Alaska's subsistence fisheries. Because of such limitations, harvest data may be a conservative estimate of the number of salmon being taken for subsistence uses in Alaska. These limitations include:

- Annual harvest assessment programs do not take place for all subsistence fisheries although programs are in place for most salmon fisheries such as the Yukon and Kuskokwim river drainages through post-season household surveys and for Bristol Bay Area through subsistence salmon permits. There is no longer an annual subsistence harvest monitoring program for the Kotzebue Fisheries Management Area. Similarly, since 2004 annual harvest monitoring in the Norton Sound-Port Clarence Area has been limited to post-season household surveys in Shaktoolik and Unalakleet and through catch and gear information obtained from subsistence fishing permits in other parts of Norton Sound-Port Clarence Area.
- Annual subsistence harvest data are largely dominated by fish harvested under efficient gear types authorized by regulation, which, especially for salmon, generally means fish taken with gillnets, beach seines, or fish wheels. However, in portions of the Kotzebue Fisheries Management Area (5 AAC 01.120(b) &(f)), Norton Sound-Port Clarence Area (5 AAC 01.170(b) & (h)), and Yukon-Northern Area (5 AAC 01.220(a) & (k)), as well as the entire Kuskokwim Fisheries Management Area (5 AAC 01.270(a)), hook and line attached to a rod or pole (i.e. rod and reel) are recognized as legal subsistence gear under state subsistence fishing regulations. In these areas, significant numbers of households take salmon for subsistence uses with rod and reel or retain salmon from commercial harvests for home use. Where the BOF has recognized rod and reel gear as legal subsistence gear, annual harvest assessment programs or subsistence fishing permits also document salmon harvested with rod and reel. Federal subsistence management represents different subsistence gear regulations in some cases. For example, in Kotzebue Sound federally qualified users are authorized under federal subsistence regulations to harvest salmon by gillnet, beach seine, or rod and reel, but these harvests are not documented through either a state or federal harvest monitoring program and the numbers of salmon (largely chum salmon) harvested by gillnet or beach seine compared to rod and reel is unknown.
- Annual harvest assessment programs are generally limited to post-season household surveys in communities located within the fisheries management area or through subsistence permits such that harvests by other Alaskans in the Kotzebue Area, Kuskokwim river drainage or areas where permits are not required along the Yukon River drainage, for example, are not reflected in the annual harvest assessment programs.
- Between management areas, and sometimes between districts within management areas, there is inconsistency in how subsistence harvest data are collected, analyzed, and reported.
- In some areas there are no routine mechanisms for evaluating the quality of subsistence harvest data. For example, in some areas it is not known if all subsistence fishermen are obtaining permits and providing accurate harvest reports. This can result in an underestimation of harvests.

- There are few programs for contextualizing annual subsistence harvest data so as to interpret changes in harvests. However, in some cases, FMRs do contain discussions of data limitations and harvest trends.

For more information on state management of salmon subsistence fisheries, refer to the ADF&G website at http:///www.adfg.alaska.gov/index.cfm?adfg=fishingSubsistence.main and the Alaska Subsistence Salmon Fisheries 2008 Annual Report (Fall et al. 2011).

3.1.2 State commercial salmon fishery management

Commercial fishing is defined by the State of Alaska as the taking of fish with the intent of disposing of them for profit, or by sale, barter, trade, or in commercial channels (AS 16.05.940 (5)). Commercial fisheries in Alaska fall under a mix of state and federal management jurisdictions. In general, the state has management authority for all salmon, herring, and shellfish fisheries, and for groundfish fisheries within three nautical miles of shore. Under the Magnuson-Stevens Act, the federal government has management authority for the majority of groundfish fisheries three to two hundred nautical miles offshore.

The state manages a large number of commercial salmon fisheries in waters from Southeast Alaska to the Bering Strait. Management of the commercial salmon fisheries is the responsibility of the ADF&G Division of Commercial Fisheries, under the direction of the BOF. The fisheries are managed under a limited entry system; participants need to hold a limited entry permit for a fishery in order to fish and the number of permits for each fishery is limited. The state originally issued permits to persons with histories of participation in the various salmon fisheries. Permits can be bought and sold; thus, new persons have entered into the commercial fishery since the original limitation program was implemented by buying permits on the open market.

Alaska's commercial salmon fisheries are administered through the use of management areas throughout the state. The value of the commercial salmon harvest varies with the size of the runs, market conditions, and with foreign currency exchange rates. Because of the magnitude of commercial fisheries for salmon, state biologists collect extensive information and statistics to support management decisions. For information on commercial regulations refer to:
www.adfg.alaska.gov/index.cfm?adfg=CommercialByFisherySalmon.main.

3.1.3 State management of personal use and sport salmon fisheries

The State of Alaska defines personal use fishing as the taking, fishing for, or possession of finfish, shellfish, or other fishery resources, by Alaska residents for personal use and not for sale or barter, with gill or dip net, seine, fish wheel, longline, or other means defined by the BOF (AS 16.05.940(25)). Personal use fisheries are different from subsistence fisheries because they either do not meet the criteria established by the Joint Board of Fisheries and Game (Joint Board) for identifying customary and traditional fisheries (5 AAC 99.010) or because they occur within nonsubsistence areas.

The Joint Board is required to identify 'nonsubsistence areas', where 'dependence upon subsistence is not a principal characteristic of the economy, culture, and way of life of the area or community' (AS 16.05.258(c)). The BOF may not authorize subsistence fisheries in nonsubsistence areas. Personal use fisheries provide opportunities for harvesting fish with gear other than rod and reel in nonsubsistence areas. The Joint Board has identified Ketchikan, Juneau, Anchorage-Matsu-Kenai, Fairbanks, and Valdez as nonsubsistence areas (5 AAC 99.015). Persons may participate in personal use or recreational harvests for subsistence purposes within nonsubsistence use areas, but subsistence use does not have a preference in those areas.

Generally, fish may be taken for personal use purposes only under authority of a permit issued by ADF&G. Personal use fishing is primarily managed by ADF&G, Division of Sport Fish, but some regional or area fisheries for various species of fish are managed by the Division of Commercial Fisheries. For more information on state management of personal use fisheries, refer to the ADF&G website: http:///www.adfg.alaska.gov/index.cfm?adfg=fishingPersonalUse.main.

The ADF&G Division of Sport Fish also manages the state's recreational fisheries. Alaska statute defines sport fishing as the taking of or attempting to take for personal use, and not for sale or barter, any fresh water, marine, or anadromous fish by hook and line held in the hand, or by hook and line with the line attached to a pole or rod which is held in the hand or closely attended, or by other means defined by the BOF (AS 16.05.940(30)). By law, the division's mission is to protect and improve the state's recreational fisheries resources. For more information on state management of recreational fisheries, refer to the ADF&G website: http:///www.adfg.alaska.gov/index.cfm?adfg=fishingSport.main.

Per Alaska statute (5 AAC 75.075(c)), the ADF&G, Division of Sport Fish is also responsible for overseeing the annual licensing of sport fish businesses and guides. A 'sport fishing guide' means a person who is licensed to provide sport fishing guide services to persons who are engaged in sport fishing (AS 16.40.299). 'Sport fishing guide services' means assistance, for compensation or with the intent to receive compensation, to a sport fisherman to take or to attempt to take fish by accompanying or physically directing the sport fisherman in sport fishing activities during any part of a sport fishing trip. Salmon is one of the primary species targeted in the states' recreational fisheries. For further information, refer to the ADF&G website: http:///www.adfg.alaska.gov/index.cfm?adfg=prolicenses.sportfishguides. This site contains information important to the State of Alaska, Department of Fish and Game requirements for sport fish charter businesses, sport fish guides, and saltwater charter vessels.

3.1.4 Federal subsistence management

The Alaska National Interest Lands Conservation Act (ANILCA), passed by Congress in 1980, mandates that rural residents of Alaska be given a priority opportunity for customary and traditional subsistence use, among consumptive uses of fish and wildlife, on federal lands (16 U.S.C. 3114). In 1986, Alaska amended its subsistence law mandating a rural subsistence priority to bring it into compliance with ANILCA. However, in 1989, in the *McDowell* decision, the Alaska Supreme Court ruled that the priority in the state's subsistence law could not be exclusively based on location of residence under provisions of the Alaska Constitution. Other federal court cases regarding the state's administration of Title VIII of ANILCA ruled that the state would not be given deference in interpreting federal statute. Proposed amendments to ANILCA and the constitution were not adopted to rectify these conflicts, so the Secretaries of Interior and Agriculture implemented a duplicate regulatory program to assure the rural subsistence priority is applied under ANILCA on federal lands. As a result, beginning in 1990, the state and federal governments both provide subsistence uses on federal public lands and waters in Alaska, which is about 230 million acres or 60% of the land within the state. In 1992, the secretaries of the Interior and Agriculture established the Federal Subsistence Board (FSB) and ten Regional Advisory Councils (RACs) to administer the responsibility. The FSB's composition includes a chair appointed by the Secretary of the Interior with concurrence of the Secretary of Agriculture; the Alaska Regional Director, U.S. Fish and Wildlife Service; the Alaska Regional Director, National Park Service; the Alaska State Director, Bureau of Land Management; the Alaska Regional Director, Bureau of Indian Affairs; and the Alaska Regional Forester, USDA Forest Service. See the figure below for the subsistence fisheries areas in Alaska.

Through the FSB, these agencies participate in development of regulations which establish the program structure, determine which Alaska residents are eligible to take specific species for subsistence uses, and establish seasons, harvest limits, and methods and means for subsistence take of species in specific federal areas. The RACs provide recommendations and information to the FSB; review proposed regulations, policies, and management plans; and provide a public forum for subsistence issues. Each RAC consists of residents representing subsistence, sport, and commercial fishing and hunting interests.

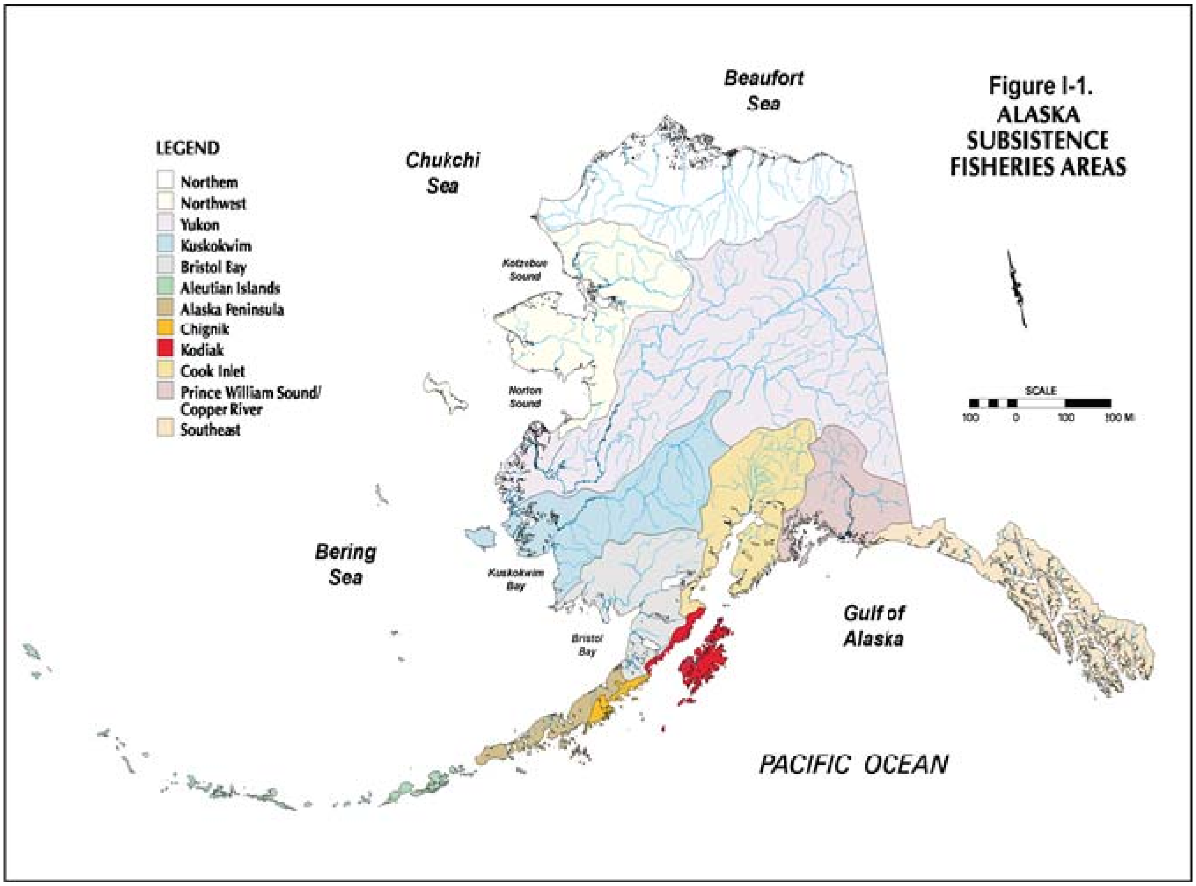


Figure 3-1 Alaska Subsistence Fisheries Areas

While ANILCA creates a priority for subsistence uses over the taking of fish and wildlife for other purposes on public lands, it also imposes obligations on federal agencies with respect to decisions affecting the use of public lands, including a requirement that they analyze the effects of those decisions on subsistence uses and needs (16 U.S.C. 3120).

ANILCA defines "public lands" as lands situated "in Alaska" which, after December 2, 1980, are federal lands, except those lands selected by or granted to the State of Alaska, lands selected by an Alaska Native Corporation under the Alaska Native Claims Settlement Act (ANCSA), and lands referred to in section 19(b) of ANCSA (16 U.S.C. 3102(3)). The U.S. Supreme Court has ruled that ANILCA's use of "in Alaska" refers to the boundaries of the State of Alaska and concluded that ANILCA does not apply to the outer continental shelf (OCS) region (*Amoco Prod. Co. v. Village of Gambell*, 480 U.S. 531, 546-47 (1987)). The area for chum salmon PSC management is in the Bering Sea EEZ, which is in the OCS region.

Although ANILCA does not directly apply to the OCS region, NMFS aims to protect such uses pursuant to other laws, such as NEPA and the Magnuson-Stevens Act. The RIR evaluates the consequences of the proposed actions on subsistence uses. One of the reasons NMFS and the Council have proposed implementing salmon PSC reduction measures in the federal groundfish fisheries is to protect the interests of salmon subsistence users.

3.2 Importance of subsistence harvests

ADF&G, Division of Subsistence, estimates that approximately 43.7 million pounds of wild foods are harvested annually by residents of rural Alaska, representing on average 375 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). For example, Wolfe (2000) 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 and 1990s, ADF&G found that on average, fish (mostly salmon) represent 60% of the total subsistence harvests by rural residents, followed by land mammals (20%), marine mammals (14%), birds, shellfish, and plants (each 2%).

Annual per capita subsistence harvest rates range from 516 pounds of wild foods per person in Arctic communities to 613 pounds per person in rural Interior Alaska communities, to 664 pounds per person among Yukon-Kuskokwim Delta communities. Average per capita harvests in Bristol Bay/Aleutians area is estimated at 373 pounds per person (Wolfe 2000).

The BOF has made ANS findings for salmon throughout the areas under discussion here, which provides a perspective on the importance of salmon harvests to subsistence economies of rural Alaska given that these findings are based upon historical harvest patterns within each fisheries management area (Figure 3-1).

The number of summer chum salmon harvested for subsistence from the Yukon River has fallen below the lower limit of the ANS four times between the years 1998 and 2008. Similarly, fall chum salmon harvests have fallen below the lower limit of the ANS eight times between 1998 and 2008. Yukon River coho salmon harvests have fallen below the lower limit of the ANS five times between the years 1998 and 2008. Chinook salmon harvests from the Yukon River drainage have fallen below the lower limit of the ANS three times between the years 1998 and 2008 (refer to Section 3.3.4 for further discussion). 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 reduced the harvest success in order to achieve adequate escapements 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.

Table 3-1 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[8]	-	-	-	55,000-65,000[9]	-	157,000-172,171
Alaska Peninsula	1998	-	-	-	-	-	34,000-56,000

Generally, the rural population has increased in the fishery management areas discussed in this document. Table 3-2 shows the populations reported for four U.S. Census periods (1980 – 2010) for each of the management areas at issue. Overall, the 2010 population of these communities is about 41% higher than that reported in 1980. Note that the Yukon Area includes the city of Fairbanks, the second largest city in Alaska. The Fairbanks population equates to 36% to 40% of the total population of all of the communities combined in each census year reported. Excluding the city of Fairbanks does not change the overall population trend of a 41% increase since 1980.

The recorded populations increased in each fishery management area with each new census, with one exception; the population of the combined communities in the Bristol Bay area decreased by about 5% from 2000 to 2010. The rate of increase, however, has slowed, from a 28% increase from 1980 to 1990, to an 8% increase from 1990 to 2000, to a 2% increase from 2000 to 2010. Excluding the city of Fairbanks from the total lowers these percentages, but does not change the overall trend of a continued increase in population numbers, but a lower percentage increase with each new census.

[8] 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.

[9] 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)).

Table 3-2 Population trends by fishery management area, 1980 - 2010

ADF&G management area	POP. 2010	POP. 2000	POP. 1990	POP. 1980
Bristol Bay (24 communities)	6,918	7,328	6,388	4,969
Kuskokwim Area (38 communities)	17,457	16,554	14,259	11,350
Yukon Area[1] (42 communities)	43,527	42,709	41,950	32,532
Arctic Area (23 communities)	14,700	14,351	12,790	10,008
AK Peninsula Area (6 communities)	2,211	2,098	1,747	1,498
TOTAL	84,813	83,040	77,134	60,357
% pop. change between census years	2%	8%	28%	n/a

Source: State of Alaska, Community Information Summaries. Alaska Dept of Commerce, Community, and Economic Development, Division of Community & Regional Affairs. U.S. Census population data.
[1]The Yukon Area includes the city of Fairbanks, with populations of 31,535 (2010); 30,224 (2000); 30,843 (1990); and 22,645 (1980). The Fairbanks population equates to 36% - 40% of the total population of these communities in each census year reported. The percentage increase in population (between census years) in Fairbanks is greater than the other communities in aggregate, with the exception of the change between 1990 and 2000. Fairbanks' rate of increase in population was 36% between 1980 and 1990; -2% between 1990 and 2000; and 4% between 2000 and 2010. All other reported communities realized an increase in population of: 23% between 1980 and 1990; 14% between 1990 and 2000; and 1% between 2000 and 2010.

Note that different population trends occur within the communities of the regions reported. For example, the Yukon River drainage encompasses over 850,000 km^2 and includes dozens of tributaries and approximately 50 rural and urban communities scattered up and down the river (Loring and Gerlach, 2010). While the overall rural population has grown in the Yukon River drainage, downriver and upriver areas have displayed different population trends. Most recent growth has occurred in villages of the lower river (a five-fold increase from 1950 to 2008), while village populations of the middle and upper river have shown no growth after about 1980 (Wolfe, 2009). Refer to Section 3.3.4 for a map detailing the lower, middle, and upper sections of the Yukon River.

Despite the trend of decreasing harvests of salmon (other than Chinook) from the Yukon River drainage during the recent decade, ADF&G, Division of Subsistence, estimates for the time period 2000 - 2009 that 65% of the total subsistence harvests by rural Interior Alaska communities is of salmon, followed by 17% large land mammals, 12% other fish, 3% small land mammals, 2% birds and eggs, and 1% wild plants. During this same time period, ADF&G estimates that rural Interior Alaska communities harvested on average 623 usable pounds of wild foods per person annually, which is comparable to the estimate of 613 pounds per person derived from research conducted in the 1980s and 1990s (personal communication, Jim Fall, 2010).

In discussing the importance of subsistence salmon harvests to Alaska Native populations in rural communities, it is important to note that most of the existing research and literature on salmon subsistence use by Alaska Natives and communities is provided on a geographic basis, and different Alaska Native groups are prevalent in different regions. The sections below address subsistence uses of salmon by the affected regions and the Alaska Native groups that live in those areas. For example, information about subsistence uses in the Norton Sound area and the Arctic pertains to Inupiaq communities; information for the middle and upper Yukon pertains to Athabascan communities; and information for the Alaska Peninsula area pertains to Aleut communities (it is recognized that non-Alaska Native residents in these areas also participate in subsistence uses of salmon). The following information provides a general overview of the geographic scope and distribution of the Alaska Native groups that have established subsistence uses of salmon in the areas under discussion in the RIR. Further information can be found at: http://www.alaskanative.net/.

The Athabascan people traditionally live in Interior Alaska, an expansive geographic range that begins south of the Brooks Mountain Range and continues down to the Kenai Peninsula (Figure 3-2). Athabascans inhabit areas along five major river systems in this region: the Yukon, the Tanana, the Susitna, the Kuskokwim, and the Copper River drainages. There are eleven linguistic groups of Athabascans in Alaska.

Traditional Athabascans migrated seasonally, traveling in small groups to fish, hunt and trap. The Athabascans historically lived in small groups of 20 to 40 people that moved systematically through the resource territories. Annual summer fish camps for the entire family and winter villages served as base camps. In traditional and contemporary practices, Athabascans are taught respect for all living things. The most important part of Athabascan subsistence living is sharing. All hunters are part of a kin-based network in which they are expected to follow traditional customs for sharing in the community.

Figure 3-2 Traditional territory of the Athabascan people

The southwest Alaska Natives are named after the two main dialects of the Yup'ik language, known as Yup'ik and Cup'ik. Contemporary Yup’ik and Cup’ik people depend upon subsistence fishing, hunting and gathering for food.

Many of the villages within the area were ancient sites used as seasonal camps for subsistence resources. Historically, the Yup’ik and Cup’ik people were very mobile and organized their lives according to the animals and plants that they hunt and gather, often traveling with the migration of game, fish, and plants. The ancient settlements and seasonal camps contained small populations, with numerous settlements throughout the region consisting of extended families or small groups of families (Figure 3-3).

Figure 3-3 Traditional territory of the Yup'ik and Cup'ik people

The Inupiaq and the St. Lawrence Island Yupik people continue to operate as traditional hunting and gathering societies. They subsist on the land and sea of north and northwest Alaska (Figure 3-4). Their lives continue to revolve around the whale, walrus, seal, polar bear, caribou and fish. Traditional subsistence patterns depend upon the location and season of these resources:

- Whales and sea mammals are hunted in the coastal and island villages.
- Pink salmon and chum salmon, as well as cod, inconnu and whitefish are fished whenever ice is formed; herring, crab, and halibut were also caught.
- Birds and eggs form a continuous and important part of the diet.

Figure 3-4 Traditional territory of the Inupiaq and St. Lawrence Island Yupik people

The Unangax and Alutiiq (Sugpiaq) peoples are from south and southwest Alaska, obtaining most of their food and livelihood from the sea. Historically, villages were located at the mouths of streams to take advantage of fresh water and abundant salmon runs; this practice continues today. Besides nets, traps and weirs for fishing, people traditionally used wooden hooks and kelp or sinew lines. Today, salmon, halibut, octopus, shellfish, seal, sea lion, caribou (on the Alaska Peninsula), and deer remain important components of the Unangax and Alutiiq (Sugpiaq) subsistence diet.

Figure 3-5 Traditional territory of the Unangax and Alutiiq (Sugpiaq) people

3.2.1 Cultural context

Approximately 20 percent of Alaska's population, about 125,000 people, lives in rural areas. These people live in about 225 communities, most of which have fewer than 500 people and are not connected by road. About half of this rural population is made up of Alaska Native peoples (Caulfield, 2002).

For Alaska Natives and others throughout rural Alaska, harvesting and eating wild subsistence foods are essential to personal, social, and cultural identity. For purposes of this section, subsistence harvest by rural Alaskan communities is limited to the regions of western Alaska and includes: Norton Sound/Kotzebue (the Arctic Area); the Yukon River; the Kuskokwim Area; Bristol Bay; and the Alaska Peninsula (Figure 3-1). For example, rural economies of villages in the Yukon River drainage (as well as other regions in western Alaska) are characterized by a high production of wild foods for local use and low per capita monetary incomes. Salmon is a substantial part of the mix of wild foods that supports these communities. Specifically, in 2008, 40 villages of the Yukon River drainage depended upon annual harvests of salmon as dietary mainstays; this included 11,204 people, of which 89% were Alaska Native. Salmon harvests for subsistence use and commercial sale have been central to the economic and cultural well-being of this rural population (Wolfe, 2009).

Family Production and Fish Camps

Subsistence catches are directed primarily to meeting the food needs of local residents and sled dogs. Harvests tend to be self-limiting; families typically quit fishing when their family's food requirements or other social obligations are met. Unlike commercial fishing, subsistence fishing is primarily harvested for local use, including sharing. Because of this, subsistence catch levels have displayed considerably more stability over time unlike commercial participation and catches whose levels are determined more by run sizes, external markets, variable costs of operation, and income potential (Wolfe, 2009).

The production of salmon for subsistence uses typically occurs within family groups. Households commonly work together to catch and process salmon. These are most often households of children working with parents. Labor is typically unpaid for subsistence fishing; the finished product is divided and consumed among members of the participating family group. Family members from other communities sometimes visit during salmon fishing season, often to participate in fishing and processing and in bringing products back to their home communities (Wolfe, 2009; see also Ellanna and Sherrod 1984).

Some families use fish camps as bases for fishing and/or processing salmon. Fish camps are generally located near setnet sites, fish wheel sites, or drifting areas. Seasonal camps commonly have facilities such as cabins, wall tents, wood racks for drying fish, and smokehouses for curing salmon. In the past, fish camps commonly had yards for sled dogs, but these are found less often today (Wolfe, 2009).

In recent years fewer people have resided at fish camps along the Yukon River. More and more, people are living in their main community during the fishing season; however, fish camps still provide seasonal bases of operation for many people, though they may not reside or smoke fish there. Generally, fish camps have fallen into disuse with fewer sled dogs (discussed below), the loss of market for the commercial roe fishery, increased restrictions placed on subsistence fishing (discussed in Section 3.2.4), and the press of monetary employment during the summer (discussed in Section 3.2.3). Those who continue to use fish camps have done so for long tenures; aside from fishing, camps continue to be used because of the valued cultural activities attached to the camp (e.g., families enjoy camping and having the opportunity to share knowledge about living off the land) (Wolfe, 2009).

While consumption of traditional foods, including salmon, is typically widespread within rural communities, often there are certain particularly productive households in a community that procure far more foods than they themselves can consume. These households typically make up about 30 percent of a community's households, and yet they commonly produce about 70 percent or more of the community's traditional foods (Wolfe, 1987). In this way, the harvest of traditional foods is extremely important to kinship and social organization; food is shared and divided as a way of life (Wolfe, 1987). Similarly, customary barter and trade is a way for families to distribute subsistence harvests to people outside their usual sharing networks, in return for goods, services, or, under specific circumstances, cash. Like sharing, customary barter and trade provides traditional foods to individuals and families who are unable to harvest. Many of the exchanged foods (i.e. dried whitefish) are not available in commercial harvests. As noted in Section 3.1.1, customary trade for cash is not expected to be conducted for profit, nor is it conducted in isolation from other subsistence activities (Moncrieff, 2007; see also e.g., Magdanz et al. 2007, and Krieg et al. 2007).

In a recent study of household patterns and trends in subsistence salmon harvests within 10 Norton Sound communities representing harvest data from 7,838 household surveys from 1994 - 2003, Magdanz et al. (2009:424) found a pattern similar to that described above where 21% of the households harvested 70% of the salmon by edible weight. During the study period, subsistence salmon harvests were estimated to have declined 5.8% annually. Most of the declines occurred during the first 5 years (1994 - 1998), when harvests trended lower by about 8% annually. During the latter years (1999 - 2003), harvests trended lower by about 1% annually across all communities. Household salmon harvests increased with the age of household heads, and households headed by couples reported higher average harvests than households headed by single persons, especially single men (Magdanz et al. 2009).

Dog Teams

Ethnographic and historic accounts from the 100-year period 1850 to 1950 show that dogs were traditionally used to support a variety of activities including trapping, exploration, commercial freighting, individual and family transportation, racing, and military application in interior Alaska. Throughout this period, fish, specifically dried salmon, was the standard diet for working dogs and became a commodity of trade and currency along the Yukon River and elsewhere. The first four decades of the 20th century encompasses the peak of the dog sled era in the Yukon River drainage. For individuals and families in rural Alaska, sled dogs were essential to the seasonal round of activities that provided food and cash income. Since the late 1960s, ADF&G has conducted annual post-season salmon harvest surveys in all Yukon River salmon fishing communities. These surveys provide estimates of the total number of dogs in each survey community (Andersen, 1992).

Since their introduction in the 1960s and 1970s, snowmachines have become a dominant mode of winter transportation for most rural Alaska residents, but have not eliminated the use of dog teams. For individuals with access to wage employment, the speed and convenience of a snowmachine allows them to work a wage-earning job and engage in more efficient hunting and fishing activities during time off in order to provide their families with preferred wild foods. While the use and popularity of snowmachines has grown since the 1970s, dog populations declined but did not disappear. Dog teams continue to be maintained in most Yukon River drainage communities today to support activities such as general transportation, trapping, wood hauling, and racing. During the mid to late 1970s, an era of renewed interest in dog mushing began, largely sparked by highly publicized events such as the Iditarod Trail Race (Andersen, 1992).

In 1991, there were 95 mushing[10] households in seven study communities along the Yukon River. In 2008, the number of mushing households dropped to 42, a decline of 56%. In 1991, the total number of sled dogs owned by the mushing households in the seven communities was estimated at 1,363 dogs. In 2008, the number of sled dogs owned by the mushing households was 671 dogs, a decline of 51% (Table 3-3) (Andersen and Scott, 2010). A complex set of economic and social changes in rural communities has eroded the ability and need of many rural dog mushers to maintain such a lifestyle; however, rural dog teams in 2008 remain highly reliant on locally caught fish, particularly chum salmon, for food.

The overall harvest of salmon in the Yukon River drainage that is fed to dogs is viewed as a subset of the drainage-wide subsistence harvest of salmon (non-Chinook). Strategies related to fishing for dog food, timing of fishing activities, gear used, preservation methods, and the fish species targeted, vary between mushers based largely on geographic location. From the lower to upper Yukon River drainage, there is variability in the fish species utilized for dog food. In the lower part of the drainage, non-salmon species (e.g., eels/Artic lampreys, blackfish, pike) are more commonly fed to dogs than salmon. Along the middle Yukon, summer chum salmon is the most commonly harvested species of fish for use as dog food. Along the upper Yukon and Tanana rivers, fall chum salmon and coho salmon were the most common fish species harvested for dogs (Andersen, 1992).

The number of fish needed to maintain a working dog for a year varies depending upon the size of the dog, the work the dog is doing, the outside temperature, the species and condition of the fish when it was harvested, and the way the fish was preserved. As a general rule, however, there are approximately 200 feeding days for which dog food must be preserved. This is generally defined at the seven month period between mid-October when all salmon fishing ceases and mid-May when fishing activities start again. Along the upper Yukon, mushers generally allow for ½ to ¾ of a dried chum salmon or coho salmon in order to feed each dog each day during the winter. This is equivalent to approximately 100 to 150 salmon per dog for the winter feeding period. Along the middle Yukon, the availability of commercially-caught salmon carcasses from a summer chum commercial roe fishery greatly influences the number of fish used to feed dogs because the dried salmon used to feed dogs are a product of the commercial fishery and not a subset of the subsistence fishery. Along the lower Yukon, salmon comprise only a small part of the fish used to feed dogs (Andersen, 1992).

Data gathered in 2008 from mushers in the seven Yukon River study communities shows that 97% report using fish to some extent to feed their dogs and 78% report the fish comprise half or more of their dog's annual diet. In addition, 41% of mushers report that locally caught fish make up 75% or more of their dog's diet. Overall, an estimated 492,465 pounds (round weight) of fish (all species) were harvested for dog food by mushers. Chum salmon, alone, contributed almost 65% (316,360 pounds) of this total (Table 3-3). For comparison, the total quantity of all fish species utilized for dog food in 1991 was estimated at 1,211,907 pounds (round weight), a decline of 59% (Andersen and Scott, 2010).

[10] In this context, dog musher is being used as a general term encompassing all users of dog and dog teams and not distinguishing amongst the specific various uses of sled dogs in rural villages.

Table 3-3 Population, households, sled dogs, and chum salmon harvest in select Yukon River drainage communities, 1991 and 2008

Community	Population		Number of Mushing Households		Number of Sled Dogs		Estimated Pounds of Chum Salmon Harvested for Dog Food, 2008
	1990	2008	1991	2008	1991	2008	
Fort Yukon	580	587	22	10	245	135	80,400
Huslia	207	227	11	5	153	83	42,000
Kaltag	240	188	11	0	113	0	0
Manley	96	77	9	8	234	114	41,952
Russian Mission	246	362	10	5	100	74	10,800
Saint Mary's	441	541	9	3	91	28	1,728
Tanana	345	252	23	11	427	237	139,480
Total	2,155	2,234	95	42	1,363	671	316,360

As important as fish are as a high-quality, low-cost food base for working sled dogs, all dog team owners supplement fish with purchased foods and non-fish food sources. The list of non-fish food items commonly fed to dogs includes rice and other bulk grains; commercially manufactured dry dog food; dog-grade chicken, beef, and lamb meat products; furbearer carcasses and wild game cutting scraps; and various fat, vitamin, and nutrient supplements (Andersen and Scott, 2010).

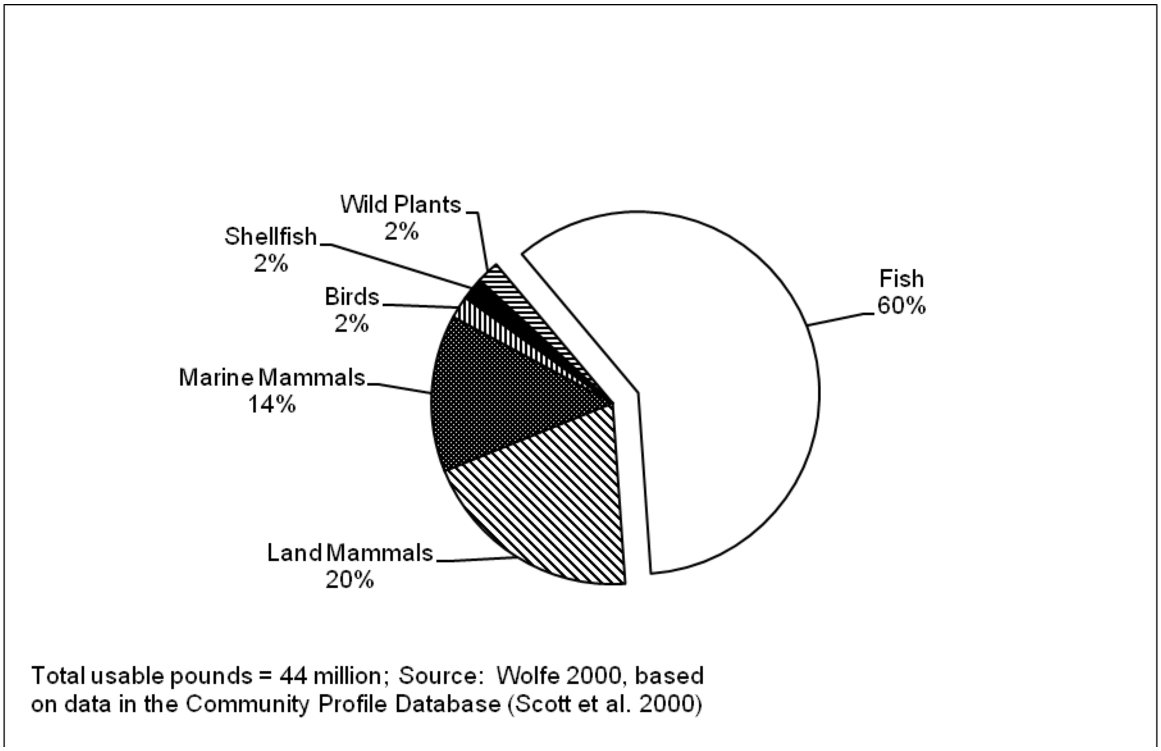
As previously mentioned, dog teams continue to play an important role in the mixed subsistence-cash economy of many rural communities despite the availability of snowmachines. Five reasons are most commonly cited by mushers as to why snowmachines have not completely replaced dog teams in their communities: 1) preference; 2) economy; 3) tradition; 4) sport and entertainment; and 5) social health. Mushers agree that the major advantages of snowmachines include speed; the fact that they do not need to be fed or maintained when not in use; they are ideal for short trips, breaking or setting trail in deep snow conditions, and hauling heavy loads on level trails; and are an easier mode of transportation for the elderly. However, the advantages of dogs center on their reliability and dependability, especially in extremely cold temperatures. There are specific areas, terrain, and/or snow conditions in which snowmachines cannot be operated and only accessed by dog teams. In addition, dogs can be acquired without a large cash outlay and can be operated without the use of costly gasoline and oil. In harsh conditions, snowmachines have a reported useful life of only two or three years. Dog teams are used to guard camps from bears, minimize waste by eating scraps, can generate income when raced or sold, and provide companionship. Dog mushing provides social benefits to individuals and communities; raising, training, caring for, and fishing for dogs is likened to a full time job, which keeps participants involved in a culturally relevant, useful, and healthy past-time on a year-round basis (Andersen, 1992).

In responding to years of low salmon runs, dog mushers outlined several strategies for maintaining the ability to feed and care for their dog teams. Overall, the option of buying more commercial food is the strategy most often employed for dealing with low salmon runs. Increasing the use of other fish species, as well as fishing longer and harder to obtain appropriate salmon quantities, is also a common compensation strategy. Mushers are reluctant to decrease the number of dogs owned as they already maintain the minimum number of dogs needed for the ways in which in the dogs are used (Andersen and Scott, 2010).

3.2.2 Diet and Nutrition

The diet of Alaska Natives has traditionally consisted of foods obtained by hunting, fishing, trapping, and gathering. These include fish, land and marine mammals, birds and eggs, plants and berries and are referred to as Native, customary and traditional, or subsistence foods. The present-day diet of Alaska Native people also includes available store-bought foods tied to the mixed subsistence-cash economy that characterizes most rural Alaskan communities (e.g., Wolfe 1983; Wolfe 1991; Wolfe et al., 1984).

Consumption of traditional foods is greater in rural Alaska than anywhere else in the United States. About 43.7 million pounds of traditional foods are taken each year. This amounts to a per capita consumption of 375 pounds or just over one pound a day. In comparison, the average American uses about 222 pounds of store-bought meat, fish, and poultry annually (Caulfield, 2002). According to the U.S. Census Bureau, for 2007, the per capita consumption of red meat was 110.6 pounds; 73.7 pounds of poultry; and 16.3 pounds of fish (www.census.gov/compendia/statab/2010/tables/10s0212.pdf).



Source: Fall et al., 2011.

Figure 3-6 Composition of subsistence harvest by rural Alaska residents

Native foods are especially nutritious as they are dense in protein, iron, vitamin B12, polyunsaturated fats, monounsaturated fats, and omega-3 fatty acids. ADF&G, Division of Subsistence, estimates that the annual rural harvest of 375 pounds per person contains 242% of the protein requirements of the rural population, containing about 118 grams of protein per person per day. The subsistence harvest contains 35% of the caloric requirements of the rural population (Wolfe 2000). In addition, they are low in saturated fat, added sugar, and salt. Native meats are generally lean and berries and greens are high in water content and micronutrients and low in empty calories. Hunting, gathering, harvesting, and preserving Native foods are energy intensive, providing physical activity. Furthermore, Native foods are highly valued and contribute to the spiritual, cultural, and social well-being of Alaska Native people as well as to the health of individuals, families, and communities. There is a trend, however, towards a greater dependency on store-bought foods and less on traditional foods (Johnson et al., 2009). This shift to increased reliance on imported store-bought foods is referred to as dietary westernization, which is officially defined as "the diffusion and adoption of western food culture" (Bersamin et al., 2007).

As a part of a traditional diet, fish and seafood especially contribute to energy, protein, mono- and polyunsaturated fatty acids, selenium, magnesium, and vitamins D and E. A decrease in traditional foods has important health implications. Higher intakes of omega-3 fatty acids may afford a greater degree of protection against coronary heart disease. Prior to the availability of store-bought foods, there were few carbohydrate sources in the diet. Much of the current carbohydrate consumption comes from foods rich in simple sugars. The relationship between increasing consumption of fructose and sucrose and the increases in type-2 diabetes and obesity in the U.S. is under active discussion. Increased consumption of added sugars can result in decreased intakes of certain micronutrients as well. Additionally, the low intake of calcium, dietary fiber, fruits, and vegetables could be contributing to the increased incidence of cancers of the digestive system (Johnson et al., 2009).

Populations in developing countries and minority and disadvantaged populations in industrialized countries are at the greatest risk for type 2 diabetes. Between 1990 and 1997, the number of Native Americans and Alaska Natives of all ages with diagnosed diabetes increased from 43,262 to 64,474 individuals. Throughout 1990 - 1997, the number of Native Americans and Alaska natives with diabetes was greatest among individuals aged 45-64 years and the prevalence of diabetes and the number of diabetic cases was higher among Native American and Alaskan Native women than men. Although the Alaska region had the lowest age-adjusted prevalence of diabetes throughout the period, it had the highest relative increase (76%) in prevalence (Burrows et al., 2000).

National health surveys used to monitor diabetes in the U.S. population are not useful for monitoring diabetes prevalence among Native Americans and Alaska natives because of small sample sizes. The prevalence of diagnosed diabetes among Native Americans and Alaska Natives served by health facilities may not be representative of the total Native American and Alaskan population. Information on diabetes prevalence is currently lacking for approximately 40% of the Native American and Alaskan Native population (Burrows et al., 2000).

In a 2004 study conducted by the Alaska Native Health Board and the Alaska Native Epidemiology Center, researchers sought to measure the usual intake of a wide variety of foods, both subsistence and purchased, over the period of one year. The Alaska Traditional Diet Project (ATDP) had participants from villages located in the following Regional Health Corporations: 1) Norton Sound Health Corporation; 2) Tanana Chiefs Conference; 3) Yukon-Kuskokwim Health Corporation; 4) Bristol Bay Health Corporation; and 5) Southeast Alaska Regional Health Consortium.[11]

Prior to the ATDP study, there were few published data on the dietary intakes of Alaska Natives; however, some general trends can be identified. First, there is substantial regional and seasonal variation in food intake patterns among Alaska natives. Second, there has been an increasing use of store foods and particularly in the consumption of sugared beverages over many years. Third, the intakes of some nutrients are reported to be low including fiber, vitamin A, B vitamins, vitamin C, folate, iron, and calcium. Fourth, many important nutrients in the diets of Alaska natives come from subsistence foods, notably vitamin A, vitamin B12, omega-3 fatty acids, iron, and protein (Ballew et al., 2004).

Food and beverage data from responses of all participants in each region of the ATDP were ranked (top 50) by total amount consumed and by the estimated contribution of particular foods to nutrient intakes. In

[11] Data from the Southeast Alaska Regional Health Consortium are not included here since this area falls outside the focus on western Alaska.

terms of total amounts of food consumed, sugared beverages (e.g., soda pop) were in the top four items in all regions. White rice, white bread, and pilot bread were a staple in nearly all regions; however, the finding of eight species of fish in the Norton Sound and Yukon-Kuskokwim regions, seven species of fish in the Bristol Bay region, and two species of fish in the Tanana Chiefs region indicates the importance of fish in the diet of Alaska natives. Table 3-4 below outlines the importance of salmon in the diet of participants of the ATDP study (Ballew et al., 2004).

Table 3-4 Total consumption (in pounds) of salmon species consumed by participants in each of the Regional Health Corporations

	Chum Salmon		King Salmon		Coho Salmon		Sockeye Salmon		Pink Salmon	
	Total Con. (lbs)	Percent Part.	Total Con. (lbs)	Percent Part.	Total Con. (lbs)	Percent Part.	Total Con. (lbs)	Percent Part.	Total Con. (lbs)	Percent Part.
Norton Sound	2,729 (26)	85% (25)	1,384 (42)	94% (7)	3,875 (18)	88% (17)	4,162 (16)	~	3,206 (23)	69% (48)
Yukon-Kuskokwim	8,296 (12)	84% (29)	15,722 (5)	98% (2)	5,968 (16)	~	~	~	~	~
Bristol Bay	2,532 (29)	~	5,076 (12)	93% (9)	3,486 (17)	86% (33)	6,354 (10)	93% (12)	2,261 (31)	~
Tanana Chiefs Conference	~	~	583 (16)	97% (1)	243 (26)	79% (24)	~	~	~	~

Note: 'Total Con.' = Total consumption in lbs.

Note: 'Percent Part.' = Percent participants. This indicates the number of people (out of those surveyed) who reported eating the salmon species. Numbers in parenthesis indicate where that species of salmon ranked among the top 50 foods consumed.

The reasons given by ATDP participants for eating less subsistence foods now include not having anyone to hunt for the family, working at a job or not having time to hunt and gather, living away from the village, lack of transportation to hunt and gather, and not having the traditional knowledge to hunt and gather. The most common reason given, however, was a reduction in the availability or quality of fish and animals. The most common concerns expressed about subsistence foods were observations of fish and animals with parasites, diseases, or lesions; reduced numbers of fish and animals; and the possible presence of contaminants in fish and animals (Ballew et al., 2004).

3.2.3 Mixed Economy

Alaska Natives historically moved within traditional areas in response to changes in regional subsistence opportunities. During the second half of the twentieth century, however, increased connections with other regions brought social and economic changes, accompanied by movement of people into and out of the rural regions of Alaska.

Rural Alaska presents an economic environment distinct from that of the other states in the U.S. The majority of the population is Alaska Native living in small, relatively 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 mixed economy in which residents allocate time between subsistence and wage work; however, there is limited resource based market activity. 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 barge during summer months (Caulfield, 2002; see also Fall et al., 1986; Magdanz and Olanna 1986; Wolfe et al., 1986).

To make a living on the Yukon River requires families to integrate subsistence activities with wage employment, commercial fishing, or other types of money-making activities (i.e., 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 the pattern 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, cities offer employment opportunities while the rural villages are places with high levels of unemployment and few prospects for economic growth. While net migration out occurs, people continue to move to rural villages. The additional real income earned by rural residents in subsistence activities may compensate for the potential money income earned in the cities. Productivity in subsistence activities depends on place specific knowledge or human capital. Natives move to improve their economic opportunities; however, subsistence activities provide rural Natives with significant real income. This affects movement into and out of rural areas because subsistence productivity is place dependent (Huskey et al., 2004).

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. 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).

When villages become too small, maintaining a local public school and other facilities becomes problematic. 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).

Food Budgets

ADF&G, Division of Subsistence, estimates that approximately 43.7 million pounds of wild foods are harvested annually by residents of rural Alaska, representing on average 375 usable pounds per person. Regarding the economic value of traditional foods to the economies of rural Alaska, the estimated replacement cost of traditional foods in rural Alaska, if assumed to be $3 per pound, equates to over $131 million for all of rural Alaska. If a replacement value of $5 per pound is used, still likely a low figure, the estimated wild food replacement value for rural Alaska is estimated to be more than $218 million annually (Wolfe 2000). In a study by Wolfe and Walker (1987) that developed a predictive model of rural community subsistence harvests, a $100 decrease in mean taxable income per income tax return resulted in an estimated one pound increase in community subsistence harvests per person per year.

3.2.4 Vulnerabilities

Food security is defined as having access to sufficient, safe, healthful, and culturally preferred foods. Food security is a condition and a constantly unfolding process, one through which people try to align short-term needs and long-term goals of health and sustainability. Numerous circumstances and drivers of change limit the ability of rural and urban Alaskans to reliably procure traditional foods including vulnerabilities to regional environmental change, external market shifts in the price or availability of imported fuel and supplies, environmental contamination, and land use changes such as oil, natural gas, and minerals development. According to the USDA’s 2008 report on household food security in the United States, approximately 11.6 percent of Alaskan households are food insecure; at some time during the year these households had difficulty providing enough food for all members of their household. This measure captures a portion of those of in Alaska coping with food insecurity. While little data is available regarding food insecurity in rural communities, other indicators of food insecurity are present in rural areas of the state including trends for various diet- and lifestyle-related health issues (e.g. type 2 diabetes and obesity) (Loring and Gerlach, 2010).

ADF&G, Division of Subsistence, recently began including questions related to food security in comprehensive wild resource research in two Kotzebue Sound communities in 2007. Using a modified national food security data collection protocol, 88% of surveyed Kivalina households and 82% of Noatak households reported high or marginal levels of food security, compared with 89% in the United States. Subsistence harvests clearly contributed to that food security, and when food insecurities were reported they were twice as likely to be related to store-bought foods as to subsistence foods (Magdanz et al. 2010:69).

In Alaska, 90% of the rural population, which represents 20% of the state’s total population and 49% of the Alaska Native population, rely on locally procured fish for at least part of the year (Loring and Gerlach, 2010). Five factors are found to be significantly related to household salmon production: fishing fuel (gallons); equipment holdings; number of harvesters; number of households eating salmon; and the number of people eating salmon. The amount of fuel expended by households while fishing was the factor most strongly associated with household subsistence salmon productivity. The strong correlation of fuel expenditures and salmon output is consistent with concerns about the rising monetary costs of subsistence fishing. To be successful fishing, a household had to expend money in boat fuel to reach fishing sites, to check setnets, to drift gillnets, and to transport fish. Difficulties are encountered given the higher costs of fuel coupled with poor salmon runs; households cannot afford to travel to set and check nets that are catching only small numbers of fish. As such, a lack of money may limit the extent of fishing, and by extension, the amount of salmon harvested (Wolfe, 2009).

While there has been a recent dramatic increase in fuel prices throughout Alaska, total utility costs, including heat, electricity, water, and sewer, paid by residents of remote Alaska communities increased from a median value of 6.6% of total income to 9.9% of total income from 2000 to 2006. By comparison, the median amount spent by urban Anchorage households increased from 2.6% to 3.1% of household income during the same period from 2000 to 2006. It is estimated that in rural Alaska, the overall consumption of diesel fuel and gasoline for all end uses equates to about 1,000 gallons of fuel per person. Increasing fuel costs equate to an additional economic burden of several thousand dollars per household in rural Alaska; however, fuel cost alone is not a definitive driver of migration through 2007. Because migration is related to earnings (see previous section), the people most impacted by high fuel costs may be least able to afford to move and unable to afford as much fuel to hunt and fish (Martin et al., 2008).

Salmon Shortages and Species Substitution

Salmon is part of a mix of wild foods that supports communities in the rural Alaska. Since the late 1990s, depressed salmon runs have been associated with substantial changes in salmon fisheries of the Yukon River drainage. Commercial salmon fishing has been restricted or closed on the lower and middle river. Incomes to village residents from commercial fishing have fallen. Subsistence fishing times have been shortened and staggered to achieve salmon escapements and provide for U.S. and Canadian harvest allocations. Catching a mix of wild foods helps to buffer against shortfalls due to annual variability in particular species. Low harvests in one type of salmon might be replaced by higher harvest of other types of fish or wildlife; however, taking into account the level of subsistence dependence on salmon, it is also possible that other wild foods do not compensate for low subsistence salmon harvests during a poor year. Some households may buy more store foods to compensate, if they have the income. Persons in other households may leave the village in search of employment because of such difficult economic circumstances (Wolfe, 2009).

Specifically, in Alakanuk (coastal district of the lower Yukon drainage) and Stevens Village (upper Yukon drainage, District Y-5), between-year comparisons of wild food harvest suggest that the low harvests of salmon may not be made up by increased harvests of other types of wild resources. Comparing 1980 with 2007, food production was lower across all major species groups in Alakanuk, including marine mammals (-48.8%) and fish (-81.4%). There was no evidence of increased production in other wild foods to make up for low subsistence salmon catches. Comparing 1985 with 2007 in Stevens Village, harvests were up for land mammals (+45.2%), but down for fish (-71.4%). The depressed local economy at Stevens Village has resulted in a significant out-migration of families from the community and a loss of population. In general, harvests of other wild food species in 2007 had not increased in order to compensate for the greater costs of catching salmon in any village (Wolfe, 2009).

Fishing Regulations

Fishing regulations determine access to salmon stocks throughout western Alaska. Custom guides the activities of extended families at the local level, including conventions regarding harvest areas, harvest methods, and disposition of catch. Alongside these local customs, subsistence fishing is regulated by state and federal entities, and by an international agreement between the U.S. and Canada under the Pacific Salmon Treaty.

Among the various agencies responsible for management of Yukon River salmon fisheries, ADF&G has the lead role in managing fisheries within the U.S. portion of the drainage and is the lead agency in negotiations between the U.S. and Canada for trans-boundary salmon stocks. The priorities of management are to first ensure adequate escapement to sustain future runs; second, provide reasonable opportunity for subsistence fishermen to meet their needs; and third, provide opportunity to commercial, sport, and personal use fishermen to harvest fish in excess of escapement and subsistence needs. ADF&G uses an adaptive management process to achieve these priorities that starts with development of management strategies based on pre-season forecasts, then transitions into evaluation of run strength in season and adjusting management strategy implementation based on in-season performance of annual salmon runs. Pre-season forecasts and management strategies are developed based on guidelines and directives as outlined in state and federal management plans and regulations, and in cooperation with federal subsistence managers, fishermen, tribal council representatives, and other stakeholders within guidelines (personal communication, J. Linderman, 2010).

While forecasts and pre-season management strategies are made each year, these are frequently revised based on in-season run assessments. For example, the structure and implementation of fishing windows may be adjusted in-season by Emergency Order based on run strength and run timing estimates derived from in-season run assessment programs. By default, subsistence fishing is open on the river and is closed by regulatory Emergency Orders; while commercial fisheries are closed by default and must be opened by Emergency Order. Management decisions often need to be made before fish have reached the areas, districts, or communities affected. Managers use test fisheries, sonar projects, genetic stock identification and age-sex-length composition, and in-season harvest reports to assess and project salmon run timing and run strength in-season to inform management decisions (personal communication, J. Linderman, 2010).

In the Yukon River Management Area, the core projects and associated platforms collecting run assessment information in-season are (in chronological order moving upstream) a nearshore marine test fishery operated near Dall Point south of the mouth of the Yukon River, inriver drift and set net test fisheries operated out of Emmonak near the mouth of the river, a drift test net fishery near the community of Mountain Village, Pilot Station Sonar operated approximately 123 miles from the mouth, test fish wheels operated at the Rapids approximately 731 mile from the mouth, and Eagle Sonar operated near the Canadian border near the community of Eagle approximately 1,200 miles from the mouth. Additional projects are operated in Yukon River tributaries spread throughout the drainage, which are primarily designed to assess escapements and assess results of management actions. The combined in-season information provided by these programs allows managers to identify trigger points that when reached prompt actions (i.e. restrictions or closures on subsistence fisheries or openings for commercial fisheries) in the various Yukon River management districts. The information provided by these projects also assists managers in determining the level of management action required, such as the duration of time warranted for commercial periods to ensure subsistence opportunity is not impacted and adequate escapements are achieved, or any reduction in subsistence fishing time needed to ensure adequate escapements (personal communication, J. Linderman, 2010).

Among the primary concerns often expressed by subsistence fishers are limitations on fishing times (open and closed seasons and periods), limitations on gear (mesh size and net depth), and the lack of effective regulations on high-seas bycatch (Wolfe, 2009). Other concerns amongst subsistence users in rural communities includes: impacts of closures on food security, economic security, and on ecosystems; observations of ecological change including fish abundance, fish size, fish health, and spawning grounds; and problems in existing management priorities/approaches including the inefficacy of radar[12] and the role of at-sea bycatch by the commercial groundfish fishery (Loring and Gerlach, 2010).

Families along the lower Yukon River often prefer to put up subsistence Chinook salmon soon after river breakup. With the bulk of Chinook salmon subsistence catch drying, families with commercial permits could then fish for sale during commercial openings. Families catch additional fish for subsistence uses between commercial periods, as needed. When schedules and locations allow, subsistence fishing would get an initial week or so jump on commercial fishing (Wolfe, 2009). Directed summer chum salmon commercial openings are initiated and managed also based upon the timing of Chinook runs. When Chinook salmon runs are weak, a directed commercial fishery is typically not prosecuted. In weak Chinook salmon years, a commercial fishery is directed at summer chum salmon in mid to late June and

[12]While the term radar is often used by subsistence stakeholders when expressing various concerns, it is assumed by area management biologists that they are referring to the use of sonar for monitoring fish passage along the Yukon River (personal communication, John Linderman, 2010).

is initiated and managed based on the strength of the chum salmon run in consideration of the impacts on Chinook salmon from incidental harvest.

While communities along the entire Yukon River focus on Chinook salmon, there is considerable variation in the patterns of summer and fall chum salmon harvest and use throughout the river area. These differences result from a range of issues including species distribution and quality throughout the river drainage and cultural patterns of use (e.g., more dog teams along the upper river. The state and federal management strategy has sought to take fishing pressure off the earliest pulses of Chinook salmon runs in order to get fish upriver to meet escapement goals, achieve Canadian border passage obligations under the Yukon River Salmon Agreement, and provide for subsistence uses in upriver districts. At the mouth of the Yukon River, when there has been uncertainty regarding the strength of Chinook and summer chum salmon runs, management has not scheduled openings until the runs have developed and uncertainty over sonar count and test fishery information is reduced. In addition, in years of strong summer chum salmon runs, but weak Chinook runs, fishing times tend to be restricted in the lower river commercial chum fishery to avoid incidental catch of Chinook salmon (Wolfe, 2009 and personal communications, Caroline Brown and John Linderman, 2010).

Subsistence fishing is open seven days a week until the first large pulse of Chinook salmon appears in each district, which then triggers implementation of the regulatory subsistence fishing schedule in each district in the lower river. In some mainstream upper river districts (i.e. Coastal District and Subdistricts 5D), the regulatory subsistence fishing schedule remains seven days per week unless additional conservation measures are warranted. The general management strategy is to reduce fishing pressure on the earliest portions of Chinook runs while providing for subsistence fishing, and secondarily, for commercial fishing. This strategy is employed to spread subsistence harvest over the entire run to provide for escapements by reducing the potential for differential harvest of specific spawning stocks, provide for subsistence harvest throughout the drainage, and provide for Canadian border passage obligations (Canadian escapement and harvest allocation combined). As a consequence, subsistence fishing periods can have negative effects on subsistence salmon processing; fish harvested in widely-spaced batches of salmon create difficulties for successfully drying and smoking salmon. There is risk involved in drying fish in smaller batches, rather than a larger, single batch because the different quality of fish drying at different rates can result in over-drying and excessively hard fish. In addition, subsistence openings may occur during bad weather creating problems with drying and processing because of an increased potential for spoilage. Without a regulatory fishing schedule, fishermen would have more flexibility in choosing appropriate weather to catch and process subsistence fish (Wolfe, 2009 and personal communication, John Linderman, 2010) but at the potential sacrifice of Yukon River treaty obligations with Canada, overall escapement, and upriver subsistence harvest needs. In extreme circumstances (i.e., scheduled fishing periods coupled with high fuel prices), individual fishermen may feel forced to fish outside regulations in order to meet their family's food needs (Wolfe, 2009). This could come at the potential cost of international treaty obligations, the overall health of Yukon River salmon populations, and upriver subsistence users.

Based upon Alaska subsistence law, the BOF made separate customary and traditional use findings for Yukon River Chinook salmon, summer chum salmon, fall chum salmon, and coho salmon, and established separate ANS findings for each (see Table 3-1). Harvests of one species that consistently fall below the lower limit of the ANS may suggest that a reasonable opportunity for subsistence uses can no longer be provided, or may suggest that the need for that level of harvest has decreased and no longer applies (i.e., with the decrease in the presence and use of dog teams, the need for historical levels of chum salmon harvest for dog food has also decreased). If it is determined reasonable opportunity can no longer be provided because of resource limitations, state statute would require that non-subsistence uses be eliminated (AS 16.05.258). Under such circumstances, like that which occurred with Nome Subdistrict chum salmon through the late 1990s and early 2000s, subsistence fishing participation would be limited through a tiered management scenario where individual Alaskans would be ranked against one another according to their customary and traditional dependence upon the fish stock in question, to determine who would be provided an opportunity to fish for subsistence uses. Therefore, those Alaskans who do not qualify for a tiered subsistence fishery where there is insufficient harvestable surplus to provide a reasonable opportunity for all subsistence uses generally would shift to other salmon stocks or other resources to ensure sufficient wild resources are obtained to support household economies (Wolfe, 2009 and personal communications, John Linderman and Jim Simon, 2010). In such cases, harvest and use of another species may then increase such that the amount necessary for subsistence for the replacement species may need to be adjusted by the BOF.

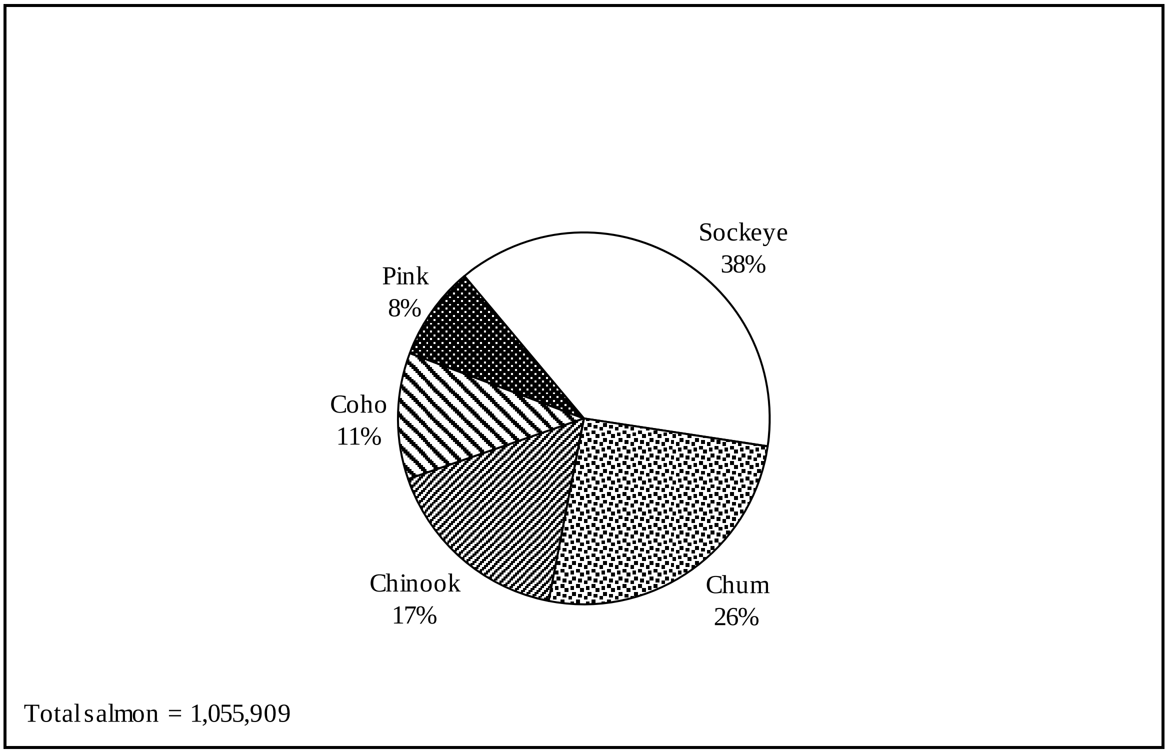
3.3 Chum salmon subsistence harvests by region in western Alaska

3.3.1 Overview of regional subsistence harvests

Of the total number of pounds of wild foods harvested annually for subsistence purposes in rural Alaska communities, subsistence fisheries contribute about 60% from finfish and 2% from shellfish. On average, subsistence fisheries harvests provide about 230 lbs of food per person annually in rural Alaska. Although producing a major portion of the food supply, subsistence harvests represent just a small part of the annual harvest of all wild resources in Alaska, approximately 2%. Commercial fisheries take 97% of the wild resource harvest, and sport fisheries and hunts take about 1% (Fall et al., 2011).

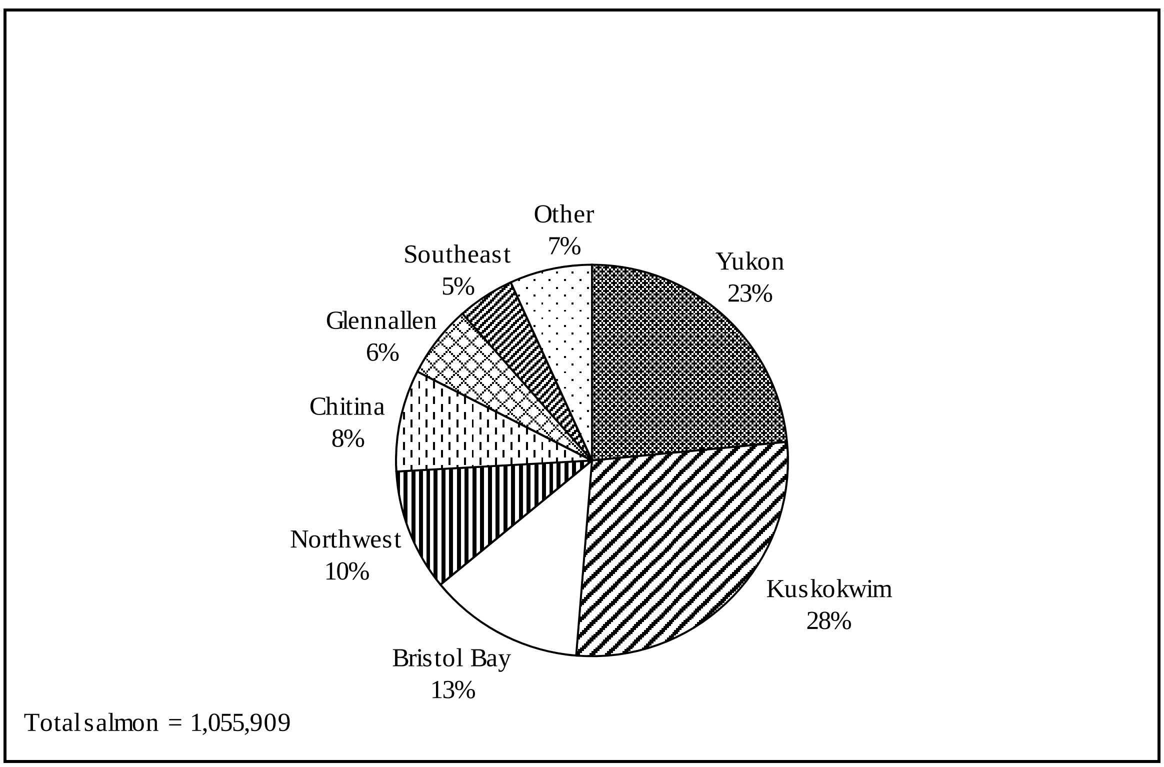
The estimated total subsistence harvest of salmon throughout Alaska in 2008, based on annual harvest assessment programs, was 1,055,909 fish. The estimated statewide harvest of chum salmon was 270,688 fish (26%) (Source: Fall et al., 2011.
Figure 3-7). In 2008, fisheries in the management areas encompassing western Alaska accounted for the following portions of the total estimated statewide subsistence salmon (all species) harvest: the Yukon Area (247,936 salmon; 23% of the statewide total); the Kuskokwim Area (293,628 salmon; 28%); the Bristol Bay Management Area (134,924 salmon; 13%); and Arctic Alaska (105,933 salmon; 10%)[13] (Figure 3-8). In 2008, as in recent years, three areas dominated the subsistence chum salmon estimated harvest: the Yukon Area (176,190 salmon; 65% of the statewide harvest), the Kuskokwim Area (76,649 salmon; 27%), and Arctic Alaska (14,004 salmon; 5%) (Table 3-5 and Source: Fall et al., 2011.
Figure 3-9). Table 3-6 provides trend data on the number or households in Alaska that use subsistence salmon. Statewide eligibility criteria require individuals to be Alaskan residents for the preceding 12 months before harvesting salmon for subsistence uses (Fall et al., 2011).

[13] Subsistence harvest estimates for Arctic Alaska for 2003 and 2004 do not include the regional center of Kotzebue, which had been included in the harvest assessment program since 1994. No subsistence fisheries harvest data were collected in the Kotzebue area for 2005 through 2008; therefore, the estimated harvest totals for Northwest Alaska as reported since 2003 are incomplete.



Source: Fall et al., 2011.

Figure 3-7 Alaska subsistence salmon harvest by species, 2008



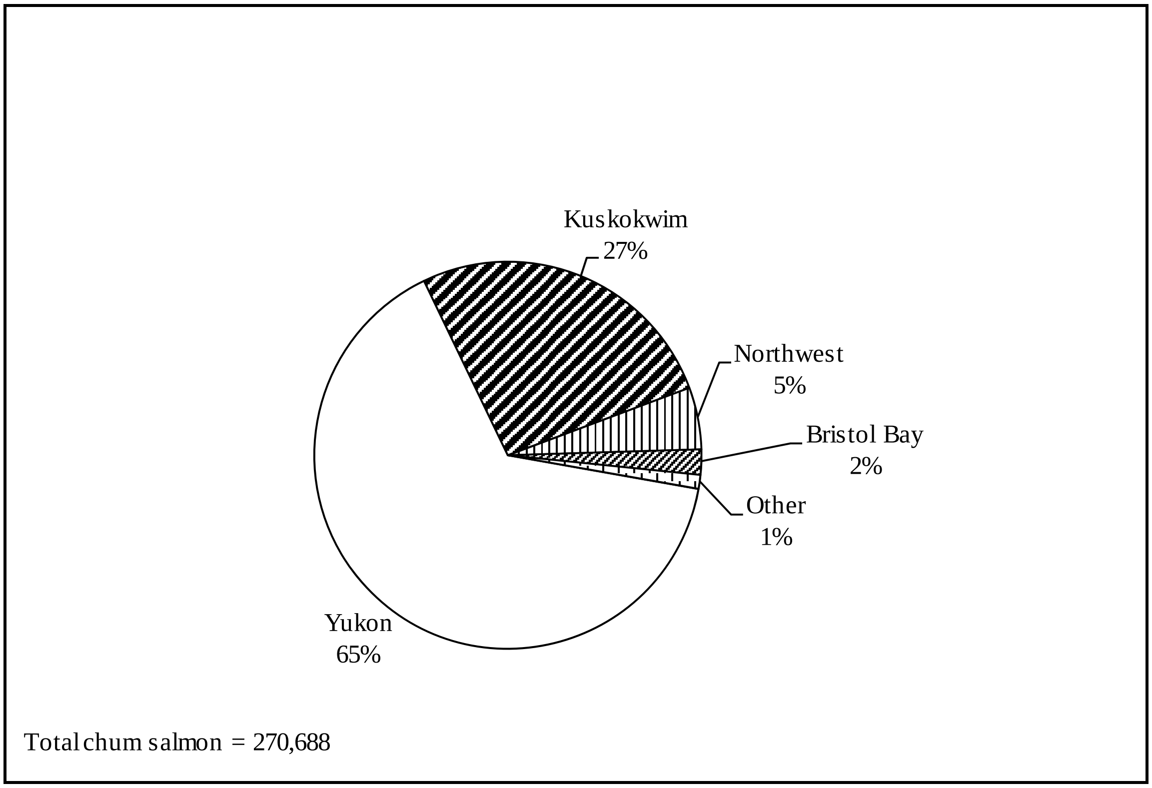
Source: Fall et al., 2011.

Figure 3-8 Alaska subsistence salmon harvest by area, 2008

Table 3-5 Subsistence chum salmon harvest for western Alaska, 2008

Area	Chum Salmon
Alaska Peninsula	1,078
Bristol Bay	5,710
Kuskokwim	71,649
Arctic Alaska[14]	14,004
Yukon River	176,190

Note: Estimates for Arctic Alaska do not include the Kotzebue Area.



Source: Fall et al., 2011.

Figure 3-9 Subsistence chum salmon harvest by area, 2008

[14] Arctic Alaska (and the subareas it encompasses) is also referred to as Northwest Alaska.

Table 3-6 Historical Alaska subsistence and personal use salmon harvests, 1994–2008

	Households or permits		Estimated salmon harvests					
Year	Total	Surveyed or returned	Chinook	Sockeye	Coho	Chum	Pink	Total
1994	22,553	16,492	188,134	445,109	138,101	417,199	94,469	1,283,012
1995	22,358	15,770	186,422	386,034	125,909	499,992	54,908	1,253,264
1996	23,708	18,751	161,976	416,467	124,786	498,525	80,928	1,282,682
1997	26,754	21,782	182,174	525,417	99,043	347,808	41,543	1,195,985
1998	27,774	22,264	177,017	466,386	95,211	302,037	74,216	1,114,867
1999	27,854	22,993	161,333	511,044	91,896	339,242	33,253	1,136,768
2000	25,365	20,983	134,270	422,002	103,212	248,598	52,710	960,791
2001	28,641	21,907	165,039	487,570	101,291	242,035	44,501	1,040,436
2002	24,497	19,189	144,777	398,134	94,365	229,922	86,754	953,952
2003	25,018	19,096	166,593	420,579	109,172	239,648	67,929	1,003,920
2004	27,046	20,923	176,416	453,201	103,772	241,022	92,281	1,066,692
2005	25,060	18,513	155,658	461,804	100,095	257,977	77,031	1,052,564
2006	25,881	18,558	142,658	452,477	96,024	291,971	74,320	1,057,451
2007	25,736	17,851	157,813	459,372	80,685	273,951	34,787	1,006,608
2008	25,920	18,762	176,158	406,621	116,105	270,688	86,337	1,055,909
5-year average (2003–2007)	25,748	18,988	159,828	449,487	97,950	260,914	69,270	1,037,447
10-year average (1998–2007)	26,287	20,228	158,157	453,257	97,572	266,640	63,778	1,039,405
Historical average (1994–2007)	25,589	19,648	164,306	450,400	104,540	316,423	64,974	1,100,642

Source: ADF&G Division of Subsistence, ASFDB 2009 (ADF&G 2009).

3.3.2 Bristol Bay

Description of Management Area

The Bristol Bay management area includes all coastal and inland waters east of a line from Cape Newenham to Cape Menshikof. The area includes the communities of Aleknagik, Clarks Point, Dillingham, Egegik, Ekwok, Igiugig, Iliamna, King Salmon, Kokhanok, Koliganek, Levelock, Manokotak, Naknek, New Stuyahok, Newhalen, Nondalton, Pedro Bay, Pilot Point, Port Alsworth, Port Heiden, Portage Creek, South Naknek, Togiak, Twin Hills, and Ugashik. The area also includes nine major river systems: Naknek, Kvichak, Alagnak, Egegik, Ugashik, Wood, Nushagak, Igushik, and Togiak. The Bristol Bay area is divided into five management districts (Naknek-Kvichak, Egegik, Ugashik, Nushagak, and Togiak) that correspond to the major river drainages (Morstad et al., 2010).

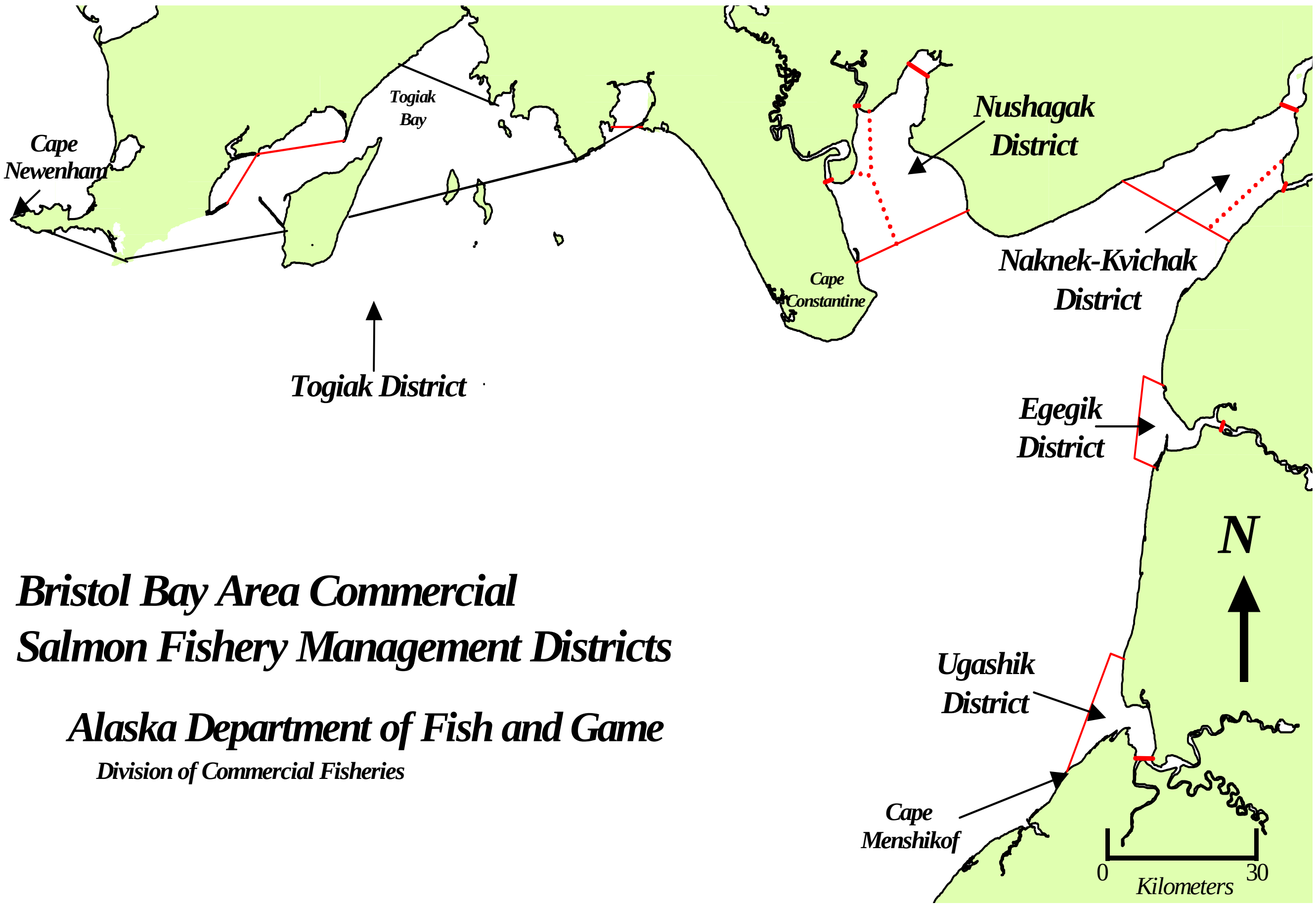


Figure 3-10 Bristol Bay Area Commercial Salmon Fishery Management Districts

All five Pacific salmon species found in Alaska are utilized for subsistence purposes in Bristol Bay, but the most popular are sockeye, Chinook, and coho salmon. Many residents continue to preserve large quantities of fish through traditional methods such as drying and smoking; fish are also frozen, canned, salted, pickled, fermented, and eaten fresh.

Subsistence Regulations
Permits are required to harvest salmon for subsistence purposes in Bristol Bay Management Area. Standard permit conditions include prohibition of fishing within 300 feet of a dam, fish ladder, weir, culvert, or other artificial obstruction. Since 1990, under state regulations, all Alaska state residents have been eligible to participate in subsistence salmon fishing in all Bristol Bay drainages, including the Lake Clark area. However, under National Park Service regulations, only qualified rural Alaska residents may participate in subsistence fisheries in the waters of Lake Clark National Park and Preserve. Prior to 2007, with a few exceptions, only gillnets were recognized as legal subsistence gear. In the Togiak District, spear fishing was also allowed. In portions of Naknek Lake in the Naknek District, spears and dip nets, in addition to gillnets, could be used during designated periods. In the Bristol Bay area, gillnet lengths are limited to 10 fathoms in the Naknek, Egegik, and Ugashik rivers, Dillingham beaches, and within the Nushagak commercial district during openings regulated by emergency order. Gillnet lengths up to 25 fathoms could be used in the remaining areas (Morstad et al., 2010).

At its regulatory meeting in December 2006, the BOF adopted three changes to subsistence salmon fishing regulations that affected portions of the Bristol Bay Area. The first change allowed salmon to be taken with drift gillnets no more than 10 fathoms in length in the lower two miles of the Togiak River. The second change allowed spears to be used to take salmon in Lake Clark. The third change allowed use of beach seines and seining with gillnets, in addition to set gillnets, to take salmon in Iliamna Lake, Six Mile Lake, and Lake Clark (Morstad et al., 2010).

In the Bristol Bay Management Area, subsistence fishing is permitted in all districts during commercial openings. In addition, all commercial districts were open for subsistence fishing in May and September, from Monday to Friday. In the late 1990s and early 2000s, declining Chinook salmon and coho salmon stocks resulted in longer commercial closures and some residents had difficulty obtaining fish for home uses. Since 2004, there have been improvements in abundance of all salmon species. Since 1988 in the Nushagak District, subsistence salmon fishing has been allowed by emergency order during periods of extended commercial fishing closures (Morstad et al., 2010).

Subsistence Harvest Assessment Methods

A permit program was gradually introduced throughout the Bristol Bay region in the late 1960s to document the harvest of salmon for subsistence uses. Much of the increase in the number of permits issued during these years reflects: 1) a greater compliance with the permitting and reporting requirements; 2) an increased level of effort expended by ADF&G in making permits available (including issuance by area vendors working as volunteers to distribute permits); 3) contacting individuals to remind them to return the harvest forms; and 4) a growing regional population. Most fishers are obtaining permits and reporting their harvests, and overall permit returns have averaged between 85% and 90%. However, fish removed for home uses from commercial catches are not included in most reported subsistence harvest totals (Morstad et al, 2010).

In 2008, a total of 1,178 permits were issued for the Bristol Bay Management Area; of those 1,083 (92%) were returned. The largest number of permits were issued for the Nushagak (571 permits) and Naknek–Kvichak (481 permits) districts. The number of permits issued in 2008 was above both the five-year average (2003 - 2007) of 1,094 permits, the 10-year average (1998 - 2007) of 1,146 permits, and historical average of 1,090 permits (Fall et al., 2011).

Chum Salmon Subsistence Harvest

Estimated total Bristol Bay subsistence salmon harvests in 2008 were 134,924 fish. The 2008 subsistence harvest was above both the five-year (2003 - 2007) average of 126,717 fish and the 10-year (1998 - 2007) average of 127,069 salmon, and below the historical average (1983 - 2007) of 150,405 salmon. The estimated harvest of 5,710 chum salmon was above both the five year average (5,285 fish) and the 10-year average (4,940 fish) (Figure 3-11, Table 3-7). In 2008, the Bristol Bay subsistence salmon harvest was composed of 77% sockeye salmon, 11% Chinook salmon, 6% coho salmon, 4% chum salmon, and 2% pink salmon (Figure 3-12) (Fall et al., 2011).

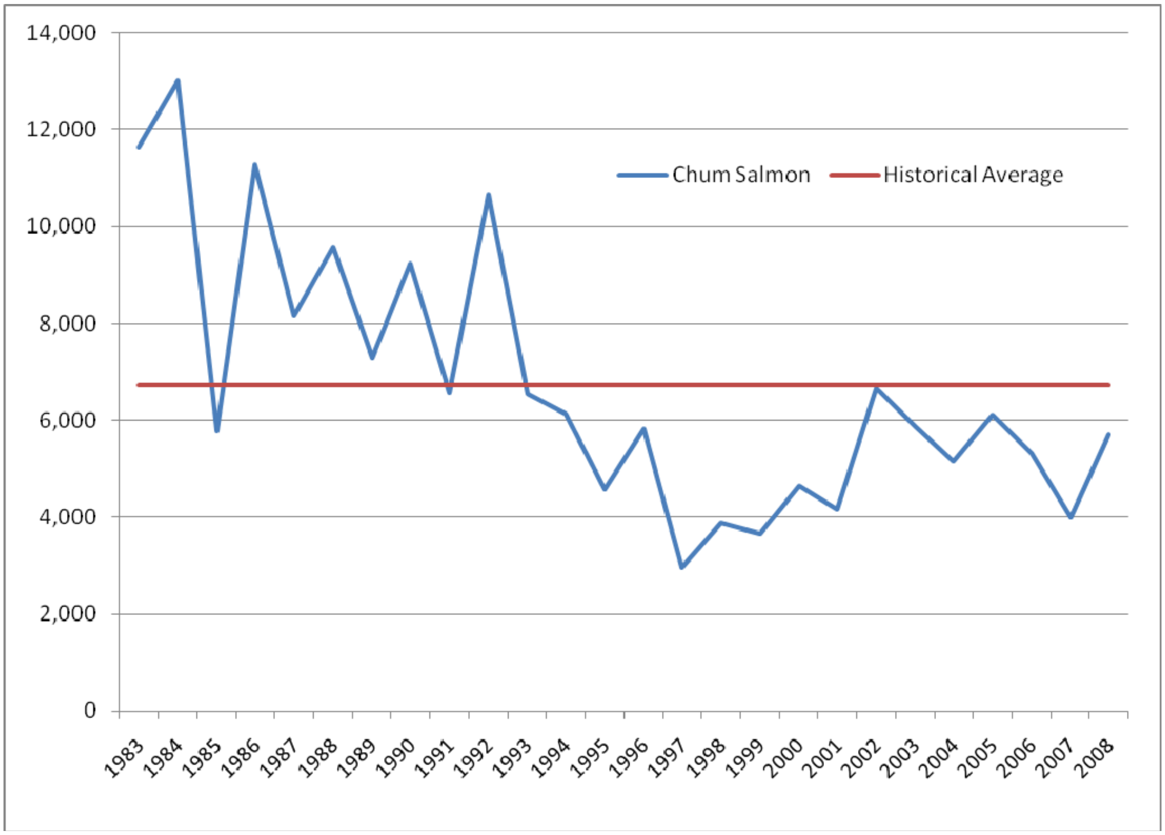


Figure 3-11 Estimated historical chum salmon subsistence harvest, Bristol Bay area, 1983-2008

Table 3-7 Estimated historical subsistence salmon harvests, Bristol Bay area, 1983 - 2008

	Permits		Estimated salmon harvest					
Year	Issued	Returned	Chinook	Sockeye	Coho	Chum	Pink	Total
1983	829	674	13,268	143,639	7,477	11,646	1,073	177,104
1984	882	698	11,537	168,803	16,035	13,009	8,228	217,612
1985	1,015	808	9,737	142,755	8,122	5,776	825	167,215
1986	930	723	14,893	129,487	11,005	11,268	7,458	174,112
1987	996	866	14,424	135,782	8,854	8,161	673	167,894
1988	938	835	11,848	125,556	7,333	9,575	7,341	161,652
1989	955	831	9,678	125,243	12,069	7,283	801	155,074
1990	1,042	870	13,462	128,343	8,389	9,224	4,455	163,874
1991	1,194	1,045	15,245	137,837	14,024	6,574	572	174,251
1992	1,203	1,028	16,425	133,605	10,722	10,661	5,325	176,739
1993	1,206	1,005	20,527	134,050	8,915	6,539	1,051	171,082
1994	1,193	1,019	18,873	120,782	9,279	6,144	2,708	157,787
1995	1,119	990	15,921	107,717	7,423	4,566	691	136,319
1996	1,110	928	18,072	107,737	7,519	5,813	2,434	141,575
1997	1,166	1,051	19,074	118,250	6,196	2,962	674	147,156
1998	1,234	1,155	15,621	113,289	8,126	3,869	2,424	143,330
1999	1,219	1,157	13,009	122,281	6,143	3,653	420	145,506
2000	1,219	1,109	11,547	92,050	7,991	4,637	2,599	118,824
2001	1,226	1,137	14,412	92,041	8,406	4,158	839	119,856
2002	1,093	994	12,936	81,088	6,565	6,658	2,341	109,587
2003	1,182	1,058	21,231	95,690	7,816	5,868	1,062	131,667
2004	1,100	940	18,012	93,819	6,667	5,141	3,225	126,865
2005	1,076	979	15,212	98,511	7,889	6,102	1,098	128,812
2006	1,050	904	12,617	95,201	5,697	5,321	2,726	121,564
2007	1,063	917	15,444	99,549	4,880	3,991	815	124,679
2008	1,178	1,083	15,153	103,583	7,627	5,710	2,851	134,924
5-year average (2003-2007)	1,094	960	16,503	96,554	6,590	5,285	1,785	126,717
10-year average (1998-2007)	1,146	1,035	15,004	98,352	7,018	4,940	1,755	127,069
Historical average (1983-2007)	1,090	949	14,921	117,724	8,542	6,744	2,474	150,405

Source: ADF&G Division of Subsistence, ASFDB 2009 (ADF&G 2009).

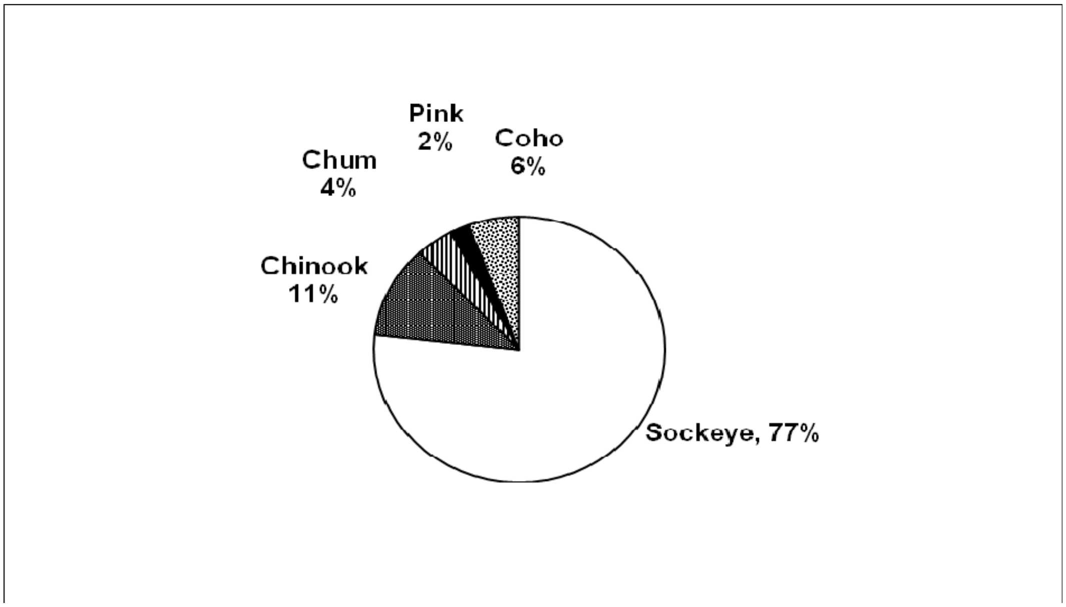
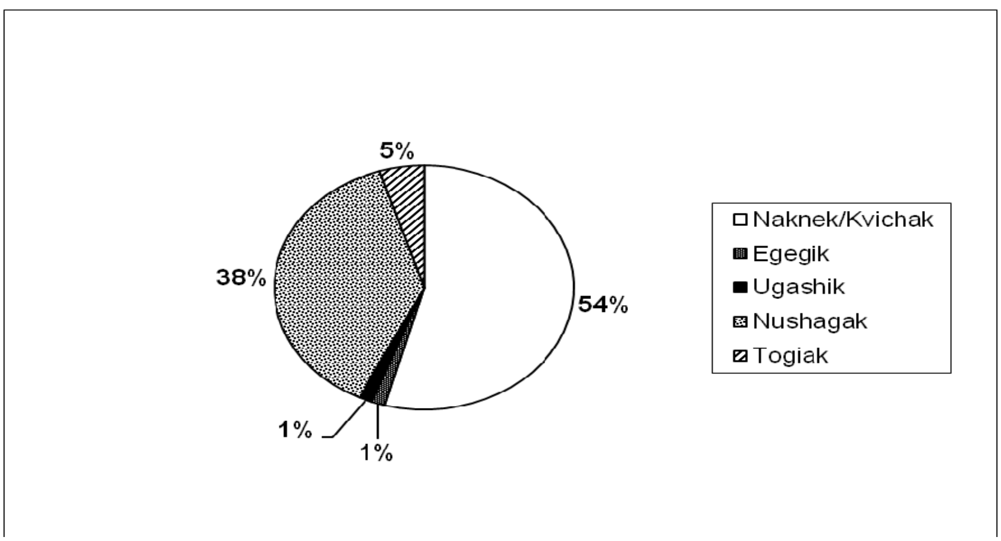


Figure 3-12 Composition of Bristol Bay area subsistence salmon harvest by species, 2008

Source: Fall et al., 2011.

In 2008, as over the last several decades, most of the Bristol Bay area subsistence harvest was taken in the Naknek–Kvichak (54%) and the Nushagak (38%) districts (Figure 3-13). The Naknek–Kvichak total harvest of 73,184 salmon in 2008 was slightly higher than in 2007 (72,280 salmon), 2006 (71,796 salmon), and 2005 (72,302 salmon). It was substantially higher than the 2003 harvest of 63,934 salmon. In the Nushagak District, the total estimated subsistence harvest in 2008 was 51,395 salmon. This was higher than the 2007 harvest of 44,944 salmon and the 2006 harvest of 40,373 salmon (Table 3-8) (Fall et al., 2011).



Source: Fall et al., 2011.

Figure 3-13 Subsistence salmon harvests by district, Bristol Bay area, 2008

Table 3-8 Estimated subsistence salmon harvests by district and location fished, Bristol Bay area, 2008

Area and River System	Number of permits issued[a]	Estimated salmon harvest Chinook	Sockeye	Coho	Chum	Pink	Total
Naknek-Kvichak District	481	719	69,823	1,437	404	801	73,184
Naknek River Subdistrict	271	684	20,260	1,397	345	769	23,456
Kvichak River/Iliamna Lake Subdistrict:	215	35	49,563	40	59	31	49,728
Igiugig	10	5	1,595	0	29	0	1,629
Iliamna Lake-General	35	0	6,638	0	0	0	6,638
Kijik	1	0	300	0	0	0	300
Kokhanok	25	26	14,142	10	10	6	14,194
Kvichak River	10	0	405	0	0	0	405
Lake Clark	47	0	4,027	0	0	0	4,027
Levelock	1	4	30	30	20	25	109
Newhalen River	58	0	10,984	0	0	0	10,984
Pedro Bay	20	0	5,388	0	0	0	5,388
Six Mile Lake	18	0	6,054	0	0	0	6,054
Egegik District	37	91	1,502	295	35	4	1,928
Ugashik District	14	47	1,660	222	17	9	1,955
Nushagak District	571	12,960	26,828	5,133	4,552	1,923	51,395
Wood River	163	2,726	6,780	816	468	260	11,051
Nushagak River	109	4,564	6,209	804	2,547	211	14,334
Nushagak Bay Noncommercial	232	4,469	8,119	2,294	1,259	801	16,942
Nushagak Bay Commercial	42	346	1,435	761	164	582	3,288
Igushik/Snake River	63	855	4,285	458	114	69	5,780
Togiak District	91	1,337	3,770	541	701	114	6,463
Total	1,178	15,153	103,583	7,627	5,710	2,851	134,924

Source: ADF&G Division of Subsistence, ASFDB 2009 (ADF&G 2009).

Note: Harvests are extrapolated for all permits issued, based on those returned and on the area fished as recorded on the permit. Due to rounding, the sum of columns and rows may not equal the estimated total. Of 1,178 permits issued for the management area, 1,083 were returned (91.9%).

[a]Sum of sites may exceed district totals, and sum of districts may exceed area total, because permittees may use more than one site.

2010 Fishery Update

In 2010, in the five fishing districts of the Bristol Bay management area (Ugashik, Egegik, Naknek/Kvichak, Nushagak and Togiak), subsistence salmon fishing was generally allowed from May 1 through May 31 and October 1 through October 31 from 9 am Monday through 9 am Friday. From June 1 through September 30, subsistence salmon could be taken only during open commercial fishing periods, but a person may not subsistence fish and commercial fish simultaneously. In the Nushagak District, emergency order subsistence salmon fishing openers are announced during periods of extended commercial closures. In the Naknek, Egegik, and Ugashik Rivers, starting a 9 am on June 23 to 9 am July 17, subsistence fishing for salmon is normally limited to two 24-hour periods a week. Each period starts at 9 am on Tuesday and Saturday and ends the following day at 9 am. In the Naknek River drainage from June 1 to October 1, gillnets were prohibited except in limited areas of the Naknek Lake by specific regulations. In the area of the Nushagak River from Nushagak Point to Lewis Point and including the lower Wood River upstream to Red Bluff, subsistence fishing for salmon from 9 am July 2 to 9 am July 17 was generally limited to three 24-hour fishing periods per week. Each period starts at 9 am on

Monday, Wednesday, and Friday and ends at 9 am the following day (www.adfg.alaska.gov/index.cfm?adfg=ByAreaSubsistenceBristolBay.fishingInfo). Subsistence fishing for chum salmon was not restricted beyond the above schedule during 2010.

2011 Fishery Update
The 2011 Bristol Bay salmon season summary covers commercial harvests; however, it does not describe subsistnence fishing conditions or subsistence harvests. Information on 2011 subsistence fishing in Brisotl Bay will be included here once the 2011 Bristol Bay Annual Management Report is made available.

3.3.3 Kuskokwim Area

Description of Management Area
The Kuskokwim Management Area is approximately 50,000 square miles in size, including the Kuskokwim River drainage and all waters of Alaska that flow into the Bering Sea between Cape Newenham and the Naskonat Peninsula, plus Nunivak and St. Matthew Islands. There are fishing districts within the Kuskokwim Area. Districts 1 and 2 are within the Kuskokwim River; Districts 4 and 5 are in Kuskokwim Bay (Estensen et al., 2009).

Figure 3-14 Kuskokwim Management Area

The Kuskokwim area subsistence salmon fishery is one of the largest in the state. From June through August, daily activities of many Kuskokwim area households revolve around harvesting, processing, and preserving salmon and non-salmon fishes for subsistence uses. Table 3-9 below lists subsistence salmon harvest by community in the Kuskokwim Management Area for 2008. The movement of families from permanent winter residences to summer fish camps situated along rivers and sloughs continues to be a significant element of the annual subsistence harvest effort in this area, even though many subsistence salmon fishers also fish directly from their home community. Division of Subsistence studies in the region indicate that fish (salmon and non-salmon) contribute 67% to 85% of the total wild resource harvest (in pounds) in a community, and salmon contribute 49% to 53% of the total pounds of fish and wildlife harvested in this area. The harvest of salmon for subsistence ranges from 241 usable pounds per person in some communities (e.g., Nunapitchuk, 1983) to 446 pounds per person (e.g., Kwethluk, 1986) and 649 pounds per person (e.g., Akiachak, 1998) in other Kuskokwim River communities (Andrews 1989, 1994; Coffing 1991; Coffing et al. 2001).

Table 3-9 Subsistence salmon harvests by community, Kuskokwim Area, 2008

	Households		Estimated Salmon Harvests					
Community	Total	Contacted	Chinook	Sockeye	Coho	Chum	Pink	Total
Kipnuk	128	0	–	–	–	–	–	–
Kwigillingok	71	0	–	–	–	–	–	–
Kongiganak	83	22	2,086	1,347	551	1,592	0	5,576
North Kuskokwim Bay	**282**	**22**	**2,086**	**1,347**	**551**	**1,592**	**0**	**5,576**
Tuntutuliak[a]	92	0	4,420	2,226	3,238	4,655	–	14,539
Eek[a]	85	0	2,826	693	1,307	725	–	5,551
Kasigluk	98	30	2,928	1,230	917	1,677	0	6,752
Nunapitchuk[a]	111	0	4,361	2,410	648	5,057	–	12,476
Atmautluak[a]	66	0	1,868	1,406	403	2,428	–	6,105
Napakiak	90	32	2,183	1,630	1,383	1,809	0	7,005
Napaskiak	101	29	4,963	2,684	717	2,857	0	11,221
Oscarville	19	8	1,351	677	62	836	5	2,931
Bethel	1,981	446	35,205	18,016	16,998	18,660	178	89,057
Kwethluk	156	33	8,303	5,045	7,058	5,871	291	26,568
Akiachak	148	37	9,475	4,700	4,098	4,027	118	22,418
Akiak	75	25	3,493	2,539	1,276	2,949	47	10,304
Tuluksak	78	24	3,425	2,305	788	4,016	77	10,611
Lower Kuskokwim	**3,100**	**664**	**84,801**	**45,561**	**38,893**	**55,567**	**716**	**225,538**
Lower Kalskag	89	17	2,442	1,736	95	2,030	111	6,414
Kalskag (Upper)	52	20	2,241	961	1,939	1,751	68	6,960
Aniak	177	97	3,252	1,796	3,013	2,839	2	10,902
Chuathbaluk	38	12	785	379	554	606	0	2,324
Middle Kuskokwim	**356**	**146**	**8,720**	**4,872**	**5,601**	**7,226**	**181**	**26,600**
Crooked Creek	39	17	598	785	1,865	970	0	4,218
Red Devil	18	7	152	379	335	171	5	1,042
Sleetmute	31	13	644	1,071	210	346	14	2,285
Stony River	19	9	667	1,679	521	1,403	106	4,376
Lime Village[a]	12	0	59	1,180	624	452	–	2,315
McGrath	119	25	573	1,292	178	1,247	0	3,290
Takotna	25	0	0	0	0	0	–	0
Nikolai	27	15	221	16	63	65	0	365
Telida	2	0	–	–	–	–	–	–
Upper Kuskokwim	**292**	**86**	**2,914**	**6,402**	**3,796**	**4,654**	**125**	**17,891**
Kuskokwim River	**4,030**	**918**	**98,521**	**58,182**	**48,841**	**69,039**	**1,022**	**275,605**
Quinhagak	172	44	4,090	2,714	2,296	1,740	270	11,110
Goodnews Bay	69	20	1,060	3,131	1,491	764	49	6,495
Platinum	17	10	42	156	114	106	0	418
South Kuskokwim Bay	**258**	**74**	**5,192**	**6,001**	**3,901**	**2,610**	**319**	**18,023**
Mekoryuk	63	0	–	–	–	–	–	–
Newtok	79	0	–	–	–	–	–	–
Nightmute	50	0	–	–	–	–	–	–
Toksook Bay	114	0	–	–	–	–	–	–
Tununak	61	0	–	–	–	–	–	–
Chefornak	79	0	–	–	–	–	–	–
Bering Sea Coast	**446**	**0**	**–**	**–**	**–**	**–**	**–**	**–**
Total	**4,734**	**992**	**103,713**	**64,183**	**52,742**	**71,649**	**1,341**	**293,628**

Source: ADF&G Division of Commercial Fisheries (2009). Preliminary results as of January 3, 2011.
Note: Includes harvests using rod and reel and the removal of salmon from commercial harvests as well as subsistence nets.
[a]These communities were not contacted during the 2008 study period, therefore the total harvest was estimated using Bayesian multiple imputation method.
[b]These communities were not contacted during the 2008 study period. Not enough data were available to estimate harvest.
– Data unavailable.

Subsistence Regulations

Most subsistence salmon fishers in the region are Kuskokwim area residents; however, some subsistence fishers are domiciled in other parts of Alaska, but return to fish on their own or assist family or friends with the harvesting or processing of salmon. Licenses and permits have never been required for subsistence salmon fishing in the Kuskokwim Area. Standard conditions include prohibition of fishing within 300 ft of a dam, fish ladder, weir, culvert, or other artificial obstruction. There are no restrictions on the number of salmon allowed to be taken by individual fishers or households for subsistence uses in the Kuskokwim area (except for subsistence fishers using rod and reel upstream of the Doestock River on the Aniak River from June 1 to August 31). Salmon can be harvested for subsistence uses by set and drift gillnets, beach seines, fish wheels, handline, and rod and reel, except that salmon may also be taken by spear in the Holitna, Kanektok, Arolik river drainages, and the drainage of Goodnews Bay (5 AAC 01.270(a)). Set or drift gillnets in use by individual fishers cannot exceed a total length of 50 fathoms, and each subsistence gillnet operated in tributaries of the Kuskokwim River must be attached to the bank, fished substantially perpendicular to the bank and in a substantially straight line.

In that portion of the Kuskokwim river drainage from the north end of Eek Island upstream to the mouth of the Kolmakoff River, no part of a set gillnet located within a tributary to the Kuskokwim River may be set or operated within 150 feet of any part of another set gillnet. A gillnet may not obstruct more than one-half the width of any fish stream and any channel or side channel of a fish stream. A stationary fishing device may not obstruct more than one-half the width of any salmon stream and any channel or side channel of a salmon stream. Gillnets used for harvesting salmon could be of any mesh size. Nets with six inch or smaller mesh could not be more than 45 meshes deep, and nets with mesh greater than six inches could not be more than 35 meshes deep. Fishers were required to have their names and addresses attached to gillnets and fish wheels (5 AAC 01.270) (Fall et al 2011).

Kuskokwim River chum salmon were listed by the BOF as a stock of yield concern (refer to definition in Section 3.3.4) in September 2000, but improved abundance led to the finding being discontinued in January 2007 and at present there are no stock of concern designations for the Kuskokwim Management Area. Historically, Kuskokwim River chum salmon, though an important subsistence species, have been primarily targeted for commercial use (Estensen, 2009). In January 2004, the BOF adopted regulations allowing ADF&G to specify closed periods around commercial fishing periods by emergency order in districts 1 and 2. Prior to this action, areas within commercial salmon fishing districts were closed to subsistence salmon net and fish wheel gear 16 hours before, during, and six hours after commercial fishing periods. Since 2004, areas within commercial salmon fishing districts have been closed to subsistence salmon net and fish wheel gear six hours before, during, and three hours after commercial fishing periods (Fall et al., 2011). Many of the fishermen who participate in the Kuskokwim commercial fisheries are area residents who also subsistence fish. The purpose of this regulatory change was to continue discouraging illegal fishing activities, such as the sale of subsistence-caught salmon into the commercial fishery, while also providing more subsistence harvest opportunity.

Subsistence Harvest Assessment Methods

There are 38 communities in the Kuskokwim Management Area, including the central hub city of Bethel. The Kuskokwim Subsistence Salmon Monitoring Program estimates the harvest of subsistence salmon primarily through household surveys and harvest calendars. The Division of Commercial Fisheries began conducting subsistence salmon harvest surveys among Kuskokwim River fishers in the Kuskokwim River drainage in 1960. During the 1980s, funding was insufficient to conduct surveys in all Kuskokwim Area communities; instead, subsets of villages sampled and then these data were expanded to produce an estimate of the salmon harvest by other communities. As such, while information from 1960 to 1988 is available, the data are not necessarily comparable from year to year because the statistical methods used to expand the harvest data and produce total harvest estimates of Kuskokwim Area subsistence salmon were not fully documented (personal communication, Holly Carroll, 2010; see also Simon et al., 2007 and Walker and Coffing, 1993).

The Division of Subsistence assumed responsibility for the Kuskokwim Subsistence Salmon Monitoring Program in 1988 and collected and analyzed subsistence data until 2007. The division developed a stratified household survey program to estimate Kuskokwim subsistence salmon harvests by community. Subsistence salmon harvests were estimated based on the total number of households in a community, not just the number of fishing households as in the previous method. Households in the Kuskokwim Area are assigned a “household identification number” (HHID) to aid in tracking a household’s subsistence harvest over time. Not only are households that “usually fish” tracked on an annual basis, but households that “usually do not fish” and “unknown” households are also tracked annually as well as sampled during postseason harvest monitoring activities. This stratified method of estimating total community harvest results in more complete data for all salmon species harvested for most communities in the Kuskokwim Area. When compared to the new method, the previous method significantly overestimated subsistence salmon harvests, due likely to the overemphasis on fishing households in the reporting of harvest information (personal communication, Holly Carroll, 2010; see also Simon et al., 2007 and Walker and Coffing, 1993).

In 2007, Subsistence Division ran an abbreviated version of the monitoring program with limited funding. In 2008, the Division of Commercial Fisheries reacquired supervision of the program in the Kuskokwim Area in order to continue the collection of this information that is important for managing the subsistence as well as the commercial and sport salmon fisheries in the Kuskokwim Area (personal communication, Holly Carroll, 2010). Given the history of differing methodologies used for estimating subsistence salmon harvest in the Kuskokwim Management Area, harvest numbers presented in this section are estimates only and cannot be compared to one another across the time series.[15]

The four primary objectives of the 2008 Kuskokwim Area postseason subsistence salmon harvest monitoring program included: 1) estimating the number of salmon harvest for subsistence by residents of Bethel; 2) estimating the number of salmon harvested for subsistence by residents of Aniak; 3) placing the Bethel and Aniak estimates within the context of the harvest estimates for the entire Kuskokwim Fisheries Management Area; and 4) where applicable, generation of estimated harvest for uncontacted communities. In 2008, subsistence salmon harvest data collection in Bethel was conducted by staff from the Orutsararmuit Native Council (ONC). ONC staff have been involved in subsistence salmon harvest monitoring in Bethel since 1999. Subsistence harvest data collection in Aniak was conducted by staff from the Kuskokwim Native Association (KNA). KNA staff have been involved in subsistence salmon harvest monitoring in Aniak since 2002 (Fall et al 2011).

Subsistence salmon harvest by Bethel residents was estimated by employing a simple random harvest survey method. The population of Bethel is highly fluid; therefore, it is difficult to maintain an accurate and complete household list. Subsistence salmon harvest of Aniak residents was estimated by employing a stratified random harvest survey method. Compared to Bethel, Aniak is small and there is less change among households. In both locations, ADF&G Commercial Fisheries Division was responsible for designing and producing the survey instrument and either ONC or KNA was responsible for conducting household surveys (Fall et al., 2011).

For the remaining 36 communities in the Kuskokwim Area, annual subsistence harvest surveys were conducted by ADF&G Commercial Fisheries staff from October through December. The survey design in

[15]ADF&G Division of Commercial Fisheries staff are currently involved in a project designed to revise historical harvest estimates to align them with the current monitoring methodology used. Project efforts include the use of statistical modeling to integrate the various datasets in order to provide estimates of historical run abundance.

each community was either a census (100% survey) or a stratified random sample, depending on community size. Every effort is made to survey all communities; however, there are several communities who refuse to participate. As such, they are not included in harvest estimates (Fall et al., 2011).

In addition to household surveys, subsistence salmon harvest calendars were mailed in late April or early May so that they were available to fishers prior to the start of the salmon fishing season. Calendar data is instrumental for examination of subsistence salmon harvest timing. Most subsistence salmon harvest data obtained from returned calendars are not used to directly calculate Kuskokwim Area subsistence salmon harvest estimates, but these data are used to corroborate household survey data.

From an estimated 4,734 households located in the Kuskokwim Area, contact was made with 992 unique households by household surveys among 23 communities. From this total, 577 households were identified as having subsistence fished for salmon in 2008, which represents a substantial decrease in the estimated proportion of Kuskokwim Area households engaged in subsistence fishing from previous harvest monitoring efforts (may be due to methodological shifts). Despite attempts to estimate subsistence salmon harvests where no household contact has been made, insufficient data exists and Kuskokwim Management Area subsistence harvest totals should be viewed as estimates only based on expanded harvest data (Fall et al., 2011).

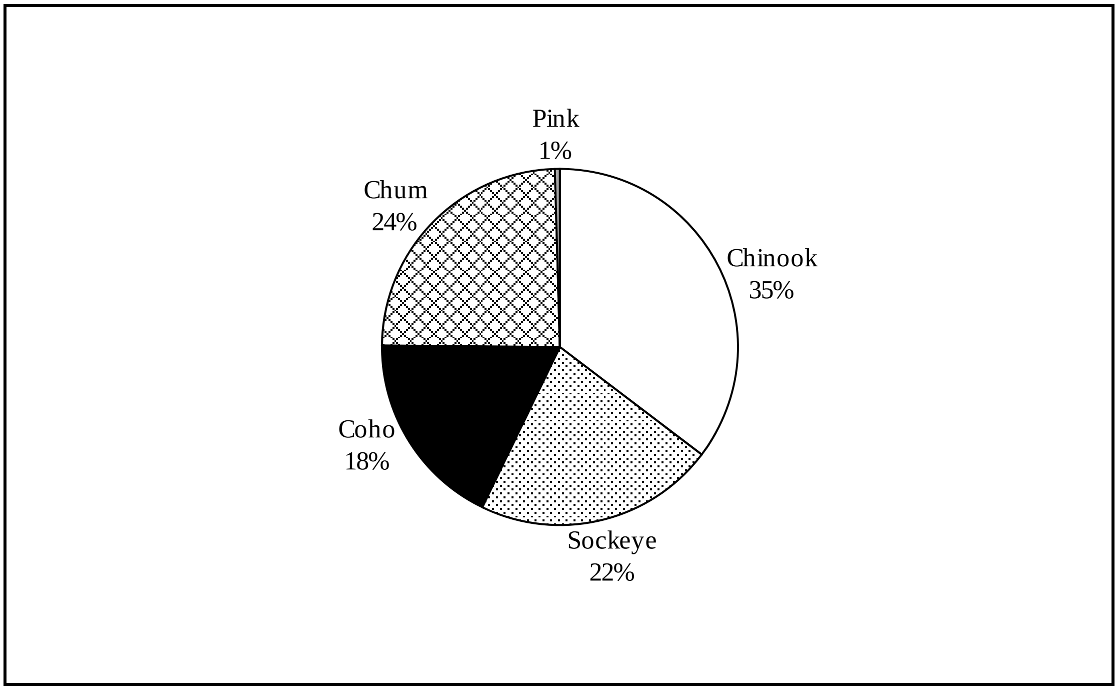
The Kuskokwim River drainage (including North Kuskokwim Bay communities) represents 85% of the estimated total number of households in the entire Kuskokwim area and 91% of the identified subsistence fishing households. In the South Kuskokwim Bay region (Quinhagak, Goodnews Bay, and Platinum), 20% of households contacted were estimated to have subsistence fished in 2008, with 70% of those having harvested salmon for subsistence uses. Data from the Bering Sea coastal communities are limited, but harvest activity by households in the Bering Sea coastal communities is believed to be much greater than what the available data documents (Fall et al., 2011).

Chum Salmon Subsistence Harvest

Chum salmon subsistence harvest estimates for 2008 were 71,649 fish out of an all salmon species[16] total of 292,287 fish (Table 3-10). Average annual subsistence harvest for the most recent five years is approximately 50,000 chum salmon and harvest has been within or above ANS every year since 1990 (Fall et al., 2011).

In 2008, estimates of subsistence salmon harvest for communities contacted in the Kuskokwim Area totaled 24% of the total subsistence salmon harvested (Figure 3-15). These estimates fall above the most recent five year averages for all species of salmon, with the exception of pink salmon. Figure 3-16 and Table 3-10 below highlight historical subsistence chum salmon harvests for the Kuskokwim Area. Lower Kuskokwim River communities accounted for 77% of the 2008 estimated subsistence salmon harvests in the Kuskokwim Area. Residents of Bethel accounted for 30% of the Kuskokwim Area subsistence salmon harvests (Fall et at., 2011).

[16] Pink salmon are not included in these data. ADF&G has only recently begun monitoring pink salmon in the Kuskokwim area; therefore, historical comparisons are not yet possible.



Source: Fall et al., 2011.

Figure 3-15 Kuskokwim Area subsistence salmon harvest composition, 2008

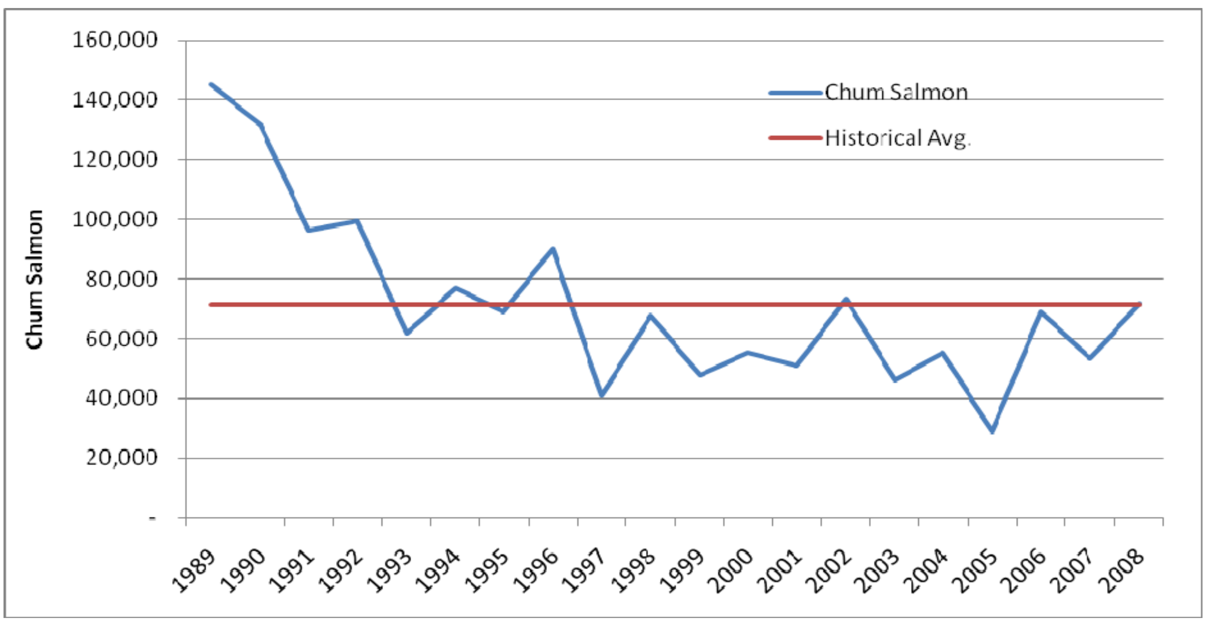


Figure 3-16 Estimated historical subsistence chum salmon harvests, Kuskokwim Area, 1989-2008.

Table 3-10 Estimated historical subsistence chum salmon harvest, Kuskokwim Area, 1989-2008.

	Households		Estimated Salmon Harvest				
Year	Total	Surveyed	Chinook	Sockeye	Coho	Chum	Total
1989	3,422	2,135	85,322	37,088	57,786	145,106	325,287
1990	3,317	1,830	92,675	39,659	50,708	131,470	314,513
1991	3,347	2,024	90,226	56,401	55,620	96,314	298,561
1992	3,314	1,724	68,685	34,158	44,494	99,576	246,914
1993	3,274	1,816	91,722	51,362	35,295	61,724	240,103
1994	3,179	1,821	98,378	39,280	36,504	76,949	251,111
1995	3,652	1,894	100,157	28,622	39,165	68,941	236,885
1996	3,643	1,837	81,597	35,037	34,699	90,239	241,572
1997	3,510	1,831	85,506	41,251	30,717	40,993	198,466
1998	3,495	1,849	86,113	37,579	27,240	67,664	218,595
1999	4,180	2,523	77,660	49,388	27,753	47,612	202,413
2000	4,441	2,750	68,841	44,832	35,670	55,371	204,714
2001	4,483	2,297	77,570	51,965	31,686	51,117	212,338
2002	4,339	2,798	70,219	27,733	34,413	73,234	205,599
2003	4,535	2,375	72,498	36,894	38,791	46,291	194,474
2004	4,670	2,432	85,086	34,892	39,406	55,575	214,959
2005	3,903	1,610	72,174	47,656	36,751	28,838	186,762
2006	4,657	1,514	68,041	34,849	32,809	68,812	204,510
2007	4,618	1,356	72,097	34,578	26,270	53,298	186,243
2008	4,734	992	90,179	56,268	46,522	71,649	251,301
5-year average (2003-2007)	4,477	1,857	73,979	37,774	34,805	50,563	197,121
10-year average (1998-2007)	4,332	2,150	75,030	40,037	33,079	54,781	202,926
15-year average (1993-2007)	4,039	2,047	80,511	39,728	33,811	59,110	213,160
Historical average (1989-2007)	3,894	2,022	81,293	40,170	37,672	71,533	230,668

Source: Fall et al., 2011.

During 2008, out of 577 contacted fishing households, 438 households reported using drift gillnets for subsistence salmon harvests, 61 reported using setnets, and 70 reported using subsistence rod and reel gear. The most common gear type used in the Kuskokwim Area is the drift gillnet (76% of reporting households). Many households throughout the area also use rod and reel for subsistence fishing. Rod and reel is used by households that may not have access to other gear types, by fishers in areas where other gear types are not as effective or efficient, and to harvest fewer fish when less are sought (Fall et al., 2011).

In 2008, few households reported retaining commercially-caught salmon for subsistence uses. An estimated total of 1,630 salmon were retained from commercial catches, including 182 chum salmon (Fall et al., 2011).

2010 Fishery Update

Chum salmon run timing for the Kuskokwim Area was normal in 2010. The subsistence fishing schedule was not implemented given that Chinook, chum salmon, sockeye salmon, and coho salmon runs were anticipated to be adequate to achieve escapement goals and provide for subsistence uses. For the Kuskokwim River, subsistence fishing was allowed seven days a week throughout the season with the exception of closed periods six hours before, during, and three hours after commercial fishing periods in June, July, and August. For Kuskokwim Bay, subsistence fishing was allowed seven days per week throughout the season with the exception of closed periods 16 hours before, during, and six hours after commercial fishing periods. These closures were reduced to eight hours before, during, and six hours after commercial fishing periods beginning July 13.[17]

2011 Fishery Update[18]

The 2011 preseason outlook for Chinook salmon was similar to 2010 when the Kuskokwim River Drainage experierienced the lowest estimated total runa and spawning escapement on record and not achieving escapement goals for several years in Kuskokwim River tributaries was cause for conservation concern. Several preseason management measures were put into place from June 1 to July 25 to protect Chinook salmon. On June 29 through July 7, 2011 ADF&G restricted subsistence salmon fishing to 6-inch or smaller gillnets in District 1 of the Kuskokwim River drainage in order to conserve Chinook while providing harvest opportunities for more abundant chum and sockeye salmon. Post season subsistence harvest surveys are presently being conducted and subsistence harvest numbers for 2011 are not yet available.

3.3.4 Yukon River

Description of Management Area

The Yukon Area includes all waters of Alaska within the Yukon River drainage and coastal waters from Point Romanof, northeast of Kotlik, to the Naskonat Peninsula. For management purposes, the Yukon Area is divided into seven districts and 10 subdistricts (Figure 3-17). Commercial fishing may be allowed along the entire 1,224 miles of the Yukon River in Alaska and along the lower 225 miles of the Tanana River. The Coastal District includes the majority of coastal marine waters within the Yukon Area and is only open to subsistence fishing. The Lower Yukon Area (Districts 1, 2, and 3) includes coastal waters of the Yukon River delta and that portion of the Yukon River drainage downstream of Old Paradise Village (river mile 301). The Upper Yukon Area (Districts 4, 5, and 6) is the Alaskan portion of the Yukon River drainage upstream of Old Paradise Village (Bergstrom et al., 2009).

While non-salmon fish species provide an important component of the overall fish harvest in the Yukon Area, salmon comprise the bulk of the fish harvested for subsistence. Chinook salmon, summer and fall chum salmon, and coho salmon comprise the majority of the salmon harvests in the Yukon River drainage. The number of salmon harvested for subsistence in this region is significant. Unlike many marine and coastal fisheries in which commercial harvests predominate, subsistence salmon harvests within the Yukon drainage often exceed commercial, sport, and personal use harvests combined (Fall et al., 2009).

[17] www.adfg.alaska.gov/static/fishing/PDFs/commercial/2010_kuskokwim_post_summary.pdf

[18] Chum Salmon RIR_IRFA_April 2012 initial review_working draft Feb 2012.doc

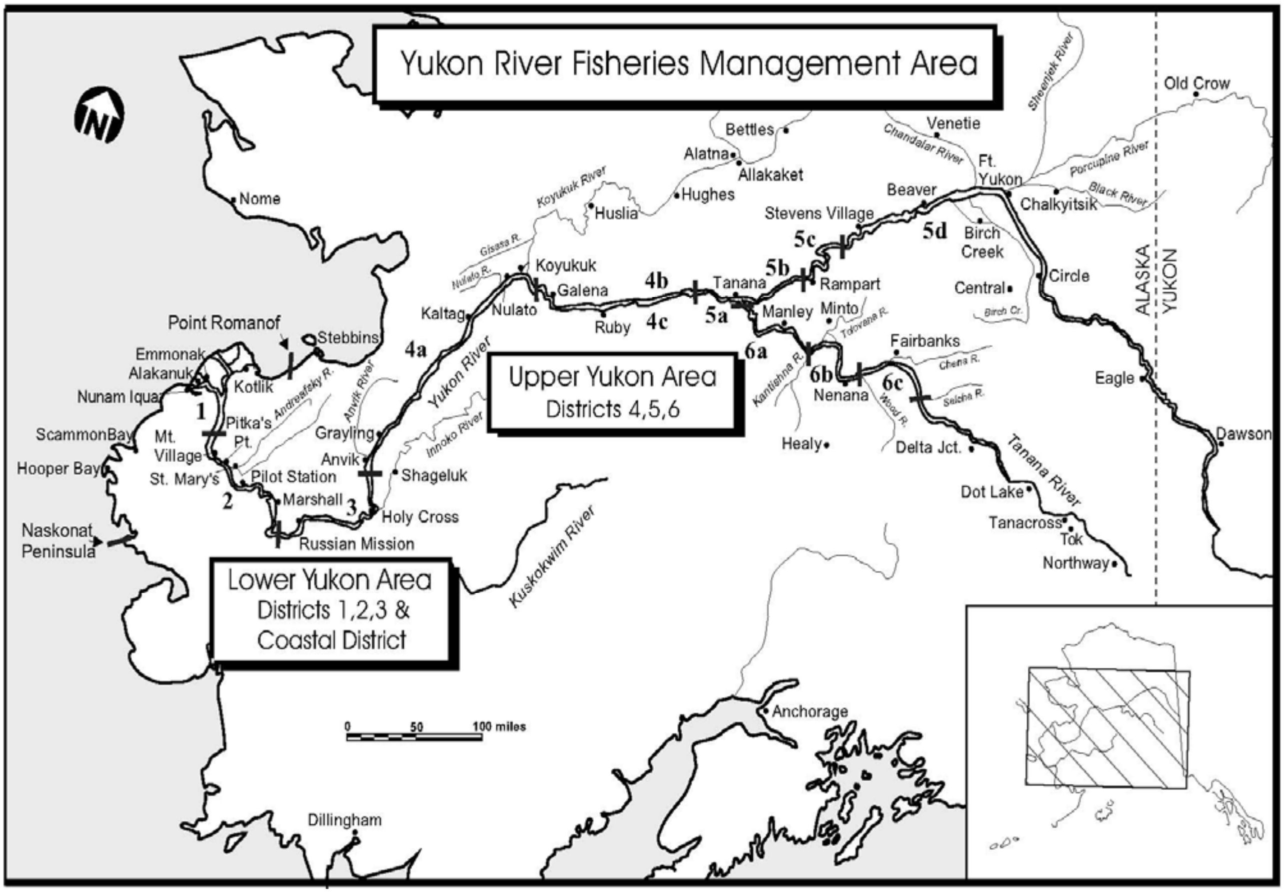


Figure 3-17 Yukon River Fisheries Management Area

Drift gillnets, set gillnets, and fish wheels are used by Yukon Area fishers to harvest the majority of salmon. According to regulation, salmon may be taken by gillnet, beach seine, a hook and line attached to a rod or pole, handline, or fish wheel (5AAC 01.220(a)). Set gillnets are utilized throughout the Yukon Area, often in the main rivers and coastal marine waters, while drift gillnets are used extensively in some parts of the river (i.e., by state regulation, that portion of the Yukon drainage from the mouth to a point 18 miles downstream of Galena) (5 AAC 01.220(e)). During subsistence fishing closures specified in 5 AAC 01.210(b), all salmon gillnets with a mesh size greater than four inches must be removed from the water and fish wheels may not be operated (5 AAC 01.220(f)(9)). Fish wheels are a legal subsistence or noncommercial gear type throughout the Yukon drainage, although due to river conditions and the availability of wood for building materials, they are used almost exclusively only on the middle and upper Yukon and Tanana rivers (Fall et al, 2009).

Depending on the area of the Yukon River drainage and salmon species' run timing, subsistence fishing occurs from late May through early October; fishing opportunity in the Lower Yukon Area in May and in the Upper Yukon Area in October is highly dependent upon river ice conditions. Table 3-11 below lists subsistence salmon harvest by community in the Yukon River Management Area for 2008. Chum salmon in the Yukon River consist of an earlier, and typically more abundant, summer chum salmon run and a later fall chum salmon run. Fishing activities are based either from fish camps or from the home villages; fishing patterns and preferred sites vary from community to community. Extended family groups, typically representing several households, often undertake subsistence salmon fishing together.

Households and related individuals typically cooperate to harvest, process, preserve, and store salmon for subsistence uses (JTC, 2010).

Table 3-11 Estimated subsistence salmon harvests by community, Yukon Area, 2008

	Households or permits		Estimated salmon harvests[a]					
Community	Total	Surveyed or returned	Chinook	Coho	Summer Chum	Fall Chum	Pink	Total
Alakanuk	123	48	1,238	157	6,881	423	494	9,193
Alatna	14	8	16	0	66	0	0	82
Allakaket	48	22	58	152	3,229	1,345	0	4,784
Anvik	32	26	1,433	40	340	317	23	2,153
Beaver	32	24	546	6	27	13	0	592
Bettles	22	18	0	0	0	0	0	0
Birch Creek	19	6	32	0	0	30	0	62
Central	12	12	48	0	0	0	0	48
Chalkyitsik	32	18	0	0	0	0	0	0
Circle	20	14	519	0	5	3,198	0	3,722
Eagle	41	39	1,068	0	14	15,269	0	16,351
Emmonak	154	81	2,696	717	9,646	1,670	641	15,370
Fairbanks	282	272	2,127	356	465	1,310	0	4,258
Fort Yukon	174	71	1,991	1,618	230	14,252	196	18,287
Galena	185	63	2,232	558	758	1,364	31	4,943
Grayling	48	13	1,761	25	660	1,012	200	3,658
Healy	5	4	13	1,105	0	1,030	0	2,148
Holy Cross	54	33	2,509	38	441	920	20	3,928
Hooper Bay	202	83	388	66	12,007	329	1,013	13,803
Hughes	28	24	61	0	944	127	0	1,132
Huslia	82	27	255	100	4,377	64	100	4,896
Kaltag	68	25	2,403	45	916	620	383	4,367
Kotlik	94	39	2,066	313	4,291	671	1,161	8,502
Koyukuk	33	29	513	84	1,104	1,177	67	2,945
Manley Hot Springs	19	19	106	4,243	144	7,058	0	11,551
Marshall	73	27	3,284	490	3,023	748	26	7,571
Minto	46	41	12	0	9	28	0	49
Mountain Village	144	64	1,645	518	7,559	926	500	11,148
Nenana	35	33	327	2,775	950	7,512	0	11,564
Nulato	83	26	1,250	195	468	729	35	2,677
Nunam Iqua (Sheldon Point)	37	29	163	24	1,949	59	757	2,952
Pilot Station	107	53	1,597	268	6,012	917	34	8,828
Pitka's Point	28	23	544	130	1,246	101	15	2,036
Rampart	3	3	136	0	27	1,000	0	1,163
Ruby	61	28	637	291	655	657	184	2,424
Russian Mission	69	26	2,949	372	2,400	578	436	6,735
Saint Marys	124	61	1,756	591	6,451	830	367	9,995
Scammon Bay	80	33	1,104	50	6,113	57	2,766	10,090
Shageluk	37	25	397	0	130	323	0	850
Stevens Village	30	22	753	0	163	643	0	1,559
Tanana	97	48	3,981	1,511	2,877	17,478	80	25,927
Venetie	62	23	292	0	50	1,563	0	1,905
Other Communities	91	81	406	67	25	3,190	0	3,688
Total	**3,030**	**1,664**	**45,312**	**16,905**	**86,652**	**89,538**	**9,529**	**247,936**

Subsistence Regulations

Regulation and management of Yukon River drainage subsistence salmon fishing is guided by the *Yukon River Drainage Subsistence Salmon Fishery Management Protocol*, which provides a framework for coordinated subsistence fisheries management between ADF&G and the federal subsistence management programs in the Yukon River drainage. The protocol also directs state and federal managers to solicit input from the Yukon River Drainage Fisheries Association (YRDFA), the state and federal regularity bodies functioning through the Alaska Board of Fisheries and Federal Subsistence Board processes, and other stakeholders during the decision-making process (Fall et al, 2009).

Standard subsistence permit conditions include prohibition of fishing within 300 ft of a dam, fish ladder, weir, culvert, or other artificial obstruction. The majority of the United States' portion of the Yukon Area is open to subsistence fishing; however, the Joint Board has defined a portion of the Tanana River in the Yukon River drainage as lying within the Fairbanks Nonsubsistence Area (5 AAC 99.015). The harvest of fish for home uses in these nonsubsistence areas occurs under personal use and sport fishing regulations (see Section 3.5.3) (Fall et al., 2009).

At its September 2000 work session, the BOF classified the Yukon River summer chum salmon as a stock of management concern.[19] This determination of management concern was based on documented low escapements during 1998-2000 and an anticipated low run in 2001. The classification as a management concern was continued at the January 2004 BOF meeting due to established escapement goals not being achieved in East Fork Andreafsky River from 1998-2003 and in Anvik River from 1998-2001 and 2003 (Bergstrom et al., 2009).

Given the collectively large spawning escapements of the Yukon River summer chum salmon stock over the three years preceding the January 2007 BOF meeting (2004-2006), including a near record run in 2006, the summer chum salmon stock no longer met stock of concern criteria and the classification was discontinued in February 2007 (Bergstrom et al., 2009).

In addition to the above actions, in January 2010, the BOF modified The Yukon River Summer Chum Salmon Management Plan to allow, by emergency order, a commercial harvest up to 50,000 fish if the total run size is between 900,000 and 1,000,000 fish, distributed by district or subdistrict in proportion to the guideline harvest levels (Hayes and Norris, 2010).

Similar to that of summer chum salmon, Yukon River fall chum salmon was classified as a stock of yield concern[20] by the BOF at its September 2000 work session. Additionally, Toklat and Fishing Branch Rivers fall chum salmon were classified as stocks of management concern. The determination for the entire Yukon River fall chum salmon as a stock of yield concern was based on substantial decrease in yields and harvestable surpluses during the period 1998-2000, and the anticipated very low run expected in 2001. The 2000 fall chum salmon run was the worst on record. The determination for Toklat and Fishing Branch Rivers as stocks of management concern was based on escapements not meeting the OEG of 33,000 fish for Toklat River from 1996-2000, and not meeting the escapement objective of 50,000-120,000 fish for Fishing Branch River from 1997-2000 (Borba et al., 2009).

[19] A stock of management concern is defined as a concern arising from a chronic inability, despite use of specific management measures, to maintain escapements for a salmon stock within the bounds of the SEG, BEG, OEG, or other specified management objectives for the fishery. Chronic inability is defined as the continuing or anticpated inability to meet escapement objectives over a four to five year period (5 AAC 39.222(f)(21)). Refer to Section 5.2.1 of the (Draft) Bering Sea Non-Chinook Salmon Bycatch Management Environmental Assessement for a definition of SEG, BEG, and OEG.

[20] A stock of yield concern is defined as a concern arising from a chronic inability, despite use of specific management measures, to maintain expected yields, or harvestable surpluses, above a stock's escapement needs (5 AAC 39.222(f)(42)).

Classification as a stock of yield concern continued at the January 2004 BOF meeting because the combined commercial and subsistence harvests showed a substantial decrease in fall chum salmon yield from the 10-year period (1989-1998) to the more recent five year average (1999-2003). Toklat River stock was removed from management concern classification as a result of the BEG review presented at the BOF meeting; however, as a component of the Yukon River drainage, Toklat River fall chum salmon stock was included in the drainage-wide yield concern classification. Fishing Branch River stock was also removed from the management concern classification because management of the portion of the drainage is covered by an annex to the Pacific Salmon Treaty, which is governed under the authority of the Yukon River Panel (Borba et al., 2009).

In January 2007, the BOF determined that Yukon River fall chum salmon stock no longer met the criteria for a yield concern. Run strength was poor from 1998-2002; however, steady improvement had been observed since 2003. The 2005 run was the largest in 30 years and 2006 was above average for an even-numbered year run. The drainage-wide OEG of 300,000 fall chum salmon was exceeded in the preceding five years. The five year average (2002-2006) total reconstructed run of approximately 950,000 fish was greater than the 1989-1998 10-year average of approximately 818,000 fish, which indicated a return to historical run levels (Borba et al., 2009).

As with summer chum salmon, the BOF also modified the Yukon River Fall Chum Salmon Management Plan in January 2010. The BOF lowered the threshold required to allow a directed fall chum salmon commercial fishery from a run size of 600,000 fall chum salmon to 500,000 fall chum salmon. This modification also changed the threshold in the Yukon River Coho Salmon Management Plan from a run size of 550,000 fall chum salmon to 500,000 fall chum salmon in order to conduct a coho salmon directed commercial fishery (Hayes and Norris, 2010).

Since adopted by the BOF in 2001, the subsistence salmon fishery has been managed based on a schedule implemented chronologically consistent with migratory timing as the run progresses upstream. Subsistence fishing is open 7 days per week until the schedule is established. The subsistence salmon fishing schedule is based on current or past fishing schedules and provides reasonable opportunity for subsistence during years of normal to below average runs. The objectives of the schedule are to 1) reduce harvest early in the run when there is a higher level of uncertainty, 2) spread the harvest throughout the run to reduce harvest impacts on any particular component of the run and 3) provide subsistence fishing opportunity among all users during years of low salmon runs (personal communication, J. Linderman, 2010). Table 3-12 below presents the 2010 subsistence fishing schedule as it was established prior to the start of the season. Once commercial fishing is opened, subsistence fishing is open seven days per week, 24 hours per day, with the exception of closed periods 18 hours before, during, and 12 hours after commercial openings.

Table 3-12 Yukon Area subsistence fishing schedule by Yukon River district, 2010

Geographic Area/District	Fishing Period	Schedule to Begin	Days of the Week
Coastal District	7 days/week	All season	M/T/W/Th/F/Sa/Su - 24 hours
District Y-1	Two 36-hour periods/week	7-Jun-10	Mon. 8 pm to Wed. 8 am/Thu. 8 pm to Sat. 8 am
District Y-2	Two 36-hour periods/week	9-Jun-10	Wed. 8 pm to Fri. 8 am/Sun. 8 pm to Tue. 8 am
District Y-3	Two 36-hour periods/week	13-Jun-10	Wed. 8 pm to Fri. 8 am/Sun. 8 pm to Tue. 8 am
Subdistrict Y-4-A	Two 48-hour periods/week	16-Jun-10	Sun. 6 pm to Tue. 6 pm/Wed. 6 pm to Fri. 6 pm
Subdistricts Y-4-B, C	Two 48-hour periods/week	23-Jun-10	Sun. 6 pm to Tue. 6 pm/Wed. 6 pm to Fri. 6 pm
Koyukuk and Innoko Rivers	7 days/week	All season	M/T/W/Th/F/Sa/Su - 24 hours
Subdistricts Y-5-A, B, C	Two 48-hour periods/week	29-Jun	Tue. 6 pm to Thu. 6 pm/Fri. 6 pm to Sun. 6 pm
Subdistricts Y-5-D	7 days/week	All season	M/T/W/Th/F/Sa/Su - 24 hours
District Y-6	Two 42-hour periods/week	All seaon	Mon. 6 pm to Wed. Noon/Fri. 6 pm to Sun. Noon
Old Minto Area	5 days/week	All season	Friday 6 pm to Wednesday 6 pm

Source: Hayes and Norris, 2010.

Subsistence Harvest Assessment Methods

Most Yukon Area communities have no regulatory requirements to report their subsistence salmon harvest. For these communities, ADF&G operates a voluntary survey program. Harvest information is collected through postseason household interviews, follow-up telephone interviews and postal questionnaires, and harvest calendars. In select areas, fishermen must document their harvest on a subsistence or personal use permit. Subsistence harvest information is necessary to determine if sufficient salmon are returning to the Yukon Area for escapement and subsistence requirements, and if adequate fishing opportunity is provided to meet subsistence uses. Subsistence harvest information is critical for run reconstruction analysis and forecasting (Bergstrom et al., 2009).

Harvest information is collected using a combination of subsistence harvest calendars mailed prior to fishing activities, postseason household interviews, postseason telephone interviews, and postseason post card reminders. In road-accessible portions of the Yukon area, including the majority of the Tanana River drainage (subdistricts 6A and 6B, and the Upper Tanana River drainage), the Yukon River drainage between Hess Creek and the Dall River (known as the Yukon River bridge area), the upper portion of Subdistrict 5D between the upstream mouth of Twenty-two Mile Slough and the U.S.–Canada border, and, as of 2004, the Rampart area (western end of Garnet Island to the mouth of Hess Creek), and the Middle and South Fork area of the Koyukuk River, subsistence fishers are required to obtain an annual household permit prior to fishing, document their subsistence salmon harvest on the household permit, and return it to ADF&G at the end of the season (Fall et al., 2009).

Prior to salmon fishing activities, subsistence harvest calendars are mailed to all identified fishing households within the survey communities. The Lower Yukon Area calendars contain the months of May through September and the Upper Yukon Area calendars contain the months of June through October. Additional calendars are mailed to those households for which fishing activities are unknown and are also made available to households upon request from ADF&G offices in Emmonak and Fairbanks. The calendars provide space for fishers to record their daily subsistence harvest of salmon by species.

Calendars are return-postage-paid and are mailed to ADF&G or given to ADF&G research staff during postseason trips to the villages, especially to conduct the postseason salmon survey. Posters sent to village post offices and announcements on area radio stations remind fishers to give their calendars to research staff (Fall et al., 2009).

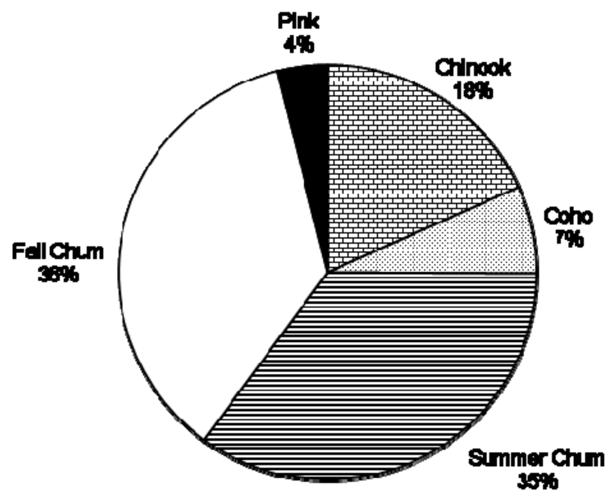
In addition to the harvest calendars, ADF&G Division of Commercial Fisheries staff conduct postseason in-person interviews with a stratified random sample of all households within the Yukon River drainage. Survey questions focus on Chinook, summer chum, fall chum, and coho salmon, but households are also asked about other fish species as well. Some households that are not contacted in person by the surveyors are contacted by telephone. Those households not contacted by telephone are mailed a survey questionnaire and a postage-paid return envelope (Fall et al., 2009).

A subsistence permit is required in the road-accessible portions of the Yukon River drainage. Subsistence fishers record their daily salmon harvests on a household permit and return the permit within 10 days of the expiration date on the permit. Subsistence permit applications are mailed to all who returned the prior year's permit, along with instructions on how to apply by mail. In addition, ADF&G staff travel to select villages so that applicants can be issued permits in person. Permits are also issued in several ADF&G offices or by mail throughout the season. Those who do not return permits are sent up to two reminder letters. Telephone contacts with households that do not respond to the reminder letters are attempted as a final measure (Fall et al., 2009).

Subsistence salmon permit holders in a portion of Subdistrict 6B (the Tanana River drainage above a point three miles upstream of Totchaket Slough to the boundary with 6C) and personal use harvesters in Subdistrict 6C are required to report their harvests weekly for inseason management purposes. To maximize the return of permits, ADF&G sends reminder letters to these households. Most unreturned permits are considered unfished, as subsistence fishing households are not eligible to receive a permit the following year until the previous year's permit is returned (Fall et al., 2009).

Chum Salmon Subsistence Harvest

The species composition of the estimated 2008 subsistence–personal use salmon harvests for the entire Yukon Area included 86,652 summer chum salmon (35%) and 89,538 fall chum salmon (36%) out of a estimate of 247,936 total salmon (all species) (Figure 3-18). This is an estimated total based on household surveys and returned permits and calendars, and it includes subsistence harvests, personal use harvests, commercial harvests retained for home uses, and fish distributed from ADF&G test fisheries. The 2008 harvest estimates registered above the 5-year average for fall chum salmon and below the 5-year average for summer chum salmon. While low salmon abundance in 2001 closed commercial fishing in the Alaska portion of the Yukon River drainage, a small commercial fishery for Chinook and summer chum salmon has been offered in every year since, including 2007 (Fall et al., 2011).



Source: Fall et al., 2011.

Figure 3-18 Yukon area estimated subsistence salmon harvests, 2008

The estimated 2008 subsistence harvest of 86,652 summer chum salmon was below both the five year and 10-year averages (93,011 and 86,947, respectively). While summer chum salmon harvests have been relatively stable since 1990, they mark a significant decrease from the 1980s when harvests were higher, likely due to the then-existing commercial roe fishery in the middle Yukon River. The fall chum salmon harvest of 89,538 is also an increase in harvest since 1997 and registers above both the 5-year average of 79,540 fall chum salmon and the 10-year average of 61,973 fall chum salmon, both of which reflect multiple years of poor runs and harvests (Figure 3-19 and Table 3-13). It should be noted that regulatory restrictions were implemented so as to protect fall chum salmon stocks due to these poor runs in 1998, and 2000 through 2003. While harvests of fall chum salmon have recently climbed from earlier years' estimates, comparison with average fall chum salmon harvests for 1976–2007 begins to show the true magnitude of the harvest decline in this fishery between 2000 and 2003; the historical average (1976–2007) harvest of fall chum salmon was 117,460 fish (Fall et al., 2011).

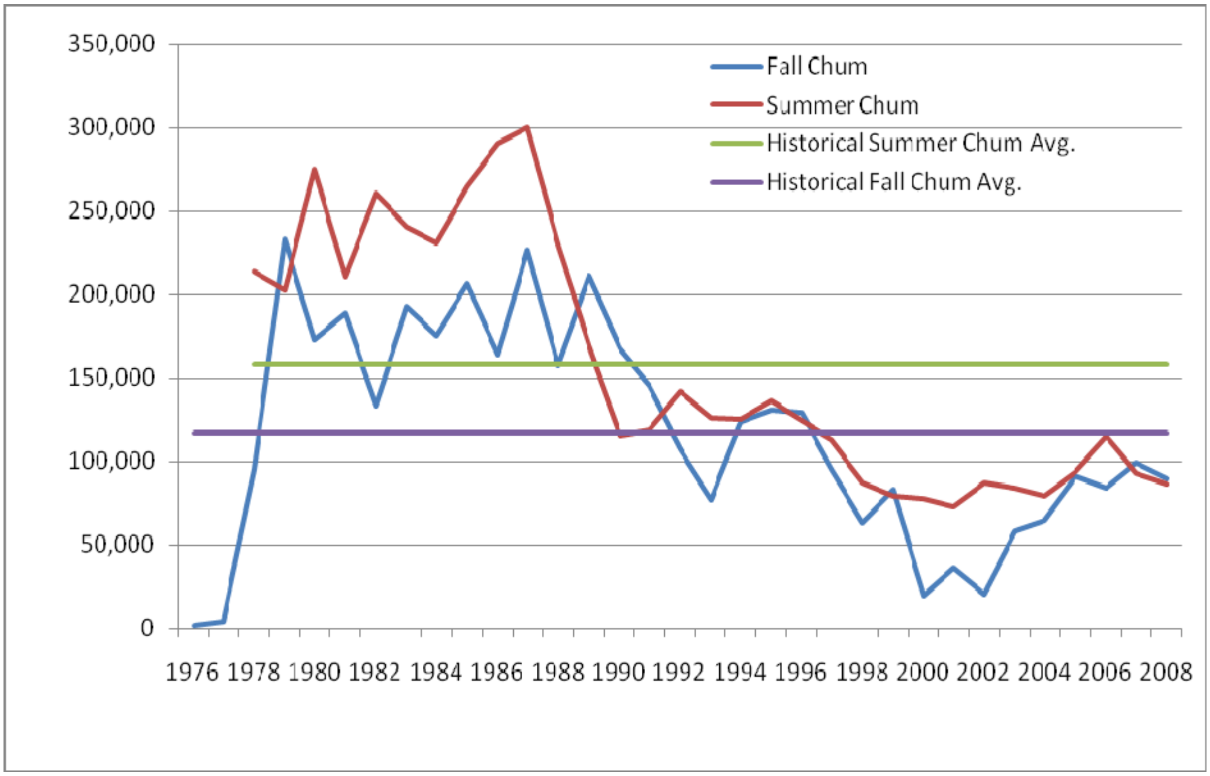


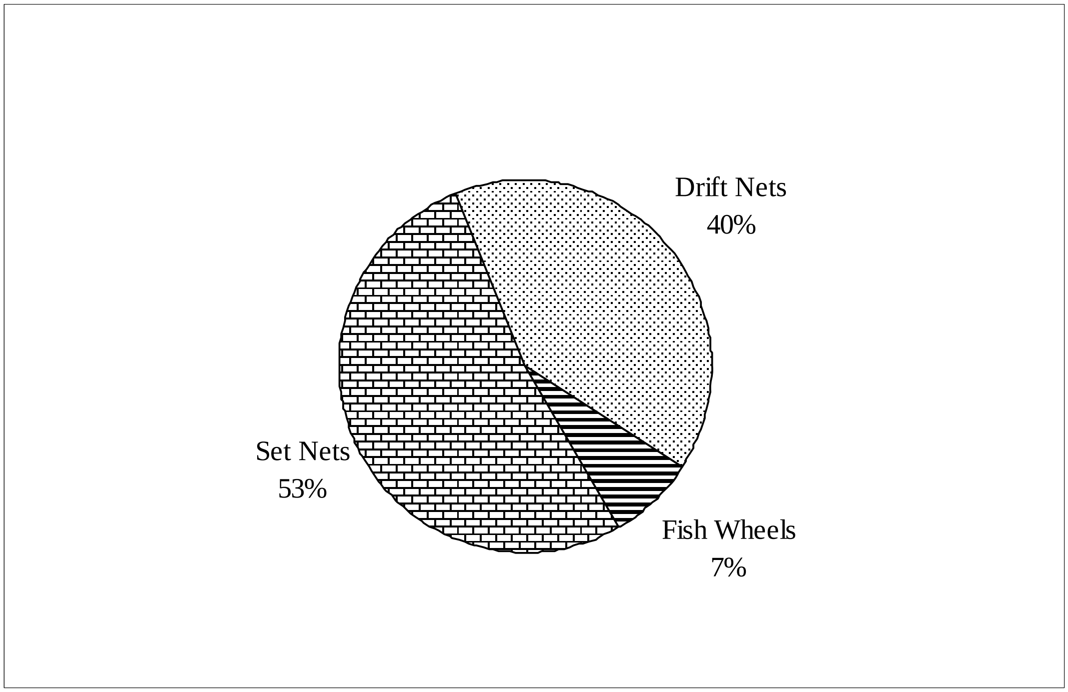
Figure 3-19 Estimated historical subsistence chum salmon harvest, Yukon River area, 1976-2008

Table 3-13 Estimated historical subsistence chum salmon harvest, Yukon River area, 1976-2008

	Households or Permits[a]		Estimated salmon harvest[a]					
Community	Total	Surveyed or Returned	Chinook	Coho	Summer Chum	Fall Chum	Pink	Total
1976			17,530	12,737		1,375		31,642
1977			16,007	16,333		4,099		36,439
1978			30,785	7,965	213,953	95,532		348,235
1979			31,005	9,794	202,772	233,347		476,918
1980			42,724	20,158	274,883	172,657		510,422
1981			29,690	21,228	210,785	188,525		450,228
1982			28,158	35,894	260,969	132,897		457,918
1983			49,478	23,905	240,386	192,928		506,697
1984			42,428	49,020	230,747	174,823		497,018
1985			39,771	32,264	264,828	206,472		543,335
1986			45,238	34,468	290,825	164,043		534,574
1987			55,039	46,213	300,042	226,990		628,284
1988	2,700	1,865	45,495	69,679	229,838	157,075		502,087
1989	2,211	983	48,462	40,924	169,496	211,303		470,185
1990	2,666	1,121	48,587	43,460	115,609	167,900		375,556
1991	2,521	1,261	46,773	37,388	118,540	145,524		348,225
1992	2,751	1,281	47,077	51,980	142,192	107,808		349,057
1993	3,028	1,397	63,915	15,812	125,574	76,882		282,183
1994	2,922	1,386	53,902	41,775	124,807	123,565		344,049
1995	2,832	1,391	50,620	28,377	136,083	130,860		345,940
1996	2,869	1,293	45,671	30,404	124,738	129,258		330,071
1997	2,825	1,309	57,117	23,945	112,820	95,141		289,023
1998	2,986	1,337	54,124	18,121	87,366	62,901		222,512
1999	2,888	1,377	50,515	19,984	79,250	83,420		233,169
2000	3,209	1,341	36,844	16,650	77,813	19,402	1,591	152,300
2001	3,072	1,355	56,103	23,236	72,392	36,164	403	188,298
2002	2,775	1,254	44,384	16,551	87,599	20,140	8,425	177,100
2003	2,850	1,377	56,872	24,866	83,802	58,030	2,167	225,737
2004	2,721	1,228	57,549	25,286	79,411	64,562	9,697	236,506
2005	2,662	1,406	53,547	27,357	93,411	91,667	3,132	269,114
2006	2,833	1,473	48,682	19,985	115,355	84,320	4,854	273,196
2007	2,819	1,495	55,292	22,013	93,075	99,120	2,118	271,618
2008	3,030	1,664	45,312	16,905	86,652	89,538	9,529	247,936
5-year average (2003-2007)	2,777	1,396	54,388	23,901	93,011	79,540	4,394	255,234
10-year average (1998-2007)	2,882	1,364	51,391	21,405	86,947	61,973	4,048	224,955
Historical average (1976-2007)	2,807	1,347	45,293	28,368	158,645	117,460	4,048	340,864

Source: ADF&G Division of Commercial Fisheries personal communication, preliminary report. Tables 1, 3, 7, and 11. Preliminary results as of June 9, 2009.

[a]Estimates prior to 1988 are based on fish camp surveys and sampling information is unavailable.

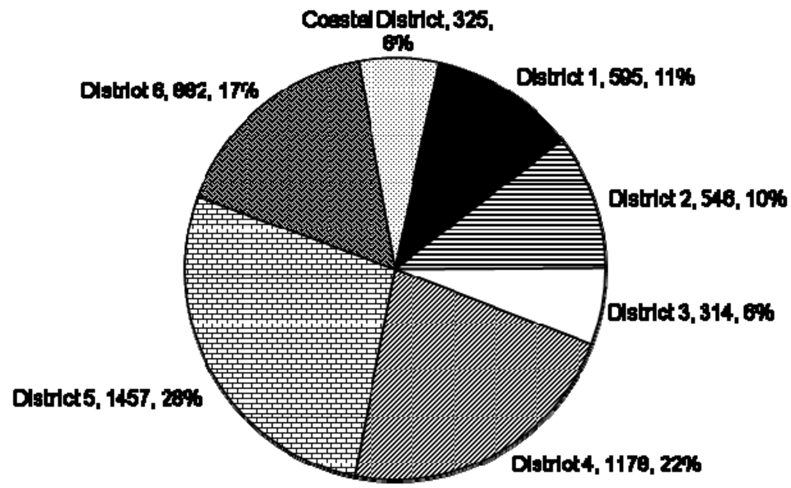


Source: Fall et al., 2011.

Figure 3-20 Primary gear type utilized for subsistence salmon fishing, Yukon area, 2008

Primary gear types used by fishing households in surveyed villages in 2008 included set gillnet (53%), drift gillnet (40%), and fish wheel (7%), largely the same as 2006 and 2007(Figure 3-20) (Fall et al., 2009).

Of the estimated 1,732 households (drainage-wide) owning dogs, about 16% (268 households) are estimated to have fed their dogs whole salmon in 2008. Of the 5,5,310 dogs owned by fishing households in 2008, about 67% (3,530 dogs) were owned by households in the Upper Yukon River, which includes districts 4, 5, and 6. In 2008, species-specific information on the number of salmon retained for dog food was collected from subsistence harvests in surveyed communities; in permit communities, only the number of whole salmon, not species-specific, was documented. In the Coastal District and in districts 1 through 5, an estimated 12,045 summer chum salmon and 29,583 fall chum salmon were retained for dog food from subsistence salmon harvests. An additional 24,487 whole salmon (species unknown) were fed to dogs by permit holders, including those users in District 6. From commercial harvests, 2,322 summer chum salmon and 9,005 fall chum salmon were retained and used as dog food in Districts 1–5 (Fall et al., 2009).



Source: Fall et al., 2011.

Figure 3-21 Estimated number of dogs by district, Yukon area, 2008

Since 1992, ADF&G has inquired as to whether surveyed households were meeting their subsistence salmon needs for that year. The disastrous fishing year in 2000 resulted in restrictions and closures in subsistence salmon fishing schedules and made it extremely difficult for fishing families to meet their needs (64% of surveyed households reported not meeting their needs in 2000). In 2003, ADF&G began asking this question in a species-specific manner, measuring responses by community and by species. Specifically, surveyed households were asked whether 100%, 75%, 50%, or <25% of their harvest needs were met for each species. Two checkboxes, “0%” and “no need,” were added to the 2005 survey in order to distinguish those who had a need, but no success in harvesting a species, from those who had no need and therefore, did not harvest any fish. In 2008, 1,142 households (46% of the estimated total in Distrits 1-5) and 522 permit holders (466 subsistence permit holders and 56 personal use permit holders) provided harvest data for the Yukon area subsistence-personal use salmon fishery. According to the 2008 data, 51% of all households reported meeting >75% of their needs for summer chum salmon and 37% reported meeting >75% of their needs for fall chum salmon. Forty-two percent and 58%of households reporting meeting less than one-half their needs for summer chum salmon and fall chum salmon, respectively(Fall et al., 2011).

In 1993, the BOF made a positive customary and traditional (C&T) use finding for all salmon in the Yukon–Northern Area. Since 1990, the overall total subsistence salmon harvest in the Yukon area has declined by approximately 30%. The ANS determination for summer chum salmon was established at 83,500-142,192 and at 89,500-167,900 for fall chum salmon. In 2001, the BOF determined species-specific amounts of salmon necessary for subsistence. Only summer chum salmon harvests were within ANS ranges in 2008. All species were within ANS ranges in 2007; 2005 and 2007 mark the only times this has happened since 2001 (and 1998, if species-specific ANS estimates are projected back to 1998) (Table 3-14) (Fall et al., 2011).

Table 3-14 Comparison of amounts necessary for subsistence (ANS) and estimated subsistence chum salmon harvests, Yukon River area, 1998-2008

	Chinook	Coho	Summer Chum	Fall Chum
ANS Range	45,500-66,704	20,500-51,980	83,500-142,192	89,500-167,900
Year	Estimated Number of Subsistence Salmon Harvested			
1998	54,124	**<u>18,121</u>**	87,366	**<u>62,901</u>**
1999	53,305	20,885	83,784	89,940
2000	**<u>36,404</u>**	**<u>14,939</u>**	**<u>78,072</u>**	**<u>19,395</u>**
2001	55,819	22,122	**<u>72,155</u>**	**<u>35,703</u>**
2002	**<u>43,742</u>**	**<u>15,489</u>**	87,056	**<u>19,674</u>**
2003	56,959	23,872	**<u>82,272</u>**	**<u>56,930</u>**
2004	55,713	20,795	**<u>77,934</u>**	**<u>62,526</u>**
2005	53,409	27,250	93,259	91,534
2006	48,593	**<u>19,706</u>**	115,093	**<u>83,987</u>**
2007	55,156	21,878	92,891	98,947
2008	**<u>45,184</u>**	**<u>16,855</u>**	86,504	**<u>89,357</u>**

Source: ADF&G Division of Commercial Fisheries preliminary report; Appendices B1-B4. Preliminary results as of June 9, 2011.
<u>Bold underlined</u> cells indicate harvest amounts are below the minimum ANS. Totals include Coastal District, harvests from subsistence permits, and test fish. Totals do not include personal use salmon harvests.

In January 2001, the BOF used ADF&G's harvest data to adjust the amount necessary for subsistence, a measure which attempts to quantify the amount of salmon reasonably necessary for subsistence use in the Yukon area. Harvest estimates include personal use, test fish distributions, and commercial retained and these parameters were included in harvest estimates used to establish current ANS ranges[21]. The BOF established maximum and minimum ANS harvest ranges based on the total historic estimated harvest for each species by all districts combined for the years from 1990 to 1999, with exceptions for years when subsistence fishing was restricted to meet escapement requirements for fall chum salmon and coho salmon. The ANS levels represent the needs of all subsistence users drainage-wide and do not necessarily reflect the needs of specific individuals, communities, or sections of the drainage.

2010 Fishery Update

For Yukon River, the 2010 regulatory summer subsistence salmon fishing schedule began June 7 in District 1 and was implemented chronologically with the upriver migration of both Chinook and summer chum salmon. A surplus of summer chum salmon was anticipated above escapement and subsistence needs. River-wide subsistence fishing restrictions beyond the regulatory fishing schedule (see Table 3-12 above) were not taken; therefore, subsistence salmon fishing periods were not altered by commercial chum salmon fishing periods.[22]

[21] It should be noted that harvest estimates derived from source data presented in Table 8 will differ when compared to harvest estimates (prior to 2005) presented in The 2008 Annual Subsistence Report (2011). Subsistence harvest estimates presented in the 2008 Annual Subsistence Report have been adjusted and do not include personal use harvests, ADF&G test fishery distributions, or salmon retained from commercial harvests.
[22] www.adfg.alaska.gov/static/fishing/PDFs/commercial/2010_yukonriver_summersalmon_summary.pdf

The fall chum salmon season began by regulation on July 16. It was anticipated that the level of abundance would be adequate to meet escapement needs and provide for normal subsistence harvests. At the beginning of the fall season, subsistence fishing in Districts 1, 2, and 3, and Subdistrict 5-D were open seven days a week, 24 hours a day while District 4 and Subdistricts 5-A, 5-B, and 5-C were on a five days a week schedule. The subsistence fishing schedule for District 4 and Subdistricts 5-A, 5-B, and 5-C was liberalized to seven days a week, 24 hours a day in order to provide more opportunity to offset difficulties incurred by subsistence fishermen from high water level and debris load early in the season.

Around mid-August, inseason assessment of fall chum salmon indicated that run strength was weaker than anticipated and concern developed that low abundance of fall chum salmon would hinder treaty obligations with Canada. As such, ADF&G implemented subsistence restrictions which amounted to cancelling one subsistence fishing period in the main river districts, excluding Subdistricts 5-A and 5-D. In early September it became clear that the lower end of the Canadian border passage goal (80,000 fish) would be met. At this time, ADF&G liberalized subsistence fishing schedules in the main river districts.[23]

2011 Fishery Update[24]
According to preseason management strategies and inseason assessment through the early poton of the run, the Chinook salmon run was expected to be large enough to provide for escapement but not large enough to meet subsistence needs.

Consistent with preseason management strategies, a conservation management plan was initiated in District 1 and the northern portion of the Coastal District on June 13. Based upon historical run timing and the current inseason information, a subsistence salmon fishing period was cancelled to protect the first pulse of Chinook in each fishing district and subdistrict based on migratory timing. As the run developed it became evident that the Chinook salmon run size would likely be at or below the lower end of preseason projections. Consequently it was necessary to protect the second pulse of Chinook salmon. An additional two subsistence periods were reduced by half in District 1 and an additional subsistence period in Districts 2-5 was cancelled to ensure that escapement goals were met.

Furthermore, beginning June 27 in District 1 and June 29 in District 2, the mesh size during subsistence fishing periods was restricted to six inch or smaller for the remainder of the summer season to provide further protection on the third pulse of Chinook salmon as it passed through the districts. This management action was taken with the intent that Chinook salmon incidentally harvested during summer chum directed commercial fishing periods in these districts would be used for subsistence purposes, which would help offset a reduction in subsistence fishing opportunity.

Some subsistence fishermen were able to take advantage of early Chinook salmon throughout the drainage, but many delayed harvest effort, preferring better processing weather and higher abundance later in the run. Preliminary reports from fishermen incidate that management actions taken later in the run to reduce the subsistence havest of Chinook salmon resulted in many fishermen throughout the drainage not meeting their subsistence needs. Subsistence harvest surveys are currently being conducted by the deparement and the 2011 harvest information is not available at this time.

3.3.5 Arctic Alaska

Arctic Alaska includes the Norton Sound, Port Clarence, and Kotzebue management districts. These three districts include all waters from Point Romanoff in southern Norton Sound to Point Hope, and St.

[23] www.adfg.alaska.gov/static/fishing/PDFs/commercial/2010_yukonriver_fallsalmon_summary.pdf
[24] http://www.adfg.alaska.gov/index.cfm?adfg=fishingCommercial.main

Lawrence Island. These management districts encompass over 65,000 square miles and have a coastline exceeding that of California, Oregon, and Washington combined (Soong et al., 2008). There are approximately 17,000 people in the area, the majority of whom are Native Alaskans residing in more than 30 villages scattered along the coast and major river systems (Menard et al., *2010*).

The five species of Pacific salmon are indigenous to the area; however, chum salmon, coho salmon, and pink salmon are the most abundant. Table 3-15 below provides a summary of subsistence salmon harvest for Arctic Alaska in 2008 (Fall et al., 2011). In summer, subsistence fishermen harvest salmon with gillnets or seines in the main Seward Peninsula rivers and in the coastal marine waters. Beach seines are used near the spawning grounds to harvest schooling or spawning salmon and other species of fish. A major portion of fish taken during the summer months is air dried or smoked for later consumption by residents. Chum and pink salmon are the most abundant species throughout the area (Fall et al., 2009).

Two visits by ADF&G personnel are made to each village in the management area in order to issue Tier I subsistence fishing permits. Villagers can also call the Nome office toll free and a permit will be mailed or faxed when possible. Village residents are able to mail completed permits to the Nome office postage free. Attempts are made to contact all permit holders who did not return their household permit by phone or letter. Also, trips to villages are made postseason by ADF&G personnel to collect permits and discuss the fishing season (Menard et al., *2010*).

In 2004, ADF&G's subsistence salmon harvest assessment program changed when household surveys were discontinued in most communities because the Tier 1 household subsistence permit system was expanded from Nome to include Port Clarence District and Norton Sound Subdistricts 2 and 3. Thereafter, subsistence salmon harvests for these communities are reported totals from subsistence permits, so household surveys have not been necessary (Menard et al., *2010*).

In 2007, the BOF approved new regulations to allow for cash sales of up to $200 worth of subsistence-taken finfish per household, per year, harvested in Norton Sound-Port Clarence Area only. Persons intending to sell any subsistence-taken salmon (and other finfish) need to obtain a free customary trade permit from Nome ADF&G and record cash sales on the permit. Sales cannot be made to a fishery business or resold by the buyer (Menard et al., *2010*).

Table 3-15 Subsistence salmon harvests by district, Arctic Alaska, 2008

		Estimated salmon harvest[a]					
District	Households surveyed or permits returned	Chinook	Sockeye	Coho	Chum	Pink	Total
Norton Sound District[b]	1,151	3,087	399	18,889	11,505	56,096	89,976
Port Clarence District[c]	399	125	5,144	562	2,499	7,627	15,957
Kotzebue Area[d]	ND	ND	ND	ND	ND	ND	ND
Total[e]	1,172	3,212	5,543	19,451	14,004	63,723	105,933

Source: ADF&G Division of Subsistence, ASFDB 2009 (ADF&G 2009) and Kawerak, Inc., household survey, 2009.

a. Harvests reported during household surveys are expanded into estimates to account for uncontacted households. Harvests reported on permits are not expanded.

b. Household surveys conducted in Unalakleet, Koyuk, Shaktoolik, St. Michael, and Stebbins. Permits issued for Cape Woolley, Nome Subdistrict (Tier I), Golovin Subdistrict, and Elim Subdistrict.

c. Permits issued for Port Clarence Subdistrict, Pilgrim River, and Salmon Lake.

yearly subsistence harvest of salmon in the Kotzebue area between 1994 and 2004 was 59,650 fish. ND = No data. Districts

3.1.1.1 Norton Sound

Description of Management Area

Norton Sound District encompasses all waters from Point Romanof north to Cape Douglas. It is divided into six subdistricts: 1) Nome, 2) Golovin, 3) Moses Point, 4) Norton Bay, 5) Shaktoolik, and 6)

Unalakleet. The subdistrict and statistical area boundaries were established to facilitate management of individual salmon stocks, and each subdistrict contains at least one major salmon-producing stream (Soong et al., 2008). In 2001, a regulatory change by the BOF made rod and reel a legal subsistence fishing gear type in the area from Cape Espenberg on northern Seward Peninsula to Bald Head, which is between Elim and Koyuk. This area includes subsistence fishing areas used by the residents of Nome, White Mountain, Golovin, Elim, Koyuk, Shaktoolik, and Unalakleet (Fall et al., 2009). Although a fishing pole can be used for subsistence fishing, sport fish methods and means requirements still apply to harvesting of fish.

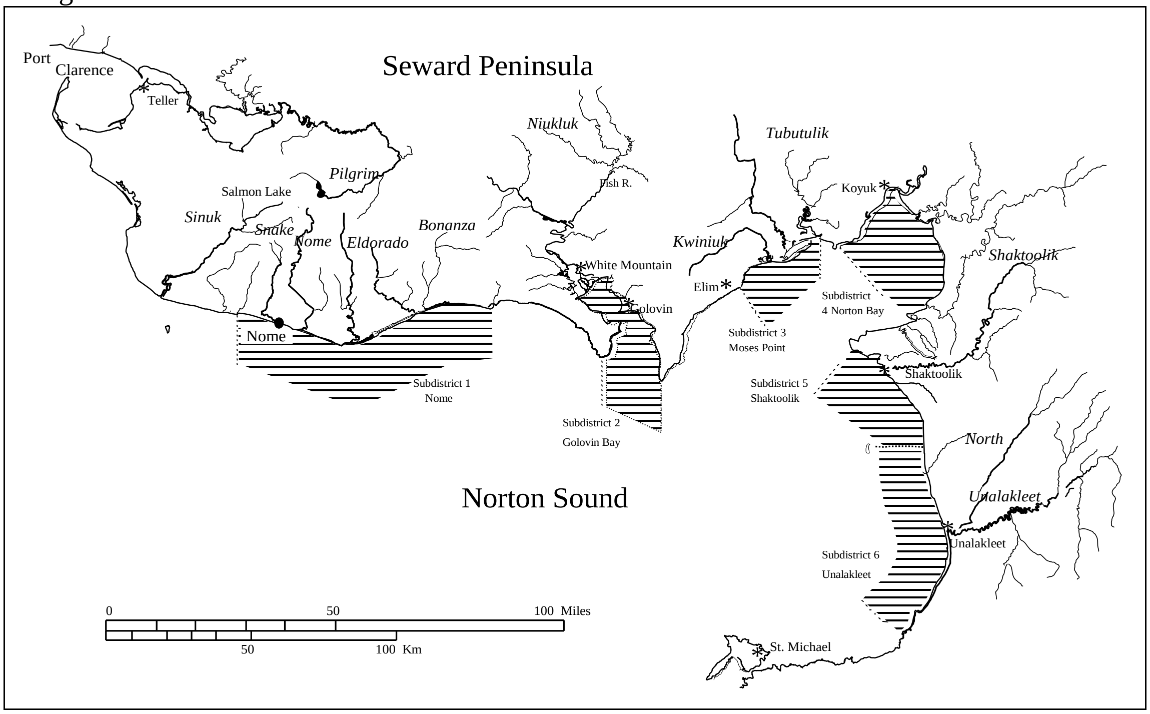
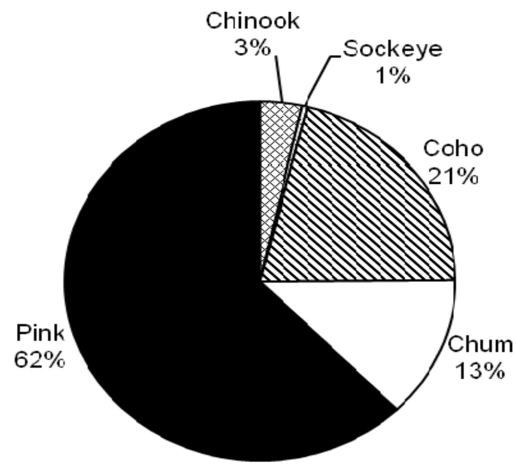


Figure 3-22 Norton Sound District

Salmon management in Norton Sound has changed significantly since the mid-1990s because of limited market conditions and marginal returns of many salmon stocks within the district. Except for the Nome Subdistrict, commercial fishing can occur if salmon runs are sufficient and a commercial market opens. The Nome Subdistrict is managed intensively for subsistence use: Tier II chum salmon subsistence permits, registration permits, closed waters, setting fishing period length, limiting gear, and harvest limits are all tools employed throughout the season to provide for escapement needs and to maximize subsistence opportunity (Menard et al., *2010*).

Chum Salmon Subsistence Harvest

The estimated 2008 subsistence harvest of salmon by communities in the Norton Sound District was 89,976 fish (Table 3-15). This was the highest total harvest for the district since 2002, driven by strong pink salmon and coho salmon returns. Chum salmon runs were below average for northern Norton Sound. Subsistence harvesters took 11,505 chum salmon runs (13%) in 2008, compared to just over 18,000 in 2007 and 10,000 in 2006 (Table 3-15; Figure 3-23). Very little of the documented subsistence salmon harvest was taken by residents from outside the district (Fall et al., 2011).



Source: Fall et al., 2011.

Figure 3-23 Species composition of estimated subsistence salmon harvests, Norton Sound District, 2008

Subdistrict 1 (Nome)

In Subdistrict 1 (Nome), subsistence harvests consist primarily of pink salmon, coho salmon, and chum salmon. Chum salmon runs have been depressed for over 20 years, leading to increasing restrictions on all types of harvest. Upstream portions of most rivers are closed to protect spawning salmon, and harvests are limited in all Subdistrict rivers. For 16 years, subsistence fishing has been prosecuted primarily by emergency order, with openings much less frequent than in regulation (Fall et al., 2009).

In September 2000, the BOF classified chum salmon in the Nome Subdistrict as a stock of management concern. The stock of concern determination was a result of persistent low chum salmon productivity since the mid-1980s. Commercial and sport fishing for chum salmon are closed in Subdistrict 1 and subsistence salmon management is among the most restrictive in Alaska with a Tier II chum salmon fishery in effect from 1999-2005. A Tier II subsistence permit program is necessary when the number of participants in a subsistence fishery must be limited because the harvestable surplus of the fish stock is less than the amount necessary to provide for subsistence uses. Individuals are scored based on their history of uses of the particular resource and the ability to obtain food; those with the highest scores receive Tier II permits. In 1999, the chum salmon return was so poor that even Tier II fishing was closed; in 2000, only 10 permits were awarded (Menard and Bergstrom, 2009). Under a Tiered management system, subsistence fishing participation is limited through a process where individual Alaskans are ranked against one another according to their customary and traditional dependence upon the fish stock in question to determine who would be provided an opportunity to fish for subsistence uses. Those Alaskans who do not qualify for a Tiered subsistence fishery (where there is insufficient harvestable surplus to provide a reasonable opportunity for all subsistence uses) generally would shift to other salmon stocks or other resources to ensure sufficient wild resources are obtained to support household economies (Wolfe, 2009 and personal communications, John Linderman and Jim Simon, 2010). In such cases, harvest and use of another species may then increase such that the amount necessary for subsistence for the replacement species may need to be adjusted by the BOF.

Qualifications for a Tier II chum salmon permit are established under 5 AAC 01.184 and utilize a point system based upon the following criteria:

- An applicant's customary and direct dependence on the chum salmon stock for human consumption as a mainstay of livelihood may provide up to 75 points; one point will be given for each year above the age of five years in which any one member of an applicant's household has fished for (or processed) chum salmon in Subdistrict 1, plus the number of years in which that member would have fished for (or processed) chum salmon but did not because for chum salmon was closed due to a low number of returning stock, or the Department did not issue a permit to fish to that member for which the member applied.

- An applicant's direct dependence on subsistence chum salmon fishing and ability to obtain food if subsistence uses of Subdistrict 1 chum salmon are restricted or eliminated, based on the relative availability of alternative sources of chum salmon to the applicant's household may provide up to 10 points (measured by the percentage of chum salmon taken by the household in Subdistrict 1 over the four years immediately preceding the date of application).

The maximum amount of points available under the Tier II permitting system is 85. Over the years in which ADF&G utilized Tier II permits in the Nome Subdistrict, criticism of the program centered on the way in which the maximum number of points could go only to households with an elder (80+ years old) who relied entirely on the Nome subdistrict for his/her chum. As such, high Tier II scores (and thus permits) were awarded to elders no longer physically able to fish. Younger people in an elder household could fish on the same permit, but not all elders who received permits had such fishing assistance. In addition, subsistence permit histories had no influence on Tier II scores assigned. Families with long, consistent fishing permit histories could be denied permits while other families that occasionally (or perhaps never) appeared in the permit record were awarded Tier II subsistence permits (Jim Magdanz, personal communication, 2011).

The classification of chum salmon as a management concern was continued at the January 2004 BOF meeting. In 2007, the BOF changed the status of Subdistrict 1 chum salmon from a stock of management concern to a stock of yield concern based on data showing that during the preceeding five years[25] (2002-2006) a majority of chum salmon escapement goals had been achieved in Subdistrict 1. Since the 2006 fishing season, Subdistrict 1 has reverted back to Tier I[26] subsistence fishing regulations (including observance of the fishing schedule provided in regulation) because projected runs of chum salmon exceeded the amount necessary for subsistence; however, at the October 2009 BOF work session, ADF&G recommended continuation of Norton Sound Subdistrict 1 chum salmon as a stock of yield concern based on low yields for the recent five year (2005-2009) period compared to historical yields in the 1980s. While the majority of chum salmon escapement goals were achieved during the preceding five years, the inability, despite the use of specific management measures, to consistently maintain expected yields (or harvestable surpluses) above the stock's escapement needs was the basis for continuation as a stock of yield concern. In 2009, ADF&G forecasted the chum salmon run to reach the lower end of the escapement goal range, but by mid-July the chum salmon run in Subdistrict 1 was projected to fall short of the escapement goal, and subsistence salmon gillnetting and subsistence chum salmon fishing was subsequently closed. Even though Tier II fishing restrictions have been suspended since 2006, subsistence harvests of chum salmon continue to be low in the later 2000s and may be the result of record pink and

[25] Based on definitions provided in the *Policy for the Management of Sustainable Salmon Fisheries* (SSFP), only the most recent five-year yield and escapement information and the historical level of yield or harvestable surpluses are considered when recommending stock of concern designations.
[26] In a Tier I subsistence fishery, all interested Alaska residents may participate. Other harvesters (commercial, sport, and personal use) are prohibited or restricted.

coho salmon runs in recent years allowing subsistence permit holders in Subdistrict 1 to target those species (Menard and Bergstrom, 2009).

In 2001, ADF&G recommended, and later established, a chum salmon biological escapement goal (BEG) for Subdistrict 1 chum salmon at 23,000-35,000 fish. In January 2001, the BOF established optimal escapement goal (OEG) ranges for chum salmon on three rivers in Subdistrict 1 (Nome, Snake, and Eldorado Rivers) in order to index the district-wide BEG. In Subdistrict 1, larger chum salmon runs are typically east of Nome, particularly in the Eldorado and Flambeau rivers. OEG ranges for the three rivers are as follows: Snake River: 1,600 to 2,500 chum salmon; Nome River: 2,900 to 4,300 chum salmon; and Eldorado River: 6,000 to 9,200 chum salmon. Chum salmon have been counted via towers or weirs on these rivers since 1994, 1995, and 1997, respectively. ADF&G also established sustainable escapement goal (SEG) ranges, based on aerial survey information, on four other rivers in Subdistrict 1. All BOF-established OEGs and ADF&G established SEGs were set in conjunction with the overall Subdistrict 1 BEG, and have been used to assess the overall escapement to Subdistrict 1 in relation to the BEG. The Subdistrict 1 BEG was achieved or exceeded from 2005-2008 and fell short in 2009. During this same time period (2005-2009), the OEG has been achieved or exceeded for three of five years at Snake and Nome rivers and four of five years at Eldorado River. In the 5-year period (2005-2009), the majority of escapement goals were achieved except for 2009; however, the average total chum salmon harvest and available yield continues to be below the historical yield (combined subsistence and commercial harvests) of the 1980s and early 1990s (Menard and Bergstrom, 2009).

ADF&G manages Subdistrict 1chum salmon stocks to achieve optimal escapement goals for chum salmon spawning streams and to restore chum salmon abundance to that a Tier II subsistence fishery will not be necessary. Specifically, ADF&G manages chum salmon in Subdistrict 1 as follows:

1. Commercial fishing for chum salmon is closed and will be reopened only after
    a. The harvestable surplus of chum salmon has met Tier 1 subsistence needs for four consecutive years; and
    b. The Department has proposed to the BOF and the Board has adopted an abundance-based management plan supported by inseason enumerator counts of abundance.

2. In the subsistence fishery,
    a. Subsistence chum salmon fishing will be opened and closed by emergency order on a stream-by-stream basis, to be determined by the department, when chum salmon stocks are abundant enough to provide for optimal escapement goals and a harvestable surplus;
    b. A subsistence fishing permit is required and will be issued to a household; the permit will identify the body of water to be fished, the annual limit for each salmon species, and the allowable gear;
    c. Pink salmon may be taken only with gillnets that have a mesh size of 4.5 inches or less (Menard and Bergstrom, 2009).

Permits have been required for subsistence salmon fishing in Norton Sound Subdistrict 1 since 1974. By regulation, permits with catch calendars are issued to each requesting household listing all Nome Subdistrict fishing locations, catch limits, and gear restrictions. After the fishing season, households are required to return the completed permit to ADF&G regardless of whether or not they actually fished. Since 1998, the Nome permit data have not been expanded to account for households whose permits were not returned. This contrasts with earlier years when permit data were expanded by drainage, with expansion factors based upon the fraction of unreturned permits for that drainage. ADF&G staff believed that expansion of the permit data led to an overestimation of the salmon harvest because the unreturned permits were most likely from households that did not fish (Fall et al., 2009). Beginning in 2004, stricter enforcement of regulations including fines for failure to return a permit has resulted in nearly all permits issued being returned (Menard et al., *2010*). In 2008, the Nome ADF&G office issued 461 subsistence (Tier I) salmon permits; 450 were returned and 363 households reported fishing. While the number of permits issued was less than in 2004, permit numbers were greater than the previous two years (368 and 329). Fisheries managers in Nome attribute the increase in permits in 2008 to below average returns of sockeye salmon to the Pilgrim River and increased fishing costs due to rising fuel prices (Fall et al, 2011).

Subdistricts 2 (Moses Point), 3 (Golovin), and 4 (Norton Bay)

At its September 2000 work session, the BOF classified Norton Sound Subdistricts 2 and 3 chum salmon as a stock of yield concern. This determination was based on low harvest levels for the previous five year (1995-1999) period. The classification was continued at the January 2004 BOF meeting and at the January 2007 BOF meeting. At the October 2009 BOF work session, ADF&G recommended continuation of the Norton Sound Subdistrict 2 and Subdistrict 3 chum salmon as a stock of yield concern. Based on data from 2005-2009, low yields of chum salmon continue in Subdistricts 2 and 3; yields have been inconsistent, but often low. Subsistence chum salmon harvests averaged 1,767 and 1,216 fish in Subdistricts 2 and 3, respectively, from 2005-2009. From 2004-2009, the SEG in Subdistrict 2 was achieved only in 2007. Since the stock was first identified in 2000, ADF&G has restricted chum salmon subsistence fishing opportunities in Subdistricts 2 and 3 only once, in 2003 (Menard and Bergstrom, 2009).

In Subdistrict 2 (Moses Point), ADF&G established a threshold SEG of 30,000 chum salmon for Niukluk River tower in 2004. In Subdistrict 2, most subsistence fishing occurs in the Niukluk and Fish rivers. From 2004 to 2009, this SEG was achieved only in 2007, but was within 801 fish of the goal in 2006. There has been a decreasing trend in escapement since the project was established in 1995 (Menard and Bergstrom, 2009).

In 2001, ADF&G established chum salmon BEG goals for the Kwiniuk River (10,000 to 20,000 chum salmon) and for the Tubutulik River (8,000 to 16,000 chum salmon) in Subdistrict 3. In the Golovin Subdistrict, most subsistence fishing occurs in the Kwiniuk and Tubutulik rivers. The BOF established OEG ranges for chum salmon in the Kwiniuk and Tubutulik rivers by adding an additional 15% to the BEG range to account for subsistence harvests that may occur above the tower site. Based on escapement counts from the Kwiniuk River, the OEG of 11,500 to 23,000 chum salmon has been achieved or exceeded in three of the five (2005-2009) most recent years. The OEG for the Tubutulik River is 9,200 to 18,400 chum salmon and is assessed via aerial survey. It is difficult to determine if the OEG for this river was achieved in most recent years because aerial surveys were often incomplete due to poor weather conditions or lack of aircraft. In addition, huge numbers of pink salmon arriving at the same time have prevented adequate survey of chum salmon. Overall, chum salmon runs in Subdistrict 3 have been lower in the 1990s and 2000s than in the 1980s based on Kwiniuk River escapements and reported harvests (Menard and Bergstrom, 2009).

In Subdistricts 2 and 3, chum salmon harvests in the 2000s have been very minimal. Subsistence chum salmon harvest averaged 1,767 and 1,216 fish in Subdistricts 2 and 3, respectively, from 2005 through 2009. The total subsistence salmon harvest has usually been double in even-numbered years compared to odd-numbered years as fishermen take advantage of the greater runs of pink salmon in even-numbered years. In most years since 2003, chum salmon runs have been insufficient to allow for a commercial harvest in Subdistricts 2 and 3; however, in 2007 there was a large surplus of chum salmon, but the buyer was only able to purchase fish in Subdistrict 3. In 2008 and 2009 there was not a surplus of chum salmon in either subdistrict. During the last five years (2005-2009), with the exception of 2007, available yield has been much less than historical yield in the 1980s (Menard and Bergstrom, 2009).

ADF&G manages the commercial, sport, subsistence, and personal use fisheries for chum salmon, to the extent practicable, in Subdistricts 2 and 3 to achieve escapement goals. Specifically, ADF&G manages chum salmon in Subdistricts 2 and 3 as follows:

1. In the commercial chum salmon fishery:
    a. ADF&G shall manage the fisheries to achieve the following optimal escapement goal ranges:
        i. Kwiniuk River – 11,500 to 23,000 chum salmon and
        ii. Tubutulik River – 9,200 to 18,400 chum salmon;
    b. The chum salmon harvest may not exceed 15,000 fish before ADF&G's mid-July run assessment in Subdistrict 2;
    c. The fishery may occur only if the department projects that chum salmon escapement goals will be achieved and the harvestable surplus will more than meet subsistence needs.

2. In the commercial pink salmon fishery, the fishery may occur only if subsistence needs are expected to be met and chum salmon escapement goals achieved.

3. In the commercial coho salmon fishery, the fishery may occur only when the chum salmon escapement goals for the Norton Sound District index rivers are achieved or when ADF&G determines that further restrictions would have no impact on achieving chum salmon escapement goals.

4. The Commissioner may not place restrictions on subsistence fishing for chum salmon by emergency order, unless all directed chum salmon commercial fishing has been closed and sport fishing has been appropriately restricted in the subdistrict (Menard and Bergstrom, 2009).

Subsistence permits were required for salmon fishing in Golovin and Moses Point for the fifth year as of 2007. In 2008, 155 permits were issued for Subdistrict 2; fewer than in 2004 (199) and 2005 (174). All the permits issued in subdistrict 2 were returned; 100 reported fishing. The number of Subdistrict 2 permits issued to Nome residents dropped by 25% from 2004 to 2008. Fishery managers attribute the decline to easing of fishing restrictions in the Nome subdistrict. In 2008, ADF&G issued 57 permits for Subdistrict 3, the lowest number since the permit system began. All permits were returned. No subsistence harvest information was obtained for Norton Bay in 2008 (Fall et al., 2011).

Subdistricts 5 (Shaktoolik) and 6 (Unalakleet)

The Shaktoolik and Unalakleet subdistricts are typically managed together because actions in one subdistrict are believed to affect the movement of fish in the other. Restrictions were placed upon subsistence and sport fisheries in 2003, 2004, 2006, and 2008. Under the Chinook salmon management plan adopted by the BOF in February 2007 (5 AAC 04.395), subsistence gillnet salmon fishing (all species) is limited to two 48-hour fishing periods per week in marine waters from mid-June to mid-July. On the Unalakleet River, subsistence fishing is limited to two 36-hour fishing periods per week. Fishing time could be increased only if ADF&G were to project that the lower end of the SEG range would be reached. In 2008, early run timing and strength indicators suggested that the Chinook return would be weak and late. In order to protect larger females entering the Unalakleet River, on June 30 a mesh size restriction of six inches or less was enacted for subsistence gillnets on the river. On July 5, further restrictions were put in place that included closing marine waters to subsistence fishing with gillnets as well as the freshwaters of the Unalakleet River drainage. The emergency order did, however, open all fresh waters to beach seining for salmon other than Chinook. On July 16, with coho salmon beginning to arrive, restrictions were eased on gillnets in order to allow subsistence fishers to target this species (Fall et al., 2011).

ADF&G personnel conduct household surveys in Shaktoolik and Unalakleet. Researchers attempt to contact all of the households in each of the surveyed communities. For 2008, actual sample rates ranged from 93% in Unalakleet, where 201 of the 217 households were surveyed, to 89% in Shaktoolik, where 51 of the 57 households were surveyed. The salmon survey data were expanded by community to account for the households not contacted (Fall et al., 2011).

Shaktoolik and Unalakleet continue to be surveyed postseason, by household. Additionally, daily surveys of Unalakleet River and ocean subsistence fishermen have been conducted annually during the Chinook salmon run since 1985. Although total harvests by subsistence fishermen are not documented, effort and catch information are used to judge timing and magnitude of the Chinook salmon return. The commercial fishery in these areas is delayed until it becomes apparent subsistence needs are being met and Chinook salmon are beginning their upstream migration as indicated by ADF&G test net in the lower Unalakleet River (Menard et al., *2010*).

Table 3-16 Subsistence chum salmon harvest by subdistrict in Norton Sound, 1998 - 2008

	Subsistence Chum Salmon					
Year	Nome	Golovin	Moses Point	Norton Bay	Shaktoolik	Unalakleet
1998	964	1,893	1,376	6,192	1,034	3,038
1999	337	3,656	744	4,153	467	3,692
2000	535	1,155	1,173	4,714	2,412	3,000
2001	858	3,291	898	4,445	1,553	2,918
2002	1,114	1,882	1,451	3,971	800	3,877
2003	565	1,477	1,687	3,397	587	1,785
2004	685	880	683	ND	139	2,154
2005	803	1,852	598	ND	202	2,660
2006	940	722	1,267	ND	351	2,712
2007	2,938	4,217	2,334	ND	465	2,057
2008	739	350	1,284	3,330	201	960

ND = no data. Source: Menard et al., *2010*.

3.1.1.2 Port Clarence

Description of Management Area

The Port Clarence District includes all waters from Cape Douglas north to Cape Prince of Wales, including Salmon Lake and the Pilgrim River drainage (Figure 3-24). Port Clarence District also encompasses the towns of Brevig Mission and Teller. In most of the district, subsistence salmon fishing has few restrictions other than the general statewide provisions. Standard permit conditions include prohibition of fishing within 300 ft of a dam, fish ladder, weir, culvert, or other artificial obstruction. Salmon may be taken in most areas at any time, with no harvest limits. Since 2004, subsistence salmon permits have been required in all Port Clarence waters. In addition, in the Pilgrim River drainage, including Salmon Lake and the Kuzitrin drainage, harvests are limited, and specified areas are closed to subsistence salmon fishing. For Salmon Lake, 2008 was the fourth year salmon fishing was opened in a portion of that body of water since its closure in 1972 (Fall et al., 2011).

In 2008, 405 Port Clarence Pilgrim River permits were issued, compared to 363 in 2007, 345 in 2006, and 330 in 2005. Of the permits issued in 2008, 255 were to fish the Pilgrim River only; 150 were for other waters in the district. The number of permits for the Pilgrim River has grown substantially, perhaps corresponding to several consecutive years of record sockeye salmon runs. ADF&G issued 3 permits for Salmon Lake in 2008 (Fall et al., 2011).

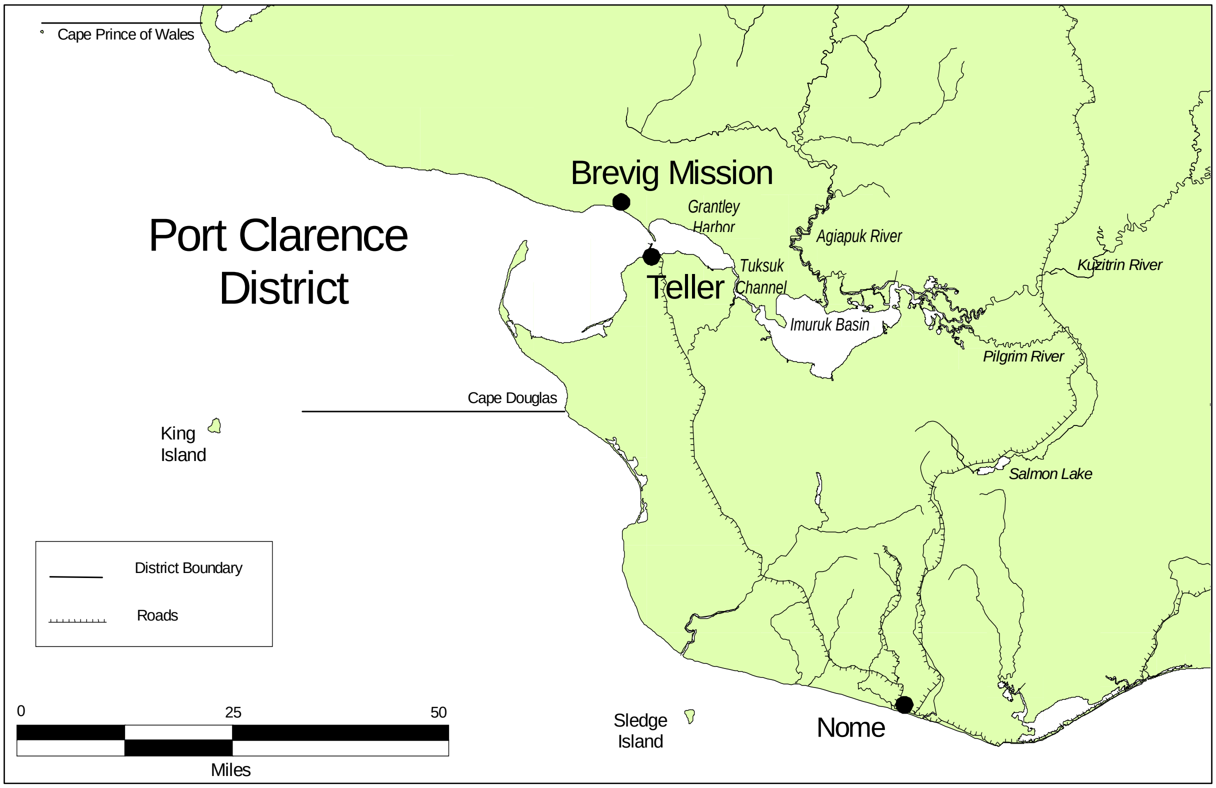
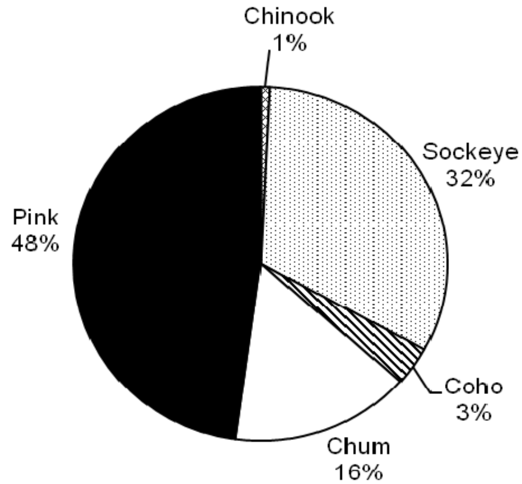


Figure 3-24 Port Clarence District

Chum Salmon Subsistence Harvest

The estimated 2008 subsistence harvest of salmon in the Port Clarence District was 15,957 fish (Table 3-15). This was the lowest harvest in four years, but still above harvests from 1994-2003. Of the total salmon harvest, 16% were chum salmon (Figure 3-25) (Fall et al., 2011).



Source: Fall et al., 2011.

Figure 3-25 Species composition of estimated subsistence salmon harvests, Port Clarence District, 2008

3.1.1.3 Kotzebue

The Kotzebue area encompasses all waters from Point Hope to Cape Prince of Wales, including those waters draining into the Chukchi Sea, and includes fishing areas used by residents of Point Hope, Kivalina, Noatak, Kotzebue, Kiana, Noorvik, Selawik, Ambler, Shungnak, Kobuk, Buckland, Deering, Shismaref, and Wales (Figure 3-26). Along the Noatak and Kobuk rivers, where runs of chum salmon are strong, household subsistence activities in mid and late summer revolve around the harvesting, drying, and storing of salmon for uses during the winter. In southern Kotzebue Sound, fewer salmon are taken for subsistence because of low availability. Chum salmon predominate in the district, but small numbers of other salmon species are present in the district (Menard et al., *2010*).

In the Kotzebue area, subsistence salmon fishing has few restrictions, other than the general statewide provisions. Standard conditions include prohibition of fishing within 300 ft of a dam, fish ladder, weir, culvert, or other artificial obstruction. Salmon may be taken in the district at any time with no harvest limits and no required permits. Commercial fishermen, however, are not allowed to subsistence fish for salmon during the commercial season (Fall et al., 2009).

From 1994 through 2004, with funding from the Division of Commercial Fisheries, the Division of Subsistence conducted household surveys in selected Kotzebue Sound communities to collect subsistence salmon harvest data. Since funding for that effort has not been available since 2004, no surveys have been conducted; therefore, no subsistence salmon harvest estimates are available since that time. The average yearly subsistence harvest between 1994 and 2004 was 59,650 salmon, the majority of which were chum salmon (Table 3-17). This average may be low due to incomplete datasets resulting in low harvest totals for several years during that period. Harvest estimates for 1994, 2002, 2003, and 2004 do not include the city of Kotzebue. Because Kotzebue is the largest community in the region, residents typically harvest as much salmon as residents from all other communities in the region combined. No harvest information is available for Ambler, a Kobuk River village, for 2001. Data for 2002 include only harvest information from Noatak and Noorvik (Fall et al., 2009).

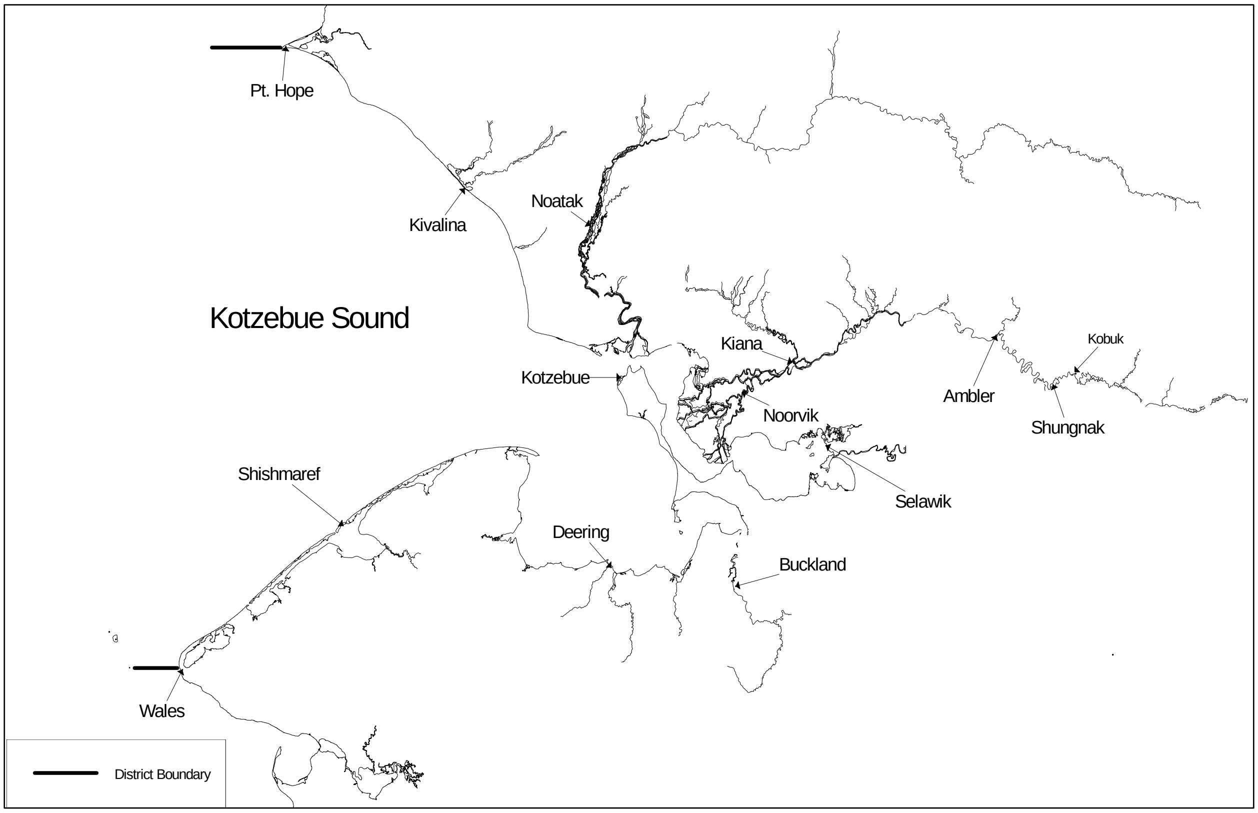


Figure 3-26 Kotzebue Sound area

Historical subsistence surveys for the Kotzebue Area have been less complete than for Norton Sound and Port Clarence Districts. Expanded surveys from 1995 to 2004 result in an estimated total subsistence harvest for Kotzebue to be 57,977 annually, the majority of which are chum salmon (Menard et al., *2010*). The ADF&G 2011 Kotzebue Salmon Season Summary indicates that subsistence harvests were very good in 2011.

Table 3-17 Estimated historical subsistence chum salmon harvests by district, Arctic Alaska, 1994 - 2008

	Norton Sound District						
Year	Number of households	Chinook	Sockeye	Coho	Chum	Pink	Total
1994	839	7,212	1,161	22,108	24,776	70,821	126,077
1995	851	7,766	1,222	23,015	43,014	38,594	113,612
1996	858	7,255	1,182	26,304	34,585	64,724	134,050
1997[a]	1,113	8,998	1,892	16,476	26,803	27,200	81,370
1998[a]	1,184	8,295	1,214	19,007	20,032	51,933	100,480
1999	898	6,144	1,177	14,342	19,398	20,017	61,078
2000	860	4,149	682	17,062	17,283	38,308	77,485
2001	878	5,576	767	14,550	20,213	30,261	71,367
2002	935	5,469	763	15,086	17,817	64,354	103,490
2003	940	5,290	801	14,105	13,913	49,674	83,782
2004	1,003	3,169	363	8,225	3,200	61,813	76,770
2005	1,061	4,087	774	13,896	12,008	53,236	84,000
2006	1,066	3,298	901	19,476	10,306	48,764	82,745
2007	1,041	3,744	923	13,564	18,170	21,714	58,116
2008	1,151	3,087	399	18,889	11,505	56,096	89,976
	Port Clarence District						
Year	Number of households	Chinook	Sockeye	Coho	Chum	Pink	Total
1994	151	203	2,220	1,892	2,294	4,309	10,918
1995	151	76	4,481	1,739	6,011	3,293	15,600
1996	132	194	2,634	1,258	4,707	2,236	11,029
1997	163	158	3,177	829	2,099	755	7,019
1998	157	289	1,696	1,759	2,621	7,815	14,179
1999	177	89	2,392	1,030	1,936	786	6,233
2000	163	72	2,851	935	1,275	1,387	6,521
2001	160	84	3,692	1,299	1,910	1,183	8,167
2002	176	133	3,732	2,194	2,699	3,394	12,152
2003	242	176	4,436	1,434	2,425	4,108	12,578
2004	371	278	8,688	1,131	2,505	5,918	18,520
2005	329	152	8,532	726	2,478	6,593	18,481
2006	345	133	9,862	1,057	3,967	4,925	19,944
2007	362	85	9,484	705	4,454	1,468	16,196
2008	399	125	5,144	562	2,499	7,627	15,957
	Kotzebue Area[b]						
Year	Number of households	Chinook	Sockeye	Coho	Chum	Pink	Total
1994[c]	557	135	33	478	48,175	3,579	52,400
1995[d]	1,327	228	935	2,560	102,880	2,059	108,662
1996	1,187	550	471	317	99,740	951	102,029
1997	1,122	464	528	848	57,906	1,181	60,925
1998	1,279	383	392	461	48,979	2,116	52,330
1999	1,277	9	478	1,334	94,342	841	97,004
2000	1,227	211	75	2,557	65,975	75	68,893
2001[e]	1,149	11	14	768	49,014	36	49,844
2002[f]	216	3	9	56	16,880	8	16,955
2003[g]	488	40	53	1,042	19,201	583	20,918
2004[g]	440	54	18	1,502	23,348	1,259	26,181
2005[h]	ND	ND	ND	ND	ND	ND	ND
2006[h]	ND	ND	ND	ND	ND	ND	ND
2007[h]	ND	ND	ND	ND	ND	ND	ND
2008[h]	ND	ND	ND	ND	ND	ND	ND

Source: ADF&G Division of Subsistence, ASFDB 2009 (ADF&G 2009) and Kawerak, Inc., household survey, 2009.

a. Includes Gambell and Savoonga.

b. Normally includes Ambler, Kiana, Kobuk, Kotzebue, Noatak, Noorvik, and Shungnak.

c. Includes Deering and Wales; does not include Kotzebue.

d. Includes Shishmaref.

e. Does not include Ambler.

f. Includes only Noatak and Noorvik.

g. Does not include Kotzebue.

h. Due to lack of funding, no collection of subsistence salmon harvest data took place in Kotzebue area communities from 2005-2008. The average yearly subsistence harvest of salmon in the Kotzebue area between 1994 and 2004 was 59,650 fish. ND = No Data.

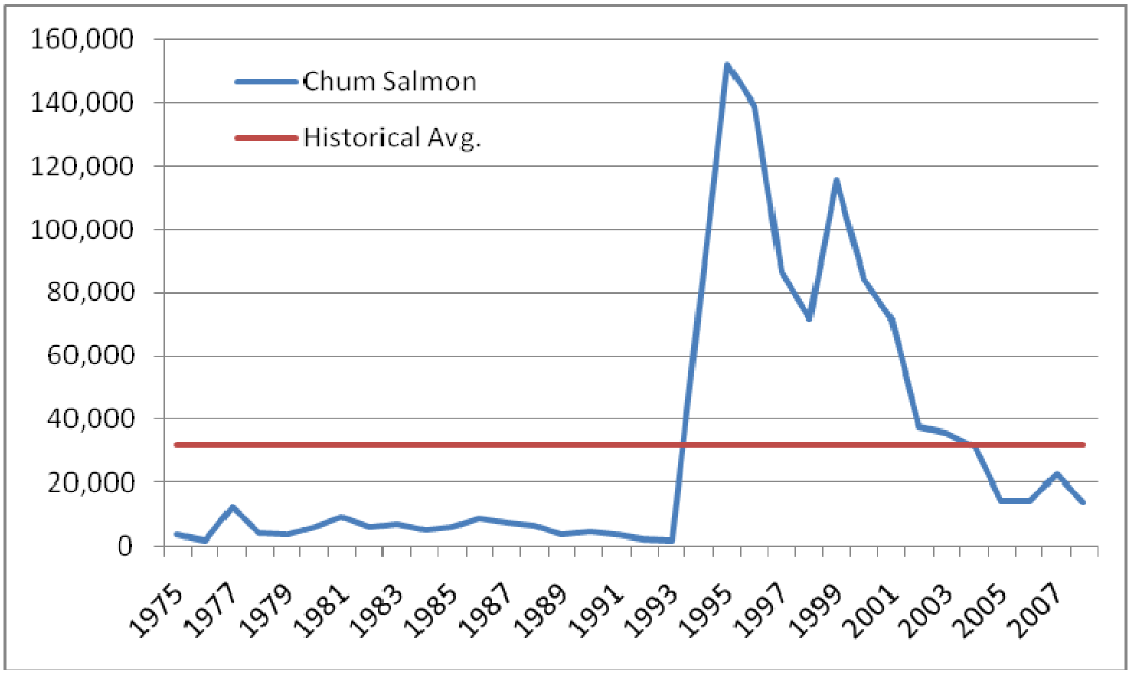
Table 3-18 Historic subsistence salmon harvests, Arctic Alaska, 1975 - 2008

	Households or permits		Estimated salmon harvest[a]					
Year	Total	Surveyed or returned	Chinook	Sockeye	Coho	Chum	Pink	Total
1975	117	79	3	225	102	3,698	7,298	11,326
1976	138	104	6	0	275	1,856	5,472	7,609
1977	195	181	35	64	623	12,222	2,839	15,783
1978	168	126	31	0	242	4,035	10,697	15,005
1979	138	119	519	0	1,007	3,419	5,842	10,787
1980	232	161	135	0	2,075	5,839	21,728	29,777
1981	236	169	47	88	1,844	9,251	6,100	17,330
1982	230	182	33	6	2,093	5,719	20,480	28,331
1983	243	189	74	40	1,950	7,013	8,499	17,576
1984	240	189	85	0	1,890	4,945	18,067	24,987
1985	215	198	56	114	1,054	5,717	2,117	9,058
1986	279	240	157	127	788	8,494	9,011	18,577
1987	235	173	97	102	812	7,265	705	8,981
1988	192	166	67	171	1,089	6,379	2,543	10,249
1989	173	130	24	131	549	3,456	924	5,084
1990	188	165	60	234	542	4,525	2,413	7,774
1991	155	128	83	166	1,279	3,715	194	5,437
1992	163	132	152	163	1,720	2,030	7,746	11,811
1993	142	104	51	74	1,780	1,578	758	4,241
1994	1,547	1,169	7,713	3,414	24,494	75,489	78,954	190,063
1995[b]	2,329	1,445	8,070	6,639	27,314	151,905	43,947	237,874
1996	2,177	1,454	7,999	4,287	27,879	139,032	67,911	247,108
1997[c]	2,398	1,645	9,620	5,597	18,153	86,808	29,135	149,314
1998[c]	2,620	1,730	8,967	3,301	21,226	71,632	61,863	166,989
1999	2,351	1,300	6,242	4,046	16,706	115,676	21,644	164,315
2000	2,247	1,336	4,399	3,612	20,654	84,196	40,499	153,360
2001[d]	2,192	1,259	5,671	4,473	16,617	71,138	31,480	129,378
2002[e]	1,327	1,204	5,624	4,504	17,838	37,396	67,756	133,119
2003[f]	1,670	1,488	5,505	5,289	16,580	35,540	54,365	117,279
2004[g]	1,915	1,814	3,534	9,159	11,585	31,386	70,841	126,506
2005[g,h]	1,129	1,104	4,239	9,306	14,622	14,486	59,829	102,481
2006[g,h]	1,125	1,099	3,431	10,763	20,533	14,273	53,689	102,689
2007[g,h]	1,122	1,073	3,829	10,407	14,269	22,624	23,182	74,312
2008[h]	1,247	1,172	3,212	5,543	19,451	14,004	63,723	105,933
5-year average (2003-2007)	1,392	1,316	4,108	8,985	15,518	23,662	52,381	104,653
10-year average (1998-2007)	1,770	1,341	5,144	6,486	17,063	49,835	48,515	127,043
Historical average (1975-2007)	904	668	2,623	2,621	8,793	31,901	25,410	71,349

Source: ADF&G Division of Subsistence, ASFDB 2009 (ADF&G 2009) and Kawerak, Inc., household survey, 2009.

Note: Since 1994 ADF&G has conducted an annual subsistence salmon harvest assessment effort in Northwest. Alaska that provides more extensive and reliable estimates. Harvest estimates prior to 1994 cannot be directly compared.

a. Includes selected communities in the Norton Sound District, Port Clarence District, and Kotzebue Area.
b. Includes Shishmaref.
c. Includes Gambell and Savoonga.
d. Does not include Ambler.
e. For the Kotzebue Area, includes only Noatak and Noorvik.
f. Does not include Kotzebue.
g. Does not include Koyuk.
h. Does not include Kotzebue Area.



Note: Data incomplete for years 1990-1993 and 2005-2008. Source: Menard et al., 2010.

Figure 3-27 Total estimated historical subsistence chum salmon harvest, Arctic Alaska, 1975-2008

2009 Fishery Update

Subsistence salmon fishers in Nome, Golovin, and Moses Point (Subdistricts 1-3) as well as Port Clarence were required to possess a subsistence salmon permit for each household that fished in these locations. Subsistence permits list the bag limit by species which are specific to each body of water. The only place where there were limits on subsistence salmon harvest was in the Nome subdistrict, and in Pilgrim River, Kuzitrin River, and Salmon Lake in Port Clarence District. If subsistence fishermen filled their harvest limit in one river, they could fish in another river.

An average to below average chum salmon run was forecast for the Nome Subdistrict, but enough chum salmon were predicted to return to eliminate the need for a Tier II fishery. The chum salmon run was also anticipated to meet ANS. Subsistence fishing in Nome is normally open four days a week from June 15-August 31; however, all chum salmon fishing and net fishing was closed on July 16 when it was projected that the lower end of the BEG range for chum salmon would not be reached. Subsistence net fishing reopened in early August in marine waters to five days per week, and in the second week of August in fresh waters to two 48-hour fishing periods per week.

As in Nome, below average chum salmon returns were forecast for the other subdistricts in Northern Norton Sound. In Golovin, Moses Point, and Norton Bay (Subdistricts 2-4), subsistence salmon fishing is normally open seven days a week. In 2009, chum salmon fishing did not occur in Moses Point because the Kwiniuk River had one of the lowest counts on record.

In Shaktoolik and Unalakleet (Subdistricts 5 and 6), subsistence salmon fishing is generally open four days per week from June 15-July 15 and chum salmon returns to these areas were forecast as average to above average.

In Port Clarence District, subsistence salmon fishing is normally open seven days per week. Reports of poor subsistence catches by fishermen in Brevig Mission and Teller resulted in ADF&G holding off on all commercial fishing until sockeye salmon started to pass at Pilgrim River weir. Passage at the weir was so low that no commercial fishing was allowed and subsistence net fishing in the river was closed.[27]

The overall chum salmon run to Kotzebue Sound was estimated to be average to above average. Comments from subsistence fishers indicate chum salmon fishing on the Kobuk River and Noatak River was good.[28]

2011 Fishery Update[29]
In the Nome Subdistrict, the 2011 chum salmon run was above average and easily provided for escapement needs and subsistence harvest above the ANS (Amounts Necessary for Subsistence) range of 3,430-5,716 chum salmon. By the first week of July, assessments ofchum salmon abundance were tracking with forecast and good numbers of chum salmon were observed in most Nome Subdistrict drainages. On July 8, the upper end of the Eldorado River chum salmon escapement ogal (6,000-9,200 chum salmon) was projected to be reached and all subsistence catch limits in freshwater areas east of Cape Nome were waived with the exception of the Solomon River. Chum salmon surpluses in 2011 were large enough to easily provide for customary levels of subsistence use and buffer greatly reduced Chinook salmon harvest in all areas of Norton Sound. (ADF&G 2011 Norton Sound Season Summary)

3.3.6 Alaska Peninsula/Area M

Description of Management Area
The Alaska Peninsula area includes all Pacific Ocean waters of Alaska between a line extending southeast from the tip of Kupreanof Point and the longitude of the tip of Cape Sarichef, and all Bering Sea waters of Alaska east of the longitude of the tip of Cape Sarichef and south of the latitude of the tip of Cape Menshikof. The communities of the Alaska Peninsula area are Port Heiden (estimated population 83 in 2009), Nelson Lagoon (population 60 in 2009), False Pass (population 41 in 2009), Cold Bay (population 84 in 2009), King Cove (population 744 in 2009), and Sand Point (population 1,001 in 2009) (http://laborstats.alaska.gov). Port Heiden is in the Lake and Peninsula Borough; the other communities are in the Aleutians East Borough (which also includes Akutan in the Aleutian Islands area) (Fall et al., 2011).

The Alaska Peninsula Management Area is further divided into the North Peninsula portion and the South Peninsula portion. The North Alaska Peninsula includes those waters from Cape Sarichef to Cape Menshikof and consists of two districts: The Northwestern District (includes all waters between Cape Sarichef and Moffet Point) and the Northern District (includes all water between Moffet Point and Cape Menshikof) (Hartill and Murphy, 2010). The South Peninsula portion is divided into four management districts: 1) Southeastern District, consisting of waters between Kupreanof Point and McGinty Point; 2) South Central District, consisting of waters between McGinty Point and Arch Point Light; 3) Southwestern District, consisting of waters between Arch Point Light, False Pass, and Cape Pankof Light; and 4) Unimak District, consisting of waters between Cape Pankof Light and Scotch Cap, including Sanak Island (Poetter et al., 2009). It should be noted that the Alaska Peninsula Area (Area M) and Bristol Bay Are (Area T) overlap consists of the Cinder River Section, Inner Port Heiden Section, and Ilnik Lagoon .

[27] www.adfg.alaska.gov/static/fishing/PDFs/commercial/2009_norton_salmon_summary.pdf
[28] www.adfg.alaska.gov/static/fishing/PDFs/commercial/2009_kotzebue_salmon_summary.pdf
[29] http://www.adfg.alaska.gov/index.cfm?adfg=fishingCommercial.main

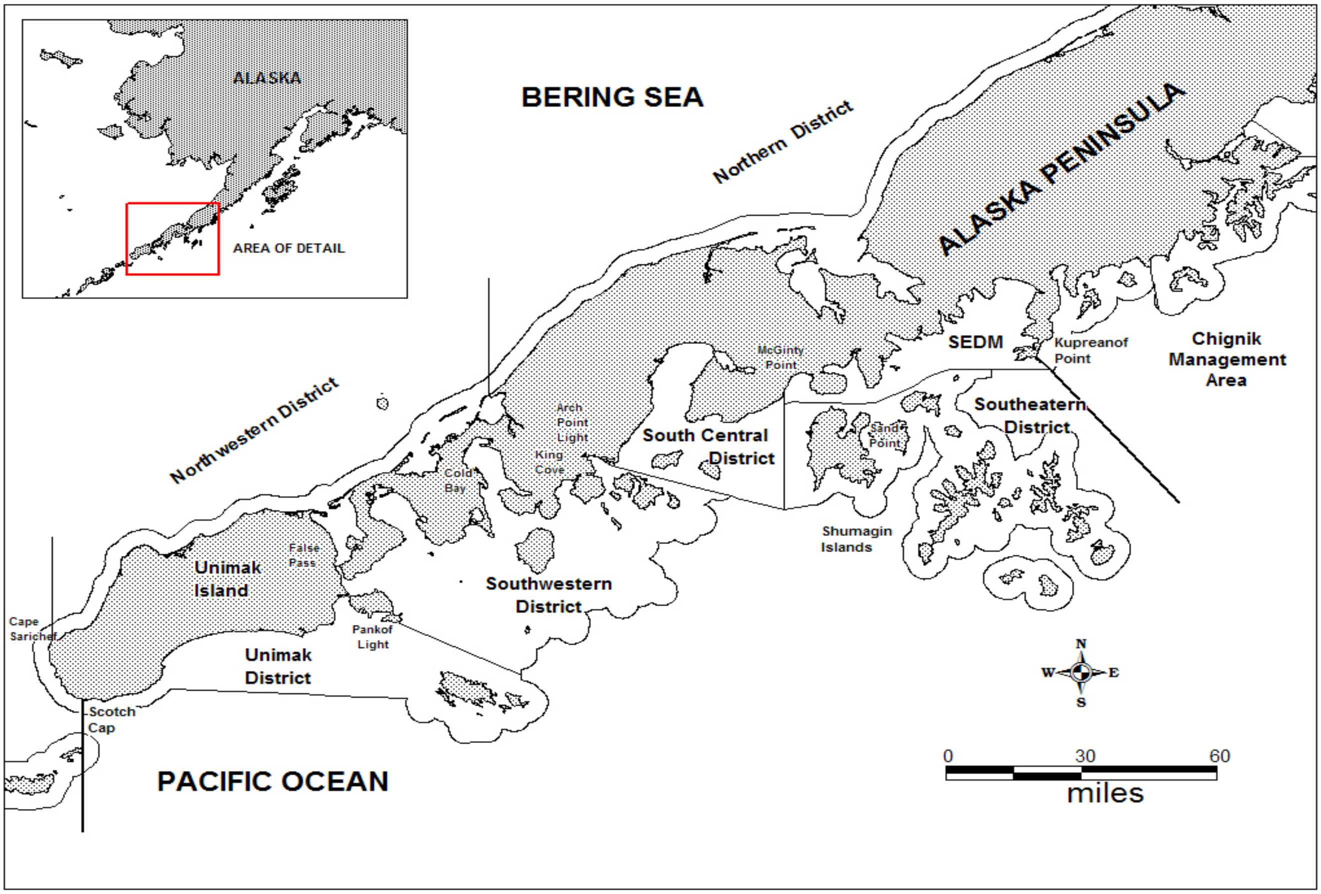


Figure 3-28 Alaska Peninsula area

Subsistence Regulations

A subsistence permit, which must be used to record daily harvests, is required for subsistence fishing in the Alaska Peninsula Management Area. There is an annual limit of 250 salmon per household. Legal gear includes seines and gillnets. In waters open to commercial fishing, set and drift gillnets may not exceed 50 fathoms in length. In most other areas, set gillnets may not exceed 100 fathoms and drift gillnets may not exceed 200 fathoms. Purse seines may not exceed 250 fathoms in length. Other standard permit conditions include prohibition of fishing within 300 feet of a dam, fish ladder, weir, culvert, or other artificial obstruction. Salmon may be taken at any time except in those districts and sections open to commercial salmon fishing; salmon may not be taken during the 24 hours before and 12 hours following a commercial salmon fishing period. A few small areas closed to subsistence salmon fishing are listed in 5 AAC 01.425 (Fall et al., 2009).

Federal regulations governing subsistence salmon fishing in waters under the jurisdiction of the FSB are generally identical to the state regulations summarized above, with the exception that rod and reel, in addition to gillnet and seine, is legal subsistence gear under federal rules. There is no separate federal subsistence permit; a state permit is required for subsistence fishing under the federal regulations (Fall et al., 2009).

Subsistence Harvest Assessment Methods

Subsistence permits for the Alaska Peninsula area have been issued since 1979. Except for residents of Sand Point and Cold Bay, permits are mailed each year to fishers who returned their permits at the end of the previous fishing season. Sand Point and Cold Bay residents are issued permits upon request at the ADF&G offices in Sand Point and Cold Bay. Permits are also issued upon request at other ADF&G offices and by mail to people who telephone to request them. Regulations require that permits be returned to ADF&G by October 31. Reminder letters are sent around November 1 to people who have not yet returned their permits. If a person does not return the permit, his or her name is removed from the mailing list. Data from returned permits are tabulated by species and fishing area. Harvest data from returned permits are expanded by community of residence to estimate the harvest by all permit holders (Fall et al, 2009).

From 1985 through 2008, the number of subsistence salmon permits issued for the Alaska Peninsula Management Area has averaged 195 per year. The recent five-year average (2004–2008) was 161 permits. In 2009, 134 subsistence salmon fishing permits were issued for the Alaska Peninsula area, down from 199 issued in 2008. The response rate was 88% in 2009 (118 of 134 permits were returned). Of all permits issued, 122 (91%) were issued to residents of Alaska Peninsula area communities, and 12 (9%) were issued to residents of other Alaska communities. Most nonlocal residents fish at Mortensen's Lagoon on the Cold Bay road system (Hartill and Keyse, 2010).

Chum Salmon Subsistence Harvest

The estimated subsistence chum salmon harvest in the Alaska Peninsula Management Area in 2008 was 1,078 fish. The estimated subsistence harvest for all salmon species in 2008 was 15,022 fish. This is an increase from the year before (10,811 salmon) and higher than the most recent five year average (14,736 salmon), but lower than the historical average (1985–2008; 18,552 salmon). (Figure 3-29, Table 3-19). The 2008 subsistence harvest was made up of 51% sockeye salmon, 29% coho salmon, 11% pink salmon, 7% chum salmon (Figure 3-30), and 2% Chinook salmon. Of the total salmon harvest, residents of Cold Bay harvested 3%, Sand Point residents 28%, Port Moller and Nelson Lagoon residents 4%, King Cove residents 44%, and False Pass residents 2%. Other Alaska residents harvested 6% (Figure 3-31) (Fall et al, 2011).

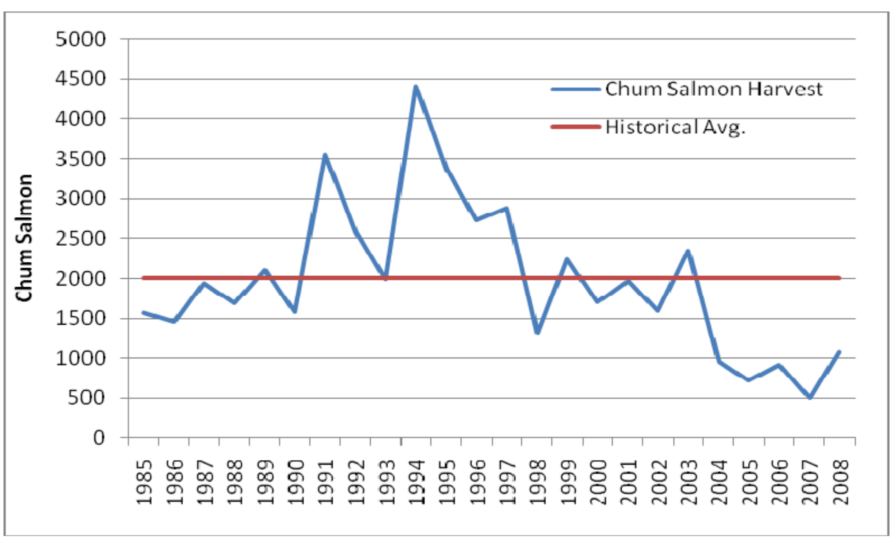


Figure 3-29 Estimated historical subsistence chum salmon harvest, Alaska Peninsula, 1985-2009

Table 3-19 Estimated historical subsistence salmon harvest, Alaska Peninsula, Area M, 1985-2009

	Permits		Estimated salmon harvests					
Year	Issued	Returned	Chinook	Sockeye	Coho	Chum	Pink	Total
1985	161	95	74	4,037	7,504	1,566	574	13,755
1986	147	84	101	5,396	2,996	1,455	1,779	11,727
1987	191	144	193	5,777	4,259	1,943	1,547	13,719
1988	183	114	257	5,501	5,646	1,692	1,666	14,762
1989	188	139	88	10,404	3,505	2,104	1,213	17,314
1990	201	157	246	8,588	4,029	1,589	736	15,188
1991	249	185	458	11,345	5,551	3,551	1,878	22,783
1992	229	177	385	10,739	4,267	2,574	1,840	19,805
1993	262	215	615	12,478	5,753	1,997	1,189	22,032
1994	256	213	674	11,884	6,086	4,406	2,206	25,256
1995	260	198	492	12,716	5,021	3,369	2,653	24,251
1996	234	178	362	12,176	7,743	2,728	2,569	25,578
1997	217	172	420	15,224	4,612	2,885	2,955	26,096
1998	233	153	407	12,920	5,820	1,326	2,286	22,759
1999	185	148	391	15,119	4,961	2,235	2,136	24,843
2000	180	152	341	9,955	5,239	1,699	950	18,185
2001	185	155	570	12,259	3,940	1,963	1,181	19,912
2002	157	133	345	9,384	3,188	1,603	532	15,052
2003	166	128	312	10,103	4,266	2,353	1,194	18,228
2004	147	135	218	9,484	3,787	951	609	15,049
2005	160	139	192	11,260	4,089	716	1,054	17,310
2006	153	131	110	7,847	2,452	910	961	12,280
2007	150	124	100	6,872	2,648	498	693	10,811
2008	199	164	280	7,623	4,355	1,078	1,687	15,022
5-year average (2003–2007)	155	131	186	9,113	3,448	1,086	902	14,736
10-year average (1998–2007)	172	140	299	10,520	4,039	1,426	1,160	17,443
Historical average (1985–2007)	195	151	320	10,064	4,668	2,005	1,496	18,552

Source: ADF&G Division of Subsistence, ASFDB 2009 (ADF&G 2009).

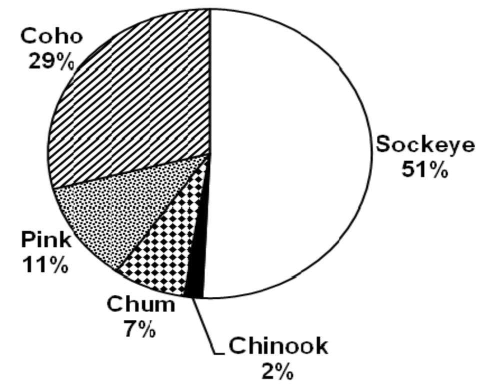


Figure 3-30 Composition of Alaska Peninsula area subsistence salmon harvest by species, 2008

Source: Fall et al., 2011.

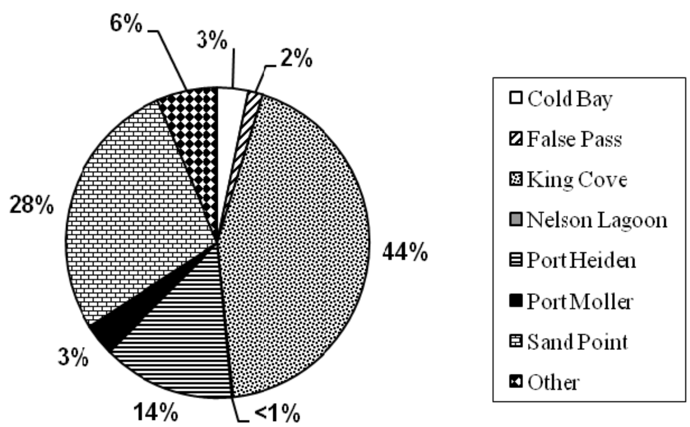


Figure 3-31 Subsistence salmon harvests by community, Alaska Peninsula area, 2008

Source: Fall et al., 2011.

In interviews with ADF&G Division of Subsistence staff, fishery managers expressed the view that the subsistence permit program did not completely document all subsistence salmon harvesting activities because some subsistence users did not obtain permits. A comparison of permit and household interview data for 1992 for King Cove found that about 31% of interviewed households that reported subsistence fishing did not have permits. The estimated total subsistence salmon harvest for the community based on the interviews was 7,036 (±1,773), compared to 5,856 based on permit returns. At Sand Point in the same year, 41% of interviewed households reported that they harvested salmon for subsistence but did not have permits. The estimated total subsistence salmon harvest for Sand Point based on the household interviews was 11,338 (±2,551), compared to 7,833 based on estimates using permit return information (Fall et al., 2009).

The subsistence permit program for the Alaska Peninsula area does not account for salmon withheld from commercial catches for home uses. However, commercial fishermen are required to report the retention of fish taken in a commercial fishery on commercial harvest fish tickets. Fishery managers believe that this number is substantial, especially in years when commercial salmon prices are low. For 1992, it was estimated that 51% of the salmon harvested for home uses at King Cove, and 45% at Sand Point, were removed from commercial harvests (Fall et al., 2009).

2009 Fishery Update
Both subsistence and commercial fisheries in the Alaska Peninsula management area are primarily made up of sockeye salmon. As such, there are no highlights or updates to report for the chum salmon subsistence fishery in this region. In the South Peninsula, chum salmon escapement fell within its established escapement goal range; however, chum salmon escapement within the Northwestern District fell below its established escapement goal range.[30]

2010 and 2011 Fishery Update
The annual season summaries for this area only provide information on commercial harvests and indicate that subsistence information will be provided in the 2011 Annual Management Report. Thus, current subsistence information will be included here once the annual management report for 2011 is made available.

3.4 Sport and personal use fisheries by region in western Alaska

Alaskan sport fishing effort and harvest are monitored annually through a statewide sport fishery postal survey. Harvest estimates are typically not available until approximately one calendar year after the fishing season; therefore, 2010 harvest estimates are not available for this document.

3.4.1 Bristol Bay

Sport Fisheries
While the majority of sport fishing effort in the Bristol Bay area targets Chinook, coho, sockeye salmon and rainbow trout, several drainages, including the Togiak, Nushagak, and Alagnak, support directed chum salmon sport fisheries. The 2009 sport catch/harvest of chum salmon was estimated as follows: Togiak: 3,014/88; Nushagak: 10,009/1,239; Alagnak: 12,630/50; and Bristol Bay wide: 30,766/1,443. The recent five year (2004-2008) average sport catch/harvest was estimated as follows: Togiak: 3,938/79; Nushagak: 7,519/1,112; Alagnak: 13,321/321; and Bristol Bay wide: 26,898/1,760. The 2009 sport fishing effort (angler-days) was estimated as: Togiak: 3,638; Nushagak: 18,064; Alagnak: 9,995; and Bristol Bay wide: 76,848. The recent five year (2004-2008) average sport fishing effort (angler-days) was estimated as: Togiak: 5,426; Nushagak: 23,328; Alagnak: 9,907; and Bristol Bay wide: 98,249.

The majority of sport fishing effort (>90%) targets species other than chum salmon. In terms of effort, catch, and harvest, the directed chum salmon sport fisheries in Bristol Bay would be characterized as minor in relation to other sport fisheries in the area. Additionally, a significant proportion of the sport catch of chum salmon occurs incidentally in directed king salmon sport fisheries. After a relatively

[30] www.adfg.alaska.gov/static/fishing/PDFs/commercial/2009_akpeninsula_salmon_summary.pdf

steady increase from the 1970s through 2000, total sportfishing effort in the Bristol Bay Area declined during 2002 and 2003, followed by increasing effort through 2007 and another decline during 2008 and 2009. Catch and harvest of chum salmon in Bristol Bay sport fisheries have remained stable or declined slightly during the last 10 years (personal communication, Jason Dye, 2010).

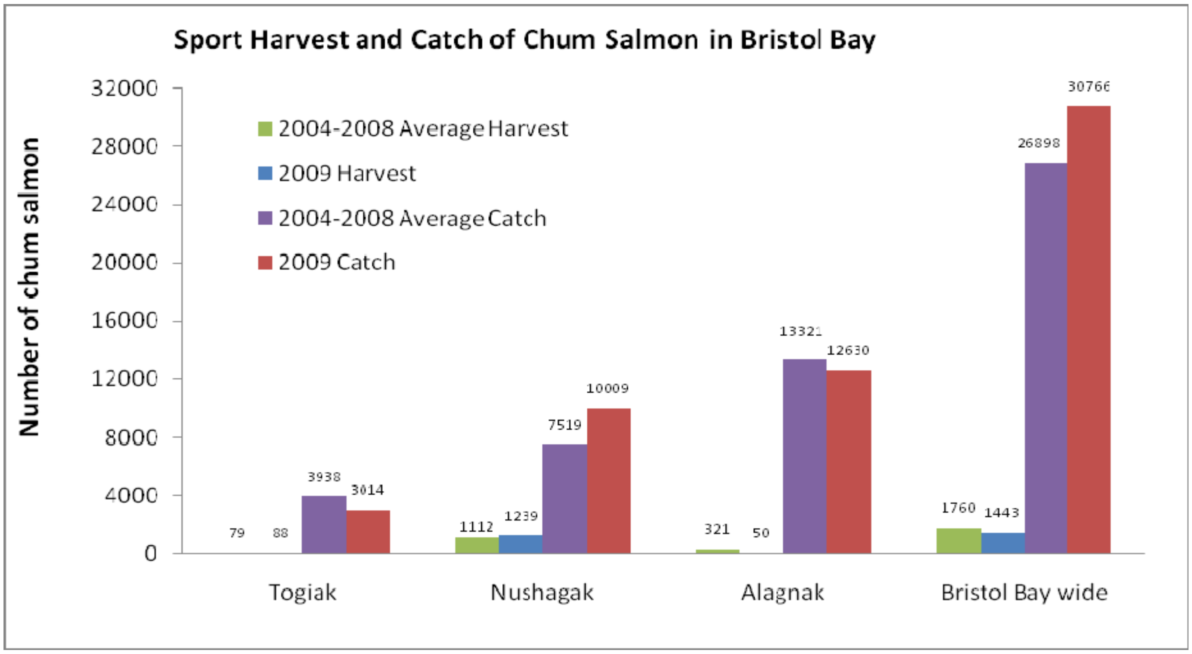


Figure 3-32 Sport Harvest and Catch of Chum Salmon in Bristol Bay

Personal Use Fisheries
Due to subsistence fishing opportunities in Bristol Bay and the limits on personal use fisheries, personal use fishing rarely occurs in the Bristol Bay area and no recent personal use chum salmon harvest has been documented (personal communication, Jason Dye, 2010).

3.4.2 Kuskokwim Area

Sport Fisheries
Most of the Kuskokwim River and Kuskokwim Bay sport fishing effort occurs in the Lower Rivers of the Kuskokwim drainage and in the Goodnews and Kanektok Rivers of Kuskokwim Bay. Most effort is directed at Chinook and coho salmon and rainbow trout. Little sport fishing effort is directed at chum salmon, but there is a small yearly harvest. The amount of effort toward chum salmon catch and harvest is expected to remain similar in subsequent years.

As the Kuskokwim River and Kuskokwim Bay fisheries are not in the same drainage, they are calculated separately. From 2004-2008, the average Kuskokwim River chum salmon harvest in the sport fishery was 286 fish. For same time period 2004-2008, the average Kuskokwim Bay chum salmon harvest in the sport fishery was 88 fish. The total 2008 sport harvest of summer chum salmon in the Kuskokwim River drainage (not including Kuskokwim Bay) was estimated at 121 fish. The 2008 sport fish harvest of chum salmon in Kuskokwim Bay was 141 fish.

Personal Use Fisheries
Currently there are no personal use salmon fishing regulations in effect for the Kuskokwim Management Area.

3.4.3 Yukon River

Sport Fisheries

Most of the Yukon River drainage's sport fishing effort occurs in the Tanana River drainage along the road system and most effort is directed primarily at Chinook and coho salmon. Little sport fishing effort is directed at chum salmon, but all chum salmon harvested in the sport fishery are categorized as summer chum salmon. Although a portion of the genetically distinct fall chum salmon stock may be taken by sport fishers, most of the sport chum salmon harvest is thought to be made up of summer chum salmon because: 1) the run is much more abundant in tributaries where most sport fishing occurs; and 2) the chum salmon harvest is typically incidental to efforts directed at Chinook salmon, which overlap in run timing with summer chum salmon (JTC, 2010).

From 2004-2008, the Tanana River on average made up 36% of the total Yukon River drainage summer chum salmon harvest. On September 1, 2009 two Emergency Orders were issued to close all waters of the Yukon and Tanana River drainages to the retention of chum salmon. These actions remained in effect throughout the remainder of the 2009 salmon season. The total 2008 sport harvest of summer chum salmon in the Alaskan portion of the Yukon River drainage (including the Tanana River) was estimated at 371 fish. The recent five year (2004-2008) average for sport harvest of summer chum salmon was estimated at 367 fish (JTC, 2010).

Personal Use Fisheries

The Fairbanks Nonsubsistence Area, located in the middle portion of the Tanana River, contains the only personal use fishery within the Yukon River drainage. The management area known as Subdistrict 6-C is completely within the Fairbanks Nonsubsistence Area. Personal use salmon and a valid resident sport fishing license are required to fish within the Fairbanks Nonsubsistence Area. The harvest limit for a personal use salmon household permit is 10 Chinook, 75 summer chum salmon, and 75 fall chum salmon and coho salmon combined. The personal use salmon fishery in Subdistrict 6-C has a harvest limit of 750 Chinook, 5,000 summer chum salmon, and 5,200 fall chum salmon and coho salmon combined (JTC, 2010).

In 2009, the personal use salmon fishery followed the regulatory fishing time of two 42-hour periods per week except during the time period September 3-17 when it was closed to conserve fall chum salmon with precedence for subsistence fisheries and escapement requirements. The 2009 preliminary harvest (as of February 2010) based on permits returned for Subdistrict 6-C included 308 summer chum salmon and 78 fall chum salmon. The recent five year (2004-2008) average personal use harvest was estimated at 193 summer chum salmon and 210 fall chum salmon in the Yukon River drainage (JTC, 2010).

3.4.4 Arctic Alaska

Personal Use Fisheries

Currently there are no personal use salmon fishing regulations in effect for the Arctic Alaska Management Area.

3.1.1.4 Norton Sound

Sport Fisheries

In Norton Sound, most of the sport fishing effort occurs along the Nome road system, and to the south in the Unalakleet River drainage, where king and coho salmon fishing is popular and two large sport guiding operations are located. Pink salmon fishing is also popular, but sockeye fishing is nearly nonexistent. Chum salmon stocks have steadily declined in many places on the Seward Peninsula since the early 1980s. This has led to increasingly restrictive sport and commercial management, and the initiation of Tier II subsistence in the Nome Subdistrict (as previously discussed in Section 3.3.5.1.1). All rivers in northern Norton Sound from the Sinuk River in the west to Topkok in the east have been closed to sportfishing for chum salmon since 1992. It is anticipated that until chum salmon populations recover, there will be a need to continue with very restrictive measures to protect local stocks. In the Golovin, Elim, Norton Bay, Shaktoolik, and Unalakleet subdistricts, sport fishing for chum remains open, with recent ten-year average catches of 3,892 and harvests of 616 fish per year, with an average annual fishing effort of 17,027 angler days. In 2009, catches of chum salmon in Norton Sound was 2,113 and harvest was 412 fish (personal communication, Brendan Scanlon, 2010).

3.1.1.5 Kotzebue

Sport Fisheries

Chum salmon are far and away the most abundant of the five Pacific salmon in the Kotzebue area, therefore, virtually all of the salmon sport fishing effort directed at chum salmon. However, while some salmon fishing effort occurs in association with wilderness float trips in Kotzebue Sound drainages, the amount of sport fishing effort expended toward salmon in the northern part of the management area is very light and harvests are very small, with sheefish and Dolly Varden being the principle target species. The recent 10-year average chum salmon harvest for the entire Kotzebue Area was 978 fish, the average catch was 2,903 fish, and the average of annual sport fishing effort was 5,779 angler-days. In 2009, catches of chum salmon in the Kotzebue area was 3,232 and harvest was 229 fish (personal communication, Brendan Scanlon, 2010).

3.4.5 Alaska Peninsula/Area M

Sport Fisheries

A significant percentage of the Alaska Peninsula/Aleutian Islands Regulatory Area sport fishing effort occurs in the Chignik River drainage and is directed at Chinook and coho salmon. Relatively little sport fishing effort is directed at chum salmon, and few are harvested annually. The annual chum salmon harvest typically represents around 1% of the total salmon harvest within the regulatory area. Most chum salmon sport fishing effort normally occurs in freshwaters of the Russel Creek drainage near Cold Bay (personal communication, 2010). From 2000-2009, Alaska Peninsula chum salmon sport harvests averaged 303 fish, although the median harvest during this period equaled 173. Total chum catch (including harvests) averaged just below 3,700. With the exception of 2009, when the chum salmon harvest appeared to increase substantially from historic levels, the most recent 10-year trend shows relatively little change in sport fishing activity targeting this species (personal communication, Donn Tracy, 2010).

Table 3-20 Alaska Peninsula/Aleutian Islands chum salmon catch and harvest, 2000 - 2009

Alaska Peninsula/Aleutian Islands
Chum Salmon Catch and Harvest

Year	Catch*	Harvest
2000	7,217	213
2001	784	174
2002	1,734	107
2003	5,631	179
2004	3,024	435
2005	2,648	64
2006	1,856	109
2007	2,382	171
2008	3,443	62
2009	8,194	1,519
Avg.	3,691	303
Median	2,836	173

*Includes harvest.

Regarding the table above, the terms catch and harvest are often used interchangeably in commercial and subsistence fisheries; however there is a distinction between catch and harvest in the sport fisheries. When reporting or speaking of harvest, it is simply the number of fish that are caught and taken (killed) by an angler of a particular species for a certain fishery or location. Catch, however, are the numbers of fish of a particular species that are caught but not retained or harvested. In sport fishery terms, catch is the total number of fish that were caught including those fish that were released, while harvest is the number of fish caught that were kept. As such, harvest is a subset of catch when reviewing statewide harvest survey numbers (personal communication, Charlie Swanton and Tom Taube, 2010).

It should be noted, however, that when evaluating or reporting catch, there is often confusion regarding the distinction between catch and harvest so that catch statistics may (and often times do) include fish that have been harvested. In a strict interpretation, it cannot be emphatically stated that all fish reported as caught are released which is why both catch and harvest are reported (personal communication, Charlie Swanton and Tom Taube, 2010).

Personal Use Fisheries
Currently there are no personal use salmon fishing regulations in effect for the Alaska Peninsula/Aleutian Islands Regulatory Area.

3.5 Commercial chum salmon fisheries by region in western Alaska

3.5.1 Summary of recent management actions by region

3.5.1.1 Bristol Bay

Recent Management Actions

Management of the commercial fishery in Bristol Bay is focused on discrete stocks with harvest directed at terminal areas around the mouths of major river systems. Each stock is managed to achieve a spawning escapement goal based on sustained yield. Escapement goals are achieved by regulating fishing time and area by emergency order and/or adjusting weekly fishing schedules (Morstad et al., 2010).

In the Nushagak District, the Nushagak-Mulchatna Chinook Salmon Management Plan (5 AAC 06.361) was adopted to ensure an adequate spawning escapement of Chinook salmon into the Nushagak River system. The plan (adopted in 1992 and amended in 119, 1997, and 2003) directs ADF&G to manage the commercial fishery for an inriver goal of 75,000 Chinook salmon past the sonar site at Portage Creek. The inriver goal provides: 1) a biological escapement goal of 65,000 spawners; 2) a reasonable opportunity for inriver subsistence harvest; and 3) a guideline sport harvest of 5,000 fish. The plan addresses poor run scenarios by specifying management actions to be taken in commercial, sport, and subsistence fisheries. The Nushagak Coho Salmon Management Plan (5 AAC 06.368) also establishes spawning and inriver escapement goals and provides guidance for managing sport, subsistence, and commercial fisheries that harvest coho salmon. The plan directs ADF&G to manage the commercial coho salmon fishery to achieve an in-river escapement goal of 100,000 fish and a biological escapement goal of 90,000 spawners and 10,000 additional fish for upriver sport and subsistence harvests (Morstad et al., 2010).

Fishery and Reporting Requirements

Requirements for commercial fishing in the Bristol Bay Area are set out in commercial fishing regulations (5 AAC 06). Subsistence, personal use, and sport fishing regulations affecting commercial fishing activities are set out in subsistence fishing regulations (5 AAC 01 and 02), personal use fishing regulations (5 AAC 77), and sport fishing regulations (5 AAC 67 and 75).

Commercial fishermen are required to have a valid CFEC limit entry permit to participate in the commercial salmon fisheries in the Bristol Bay Area. All salmon caught by CFEC permit holders during commercial periods must be reported on fish tickets. Regulations also require commercial fishermen to report, on each fish ticket, the number of salmon harvested but not sold during commercial fishing periods. Buyers are required to ensure this information is reported on fish tickets even though a portion of the commercial harvest may have been used for subsistence or personal use.

All processors, buyers, and catcher/sellers are required to register with ADF&G prior to commencing operations in Bristol Bay. In addition, commercial operators are required by Alaska State statutes to submit the following catch and production information (5 AAC 39.130, Commercial Fishing Regulations):

- Processor Checklist: this is required to be completed and signed by an ADF&G representative before your company buys any fish;
- Daily Catch Reports: these reports must be transmitted to ADF&G by 10:00 a.m. the day after each fishing period of the season or from midnight to midnight if the fishing period extends beyond midnight;
- Weekly Catch Reports: these must be submitted for each week (Sunday through Saturday) that your company operates;

- Fish Tickets: these must be submitted to the local ADF&G office each week with the weekly catch report. Each ticket should have the number of fish, pounds of fish, and price for each species on every delivery. Also include fish by species kept by fishers for personal use; and
- Final Operations Report: must be filed with the King Salmon or Dillingham ADF&G office upon completion of the salmon buying activity in Bristol Bay or by September 30, whichever is earlier. Report the final, confirmed tally of salmon delivered to your company by district, species, and date. Also report all germane information in full as requested. Information specific to each company will remain confidential and is used to compile catch totals, preliminary ex-vessel values, average fish weights, and the overall production totals for the Bristol Bay season. It is extremely important that you file this report as soon as possible after completion of your company's fish buying activities.

ADF&G compiles this information for use in daily management strategies and distributes catch data to the fishing industry.

3.5.1.2 Kuskokwim Area

Kuskokwim River Recent Management Actions
Low chum salmon abundance from 1997 through 2000 prompted the Alaska Board of Fisheries to declare Kuskokwim River chum salmon as a stock of yield concern in September 2000. The chum salmon runs to the Kuskokwim River improved throughout 2000s, with near record runs from 2005 through 2007, which led to the stock of concern finding being lifted in January 2007. Near record runs occurred from 2005 through 2007; thereafter, abundance has been near average (Estensen et al., 2009).

As directed by the Kuskokwim River Salmon Management Plan (5 AAC 07.365), a commercial fishery is allowed to be prosecuted in June and July if salmon abundance is above the amounts necessary to meet escapement goals and subsistence use. Improved chum salmon markets and increased processing capacity at the Platinum processing plant should result in commercial openings occurring from mid-to late June through July, provided salmon abundance in adequate and subsistence needs are being met. However, processing capacity may limit commercial openings in District 1 to Subdistrict 1-B (Bethel) only. Commercial openings may be announced when no large scale buyers are available in order to provide opportunity for all permit holders operating as catcher/sellers or catcher/processors (ADF&G, 2010).

Although the use of gillnets with up to 8-inch mesh is allowed by regulation, commercial fishing periods are almost always limited to gillnets with 6-inch mesh or less. This allows for the commercial harvest of sockeye and chum salmon while limiting impacts to Chinook salmon (ADF&G, 2010).

Kuskokwim Bay Recent Management Actions
The District 4 commercial fishery is managed in accordance with the District 4 Salmon Management Plan 5 ACC 07.367. By regulation, the first commercial fishing period in District 4 is to occur prior to June 16. Additional commercial fishing periods are scheduled if salmon abundance warrants. In District 5, the commercial fishery will open during the fourth week of June given adequate run abundance and processor capacity. The commercial fishing schedule is anticipated to align with the District 4 commercial schedule from late June through July given adequate run abundance, market interest, and processor capacity. Fishing time may be reduced if such action is necessary to achieve salmon escapement objectives (ADF&G, 2010).

Kuskokwim River and Bay Fishery and Reporting Requirements
All processors, buyers, and catcher/sellers of salmon are required to register with ADF&G before operating in the Kuskokwim Area. Processors, buyers, and catcher/sellers in Districts 1, 4, and 5 must register with the ADF&G office in Bethel. Registered salmon buyers are required to provide a verbal

report of their salmon purchases within 24 hours following the closure of a commercial fishing period. Buyers are also required to mail fish tickets to ADF&G within 24 hours or deliver fish tickets within 72 hours following the closure of each commercial fishing period in the Kuskokwim Area. If there is incomplete reporting, ADF&G may delay additional commercial fishing periods until the needed harvest reports are received. In addition, it is very important for buyers to accurately report on each fish ticket the statistical area where salmon were harvested (maps of statistical areas are available upon request and are noted in regulation) (Estensen et al., 2009).

All salmon caught by CFEC permit holders during commercial periods must be reported on fish tickets. Regulations also require commercial fishermen to report, on each fish ticket, the number of salmon harvested but not sold during commercial fishing periods. Buyers are required to ensure this information is reported on fish tickets even though a portion of the commercial harvest may have been used for subsistence (ADF&G, 2010).

3.5.1.3 Yukon River

Recent Management Actions

At its September 2000 work session, the BOF classified the Yukon River summer chum salmon as a stock of management concern. This determination of management concern was based on documented low escapements during 1998-2000 and an anticipated low run in 2001. The classification as a management concern was continued at the January 2004 BOF meeting due to established escapement goals not being achieved in East Fork Andreafsky River from 1998-2003 and in Anvik River from 1998-2001 and 2003 (Bergstrom et al., 2009).

Given the collectively large spawning escapements of the Yukon River summer chum salmon stock over the three years preceding the January 2007 BOF meeting (2004-2006), including a near record run in 2006, the summer chum salmon stock no longer met stock of concern criteria and the classification was discontinued in February 2007 (Bergstrom et al., 2009).

In addition to the above actions, in January 2010, the BOF modified The Yukon River Summer Chum Salmon Management Plan to allow, by emergency order, a commercial harvest up to 50,000 fish if the total run size is between 900,000 and 1,000,000 fish, distributed by district or subdistrict in proportion to the guideline harvest levels (Hayes and Norris, 2010).

Similar to that of summer chum salmon, Yukon River fall chum salmon was classified as a stock of yield concern by the BOF at its September 2000 work session. Additionally, Toklat and Fishing Branch Rivers fall chum salmon were classified as stocks of management concern. The determination for the entire Yukon River fall chum salmon as a stock of yield concern was based on substantial decrease in yields and harvestable surpluses during the period 1998-2000, and the anticipated very low run expected in 2001. The 2000 fall chum salmon run was the worst on record. The determination for Toklat and Fishing Branch Rivers as stocks of management concern was based on escapements not meeting the OEG of 33,000 fish for Toklat River from 1996-2000, and not meeting the escapement objective of 50,000-120,000 fish for Fishing Branch River from 1997-2000 (Borba et al., 2009).

Classification as a stock of yield concern continued at the January 2004 BOF meeting because the combined commercial and subsistence harvests showed a substantial decrease in fall chum salmon yield from the 10-year period (1989-1998) to the more recent five year average (1999-2003). Toklat River stock was removed from management concern classification as a result of the BEG review presented at the BOF meeting; however, as a component of the Yukon River drainage, Toklat River fall chum salmon stock was included in the drainage-wide yield concern classification. Fishing Branch River stock was also removed from the management concern classification because management of the portion of the drainage is covered by an annex to the Pacific Salmon Treaty, which is governed under the authority of the Yukon River Panel (Borba et al., 2009).

In January 2007, the BOF determined that Yukon River fall chum salmon stock no longer met the criteria for a yield concern. Run strength was poor from 1998-2002; however, steady improvement had been observed since 2003. The 2005 run was the largest in 30 years and 2006 was above average for an even-numbered year run. The drainage-wide OEG of 300,000 fall chum salmon was exceeded in the preceding five years. The five year average (2002-2006) total reconstructed run of approximately 950,000 fish was greater than the 1989-1998 10-year average of approximately 818,000 fish, which indicated a return to historical run levels (Borba et al., 2009).

As with summer chum salmon, the BOF also modified The Yukon River Fall Chum Salmon Management Plan in January 2010 by lowering the threshold required to allow a directed fall chum salmon commercial fishery from a run size of 600,000 fall chum salmon to 500,000 fall chum salmon (Hayes and Norris, 2010).

Fishery and Reporting Requirements

All processors, buyers, and catcher/sellers of salmon are required to register with ADF&G before operating in the Yukon Area. Processors, buyers, and catcher/sellers in Districts 1, 2, and 3 must register with the ADF&G office in Emmonak. Processors, buyers, and catcher/sellers in Districts 4, 5, and 6 must register with the ADF&G office in Fairbanks. Registered salmon buyers are required to provide a verbal report of their salmon purchases within 18 hours following the closure of a commercial fishing period. Buyers may verbally report harvest information in the Upper Yukon Area after office hours by calling a 24-hour message recording. Buyers are also required to mail fish tickets to ADF&G within 24 hours or deliver fish tickets within 48 hours following the closure of each commercial fishing period in the Lower Yukon Area. In the Upper Yukon Area, buyers are required to mail fish tickets to ADF&G within 36 hours or deliver fish tickets within 36 hours following the closure of each commercial fishing period. If there is incomplete reporting, ADF&G may delay additional commercial fishing periods until the needed harvest reports are received. In addition, it is very important for buyers to accurately report on each fish ticket the statistical area where salmon were harvested (maps of statistical areas are available upon request and are noted in regulation) (Hayes and Norris, 2010).

Table 3-21 Guideline harvest ranges and midpoints for commercial harvest of Yukon River summer and fall chum salmon

District or Subdistrict	Summer Chum Salmon Guideline Harvest Range: Lower Number	Percent	Midpoint Number	Percent	Upper Number	Percent
1 and 2	0 to 251,000	62.8	503,000	62.9	755,000	62.9
3	0 to 6,000	1.5	12,500	1.6	19,000	1.6
4-A[31]	0 to 113,000	28.3	225,500	28.2	338,000	28.2
4-B and 4-C	0 to 16,000	4	31,500	3.9	47,000	3.9
5-B, C, and D	0 to 1,000	0.3	2,000	0.3	3,000	0.3
6	0 to 13,000	3.3	25,500	3.2	38,000	3.2
Total	400,000	100	800,000	100	1,200,000	100

District or Subdistrict	Fall Chum Salmon Guideline Harvest Range: Lower Number	Percent	Midpoint Number	Percent	Upper Number	Percent
1, 2, and 3	0 to 60,000	82.5	140,000	71.2	220,000	68.6
4	0 to 5,000	6.9	22,500	11.4	40,000	12.5
5-B and 5-C	0 to 4,000	5.5	20,000	10.2	36,000	11.2
5-D	0 to 1,000	1.4	2,500	1.3	4,000	1.2
6	0 to 2,750	3.8	11,625	5.9	20,500	6.4
Total	0 to 72,750	100	196,625	100	320,500	100

Note: Guideline harvest ranges for summer and fall chum salmon were established in 1990.
Source: Hayes and Norris, 2010.

All salmon caught by CFEC permit holders during commercial periods must be reported on fish tickets. In fisheries directed at the harvest of roe, the number of salmon from which the roe was extracted must be reported on the fish ticket and the pounds of roe produced and the number of male chum salmon and Chinook salmon released alive. Regulations also require commercial fishermen to report, on each fish ticket, the number of salmon harvested but not sold during commercial fishing periods. Buyers are required to ensure this information is reported on fish tickets even though a portion of the commercial harvest may have been used for subsistence (Hayes and Norris, 2010).

3.5.1.4 Arctic Alaska

Norton Sound

Recent Management Actions

In response to guidelines established in the SSFP (5 AAC 39.222(f)(21)), the BOF classified Subdistrict 1 chum salmon stock as a management concern in 2000. The classification was upheld at the 2004 BOF meeting (Menard and Bergstrom, 2003a). In 2007, based on definitions provided in SSFP (5 AAC 39.222(f)(21) and (42)), only the most recent 5-year yield and escapement information (2002–2006), and the historical level of yield or harvestable surpluses were considered. Accordingly, ADF&G recommended a change in status of the Subdistrict 1 chum salmon stock from a management concern to a yield concern at the October 2006 BOF work session because in the preceding 5 years (2002–2006) a majority of chum salmon escapement goals had been achieved in Subdistrict 1. The BOF accepted ADF&G's recommendation and the Subdistrict 1 chum salmon stock was reclassified at its 2007 meeting (Menard and Bergstrom, 2006a). At the 2009 BOF meeting, ADF&G recommended continuation of

[31] Or the equivalent roe poundage of 61,000 to 183,000 pounds or some combination of fish and pounds of roe.

Norton Sound Subdistrict 1 chum salmon as a stock of yield concern (Menard and Bergstrom, 2009). During the most recent 5 years (2005–2009), a majority of chum salmon escapement goals had been achieved in Subdistrict 1. ADF&G's recommendation to continue classification of this stock as a yield concern was based on low yields for the recent 5-year period (2005–2009) compared to historical yields in the 1980s.

In response to the guidelines established in the SSFP (5 AAC 39.222(f)(42)), the BOF classified Norton Sound Subdistricts 2 and 3 chum salmon as a stock of yield concern at its September 2000 work session. This determination as a yield concern was based on low harvest levels for the previous 5-year period (1995–1999). An action plan was subsequently developed by ADF&G and acted upon by the BOF in January 2001. The classification as a yield concern was continued at the January 2004 BOF meeting (Menard and Bergstrom, 2003b) and at the January 2007 BOF meeting (Menard and Bergstrom, 2006b). ADF&G recommended continuation of the Norton Sound Subdistrict 2 and Subdistrict 3 chum salmon as a stock of yield concern at the 2009 BOF meeting (Menard and Bergstrom, 2009b). From 2005 to 2009, low yields of chum salmon have continued in Norton Sound Subdistrict 2 and in Subdistrict 3; yields have been inconsistent, but often low.

The 2009 Salmon Management Plan for the Golovin Subdistrict limits commercial harvest to a maximum of 15,000 chum salmon before mid-July in an attempt to protect chum salmon stocks and allow for some harvest while flesh quality is at its best. By that date, the chum salmon run usually can be assessed and fishing time adjusted accordingly. Previous to 2008 there had been no commercial chum salmon fishing in Subdistrict 2 since 2001, largely because escapements had fallen short of the SEG of 30,000 at the Niukluk River. Consequently, ADF&G has implemented a conservative approach with respect to determining when commercial fishing may occur. In 2009, the poor chum counts at Kwiniuk River tower in the adjacent subdistrict indicated a possible near-record low chum salmon run to northern Norton Sound and ADF&G did not open the Golovin Subdistrict to commercial salmon fishing until the coho salmon season. In the Moses Point Subdistrict 3, chum salmon fishing did not occur in 2009 because of a poor chum salmon run.

The Norton Bay Subdistrict typically has difficulty attracting a buyer due to its remoteness and reputation for watermarked fish. Because of lack of timely salmon escapement information, Norton Bay Subdistrict is typically managed similar to the Shaktoolik and Unalaklett Subdistricts. Both Shaktoolik and Unalakleet Subdistricts consistently attract commercial markets due to larger volumes of fish and better transportation services. In 2009, ADF&G delayed the onset of the chum salmon fishery until they could project that Chinook salmon escapement goals would be reached. When the escapement goal was projected to be reached, a 24-hour commercial chum salmon opening was permitted in Subdistricts 5 and 6 to evaluate chum salmon run strength and evaluate Chinook salmon incidental catches. Subdistricts 5 and 6 Chinook salmon were designated a stock of yield concern in 2004 and the BOF continued the designation in February 2007. To increase Chinook salmon escapements, the BOF also adopted a more conservative Subdistricts 5 and 6 King Salmon Management Plan (5 AAC 04.395) that was first implemented during the 2007 season (ADF&G, 2009).

The BOF met in Fairbanks in January 2010. At the meeting the department presented reports for Stock of Concern status for chum salmon in Subdistricts 1 (Nome), 2 (Golovin), and 3 (Moses Point) and king salmon in Subdistricts 5 (Shaktoolik) and 6 (Unalakleet). At this time ADF&G recommended continuation of a yield concern for those stocks.

Fishery and Reporting Requirements

All buyers, catcher/sellers and processors are required to register with the ADF&G office in Nome. In the last several years a buyer has returned to the northern subdistricts of Norton Sound to purchase salmon. Beginning in 2002 there was a five-year period where there was not a buyer in northern Norton Sound and only Subdistricts 5 and 6 had commercial salmon fishing periods. Although there were strengthening chum salmon runs beginning in the mid-2000s there was little buyer interest. The sole buyer for Norton Sound salmon is based out of Unalakleet in southern Norton Sound. The buyer is required to give a verbal report by phone or fax of catches from the preceding day by 10 a.m.

Because of distances involved in getting tenders to and from northern Norton Sound and Unalakleet the department staggers the commercial openings based on buyer capacity. Commercial fishermen are allowed to fish 100 fathoms of set nets, but two commercial permit holders may fish together and fish 200 fathoms of gear out of one boat. The buyer has up to one week to submit fish tickets. Most commercial fishing periods for chum salmon are 48 hours in length, but ranged from 24 hours to 54 hours in 2010.

All salmon caught by CFEC permit holders during commercial periods must be reported on fish tickets. Regulations also require commercial fishermen to report, on each fish ticket, the number of salmon harvested but not sold during commercial fishing periods. Buyers are required to ensure this information is reported on fish tickets even though a portion of the commercial harvest may have been used for subsistence (ADF&G, 2010).

Kotzebue

Recent Management Actions

Primary commercial fishery management objectives are to provide adequate chum salmon escapement through the commercial fishery to: 1) ensure sustained runs by allowing adequate escapement, and 2) meet subsistence harvest needs. During the last five years, the commercial fishing schedule has been set by the buyer. ADF&G opens the commercial fishery to the hours requested by the buyer in order to allow the buyer flexibility. If poor run strength necessitates fishing restrictions, ADF&G will establish periodic closures of the fishery. Only in 2006 has the department restricted fishing time to allow for more salmon passage through the commercial fishing district (Menard, 2010).

Fishery and Reporting Requirements

In the Kotzebue fishery, gear is limited to set nets with an aggregate of no more than 150 fathoms per permit holder. There has been limited buyer capacity in the Kotzebue fishery in the 2000s. In 2002 and 2003 there was no buyer in Kotzebue and only one buyer has been in Kotzebue since 2004.

The buyer has until 10 a.m. to report catches from the preceding day by phone or fax. However, the buyer has always reported catches within a few hours of the fishery closure and makes a request for fishing time the following day based on their capacity and cargo plane schedules. Commercial fish tickets are turned in the following day although they have up to three days to submit the tickets. Commercial fishing periods ranged from four to eight hours in 2010.

All salmon caught by CFEC permit holders during commercial periods must be reported on fish tickets. Regulations also require commercial fishermen to report, on each fish ticket, the number of salmon harvested but not sold during commercial fishing periods. Buyers are required to ensure this information is reported on fish tickets even though a portion of the commercial harvest may have been used for subsistence (ADF&G, 2010).

3.5.1.5 Alaska Peninsula/Area M

Recent Management Actions

In February 2004, the board modified the South Unimak and Shumagin Islands June Fisheries Management Plan (5 AAC 09.365) by establishing a fishing schedule that began at 6:00 AM on June 7 and ended at 10:00 PM on June 29. Fishing periods were 88 hours in duration interspersed by 32-hour closures, except for the final fishing period, which was 64 hours. Fishing time was concurrent for all gear types. A total of 271,700 chum salmon were harvested during the 2010 June fishery which was below the recent 10-year average. (Poetter et al., *in prep*).

Post-June fishing opportunity for chum salmon is based on a maximum allowable schedule during the month of July, and on the strength of escapement, August through October. Limited commercial fishing opportunity was provided during the 2010 season due to the weak chum salmon escapements to South Peninsula streams. Of the four sustainable escapement goals for chum salmon, only two were achieved. Because of the poor escapements, the commercial salmon fishery was closed from August 5 through September 12 in the South Peninsula. This is historically the time period when the bulk of local pink and chum salmon are harvested (Poetter et al., *in prep*).

North (Alaska) Peninsula is mainly a sockeye salmon fishery, however there are Chinook, coho ,pink, and chum salmon fisheries in various locations In 2010, there were directed chum salmon fisheries in the Izembek-Moffet Bay Section of the Northwestern District and in the Herendeeen-Moller Bay Section of the Northern District. In 2010, chum salmon fisheries were conducted using emergency order authority and based on abundance of salmon in various rivers. The North Alaska Peninsula has two chum salmon escapement goals, one for the entire Northern District and one for the entire Northwestern District. In 2010, the Northern District chum salmon escapement goal was met as was the chum salmon escapement goal for the Northwestern District.

Fishery and Reporting Requirements
Legal salmon gear types allowed in the Alaska Peninsula Management Area include seine, drift gillnet, and set gillnet (5 AAC 09.330). Portions of the management area are closed to one or two of the three gear types. In the Aleutian Islands Management Area, purse, beach, and hand seines are the only legal commercial fishing methods for salmon (5 AAC 12.330). In the Atka-Amlia Area, salmon may be taken by purse seine and set gillnet only (5 AAC 11.333) (Hartill and Keyse, 2010).

3.6 Description of Commercial Chum Salmon Fisheries by Region

This section provides extensive background information on the commercial chum salmon fisheries in western Alaska river systems likely most affected by 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.

3.6.1 Kotzebue Sound

The Kotzebue Sound District includes all waters from Cape Prince of Wales to Point Hope. The Kotzebue District is divided into three subdistricts. Subdistrict 1 has six statistical areas open to commercial salmon fishing. Within the Kotzebue District chum salmon are the most abundant anadromous fish. Other salmon species (Chinook, pink, coho, and sockeye) occur in lesser numbers, as do Arctic char and sheefish. (This section was developed from ADF&G 2007a, Menard 2007a, ADF&G 2009b, ADF&G 2010 b and c, and data supplied by ADF&G in ADF&G 2010 and 2007).

Recent Management Actions
Primary commercial fishery management objectives are to provide adequate chum salmon escapement through the commercial fishery to: 1) ensure sustained runs by allowing adequate escapement, and 2) meet subsistence harvest needs. During the last five years, the commercial fishing schedule has been set by the buyer. ADF&G opens the commercial fishery to the hours requested by the buyer in order to allow the buyer flexibility. If poor run strength necessitates fishing restrictions, ADF&G will establish periodic closures of the fishery. Only in 2006 has the department restricted fishing time to allow for more salmon passage through the commercial fishing district (Menard, 2010).

Fishery and Reporting Requirements

In the Kotzebue fishery, gear is limited to set nets with an aggregate of no more than 150 fathoms per permit holder. There has been limited buyer capacity in the Kotzebue fishery in the 2000s. In 2002 and 2003 there was no buyer in Kotzebue and only one buyer has been in Kotzebue since 2004. The buyer has until 10 a.m. to report catches from the preceding day by phone or fax. However, the buyer has always reported catches within a few hours of the fishery closure and makes a request for fishing time the following day based on their capacity and cargo plane schedules. Commercial fish tickets are turned in the following day although they have up to three days to submit the tickets. Commercial fishing periods ranged from four to eight hours in 2010.

All salmon caught by CFEC permit holders during commercial periods must be reported on fish tickets. Regulations also require commercial fishermen to report, on each fish ticket, the number of salmon harvested but not sold during commercial fishing periods. Buyers are required to ensure this information is reported on fish tickets even though a portion of the commercial harvest may have been used for subsistence (ADF&G, 2010).

Status of Runs and Conservation Concerns

he Kotzebue fishery is primarily a chum salmon fishery, with some Chinook, sockeye, and Dolly Varden taken incidentally. The overall chum salmon run to Kotzebue Sound in 2010 was estimated to be above average, based on the commercial harvest rates, subsistence participants reporting average to above average catches, and the Kobuk test fish index being the fifth best in the 18 year project history. No stocks in the Kotzebue area are presently identified as being of management or yield concern and the commercial fishery is allowed to remain open continuously with harvest activity regulated by buyer interest.

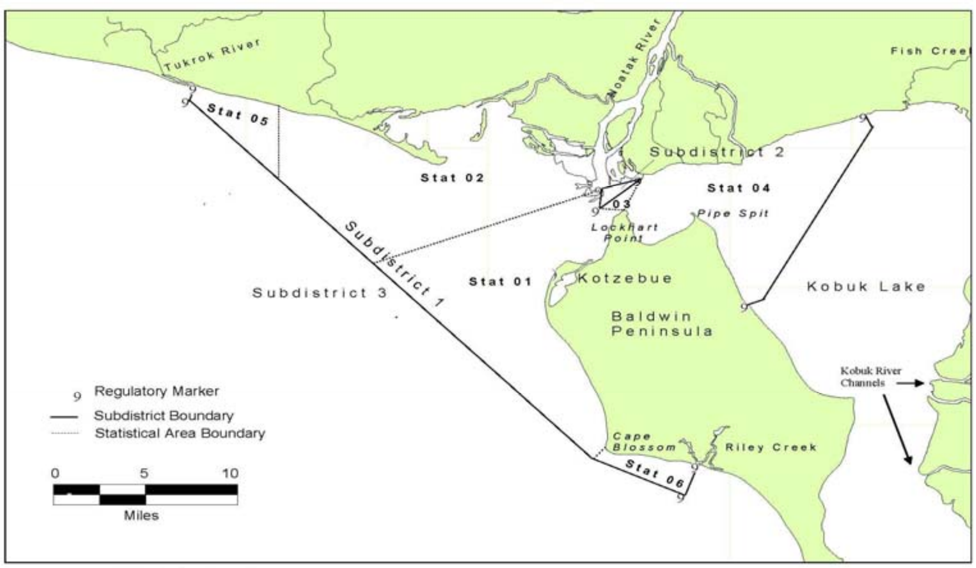


Figure 3-33 Kotzebue Fishery Management Area.

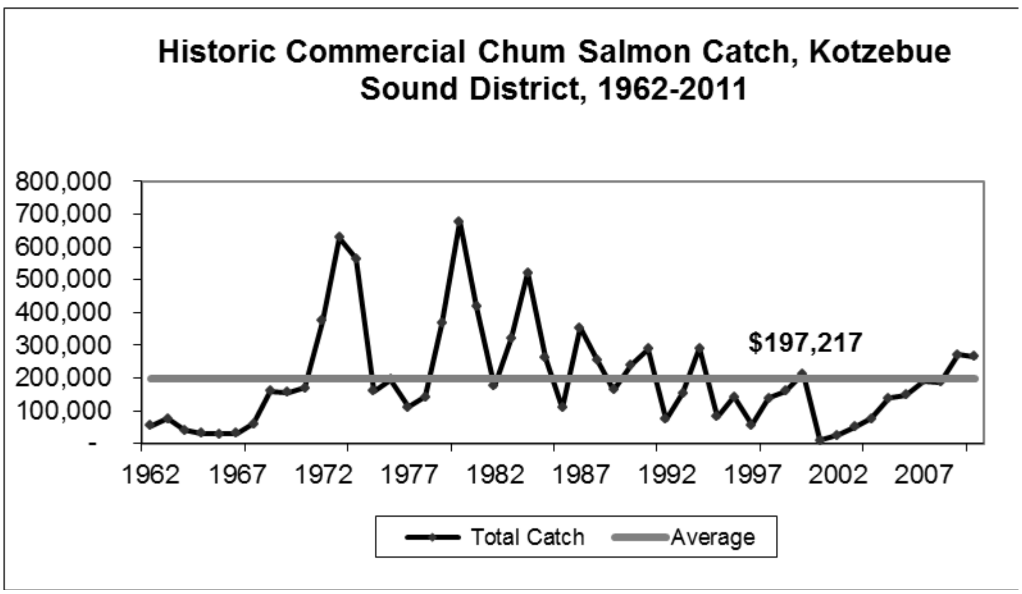
Commercial Fishery Situation and Outlook

The historical commercial chum salmon harvests are listed in Table 3-22. Commercial chum salmon harvests during the 20 years when there was a major buyer (1982-2001) ranged from 55,907 to 521,406 fish, the 20-year average being 220,720. The 5-year (1997-2001) average catch was 141,741. This significant decrease reflects the lack of demand for salmon on the open market that began in the mid-

1990s as buyers began to purchase less salmon. Fishing effort during 1982–2001 ranged from 45 to 199 fishermen. The 20-year average was 129 fishermen; the 5-year average from 1997–2001 was 61 fishermen. The decrease in participation was likely due to substantial price declines and lack of market.

In 2002, the last significant buyer in the commercial fishery decided to not purchase fish in Kotzebue. Because there was no major buyer only 3 permit holders fished in 2002. Likewise, in 2003 there were only 4 permit holders. In both 2002 and 2003, one permit holder became a licensed agent for a buyer outside of Kotzebue, and worked with other permit holders to provide product for that market.

Beginning in 2004 one buyer provided a limited market for permit holders. The fishing effort (permits fished) over the last 5 years has one-quarter the fishing effort of 20 years ago. From 2004–2008 there were less than 50 permit holders participating in the commercial fishery each year with the average being 44 permit holders. In 2009 there was an increase to 62 permit holders participating in the fishery. The 2010 harvest of 270,343 chum salmon was the highest since 1995. Also, harvested for personal se in 2009 were 13 Chinook salmon, 6 sockeye salmon, 557 pink salmon, 7 coho salmon, 1,323 Dolly Varden and 3,021 sheefish. A total of 2,160,264 pounds of chum salmon were sold with a total ex-vessel value of $860,125. The 2010 average value per permit holder was $12,837 and was the highest value since 1988 (Table 3-22). Historic catches and values, compared to average catch and value, are depicted in Figure 3-34 and Figure 3-35.



Source: Data provided to NMFS by ADF&G, in 2010, in response to a special data request.

Figure 3-34 Kotzebue Sound commercial chum salmon catch, 1962-2010.

2011 Preliminary Commercial Fishery Update

The 2011 Kotzebue Sound commercial salmon fishery openened 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 aveage 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 nearly 150% of the historic average.

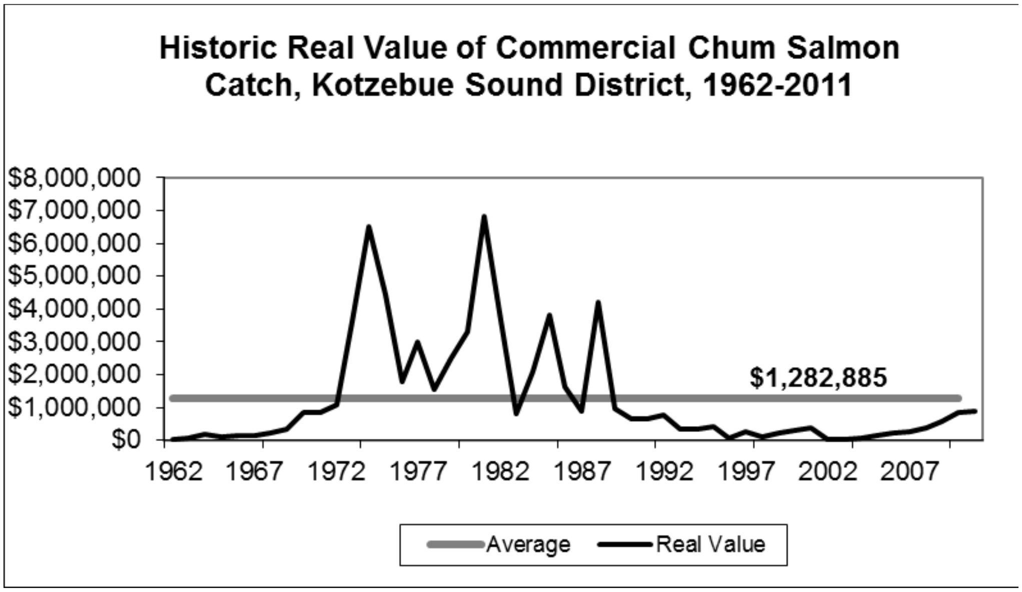
Table 3-22 Kotzebue district chum salmon catch and dollar value 1963-2011

Year	Total Catch	Number of Permits [a]	Season Catch per Permit Holder	Gross Value of Catch to Permit Holders [b]	Real Value of Catch to Permit Holders [b]
1962	129,948	84	1,547	$4,500	$25,877.01
1963	54,445	61	893	$9,140	$52,005.25
1964	76,449	52	1,470	$34,660	$194,206.20
1965	40,025	45	889	$18,000	$99,054.67
1966	30,764	44	699	$25,000	$133,781.24
1967	29,400	30	980	$28,700	$148,991.26
1968	30,212	59	512	$46,000	$229,070.05
1969	59,335	52	1,141	$71,000	$336,926.49
1970	159,664	82	1,947	$186,000	$838,441.83
1971	154,956	91	1,703	$200,000	$858,614.34
1972	169,664	104	1,631	$260,000	$1,070,057.07
1973	375,432	148	2,537	$925,000	$3,606,782.69
1974	627,912	185	3,394	$1,822,784	$6,515,929.69
1975	563,345	267	2,110	$1,365,648	$4,460,134.84
1976	159,796	220	726	$580,375	$1,792,606.32
1977	195,895	224	875	$1,033,950	$3,002,209.99
1978	111,494	208	536	$575,260	$1,560,819.92
1979	141,623	181	782	$990,263	$2,480,466.14
1980	367,284	176	2,087	$1,446,633	$3,320,824.20
1981	677,239	187	3,622	$3,246,793	$6,814,690.56
1982	417,790	199	2,099	$1,961,518	$3,880,238.86
1983	175,762	189	930	$420,736	$800,634.98
1984	320,206	181	1,769	$1,148,884	$2,107,133.15
1985	521,406	189	2,759	$2,137,368	$3,804,852.43
1986	261,436	187	1,398	$931,241	$1,621,907.34
1987	109,467	160	684	$515,000	$871,652.85
1988	352,915	193	1,829	$2,581,333	$4,223,932.90
1989	254,617	165	1,543	$613,823	$967,867.43
1990	163,263	153	1,067	$438,044	$665,035.01
1991	239,923	142	1,690	$437,948	$642,130.42
1992	289,184	149	1,941	$533,731	$764,440.48
1993 [c]	73,071	114	641	$235,061	$329,390.10
1994	153,452	109	1,408	$233,512	$320,467.97
1995	290,730	92	3,160	$316,031	$424,864.33
1996	82,110	55	1,493	$56,310	$74,287.75
1997	142,720	68	2,099	$187,978	$243,690.01
1998	55,907	45	1,242	$70,587	$90,484.20
1999	138,605	60	2,310	$179,781	$227,119.38
2000	159,802	64	2,497	$246,786	$305,159.20
2001	211,672	66	3,207	$322,650	$390,152.01
2002	8,390	3	2,797	$7,572	$9,010.23
2003	25,763	4	6,441	$26,377	$30,725.98
2004	51,077	43	1,188	$64,420	$72,970.94
2005	75,971	41	1,853	$124,820	$136,821.44
2006	137,961	42	3,285	$216,654	$229,994.37
2007	147,087	46	3,198	$243,149	$250,741.12
2008	190,550	48	3,970	$385,270	$388,802.80
2009	187,562	62	3,025	$585,240	$585,240.00
2010	270,343	67	4,035	$860,125	$860,125
2011	264,321	89	2,970	$867,085	$867,085
Average	197,217	111	1,952	590,850	$1,282,885

[a] During 1962-1966 and 1968-1971 figures represent the number of vessels licensed to fish in the Kotzebue District, not the number of fishers.

[b] Some estimates between 1962 and 1981include only chum value which in figures represent over 99% of the total value. Figures after 1981 represent the chum value as well as incidental species such as Dolly Varden, whitefish and other salmon.

[c] Includes 2,000 chum salmon and $3,648 from the Sikusuilaq springs Hatchery terminal fishery.



Source: Data provided to NMFS by ADF&G, in 2010, in response to a special data request.

Figure 3-35 Kotzebue Sound real value of commercial chum salmon catch, 1962-2010.

3.6.2 Norton Sound

Norton Sound is comprised of two fishing districts, the Norton Sound District and the Port Clarence District. The Norton Sound District extends from Cape Douglas south to Point Romanof and includes over 500 miles of coastline. The area open to commercial salmon fishing is divided into six Subdistricts. Each Subdistrict contains at least one major spawning stream with commercial fishing effort located in the ocean near stream mouths. The Port Clarence District encompasses all waters from Cape Douglas north to Cape Prince of Wales. The area open to commercial salmon fishing is adjacent to the communities of Brevig Mission and Teller. (This section was developed from ADF&G 2007d, Menard 2007b, ADF&G 2009b, ADF&G 2010e and f, ADF&G 2011e, and ADF&G supplied data in ADF&G 2010 and 2007).

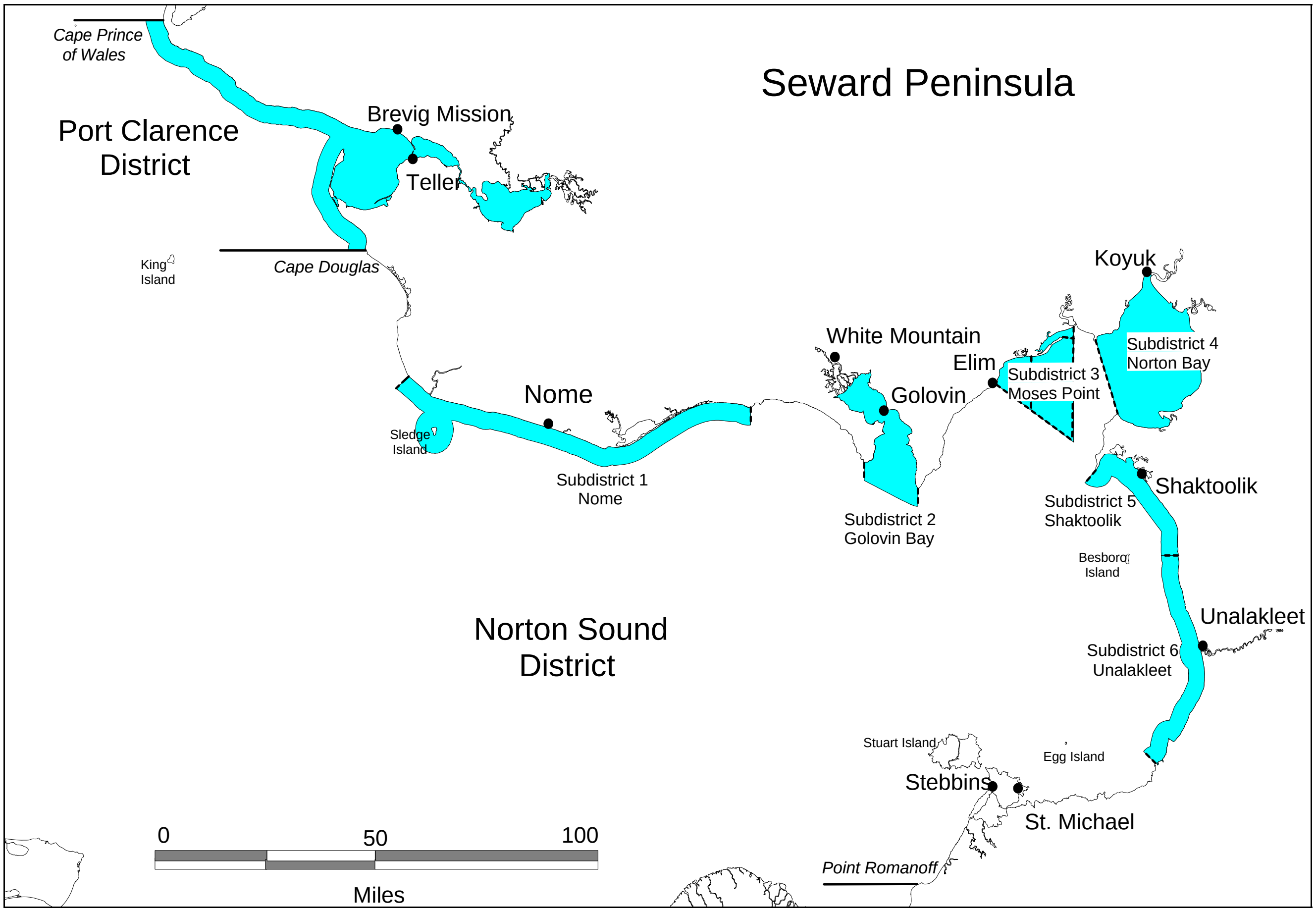


Figure 3-36 Norton Sound fishing district map.

Recent Management Actions

In response to guidelines established in the SSFP (5 AAC 39.222(f)(21)), the BOF classified Subdistrict 1 chum salmon stock as a management concern in 2000. The classification was upheld at the 2004 BOF meeting (Menard and Bergstrom, 2003a). In 2007, based on definitions provided in SSFP (5 AAC 39.222(f)(21) and (42)), only the most recent 5-year yield and escapement information (2002–2006), and the historical level of yield or harvestable surpluses were considered. Accordingly, ADF&G recommended a change in status of the Subdistrict 1 chum salmon stock from a management concern to a yield concern at the October 2006 BOF work session because in the preceding 5 years (2002–2006) a majority of chum salmon escapement goals had been achieved in Subdistrict 1. The BOF accepted ADF&G's recommendation and the Subdistrict 1 chum salmon stock was reclassified at its 2007 meeting (Menard and Bergstrom, 2006a). At the 2009 BOF meeting, ADF&G recommended continuation of Norton Sound Subdistrict 1 chum salmon as a stock of yield concern (Menard and Bergstrom, 2009). During the most recent 5 years (2005–2009), a majority of chum salmon escapement goals had been achieved in Subdistrict 1. ADF&G's recommendation to continue classification of this stock as a yield concern was based on low yields for the recent 5-year period (2005–2009) compared to historical yields in the 1980s.

In response to the guidelines established in the SSFP (5 AAC 39.222(f)(42)), the BOF classified Norton Sound Subdistricts 2 and 3 chum salmon as a stock of yield concern at its September 2000 work session. This determination as a yield concern was based on low harvest levels for the previous 5-year period (1995–1999). An action plan was subsequently developed by ADF&G and acted upon by the BOF in

January 2001. The classification as a yield concern was continued at the January 2004 BOF meeting (Menard and Bergstrom, 2003b) and at the January 2007 BOF meeting (Menard and Bergstrom, 2006b). ADF&G recommended continuation of the Norton Sound Subdistrict 2 and Subdistrict 3 chum salmon as a stock of yield concern at the 2009 BOF meeting (Menard and Bergstrom, 2009b). From 2005 to 2009, low yields of chum salmon have continued in Norton Sound Subdistrict 2 and in Subdistrict 3; yields have been inconsistent, but often low.

The 2009 Salmon Management Plan for the Golovin Subdistrict limits commercial harvest to a maximum of 15,000 chum salmon before mid-July in an attempt to protect chum salmon stocks and allow for some harvest while flesh quality is at its best. By that date, the chum salmon run usually can be assessed and fishing time adjusted accordingly. Previous to 2008 there had been no commercial chum salmon fishing in Subdistrict 2 since 2001, largely because escapements had fallen short of the SEG of 30,000 at the Niukluk River. Consequently, ADF&G has implemented a conservative approach with respect to determining when commercial fishing may occur. In 2009, the poor chum counts at Kwiniuk River tower in the adjacent subdistrict indicated a possible near-record low chum salmon run to northern Norton Sound and ADF&G did not open the Golovin Subdistrict to commercial salmon fishing until the coho salmon season. In the Moses Point Subdistrict 3, chum salmon fishing did not occur in 2009 because of a poor chum salmon run.

The Norton Bay Subdistrict typically has difficulty attracting a buyer due to its remoteness and reputation for watermarked fish. Because of lack of timely salmon escapement information, Norton Bay Subdistrict is typically managed similar to the Shaktoolik and Unalaklett Subdistricts. Both Shaktoolik and Unalakleet Subdistricts consistently attract commercial markets due to larger volumes of fish and better transportation services. In 2009, ADF&G delayed the onset of the chum salmon fishery until they could project that Chinook salmon escapement goals would be reached. When the escapement goal was projected to be reached, a 24-hour commercial chum salmon opening was permitted in Subdistricts 5 and 6 to evaluate chum salmon run strength and evaluate Chinook salmon incidental catches. Subdistricts 5 and 6 Chinook salmon were designated a stock of yield concern in 2004 and the BOF continued the designation in February 2007. To increase Chinook salmon escapements, the BOF also adopted a more conservative Subdistricts 5 and 6 King Salmon Management Plan (5 AAC 04.395) that was first implemented during the 2007 season (ADF&G, 2009).

The BOF met in Fairbanks in January 2010. At the meeting the department presented reports for Stock of Concern status for chum salmon in Subdistricts 1 (Nome), 2 (Golovin), and 3 (Moses Point) and king salmon in Subdistricts 5 (Shaktoolik) and 6 (Unalakleet). At this time ADF&G recommended continuation of a yield concern for those stocks.

Fishery and Reporting Requirements

All buyers, catcher/sellers and processors are required to register with the ADF&G office in Nome. In the last several years a buyer has returned to the northern subdistricts of Norton Sound to purchase salmon. Beginning in 2002 there was a five-year period where there was not a buyer in northern Norton Sound and only Subdistricts 5 and 6 had commercial salmon fishing periods. Although there were strengthening chum salmon runs beginning in the mid-2000s there was little buyer interest. The sole buyer for Norton Sound salmon is based out of Unalakleet in southern Norton Sound. The buyer is required to give a verbal report by phone or fax of catches from the preceding day by 10 a.m.

Because of distances involved in getting tenders to and from northern Norton Sound and Unalakleet the department staggers the commercial openings based on buyer capacity. Commercial fishermen are allowed to fish 100 fathoms of set nets, but two commercial permit holders may fish together and fish 200 fathoms of gear out of one boat. The buyer has up to one week to submit fish tickets. Most commercial fishing periods for chum salmon are 48 hours in length, but ranged from 24 hours to 54 hours in 2010.

All salmon caught by CFEC permit holders during commercial periods must be reported on fish tickets. Regulations also require commercial fishermen to report, on each fish ticket, the number of salmon harvested but not sold during commercial fishing periods. Buyers are required to ensure this information is reported on fish tickets even though a portion of the commercial harvest may have been used for subsistence (ADF&G, 2010).

Status of Runs and Conservation Concerns

The BOF made several changes to regulations at meetings in February and March 2007, for the management of Norton Sound salmon. The BOF changed the stock of concern classification for Subdistrict 1 (Nome) chum salmon from a management concern to a yield concern. Subdistricts 2 and 3 (Golovin and Moses Point) chum salmon stocks and Subdistricts 5 and 6 (Shaktoolik and Unalakleet) Chinook salmon stocks were continued as stocks of yield concern.

A commercial fishery for sockeye salmon is authorized in the Port Clarence District from July 1 through July 31, with openings established by emergency order. A guideline harvest level (GHL) was established allowing a harvest range from 0 to 10,000 sockeye salmon, dependent on a 30,000 sockeye salmon in-river goal for Pilgrim River. Also, the BOF closed the southwestern half of Salmon Lake to all subsistence salmon fishing to protect the majority of the sockeye salmon spawning grounds and the northeastern half of Salmon Lake may now only be opened by emergency order.

Commercial Fishery Situation and Outlook

Table 3-23 provides historic Chum salmon catches in the Norton Sound District from 1961 through 2010, wish preliminary chum and Chinook numbers provided for 2011. The catch data document a long term decline in commercial harvest of chum salmon. From peak numbers of more than 300,000 in the 1980s, commercial harvest of chum salmon declined to a period low of just 600 fish in 2002. The 2004 commercial chum harvest was 6,296; however, since then the commercial chum harvest has improved considerably and the 2010 harvest of 117,743 chum salmon is the largest since 1986. This trend in Norton Sound commercial Chum harvests is depicted graphically in Figure 3-37. In addition, Table 3-24 provides historic data on the numbers of permits fishing in the Norton Sound area. This data shows a similar decline in permits fished as harvest of Chinook and chum salmon declined. However, the 2010 total of 115 permits fished is nearly triple the five year average and more than double the ten year average. 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 164% above the recent five year average. 2011 also marks the first time in 24 years that there have been consecutive years with harvest exceeding 100,000 chum salmon. 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.

Table 3-23 Commercial salmon catch by species, Norton Sound District, 1961-2011

Year		Chinook	Sockeye	Coho	Pink	Chum	Total
1961		5,300	35	13,807	34,327	48,332	101,801
1962		7,286	18	9,156	33,187	182,784	232,431
1963		6,613	71	16,765	55,625	154,789	233,863
1964		2,018	126	98	13,567	148,862	164,671
1965		1,449	30	2,030	220	36,795	40,524
1966		1,553	14	5,755	12,778	80,245	100,345
1967		1,804	-	2,379	28,879	41,756	74,818
1968		1,045	-	6,885	71,179	45,300	124,409
1969		2,392	-	6,836	86,949	82,795	178,972
1970		1,853	-	4,423	64,908	107,034	178,218
1971		2,593	-	3,127	4,895	131,362	141,977
1972		2,938	-	454	45,182	100,920	149,494
1973		1,918	-	9,282	46,499	119,098	176,797
1974		2,951	-	2,092	148,519	162,267	315,829
1975		2,393	2	4,593	32,388	212,485	251,861
1976		2,243	11	6,934	87,916	95,956	193,060
1977		4,500	5	3,690	48,675	200,455	257,325
1978		9,819	12	7,335	325,503	189,279	531,948
1979		10,706	57	31,438	167,411	140,789	350,401
1980		6,311	40	29,842	227,352	180,792	444,337
1981		7,929	56	31,562	232,479	169,708	441,734
1982		5,892	10	91,690	230,281	183,335	511,208
1983		10,308	27	49,735	76,913	319,437	456,420
1984		8,455	6	67,875	119,381	146,442	342,159
1985		19,491	166	21,968	3,647	134,928	180,200
1986		6,395	233	35,600	41,260	146,912	230,400
1987		7,080	207	24,279	2,260	102,457	136,283
1988		4,096	1,252	37,214	74,604	107,966	225,132
1989		5,707	265	44,091	123	42,625	92,811
1990		8,895	434	56,712	501	65,123	131,665
1991		6,068	203	63,647	0	86,871	156,789
1992		4,541	296	105,418	6,284	83,394	199,933
1993		8,972	279	43,283	157,574	53,562	263,670
1994		5,285	80	102,140	982,389	18,290	1,108,184
1995		8,860	128	47,862	81,644	42,898	181,392
1996		4,984	1	68,206	487,441	10,609	571,241
1997		12,573	161	32,284	20	34,103	79,141
1998		7,429	7	29,623	588,013	16,324	641,396
1999		2,508	0	12,662	0	7,881	23,051
2000		752	14	44,409	166,548	6,150	217,873
2001		213	44	19,492	0	11,100	30,849
2002		5	1	1,759	0	600	2,365
2003		12	16	17,058	0	3,560	20,646
2004		0	40	42,016	0	6,296	48,352
2005		151	280	85,255	0	3,983	89,669
2006		12	3	130,808	0	10,042	140,865
2007		19	2	126,115	3,769	22,431	152,336
2008		83	60	120,293	75,384	25,124	220,944
2009		84	126	87,041	17,364	34,122	138,737
2010		140	103	62,079	31,557	117,743	211,622
2011	preliminary	na	na	58,917	na	110,555	na
Average 2005-2009		70	94	109,902	19,303	19,140	148,510
Average 2000--2009		133	59	67,425	26,307	12,341	106,264

Source: Data provided to NMFS by ADF&G in response to a special data request and Norton Sound Annual Management Report data courtesy of Jim Menard, ADF&G.

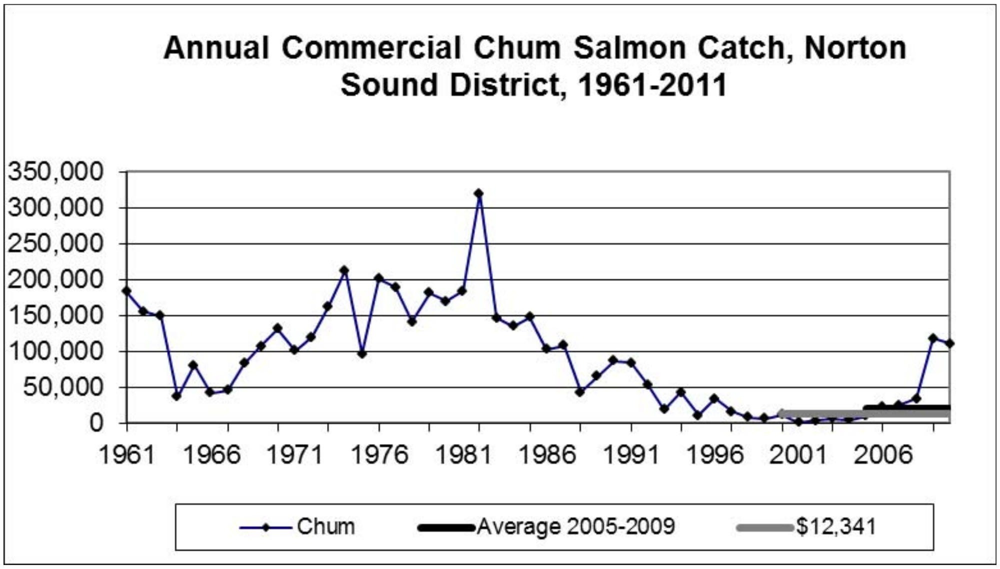


Figure 3-37 Norton Sound commercial chum salmon catch, 1961-2010

Source: Data provided to NMFS by ADF&G, in 2010, in response to a special data request, and updated with prelinary 2011 data.

Table 3-24 Number of commercial salmon permits fished, Norton Sound, 1970–2010

Year	SUBDISTRICT 1	2	3	4	5	6	District Total [a]
1970	6	33	21	0	12	45	b
1971	7	22	45	6	19	72	b
1972	20	20	48	32	20	71	b
1973	21	34	57	30	27	94	b
1974	25	25	60	8	23	53	b
1975	24	42	67	42	39	61	b
1976	21	22	54	27	37	60	b
1977	14	25	52	24	30	45	164
1978	16	24	44	26	26	51	176
1979	15	21	41	22	29	63	175
1980	14	17	26	13	26	66	159
1981	15	19	33	10	26	73	167
1982	18	17	28	10	32	68	164
1983	19	21	39	15	34	72	170
1984	8	22	25	8	24	74	141
1985	9	21	34	12	21	64	155
1986	13	24	34	9	30	73	163
1987	10	21	34	12	39	65	164
1988	5	21	36	13	21	69	152
1989	2	0	13	0	26	73	110
1990	0	15	23	0	28	73	128
1991	0	16	24	0	25	75	126
1992	2	1	21	9	25	71	110
1993	1	8	26	15	37	66	153
1994	1	5	21	0	39	71	119
1995	2	7	12	0	26	58	105
1996	1	4	12	0	20	54	86
1997	0	11	21	9	19	57	102
1998	0	16	23	0	28	52	82
1999	0	0	0	0	15	45	60
2000	0	12	13	0	26	49	79
2001	0	5	5	0	13	29	51
2002	0	0	0	0	7	5	12
2003	0	0	0	0	10	20	30
2004	0	0	0	0	11	25	36
2005	0	0	0	0	12	28	40
2006	0	0	0	0	22	40	61
2007	0	0	11	0	15	47	71
2008	0	4	12	4	23	58	91
2009	0	5	17	7	21	49	88
2010	0	10	19	5	35	49	115
2011-preliminary.							123
Average 2005-2009	b	2	13	b	19	44	36
Average 2000-2009	0	3	6	1	16	35	56

Source: Data provided to NMFS by ADF&G in response to a special data request.

[a] District total is the number of fishermen that actually fished in Norton Sound; some fishermen may have fished more than one subdistrict.

[b] Data not available.

Table 3-25 provides the real (inflation adjusted) value of commercial Chum salmon harvest compared to total real value of Norton Sound commercial salmon harvest from 1967 through 2010. The decline in catch of both chum and Chinook salmon, combined with declining salmon prices since the late 1970s, have depressed overall fishery value, from a peak of nearly $2.5 million in the late 1970s to a period low of just $3,500 in 2002. Over this time, Chum real value peaked in 1979 at $1.253 million. Chum real value has fluctuated since the 1980s; however, has had a generally downward trend to the period low of $379 in 2002. Since 2002, chum harvest and value have trended upwards and the 2010 harvest value of nearly half a million dollars is the highest real value recorded since 1985.

Table 3-25 Real historical value of commercial Chum catch, Norton Sound, 1967-2010 (inflation adjusted to 2010 value using the GDP deflator)

Year	Reported Total Value	Chum Value	Chum Value % of Total
1967	$228,616	$135,248	59.16%
1968	$317,212	$152,815	48.17%
1969	$452,227	$276,260	61.09%
1970	$446,353	$275,238	61.66%
1971	$433,600	$367,922	84.85%
1972	$420,718	$321,815	76.49%
1973	$1,203,847	$1,055,094	87.64%
1974	$1,562,604	$1,238,366	79.25%
1975	$1,349,669	$1,033,172	76.55%
1976	$881,155	$620,577	70.43%
1977	$1,585,412	$1,233,446	77.80%
1978	$2,461,806	$1,131,264	45.95%
1979	$2,201,247	$1,028,581	46.73%
1980	$1,313,344	$687,265	52.33%
1981	$1,598,643	$700,802	43.84%
1982	$2,116,106	$847,477	40.05%
1983	$1,800,622	$1,253,255	69.60%
1984	$1,353,661	$449,260	33.19%
1985	$1,457,018	$518,675	35.60%
1986	$951,735	$475,809	49.99%
1987	$876,551	$408,622	46.62%
1988	$1,244,666	$489,585	39.33%
1989	$503,766	$84,339	16.74%
1990	$719,720	$168,328	23.39%
1991	$606,253	$236,449	39.00%
1992	$642,217	$187,591	29.21%
1993	$451,381	$116,724	25.86%
1994	$1,184,449	$48,770	4.12%
1995	$478,818	$70,284	14.68%
1996	$449,008	$8,902	1.98%
1997	$471,761	$36,079	7.65%
1998	$460,173	$12,308	2.67%
1999	$97,098	$8,012	8.25%
2000	$185,365	$7,474	4.03%
2001	$68,830	$18,278	26.56%
2002	$3,500	$379	10.84%
2003	$75,103	$3,863	5.14%
2004	$138,767	$6,722	4.84%
2005	$324,629	$4,523	1.39%
2006	$413,703	$10,180	2.46%
2007	$590,061	$37,467	6.35%
2008	$766,415	$27,635	3.61%
2009	$722,167	$79,366	10.99%
2010	$1,220,487	$495,721	40.62%
2011 preliminary	$1,269,730	na	na

Source: Calculated from data provided to NMFS by ADF&G in response to a special data request.

Real historic chum salmon value, real total value, and the percentage of real chum value in real total value are displayed in Figure 3-38. Both chum value and total value are displayed with respect to the left vertical axis and chum percent of total value is displayed on the right vertical axis. From this figure it is easy to see the divergence of chum and total value during the 2000s as commercial chum harvests in

Norton Sound have been in decline. Also evident is the sharp increase in value of chum harvest in 2010 and that chum harvests accounted for just over 40 percent of the total value of all salmon harvested in Norton Sound. Total Norton Sound harvested value rose slightly in 2011, based on prelinary data. However, the specific value of the chum salmon harvest has not yet been reported.

Historically, chum value was as much as 87 percent of total value in the early 1970s and trended downward in importance to the regions total fishery value through the early 2000s. In 2005, for example, chum accounted for only about 1.4 percent of the total commercial harvest value in Norton Sound. This decline was coincident with similar declines in Chinook salmon harvest and value leaving coho, pink, and sockeye as the primary sources of commercial salmon income in the region.

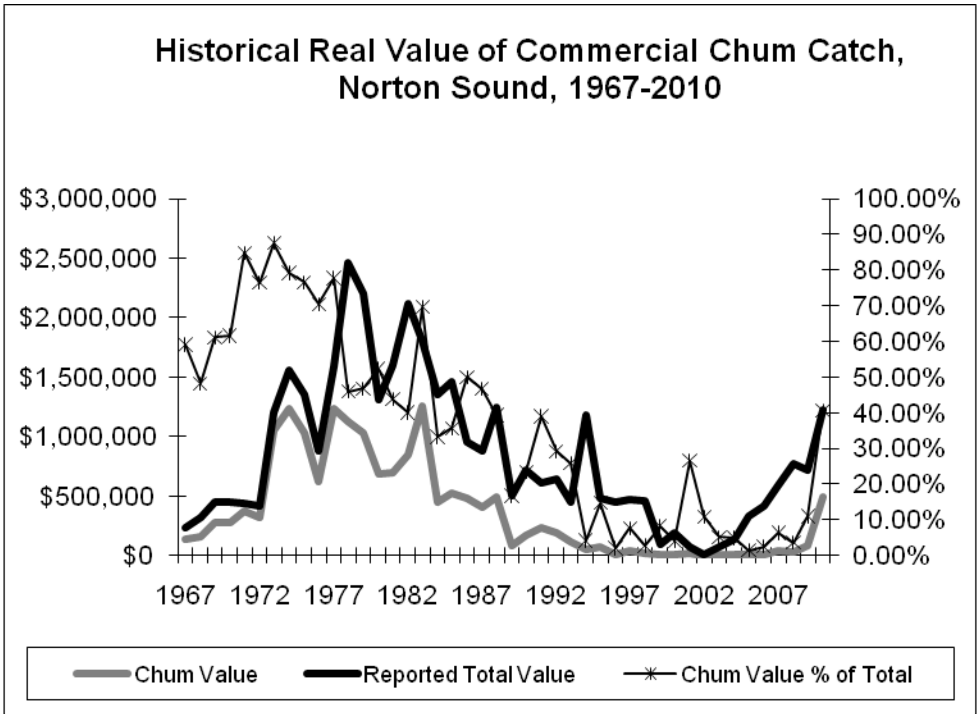


Figure 3-38 Norton Sound commercial real Chum value, total value, and percent Chum value in total value, 1967-2010 (values are inflation adjusted to 2009 values using the GDP deflator)

Source: Derived from data provided to NMFS by ADF&G in response to a special data request.

3.6.3 Kuskokwim River, Kuskokwim Bay

The Kuskokwim Area includes the Kuskokwim River drainage, all waters of Alaska that flow into the Bering Sea between Cape Newenham and the Naskonat Peninsula, and Nunivak and St. Matthew Islands (Figure 3-39). The 2007 Kuskokwim River salmon fisheries were managed according to the Kuskokwim River Salmon Management Plan (5 AAC 07.365). Kuskokwim Bay salmon fisheries were managed according to the District 4 Salmon Management Plan (5 AAC 07.367) and their associated regulations. (This section was developed from ADF&G 2007b,c, ADF&G 2009a, ADF&G 2010d, ADF&G 2011d, and data supplied in ADF&G 2010 and 2007.)

The Kuskokwim River Salmon Management Working Group (Working Group) was formed in 1988 by the BOF in response to requests from stakeholders in the Kuskokwim River drainage seeking a more active role in the management of salmon fishery resources. Since then, the Working Group has become increasingly active in the preseason, inseason, and postseason management of the Kuskokwim River drainage subsistence, commercial, and sport salmon fisheries. In 2001, the Working Group modified its charter in order to more effectively address the needs of the Federal Subsistence Management Program by including members of the Coordinating Fisheries Committee of the Yukon-Kuskokwim Delta and Western Interior Regional Advisory Councils. The Working Group now serves as a public forum for Federal and State fisheries managers to meet with local users of the salmon resource to review run assessment information and reach a consensus on how to proceed with management of Kuskokwim River salmon fisheries. Working Group meetings provide the forum for area fishermen, user representatives, community representatives, Regional Advisory Council representatives, Fish and Game Advisory Committee members, and State and Federal managers to come together to discuss issues relevant to sustained yield fishery management and providing for the subsistence use priority.

Improvements have been made toward strengthening the cooperative management process of the Kuskokwim River Salmon Management Working Group through funding provided by the Office of Surface Mining, Reclamation and Enforcement, Department of the Interior (OSM) in support of project Fisheries Information Services (FIS) 01-116. The funding provided by OSM allowed ADF&G staff and Working Group members to more effectively keep area fishermen informed of run abundance, fishery status, and management strategies through discussion, news releases, newspaper articles and radio talk shows. The funding allowed dedicated staff to more effectively prepare for meetings by providing complete and frequent distribution of updated fishery status information in a standardized format. The funding also allowed travel for Working Group members to participate in fishery meetings located outside the drainage. Although progress has been made toward strengthening cooperative management, it is an ongoing process that will require the continued participation by area fishermen and basic funding for material preparation, communication and travel to maintain the interaction of Working Group members with fishery managers, fishery project leaders, research planners, and policy makers.

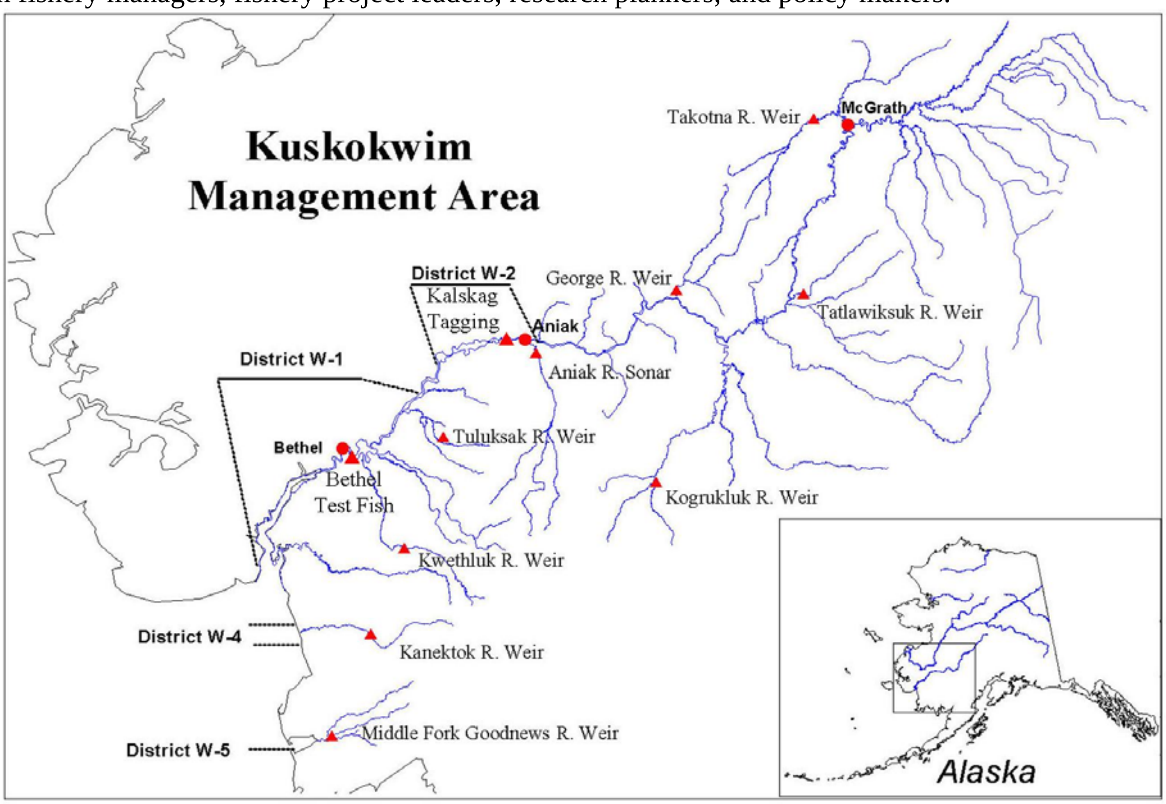


Figure 3-39 Kuskokwim Management Area and salmon run assessment projects

Recent Management Actions

The District 4 commercial fishery is managed in accordance with the District 4 Salmon Management Plan 5 ACC 07.367. By regulation, the first commercial fishing period in District 4 is to occur prior to June 16. Additional commercial fishing periods are scheduled if salmon abundance warrants. In District 5, the commercial fishery will open during the fourth week of June given adequate run abundance and processor capacity. The commercial fishing schedule is anticipated to align with the District 4 commercial schedule from late June through July given adequate run abundance, market interest, and processor capacity. Fishing time may be reduced if such action is necessary to achieve salmon escapement objectives (ADF&G, 2010).

Low chum salmon abundance from 1997 through 2000 prompted the Alaska Board of Fisheries to declare Kuskokwim River chum salmon as a stock of yield concern in September 2000. The chum salmon runs to the Kuskokwim River improved throughout 2000s, with near record runs from 2005 through 2007, which led to the stock of concern finding being lifted in January 2007. Near record runs occurred from 2005 through 2007; thereafter, abundance has been near average (Estensen et al., 2009).

As directed by the Kuskokwim River Salmon Management Plan (5 AAC 07.365), a commercial fishery is allowed to be prosecuted in June and July if salmon abundance is above the amounts necessary to meet escapement goals and subsistence use. Improved chum salmon markets and increased processing capacity at the Platinum processing plant should result in commercial openings occurring from mid-to late June through July, provided salmon abundance in adequate and subsistence needs are being met. However, processing capacity may limit commercial openings in District 1 to Subdistrict 1-B (Bethel) only. Commercial openings may be announced when no large scale buyers are available in order to provide opportunity for all permit holders operating as catcher/sellers or catcher/processors (ADF&G, 2010).

Although the use of gillnets with up to 8-inch mesh is allowed by regulation, commercial fishing periods are almost always limited to gillnets with 6-inch mesh or less. This allows for the commercial harvest of sockeye and chum salmon while limiting impacts to Chinook salmon (ADF&G, 2010).

Fishery and Reporting Requirements

All processors, buyers, and catcher/sellers of salmon are required to register with ADF&G before operating in the Kuskokwim Area. Processors, buyers, and catcher/sellers in Districts 1, 4, and 5 must register with the ADF&G office in Bethel. Registered salmon buyers are required to provide a verbal report of their salmon purchases within 24 hours following the closure of a commercial fishing period. Buyers are also required to mail fish tickets to ADF&G within 24 hours or deliver fish tickets within 72 hours following the closure of each commercial fishing period in the Kuskokwim Area. If there is incomplete reporting, ADF&G may delay additional commercial fishing periods until the needed harvest reports are received. In addition, it is very important for buyers to accurately report on each fish ticket the statistical area where salmon were harvested (maps of statistical areas are available upon request and are noted in regulation) (Estensen et al., 2009).

All salmon caught by CFEC permit holders during commercial periods must be reported on fish tickets. Regulations also require commercial fishermen to report, on each fish ticket, the number of salmon harvested but not sold during commercial fishing periods. Buyers are required to ensure this information is reported on fish tickets even though a portion of the commercial harvest may have been used for subsistence (ADF&G, 2010).

Status of Runs and Conservation Concerns

The BOF met in Anchorage from January 31 to February 5, 2007, to review regulatory fisheries proposals concerning the AYK area. The BOF discontinued the stock of yield concern designations for the Kuskokwim River Chinook and chum stocks based on Chinook and chum salmon runs being at or above the historical average each year since 2002. The Kuskokwim Area has no formal forecast for salmon returns, but broad expectations are developed based on parent-year escapements and recent year trends.

Commercial Fishery Situation and Outlook

There are 4 commercial salmon fishing districts: 1, 2, 4, and 5 (5AAC 07.200). District 1 (District W-1), the Lower Kuskokwim River, consists of the Kuskokwim River from a line between Apokak Slough and the southernmost tip of Eek Island and Popokamiut upstream to a line between ADF&G regulatory markers located at Bogus Creek, about 9 miles above the Tuluksak River (Fig. 2; Appendix A2). The downstream boundary has been in effect since 1986, and the upstream boundary was established in 1994 (Appendix A3). District 1 was divided into 2 subdistricts in 2000. Subdistrict 1A consists of that portion of District 1 upstream from a line between regulatory markers located at the downstream end of Steamboat Slough. Subdistrict 1B consists of that portion of District 1 downstream from the Steamboat Slough regulatory markers. Subdistrict registration requirements are in effect in District 1 (5 AAC 07.370).

District 2, the Middle Kuskokwim River, consists of the Kuskokwim River from ADF&G regulatory markers located at the upstream entrance to the second slough on the west bank downstream from Kalskag to the regulatory markers at Chuathbaluk. The downstream boundary of District 2 was used for the first time in 1990.

The District 4 commercial salmon fishery was established in 1960. The boundaries of District 4 extend from the northern-most edge of the mouth of Oyak Creek to the southern-most tip of the south mouth of the Arolik River, and expand 3 mi from the coast into Kuskokwim Bay. Prior to 2001, the northern most boundary of the district was the northern most edge of Weelung Creek. The northern boundary was moved by regulation to minimize the number of Kuskokwim River bound Chinook and chum salmon harvested in the District 4 commercial fishery. The Kanektok and Arolik Rivers are the main spawning streams in the district. The village of Quinhagak is located at the mouth of the Kanektok River.

The District 5 commercial salmon fishery was established in 1968. The boundaries of District 5 extend from the southern most tip of the north spit to the northern most tip of the south spit at the entrance of Goodnews Bay, expanding east to a line between the mouth of Ukfigag Creek to the mouth of the Tunulik River. The Goodnews River drainage is the main spawning drainage in the district. The Goodnews and Middle Fork Goodnews Rivers are the primary spawning rivers within the drainage.

Kuskokwim River

Throughout the Kuskokwim Area, in 2010, chum and sockeye salmon abundance was very good while coho salmon abundance was below average and Chinook salmon abundance was poor. Kuskokwim River Chinook salmon run timing was normal, while sockeye, chum, and coho salmon runs were later than historical average. Kuskokwim Bay run timing was late for Chinook and coho salmon with normal run timing for both sockeye and chum salmon.

There were two registered buyers in the Kuskokwim Area in 2010 and processing capacity was adequate to purchase harvested fish with participation ranging from 49 to 226 permit holders. On average, 123 permit holders participated in each of 16 commercial fishing periods from 25 June through 12 August 2010. Chinook salmon catch rates from late June through mid-July were below average. Catch rates for Sockeye, and chum salmon, were average to above average from late June through late July. Coho salmon catch rates from late July through 12 August were primarily below average.

A total of 433 individual permit holders recorded landings in District 1 of the Kuskokwim River during the 2010 season. This level of fishing effort was 12 percent above the recent 10-year average of 387 fishermen. District 1 commercial harvest in 2010 was 2,731 Chinook; 22,428 sockeye, 58,031 coho; and

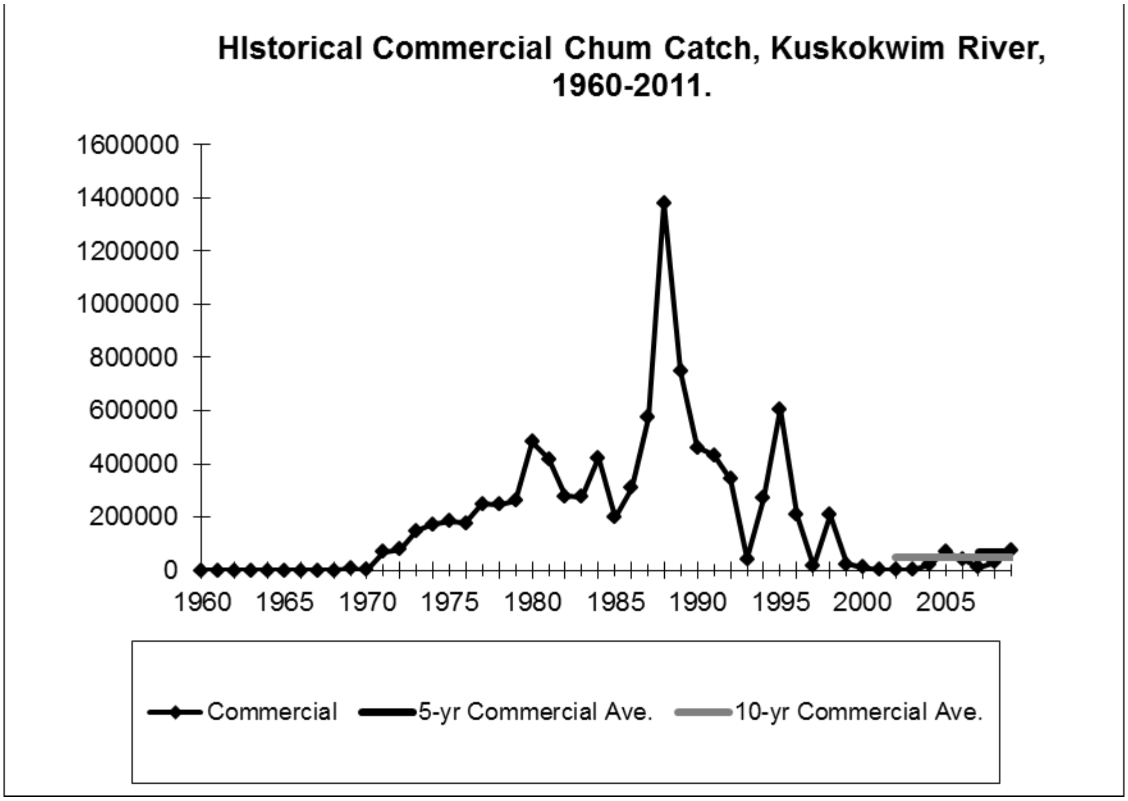
Table 3-26 Chum salmon harvests, Kuskokwim River Area, 1960–2009

Year	Commercial Harvest[a]	Subsistence Harvest[b]	Test-Fish Harvest	Sport Fish Harvest	Total Harvest
1960	0	301,753 [c]			301,753
1961	0	179,529 [c]			179,529
1962	0	161,849 [c]			161,849
1963	0	137,649 [c]			137,649
1964	0	190,191 [c]			190,191
1965	0	250,878 [c]			250,878
1966	0	175,735 [c]	502 [d]		176,237
1967	148	208,445 [c]	338		208,931
1968	187	275,008 [c]	562		275,757
1969	7,165	204,105 [c]	384		211,654
1970	1,664	246,810 [c]	1,139 [d]		249,613
1971	68,914	116,391 [c]	254		185,559
1972	78,619	120,316 [c]	486		199,421
1973	148,746	179,259 [c]	675		328,680
1974	171,887	277,170 [c]	2,021		451,078
1975	184,171	176,389 [c]	1,062		361,622
1976	177,864	223,792 [c]	2,101		403,757
1977	248,721	198,355 [c]	576	129	447,781
1978	248,656	118,809 [c]	2,153	555	370,173
1979	261,874	161,239 [c]	412	259	423,784
1980	483,751	165,172 [c]	2,058	324	651,305
1981	418,677	157,306 [c]	1,793	598	578,374
1982	278,306	190,011 [c]	504	1125	469,946
1983	276,698	146,876 [c]	1,069	922	425,565
1984	423,718	142,542 [c]	1,186	520	567,966
1985	199,478	94,750	616	150	294,994
1986	309,213	141,931 [c]	1,693	245	453,082
1987	574,336	70,709	2,302	566	647,913
1988	1,381,674	151,967 [e]	4,379	764	1,538,784
1989	749,182	139,672	2,082	2,023	892,959
1990	461,624	126,509	2,107	533	590,773
1991	431,802	93,077	931	378	526,188
1992	344,603	96,491	15,330	608	457,032
1993	43,337	59,394	8,451	359	111,541
1994	271,115	72,022	11,998	1,280	356,415
1995	605,918	67,861	17,473	226	691,478
1996	207,877	88,966	2,864	280	299,987
1997	17,026	39,987	790	86	57,889
1998	207,809	63,537	1,140	291	272,777
1999	23,006	43,601	562	180	67,349
2000	11,570	51,696	1,038	26	64,330
2001	1,272	49,874	1,743	112	53,001
2002	1,900	69,019	2,666	53	73,638
2003	2,764	43,320	1,713	67	47,864
2004	20,429	52,374	1,810	117	74,730
2005	69,139	46,036	4,459	608	120,242
2006[f]	44,070	57,024	3,547	144	104,784
2007	10,783	51,308	3,237	424	65,752
2008	30,798	50,012 [f]	2,473	272 [f]	83,555
2009	76,790	50,012 [f]	2,741	272 [f]	129,815
2010	93,148	na	na	na	
2011	118,256	na	na	na	
5-yr avg	65,955	50,444	3,105	323	93,041
10-yr avg	46,808	52,388	2,325	245	87,548

[a] Districts 1 and 2 only; no chum harvests were reported in District 3.
[b] Estimated subsistence harvest expanded from villages surveyed.
[c] Includes small numbers of small Chinook, sockeye, and coho salmon.
[d] Includes small numbers of sockeye.
[e] Beginning in 1988, estimates based on a new formula. Data since 1988 is not comparable with previous years.
[f] 2008 and 2009 subsistence and sport harvest based on most recent 5-year average (2003–2007).

93,148 chum salmon. Chinook, sockeye, and chum salmon harvests were above the recent 10-year average, while coho salmon harvest was below the recent 10-year average. The chum salmon harvest was the highest since 1998. Total ex-vessel value of the fishery was $765,606; approximately 160 percent above the recent 10-year value.

Figure 3-40 Kuskokwim River commercial chum salmon catch, 1960-2010



Source: Data provided to NMFS by ADF&G, in 2010, in response to a special data request.

Table 3-27 provides the real (inflation adjusted) value of commercial Chinook salmon harvest compared to total value of Kuskokwim Area commercial salmon harvest from 1993 through 2011. Over this time, real Chum value peaked in 1995 at $973,695, when it represented 26 percent of the overall real value. The decline in catch, combined with declining salmon prices in the late 1990s and early 2000s depressed overall chum value to $1,000 in 2001. Chum catch and value improved slowely thorugh the 200s and from 2008 to 2011, chum catches rose from just over 30,000 fish to 118,256 fish with 2011 value at $350,124. The 2011 value represented more than 45 percent of total value due to declines in Chinook catch and value. The remaining value is mostly derived from coho catches with sockeye providing the remainder of the total value. Figure 3-41, below, provides a graphical representation of these data.

Table 3-27 Salmon harvests and real (inflation adjusted) value by species, Kuskokwim River, 1993–2011.

	Chinook		Sockeye		Chum		Coho		Total	
Year	Number	Value	Number	Value	Number	Chum Value	Number	Value	Number	Total Value
1993	8,735	$101,817	27,008	$196,181	43,337	$158,005	610,739	$3,552,736	689,883	$4,008,821
1994	16,211	$174,144	49,365	$258,956	271,115	$523,755	724,689	$3,946,704	1,092,310	$4,915,866
1995	30,846	$376,811	92,500	$602,993	605,918	$973,695	471,461	$1,766,163	1,201,060	$3,719,728
1996	7,419	$31,220	33,878	$128,201	207,877	$225,564	937,299	$2,407,238	1,188,094	$2,793,205
1997	10,441	$47,762	21,989	$84,163	17,026	$25,291	130,803	$2,809,881	180,261	$2,967,099
1998	17,359	$95,355	60,906	$269,016	207,809	$234,978	210,481	$661,482	496,647	$1,260,901
1999	4,705	$28,129	16,976	$109,203	23,006	$20,754	23,593	$56,385	68,282	$214,471
2000	444	$3,764	4,130	$17,648	11,570	$9,851	261,379	$605,461	277,530	$636,728
2001	90	$646	84	$320	1,272	$1,000	192,998	$510,980	194,444	$512,946
2002	72	$252	84	$233	1,900	$1,416	83,463	$148,461	85,519	$150,362
2003	158	$985	282	$935	2,764	$1,266	284,064	$524,720	287,268	$527,907
2004	2,300	$11,118	9,748	$22,144	20,429	$7,489	433,807	$1,028,289	466,284	$1,069,039
2005	4,784	$31,832	27,645	$119,549	69,139	$25,338	142,319	$315,291	243,887	$492,010
2006	2,777	$17,189	12,618	$44,470	44,070	$15,911	185,598	$401,613	245,064	$479,184
2007	179	$1,657	703	$2,486	10,763	$3,128	141,049	$385,460	152,694	$392,731
2008	8,865	$71,639	15,601	$60,325	30,156	$11,315	142,877	$399,963	197,859	$543,246
2009	6,664	$61,452	25,673	$101,445	76,790	$76,494	104,546	$263,457	213,675	$502,848
2010	2,731	$53,134	22,438	$167,575	93,148	$162,445	58,031	$382,452	176,338	$765,606
2011	49	$411	13,482	$79,370	118,256	$350,124	74,108	$224,452	205,896	$764,357
5-yr avg	3,698	$37,659	15,579	$82,240	65,823	$120,701	104,122	$331,157	189,292	$593,758
10-yr avg	2,858	$24,967	12,827	$59,853	46,742	$65,492	164,986	$407,416	227,448	$568,729

NOTE: Pink have been omitted due to extremely low numbers in the past decade.

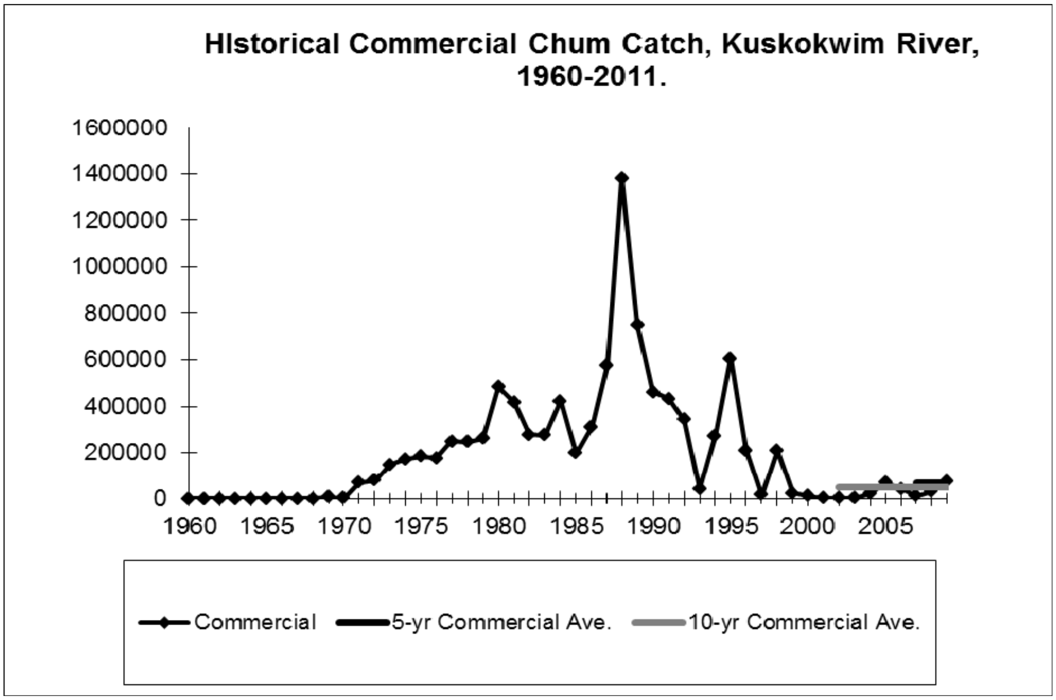


Figure 3-41 Real Kuskokwim River Chum commercial value relative to total value, 1993-2009

Source: Derived from data provided to NMFS by ADF&G in response to a special data request.

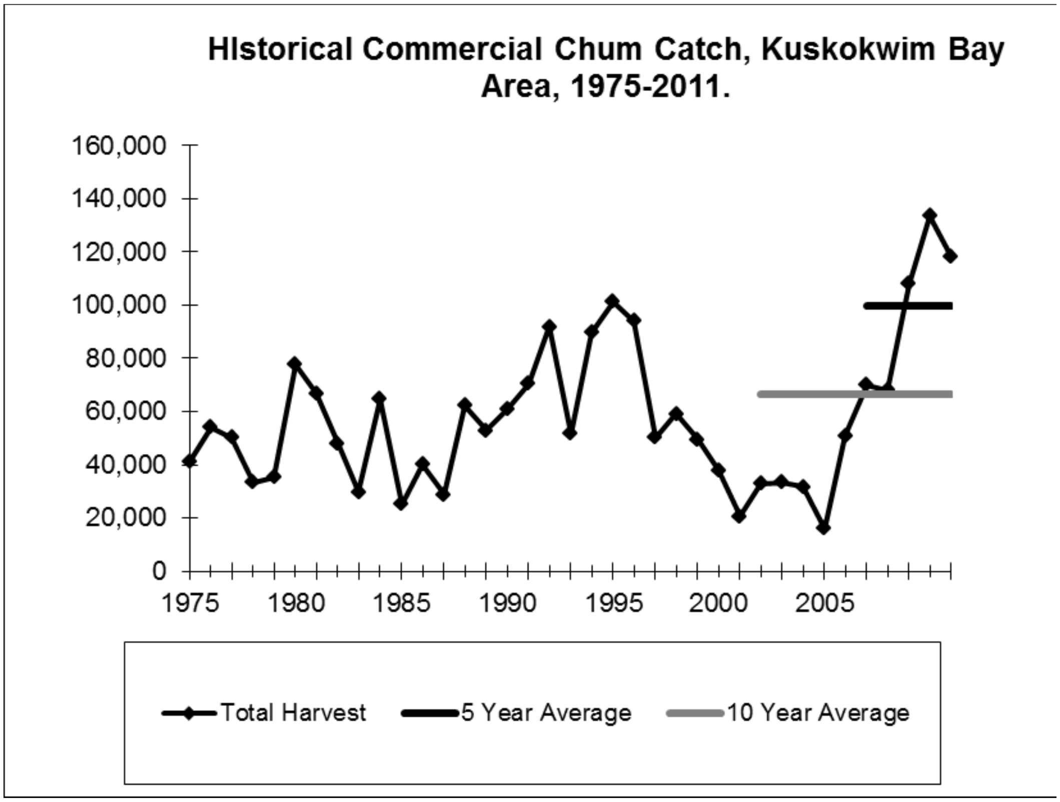
Kuskokwim Bay
In 2010, the District 4 commercial salmon fishing season opened June 15, with management directed towards Chinook salmon harvest, and the District 5 season opened on June 28. Each district was initially placed on a 1 or 2 day per week commercial fishing schedule to allow for Chinook escapement. A schedule of three 12 hour commercial openings per week was initiated in Districts 4 and 5 on July 5 when management transitioned to sockeye salmon directed harvest. Chinook salmon harvest and catch rates per period were below. Sockeye anc chum salmon harvest and catch rates per period were above average in both districts.

A total of 241 individual permit holders recorded landings in District 4 during the 2010 season. This level of fishing effort was 65 percent above the recent 10-year average of 146 fishermen. The 2010 District 4 commercial harvest was 14,230 Chinook, 138,362 sockeye, 106,610 chum, and 13,690 coho salmon from 23 periods. District 4 chum and sockeye salmon harvest were the highest on record, while Chinook and coho salmon harvests were below the 10-year average. The total ex-vessel value of the District 4 fishery was $1,655,321, approximately 40 percent above the recent 10-year average value.

A total of 48 individual permit holders recorded landings in District 5 during the 2010 season. This level of fishing effort was an increase compared to 2009, and was 51 percent above the recent 10-year average of 32 fishermen. The 2010 District 5 commercial harvest was 1,752 Chinook, 41,074 sockeye, 26,914 chum, and 4,900 coho salmon from 22 periods. District 5 Chinook salmon harvest was below average. However, sockeye salmon harvest was approximately 49 percent above the recent 10-year average while chum salmon harvest was approximately 356 percent above the recent 10-year average. Coho salmon harvest was approximately 63 percent below the recent 10-year average. The total ex-vessel value of the District 5 fishery was $43,661; and was the second highest fishery value since 1988.

Table 3-28 Commercial salmon harvests, Kuskokwim Bay, Areas 4 and 5: 1990–2011

	District W-4 (Quinhagak)				District W-5 (Goodnews Bay)				Total
Year	Chinook	Sockeye	Coho	Chum	Chinook	Sockeye	Coho	Chum	Harvest
1975	3,928	8,584	10,742	35,233	2,156	9,098	17,889	5,904	41,137
1976	14,110	6,090	13,777	43,659	4,417	5,575	9,852	10,354	54,013
1977	19,090	5,519	9,028	43,707	3,336	3,723	13,335	6,531	50,238
1978	12,335	7,589	20,114	24,798	5,218	5,412	13,764	8,590	33,388
1979	11,144	18,828	47,525	25,995	3,204	19,581	42,098	9,298	35,293
1980	10,387	13,221	62,610	65,984	2,331	28,632	43,256	11,748	77,732
1981	24,524	17,292	47,551	53,334	7,190	40,273	19,749	13,642	66,976
1982	22,106	25,685	73,652	34,346	9,476	38,877	46,683	13,829	48,175
1983	46,385	10,263	32,442	23,090	14,117	11,716	19,660	6,766	29,856
1984	33,633	17,255	132,151	50,422	8,612	15,474	71,176	14,340	64,762
1985	30,401	7,876	29,992	20,418	5,793	6,698	16,498	4,784	25,202
1986	22,835	21,484	57,544	29,700	2,723	25,112	19,378	10,355	40,055
1987	26,022	6,489	50,070	8,557	3,357	27,758	29,057	20,381	28,938
1988	13,883	21,556	68,605	29,220	4,964	36,368	30,832	33,059	62,279
1989	20,820	20,582	44,607	39,395	2,966	19,299	31,849	13,622	53,017
1990	27,644	83,681	26,926	47,717	3,303	35,823	7,804	13,194	60,911
1991	9,480	53,657	42,571	54,493	912	39,838	13,312	15,892	70,385
1992	17,197	60,929	86,404	73,383	3,528	39,194	19,875	18,520	91,903
1993	15,784	80,934	55,817	40,943	2,117	59,293	20,014	10,657	51,600
1994	8,564	72,314	83,912	61,301	2,570	69,490	47,499	28,477	89,778
1995	38,584	68,194	66,203	81,462	2,922	37,351	17,875	19,832	101,294
1996	14,165	57,665	118,718	83,005	1,375	30,717	43,836	11,093	94,098
1997	35,510	69,562	32,862	38,445	2,039	31,451	2,983	11,729	50,174
1998	23,158	41,382	80,183	45,095	3,675	27,161	21,246	14,155	59,250
1999	18,426	41,315	6,184	38,091	1,888	22,910	2,474	11,562	49,653
2000	21,229	68,557	30,529	30,553	4,442	37,252	15,531	7,450	38,003
2001	12,775	33,807	18,531	17,209	1,519	25,654	9,275	3,412	20,621
2002	11,480	17,802	26,695	29,252	979	6,304	3,041	3,799	33,051
2003	14,444	33,941	49,833	27,868	1,412	29,423	12,658	5,593	33,461
2004	25,465	34,627	82,398	25,820	2,565	20,922	23,690	6,014	31,834
2005	24,195	68,801	51,708	13,529	2,035	23,933	11,735	2,568	16,097
2006	19,004	106,424	26,831	39,191	2,899	29,858	12,561	11,678	50,869
2007	19,575	109,517	34,710	62,232	3,126	43,766	13,697	7,853	70,085
2008	13,812	69,776	95,073	57,663	1,278	27,237	22,547	10,408	68,071
2009	13,920	112,153	48,115	91,158	1,509	32,544	8,406	16,985	108,143
2010	14,230	138,362	13,960	106,610	1,752	41,074	4,900	26,914	133,524
2011	15,387	38,543	30,457	104,959	2,092	24,573	15,358	13,191	118,150
5-yr avg	15,385	93,670	44,463	84,524	1,951	33,839	12,982	15,070	99,595
10-yr avg	17,151	72,995	45,978	55,828	1,965	27,963	12,859	10,500	66,329



Source: Data provided to NMFS by ADF&G, in 2010, in response to a special data request.

Figure 3-42 Kuskokwim Bay commercial chum salmon catch, 1960-2011

Table 3-29 Kuskokwim Bay real value of commercial chum salmon catch, 1960–2011

Year	District 4 (Quinhagak)	District 5 (Goodnews Bay)	Chum Total Value	Kuskokwim Bay Total	Chum Percent of Total Value
1990	$135,640	$39,119	$174,759	$2,086,203	8%
1991	$155,891	$46,031	$201,921	$1,271,738	16%
1992	$199,468	$56,017	$255,485	$2,003,888	13%
1993	$147,467	$39,662	$187,129	$1,876,882	10%
1994	$115,822	$56,692	$172,514	$2,040,602	8%
1995	$140,518	$28,806	$169,324	$1,792,840	9%
1996	$81,380	$11,893	$93,273	$999,098	9%
1997	$38,384	$12,131	$50,516	$803,674	6%
1998	$46,785	$14,271	$61,056	$835,925	7%
1999	$35,838	$10,520	$46,357	$483,536	10%
2000	$29,589	$7,420	$37,009	$803,221	5%
2001	$15,728	$3,127	$18,855	$395,973	5%
2002	$27,814	$3,545	$31,359	$229,124	14%
2003	$22,437	$4,523	$26,960	$512,150	5%
2004	$20,811	$4,807	$25,618	$612,348	4%
2005	$7,512	$1,594	$9,106	$774,167	1%
2006	$14,894	$4,637	$19,531	$735,084	3%
2007	$21,701	$2,868	$24,569	$910,772	3%
2008	$20,770	$3,946	$24,716	$957,501	3%
2009	$95,993	$18,998	$114,991	$939,356	12%
2010	$194,105	$49,679	$243,784	$956,150	25%
2011	$603,855	$78,980	$682,835	$1,522,458	45%
5-yr avg	$187,285	$30,894	$218,179	$1,057,247	
10-yr avg	$102,989	$17,358	$120,347	$814,911	

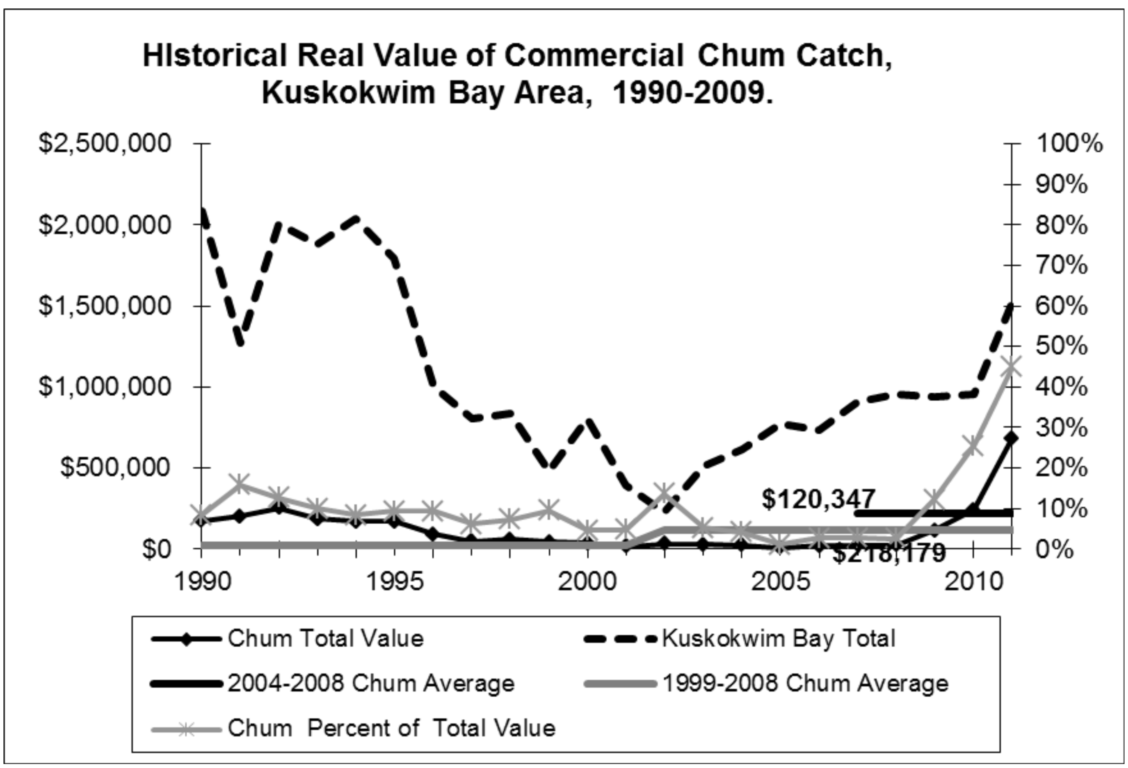


Figure 3-43 Kuskokwim Bay real value of commercial chum salmon catch, 1960-2011

Source: Data provided to NMFS by ADF&G, in 2010, in response to a special data request.

3.6.4 Yukon River

The Yukon River salmon fishery is among the most complex, in terms of management, in Alaska. The fishery is composed of four stocks; Chinook, summer chum, fall chum, and coho. ADF&G manages the overall Yukon salmon fishery for escapement needs and, in portions of the region, jointly manages subsistence harvest with the U.S. Fish and Wildlife Service. In addition, the U.S./Canada panel of the Pacific Salmon Treaty annually negotiates escapement objectives for the Canadian portion of the Yukon River. The fishery supports subsistence, personal use, sport, and commercial harvests of salmon. For a complete treatment of the management of this fishery please refer to 2007 Yukon Area Management Report (JTC 2008) (This section was developed from ADF&G 2008, ADF&G 2007e, Bue and Hayes 2007, ADF&G 2010 g and h, ADF&G 2011f and g, and data supplied in ADF&G 2010 and 2007.)

As in other areas of the State, subsistence fishing has highest priority over other uses. ADF&G utilizes a subsistence fishery schedule, as well as emergency orders, to ensure adequate subsistence fishing opportunities are made available. There is also a personal use fishery schedule. Commercial openings are made when available surpluses are determined to be available.

The Yukon River drainage is divided into fishery districts and sub-districts for management purposes (Figure 3-44). ADF&G uses an adaptive management strategy that evaluates run strength in season to determine a harvestable surplus above escapement requirements and subsistence uses. Preseason, a management strategy was developed in cooperation with federal subsistence managers that outlined run and harvest outlooks along with the regulatory subsistence salmon fishing schedule described in an information sheet. The 2007 strategy was to implement the subsistence salmon fishing schedule as salmon began to arrive in each district or sub-district in a stepwise manner. Before implementing this schedule, subsistence fishing would be allowed 7 days a week to provide opportunity to harvest non-salmon species, such as whitefish, sheefish, pike, and suckers. Additionally, an informational sheet was used to prepare fishermen for possible reductions to the subsistence salmon fishing schedule or to allow for a small commercial fishery contingent on how the runs developed. The information sheet was mailed to Yukon River commercial permit holders and approximately 2,800 families identified from ADF&G’s survey and permit databases. State and federal staff presented the management strategy to the YRDFA, State of Alaska Advisory Committees, Federal Regional Advisory Councils, and other interested and affected Parties.

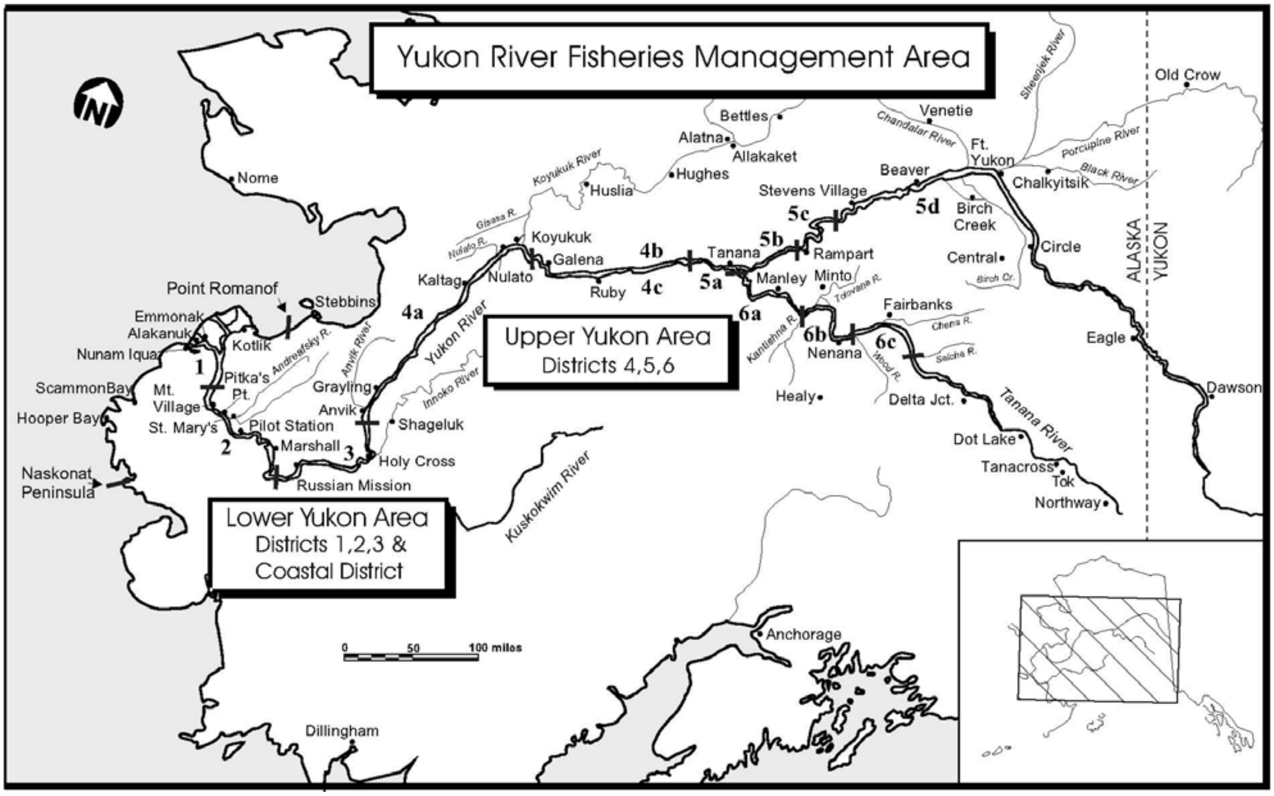


Figure 3-44 Yukon River fisheries management areas

Recent Management Actions
At its September 2000 work session, the BOF classified the Yukon River summer chum salmon as a stock of management concern. This determination of management concern was based on documented low escapements during 1998-2000 and an anticipated low run in 2001. The classification as a management concern was continued at the January 2004 BOF meeting due to established escapement goals not being achieved in East Fork Andreafsky River from 1998-2003 and in Anvik River from 1998-2001 and 2003 (Bergstrom et al., 2009).

Given the collectively large spawning escapements of the Yukon River summer chum salmon stock over the three years preceding the January 2007 BOF meeting (2004-2006), including a near record run in 2006, the summer chum salmon stock no longer met stock of concern criteria and the classification was discontinued in February 2007 (Bergstrom et al., 2009).

In addition to the above actions, in January 2010, the BOF modified The Yukon River Summer Chum Salmon Management Plan to allow, by emergency order, a commercial harvest up to 50,000 fish if the total run size is between 900,000 and 1,000,000 fish, distributed by district or subdistrict in proportion to the guideline harvest levels (Hayes and Norris, 2010).

Similar to that of summer chum salmon, Yukon River fall chum salmon was classified as a stock of yield concern by the BOF at its September 2000 work session. Additionally, Toklat and Fishing Branch Rivers fall chum salmon were classified as stocks of management concern. The determination for the entire Yukon River fall chum salmon as a stock of yield concern was based on substantial decrease in yields and harvestable surpluses during the period 1998-2000, and the anticipated very low run expected in 2001. The 2000 fall chum salmon run was the worst on record. The determination for Toklat and Fishing Branch Rivers as stocks of management concern was based on escapements not meeting the OEG of

33,000 fish for Toklat River from 1996-2000, and not meeting the escapement objective of 50,000-120,000 fish for Fishing Branch River from 1997-2000 (Borba et al., 2009).

Classification as a stock of yield concern continued at the January 2004 BOF meeting because the combined commercial and subsistence harvests showed a substantial decrease in fall chum salmon yield from the 10-year period (1989-1998) to the more recent five year average (1999-2003). Toklat River stock was removed from management concern classification as a result of the BEG review presented at the BOF meeting; however, as a component of the Yukon River drainage, Toklat River fall chum salmon stock was included in the drainage-wide yield concern classification. Fishing Branch River stock was also removed from the management concern classification because management of the portion of the drainage is covered by an annex to the Pacific Salmon Treaty, which is governed under the authority of the Yukon River Panel (Borba et al., 2009).

In January 2007, the BOF determined that Yukon River fall chum salmon stock no longer met the criteria for a yield concern. Run strength was poor from 1998-2002; however, steady improvement had been observed since 2003. The 2005 run was the largest in 30 years and 2006 was above average for an even-numbered year run. The drainage-wide OEG of 300,000 fall chum salmon was exceeded in the preceding five years. The five year average (2002-2006) total reconstructed run of approximately 950,000 fish was greater than the 1989-1998 10-year average of approximately 818,000 fish, which indicated a return to historical run levels (Borba et al., 2009).

As with summer chum salmon, the BOF also modified The Yukon River Fall Chum Salmon Management Plan in January 2010 by lowering the threshold required to allow a directed fall chum salmon commercial fishery from a run size of 600,000 fall chum salmon to 500,000 fall chum salmon (Hayes and Norris, 2010).

Fishery and Reporting Requirements

All processors, buyers, and catcher/sellers of salmon are required to register with ADF&G before operating in the Yukon Area. Processors, buyers, and catcher/sellers in Districts 1, 2, and 3 must register with the ADF&G office in Emmonak. Processors, buyers, and catcher/sellers in Districts 4, 5, and 6 must register with the ADF&G office in Fairbanks. Registered salmon buyers are required to provide a verbal report of their salmon purchases within 18 hours following the closure of a commercial fishing period. Buyers may verbally report harvest information in the Upper Yukon Area after office hours by calling a 24-hour message recording. Buyers are also required to mail fish tickets to ADF&G within 24 hours or deliver fish tickets within 48 hours following the closure of each commercial fishing period in the Lower Yukon Area. In the Upper Yukon Area, buyers are required to mail fish tickets to ADF&G within 36 hours or deliver fish tickets within 36 hours following the closure of each commercial fishing period. If there is incomplete reporting, ADF&G may delay additional commercial fishing periods until the needed harvest reports are received. In addition, it is very important for buyers to accurately report on each fish ticket the statistical area where salmon were harvested (maps of statistical areas are available upon request and are noted in regulation) (Hayes and Norris, 2010).

All salmon caught by CFEC permit holders during commercial periods must be reported on fish tickets. In fisheries directed at the harvest of roe, the number of salmon from which the roe was extracted must be reported on the fish ticket and the pounds of roe produced and the number of male chum salmon and Chinook salmon released alive. Regulations also require commercial fishermen to report, on each fish ticket, the number of salmon harvested but not sold during commercial fishing periods. Buyers are required to ensure this information is reported on fish tickets even though a portion of the commercial harvest may have been used for subsistence (Hayes and Norris, 2010).

Status of Runs and Conservation Concerns

In response to the guidelines established in the Sustainable Salmon Policy, the BOF discontinued the Yukon River summer and fall chum salmon as stocks concern during the February 2007 work session. The Yukon River Chinook salmon stock was continued as a stock of yield concern based on the inability, despite the use of specific management measures, to maintain expected yields, or harvestable surpluses, above the stock's escapement needs since 1998.

Co**mmercial Fishery Situation and Outlook**

Since 2007, there has been a renewed market interest for summer chum salmon in the lower river districts. Based on the projected average run estimate for summer chum salmon, the department initiated eleven short commercial periods restricted to 6-inch maximum mesh size in Districts 1 and 2 directed at chum salmon. Additionally, seven commercial periods were established in Subdistrict 4-A. Six commercial periods were established in District 6 directed at summer chum salmon, but due to high water events, fishing effort was limited.

Table 3-30 provides historic summer and fall chum salmon catches in the Alaska Yukon from 1961 through 2009. The catch data document a long term decline in commercial harvest of fall chum salmon prior to and during the early 2000s. Some recovery in fall chum commercial catch occurred from 2005 through 2008; however, the 2009 fishery declined significantly from 2009 catch numbers. In 2009, the summer chum commercial harvest was 170,272 (Table 3-30), which was well above the 5-year and 10-year averages; however, well below the historic average of more than half a million summer chum salmon.

Table 3-30 Alaska Yukon Area commercial chum salmon catch totals, 1970-2011

Year	Summer Commercial Total	Fall Commercial Total
1970	137,006	209,595
1971	100,090	189,594
1972	135,668	152,176
1973	285,509	232,090
1974	589,892	289,776
1975	710,295	275,009
1976	600,894	156,390
1977	534,875	257,986
1978	1,077,987	247,011
1979	819,533	378,412
1980	1,067,715	298,450
1981	1,279,701	477,736
1982	717,013	224,992
1983	995,469	307,662
1984	866,040	210,560
1985	934,013	270,269
1986	1,188,850	140,019
1987	622,541	0
1988	1,616,682	136,990
1989	1,452,740	284,944
1990	517,177	136,342
1991	658,102	254,218
1992	543,577	19,022
1993	140,116	0
1994	258,741	7,999
1995	818,414	283,057
1996	682,233	105,630
1997	228,252	58,187
1998	28,798	0
1999	29,413	20,371
2000	6,624	0
2001	0	0
2002	13,577	0
2003	10,685	10,996
2004	26,410	4,110
2005	41,264	180,162
2006	92,116	174,542
2007	198,201	90,677
2008	151,201	119,265
2009	170,272	25,269
2010	232,888	2,250
2011	275,161	238,979
5 year av.	101,838	95,288
10 year av.	56,949	84,625

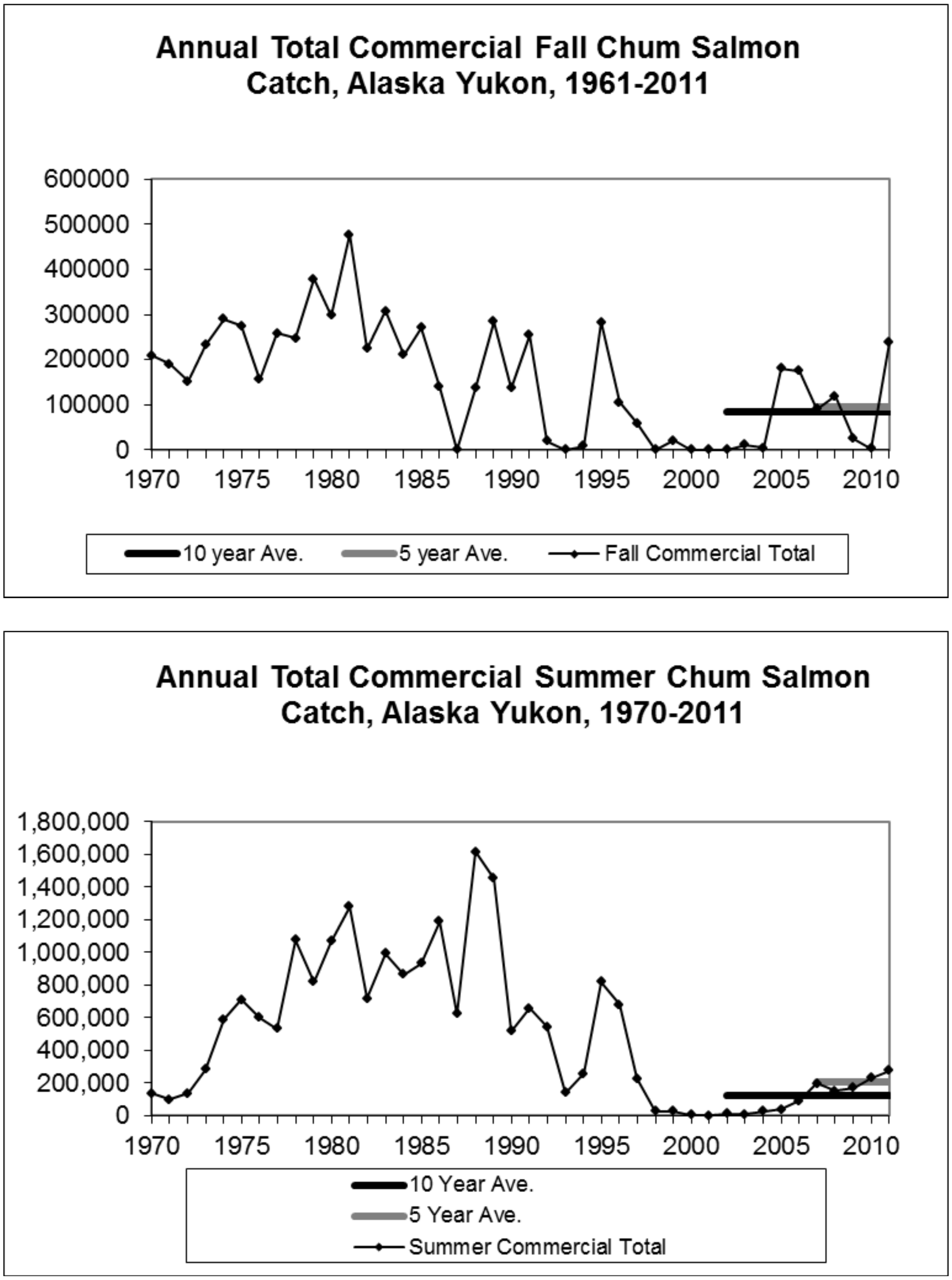


Figure 3-45 Alaska Yukon annual commercial chum salmon catch, 1970-2009

Source: ADF&G 2009d

The run size projection, along with 2009 commercial buyers willing to purchase fish harvested during the overlap of summer and fall chum salmon, resulted in a continuation of commercial fishing periods immediately following the summer season. The harvests took advantage of unusually good quality late summer chum salmon when they were mixed with overlapping early fall chum salmon. The relationship between the summer and fall chum salmon runs suggested the fall run would perform similarly and thereby provided confidence that there would be surplus fall chum salmon available for commercial harvest.

Districts 1, 2, Subdistricts 5-B and 5-C, and District 6 had commercial buyer commitments prior to the season. The first fall season commercial fishing periods began on July 17 in District 1 and July 20 in District 2. Commercial fishing periods continued to be scheduled in both District 1 and District 2 until August 5 and August 3, respectively. Fall chum salmon were harvested commercially prior to and during the first small pulse of fish. Seven commercial fishing periods were opened, four in District 1 and three in District 2 through August 5. The Pilot Station sonar cumulative estimate through August 5 of 57,000 fish was well below the historical average of 243,000 fall chum salmon for that date of operation. According to the management plan, additional fish were needed to achieve the run passage necessary to support normal escapement and meet subsistence requirements before additional commercial harvest could take place. Consequently, commercial fishing activity was suspended.

Overall, the fall season fishery was extremely challenging. The fall chum salmon pulses were spread out over the length of the season, separated with long durations of low passage rates of fish entering the river and relatively small pulses, which made in-season run size projection difficult in 2009. Management struggled between meeting escapement needs and providing opportunity for subsistence fishing during the entire second half of the fall chum salmon run. The resulting fall chum commercial harvest was 25,269 fish, which is well below all averages (Table 3-30).

The total 2009 Canadian Yukon commercial fall chum salmon catch of 293 fish was only 4.8% of the 1999 to 2008 average of 6,058 (Table 3-31). Within the 1999–2008 period, the commercial fall chum salmon catch ranged from 1,319 in 2000, when the fishery was closed most of season due to conservation concerns, to 11,931 fall chum salmon in 2005. The fall chum salmon commercial fishery is somewhat of a misnomer as virtually all of the catch is used for what could be termed personal needs. License holders use most of the catch to feed their personal sled dog teams. This situation could change with the development of local value-added products such as smoked fall chum salmon and salmon caviar.

Table 3-31 Canadian Yukon Area chum salmon catch totals, 1961-2009

	Mainstem Yukon River Harvest						Porcupine River	Total
Year	Commercial	Domestic	Test	Aboriginal Fishery	Combined Non-Commercial	Total	Aboriginal Fishery Harvest	Canadian Harvest
1961	3,276			3,800	3,800	7,076	2,000	9,076
1962	936			6,500	6,500	7,436	2,000	9,436
1963	2,196			5,500	5,500	7,696	20,000	27,696
1964	1,929			4,200	4,200	6,129	6,058	12,187
1965	2,071			2,183	2,183	4,254	7,535	11,789
1966	3,157			1,430	1,430	4,587	8,605	13,192
1967	3,343			1,850	1,850	5,193	11,768	16,961
1968	453			1,180	1,180	1,633	10,000	11,633
1969	2,279			2,120	2,120	4,399	3,377	7,776
1970	2,479			612	612	3,091	620	3,711
1971	1,761			150	150	1,911	15,000	16,911
1972	2,532				0	2,532	5,000	7,532
1973	2,806			1,129	1,129	3,935	6,200	10,135
1974	2,544	466		1,636	2,102	4,646	7,000	11,646
1975	2,500	4,600		2,500	7,100	9,600	11,000	20,600
1976	1,000	1,000		100	1,100	2,100	3,100	5,200
1977	3,990	1,499		1,430	2,929	6,919	5,560	12,479
1978	3,356	728		482	1,210	4,566	5,000	9,566
1979	9,084	2,000		11,000	13,000	22,084		22,084
1980	9,000	4,000		3,218	7,218	16,218	6,000	22,218
1981	15,260	1,611		2,410	4,021	19,281	3,000	22,281
1982	11,312	683		3,096	3,779	15,091	1,000	16,091
1983	25,990	300		1,200	1,500	27,490	2,000	29,490
1984	22,932	535		1,800	2,335	25,267	4,000	29,267
1985	35,746	279		1,740	2,019	37,765	3,500	41,265
1986	11,464	222		2,200	2,422	13,886	657	14,543
1987	40,591	132		3,622	3,754	44,345	135	44,480
1988	30,263	349		1,882	2,231	32,494	1,071	33,565
1989	17,549	100		2,462	2,562	20,111	2,909	23,020
1990	27,537	0		3,675	3,675	31,212	2,410	33,622
1991	31,404	0		2,438	2,438	33,842	1,576	35,418
1992	18,576	0		304	304	18,880	1,935	20,815
1993	7,762	0		4,660	4,660	12,422	1,668	14,090
1994	30,035	0		5,319	5,319	35,354	2,654	38,008
1995	39,012	0		1,099	1,099	40,111	5,489	45,600
1996	20,069	0		1,260	1,260	21,329	3,025	24,354
1997	8,068	0		1,218	1,218	9,286	6,294	15,600
1998[a]				1,795	1,792	1,792	6,159	7,954
1999	10,402	0		3,234	3,234	13,636	6,000	19,636
2000	1,319	0		2,927	2,917	4,236	5,000	9,246
2001	2,198	3	1 [b]	3,077	3,030	5,228	4,594	9,872
2002	3,065	0	2,756 [b]	3,109	3,093	6,158	1,860	8,034
2003	9,030	0	990 [b]	1,493	1,943	10,973	382	10,905
2004	7,365	0	995 [b]	2,180	2,180	9,545	205	9,750
2005	11,931	13		2,035	1,813	13,744	4,593	18,572
2006	4,096	0		2,521	2,521	6,617	5,179	11,796
2007	7,109	0	3,765	2,221	2,221	9,330	4,500	13,830
2008	4,062	0		2,068	2,068	6,130	3,436	9,566
2009 [c]	293	0		820	820	1,113	898	2,011
Average								
1961-2008	10,954	545	2,127	2,512	2,846	13,572	4,703	18,177
1999-2008	6,058	2	2,127	2,487	2,488	8,546	3,575	12,121
2004-2008	6,913	3	2,380	2,205	2,208	9,120	3,583	12,703

a A test fishery and aboriginal fisheries took place, but all other fisheries were closed.
b The chum salmon test fishery is a live-release test fishery.
c Data are preliminary.

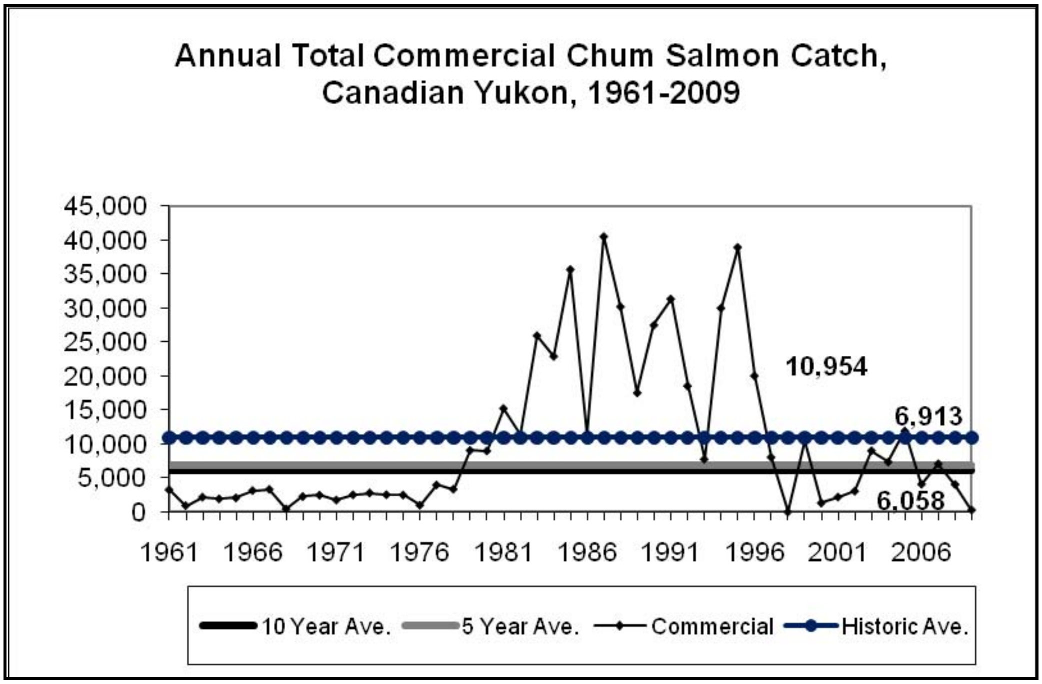


Figure 3-46 Canadian Yukon commercial chum salmon catch, 1960-2010

Source: Data provided to NMFS by ADF&G, in 2010, in response to a special data request.

A total of 387 permit holders participated in the summer chum salmon fishery, which was approximately 33% below the 1999–2008 average of 575 permit holders. The Lower Yukon Area (Districts 1–3) and Upper Yukon Area (Districts 4–6) are separate Commercial Fisheries Entry Commission (CFEC) permit areas. A total of 376 permit holders fished in the Lower Yukon Area in 2009, which was approximately 32% below the 1999–2008 average of 555. In the Upper Yukon Area, 11 permit holders fished, which was approximately 48% below the 1999–2008 average of 21 (ADF&G 2010d Appendix A4).

Yukon River fishermen in Alaska received an estimated $556,000 for their Chinook and summer chum salmon harvest in 2009, approximately 73% below the 2004–2008 average of $2.1 million. Two buyer-processors operated in the Lower Yukon Area. Lower Yukon River fishermen received an estimated average price per pound of $5.00 for incidentally harvested Chinook and $0.50 for summer chum salmon. The average income for Lower Yukon Area fishermen in 2009 was $1,425. Two buyer-processors and one catcher-seller operated in the Upper Yukon Area. Upper Yukon Area fishermen received an estimated average price per pound of $0.26 for summer chum salmon sold in the round and $3.00 for summer chum salmon roe. The average price paid for summer chum salmon sold in the round in the Upper Yukon Area was approximately 8% above the 1999–2008 average of $0.24 per pound. No Chinook salmon were sold in the Upper Yukon Area. The average income for Upper Yukon Area fishermen that participated in the 2009 fishery was $1,857.

The preliminary 2009 commercial fall chum and coho salmon season value for the Yukon Area was $164,400 ($162,700 for the Lower Yukon Area, $1,700 for the Upper Yukon Area) (Appendix A5). The previous 5 year average value for the Yukon Area was $344,700 ($312,000 for the Lower Yukon Area, $32,700 for the Upper Yukon Area). Yukon River fishers received an average price of $0.70 per pound for fall chum salmon in the Lower Yukon Area and $0.19 per pound in the Upper Yukon Area in 2009. This compares to the 1999–2008 average of $0.28 per pound in the Lower Yukon Area and $0.16 per pound in the Upper Yukon Area. For coho salmon, fishermen in the Lower and Upper Yukon Areas received an average price of $1.00 per pound and $0.15 per pound compared to the recent 10-year average price of $0.39 and $0.12 per pound, respectively (ADF&G 2010d Appendix A5).

Table 3-32 (ADF&G 2007 NMFS data request) provides historic data on Yukon Chinook and Summer chum commercial sales value, from 1977-2007. In the lower Yukon River, Chinook commercial harvest value peaked in 1992 at just under $14 million, approximately 99 percent of which came from the lower Yukon. As harvest trended downward in the late 1990s so did Chinook value and, by 2001, there were no commercial Chinook openings in the Yukon River, partly due to the need to conserve chum stocks. Since 2001, the Chinook and chum runs have improved enough to allow for commercial openings; however, the catch, and value, are still much lower than historic levels and the 2009 harvest was worth just over a half a million dollars, which is the lowest level since complete closure of the Yukon in 2001. A review of the summer chum data shows that the value of the summer chum fishery has fallen precipitously since the late 1980s. Also evident is that the Chinook fishery is often more than ten times as valuable as the chum fishery. This fact highlights the importance of the commercial Chinook fishery as a major source of cash income in the region.

Table 3-32 Real gross ex-vessel revenue from commercial salmon fishing to Yukon Area fishermen, summer season, 1977-2011. (Values are inflation adjusted to 2010 value using the base 2005 GDP deflator)

	Yukon Chinook			Yukon Summer Chum				
Year	Lower Value	Upper Value	Subtotal	Lower Value	Upper Value	Subtotal	Total Season	Total Value
1977	$5,345,682	$431,962	$5,777,643	$2,924,770	$889,908	$3,814,678	$9,592,322	$12,391,150
1978	$5,558,550	$180,355	$5,738,904	$5,620,303	$1,779,176	$7,399,479	$13,138,383	$15,574,531
1979	$6,922,002	$311,178	$7,233,180	$5,617,300	$1,114,471	$6,731,770	$13,964,950	$17,963,612
1980	$7,825,785	$260,917	$8,086,702	$2,359,228	$1,439,884	$3,799,112	$11,885,814	$13,290,688
1981	$9,278,538	$433,171	$9,711,708	$5,753,456	$1,468,969	$7,222,425	$16,934,133	$21,032,238
1982	$7,454,000	$321,848	$7,775,848	$2,448,465	$895,794	$3,344,258	$11,120,107	$13,205,830
1983	$7,789,799	$200,920	$7,990,719	$3,300,210	$536,406	$3,836,616	$11,827,335	$13,252,504
1984	$6,439,277	$187,724	$6,627,001	$1,700,039	$702,038	$2,402,077	$9,029,078	$10,398,485
1985	$7,644,767	$147,119	$7,791,886	$1,838,369	$1,057,060	$2,895,429	$10,687,315	$12,495,585
1986	$5,512,497	$127,774	$5,640,271	$3,041,735	$1,104,372	$4,146,107	$9,786,378	$10,904,748
1987	$9,188,631	$230,516	$9,419,147	$2,223,338	$547,721	$2,771,059	$12,190,206	$12,190,206
1988	$8,940,623	$232,825	$9,173,447	$8,183,489	$1,986,499	$10,169,989	$19,343,436	$21,893,695
1989	$8,170,431	$170,574	$8,341,005	$3,496,838	$2,171,419	$5,668,257	$14,009,262	$16,050,655
1990	$7,318,991	$159,858	$7,478,849	$755,408	$769,133	$1,524,541	$9,003,390	$9,895,264
1991	$10,451,693	$142,429	$10,594,123	$1,147,028	$919,583	$2,066,611	$12,660,733	$14,006,551
1992	$14,260,996	$242,050	$14,503,046	$869,346	$752,228	$1,621,574	$16,124,620	$16,230,163
1993	$6,843,993	$158,651	$7,002,643	$317,775	$285,531	$603,306	$7,605,949	$7,605,949
1994	$5,721,837	$170,546	$5,892,383	$108,701	$544,404	$653,105	$6,545,488	$6,569,169
1995	$7,148,727	$117,040	$7,265,767	$324,798	$1,425,471	$1,750,269	$9,016,037	$9,612,829
1996	$4,606,318	$62,377	$4,668,696	$117,441	$1,274,774	$1,392,215	$6,060,911	$6,329,819
1997	$7,065,806	$143,526	$7,209,331	$73,291	$125,497	$198,787	$7,408,119	$7,634,742
1998	$2,450,151	$22,157	$2,472,308	$33,861	$1,052	$34,913	$2,507,221	$2,507,221
1999	$6,254,051	$94,085	$6,348,136	$24,871	$2,173	$27,044	$6,375,179	$6,425,882
2000	$897,236	$0	$897,236	$10,675	$0	$10,675	$907,911	$907,911
2001 [a]	$0	$0	$0	$0	$0	$0	$0	$0
2002	$2,012,315	$24,684	$2,037,000	$5,167	$7,349	$12,516	$2,049,515	$2,049,515
2003	$2,179,722	$47,710	$2,227,432	$1,846	$8,013	$9,860	$2,237,291	$2,275,329
2004	$3,470,330	$43,373	$3,513,703	$10,063	$10,925	$20,988	$3,534,691	$3,547,287
2005	$2,139,804	$26,763	$2,166,567	$12,062	$14,775	$26,837	$2,193,404	$2,706,218
2006	$3,492,970	$34,640	$3,527,610	$25,331	$45,635	$70,966	$3,598,576	$3,914,797
2007	$1,999,661	$28,039	$2,027,700	$227,607	$35,496	$263,102	$2,290,803	$2,590,270
2008	$328,469	$0	$328,469	$329,928	$66,444	$396,372	$724,840	$1,402,550
2009	$20,970	$0	$20,970	$514,856	$20,430	$535,286	$556,256	$720,696
2010	$639,230	$0	$639,230	$823,967	$61,534	$885,501	$1,524,731	
2011	$0	$0	$0	$1,301,403	$12,966	$1,314,369	$1,314,369	
5 year Ave.	$2,286,247	$26,563	$2,312,810	$120,998	$34,655	$155,653	$2,468,463	$2,832,224
10 year Ave.	$2,277,456	$29,929	$2,307,385	$64,755	$19,081	$83,836	$2,391,221	$2,581,976

Source: Data provided to NMFS by ADF&G in response to a special data request

a No commercial salmon fisheries occurred in the Yukon River in 2001.

Table 3-33 provides historic data on Yukon fall chum and coho commercial fisheries. The data shows that these fisheries have fallen in real commercial ex-vessel gross value from historic highs in the late 1980s and have had several periods of no commercial harvest since then. From 2000 through 2002, there were no commercial harvest of fall chum and coho in the Yukon River. Subsequently, harvests have been allowed; however, total value remains well below historic highs and averages.

Table 3-33 Real gross ex-vessel revenue from commercial salmon fishing to Yukon Area fishermen, fall season, 1977-2011. (Values are inflation adjusted to 2010 value using the 2005 GDP Deflator)

	Yukon Fall Chum			Yukon Coho			
Year	Lower Value	Upper Value	Subtotal	Lower Value	Upper Value	Subtotal	Total Season
1977	$2,086,466	$296,664	$2,383,130	$409,162	$6,536	$415,698	$2,798,828
1978	$1,877,168	$279,711	$2,156,879	$262,704	$16,564	$279,269	$2,436,147
1979	$2,901,838	$871,224	$3,773,062	$209,070	$16,530	$225,600	$3,998,662
1980	$904,820	$454,722	$1,359,542	$39,883	$5,450	$45,333	$1,404,874
1981	$3,156,207	$748,898	$3,905,104	$183,412	$9,588	$193,000	$4,098,104
1982	$1,674,515	$105,354	$1,779,869	$268,692	$37,162	$305,855	$2,085,723
1983	$1,124,658	$245,384	$1,370,042	$33,296	$21,831	$55,126	$1,425,168
1984	$686,600	$189,674	$876,274	$469,614	$23,518	$493,132	$1,369,406
1985	$1,129,717	$317,091	$1,446,807	$313,760	$47,703	$361,463	$1,808,270
1986	$695,482	$52,788	$748,270	$369,131	$968	$370,100	$1,118,370
1987	$0	$0	$0	$0	$0	$0	$0
1988	$1,045,129	$247,578	$1,292,707	$1,201,727	$55,825	$1,257,552	$2,550,259
1989	$1,124,879	$353,194	$1,478,073	$509,775	$53,546	$563,321	$2,041,394
1990	$361,580	$265,631	$627,211	$208,451	$56,213	$264,663	$891,874
1991	$642,661	$231,416	$874,077	$440,134	$31,606	$471,740	$1,345,817
1992	$0	$77,573	$77,573	$0	$27,971	$27,971	$105,543
1993	$0	$0	$0	$0	$0	$0	$0
1994	$0	$11,689	$11,689	$0	$11,993	$11,993	$23,682
1995	$248,758	$225,278	$474,036	$107,576	$15,181	$122,756	$596,792
1996	$64,089	$59,945	$124,033	$127,698	$17,177	$144,875	$268,908
1997	$112,170	$9,401	$121,571	$103,675	$1,377	$105,052	$226,623
1998	$0	$0	$0	$0	$0	$0	$0
1999	$45,023	$1,107	$46,130	$4,573	$0	$4,573	$50,703
2000	$0	$0	$0	$0	$0	$0	$0
2001 [a]	$0	$0	$0	$0	$0	$0	$0
2002	$0	$0	$0	$0	$0	$0	$0
2003	$6,981	$3,958	$10,939	$21,163	$5,935	$27,099	$38,038
2004	$1,275	$961	$2,236	$3,142	$7,218	$10,360	$12,596
2005	$347,149	$52,789	$399,938	$91,850	$21,026	$112,876	$512,814
2006	$215,114	$35,888	$251,002	$53,396	$11,823	$65,219	$316,221
2007	$148,760	$17,435	$166,195	$131,862	$1,411	$133,272	$299,467
2008	$432,903	$22,292	$455,194	$218,765	$3,751	$222,516	$677,710
2009	$110,408	$1,262	$111,670	$52,303	$467	$52,770	$164,440
2010	$5,428	$2,761	$8,189	$20,535	$442	$20,977	$29,166
2011	$1,627,575	$16,114	$1,643,689	$472,168	$6,792	$478,960	$2,122,649
2004-2008 Ave.	$465,015	$11,973	$476,987	$179,126	$2,573	$181,699	$658,686
1999-2008 Ave.	$289,559	$15,346	$304,905	$106,518	$5,886	$112,405	$417,310

Source: Derived from data provided to NMFS by ADF&G in response to a special data request

a No commercial salmon fisheries occurred in the Yukon River in 2001.

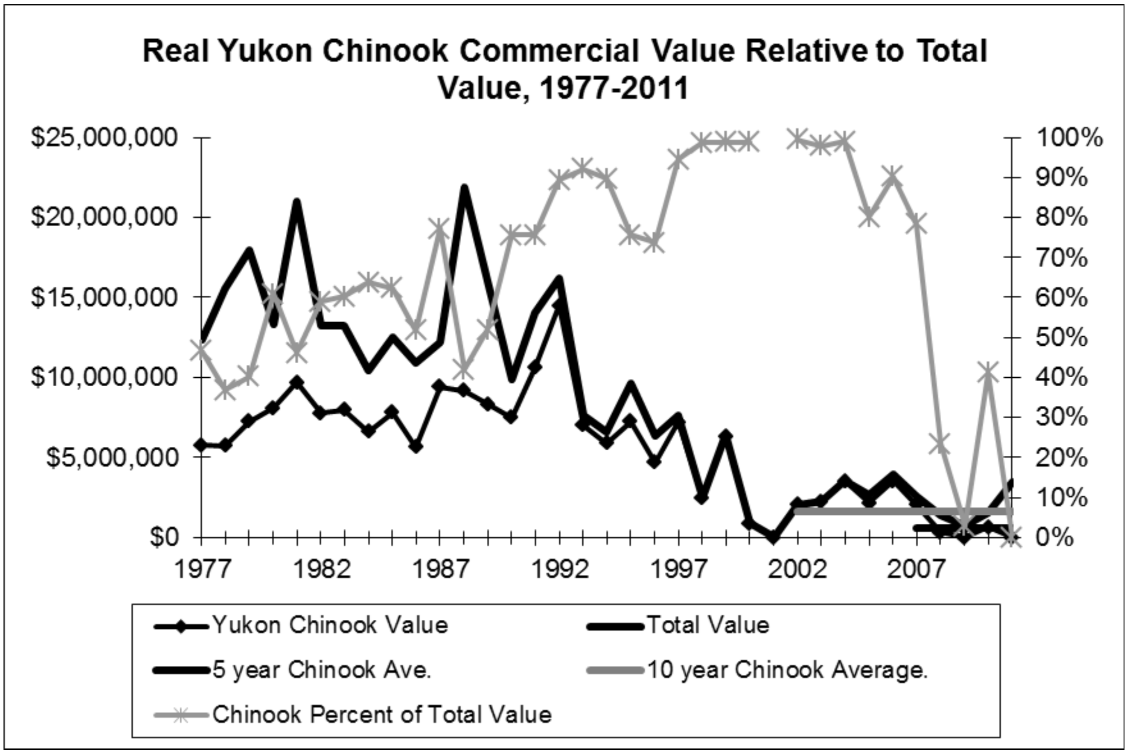


Figure 3-47 Real Yukon Chinook commercial value relative to total value, 1977-2011. (Values are inflation adjusted to 2010 value using the base 2005 GDP deflator)

Source: Derived from data provided to NMFS by ADF&G in response to a special data request

Figure 3-47, depicts the comparison between Yukon Chinook commercial value and total commercial value from all salmon fisheries from 1977-2009. Also shown is the percent of total value that the commercial Chinook value represents. Since the early 1990s, Chinook has accounted for 70 percent to nearly 100 percent of the total commercial value. Also clearly shown is the decline in Chinook value and total value during the 1990s, as well as the fall to zero when all the fisheries were closed in 2001. As Chinook catch improved, since 2001, so has Chinook value and total value; however, the 2008 and 2009 Chinook catch and values fell sharply from previous years.

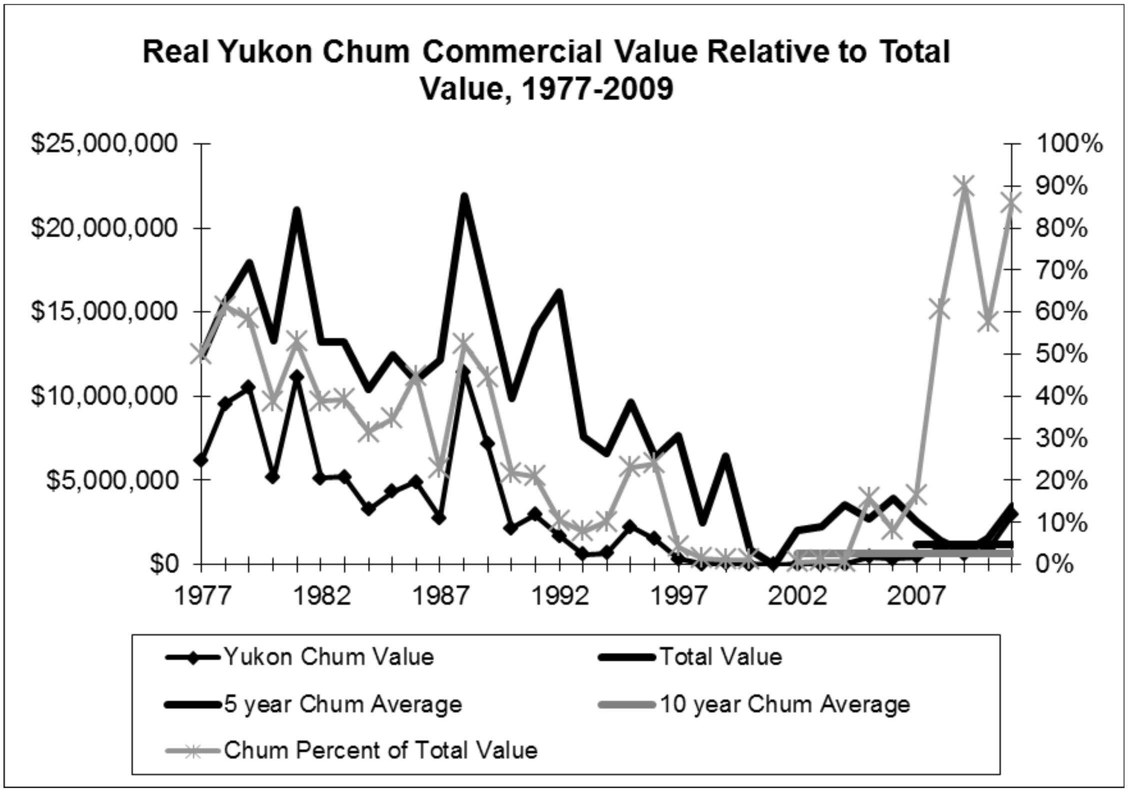


Figure 3-48 Real Yukon Chum commercial value relative to total value, 1977-2011. (Values are inflation adjusted to 2010 value using the base 2005 GDP deflator)

Source: Derived from data provided to NMFS by ADF&G in response to a special data request

Figure 3-48, depicts the comparison between Yukon Chum commercial value and total commercial value from all salmon fisheries from 1977-2009. Also shown is the percent of total value that the commercial chum value represents. Historically, chum salmon has represented as much as half of all commercial value earned in the Alaska Yukon. As chum harvests trended downward the proportion of chum to total value also fell. However, with the concurrent decline in Chinook value, some improvement in chum harvests overall, and continued decline in Chinook value, chum salmon value has become increasingly important in the past several years. In 2009, for example, chum value was 90 percent of the total value earned in the Alaska Yukon commercial salmon fishery.

3.6.5 Bristol Bay

The Bristol Bay management area includes all coastal and inland waters east of a line from Cape Newenham to Cape Menshikof (Figure 3-49). The area includes nine major river systems: Naknek, Kvichak, Alagnak, Egegik, Ugashik, Wood, Nushagak, Igushik, and Togiak. Collectively, these rivers are home to the largest commercial sockeye salmon fishery in the world. Sockeye salmon *Oncorhynchus nerka* are by far the most abundant salmon species that return to Bristol Bay each year, but Chinook *O. tshawytscha*, chum *O. keta*, coho *O. kisutch*, and (in even-years) pink salmon *O. gorbuscha* returns are important to the fisheries as well. The Bristol Bay area is divided into five management districts (Naknek-Kvichak, Egegik, Ugashik, Nushagak, and Togiak) that correspond to the major river drainages. The management objective for each river is to achieve desired escapement goals for the major salmon species while harvesting all fish in excess of the established requirement through orderly fisheries. In addition, regulatory management plans have been adopted for individual species in certain districts. This section was developed from ADF&G 2009a, ADF&G 2010a, ADF&G 2011a and data supplied in ADF&G 2010 and 2007.

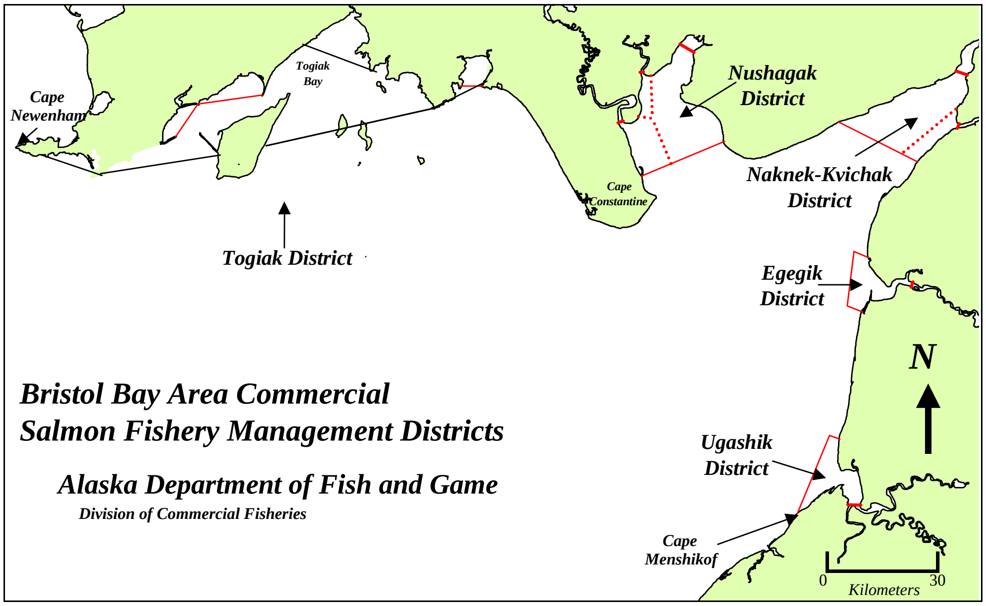


Figure 3-49 Bristol Bay area commercial fisheries salmon management districts

Overview of Bristol Bay Salmon Fisheries

The 5 species of Pacific salmon found in Bristol Bay are the focus of major commercial, subsistence, and sport fisheries. Annual commercial catches for the most recent 20-year span (1989–2008) average nearly 25.7 million sockeye, 64,900 Chinook, 947,000 chum, 97,000 coho, and 170,000 (even-years only) pink salmon (ADF&G 2009a Appendices A3–A7). Since 1989, the real value of the commercial salmon harvest in Bristol Bay has averaged $225.5 million, with sockeye salmon being the most valuable, worth an average $221.5 million (Table 3-35).

Management of the commercial fishery in Bristol Bay is focused on discrete stocks with harvests directed at terminal areas around the mouths of major river systems. Each stock is managed to achieve a spawning escapement goal based on sustained yield. Escapement goals are achieved by regulating fishing time and area by emergency order (EO) and/or adjusting weekly fishing schedules. Legal gear for the commercial salmon fishery includes both drift (150 fathoms) and set (50 fathoms) gillnets. However, the Alaska Board of Fisheries (BOF) passed a regulation in 2003 allowing for 2 drift permit holders to concurrently fish from the same vessel and jointly operate up to 200 fathoms of drift gillnet gear. This regulation does not apply in special harvest areas. Drift gillnet permits are the most numerous at 1,863 in Bristol Bay (Area T), and of those, 1,642 fished in 2009. There are a total of 981 set gillnet permits in Bristol Bay and of those, 855 fished in 2009 (ADF&G 2009a--Appendix A).

Recent Management Actions

Management of the commercial fishery in Bristol Bay is focused on discrete stocks with harvest directed at terminal areas around the mouths of major river systems. Each stock is managed to achieve a spawning escapement goal based on sustained yield. Escapement goals are achieved by regulating fishing time and area by emergency order and/or adjusting weekly fishing schedules (Morstad et al., 2010).

In the Nushagak District, the Nushagak-Mulchatna Chinook Salmon Management Plan (5 AAC 06.361) was adopted to ensure an adequate spawning escapement of Chinook salmon into the Nushagak River system. The plan (adopted in 1992 and amended in 119, 1997, and 2003) directs ADF&G to manage the commercial fishery for an inriver goal of 75,000 Chinook salmon past the sonar site at Portage Creek. The inriver goal provides: 1) a biological escapement goal of 65,000 spawners; 2) a reasonable opportunity for inriver subsistence harvest; and 3) a guideline sport harvest of 5,000 fish. The plan addresses poor run scenarios by specifying management actions to be taken in commercial, sport, and subsistence fisheries. The Nushagak Coho Salmon Management Plan (5 AAC 06.368) also establishes spawning and inriver escapement goals and provides guidance for managing sport, subsistence, and commercial fisheries that harvest coho salmon. The plan directs ADF&G to manage the commercial coho salmon fishery to achieve an inriver escapement goal of 100,000 fish and a biological escapement goal of 90,000 spawners and 10,000 additional fish for upriver sport and subsistence harvests (Morstad et al., 2010).

Fishery and Reporting Requirements

Requirements for commercial fishing in the Bristol Bay Area are set out in commercial fishing regulations (5 AAC 06). Subsistence, personal use, and sport fishing regulations affecting commercial fishing activities are set out in subsistence fishing regulations (5 AAC 01 and 02), personal use fishing regulations (5 AAC 77), and sport fishing regulations (5 AAC 67 and 75).

Commercial fishermen are required to have a valid CFEC limit entry permit to participate in the commercial salmon fisheries in the Bristol Bay Area. All salmon caught by CFEC permit holders during commercial periods must be reported on fish tickets. Regulations also require commercial fishermen to report, on each fish ticket, the number of salmon harvested but not sold during commercial fishing periods. Buyers are required to ensure this information is reported on fish tickets even though a portion of the commercial harvest may have been used for subsistence or personal use.

All processors, buyers, and catcher/sellers are required to register with ADF&G prior to commencing operations in Bristol Bay. In addition, commercial operators are required by Alaska State statutes to submit the following catch and production information (5 AAC 39.130, Commercial Fishing Regulations):

- Processor Checklist: this is required to be completed and signed by an ADF&G representative before your company buys any fish;
- Daily Catch Reports: these reports must be transmitted to ADF&G by 10:00 a.m. the day after each fishing period of the season or from midnight to midnight if the fishing period extends beyond midnight;
- Weekly Catch Reports: these must be submitted for each week (Sunday through Saturday) that your company operates;
- Fish Tickets: these must be submitted to the local ADF&G office each week with the weekly catch report. Each ticket should have the number of fish, pounds of fish, and price for each species on every delivery. Also include fish by species kept by fishers for personal use; and
- Final Operations Report: must be filed with the King Salmon or Dillingham ADF&G office upon completion of the salmon buying activity in Bristol Bay or by September 30, whichever is earlier. Report the final, confirmed tally of salmon delivered to your company by district, species, and date. Also report all germane information in full as requested. Information specific to each company will remain confidential and is used to compile catch totals, preliminary ex-vessel values, average fish weights, and the overall production totals for the Bristol Bay season. It is extremely important that you file this report as soon as possible after completion of your company’s fish buying activities.

ADF&G compiles this information for use in daily management strategies and distributes catch data to the fishing industry.

Commercial Chum Fishery Situation and Outlook

In 2009, the commercial harvest of approximately 1.366 million chum salmon was 38% more than the 20-year average of 946,000 fish. Chum salmon catches were above 20-year averages in all districts except Ugashik and Togiak (Table 3-13). Preliminary data for 2010 indicates a chum harvest of 1.09 million fish with and ex-vessel value of $1.9 million. Data for 2010 will be included in tabular format in the initial review draft of this document.

Table 3-34 shows that, historically, Bristol Bay chum harvests generally trended downwards during the 1990's; however, since 2001, the trend has been generally upwards with a peak harvest of 2.2 million fish in 2006. Recent chum salmon harvest, though below peak levels, have continued to be above the 5-year, 10-year, and 20-year averages. These trends are also depicted in Figure 3-50 below.

Table 3-34 Chum salmon commercial catch by district, in numbers of Fish, Bristol Bay, 1989-2011

Year	Naknek-Kvichak	Egegik	Ugashik	Nushagak	Togiak	Total
1989	310,869	136,185	84,673	523,910	203,171	1,258,808
1990	422,276	122,843	31,798	375,361	102,861	1,055,139
1991	443,189	75,892	60,299	463,780	246,589	1,289,749
1992	167,168	121,472	57,170	398,691	176,123	920,624
1993	43,684	70,628	73,402	505,799	144,869	838,382
1994	219,118	62,961	52,127	328,260	232,559	895,025
1995	236,472	68,325	62,801	390,158	221,126	978,882
1996	97,574	85,151	106,168	331,414	206,226	826,533
1997	8,628	59,139	16,903	185,635	47,285	317,590
1998	82,281	29,405	8,088	208,551	67,345	395,670
1999	259,922	74,890	68,004	170,795	111,677	685,288
2000	68,218	38,777	36,349	114,454	140,175	397,973
2001	16,472	33,579	43,394	526,602	211,701	831,748
2002	19,180	23,516	35,792	276,777	112,987	468,252
2003	34,481	37,116	52,908	740,311	68,154	932,970
2004	29,972	75,061	49,358	458,902	94,025	732,481
2005	204,777	62,029	39,513	966,050	124,694	1,397,063
2006	457,855	153,777	168,428	1,240,235	223,364	2,243,659
2007	383,927	157,991	242,025	953,275	202,486	1,939,704
2008	237,260	92,901	135,292	492,341	301,967	1,259,761
2009	258,141	124,131	65,439	775,340	143,418	1,366,469
2010	330,342	64,539	70,839	738,542	123,703	1,522,965
2011	205,790	41,401	37,556	589,159	113,455	739,052
20-Year Ave.	168,063	73,839	71,078	519,565	153,367	984,505
10 year Ave.	216,173	83,246	89,715	723,093	150,825	1,260,238
5 year Ave.	283,092	96,193	110,230	709,731	177,006	1,365,590

a Total includes General District catch of 25,163.
Source: ADF&G 2009, Table A5.

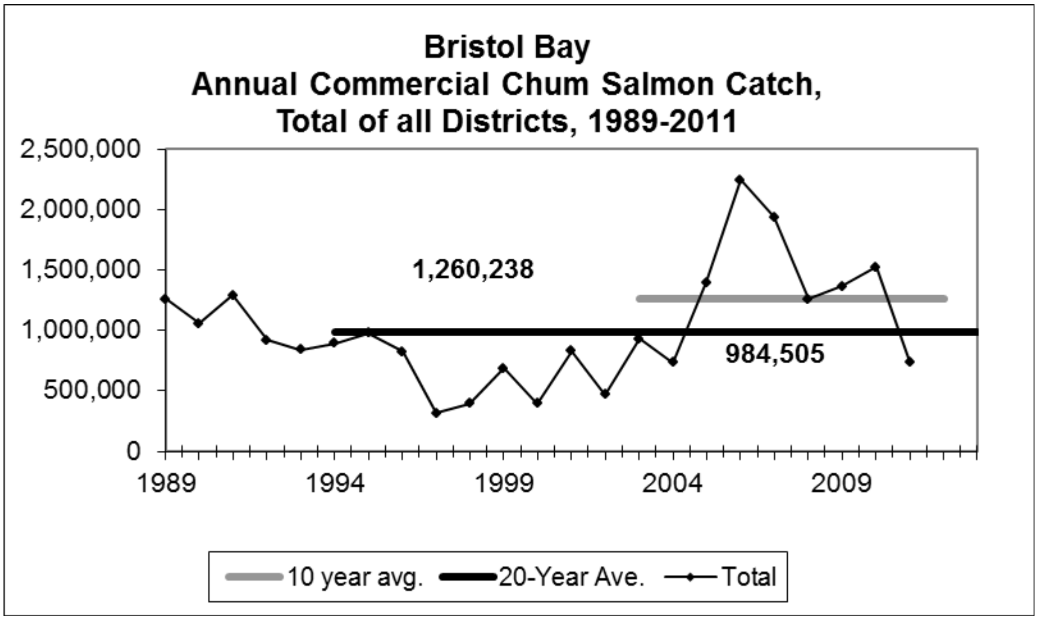


Figure 3-50 Bristol Bay annual commercial chum catch, total all districts, 1989-2011

Table 3-35 provides the historic estimated real ex-vessel value of Bristol Bay commercial salmon catch, by species, in thousands of dollars. It is evident that the Sockeye fishery dwarfs all other salmon species in terms of total value. Also evident is a significant decline in Chinook and chum salmon values since the mid-1990s and while Chinook values have continued to be low, chum values have rebounded considerably in recent years.

Table 3-35 Estimated real ex-vessel revenue of the commercial salmon catch by species, in thousands of dollars, Bristol Bay, 1989-2011 (Inflation adjusted to 2010 value using the GDP deflator)

Year	Sockeye	Chinook	Chum	Pink[a]	Coho	Total
1989	$324,272	$989	$3,198		$1,991	$330,452
1990	$318,907	$796	$2,642	$840	$856	$324,041
1991	$164,384	$463	$2,578		$721	$168,147
1992	$293,046	$1,537	$2,186	$359	$1,134	$298,261
1993	$228,536	$1,588	$1,673		$369	$232,165
1994	$259,268	$2,218	$1,648	$56	$1,398	$264,590
1995	$252,558	$1,741	$1,697		$191	$256,187
1996	$199,167	$995	$799	$9	$443	$201,413
1997	$85,228	$845	$257		$237	$86,568
1998	$90,410	$1,813	$300	$9	$645	$93,177
1999	$144,654	$262	$514		$123	$145,552
2000	$103,795	$204	$287	$20	$498	$104,804
2001	$48,846	$160	$821		$48	$49,875
2002	$37,958	$324	$345		$23	$38,648
2003	$55,906	$290	$561		$90	$56,847
2004	$88,237	$733	$451	$22	$179	$89,621
2005	$105,943	$809	$1,054		$169	$107,974
2006	$95,789	$1,412	$1,433	$20	$189	$98,843
2007	$122,918	$559	$1,632		$124	$125,233
2008	$110,912	$301	$1,283	$159	$291	$112,945
2009	$127,615	$400	$1,291		$162	$129,468
2010	$148,703	$449	$1,888		$497	$153,115
2011	$135,655	$429	$1,604		$37	$137,726
20 Year Ave.	$136,757	$853	$1,086	$82	$342	$139,151
10 year Ave.	$102,964	$571	$1,154	$67	$176	$105,042
5 year Ave.	$129,161	$428	$1,540	$159	$222	$131,697

Note: Gross revenue paid to fishermen, derived from price per pound times commercial catch. Blank cells represent no data.
a: Included even-years only. Source: ADF&G 2009a and data provided in ADF&G 2010 and 2007/.

Figure 3-51 depicts the historical trends in commercial chum value as well as the percent of total value (right vertical axis) that chum value represents. Historically, chum value has never exceeded 2 percent of the total commercial value in Bristol Bay, and in 2009 it represented only about six tenths of a percent.

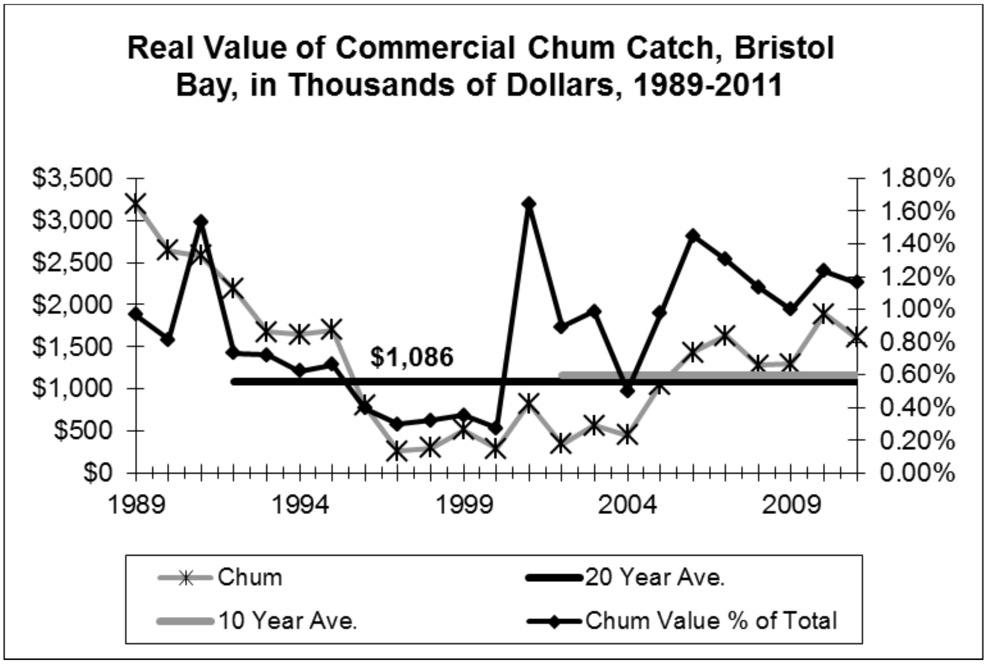


Figure 3-51 Historical real value of commercial Chum catch, Bristol Bay, 1989-2011

Source: Derived from data provided to NMFS by ADF&G in response to a special data request.

3.7 Identification of Regions and Communities Principally Dependent on Commercial Salmon Fisheries

3.7.1 Northern Region

Table 3-36 is adapted from an Alaska Department of Labor and Workforce Development (ADOLWD) analysis of local resident crew members, by census areas, with the region defined by ADOLWD as the Northern Region. The Northern Region includes the communities, Boroughs, and Census areas associated with the fisheries of the Kotzebue, Norton Sound, and part of the upper Yukon area. Overall, in the Northern Region, 410 crew licenses were purchased in 2009 with about half of these coming from the Nome Census area.

The crew counts shown below are in addition to limited entry commercial salmon permits, shown in Table 3-37, that are actively used in the area's fisheries. 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.

Table 3-36 Local resident crew members, Northern Region, 2004–2009

Borough/Census Area	Local Residents Who Bought Commercial Crew Licenses					
	2004	2005	2006	2007	2008	2009
Denali Borough	5	2	3	5	3	4
Fairbanks North Star Borough	62	67	62	81	85	86
Nome Census Area	78	151	146	154	194	193
North Slope Borough	6	5	5	4	7	5
Northwest Arctic Borough	60	58	63	53	50	101
Southeast Fairbanks Census Area	11	14	18	14	13	12
Yukon-Koyukuk Census Area	15	15	17	21	26	16
Local Resident Total	237	312	314	332	378	417
Region's Harvest Total	203	345	445	469	465	428

Source: Commercial Fisheries Entry Commission, and ADOLWD.

Table 3-37 Fishermen by residency, Northern Region, 2004 – 2009

Borough/Census Area	Residents Who Fished Their Permits					
	2004	2005	2006	2007	2008	2009
Fairbanks North Star Borough	41	51	54	52	41	36
Nome Census Area	63	99	109	116	126	125
North Slope Borough	3	4	3	4	3	3
Northwest Arctic Borough	44	45	43	50	50	66
Southeast Fairbanks Census Area	12	16	15	17	15	13
Yukon-Koyukuk Census Area	24	24	39	27	33	21
Local Resident Total	187	239	263	266	268	264
Region's Harvest Total	133	177	202	145	165	199

Source: Commercial Fisheries Entry Commission, and ADOLWD
Notes: "Region's Harvest Total" represents total fishermen who fished in the region's fisheries. Permit holders do not necessarily work in their local fisheries.

ADOLWD has also tabulated data on fish harvesting employment and earning by gear type in the Northern Region, which is reprinted with permission (Warren, 2011) in
Table 3-38. The largest proportions of the total estimated workforce have historically come from the salmon fisheries (gillnet and set-net combined). Salmon harvesting gross gillnet revenue declined substantially during the late 2000s; however, set-net revenue improved considerably durig 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.

Table 3-38 Fish harvesting employment and gross earnings by gear type, 2003-2009, Northern Region

Year	Gear Type	Vessels[1]	Total Estimated Workforce[2]	Total Gross Earning of Permit Holders[3]	Percent of Gross Earnings Earned by Nonresident Permit Holders
2003	Gillnet	26	91	$148,152	ND
2004	Gillnet	0	0	$0	0
2005	Gillnet	56	196	$257,942	0
2006	Gillnet	41	144	$128,476	0
2007	Gillnet	7	25	$16,700	0
2008	Gillnet	14	49	$52,287	0
2009	Gillnet	6	21	$17,589	0
2003	Pot Gear	38	152	$1,040,259	6.5
2004	Pot Gear	29	116	$1,020,500	ND
2005	Pot Gear	37	148	$1,199,263	ND
2006	Pot Gear	30	120	$1,000,794	0
2007	Pot Gear	35	142	$797,732	0
2008	Pot Gear	27	108	$1,272,304	0
2009	Pot Gear	25	100	$1,258,044	0
2003	Set-net	-	87	$86,588	0
2004	Set-net	-	177	$199,428	0
2005	Set-net	-	267	$411,674	0
2006	Set-net	-	340	$606,549	0
2007	Set-net	-	381	$812,432	ND
2008	Set-net	-	459	$1,129,243	0
2009	Set-net	-	496	$1,118,619	0
2003	Total	65	362	$1,446,598	ND
2004	Total	29	308	$1,280,487	ND
2005	Total	102	692	$2,024,124	ND
2006	Total	79	727	$1,813,382	ND
2007	Total	54	674	$1,626,864	ND
2008	Total	50	712	$2,453,834	ND
2009	Total	44	695	$2,780,621	ND

[1]Skiffs and small vessels are usually not registered as commercial vessels and are therefore not counted in these data.
[2]'Workforce' refers to the number of fisherman fishing permits plus the requisite crew members needed for the permits(s) they fish. Regional crew member counts are estimates derived by applying a crew factor to catch data.
[3]Gross earnings, or revenue, are currently the most reliable data available, but are not directly comparable to wages as expenses have not been deducted.

Source: Commercial Fisheries Entry Commission, and ADOLWD.

Figure 3-52 depicts Northern Region resident permit holder salmon fishery gross earnings, by community, as tabulated by ADOLWD. None of the communities in the region have gross earnings of resident permit holders that exceed $1 million from the salmon fisheries.

Figure 3-52 Northern region salmon harvesting, gross earnings of resident permit holders by community, 2009

Source: ADOLWD

Northern Region fish harvesting employment, by species and month, also tabulated by ADOLWD, are shown in Table 3-39. 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 as compared to the monthly average of 87. Norton Sound crab and Kuskokwim bay herring fisheries also historically contribute to harvesting employment as has halibut fishing in recent years.

Table 3-39 Fish harvesting employment by species and month, 2003–2009 Northern Region

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Monthly Average
All Species[1]													
2003	0	18	33	36	86	31	151	160	34	4	0	0	46
2004	0	3	6	6	0	33	221	220	48	4	0	0	45
2005	5	3	13	12	3	190	242	259	71	6	0	0	67
2006	0	0	0	0	3	138	283	321	117	15	0	0	73
2007	8	23	26	18	3	50	309	352	94	31	2	0	76
2008	0	12	24	27	9	74	324	363	143	17	20	6	85
2009	15	18	15	9	3	66	297	394	164	33	25	3	87
Crab													
Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Monthly Average
2003	0	18	33	36	3	27	87	96	0	0	0	0	25
2004	0	3	6	6	0	30	75	78	0	0	0	0	17
2005	3	3	9	12	3	24	90	90	0	0	0	0	20
2006	0	0	0	0	3	33	72	87	0	0	0	0	16
2007	3	18	21	18	3	30	78	75	0	0	0	0	21
2008	0	12	24	27	9	39	69	84	3	0	0	6	23
2009	15	18	15	9	3	51	75	66	54	0	0	0	26
Groundfish													
Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	
2003	-	-	-	-	-	-	-	-	-	-	-	-	-
2004	-	-	-	-	-	-	-	-	-	-	-	-	-
2005	-	-	-	-	-	-	-	-	-	-	-	-	-
2006	0	0	0	0	0	0	0	0	3	0	0	0	0
2007	5	5	5	0	0	0	0	0	0	3	0	0	2
2008	0	0	0	0	0	0	0	0	3	3	0	0	1
2009	0	0	0	0	0	0	0	0	0	6	3	3	1
Halibut[2]													
Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	
2003	0	0	0	0	3	0	0	0	0	0	0	0	0
2004	-	-	-	-	-	-	-	-	-	-	-	-	-
2005	0	0	0	0	0	0	3	15	27	6	0	0	4
2006	0	0	0	0	0	0	3	12	18	15	0	0	4
2007	0	0	0	0	0	0	3	21	24	18	0	0	6
2008	0	0	0	0	0	0	3	15	27	12	0	0	5
2009	0	0	0	0	0	0	0	24	24	27	0	0	6
Herring													
Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	
2003	0	0	0	0	80	0	0	0	0	0	0	0	7
2004	0	0	0	0	0	3	0	0	0	0	0	0	0
2005	0	0	0	0	0	140	3	0	0	0	0	0	12
2006	0	0	0	0	0	105	0	0	0	0	0	0	9
2007	0	0	0	0	0	20	0	0	0	0	0	0	2
2008	0	0	0	0	0	35	0	0	0	0	0	0	3
2009	0	0	0	0	0	15	0	0	0	0	0	0	1
Salmon													
Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	
2003	0	0	0	0	0	4	64	64	34	4	0	0	14
2004	0	0	0	0	0	0	146	142	48	4	0	0	28
2005	0	0	0	0	0	26	146	154	44	0	0	0	31
2006	0	0	0	0	0	0	208	222	96	0	0	0	44
2007	0	0	0	0	0	0	228	256	70	10	0	0	47
2008	0	0	0	0	0	0	252	264	110	2	0	0	52
2009	0	0	0	0	0	0	222	304	86	0	0	0	51

[1]A small number of fishermen in unknown or other fisheries are included in the totals; however, they are not listed separately in this exhibit.
Source: Commercial Fisheries Entry Commission; National Marine Fisheries Service and Alaska Department of Labor and Workforce Development, Research and Analysis Section

Figure 3-53 shows the locations of canneries and land-based seafood processors in the Northern Region in 2008. As is shown in the figure, there are 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 in 2006. Note, however, that these data do not include any floating processors or buying stations that may be in operation in the area.

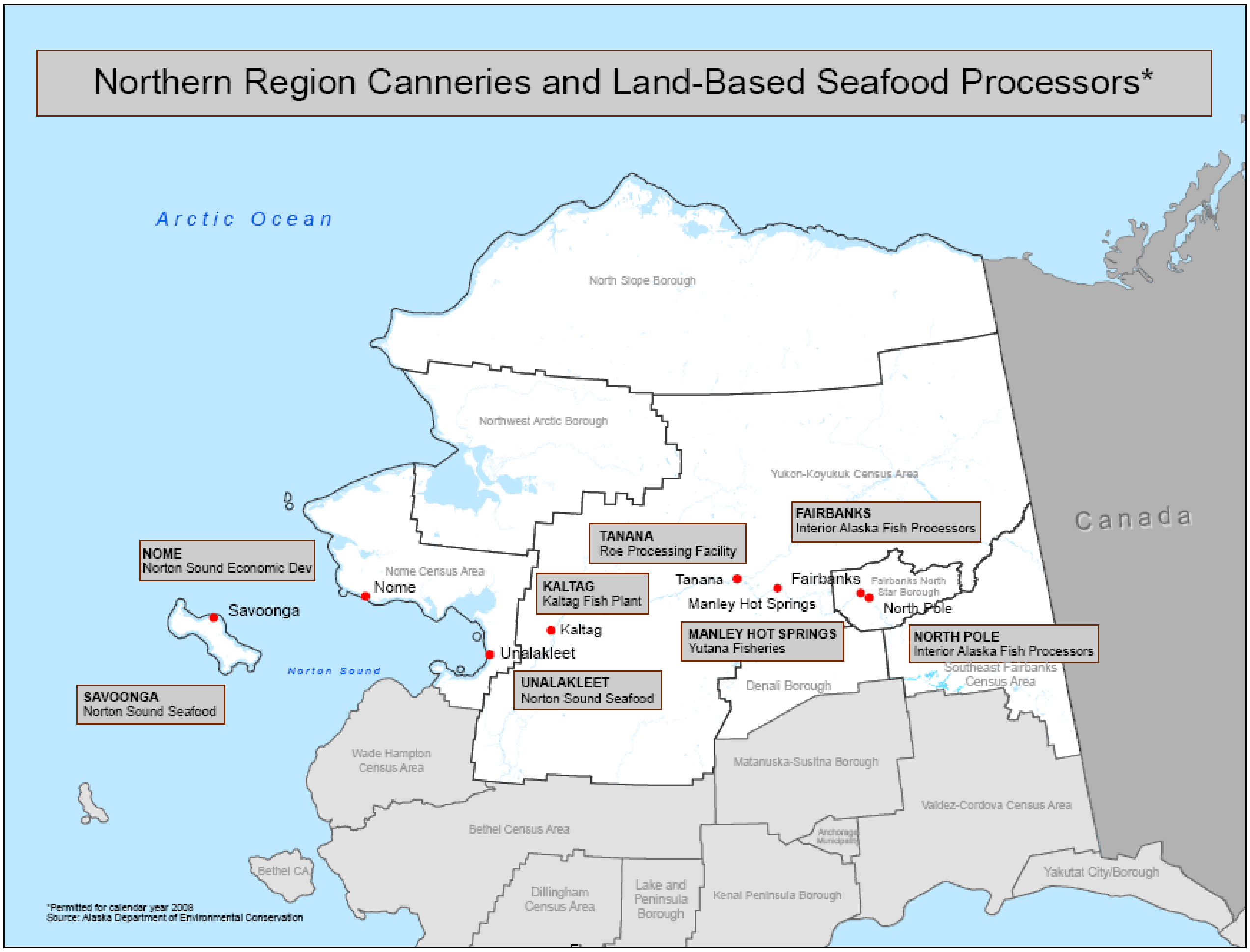


Figure 3-53 Northern Region canneries and land based seafood processors

Source: ADOLWD

Table 3-40 provides estimated seafood processing employment and percent of non-resident workers and percent of non-resident earnings in the Northern Region. The total worker count in the Northern Region seafood processing sector declined continuously from 189 processing workers in 2000 to 20 in 2004 and has rebouneded somewhat to 68 in 2009. Non-resident wages cannot be disclosed; however, percent of non-resident wages is often higher than percent of non-resident workers and may indicate relatively higher wages (more highly skilled jobs) for non-resident workers.

Table 3-40 Northern Region seafood processing employment, 2003-2009

Seafood Processing				
Year	**Total Worker Count**	**Percent Nonresident Workers**	**Wages**	**Percent Nonresident Wages**
2003	20	20	ND	21.6
2004	20	15	ND	26.3
2005	54	20.4	ND	37.6
2006	52	15.4	ND	11.3
2007	59	6.8	ND	10
2008	57	5.3	ND	8.9
2009	68	13.2	ND	13.5

Sources: ADOLWD, Research and Analysis Section and CFEC

3.7.2 Yukon Delta Region

Table 3-41 reprints an ADOLWD analysis of local resident crew members by census areas with the region defined by ADOLWD as the Yukon Delta Region. The Yukon Delta Region includes the communities, Boroughs, and Census areas associated with the fisheries of the lower Yukon River area. 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.

Table 3-41 Local resident crew members, Yukon Region, 2004-2009

Borough/Census Area	**Local Residents Who Bought Commercial Crew Licenses**					
	2004	**2005**	**2006**	**2007**	**2008**	**2009**
Bethel Census Area	583	654	536	582	524	609
Wade Hampton Census Area	526	643	447	727	557	477
Local Resident Total	1,109	1297	983	1,309	1,081	1,086
Region's Harvest Total	2,733	2,738	3,134	3,045	2,707	2,986

Source: Commercial Fisheries Entry Commission

The crew counts shown above are in addition to limited entry commercial salmon permits that are actively used in the area's fisheries, which are shown in Table 3-42. Overall, in the Yukon Delta Region 1,038 permit holders were active in 2009 with 987 of these having fished in the region. These numbers represent a declining trend in the late 2000s.

Table 3-42 Fishermen by residency, Yukon Region, 2004–2009

Borough/Census Area	**Residents Who Fished Their Permits**					
	2004	**2005**	**2006**	**2007**	**2008**	**2009**
Bethel Census Area	676	693	658	691	662	621
Wade Hampton Census Area	520	547	545	539	472	408
Local Resident Total	1,196	1,240	1,203	1,230	1,134	1,038
Region's Harvest Total	1,055	1,092	1,048	1,006	897	987

Notes: "Region's Harvest Total" represents total fishermen who fished in the region's fisheries. Permit holders do not necessarily work in their local fisheries.

Source: Commercial Fisheries Entry Commission

Figure 3-54 depicts Yukon Delta Region resident permit holder salmon fishery gross earnings by community, as tabulated by ADOLWD. None of the communities in the region have gross earnings of resident permit holders that exceed $1 million from the salmon fisheries. However, earnings from salmon fishing are spread throughout many communities in both the Wade Hampton and Bethel Census Areas.

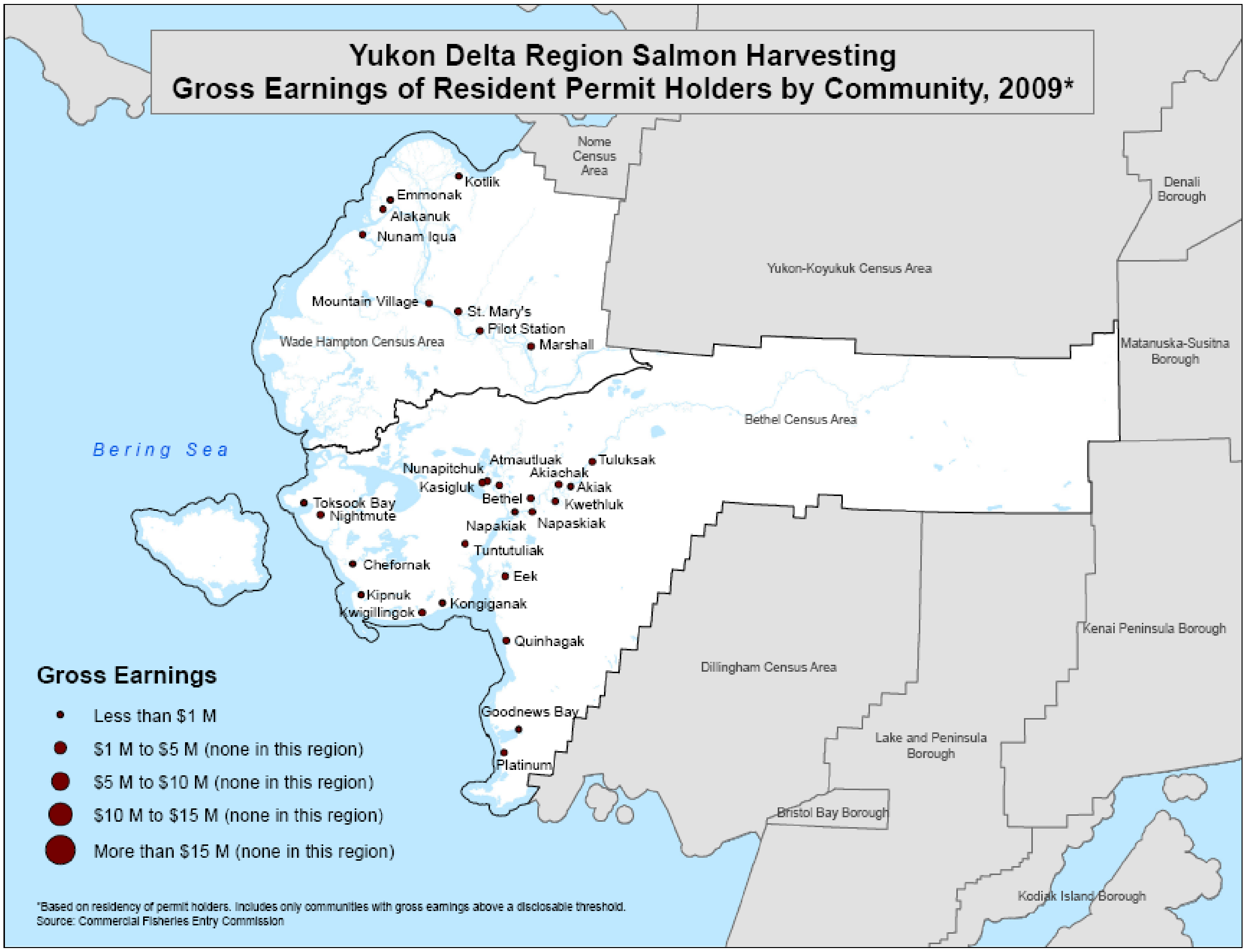


Figure 3-54 Yukon Delta Region salmon harvesting gross earnings of resident permit holders by community, 2009

Source: ADOLWD

ADOLWD has also tabulated data on fish harvesting employment and earning by gear type in the Yukon Delta Region, which is reprinted with permission (Warren, 2011) in Table 3-43. Salmon fisheries of the Yukon Delta region have had an increasing total harvesting workforce (permit holders and crew) over the past several years. In 2005, workforce in the set-net salmon fishery peaked at 3,226 total workers. The total workforce for the region is slightly larger than the set-net number, and it is not clear from the ADOLWD data what fishery contributes the additional workforce. Total gross earning of permit holders shows the decline in value, due to poor harvests, that occurred in the early 2000s, and also shows how that gross earnings improved in the mid 2000s. However, set net permit holder revenue declined in the late 2000s as both Chinook and chum salmon harvests were contrained by poor Chinook runs. Surprisingly, the 2009 total revneu increased dramatically from previous years and the source of this revenue increase is not clear.

Table 3-43 Fish harvesting employment and gross earnings by gear type, 2003-2009, Yukon Region.

Year	Gear Type	Total Estimated Workforce[1]	Total Gross Earning of Permit Holders[2]	Percent of Gross Earnings Earned by Nonresident Permit Holders
2003	Set-net	1,713	$1,890,795	ND
2004	Set-net	2,214	$3,240,140	ND
2005	Set-net	3,226	$2,908,123	ND
2006	Set-net	3,108	$4,384,238	ND
2007	Set-net	3,099	$3,557,034	ND
2008	Set-net	2,830	$2,686,837	ND
2009	Set-net	2,517	$2,155,988	ND
2003	Total	919	$2,939,374	ND
2004	Total	1,805	$4,517,680	ND
2005	Total	3,814	$3,576,085	ND
2006	Total	3,327	$4,404,286	ND
2007	Total	3,721	$4,786,208	ND
2008	Total	3,366	$3,552,485	ND
2009	Total	3,020	$5,941,948	ND

ND: Nondisclosable

[1]'Workforce' refers to the number of fisherman fishing permits plus the requisite crew members needed for the permit(s) they fish. Regional crew member counts are estimates derived by applying a crew factor to catch data. For more, see the Methodology section.

[2]Gross earnings, or revenue, are currently the most reliable data available, but are not directly comparable to wages as expenses have not been deducted.

Source: Commercial Fisheries Entry Commission.

Figure 3-55 shows the locations of canneries and land based seafood processors in the Yukon Delta Region in 2006. As is shown in the figure, there are as many as 10 processing facilities in the region. Note, however, that these data do not include any floating processors or buying stations that may be in operation in the area.

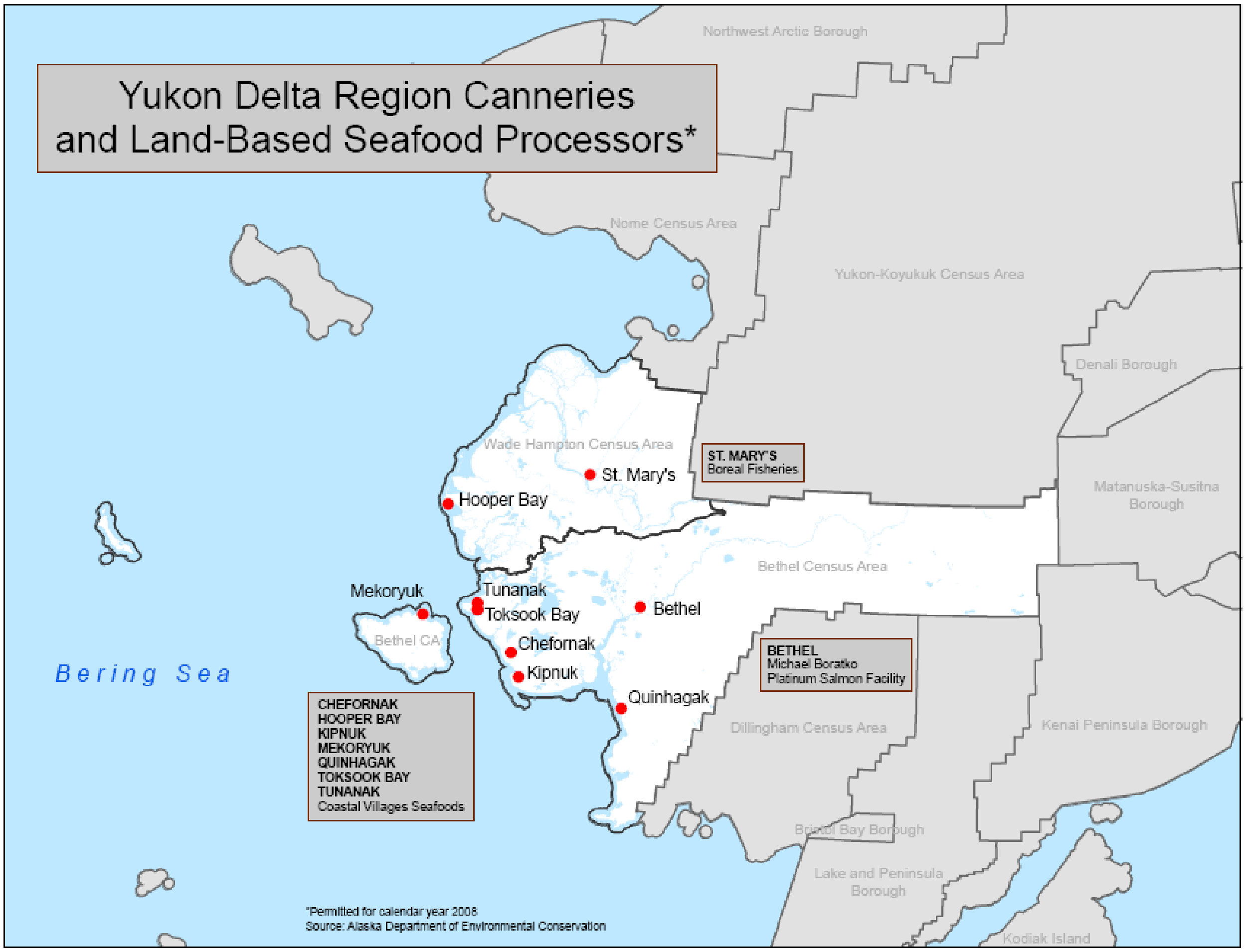


Figure 3-55 Yukon Delta Region canneries and land based seafood processors

Source: ADOLWD

Yukon Delta Region Fish harvesting employment by species and month, also tabulated by ADOLWD, are shown in Table 3-44. Salmon fisheries dominate overall employment in the region, with the greatest employment in the summer months of June, July and August. In 2009, for example, 1,812 individuals were engaged in fish harvesting activity in July as compared to the monthly average of 399. 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.

Table 3-44 Fish harvesting employment by species and month, 2003 - 2009 Yukon Region

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Monthly Average
All Species[1]													
2003	0	0	0	0	118	1,302	1,100	992	216	0	0	0	311
2004	0	0	0	0	108	1,396	1,264	914	438	0	0	0	343
2005	0	8	0	0	90	2,034	1,783	1,329	338	26	0	0	467
2006	0	0	0	0	120	1,655	1,342	1,416	108	0	0	0	387
2007	0	0	0	40	48	1,720	1,438	1,576	322	0	8	0	429
2008	0	0	0	0	0	845	1,556	1,749	612	24	0	0	399
2009	2	0	0	0	0	1,262	1,812	1,314	172	0	14	4	382
Groundfish													
2003-04	-	-	-	-	-	-	-	-	-	-	-	-	-
2005	0	8	0	0	15	0	40	0	0	0	0	0	5
2006	0	0	0	0	107	5	0	0	0	0	0	0	9
2007	0	0	0	40	47	0	16	0	0	0	8	0	9
2008	-	-	-	-	-	-	-	-	-	-	-	-	-
2009	0	0	0	0	0	0	32	7	0	0	0	0	3
Halibut													
2003-04	-	-	-	-	-	-	-	-	-	-	-	-	-
2005	0	0	0	0	0	245	261	87	0	0	0	0	49
2006	-	-	-	-	-	-	-	-	-	-	-	-	-
2007	0	0	0	0	1	344	378	98	0	0	0	0	68
2008	0	0	0	0	0	251	320	209	0	0	0	0	65
2009	0	0	0	0	0	184	300	125	0	0	0	0	51
Herring													
2003	0	0	0	0	118	0	0	0	0	0	0	0	10
2004	0	0	0	0	108	0	0	0	0	0	0	0	9
2005	0	0	0	0	75	13	0	0	0	0	0	0	7
2006	0	0	0	0	13	20	0	0	0	0	0	0	3
2007-09	-	-	-	-	-	-	-	-	-	-	-	-	-
Salmon													
2003	0	0	0	0	0	1,302	1,100	992	216	0	0	0	301
2004	0	0	0	0	0	1,396	1,264	914	438	0	0	0	334
2005	0	0	0	0	0	1,776	1,482	1,242	338	0	0	0	403
2006	0	0	0	0	0	1,630	1,342	1,416	108	0	0	0	375
2007	0	0	0	0	0	1,376	1,044	1,478	290	0	0	0	349
2008	0	0	0	0	0	594	1,236	1,540	582	0	0	0	329
2009	0	0	0	0	0	1,078	1,480	1,182	124	0	0	0	322

[1]A small number of fishermen in unknown or other fisheries are included in the totals; however, they are not listed separately in this exhibit.

[2]2006 halibut fishing employment data are not yet available. 2005's monthly halibut figures have instead been used as a temporary proxy for 2006 and are part of the 2006 "All Species" calculation. They will be revised once they become available. Counting Employment: Harvesting data in this table are counted differently than in other tables in this report. In this table, the permit itself is considered the employer.

In other tables where a count of workers was estimated, the employer was considered to be the vessel, or permit holders for fisheries that did not typically use vessels. This means that a permit holder who makes landings under two different permits (in the same vessel) in the same month will generate two sets of jobs whereas for tables where the vessel is the employer there would be only one set of workers.

Source: Commercial Fisheries Entry Commission; National Marine Fisheries Service and ADOLWD, Research and Analysis Section

Table 3-45 provides estimated seafood processing employment, percent of non-resident workers, and percent of non-resident earnings in the Yukon Delta Region. The total 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.

Table 3-45 Yukon Region seafood processing employment, 2000-2005

Seafood Processing				
Year	**Total Worker Count**	**Percent Nonresident Workers**	**Wages**	**Percent Nonresident Wages**
2003	459	5.4	ND	15.7
2004	468	4.9	ND	11.5
2005	557	5.0	1,762,231	18.5
2006	486	5.3	1,051,618	16.5
2007	583	9.9	$2,019,965	18.7
2008	789	15.7	$3,416,563	20.4
2009	831	7.6	$4,704,665	22

ND: Nondisclosable

Source: ADOLWD, Research and Analysis Section and CFEC

3.7.3 Bristol Bay Region

Table 3-46, and the other tables and figures in this section, are reprinted from an ADOLWD analysis of local resident crew members, by census areas, with the region defined by ADOLWD as the Bristol Bay Region. 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.

Table 3-46 Local resident crew members, Bristol Bay Region, 2001 - 2005

Borough/Census Area	**Local Residents Who Bought Commercial Crew Licenses**					
	2004	**2005**	**2006**	**2007**	**2008**	**2009**
Bristol Bay Borough	175	172	182	159	160	149
Dillingham Census Area	608	643	580	604	587	587
Lake and Peninsula Borough	137	164	246	222	234	142
Local Resident Total	**920**	**979**	**1008**	**985**	**981**	**878**
Region's Harvest Total	**4,313**	**4368**	**4,852**	**4,543**	**4,573**	**4,715**

"Region's Harvest Total" represents total estimated number of crew workers working in the region's fisheries. Crew members do not necessarily work in their local fisheries.

Source: Commercial Fisheries Entry Commission

The crew counts shown above are in addition to limited entry commercial salmon permits that are actively used in the area's fisheries, which are shown in Table 3-47. Overall, in the Bristol Bay Region, 603 resident permit holders and a total of 2,335 permit holder were active in 2009.

Table 3-47 Fishermen by residency, Bristol Bay Region, 2001 - 2006

Borough/Census Area	Residents Who Fished Their Permits					
	2004	2005	2006	2007	2008	2009
Bristol Bay Borough	166	167	173	160	151	146
Dillingham Census Area	392	401	403	395	404	378
Lake and Peninsula Borough	53	49	93	85	72	79
Local Resident Total	**611**	**617**	**669**	**640**	**627**	**603**
Region's Harvest Total	**2,406**	**2,476**	**2,405**	**2,257**	**2,268**	**2,335**

Source: Commercial Fisheries Entry Commission
Notes: "Region's Harvest Total" represents total fishermen who fished in the region's fisheries. Permit holders do not necessarily work in their local fisheries.

Figure 3-56 depicts Bristol Bay Region resident permit holder salmon fishery gross earnings by community, as tabulated by ADOLWD. Dillingham recorded total earnings of between \$5 million and \$10 million in 2006, while Togak, Naknek, and King Salmon all recorded values of between \$1 million and \$5 million. Several other communities reported values less than \$1 million.

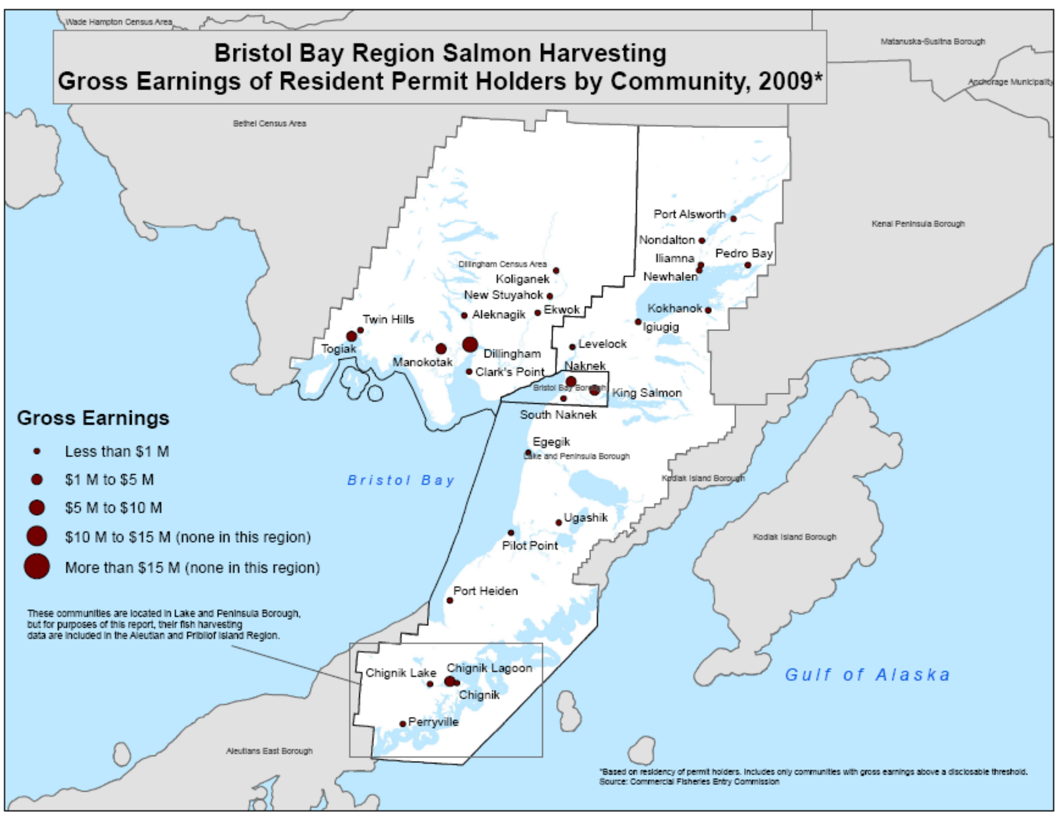


Figure 3-56 Bristol Bay Region salmon harvesting gross earnings of resident permit holders by community, 2009 Source: ADOLWD

ADOLWD has also tabulated data on fish harvesting employment and earning by gear type in the Bristol Bay Region, which is shown in Table 3-48. Since 2003, salmon fishery workforce in the Bristol Bay Region has stayed relatively constant, while gross earnings have stredily increased. In 2009, total workforce is estimated to have been 9,416 and total gross earnings are estimated to have been about $84 million. In 2002, total workforce is estimated to have been 5,334 and gross revenues were about $133 million.

Table 3-48 Fish harvesting employment and gross earnings by gear type, 2003-2009, Bristol Bay Region

Year	Gear Type	Vessels[1]	Total Estimated Workforce[2]	Total Gross Earning of Permit Holders[3]	Percent of Gross Earnings Earned by Nonresident Permit Holders
2003	Gillnet	1,452	5,788	$37,615,449	57.2
2004	Gillnet	1,414	5,639	$65,242,638	60.2
2005	Gillnet	1,487	5,939	$76,609,611	61.1
2006	Gillnet	1,516	6,053	$78,481,978	59.5
2007	Gillnet	1,486	5,943	$90,426,471	60.8
2008	Gillnet	1,488	5,950	$91,059,307	61.4
2009	Gillnet	1,455	5,819	$106,146,261	64.1
2003	Set-net	-	2,924	$10,386,571	29.4
2004	Set-net	-	3,040	$11,629,112	38.3
2005	Set-net	-	3,336	$17,252,681	34.3
2006	Set-net	-	3,420	$14,241,581	32.7
2007	Set-net	-	3,388	$19,011,521	34.6
2008	Set-net	-	3,416	$19,793,116	34.3
2009	Set-net	-	3,432	$24,262,824	37.6
2003	Total	1,634	9,512	$48,415,926	50.8
2004	Total	1,534	9,221	$77,333,163	56.3
2005	Total	1,569	9,669	$94,571,755	55.5
2006	Total	1,558	9,697	$92,723,559	55.4
2007	Total	1,510	9,463	$109,437,992	56.2
2008	Total	1,513	9,512	$110,852,423	56.6
2009	Total	1,484	9,416	$133,326,958	58.8

[1]Skiffs and small vessels are usually not registered as commercial vessels and are therefore not counted in these data.
[2]'Workforce' refers to the number of fisherman fishing permits plus the requisite crew members needed for the permit(s) they fish. Regional crew member counts are estimates derived by applying a crew factor to catch data.

[3]Gross earnings, or revenue, are currently the most reliable data available, but are not directly comparable to wages as expenses have not been deducted.

Source: Commercial Fisheries Entry Commission.

Bristol Bay Region Fish harvesting employment by species and month, also tabulated by ADOLWD, are shown in Table 3-49. Salmon fisheries dominate overall employment in the 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.

Table 3-49 Fish harvesting employment by species and month, 2000 - 2006, Bristol Bay Region

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Monthly Average
All Species[1]													
2003	4	0	8	380	643	6,474	6,782	389	32	22	0	0	1,228
2004	0	0	0	268	526	6,441	6,721	466	108	9	0	0	1,211
2005	0	0	3	285	411	6,135	6,755	279	15	5	5	0	1,158
2006	0	0	0	0	286	6,267	6,936	549	6	3	8	0	1,171
2007	0	0	0	0	153	5,985	6,894	444	4	5	0	0	1,124
2008	0	0	0	0	176	6,060	6,969	504	21	5	0	0	1,145
2009	0	0	0	0	189	6,403	6,768	509	59	0	4	4	1,161
Halibut													
Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Mo. Avg.
2003	0	0	0	0	96	426	294	123	27	22	0	0	82
2004	0	0	0	0	116	340	199	88	24	6	0	0	64
2005-09	-	-	-	-	-	-	-	-	-	-	-	-	-
Herring													
Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Mo. Avg.
2003	0	0	0	365	537	0	0	0	0	0	0	0	75
2004	0	0	0	263	405	0	0	0	0	0	0	0	56
2005	0	0	0	280	408	0	0	0	0	0	0	0	57
2006	0	0	0	0	274	63	0	0	0	0	0	0	28
2007	0	0	0	0	153	0	0	0	0	0	0	0	13
2008	0	0	0	0	176	0	0	0	0	0	0	0	15
2009	0	0	0	0	186	0	0	0	0	0	0	0	16
Sablefish													
Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Mo. Avg.
2003	0	0	8	15	10	3	15	13	5	0	0	0	6
2004	0	0	0	5	5	8	5	3	0	3	0	0	2
2005	0	0	3	5	3	0	5	0	0	5	5	0	2
2006	0	0	0	0	10	3	0	9	3	3	8	0	3
2007	-	-	-	-	-	-	-	-	-	-	-	-	-
2008	0	0	0	0	0	0	0	0	5	5	0	0	1
2009	0	0	0	0	3	10	0	5	5	0	0	0	2
Salmon													
Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Mo. Avg.
2003	0	0	0	0	0	6,045	6,465	249	0	0	0	0	1,063
2004	0	0	0	0	0	6,093	6,513	375	84	0	0	0	1,089
2005	0	0	0	0	0	6,135	6,750	279	15	0	0	0	1,098
2006	0	0	0	0	3	6,201	6,936	540	3	0	0	0	1,140
2007	0	0	0	0	0	5,982	6,891	444	0	0	0	0	1,110
2008	0	0	0	0	0	6,060	6,969	504	12	0	0	0	1,129
2009	0	0	0	0	0	6,393	6,768	504	54	0	0	0	1,143

[1]A small number of fishermen in unknown or other fisheries are included in the totals; however, they are not listed separately in this exhibit.

[2]2006 halibut fishing employment data are not yet available. 2005's monthly halibut figures have instead been used as a temporary proxy for 2006 and are part of the 2006 "All Species" calculation. They will be revised once they become available. Counting Employment: Harvesting data in this table are counted differently than in other tables in this report. In this table, the permit itself is considered the employer.

In other tables where a count of workers was estimated, the employer was considered to be the vessel, or permit holders for fisheries that did not typically use vessels. This means that a permit holder who makes landings under two different permits (in the same vessel) in the same month will generate two sets of jobs whereas for tables where the vessel is the employer there would be only one set of workers.

Source: Commercial Fisheries Entry Commission; National Marine Fisheries Service and ADOLWD, Research and Analysis Section

Figure 3-57 shows the locations of canneries and land based seafood processors in the Bristol Bay Region in 2008. As is shown in the figure, there are many processing facilities in the region. Note, however, that these data do not include any floating processors or buying stations that may be in operation in the area.

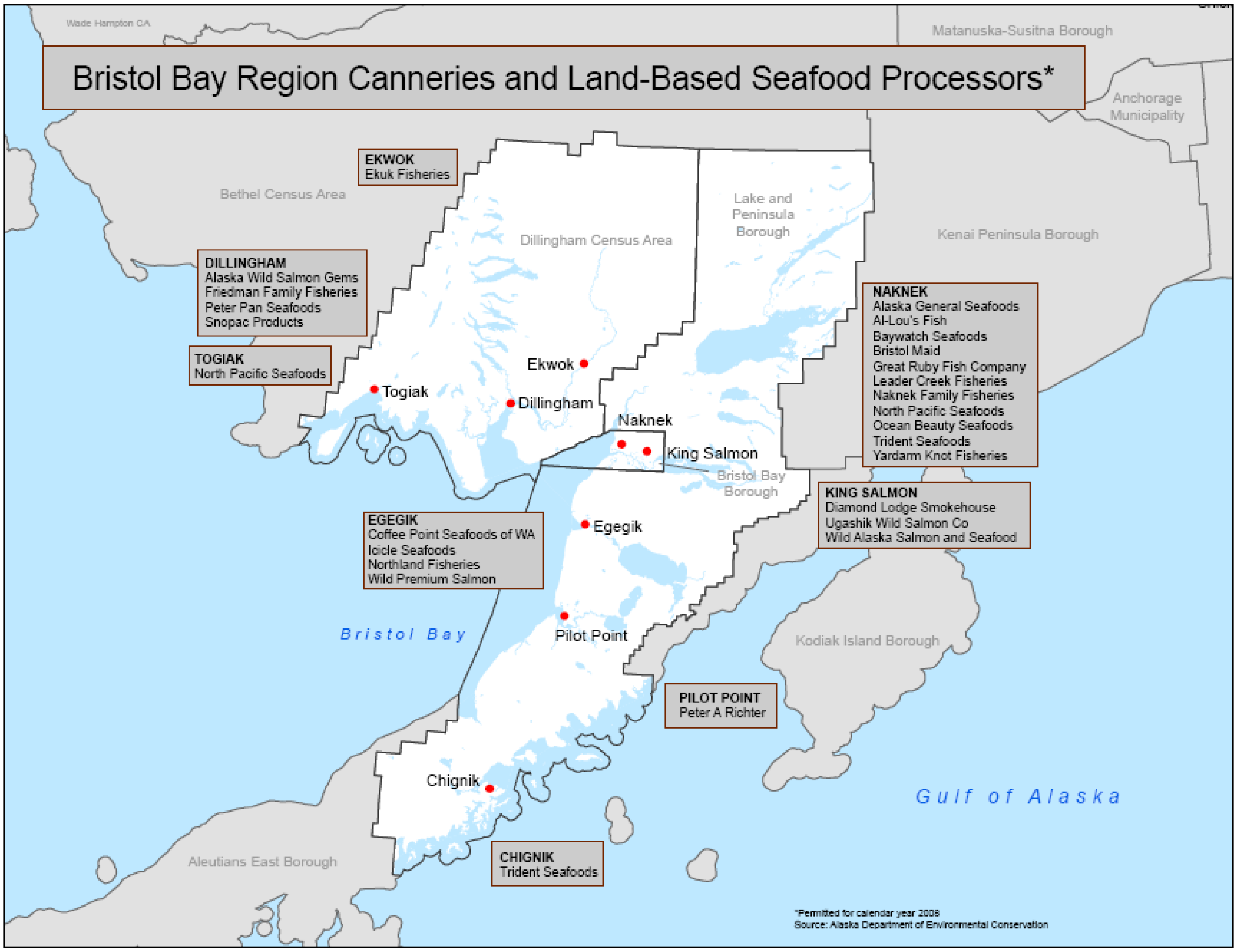


Figure 3-57 Bristol Bay Region canneries and land-based seafood processors

Source: ADOLWD

Table 3-50 provides estimated seafood processing employment, percent of non-resident workers, and percent of non-resident earnings in the Bristol Bay Region. 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 prior 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 20096. 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.

Table 3-50 Bristol Bay Region seafood industry, 2003-2009

Seafood Processing				
Year	**Total Worker Count**	**Percent Nonresident Workers**	**Wages**	**Percent Nonresident Wages**
2003	2,484	75	$14,830,448	79.6
2004	3,474	83	$21,416,637	84.6
2005	3,272	81.4	$22,216,128	84.4
2006	2,940	84.6	$24,009,778	85.1
2007	3,512	84.2	$28,207,682	84.6
2008	3,952	83.7	$28,345,655	84.4
2009	4,522	86.6	$31,185,365	87.1

Sources: Commercial Fisheries Entry Commission and ADOLWD, Research and Analysis Section

Table 3-51 provides estimated fish harvesting employment, gross earnings and percent gross earnings earned by non-resident workers in the Bristol Bay Region. While halibut and sablefish have contributed to the region's earning in the past they have declined substantially in recent years leaving salmon and herring as the primary fisheries of the region in 2009. The total value of the Bristol Bay Region fisheries was approximately $133 million in 2009, with about 59 percent of the earning accruing to non-residents.

Table 3-51 Bristol Bay Region Fish Harvesting Workforce and Gross Earnings by Species, 2003-2009

Year	Species	Individuals Who Fished Permits	Percent of Individuals Who Fished Permits/Nonresident	Total Estimated Workforce [1]	Total Gross Earnings of Permit Holders [2]	Percent of Total Gross Earnings Earned by Nonresident Permit Holders
2003	Halibut	201	0.5	321	$757,722	ND
2004	Halibut	166	0	205	$595,465	ND
2005	Halibut	25	0	75	$194,358	ND
2006	Halibut	--	--	--	--	--
2007	Halibut	--	--	--	--	--
2008	Halibut	--	--	--	--	--
2009	Halibut	--	--	--	--	--
2003	Herring	206	25.2	479	$2,989,210	32.9
2004	Herring	134	30.6	395	$2,744,792	26.4
2005	Herring	135	31.9	407	$3,041,808	27.5
2006	Herring	108	25.9	336	2,588,850	28.5
2007	Herring	44	27.3	150	1,876,565	25.5
2008	Herring	51	29.4	174	2,652,024	22.5
2009	Herring	57	35.1	243	$3,152,017	39.5
2003	Sablefish	10	40	43	$349,527	ND
2004	Sablefish	6	66.7	20	$110,859	ND
2005	Sablefish	11	72.7	33	$169,504	ND
2006	Sablefish	9	55.6	34	$247,968	61.9
2007	Sablefish	0	0	0	$0	0
2008	Sablefish	1	100	5	ND	ND
2009	Sablefish	5	60	26	ND	ND
2003	Salmon	2,196	44.5	6,324	$48,415,926	50.8
2004	Salmon	2,210	45.2	6,294	$77,333,163	56.3
2005	Salmon	2,286	45.2	6,444	$94,571,755	55.5
2006	Salmon	2,340	46.8	7,020	$93,393,003	56.1
2007	Salmon	2,239	46.2	6,717	$108,950,163	56.2
2008	Salmon	2,245	45.7	6,735	$110,157,578	56.6
2009	Salmon	2,309	47.7	9,236	$129,788,089	59.2
2003	Total	2,613	110	7,167	52,512,385	49.8
2004	Total	2,516	143	6,914	80,784,279	55.3
2005	Total	2,457	150	6,959	97,977,425	54.6
2006	Total	2,457	128	7,390	96,229,821	55.4
2007	Total	2,283	74	6,867	110,826,728	55.7
2008	Total	2,297	175	6,914	112,809,602	55.8
2009	Total	2,371	143	9,505	132,940,106	58.7

Note: Annual data do not sum to Total due to nondisclosable data for some fisheries.
Source: Commercial Fisheries Entry Commission.
[1] Workforce refers to the number of fishermen fishing permits plus the requisite crew members needed for the permit(s) they fish.
[2] Gross earnings, or revenue, are currently the most reliable data available, but do not equal wages because expenses are not deducted

3.7.4 Aleutian and Pribilof Islands Region

Figure 3-58 depicts the locations of the canneries and land based seafood processors in the region, and identifies the organizations that operate in each location. This information is reprinted with permission of the ADOLWD (Warren, 2011).

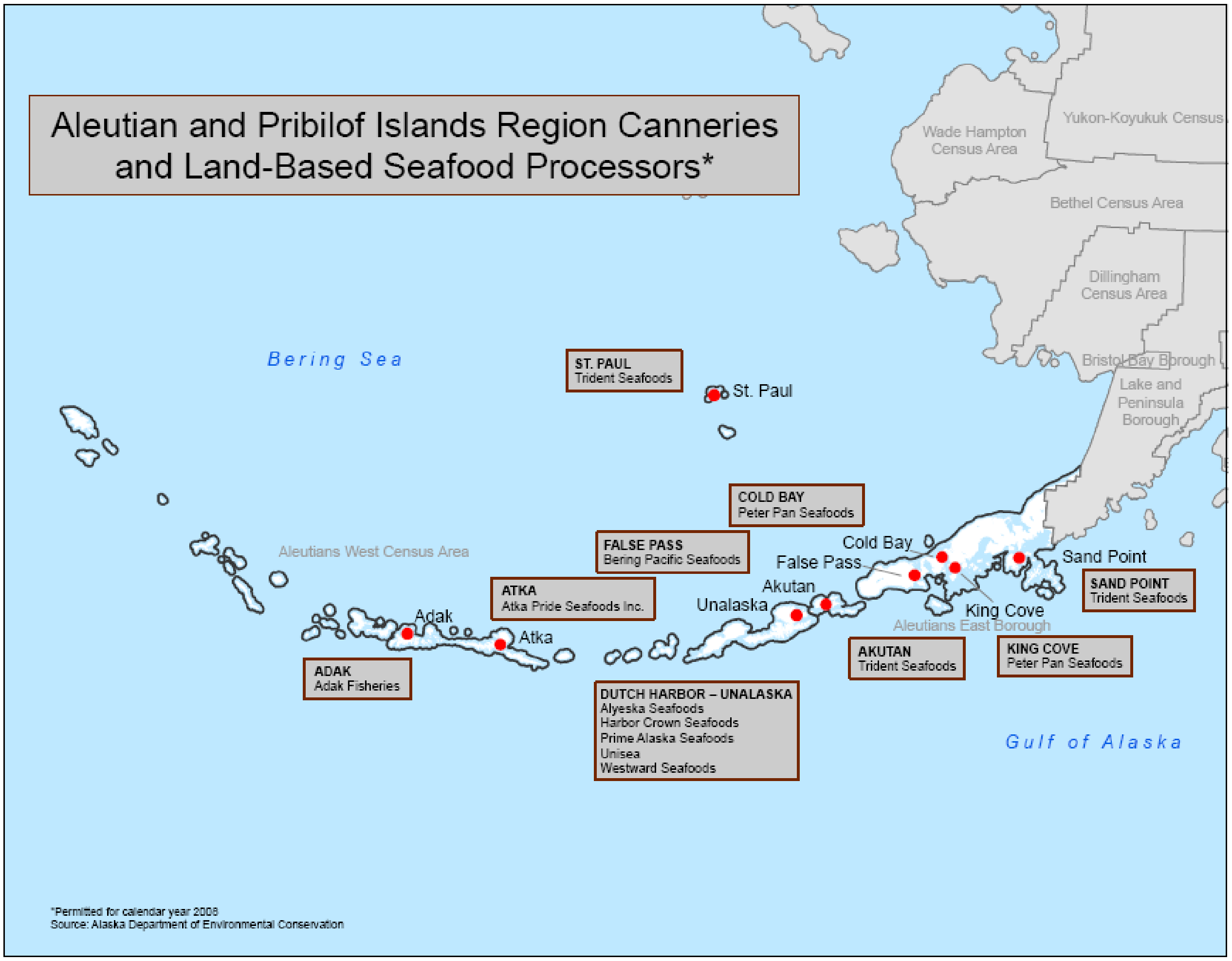


Figure 3-58 Aleutian and Pribilof Islands Region canneries and land-based seafood processors

Source: ADOLWD

Table 3-52 is adapted from an ADOLWD analysis of local resident crew members, by census areas, with the region defined by ADOLWD as the Aleutian and Pribilof Islands Region. The Aleutian and Pribilof Islands Region includes the communities, boroughs, and census areas associated with the fisheries of the Bering Sea and Aleutian Islands. Overall, in the Aleutian and Pribilof Islands Region, 4,239 crew licenses were purchased in 2009, with 626 purchased by local residents the three boroughs in the region. In total, 1070 permits were purchased in the region in 2009, wich 292 purchased by local residents (Table 3-53).

Table 3-52 Local resident crew members, Aleutian and Pribilof Islands Region, 2004 - 2009

Borough/Census Area	Local Residents Who Bought Commercial Crew Licenses					
Aleutians East Borough	277	222	274	276	278	285
Aleutians West Census Area	244	243	234	218	234	259
Chignik and surrounding area	82	109	99	87	101	82
Local Resident Total	603	574	607	581	613	626
Region's Harvest Total	3997	3733	3908	4114	4362	4239

Source: Commercial Fisheries Entry Commission
Notes: "Region's Harvest Total" represents total fishermen who fished in the region's fisheries. Permit holders do not necessarily work in "Chignik and surrounding area" includes Chignik, Chignik Bay, Chignik Lagoon, Chignik Lake and Perryville.their local fisheries.

Table 3-53 Fishermen by residency, Aleutian and Pribilof Islands Region, 2004 - 2009

Borough/Census Area	Residents Who Fished Their Permits					
	2004	2005	2006	2007	2008	2009
Aleutians East Borough	173	169	165	164	175	164
Aleutians West Census Area	74	71	62	66	64	56
Chignik and surrounding area	42	52	37	36	40	41
Local Resident Total	289	292	264	266	279	292
Region's Harvest Total	1,210	1,228	952	1,040	1,058	1,070

Source: Commercial Fisheries Entry Commission
Notes: "Region's Harvest Total" represents total fishermen who fished in the region's fisheries. Permit holders do not necessarily work in their local fisheries.
"Chignik and surrounding area" includes Chignik, Chignik Bay, Chignik Lagoon, Chignik Lake and Perryville.

ADOLWD has also tabulated data on fish harvesting employment and earnings by gear type in the Aleutian and Pribilof Islands Region, which is reprinted with permission (Warren, 2011) in Table 3-54. The largest proportions of the total estimated workforce in this region have come from the Pot (crab) and longline (halibut, sablefish, Pacific cod) fisheries. However, in terms of earnings the trawl fisheries, including but not limited to pollock, are of the greatest value historically. The trawl fisheries also have the highest proportions of non-resident participation, followed by the pot and longline fisheries. 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. 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.

Aleutian and Pribilof Islands Region fish harvesting employment numbers, by species and month, also tabulated by ADOLWD, are shown in Table 3-55. Harvesting employment in the region tends to be dominated by the groundfish fisheries, including but limited to the pollock fishery, and while spread across all months is greatest in the A season months of January, February and March.

Table 3-54 Fish harvesting employment and gross earnings by gear type, 2003-2009, Aleutian and Pribilof Islands Region[1]

Year	Gear Type	Vessels[2]	Total Estimated Workforce[3]	Total Gross Earning of Permit Holders[4]	Percent of Gross Earnings Earned by Nonresident Permit Holders
2003	Gillnet	116	461	$4,996,797	56.7
2004	Gillnet	125	496	$7,853,530	55.3
2005	Gillnet	124	497	$10,798,350	56.7
2006	Gillnet	130	519	$7,711,764	53.4
2007	Gillnet	130	520	$14,016,984	53.3
2008	Gillnet	136	545	$11,152,647	52.2
2009	Gillnet	147	588	$11,333,008	49.6
2003	Longline	515	2,238	$98,865,417	57.5
2004	Longline	478	2,083	$83,513,203	56.1
2005	Longline	347	1,508	$49,480,031	52.4
2006	Longline	356	1,539	$53,487,373	48.4
2007	Longline	465	1,978	$64,747,796	49.2
2008	Longline	462	1,963	$74,801,056	46.8
2009	Longline	467	1,995	$53,129,358	47.6
2003	Pot Gear	389	2,571	$176,729,360	76.1
2004	Pot Gear	397	2,603	$161,472,660	75.1
2005	Pot Gear	341	2,164	$152,212,665	75.7
2006	Pot Gear	249	1,594	$126,173,057	73.9
2007	Pot Gear	237	1,470	$184,110,863	72.8
2008	Pot Gear	256	1,611	$267,160,198	77
2009	Pot Gear	235	1,471	$185,972,234	79
2003	Seine	92	540	$9,156,219	9.4
2004	Seine	74	436	$10,633,851	9.5
2005	Seine	146	839	$13,250,356	17
2006	Seine	94	549	$10,607,012	20.4
2007	Seine	102	595	$14,732,349	20.1
2008	Seine	116	680	$23,346,571	21
2009	Seine	119	697	$21,375,796	19.7
2003	Set-Net	-	264	$2,771,342	14.1
2004	Set-Net	-	258	$3,871,641	19.2
2005	Set-Net	-	285	$4,903,490	12.8
2006	Set-Net	-	289	$3,814,734	11.9
2007	Set-Net	-	271	$3,765,209	13.9
2008	Set-Net	-	252	$2,752,126	7.9
2009	Set-Net	-	265	$3,459,884	8.5
2003	Trawl	212	1,270	$186,687,352	93.9
2004	Trawl	201	1,204	$234,510,178	94.1
2005	Trawl	185	1,108	$179,229,558	93.2
2006	Trawl	187	1,090	$185,188,335	94
2007	Trawl	191	1,112	$162,460,882	92.2
2008	Trawl	179	1,035	$191,990,645	90.6
2009	Trawl	164	945	$159,165,235	92.9

[1]For the purposes of this report, harvesting data from Chignik, Chignik Bay, Chignik Lagoon, and Chignik Lake are included in the Aleutian and Pribilof Islands Region.
[2]Skiffs and small vessels are usually not registered as commercial vessels and are therefore not included
[3]Workforce refers to the number of fisherman fishing permits plus the requisite crew members needed
[4]Gross earnings, or revenue, are currently the most reliable data available, but are not directly
Source: Commercial Fisheries Entry Commission

Table 3-55 Fish harvesting employment by species and month, 2000 - 2006, Aleutian and Pribilof Islands Region

All Species[1]													
Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Monthly Average
2003	2,061	2,051	1,547	982	955	2,146	2,520	2,645	2,046	2,758	646	64	1,702
2004	2,336	1,957	1,211	968	977	2,048	2,307	2,301	1,650	2,714	627	37	1,594
2005	2,492	1,700	1,148	895	805	2,297	2,457	2,192	1,641	1,690	933	396	1,554
2006	1,687	1,767	1,620	959	564	2,045	2,283	2,308	1,751	1,443	891	164	1,457
2007	1,655	1,807	1,736	921	777	2,134	2,433	2,397	1,739	1,283	1,087	224	1,516
2008	1,265	1,411	1,375	828	526	1,990	2,141	2,136	1,509	1,163	768	190	1,275
2009	1,547	1,806	1,598	895	646	2,267	2,416	2,618	1,617	1,524	983	90	1,501
Crab													
Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Avg
2003	798	552	54	18	21	16	53	174	181	1,730	138	36	314
2004	1,023	327	60	6	12	33	43	170	107	1,586	99	30	292
2005	1,236	204	21	6	3	16	40	73	88	476	510	162	236
2006	312	333	426	156	45	6	30	50	85	570	585	27	219
2007	207	345	336	198	27	9	36	58	84	493	584	102	207
2008	375	534	426	168	90	21	42	49	96	516	579	183	257
2009	399	552	432	153	39	37	56	87	115	573	498	63	250
Groundfish													
Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Avg
2003	1,263	1,496	1,440	754	424	550	869	1,029	1,029	718	325	28	827
2004	1,311	1,621	1,049	812	488	591	781	975	975	885	358	7	821
2005	1,256	1,496	1,053	755	349	629	782	885	994	858	303	234	800
2006	1,371	1,434	1,182	735	245	644	821	931	1,039	658	195	129	782
2007	1,448	1,462	1,377	630	412	662	854	907	993	513	378	118	813
2008	890	877	896	532	131	466	511	485	580	404	63	3	487
2009	1,148	1,254	1,148	623	284	675	791	908	641	614	316	23	702
Halibut[2]													
Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Avg
2003	0	0	34	159	308	470	454	619	418	171	120	0	229
2004	0	0	48	82	281	404	444	557	341	135	81	0	198
2005	0	0	51	74	294	447	384	526	321	247	69	0	201
2006	0	0	3	3	150	337	276	434	285	118	64	0	139
2007	0	0	12	49	228	382	375	541	295	200	69	0	179
2008	0	0	40	65	190	397	413	556	397	138	82	0	190
2009	0	0	15	62	166	312	318	500	391	216	113	0	174
Herring													
Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Monthly Average
2003	0	0	0	0	0	0	76	0	0	0	0	0	6
2004	0	0	0	0	0	0	46	0	0	0	0	0	4
2005	0	0	0	0	21	0	16	0	0	0	0	0	3
2006	0	0	0	0	0	0	15	0	0	0	0	0	1
2007	0	0	0	0	0	0	15	0	0	0	0	0	1
2008	0	0	0	0	0	0	13	0	0	0	0	0	1
2009	0	0	0	0	21	21	15	0	0	0	0	0	5

Table 3-55 Continued

Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Monthly Average
Miscellaneous Shellfish													
2003	0	3	0	0	0	0	3	0	0	0	0	0	1
2004	2	9	4	0	2	3	0	0	3	24	14	0	5
2005	0	0	0	4	0	0	0	0	5	8	0	0	1
2006	4	0	0	0	0	0	0	0	0	0	4	8	1
2007	0	0	0	0	0	0	0	0	0	0	0	4	0
2008	0	0	0	0	2	0	0	0	2	7	2	4	1
2009	0	0	0	0	0	0	0	0	4	4	4	4	1
Sablefish													
Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Monthly Average
2003	0	0	19	52	202	215	205	236	217	135	63	0	112
2004	0	0	50	68	195	170	174	181	145	84	75	0	95
2005	0	0	23	56	139	154	116	143	120	101	51	0	75
2006	0	0	9	65	124	135	164	179	134	97	43	0	79
2007	0	0	11	39	102	126	128	112	107	72	41	0	61
2008	0	0	13	63	113	165	138	124	83	98	42	0	70
2009	0	0	3	57	136	206	162	141	146	117	52	0	85
Salmon													
Year	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Monthly Average
2003	0	0	0	0	0	895	860	588	202	4	0	0	212
2004	0	0	0	0	0	848	820	419	79	0	0	0	180
2005	0	0	0	0	0	1,051	1,120	566	113	0	0	0	238
2006	0	0	0	0	0	923	977	715	209	0	0	0	235
2007	0	0	0	0	0	935	994	757	248	0	0	0	245
2008	0	0	0	0	0	942	1,025	922	351	0	0	0	270
2009	0	0	0	0	0	1,017	1,074	982	320	0	0	0	283

1: A small number of fishermen in unknown or other fisheries are included in the totals; however, they are not listed separately in this exhibit.
Counting Employment: Harvesting data in this table are counted differently than in other tables in this report. In this table, the permit itself is considered the employer.
In other tables where a count of workers was estimated, the employer was considered to be the vessel, or permit holders for fisheries that did not typically use vessels. This means that a permit holder who makes landings under two different permits (in the same vessel) in the same month will generate two sets of jobs whereas for tables where the vessel is the employer there would be only one set of workers.
Source: Commercial Fisheries Entry Commission; National Marine Fisheries Service and Alaska Department of Labor and Workforce Development, Research and Analysis Section

Table 3-56 provides estimated seafood processing employment and percent of non-resident workers and percent of non-resident earnings in the Aleutian and Pribilof Islands Region. The 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.

Table 3-56 Aleutian and Pribilof Islands Region seafood processing workforce and earnings, 2003–2009

Seafood Processing				
Year	**Total Worker Count**	**Percent Nonresident Workers**	**Wages**	**Percent Nonresident Wages**
2003	7,331	79.4	$108,397,216	72.5
2004	7,041	80.7	$108,021,030	73.5
2005	7,243	81.7	$114,786,581	74.4
2006	8,236	84.0	$128,695,727	77.3
2007	7,491	81.2	$124,618,518	73.5
2008	7,279	77.6	$118,683,334	67.1
2009	6,276	76.2	$105,237,864	66.7

Notes: For the purposes of this report, harvesting data from Chignik, Chignik Bay, Chignik Lagoon, and Chignik Lake are included in the Aleutian and Pribilof Islands Region.
Sources: Commercial Fisheries Entry Commission and ADOLWD, Research and Analysis Section.

The information on employment, participation, and wages presented above for the 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 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.

Table 3-57 Aleutian and Pribilof Islands Region Fish Harvesting Workforce and Gross Earnings by Species, 2003–2009

Year	Species	Individuals Who Fished Permits	Percent of Individuals Who Fished Permits/Nonresident	Total Estimated Workforce [2]	Total Gross Earnings of Permit Holders [3]	Percent of Total Gross Earnings Earned by Nonresident Permit Holders
2003	Crab	307	66.1	1,571	$152,857,305	80.2
2004	Crab	312	65.7	1,613	$140,446,422	79.3
2005	Crab	286	52.8	1,248	$130,281,822	80.2
2006	Crab	177	60.5	930	$96,566,096	79.7
2007	Crab	134	61.2	706	$150,993,314	77.8
2008	Crab	162	61.1	852	$224,737,485	81.4
2009	Crab	162	59.9	986	$168,783,872	81.5
2003	Groundfish	475	59.6	1,660	$226,315,671	89.1
2004	Groundfish	480	59	1,601	$269,271,749	90.2
2005	Groundfish	435	60.5	1,497	$211,346,945	89.5
2006	Groundfish	345	59.7	1,621	$213,959,973	88.9
2007	Groundfish	336	59.2	1,598	$190,470,784	84.7
2008	Groundfish	362	57.7	1,663	$232,512,499	83.8
2009	Groundfish	318	56.3	1765	$396,027,147	94.8
2003	Halibut	471	29.1	1,532	$65,917,236	44.7
2004	Halibut	441	30.2	1,382	$55,760,089	43
2005	Halibut	313	31.3	1,330	$34,736,200	46.6
2006	Halibut	313	30	1,319	$38,547,082	41.6
2007	Halibut	436	29.4	1,830	$55,930,505	47.9
2008	Halibut	420	30	1,766	$63,487,663	46.8
2009	Halibut	433	29.3	1828	$40,564,694	47.9
2003	Herring	23	ND	49	$380,769	17.6
2004	Herring	15	0	31	$385,998	0
2005	Herring	ND	ND	16	$374,008	ND
2006	Herring	4	25	16	ND	65
2007	Herring	2	50	10	ND	75.2
2008	Herring	3	33.3	13	ND	60.2
2009	Herring	9	22.2	45	ND	73.3
2003	Sablefish	160	52.5	585	$18,294,494	66.2
2004	Sablefish	132	50	495	$14,544,058	65.9
2005	Sablefish	133	55.6	515	$16,311,246	75.3
2006	Sablefish	129	52.7	607	$15,723,798	62.5
2007	Sablefish	102	52.9	479	$14,157,577	70.8
2008	Sablefish	108	46.3	517	$14,357,870	52.9
2009	Sablefish	124	48.4	583	$14,242,141	60.1
2003	Salmon	277	27.1	1,228	$16,614,636	23.3
2004	Salmon	265	26.4	1,138	$22,116,635	26.8
2005	Salmon	345	25.8	1,310	$28,813,897	30
2006	Salmon	306	27.1	1,298	$21,942,099	29.9
2007	Salmon	300	25.3	1,302	$32,077,805	33.1
2008	Salmon	310	27.7	1,376	$36,654,889	28.8
2009	Salmon	331	28.1	1456	$35,200,880	28
2003	Total	1,253	48	5,093	$480,385,349	77
2004	Total	1,210	48.3	4,835	$502,702,650	78.3
2005	Total	1,228	45.8	4,524	$444,403,459	76.4
2006	Total	1,295	44.9	4,659	$383,912,861	78.3
2007	Total	1,312	41.3	5,933	$444,955,461	73.6
2008	Total	1,371	41.7	6,197	$572,375,902	74.4
2009	Total	1379	40.5	6673	$657,505,626	84.1

Note: Annual data do not sum to Total due to nondisclosable data for some fisheries.
Source: Commercial Fisheries Entry Commission.
[1] Harvesting data from Chignik, Chignik Bay, Chignik Lagoon, and Chignik Lake are included in the Aleutian and Pribilof Islands area.
[2] Workforce refers to the number of fishermen fishing permits plus the requisite crew members needed for the permit(s) they fish.
[3] Gross earnings, or revenue, are currently the most reliable data available, but do not equal wages because expenses are not deducted

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 detailed description of the following three alternatives:

Alternative 1: Status Quo (No Action)

Alternative 2: Hard cap

Alternative 3: Triggered closure with RHS exemption

The alternatives analyzed in this environmental assessment and the Regulatory Impact Review (RIR) represent a complex suite of components, options, and suboptions. 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. Alternative 2 components and options 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 suboptions for analysis.

Component	Option	Non-Chinook total	CDQ	Non-CDQ
Setting the hard cap (Component 1)	Option 1a: Cap established for B season. Select cap from a range of numbers*	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

Component	Range of sector allocations*	CDQ	Inshore CV	Mothership	Offshore CP
Sector allocation (Component 2)*	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%

Component	Option	Description	Suboption	Percentage
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		
		Suboption: 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.		

Component	Option	Description	Suboption	Percentage
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)		
		Suboption 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 Closures

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 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 currently is 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. These components and options are summarized in Table 4-2 below.

Table 4-2 Alternative 3 Components and options.

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 a: timing	Applies to remainder of B season if triggered			
	Suboption b: Timing	Applies in June and July if triggered			
	Option 2: Area 60%	Triggered closure encompassing 60% of historical PSC for all RHS participants			
	Suboption a: timing	Applies to remainder of B season if triggered			
	Suboption b: 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%	

4.4 Comparison of Alternatives

The following section provides an overview of the three broad alternatives under consideration and the over-arching management measures that would be imposed under each. Table 2-9 compares the three 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 3 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 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 of over-arching management measures under the three alternatives considered in this analysis

Alternative	Timing	Management action		
1-Status quo	B season	Exemption to regulatory closure of CSSA (Fig. ES-2.) provided participation in current 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		***Closure area applies to***	***Closure Area***	***Basis period***
	B season (Component 1)	**Non**-participants of RHS program when **fishery level** caps[1] reached	80% of chum (Figure ES-3)	B season
	B season (Component 2, Suboption 1a)	Participants of RHS program when **sector-level** caps reached	80% of chum (Figure ES-5)	B season
	June-July (Component 2, Suboption 1b)	Participants of RHS program when **sector-level** caps reached	80% of chum (Figure ES-7)	June-July
	B season (Component 2, Suboption 2a)	Participants of RHS program when **sector-level** caps reached	60% of chum (Figure ES-7)	B season
	June-July (Component 2, Suboption 2b)	Participants of RHS program when **sector-level** caps reached	60% of chum (Figure ES-6)	June-July

5.0 POTENTIAL BENEFITS OF THE PROPOSED ACTION

This analysis draws heavily on the analysis in EA Chapters 4 and 5 that estimates the likely dates of pollock fisheries closures and thereby retrospectively projects the number of non-Chinook salmon that may be saved under each of the alternatives due to projected fishery closures. In this way, benefits are tabulated in terms of the numbers of non-Chinook salmon that would not be taken as PSC (i.e. salmon that would have been saved).

Results presented in EA Chapter 5 include both overall changes in non-Chinook salmon mortality due to alternative management measures, as well as resulting estimates of Adult Equivalent (AEQ) non-Chinook salmon likely to return to natal rivers as adult fish. The AEQ estimates represent the potential benefit in numbers of adult non-Chinook salmon that would have returned to individual river systems and aggregate river systems as applicable over the years from 2004 to 2011. These benefits would accrue within natal river systems of stock origin as returning adult fish that may return to spawn or be caught in commercial, subsistence, or sport fisheries. However, given that the average estimated run size for Coastal Western Alaska for this period is 4.9 million chum salmon, the ratio of mortality impact, calculated in the analysis of Chapter 5, is about 0.5%. Thus, it seems unlikely that in-river management would have been modified for this amount of returning fish aggregated over all rivers systems in coastal west Alaska given the intricacies of in-season, in-river management as described in Section 5.2.1 of the EA. Thus, it is simply not possible to quantify exactly how those fish would be used. 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.

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.

5.1.1 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.

5.1.2 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.

5.2 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 VRHS 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 acoompanying EA).

5.3 Effects of Alternative 2 Hard Caps on non-Chinook Salmon Savings

The information presented here is taken directly from the analysis, in EA Chapter 5, of hypothetical reductions in non-Chinook salmon PSC and a relatrively 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.

Prior to embarking on a discussion of potential benefits of 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 Alska was approximately 4.5 million chum salmon. For Coastsl western Alaska the run size average is analytical period in question, 2003-2011, 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 estimates of chum salmon savings by alternative appearing below do not exceed 60,000 in any year. These contrasting orders of magnitudue serve to point out why this analysis cannot be extended to numbers of fish that may be taken by users within the various river systems of western Alaska.

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 is identical to table 5-75 of the accompanying EA 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

The benefits, in numbers of non-Chinook 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, in numbers of adult non-Chinook salmon saved, would occur in the highest PSC years (2004 and 2005) 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 5-2 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 57,199 fish in 2005. The CP sector is estimated to have non-Chinook salmon saved of between zero and 5,818 (2004) under the 50,000 cap. The mothership sector estimates ranged from zero to 1,381, whilie the CDQ sector estimates ranged from zero to 215. 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, an 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 5-2 Estimated 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	713	5,144	936	19,519	342	3,221	412	11,176		2,163		2,926
2005	648	5,818	1,381	57,199	242	4,030	544	37,688		2,728	58	17,911
2006	201	2,411	563	42,588	62	1,241	214	22,642		845	32	8,941
2007	215	1,286	165	9,536				2,927				
2008	118	516	91	370								
2009												
2010												
2011	128	2,399	1,408	3,598		1,205	1,005			383	561	
Total	2,023	17,574	4,545	132,811	646	9,697	2,175	74,433		6,119	650	29,777

4ii (sector allocation 2)

Cap:	**50,000**				**200,000**				**353,000**			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004	572	4,508	811	20,613		2,163	15	12,796				6,994
2005	534	5,047	1,190	58,387		1,983	137	44,331				29,955
2006	166	1,695	485	43,035		437	71	29,236				16,574
2007	189	697	112	10,162				4,726				1,235
2008	103	321	61	713								
2009				429								
2010				235								
2011	24	1,948	1,331	4,287			678				69	
Total	1,588	14,217	3,990	137,862		4,583	901	91,089			69	54,759

6 (sector allocation 3)

Cap:	**50,000**				**200,000**				**353,000**			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004	424	3,652	715	21,917		287		15,861				11,176
2005	362	4,323	995	59,977		157		53,042				38,824
2006	103	1,306	401	45,671				38,473				23,895
2007	16	290	43	11,583				7,442				3,272
2008	9	159	24	876								
2009				1,175								
2010				644								
2011		1,436	1,331	4,997			411	585				
Total	913	11,166	3,508	146,840		444	411	115,403				77,167

The impact of Alternative 2, option 1b, is shown in Table 5-3 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 leavel 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 5-3 Estimated 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:	**50,000**				**200,000**				**353,000**			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004	-36	-328	-55	-137		-406	2			-688		
2005	-20	-1,106	208	24,767		-632	55	23,383		-377	-136	21,991
2006		31	122	25,597		24	30	21,973			-74	20,187
2007		79	-10	6,589		136		5,018				4,457
2008		-131	-5									
2009		-2	-63	624								
2010		-1	-31	342								
2011	-61	295	131	851		285	48	-199		349	21	
Total	-117	-1,163	297	58,632		-594	135	50,177		-716	-189	46,635

4ii (sector allocation 2)

Cap:	**50,000**				**200,000**				**353,000**			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004		-268	-22	-501		-675				-46		
2005		-1,149	213	23,776		-370	-17	24,194		-25		21,991
2006		-86	124	25,163			-9	23,458				20,187
2007		254	-1	6,578				5,589				4,457
2008			-1	-6								
2009			-36	484								
2010			-20	265								
2011	-8	261	94	932		349	21	164			-103	
Total	-8	-989	352	56,692		-697	-4	53,404		-71	-103	46,635

6 (sector allocation 3)

Cap:	**50,000**				**200,000**				**353,000**			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004		-268	-23	-1,498		-400						
2005		-1,451	213	23,152		-219	-206	24,639				23,383
2006		-388	124	25,032			-113	25,527				21,973
2007		179	-7	6,545				6,589				5,018
2008			-4	-24								
2009				156								
2010				86								
2011		257	94	1,224			-46	429			-90	-199
Total		-1,671	397	54,673		-619	-364	57,184			-90	50,177

5.4 Effects of Alternative 3 Triggered Closures on non-Chinook Salmon Savings

The potential effect of the triggered area closure of Alternative 3, Option 1a, is presented in Table 5-4 below. As with Alternative 2, the benefits, in numbers of non-Chinook salmon that would potentially have accrued under Alternative 3, Option 1a, are dependent on the level of PSC and on the level of the hard cap. The greatest benefits under Alternative 3, in numbers of adult non-Chinook salmon saved, would occur in the highest PSC years (2004 and 2005) 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 5-4 and Table 5-5, in the CV sector under the 50,000 cap are estimated to range from a negative value to as high as 36,233 fish in 2005. The CP sector is estimated to have non-Chinook salmon saved of between zero and 1,319 (2004) under the 50,000 cap. The mothership sector estimates ranged from negative to 695 (2011), whilie the CDQ sector estimates ranged from negative to 26 chum salmon saved. The effect of allocation scenario 2 is to slightly increase these numbers in the CV sectorin most years 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, an 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 3, option 1b, is shown in Table 5-3 and Table 5-5 below. In comparison to option 1a, the change in timing of option 1b results in considerably fewer, by not quite 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. 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 leavel 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.

Results of the salmon saved estimates under Alternative 3, Options 2a and 2b, are presented in Table 5-6 and Table 5-7 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 28,291 non-chinook salmon would have been saved. Under Option 2b, this number falls to 20,367. The patterns of changes in salmon savings as the cap is increased and the allocation is changed generally mimic the patters discussed above.

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 3, 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	26	1,750	358	13,950	-13	1,675	319	12,848	5	1,708	246	9,296
2005	-11	1,319	623	36,233	-42	963	383	29,626	-2	1,012	74	15,616
2006		715	296	30,124		335	169	23,687		42		10,217
2007	-18	275	2	7,568	-17	169	0	5,995				2,440
2008	-10	11	0	-71	-9	6	0					
2009			-1	1,423								
2010			0	780								
2011	79	877	695	2,891	62	861	592	906		841	384	
Total	66	4,947	1,974	92,899	-20	4,010	1,463	73,062	3	3,603	704	37,570

4ii (sector allocation 2)

Cap:		**25,000**				**75,000**				**200,000**		
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004	20	1,774	315	13,950	11	1,815	300	13,395		1,551		10,520
2005	-23	1,046	485	36,253	1	1,015	225	33,682		890		19,104
2006		396	229	30,135		40	84	26,351		22		13,890
2007	-16	191	0	7,498	-2	-57		6,116				3,567
2008	-9	8	0	-109	-1	-31		-120				
2009			-1	1,423								
2010			0	780								
2011	73	870	695	3,193		864	494	1,824			290	
Total	45	4,285	1,724	93,123	9	3,644	1,103	81,247		2,463	290	47,082

6 (sector allocation 3)

Cap:		**25,000**				**75,000**				**200,000**		
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004	-27	1,675	270	14,052	-33	1,671	298	13,466		20		11,611
2005	-44	961	393	34,850	3	998	75	31,129		11		29,193
2006		334	192	29,366		45		25,704				23,562
2007	-17	168	0	7,807				6,655				5,926
2008	-9	6	0	115				-45				
2009				1,712				218				
2010				922				120				
2011	62	874	641	3,343		645	494	2,243			289	585
Total	-35	4,018	1,496	92,168	-30	3,359	868	79,490		32	289	70,876

Table 5-5 Estimated Coastal West Alaska non-Chinook salmon saved by sector and year under 3 different allocation schemes and hard caps of Alternative 3, Option 1b, 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	-26	27	-65	-853	-5	-12	-47			-12	0	
2005	-14	322	410	20,783	-3	298	417	21,930		20	273	20,642
2006	0	482	244	23,195		457	244	23,603		257	150	20,006
2007	0	178	21	6,420		159	0	6,349		132		4,763
2008		2	11	39			0					
2009		-1	14	878				468				
2010		-1	22	481				256				
2011	-2	1	326	2,183	-2	1	283	1,413		0	237	116
Total	-42	1,011	982	53,127	-9	902	896	54,019		397	660	45,526

4ii (sector allocation 2)

Cap:	25,000				75,000				200,000			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004	-20	37	-68	-2,583		-12	-43			-90		
2005	-11	329	409	19,902		15	314	22,215		-49	250	21,467
2006		457	244	23,589		263	185	23,759			137	21,525
2007		156	21	6,638		138		6,349				5,348
2008		-1	11	38								
2009			11	878				489				
2010			9	500				268				
2011	-9	1	320	2,193		0	283	1,705		5	211	654
Total	-40	979	958	51,155		403	739	54,786		-133	598	48,994

6 (sector allocation 3)

Cap:	25,000				75,000				200,000			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004	-5	-12	-54	-4,040		-82	-26	-351		-12		
2005	-3	298	416	18,291		-45	259	21,250		-6		22,119
2006		457	244	23,101		241	150	23,325				23,706
2007		159	0	6,614		132		6,402				6,349
2008			0	27				29				
2009			13	835				761				
2010			7	558				417				
2011	-2	1	318	2,238		-2	237	1,892			144	1,130
Total	-9	902	945	47,624		245	619	53,725		-18	144	53,304

Table 5-6 Estimated Coastal West Alaska non-Chinook salmon saved by sector and year under 3 different allocation schemes and hard caps of Alternative 3, 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	69	1,545	295	11,927	25	1,453	257	11,724	47	1,452	210	8,494
2005	4	1,168	233	28,291	-26	790	201	18,885	-3	833	55	2,428
2006		665	91	22,973		307	78	15,728		21		2,997
2007	-18	264	2	5,744	-17	169	0	4,798				2,314
2008	-10	11	0	-144	-9	7	0					
2009			-1	958								
2010			0	525								
2011	68	697	313	-163	54	687	339	-1,364		675	134	
Total	113	4,349	934	70,112	27	3,412	876	49,770	44	2,980	399	16,233

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	1,537	253	11,927	47	1,476	267	11,204		1,377		9,537
2005	-8	872	232	29,761	-3	805	211	22,092		790		2,664
2006		353	100	23,780		19	84	18,114		19		4,493
2007	-16	184	0	5,735	-2	-57		4,958				3,173
2008	-9	8	0	-149	-1	-31		-69				
2009			-1	958								
2010			0	525								
2011	69	696	313	158		690	244	-990			78	
Total	93	3,650	897	72,696	42	2,901	806	55,309		2,186	78	19,866

6 (sector allocation 3)

Cap:	**25,000**				**75,000**				**200,000**			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004	20	1,453	256	12,055	-4	1,432	261	11,371		9		10,463
2005	-26	791	225	27,696	3	824	57	24,550		5		18,359
2006		307	94	22,647		22		19,567				15,831
2007	-17	168	0	5,875				4,864				4,854
2008	-9	6	0	-64				-179				
2009				1,051				-69				
2010				573				-38				
2011	54	700	327	292		563	244	-650			-15	-148
Total	22	3,424	902	70,125	-1	2,840	562	59,417		15	-15	49,359

Table 5-7 Estimated Coastal West Alaska non-Chinook salmon saved by sector and year under 3 different allocation schemes and hard caps of Alternative 3, Option 2b, 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	-23	-136	-2	-844	-3	-131	25			-131	-3	
2005	-13	239	336	20,367	-2	240	348	21,428		-40	269	20,498
2006		333	184	20,982		329	184	21,343		17	149	18,144
2007		89	0	5,293		87	0	5,260				3,786
2008			0	18			0					
2009		0	18	685				483				
2010		0	24	376				265				
2011	6	-5	213	1,487	-1	-5	205	1,005		-5	159	238
Total	-30	520	772	48,364	-5	519	762	49,785		-159	575	42,665

4ii (sector allocation 2)

Cap:	25,000				75,000				200,000			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004	-18	-133	-2	-2,524		-131	-23			-139		
2005	-10	239	336	19,512		-40	323	21,802		-76	250	21,308
2006		329	184	21,326		41	184	21,548			137	19,453
2007		87	0	5,484		13		5,260				4,260
2008			0	17								
2009			14	687				483				
2010			11	402				265				
2011	-1	-5	207	1,501		-5	205	1,297			159	222
Total	-30	517	748	46,404		-122	690	50,655		-215	547	45,244

6 (sector allocation 3)

Cap:	25,000				75,000				200,000			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2004	-3	-131	12	-3,620		-131	-24	-348		48		
2005	-2	240	343	18,189		-72	258	20,837		26		21,660
2006		329	184	20,886			149	21,114				21,470
2007		87	0	5,485				5,313				5,260
2008			0	24				29				
2009			14	649				577				
2010			8	427				316				
2011	-1	-5	205	1,527		-5	159	1,487			91	752
Total	-5	519	765	43,568		-208	542	49,326		74	91	49,143

5.5 Qualitative Discussion of the Potential Beneifts 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 retuns 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 estiamates of salmon saved presented above are relatively small with respect to oveall 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 therby 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 activites. In some cases, especially with the high cost of fuel, subsistence activities may be reduced if commercical 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 restrictons 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 forcast. 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 benfits discussed here are fundamentally important to the cultural well being 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 abilty 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 anlaysis and is contained in Chapter 3. One must guage 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.

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)[32]. 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 2003 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. Including data prior to 2003 would not be representative of current PSC levels, of current regulations, or of current efforts by industry to avoid non-Chinook PSC.

In addition, in 2003 NMFS implemented the current catch accounting system known as e-landings. Thus, the period of 2003 thorough 2011 is covered by e-landings data. Prior to 2003, a "blend" system was used and differs from the present methodology. These data represents the most consistent and uniform data set available on a sector-specific basis for analysis. Thus, for data consistency, accuracy, and to meet the agency's obligation to use the "best scientific information," the analytical period of 2003-2011 was chosen and NMFS asserts that it is the appropriate analytical period.

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 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.

[32] "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.

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.

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) 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 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 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, 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 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.

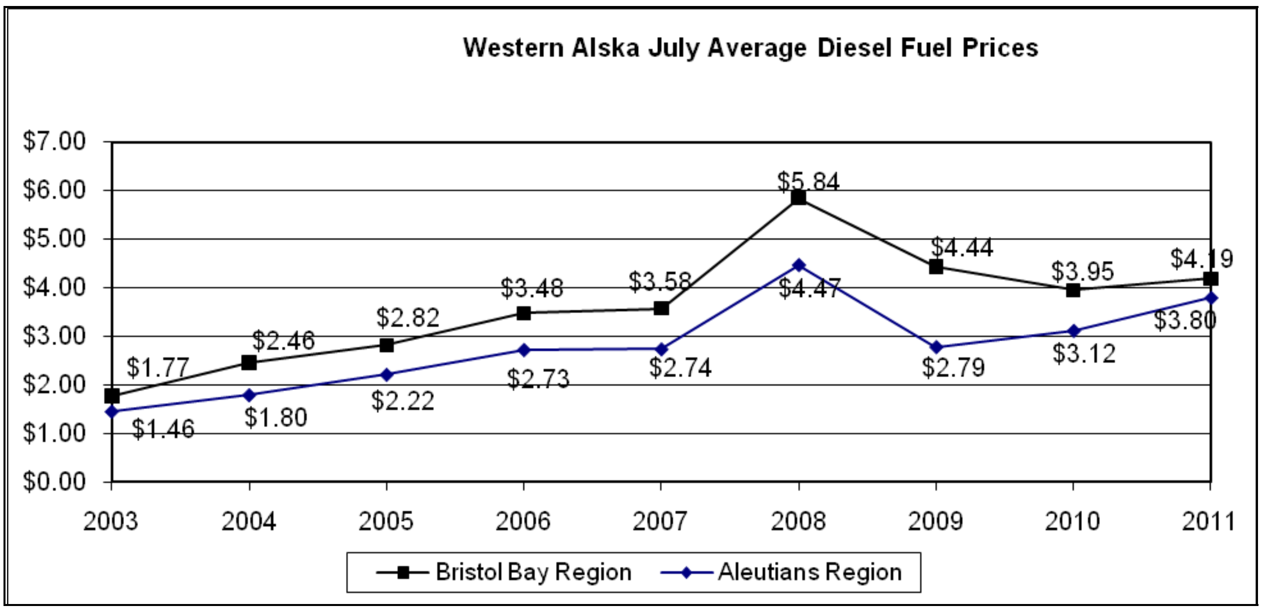


Figure 6-1 Representative Diesel fuel costs from western Alaska, 2001-20011 ($/gallon).

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 6.2)

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 triggred 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 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., PSCes 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 PSCes might take place (Queirolo et al. 1995). Both PSCes 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.

6.2 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 triggered closures of Alternative 3, 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 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.

6.2.1 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.

6.2.2 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 does, say, 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, then 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.

6.2.3 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 revenues to industry (i.e., producers' surplus gains). While a loss to consumers, this is not a loss to society. It is a measure of the benefit that consumers used to enjoy, but that now accrues to industry in the form of increased prices and additional revenues.

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).

6.2.4 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.

<u>Displacing Capacity and Effort</u>: 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 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 dependent upon them.

Increased Costs of Gearing Up and Standing Down: 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 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.

6.3 The Voluntary Rolling Hotspot System Under Alternative 1: Status Quo

An examination and analysis of the effectiveness of the volungtary rolling hotspot system, 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 section 5.3 of the accompanying EA. This analysis, which spans approximately 40 pages in section 5.3, is the most comprehensive treatement of the efficacy of the VRHS 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 3 with the status quo, the analysts have chosen to limit the treatment here to the summary of findings of that analysis rather than reprinting all 40 pages. 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 non-Chinook salmon PSC measures implemented through the VRHS system and Amendment 91 arguably represent the most extensive PSC reduction efforts that have ever been undertaken. Given the importance of the VRHS in the status quo as well as a component of the action alternatives, an extensive analysis of the efficacy of this system has been developed and is presented in Chapter 5 section 3 of the accompanying EA. What is presented here is a synopsis of the findings of that analysis.

Key findings of this analysis include:

- From 2003-2010, comparing chum PSC rates in the 1-3 days following RHS closures are approximately 8 percent lower
- Annual average chum PSC in the 5-days before closures were imposed from 2003-2010 ranged from 11-33 percent for CVs and from 2-30 percent for other sectors, with the majority of years being in the upper end of this range. The average percentage of pollock range from 7-21 percent for CVs and was less than 5 percent for other sectors.
- Evaluating the 1993-2000, an RHS-like system would likely have reduced chum PSC by 9-22 percent on average with about 4-10% percent of pollock fishing have been relocated to other areas.
- The pre-RHS analysis suggest that often ‘what’s good for chum is good for Chinook’ with the range of Chinook savings as 6-14 percent per year.

- Based on 1993-2000 data, large closures reduce salmon PSC more but at the cost of moving additional pollock. Also, closures based on the most recent information possible leads to larger average reductions and relatively small base rates appear on average to be more 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 provides 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. 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.
- 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 trigger this area could be actually increase chum PSC.

- In 2011, chum RHS closures were in place throughout the B season, whereas in previous years Chinook closures were explicitly given regulatory priority.

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.
- The system can adapt with new information. 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."
- Through regular reporting to the Council and independent audits of potential violations, there is transparency in whether vessels adhere to closures. The number of violations of the closures has been very limited and seemingly generally due to honest mistakes by vessel operators.

The Council's June 2010 motion requested an analysis of potential means to modify the chum rolling hotspot system. Options for adjusting the system include:

- Modifications of the RHS program to the vessel-level would follow the current shoreside and catcher-processor Chinook RHS programs. An individual-level system would increase the likelihood that vessels face consequences for high PSC. Because there may also be some advantages to having cooperative-level incentives, a RHS system could also include *both* individual and cooperative-level incentives.
- Sea State strives to have recent information available for deciding which areas to close. There is no easy technical fix to reduce the utilization of information. Shortening the approximately 24-hour delay between when closures are announced and implemented would improve the quality of data and could provide some additional incentive to avoid high-PSC areas immediately before closures are implemented. However, this would occur at additional cost to the fleet and historical simulation results suggest that the reduction in PSC would be relatively small.
- The RHS could be adjusted to focus on benefits to Western Alaska stocks by being more active early in the B season. However, if extremely large closures are imposed in this period so that fishing is slowed down significantly, it could have the unintended consequence of pushing a larger amount of fishing effort into October, when Chinook PSC is usually highest.
- Historical simulation results indicate that larger closures are likely to further reduce PSC, but at a decreasing rate as they get larger. Larger areas at high-PSC periods would allow more high-PSC areas to be closed.
- When PSC rates change quickly, the current 3-week moving basis for determining the base rate means that all cooperatives or few cooperatives are subject to closures. The base rate could be based on the most recent behavior to ensure that vessels or cooperatives with relatively high PSC rates in the most recent period would be subject to closures.
- Modifying the incentives associated with the tier system has the potential to significantly strengthen the effectiveness of the RHS system. Larger and longer closures or any other reward and penalty could be incorporated into the tier system. If a more stringent chum RHS is developed,

vessels could be made exempt from some of the closures if they have relatively low *Chinook* PSC, further increasing the incentive to avoid Chinook PSC as well.

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. The program has continued to evolve and learn from new challenges.

6.4 Pollock Fishery Gross Revenue under Alternative 1: Status Quo

The analysis of potential effects on pollock industry revenue uses a retrospective analysis of fishery conditions during the 2003 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 2003–2011.

YEAR	A and B Season Annual Total First Wholesale Gross Value			Total Annual First Wholesale Value
	CDQ	CP/M	Shoreside	
2003	$103	$468	$456	$1,026
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**	$139	$660	$612	$1,410

Sources: Terry Hiatt: Alaska Fisheries Science Center, from data compiled for the Economic Status and Fishery Evaluation Report, 2008 and 2010.

*Estimated using pollock catch by season and sector, from catch accounting, and applying the 2010 price per round metric ton as a price proxy.

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 <u>received</u> 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.

6.5 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 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, 2003-2011 ($/mt).

YEAR	Round Weight Equivalent First Wholesale Value/mt		
	CDQ	CP/M	Shoreside
2003	$537.68	$540.30	$632.96
2004	$564.94	$559.48	$595.94
2005	$687.96	$712.30	$700.32
2006	$704.51	$713.41	$697.62
2007	$834.10	$818.19	$762.63
2008	$1,232.55	$1,248.65	$1,113.88
2009	$1,153.11	$1,122.08	$1,189.18
2010	$1,185.42	$1,236.22	$1,178.04
2011*	$1,185.42	$1,236.22	$1,178.04

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 2003–2011.

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**	$60	$390	$353	$803

Sources: Terry Hiatt: Alaska Fisheries Science Center, from data compiled for the Economic Status and Fishery Evaluation Report, 2010.
** Estimated using pollock catch by season and sector, from catch accounting, and applying the 2010 price per round metric ton as a price proxy.

The analysis of 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.

6.6 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 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 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 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 whitting) , 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 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 under the most restrictive PSC cap of 50,000 non-Chinook salmon where scenario 1 estimates are approximately $482 million would potentially have been forgone. That gross value is composed of $209 million from the CV sector, $202 million from the CP sector, $53million from the Mothership sector, and $18 million from CDQ pollock fisheries.

As is expected, the greatest adverse economic impact on the pollock fishery would have occurred in the highest PSC years (2005 and 2011) and under the most restrictive PSC cap of 50,000 non-Chinook salmon where Alternative 2 Option 1a is estimated to result in approximately $482 million and $519 million in potentially forgone gross revenue in 2005 and 2011, respectively. The 2005 potentially forgone gross value is composed of $209 million from the CV sector, $202 million from the CP sector, $53 million from the Mothership sector, and $18 million from CDQ pollock fisheries. The 2011 potentially forgone gross value is composed of $222 million from the CV sector, $253 million from the CP sector, $78 million from the Mothership sector, and $25 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 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 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), 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.

The effect of Alternative 2, option 1b (June and July closure option), in the highest PSC years (2005 and 2011) and under the most restrictive PSC cap of 50,000 non-Chinook salmon is estimated to be approximately $191 million and $330 million in gross revenue at risk in 2005 and 2011, respectively. That gross value is composed of $83 million from the CV sector, $81 million from the CP sector, and $27 million from the Mothership sector. The 2011 revenue at risk is composed of $163 million from the CV sector, $106 million from the CP sector, $37 million from the Mothership sector, and $24 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 6-4 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, 2003-2011.

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**
2003	$27	$36	$24	$123	$211	$7		$7		$13					
2004	$42	$170	$35	$119	$366	$16	$124	$5	$53	$199		$74		$22	$96
2005	$18	$202	$53	$209	$482	$7	$75	$19	$179	$279		$57	$5	$141	$203
2006		$160		$251	$412				$168	$168					
2007	$15	$98	$25	$62	$200										
2008															
2009															
2010															
2011	$25	$253	$78	$222	$577		$115	$63		$178		$13	$26		$39
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**
2003	$18	$18	$15	$139	$191				$18	$18					
2004	$29	$162	$28	$122	$342		$74	$0	$57	$131				$40	$40
2005	$15	$91	$49	$213	$367		$46	$9	$185	$240				$167	$167
2006		$67		$251	$318				$203	$203				$141	$141
2007	$13	$68	$19	$79	$178										
2008															
2009				$16	$16										
2010															
2011	$3	$187	$75	$254	$519			$34		$34			$9		$9
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**
2003	$7	$3	$11	$157	$178				$44	$44					
2004	$19	$148	$21	$135	$322		$11		$91	$101				$53	$53
2005	$14	$80	$47	$225	$366				$204	$204				$179	$179
2006				$261	$261				$229	$229				$170	$170
2007	$5	$51	$11	$91	$158										
2008															
2009				$77	$77										
2010															
2011		$161	$75	$286	$522			$21	$72	$94					

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 revenue. What is immediately obvious is that potentially forgone revenue in the CV sector can represent nearly 94% of B season total 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 81% of their B season revenue placed at risk under the lowest cap, while motherships have relatively lower percentages of less than 20 percent of B season revenue placed at risk. As is the case with 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 revenue one sees that the percentage impacts fall by roughly half of their value but remain farily 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, 2003-2011.

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**
2003	56.1%	16.7%	11.0%	49.5%	40.9%	14.0%		3.0%		2.6%					
2004	81.5%	76.9%	16.0%	52.8%	73.6%	30.4%	56.2%	2.3%	23.7%	39.9%		33.6%		9.6%	19.3%
2005	28.2%	71.3%	18.6%	76.5%	77.8%	10.9%	26.6%	6.6%	65.3%	45.1%		20.2%	1.8%	51.4%	32.8%
2006		55.7%		93.7%	66.4%				62.5%	27.1%					
2007	21.7%	32.2%	8.2%	24.6%	32.0%										
2008															
2009															
2010															
2011	41.0%	64.8%	19.9%	63.0%	71.8%		29.4%	16.2%		22.2%		3.4%	6.7%		4.9%
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**
2003	37.4%	8.2%	7.1%	55.9%	37.0%				7.2%	3.5%					
2004	57.3%	73.2%	12.9%	54.1%	68.6%		33.6%	0.1%	25.1%	26.4%				17.8%	8.0%
2005	24.7%	32.0%	17.2%	77.7%	59.3%		16.4%	3.1%	67.8%	38.8%				61.0%	27.0%
2006		23.3%		93.7%	51.4%				75.7%	32.8%				52.5%	22.7%
2007	18.3%	22.4%	6.2%	31.5%	28.6%										
2008															
2009				6.5%	2.9%										
2010															
2011	4.6%	48.0%	19.1%	72.0%	64.6%			8.8%		4.3%			2.4%		1.2%
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**
2003	14.0%	1.6%	4.9%	63.1%	34.6%				17.6%	8.5%					
2004	36.3%	66.9%	9.4%	59.8%	64.7%		4.7%		40.4%	20.4%				23.7%	10.7%
2005	21.9%	28.3%	16.6%	82.2%	59.0%				74.7%	33.0%				65.4%	28.9%
2006				97.2%	42.1%				85.5%	37.0%				63.4%	27.5%
2007	7.7%	16.7%	3.6%	36.5%	25.4%										
2008															
2009				30.8%	13.9%										
2010															
2011		41.2%	19.1%	81.1%	64.9%			5.5%	20.5%	11.7%					

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, 2003-2011.

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**
2003	26.5%	7.8%	5.1%	27.1%	20.5%	6.6%		1.4%		1.3%					
2004	35.9%	32.8%	6.8%	26.7%	33.9%	13.4%	23.9%	1.0%	12.0%	18.3%		14.3%		4.8%	8.9%
2005	13.4%	33.8%	8.8%	39.1%	38.1%	5.2%	12.6%	3.1%	33.3%	22.1%		9.6%	0.9%	26.2%	16.0%
2006		26.8%		48.6%	33.0%				32.5%	13.5%					
2007	11.0%	16.2%	4.1%	12.3%	16.1%										
2008															
2009															
2010															
2011	17.8%	38.3%	11.8%	36.3%	40.9%		17.4%	9.6%		12.6%		2.0%	3.9%		2.8%
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**
2003	17.6%	3.8%	3.3%	30.6%	18.6%				3.9%	1.8%					
2004	25.2%	31.2%	5.5%	27.3%	31.6%		14.3%	0.0%	12.7%	12.1%				9.0%	3.7%
2005	11.8%	15.2%	8.2%	39.7%	29.1%		7.8%	1.4%	34.6%	19.0%				31.1%	13.2%
2006		11.2%		48.6%	25.5%				39.3%	16.3%				27.3%	11.3%
2007	9.3%	11.3%	3.1%	15.8%	14.4%										
2008															
2009				3.6%	1.6%										
2010															
2011	2.0%	28.4%	11.3%	41.5%	36.8%			5.2%		2.4%			1.4%		0.7%
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**
2003	6.6%	0.7%	2.3%	34.5%	17.4%				9.6%	4.3%					
2004	16.0%	28.5%	4.0%	30.2%	29.8%		2.0%		20.4%	9.4%				12.0%	4.9%
2005	10.4%	13.4%	7.9%	41.9%	28.9%				38.1%	16.2%				33.4%	14.2%
2006				50.5%	20.9%				44.4%	18.4%				32.9%	13.6%
2007	3.9%	8.4%	1.8%	18.3%	12.8%										
2008															
2009				17.2%	7.5%										
2010															
2011		24.4%	11.3%	46.7%	37.0%			3.2%	11.8%	6.6%					

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, 2003-2011.

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**
2003	$27	$36	$24	$123	$211	$7		$7		$13					
2004	$6	$98	$11		$115		$89	$2		$91		$86			$86
2005		$81	$27	$83	$191		$24	$26	$59	$108			$20	$54	$74
2006		$62	$4	$105	$171		$8		$80	$88				$73	$73
2007		$39	$12		$51										
2008															
2009		$14	$21	$4	$40										
2010			$7		$7										
2011	$24	$106	$37	$163	$330		$63	$35	$48	$147		$7	$33		$39
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**
2003			$3	$15	$18										
2004		$96	$9	$3	$109		$78			$78		$28			$28
2005		$75	$27	$93	$195			$22	$59	$81				$54	$54
2006		$31		$105	$136				$95	$95				$73	$73
2007			$7	$6	$13										
2008															
2009			$10	$27	$37										
2010															
2011	$35	$267	$79	$326	$707		$178	$75	$226	$479		$102	$63	$119	$284
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**
2003			$1	$31	$33										
2004		$96	$9	$11	$116		$50			$50					
2005		$72	$27	$101	$200			$15	$68	$82				$59	$59
2006		$18		$105	$123				$105	$105				$80	$80
2007			$4	$18	$22										
2008															
2009				$67	$67										
2010															
2011	$25	$253	$79	$333	$689		$115	$70	$263	$448		$13	$54	$204	$272

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, 2003-2011.

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**
2003	56.1%	16.7%	11.0%	49.5%	40.9%	14.0%		3.0%		2.6%					
2004	12.1%	44.3%	4.8%		23.1%		40.3%	0.8%		18.3%		38.7%			17.2%
2005		28.7%	9.5%	30.3%	30.9%		8.5%	9.1%	21.4%	17.5%			7.0%	19.8%	12.0%
2006		21.6%		39.0%	27.6%		2.7%		30.0%	14.2%				27.2%	11.8%
2007		12.8%	3.9%		8.1%										
2008															
2009		5.8%	8.4%	1.8%	7.2%										
2010			2.6%		1.2%										
2011	39.7%	27.1%	9.6%	46.1%	41.1%		16.2%	9.1%	13.7%	18.3%		1.7%	8.3%		4.9%
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**
2003			1.4%	6.0%	3.5%										
2004		43.3%	4.3%	1.5%	21.8%		35.3%			15.7%		12.4%			5.5%
2005		26.5%	9.5%	34.2%	31.5%			7.7%	21.7%	13.1%				19.8%	8.7%
2006		10.9%		39.0%	21.9%				35.4%	15.3%				27.2%	11.8%
2007			2.3%	2.3%	2.0%										
2008															
2009			4.2%	10.8%	6.7%										
2010															
2011	57.4%	68.4%	20.2%	92.5%	88.0%		45.7%	19.1%	64.1%	59.6%		26.1%	16.2%	33.8%	35.3%
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**
2003			0.7%	12.6%	6.4%										
2004		43.3%	4.3%	4.8%	23.3%		22.6%			10.1%					
2005		25.6%	9.5%	36.8%	32.3%			5.1%	24.7%	13.3%				21.4%	9.5%
2006		6.3%		39.0%	19.8%				39.0%	16.9%				30.0%	13.0%
2007			1.3%	7.0%	3.5%										
2008															
2009				26.7%	12.0%										
2010															
2011	41.0%	64.8%	20.2%	94.4%	85.8%		29.4%	17.9%	74.7%	55.8%		3.4%	14.0%	57.9%	33.8%

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, 2003-2011.

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**
2003	26.5%	7.8%	5.1%	27.1%	20.5%	6.6%		1.4%		1.3%					
2004	5.4%	18.9%	2.1%		10.6%		17.2%	0.4%		8.4%		16.5%			7.9%
2005		13.6%	4.5%	15.5%	15.1%		4.0%	4.3%	10.9%	8.6%			3.3%	10.1%	5.9%
2006		10.4%	0.7%	20.2%	13.7%		1.3%		15.5%	7.1%				14.1%	5.9%
2007		6.4%	2.0%		4.1%										
2008															
2009		3.1%	4.4%	1.0%	3.9%										
2010			1.5%		0.7%										
2011	17.2%	16.1%	5.7%	26.6%	23.4%		9.6%	5.4%	7.9%	10.4%		1.0%	4.9%		2.8%
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**
2003			0.7%	3.3%	1.8%										
2004		18.5%	1.8%	0.8%	10.0%		15.0%			7.2%		5.3%			2.5%
2005		12.6%	4.5%	17.4%	15.4%			3.7%	11.1%	6.4%				10.1%	4.3%
2006		5.3%		20.2%	10.9%				18.4%	7.6%				14.1%	5.9%
2007			1.2%	1.2%	1.0%										
2008															
2009			2.2%	6.0%	3.6%										
2010															
2011	24.9%	40.5%	12.0%	53.3%	50.1%		27.0%	11.3%	36.9%	34.0%		15.4%	9.6%	19.5%	20.1%
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**
2003			0.3%	6.9%	3.2%										
2004		18.5%	1.8%	2.4%	10.7%		9.6%			4.6%					
2005		12.1%	4.5%	18.8%	15.8%			2.4%	12.6%	6.5%				10.9%	4.6%
2006		3.0%		20.2%	9.8%				20.2%	8.4%				15.5%	6.4%
2007			0.7%	3.5%	1.7%										
2008															
2009				14.9%	6.5%										
2010															
2011	17.8%	38.3%	12.0%	54.4%	48.9%		17.4%	10.6%	43.1%	31.8%		2.0%	8.3%	33.4%	19.3%

6.7 Revenue at Risk under Alternative 3

While the hard cap alternatives have the potential effect of fishery closure and resulting forgone pollock fishery revenue, the triggered closures do not directly create forgone gross revenue, but rather, they place 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 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 revenue at risk estimate is the answer to the question of how much revenue they earned, in each of the years 2003-2011, 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 revenue earned in those years from the projected triggered closure date forward. Presented here are the estimates of revenue at risk and the percent of total revenue that these estimates comprise.

It is also possible to take a further step with regard to analysis of triggered closure areas (Alternative 3). 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 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 2003 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 2001 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% level (Options 1a and 1b), versus a 60% level (Options 2a, and 2b). Chapter 2, of the accompanying EA provides an extensive discussion of how these alternative coponents and options were developed and also provides a treatment of the management and enforcement implications associated with thes 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 these numbers in terms of dollars of revenue and also as a percent of B season total revneu and as a percent of total annual revenue by sector. A review of the data presented in these tables reveals that shore based CVs would have the vast majority of the revenue at risk and the greatest percentages of B season total first wholesale 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 $168 million in revenue at risk in2005 out of the $183 million total for all fleet sectors combined. This represents approximately 61 percent of the CV B season total gross revenue and approximately 30 percent of total gross revenue.

As is expected, relaxing the trigger caps has the result of decreasing the revenue at risk. The 2005 CV revenue at risk (scenario 1), for example, decreases from $168 million to $1502 million and $127 million 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 2005 CV revenue at risk, for example, increasing from $168 million to $172 million, and $186 million.

In percentage of B season gross revenue terms, the potential impacts to sectors other than the CV sector are very small in nearly all years under consideration. There is one relatively high impact to the CDQ sector in 2003; however, the CDQ sector has had considerably lower revenue at risk on all years since 2003. When considering revenue at risk as a percent of annual total 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 revenue at risk under Alternative 3, option 1. The CV sector, in contrast, bears as much as 30 percent of its 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 6-10 Alternative 3, 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, 2003-2011.

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**
2003	$20	$11	$11	$144	$186	$17	$6	$8	$66	$97	$6		$4		$11
2004	$13	$47	$10	$122	$191	$11	$44	$4	$91	$149	$1	$20		$42	$63
2005		$7	$7	$168	$183		$4	$4	$150	$157		$4		$127	$131
2006		$8		$140	$147				$113	$113				$77	$77
2007	$1	$12		$66	$79	$1	$12			$13					
2008															
2009			$1	$29	$30										
2010															
2011	$11	$31	$37	$196	$275	$7	$31	$34	$116	$188		$26	$26		$52
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**
2003	$19	$8	$8	$144	$181	$6	$3	$6	$99	$115				$17	$17
2004	$12	$47	$9	$122	$189	$2	$38	$3	$95	$137		$12		$46	$57
2005		$7	$7	$172	$187		$4	$2	$154	$160				$132	$132
2006				$140	$140				$117	$117				$90	$90
2007	$1	$12		$70	$83		$12		$44	$56					
2008															
2009			$1	$29	$30										
2010															
2011	$10	$31	$37	$214	$292		$26	$29	$159	$214			$23		$23
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**
2003	$17	$6	$8	$157	$188	$1		$6	$128	$134				$37	$37
2004	$11	$44	$7	$122	$183		$15		$106	$121				$80	$80
2005		$4	$7	$186	$196		$4		$154	$158				$150	$150
2006				$140	$140				$131	$131				$113	$113
2007	$1	$12		$74	$87				$57	$57					
2008				$14	$14										
2009				$29	$29				$12	$12					
2010															
2011	$7	$26	$35	$220	$289		$21	$29	$171	$221			$18	$67	$85

Table 6-11 Alternative 3, 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, 2003-2011.

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**
2003	41.2%	5.2%	4.9%	58.0%	36.2%	34.6%	2.6%	3.9%	26.5%	18.8%	13.2%		1.9%		2.1%
2004	24.7%	21.0%	4.6%	54.0%	38.4%	21.4%	19.7%	1.6%	40.5%	30.0%	1.7%	9.2%		18.6%	12.7%
2005		2.6%	2.6%	61.4%	29.5%		1.3%	1.3%	54.7%	25.4%		1.3%		46.4%	21.1%
2006		2.6%		52.1%	23.8%				42.0%	18.2%				28.6%	12.4%
2007	1.7%	4.0%		26.2%	12.6%	1.7%	4.0%			2.1%					
2008															
2009			0.3%	11.7%	5.4%										
2010															
2011	18.4%	8.0%	9.4%	55.5%	34.2%	11.5%	8.0%	8.7%	33.0%	23.5%		6.7%	6.6%		6.5%

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**
2003	39.6%	3.9%	3.9%	58.0%	35.1%	13.2%	1.3%	2.9%	39.7%	22.2%				6.6%	3.2%
2004	23.1%	21.0%	4.2%	54.0%	38.0%	3.3%	17.1%	1.3%	42.2%	27.6%		5.3%		20.2%	11.5%
2005		2.6%	2.6%	63.0%	30.2%		1.3%	0.7%	56.4%	25.8%				48.1%	21.2%
2006				52.1%	22.6%				43.7%	18.9%				33.6%	14.5%
2007	1.7%	4.0%		27.9%	13.3%		4.0%		17.4%	8.9%					
2008															
2009			0.3%	11.7%	5.4%										
2010															
2011	16.1%	8.0%	9.4%	60.7%	36.3%		6.7%	7.3%	45.1%	26.6%			5.9%		2.9%

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**
2003	34.6%	2.6%	3.9%	62.9%	36.4%	1.6%		2.6%	51.3%	26.1%				14.9%	7.2%
2004	21.4%	19.7%	3.3%	54.0%	36.8%		6.6%		47.2%	24.3%				35.4%	16.0%
2005		1.3%	2.3%	68.0%	31.7%		1.3%		56.4%	25.5%				54.7%	24.2%
2006				52.1%	22.6%				48.7%	21.1%				42.0%	18.2%
2007	1.7%	4.0%		29.7%	14.0%				22.7%	9.1%					
2008				5.0%	2.1%										
2009				11.7%	5.3%				5.0%	2.3%					
2010															
2011	11.5%	6.7%	9.0%	62.4%	35.9%		5.4%	7.3%	48.6%	27.5%			4.5%	19.1%	10.6%

Table 6-12 Alternative 3, 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, 2003-2011.

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**
2003	19.5%	2.4%	2.3%	31.7%	18.2%	16.4%	1.2%	1.8%	14.5%	9.5%	6.2%		0.9%		1.0%
2004	10.9%	8.9%	1.9%	27.3%	17.6%	9.4%	8.4%	0.7%	20.4%	13.8%	0.7%	3.9%		9.4%	5.8%
2005		1.2%	1.2%	31.3%	14.5%		0.6%	0.6%	27.9%	12.4%		0.6%		23.7%	10.3%
2006		1.3%		27.0%	11.8%				21.8%	9.0%				14.8%	6.1%
2007	0.8%	2.0%		13.1%	6.3%	0.8%	2.0%			1.1%					
2008															
2009			0.2%	6.5%	2.9%										
2010															
2011	8.0%	4.8%	5.6%	32.0%	19.5%	5.0%	4.8%	5.1%	19.0%	13.4%		4.0%	3.9%		3.7%

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**
2003	18.7%	1.8%	1.8%	31.7%	17.6%	6.2%	0.6%	1.4%	21.7%	11.2%				3.6%	1.6%
2004	10.2%	8.9%	1.8%	27.3%	17.5%	1.5%	7.3%	0.6%	21.3%	12.7%		2.2%		10.2%	5.3%
2005		1.2%	1.2%	32.2%	14.8%		0.6%	0.3%	28.8%	12.6%				24.5%	10.4%
2006				27.0%	11.2%				22.7%	9.4%				17.4%	7.2%
2007	0.8%	2.0%		14.0%	6.7%		2.0%		8.7%	4.5%					
2008															
2009			0.2%	6.5%	2.9%										
2010															
2011	7.0%	4.8%	5.6%	35.0%	20.7%		4.0%	4.3%	26.0%	15.2%			3.5%		1.6%

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**
2003	16.4%	1.2%	1.8%	34.4%	18.3%	0.8%		1.2%	28.1%	13.1%				8.2%	3.6%
2004	9.4%	8.4%	1.4%	27.3%	17.0%		2.8%		23.9%	11.2%				17.9%	7.4%
2005		0.6%	1.1%	34.7%	15.5%		0.6%		28.8%	12.5%				27.9%	11.8%
2006				27.0%	11.2%				25.3%	10.5%				21.8%	9.0%
2007	0.8%	2.0%		14.9%	7.0%				11.4%	4.6%					
2008				2.6%	1.1%										
2009				6.5%	2.8%				2.8%	1.2%					
2010															
2011	5.0%	4.0%	5.4%	36.0%	20.5%		3.2%	4.3%	28.0%	15.7%			2.7%	11.0%	6.0%

Table 6-13 through Table 6-21 provide estimates of revenue at risk, percent of total B season gross revenue, and percent of total annual gross revenue, as presented above for option 1a, under each of options 1b, 2a, and 2b.

The potential impact of Alternative 3, option 1b in the years with greatest revenue impacts under this alternative (2004, 2011) and under the most restrictive PSC cap of 50,000 non-Chinook salmon area estimated to be approximately $97 million and $136 million in 2004 and 2011, respectively. The 2004 gross value is composed of $86 million from the CV sector, $4 million from the CP sector, and $8 million from the Mothership sector. The 2011 gross value is composed of $101 million from the CV sector, $10 million from the CP sector, $20 million from the Mothership sector, and $4 million from CDQ pollock fisheries.

In percentage of B season gross revenue terms, the potential impacts to sectors other than the CV sector are very small in nearly all years under consideration. When considering revenue at risk as a percent of annual total 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 revenue at risk under Alternative 3, option 1. The CV sector, in contrast, bears as much as 30 percent of its 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 3, 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, 2003-2011.

2ii (sector allocation 1) Option 1b															
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**
2003	$0	$3	$3	$16	$22			$1		$1					
2004	$3	$22	$7	$7	$39	$1	$20	$6		$26		$20	$1		$21
2005		$4	$8	$86	$97		$3	$8	$63	$74		$1	$7	$48	$55
2006	$0	$6		$63	$70		$5		$63	$68		$0		$43	$43
2007		$2	$1	$5	$8			$0		$0					
2008															
2009		$1	$3	$15	$18				$2	$2					
2010			$4		$4										
2011	$4	$10	$20	$101	$136	$1	$10	$19	$74	$104		$9	$18	$23	$50
4ii (sector allocation 2) Option 1b															
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**
2003		$1	$3	$23	$27										
2004	$2	$22	$7	$20	$50		$20	$5		$25		$15			$15
2005		$3	$8	$86	$97		$1	$7	$68	$76			$3	$49	$52
2006		$5		$67	$72		$2		$63	$65				$54	$54
2007		$0	$1	$9	$10										
2008				$2	$2										
2009			$1	$16	$17				$2	$2					
2010			$2	$6	$8										
2011	$4	$10	$20	$101	$136		$9	$19	$78	$107		$1	$15	$33	$49
6 (sector allocation 3) Option 1b															
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**
2003			$3	$31	$34				$9	$9					
2004	$1	$20	$6	$30	$56		$18	$4	$3	$25		$7			$7
2005		$3	$8	$95	$106			$7	$78	$85				$53	$53
2006		$5		$67	$72		$0		$63	$63				$63	$63
2007			$0	$15	$15				$1	$1					
2008				$11	$11										
2009			$1	$26	$27				$5	$5					
2010				$15	$15										
2011	$1	$10	$20	$101	$132		$9	$18	$95	$122			$10	$49	$59

Table 6-14 Alternative 3, 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, 2003-2011.

2ii (sector allocation 1) Option 1b

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
2003	0.4%	1.2%	1.6%	6.3%	4.2%			0.4%		0.2%					
2004	5.9%	9.8%	3.3%	3.1%	7.8%	1.0%	9.0%	2.7%		5.3%		9.0%	0.6%		4.3%
2005		1.3%	2.8%	31.3%	15.7%		1.1%	2.8%	23.0%	11.9%		0.2%	2.3%	17.6%	8.9%
2006		2.1%		23.5%	11.2%		1.8%		23.5%	11.0%		0.1%		15.9%	6.9%
2007		0.6%	0.2%	2.2%	1.3%			0.1%		0.0%					
2008															
2009		0.3%	1.1%	5.9%	3.3%				0.6%	0.3%					
2010			1.6%		0.7%										
2011	7.2%	2.5%	5.2%	28.7%	16.9%	1.2%	2.5%	5.0%	21.1%	13.0%		2.4%	4.6%	6.5%	6.3%

4ii (sector allocation 2) Option 1b

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
2003		0.5%	1.6%	9.1%	5.3%										
2004	3.8%	9.8%	3.2%	8.7%	10.1%		9.0%	2.4%		5.1%		6.7%			3.0%
2005		1.1%	2.8%	31.3%	15.6%		0.4%	2.5%	24.8%	12.2%			1.2%	17.7%	8.4%
2006		1.8%		25.0%	11.7%		0.8%		23.5%	10.5%				20.0%	8.6%
2007		0.1%	0.2%	3.6%	1.6%										
2008				0.6%	0.2%										
2009			0.5%	6.3%	3.1%				0.8%	0.4%					
2010			0.6%	2.5%	1.4%										
2011	7.0%	2.5%	5.2%	28.7%	16.9%		2.4%	5.0%	22.2%	13.4%		0.2%	3.9%	9.5%	6.1%

6 (sector allocation 3) Option 1b

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
2003			1.6%	12.4%	6.6%				3.5%	1.7%					
2004	1.0%	9.0%	2.7%	13.1%	11.3%		8.3%	1.7%	1.3%	5.1%		3.1%			1.4%
2005		1.1%	2.8%	34.6%	17.1%			2.3%	28.6%	13.7%				19.3%	8.5%
2006		1.8%		25.0%	11.7%		0.1%		23.5%	10.2%				23.5%	10.2%
2007			0.1%	6.0%	2.4%				0.5%	0.2%					
2008				3.8%	1.5%										
2009			0.3%	10.5%	4.9%				2.1%	0.9%					
2010				6.0%	2.5%										
2011	1.2%	2.5%	5.2%	28.7%	16.4%		2.4%	4.6%	26.8%	15.2%			2.7%	13.9%	7.4%

Table 6-15 Alternative 3, 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, 2003-2011.

2ii (sector allocation 1) Option 1b															
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**
2003	0.2%	0.6%	0.7%	3.4%	2.1%			0.2%		0.1%					
2004	2.6%	4.2%	1.4%	1.6%	3.6%	0.4%	3.8%	1.2%		2.4%		3.8%	0.3%		2.0%
2005		0.6%	1.3%	16.0%	7.7%		0.5%	1.3%	11.7%	5.9%		0.1%	1.1%	9.0%	4.4%
2006	0.4%	1.0%		12.2%	5.6%		0.8%		12.2%	5.5%		0.1%		8.2%	3.4%
2007		0.3%	0.1%	1.1%	0.6%			0.0%		0.0%					
2008															
2009		0.1%	0.6%	3.3%	1.8%				0.4%	0.2%					
2010			0.9%		0.4%										
2011	3.1%	1.5%	3.1%	16.6%	9.6%	0.5%	1.5%	3.0%	12.2%	7.4%		1.4%	2.7%	3.7%	3.6%
4ii (sector allocation 2) Option 1b															
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**
2003		0.2%	0.7%	5.0%	2.6%										
2004	1.7%	4.2%	1.4%	4.4%	4.6%		3.8%	1.0%		2.3%		2.9%			1.4%
2005		0.5%	1.3%	16.0%	7.6%		0.2%	1.2%	12.6%	6.0%			0.6%	9.1%	4.1%
2006		0.9%		13.0%	5.8%		0.4%		12.2%	5.2%				10.4%	4.3%
2007		0.1%	0.1%	1.8%	0.8%										
2008				0.3%	0.1%										
2009			0.2%	3.5%	1.7%				0.5%	0.2%					
2010			0.3%	1.4%	0.8%										
2011	3.0%	1.5%	3.1%	16.6%	9.6%		1.4%	3.0%	12.8%	7.6%		0.1%	2.3%	5.5%	3.5%
6 (sector allocation 3) Option 1b															
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**
2003			0.7%	6.8%	3.3%				1.9%	0.9%					
2004	0.4%	3.8%	1.2%	6.6%	5.2%		3.6%	0.7%	0.6%	2.3%		1.3%			0.6%
2005		0.5%	1.3%	17.7%	8.4%			1.1%	14.6%	6.7%				9.8%	4.2%
2006		0.8%		13.0%	5.8%		0.0%		12.2%	5.1%				12.2%	5.1%
2007			0.0%	3.0%	1.2%				0.3%	0.1%					
2008				2.0%	0.8%										
2009			0.2%	5.9%	2.6%				1.2%	0.5%					
2010				3.4%	1.4%										
2011	0.5%	1.5%	3.1%	16.6%	9.4%		1.4%	2.7%	15.5%	8.6%			1.6%	8.0%	4.2%

The potential impact of Alternative 3, option 2a in the years with greatest revenue impacts under this alternative (2005, 2011) and under the most restrictive PSC cap of 50,000 non-Chinook salmon area estimated to be approximately $131 million and $184 million in 2005 and 2011, respectively. The 2005 gross value is composed of $122 million from the CV sector, $4 million from the CP sector, and $5 million from the Mothership sector. The 2011 gross value is composed of $122 million from the CV sector, $26 million from the CP sector, $26 million from the Mothership sector, and $10 million from CDQ pollock fisheries.

In percentage of B season gross revenue terms, the potential impacts to sectors other than the CV sector are realtively small in nearly all years under consideration. However, CDQ impacts are approximately 30 percent of B season gross revenue in 2003 and impacts to the CDQ and CP sectors exeed 13 percent and 14 percent, respectively, in 2004. When considering revenue at risk as a percent of annual total 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 revenue at risk under Alternative 3, option 2a. The CV sector, in contrast, bears as much as 25 percent of its 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 6-16 Alternative 3, 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, 2003-2011.

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**
2003	$15	$11	$6	$95	$127	$12	$6	$6	$33	$56	$6		$4		$11
2004	$7	$32	$5	$72	$116	$6	$32	$1	$53	$92	$1	$17		$30	$49
2005		$4	$5	$122	$131		$4	$2	$113	$119				$91	$91
2006		$4		$108	$112				$86	$86				$59	$59
2007	$1	$12		$52	$66	$1	$12			$13					
2008															
2009			$1	$17	$17										
2010															
2011	$10	$26	$26	$122	$184	$6	$26	$24	$67	$123		$21	$18		$39

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**
2003	$14	$6	$6	$95	$121	$6	$3	$6	$54	$69				$12	$12
2004	$6	$32	$4	$72	$114	$1	$26	$1	$53	$81		$9		$34	$43
2005		$4	$5	$127	$135			$2	$113	$115				$100	$100
2006				$108	$108				$90	$90				$72	$72
2007	$1	$12		$52	$66		$12		$39	$51					
2008															
2009			$1	$17	$17										
2010															
2011	$8	$26	$26	$122	$183		$26	$20	$92	$138			$16		$16

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**
2003	$12	$6	$6	$99	$122	$1		$6	$78	$85				$25	$25
2004	$6	$32	$2	$72	$112		$12		$65	$76				$46	$46
2005			$5	$136	$141				$113	$113				$113	$113
2006				$108	$108				$99	$99				$86	$86
2007	$1	$12		$52	$66				$48	$48					
2008				$10	$10										
2009				$17	$17				$4	$4					
2010															
2011	$6	$26	$24	$135	$191		$21	$20	$104	$145			$11	$49	$60

Table 6-17 Alternative 3, 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, 2003-2011.

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**
2003	31.3%	5.2%	2.6%	38.1%	24.7%	24.7%	2.6%	2.6%	13.2%	10.9%	13.2%		1.9%		2.1%
2004	13.2%	14.4%	2.3%	32.0%	23.3%	11.5%	14.4%	0.3%	23.6%	18.4%	1.7%	7.9%		13.5%	9.8%
2005		1.3%	1.6%	44.8%	21.1%		1.3%	0.7%	41.5%	19.2%				33.2%	14.7%
2006		1.3%		40.3%	18.1%				31.9%	13.8%				21.8%	9.5%
2007	1.7%	4.0%		20.9%	10.5%	1.7%	4.0%			2.1%					
2008															
2009			0.3%	6.7%	3.2%										
2010															
2011	16.1%	6.7%	6.6%	34.7%	22.9%	9.2%	6.7%	6.3%	19.1%	15.4%		5.4%	4.5%		4.8%

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**
2003	29.7%	2.6%	2.6%	38.1%	23.4%	13.2%	1.3%	2.6%	21.5%	13.3%				5.0%	2.4%
2004	11.5%	14.4%	2.0%	32.0%	23.0%	1.7%	11.8%	0.3%	23.6%	16.3%		3.9%		15.2%	8.6%
2005		1.3%	1.6%	46.4%	21.9%			0.7%	41.5%	18.6%				36.5%	16.1%
2006				40.3%	17.5%				33.6%	14.5%				26.9%	11.6%
2007	1.7%	4.0%		20.9%	10.5%		4.0%		15.7%	8.2%					
2008															
2009			0.3%	6.7%	3.2%										
2010															
2011	13.8%	6.7%	6.6%	34.7%	22.7%		6.7%	5.2%	26.0%	17.2%			4.2%		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**
2003	24.7%	2.6%	2.6%	39.7%	23.7%	1.6%		2.6%	31.5%	16.5%				9.9%	4.8%
2004	11.5%	14.4%	1.0%	32.0%	22.6%		5.3%		28.7%	15.3%				20.2%	9.2%
2005			1.6%	49.8%	22.7%				41.5%	18.3%				41.5%	18.3%
2006				40.3%	17.5%				37.0%	16.0%				31.9%	13.8%
2007	1.7%	4.0%		20.9%	10.5%				19.2%	7.7%					
2008				3.4%	1.4%										
2009				6.7%	3.0%				1.7%	0.8%					
2010															
2011	9.2%	6.7%	6.3%	38.2%	23.7%		5.4%	5.2%	29.5%	18.1%			2.8%	13.9%	7.4%

Table 6-18 Alternative 3, 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, 2003-2011.

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
2003	14.8%	2.4%	1.2%	20.8%	12.4%	11.7%	1.2%	1.2%	7.2%	5.5%	6.2%		0.9%		1.0%
2004	5.8%	6.2%	1.0%	16.2%	10.7%	5.1%	6.2%	0.1%	11.9%	8.5%	0.7%	3.4%		6.8%	4.5%
2005		0.6%	0.8%	22.9%	10.4%		0.6%	0.3%	21.2%	9.4%				16.9%	7.2%
2006		0.6%		20.9%	9.0%				16.6%	6.9%				11.3%	4.7%
2007	0.8%	2.0%		10.5%	5.3%	0.8%	2.0%			1.1%					
2008															
2009			0.2%	3.7%	1.7%										
2010															
2011	7.0%	4.0%	3.9%	20.0%	13.1%	4.0%	4.0%	3.7%	11.0%	8.8%		3.2%	2.7%		2.7%

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
2003	14.0%	1.2%	1.2%	20.8%	11.8%	6.2%	0.6%	1.2%	11.8%	6.7%				2.7%	1.2%
2004	5.1%	6.2%	0.8%	16.2%	10.6%	0.7%	5.0%	0.1%	11.9%	7.5%		1.7%		7.7%	4.0%
2005		0.6%	0.8%	23.7%	10.7%			0.3%	21.2%	9.1%				18.6%	7.9%
2006				20.9%	8.7%				17.4%	7.2%				14.0%	5.8%
2007	0.8%	2.0%		10.5%	5.3%		2.0%		7.9%	4.1%					
2008															
2009			0.2%	3.7%	1.7%										
2010															
2011	6.0%	4.0%	3.9%	20.0%	13.0%		4.0%	3.1%	15.0%	9.8%			2.5%		1.2%

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
2003	11.7%	1.2%	1.2%	21.7%	11.9%	0.8%		1.2%	17.2%	8.3%				5.4%	2.4%
2004	5.1%	6.2%	0.4%	16.2%	10.4%		2.2%		14.5%	7.0%				10.2%	4.2%
2005			0.8%	25.4%	11.1%				21.2%	9.0%				21.2%	9.0%
2006				20.9%	8.7%				19.2%	8.0%				16.6%	6.9%
2007	0.8%	2.0%		10.5%	5.3%				9.6%	3.9%					
2008				1.8%	0.7%										
2009				3.7%	1.6%				0.9%	0.4%					
2010															
2011	4.0%	4.0%	3.7%	22.0%	13.5%		3.2%	3.1%	17.0%	10.3%			1.6%	8.0%	4.2%

The potential impact of Alternative 3, option 2b in the years with greatest revenue impacts under this alternative (2005, 2011) and under the most restrictive PSC cap of 50,000 non-Chinook salmon with allocation scenario 1 are estimated to be approximately $72 million and $65 million in 2005 and 2011, respectively. The 2005 gross value is composed of $63 million from the CV sector, $2 million from the CP sector, and $7 million from the Mothership sector. The 2011 gross value is composed of $54 million from the CV sector, $1 million from the CP sector, $9 million from the Mothership sector, and less than $1 million from CDQ pollock fisheries. Of note is that these impacts tend to incrase under allocation scenarios 2 and 3, with 2005 all fleet revenue at risk estimated to be $80 million.

Consistent with analysis of the preivious options, in percentage of B season gross revenue terms the potential impacts to sectors other than the CV sector are realtively small in nearly all years under consideration. When considering revenue at risk as a percent of annual total 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 revenue at risk under Alternative 3, option 2a. The CV sector, in contrast, bears as much as 10 to 13 percent of its revenue being placed at risk in several of the years within this retrospective analysis.

Table 6-19 Alternative 3, 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.

2ii (sector allocation 1) Option 2b

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
2003		$1	$3	$15	$19			$1		$1					
2004	$3	$15	$6	$7	$31	$1	$15	$4		$19		$15	$1		$16
2005		$2	$7	$63	$72		$2	$7	$44	$52		$0	$6	$32	$39
2006		$3		$47	$50		$3		$47	$50				$27	$27
2007			$0	$3	$3			$0		$0					
2008															
2009		$0	$2	$11	$12				$2	$2					
2010			$4		$4										
2011	$0	$1	$9	$54	$65	$0	$1	$9	$34	$45		$1	$7	$9	$18

4ii (sector allocation 2) Option 2b

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
2003			$3	$22	$25										
2004	$2	$15	$6	$19	$42		$15	$4		$19		$11			$11
2005		$2	$7	$63	$72		$0	$7	$46	$53			$3	$33	$37
2006		$3		$50	$54		$0		$47	$47				$37	$37
2007			$0	$5	$5										
2008				$1	$1										
2009			$1	$11	$12				$2	$2					
2010			$1	$5	$6										
2011	$0	$1	$9	$54	$65		$1	$9	$38	$48			$7	$10	$18

6 (sector allocation 3) Option 2b

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
2003			$3	$29	$33				$9	$9					
2004	$1	$15	$5	$27	$47		$15	$3	$3	$21		$4			$4
2005		$2	$7	$72	$80			$6	$56	$63				$34	$34
2006		$3		$50	$54				$47	$47				$47	$47
2007			$0	$8	$8				$1	$1					
2008				$7	$7										
2009			$1	$21	$22				$3	$3					
2010				$10	$10										
2011	$0	$1	$9	$54	$65		$1	$7	$54	$63			$3	$22	$25

Table 6-20 Alternative 3, 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, 2003-2011.

2ii (sector allocation 1) Option 2b															
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**
2003		0.3%	1.6%	6.2%	3.8%			0.4%		0.2%					
2004	5.7%	6.8%	2.7%	3.1%	6.2%	1.2%	6.7%	1.7%		3.9%		6.7%	0.6%		3.3%
2005		0.6%	2.3%	23.2%	11.6%		0.5%	2.3%	16.2%	8.5%		0.0%	2.2%	11.9%	6.3%
2006		1.2%		17.4%	8.1%		1.1%		17.4%	8.0%				10.0%	4.3%
2007			0.0%	1.2%	0.5%			0.0%		0.0%					
2008															
2009		0.0%	0.7%	4.3%	2.3%				0.6%	0.3%					
2010			1.5%		0.7%										
2011	0.7%	0.4%	2.3%	15.3%	8.0%	0.5%	0.4%	2.3%	9.7%	5.6%		0.3%	1.9%	2.6%	2.3%
4ii (sector allocation 2) Option 2b															
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**
2003			1.6%	8.6%	4.8%										
2004	4.0%	6.8%	2.7%	8.5%	8.4%		6.7%	1.7%		3.7%		5.1%			2.3%
2005		0.6%	2.3%	23.2%	11.6%		0.0%	2.3%	16.8%	8.5%			1.2%	12.1%	5.9%
2006		1.1%		18.8%	8.6%		0.2%		17.4%	7.6%				13.8%	6.0%
2007			0.0%	2.0%	0.8%										
2008				0.4%	0.2%										
2009			0.4%	4.3%	2.1%				0.6%	0.3%					
2010			0.5%	2.0%	1.1%										
2011	0.6%	0.4%	2.3%	15.3%	8.0%		0.3%	2.3%	10.8%	6.0%			1.9%	2.9%	2.2%
6 (sector allocation 3) Option 2b															
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**
2003			1.6%	11.8%	6.4%				3.5%	1.7%					
2004	1.2%	6.7%	2.2%	11.8%	9.5%		6.7%	1.5%	1.3%	4.2%		1.6%			0.7%
2005		0.5%	2.3%	26.2%	12.9%			2.2%	20.6%	10.1%				12.5%	5.5%
2006		1.1%		18.8%	8.6%				17.4%	7.5%				17.4%	7.5%
2007			0.0%	3.1%	1.3%				0.5%	0.2%					
2008				2.3%	0.9%										
2009			0.4%	8.3%	3.9%				1.0%	0.5%					
2010				4.1%	1.7%										
2011	0.5%	0.4%	2.3%	15.3%	8.0%		0.3%	1.9%	15.3%	7.8%			0.8%	6.3%	3.1%

Table 6-21 Alternative 3, Option 2b: 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 2b, 2003-2011.

2ii (sector allocation 1) Option 2b															
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**
2003		0.1%	0.7%	3.4%	1.9%			0.2%		0.1%					
2004	2.5%	2.9%	1.1%	1.6%	2.8%	0.5%	2.9%	0.7%		1.8%		2.9%	0.3%		1.5%
2005		0.3%	1.1%	11.8%	5.7%		0.3%	1.1%	8.2%	4.1%		0.0%	1.0%	6.1%	3.1%
2006		0.6%		9.0%	4.0%		0.5%		9.0%	4.0%				5.2%	2.2%
2007			0.0%	0.6%	0.2%			0.0%		0.0%					
2008															
2009		0.0%	0.4%	2.4%	1.2%				0.4%	0.2%					
2010			0.8%		0.4%										
2011	0.3%	0.2%	1.3%	8.8%	4.6%	0.2%	0.2%	1.3%	5.6%	3.2%		0.2%	1.1%	1.5%	1.3%
4ii (sector allocation 2) Option 2b															
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**
2003			0.7%	4.7%	2.4%										
2004	1.7%	2.9%	1.1%	4.3%	3.9%		2.9%	0.7%		1.7%		2.2%			1.0%
2005		0.3%	1.1%	11.8%	5.7%		0.0%	1.1%	8.6%	4.2%			0.6%	6.2%	2.9%
2006		0.5%		9.8%	4.3%		0.1%		9.0%	3.8%				7.2%	3.0%
2007			0.0%	1.0%	0.4%										
2008				0.2%	0.1%										
2009			0.2%	2.4%	1.1%				0.4%	0.2%					
2010			0.3%	1.1%	0.6%										
2011	0.2%	0.2%	1.3%	8.8%	4.6%		0.2%	1.3%	6.2%	3.4%			1.1%	1.7%	1.3%
6 (sector allocation 3) Option 2b															
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**
2003			0.7%	6.5%	3.2%				1.9%	0.8%					
2004	0.5%	2.9%	0.9%	6.0%	4.3%		2.9%	0.6%	0.6%	1.9%		0.7%			0.3%
2005		0.3%	1.1%	13.4%	6.3%			1.0%	10.5%	5.0%				6.4%	2.7%
2006		0.5%		9.8%	4.3%				9.0%	3.7%				9.0%	3.7%
2007			0.0%	1.6%	0.6%				0.3%	0.1%					
2008				1.2%	0.5%										
2009			0.2%	4.7%	2.1%				0.6%	0.3%					
2010				2.3%	1.0%										
2011	0.2%	0.2%	1.3%	8.8%	4.6%		0.2%	1.1%	8.8%	4.5%			0.4%	3.6%	1.8%

6.8 Implications of Sector Transfers and Rollovers

Alternative 2 contains provisions for transfers and rollovers via component 3, while Alternative 3 provides for transfers and rollovers in component 5. These options would only apply if the sector level PSC caps under Component 2 and the inshore CV sector level cap is further allocated among the inshore cooperatives and the inshore open access fishery (if the inshore open access fishery existed in a particular year) under Component 4. Option 1 or Option 2 or both could be selected.

When a salmon inshore cooperative cap is reached, the cooperative must stop fishing for pollock and may:

Option 1) Transfer (lease) its remaining pollock to another inshore cooperative for the remainder of the season or year. Allow inter-cooperative transfers of pollock to the degree currently authorized by the AFA.

Option 2) Transfer salmon PSC cap amounts from other inshore cooperatives (industry initiated)

Suboption: Limit transfers to the following: a) 50%, b) 70%, or c) 90% of available salmon

Option 1, would allow an inshore cooperative to transfer pollock to another inshore cooperative after the first cooperative's Chinook salmon allocation is reached. This option provides another means in addition to the transfer of the Chinook salmon PSC allocations to match available pollock and available salmon PSC for the inshore cooperatives.

Sections 206(a) and (b) of the AFA establish the allocation of the TAC of pollock among the different AFA sectors, including the CDQ Program. Section 213(c) allows the Council to supersede some provisions of the AFA under certain circumstances. However, section 213(c) specifically does not allow the Council to supersede the sector allocations of pollock in sections 206(a) and 206(b). Therefore, the AFA's allocation requirements effectively preclude the transfer of pollock from *one sector to another*. However, the AFA would allow the transfer of pollock among the inshore cooperatives. Such transfers would be subject to the 90 percent processor delivery requirement in section 210(b), which requires that 90 percent of the pollock allocated to an inshore cooperative must be delivered to the inshore processor associated with that cooperative. The AFA specifically requires that this provision be included in the inshore cooperative contracts and NMFS regulations contain this contract requirement in the inshore cooperative permitting requirements at § 679.4(l)(6).

Although not prohibited by the AFA, NMFS regulations currently do not authorize the transfer of pollock among the inshore cooperatives. Thus far, regulations authorizing inter-cooperative transfers of pollock have not been recommended to NMFS by the Council. However, regulations could be amended to allow pollock transfers among inshore cooperatives, subject to the requirement that the inshore cooperative contracts continue to include the 90 percent processor delivery requirement. These regulatory amendments could be made without requiring the Council to supercede requirements of the AFA.

Full transferability of pollock among the inshore cooperatives by superseding the 90 percent processor delivery requirements of subsections 210(b)(1) and (b)(6), could be allowed as long as the findings required in section 213(c)(1) of the AFA are made. To supersede this requirement, the Council would have to provide a rationale that explained why the proposed action mitigated adverse effects on fishery cooperatives and how it took into account all factors affecting the fisheries, including rationale explaining that the action was imposed fairly and equitably, to the extent practicable, among and within the sectors in the pollock fishery.

Option 1 would require NMFS to monitor the pollock harvest for each cooperative and track amounts of transferred pollock among cooperatives. By way of example, NMFS has implemented management programs that allow the transfer of fish among entities in various BSAI and Gulf of Alaska fisheries. These programs use a combination of electronic reporting done by the processing plant, online account access for cooperatives, and NMFS approval and tracking of transfers. Option 1 would be similar to other programs in that annual allocations of pollock would be tracked for each cooperative using the existing NMFS's Catch Accounting System (CAS) and electronic reporting system (eLandings). The CAS is configured to track cooperative-specific amounts of pollock, but in its current configuration does not accommodate pollock transfers. Thus, adjustment to the CAS would be needed to accommodate programming complexities associated with transfers, business rules, and CAS account structure.

Pollock transfers would require NMFS approval before the transaction could be completed. Upon receipt of a transfer application, NMFS would review a cooperative’s catch to ensure its salmon cap was reached and that an adequate amount of pollock was available. The transfer process could be through eLandings or using a paper application process. NMFS prefers online transfers because paper-based transfers increase staff burden, the time required to complete a transfer, and may only be completed during business hours.

Online accounting of pollock is dependent on the CAS structure, which is the primary repository for catch data. The online interface would need to allow harvesters and NMFS to check account balances, make and accept transfers of pollock, and allow account balances to be updated based on transferred pollock and inseason reallocations of pollock from the ICA and the Aleutian Islands, should such reallocations occur. The online system would not allow cooperatives to receive transfers of pollock if they do not have any remaining Chinook salmon PSC allocation. Thus, pollock allocation amounts and associated CAS account structure is dependent on whether salmon PSC is allocated to the cooperative level and transferability of salmon is allowed. Any changes to the CAS required for salmon allocation transfers would need to interface with pollock transfer accounting.

As noted in methods, the analysis 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. By year, comparing with and without transferability shows that adding transferability generally increases the amount of forgone pollock and reduces the effectiveness of saving chum salmon. (Table 5-80).

The fundamental purpose of allowing transfers and rollovers of PSC cap amounts that remain unharvested is to allow other sectors that may have attained their PSC caps to utilize remaining PSC cap amounts, under the aggregate cap, to harvest either all, or a portion of the remainder of their pollock allocation. In this way, transferability and rollovers of unused PSC caps are intended to maximize the economic yield from the pollock resouces while meeting the aggregate cap level deemed practicable by the Council. Clearly, increasing pollock harvest has economic benefits, in terms of revenue, to pollock harvesters while at the same time potentially reducing salmon savings that may occur if a sector hits its allocation of a cap and must stop fishing, either altogether (Alt. 2) or in a specific area (Alt. 3) and has no option to obtain (transfer) or receive (rollover) additional PSC allowances. The level of the salmon savings that may be deemed practicable with rollovers and tranfers can be set using the suboption which limit transfers and rollovers to either 50 percent, 70 percent, or 90 percent of available PSC cap.

Actual transferability options would be initially from sector specific allocations (the analysis above was as if there were no sector 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 PSC (within a cap) and less foregone pollock.

To provide some evaluation of this option one scenario to for Alternative 2, option 1a) with a cap of 50,000 and sector allocation 6. 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; 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.

Table 6-22 showing the pollock foregone by year and sector between the Alternative 2 1a) without transferability (default) and with transferability A subset of estimated sum of chum salmon saved (AEQ) by region and year under 3 different allocation schemes and hard caps for Alternative 2, component 2 **option 1a)**, 2004-2011 with and without transferabilit. The shaded column represents the sum of annual estimated AEQ impact that occurred due to pollock fishing whereas the other values represent the amount (in numbers of fish) that would have been saved had the measures been in place.

		Sector							
		CDQ Transferability?		CP Transferability?		M Transferability?		S Transferability?	
Cap	Year	No	Yes	No	Yes	No	Yes	No	Yes
	2003	33,787	61,451	32,926	67,320	28,469	42,436	220,230	191,720
	2004	51,765	77,704	289,711	132,913	50,902	51,002	204,602	231,894
	2005	22,469	65,580	127,176	246,828	68,474	58,303	303,437	298,886
	2006		89,774	93,943	295,256		74,320	360,034	338,987
50,000	2007	15,434	13,128	82,889	71,579	22,808	22,092	103,343	103,475
	2008								
	2009							13,558	
	2010								
	2011	2,323	43,597	151,590	186,988	60,464	51,428	215,455	209,896
	2003							28,381	
	2004		36,085	132,913	10,724	458	24,342	95,021	95,021
	2005		46,176	65,017	203,020	12,128	43,124	264,732	245,510
	2006		30,693		171,807		36,076	290,957	223,714
200,000	2007								
	2008								
	2009								
	2010								
	2011					27,827			
	2003								
	2004		21,477		3,336		20,322	67,238	57,316
	2005		34,094		156,000		32,341	238,356	196,470
	2006							201,854	
353,000	2007								
	2008								
	2009								
	2010								
	2011					7,574			

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

Under Alternative 2, if 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 Alternative 2 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 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 hade 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 3, 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 PSC under Amendment 91 also enable NMFS to monitor non-Chinook salmon PSC under a hard cap. Therefore, NMFS does not anticipate changes to observer requirements or additional monitoring provisions under either Alternative 2 or 3.

If the Council allocates hard caps or trigger caps among sectors and cooperatives, NMFS recommends that any entities receiving allocations be the same as those used for Chinook salmon PSC allocations under Amendment 91. 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.

Area closures could be managed in a number of different ways, depending on the combination of components and options selected. Trigger closures would require a sector to stop pollock fishing in certain closure areas when its allocation of non-Chinook salmon PSC is reached. Depending on the selection of subsequent components in this alternative, salmon may be allocated at the fishery level (CDQ and non-CDQ), to each sector (inshore, mothership, catcher/processor, and CDQ), or among the inshore cooperatives.

Under Alternative 3, participants in the RHS would be exempt from the regulatory closure system. Monitoring and enforcement of this alternative is similar to status quo in which ICA members are managed under the RHS and NMFS closes the trigger area for non-ICA members.

The current census data collection program is highly responsive to management needs and provides timely data, especially considering the logistics of the sectors and variation in operation type. However, even with this highly responsive system, a June and July cap results in a very short time period for NMFS to monitor and insure a timely trigger area closure. NMFS would need to project non-Chinook salmon harvest during the week required to publish a *Federal Register* notice and get census information. These projections may result in a trigger closure being made prior to or after the cap being reached.

If the Council recommends a chum salmon PSC management program under either Alternative 1 or Alternative 3 that provides exemptions to caps or area closures for participants in an approved ICA, NMFS will continue to require that the federal regulations contain sufficient detail to prevent later substantive revisions to the ICA that would reduce its effectiveness.

In addition, NMFS has determined that federal regulations for the RHS may not include specific requirements for the enforcement provisions or penalties that the ICA would impose on its participants. Therefore, in the future, under either Alternative 1 or Alternative 3, the Council could recommend that federal regulations require the RHS ICA to contain a description of the enforcement provisions and penalties that the ICA participants agree to assess on themselves for violation of the ICA provisions. However, the regulations could not include specific requirements for what these penalties must be.

The fishing industry will continue to incur costs associated with the administration of the RHS ICA. However, NMFS has not identified significant costs to the agency for managing or monitoring these alternatives. NMFS Office of Law Enforcement will provide additional information about the costs of enforcing Amendment 91 and the potential costs of the chum salmon PSC alternatives prior to Council final action.

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

This assessment provides a breakout of the shoreside processing sector 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 potentially forgone 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 6-23 Bering Sea pollock nominal ex-vessel value by season and port group ($millions), 2003-2011.

Season	Port Group	2003	2004	2005	2006	2007	2008	2009	2010	2011
A Season	AKU/DUT	$68	$73	$85	$85	$78	$90	$59	$48	$62
	Others	$4	$5	$7	$6	$6	$5	$3	$3	$4
	Total	**$72**	**$78**	**$91**	**$91**	**$84**	**$95**	**$62**	**$51**	**$66**
B season	AKU/DUT	$82	$75	$88	$92	$78	$99	$75	$64	$94
	Others	$5	$6	$7	$7	$6	$6	$3	$3	$5
	Total	**$87**	**$80**	**$95**	**$98**	**$84**	**$105**	**$78**	**$67**	**$99**
	Grand Total	**$158**	**$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 6-24 Bering Sea pollock shoreside processing nominal value added by season and port group ($millions), 2003-2011.

Season	Port Group	2003	2004	2005	2006	2007	2008	2009	2010	2011
A Season	AKU/DUT	$132	$141	$167	$154	$160	$160	$133	$138	$192
	Others	$3	$2	$4	$4	$4	$2	$2	$0	$1
	Total	**$135**	**$142**	**$171**	**$157**	**$165**	**$161**	**$135**	**$138**	**$193**
B season	AKU/DUT	$160	$144	$175	$166	$161	$176	$168	$181	$253
	Others	$3	$2	$4	$4	$5	$2	$3	$1	$1
	Total	**$163**	**$145**	**$179**	**$169**	**$166**	**$178**	**$171**	**$182**	**$254**
	Grand Total	**$297**	**$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 6-25 Bering Sea pollock total shoreside sector nominal value (ex-vessel value plus shoreside processing value added ($millions)) by season and port group, 2003-2011

Season	Port Group	2003	2004	2005	2006	2007	2008	2009	2010	2011
A Season	AKU/DUT	$200	$214	$252	$239	$238	$249	$192	$186	$255
	Others	$7	$7	$10	$10	$10	$7	$5	$3	$4
	Total	**$206**	**$221**	**$262**	**$248**	**$249**	**$256**	**$197**	**$189**	**$259**
B season	AKU/DUT	$241	$218	$263	$257	$239	$275	$243	$245	$347
	Others	$8	$7	$11	$10	$10	$8	$6	$4	$6
	Total	**$249**	**$225**	**$274**	**$268**	**$250**	**$283**	**$249**	**$249**	**$353**
	Grand Total	**$456**	**$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 6-26 B Season Bering Sea pollock processing nominal value, by port group, as a percent of total B season first wholesale gross revenue, 2003-2011.

Port Group	Season	2003	2004	2005	2006	2007	2008	2009	2010	2011
AKU/DUT	B	96.8%	96.8%	96.1%	96.1%	95.9%	97.3%	97.6%	98.4%	98.4%
All Others	B	3.2%	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.

As shown in Table 6-27 through
Table 6-29, the effect of hard cap allocation scenarios and cap levels on shoreside value added in dollars, percent of B season total gross revenue, and in percent of annual total gross revenue, repectively. 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 revenue from the CV sector. In the worst cases, potentially forgone shoreside value added revenue exceeds $161 million, or approximately 97 percent of B season total gross revenue and approximately 48 percent of total annual goross 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 anlsysis 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 6-27 Hypothetical potentially forgone ex-vessel nominal revenue and shoreside nominal value added pollock first wholesale revenue by year, season, and aggregated port group under Alternative 2, Option 1a ($ Millions) 2003-2011.

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**
2003	$40.48	$78.97	$2.43	$1.54	2003					2003				
2004	$39.38	$75.91	$2.92	$0.86	2004	$17.66	$34.05	$1.31	$0.39	2004	$7.16	$13.80	$0.53	$0.16
2005	$67.47	$133.62	$5.19	$3.03	2005	$57.60	$114.09	$4.43	$2.59	2005	$45.31	$89.74	$3.49	$2.04
2006	$86.21	$155.54	$6.17	$3.57	2006	$57.54	$103.82	$4.12	$2.38	2006				
2007	$19.32	$39.75	$1.44	$1.11	2007					2007				
2008					2008					2008				
2009					2009					2009				
2010					2010					2010				
2011	$59.15	$159.19	$3.03	$0.55	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**
2003	$45.72	$89.19	$2.75	$1.74	2003	$5.89	$11.49	$0.35	$0.22	2003				
2004	$40.33	$77.73	$2.99	$0.88	2004	$18.73	$36.10	$1.39	$0.41	2004	$13.25	$25.55	$0.98	$0.29
2005	$68.49	$135.66	$5.27	$3.08	2005	$59.76	$118.35	$4.60	$2.69	2005	$53.80	$106.56	$4.14	$2.42
2006	$86.21	$155.54	$6.17	$3.57	2006	$69.67	$125.70	$4.99	$2.89	2006	$48.34	$87.20	$3.46	$2.00
2007	$24.72	$50.86	$1.84	$1.42	2007					2007				
2008					2008					2008				
2009	$4.86	$10.88	$0.21	$0.17	2009					2009				
2010					2010					2010				
2011	$67.63	$182.02	$3.47	$0.63	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**
2003	$51.60	$100.67	$3.10	$1.97	2003	$14.41	$28.12	$0.87	$0.55	2003				
2004	$44.59	$85.95	$3.30	$0.98	2004	$30.08	$57.98	$2.23	$0.66	2004	$17.66	$34.05	$1.31	$0.39
2005	$72.43	$143.46	$5.58	$3.26	2005	$65.83	$130.38	$5.07	$2.96	2005	$57.69	$114.27	$4.44	$2.59
2006	$89.47	$161.41	$6.40	$3.71	2006	$78.64	$141.88	$5.63	$3.26	2006	$58.36	$105.29	$4.18	$2.42
2007	$28.64	$58.92	$2.13	$1.65	2007					2007				
2008					2008					2008				
2009	$23.17	$51.88	$1.01	$0.82	2009					2009				
2010					2010					2010				
2011	$76.15	$204.95	$3.90	$0.71	2011	$19.25	$51.82	$0.99	$0.18	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 revenue and shoreside nominal value added pollock first wholesale processing revenue by year, season, and aggregated port group under Alternative 2, Option 1a, in percent of B season sector revenue, 2003-2011.

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**
2003	46.7%	48.6%	2.8%	0.9%	2003					2003				
2004	49.2%	52.2%	3.6%	0.6%	2004	22.1%	23.4%	1.6%	0.3%	2004	8.9%	9.5%	0.7%	0.1%
2005	71.1%	74.8%	5.5%	1.7%	2005	60.7%	63.9%	4.7%	1.5%	2005	47.7%	50.2%	3.7%	1.1%
2006	87.6%	91.8%	6.3%	2.1%	2006	58.5%	61.3%	4.2%	1.4%	2006				
2007	23.0%	24.0%	1.7%	0.7%	2007					2007				
2008					2008					2008				
2009					2009					2009				
2010					2010					2010				
2011	59.9%	62.7%	3.1%	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**
2003	52.7%	54.8%	3.2%	1.1%	2003	6.8%	7.1%	0.4%	0.1%	2003				
2004	50.4%	53.5%	3.7%	0.6%	2004	23.4%	24.8%	1.7%	0.3%	2004	16.6%	17.6%	1.2%	0.2%
2005	72.1%	76.0%	5.6%	1.7%	2005	62.9%	66.3%	4.8%	1.5%	2005	56.7%	59.7%	4.4%	1.4%
2006	87.6%	91.8%	6.3%	2.1%	2006	70.8%	74.2%	5.1%	1.7%	2006	49.1%	51.5%	3.5%	1.2%
2007	29.4%	30.7%	2.2%	0.9%	2007					2007				
2008					2008					2008				
2009	6.2%	6.4%	0.3%	0.1%	2009					2009				
2010					2010					2010				
2011	68.5%	71.7%	3.5%	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**
2003	59.5%	61.9%	3.6%	1.2%	2003	16.6%	17.3%	1.0%	0.3%	2003				
2004	55.7%	59.1%	4.1%	0.7%	2004	37.6%	39.9%	2.8%	0.5%	2004	22.1%	23.4%	1.6%	0.3%
2005	76.3%	80.3%	5.9%	1.8%	2005	69.3%	73.0%	5.3%	1.7%	2005	60.8%	64.0%	4.7%	1.5%
2006	90.8%	95.2%	6.5%	2.2%	2006	79.8%	83.6%	5.7%	1.9%	2006	59.3%	62.1%	4.2%	1.4%
2007	34.0%	35.6%	2.5%	1.0%	2007					2007				
2008					2008					2008				
2009	29.6%	30.4%	1.3%	0.5%	2009					2009				
2010					2010					2010				
2011	77.1%	80.8%	4.0%	0.3%	2011	19.5%	20.4%	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 6-29 Hypothetical potentially forgone ex-vessel nominal revenue and shoreside nominal value added pollock first wholesale processing revenue by year, season, and aggregated port group under Alternative 2, Option 1a, in percent of total annual sector revenue, 2003-2011.\

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**
2003	25.5%	26.6%	0.8%	0.5%	2003					2003				
2004	24.8%	26.4%	1.0%	0.3%	2004	11.1%	11.8%	0.8%	0.1%	2004	4.5%	4.8%	0.3%	0.1%
2005	36.3%	38.2%	1.5%	0.9%	2005	31.0%	32.6%	2.4%	0.7%	2005	24.4%	25.6%	1.9%	0.6%
2006	45.4%	47.6%	1.9%	1.1%	2006	30.3%	31.8%	2.2%	0.7%	2006				
2007	11.5%	12.0%	0.4%	0.3%	2007					2007				
2008					2008					2008				
2009					2009					2009				
2010					2010					2010				
2011	35.9%	35.6%	0.7%	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**
2003	28.9%	30.0%	1.7%	0.6%	2003	3.7%	3.9%	0.2%	0.1%	2003				
2004	25.4%	27.0%	1.9%	0.3%	2004	11.8%	12.5%	0.9%	0.1%	2004	8.4%	8.9%	0.6%	0.1%
2005	36.8%	38.8%	2.8%	0.9%	2005	32.1%	33.8%	2.5%	0.8%	2005	28.9%	30.5%	2.2%	0.7%
2006	45.4%	47.6%	3.3%	1.1%	2006	36.7%	38.5%	2.6%	0.9%	2006	25.5%	26.7%	1.8%	0.6%
2007	14.7%	15.4%	1.1%	0.4%	2007					2007				
2008					2008					2008				
2009	3.5%	3.6%	0.2%	0.1%	2009					2009				
2010					2010					2010				
2011	41.0%	40.8%	2.1%	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**
2003	32.6%	33.9%	2.0%	0.7%	2003	9.1%	9.5%	0.5%	0.2%	2003				
2004	28.1%	29.9%	2.1%	0.3%	2004	19.0%	20.2%	1.4%	0.2%	2004	11.1%	11.8%	0.8%	0.1%
2005	38.9%	41.0%	3.0%	0.9%	2005	35.4%	37.3%	2.7%	0.8%	2005	31.0%	32.7%	2.4%	0.7%
2006	47.1%	49.4%	3.4%	1.1%	2006	41.4%	43.4%	3.0%	1.0%	2006	30.7%	32.2%	2.2%	0.7%
2007	17.1%	17.8%	1.3%	0.5%	2007					2007				
2008					2008					2008				
2009	16.5%	17.0%	0.7%	0.3%	2009					2009				
2010					2010					2010				
2011	46.2%	45.9%	2.4%	0.2%	2011	11.7%	11.6%	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.

Table 6-30 Hypothetical potentially forgone ex-vessel nominal revenue and shoreside nominal value added pollock first wholesale revenue by year, season, and aggregated port group under Alternative 2, Option 1b ($ Millions) 2003-2011.

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**
2003	$40.48	$78.97	$2.43	$1.54	2003					2003				
2004					2004					2004				
2005	$26.73	$52.94	$2.06	$1.20	2005	$18.87	$37.38	$1.45	$0.85	2005	$17.47	$34.59	$1.34	$0.79
2006	$35.85	$64.68	$2.57	$1.49	2006	$27.57	$49.73	$1.97	$1.14	2006	$25.04	$45.17	$1.79	$1.04
2007					2007					2007				
2008					2008					2008				
2009	$1.34	$3.01	$0.06	$0.05	2009					2009				
2010					2010					2010				
2011	$43.35	$116.67	$2.22	$0.40	2011	$12.86	$34.60	$0.66	$0.12	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**
2003	$4.90	$9.56	$0.29	$0.19	2003					2003				
2004	$1.11	$2.15	$0.08	$0.02	2004					2004				
2005	$30.11	$59.64	$2.32	$1.35	2005	$19.10	$37.83	$1.47	$0.86	2005	$17.47	$34.59	$1.34	$0.79
2006	$35.85	$64.68	$2.57	$1.49	2006	$32.60	$58.82	$2.33	$1.35	2006	$25.04	$45.17	$1.79	$1.04
2007	$1.81	$3.72	$0.13	$0.10	2007					2007				
2008					2008					2008				
2009	$8.09	$18.11	$0.35	$0.29	2009					2009				
2010					2010					2010				
2011	$86.86	$233.77	$4.45	$0.81	2011	$60.18	$161.98	$3.09	$0.56	2011	$31.71	$85.35	$1.63	$0.30
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**
2003	$10.32	$20.14	$0.62	$0.39	2003					2003				
2004	$3.57	$6.87	$0.26	$0.08	2004					2004				
2005	$32.46	$64.29	$2.50	$1.46	2005	$21.80	$43.18	$1.68	$0.98	2005	$18.87	$37.38	$1.45	$0.85
2006	$35.85	$64.68	$2.57	$1.49	2006	$35.85	$64.68	$2.57	$1.49	2006	$27.57	$49.73	$1.97	$1.14
2007	$5.50	$11.32	$0.41	$0.32	2007					2007				
2008					2008					2008				
2009	$20.08	$44.96	$0.88	$0.71	2009					2009				
2010					2010					2010				
2011	$88.67	$238.65	$4.55	$0.83	2011	$70.16	$188.84	$3.60	$0.65	2011	$54.36	$146.29	$2.79	$0.51

Table 6-31 Hypothetical potentially forgone ex-vessel nominal revenue and shoreside value added pollock first wholesale revenue by year, season, and aggregated port group under Alternative 2, Option 1b, in percent of B season sector revenue, 2003-2011.

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**
2003	46.7%	48.6%	2.8%	0.9%	2003					2003				
2004					2004					2004				
2005	28.2%	29.6%	2.2%	0.7%	2005	19.9%	20.9%	1.5%	0.5%	2005	18.4%	19.4%	1.4%	0.4%
2006	36.4%	38.2%	2.6%	0.9%	2006	28.0%	29.4%	2.0%	0.7%	2006	25.5%	26.7%	1.8%	0.6%
2007					2007					2007				
2008					2008					2008				
2009	1.7%	1.8%	0.1%	0.0%	2009					2009				
2010					2010					2010				
2011	43.9%	46.0%	2.3%	0.2%	2011	13.0%	13.6%	0.7%	0.0%	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**
2003	5.7%	5.9%	0.3%	0.1%	2003					2003				
2004	1.4%	1.5%	0.1%	0.0%	2004					2004				
2005	31.7%	33.4%	2.4%	0.8%	2005	20.1%	21.2%	1.5%	0.5%	2005	18.4%	19.4%	1.4%	0.4%
2006	36.4%	38.2%	2.6%	0.9%	2006	33.1%	34.7%	2.4%	0.8%	2006	25.5%	26.7%	1.8%	0.6%
2007	2.1%	2.2%	0.2%	0.1%	2007					2007				
2008					2008					2008				
2009	10.3%	10.6%	0.5%	0.2%	2009					2009				
2010					2010					2010				
2011	87.9%	92.1%	4.5%	0.3%	2011	60.9%	63.8%	3.1%	0.2%	2011	32.1%	33.6%	1.6%	0.1%

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**
2003	11.9%	12.4%	0.7%	0.2%	2003					2003				
2004	4.5%	4.7%	0.3%	0.1%	2004					2004				
2005	34.2%	36.0%	2.6%	0.8%	2005	23.0%	24.2%	1.8%	0.5%	2005	19.9%	20.9%	1.5%	0.5%
2006	36.4%	38.2%	2.6%	0.9%	2006	36.4%	38.2%	2.6%	0.9%	2006	28.0%	29.4%	2.0%	0.7%
2007	6.5%	6.8%	0.5%	0.2%	2007					2007				
2008					2008					2008				
2009	25.6%	26.3%	1.1%	0.4%	2009					2009				
2010					2010					2010				
2011	89.8%	94.1%	4.6%	0.3%	2011	71.0%	74.4%	3.6%	0.3%	2011	55.0%	57.7%	2.8%	0.2%

Table 6-32 Hypothetical potentially forgone ex-vessel revenue and shoreside nominal value added pollock first wholesale revenue by year, season, and aggregated port group under Alternative 2, Option 1b, in percent of total annual sector revenue, 2003-2011.

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**
2003	25.5%	26.6%	0.8%	0.5%	2003					2003				
2004					2003					2004				
2005	14.4%	15.1%	0.6%	0.3%	2003	10.1%	10.7%	0.8%	0.2%	2005	9.4%	9.9%	0.7%	0.2%
2006	18.9%	19.8%	0.8%	0.5%	2003	14.5%	15.2%	1.0%	0.3%	2006	13.2%	13.8%	0.9%	0.3%
2007					2003					2007				
2008					2003					2008				
2009	1.0%	1.0%	0.0%	0.0%	2003					2009				
2010					2003					2010				
2011	26.3%	26.1%	0.5%	0.1%	2003	7.8%	7.7%	0.4%	0.0%	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**
2003	3.1%	3.2%	0.2%	0.1%	2003					2003				
2004	0.7%	0.7%	0.1%	0.0%	2004					2004				
2005	16.2%	17.0%	1.2%	0.4%	2005	10.3%	10.8%	0.8%	0.2%	2005	9.4%	9.9%	0.7%	0.2%
2006	18.9%	19.8%	1.4%	0.5%	2006	17.2%	18.0%	1.2%	0.4%	2006	13.2%	13.8%	0.9%	0.3%
2007	1.1%	1.1%	0.1%	0.0%	2007					2007				
2008					2008					2008				
2009	5.8%	5.9%	0.3%	0.1%	2009					2009				
2010					2010					2010				
2011	52.7%	52.3%	2.7%	0.2%	2011	36.5%	36.3%	1.9%	0.1%	2011	19.2%	19.1%	1.0%	0.1%
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**
2003	6.5%	6.8%	0.4%	0.1%	2003					2003				
2004	2.2%	2.4%	0.2%	0.0%	2004					2004				
2005	17.4%	18.4%	1.3%	0.4%	2005	11.7%	12.3%	0.9%	0.3%	2005	10.1%	10.7%	0.8%	0.2%
2006	18.9%	19.8%	1.4%	0.5%	2006	18.9%	19.8%	1.4%	0.5%	2006	14.5%	15.2%	1.0%	0.3%
2007	3.3%	3.4%	0.2%	0.1%	2007					2007				
2008					2008					2008				
2009	14.3%	14.7%	0.6%	0.2%	2009					2009				
2010					2010					2010				
2011	53.8%	53.4%	2.8%	0.2%	2011	42.5%	42.3%	2.2%	0.1%	2011	33.0%	32.8%	1.7%	0.1%

Table 6-33 through Table 6-44 shoreside value added under Alternative 3 in dollars, percent of B season total gross revenue, and in percent of annual total gross revenue, for each of the Alternatgive 3 options. 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 revenue from the CV sector. In the worst cases, potentially forgone shoreside value added revenue exceeds $119 million, or approximately 67 percent of B season total gross revenue and approximately 34 percent of total annual goross 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 impacta anlsysis 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 3.

Table 6-33 Hypothetical “at risk” ex-vessel nominal revenue and and shoreside nominal value added pollock first wholesale revenue by year, season, and aggregated port group under Alternative 3, Option 1a ($ Millions), 2003-2011.

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**
2003	$47.39	$92.45	$2.85	$1.81	2003	$21.66	$42.26	$1.30	$0.83	2003				
2004	$40.24	$77.56	$2.98	$0.88	2004	$30.18	$58.17	$2.24	$0.66	2004	$13.83	$26.66	$1.03	$0.30
2005	$54.11	$107.16	$4.16	$2.43	2005	$48.26	$95.58	$3.71	$2.17	2005	$40.95	$81.10	$3.15	$1.84
2006	$47.92	$86.46	$3.43	$1.99	2006	$38.65	$69.73	$2.77	$1.60	2006	$26.28	$47.42	$1.88	$1.09
2007	$20.55	$42.28	$1.53	$1.18	2007					2007				
2008					2008					2008				
2009	$8.79	$19.68	$0.38	$0.31	2009					2009				
2010					2010					2010				
2011	$52.14	$140.34	$2.67	$0.49	2011	$30.96	$83.32	$1.59	$0.29	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**
2003	$47.39	$92.45	$2.85	$1.81	2003	$32.49	$63.40	$1.95	$1.24	2003	$5.42	$10.57	$0.33	$0.21
2004	$40.24	$77.56	$2.98	$0.88	2004	$31.44	$60.59	$2.33	$0.69	2004	$15.09	$29.09	$1.12	$0.33
2005	$55.57	$110.06	$4.28	$2.50	2005	$49.72	$98.47	$3.83	$2.24	2005	$42.41	$83.99	$3.26	$1.91
2006	$47.92	$86.46	$3.43	$1.99	2006	$40.20	$72.52	$2.88	$1.67	2006	$30.92	$55.78	$2.21	$1.28
2007	$21.92	$45.10	$1.63	$1.26	2007	$13.70	$28.19	$1.02	$0.79	2007				
2008					2008					2008				
2009	$8.79	$19.68	$0.38	$0.31	2009					2009				
2010					2010					2010				
2011	$57.03	$153.49	$2.92	$0.53	2011	$42.37	$114.02	$2.17	$0.39	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**
2003	$51.45	$100.38	$3.09	$1.96	2003	$41.97	$81.89	$2.52	$1.60	2003	$12.19	$23.77	$0.73	$0.46
2004	$40.24	$77.56	$2.98	$0.88	2004	$35.21	$67.87	$2.61	$0.77	2004	$26.41	$50.90	$1.96	$0.58
2005	$59.96	$118.75	$4.62	$2.70	2005	$49.72	$98.47	$3.83	$2.24	2005	$48.26	$95.58	$3.71	$2.17
2006	$47.92	$86.46	$3.43	$1.99	2006	$44.83	$80.89	$3.21	$1.86	2006	$38.65	$69.73	$2.77	$1.60
2007	$23.29	$47.92	$1.73	$1.34	2007	$17.81	$36.65	$1.32	$1.03	2007				
2008	$5.01	$8.90	$0.28	$0.10	2008					2008				
2009	$8.79	$19.68	$0.38	$0.31	2009	$3.77	$8.43	$0.16	$0.13	2009				
2010					2010					2010				
2011	$58.66	$157.88	$3.01	$0.55	2011	$45.63	$122.79	$2.34	$0.42	2011	$17.92	$48.24	$0.92	$0.17

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 revenue by year, season, and aggregated port group under Alternative 3, Option 1a, in percent of B season sector revenue, 2003-2009).

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**
2003	54.7%	56.8%	3.3%	1.1%	2003	25.0%	26.0%	1.5%	0.5%	2003				
2004	50.3%	53.4%	3.7%	0.6%	2004	37.7%	40.0%	2.8%	0.5%	2004	17.3%	18.3%	1.3%	0.2%
2005	57.0%	60.0%	4.4%	1.4%	2005	50.8%	53.5%	3.9%	1.2%	2005	43.1%	45.4%	3.3%	1.0%
2006	48.7%	51.0%	3.5%	1.2%	2006	39.3%	41.2%	2.8%	0.9%	2006	26.7%	28.0%	1.9%	0.6%
2007	24.4%	25.5%	1.8%	0.7%	2007					2007				
2008					2008					2008				
2009	11.2%	11.5%	0.5%	0.2%	2009					2009				
2010					2010					2010				
2011	52.8%	55.3%	2.7%	0.2%	2011	31.3%	32.8%	1.6%	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**
2003	54.7%	56.8%	3.3%	1.1%	2003	37.5%	39.0%	2.3%	0.8%	2003	6.2%	6.5%	0.4%	0.1%
2004	50.3%	53.4%	3.7%	0.6%	2004	39.3%	41.7%	2.9%	0.5%	2004	18.8%	20.0%	1.4%	0.2%
2005	58.5%	61.6%	4.5%	1.4%	2005	52.4%	55.1%	4.0%	1.3%	2005	44.7%	47.0%	3.4%	1.1%
2006	48.7%	51.0%	3.5%	1.2%	2006	40.9%	42.8%	2.9%	1.0%	2006	31.4%	32.9%	2.2%	0.8%
2007	26.1%	27.2%	1.9%	0.8%	2007	16.3%	17.0%	1.2%	0.5%	2007				
2008					2008					2008				
2009	11.2%	11.5%	0.5%	0.2%	2009					2009				
2010					2010					2010				
2011	57.7%	60.5%	3.0%	0.2%	2011	42.9%	44.9%	2.2%	0.2%	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**
2003	59.4%	61.7%	3.6%	1.2%	2003	48.4%	50.4%	2.9%	1.0%	2003	14.1%	14.6%	0.8%	0.3%
2004	50.3%	53.4%	3.7%	0.6%	2004	44.0%	46.7%	3.3%	0.5%	2004	33.0%	35.0%	2.4%	0.4%
2005	63.1%	66.5%	4.9%	1.5%	2005	52.4%	55.1%	4.0%	1.3%	2005	50.8%	53.5%	3.9%	1.2%
2006	48.7%	51.0%	3.5%	1.2%	2006	45.6%	47.7%	3.3%	1.1%	2006	39.3%	41.2%	2.8%	0.9%
2007	27.7%	29.0%	2.1%	0.8%	2007	21.2%	22.1%	1.6%	0.6%	2007				
2008	4.8%	5.0%	0.3%	0.1%	2008					2008				
2009	11.2%	11.5%	0.5%	0.2%	2009	4.8%	4.9%	0.2%	0.1%	2009				
2010					2010					2010				
2011	59.4%	62.2%	3.0%	0.2%	2011	46.2%	48.4%	2.4%	0.2%	2011	18.1%	19.0%	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 6-35 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 3, Option 1a, in percent of total annual sector revenue, 2003-2011.

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
2003	29.9%	31.1%	1.0%	0.6%	2003	13.7%	14.2%	0.8%	0.3%	2003				
2004	25.4%	27.0%	1.0%	0.3%	2003	19.0%	20.2%	1.4%	0.2%	2004	8.7%	9.3%	0.6%	0.1%
2005	29.1%	30.6%	1.2%	0.7%	2003	25.9%	27.3%	2.0%	0.6%	2005	22.0%	23.2%	1.7%	0.5%
2006	25.3%	26.5%	1.1%	0.6%	2003	20.4%	21.4%	1.5%	0.5%	2006	13.9%	14.5%	1.0%	0.3%
2007	12.2%	12.8%	0.5%	0.4%	2003					2007				
2008					2003					2008				
2009	6.3%	6.4%	0.1%	0.1%	2003					2009				
2010					2003					2010				
2011	31.6%	31.4%	0.6%	0.1%	2003	18.8%	18.7%	1.0%	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
2003	29.9%	31.1%	1.8%	0.6%	2003	20.5%	21.3%	1.2%	0.4%	2003	3.4%	3.6%	0.2%	0.1%
2004	25.4%	27.0%	1.9%	0.3%	2004	19.8%	21.1%	1.5%	0.2%	2004	9.5%	10.1%	0.7%	0.1%
2005	29.9%	31.5%	2.3%	0.7%	2005	26.7%	28.1%	2.1%	0.6%	2005	22.8%	24.0%	1.8%	0.5%
2006	25.3%	26.5%	1.8%	0.6%	2006	21.2%	22.2%	1.5%	0.5%	2006	16.3%	17.1%	1.2%	0.4%
2007	13.1%	13.7%	1.0%	0.4%	2007	8.2%	8.5%	0.6%	0.2%	2007				
2008					2008					2008				
2009	6.3%	6.4%	0.3%	0.1%	2009					2009				
2010					2010					2010				
2011	34.6%	34.4%	1.8%	0.1%	2011	25.7%	25.5%	1.3%	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
2003	32.5%	33.8%	2.0%	0.7%	2003	26.5%	27.5%	1.6%	0.5%	2003	7.7%	8.0%	0.5%	0.2%
2004	25.4%	27.0%	1.9%	0.3%	2004	22.2%	23.6%	1.6%	0.3%	2004	16.7%	17.7%	1.2%	0.2%
2005	32.2%	33.9%	2.5%	0.8%	2005	26.7%	28.1%	2.1%	0.6%	2005	25.9%	27.3%	2.0%	0.6%
2006	25.3%	26.5%	1.8%	0.6%	2006	23.7%	24.8%	1.7%	0.6%	2006	20.4%	21.4%	1.5%	0.5%
2007	13.9%	14.5%	1.0%	0.4%	2007	10.6%	11.1%	0.8%	0.3%	2007				
2008	2.5%	2.6%	0.1%	0.0%	2008					2008				
2009	6.3%	6.4%	0.3%	0.1%	2009	2.7%	2.8%	0.1%	0.0%	2009				
2010					2010					2010				
2011	35.6%	35.4%	1.8%	0.1%	2011	27.7%	27.5%	1.4%	0.1%	2011	10.9%	10.8%	0.6%	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 6-36 Hypothetical "at risk" ex-vessel nominal reveue and shoreside nominal value added pollock first wholesale processing revenue by year, season, and aggregated port group under Alternative 3, Option 1b ($ Millions), 2003-2011.

2ii (sector allocation 1) Option 1b.														
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**
2003	$5.14	$10.03	$0.31	$0.20	2003					2003				
2004	$2.32	$4.48	$0.17	$0.05	2004					2004				
2005	$27.57	$54.60	$2.12	$1.24	2005	$20.29	$40.18	$1.56	$0.91	2005	$15.49	$30.68	$1.19	$0.70
2006	$21.62	$39.01	$1.55	$0.90	2006	$21.62	$39.01	$1.55	$0.90	2006	$14.61	$26.36	$1.05	$0.61
2007	$1.71	$3.52	$0.13	$0.10	2007					2007				
2008					2008					2008				
2009	$4.47	$10.00	$0.19	$0.16	2009	$0.47	$1.06	$0.02	$0.02	2009				
2010					2010					2010				
2011	$27.00	$72.67	$1.38	$0.25	2011	$19.83	$53.36	$1.02	$0.18	2011	$6.08	$16.36	$0.31	$0.06

4ii (sector allocation 2) Option 1b.														
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**
2003	$7.41	$14.45	$0.45	$0.28	2003					2003				
2004	$6.49	$12.50	$0.48	$0.14	2004					2004				
2005	$27.57	$54.60	$2.12	$1.24	2005	$21.84	$43.26	$1.68	$0.98	2005	$15.64	$30.98	$1.20	$0.70
2006	$23.03	$41.55	$1.65	$0.95	2006	$21.62	$39.01	$1.55	$0.90	2006	$18.37	$33.14	$1.31	$0.76
2007	$2.83	$5.83	$0.21	$0.16	2007					2007				
2008	$0.59	$1.04	$0.03	$0.01	2008					2008				
2009	$4.77	$10.67	$0.21	$0.17	2009	$0.63	$1.40	$0.03	$0.02	2009				
2010	$1.59	$4.53	$0.09	$0.02	2010					2010				
2011	$27.00	$72.67	$1.38	$0.25	2011	$20.90	$56.25	$1.07	$0.19	2011	$8.91	$23.97	$0.46	$0.08

6 (sector allocation 3) Option 1b.														
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**
2003	$10.10	$19.71	$0.61	$0.38	2003	$2.87	$5.60	$0.17	$0.11	2003				
2004	$9.80	$18.88	$0.73	$0.21	2004	$0.95	$1.83	$0.07	$0.02	2004				
2005	$30.50	$60.42	$2.35	$1.37	2005	$25.22	$49.95	$1.94	$1.13	2005	$16.99	$33.65	$1.31	$0.76
2006	$23.03	$41.55	$1.65	$0.95	2006	$21.62	$39.01	$1.55	$0.90	2006	$21.62	$39.01	$1.55	$0.90
2007	$4.68	$9.63	$0.35	$0.27	2007	$0.40	$0.83	$0.03	$0.02	2007				
2008	$3.75	$6.65	$0.21	$0.08	2008					2008				
2009	$7.90	$17.69	$0.34	$0.28	2009	$1.55	$3.47	$0.07	$0.06	2009				
2010	$3.81	$10.85	$0.21	$0.04	2010					2010				
2011	$27.00	$72.67	$1.38	$0.25	2011	$25.19	$67.79	$1.29	$0.23	2011	$13.07	$35.18	$0.67	$0.12

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 revenue and shoreside nominal value added pollock first wholesale processing revenue by year, season, and aggregated port group under Alternative 3 Option 1b, in percent of B season sector revenue, 2003-2011.

2ii (sector allocation 1) Option 1b.

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**
2003	5.9%	6.2%	0.4%	0.1%	2003					2003				
2004	2.9%	3.1%	0.2%	0.0%	2004					2004				
2005	29.0%	30.6%	2.2%	0.7%	2005	21.4%	22.5%	1.6%	0.5%	2005	16.3%	17.2%	1.3%	0.4%
2006	22.0%	23.0%	1.6%	0.5%	2006	22.0%	23.0%	1.6%	0.5%	2006	14.9%	15.6%	1.1%	0.4%
2007	2.0%	2.1%	0.2%	0.1%	2007					2007				
2008					2008					2008				
2009	5.7%	5.9%	0.2%	0.1%	2009	0.6%	0.6%	0.0%	0.0%	2009				
2010					2010					2010				
2011	27.3%	28.6%	1.4%	0.1%	2011	20.1%	21.0%	1.0%	0.1%	2011	6.2%	6.4%	0.3%	0.0%

4ii (sector allocation 2) Option 1b.

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**
2003	8.5%	8.9%	0.5%	0.2%	2003					2003				
2004	8.1%	8.6%	0.6%	0.1%	2004					2004				
2005	29.0%	30.6%	2.2%	0.7%	2005	23.0%	24.2%	1.8%	0.5%	2005	16.5%	17.3%	1.3%	0.4%
2006	23.4%	24.5%	1.7%	0.6%	2006	22.0%	23.0%	1.6%	0.5%	2006	18.7%	19.6%	1.3%	0.4%
2007	3.4%	3.5%	0.3%	0.1%	2007					2007				
2008	0.6%	0.6%	0.0%	0.0%	2008					2008				
2009	6.1%	6.3%	0.3%	0.1%	2009	0.8%	0.8%	0.0%	0.0%	2009				
2010	2.4%	2.5%	0.1%	0.0%	2010					2010				
2011	27.3%	28.6%	1.4%	0.1%	2011	21.2%	22.2%	1.1%	0.1%	2011	9.0%	9.4%	0.5%	0.0%

6 (sector allocation 3) Option 1b.

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**
2003	11.7%	12.1%	0.7%	0.2%	2003	3.3%	3.4%	0.2%	0.1%	2003				
2004	12.2%	13.0%	0.9%	0.1%	2004	1.2%	1.3%	0.1%	0.0%	2004				
2005	32.1%	33.8%	2.5%	0.8%	2005	26.6%	28.0%	2.0%	0.6%	2005	17.9%	18.8%	1.4%	0.4%
2006	23.4%	24.5%	1.7%	0.6%	2006	22.0%	23.0%	1.6%	0.5%	2006	22.0%	23.0%	1.6%	0.5%
2007	5.6%	5.8%	0.4%	0.2%	2007	0.5%	0.5%	0.0%	0.0%	2007				
2008	3.6%	3.7%	0.2%	0.0%	2008					2008				
2009	10.1%	10.4%	0.4%	0.2%	2009	2.0%	2.0%	0.1%	0.0%	2009				
2010	5.7%	6.0%	0.3%	0.0%	2010					2010				
2011	27.3%	28.6%	1.4%	0.1%	2011	25.5%	26.7%	1.3%	0.1%	2011	13.2%	13.9%	0.7%	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 6-38 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 3 Option 1b, in percent of total annual sector revenue, 2003-2011.

2ii (sector allocation 1) Option 1b.														
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**
2003	3.2%	3.4%	0.1%	0.1%	2003					2003				
2004	1.5%	1.6%	0.1%	0.0%	2003					2004				
2005	14.8%	15.6%	0.6%	0.4%	2003	10.9%	11.5%	0.8%	0.3%	2005	8.3%	8.8%	0.6%	0.2%
2006	11.4%	11.9%	0.5%	0.3%	2003	11.4%	11.9%	0.8%	0.3%	2006	7.7%	8.1%	0.6%	0.2%
2007	1.0%	1.1%	0.0%	0.0%	2003					2007				
2008					2003					2008				
2009	3.2%	3.3%	0.1%	0.1%	2003	0.3%	0.3%	0.0%	0.0%	2009				
2010					2003					2010				
2011	16.4%	16.3%	0.3%	0.1%	2003	12.0%	11.9%	0.6%	0.0%	2011	3.7%	3.7%	0.2%	0.0%
4ii (sector allocation 2) Option 1b.														
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**
2003	4.7%	4.9%	0.3%	0.1%	2003					2003				
2004	4.1%	4.3%	0.3%	0.0%	2004					2004				
2005	14.8%	15.6%	1.1%	0.4%	2005	11.7%	12.4%	0.9%	0.3%	2005	8.4%	8.9%	0.6%	0.2%
2006	12.1%	12.7%	0.9%	0.3%	2006	11.4%	11.9%	0.8%	0.3%	2006	9.7%	10.2%	0.7%	0.2%
2007	1.7%	1.8%	0.1%	0.0%	2007					2007				
2008	0.3%	0.3%	0.0%	0.0%	2008					2008				
2009	3.4%	3.5%	0.1%	0.1%	2009	0.4%	0.5%	0.0%	0.0%	2009				
2010	1.3%	1.4%	0.1%	0.0%	2010					2010				
2011	16.4%	16.3%	0.8%	0.1%	2011	12.7%	12.6%	0.6%	0.0%	2011	5.4%	5.4%	0.3%	0.0%
6 (sector allocation 3) Option 1b.														
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**
2003	6.4%	6.6%	0.4%	0.1%	2003	1.8%	1.9%	0.1%	0.0%	2003				
2004	6.2%	6.6%	0.5%	0.1%	2004	0.6%	0.6%	0.0%	0.0%	2004				
2005	16.4%	17.3%	1.3%	0.4%	2005	13.6%	14.3%	1.0%	0.3%	2005	9.1%	9.6%	0.7%	0.2%
2006	12.1%	12.7%	0.9%	0.3%	2006	11.4%	11.9%	0.8%	0.3%	2006	11.4%	11.9%	0.8%	0.3%
2007	2.8%	2.9%	0.2%	0.1%	2007	0.2%	0.3%	0.0%	0.0%	2007				
2008	1.9%	2.0%	0.1%	0.0%	2008					2008				
2009	5.6%	5.8%	0.2%	0.1%	2009	1.1%	1.1%	0.0%	0.0%	2009				
2010	3.2%	3.4%	0.2%	0.0%	2010					2010				
2011	16.4%	16.3%	0.8%	0.1%	2011	15.3%	15.2%	0.8%	0.1%	2011	7.9%	7.9%	0.4%	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 6-39 Hypothetical “at risk” ex-vesel nominal revenue and shoreside nominal value added pollock first wholesale processing revenue by year, season, and aggregated port group under Alternative 3 Option 2a ($ Millions), 2003-2011.

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**
2003	$31.14	$60.75	$1.87	$1.19	2003	$10.83	$21.13	$0.65	$0.41	2003				
2004	$23.89	$46.05	$1.77	$0.52	2004	$17.60	$33.93	$1.30	$0.38	2004	$10.06	$19.39	$0.75	$0.22
2005	$39.48	$78.20	$3.04	$1.78	2005	$36.56	$72.41	$2.81	$1.64	2005	$29.25	$57.93	$2.25	$1.32
2006	$37.10	$66.94	$2.66	$1.54	2006	$29.37	$52.99	$2.10	$1.22	2006	$20.10	$36.26	$1.44	$0.83
2007	$16.44	$33.83	$1.22	$0.95	2007					2007				
2008					2008					2008				
2009	$5.02	$11.25	$0.22	$0.18	2009					2009				
2010					2010					2010				
2011	$32.59	$87.71	$1.67	$0.30	2011	$17.92	$48.24	$0.92	$0.17	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**
2003	$31.14	$60.75	$1.87	$1.19	2003	$17.60	$34.34	$1.06	$0.67	2003	$4.06	$7.92	$0.24	$0.15
2004	$23.89	$46.05	$1.77	$0.52	2004	$17.60	$33.93	$1.30	$0.38	2004	$11.32	$21.81	$0.84	$0.25
2005	$40.95	$81.10	$3.15	$1.84	2005	$36.56	$72.41	$2.81	$1.64	2005	$32.17	$63.72	$2.48	$1.45
2006	$37.10	$66.94	$2.66	$1.54	2006	$30.92	$55.78	$2.21	$1.28	2006	$24.74	$44.63	$1.77	$1.02
2007	$16.44	$33.83	$1.22	$0.95	2007	$12.33	$25.37	$0.92	$0.71	2007				
2008					2008					2008				
2009	$5.02	$11.25	$0.22	$0.18	2009					2009				
2010					2010					2010				
2011	$32.59	$87.71	$1.67	$0.30	2011	$24.44	$65.78	$1.25	$0.23	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**
2003	$32.49	$63.40	$1.95	$1.24	2003	$25.72	$50.19	$1.55	$0.98	2003	$8.12	$15.85	$0.49	$0.31
2004	$23.89	$46.05	$1.77	$0.52	2004	$21.38	$41.20	$1.58	$0.47	2004	$15.09	$29.09	$1.12	$0.33
2005	$43.87	$86.89	$3.38	$1.97	2005	$36.56	$72.41	$2.81	$1.64	2005	$36.56	$72.41	$2.81	$1.64
2006	$37.10	$66.94	$2.66	$1.54	2006	$34.01	$61.36	$2.43	$1.41	2006	$29.37	$52.99	$2.10	$1.22
2007	$16.44	$33.83	$1.22	$0.95	2007	$15.07	$31.01	$1.12	$0.87	2007				
2008	$3.34	$5.93	$0.19	$0.07	2008					2008				
2009	$5.02	$11.25	$0.22	$0.18	2009	$1.26	$2.81	$0.05	$0.04	2009				
2010					2010					2010				
2011	$35.85	$96.48	$1.84	$0.33	2011	$27.70	$74.55	$1.42	$0.26	2011	$13.04	$35.08	$0.67	$0.12

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" ex-vesssel nominal revenue and shoreside nominal value added pollock first wholesale processing revenue by year, season, and aggregated port group under Alternative 3 Option 2a, in percent of B season sector revenue, 2003-2011.

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
2003	35.9%	37.4%	2.2%	0.7%	2003	12.5%	13.0%	0.8%	0.3%	2003				
2004	29.8%	31.7%	2.2%	0.4%	2004	22.0%	23.4%	1.6%	0.3%	2004	12.6%	13.3%	0.9%	0.2%
2005	41.6%	43.8%	3.2%	1.0%	2005	38.5%	40.5%	3.0%	0.9%	2005	30.8%	32.4%	2.4%	0.7%
2006	37.7%	39.5%	2.7%	0.9%	2006	29.9%	31.3%	2.1%	0.7%	2006	20.4%	21.4%	1.5%	0.5%
2007	19.6%	20.4%	1.5%	0.6%	2007					2007				
2008					2008					2008				
2009	6.4%	6.6%	0.3%	0.1%	2009					2009				
2010					2010					2010				
2011	33.0%	34.6%	1.7%	0.1%	2011	18.1%	19.0%	0.9%	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
2003	35.9%	37.4%	2.2%	0.7%	2003	20.3%	21.1%	1.2%	0.4%	2003	4.7%	4.9%	0.3%	0.1%
2004	29.8%	31.7%	2.2%	0.4%	2004	22.0%	23.4%	1.6%	0.3%	2004	14.1%	15.0%	1.0%	0.2%
2005	43.1%	45.4%	3.3%	1.0%	2005	38.5%	40.5%	3.0%	0.9%	2005	33.9%	35.7%	2.6%	0.8%
2006	37.7%	39.5%	2.7%	0.9%	2006	31.4%	32.9%	2.2%	0.8%	2006	25.1%	26.3%	1.8%	0.6%
2007	19.6%	20.4%	1.5%	0.6%	2007	14.7%	15.3%	1.1%	0.4%	2007				
2008					2008					2008				
2009	6.4%	6.6%	0.3%	0.1%	2009					2009				
2010					2010					2010				
2011	33.0%	34.6%	1.7%	0.1%	2011	24.7%	25.9%	1.3%	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
2003	37.5%	39.0%	2.3%	0.8%	2003	29.7%	30.9%	1.8%	0.6%	2003	9.4%	9.7%	0.6%	0.2%
2004	29.8%	31.7%	2.2%	0.4%	2004	26.7%	28.4%	2.0%	0.3%	2004	18.8%	20.0%	1.4%	0.2%
2005	46.2%	48.7%	3.6%	1.1%	2005	38.5%	40.5%	3.0%	0.9%	2005	38.5%	40.5%	3.0%	0.9%
2006	37.7%	39.5%	2.7%	0.9%	2006	34.6%	36.2%	2.5%	0.8%	2006	29.9%	31.3%	2.1%	0.7%
2007	19.6%	20.4%	1.5%	0.6%	2007	17.9%	18.7%	1.3%	0.5%	2007				
2008	3.2%	3.3%	0.2%	0.0%	2008					2008				
2009	6.4%	6.6%	0.3%	0.1%	2009	1.6%	1.6%	0.1%	0.0%	2009				
2010					2010					2010				
2011	36.3%	38.0%	1.9%	0.1%	2011	28.0%	29.4%	1.4%	0.1%	2011	13.2%	13.8%	0.7%	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 6-41 Hypothetical “at risk” nominal revenue at risk and shoreside nominal value added pollock first wholesale processing revenue by year, season, and aggregated port group under Alternative 3 Option 2a in percent of total annual sector revenue, 2003-2011.

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**
2003	19.7%	20.4%	0.6%	0.4%	2003	6.8%	7.1%	0.4%	0.1%	2003				
2004	15.1%	16.0%	0.6%	0.2%	2003	11.1%	11.8%	0.8%	0.1%	2004	6.3%	6.7%	0.5%	0.1%
2005	21.2%	22.4%	0.9%	0.5%	2003	19.7%	20.7%	1.5%	0.5%	2005	15.7%	16.6%	1.2%	0.4%
2006	19.6%	20.5%	0.8%	0.5%	2003	15.5%	16.2%	1.1%	0.4%	2006	10.6%	11.1%	0.8%	0.3%
2007	9.8%	10.2%	0.4%	0.3%	2003					2007				
2008					2003					2008				
2009	3.6%	3.7%	0.1%	0.1%	2003					2009				
2010					2003					2010				
2011	19.8%	19.6%	0.4%	0.1%	2003	10.9%	10.8%	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**
2003	19.7%	20.4%	1.2%	0.4%	2003	11.1%	11.6%	0.7%	0.2%	2003	2.6%	2.7%	0.2%	0.1%
2004	15.1%	16.0%	1.1%	0.2%	2004	11.1%	11.8%	0.8%	0.1%	2004	7.1%	7.6%	0.5%	0.1%
2005	22.0%	23.2%	1.7%	0.5%	2005	19.7%	20.7%	1.5%	0.5%	2005	17.3%	18.2%	1.3%	0.4%
2006	19.6%	20.5%	1.4%	0.5%	2006	16.3%	17.1%	1.2%	0.4%	2006	13.0%	13.7%	0.9%	0.3%
2007	9.8%	10.2%	0.7%	0.3%	2007	7.3%	7.7%	0.5%	0.2%	2007				
2008					2008					2008				
2009	3.6%	3.7%	0.2%	0.1%	2009					2009				
2010					2010					2010				
2011	19.8%	19.6%	1.0%	0.1%	2011	14.8%	14.7%	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**
2003	20.5%	21.3%	1.2%	0.4%	2003	16.2%	16.9%	1.0%	0.3%	2003	5.1%	5.3%	0.3%	0.1%
2004	15.1%	16.0%	1.1%	0.2%	2004	13.5%	14.3%	1.0%	0.2%	2004	9.5%	10.1%	0.7%	0.1%
2005	23.6%	24.8%	1.8%	0.6%	2005	19.7%	20.7%	1.5%	0.5%	2005	19.7%	20.7%	1.5%	0.5%
2006	19.6%	20.5%	1.4%	0.5%	2006	17.9%	18.8%	1.3%	0.4%	2006	15.5%	16.2%	1.1%	0.4%
2007	9.8%	10.2%	0.7%	0.3%	2007	9.0%	9.4%	0.7%	0.3%	2007				
2008	1.7%	1.7%	0.1%	0.0%	2008					2008				
2009	3.6%	3.7%	0.2%	0.1%	2009	0.9%	0.9%	0.0%	0.0%	2009				
2010					2010					2010				
2011	21.7%	21.6%	1.1%	0.1%	2011	16.8%	16.7%	0.9%	0.1%	2011	7.9%	7.9%	0.4%	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 6-42 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 3, Option 2b ($ Millions), 2003-2011.

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
2003	$5.06	$9.87	$0.30	$0.19	2003					2003				
2004	$2.31	$4.45	$0.17	$0.05	2004					2004				
2005	$20.46	$40.51	$1.57	$0.92	2005	$14.25	$28.23	$1.10	$0.64	2005	$10.47	$20.73	$0.81	$0.47
2006	$15.97	$28.81	$1.14	$0.66	2006	$15.97	$28.81	$1.14	$0.66	2006	$9.23	$16.65	$0.66	$0.38
2007	$0.91	$1.87	$0.07	$0.05	2007					2007				
2008					2008					2008				
2009	$3.22	$7.20	$0.14	$0.11	2009	$0.48	$1.07	$0.02	$0.02	2009				
2010					2010					2010				
2011	$14.40	$38.74	$0.74	$0.13	2011	$9.10	$24.48	$0.47	$0.08	2011	$2.48	$6.68	$0.13	$0.02
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
2003	$7.07	$13.80	$0.43	$0.27	2003					2003				
2004	$6.34	$12.21	$0.47	$0.14	2004					2004				
2005	$20.46	$40.51	$1.57	$0.92	2005	$14.82	$29.36	$1.14	$0.67	2005	$10.70	$21.18	$0.82	$0.48
2006	$17.31	$31.22	$1.24	$0.72	2006	$15.97	$28.81	$1.14	$0.66	2006	$12.72	$22.95	$0.91	$0.53
2007	$1.57	$3.23	$0.12	$0.09	2007					2007				
2008	$0.37	$0.65	$0.02	$0.01	2008					2008				
2009	$3.25	$7.28	$0.14	$0.12	2009	$0.48	$1.07	$0.02	$0.02	2009				
2010	$1.27	$3.63	$0.07	$0.01	2010					2010				
2011	$14.40	$38.74	$0.74	$0.13	2011	$10.17	$27.38	$0.52	$0.09	2011	$2.75	$7.41	$0.14	$0.03
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
2003	$9.66	$18.85	$0.58	$0.37	2003	$2.86	$5.57	$0.17	$0.11	2003				
2004	$8.81	$16.98	$0.65	$0.19	2004	$0.95	$1.83	$0.07	$0.02	2004				
2005	$23.11	$45.77	$1.78	$1.04	2005	$18.20	$36.05	$1.40	$0.82	2005	$11.05	$21.88	$0.85	$0.50
2006	$17.31	$31.22	$1.24	$0.72	2006	$15.97	$28.81	$1.14	$0.66	2006	$15.97	$28.81	$1.14	$0.66
2007	$2.46	$5.06	$0.18	$0.14	2007	$0.40	$0.83	$0.03	$0.02	2007				
2008	$2.32	$4.11	$0.13	$0.05	2008					2008				
2009	$6.27	$14.04	$0.27	$0.22	2009	$0.79	$1.76	$0.03	$0.03	2009				
2010	$2.59	$7.38	$0.14	$0.03	2010					2010				
2011	$14.40	$38.74	$0.74	$0.13	2011	$14.40	$38.74	$0.74	$0.13	2011	$5.92	$15.93	$0.30	$0.06

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 revenue and shoreside nominal value added pollock first wholesale processing revenue by year, season, and aggregated port group under Alternative 3 Option 2b, in percent of B season sector revenue, 2003-2011.

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**
2003	5.8%	6.1%	0.4%	0.1%	2003					2003				
2004	2.9%	3.1%	0.2%	0.0%	2004					2004				
2005	21.5%	22.7%	1.7%	0.5%	2005	15.0%	15.8%	1.2%	0.4%	2005	11.0%	11.6%	0.8%	0.3%
2006	16.2%	17.0%	1.2%	0.4%	2006	16.2%	17.0%	1.2%	0.4%	2006	9.4%	9.8%	0.7%	0.2%
2007	1.1%	1.1%	0.1%	0.0%	2007					2007				
2008					2008					2008				
2009	4.1%	4.2%	0.2%	0.1%	2009	0.6%	0.6%	0.0%	0.0%	2009				
2010					2010					2010				
2011	14.6%	15.3%	0.7%	0.1%	2011	9.2%	9.6%	0.5%	0.0%	2011	2.5%	2.6%	0.1%	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**
2003	8.2%	8.5%	0.5%	0.2%	2003					2003				
2004	7.9%	8.4%	0.6%	0.1%	2004					2004				
2005	21.5%	22.7%	1.7%	0.5%	2005	15.6%	16.4%	1.2%	0.4%	2005	11.3%	11.9%	0.9%	0.3%
2006	17.6%	18.4%	1.3%	0.4%	2006	16.2%	17.0%	1.2%	0.4%	2006	12.9%	13.5%	0.9%	0.3%
2007	1.9%	2.0%	0.1%	0.1%	2007					2007				
2008	0.4%	0.4%	0.0%	0.0%	2008					2008				
2009	4.1%	4.3%	0.2%	0.1%	2009	0.6%	0.6%	0.0%	0.0%	2009				
2010	1.9%	2.0%	0.1%	0.0%	2010					2010				
2011	14.6%	15.3%	0.7%	0.1%	2011	10.3%	10.8%	0.5%	0.0%	2011	2.8%	2.9%	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**
2003	11.1%	11.6%	0.7%	0.2%	2003	3.3%	3.4%	0.2%	0.1%	2003				
2004	11.0%	11.7%	0.8%	0.1%	2004	1.2%	1.3%	0.1%	0.0%	2004				
2005	24.3%	25.6%	1.9%	0.6%	2005	19.2%	20.2%	1.5%	0.5%	2005	11.6%	12.3%	0.9%	0.3%
2006	17.6%	18.4%	1.3%	0.4%	2006	16.2%	17.0%	1.2%	0.4%	2006	16.2%	17.0%	1.2%	0.4%
2007	2.9%	3.1%	0.2%	0.1%	2007	0.5%	0.5%	0.0%	0.0%	2007				
2008	2.2%	2.3%	0.1%	0.0%	2008					2008				
2009	8.0%	8.2%	0.3%	0.1%	2009	1.0%	1.0%	0.0%	0.0%	2009				
2010	3.9%	4.1%	0.2%	0.0%	2010					2010				
2011	14.6%	15.3%	0.7%	0.1%	2011	14.6%	15.3%	0.7%	0.1%	2011	6.0%	6.3%	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.

Table 6-44 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 3 Option 2b, in percent of total annual sector revenue, 2003-2011.

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**
2003	3.2%	3.3%	0.1%	0.1%	2003					2003				
2004	1.5%	1.5%	0.1%	0.0%	2003					2004				
2005	11.0%	11.6%	0.5%	0.3%	2003	7.7%	8.1%	0.6%	0.2%	2005	5.6%	5.9%	0.4%	0.1%
2006	8.4%	8.8%	0.4%	0.2%	2003	8.4%	8.8%	0.6%	0.2%	2006	4.9%	5.1%	0.3%	0.1%
2007	0.5%	0.6%	0.0%	0.0%	2003					2007				
2008					2003					2008				
2009	2.3%	2.4%	0.0%	0.0%	2003	0.3%	0.4%	0.0%	0.0%	2009				
2010					2003					2010				
2011	8.7%	8.7%	0.2%	0.0%	2003	5.5%	5.5%	0.3%	0.0%	2011	1.5%	1.5%	0.1%	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**
2003	4.5%	4.6%	0.3%	0.1%	2003					2003				
2004	4.0%	4.2%	0.3%	0.0%	2004					2004				
2005	11.0%	11.6%	0.8%	0.3%	2005	8.0%	8.4%	0.6%	0.2%	2005	5.7%	6.1%	0.4%	0.1%
2006	9.1%	9.6%	0.7%	0.2%	2006	8.4%	8.8%	0.6%	0.2%	2006	6.7%	7.0%	0.5%	0.2%
2007	0.9%	1.0%	0.1%	0.0%	2007					2007				
2008	0.2%	0.2%	0.0%	0.0%	2008					2008				
2009	2.3%	2.4%	0.1%	0.0%	2009	0.3%	0.4%	0.0%	0.0%	2009				
2010	1.1%	1.1%	0.1%	0.0%	2010					2010				
2011	8.7%	8.7%	0.4%	0.0%	2011	6.2%	6.1%	0.3%	0.0%	2011	1.7%	1.7%	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**
2003	6.1%	6.3%	0.4%	0.1%	2003	1.8%	1.9%	0.1%	0.0%	2003				
2004	5.6%	5.9%	0.4%	0.1%	2004	0.6%	0.6%	0.0%	0.0%	2004				
2005	12.4%	13.1%	1.0%	0.3%	2005	9.8%	10.3%	0.8%	0.2%	2005	5.9%	6.3%	0.5%	0.1%
2006	9.1%	9.6%	0.7%	0.2%	2006	8.4%	8.8%	0.6%	0.2%	2006	8.4%	8.8%	0.6%	0.2%
2007	1.5%	1.5%	0.1%	0.0%	2007	0.2%	0.3%	0.0%	0.0%	2007				
2008	1.2%	1.2%	0.1%	0.0%	2008					2008				
2009	4.5%	4.6%	0.2%	0.1%	2009	0.6%	0.6%	0.0%	0.0%	2009				
2010	2.2%	2.3%	0.1%	0.0%	2010					2010				
2011	8.7%	8.7%	0.4%	0.0%	2011	8.7%	8.7%	0.4%	0.0%	2011	3.6%	3.6%	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.

7.0 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 profileds, along with 2010 Census data will be used to update this chapter prior to final action, which is presently scheduled for October of 2012.

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.

7.1 What is an environmental justice analysis

This chapter is an analysis required under Executive Order (E.O.) 12899, Environmental Justice (59 FR 7629) [33]. 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.[34]

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

[33] 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.

[34] 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[35] 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 lifeways 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.

7.2 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. 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

[35] 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.) 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.) 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 and Russia 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.

7.2.1 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)[36].

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.

7.2.2 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:

[36] 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 does 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).

7.3 Are minority or low income populations present?

A significant part of the population in the impacted area is made up of Alaskan Natives. Table 7-1 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 16 percent of Alaska's population is made up of Native Americans; however, none of the census districts in the action area is less than 44 percent Alaskan Native.

Table 7-1 Minority and low income populations by western Alaska census district, 2000 Census

Area	Population	American Indian or Native Alaskan	Two or more races	Min native percentage of population	Max native percentage of population
United States	281,421,906	2,447,989	n.a.	~ 1	n.a.
Alaska	626,932	98,043	34,146	16	21
Lake and Peninsula	1,832	1,340	127	74	80
Bristol Bay	1,258	550	30	44	46
Dillingham	4,922	3,452	329	70	77
Bethel	16,006	13,114	617	82	86
Wade Hampton	7,028	6,503	177	93	95
Yukon-Koyukuk	6,551	4,644	256	71	75
Nome	9,196	6,915	387	75	79
Northwest Arctic	7,208	5,944	267	82	86
Aleutians west	5,465	1,145	189	21	24
Aleutians east	2,697	1,005	79	37	40

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.[37] The following brief list of minority ethnic groups within the region depends primarily on Langdon and Krauss (Langdon 2002; Krauss 1982). 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

[37] 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 descendents, 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.[38] 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

[38] 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 make up 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 7-2 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 7-2 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[39]

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.[40] 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.[41]

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39 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.

40 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.

41 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 7-3 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 2000.

Table 7-3 Racial and ethnic composition of population, selected Alaska Peninsula/Aleutian Islands Region communities, 2000

Race/Ethnicity	Unalaska		Akutan		King Cove		Sand Point	
	N	%	N	%	N	%	N	%
White	1,893	44.2	168	23.6	119	15.0	264	27.7
Black or African American	157	3.7	15	2.2	13	1.6	14	1.5
Native American/Alaska Native	330	7.7	112	15.7	370	46.7	403	42.3
Nat. Hawaiian/Other Pacific Islander	24	0.6	2	0.3	1	0.1	3	0.3
Asian	1,312	30.6	275	38.6	212	26.8	221	23.2
Some Other Race	399	9.3	130	18.2	47	5.9	21	2.2
Two Or More Races	168	3.9	11	1.5	30	3.8	26	2.7
Total	4,283	100	713	100	792	100	952	100
Hispanic*	551	12.9	148	20.8	59	7.4	129	13.6

* "Hispanic" is an ethnic category and may include individuals of any race (and therefore is not included in the total as this would result in double counting).
Source: U.S. Bureau of Census.

Table 7-4 Employment, income, and poverty information, selected Alaska Peninsula/Aleutian Islands Region communities, 2000

Community	Total Persons Employed	Unemployed	Percent Unemployment	Percent Adults Not Working	Not Seeking Employment	Percent Poverty	Median Family Income
Akutan	97	505	78.9	84.84	38	45.5	$43,125
King Cove	450	31	4.7	31.50	176	11.9	$47,188
Sand Point	427	190	22.8	48.67	215	16.0	$58,000
Unalaska	2,675	414	11.1	27.93	625	12.5	$80,829

Source: U.S. Bureau of the Census 2000.

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[42] 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.[43] 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.[44]

Table 7-4 displays data on employment, income, and poverty[45] information for the relevant communities for 2000. The income range is large for the communities shown, with the median family income in Akutan being roughly half of that in Unalaska.

Additionally, Table 7-4 illustrates a potentially problematic aspect of the 2000 data. As shown in the PSEIS, in 1990 there was virtually no unemployment in these communities, no doubt due in large to the presence of fishery-related employment opportunities (NMFS 2004a). A working knowledge of the

[42] 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.

[43] 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.

[44] 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.

[45] 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.

fishing industry would seem to indicate the 2000 data are anomalous. For example, in 2000 the U.S. Census lists a total of 505 unemployed persons in Akutan. Given that the traditional village of Akutan consists of less than 100 persons (including all age groups, not just adults in the labor pool who could qualify as employed or unemployed), the overwhelming majority of persons enumerated as unemployed must have been idled seafood processing workers. While this unemployment may have been real in the sense that processing workers were present and not actively working when the census was taken, it is most likely an artifact of the timing of the census. Processing workers are not typically present in the community when the plant is idle for any extended period of time. Under normal conditions, there are no unemployed seafood processing workers present in the community (by design). The same type of data problem may be occurring in Sand Point and Unalaska, but this is not as clear as is the case for Akutan.

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 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) 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 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.

7.4 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 2.5) as well as the Prohibited Species Donation program (section 2.4). 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[46]

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

[46] 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).

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 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).[47]

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.

[47] 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.

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 2007b) Thus the PSEIS indicates that pollock are not an important subsistence resource.

Forage fish

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 2007b).

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 these PSCes.

7.5 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 revenues 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-Chionook 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 mayhave 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. There is; however, an ongoing effort to prepare a decennial review of the CDQ program which is hoped to provide information necessary to estimate CDQ royalty effects in time for the final review of this anlalysis in December of 2011. 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 othe marine resources. Thus, at present, it is not possible to evaluate the comprehensive suite of potential effects on minority and low income populations until such time as some of the se issues are resolved. It is anticipated that such evaluation will be completed and provided in the final review draft analysis for consideration by the Council in December of 2011.

8.0 PREPARERS AND PERSONS CONSULTED FOR RIR

8.1 Lead Preparers

Scott A. Miller, Industry Economist, NMFS Alaska Region, Analytical Team. Scott holds a Bachelor of Arts degree in economics and mathematics from the University of Puget Sound, and a Masters in agricultural and natural resource economics from the University of Maryland, College Park. He has worked as a resource economist for Battelle Pacific Northwest National Laboratories, the Commonwealth of the Northern Mariana Islands, the Northern Marianas College, and has been with NMFS since 2003. Primary author for RIR and IRFA.

Diana L. Stram (NPFMC) graduated from Colgate University (B.A. Geology), and received her Ph.D. in Oceanography from the University of Rhode Island, in 2001. She has worked as Fishery Management Plan Team Coordinator for the North Pacific Fishery Management Council for the last seven years, and is the Co-Chair of the Council's Gulf of Alaska Fishery Management Plan Team, Interim Chair of the Council's Scallop Fishery Management Plan Team, and coordinator of the Council's King and Tanner Crab Fishery Management Plan Team. She has been working on salmon PSC issues for the Council for the last four years. Dr Stram is the Council project leader for this EA. In addition to preparing the background and Council presentation materials throughout the development of the EA, and helping to develop the impacts methodology for analysis of Chinook, pollock, and chum impacts, Dr Stram was a primary author for EA Chapter 7.

Nicole S. Kimball (formerly NPFMC, presently with ADF&G) graduated from the University of Maine, Orono (B.S. Natural Resource Management), and received her M.A. in Environmental Policy with a concentration in renewable resource policy from Tufts University in 1998. Ms Kimball has worked as a fishery analyst for the North Pacific Fishery Management Council for more than twelve years, and is the staff specialist on the impact of fisheries policy on fishing communities. She has recently developed a rural community outreach policy for the Council, and is coordinating the Council's outreach meetings on the proposed action. Collaborated with State of Alaska staff to develop Sections 3.1 through 3.4 of the RIR.

James N. Ianelli (AFSC) graduated from Humboldt State University (B.S. Fisheries) and received his Ph.D. in Fisheries Science from the University of Washington, Seattle in 1993. He has worked for the National Marine Fisheries Service, Alaska Fisheries Science Center for over 20 years. Dr Ianelli is the Co-Chair of the Council's Gulf of Alaska Fishery Management Plan Team, and is the primary stock assessment author for Eastern Bering Sea pollock. Dr Ianelli developed the methodology for pollock and chum impact assessment used in the EA, and developed the Adult Equivalency PSC methodology and analysis. Provided results for EA Chapters 5, 6, and 7.

9.0 LITERATURE CITED FOR RIR

Alaska Department of Commerce, Community, and Economic Development (ADCCED). N.D. Community Development Quota (CDQ). http://www.commerce.state.ak.us/bsc/cdq/cdq.htm

Alaska Department of Commerce, Community, and Economic Development. n.d. Alaska Economic Information System. Web site accessed at http://www.dced.state.ak.us/dca/AEIS/AEIS_Home.htm on August 21, 2008.

ADF&G. 2010. Data Supplied in response to a formal data request by Council staff and NMFS. Alaska Department of Fish and Game, Division of Commercial Fisheries. Juneau Alaska. November er 2010.

ADF&G , 2011a, 2011 Bristol Bay Area Salmon Fishery Summary; News Release. Department of Fish and Game, Division of Commercial Fisheries. King Salmon, Alaska. September, 2010.

ADF&G 2011b, 2010 Kotzebue Sound Fisheries Management Plan; Regional Information Report No. 3A10-04. Alaska Department of Fish and Game, Division of Commercial Fisheries, Anchorage, Alaska. October, 2011.

ADF&G 2011c, 2011 Kotzebue Sound Fisheries Season Summary; News Release. Alaska Department of Fish and Game, Division of Commercial Fisheries, Anchorage, Alaska. December 2011.

ADF&G, 2011d. 2011 Kuskokwim Area Salmon Fishery Summary; News Release. Department of Fish and Game, Division of Commercial Fisheries. Anchorage, Alaska. October, 2011.

ADF&G 2011e, 2011 Norton Sound Fisheries Season Summary; News Release. Alaska Department of Fish and Game, Division of Commercial Fisheries, Anchorage, Alaska. December 2011.

ADF&G 2011f, 2010 Yukon River Preliminary Summer Season Summary; News Release. Alaska Department of Fish and Game, Division of Commercial Fisheries, Anchorage, Alaska. October, 2011.

ADF&G 2011g, 2010 Yukon River Fall Season Summary; News Release. Alaska Department of Fish and Game, Division of Commercial Fisheries, Anchorage, Alaska. December 2011.

ADF&G , 2010a, 2010 Bristol Bay Area Salmon Fishery Summary; News Release. Department of Fish and Game, Division of Commercial Fisheries. King Salmon, Alaska. September, 2010.

ADF&G 2010b, 2010 Kotzebue Sound Fisheries Management Plan; Regional Information Report No. 3A10-04. Alaska Department of Fish and Game, Division of Commercial Fisheries, Anchorage, Alaska. May 2010.

ADF&G 2010c, 2010 Kotzebue Sound Fisheries Season Summary; News Release. Alaska Department of Fish and Game, Division of Commercial Fisheries, Anchorage, Alaska. December 16, 2010.

ADF&G, 2010d. 2010 Kuskokwim Area Salmon Fishery Summary; News Release. Department of Fish and Game, Division of Commercial Fisheries. Anchorage, Alaska. October, 2007.

ADF&G 2010e, 2010 Norton Sound Fisheries Management Plan; Regional Information Report No. 3A10-03. Alaska Department of Fish and Game, Division of Commercial Fisheries, Anchorage, Alaska. May 2010.

ADF&G 2010f, 2010 Norton Sound Fisheries Season Summary; News Release. Alaska Department of Fish and Game, Division of Commercial Fisheries, Anchorage, Alaska. December 14, 2010.

ADF&G 2010g, 2010 Yukon River Preliminary Summer Season Summary; News Release. Alaska Department of Fish and Game, Division of Commercial Fisheries, Anchorage, Alaska. October, 2010.

ADF&G 2010h, 2010 Yukon River Fall Season Summary; News Release. Alaska Department of Fish and Game, Division of Commercial Fisheries, Anchorage, Alaska. December 14, 2010.

ADF&G, 2009. Bristol Bay Annual Management Report for 2009. Alaska Department of Fish and Game, Division of Commercial Fisheries FMR 10-25. Anchorage Alaska. June, 2010.

ADF&G 2009a. Kuskokwim River Salmon Stock Status and Kuskokwim Area Fisheries, 2009; a Report to the Alaska Board of Fisheries ; Special Publicatin No. 09-21. Alaska Department of Fish and Game, Division of Commercial Fisheries. Anchorage Alaska, December, 2009.

ADF&G, 2009b. 2009 Norton Sound, Kotzebue, and Port Clarence Salmon Fishery News Release #4. Alaska Department of Fish and Game, Division of Commercial Fisheries. Nome Alaska. July 3, 2009.

ADF&G, 2009c, Yukon River Salmon 2009 Season Summary and 2010 Season Outlook; Regional Information Report, No. 3A10-01. Alaska Department of Fish and Game, Division of Commercial Fisheries. Anchorage Alaska, March, 2009.

ADF&G, 2008. Yukon River Salmon Fisheries Outlook, 2008. Alaska Department of Fish and Game, Division of Commercial Fisheries. Fairbanks Alaska. April, 2008.

ADF&G. 2007. Data Supplied in response to a formal data request by NMFS. Alaska Department of Fish and Game, Division of Commercial Fisheries. Juneau Alaska. April, 2007

ADF&G. 2007a. Kotzebue Sound Salmon Season Summary, 2007. Alaska Department of Fish and Game, Division of Commercial Fisheries News Release. Alaska Department of Fish and Game. Anchorage, Alaska. October 1, 2007

ADF&G, 2007b. Kuskokwim Area Regulatory Changes, Salmon Outlook, and Management Strategies, 2007. Department of Fish and Game, Division of Commercial Fisheries. Bethel, Alaska. April 2007

ADF&G, 2007c. Kuskokwim Area Salmon Fishery Summary, Preliminary 2007. Department of Fish and Game, Division of Commercial Fisheries. Bethel, Alaska. September 2007.

ADF&G, 2007d. Norton Sound Salmon Season Summary, 2007. Alaska Department of Fish and Game, Division of Commercial Fisheries. Anchorage Alaska. October 2007.

ADF&G, 2007e. Yukon River Summer Season Summary, 2007 Preliminary. Alaska Department of Fish and Game, Division of Commercial Fisheries. Anchorage Alaska. September 2007.

ADF&G, 2007f. Bristol Bay Annual Management Report for 2007. Alaska Department of Fish and Game, Division of Commercial Fisheries. Anchorage Alaska. September 2007.

Alaska Migratory Bird Co-Management Council (AMBCC). n.d. Website. Accessed at http://alaska.fws.gov/ambcc/ on April 23, 2008.

Alaska Natives Commission. 2004. Final Report. URL: http://www.alaskool.org/resources/anc/anc_toc.htm.

Ballew, C., A. Ross, R. Wells, V. Hiratsuka, K.J. Hanrick, E.D. Nobmann, and S. Barell. 2004. Final Report on the Alaska Traditional Diet Survey. Alaska Native Epidemiological Center. Anchorage, Alaska.

Bue, F.J., Hayes S.J. 2007. 2005 Yukon Area Subsistence, Personal Use, and Commercial Salmon Fisheries Outlook and Management Strategies. Fishery Management Report No. 3A07-04. Alaska Department of Fish and Game, Division of Commercial Fisheries. Anchorage Alaska. May, 2007

Burr, J.M., 2004. Fishery Management Report for Sport Fisheries in the Arctic-Yukon-Kuskokwim Management Area, 2002-2003. Alaska Department of Fish and Game, Fishery Management Report NO. 04-02, Anchorage.

Busher, William H., 2009. Personal Communication, Alaska Department of Fish and Game, Fairbanks Alaska, July 2009.

Bering Sea Elders Advisory Group. 2009. Public comment on the Chinook Salmon Bycatch Draft EIS. Letter from D. Bill, Sr., Chairman to D. Mecum, Acting Regional Administrator, NOAA. February 20, 2009.

CBSFA News, v7 issue 1. October 2006.

CDQ Entities: 2005 Annual Reports of the CDQ entities (CVRF, NSEDC)

CDQ Entities: 2006 Annual Reports of the CDQ entities (APICDA, BBEDC, CVRF, NSEDC, YDFDA)

CDQ Entities: 2007 Annual Reports of the CDQ entities (APICDA, BBEDC, CVRF, YDFDA)

Coastal Villages Region Fund. "Pollock Provides" video. 2008

Coffing, Michael W. 1991. Kwethluk Subsistence: Contemporary Land Use Patterns, Wild Resource Harvest and Use, and the Subsistence Economy of a Lower Kuskokwim River Area Community. Alaska Department of Fish and Game, Division of Subsistence, Technical Paper Series, No. 157. Juneau, Alaska.

Colt, Steve, Gunnar Knapp, and Jeffrey Griffin. 2002. Incremental Cost Analysis: Conservation and Sustainable Use of Wild Salmonid Diversity in Kamchatka, Russia.

Dye J.E., Schwanke C. J., and Jaecks T.A. 2006. Report to the Alaska Board of Fisheries for the Recreational Fisheries of Bristol Bay, 2004, 2005, and 2006. Alaska Department of Fish and Game. Anchorage Alaska. November 2006.

EU Fish Processors' Association. 2006. A.I.P.C.E. white fish study 2006.

Eurofish. October 2003. FISH INFOnetwork Market Report on Pollock. Available at: http://www.eurofish.dk/indexSub.php?id=1713. Accessed August 20, 2007.

Fall et al. 2009 (unpublished). Alaska Subsistence Salmon Fisheries 2007 Annual Report. ADF&G, Division of Subsistence, Technical Paper Series, No. 346. Anchorage, Alaska.

Fall et al. 2009. Alaska Subsistence Salmon Fisheries 2006 Annual Report, May 2009. ADF&G, Division of Subsistence, Technical Paper Series, No. 344. Anchorage, Alaska.

Fall et al. 2007. Alaska Subsistence Salmon Fisheries 2005 Annual Report, December 2007. ADF&G, Division of Subsistence, Technical Paper Series, No. 318. Juneau, Alaska.

Fall J.A., Krieg, T. 2006. An Overview of the Subsistence Fisheries of the Bristol Bay Management Area. Division of Subsistence Alaska Department of Fish and Game 333 Raspberry Road, Anchorage, AK, 99518. December, 2006.

Federal Subsistence Management Program (FSMP). n.d. Website. Accessed at http://alaska.fws.gov/asm/index.cfm on April 23, 2008.

Fienup-Riordan, Ann. 1990. Eskimo Essays. Rutgers University Press. New Brunswick, N.J.

Hiatt, T.R. et.al. 2007. Stock Assessment and Fishery Evaluation Report for the Groundfish Fisheries of the Gulf of Alaska and Bering Sea/Aleutian Island Area: Economic Status of the Groundfish Fisheries off Alaska, 2006. Economic and Social Sciences Research Program Alaska Fisheries Science Center National Marine Fisheries Service National Oceanic and Atmospheric

Administration 7600 Sand Point Way N.E. Seattle, Washington 98115-6349 October 2007. 354 pp.

Hiatt, T.R. et.al. 2011. Stock Assessment and Fishery Evaluation Report for the Groundfish Fisheries of the Gulf of Alaska and Bering Sea/Aleutian Island Area: Economic Status of the Groundfish Fisheries off Alaska, 2010. Economic and Social Sciences Research Program Alaska Fisheries Science Center National Marine Fisheries Service National Oceanic and Atmospheric Administration 7600 Sand Point Way N.E. Seattle, Washington 98115-6349 October 2007.

Jones, Matt, 2009. Bristol Bay Preliminary Chinook Run Summary Information. Alaska Department of Fish and Game, Division of Commercial Fisheries. Anchorage Alaska, Personal Communication via e-mail, August 31, 2009.

JTC. The United States and Canada Yukon River Joint Technical Committee. 2008. Regional Information Report No. 3A08-01. Yukon River Salmon 2007 Season Summary and 2008 Season Outlook. Alaska Department of Fish and Game, Division of Commercial Fisheries. 333 Raspberry Rd., Anchorage, AK 99518. March 2008.Krauss, Michael E. 1982. Native Peoples and Languages of Alaska. Map. Alaska Native Language Center. University of Alaska, Fairbanks. Fairbanks, Alaska.

King, G. 2001. Addressing Environmental Justice in California. The Environmental Monitor. URL: http://www.calepa.ca.gov/envjustice/Documents/2003/Appendices/AppendixA.pdf

Krieg et al. 2007. Sharing, Bartering and Cash Trade in Bristol Bay, October 2007. ADF&G, Division of Subsistence, Technical Paper Series, No. 326. Juneau, Alaska.

Lafferty, R., 2004. Fishery Management Report for Sport Fisheries in the Arctic-Yukon-Kuskokwim Management Area, 1999 and 2000. Alaska Department of Fish and Game, Fishery Management Report NO. 04-03, Anchorage.

Langdon, Steve J. 2002. The Native People of Alaska. Traditional Living in a Northern Land. Greatland Graphics. Anchorage, Alaska.

Lincoln, J.M., and G.A. Conway. 1999. Preventing commercial fishing deaths in Alaska." *Occup. Environ. Med.*, 56:691-695.

Loomis, J.B., A. Gonzalez-Caban, and R. Gregory. 1996. A contingent valuation study of the value of reducing fire hazards to old-growth forests in the Pacific Northwest. Res. Paper PSW-RP-229-Web. Albany CA: Pacific Southwest Research Station, Forest Service, U.S. Department of Agriculture; 26p.

Magdanz, James. Eric Trigg, Austin Ahmasuk, Peter Nanouk, David Koster, and Kurt Kamletz. 2005. Patterns and Trends in Subsistence Salmon Harvests, Norton Sound and Port Clarence. Alaska Department of Fish and Game Division of Subsistence Technical Paper 294. Department of Natural Resources, Kawerak, Inc and Division of Subsistence. Nome and Juneau. August 2005.

Menard, J. 2007a. Kotzebue Sound Salmon Fisheries Management Plan. 2007. Regional Information Report No. 3A07-06. Alaska Department of Fish and Game. Anchorage, Alaska. May 2007.

Menard, J. 2007b. 2007 Norton Sound Salmon Fisheries Management Plan. Regional Information Report No. 3A07-05. Alaska Department of Fish and Game. Anchorage, Alaska. December 2003

Moncrieff, Catherine F. 2007. Traditional Ecological Knowledge of Customary Trade of Subsistence Harvested Salmon on the Yukon River. Final Report to the Office of Subsistence Management, Fisheries Information Services, Study 04-265. Yukon River Drainage Fisheries Association. Anchorage. July 2007.

Myers, K., R.V. Walker, N.D. Davis and J.L. Armstrong. 2004. High Seas Salmon Research Program, 2003. SAFS-UW-0402, School of Aquatic and Fishery Sciences, University of Washington, Seattle. 93p.

Nelson, P., M. D. Plotnick, and A. M. Carroll, eds. 2008. Run Forecasts and Harvest Projections for 2008 Alaska Salmon Fisheries and Review of the 2007 Season. Alaska Department of Fish and Game. Special Publication 08-09. February 2008.

NMFS. n.d. Questions and Answers about Purchasing or Possessing Marine Mammal Skins, Muktuk, Baleen, and Bones. Web page accessed at http://www.fakr.noaa.gov/protectedresources/buying.htm on April 25, 2008.

NMFS. 2008. Bering Sea Salmon Bycatch Management Environmental Impact Statement Scoping Report. National Marine Fisheries Service Alaska Regional Office. Juneau, AK. March 2008. Accessed at http://www.fakr.noaa.gov/sustainablefisheries/bycatch/default.htm.

NMFS. 2007a. Supplemental Biological Opinion Reinitiating Consultation on the November 30, 2000 Biological Opinion regarding Authorization of Bering Sea/Aleutian Islands Groundfish Fisheries. January 11, 2007. U.S. Dept. of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Seattle, WA.

NMFS. 2007b. Alaska Groundfish Harvest Specifications Final Environmental Impact Statement. National Marine Fisheries Service Alaska Regional Office. Juneau, AK. January 2007. Accessed at http://www.fakr.noaa.gov/analyses/specs/eis/default.htm on April 24 2008

NMFS. 2005. Setting the Annual Subsistence Harvest of Northern Fur Seals on the Pribilof Islands. Final Environmental Impact Statement. National Marine Fisheries Service Alaska Regional Office. Juneau, AK. May 2005. Accessed at http://www.fakr.noaa.gov/protectedresources/seals/fur/eis/final0505.pdf on April 25, 2008.

NMFS. 2004a. Programmatic supplemental environmental impact statement for the Alaska Groundfish Fisheries implemented under the authority of the fishery management plans for the groundfish fishery of the Gulf of Alaska and the groundfish fishery of the Bering Sea and Aleutian Islands (PSEIS). NMFS Alaska Regional Office. Juneau, AK. Accessed at http://www.fakr.noaa.gov/sustainablefisheries/seis/intro.htm on April 25, 2008.

NMFS. 2004b. Puget Sound Chinook Harvest Resource Management Plan. Final Environmental Impact Statement. National Marine Fisheries Service Northwest Region with assistance from the Puget Sound Treaty Tribes and Washington Department of Fish and Wildlife. Seattle, WA. December 2004.

NMFS. 2003a. Regulatory Impact Review for a Proposed Rule to Allow Processors to Use Offal from Prohibited Species for Fish Meal. NOAA Fisheries, P.O. Box 21668, Juneau, Alaska 99801. 12 p.

NMFS. 2003b. 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. National Marine Fisheries Service, Northwest Region, Alaska Department of Fish and Game, Cooperating Agency. Seattle, WA. November 2003.

NMFS. 1996. Environmental Assessment and Regulatory Impact Review for Amendment 26 to the Fishery Management Plan for Groundfish of the Bering Sea and Aleutian Island Area and Amendment 29 to the Fishery Management Plan for Groundfish of the Gulf of Alaska; NMFS-Authorized Distribution of Salmon Bycatch in the Groundfish Fisheries Off Alaska to Economically Disadvantaged Individuals. NMFS, P.O. Box 21668, Juneau, Alaska 99801. 32 p.

Northern Economics. The Seafood Industry in Alaska's Economy. January 2009.

Northern Economics. 2002. An Assessment of the Socioeconomic Impacts of the Western Alaska Community Development Program. Report prepared for the Alaska Department of Community and Economic Development Division of Community and Business Development. Anchorage, Alaska. November 2002.

Pacific Fishery Management Council. 2008. Review of 2007 Ocean Salmon Fisheries. 7700 NE Ambassador Place, Suite 101, Portland OR. February.

Pahlke, K.A.. 2007. Escapements of Chinook Salmon in Southeast Alaska and Transboundary Rivers in 2005. Alaska Department of Fish and Game. Fishery Data Series No. 07-62. October 2007.

Sands et al. 2008. 2007 Bristol Bay Area Annual Management Report. Fishery Management Report No. 08-28. Alaska Department of Fish and Game. Anchorage, Alaska. May 2008

SeaShare. 2008. Application for Permit renewal to operate as NMFS Authorized Distributor of Salmon. SeaShare, 600 Ericksen Avenue, Suite 310, Bainbridge Island, Washington, 98110. 21p.

SeaShare. 2011. Personal Communication, April 19, 2011.

Simon, Jim, Tracie Krauthoefer, David Koster, and David Caylor. 2007. Subsistence Salmon Harvest Monitoring Report, Kuskokwim Fisheries Management Area, Alaska, 2004. ADF&G, Division of Subsistence, Technical Paper Series, No. 313. Juneau, Alaska.

Southwest Alaska Municipal Conference (SWAMC). Southwest Alaska Comprehensive Economic Development Strategy Annual Update 2007. July 2007.

Tysiachniouk, Maria and Jonathan Reisman. N.d. Indigenouse Peoples and Environmental Protection in Kamchatka, Russia. Unpublished manuscript.

University of Alaska Cooperative Extension Service. 2007. Cooperative Extension Service Food Cost Survey. University of Alaska Fairbanks. December 2007. Accessed at: http://www.uaf.edu/ces/fcs/index.html on April 18, 2008.

Varnavskaya, Natalia and Nina Shpigalskaya. 2004. Genetic Stock Identification of Chinook Salmon, Oncorhynchus tshawytscha (Walbaum). North Pacific Anadromous Fish Commission. NPAFC Technical Report No. 5.

Walker and Coffing. 1993. Subsistence Salmon Harvests in the Kuskokwim Area During 1989. February 1993. ADF&G, Division of Subsistence, Technical Paper Series, No. 189. Juneau, Alaska.

Walker et al. 1989. Subsistence Harvest of Pacific Salmon in the Yukon River Drainage, Alaska, 1977 – 88. October 1989. ADF&G, Division of Subsistence, Technical Paper Series, No. 187. Juneau, Alaska.

Western Alaska Community Development Association (WACDA). Supporting the Advancement of Bering Sea Communities. 2007.

URL: www.subsistence.adfg.state.ak.us/geninfo/publctns/articles.cfm#SUBSISTENCE_2000.

Wolfe, Robert J. 1987. "The super-household: specialization in subsistence economies." Paper presented at the 14th Annual Meeting of the Alaska Anthropological Association. March 12 – 13, Anchorage, Alaska.

Wolfe, Robert J. and Walker, Robert J. 1987. Subsistence Economies in Alaska: Productivity, Geography, and Development Impacts. ADF&G, Division of Subsistence. Arctic Anthropology, Vol. 24, No. 2, pp. 56-81.

Windish-Cole, B. 2008. Permission to use ADOLWD web content. Personal Communication, April 2008.

Yukon River Drainage Fisheries Association. 2009. Public comment on the Chinook Salmon Bycatch Draft EIS. Letter from R. Gisclair, Policy Director to D. Mecum, Acting Regional Administrator, NOAA, and E. Olson, Chair, NPFMC. January 26, 2009.

Literature cited specifically in Sections 3.1 through 3.4:

Alaska Department of Fish & Game. 2010. 2010 Kuskokwim Area Salmon Fishery News Release #1: 2010 Kuskokwim Area Salmon Outlook and Management Strategy. Kuskokwim Area News Release, Bethel.

Alaska Department of Fish & Game. 2009. 2009 Norton Sound Salmon Season Summary. News Release, Nome.

Andersen, David B. 1992. The Use of Dog Teams and the Use of Subsistence-caught Fish for Feeding Sled Dogs in the Yukon River Drainage, Alaska. Alaska Department of Fish and Game Division of Subsistence, Technical Paper No. 210, Juneau.

Andersen, D.B. and C.L. Scott. 2010. An update on the use of subsistence-caught fish to feed sled dogs in the Yukon River drainage, Alaska. Final Report 08-250. U.S. Fish and Wildlife Service, Office of Subsistence Management, Fisheries Resource Monitoring Program.

Andrews, Elizabeth. 1989. The Akulmiut: Territorial Dimensions of the Yup'ik Eskimo. Alaska Department of Fish and Game, Division of Subsistence, Technical Paper No. 177. Juneau.

Andrews, Elizabeth. 1994. Territoriality and land use among the *Aklumiut* of western Alaska. In: <u>Key Issues in Hunter-Gatherer Research</u>, E.S. Burch, Jr. and Linda J. Ellanna (editors), pp. 65-93. Oxford: Berg Publishers, Inc.

Ballew, Carol, Angela Ross, Rebecca S. Wells, and Vanessa Hiratsuka. 2004. Final Report on the Alaska Traditional Diet Survey. Alaska Native Epidemiology Center, Alaska Native Health Board, Anchorage.

Bergstrom, D.J., D.F. Evenson, and E.J. Newland. 2009. Yukon River summer chum salmon stock status, 2009; a report to the Alaska Board of Fisheries. Alaska Department of Fish and Game, Special Publication No. 09-22, Anchorage.

Bersamin, Andrea, Sheri Zidenberg-Cherr, Judith S. Stern, and Bret R. Luick. 2007. Nutrient Intakes Are Associated With Adherence to a Traditional Diet Among Yup'ik Eskimos Living in Remote Alaska Native Communities: The CANHR Study. *International Journal of Circumpolar Health* 66:1.

Borba, B.M., D.J. Bergstrom, and F.J. Bue. 2009. Yukon River fall chum salmon stock status and fall season salmon fisheries, 2009; a report to the Alaska Board of Fisheries. Alaska Department of Fish and Game, Special Publication No. 09-24, Anchorage.

Burrows, Nilka R., Linda S. Geiss, Michael M. Engelgau, and Kelly J. Acton. 2000. Prevalence of Diabetes Among Native Americans and Alaska Natives, 1990-1997: An increasing burden. *Diabetes Care* 23:1786-1790.

Caulfield, Richard A. 2002. Food Security in Arctic Alaska: A Preliminary Assessment. *Sustainable Food Security in the Arctic*: 75–94.

Coffing, Michael W. 1991. Kwethluk subsistence: contemporary land use patterns, wild resource harvest use and the subsistence economy of a Lower Kuskokwim River area community. Alaska Department of Fish and Game, Division of Subsistence, Technical Paper No. 157. Juneau.

Coffing, Michael W., L. Brown, G. Jennings, and C. J. Utermohle. 2001. The subsistence harvest and use of wild resources in Akiachak, Alaska, 1998. Alaska Department of Fish and Game, Division of Subsistence, Technical Paper No. 258. Juneau.

Ellanna, Linda J. and George K. Sherrod. 1984. The Role of Kinship Linkages in Subsistence Production: Some Implications for Community Organization. Alaska Department of Fish and Game, Division of Subsistence, Technical Paper No. 100. Juneau.

Estensen, J.L., D.B. Molyneaux, and D.J. Bergstrom. 2009. Kuskokwim River salmon stock status and Kuskokwim area fisheries, 2009: a report to the Alaska Board of Fisheries. Special Publication No. 09-21, Anchorage.

Fall, James A., Janet C. Schichnes, Molly Chythlook, and Robert J. Walker. Patterns of Wild Resource Use in Dillingham: Hunting and Fishing in an Alaskan Regional Center. Alaska Department of Fish and Game, Division of Subsistence, Technical Paper No. 135. Juneau.

Fall, J.A., C. Brown, N. Braem, J.J. Simon, W.E. Simone, D.L. Holen, L. Naves, L. Hutchinson-Scarborough, T. Lemons, and T.M. Krieg. 2011, revised. Alaska subsistence salmon fisheries 2008 annual report, Alaska Department of Fish and Game Division of Subsistence, Technical Paper No. 359, Anchorage.

Fall, J.A., C. Brown, M.F. Turek, N. Braem, J.J. Simon, W.E. Simeone, D.L. Holen, L. Naves, L. Hutchinson-Scarbrough, T. Lemons, V. Ciccone, T.M. Krieg, and D. Koster. 2009. Alaska subsistence salmon fisheries 2007 annual report. Alaska Department of Fish and Game Division of Subsistence, Technical Paper No. 346, Anchorage.

Fall, J.A., T.M. Krieg, and D. Holen. 2009. Overview of the subsistence fisheries of the Bristol Bay Management Area. Alaska Department of Fish and Game Division of Subsistence Special Publication No. BOF 2009-07, Anchorage.

Hartill, T.G. and M.D. Keyse. 2010. Annual summary of the commercial, subsistence, and personal use salmon fisheries and salmon escapements in the Alaska Peninsula, Aleutian Islands, and Atka-Amlia Islands Management Areas, 2009. Alaska Department of Fish and Game, Fishery Management Report No, 10-21, Anchorage.

Hartill, T.G. and R.L. Murphy. 2010. North Alaska Peninsula commercial salmon annual management report, 2009. Alaska Department of Fish and Game, Fishery Management Report No. 10-19, Anchorage.

Hayes, S.J. and D.L. Norris. 2010. 2010 Yukon Area subsistence, personal use, and commercial salmon fisheries outlook and management strategies. Alaska Department of Fish and Game, Regional Information Report No. 3A10-02, Anchorage.

Huskey, Lee, Matthew Bermann, and Alexandra Hill. 2004. Leaving home, returning home: Migration as a labor market choice for Alaska Natives. *The Annals of Regional Science* 38:75-92.

Johnson, Jennifer S., Elizabeth D. Nobmann, Elvin Asay, and Anne P. Lanier. 2009. Dietary Intake of Alaska Native People in Two Regions and Implications for Health: The Alaska Native Dietary and Subsistence Food Assessment Project. *International Journal of Circumpolar Health* 68:2.

JTC (Joint Technical Committee of the Yukon River U.S./Canada Panel). 2010. Yukon River salmon 2009 season summary and 2010 season outlook. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 3A10-01, Anchorage.

Krieg, Fall, Chythlook, La Vine, and Koster. 2007. Sharing, Bartering, and Cash Trade of Subsistence Resources in the Bristol Bay Area. Alaska Department of Fish and Game, Technical Paper No. 326.

Loring, Philip A. and Craig Gerlach. 2010. Food Security and Conservation of Yukon River Salmon: Are We Asking Too Much of the Yukon River? *Sustainability* 2:2965-2987.

Magdanz, James S. and Annie Olanna. 1986. Subsistence Land Use in Nome, A Northwest Alaska Regional Center. Alaska Department of Fish and Game, Division of Subsistence, Technical Paper No. 148. Juneau.

Magdanz, James S., Sandra Tahbone, Austin Ahmasuk, David S. Koster, and Brian L. Davis. 2007. Customary Trade and Barter in Fish in the Seward Peninsula Area, Alaska. Alaska Department of Fish and Game, Division of Subsistence, Technical Paper No. 328, Juneau.

Magdanz, James S., Eric Trigg, Austin Ahmasuk, Peter Nanouk, David S. Koster, and Kurt Kamletz. 2009. Patterns and Trends in Subsistence Salmon Harvests, Norton Sound-Port Clarence Area, Alaska 1994-2003. *American Fisheries Society Symposium 70*:395-431.

Magdanz, James S., Nicole S. Braem, Brad C. Robbins, and David S. Koster. 2010. Subsistence Harvests in Northwest Alaska, Kivalina and Noatak, 2007. Alaska Department of Fish and Game, Division of Subsistence, Technical Paper No. 354. Kotzebue.

Martin, Stephanie, Mary Killorin, and Steve Colt. 2008. Fuel Costs, Migration, and Community Viability, Final Report. Prepared for The Denali Commission. Institute of Social and Economic Research, University of Alaska, Anchorage.

Menard, J. 2010. 2010 Kotzebue Sound salmon fisheries management plan. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report No. 3A10-04, Anchorage.

Menard J., and D. J. Bergstrom. 2003a. Norton Sound Nome Subdistrict 1 chum salmon stock status and action plan. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 3A03-35, Anchorage. http://www.sf.adfg.state.ak.us/FedAidPDFs/RIR.3A.2003.35.pdf

Menard J., and D. J. Bergstrom. 2003b. Norton Sound, Golovin, and Moses Point Subdistricts chum salmon stock status and action plan. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 3A03-36, Anchorage. http://www.sf.adfg.state.ak.us/FedAidPDFs/RIR.3A.2003.36.pdf

Menard J., and D. J. Bergstrom. 2006a. Norton Sound Nome Subdistrict chum salmon stock status and action plan. Alaska Department of Fish and Game, Special Publication 06-33, Anchorage. http://www.sf.adfg.state.ak.us/FedAidpdfs/sp06-33.pdf

Menard J., and D. J. Bergstrom. 2006b. Norton Sound, Golovin, and Moses Point Subdistricts chum salmon stock status and action plan. Alaska Department of Fish and Game, Special Publication No. 06-37, Anchorage. http://www.sf.adfg.state.ak.us/FedAidPDFs/sp06-32.pdf

Menard, J. and D.J. Bergstrom. 2009. Norton Sound Subdistrict 1 (Nome) chum salmon stock status and action plan, 2010: A report to the Alaska Board of Fisheries. Alaska Department of Fish and Game, Special Publication No. 09-20, Anchorage.

Menard J., and D. J. Bergstrom. 2009b. Norton Sound, Golovin, and Moses Point Subdistricts chum salmon stock status and action plan. Alaska Department of Fish and Game, Special Publication No. 09-37, Anchorage. http://www.sf.adfg.state.ak.us/FedAidPDFs/sp09-19.pdf

Menard, J., J Soong, and S. Kent. 2010. 2008 annual management report Norton Sound, Port Clarence, and Kotzebue. Alaska Department of Fish and Game, Fishery Management Report No. 10-49, Anchorage.

Moncrieff, Catherine F. 2007. Traditional Ecological Knowledge of Customary Trade of Subsistence Harvested Salmon on the Yukon River. Final Report to the Office of Subsistence Management, Fisheries Information Services (Study 04-265). Yukon River Drainage Association, Anchorage.

Morstad, S., M. Jones, T. Sands, P. Salomone, T. Baker, G. Buck, and F. West. 2010. 2009 Bristol Bay area annual management report. Alaska Department of Fish and Game, Fishery Management Report No. 10-25, Anchorage.

Poetter, A.D., M.D. Keyse, and A.C. Bernard. 2009. South Alaska Peninsula salmon annual management report, 2009. Alaska Department of Fish and Game, Fishery Management Report No. 09-57, Anchorage.

Simon, Jim, Tracie Krauthoefer, David Koster, and David Caylor. 2007a. Subsistence Salmon Harvest Monitoring Report, Kuskokwim Fisheries Management Area, Alaska, 2004. Alaska Department of Fish and Game, Division of Subsistence, Technical Paper No. 313. Juneau.

Simon, Jim, Tracie Krauthoefer, David Koster, Michael Coffing, and David Caylor. 2007b. Bethel Subsistence Fishing Harvest Monitoring Report, Kuskokwim Fisheries Management Area, Alaska, 2001-2003. Alaska Department of Fish and Game, Division of Subsistence, Technical Paper No. 330. Juneau.

Soong, J., A. Banducci, S. Kent, and J. Menard. 2008. 2007 annual management report Norton Sound, Port Clarence, and Kotzebue. Alaska Department of Fish and Game, Fishery Management Report No. 08-39, Anchorage.

Walker, Robert J. and Michael W. Coffing. 1993. Subsistence salmon harvests in the Kuskokwim Area during 1989. Alaska Department of Fish and Game, Division of Subsistence, Technical Paper No. 189. Juneau.

Wolfe, Robert J. 1979. Food Production in a Western Eskimo Population. Doctoral Dissertation in Anthropology, University of California, Los Angeles. University Microfilms International, Ann Arbor, Michigan.

Wolfe, Robert J. 1982. The Subsistence Salmon Fishery of the Lower Yukon River. Alaska Department of Fish and Game, Division of Subsistence, Technical Paper No. 60. Bethel.

Wolfe, Robert J. 1983. Understanding Resource Uses in Alaskan Socioeconomic Systems, in Robert J. Wolfe and Linda J. Ellanna's (Eds.) Resource Use and Socioeconomic Systems: Case Studies of Fish and Hunting in Alaskan Communities. Alaska Department of Fish and Game, Division of Subsistence, Technical Paper 61, Juneau.

Wolfe, Robert J. and Robert Walker. 1987. Subsistence Economies in Alaska: Productivity, Geography, and Development Impacts. *Arctic Anthropology*. 24(2):56-81.

Wolfe, Robert J., Cheryl Scott, William Simeone, Charles Utermohle, and Mary Pete. n.d. The Super-Household in Alaska Native Subsistence Economies. Paper prepared for the National Science Foundation, Award ARC 0352611. Robert J. Wolfe and Associates, San Marcos, CA.

Wolfe, Robert J. 1987. The Super-household: Specialization in Subsistence Economies. Paper presented at the 14th Annual Meeting of the Alaska Anthropological Association, Anchorage, 1987.

Wolfe, Robert J. 1991. Trapping in Alaska Communities With Mixed, Subsistence-Cash Economies. Alaska Department of Fish and Game, Division of Subsistence, Technical Paper No. 217. Juneau.

Wolfe, Robert J. 2000. Subsistence in Alaska: A Year 2000 Update. Alaska Department of Fish and Game, Division of Subsistence. Juneau. http://www.subsistence.adfg.state.ak.us/download/subupd00.pdf.

Wolfe Robert J. 2004. Local Traditions and Subsistence: A Synopsis from Twenty-Five Years of Research by the State of Alaska. Alaska Department of Fish and Game, Division of Subsistence, Technical Paper No. 284. Juneau.

Wolfe, Robert J., James A. Fall, Virginia Fay, Susan Georgette, James Magdanz, Sverre Pedersen, Mary Pete, and Janet Schichnes. 1986. The Role of Fish and Wildlife in the Economies of Barrow, Bethel, Dillingham, Kotzebue, and Nome. Alaska Department of Fish and Game, Division of Subsistence, Technical Paper No. 154. Juneau.

Wolfe, Robert J., Joseph J. Gross, Steven J. Langdon, John M. Wright, George K. Sherrod, Linda J. Ellanna, Valerie Sumida, and Peter J. Usher. 1984. Subsistence-based Economies in Coastal Communities of Southwest Alaska. Alaska Department of Fish and Game, Division of Subsistence, Technical Paper 89. Juneau.

Wolfe, R.J. and C. Scott. 2009. Continuity and Change in Salmon Harvest Patterns, Yukon River Drainage, Alaska. U.S. Fish and Wildlife Service, Office of Subsistence Management, Fisheries Monitoring Program, Final Report (Study No. 07-253). Robert J. Wolfe and Associates, San Marcos, California.

10.0 INITIAL REGULATORY FLEXIBILITY ANALYSIS

10.1 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).

10.2 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.

10.3 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.

10.4 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.

<u>Small business:</u> 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.

10.5 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.[48] 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 EIS 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 voluntary rolling hotspot system (VRHS) coordinated through an inter-cooperative agreement (ICA), have reduced non-Chinook salmon PSC rates under some conditions, when compared with what they would have been without the measures, 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 are needed.

10.6 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.

10.7 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.

[48] 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).[49] 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)

[49]*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. In 2007, the six CDQ groups held approximately $543 million in assets and had invested more than $140 million in BSAI fishery related projects, including, but not limited to, the pollock industry. Complete descriptions of the CDQ groups, and the impacts of this action, are located in sections 2.5 and 6.10.3 of the RIR.

10.8 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.

10.9 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.

10.10 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**
- **Alternative 3: Triggered 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 42,000[50] '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 salmon) is allocated to the CDQ Program as a PSQ reserve[51], while the remaining 37,506 chum salmon are available to the non-CDQ pollock fishery. NMFS further allocates the PSQ reserves among the six

[50] This number is inclusive of the allocation to CDQ groups. Non-CDQ 'other salmon' limit is 38,850.
[51] See 50 CFR 679.21(e)(3)(i)(A)(3)(i) .

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 VRHS 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 a hard cap to limit non-Chinook salmon PSC in the pollock fishery. When the hard cap is reached all directed pollock fishing must cease. 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 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 forgone 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

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 burden on the CDQ groups than the preferred alternative. If triggered, NMFS would only close the seasonal areas, described in section 2.3 of the EIS, 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.