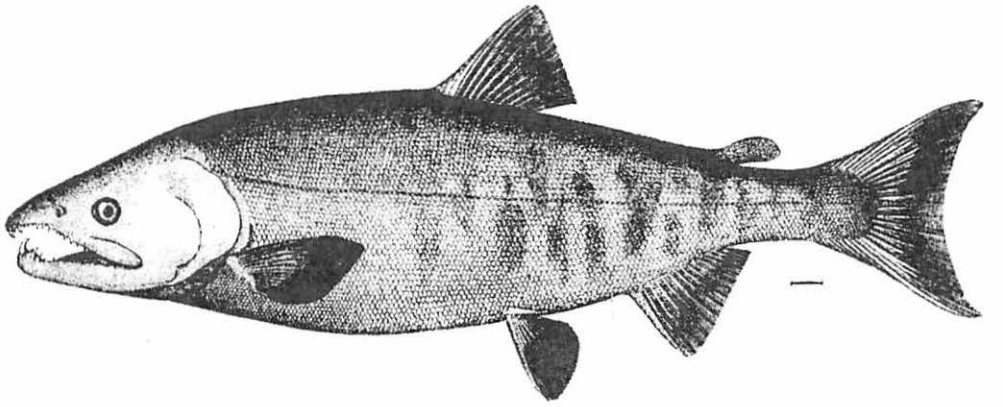
AGENDA C-5(a)
JUNE 2011

Bering Sea Non-Chinook Salmon Bycatch Management

Initial Review Draft Environmental Assessment



THE KAYKO OR DOG SALMON.

Oncorhynchus keta (Walb.), Gill & Jordan. (p. 476.)

Drawing by H. L. Todd, from No. 27617, U. S. National Museum, collected at Fort Alexander, Cook's Inlet, Alaska, July 4 1880, by J. Cohen.

PLATE 188 a.

North Pacific Fishery Management Council

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

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Executive Summary

This executive summary summarizes the draft Bering Sea Chum Salmon Bycatch Management Environmental Assessment (EA) and Regulatory Impact Review (RIR). The EA and RIR provide decision-makers and the public with an evaluation of the predicted environmental, social, and economic effects of alternative measures to minimize chum salmon bycatch in the Bering Sea pollock fishery.

The proposed action is to amend the Bering Sea Aleutian Islands groundfish fishery management plan (FMP) and federal regulations to establish new measures to reduce chum salmon bycatch in the Bering Sea pollock fishery to the extent practicable while achieving optimum yield. The proposed action is focused on the Bering Sea pollock fishery because this fishery catches the majority of the chum salmon taken incidentally as bycatch in the Bering Sea and Aleutian Islands (BSAI) groundfish fisheries. Since 2005 the pollock fishery contribution to the total non-Chinook bycatch has ranged from 88% in 2010 to 99.3% in 2005.

Any amendment to the FMP must comply with the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) and all other applicable federal laws. With respect to the Magnuson-Stevens Act, the amendment must be consistent with all ten national standards. The most relevant for this action are National Standard 9, which requires that conservation and management measures shall, to the extent practicable, (A) minimize bycatch and (B) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch; and National Standard 1, which requires that conservation and management measures prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry. The Magnuson-Stevens Act defines optimum yield as the amount of harvest which will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities, and taking into account the protection of marine ecosystems. Therefore, this action must minimize chum salmon bycatch in the Bering Sea pollock fishery to the extent practicable while achieving optimum yield. Minimizing chum salmon bycatch 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 Act and other applicable federal law.

This EA examines four alternatives to reduce chum salmon bycatch in the Bering Sea pollock fishery. The EA evaluates the environmental consequences of each of these alternatives with respect to four resource categories:

- Pollock
- Chum salmon
- Chinook salmon
- Other Marine Resources including groundfish species, ecosystem component species, marine mammals, seabirds, essential fish habitat and marine ecosystem.

The RIR evaluates the social and economic consequences of the alternatives with respect to three major issues:

- economic impacts and net benefits to the Nation
- Alaska Native, non-native minority, and low income populations
- fisheries management and enforcement

Bering Sea Pollock Fishery

The pollock fishery in waters off Alaska is the largest U.S. fishery by volume. The economic character of the fishery derives from the products produced from pollock: roe (eggs), surimi, and fillet products. In

2008, the total value of pollock was an estimated $1.331 billion. This dropped to $1.030 billion in 2009. Table ES-1 shows the number of participating vessels in the Bering Sea pollock fishery and the pollock total allowable catch (TAC) in metric tons from 2003 to 2010.

Until 1998, the Bering Sea pollock fishery was managed as an open access fishery, commonly characterized as a "race for fish." In October 1998, Congress enacted the American Fisheries Act (AFA) to rationalize the fishery by identifying the vessels and processors eligible to participate in the Bering Sea pollock fishery and allocating specific percentages of the Bering Sea directed pollock fishery TAC among the competing sectors of the fishery. Each year, NMFS apportions the pollock TAC among the inshore catcher vessel (CV) sector, offshore catcher/processor (CP) sector, and mothership sector after allocations are made to the Community Development Quota (CDQ) Program and incidental catch allowances.

The Bering Sea pollock TAC is divided into two seasons –the A season (January 20 to June 10) and the B season (June 10 to November 1). Typically, the fleet targets roe –bearing females in the A season and harvests the A season TAC by early April. The B season fishery focuses on pollock for filet and surimi markets and the fleet harvests most of the B season TAC in September and October.

The AFA also allowed for development of pollock fishing cooperatives. Ten such cooperatives were developed as a result of the AFA: seven inshore CV cooperatives, two offshore CP cooperatives, and one mothership cooperative. Catcher vessels in the inshore CV sector deliver pollock to shorebased processors. Catcher/processors harvest and process pollock on the same vessel. Catcher vessels in the mothership sector deliver pollock to motherships, which are processing vessels.

The CDQ Program was created to improve the social and economic conditions in coastal western Alaska communities by facilitating their economic participation in the BSAI fisheries, which had developed without significant participation from rural western Alaska communities. These fisheries, including the Bering Sea pollock fishery, are capital-intensive and require large investments in vessels, infrastructure, processing capacity, and specialized gear. The CDQ Program was developed to redistribute some of the BSAI fisheries' economic benefits to adjacent communities by allocating a portion of commercially important fisheries to six groups representing those communities as fixed shares of groundfish, halibut, crab, and prohibited species catch. These allocations, in turn, provide an opportunity for residents of these communities to both participate in and benefit from the BSAI fisheries through revenues derived from the fisheries, employment, capital projects, and fisheries infrastructure. Currently, NMFS allocates 10 percent of the pollock TAC and 7.5 percent of the Bering Sea Chinook salmon prohibited species catch limit to the CDQ Program.

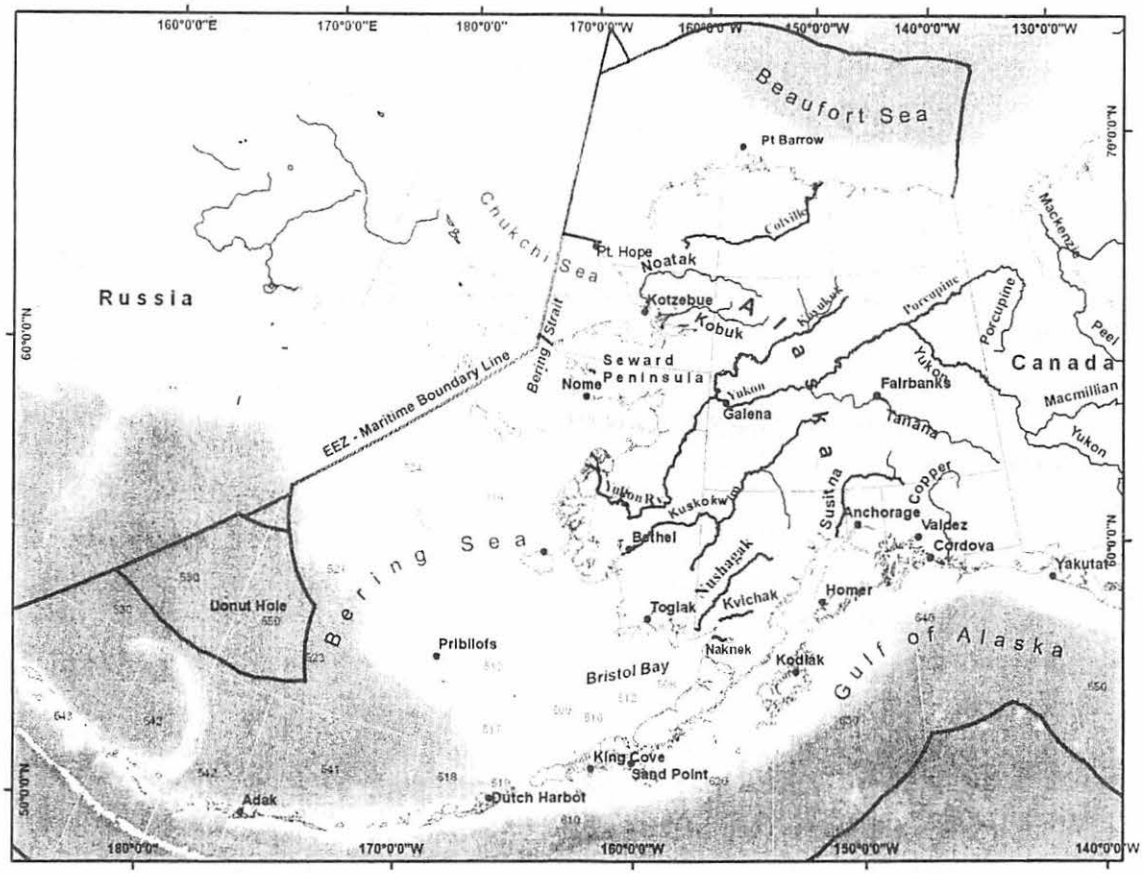

Figure ES-1 Map of the Bering Sea and major connected salmon producing rivers in Alaska and Northwest Canada

Salmon Bycatch in the Bering Sea Pollock Fishery

Pacific salmon are caught incidentally in the Bering Sea pollock fishery. Pollock is harvested with fishing vessels using trawl gear, which are large nets towed through the water. Salmon in the Bering Sea occur in the same locations and depths as pollock and are, therefore, caught in the nets as fishermen target pollock. Of the five species of Pacific salmon, Chinook salmon (*Oncorhynchus tshawytscha*) and chum salmon (*O. keta*) are caught most often in the pollock fishery. Chinook salmon is caught during both 'A' and 'B' seasons of the fishery while chum salmon are caught almost exclusively in the 'B' season.

Salmon are culturally, nutritionally, and economically significant to Alaska communities (see RIR Chapter 3). Salmon are fully allocated and used in subsistence, commercial, and recreational fisheries in and off Alaska and, in the case of Chinook and chum salmon, in Canada. Therefore, NMFS manages Chinook salmon and all other species of salmon (a category called non-Chinook salmon and here in this analysis summarized as 'chum' due to it being comprised of over 99% chum salmon) as prohibited species in the BSAI groundfish fisheries, including the Bering Sea pollock fishery. As a prohibited species, salmon must be avoided as bycatch, and any salmon caught must either be donated to the Prohibited Species Donation Program or be returned to the sea as soon as is practicable, with a minimum of injury, after an observer has determined the number of salmon and collected any scientific data or biological samples.

The Council took action in 2009 on management measures for Chinook salmon under the Amendment 91 Chinook salmon bycatch management program. The program imposes a dual cap system which is divided by sector and season. The program includes an annual 'high cap' of 60,000 fish and a lower cap of 47,591 fish. Annual bycatch is intended to remain below the lower cap to avoid penalty. Should any sector exceed its proportion of the lower cap 3 times in a rolling 7-year period, it would then be held to this lower cap only for all future years. In order to fish under the dual cap system (as opposed to solely the lower cap) sectors much participate in incentive program agreements (IPAs) that are approved by NMFS and are designed for further bycatch reduction and individual vessel accountability. This program was implemented in January 2011, thus the fishery has operated under the new program during the 'A' season thus far.

Several management measures have been used to reduce salmon bycatch in the Bering Sea pollock fishery. In the early-1990s, the Chum Salmon Savings Area was established as a large area closure in the Bering Sea in August and further closed when triggered by a cap of 42,000[1] non-Chinook salmon. The savings area was adopted based on areas of high historic observed salmon bycatch rates and designed to avoid areas and times of high salmon bycatch.

While chum salmon bycatch in the past few years has been declining, numbers reached an historical high in 2005 with approximately 705,000 fish taken as bycatch in the pollock fishery. Table ES-1 shows the number of chum salmon taken as bycatch from 2003 to 2010.

Table ES-1 The number of participating vessels in the Bering Sea pollock fishery, the pollock total allowable catch (TAC) in metric tons (t), and the number of non-Chinook (chum) salmon taken as bycatch from 2003 to 2010.[2]

Year	Number of pollock fishing vessels	Pollock TAC (t)	Non-Chinook (chum) salmon bycatch (numbers of fish)
2003	110	1,491,760	189,185
2004	113	1,492,000	440,459
2005	109	1,478,000	704,586
2006	105	1,487,756	309,644
2007	108	1,394,000	93,786
2008	108	1,000,000	15,142
2009	106	815,000	46,129
2010	104	813,000	13,306

The Council started considering revisions to existing chum salmon bycatch management measures in 2004 when information from the fishing fleet indicated that it was experiencing increases in chum salmon

[1] The Chum Salmon Savings Area is closed to pollock fishing from August 1 through August 31 of each year. Additionally, if the prohibited species catch 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 Salmon Savings Area remains closed to directed fishing for pollock for the remainder of the period September 1 through October 14. This limit is divided between with CDQ and combined non-CDQ fisheries.

[2] Non-Chinook (Chum) salmon bycatch is estimated using the NMFS Catch Accounting System (CAS). The CAS continually revises past bycatch estimates based on new information. Therefore, these numbers change slightly depending on when the analyst retrieved the data from the CAS. NMFS periodically revises the bycatch estimates and posts the most recent estimates on the NMFS Alaska Region webpage at: http://www.fakr.noaa.gov/sustainablefisheries/inseason/chum_salmon_mortality.pdf.. Chapter 3 provides more detailed information on the CAS.

bycatch following the regulatory closure of the Chum Salmon Savings Area. Contrary to the original intent of the area closure, chum salmon bycatch rates appeared to be higher outside of the savings area than inside the area. To address this problem, the Council examined other means to minimize chum salmon bycatch that were more flexible and adaptive.

Since 2006, the pollock fleet has been exempt from regulatory closures of the Chum Salmon Savings Areas if they participate in a salmon intercooperative agreement (ICA) with a rolling hotspot system (RHS). The fleet started the RHS for chum salmon in 2001 (and similarly for Chinook salmon in 2002). It was intended to increase the ability of pollock fishery participants to minimize salmon bycatch by giving them more flexibility to move fishing operations quickly to avoid areas where they experience high rates of salmon bycatch. The exemption to area closures for vessels that participated in the RHS ICA was implemented in 2006 and 2007 through an exempted fishing permit and subsequently, in 2008, through Amendment 84 to the BSAI FMP. Since 2006, all AFA cooperatives and all six of the CDQ groups have participated in a salmon bycatch reduction ICA and have been exempt from closures of the Chum Salmon Savings Area in the Bering Sea.

The Council has taken recent action to minimize bycatch of Bering Sea Chinook salmon by recommending the Chinook salmon bycatch management program under Amendment 91. The Council had previously indicated its prioritization of a Chinook salmon bycatch management program in light of high Chinook salmon bycatch in 2007 (with declining trends in chum salmon simultaneously) but indicated that following action on Chinook salmon, the Council would then examine additional management measures to minimize chum bycatch to the extent practicable. This analysis evaluates four alternatives to meet that objective.

Description of Alternatives

Chapter 2 describes and compares four alternatives for minimizing chum salmon bycatch, including detailed options and suboptions for each alternative.

Alternative 1: Status Quo (No Action)
Alternative 2: Hard cap
Alternative 3: Triggered closures
Alternative 4: Triggered closure with intercooperative exemption

The alternatives analyzed in the EA and RIR generally involve limits or "caps" on the number of non-Chinook (elsewhere in document referred to simply as chum salmon as they comprise over 99% of the composition of the bycatch) that may be caught in the Bering Sea pollock fishery and closures 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 bycatch cap was reached even if a portion of the pollock TAC has not yet been harvested. Alternatives 2 and 3 represent a change in management of the pollock fishery because if the non-Chinook salmon bycatch allocations are reached before the full harvest of the pollock allocation, then directed fishing for pollock must stop either BS-wide or in a specified area. Under Alternative 3, like Alternative 1, reaching the cap closes specific areas important to pollock fishing. Under Alternative 4, a closure is proposed to which the fleet would be exempt for participating in an RHS program similar to status quo.

Alternative 1: Status Quo (No Action)

Alternative 1 retains the current program of Chum Salmon Savings Area (SSA) closures in the BS triggered by separate non-CDQ and CDQ non-Chinook salmon prohibited species catch (PSC) limits, along with the exemption to these closures by pollock vessels participating in the Rolling Hot Spot

intercooperative agreement (RHS ICA). This area is closed to all trawling from August 1 through August 31. Additionally, if 42,000 'other" salmon are caught in the Catcher Vessel Operational Area (CVOA) during the period August 15-October 14, the area remains closed remainder of the period September 1 through October 14. 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. Under this system, the pollock fishery can continue to harvest pollock outside of the closed areas. Pollock vessels participating in the RHS ICA, under regulations implemented for BSAI FMP Amendment 84, are exempt from these closures altogether.

Alternative 2: Hard cap

Alternative 2 would establish separate chum salmon bycatch caps for the pollock fishery (in the B season). When the hard cap is reached all directed fishing for pollock must cease. 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. .

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

Setting the Hard Cap

Table 2-4 lists the range of numbers considered for the overall non-Chinook salmon hard caps, in numerical order, lowest to highest. As listed here, the CDQ Program of the fishery level cap would be allocated 10.7%, with the remainder allocated to the combined non-CDQ fishery.

Table ES-2 Range of suboptions for hard cap for non-Chinook with allocations for CDQ Program (10.7%) and remainder for non-CDQ fishery (89.3 %)

	Non-Chinook	CDQ	Non-CDQ
i)	**50,000**	5,350	44,650
ii)	75,000	8,025	66,975
iii)	125,000	13,375	111,625
iv)	**200,000**	21,400	178,600
v)	300,000	32,100	267,900
vi)	**353,000**	37,771	315,229

For analytical purposes only, a subset of the cap numbers included in the six suboptions were used in this document to assess the impacts of operating under a given hard cap. This subset approximates the upper and lower endpoints of the suboption range, and a midpoint (**bolded**).

Apportioning the hard cap

The hard caps could be apportioned as:

- fishery level caps for the CDQ fishery and the non-CDQ fishery;
- sector level caps for the three non-CDQ sectors: the inshore CV sector, the mothership sector, and the offshore CP sector; and
- cooperative level caps for the inshore CV sector.

A fishery level cap would be managed by NMFS with inseason actions to close the fishery once the cap was reached. The CDQ fishery caps would be allocated and managed at the CDQ group level, as occurs under status quo. The hard caps could be apportioned to sectors as sector level caps based on the

percentages in Table 2-6. Non-CDQ sector level caps would be managed by NMFS with inseason actions to close the fishery once the cap was reached.

The inshore CV sector level cap could be allocated to cooperatives and the inshore CV limited access fishery. The cooperative transferable allocation amounts would be based on the proportion of pollock allocations received by the cooperatives.

For analytical purposes, a subset of the sector level cap options (shown in bold) providing the greatest contrast is used for detailed analysis.

Table ES-3. Sector percentage allocations resulting from options 1-3. Note that percentage allocations under Option 6 for the remaining sections are not included at this time. The allocation included for analytical purposes are shown in **bold**.

Time Period for Average	Option	% historical: pro-rata	CDQ	Inshore CV	Mothership	Offshore CPs
NA (AFA)	1	0:100	10.0%	45.0%	9.0%	36.0%
2007-2009	2i	100:0	4.4%	75.6%	5.6%	14.4%
	3i	75:25	5.8%	67.9%	6.5%	19.8%
	4i	50:50	7.2%	60.3%	7.3%	25.2%
	5i	25:75	8.6%	52.6%	8.2%	30.6%
2005-2009	**2ii**	**100:0**	**3.4%**	**81.5%**	**4.0%**	**11.1%**
	3ii	75:25	5.0%	72.4%	5.3%	17.3%
	4ii	**50:50**	**6.7%**	**63.3%**	**6.5%**	**23.6%**
	5ii	25:75	8.3%	54.1%	7.8%	29.8%
2000-2009	2iii	100:0	4.4%	76.0%	6.2%	13.4%
	3iii	75:25	5.8%	68.3%	6.9%	19.1%
	4iii	50:50	7.2%	60.5%	7.6%	24.7%
	5iii	25:75	8.6%	52.8%	8.3%	30.4%
1997-2009	2iv	100:0	4.4%	74.2%	7.3%	14.1%
	3iv	75:25	5.8%	66.9%	7.8%	19.5%
	4iv	50:50	7.2%	59.6%	8.2%	25.0%
	5iv	25:75	8.6%	52.3%	8.6%	30.5%
suboption(10.7% to CDQ)	**6**	**NA**	**10.7%**	**44.77%**	**8.77%**	**35.76%**

Transfers and Rollovers

To provide sectors and cooperatives more opportunity to fully harvest their pollock allocations, Alternative 2 could include the ability to transfer sector and cooperative allocations and/or rollover unused salmon bycatch (Table ES-4).

If the Council determines that sector level caps should be issued as transferable allocations, then these entities could request NMFS to move a specific amount of a salmon bycatch allocation from one entity's account to another entity's account during a fishing season. Transferable allocations would not constitute a "use privilege" and, under the suboptions, only a portion of the remaining salmon bycatch could be transferred. If NMFS issues the sector level cap as a transferable allocation to a legal entity representing all participants in that sector, that entity would be prohibited from exceeding its allocation and would be subject to an enforcement action if it exceeded its allocation.

Under the sector rollover option, rollovers would occur when a sector has harvested all of its pollock allocation but has not reached its seasonal sector level Chinook salmon bycatch cap. NMFS would move the unused portion of that sector's cap to the sectors still fishing in that season.

Table ES-4. Transfers and rollovers options for Alternative 2, hard caps.

	Option	Provision		
No transfer of salmon				
Sector transfers	Option 1	Caps are transferable among sectors in a fishing season		
	Suboption	Maximum amount of transfer limited to the following percentage of salmon remaining:	a	50%
			b	70%
			c	90%
Sector rollover	Option 2	NMFS rolls over unused salmon bycatch to sectors still fishing in a season, based on proportion of pollock remaining to be harvested		
Cooperative transfers	Option 1	Lease pollock among cooperatives in a season or a year		
	Option 2	Transfer salmon bycatch in a season		
	suboption	Maximum amount of transfer limited to the following percentage of salmon remaining:	a	50%
			b	70%
			c	90%

A summary of the Alternative 2 Components, option and suboptions for analysis is shown in Table ES-5 below.

Table ES-5. Alternative 2 components, options, and suboptions for analysis.

Setting the hard cap (Component 1)	Option 1: Select from a range of numbers	**Non-Chinook**		**CDQ**	**Non-CDQ**
		50,000		5,350	44,650
		200,000		21,400	178,600
		353,000		37,771	315,229
Allocating the hard cap to sectors (Component 2)*		CDQ	Inshore CV	Mothership	Offshore CP
	No allocation	10.0%	45.0%	9.0%	36.0%
	1: Option 2ii	10%	45%	9%	36%
	2: Option 4ii	3%	70%	6%	21%
	3: Suboption	10.7%	44.77%	8.77%	35.76%
Sector transfers (Component 3)	No transfers				
	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.			
Allocating the hard cap to cooperatives (Component 4)	No allocation	Allocation managed at the inshore CV sector level.			
	Allocation	Allocate cap to each cooperative based on that cooperative's proportion of pollock allocation.			
	Cooperative Transfers	Option 1	Lease pollock among cooperatives in a season or a year		
		Option 2	Transfer salmon PSC (industry initiated)		
		Suboption Maximum amount of transfer limited to the following percentage of salmon remaining:		a	50%
				b	70%
				c	90%

Alternative 3: Triggered Closures

Alternative 3 would establish monthly time and area closure systems that are triggered when specified cap levels are reached. As with Alternative 2, components and options for each component are specified and described below.

Trigger cap levels:

Table ES-6 lists the range of numbers considered for the overall non-Chinook salmon hard caps, in numerical order, lowest to highest. As listed here, the CDQ sector allocation of the fishery level cap would be 10.7%, with the remainder apportioned to the combined non-CDQ fishery.

Table ES-6. Range of suboptions for trigger cap levels for non-Chinook with allocations for CDQ (10.7%) and remainder for non-CDQ fishery.

	Non-Chinook	CDQ	Non-CDQ
i)	**25,000**	2,675	22,325
ii)	50,000	5,350	44,650
iii)	**75,000**	8,025	66,975
iv)	125,000	13,375	111,625
v)	**200,000**	21,400	178,600

For analytical purposes only, a subset of the cap levels included in the six suboptions were used in this document to assess the impacts of operating under a given hard cap. This subset approximates the upper and lower endpoints of the suboption range, and a midpoint (**bolded**).

Component 1B: Trigger limit application:

Three options are considered to apply trigger caps (Component 1B) to the area closure options. Option 1 would apply the trigger to all chum salmon bycatch, and use the calculated cumulative monthly proportion of the cap to establish monthly threshold limits. Here the cumulative monthly proportion (as noted in Table 2-10 below) is used to establish threshold limits by month for the overall cap as selected under Component 1A. The cumulative monthly proportion is calculated by estimating the average bycatch per month over the years 2003-2010.

Table ES-7. Monthly proportion of non-Chinook salmon limit that specifies option 1 of Alternative 3.

Month	**Option 1** : monthly threshold cumulative proportion
June	11.1%
July	35.4%
August	66.5%
September	92.8%
October	100.0%

Option 2 specifies a within-monthly limit defined as the minimum of the monthly cumulative and 150% of monthly historical proportion[3]. A suboption (referred to as Option 2a in the analysis) specifies a monthly trigger limit application that redistributes the monthly percentage such that trigger limits are lower in months where the western Alaska chum salmon bycatch component[4] is proportionately higher. This suboption is intended to provide similar protection levels for western Alaskan chum salmon stocks throughout the B-season. Note that in all months, results to date indicate that Asian stocks make up the

[3] Note monthly limit should evaluate +/- 25% of monthly limit distribution

[4] The category of western Alaska stocks includes coastal western Alaska and fall run Yukon chum salmon.

highest proportion of the bycatch. Similarly, the results from genetic studies indicate that the proportion of chum salmon bycatch that is western Alaska stock is higher during the early (June-July) part of the B-season compared to later in the season (August-October).

Under Option 3, a single (overall or sector-split) cap would be specified and bycatch would accrue toward it cumulatively over the season. When that cap was reached, the closure system specified in Component 4 would be enacted. There would be no additional monthly cap limit constraints as specified under Components 1A and 1B. The areas to be closed would depend upon the timing of when the overall cap (or sector-specific proportion) was reached and would continue monthly as specified under the closure system selected under Component 4.

Options 1-3 describe the mechanism by which the specific trigger limit (as selected under Component 1) is applied, which if reached enacts a series of closures, as described under Component 4. Under all three options, the closure system would be enacted for the remainder of the season should the cumulative total trigger by sector be reached. The distinction between the options is the progressively more restrictive within monthly limits imposed on either option 1 or 2 in addition to the cumulative cap. Component 4 describes the range of area closures under consideration based upon average historical bycatch percentages. Here Component 4B (50% historical bycatch) is selected for this example. The areas corresponding to these closures are shown in Figure 2-3.

Under option 1, the listed area will close for the month in which the sectors cap is reached. Those areas would then reopen at the end of the month. The next areas would remain open unless the cumulative bycatch by sector reaches the monthly limit. If bycatch reaches the monthly limit then the areas listed for that month will close for the remainder of the month. If in any month the cumulative total amount (listed in bold) is reached, then the CSSAs listed for each month would close according to their monthly schedule for the remainder of the season. In all cases there may be additional bycatch by sector outside of the CSSAs, however the sector whose limit has been reached will be prohibited from fishing in the CSSAs in each month in which the closure applies.

Under option 2, there are more restrictive within monthly limits in addition to the monthly cumulative limits shown in Table 2-10. For all sectors the monthly and cumulative amounts for June are equivalent (and for this sector allocation example they are equivalent in July as well). Should the within-monthly limit by sector be reached, regardless of the cumulative monthly limit not being reached, the CSSA would close for the remainder of the month. The following month, the CSSA would only close if the limit for that month was reached or if the cumulative bycatch reached the cumulative limits. As with option 1, if at any time the annual cumulative total (in bold) were reached, then the CSSAs would be enacted monthly for the remainder of the season and the sector or sectors reaching their limits would be prohibited from directed fishing for pollock within those areas in each month. As with option 1, bycatch by sector may continue to accrue outside of the CSSAs.

Under option 3, when the cumulative amount by sector is reached, the CSSA in the month in which the cap was reached will close for the remainder of the month and the CSSAs for all subsequent months through the end of the season will close as scheduled. No within monthly limit is applied in addition to the cumulative bycatch limit under this option. As with option 1 and 2, bycatch by sector may continue to accrue outside of the CSSAs.

Component 3: Cooperative Provisions

As with Alternative 2, the trigger cap may be further apportioned within the shoreside CV sector to the cooperative level if this component is selected.

Component 4: Area and Timing Options

Component 4 includes three options for a system of closure areas which change by month. Options represent the overall estimated bycatch percentage represented historically within these regions, on a monthly basis, over the years 2003-2010.

a) Area closure groupings by month that represent 40% of historical bycatch.
b) Area closure groupings by month that represent 50%[5] of historical bycatch.
c) Area closure groupings by month that represent 60% of historical bycatch.

Under the closure systems represented by Component 4, options a-c, the specified closures vary each month depending upon the selected historical bycatch percentage. Once a cap level and allocation as selected under components 1-3 are reached (by fishery, sector or cooperative depending upon the allocation level), the specified areas by month would close for the remainder of the month. At the end of the month, the areas would then reopen and if triggered (already based upon exceeding a cumulatively specified cap or within the subsequent month by triggering a within-month cap) new areas would close to those entities which exceeded their proportion of the cap the following month. In each month the areas to be closed are pre-specified but are not exactly the same from one month to the next. Under a cumulative cap scenario, once the cap is reached the closure system goes into place in every month for the remainder of the season. Further information on how the cap application corresponds to the closure system is contained in Chapter 2.

[5] The Council noted that the analysis should include quantitative analysis of the 50% closure options and qualitative analysis of the 40% and 60% closure options.

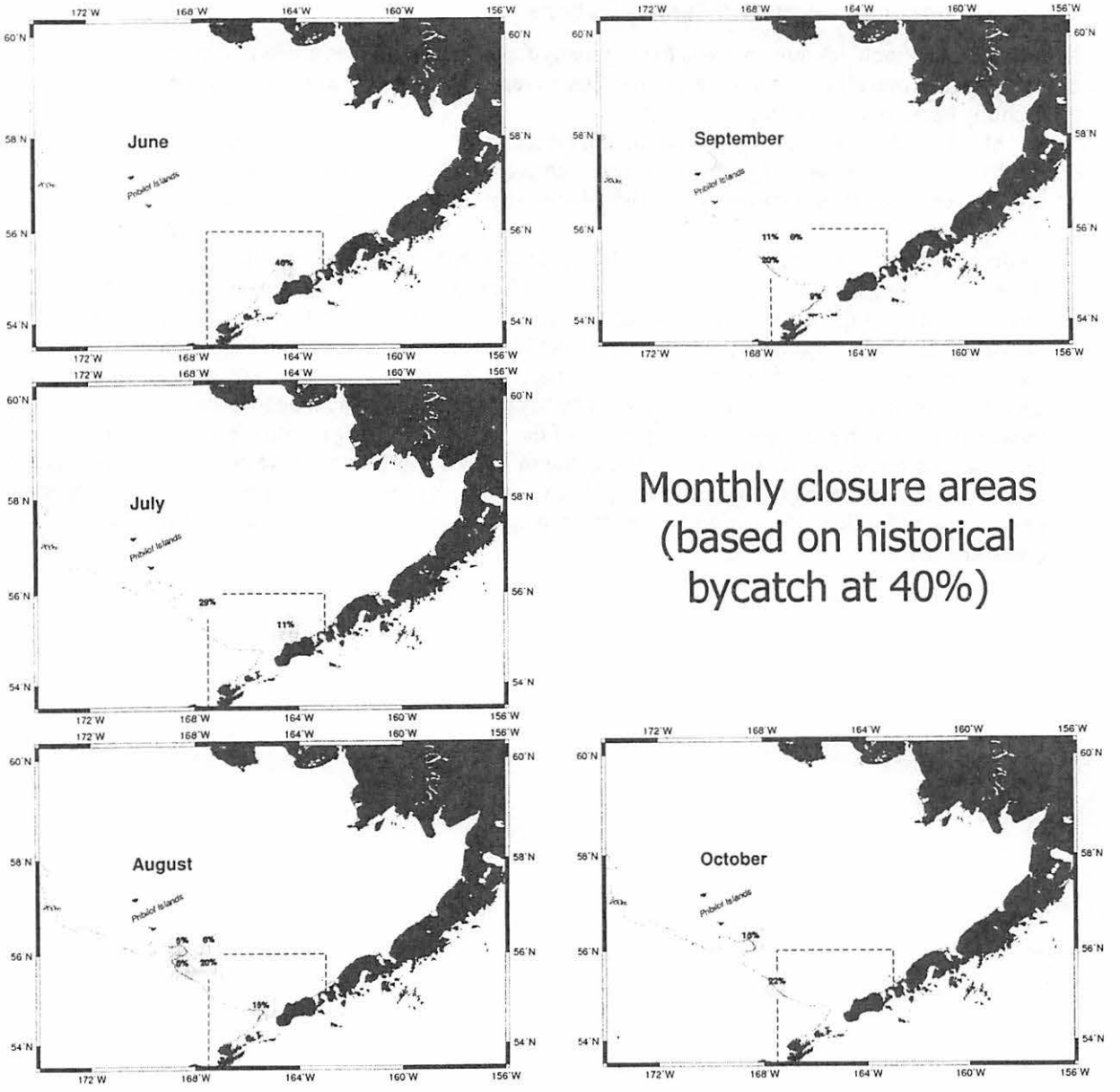

Figure ES-2. Monthly area closures based on ADFG areas that represented 40% of the historical chum salmon bycatch (within each month)

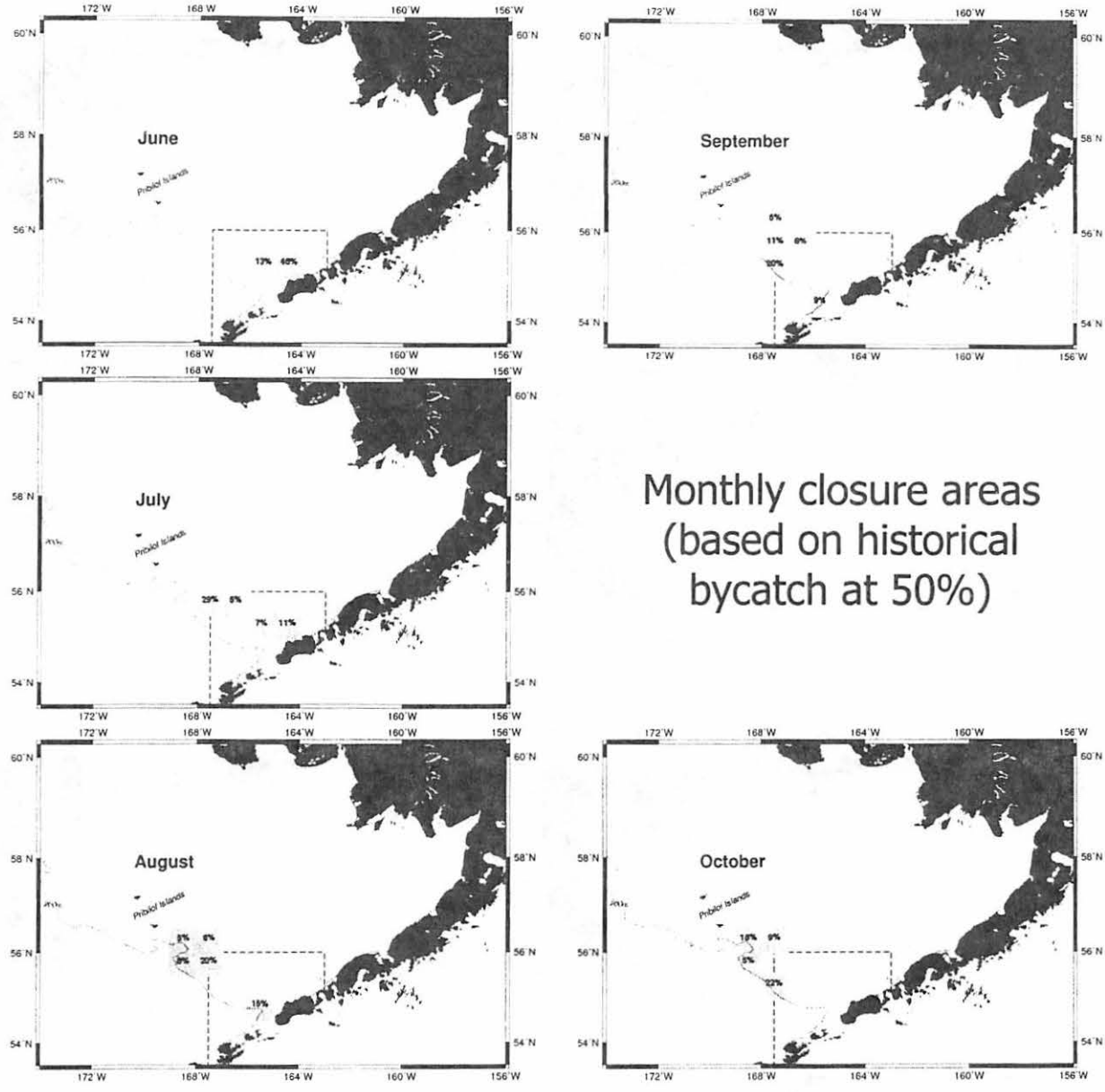

Figure ES-3. Monthly area closures based on ADFG areas that represented 50% of the historical chum salmon bycatch (within each month).

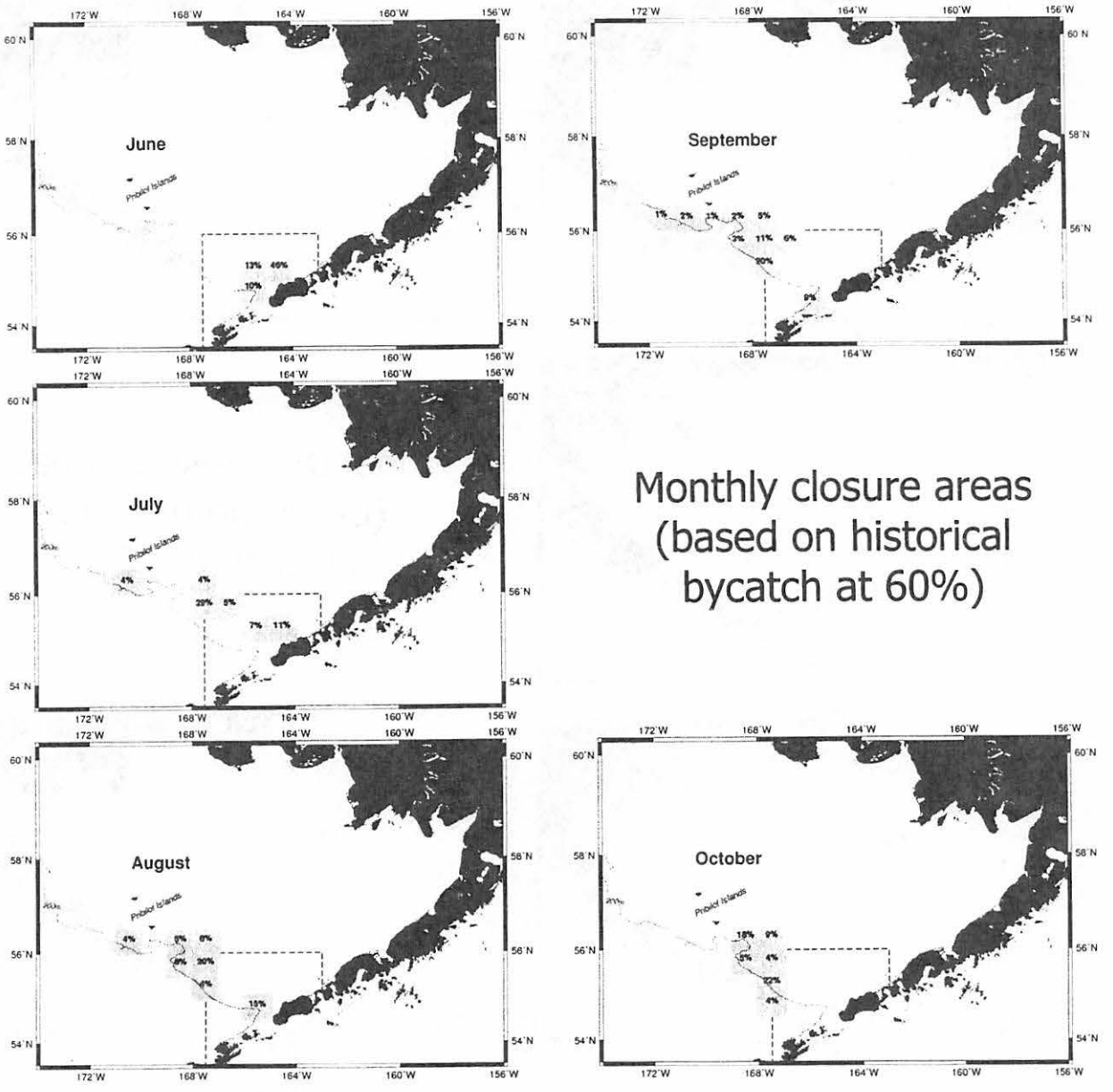

Figure ES-4. Monthly area closures based on ADFG areas that represented 60% of the historical chum salmon bycatch (within each month)

A summary of the Alternative 3 components and options for analysis are show in Table ES-8.

Table ES-8. Alternative 3 Components and options.

Setting the cap (Component 1)	1A: How to formulate the cap	Select a cap from a range of numbers, 25,000 –200,000 (same range as Alternative 2)			
	1B: How to apportion cap by season	Option 1: monthly apportionment of cap			
		Option 2: monthly threshold and within monthly limit			
Allocating the hard cap to sectors (Component 2)		CDQ	Inshore CV	Mothership	Offshore CP
	No allocation	3.4%	81.5%	4.0%	11.1%
	1: Option 2ii	6.7%	63.3%	6.5%	23.6%
	2: Option 4ii	10.7%	44.77%	8.77%	35.76%
	3: Option 6	3.4%	81.5%	4.0%	11.1%
Cooperative Provisions (Component 3)	Voluntary transfers among sectors are allowed				
	NMFS can reapportion unused salmon to other sectors based on their proportion of remaining pollock (except not from CDQ groups)				
Area and Timing Options (Component 4)	a	Area closure groupings by month that represent 40% of historical PSC			
	b	Area closure groupings by month that represent 50% of historical PSC			
	c	Area closure groupings by month that represent 60% of historical PSC			

Alternative 4-Closure with RHS exemption

Alternative 4 would establish a large area closure, with an option to select a cap to trigger the closure. If the triggered closure option is not selected, the area would be closed during the entire B-season. Similar to status quo (rolling hot-spot (RHS) system in regulation), participants in a vessel-level (platform level for the mothership sector) RHS would be exempt from the regulatory closure system under Alternative 4. The area proposed to be closed under Alternative 4 represents an area encompassing 80% of historical bycatch (Figure ES-5). A summary of the Components and options under Alternative 4 are provided in Table ES-9.

Table ES-9. Alternative 4 components

Fleet PSC management with non-participant fixed closure	B Season	Fixed closure encompassing 80% of historical PSC			
	RHS Exemption	Participants in RHS would be exempt from the regulatory closure			
Trigger Closure Option 1	All B Season	Fixed closure encompassing 80% of historical PSC for all RHS non-participants			
	Trigger Caps	1a	50,000		
		1b	200,000		
Sector Allocation Suboption	Trigger cap options under 1a and 1b would be apportioned to the sector level. This would result in separate sector level caps for the CDQ sector, the inshore catcher vessel (CV) sector, the mothership sector, and the offshore catcher processor (CP) sector.				
Allocating the hard cap to sectors (functionally same as under Alternative 2) see table 2-20 and Chapter 2 for cap numbers.		CDQ	Inshore CV	Mothership	Offshore CP
	No allocation	3.4%	81.5%	4.0%	11.1%
	1: Option 2ii	6.7%	63.3%	6.5%	23.6%
	2: Option 4ii	10.7%	44.77%	8.77%	35.76%
	3: Option 6	3.4%	81.5%	4.0%	11.1%

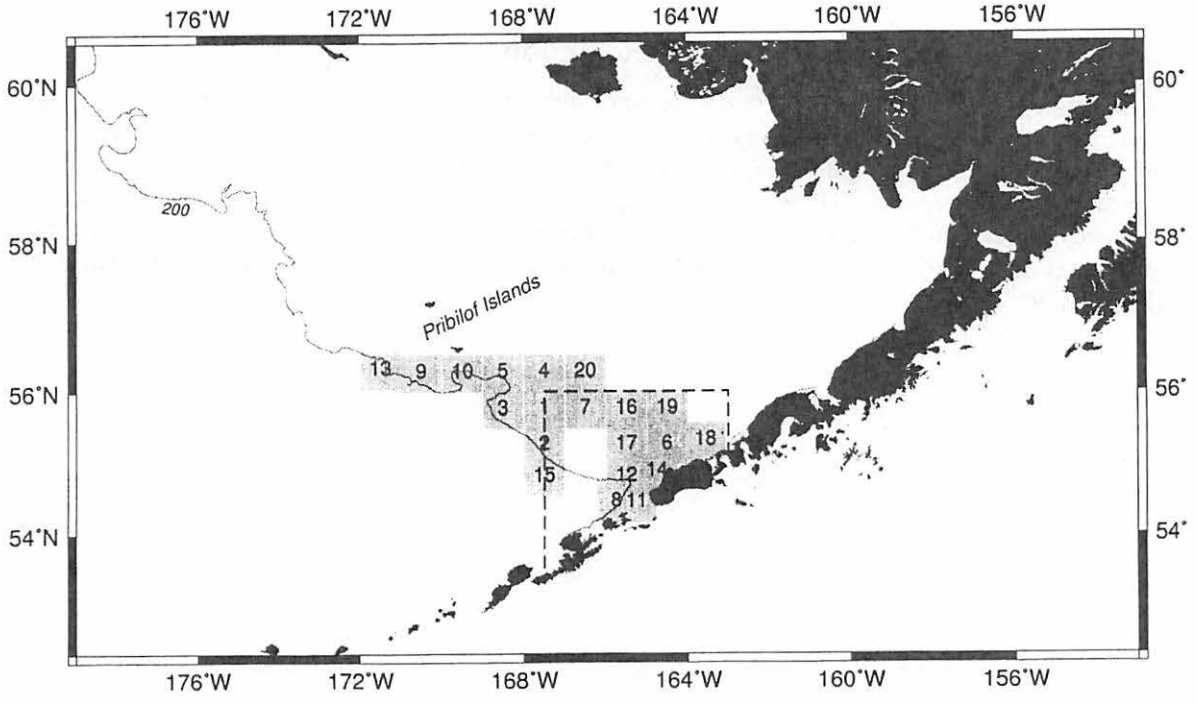

Figure ES-5. Large area closure based on ADFG areas that represented about 80% of the historical chum salmon bycatch

Effects of the Alternatives

Quantitative analysis was completed on the potential impacts of the alternatives on chum salmon, pollock, Chinook salmon, and related economic analyses. Chapter 3 describes the methodology for the quantitative analysis. For the remaining resource categories considered in this analysis - marine mammals, seabirds, other groundfish, essential fish habitat, ecosystem relationships, and environmental justice - impacts of the alternatives were evaluated largely qualitatively based on results and trends from the quantitative analysis.

The estimated impacts of alternative chum salmon bycatch management measures were evaluated by examining when cap options would have resulted in fishery closures and then estimating the numbers of salmon that would have been 'saved' by virtue of the fishery (or sector) closing earlier. The salmon saved is then compared to the amount of pollock that would have been forgone or diverted to open areas (for Alternative 3). The analyses were based on 2003-2010 NMFS observer data combined with NMFS regional office catch-accounting. For Alternative 3 triggered closures, data were augmented by using the same spatial and temporal patterns of PSC observed but with different absolute levels. This was done to provide resolution needed to distinguish characteristics between triggered closure options. For this reason proportional change between scenarios are reported and application to a "prototypical year" is presented to evaluate the expected consequences. Alternative 4 was analyzed two ways: 1) as a fixed B season closure should all vessels fail to participate in a voluntary rolling hotspot program, and 2) with 100% vessel participation in a rolling hotspot program. This allows for evaluation of two bookends of the potential impacts under this alternative.

Results presented in Chapter 5 include both overall changes in chum salmon bycatch due to alternative management measures, as well as resulting estimates of the amount of chum salmon that would have returned to natal rivers as adult fish.

The RIR examines the costs and benefits of the alternatives based on the analysis in Chapters 4 and 5 that estimates the likely dates of pollock fishery closures and thereby retrospectively projects likely forgone pollock harvest and the number of chum salmon that may have been saved. Under Alternative 3, the RIR uses estimates of pollock caught outside of proposed closure areas. In this way, estimates of direct costs, in terms of potentially forgone gross revenue due to unharvested pollock, may be compared to the estimated benefits, in terms of the numbers of chum salmon that would not be taken as bycatch. Potentially forgone pollock fishery gross revenue is estimated by tabulating the amount of pollock historically caught after a closure date and applying established sector and seasonal prices. However, it is not a simple matter to estimate changes in gross revenues due to changes in chum salmon bycatch predicted under the alternatives. The analysis relies on estimates of chum salmon saved as the measure of economic benefits of the alternatives.

Chum Salmon

The chum salmon taken as bycatch in the pollock fishery originate from Alaska, the Pacific Northwest, Canada, and Asian countries along the Pacific Rim. Combined there about 3 billion chum released each year from hatcheries around the Pacific Rim. The majority of hatchery releases are from Russia and Japan. Currently the North Pacific groundfish observer program treats hatchery and wild origin chum salmon the same even though a less than 20% of hatchery fish are released with thermal signatures that can be identified from otoliths. The percentage of chum salmon in the PSC that are of hatchery origin is unknown but genetic analyses provide estimates of chum that are Asian versus Alaskan origin. Estimates are provided in this analysis of the relative stock composition of the chum salmon PSC from broad regional groupings around the Pacific Rim. The majority of bycatch appears to be of Asian origin. For PSC impact considerations, analyses focus on the impact to Alaska and in particular to PSC attributed to be from western Alaskan rivers.

Summaries on the status of wild chum salmon stocks in Alaska are presented to provide context of where issues and concerns are highest. These sections include tables of catch, the types of fisheries that the stocks support, whether escapement goals have been met, and whether there are stock concerns which are further summarized here (Table ES-10).

Table ES-10. Overview of Alaskan chum salmon stock performance, 2010.

Chum salmon stock	Total run size?	Escapement goals met?[1]	Subsistence fishery?	Commercial fishery?	Sport fishery?	Stock of concern?
Bristol Bay	Above average	1 of 1	Yes	Yes	Yes	No
Kuskokwim Bay	Above average	2 of 2	Yes	Yes	Yes	No
Kuskokwim River	Average	2 of 2	Yes	Yes	Yes	Yield concern discontinued 2007
Yukon River summer run	Average	2 of 2	Yes	Yes, but limited by low Chinook	Yes	Management concern discontinued 2007
Yukon River fall run	Below average	6 of 8	Restrictions	Limited late season (Tanana River)	No	Yield concern discontinued 2007
Eastern Norton Sound	Above average	1 of 1	Yes	Yes	Yes	No
Northern Norton Sound	Above average	7 of 7	Yes	Yes	Yes, except for Nome Subdistrict	Yield concern (since 2000)
Kotzebue	Above average	6 of 6	Yes	Yes	Yes	No
North Peninsula	Average	2 of 2	Yes	Yes	Yes	No
South Peninsula	Below average	2 of 4	Yes	Yes	Yes	No
Aleutian Islands	n/a	n/a	Yes	Yes	Yes	No
Kodiak	Below average	2 of 2	Yes	Yes	Yes	No
Chignik	Average	1 of 1	Yes	Yes	Yes	No
Upper Cook Inlet	Above average	1 of 1	Yes	Yes	Yes	No
Lower Cook Inlet	Average	9 of 12	Yes	Yes	Yes	No
Prince William Sound	Average	5 of 5	Yes	Yes	Yes	No
Southeast	Below average	6 of 8	Yes	Yes	Yes	No

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

Chum salmon support subsistence, commercial, personal use, and sport fisheries in their regions of origin. The State of Alaska Department of Fish & Game manages the commercial, subsistence, sport, and personal use salmon fisheries. The Alaska Board of Fisheries (BOF) adopts regulations through a public process to conserve fisheries resources and to allocate fisheries resources to the various users. The first priority for state management is to meet spawning escapement goals to sustain salmon resources for future generations. The highest priority use is for subsistence under both state and federal law. Subsistence fisheries management includes coordination with the Federal Subsistence Board and Office of Subsistence Management, which manages subsistence uses by rural residents on federal lands and applicable waters under Title VIII of the Alaska National Interest Lands Conservation Act (ANILCA). Surplus fish beyond escapement needs and subsistence use are made available for recreational, personal use, and commercial fisheries. Yukon River salmon fisheries management includes obligations under an international treaty with Canada.

Chum salmon serve an integral cultural, spiritual, nutritional, and economic role in the lives of Alaska Native peoples and others who live in rural communities. For Alaska Natives and others throughout western and interior Alaska, harvesting and eating wild subsistence foods are essential to personal, social, and cultural identity, and salmon comprise the majority of subsistence foods harvested and used. In addition, commercial fishing for chum salmon provides a significant source of income for many people who live in remote villages, which often supports the ability to engage in subsistence harvests. For

purposes of the RIR and this action, 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.

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 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.

The Alaska Board of Fisheries has made ANS findings for salmon throughout the areas under discussion in the RIR, 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. 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. 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, in some years when ANS was not achieved, total summer chum and fall chum runs (and other runs) were adequate to provide for subsistence harvests and no additional restrictions were in place on the subsistence fishery. The importance of salmon for subsistence and other uses is the subject of Chapter 3 of the RIR.

Chum salmon savings

Chapter 5 analyzes the impacts of the alternatives on chum salmon. First, estimates on the number of chum salmon saved under each alternative compared to Alternative 1 (status quo) are made based on the details of the alternatives and options. These estimates were then combined with data on the ages of chum salmon taken by the pollock fishery to provide annual estimates on the numbers of chum salmon that would have returned to spawn (referred to as adult equivalents or AEQ). Finally, the data from genetic samples available from 2005-2009 were combined with the AEQ and run size estimates (along with associated uncertainties) to evaluate impacts on specific chum salmon runs or groups of runs to different regions.

Estimates of historical bycatch represent actual numbers of chum salmon taken and include benefits of existing management measures. A separate analysis of the current mechanisms in place under status quo (i.e., the fleet-based rolling hot spot program) estimates what percentages of salmon are likely already being saved. These estimates are provided to understand the effectiveness of the current system relative to one which lacked any salmon bycatch avoidance program. The reduction due to this program is estimated to range from 4-28% based on estimation of imposing the system in years prior to its operation. Comparing alternatives against status quo requires understanding that the relative benefits are in addition to the current status quo measures.

Analysis of the efficacy of the existing RHS program showed the following general conclusions:

- From 2003-2010, chum bycatch rates in the 1-3 days following RHS closures are approximately 8 percent lower than rates prior to the closure
- Annual average chum bycatch rates by sector in the 5-days before closures (imposed on 2003-2010 data) ranged from 11-33 percent for CVs and from 2 percent to 30 percent for other sectors, most years in the upper end of this range.

- The average percentage of pollock catch that was moved due to closures ranged from 7 percent to 21 percent for CVs and was less than 5 percent for other sectors.
- Evaluating the pre-RHS data from 1993-2000, an RHS-like system would likely have reduced chum bycatch by 9 percent to 22 percent on average with about 4-10% percent of pollock fishing have been relocated to other areas.
- The pre-RHS analysis suggests that closures in place for chum have likewise been effective for Chinook with the range of Chinook savings as 6 percent to 14 percent per year.

Some additional considerations in analyzing the RHS system include the following:

- Based on 1993-2000 data, large closures reduce salmon PSC more but at the cost of reducing the areas where pollock could be taken. Also, closures based on the most recent information possible lead to larger average reductions and relatively small base rates appear on average to be more effective.
- The "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 areas closed to others. During closure periods, 4.6 percent of pollock from shore-based catcher vessels and 0.3 percent of pollock from other sectors was taken inside the closure areas.

Compared to alternative spatial management systems, the RHS system has advantages and limitations. Some of the key advantages include the flexibility to adapt to new information rapidly, the ability to explicitly make trade-offs between chum and Chinook as necessary and reporting requirements that allow for transparency in the adherence of vessels to designated closures. Some limitations include provisions on the maximum area that can be closed and a lack of incentives at the vessel level when restrictions are based on a cooperative level bycatch rate. Further information on the methodology and detailed impacts under the RHS system are contained in Chapter 5.

Adult Equivalent chum salmon savings

AEQ bycatch takes into account the fact that some of the chum salmon taken in the pollock fishery would not have returned to their river of origin in that year. Based on their age and maturity, they might have returned one to two years later. Also, the approach accounts for that fact that some proportion of the bycatch may have suffered mortality in the ocean (e.g., predation). AEQ bycatch estimates provide a way to evaluate the impacts to spawning stocks and future mature returning chum salmon.

Results show that the extent that bycatch is adjusted depending on the ages (to obtain the AEQ estimate) for chum salmon is variable (Figure ES-6). In some years, the actual bycatch may be below the AEQ estimates, due to the lagged impact of higher bycatch in previous years. Overall, the range of uncertainty

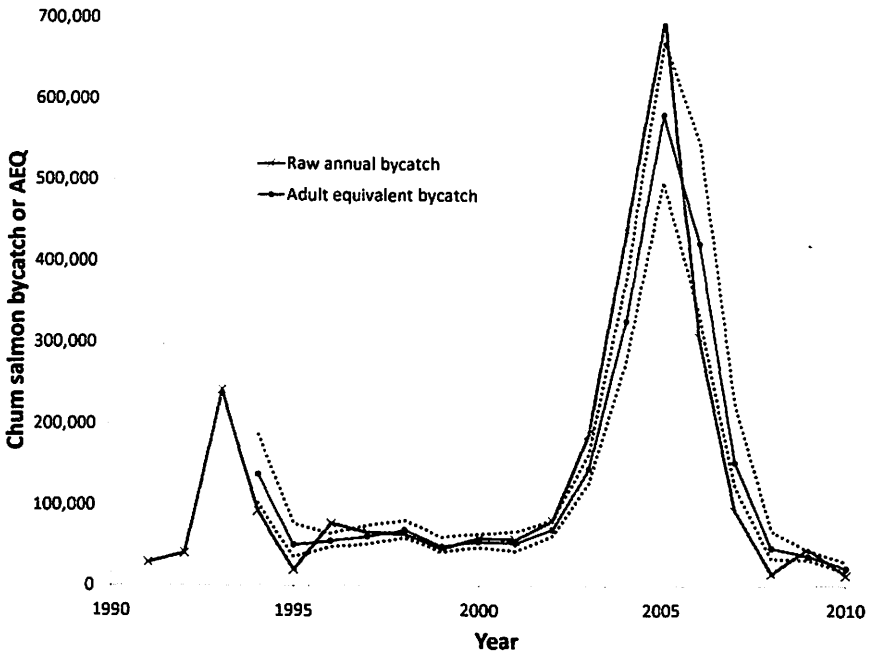

Figure ES-6. Time series of non-Chinook (chum) annual bycatch estimates compared to the adult equivalent estimates from the pollock fishery, 1991-2010. The dotted lines represent the uncertainty of the AEQ estimate, due to the combined variability of ocean mortality, maturation rate, and age composition of bycatch estimates.

AEQ chum salmon returns to rivers of origin

Combining the AEQ results with genetic analysis from 2005-2009 and estimates of run sizes (for coastal west Alaska and the Upper Yukon) provides the means to evaluate the historical impact of chum salmon bycatch. In particular, it provides estimates on how many salmon would have returned to specific river systems and regions had there been no pollock fishing. The stock composition mixtures of the chum salmon bycatch were based on samples collected from the Bering Sea pollock fishery. Results from a number of these analyses have been completed and presented to the Council (i.e., Guyon et al. 2010, Marvin et al. 2010, Gray et al. 2010, and McCraney et al. 2010). This analysis used the same approach and genetic breakouts to 6 individual regions to characterize region of origin for chum bycatch but with a slightly different sample stratification scheme. The regions that could be clearly resolved using genetics were: East Asia (referred in analysis as 'Asia'), north Asia (referred in analysis as 'Russia'), coastal western Alaska (including all WAK systems with the exception of the upper/middle Yukon), upper/middle Yukon, Southwest Alaska (including river systems in Kodiak as well as North and South Peninsula stocks) and Pacific Northwest (which includes river systems from Prince William Sound to WA/OR in the lower 48; Figure 3-9).

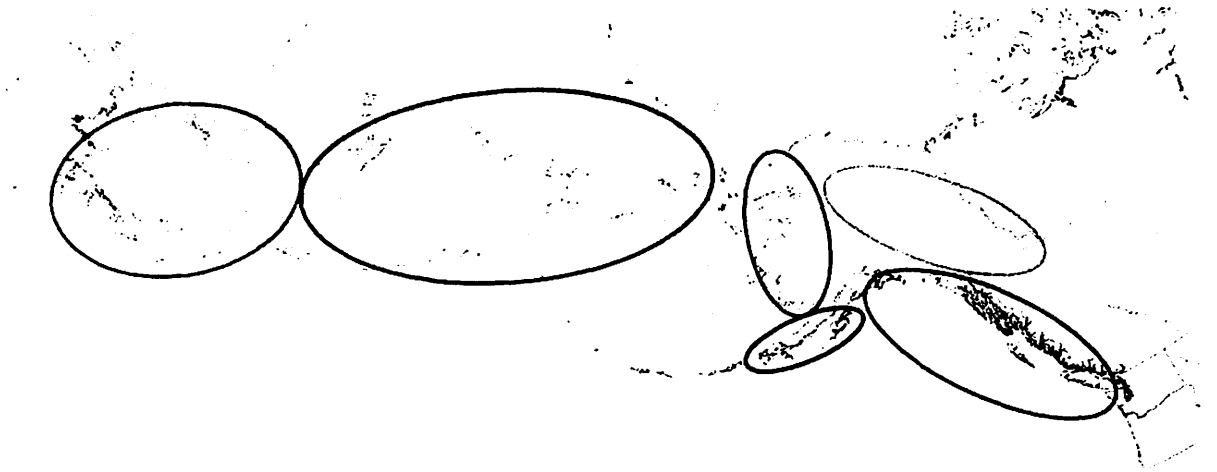

Figure ES-7. Six regional groupings of chum salmon populations used in the analysis including east Asia (grey), north Asia (red), coastal western Alaska (blue), upper/middle Yukon (green), southwest Alaska (black), and the Pacific Northwest (magenta). From Gray et al. 2010.

For this analysis, the genetic analysis was re-done (on the same sets of samples presented in the other studies—e.g., Guyon et al. 2010) but with the samples stratified temporally as from June-July or from August-October. The earlier genetic analyses presented to the Council, there appears to be a consistent pattern showing that Alaskan stocks are proportionately less common in bycatch later in the season compared to earlier. This re-stratification, along with careful accounting on the relative proportions of bycatch that occurred within years, confirms this pattern with Alaskan stocks being proportionately more common in the June-July period compared to later (Figure 3-16). The proportions of bycatch from the SE Alaska-BC-Washington region also decreased later in the season while proportions from Russia and Japan increased.

Relative impacts to individual river systems depend on where and when the bycatch occurs. This can add to the inter-annual variability in results for the same caps, closures, and allocations between sectors. On average (based on 2005-2009 data) approximately 12% of the AEQ is attributed to the coastal western Alaskan regional grouping while ~7% is attributed to the Upper Yukon (Fall chum). For the Southwest Alaska Peninsula stocks, the average AEQ over this period is ~2%, while for the combined PNW (including regions from Prince William Sound all the way to WA/OR), the average is 22%. Combined estimated Asian contribution is ~58% on average (for Russian stocks and Japanese stocks combined). Yearly estimates are presented in Chapter 3.

These proportions by year are applied to conservative run size estimates, where available, for Alaskan regional groupings to estimate an overall average impact rate of bycatch by region (Figure 5-92). Results indicate that the highest impact rate (chum salmon mortality due to the pollock fishery divided by run-size estimates) was less than 1.7% for the combined western Alaska stocks. For the Upper Yukon stock, the estimate of the impact was higher with a peak rate of 2.7% estimated on the run that returned in 2006 (Figure 5-92). For the SW Alaska region (taken to be from Area M) the estimate of impact rate was the lowest for any of the Alaska sub-regions. The average impact rate (2005-2009) by region (with ranges) was:

Coastal west Alaska	0.6%	(0.1% - 1.5%)
Upper Yukon	1.2%	(0.2% - 2.7%)
Combined WAK	0.7%	(0.1% - 1.5%)
Southwest Alaska	0.4%	(0.1% - 1.0%)

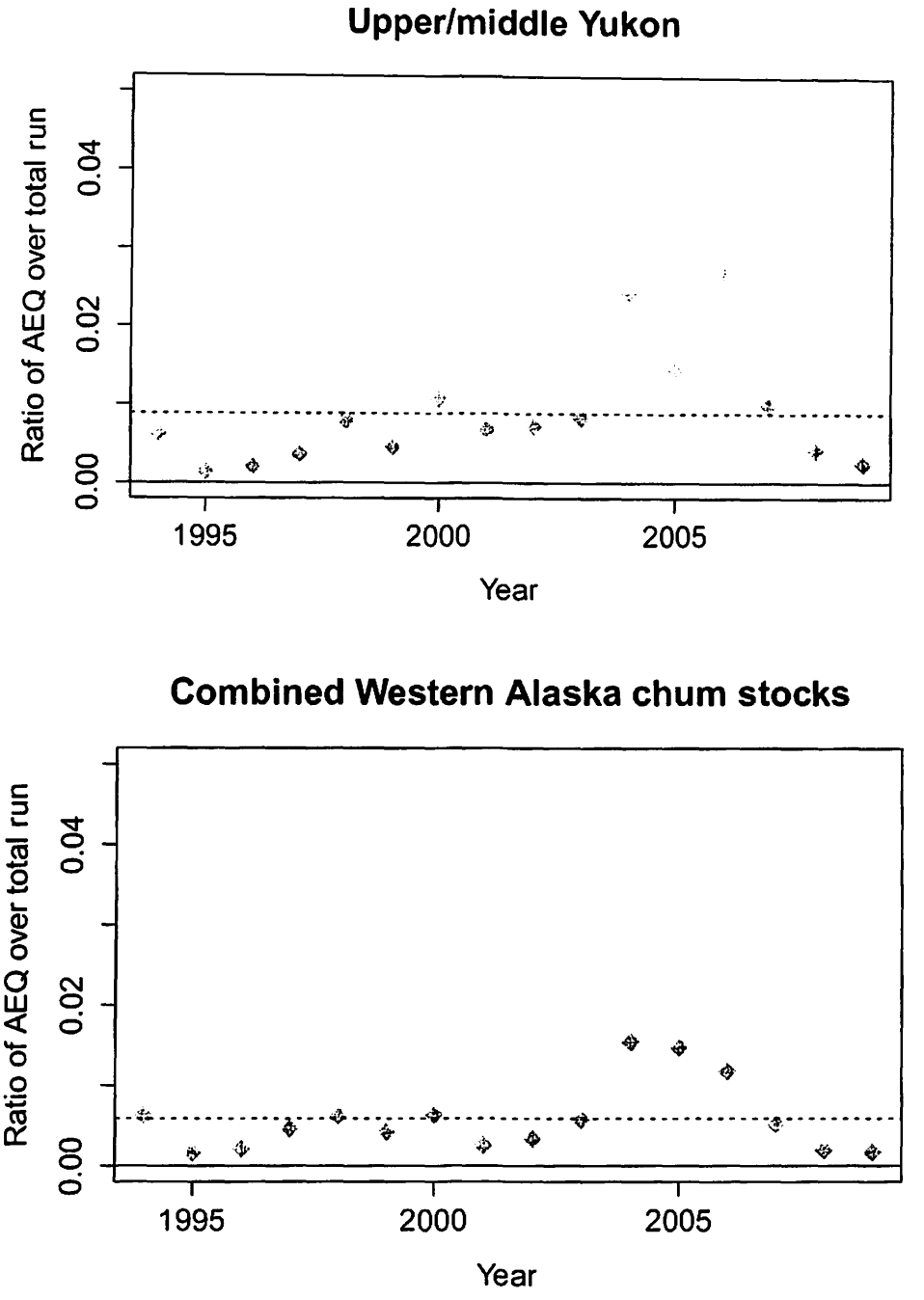

Figure ES-8. Estimated impact rates due to pollock fishery bycatch of chum salmon run sizes for Upper/middle Yukon (top) and for western Alaska stocks (coastal west Alaska stocks plus Upper/middle Yukon combined; bottom). Dashed horizontal line represents the mean value.

Under Alternative 2, the hard cap options, estimates are made by year of the number of salmon saved (in numbers as well as AEQ estimates) and compared to the actual amounts estimated under status quo under each cap and sector allocation scenario. The amount of salmon saved under each options varies considerably from year to year as well as by cap and sector allocation. The greatest number of salmon saved under Alternative 2 is 93% in the highest year (2005) for the most restrictive cap level considered (50,000). This contrasts with other years where no salmon would have been saved (given the assumptions) under the higher cap scenarios in years of both high and low bycatch. In years of low bycatch there is limited salmon savings under any cap and allocation scenario. Expected chum salmon saved for selected options under alternative 2 are presented in Table 5-80.

Table ES-11. Estimated proportion of Alaska chum salmon saved relative to AEQ mortality year for different **hard caps** and sector allocations by year for Alternative 2.

Sector allocation option	Hard Cap		
	50,000	200,000	353,000
2ii	80%	45%	21%
4ii	80%	50%	29%
6	81%	56%	43%

As previously noted, results for Alternative 3 the trigger cap and closure options are presented for scenarios over a range of hypothetical high and low bycatch years to provide contrast among the specified options rather than on actual historical bycatch levels. Results for the trigger cap levels and options themselves indicate that the resulting salmon savings are relatively insensitive to the cap levels and among the four different trigger application options. This insensitivity reflects the highly variable nature of chum salmon bycatch between years, and by seasons and areas rather than shortcomings of the closure design. Of the trigger application options, option 3 results in the highest percentage of salmon saved. However, this option results in lower amounts of salmon saved earlier in the B season when more of the bycatch is estimated to be of WAK origin. Overall savings of salmon under Alternative 3 ranged from 6-14% over all cap configurations and high and low bycatch years with sub-option 2a generally performing the best compared to the other options (i.e., greater levels of chum salmon PSC reductions; Table 5-86).

Table ES-12. Estimated relative reduction in chum salmon bycatch and diverted pollock catch by sector allocation (panels) and trigger cap levels for different trigger closure options.

2ii (sector allocation 1)						
	25,000		75,000		200,000	
	Chum	Pollock	Chum	Pollock	Chum	Pollock
Option 1	13.6%	11.3%	12.5%	8.1%	8.6%	3.7%
Option 2	13.6%	11.4%	12.6%	8.5%	9.0%	4.3%
Option 2a	13.8%	12.0%	13.1%	9.1%	10.7%	5.0%
Option 3	13.2%	9.7%	10.9%	6.4%	5.9%	2.5%
4ii (sector allocation 2)						
	25,000		75,000		200,000	
	Chum	Pollock	Chum	Pollock	Chum	Pollock
Option 1	13.1%	9.6%	12.8%	8.5%	9.9%	4.7%
Option 2	13.1%	10.1%	12.8%	8.9%	10.3%	5.3%
Option 2a	13.5%	10.8%	13.3%	9.6%	11.2%	5.8%
Option 3	11.9%	7.8%	11.6%	6.8%	6.6%	3.2%
6 (sector allocation 3)						
	25,000		75,000		200,000	
	Chum	Pollock	Chum	Pollock	Chum	Pollock
Option 1	13.7%	11.9%	13.2%	9.3%	10.9%	6.1%
Option 2	13.7%	12.0%	13.2%	9.7%	11.1%	6.5%
Option 2a	13.7%	12.7%	13.4%	10.3%	11.7%	7.0%
Option 3	13.5%	10.3%	12.2%	7.7%	8.3%	4.5%

Under Alternative 4, with a fixed large-scale area closure imposed over the entire B season, the overall reduction in salmon bycatch is estimated to be approximately 36%, given the assumption that pollock fishing outside of the closure area remains viable (estimated with data from 2003-2010) and no fishing occurs in the closed area. However, as with status quo, participation under the RHS program is anticipated to remain at 100%, particularly with the greater incentive to participate under Alternative 4, , thus estimated impacts are likely best approximated by status quo.

Additional information on the relative salmon savings, AEQ and region of origin impacts under all of the alternatives is contained in Chapter 5.

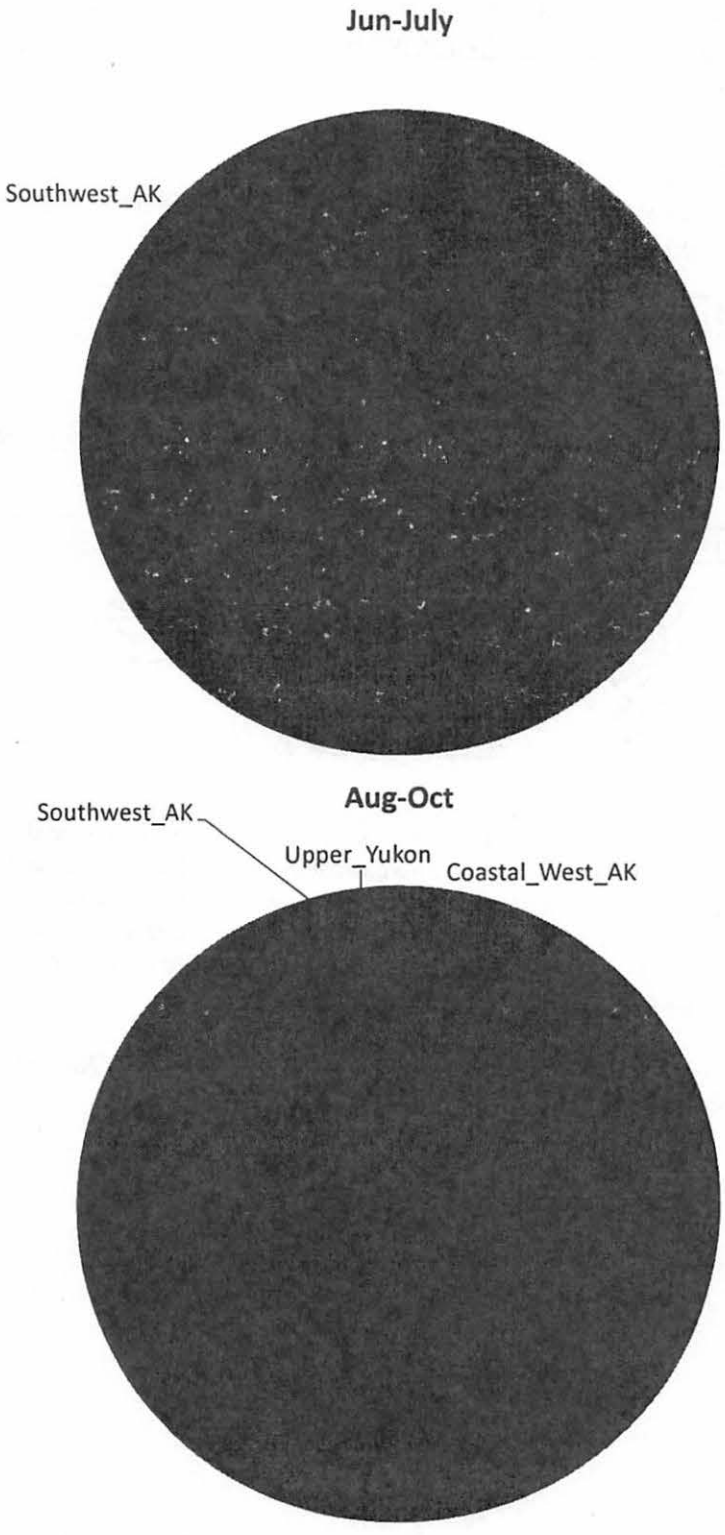

Figure ES-9. Average breakout of bycatch based on genetic analysis by early and late B-season strata, 2005-2009.

Chinook salmon

The pollock fishery catches both chum and Chinook salmon PSC in the B-season. The timing of this catch is dissimilar amongst the two species, with Chinook salmon caught in the latter part of the B season and chum salmon caught throughout the B season (Figure ES-10).

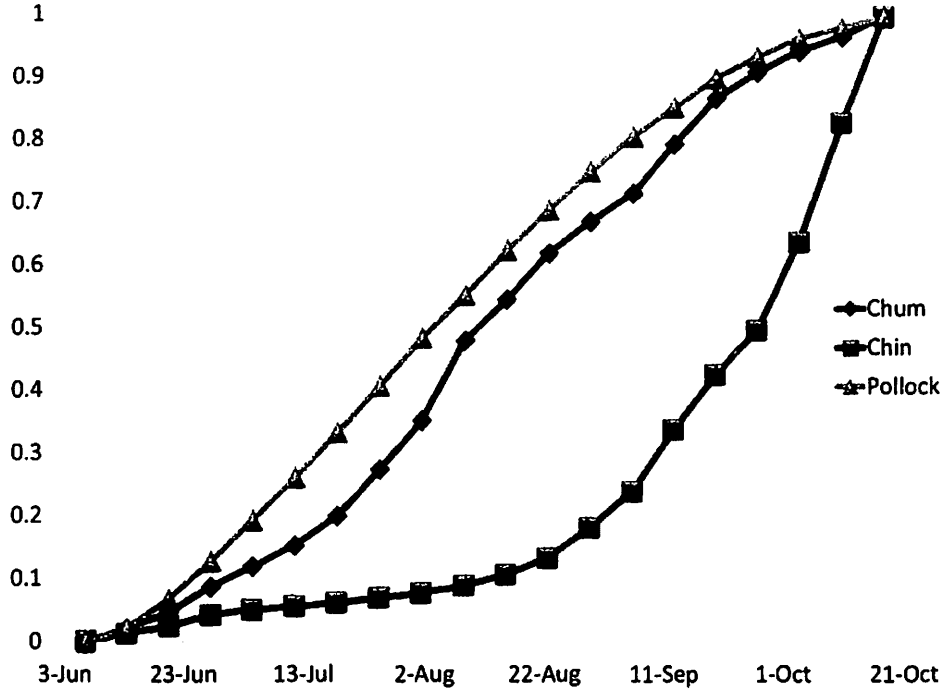

Figure ES-10. Mean relative values of pollock catch (triangles) compared with catch of chum (diamonds) and Chinook (squares) salmon species in the pollock fishery during the B-season.

Policy decisions for alternative management measures for chum must also consider the potential impact on the catch of Chinook salmon as a result of imposing additional management measures on the same pollock fishery. The 2011 A-season was the first season of management under the new bycatch management program implemented by Amendment 91. Incidental catch of Chinook salmon by the pollock fishery participants in the 2011 A-season indicated that pollock fishery participants remained well below their limits with a total A-season bycatch of 6,706 fish. This compares to Chinook salmon bycatch ranging from 7,661 fish in the A season of 2010 to 69,408 fish in the A season of 2007, thus Chinook bycatch in 2011 so far is much lower than in the recent 5 years.

For Alternative 2, hard caps for chum salmon, the impact on Chinook will likely result in lower levels of bycatch since for many years, the fishery is closed relatively early and Chinook bycatch tends to increase later in the B-season. Analysis of closure configurations under Alternative 3 indicates that many of the area closures benefit both chum and Chinook salmon savings. The early part of the season (June-July) on average tends to save a higher percentage of Chinook salmon compared to later for the different cap, sector splits, and trigger closure options. However, since the total Chinook bycatch is relatively low in the early period, the impact of the chum salmon trigger closures would tend to reduce Chinook bycatch by about 3% on average. Note that the variability about this result indicates that in some years, in particular years when high Chinook bycatch, the chum measures will make Chinook bycatch levels worse. Compared to the non-Chinook measures, the impact of lower cap levels on relative salmon savings was similar in direction (lower cap meaning more Chinook salmon saved) but not as beneficial. Additional

information on the estimated impacts of chum management measures on Chinook salmon is contained in Chapter 6.

Economic Impacts of the Alternatives

The RIR provides an overview of the economic impacts of the alternatives in terms of **salmon saved** by imposing the proposed management measures as a reflection of the costs and benefits to salmon dependent subsistence, recreational, and commercial fisheries and communities. The RIR also summarizes the estimated cost of the alternatives on the directed pollock fishery and pollock fishery dependent communities. Detailed tables of salmon saved, forgone revenue, and revenue at risk are contained in the RIR and not repeated here.

The RIR analyzes the benefits of the estimated changes in chum salmon savings under the alternatives. The AEQ estimates represent the potential benefit in numbers of adult chum salmon that would have returned to aggregate regions as applicable in the years 2003 to 2010. These benefits would accrue within natal river systems of stock origin as returning adult fish that may return to spawn or be caught in subsistence, commercial, or sport fisheries. Exactly how those fish would be used is the fundamental question to answer in order to provide a balanced treatment of costs and benefits.

Measuring the potential economic benefit of chum salmon saved, in terms of effects on specific subsistence, commercial, sport, and personal use fisheries is difficult. The proportion of AEQ estimated chum salmon that might be taken in each of the various fisheries is a function of many variables, including overall run strength, subsistence management strategies, commercial management strategies, availability of commercial markets, the effect of weather on catch (e.g., high water), and potentially, on management of other salmon runs. Lacking estimates of the proportion of AEQ chum salmon that would be caught by each user group, it is not possible to estimate economic benefits in terms of gross revenues or other monetary values for those user groups due to changes in AEQ chum salmon estimated for each alternative

The proposed action is not designed to close the pollock fishery; it is intended to create incentives for pollock fishermen to avoid non-Chinook salmon. Thus, the impacts on the pollock industry 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 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. The Council's intent is to incentivize non-Chinook salmon PSC avoidance in order to reduce it in all years of abundance, and the caps 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 reduction in pollock harvest.

While the hard caps (Alternative 2) have the potential effect of fishery closure and resulting forgone pollock fishery gross revenues, the triggered closures (Alternatives 3 and 4) do not directly create forgone earnings, 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 any 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 greatest adverse economic impact on the pollock fishery 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 $489 million would potentially have been forgone. That gross value is

composed of $214 million from the CV sector, $206 million from the CP sector, $51million from the Mothership sector, and $19 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 the potentially forgone revenue accrues mostly, an in some cases only, in the CV sector. This is simply a function of the CV sector having the highest proportion of non-Chinook PSC of all sectors. As the hard cap level is increased to 353,000 fish the potentially forgone revenue estimates continue to decline relative to the two lower caps and the impacts accrue mostly, an in some cases only, in the CV sector. 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.

Comparing the alternatives on the relative impact on chum salmon savings (in terms of AEQ) together with the relative change in pollock that would be diverted to areas outside of the closed areas suggests that relatively little benefit (in terms of bycatch reduction) is estimated by using low trigger cap levels. For example, computing averages over the different sector allocations and trigger options shows that the benefit for greater salmon savings at lower cap levels was much lower than the relative costs of redistributing pollock fishing effort.

There are several options for triggered area closures under Alternative 3. Summarizing years (2003-2010) and sectors suggests that a trigger closure under Alternative 3, option 3 results in the lowest reduction in bycatch for all sector splits and cap levels. Trigger closure option 2a, which was designed to improve early-season salmon savings in order to target a higher salmon savings during the portion of the season in which a higher relative percentage of the bycatch is of western Alaska stock, performed better than the other options in June-July, particularly for the high cap level. At the low trigger cap level and third sector allocation scheme, option 2a is estimated to perform similar to options 1 and 2. Option 3 performed poorly during the early period, since under this option, closures would generally occur later in the season since cap limits are based on season rather than monthly limits.

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. 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 management 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 RIR addresses 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.

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

The RIR discusses specific safety-related issues that have been considered with respect to the alternatives. These include the following:

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

Additional information on all of the categories of cost and safety-related issues are discussed in detail in the RIR.

Alternative 4 is essentially a rolling hotspot system, similar to the current approach under status quo, with a large area closure for those who do not participate. While impacts in terms of revenue at risk have been provided for Alternative 4 in the RIR, they are intended to identify the considerable incentive for participation in the rolling hotspot system. As such, it appears likely that most, if not all, vessel operators would be motivated to participate in a rolling hotspot system, thereby eliminating any potential revenue at risk under this alternative. As a result, it is not possible to predict whether any vessel may choose not to participate, and thereby have vessel specific revenue at risk, which would potentially generate shoreside value added "at risk" as well. Thus, the analysis does not provide that breakout as it would be inappropriate to imply that such a likelihood exists.

Other resources categories analyzed

The EA also evaluated the impact of alternative management measures for chum salmon on several different resources categories: pollock stocks, other marine resources (comprised of marine mammals, seabirds, habitat, ecosystem) and cumulative effects. Impacts of the alternatives for these categories are summarized below.

Pollock stocks

Chapter 4 analyzes the impacts of the alternatives on pollock stocks. Analysis of Alternatives 2, 3, and 4 indicate that these alternatives would make it more difficult to catch the full TAC for Bering Sea pollock compared to Alternative 1. Catching less pollock than authorized under the TAC would reduce the total

catch of pollock and reduce the impact of fishing on the pollock stock. However, these alternatives are likely to result in fishermen shifting where they fish for pollock to avoid chum salmon bycatch. Changes in where pollock fishing occurs were shown to likely change the size—and by extension—age to younger smaller pollock which would potentially impact future ABC limits established for the pollock stocks.

The impact of Alternative 3 (triggered closures) on pollock fishing was evaluated in a similar way. The assumption that the pollock TAC may be fully harvested depends on the availability of pollock outside of triggered closures. The data show that in some years, the catch rate is consistently higher outside of the trigger area whereas in other years it is consistently lower for at-sea processors and inshore CVs and for the fleet as whole. The impact of a triggered area closure depends on when the closure occurs and the spatial characteristics of the pollock stock, which, based on this examination, appears to be highly variable between years. As with the evaluation of hard caps, under Alternatives 2 the same impacts under triggered closures (Alternative 3) would apply; it seems likely that the fleet would fish earlier in the summer season and would tend to fish in places farther away from the core fishing grounds north of Unimak Island (estimated average increased distance from port due to closures was about 8%). Both of these effects would result in catches of pollock that were considerably smaller and younger, less valuable age groups. This impact would, based on future assessments, likely result in smaller TACs since individual pollock sizes would smaller since they would miss the benefits from the summer-season growth.

Because this fishery is extensively monitored, the consequences of possibly catching smaller fish due to this alternative would be accounted for in the procedures for setting ABC and OFL. Namely, that as the "selectivity" of the fishery shifts, then the impact on allowable catch levels would be adjusted appropriately so as to avoid overfishing.

Other marine resources

The impacts of the alternative management measures on marine mammals, seabirds, habitat and the ecosystem are evaluated qualitatively based upon results of the quantitative analysis for chum, Chinook, pollock and economic considerations. Alternative 2, hard caps, is not likely to increase fishery interactions with any of these resources categories, and may result in fewer interactions compared to status quo since the pollock fishery is likely to be closed earlier in the B-season. Under area closures proposed under Alternatives 3 and 4, any closure of an area where marine mammals and seabirds are likely to interact with pollock fishing vessels would likely reduce the potential for incidental takes. The potential reduction would depend on the location and marine mammal species. Closures under Alternatives 3 and 4 would also minimize fishery interactions with the seafloor and benthic habitat.

Cumulative effects

The discussion of cumulative effects includes future actions that may affect the Bering Sea pollock fishery, the salmon caught as bycatch in that fishery, and the impacts of salmon bycatch on the resource components analyzed in this analysis. The future actions considered have been grouped in the following four categories: ecosystem-sensitive management, traditional management tools, actions by other Federal, State, and international agencies and private actions. Details on the actions contained in these categories and the activities considered are contained in Chapter 8.

This section considers the direct and indirect impacts of the proposed action when added to the impacts of past and present actions previously analyzed in other documents (incorporated by reference) and the impacts of the reasonably foreseeable future actions listed.

Policy considerations

In considering a preferred management approach, the Council will evaluate the range of alternatives and the estimated impacts biologically and economically (including impacts to subsistence, commercial, and recreational salmon fishing and commercial pollock fishing) of each alternative. Some comparative information is provided below to compare alternatives in terms of relative chum salmon saved, forgone pollock harvest, pollock revenue at risk (i.e., potentially unrealized economic gain due to closure areas), trade-offs in bycatch reductions for chum salmon compared with Chinook salmon, and relative benefits accrued from reductions in both species. At this time, it is difficult to predict pollock fleet behavior in the 2011 B-season under the first year of operation under Amendment 91, thus it is not possible to estimate how the Chinook salmon bycatch management measures will be affected by any new management measures imposed for chum salmon bycatch.

Comparison of chum salmon saved and forgone pollock harvest

Selection of a preferred alternative involves explicit consideration of trade-offs between the potential salmon saved and the forgone pollock catch, and of ways to maximize the amount of salmon saved and minimize the amount of forgone pollock.

As analyzed Chapters 4 and 5, the impacts of the alternatives on total bycatch numbers and forgone pollock would vary by year. This is due to the annual variability in the rate of chum salmon caught per ton of pollock and annual changes in chum salmon abundance and distribution in the Bering Sea. The RIR examines the relative cost of forgone pollock fishing under Alternative 2 and the revenue at risk under Alternative 3 as well as the potential benefits to subsistence, commercial, and recreational salmon fisheries.

In terms of cap and sector allocation options under Alternative 2, the lowest forgone pollock catches result in expected reductions of chum salmon bycatch by about 20 percent to 45 percent, depending on the sector allocation options (Figure ES-11). For hard cap scenarios that have the highest impact on forgone pollock catch levels, the sector allocation are estimated to have negligible additional improvements on chum salmon saved (Figure ES-11).

Under Alternative 3, options that require a greater proportion of pollock to be diverted elsewhere have diminishing benefits in terms of increased salmon savings (Figure ES-12). Option 2a generally outperforms the other options (i.e., greater reductions in chum salmon) given the same cap and allocation configurations. Option 3 has the lowest estimated levels of pollock diverted relative to the other options and allocation scenarios but also has a relatively low estimated level of salmon saved (Figure ES-12).

The implications of imposing Alternatives 2 or 3 and the associated options indicate that reducing bycatch levels and impacts to Alaskan chum salmon runs can be achieved, but improvements would be relative to the current estimated impacts which are already low (typically less than 1%). The extent that these measures, if enacted without a system like the current RHS program (analyzed under Alternative 1) are less well understood. It is clear that bycatch totals generally increase as run sizes increase. It is also clear that the effectiveness of triggered closure areas will vary from year to year due to the inherent variability and complexity of pollock and chum salmon seasonal and spatial distribution.

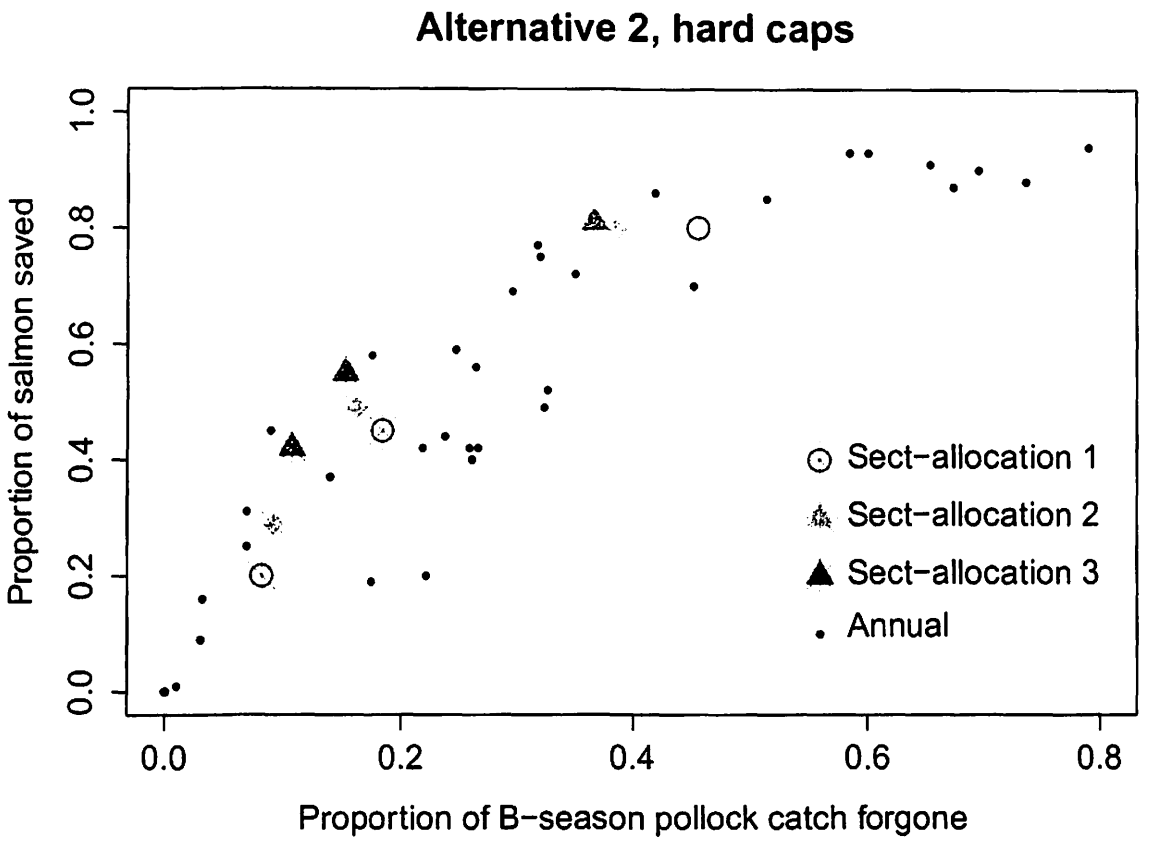

Figure ES-11. Expected (mean) trade-offs between B-season pollock forgone (horizontal axis) and relative salmon saved for **Alternative 2, hard caps** by sector allocation splits and three cap levels (50k chum, 200k chum, and 353k chum). Bullet points represent estimates from annual data (2003-2010).

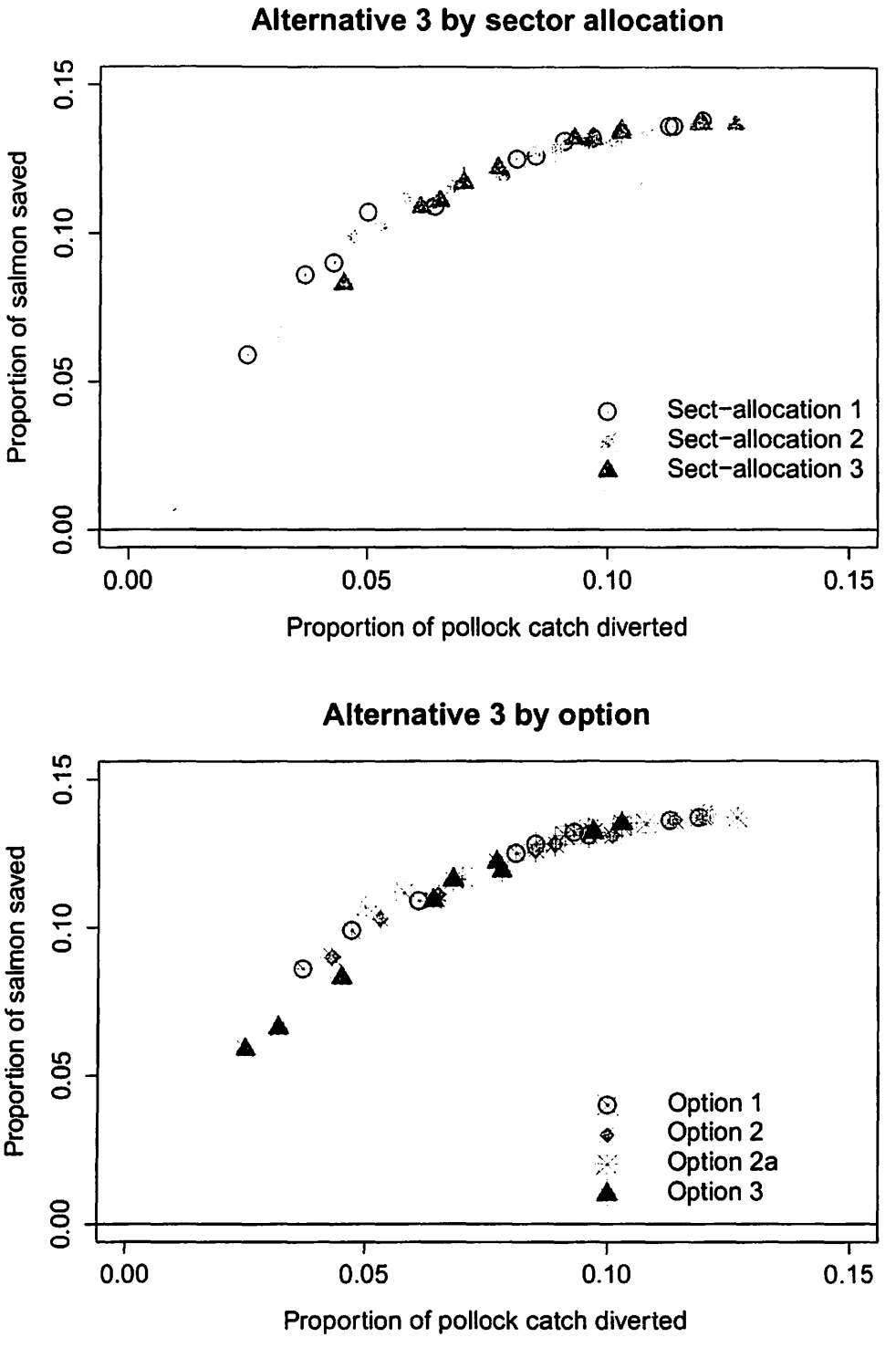

Figure ES-12. Expected (mean) trade-offs between B-season pollock forgone (horizontal axis) and relative salmon saved for **Alternative 3, triggered closures** by sector allocation splits (top) and by options (bottom) with three cap levels (25k chum, 75k chum, and 200k chum).

Rural community outreach

One of the Council's policy priorities is to improve outreach and communication with Alaska Native entities, communities, and rural stakeholders in the development of fishery management actions.[6] The Council's Rural Community Outreach Committee met in August 2009 and recommended that the non-Chinook salmon bycatch issue be a priority for rural outreach, as did the Council's Salmon Bycatch Workgroup, and the Council agreed to undertake an outreach effort with affected community and Native stakeholders prior to and during the development of the draft analysis, well prior to final Council action.

The outreach plan for non-Chinook salmon bycatch management measures was developed by Council staff with input from NMFS, the Council, the Rural Community Outreach Committee, and affected stakeholders. It is intended to improve the Council's decision-making processes on the proposed action, as well as enable ongoing, two-way communication with Alaska Native and rural communities. The outreach plan for the proposed action is maintained and updated on the Council website.[7] The general components of the outreach plan include: several direct mailings to stakeholders prior to important steps in the process and/or Council meetings; rural community outreach meetings; additional outreach (statewide teleconference, radio/newspaper, press releases); and documentation of rural outreach meeting results. In addition, the draft analyses, associated documents, outreach materials, and powerpoint presentations, have been posted on the Council website as the process occurs.

While the outreach plan consists of several components, one of the most significant mechanisms for direct feedback from rural stakeholders has been outreach meetings or presentations to people that depend on salmon in rural communities in western and interior Alaska. The approach to the community outreach meetings was to work with established community representatives, Alaska Native entities, and Tribes within the affected regions, to attend annual or recurring regional meetings, in order to reach a broad group of stakeholders in the affected areas prior to the selection of a preferred alternative by the Council.

Council staff consulted with the coordinators of five of the Federal Subsistence Regional Advisory Councils (RACs), the Association of Village Council Presidents (AVCP), the Tanana Chiefs Conference (TCC), the Yukon River Drainage Fisheries Association (YRDFA), Kawerak, Inc., and the Yukon River Panel, in order to evaluate the potential for time on the agendas of their annual regional meetings.[8] In sum, two Council members and one to two staff analysts attended and presented the preliminary analysis of the alternatives for the proposed action at seven regional meetings, in addition to two meetings with the Yukon River Panel in Anchorage. The meetings were as follows:

Yukon River Panel: December 2010 and April 2011; Anchorage
Yukon River Drainage Fisheries Association annual meeting: February 14 – 17, 2011; Mountain Village
Bering Strait Regional Conference: Feb 22 – 24, 2011; Nome[9]
Yukon-Kuskokwim Delta Regional Advisory Council: February 23 – 24, 2011; St. Mary's
Eastern Interior Regional Advisory Council: March 1 – 2, 2011; Fairbanks
Western Interior Regional Advisory Council: March 1 – 2, 2011; Galena
Bristol Bay Regional Advisory Council: March 9 – 10, 2011; Naknek
Tanana Chiefs Conference annual meeting: March 15 – 19, 2011; Fairbanks

Council staff and members were available to answer questions, and staff documented the results of each meeting. In addition to input that could be incorporated into the impact analysis, the results of the

[6]This policy priority is identified in the Council's workplan resulting from the Programmatic SEIS.
[7]http://www.fakr.noaa.gov/npfmc/current_issues/bycatch/ChumOutreach1210.pdf.
[8]Schedule conflicts with Council meetings prevented Council members and staff from attending the October 2010 AVCP annual meeting and the February 2011 Seward Peninsula RAC meeting.
[9]NMFS staff presented the prepared information at this meeting, as Council staff could not get into Nome due to weather.

outreach meetings are provided in the form of an outreach report, included as a supplement to this EA/RIR/IRFA. Please reference the outreach report for details of the meetings, a summary of the input provided, and any formal resolutions resulting from the meetings attended.

Chum EA/RIR/IRFA Errata Sheet

Executive Summary

Page xxi-xxii: replace second bullet at end of page xxi and first bullet on page xxii with the following:

"• The annual average total amount of chum bycatch occurring 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 ranged from 7-21 percent for CVs and was less than 5 percent for other sectors. "

Page xxvi : 4th sentence of second paragraph should read the following (change in strike out and bold) "Of the trigger application options, ~~option 3~~ **option 2a** results in the highest percentage of salmon saved."

EA

Section 5.4.6, Page 317 : 4th sentence of second paragraph should read the following (change in strike out and bold) "Of the trigger application options, ~~option 3~~ **option 2a** results in the highest percentage of salmon saved."

RIR

Page 20-21: Section on "Summary of Findings on Status Quo Chum PSC-reductions measures" has been duplicated. The second summary should remain with the section on pages 20-21 deleted.

Outreach Report

Summary of outreach on proposed action to limit non-Chinook (chum) salmon bycatch in the Bering Sea pollock fishery

June 2011

Genesis for outreach plan

As a result of one of the North Pacific Fishery Management Council's (Council) policy priorities, it is focusing on improving outreach and communications with rural stakeholders and developing a method for systematic documentation of Alaska Native and community participation in the development of fishery management actions.[1] Upon review of several suggestions to expand both ongoing communication and outreach specific to particular projects,[2] the Council initiated a small workgroup to further review potential approaches and provide recommendations. Upon review of the workgroup report in February 2009, the Council approved the workgroup's primary recommendation to initiate a standing committee (the Rural Community Outreach Committee) to provide input to the Council on ways to improve outreach to communities and Alaska Native entities. The committee has three primary tasks: 1) to advise the Council on how to provide opportunities for better understanding and participation from Native Alaska and rural communities; 2) to provide feedback on community impacts sections of specific analyses; and 3) to provide recommendations regarding which proposed Council actions need a specific outreach plan and prioritize multiple actions when necessary. The committee was initiated in June 2009.

In addition to the stated Council policy priority, the need to improve the stakeholder participation process was highlighted during development of the Chinook salmon bycatch analysis. The Council made efforts to solicit and obtain input on the proposed action from Alaska Natives, rural communities, and other affected stakeholders. This outreach effort, specific to Chinook salmon bycatch management, dovetailed with the Council's overall community and Alaska Native stakeholder participation policy.

The Council's Rural Community Outreach Committee met in August 2009 and recommended that the non-Chinook (chum)[3] salmon bycatch issue be a priority for rural outreach. The Council agreed with this recommendation, to undertake an outreach effort with affected community and Native stakeholders prior to and during the development of the draft EA/RIR/IRFA (analysis), prior to final Council action. The committee met again in November 2009, with the primary purpose of helping to develop an outreach plan for this issue, given that the Council was scheduled to review the chum bycatch alternatives at its December 2009 meeting. Note that in October, the Council's Salmon Bycatch Workgroup also recommended that outreach begin prior to approval of the final alternatives. Both the workgroup and November committee report are on the Council website. The Rural Community Outreach Committee met again in February 2010, in part to review and finalize the outreach plan.

The outreach plan for chum salmon bycatch management was developed by Council staff with input from NMFS, the Council, the Rural Community Outreach Committee, and affected stakeholders. It is intended to improve the Council's decision-making processes on the proposed action, as well as enable the Council to maintain ongoing and proactive relations with Alaska Native and rural communities. Another of the objectives of the plan is to coordinate with NMFS' tribal consultation activities, to prevent a duplication

[1]This policy priority is identified in the Council's workplan resulting from the Programmatic SEIS.
[2]http://www.fakr.noaa.gov/npfmc/Tasking/community_stakeholder.pdf
[3]While the proposed action would regulate all non-Chinook salmon bycatch, including sockeye, coho, pink, and chum salmon, chum salmon comprises over 99.6% of the total catch in this category. Thus, the proposed action is commonly referred to as the chum salmon bycatch issue.

of efforts between the Council and NMFS, which includes not confusing the public with divergent processes or providing inconsistent information. The entire outreach plan is provided here: http://www.fakr.noaa.gov/npfmc/current_issues/bycatch/ChumOutreach1210.pdf.

This report will be included, in part or in whole, in the analysis submitted to the Council prior to its final recommendation. A broad overview of the primary steps of and results from the chum salmon bycatch outreach plan follows.

Outreach components

The following sections outline the general components of the outreach plan for the proposed action on chum salmon bycatch in the Bering Sea pollock fisheries. These include: direct mailings to stakeholders; community outreach meetings; additional outreach (statewide teleconference, radio/newspaper, press releases); and documentation of rural outreach meeting results.

Note also that NMFS undertook scoping for the alternatives in late March 2009, and the scoping report was provided to the Council in June 2009. Through the notice of intent, NMFS notified the public that a NEPA analysis and decision-making process for the proposed action has been initiated so that interested or affected people may participate and contribute to the final decision. Scoping is accomplished through written communications and consultations with agency officials, interested members of the public and organizations, Alaska Native representatives, and State and local governments. The formal scoping period began with the publication of a Notice of Intent in the *Federal Register* on January 8, 2009 (74 FR 798). Public comments were due to NMFS by March 23, 2009. In the Notice of Intent, NMFS requested written comments from the public on the range of alternatives to be analyzed and on the environmental, social, and economic issues to be considered in the analysis.

The scoping report summarizes the comments received during the January 8, 2009 to March 23, 2009, scoping period, and summarizes the issues associated with the proposed action and describes alternative management measures raised in public comment during the scoping process. The purpose of the report is to inform the Council and the public of the results of scoping and to assist in the development of the range alternatives and analysis. NMFS received four written comments from the public and interested parties. (Appendix 1 to the Scoping Report contains copies of the comments.) The NMFS Alaska Region web site contains the notice of intent, the scoping report, and related additional information.[4]

Direct mailings to stakeholders

On September 18, 2009, the Council provided a mailing to over 600 stakeholders, including community governments, regional and village Native corporations, regional non-profit Native corporations, tribal entities, Federal Subsistence Regional Advisory Council coordinators, Community Development Quota corporations, ADF&G Regional Coordinators, and other community or Native entities. The mailing was also sent to previous contacts or individuals that have contacted the Council on salmon bycatch issues, and State legislature and Congressional representatives.

The mailing included a two-page flyer for potential posting in communities. It provided a brief summary of the issue, including bycatch trends, and solicited input from stakeholders identified as being potentially affected by the proposed action. It also provided a summary of the Council's schedule on this issue, methods of contacting the Council, and a website reference to the current suite of alternatives and options. The flyer was intended to inform individuals and communities as to the current stage of the process that the Council was undertaking in December 2009 (i.e., refining alternatives and options and establishing a

[4]http://www.fakr.noaa.gov/sustainablefisheries/bycatch/salmon/non_chinook/default.htm.

timeline for analysis). In addition, the flyer noted that pending Council direction in December, it is likely that an outreach plan will be developed for the proposed action, which would likely include regional outreach meetings in rural Alaska, in order to explain the proposed action, provide preliminary analysis, and receive feedback from rural communities.

The Council sent a letter and another mailing to the same group of stakeholders March 31, 2010, to notify the public of the May 4 Statewide teleconference and the scheduled action for the June 2010 Council meeting. The Council was scheduled to conduct a final review and possible revision of the proposed alternatives and options for analysis at the June meeting. The intent of the mailing was to ensure awareness of the current Council schedule, the suite of proposed alternatives, the statewide teleconference, and to solicit feedback on the alternatives and options to be analyzed.

Finally, the Council sent a third mailing in May 2011 to the same group of stakeholders prior to the Council meeting at which initial review is scheduled (June 2011, in Nome). The intent of this mailing was to ensure awareness of the suite of alternatives, the range of impacts analyzed, the schedule for final action, and to solicit input on the selection of a preliminary preferred alternative, should one be selected.

In addition, the draft analysis (EA/RIR/IRFA), associated documents, outreach materials, and powerpoint presentations, are posted on the Council website as available, and prior to the Council's scheduled meeting for final action. In addition, the Council newsletter reports upon progress and relevant meetings. The public is also able to listen to all Council meetings real-time via the internet if they cannot attend in person. The Council will also consider a follow-up mailing to potentially affected entities as to the results of the Council's final recommendation for chum salmon bycatch reduction measures to the Secretary of Commerce, if, at that point, the website and Council newsletter are not considered sufficient means to reach potentially affected stakeholders.

Statewide teleconference (May 2010)

In order to get feedback prior to the Council's suite of alternatives, staff conducted a statewide teleconference on May 4, 2010. The primary purpose was an orientation for the public, such that people understand the basics of the alternatives proposed and ways to provide formal input to the Council (e.g., written and oral testimony), prior to the June 2010 Council meeting. A secondary purpose of the call is to document public input on the suite of alternatives, which was provided to the Council in June 2010. A short presentation was provided on the proposed action and Council process, and using most of the time for questions and concerns from the public.

Other guidance that staff followed, as suggested by the Rural Community Outreach Committee, included:

- Limit the call to 2 - 3 hours.
- Clearly articulate the purpose of the call.
- Provide a 2 or 3 minute time limit for questions.
- Provide a mailing/flyer to the list of community and Native contacts that includes: the suite of alternatives; the schedule for action, including community outreach meetings; information on the teleconference; and notice that those who RSVP with the Council that they will attend the teleconference will have the first priority for asking questions.
- In addition to the RSVP list, attempt to take questions from a broad geographic range.
- Work with regional organizations to provide hub sites, where many community members could call in together. Examples provided: Kawerak in Nome, Northwest Arctic Borough in Kotzebue, AVCP in Bethel, Unalakleet.
- Make the powerpoint presentation available on the Council website prior to the call.
- Use a phone line without a limit on the number of callers that can participate.

- Close the call with a reminder of how to participate in the Council process, and the opportunity to provide formal input to the Council in late May/June.

The presentation provided by Council staff during the teleconference is posted here: http://www.fakr.noaa.gov/npfmc/current_issues/bycatch/chumPPT410.pdf. The audio recording of the teleconference is provided here: http://www.box.net/shared/j37fjfq8i1. The report on the teleconference is attached as **Appendix 1**, which includes the public comments provided, staff presentation, call log, and the public notice for the teleconference.

Community outreach meetings (late 2010 – early 2011)

An important component of the outreach plan was to conduct outreach on the issue in remote villages that depend heavily on salmon for subsistence. Transportation and access to Council meetings by residents of communities in western and interior Alaska is costly and difficult. The outreach plan intended to schedule outreach in various villages, regional hubs and otherwise, in order to promote two-way communication between Council members, staff, and subsistence, recreational, and commercial salmon users. The outreach was intended to help the Council understand the concerns and needs of these communities, facilitate revision of the analysis in accordance with new information, and provide information to residents on the proposed action and Council process such that they may comment and participate in a meaningful way.

Upon informal consultation with community and Native coordinators, as well as the Rural Community Outreach Committee, staff determined that the most effective approach to community outreach meetings is to work with established community representatives and Native entities within the affected regions and attend annual or recurring regional meetings, in order to reach a broad group of stakeholders in the affected areas. Working with established entities which have regular in-region meetings tends to reach more stakeholders than if the Council hosted its own outreach meeting in the community. It was determined that Council staff would convene individual outreach meetings only as necessary and appropriate, if a regional or Council meeting was not scheduled in a particular area during a timeframe in which Council staff and/or members could attend sufficiently prior to final action.

Staff scheduled outreach in rural Alaska in order to correspond with regularly scheduled regional meetings and the release of a preliminary analysis, but prior to the release and Council review of the first formal initial review draft impact analysis (June 2011) and selection of a preferred alternative. The intent was to allow the public time to review and provide comments early in the process, such that changes can be made prior to completion of the final analysis, and allow the Council to receive community input prior to its selection of a preferred alternative.

With regard to outreach meetings, Council staff consulted with the coordinators of five of the Federal Subsistence Regional Advisory Councils (RACs), the Association of Village Council Presidents (AVCP), the Tanana Chiefs Conference (TCC), the Yukon River Drainage Fisheries Association (YRDFA), Kawerak, Inc., and the Yukon River Panel, in order to evaluate the potential for time on the agendas of their annual or biannual regional meetings. There was a recognized conflict between the AVCP annual meeting October 5 – 7, 2010, in Bethel, and the Council meeting October 4 – 12, in Anchorage, so staff and Council members were unable to attend the October AVCP meeting.[5] A schedule conflict with another outreach meeting also prevented staff from attending the Seward Peninsula RAC meeting in Nome (February 15 – 16). However, the June 2011 Council meeting is scheduled in Nome, which will provide ample agenda time for this issue and public comment. In addition, NMFS staff attended the

[5]The AVCP represents 56 tribes in the Yukon-Kuskokwim Delta.

Bering Strait regional conference in Nome in February and provided the Council presentation; Council staff did not attend due to weather.

In sum, the outreach schedule included attending seven regional meetings, and at least two meetings with the Yukon River Panel in Anchorage. Through coordination with the meeting sponsors, Council staff was allocated agenda time to discuss the chum salmon bycatch proposed action at each of the following public meetings.

Yukon River Panel	**April and Dec 6 – 9, 2010; Anchorage**
Yukon River Drainage Fisheries Assn annual meeting	**Feb 14 – 17, 2011; Mountain Village**
Bering Strait Regional Conference	**Feb 22 – 24, 2011; Nome**
Yukon-Kuskokwim Delta Regional Advisory Council	**Feb 23 – 24, 2011; Mountain Village**
Western Interior Regional Advisory Council	**March 1 – 2, 2011; Galena**
Eastern Interior Regional Advisory Council	**March 3 – 4, 2011; Fairbanks**
Bristol Bay Regional Advisory Council	**March 9 – 10, 2011; Naknek**
Tanana Chiefs Conference annual meeting	**Mar 15 – 19, 2011; Fairbanks**

Each of the above organizations represents an area that encompasses several member villages and/or tribes. While it is recognized that there is some overlap in representation between the various entities, the participants that attend the meetings may be very different. However, all of the groups represent rural communities, most of which are small in population and removed from the road system. Kawerak, Inc., organizes the Bering Strait Regional Conference, and is a regional consortium of tribal governments organized as a nonprofit corporation with headquarters in Nome, Alaska. Kawerak provides services to 20 Native villages located on or near the Bering Straits. The Yukon-Kuskokwim Delta RAC represents 42 villages in its management area. The Eastern Interior RAC represents 13 villages along the Yukon or Tanana Rivers and an additional 17 villages within the region. The Western Interior RAC represents 27 villages along the Yukon and Kuskokwim Rivers. The Bristol Bay RAC represents 31 Bristol Bay subsistence communities. The Tanana Chiefs Conference is a tribal consortium of 42 villages in interior Alaska, along the Yukon, Tanana, and Kuskokwim Rivers. Please refer to the maps provided in **Appendix 2** to see the geographic representation of these entities.

Two Council members and two Council staff analysts attended a portion of each regional meeting, with the exception of the Bering Straits Regional Conference, to which weather prevented attendance. NMFS staff also attended the Bering Straits Regional Conference and the Tanana Chiefs Conference annual meeting. At each meeting, Council staff provided a 30 to 45 minute presentation on the Council process, outreach efforts, a review of the Council's previous action on Bering Sea Chinook salmon bycatch, and the proposed action on chum salmon bycatch reduction measures. Council members and staff were then available to answer questions.

In addition, Council staff provided a presentation of the proposed action at the Yukon River Panel meeting in April 2010, and again in December 2010 in Anchorage. The Yukon River Panel is an international advisory body established under the Yukon River Salmon Agreement[6] for the conservation, management, restoration, and harvest sharing of Canadian-origin salmon between the U.S. and Canada. Three Council staff members attended the December meeting and responded to questions on both the Bering Sea chum salmon bycatch action and the proposed action on Chinook salmon bycatch reduction measures in the GOA pollock fishery.

[6]This agreement constitutes Chapter 8 of the Pacific Salmon Treaty: www.psc.org/pubs/treaty.pdf.

Documenting Results

This summary report was prepared to document the outreach process and results of the regional meetings and statewide teleconference. This report will be presented to the Council, in conjunction with the initial review draft analysis, in June 2011, when the Council is scheduled to review that analysis and could select a preliminary preferred alternative if desired. As stated previously, this report will also be included in the final analysis submitted to the Secretary of Commerce after the Council selects a final preferred alternative.

Council staff documented comments provided at the regional meetings, including public testimony.[7] A short summary of each meeting is provided below, as a brief reference. Note that the dates provided below refer to the date on which the Council presentation and comments occurred, recognizing that each meeting was typically two to three days. Resolutions or motions on the issue resulting from these meetings are provided as **Appendix 3**.

Yukon River Drainage Fisheries Association annual meeting; February 15, 2011, Mountain Village

The YRDFA Board of Directors is comprised of 30 members from Yukon River communities that represent the various fishing districts, including: Alakanuk, Kotlik, Mountain Village, St. Mary's, Holy Cross, Galena, Kaltag, Tanana, Minto, Nenana, Huslia, Eagle, Scammon Bay, Marshall, Anvik, Nulato, Allakaket, Fort Yukon, Whitehorse, and Haines Junction. The Board is representative of subsistence, commercial, and sportfish salmon users, and processors, and YRDFA has members along the entire Yukon River drainage, which encompasses more than 50 communities. In addition to YRDFA Board members and staff,

The YRDFA Board was concerned with the very limited recent Yukon River fall chum salmon runs. Members emphasized that there seems to be a correlation between high bycatch and the number of salmon returning to the rivers; but that when a species natural productivity is low, even low bycatch years can exacerbate the problem. Thus, there needs to be an effort and incentives to reduce bycatch in both high and low years.

Similar to other regions, the Board was concerned with the 'waste' associated with salmon bycatch, and the need to retain chum and Chinook bycatch as food. The Board pressed for efforts to figure out how to retain more salmon bycatch of a food-grade quality for distribution to village residents in western Alaska. Others related the difficulty in maintaining subsistence fishing, given the high price of gas and the limited fishing windows (e.g., burning 25 gallons per 24-hour window, and harvesting much fewer, smaller, salmon). Members emphasized that this type of information, and the cultural importance and dependence on salmon as the mainstay of the village diet, should be included in the impact analysis.

Members were concerned with subsistence users, both western Alaska residents and tribal members, not being heard in the Council process. Several members noted that tribes and tribal members have their own questions and concerns that need to be addressed, and that there should be a priority to start and continue a dialogue between the tribes and the Council. A direct, consistent relationship, and the ability to have this type of one-on-one communication, is essential. One member stated that the hope is that the salmon stocks will start increasing, and that the Council and YRDFA need to show each other that they are engaged in meaningful efforts to facilitate a rebound. Mandatory, year-round closure areas were mentioned by multiple members as an approach the Council should take.

[7] In addition, all of the Federal Subsistence RAC meetings are recorded and transcribed.

The Board also had many specific questions about the way the pollock fishery operates, the seasons, the number of vessels in the various sectors, the status of salmon excluder devices, observer coverage, monitoring and enforcement of the provision of Amendment 91, and the differences between the timing of Chinook and chum bycatch in the Bering Sea. They also wanted a summary of the effectiveness of the current voluntary rolling hotspot closure system, as many residents along the river have varying perspectives and have heard conflicting information.
Public comment was also taken – two people testified on the importance of chum salmon to the communities in the region and Alaska Native culture.

Bering Strait Regional Conference; February 23, 2011; Nome

This conference was organized by Kawerak, Inc. and brought together residents of 20 villages in the Norton Sound region to discuss education, health care, and natural resource issues. Due to weather, Council staff was unable to get to Nome, so NMFS (Sally Bibb, AKR) participated in the panel discussion on resource issues in their place, and presented an overview of the Council process, the chum salmon bycatch analysis, and the Northern Bering Sea Research Plan to approximately 75 people. Conference participants made the following comments: (1) Norton Sound is one of the areas hit hardest by poor chum salmon returns and is the only area of the state that has Tier II management for subsistence fishing for chum salmon, (2) the hard cap for Chinook salmon implemented under BSAI Amendment 91 is too high and represents a level of bycatch that is above the actual bycatch levels of most of the last 20 years, (3) the Seward Peninsula Federal Subsistence Regional Advisory Council recommended a hard cap of 30,000 chum salmon for the Bering Sea pollock fishery, which is a cap level that currently is not included in the Council's range of alternatives, and (4) trawling should not be allowed in the Northern Bering Sea Research Area because of the sensitivity of the shallow bottom and the importance of the resources in this area to the people of Norton Sound.

NMFS AKR also manned a table at the conference with Protected Resources, Alaska Fisheries Science Center, and US Fish and Wildlife Service staff to have one-on-one conversations with conference attendees and to answer questions about protected resources and fisheries management issues. Most people stopping by the table were interested in marine mammal issues, specifically walrus and ice seals, although several people reiterated the comments that they made relevant to the panel presentation.

Yukon-Kuskokwim Delta Subsistence Regional Advisory Council; February 23, 2011, Mountain Village

The Yukon-Kuskokwim Delta RAC is comprised of 12 members, from the communities of Kalskag, Kwethluk, Tuluksak, Eek, Tuntutuliak, Bethel, Alakanuk, Pilot Station, Kotlik, Hooper Bay, and Mountain Village. Approximately 40 people attended, including State and Federal agency staff and local residents. The discussion included both Chinook and chum salmon bycatch. The majority of the discussion on chum salmon was about accounting reliability, salmon discards and retention requirements, and the potential to use more chum bycatch for food through the food bank system. The RAC requested further information on the Sea Share program and the percentage of salmon bycatch that is retained for food through that program. The RAC was very concerned with whether discards of salmon were occurring, and the general reliability of the observer and catch accounting information.

Western Interior Subsistence Regional Advisory Council; March 2, 2011, Galena

The Western Interior RAC meeting attendees included RAC members, State and Federal agency staff, YRDFA staff, and community members (estimate of 60 total participants). The region the RAC represents encompasses 27 villages along the Yukon and Kuskokwim rivers, and the 10 RAC members are from McGrath, Ruby, Aniak, Galena, Wiseman, Allakaket, Holy Cross, Anvik, and Huslia.

The RAC asked how a hard cap system is different from an allocation of salmon bycatch, and asked what types of incentives are in place to keep the pollock fleet from fishing up to the cap every year. It was later discussed that the Council should focus on disincentives to catching salmon as bycatch, as opposed to incentives. One disincentive could be requiring the retention, freezing, and distribution of salmon bycatch to Western Alaska communities and tribal councils, for both genetic sampling and food. The RAC conveyed that there needs to be strong disincentives to reduce the destruction and waste of such an important food source. Members also discussed the substitutability of salmon species: if subsistence users must give up Chinook salmon to bycatch or other factors, (fall) chum salmon becomes increasingly important to mid – to upper Yukon River communities. At the same time, it was noted that additional salmon in the food bank provides limited benefits; it does not help meet annual or long-term escapement goals. Members emphasized the vulnerability of the salmon stocks; in a year that escapement goals are not met, it lowers the productivity of the river for many years.

The RAC also wanted an explanation of how the Council balances the national standards of minimizing bycatch (e.g., of salmon) and achieving optimum yield (e.g., in the pollock fishery). There were questions about how flexible each Council may be in interpreting the national standards, and whether any priority system or guidance is formalized. The RAC also questioned the need to maximize pollock catch, and whether there is an inherent problem with not meeting optimum yield.

The RAC strongly recommended that additional funding for new genetics data be provided for salmon stocks of concern, in order to better delineate stock of origin. Specific stocks mentioned were the Norton Sound and Chukchi chum salmon stocks. This spurred discussion of the current state of the genetics data and how refined the analysis will be in terms of breaking out (bycatch) stocks by river system.

In terms of alternatives, RAC members stated that a shorter pollock season is a feasible alternative that should be included for consideration, since the fleet is on the water for 9+ months of the year. While bycatch in the pollock fishery is not the only contributing factor to lower salmon returns, the Council should consider a management strategy to reduce the fishing pressure for a period during the year, since salmon spend so much of their life cycle in marine waters. A similar alternative was recommended by the RAC for consideration under the Chinook salmon bycatch reduction measures, but was not included by the Council for analysis.

Ethics issues and appointments were also discussed, as RAC members asked about the current composition of the Council and the perception that it is skewed toward the trawl industry. Staff reviewed the representation of the currently appointed members of the Council and reiterated the appointment process and terms. The RAC was interested in who to contact regarding having a seat on the Council that represents subsistence and tribal issues.

The agenda item closed with a resolution to work with YRDFA, tribes, and communities to develop a position on the chum salmon bycatch issue prior to or during the June 2011 Council meeting. In addition, the RAC approved sending a member to attend the June 2011 Council meeting.

Eastern Interior Subsistence Regional Advisory Council; March 3, 2011, Fairbanks

The Eastern Interior RAC is comprised of 12 members, from the communities of Eagle, Tok, Tanana, Fort Yukon, Central, Manley Hot Springs, North Pole, and Venetie. The Eastern Interior RAC meeting was comprised primarily of RAC members and State and Federal agency staff, with a few community members and non-profit groups represented (estimate of 60 total participants). The Eastern Interior RAC represents thirteen villages along the Yukon or Tanana rivers and an additional seventeen villages within the region.

Overall, the RAC emphasized the severe dependence in the Upper Yukon on chum salmon, both to provide food for local residents and to support dog teams for transportation.

The Eastern Interior RAC was very concerned with the level and preciseness of genetics data, and asked for further explanation of the new 'census approach' to sampling under BSAI Amendment 91, compared to the previous system of sub-sampling of catch. There were detailed questions about how the sampling is done, and whether otoliths are used for genetic sampling, to determine the level of hatchery salmon in the bycatch. Staff committed to researching and responding to this question after the meeting.[8]

The RAC also questioned whether the Bering Sea pollock fleet is generally able to catch the entire pollock TAC; discussion ensued about this being the first year of implementation for Amendment 91 and that the fleet stood-down for about the first 10 days of the A season in an effort to avoid Chinook salmon. Members were concerned with the significant increase in the pollock TAC in 2011 and possible ramifications relative to bycatch. They questioned whether they should assume a higher TAC means that the fleet will be fishing longer. The response and discussion centered on the concept that a higher TAC does not necessarily mean higher bycatch or bycatch rates. The pollock TAC is higher as a result of increased pollock abundance resulting from the annual stock assessment; in effect, it may reduce the need to prospect for pollock, and allow the pollock fleet an opportunity to look for better, cleaner fishing grounds. The pollock seasons would not be affected, and it is uncertain whether the duration of the fishery would change. The RAC also asked for an update on the research and use of salmon excluder devices.

At the close of the agenda item, the RAC related concerns with the length of time it takes to have a management action implemented. From the time a problem is identified (such as salmon bycatch) to a solution being implemented, it can take 3 to 4 years. Members asked whether the Council has discussed the possibility of reducing the Federal requirements associated with its analytical process (i.e., NEPA) and made recommendations to that end to the Federal government. The RAC stated appreciation for the face-to-face dialogue with Council members and staff, and reiterated the need to continue to strengthen a working relationship.

Bristol Bay Subsistence Regional Advisory Council; March 9, 2011, Naknek

The Bristol Bay RAC is comprised of 10 members, from the communities of Togiak, Naknek, King Salmon, Chignik Lake, Dillingham, Manokotak, and Iliamna. The Bristol Bay RAC meeting was comprised primarily of RAC members and Federal agency staff, with a few public participants and one ADF&G staff person (estimate of 25 total participants). The Bristol Bay RAC represents 31 Bristol Bay subsistence communities and rural residents.

Regarding Chinook salmon measures, the RAC emphasized the importance of Chinook salmon as a subsistence food and noted lower returns (and smaller fish) in their region. They asked on what the existing (performance) cap of 47,591 Chinook salmon was based under Amendment 91. For chum salmon, one RAC member noted that hard caps should be targeted (more restrictive) during the months in which the data indicate that a higher proportion of the bycatch is salmon originating from western Alaska river systems (e.g., under Alternative 3).

The RAC also supported requiring that bycaught salmon is received, stored, and donated in a condition fit for human consumption, and wanted the industry to make progress on providing the infrastructure for distribution to rural Alaska residents in areas that are experiencing very low salmon returns. One member noted that salmon not fit for human consumption could still be used to feed dog teams. The requirement

[8]The response was provided from Diana Stram, Council staff, to KJ Mushovic, coordinator for the EI RAC, USFWS, via email on April 20, 2011.

to count and then discard salmon is counter-intuitive to the concept of not wasting salmon under any abundance conditions. Like the Western Interior RAC, the Bristol Bay RAC emphasized the need for disincentives to encounter salmon (i.e., the cost of retaining, freezing, storing, and distributing to food banks) as opposed to incentives for cleaner fishing. Like other RACs, the Bristol Bay RAC requested the specific amount and percentage of salmon bycatch that is currently processed and distributed to food banks.

The RAC was also interested in the areas identified for closure under Alternative 3, specifically, what years were used to identify those areas (2003 – 2010), and whether a more restrictive trigger cap could be established for specific months to avoid more western Alaska bound chum salmon. They also asked whether it is typically the majority of the fleet that operates in those high bycatch areas or just a few vessels, and whether the closures identified for each month represent a 40%, 50%, or 60% reduction in historical bycatch for each month, across the entire B season, or both.

The RAC emphasized that the Council and analysis should recognize that while the genetic data limit the analysis to impacts on river systems on an aggregate basis (e.g., western Alaska; upper and middle Yukon River), there are some very small, vulnerable streams whose relatively small runs are crucial to various subsistence communities. The example provided was the Naknek River: the entire Chinook run may be 5,000 fish, but this is a very important food source to many tribes and communities in the Bristol Bay region. A similar situation exists for chum salmon. The RAC was interested in how impacts on subsistence users would be addressed in the analysis, and whether other potential pollock trawl impacts, such as on marine mammal species and habitat, would be addressed.

Public testimony was taken; one person (WWF) testified that the RAC should recommend a hard cap on chum salmon bycatch in the Bering Sea pollock fisheries. This testimony also provided notice of a roundtable discussion with tribal leaders being scheduled for June 2011 in Nome, during the Council meeting, in order to increase tribal consultation and participation in the Federal fisheries management process. This notice was also distributed at the other RAC meetings attended by Council staff.

Tanana Chiefs Conference annual convention; March 14, 2011, Fairbanks

The Tanana Chiefs Conference is a tribal consortium of 42 villages in interior Alaska, along the Yukon, Tanana, and Kuskokwim Rivers. Their annual delegate and board of directors meeting was March 14 – 17, in Fairbanks, and the Council presentation was provided under the 'subsistence issues' agenda item. About 250 people attended, including the 42 delegates from each of the member villages. After the presentation, a question and answer period was provided for an hour for all attendees.

Overall, participants at the TCC convention emphasized the need to be treated fairly and to participate in the development of fisheries management plans and policies. This participation must be based on meaningful consultation and communication between Federal agencies, the TCC, and Alaska Native villages. One member noted that it is also important to talk to people and conduct outreach in their own villages, as they may be hesitant to speak at the convention.

Members were frustrated by current State management of the commercial and subsistence salmon fisheries that create conflict between upper and lower river salmon users, while at the same time, the Bering Sea pollock fishery is allowed an unlimited amount of salmon bycatch. Yukon River fishermen and communities have been conserving and sacrificing, but the pollock industry could do much more than they have been. Members were frustrated by the level of Chinook bycatch, the waste it represents, believed that there is a direct correlation between high bycatch years and low returns to the river in subsequent years, and reiterated that the current cap is too high. All testifiers implored the Council to recognize that there is a long cultural, spiritual, and dietary dependence on salmon and the ability to

subsistence harvest salmon. Residents of remote villages do not have access to substitute foods, and they also need salmon to feed their dogs through the winter.

One testifier stated that the advisory status Alaska Natives are afforded in the Federal and State fisheries management processes in Alaska lead to frustrated attempts to getting the real issues on the table; by contrast, participation by tribes in the Pacific Northwest appears result in more meaningful dialogue and positive outcomes. The discussion included mention that there is not a designated tribal seat on the North Pacific Council, as there is on the Pacific Council, and there needs to be more Alaska Native representation on the current Council. In addition, the North Pacific salmon recovery fund sponsors participation by OR and WA tribes in the management process; the new budget, when passed, amends the provisions of this fund such that Alaska tribes will also have access to these monies.

Another member noted that the 10 year average for Chinook bycatch is decreasing, specifically the years since 2007. They support a lower cap on chum (and Chinook, recognizing the Council has already taken action) and want to encourage a meaningful dialogue to debate the issue prior to a decision. The goal is to pass the right to fish for salmon (both subsistence and commercially) to future generations. A meeting was mentioned in April for salmon users to discuss reducing their take on the lower river to allow salmon to get to the spawning grounds. One member questioned whether ANILCA applies to Council decisions.

Summary of statewide teleconference on proposed alternatives to limit non-Chinook (chum) salmon bycatch in the Bering Sea pollock fisheries

North Pacific Fishery Management Council
May 4, 2010

Purpose

Both the Rural Community Outreach Committee and the North Pacific Fishery Management Council (Council) recommended conducting a statewide public teleconference prior to the June 2010 Council meeting, thus, this effort was included in the Council's outreach plan on this issue.[1] The primary purpose of the teleconference was an orientation for the public on the alternatives currently proposed to evaluate new management measures to limit non-Chinook (chum) salmon bycatch in the Bering Sea pollock fisheries.[2] The teleconference was intended to help the public understand the Council process, the basics of the alternatives proposed, and ways to provide formal input to the Council. A secondary purpose was to document public input on the suite of alternatives and general concerns related to the issue, and provide that feedback to the Council in June.

The timing of the teleconference was such that the public would have an opportunity to understand the proposed action and how to provide comment on the issue, prior to the Council finalizing alternatives for analysis in June. The June Council action will provide a starting point from which to base the preliminary analysis, recognizing that the Council can modify the alternatives at Council meetings throughout the analytical process. The preliminary analysis for the proposed action will be developed from June 2010 through January 2011, with the Council's first review scheduled for its February 2011 meeting.

Logistics and participation

The teleconference was publicized in several ways: email notices, postings on the Council website, Federal Register notice, newspaper notices, and direct mailings to stakeholders. The mailing was sent March 31, to notify the public of the teleconference, the current suite of alternatives under consideration, and the analytical and Council schedule for action. The mailing was sent to over 600 individuals and entities, including community governments, regional and village Alaska Native corporations, regional non-profit Alaska Native corporations, tribal entities, Federal Subsistence Regional Advisory Council coordinators, Community Development Quota corporations, ADF&G Regional Coordinators, and other community or Alaska Native entities.

Key contacts in western Alaska were also contacted and asked to host a site at which community residents could participate, and/or publicize the call in their organization's newsletter or email listserve. Newspapers contacted were the Nome Nugget, Bristol Bay Times (Dillingham), Tundra Drums (Bethel), and the Arctic Sounder (Kotzebue).

The teleconference was open to the public, and hosted by the Council and the Alaska Sea Grant Marine Advisory Program. The call was moderated and recorded by EventBuilder.[3] A toll-free number was

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[1] The Council's outreach plan for the Bering Sea chum salmon bycatch issue is provided here: http://www.fakr.noaa.gov/npfmc/current_issues/bycatch/ChumOutreach410.pdf

[2] The Council's alternatives are provided here (last revision in February 2010): http://www.fakr.noaa.gov/npfmc/current_issues/bycatch/ChumBycatchMotion210.pdf

[3] EventBuilder is a provider of online event technology and conferencing services that provides event management, online registration and web and audio conferencing. www.eventbuilder.com.

provided, and an unlimited number of lines could be accommodated. The audio file for the teleconference is available at: http://www.box.net/shared/j37fjfq8i1.

The call occurred from 9 am – 11 am on May 4. Council analysts, Nicole Kimball and Dr. Diana Stram, provided a 30 minute presentation on the proposed action, community outreach plan, and Council process, with 90 minutes remaining for questions and comments from the public. Callers provided their name and location. The powerpoint presentation was posted on the Council website two weeks prior to the teleconference, and is attached as **Appendix A**.

The call log, which indicates the number of callers, their location, and the amount of time they participated, is provided as **Appendix B**. A total of 73 unique lines called in, which effectively means a minimum of 73 people participated, as there were several sites with more than one person on the line. Note that the call log indicates that 86 lines participated, but several of those were from the same number, resulting in a total number of 73 individual lines (e.g., a person called in for a portion of the call, hung up, then called back in later). Individual phone numbers of participants are not provided in the call log to protect confidentiality. The maximum number of lines participating at any one time was 53. Thirty-one different locations were represented, with 20 of those being small Alaska villages.

Summary of questions and comments

The following provides a brief summary of participants' questions and comments. About 25 questions and/or comments were provided, by 18 participants. For detail and an exact account of both the questions and responses, please refer to the audio file at: http://www.box.net/shared/j37fjfq8i1.

1. *Edward Mark, Quinhagak. Natural Resource Director, Native Village of Quinhagak.* Rural villages have an unwritten rule about not wasting resources in subsistence hunting and gathering, thus, it is counter-intuitive to set a goal for how much salmon can be wasted in the form of bycatch. Edward questioned whether there were programs implemented to distribute chum salmon bycatch for use by community residents. A follow-up comment focused on Alternative 2; if a hard cap is selected, he supports the lowest cap possible.

2. *Victor Lord, Nenana. Commercial and subsistence salmon fisherman, Tanana River.* Question about where the pollock fishery operates, and how the Council and NMFS know where they operate (i.e., what is the managers' level of confidence in the pollock fishery's areas of operation). Also a question about the timing for public comment on this issue at the June 2010 Council meeting.

3. *Ted Suckling, Nenana. Yukon River Drainage Fisheries Association.* Question about whether there are observers on all pollock vessels, and how much the public and fisheries managers can rely on observers' bycatch estimates.

4. *Tom Okleasik, Kotzebue. Planning Director, Northwest Arctic Borough.* Question about whether the bycatch trend analysis will incorporate the natural population variation in the salmon stocks, and whether it accounts for past commercial fisheries effects (i.e., bycatch in previous years). A second question focused on the results of the finer scale, less aggregated genetic information that may be available in 2011, and whether and how indigenous people will have a role in the research process with NMFS (i.e., sample taking, interpretation of results, etc.).

5. *Don Rivard, Anchorage. Office of Subsistence Management, USFWS.* Question on whether BSAI Amendment 91 (Chinook salmon bycatch action) is on track for possible approval by the Secretary of Commerce this year, with implementation by NMFS in January 2011. Related question as to how Amendment 91 will be addressed or incorporated in the chum salmon bycatch

analysis (i.e., as part of the status quo). A follow-up question on whether the action taken under BSAI Amendment 91 to limit Chinook salmon bycatch is likely to also serve to limit chum bycatch.

6. *Julie Raymond-Yakoubian, Nome. Anthropologist, Kawerak, Inc.* Question regarding what specific steps the Council is taking to engage with NMFS on tribal consultation issues, to make sure that tribal issues are taken into consideration and addressed prior to a Council decision.

7. *Louie Green, Nome. Subsistence and commercial salmon fisherman.* Comment that the Nome subdistrict has given all the Chinook and chum salmon to intercept fisheries that it can handle; the region is losing its salmon culture and salmon cannot afford to be wasted through bycatch. Question about how the recent oil spill in the Gulf of Mexico may affect the Council's approach and decision-making on fisheries management in the Bering Sea.

8. *Morris Nuparuk (sp.?), Elim.* Comment: Since 1964, residents have been documenting how many salmon have passed the salmon counting tower in their area; a reduction in the number of salmon making it to the river has been recognized since the pollock fishery started picking up in the 1980s. In the 1970s, local fishermen could fish at least two 48-hour periods, every week. Currently, fishermen are usually on standby for a salmon opener. Question about whether there is any funding set-aside from the pollock fishery to re-stock rivers and tributaries.

9. *Charlie Fitka, St. Michael. IRA Council, subsistence and commercial salmon fishermen, Yukon River.* Comment that residents have been limited in both subsistence and commercial salmon fisheries in recent years. He was fined in 2009 for subsistence fishing; he did not have a radio and was unaware that ADF&G had reduced the net size limits. Question focused on how are we going to control bycatch of salmon in the Bering Sea when the subsistence way of life is being controlled by ADF&G. Comment continued that there is too much waste and we cannot let this amount of bycatch continue.

10. *Edward Mark, Quinhagak. Natural Resource Director, Native Village of Quinhagak.* Question on whether there is a tagging system in place in the Area M (commercial salmon) fisheries so that we can determine to which rivers (e.g., Yukon or Kuskokwim) chum salmon are migrating. If a tagging system is not in place, can we incorporate such a system in this proposed action.

11. *Lisa Ragone, Juneau. USCG.* Comment regarding the current rolling hot spot closure system (status quo, Alternative 1); it appears that the pollock fishery has a hard time avoiding salmon, even when they are trying to do so. Request to explain the new 'zone' closure system, and the size of the areas proposed for pollock closures, under Alternative 3.

12. *Ted Suckling, Nenana. Yukon River Drainage Fisheries Association.* Comment: Residents in his region (Interior) fish at the headwaters of the Tanana River, and are concerned with getting enough salmon up the river to spawn. They support a management system that would keep bycatch as low as possible. Question on how the Council determined the numbers of salmon that represent the range of hard caps under Alternative 2. What is the basis for those options?

13. *Nancy Swanson, Anchorage. National Park Service.* Comment to encourage staff to include in the analysis how the Federal management system for subsistence would be affected by the alternatives proposed (i.e., do not limit the analysis to how ADF&G management is affected). As the analysis is developed, analysts should consider Title 8 of ANILCA (subsistence priority), both in terms of providing an understanding of Title 8 in the analysis and in developing the alternatives for evaluation.

14. *Louie Green, Nome. Subsistence and commercial salmon fisherman.* Question regarding whether there have been any new genetic subsamples of Chinook and chum salmon taken in the Nome subdistrict. If not, why haven't they been requested.

15. *Tim Smith, Nome. Nome Fishermen's Association.* Question about whether it is reasonable to attempt to manage chum salmon bycatch without considering commercial salmon fisheries in Area M, especially in light of providing an ecosystem approach to fisheries management. Discussions on the approach at the February 2010 Council meeting were concerning; if Area M is a substantial mortality factor, it need to be incorporated into overall management system for chum salmon. Follow-up question related to the Community Development Quota (CDQ) Program. The Norton Sound Economic Development Corporation (NSEDC), representing Bering Straits communities, did not communicate the position they were going to recommend to the Council on Chinook salmon bycatch to the public in advance. Question on whether the CDQ groups have any obligation to communicate with their constituents on chum salmon bycatch.

16. *John Chase, Kotzebue. Northwest Arctic Borough.* Comment that he hopes that the Council can put significant weight on the comments provided by subsistence users of salmon throughout this process.

17. *Muriel Morse, Anchorage (originally from Koyuk). Alaska Marine Conservation Council.* Comment that it is necessary to recognize that Yupik is the primary language for many affected stakeholders in rural Alaska. In the future, the Council should consider providing translation services during teleconferences, outreach meetings, and Council meetings, in order to increase understanding and participation.

18. *Jetta Minerva, Galena. Subsistence specialist, Koyukuk and Nowitna National Wildlife Refuge.* Comment on the treaty between the U.S. and Canada, which requires that the U.S. provide 45,000 Chinook salmon. The Council needs to take into consideration salmon treaty obligations, and also recognize that in the past year it took a significant effort by Yukon fishery managers and sacrifices by subsistence users to meet the treaty obligation.

19. *Victor Lord, Nenana. Commercial and subsistence salmon fisherman, Tanana River.* Question about the timing of the A and B seasons for the Bering Sea pollock fishery and its relationship to Chinook and chum salmon bycatch. Question as to whether fisheries managers put more emphasis on the B season, in terms of chum salmon bycatch.

20. *Sam ??, Quinhagak.* Comment: The CDQ group in the Quinhagak region (Coastal Village Region Fund) helps local villages with their commercial fisheries management. Question about whether the pollock fishery can be mandated to provide funds for genetic research and management (funding provided directly to the State of Alaska), and specific fisheries projects in western Alaska. Question as to whether there is a way to use funds generated from violations in the pollock fishery to assist and be allocated to specific fisheries projects in western Alaska.

21. *Louie Green, Nome. Subsistence and commercial salmon fisherman.* Comment that the CDQ groups have funds for restoration and rehabilitation of fisheries. Question about the basis for the initial allocations to the CDQ groups; one of the criteria being the population of the communities represented by each group. Question about whether that basis constitutes a legal obligation to the CDQ group's constituency to communicate their positions on issues and state how they are going to use the public resource. Concern about the CDQ community liaisons and Board of Directors being the conduit for the public to receive information on the CDQ group.

22. *Paul Beans, Mountain Village.* Comment that there have been significant reductions on the Yukon River and throughout rivers in western Alaska for both the commercial and subsistence salmon fisheries in recent years, specifically 2008 and 2009. Management measures include shorter seasons, gear restrictions, and overall closures. Question concerning whether the Council has considered taking action to shorten the seasons for the Bering Sea pollock fishery (e.g., cut both A and B seasons in half, in order to share the conservation burden).

23. *Phillip ??, Minto.* Question about why Chinook and chum bycatch in the pollock fishery were so low in 2008. Interest in replicating the management and industry actions taken in 2008 to avoid salmon bycatch; fold those types of actions into the current suite of chum salmon alternatives.

24. *Jetta Minerva, Galena. Subsistence specialist, Koyukuk and Nowitna National Wildlife Refuge.* Question on the survival rate of Chinook and chum salmon caught as bycatch in the Bering Sea pollock fishery.

25. *Ted Suckling, Nenana. Yukon River Drainage Fisheries Association.* Question and concern about why the Bering Sea pollock fishery takes precedence over the subsistence salmon fishery, as subsistence is a way of life.

North Pacific Fishery Management Council

Presentation on Bering Sea chum salmon bycatch alternatives

May 4, 2010

Diana Stram & Nicole Kimball
North Pacific Fishery Mgmt Council
(907)271-2809

Who are we?

- The North Pacific Fishery Management Council (Council) and National Marine Fisheries Service (NMFS)
- Together manage U.S. Federal fisheries off Alaska (3-200 miles)
- Management is coordinated (and in some cases jointly managed) with the State of Alaska
- Council makes recommendations to NMFS
- NMFS approves, implements, and enforces them

Who is on the Council?

- 15 total members
  - 11 voting
    - 4 designated seats (heads of NMFS, ADF&G, Washington & Oregon Depts of Fish and Wildlife)
    - 7 appointed seats (5 Alaska & 2 Washington)
  - 4 non-voting
    - USCG, Pacific States, Dept of State, US Fish & Wildlife

Council meetings

- 5 meetings per year
- 3 in Anchorage, 1 in AK fishing community, 1 in Seattle or Portland
- Each meeting is ~8 days
- All meetings open to the public
- Many opportunities for public comment including written and oral testimony on each agenda item
- Audio link available to listen to Council meetings remotely (real-time)

Magnuson-Stevens Act

- Council management of fisheries is governed by the Magnuson-Stevens Act (Federal law)
- Council primarily manages groundfish (Pacific cod, pollock, flatfish, sablefish, rockfish, etc.), shellfish, halibut allocations
- Management areas: Bering Sea, Aleutian Islands, and Gulf of Alaska
- Includes management of bycatch in these fisheries

Magnuson-Stevens Act

- 10 National Standards – Council and NMFS must consider several factors, including
  - Minimizing bycatch to extent practicable (e.g., salmon bycatch)
  - Preventing overfishing while achieving, on a continuing basis, the optimum yield from each fishery (e.g., the Bering Sea pollock fishery)
  - Providing for the sustained participation and minimize adverse impacts on fishing communities

Council Decision Process

- Proposal presented to Council from public, stakeholder group, or Council
- If desired, Council initiates analysis of alternatives and options
- Council receives input on draft analyses and issues from its Scientific and Statistical Committee, Advisory Panel, various issue specific committees, and the public at each meeting

Council Decision Process (cont.)

- Analysis proceeds through
  - Initial review draft
  - further refine alternatives if necessary
  - Public review draft
  - final council decision (selection of preferred alternative)
- Final Council decision is then submitted to the Secretary of Commerce

NMFS rulemaking process

- NMFS publishes a proposed rule to implement the regulations
- Comments received on PR
- Secretary can approve, disapprove, or partially approve the Council's decision
- If approved by Secretary, NMFS publishes final rule (responds to comments from PR)
- Final rule establishes effective date

Opportunities for public comment

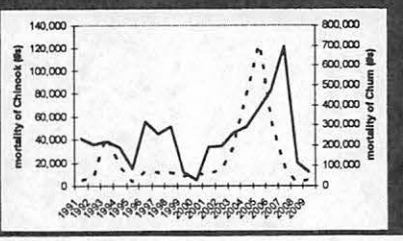
- During each Council meeting
  - Science and Statistical Committee
  - Advisory Panel
  - Council
- Council committees (e.g., Salmon Bycatch Workgroup)
- During rulemaking
  - Comment solicited on analysis and rule

Salmon bycatch in the Bering Sea pollock fisheries

- Bering Sea pollock fishery catches salmon as bycatch (primarily Chinook and chum)
- Bycatch, by law, is counted but cannot be retained or sold

Salmon bycatch trends

- 4 sectors in pollock fishery: offshore catcher processors, inshore catcher vessels, motherships, CDQ
- Differential bycatch by sector



Council action

- The Council has been managing salmon bycatch using time-area closures since the mid 1990s
- Fixed time-area closures are not responsive to changing conditions
- Since 2005, Council has been evaluating different management measures
- The Council is addressing Chinook and non-Chinook (chum) salmon bycatch in separate actions

Status of Chinook bycatch action (BSAI Am. 91)

- Council recommended hard cap
- Proposed rule was published March 23, 2010

http://www.fakr.noaa.gov/prules/75fr14016.pdf

- Comments on FMP language were due April 19; comments on proposed rule due to NMFS by
- Expected implementation by January 2011

Council-initiated action on non-Chinook (chum) salmon bycatch

- Status quo: time/area closures that the pollock fleet is exempt from because they voluntarily participate in a rolling hotspot closure system
- Alternative management measures considered
  - Revised time/area closure system
  - Hard caps

Current chum alternatives: Alternative 1

Alternative 1 (Status quo): voluntary rolling hotspot closure system

- Provides exemption from current salmon savings area since 2006
- System of short-term (3 to 7 day) moving discrete area closures based on real-time high bycatch areas
- Closures apply to 10 pollock sectors or cooperatives with the highest bycatch

Current chum alternatives: Alternative 2

Alternative 2: Hard caps ranging from 50,000-353,000 non-Chinook salmon

- Range initially based on historical bycatch trends 1997-2009, rounded and lowered by Council in December 2009
- Divided by sector similar to Chinook
- No incentive program included at present

Current chum alternatives: Alternative 3

Alternative 3: Triggered time/area closures

- Staff developing proposed discrete closure system based on recent bycatch patterns
- Zonal approach being considered

Schedule for Council action on chum

- Action in June 2010: Review/revise alternatives and initiate analysis
- Information to be provided to Council in June
- Cap calculations based on Council motion (sector allocation changes)
- Proposed area closures and zonal trigger approach
- Review results of statewide teleconference on alternatives (May 4)
- Update on genetics: both Chinook and chum

Current genetic breakouts: chum

- Analysis will consider observed bycatch stock composition using genetic samples from 2005 - 2009
- Stock composition currently available by aggregate groupings only
- Future stock composition may be reported on finer scale capability no sooner than 2011

Schedule for Council action on chum

- June 2010: Development of preliminary analysis starts
- Dec 2010: Presentation to Yukon River Panel
- February 2011: Council review of preliminary analysis
- Feb/March 2011: Regional outreach meetings in western AK
- June 2011 (Nome): Council review of initial review analysis (select prelim preferred alt)
- Late 2011: Tentative Council final action

Rural community outreach: chum/salmon bycatch

Council's Rural Community Outreach Committee has helped develop a chum salmon bycatch outreach plan similar to Chinook plan with improvements

- Outreach plan includes:
  - Statewide mailings (throughout process)
  - Statewide teleconference: May 4
  - 9 regional meetings targeted in western AK (2010-early 2011): Association of Village Council Presidents, 5 Subsistence RACs, Yukon River Drainage Fisheries Assn, Tanana Chiefs Conference, Kawerak, plus Yukon River Panel
  - Documentation of outreach results: report to Council early in process

Rural community outreach: chum/salmon bycatch

9 regional meetings possible in western AK (primarily Feb/March 2011)

- 2 Council members and Council analysts
- Working with regional organizations to be on agenda of their meetings
- Timing of regional meetings is prior to Council's selection of preliminary preferred alternative (June 2011, Nome)
- Timing of regional meetings will allow input to be considered and incorporated into analysis

How to provide public input to the Council

- **Write a letter to the Council**
- **Testify at a Council meeting**
- **Check the Council website below, or contact us to find out about upcoming agenda items**
  - Council website: http://www.alaskafisheries.noaa.gov/npfmc

Location	Start Time (PST)	End Time (PST)	Duration
Anchorage, AK	5/4/2010 9:59	5/4/2010 10:04	5
Anchorage, AK	5/4/2010 11:04	5/4/2010 11:18	14
Anchorage, AK	5/4/2010 11:19	5/4/2010 11:42	23
Anchorage, AK	5/4/2010 9:55	5/4/2010 11:53	118
Anchorage, AK	5/4/2010 9:59	5/4/2010 11:53	114
Anchorage, AK	5/4/2010 10:05	5/4/2010 11:53	108
Anchorage, AK	5/4/2010 10:00	5/4/2010 11:53	113
Anchorage, AK	5/4/2010 9:43	5/4/2010 11:53	130
Anchorage, AK	5/4/2010 9:59	5/4/2010 11:53	114
Anchorage, AK	5/4/2010 11:42	5/4/2010 11:53	11
Anchorage, AK	5/4/2010 10:02	5/4/2010 11:53	111
Anchorage, AK	5/4/2010 9:59	5/4/2010 11:53	114
Anchorage, AK	5/4/2010 9:59	5/4/2010 11:53	114
Anchorage, AK	5/4/2010 10:12	5/4/2010 11:53	101
Bethel, AK	5/4/2010 10:08	5/4/2010 10:12	4
Bethel, AK	5/4/2010 10:07	5/4/2010 10:23	16
Boston, MA	5/4/2010 10:02	5/4/2010 11:34	92
Chevak, AK	5/4/2010 10:05	5/4/2010 11:53	108
Eagle River, AK	5/4/2010 10:00	5/4/2010 10:38	38
Elim, AK	5/4/2010 10:09	5/4/2010 10:22	13
Elim, AK	5/4/2010 10:24	5/4/2010 10:30	6
Elim, AK	5/4/2010 10:39	5/4/2010 11:09	30
Elim, AK	5/4/2010 11:15	5/4/2010 11:31	16
Elim, AK	5/4/2010 11:06	5/4/2010 11:53	47
Fairbanks, AK	5/4/2010 10:02	5/4/2010 10:43	41
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Fairbanks, AK	5/4/2010 10:14	5/4/2010 11:35	81
Fairbanks, AK	5/4/2010 10:00	5/4/2010 11:36	96
Fairbanks, AK	5/4/2010 10:04	5/4/2010 11:53	109
Fairbanks, AK	5/4/2010 9:59	5/4/2010 11:53	114
Fairbanks, AK	5/4/2010 10:07	5/4/2010 11:53	106
Fort Yukon, AK	5/4/2010 10:03	5/4/2010 10:39	36
Galena, AK	5/4/2010 9:57	5/4/2010 10:02	5
Galena, AK	5/4/2010 10:02	5/4/2010 11:53	111
Gambell, AK	5/4/2010 10:06	5/4/2010 10:17	11
Homer, AK	5/4/2010 9:59	5/4/2010 11:53	114
Juneau, AK	5/4/2010 10:02	5/4/2010 11:12	70
Juneau, AK	5/4/2010 10:00	5/4/2010 11:53	113
Juneau, AK	5/4/2010 9:51	5/4/2010 11:53	122
Juneau, AK	5/4/2010 10:31	5/4/2010 11:53	82
Juneau, AK	5/4/2010 9:59	5/4/2010 11:53	114
Juneau, AK	5/4/2010 10:00	5/4/2010 11:53	113
Kodiak, AK	5/4/2010 9:55	5/4/2010 10:18	23
Kodiak, AK	5/4/2010 10:17	5/4/2010 11:08	51
Kodiak, AK	5/4/2010 10:01	5/4/2010 11:51	110
Kodiak, AK	5/4/2010 10:04	5/4/2010 11:53	109
Kotzebue, AK	5/4/2010 10:29	5/4/2010 11:53	84
Kotzebue, AK	5/4/2010 9:59	5/4/2010 11:53	114
Kwethluk, AK	5/4/2010 11:35	5/4/2010 11:46	11
Kwigillingok, AK	5/4/2010 10:02	5/4/2010 10:57	55
Kwigillingok, AK	5/4/2010 11:26	5/4/2010 11:53	27
Lewisville, TX	5/4/2010 9:52	5/4/2010 10:07	15
Minto, AK	5/4/2010 10:23	5/4/2010 11:53	90
Mountain Village, AK	5/4/2010 10:50	5/4/2010 11:39	49
Mountain Village, AK	5/4/2010 11:40	5/4/2010 11:53	13
Nenana, AK	5/4/2010 10:01	5/4/2010 11:53	112
Nome, AK	5/4/2010 10:00	5/4/2010 10:03	3
Nome, AK	5/4/2010 10:46	5/4/2010 10:47	1
Nome, AK	5/4/2010 10:03	5/4/2010 11:22	79
Nome, AK	5/4/2010 9:57	5/4/2010 11:53	116

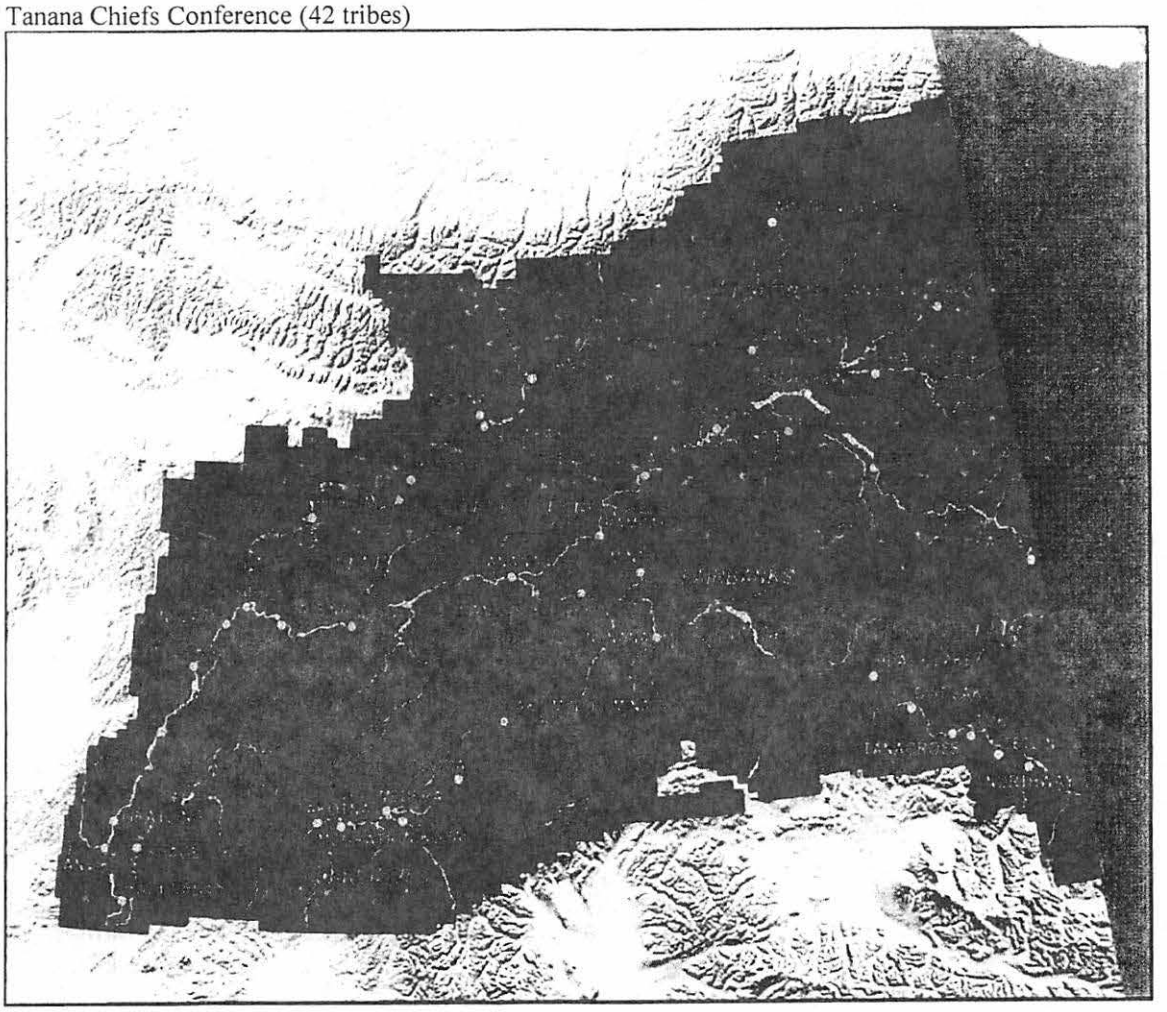
Nome, AK	5/4/2010 11:25	5/4/2010 11:53	28
Nome, AK	5/4/2010 10:48	5/4/2010 11:53	65
Nome, AK	5/4/2010 10:05	5/4/2010 11:53	108
Nunam Iqua, AK	5/4/2010 9:59	5/4/2010 10:02	3
Nunam Iqua, AK	5/4/2010 10:03	5/4/2010 10:28	25
Nunapitchuk, AK	5/4/2010 10:12	5/4/2010 11:53	101
Quinhagak, AK	5/4/2010 9:58	5/4/2010 11:53	115
Quinhagak, AK	5/4/2010 11:30	5/4/2010 11:53	23
Savoonga, AK	5/4/2010 9:58	5/4/2010 11:53	115
Scammon Bay, AK	5/4/2010 10:23	5/4/2010 10:55	32
Scammon Bay, AK	5/4/2010 10:07	5/4/2010 11:53	106
Scammon Bay, AK	5/4/2010 10:56	5/4/2010 11:53	57
Seattle, WA	5/4/2010 8:58	5/4/2010 9:00	2
Seattle, WA	5/4/2010 9:01	5/4/2010 9:03	2
Seattle, WA	5/4/2010 10:00	5/4/2010 10:58	58
Seattle, WA	5/4/2010 10:55	5/4/2010 11:51	56
Seattle, WA	5/4/2010 10:03	5/4/2010 11:53	110
Seattle, WA	5/4/2010 10:03	5/4/2010 11:53	110
Seattle, WA	5/4/2010 10:08	5/4/2010 11:53	105
Shageluk, AK	5/4/2010 10:54	5/4/2010 11:43	49
St. Michael, AK	5/4/2010 10:08	5/4/2010 11:53	105
Toksook Bay, AK	5/4/2010 9:57	5/4/2010 10:32	35
Vancouver, WA (Event Manager)	5/4/2010 9:34	5/4/2010 11:53	139
Washington, DC	5/4/2010 11:04	5/4/2010 11:53	49
		Total Duration	5663

*PST = Pacific standard time.

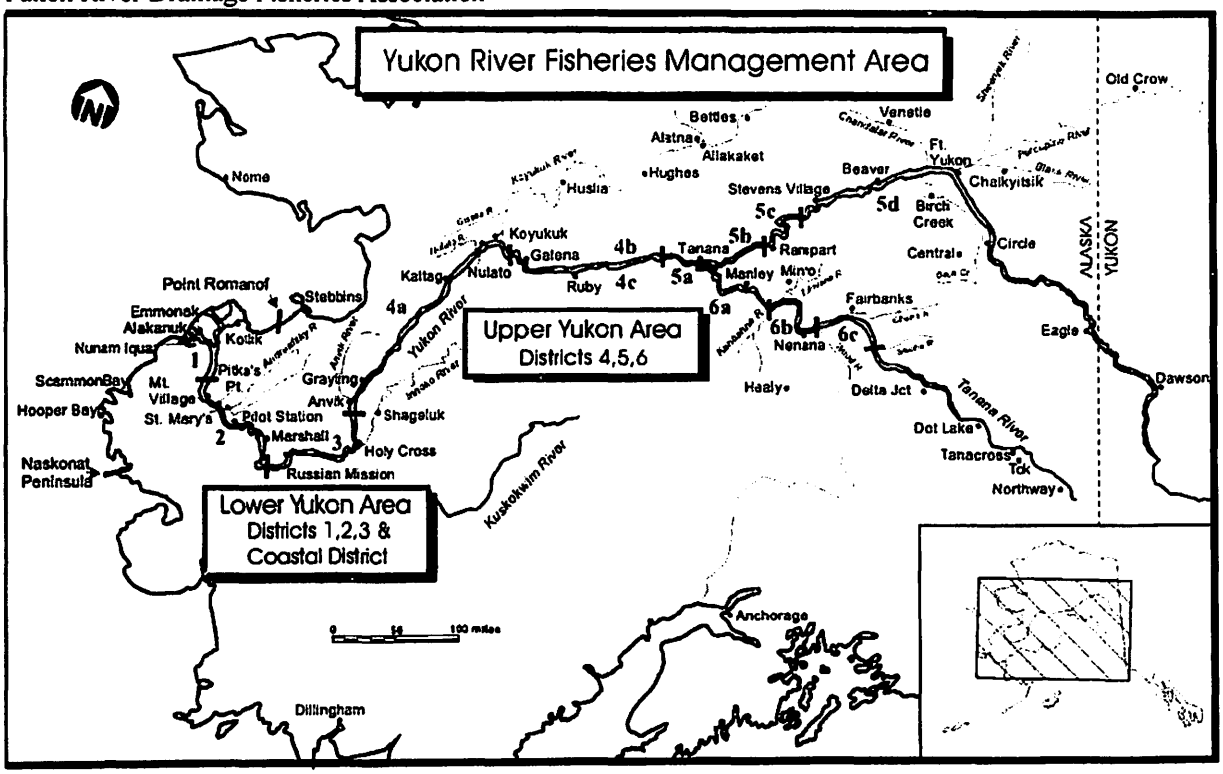
Source: EventBuilder, May 5, 2010.

Maps of villages represented by the entities holding regional meetings at which outreach was scheduled

Tanana Chiefs Conference (42 tribes)

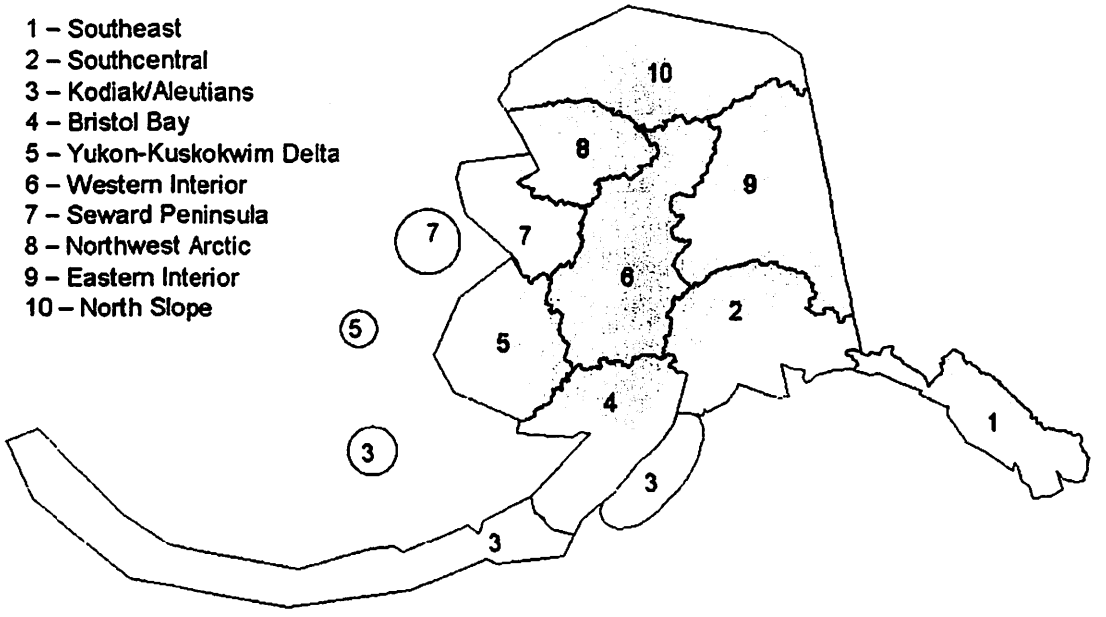


Yukon River Drainage Fisheries Association

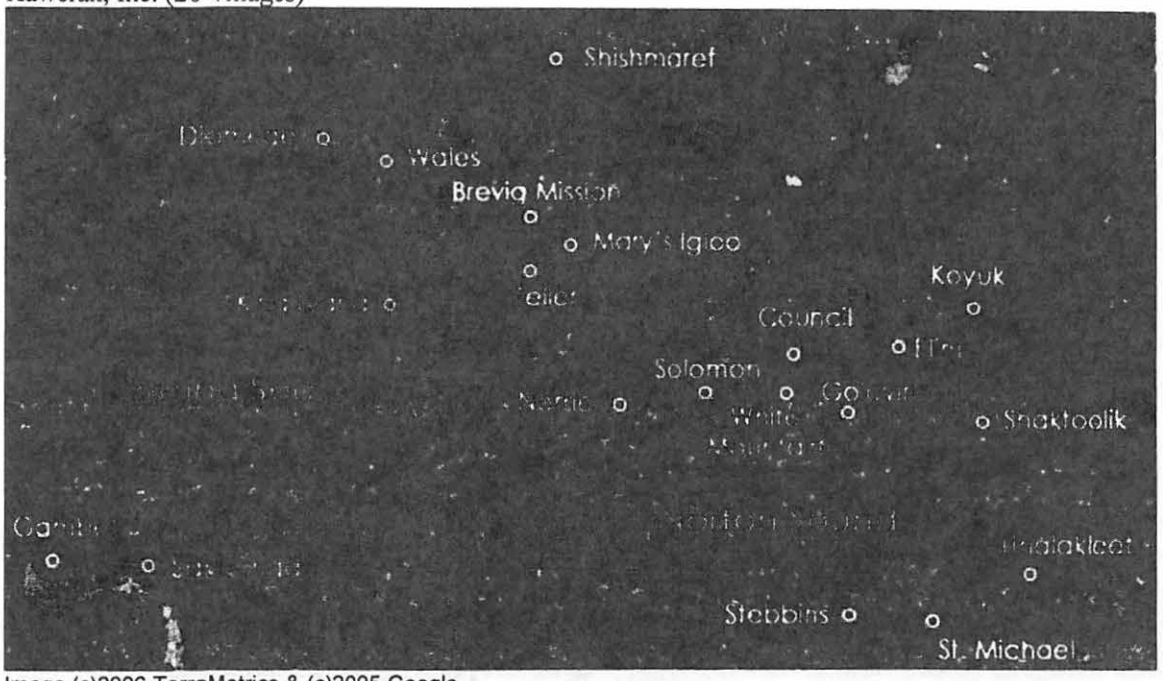


Federal Subsistence Regional Advisory Council meetings attended in February/March 2011: Eastern Interior, Western Interior, Yukon-Kuskokwim Delta, and Bristol Bay. (There was a schedule conflict with the Seward Peninsula RAC meeting.)

Regional Advisory Council Areas



Kawerak, Inc. (20 villages)



Appendix 3 to the Outreach Report: Resolutions or motions resulting from regional meetings related to the Council's chum salmon bycatch proposed action

Seward Peninsula Subsistence Regional Advisory Council

Eastern Interior Subsistence Regional Advisory Council

Yukon-Kuskokwim Delta Subsistence Region Advisory Council

Yukon River Drainage Fisheries Association

Western Interior Subsistence Regional Advisory Council

Bristol Bay Subsistence Regional Advisory Council

Seward Peninsula Subsistence Advisory Council Recommendation to the Federal Subsistence Board for Limiting Chum Salmon Bycatch in the Bering Sea and Aleutian Islands Pollock Fisheries

The Seward Peninsula Subsistence Advisory Council requests a recommendation from the Federal Subsistence Board to the North Pacific Fisheries Management Council asking the NPFMC to establish a limit of 30,000 chum salmon taken as bycatch in the Bering Sea and Aleutian Islands pollock fisheries.

Background:

Western Alaska salmon dependent communities have experienced severe restrictions on chum salmon harvesting opportunity. It is known that a significant number of chum salmon bound for Western Alaska streams are taken as bycatch in the Bering Sea and Aleutian Islands pollock fisheries.

The chum salmon taken as bycatch are from mixed stocks and there is no methodology available for identifying with sufficient accuracy where the fish taken as bycatch would have gone to spawn if they had not been caught.

Chum salmon returns to some Western Alaska streams have been reduced to a few hundred fish.

Problem statement:

The high numbers of chum salmon taken as bycatch represent an unacceptable threat to the health and survival of Western Alaska stocks by reducing the numbers returning below the number needed for escapement.

The harvest of chum salmon as bycatch in the pollock fisheries has imposed an unacceptable burden on Western Alaska salmon dependent communities by reducing the numbers available for harvesting.

Solution:

Establish a limit of 30,000 chum salmon taken as bycatch in the Bering Sea and Aleutian Islands pollock fisheries.

Justification:

A bycatch limit of 30,000 chum salmon establishes a reasonable balance between the economic interests of the pollock trawl industry and the needs of subsistence users for chum salmon.

Adopted at the February 15-16, 2011 meeting of the Seward Peninsula Advisory Council.

Resolution Regarding Chum Bycatch in the Bering Sea Pollock Fishery

Whereas, chum salmon are a vital subsistence fishery resource for subsistence users in the Eastern Interior Regional Advisory Committee region and are also essential for the small scale commercial fisheries that provide income necessary to participate in subsistence hunting, fishing and gathering, and in many years there are not enough chum to provide for subsistence and commercial uses for users throughout the Yukon drainage; and

Whereas, chum salmon are caught as bycatch in the Bering Sea pollock fishery—in 2005 over 700,000 chum were taken as bycatch —and many of these salmon are discarded overboard since it is illegal for the trawl fishery to sell the bycatch and the quality of the bycatch is often not sufficient to deliver to food banks; and

Whereas, although the bycatch has fallen over the last few years, there is little in regulation to prevent extremely high bycatch to re-occur, and the North Pacific Fishery Management Council (NPFMC) is in the process of developing regulations intended to "minimize salmon bycatch, to the extent practicable, while attempting to allow full harvest of the pollock total allowable catch"; and

Whereas, the last time the NPFMC balanced these contradictory goals was in relation to the bycatch of Chinook salmon in the Bering Sea pollock fishery, and the outcome was extremely disappointing to subsistence users in the Yukon region in that it continued to allow as many as 60,000 Chinook salmon to be caught annually as bycatch despite drastic subsistence and commercial fishery restriction on the Yukon River and failure to meet Chinook escapement and treaty obligations; and

Whereas, during the NPFMC Chinook salmon bycatch regulatory process the Federal Subsistence Board (FSB) and the USF&WS recommended and strongly advocated for a bycatch level that was far below that adopted by the Council because of the FSB's obligation to ensure healthy salmon populations, subsistence opportunity and a priority for subsistence uses; and

Whereas, the NPFMC is meeting in Nome in June of 2011 and will adopt a preliminary preferred alternative for the regulation of chum bycatch at that time.

Now Therefore Be It Resolved that the Eastern Interior Federal Subsistence Regional Advisory Council recommends that the FSB work with affected regional advisory councils, tribes and communities to develop a position from among the alternatives before the NPFMC to regulate chum bycatch. The FSB position should seek to minimizes chum bycatch to the greatest extent practicable and thereby ensure healthy fish populations and subsistence and small scale commercial fisheries. The FSB should officially convey this position to the NPFMC before or during the NPFMC meeting in June of 2011.

Dated this third day of March, 2011 at Fairbanks, Alaska.

Sue Entsminger

Chair, Eastern Interior Federal Subsistence Regional Advisory Council

Resolution of the Yukon Kuskokwim Delta Subsistence Regional Advisory Council Regarding Chum Bycatch in the Bering Sea Pollock Fishery

Whereas, chum salmon are a vital subsistence fishery resource for subsistence users in the Yukon Kuskokwim Delta Subsistence Regional Advisory Council region and are also essential for the small scale commercial fisheries that provide income necessary to participate in subsistence hunting, fishing and gathering, and in many years there are not enough chum to provide for subsistence and commercial uses in the Yukon-Kuskokwim Delta and for users throughout the Yukon drainage; and

Whereas, chum salmon are caught as bycatch in the Bering Sea pollock fishery – in 2005 over 700,000 chum were taken as bycatch - and many of these salmon are discarded overboard since it is illegal for the trawl fishery to sell the bycatch and the quality of the bycatch is often not sufficient to deliver to food banks; and

Whereas, although the bycatch has fallen over the last few years, there is little in regulation to prevent extremely high bycatch to re-occur, and the North Pacific Fisheries Management Council (NPFMC) is in the process of developing regulations intended to "minimize salmon bycatch, to the extent practicable, while attempting to allow full harvest of the pollock total allowable catch"; and

Whereas, the last time the NPFMC balanced these contradictory goals was in relation to the bycatch of Chinook salmon in the Bering Sea pollock fishery, and the outcome was extremely disappointing to subsistence users in the Yukon-Kuskokwim Delta in that it continued to allow as many as 60,000 Chinook salmon to be caught annually as bycatch despite drastic subsistence and commercial fishery restriction on the Yukon River and failure to meet Chinook escapement and treaty obligations; and

Whereas, during the NPFMC Chinook salmon bycatch regulatory process the Federal Subsistence Board and the U.S. Fish and Wildlife Service recommended and strongly advocated for a bycatch level that was far below that adopted by the Council because of the Federal Subsistence Board's obligation to ensure healthy salmon populations, subsistence opportunity and a priority for subsistence uses; and

Whereas, the NPFMC is meeting in Nome in June of 2011 and will adopt a preliminary preferred alternative for the regulation of chum bycatch at that time.

Now Therefore Be It Resolved that the Yukon Kuskokwim Delta Subsistence Regional Advisory Council recommends that the Federal Subsistence Board work with affected regional advisory councils, tribes and communities to develop a position from among the alternatives before the NPFMC meet to regulate chum bycatch. The Federal Subsistence Board position should seek to minimizes chum bycatch to the greatest extent practicable and thereby ensure healthy fish populations and subsistence and small scale commercial fisheries. The Federal Subsistence Board should officially convey this position to the NPFMC before or during the NPFMC meeting in June of 2011.

Dated this 24th day of February, 2011 at Mountain Village, Alaska.

_____

Lester Wilde, Chair of the Yukon Kuskokwim Delta Regional Advisory Council

YUKON RIVER DRAINAGE FISHERIES ASSOCIATION

725 Christensen Drive, Suite 3-B, Anchorage, Alaska 99501
Tel: 907-272-3141 Fax: 907-272-3142

Resolution: 2011-02
Salmon Bycatch

WHEREAS the Yukon River Drainage Fisheries Association (YRDFA) works on behalf of subsistence and commercial fishing families within the Alaskan and Canadian Yukon River drainage who depend on wild salmon for subsistence and commercial fisheries; and

WHEREAS chum salmon provide an essential source of food, income and culture for the people of the Yukon River; and

WHEREAS subsistence harvests of fall chum salmon have been restricted in recent years, and no directed commercial harvests of fall chum salmon have taken place on the Yukon River; and

WHEREAS the Bering Sea pollock fishery catches these same salmon as bycatch; catching over 700,000 chum salmon in 2005; and

WHEREAS according to the best available scientific information a portion of the chum salmon taken as bycatch are of Western Alaska origin, including the Yukon River; and

WHEREAS extremely high bycatch numbers have been reached under the current management measures and it is therefore prudent to adopt new management measures;

THEREFORE BE IT RESOLVED that YRDFA requests that the North Pacific Fishery Management Council adopt management measures which will adequately protect Yukon River chum salmon runs at a biologically acceptable level.

COPIES of this resolution will be sent to the North Pacific Fishery Management Council, National Marine Fisheries Service, Alaska Department of Fish and Game Commissioner, Yukon River Panel, U.S. Fish and Wildlife Service, U.S. Department of State, Bering Sea Fishermen's Association, Association of Village Council Presidents, Tanana Chiefs Conference and other Western Alaska salmon groups.

APPROVED unanimously this 16th day of February 2011 by the Board members and delegates of YRDFA assembled at their Twenty-first Annual Meeting held in Mountain Village, Alaska.

Attest: Richard Burnham

Richard Burnham, YRDFA Co-Chair

William Åstrom, YRDFA Co-Chair

Western Interior Alaska Subsistence Regional Advisory Council
c/o U.S. Fish & Wildlife Service
1011 East Tudor Road MS 121
Anchorage, Alaska 99503
Phone: (907) 787-3888, Fax: (907) 786-3898
Toll Free: 1-800-478-1456

Tim Towarak, Chair
Federal Subsistence Board
c/o U.S. & FWS, Office of Subsistence Management
1011 East Tudor Road MS 121
Anchorage, Alaska 99503

Dear Mr. Towarak:

The Western Interior Alaska Subsistence Regional Advisory Council met on March 1-2, 2011 in Galena, Alaska. The Council addressed various subsistence related management issues; among them is the by-catch issue for chum and Chinook salmon in the Bering Sea.

The Council endorsed the enclosed resolution calling for cooperative efforts to develop positions among alternatives presented by the NPFMC to regulate by-catch in the Bering Sea, Resolution 11-01. The Council asks the Board establish a position to minimize by-catch to the greatest extent to ensure healthy fish populations. The Council should officially convey this position before the NPFMC meets in June 2011.

Thank you for the opportunity for this Council to assist the Federal Subsistence Program to meet its charge of protecting subsistence resources and uses of these resources on Federal public lands and waters. We look forward to continuing discussions about the issues and concerns of subsistence users of the Western Interior Region. If you have questions about this resolution, please contact me via Donald Mike, Regional Council Coordinator, with the Office of Subsistence Management at 1-800-478-1456 or (907) 786-3629.

Sincerely,

Jack Reakoff, Chair

cc: Tim Towarak, Chair, Federal Subsistence Board
Peter J. Probasco, Assistant Regional Director, OSM
Western Interior Subsistence RAC members

Western Interior Alaska Subsistence Regional Advisory Council
c/o U.S. Fish & Wildlife Service
1011 East Tudor Road MS 121
Anchorage, Alaska 99503
Phone: (907) 787-3888, Fax: (907) 786-3898
Toll Free: 1-800-478-1456

Resolution 11-01 Regarding Chum Bycatch in the Bering Sea Pollock Fishery

Whereas, chum salmon are a vital subsistence fishery resource for subsistence users in the Western Interior Regional Advisory Committee region and are also essential for the small scale commercial fisheries that provide income necessary to participate in subsistence hunting, fishing and gathering, and in many years there are not enough chum to provide for subsistence and commercial uses for users throughout the Yukon drainage; and

Whereas, chum salmon are caught as bycatch in the Bering Sea pollock fishery—in 2007 over 700,000 chum were taken as bycatch—and many of these salmon are discarded overboard since it is illegal for the trawl fishery to sell the bycatch and the quality of the bycatch is often not sufficient to deliver to food banks; and

Whereas, although the bycatch has fallen over the last few years, there is little in regulation to prevent extremely high bycatch to re-occur, and the North Pacific Fishery Management Council (NPFMC) is in the process of developing regulations intended to "minimize salmon bycatch, to the extent practicable, while attempting to allow full harvest of the pollock total allowable catch"; and

Whereas, the last time the NPFMC balanced these contradictory goals was in relation to the bycatch of Chinook salmon in the Bering Seas Pollock fishery, and the outcome was extremely disappointing to subsistence users in the Yukon region in that it continued to allow as many as 60,000 Chinook salmon to be caught annually as bycatch despite drastic subsistence and commercial fishery restriction on the Yukon River and failure to meet Chinook escapement and treaty obligations; and

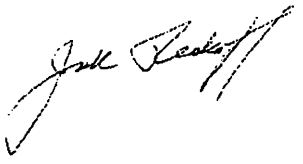
Whereas, during the NPFMC Chinook salmon bycatch regulatory process the Federal Subsistence Board (FSB) and the USF&WS recommended and strongly advocated for a bycatch level that was far below that adopted by the Council because of the FSB's obligation to ensure healthy salmon populations, subsistence opportunity and a priority for subsistence uses; and

Whereas, the NPFMC is meeting in Nome in June of 2011 and will adopt a preliminary preferred alternative for the regulation of chum bycatch at that time.

Now Therefore Be It Resolved that the Western Interior Federal Subsistence Regional Advisory Council recommends that the FSB work with affected regional advisory councils, tribes and communities to develop a position from among the alternatives before the NPFMC to regulate chum bycatch. The FSB position should seek to minimize chum bycatch to the greatest extent practicable and thereby ensure healthy fish populations and subsistence and small scale

commercial fisheries. The FSB should officially convey this position to the NPFMC before or during the NPFMC meeting in June of 2011.

Dated this _2_ day of March, 2011 at Galena, Alaska



Chairman, Western Interior Federal Subsistence Regional Advisory Council

Bristol Bay Alaska Subsistence Regional Advisory Council
c/o U.S. Fish & Wildlife Service
1011 East Tudor Road MS 121
Anchorage, Alaska 99503
Phone: (907) 787-3888, Fax: (907) 786-3898
Toll Free: 1-800-478-1456

Tim Towarak, Chair
Federal Subsistence Board
c/o U.S. & FWS, Office of Subsistence Management
1011 East Tudor Road MS 121
Anchorage, Alaska 99503

Dear Mr. Towarak:

The Bristol Bay Alaska Subsistence Regional Advisory Council met on March 9-10, 2011 in Naknek, Alaska. The Council addressed various subsistence related management issues; among them is the by-catch issue for chum and Chinook salmon in the Bering Sea.

The Council endorsed the enclosed resolution calling for cooperative efforts to develop positions among alternatives presented by the NPFMC to regulate by-catch in the Bering Sea, Resolution 11-01. The Council asks the Board establish a position to minimize by-catch to the greatest extent to ensure healthy fish populations. The Council should officially convey this position before the NPFMC meets in June 2011.

Thank you for the opportunity for this Council to assist the Federal Subsistence Program to meet its charge of protecting subsistence resources and uses of these resources on Federal public lands and waters. We look forward to continuing discussions about the issues and concerns of subsistence users of the Bristol Bay Region. If you have questions about this resolution, please contact me via Donald Mike, Regional Council Coordinator, with the Office of Subsistence Management at 1-800-478-1456 or (907) 786-3629.

Sincerely,

Molly Chythlook, Chair

cc: Federal Subsistence Board
Peter J. Probasco, Assistant Regional Director, OSM
Bristol Bay Subsistence RAC members

Resolution 11-01 of the Bristol Bay Regional Advisory Council
Regarding Chum Bycatch in the Bering Sea Pollock Fishery

Whereas, chum salmon are a vital subsistence fishery resource for subsistence users in the Bristol Bay Advisory Committee region and are also essential for the small scale commercial fisheries that provide income necessary to participate in subsistence hunting, fishing and gathering, and in many years there are not enough chum to provide for subsistence and commercial uses in Bristol Bay and for users throughout the Bristol Bay drainages; and

Whereas, chum salmon are caught as bycatch in the Bering Sea pollock fishery - in 2007 over 700,000 chum were taken as bycatch - and many of these salmon are discarded overboard since it is illegal for the trawl fishery to sell the bycatch and the quality of the bycatch is often not sufficient to deliver to food banks; and

Whereas, although the bycatch has fallen over the last few years, there is little in regulation to prevent extremely high bycatch to re-occur, and the North Pacific Fisheries Management Council (NPFMC) is in the process of developing regulations intended to "minimize salmon bycatch, to the extent practicable, while attempting to allow full harvest of the pollock total allowable catch"; and

Whereas, the last time the NPFMC balanced these contradictory goals was in relation to the bycatch of Chinook salmon in the Bering Sea pollock fishery, and the outcome was extremely disappointing to subsistence users in Bristol Bay in that it continued to allow as many as 60,000 Chinook salmon to be caught annually as bycatch despite drastic subsistence and commercial fishery restriction on the Yukon River and failure to meet Chinook escapement and treaty obligations; and

Whereas, during the NPFMC Chinook salmon bycatch regulatory process the Federal Subsistence Board and the USF&WS recommended and strongly advocated for a bycatch level that was far below that adopted by the Council because of the FSB's obligation to ensure healthy salmon populations, subsistence opportunity and a priority for subsistence uses; and

Whereas, the NPFMC is meeting in Nome in June of 2011 and will adopt a preliminary preferred alternative for the regulation of chum bycatch at that time.

Now Therefore Be It Resolved that the Bristol Bay Regional Advisory Council recommends that the FSB work with affected regional advisory councils, tribes and communities to develop a position from among the alternatives before the NPFMC to regulate chum bycatch. The FSB position should seek to minimize chum bycatch to the greatest extent practicable and thereby ensure healthy fish populations and subsistence and small scale commercial fisheries. The FSB should officially convey this position to the NPFMC before or during the NPFMC meeting in June of 2011.

Dated this 10 day of March, 2011 at Naknek, Alaska.

Molly Chythlook Chair, Bristol Bay Regional Advisory Council

5.1.4 Migration corridors

BASIS surveys have established that the distribution and migration pathways of western Alaska juvenile salmon vary by species. Farley et al. (2006; Figure 5-5) reported on the distribution and movement patterns of main species in this region. The Yukon River salmon stocks are distributed along the western Alaska coast from the Yukon River to latitude 60°N. Kuskokwim River salmon stocks are generally distributed south of latitude 60°N from the Kuskokwim River to longitude 175°W. Bristol Bay stocks are generally distributed within the middle domain between the Alaska Peninsula and latitude 60°N and from Bristol Bay to longitude 175°W. The seaward migration from natal freshwater river systems is south and east away from the Yukon River for Yukon River chum salmon, to the east and south away from the Kuskokwim River for Kuskokwim River chum, Chinook, and coho salmon, and east away from Bristol Bay river systems for Bristol Bay sockeye salmon stocks.

Previous reports have studied seasonal migration patterns of Asian and North American chum salmon in the Bering Sea (Fredin et al. 1977). These show distinct differences in the Bering Sea based upon immature and maturing fish in migratory patterns between North American and Asian origin stocks (Figure 5-6), however data used to estimate these migration trends are dated (1950-1960s; Myers et al. 2006).

Migration routes of chum salmon from Japanese hatcheries were estimated based on genetic stock identification over several years (Figure 5-7). Urawa (2000, 2003) estimated that chum salmon from Japanese hatcheries begin to migrate into the Bering Sea in their second summer/fall, migrating south and east late in the fall to the Gulf of Alaska to spend their second winter. In subsequent years they migrate between feeding grounds in the Bering Sea and Gulf of Alaska in summer and fall prior to returning as maturing fish to Japan via the western Bering Sea (Urawa 2000; 2003).

High seas tagging experiments from 1954-2006 provide insights on the distribution, biology and ecology of immature and maturing AYK origin chum salmon migrating in the North Pacific Ocean and Bering Sea (Myers et al. 2009). In particular, their compilation shows that immature AYK chum salmon were primarily in the GOA with distribution shifting from spring to summer to west or northwest (Figure 5-8; Myers et al. 2009). They suggest that maturing AYK chum are distributed in the Northeast Pacific (GOA and south) in April and shift westward into the GOA by May and then the Bering Sea beginning in June (Myers et al. 2009). By July they indicate that maturing Yukon summer chum have already returned to coastal areas and spawning streams while Yukon Fall chum at that time were distributed across a broad front in the western GOA, Aleutians, and eastern and western Bering Sea (Myers et al. 2009).

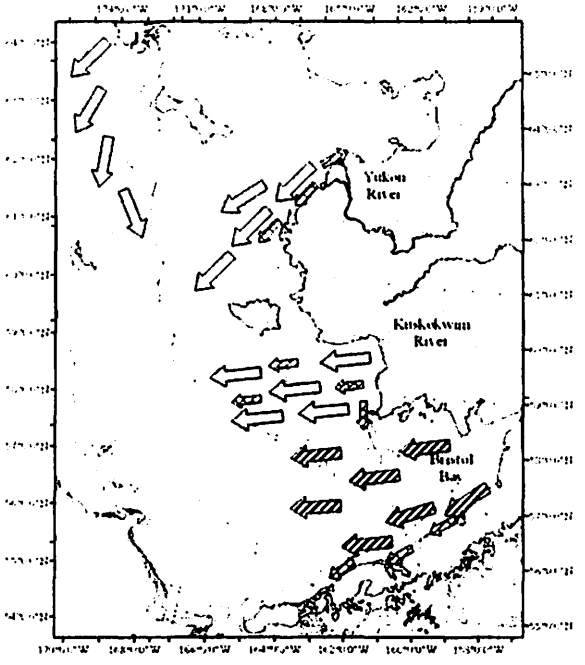


Figure 5-5. Seaward migration pathways for juvenile chum (solid arrow), sockeye (slashed line arrow), coho, and Chinook (boxed line arrow) salmon along the eastern Bering Sea shelf, August through October. *Source: Farley et al 2007.*

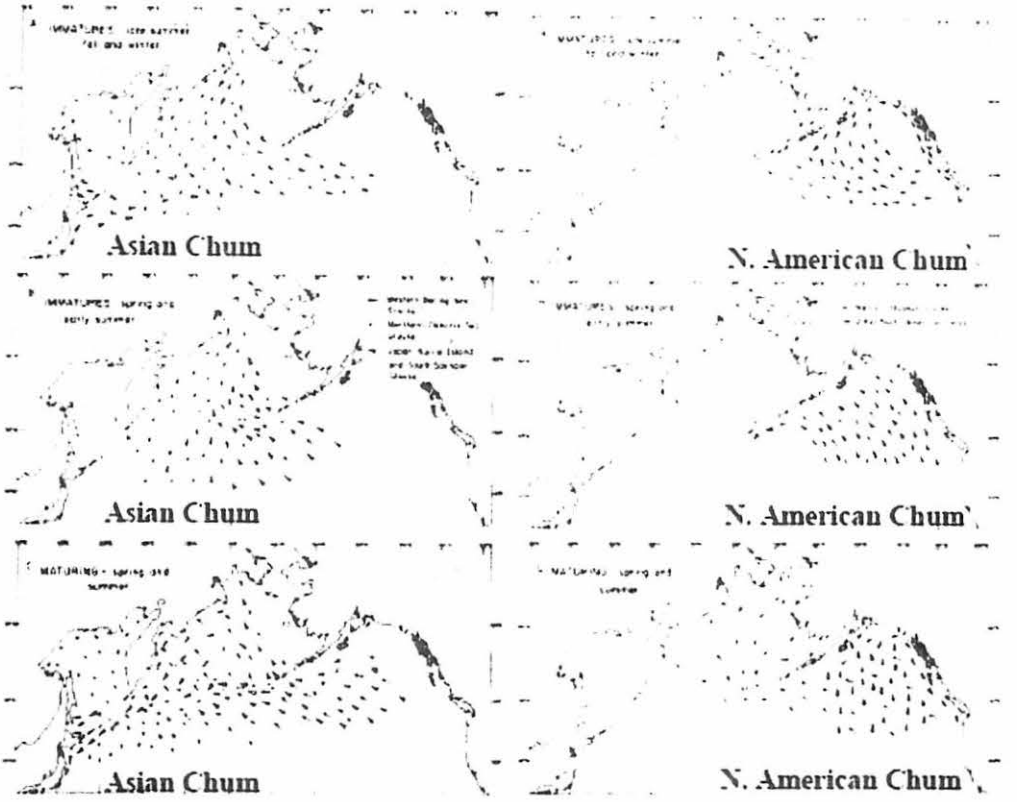


Figure 5-6. Models of seasonal ocean migration patterns of Asian and North American chum salmon. Arrows indicate direction of movement of immatures in later summer, fall and winter (top panels), immatures in spring and early summer (center panels), and maturing fish in spring and summer (bottom panels). Source: Fredin et al 1977.

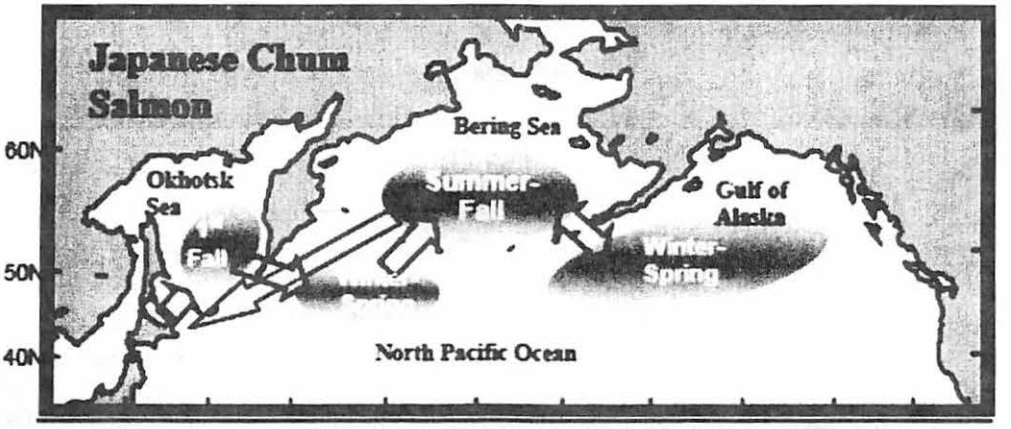


Figure 5-7. Model for Japanese hatchery chum salmon as estimated by genetic stock identification (Urawa 2000; 2003).

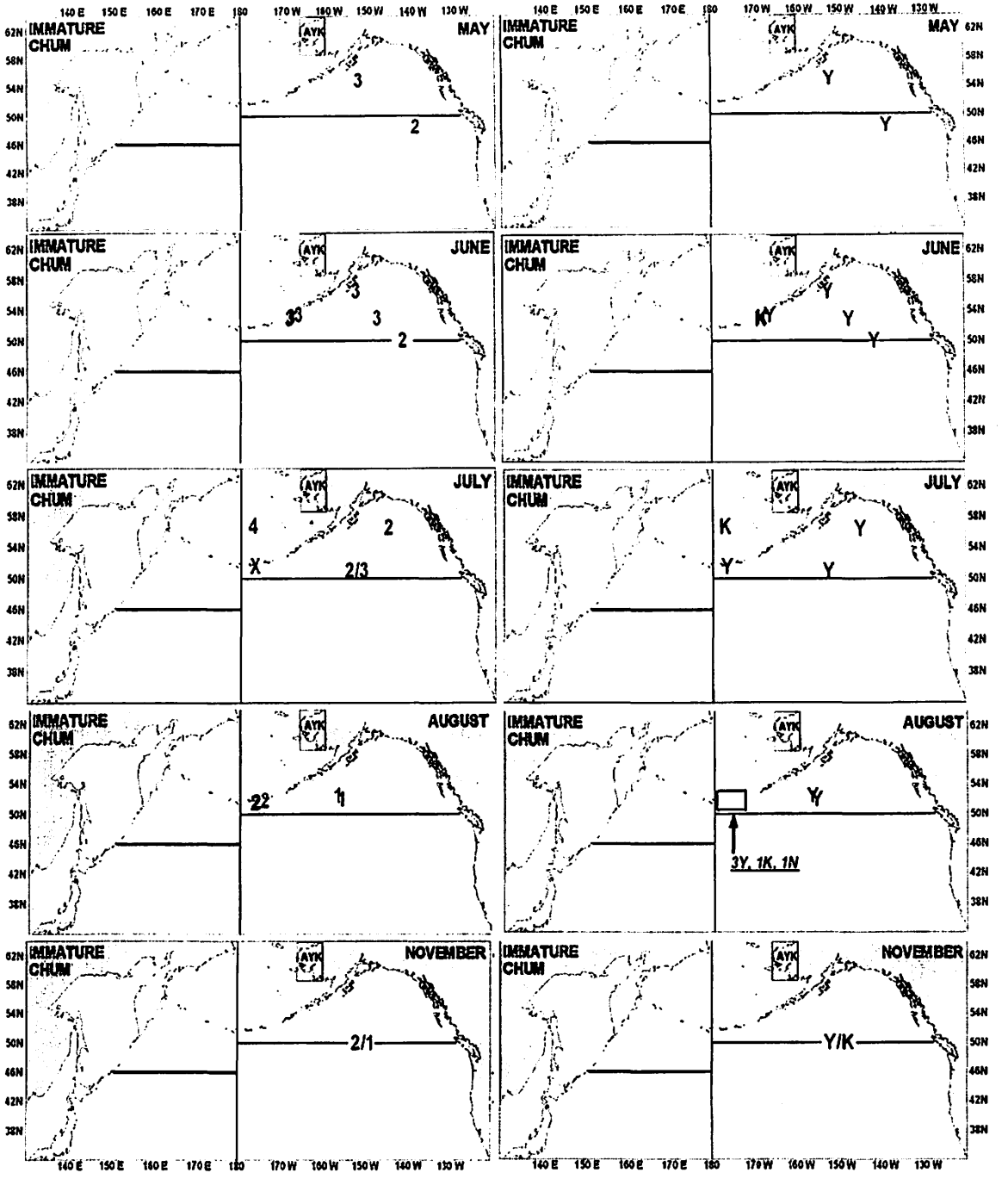


Figure 5-8. The known ocean distribution of immature Norton Sound (N), Yukon (Y), and Kuskokwim (K) chum salmon by month, ocean age-group (left panels), and stock (right panels), as indicated by high seas tag experiments 1954–2006. Numbers in left panels are ocean age at release; X = ocean age unknown; forward slash between two numbers indicates recoveries from two age groups released at or near the same ocean location. In August (right panel), labeled arrow (underline, italics) pointing at multiple recoveries (inside box) shows number of recoveries per stock. Number of recoveries by month of release: May = 2 fsh, June = 6, July = 5, August = 7, November = 2. Reported dates of recovery of adult fsh in the AYK region ranged from June 16 to September 24. **From Myers et al. (2009).**

5.1.5 Carrying capacity and run size overview for North Pacific

Hatchery releases of chum salmon are listed in section 5.1.2. Chum salmon hatchery releases are the largest of all Pacific salmon species (Eggers 2009). Hatchery stocks of chum and pink salmon have been estimated to comprise 38% of the recent biomass of all salmon species in the North Pacific (Eggers 2010). Because of this, considerable research has focused on the carrying capacity of the North Pacific for salmon species and the impact of increased hatchery stocks on the growth and survival of wild salmon stocks (e.g., Kaeriyama et al. 2009).

Estimates of abundance trends vary but the most abundant salmon species caught in the North Pacific is pink salmon, followed by sockeye and chum salmon. One estimate of the relative abundance (1952-2005) indicated that pink salmon comprise on average 70% of the total abundance of the three while sockeye comprise 17% and chum 13% (Ruggerone et al. 2010). Catches have steadily increased in coastal Japan, Russia and central and southeast Alaska while catches in western Alaska have been decreasing in general after reaching a high in the mid-1990s (Kaeriyama et al. 2009). In British Columbia and the western United States (WA, OR, and CA) catches have been decreasing since the mid-1980s (Eggers 2004).

Ruggerone et al. estimated wild and hatchery salmon abundance across the Pacific Rim from 1990-2005. For chum salmon, wild abundance was highest in mainland Russia (32% of North Pacific total) followed by Kamchatka, western Alaska, Southeast Alaska, central Alaska and southern BC in roughly equal proportions (ranging from 10-16% of North Pacific total; Figure 5-9; Ruggerone et al. 2009).

Pacific-wide, hatchery releases of chum salmon have exceeded wild production since the mid-1980s (Figure 5-10; Ruggerone et al. 2009). Their study notes that Japan produced more than 83% of hatchery chum. Within Alaska, wild salmon runs north of southeast Alaska declined over this time period, especially in Prince William Sound where hatchery-origin chum now represent approximately 73% of total chum salmon abundance (Ruggerone et al. 2009). They raise the question whether large scale hatchery releases have influenced the growth and survival of wild chum salmon similar to arguments on the impact of pink salmon hatcheries in Prince William Sound (Hilborn and Eggers 2000, 2001; Werthheimer et al. 2001, 2004a, 2004b).

Wild chum salmon stocks across the North Pacific have had dramatic declines including those from Japan, South Korea, the Amur River (Russia and China), western Alaska, the Columbia River, and the summer-run chum salmon in Hood Canal, WA (Ruggerone et al 2009). This raises many questions about the potential density-dependence and possibility for chum salmon (and salmon species in general) competing in the North Pacific for a limited "common pool" of food resources in international waters (Ruggerone et al 2009). Current efforts are underway to estimate the overall carrying capacity of the North Pacific and to estimate the dependence of chum and other salmon species on prey and prey abundance and prey variability due to climate changes.

Kaeriyama et al (2009) estimated the run size and carrying capacity of Pacific salmon species in relation to long-term climate change and interactions between wild and hatchery salmon. Their work builds upon previous investigations by Kaeriyama and Edpalina (2004). They indicate that the combined catch of sockeye, chum and pink salmon comprise over 90% of the total catch of Pacific salmon, and that temporal changes has a 30 or 40 year periodicity corresponding to long-term climate change indications such as the Pacific Decal Oscillation (PDO) and regime shifts (Kaeriyama et al. 2009). Productions trends were similar for both North American and Asian populations. While catch and run sizes for Pacific Rim populations of chum salmon in general have been increasing since the 1970s, wild chum salmon populations have been decreasing, while hatchery chum salmon have increased substantively in Japan and southeast Alaska, comprising more than 80% of catch and 40% of run size (Kaeriyama et al. 2009).

Estimated hatchery releases from 1990-2005 have apparently comprised 62% of chum salmon total abundance (wild and hatchery for pink, chum, and sockeye which combined comprise about 93% of oceanic salmon abundance; Ruggerone et al 2010).

Previous studies on Japanese chum salmon have shown that increases in run size may lead to a reduction in body size and an increase in average age at maturity that suggest a population density-dependent effect (Kaeriyama 1998). Sockeye salmon have also shown indications of density-dependent growth where greater marine growth contributed to higher survival rates and higher abundances (Ruggerone et al. 2007). Density-dependent growth from resulting from increases in hatchery salmon may affect wild chum populations (Kaeriyama et al. 2009). Significant correlations were observed between the estimated carrying capacity of three salmon species (sockeye, chum and pink) and the Aleutian Low Pressure Index (ALPI) indicating that these population trends may be synchronized with long-term trends in climate change (Kaeriyama et al. 2009). It has been suggested that carrying capacities for salmon have shifted downwards since the 1998/99 regime shift (Kaeriyama et al. 2009).

More recently a spatially explicit bioenergetics model was used to predict juvenile chum salmon growth rate potential (GRP) in the eastern Bering Sea during years of cold and warm sea surface temperatures (SST) as a means to understand the link between juvenile chum salmon prey demand and supply. Cold spring SSTs were generally correlated with higher juvenile growth rates and lower annual average GRP (Farley and Moss 2009). This may be related to cold spring temperature effects on the productivity of prey (Hunt and Stabeno 2002). Juvenile chum salmon were larger during years with SSTs in the northern region but not in the southern region (Farley and Moss 2009). Stock specific results for Kuskokwim and Yukon fall abundance in relation to SST suggest the possibility of increased size-selected predation on juvenile Kuskokwim chum salmon in cold years (Farley and Moss, 2009). This is hypothesized to be less of a factor on Yukon River chum salmon (Farley and Moss 2009).

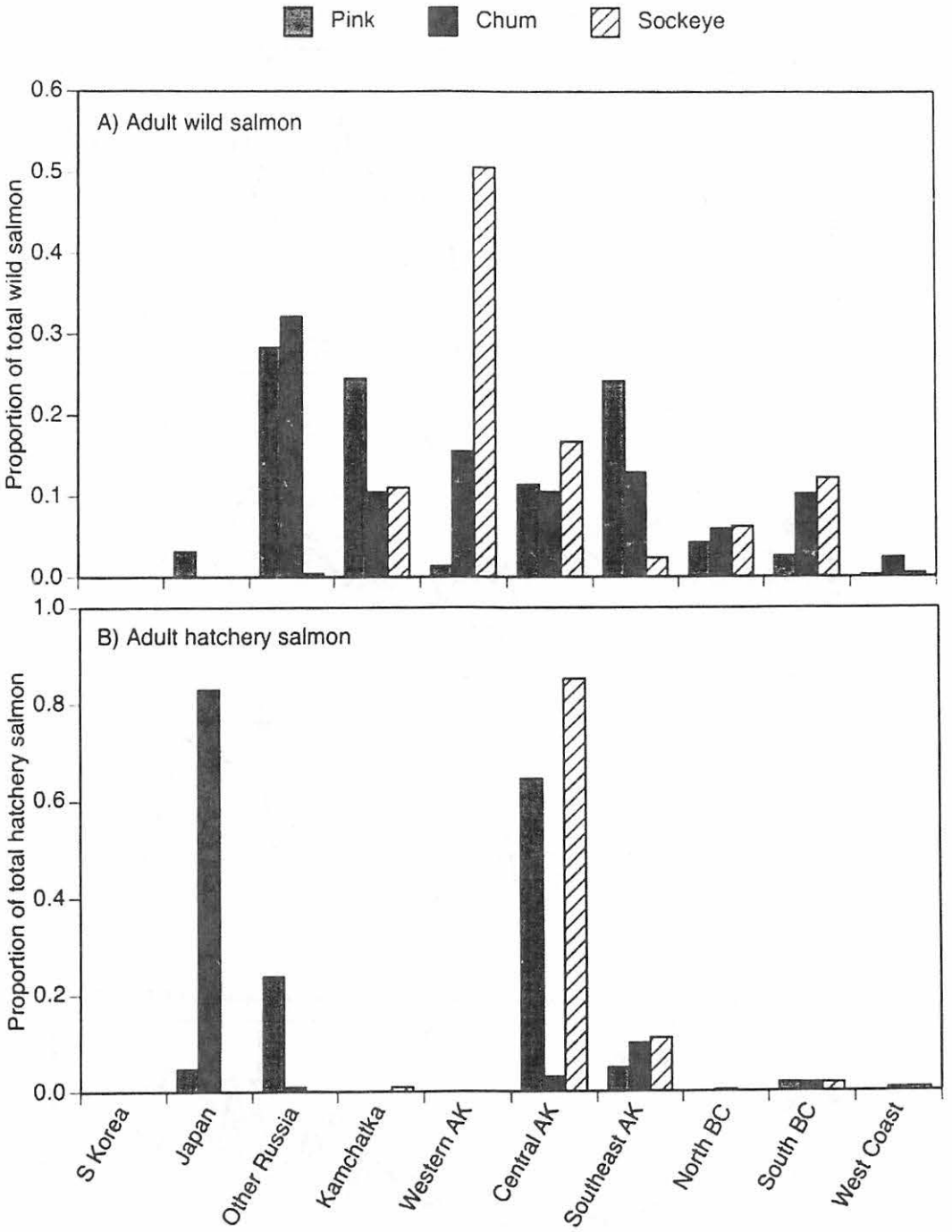


Figure 5-9. Relative contribution from each region to Pacific Rim production of adult (A) and hatchery (B) salmon during 1990-2005 (from Ruggerone et al. 2010)

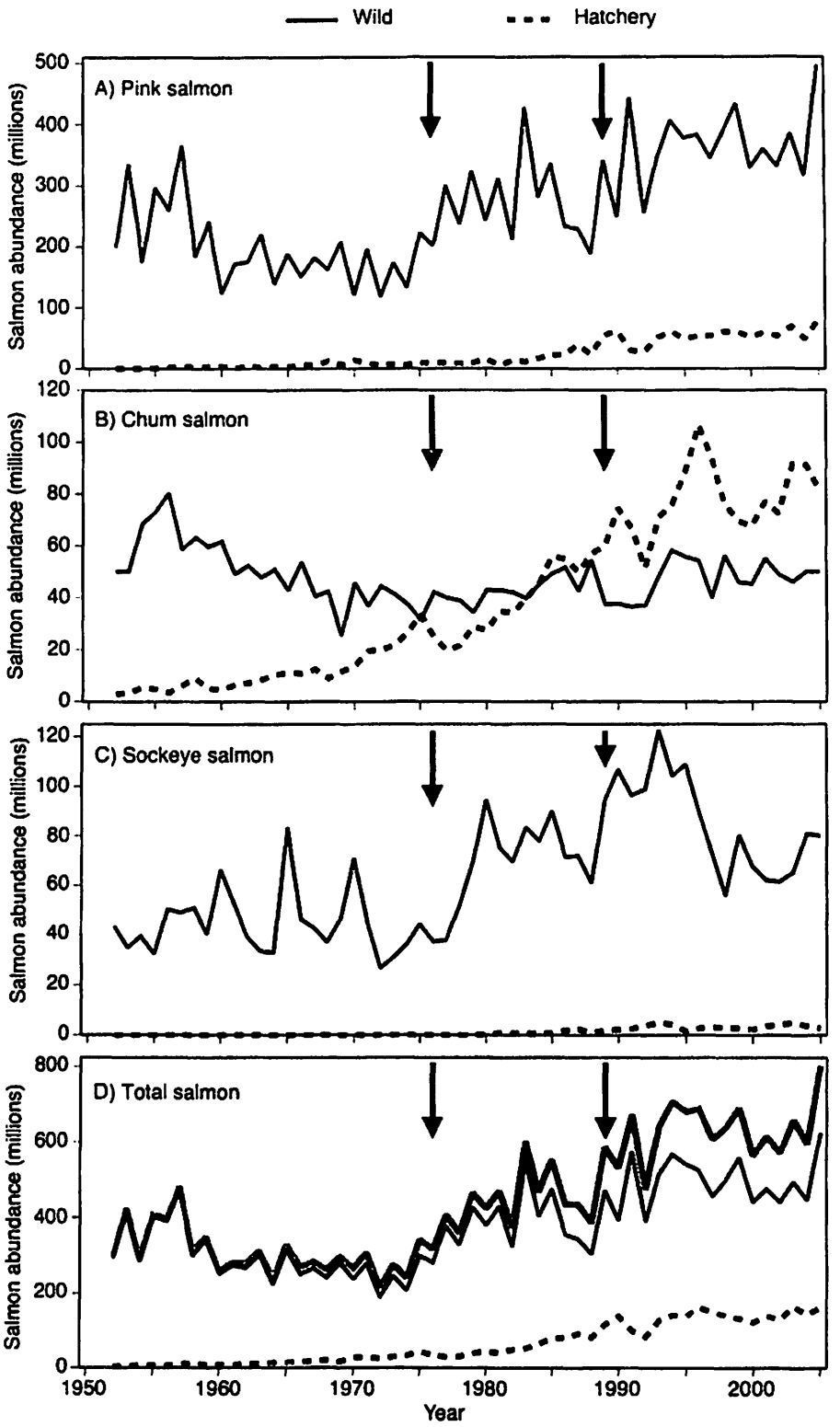


Figure 5-10. Annual adult abundance (catch plus number of spawners) of wild (solid lines) and hatchery (dashed lines) (A) pink salmon, (B) chum salmon and (c) sockeye salmon and (D) totals across species from 1952 to 2005 (from Ruggerone et al 2009).

Additional references:

Farley, E.V., Jr., and J.H. Moss. 2009. Growth rate potential of juvenile chum salmon i=on the eastern Bering Sea shelf: an assessment of salmon carrying capacity. N. Pac. Anadr. Fish Comm Bull. 5: 265-277

Kaeriyama, M., H. Seo, and H. Kudo. 2009. Trends in Run Size and Carrying Capacity of Pacific Salmon in the North Pacific Ocean. N. Pac. Anadr. Fish Comm. Bull. 5: 293-302.

Kaeriyama, M. 2004. Evaluation of Carrying Capacity of Pacific Salmon in the North Pacific Ocean for Ecosystem-Based Sustainable Conservation Management. N. Pac. Anadr. Fish Comm Technical Report. 5: 1-5.

Myers, K.T., R.V. Walker, N.D. Davis, J.L. Armstrong and M. Kaeriyama. 2009. High Seas Distribution, Biology, and Ecology of Arctic-Yukon-Kuskokwim Salmon: Diet Information from High Seas Tagging Experiments, 1954-2006. American Fisheries Society Symposium 70: 201-239.

Ruggerone, G. T., R. M. Peterman, B. Dorner and K. W. Myers. 2010. Magnitude and Trends in Abundance of Hatchery and Wild Pink Salmon, Chum Salmon and Sockeye Salmon in the North Pacific Ocean. *Marine and Coastal Fisheries: Dynamics, Management, and Ecosystem Science* 2: 306-328.

Appendix: Development of chum salmon bycatch alternatives: Area closures

The draft alternatives for the chum salmon bycatch measures include two different alternative time/area triggered closure configurations. The first was developed by staff in 2008 with iterative review and modification by the Council while the second results from work following the December 2009 Council meeting per request for staff to develop new candidate closures. This was developed further and finalized with complete data through 2010 during the February 2011 Council meeting. The purpose of this appendix is to recap and document the development of the monthly closures under Alternative 3.

Identifying candidate closures

Candidate areas were selected from observer data compiled from 1991-2010 after previous analyses had examined shorter time series through 2007. State statistical areas were selected as the smallest candidate closures. Initially all statistical areas were considered over all years, understanding that only a subset of areas would qualify for likely candidates. The first step to reducing the candidate areas was to rank them and examine the curvature of the cumulative proportion. This indicates that the top 20 areas had over 80% of the chum bycatch (Fig. 1). Based on the shorter time series the locales of these were mainly concentrated in the south east region (Fig. 2). The variability between weeks and areas highlighted difficulties in finding consistent closure areas (e.g., Fig. 3). In earlier presentations, additional factors such as choosing areas that were consistently high bycatch regions and also areas that represented relatively low proportions of pollock catch. This led to a new approach to ranking areas (overall) based on the trade-off between the differences in proportion of chum relative to pollock for each area (Fig. 4). Ranking regions this way achieved reduced the proportion of areas where pollock are by nearly 20% while only reducing the effectiveness of the chum bycatch by about 7%. Using this approach the final set for closure scenarios were identified (Fig. 5; Table 1).

Timing of closures and trigger caps for alternatives

In February 2009 the Council included the following language referring to delineating specific dates for closures under

Component 6: Timing Option – Dates of Area Closure.

> New closure dates [to be developed from staff analysis of seasonal proportions of pollock and chum salmon by period across additional ranges of years]

To address these a set of date ranges and rates were presented to the Council in February 2010 with fine-scale temporal closures (1 to 3 weeks). A similar approach was finalized at the June 2010 Council meeting but the closure periods were taken to be only by month and that for each month, a series of closure protection measures (i.e., 40%, 50%, and 60%) based on historical data were required. The cumulative proportions were based on the average over years 2003-2010 (Fig. 6).

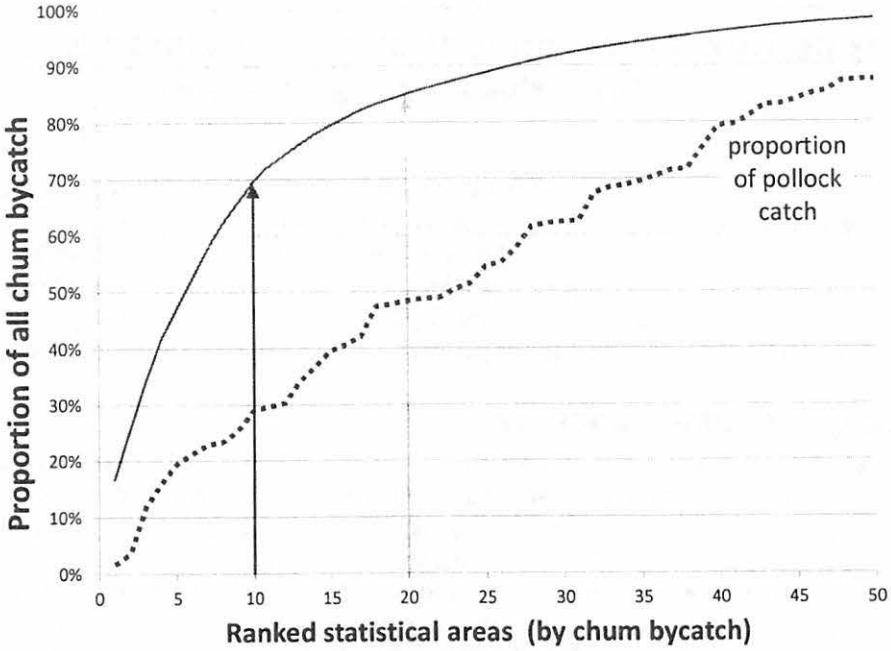


Figure 1. Proportion of ADFG statistical areas ranked by total chum bycatch (solid line) compared to the proportion of pollock catch.

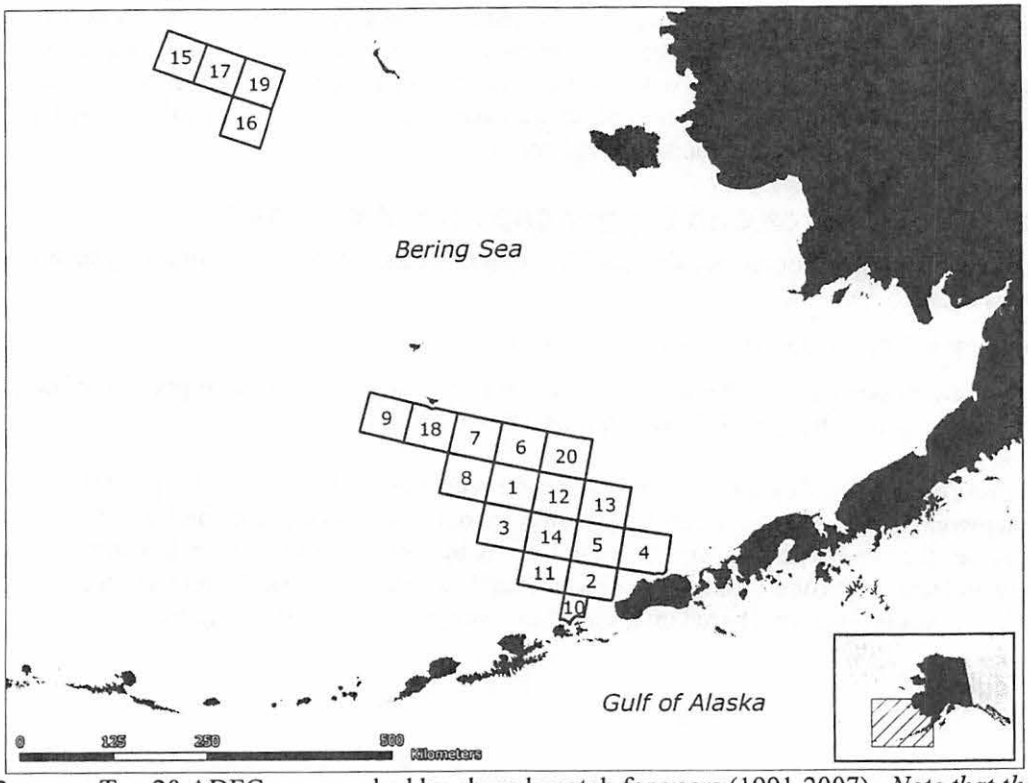


Figure 2. Top 20 ADFG areas ranked by chum bycatch for years (1991-2007). *Note that these closure areas were modified based on subsequent re-evaluations.*

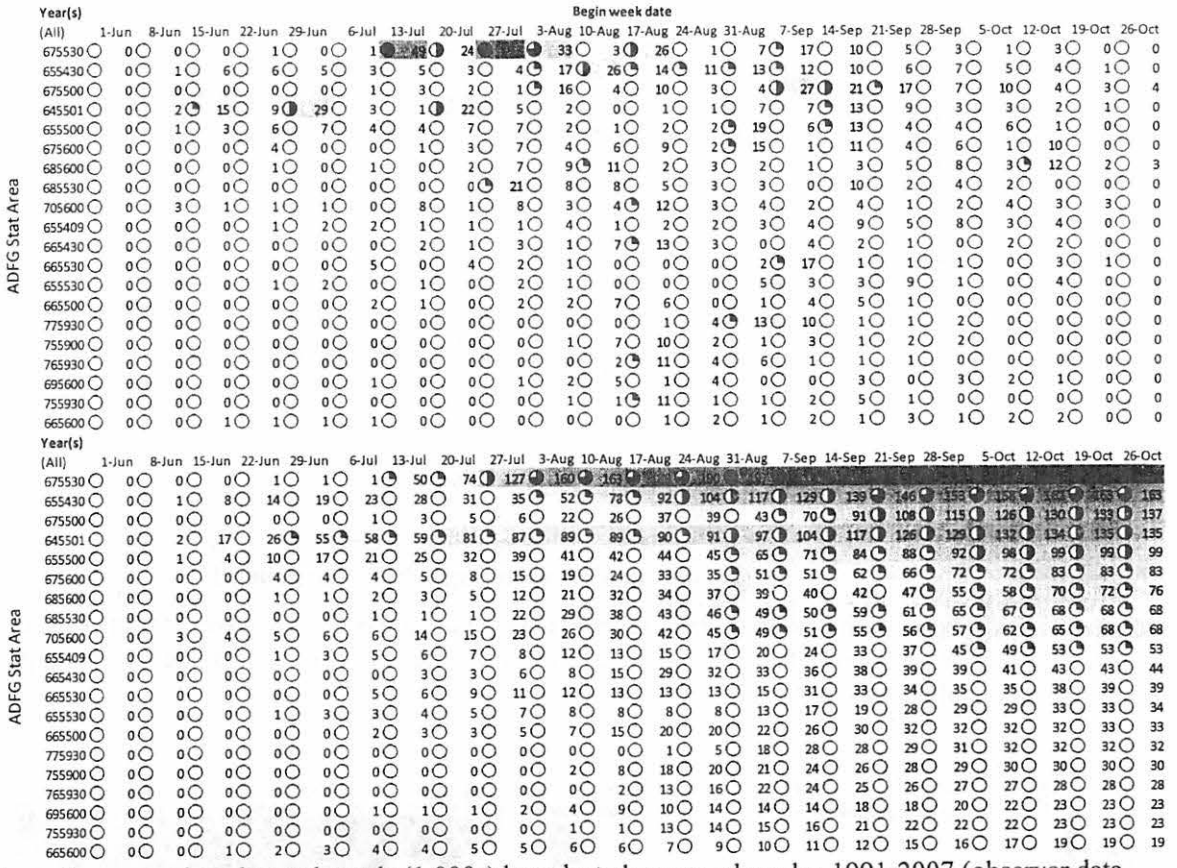


Figure 3. Chum bycatch totals (1,000s) by selected areas and weeks, 1991-2007 (observer data only). The top panel shows weekly totals, the bottom panel shows cumulative totals from June 1st. Shading (and circles) indicate relative intensity of bycatch. Open circles represent lower 5th, solid circles upper 5th, half-filled are middle 5th etc.

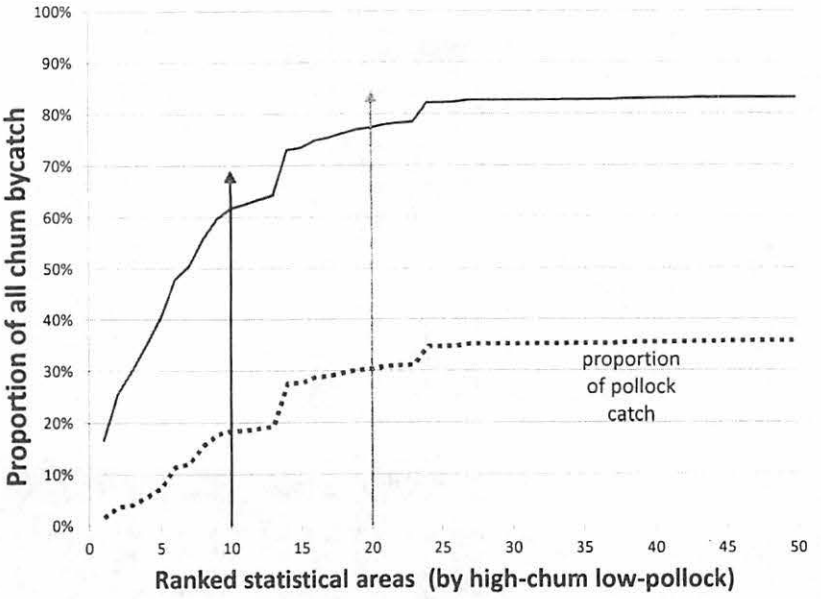


Figure 4. Proportion of ADFG statistical areas ranked by proportional differences between chum and pollock catch showing the total chum bycatch (solid line) compared to the proportion of pollock catch.

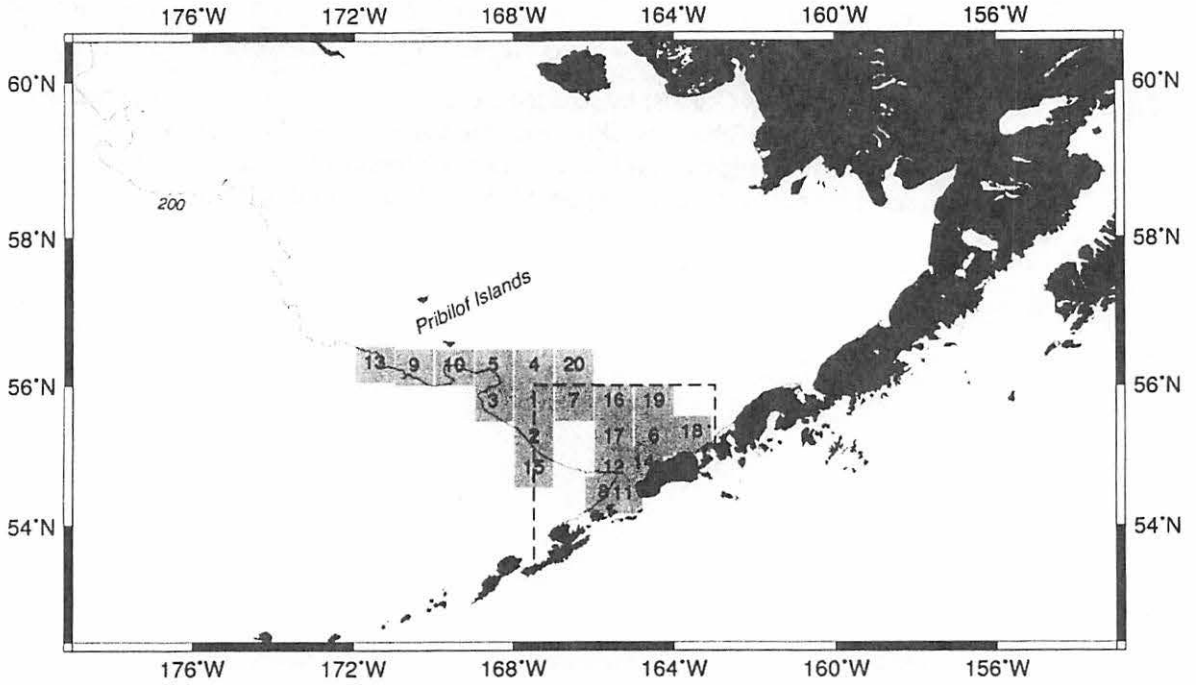
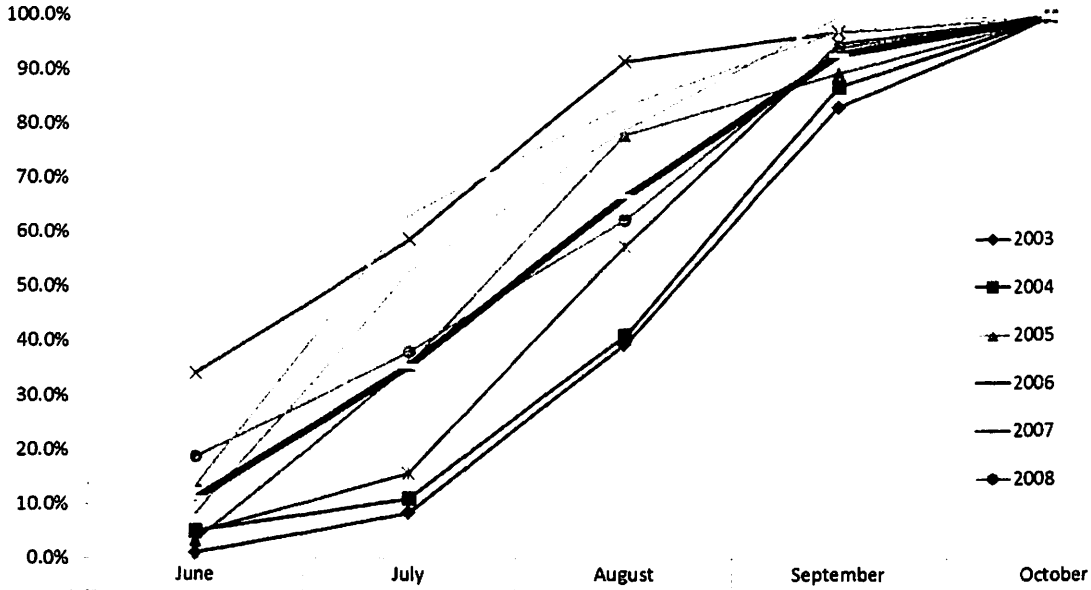


Figure 5. ADFG statistical areas selected based on by proportional differences between chum and pollock catch showing the total chum bycatch (solid line) compared to the proportion of pollock catch. Numbers represent rankings based on all available data.



	June	July	August	September	October
2003	1.0%	8.4%	39.3%	83.1%	100.0%
2004	5.1%	11.1%	41.0%	86.9%	100.0%
2005	3.3%	35.5%	78.0%	89.4%	100.0%
2006	34.0%	58.6%	91.6%	97.1%	100.0%
2007	4.7%	15.7%	57.5%	94.9%	100.0%
2008	18.7%	38.0%	62.3%	94.2%	100.0%
2009	8.3%	52.7%	79.0%	99.9%	100.0%
2010	13.3%	63.2%	83.6%	97.2%	100.0%
Proportion	11.1%	35.4%	66.5%	92.8%	100.0%

Figure 6. Seasonal patterns and interannual variability in the proportions of chum salmon bycatch by month, 2003-2010.

Table 1. Cumulative chum salmon bycatch by statistical area and final ranking.

Ranking	Stat Area	Cumulative percent	Ranking	Stat Area	Cumulative percent
1	675530	16%	11	655410	62%
2	675500	25%	12	655430	71%
3	685530	30%	13	715600	72%
4	675600	35%	14	645434	72%
5	685600	40%	15	675430	73%
6	645501	47%	16	655530	74%
7	665530	50%	17	655500	78%
8	655409	55%	18	635504	79%
9	705600	59%	19	645530	79%
10	695600	61%	20	665600	80%

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

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

Table 3-57 and Table 3-58 summarize information on the importance of chum salmon revenues for western Alaskan permit holders. Table 3-57 provides information on relative importance, and Table 3-58 provides information on absolute importance. Table 3-57 shows the percentage of the gross revenues earned by State of Alaska limited entry permit holders who live in a particular western or interior Alaska census district from salmon limited entry fisheries in western Alaska. Table 3-58 shows the average revenues per person fishing received by these permit holders.

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

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

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

	Aleutians east	Aleutians west	Bethel	Bristol Bay	Dillingham	Lake and Peninsula	Nome	Northwest	Wade Hampton	Yukon-Koyukuk
1991	$8,140	$2,269	$1,212	$432	$1,114	$868	$1,076	$4,045	$1,911	$1,144
1992	$8,822	$5,122	$1,228	$258	$1,215	$1,029	$1,120	$4,130	$920	$784
1993	$6,349	$1,885	$394	$107	$1,103	$337	$607	$1,964	$342	$1,449
1994	$12,510	$1,085	$697	$165	$1,026	$587	$230	$2,256	$123	$468
1995	$10,674	$2,558	$1,157	$166	$1,151	$932	$475	$3,321	$718	$233
1996	$1,932	$330	$320	$88	$515	$89	$70	$1,039	$269	$658
1997	$2,313	$458	$102	$26	$146	$255	$330	$2,483	$227	$1,615
1998	$2,693	$720	$343	$43	$169	$274	$115	$1,488	$41	$699
1999	$2,967	$683	$102	$95	$252	$202	$152	$2,938	$106	$456
2000	$4,375	$1,050	$70	$41	$206	$140	$124	$3,762	$14	$680
2001	$5,318	$2,300	$79	$62	$593	$903	$329	$4,525		$7,851
2002	$3,810	$964	$88	$32	$296	$465	$21	$1,558	$8	$1,135
2003	$3,459	$55	$88	$71	$333	$270	$90	$3,839	$16	$8
2004	$3,851	$139	$105	$36	$381	$39	$186	$1,358	$19	$471
2005	$3,516	$405	$119	$173	$704	$106	$185	$2,790	$647	$145
2006	$9,321	$798	$148	$317	$948	$540	$174	$5,291	$523	$334
2007	$5,750	$1,037	$127	$324	$906	$926	$467	$4,976	$668	$3,201
2008	$9,096	$9,352	$247	$210	$1,114	$3,027	$594	$7,720	$1,822	$3,581
2009	$15,511	$7,809	$465	$254	$1,005	$2,897	$879	$5,876	$1,628	$2,848
2010	$11,836	$10,180	$762	$391	$910	$6,913	$4,135	$12,654	$1,884	$2,575

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

- Northwest: chum salmon revenues have historically provided the vast majority of all commercial salmon revenues in this census area. In 2010, 92 percent of all commercial salmon revenue earned in the Northwest Alaska census area was derived from chum salmon. The 2010 average revenue was $12, 654, which was more than double the revenue from 2009 when 80 percent of all commercial salmon revenue was earned from chum salmon.

- Wade Hampton: Although not historically a consistent source of revenue in this census area, chum salmon harvests in the most recent three years have provided the majority of revenue and as much as 87 percent of total commercial salmon revenue, in 2009. The average commercial chum salmon revenue earned by limited entry permit holders from this census area has been less than $2,000 in the past three years and considerably less than that historically.

- Aleutians East: chum salmon revenues accounted for between 3 percent and 20 percent of the revenues earned by permit holders in the Aleutians East census district over the period 1991-2010, with 2010 recording the period high of 20 percent. Average revenues were as low as $1,932, but as high as $15,511(2009).

- Yukon-Koyukuk: chum salmon revenues accounted for between 0 percent and 31percent of the revenues earned by permit holders in the Yukon-Koyukuk census district over the period 1991-2010, with 2000 being the year with the highest percentage. Average revenues were as low as $8 but as high as $7,851 (2000).

- Nome: chum salmon revenues accounted for between 2 percent and 41 percent of the revenues earned by persons operating in the Nome census district. Average revenues ranged from $70 to $4,135, with the largest percentage and average revenue occurring in 2010.

- Aleutians West: chum salmon revenues accounted for between 0 percent and 13 percent of the revenues earned by persons operating in the Aleutians West census district. Average revenues ranged from $55 to $10,180, with the largest average revenue occurring in 2010.

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

- Bethel: chum salmon revenues accounted for between 1 percent and 16 percent of the revenues earned by persons operating in the Bethel census district. Average revenues ranged from $70 to $1,228, with the largest average revenue occurring in 1992. In recent years, chum salmon revenue, as a percent of total revenue, has increased from as low as 2 percent to 9 percent in 2010. The average revenue of $762, in 2010, was the largest since 1995.

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

Alaska Peninsula/Area M

This section is adapted from Fishery Management Report 10-21, 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 (Hartill and Keyes, 2010)

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, *in prep*).

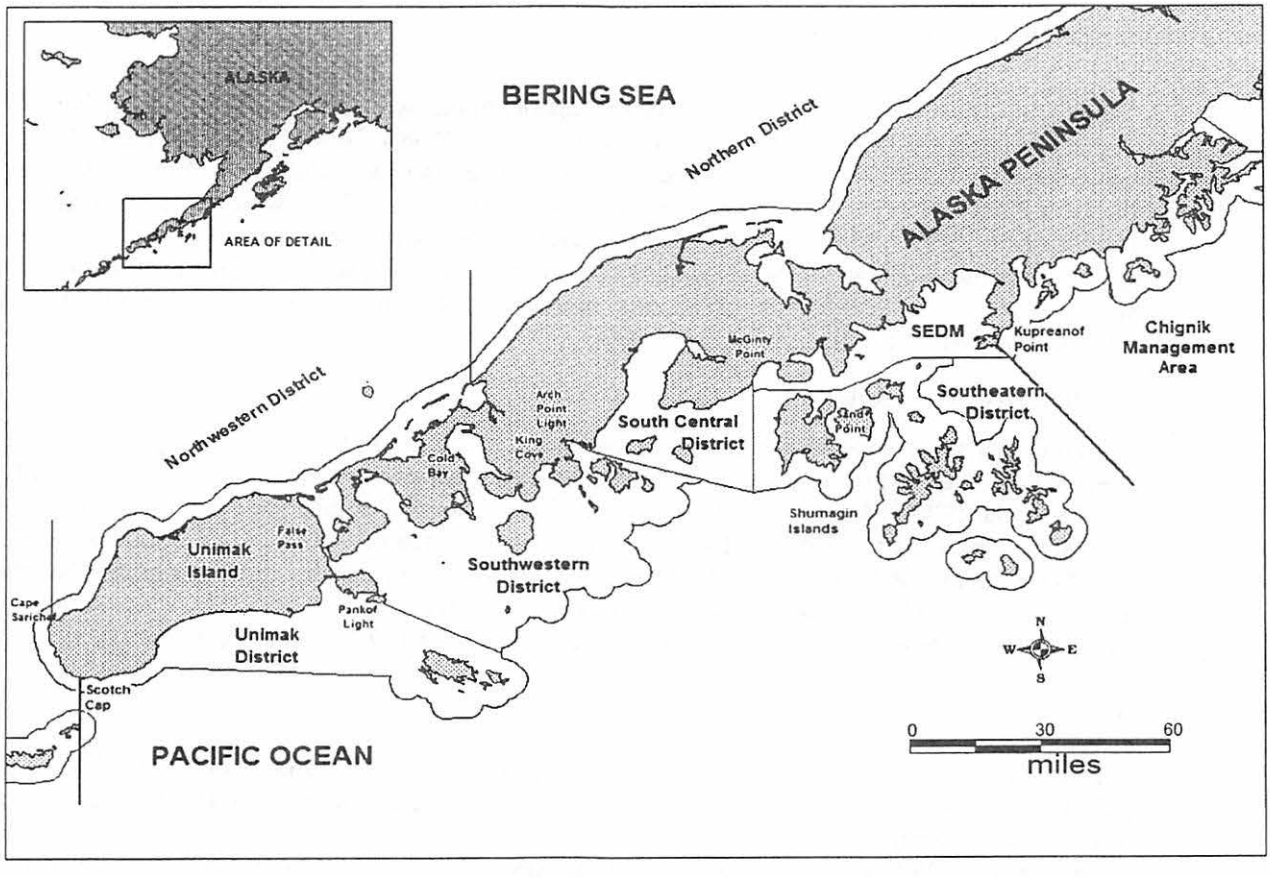


Figure 3-2-6.1 Alaska Peninsula area

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 .

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 Alaska Peninsula 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 method for salmon in the Aleutian Islands Management Area (5 AAC 12.330). In the Atka-Amlia Area, salmon may be taken by purse seine and set gillnet only (5 AAC 11.333).

Commercial Chum Fishery Situation and Outlook

North Alaska Peninsula

Table 3-2-6.1 provides chum salmon harvests by district of the Alaska Peninsula area from 1979-2009. The 2009 North Alaska Peninsula chum salmon harvest of 105,994 fish was above the 1999-2008 average harvest of 95,572 fish. In the Northern District, the chum salmon harvest of 51,825 fish was just above the 1999-2008 average of 48,594 fish. The remaining 54,169 chum salmon were harvested in the Northwestern District, which was also above the previous ten-year average of 46,978 fish. In 2009, the chum salmon harvested in the Northern District were caught incidentally during sockeye salmon fisheries, while in the Northwestern District the majority of the chum salmon harvest was from directed fisheries (Hartill and Murphy 2010).

.South Alaska Peninsula

The 2009 South Alaska Peninsula chum salmon harvest of 1,680,719 fish was well above the 1999-2008 average harvest of 844,017 fish. In the Southeastern District, the chum salmon harvest of 866,938 fish was above the 1999-2008 average of 409,176 fish. For the South Central District a total of 77,233 chum salmon were harvested which was slightly above the previous ten year average of 68,616 fish (Table 5-24). Fishermen in the Southwest District harvested 605,457 chum salmon which was higher than the 1999-2008 average harvest of 257,085 fish. A total of 131,091 chum salmon were harvest in the Unimak District, which was also above the previous ten-year average of 109,140 fish.(Poetter et al).

Alaska Peninsula Area

In 2009, 54 of the 119 available seine, 143 of 162 available drift gillnet, and 91 of 113 available set gillnet Area M permits were fished. Overall effort by the different gear groups was similar to the most recent ten year average. In 2009 the Alaska Peninsula Area commercial harvest (excluding test fish harvests) was 9,036 Chinook salmon, 4,150,233 sockeye salmon, 315,791 coho salmon, 9,800,981 pink salmon, and 1,788,357 chum salmon for a total of 16,064,398 fish. For comparison, the 2009 harvest was higher than the 1998-2007 average commercial salmon harvest, for all species except Chinook salmon. The harvest of all species combined was over 44% above the previous 10-year average. Compared to their respective 10-year average, in 2009 the Chinook salmon harvest was approximately 22% lower, the sockeye salmon harvest was about 7% higher, the coho salmon harvest was about 22% higher, the pink salmon harvest was about 39% higher, and the chum salmon harvest was about 51% higher.

Table 3-6-2.1. Area M chum salmon harvest by year and district, 1979-2009.

	Area M Salmon Management Districts						
Year	North	Northwest	Southeastern	South Central	Southwestern	Unimak	Total
1979	35,371	30,340	215,955	105,650	128,431	33,145	548,892
1980	332,685	367,511	534,752	191,080	223,100	404,540	2,053,668
1981	351,322	355,496	781,060	240,631	273,239	475,770	2,477,518
1982	236,014	95,119	845,086	240,172	643,885	545,504	2,605,780
1983	178,681	169,626	637,701	128,906	207,956	728,824	2,051,694
1984	614,268	182,455	630,929	311,193	430,211	282,332	2,451,388
1985	423,489	243,127	482,176	165,893	428,201	272,181	2,015,067
1986	157,653	113,563	825,398	254,835	467,475	201,943	2,020,867
1987	155,446	213,250	591,960	198,350	230,802	354,775	1,744,583
1988	214,790	178,285	736,086	155,378	514,960	502,083	2,301,582
1989	131,250	25,742	418,334	49,861	129,786	419,792	1,174,765
1990	95,541	30,572	564,118	60,370	208,090	445,430	1,404,121
1991	128,538	62,740	509,423	156,552	322,742	585,056	1,765,051
1992	236,884	104,732	441,023	253,811	358,237	257,266	1,651,953
1993	86,563	48,394	337,403	143,660	232,895	332,449	1,181,364
1994	43,658	40,239	581,256	317,664	962,369	317,621	2,262,807
1995	72,588	26,705	684,643	176,827	551,587	302,010	1,814,360
1996	60,225	7,731	446,435	70,607	170,952	87,063	843,013
1997	51,169	46,211	172,629	55,050	240,914	137,661	703,634
1998	37,487	32,029	252,947	90,080	217,498	151,001	781,042
1999	42,220	7,900	385,200	69,651	235,981	126,134	867,086
2000	63,087	30,609	390,120	118,854	424,916	121,426	1,149,012
2001	61,297	113,226	331,095	122,593	451,313	16,985	1,096,509
2002	29,201	21,839	342,590	44,283	320,902	111,255	870,070
2003	22,178	16,577	271,634	15,376	271,316	78,979	676,060
2004	8,480	6,478	557,336	40,423	100,116	92,234	805,067
2005	8,915	33,617	459,546	51,248	148,139	80,527	781,992
2006	92,330	39,388	664,189	110,116	326,023	77,478	1,309,524
2007	85,003	96,006	352,448	42,511	170,809	114,019	860,796
2008	73,224	104,140	337,605	71,108	121,331	272,360	979,768
2009	51,825	54,169	866,938	77,233	605,457	131,091	1,786,713
1999-2008 Average	48,594	46,978	409,176	68,616	257,085	109,140	939,588

As shown in Table 3-6-2.2 below, in 2009, 10 companies purchased salmon from Area M fishermen with an estimated salmon harvest value (ex-vessel) for all gear types of $26,845,271. This was well above the previous ten year average (1999-2008) of $19,404,429. The South Unimak and Shumagin Islands June fisheries ex-vessel value was $8,254,848 or approximately 30% of the entire Area M earnings in 2009. The North Alaska Peninsula's ex-vessel value was $10,925,209 or about 40% of the total Area M earnings. The Aleutian Islands ex-vessel value was $1,076,538 or approximately 4% of the total Area M earnings. The

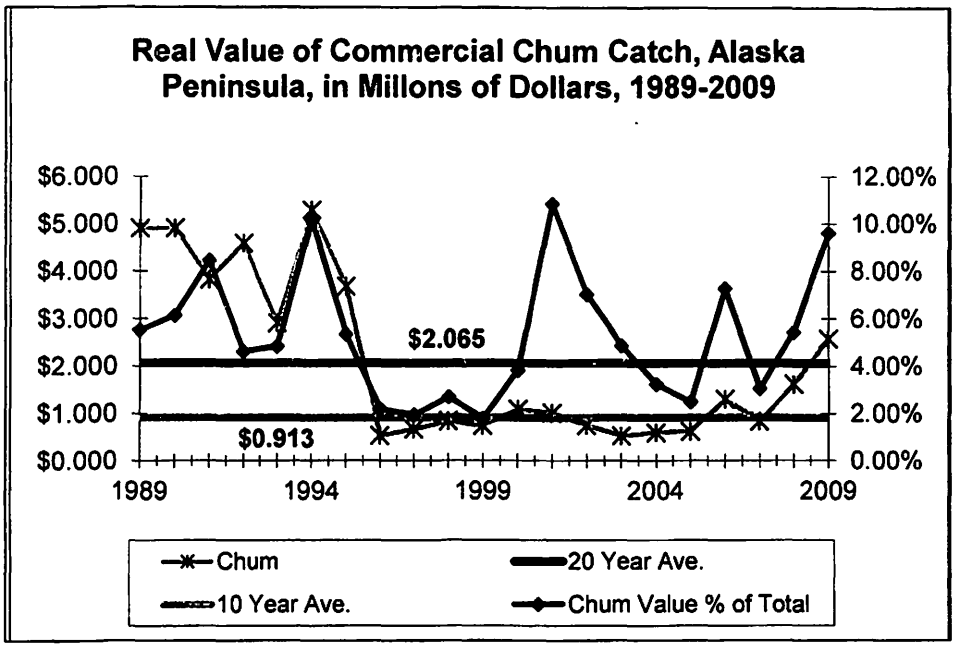
remainder of the commercial salmon harvest ex-vessel value ($6,588,675; approximately 25%) came from the Post-June and Southeastern District Mainland (SEDM) fisheries. Sockeye salmon provided the bulk of the ex-vessel revenues for fishermen in Area M and accounted for about 65% of the total value of all salmon landings in 2009. The average ex-vessel price per pound for all salmon declined substantially from 1988 to 2001, but has increased slightly since 2001. In 2009, however, prices decreased slightly for all species except Chinook salmon, which remained the same as in 2008.

Table 3-6-2.2 Real gross ex-vessel revenue from commercial salmon fishing to Alaska Peninsula/Area M fishermen, 1989-2009. (Values are inflation adjusted to 2009 value using the 2005 GDP Deflator)

Year	Sockeye	Chinook	Chum	Pink	Coho	Total
1989	$61.953	$0.577	$4.905	$15.044	$6.298	$88.778
1990	$64.310	$0.915	$4.913	$5.301	$4.502	$79.941
1991	$33.198	$0.256	$3.828	$5.766	$2.220	$45.268
1992	$83.104	$0.365	$4.592	$8.134	$3.288	$99.483
1993	$49.029	$0.450	$2.909	$6.540	$1.162	$60.089
1994	$36.978	$0.257	$5.289	$7.170	$2.360	$52.053
1995	$50.274	$0.442	$3.684	$13.277	$1.218	$68.896
1996	$22.059	$0.085	$0.539	$0.577	$1.251	$24.512
1997	$31.790	$0.145	$0.674	$1.419	$0.559	$34.588
1998	$25.174	$0.070	$0.845	$4.363	$0.754	$31.205
1999	$36.038	$0.068	$0.745	$3.989	$0.556	$41.396
2000	$24.758	$0.065	$1.092	$1.872	$0.671	$28.458
2001	$6.436	$0.029	$1.018	$1.616	$0.288	$9.387
2002	$8.884	$0.041	$0.754	$0.854	$0.188	$10.721
2003	$9.168	$0.028	$0.533	$0.959	$0.226	$10.915
2004	$15.727	$0.113	$0.598	$1.716	$0.282	$18.436
2005	$21.495	$0.081	$0.624	$2.434	$0.373	$25.007
2006	$14.323	$0.091	$1.308	$1.727	$0.504	$17.952
2007	$22.071	$0.103	$0.838	$4.013	$0.407	$27.432
2008	$16.868	$0.087	$1.621	$10.245	$0.968	$29.789
2009	$17.474	$0.132	$2.580	$6.055	$0.604	$26.845
20 Year Ave.	$31.682	$0.213	$2.065	$4.851	$1.404	$40.215
1989-98 Ave.	$45.787	$0.356	$3.218	$6.759	$2.361	$58.481
1999-08 Ave.	$17.577	$0.071	$0.913	$2.942	$0.446	$21.949

Error! Reference source not found. Figure 3-6-2.2 depicts the comparison between Alaska Peninsula chum real commercial value and total commercial value from all salmon fisheries from 1989-2009. Also shown is the percent of total value that the commercial chum value represents. Since the mid 1990s, chum commercial value has been less than $1 million in most years; however, chum commercial value increased to more than $2.5 million in 2009 and represented nearly 10 percent of total value for the first time since 2001. In 2001a sharp increase in the percentage value of chum occurred, which was due to a sharp decrease in the catch and value of the regionally more dominant sockeye species.

Figure 3-6-2-.2: Real Alaska Peninsula/Area M chum commercial value relative to total value, 1989-2009. (Values are inflation adjusted to 2009 value using the base 2005 GDP deflator)



Outlook

The Area M districts have no formal forecast for salmon returns. Broad expectations are developed based on parent-year escapements and recent year trends. The 2011 outlook and management plan will be available in June of 2011.

Potential Forgone State and Local Tax Revenues

There are three distinct types of taxes that are applied to the landed value of pollock in the BSAI fishery. The State of Alaska charges both a landings tax and a fisheries business tax on the value of pollock landed and processed, and municipalities and boroughs may charge a raw fish tax calculated as a percentage of the ex-vessel value landed within their jurisdiction. The State Fisheries Business Tax is levied on persons who process or export fisheries resources from Alaska. The tax is based on the price paid to commercial fishers or fair market value when there is not an arms length transaction. Fisheries business tax is collected primarily from licensed processors and persons who export fish from Alaska. The State Fishery Resource Landing Tax is levied on fishery resources processed outside the 3-mile limit and first landed in Alaska or any processed fishery resource subject to sec. 210(f) of the American Fisheries Act. The tax is based on the unprocessed value of the resource, which is determined by multiplying a statewide average price (determined by the Alaska Department of Fish and Game data) by the unprocessed weight. The Fishery Resource Landing Tax is collected primarily from factory trawlers and floating processors which process fishery resources outside of the state's 3-mile limit and bring their products into Alaska for transshipment (Alaska Department of Revenue, Tax Division; http://www.tax.alaska.gov/programs/programs/index.aspx?60620).

Unfortunately, confidentiality restrictions prohibit reporting of the tax value by sector, by season, and/or at a community level. Thus, the Alaska Department of Revenue has provided annual tax revenue data aggregated for the entire Aleutian/Pribilof region and in statewide totals, which was presented previously in Table 2-2. It is possible to make a crude estimate of the total State tax revenue impacts that would have occurred under the various hard cap scenarios. This can be done by multiplying the fleet wide potentially forgone gross revenue percentage of total annual pollock fishery gross revenues for each scenario by the total annual tax revenue collection. This calculation, however, ignores seasonal and sector level differences in pollock value, which would tend to increase revenue in the A season and for the offshore sectors. Still, it is an "average" State tax impact estimate for the entire region and the entire pollock fishery.

In addition, municipalities and boroughs charge a local raw fish tax that ranges from 1 percent to 3 percent. The annual ex-vessel landed value, by port group, presented in Table 6-21 can be multiplied by 3 percent to estimate total annual regional potential municipal tax revenue based on landed ex-vessel value of pollock. The total potential tax estimate can then be multiplied by the potentially forgone gross revenue percentage of total annual pollock fishery gross revenue, as shown in the pollock fishery impact section, to estimate potential municipal tax impacts under the various hard cap scenarios of Alternative 2.

It is important to note that one cannot apply the same tax impact estimation methodology using the" revenue at risk" potential impact estimates of Alternative 3 because the analysis asserts that some or all of the potential impacts may be mitigated by effort redistribution to adjacent areas that remain open when a triggered closure occurs. The analysis contained in EA chapter 4 documents that catch rates outside of the triggered closure areas appear to be similar if not slightly higher than those within the closure area. Thus, while there may be operational costs imposed on the pollock fishery participants, the analysis of Alternative 3 does not indicate that substantial portions of the pollock catch would go unharvested. As a result, it is not appropriate to assume that state and/or municipal tax revenue collections would be affected by Alternative 3.

Potential Forgone State and Local Tax Revenues under Alternative 2

Table 6-40 provides estimated potentially forgone state and municipal tax revenue calculations from 2003 through 2009 for the various cap levels and allocation scenarios under Alternative 2. Potential tax

impacts rage from zero, in years when the caps would not have constrained the pollock harvest, to more than $4 million in State tax in 2005 under the most constraining cap of 50,000 non-Chinook salmon and allocation scenario 1. Potential state tax impacts decrease as the cap level is increased, and also decrease when moving from allocation scenario 1 to scenarios 2 and 3.

Potential Municipal tax revenue impacts behave similarly with a range from zero to $3.3 million in 2006 under the 50,000 cap and scenario 1. As is the case with Potential State tax impacts, the potential impacts on Municipal taxes decrease as the cap is increased. However, in contrast to the potential State tax impacts, which are affected by CDQ, CP and Mothership potentially forgone gross revenue, the potential Municipal tax impacts are solely CV based and increase when moving from allocation scenario 1 to scenarios 2 and 3, respectively. The greatest potential Municipal tax impacts of approximately $3.4 million would have occurred in 2006 under allocation scenario 3 with a 50,000 fish cap. While these changes in impacts are slight, they highlight the effects that the allocation scenarios have on CVs and, thereby, on direct taxations by Municipalities. It is important to note; however, that Municipalities also receive a share of the State taxes. Thus, it is not necessarily the case that the allocation scenarios that have greater effect on CVs and, thereby, direct Municipal taxes will impact total Municipal finances more than scenarios that have greater effect on the CDQ, CP, and Mothership sectors. Unfortunately, municipal revenue sharing occurs in a source commingled form and pollock specific revenue sharing data is not available to the analysts at this time. Thus, it is not possible to definitively address the net effect on total tax revenue of fishery dependent communities due to each of the allocation effects of Alternative 2.

Table 6-40: Hypothetical forgone pollock State and Municipal tax revenue under the Alternative 2 cap levels ($millions)

2ii (sector allocation 1)

Year	Potential State Tax Impacts by Cap Level			Potential Municipal Tax Impacts by Cap Level		
	50,000	200,000	350,000	50,000	200,000	353,000
	All fleet	All fleet	All fleet	CV Fleet	CV Fleet	CV Fleet
2003	$1.8	$0.0		$1.5		
2004	$3.2	$1.7	$0.7	$1.5	$0.6	$0.2
2005	$4.2	$2.4	$1.7	$2.6	$2.2	$1.8
2006	$3.8	$1.5		$3.3	$2.1	
2007	$1.4			$0.6		
2008						
2009						

4ii (sector allocation 2)

Year	Potential State Tax Impacts by Cap Level			Potential Municipal Tax Impacts by Cap Level		
	50,000	200,000	350,000	50,000	200,000	353,000
	All fleet	All fleet	All fleet	CV Fleet	CV Fleet	CV Fleet
2003	$1.6	$0.2		$1.7	$0.2	
2004	$3.0	$1.1	$0.3	$1.5	$0.7	$0.4
2005	$3.2	$2.0	$1.4	$2.6	$2.3	$2.0
2006	$2.9	$1.8	$1.2	$3.3	$2.6	$1.8
2007	$1.2			$0.7		
2008						
2009	$0.2			$0.2		

6 (sector allocation 3)

Year	Potential State Tax Impacts by Cap Level			Potential Municipal Tax Impacts by Cap Level		
	50,000	200,000	350,000	50,000	200,000	353,000
	All fleet	All fleet	All fleet	CV Fleet	CV Fleet	CV Fleet
2003	$1.5	$0.3		$1.9	$0.5	
2004	$2.8	$0.8	$0.4	$1.7	$1.0	$0.6
2005	$3.1	$1.7	$1.6	$2.7	$2.4	$2.3
2006	$2.3	$2.0	$1.5	$3.4	$2.9	$2.1
2007	$1.1			$1.0		
2008						
2009	$0.7			$0.9		

Executive Summary

This executive summary is intended to supplement the executive summary contained within the accompanying Environmental Assessment (EA). The EA executive summary provides considerable summary information regarding the action alternatives, potential impacts on non-Chinook salmon, and the potential tradeoffs between salmon savings versus potentially foregone pollock harvests resulting from the action alternatives. What is contained here is meant to supplement that treatment with additional information on the economic impacts of the alternatives as provided in the RIR.

A Regulatory Impact Review (RIR) examines the costs and benefits of a proposed regulatory amendment to change non-Chinook salmon bycatch 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 North Pacific Fishery Management Council's (Council) Bering Sea and Aleutian Islands (BSAI) Fisheries Management Plan (FMP).

Proposed Alternatives

This analysis is focused on alternative measures to minimize chum (non-Chinook) salmon PSC in the Bering Sea pollock fishery. The RIR examines the costs and benefits of proposed alternatives, which include consideration of eliminating the non-Chinook Salmon Savings Areas and, thereby, eliminating an exemption to the savings area for participants in the Rolling Hotspot System (RHS) Intercooperative Agreement (ICA); imposing a hard cap on the number of non-Chinook salmon that may be taken in the Bering Sea pollock trawl fishery; and/or implementing a new triggered closure area or areas that would be managed by the National Marine Fisheries Service (NMFS). The suite of alternatives also contains components that allow for sector level allocations of hard caps, transfers and/or rollover provisions, and cooperative management provisions.

The complete suite of alternatives is summarized in Chapter 4 of the RIR and described in detail in Chapter 2 of the EA. Below is a simplified list of the alternatives; however, the reader should refer to the treatment of the alternatives as shown in EA Chapter 2 in order to fully understand the complex set of alternatives, components, options, and suboptions.

Alternative 1: Status Quo (No Action)

Alternative 2: Hard cap

Alternative 3: Triggered closures
Alternative 4: Triggered closure with RHS exemption

Each of the alternatives involves a limit or "cap" on the number of non-Chinook salmon that may be caught in the Bering Sea pollock fishery and closure of all or a part of the Bering Sea to pollock fishing once the cap is reached. These closures would occur when a non-Chinook salmon PSC cap was reached even if a portion of the pollock total allowable catch (TAC) has not yet been harvested. The action alternatives represent a change in management of the pollock fishery because if the non-Chinook salmon PSC allocations are reached before the full harvest of the pollock quota, then pollock fishing must stop either BS-wide or in a specified area.

Market Failure Rationale

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.

Bycatch of salmon in the Bering Sea pollock fishery reduces the common property pool of the salmon resource. Bycatch removals 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 bycatch. 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 under considered is to improve non-Chinook salmon avoidance in the Bering Sea pollock fishery and, thereby, further mitigate the market failure.**

The Bering Sea Pollock Fishery

Until 1998, the Bering Sea directed pollock fishery had been managed as an open access fishery, commonly characterized as a "race for fish." In 1998, however, Congress enacted the American Fisheries Act (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 allows for the development of pollock industry cooperatives. Ten such cooperatives were developed as a result of the AFA: seven inshore cooperatives, two offshore cooperatives, and one mothership cooperative. In rationalizing the Bering Sea pollock fishery, the AFA gives the industry the ability to respond more deliberately and efficiently to market demands than the "race for fish" previously allowed.

Current 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. This voluntary system is called the rolling hotspot system (RHS).

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. A 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.

A detailed description of the pollock fishery is contained in Chapter 2.0 of the RIR. In addition, a number of findings are presented relevant to the estimated efficacy of the status quo rolling hotspot system.
The key findings of this analysis are presented in the RIR in Section 2.3 (and in detail in the EA in Section 5.4.1.11). Chapter 2 also includes a description of the Prohibited Species Donation (PSD) program, which was initiated to reduce the amount of edible protein discarded under PSC regulatory requirements for salmon and halibut (Section 2.4), as well as a description of the CDQ Program, which allocates a percentage of each annual BSAI catch limit to six groups representing 65 communities in western Alaska (Section 2.5).

Potentially Affected Salmon Fisheries

Section 3.0 provides an extensive background description of conditions existing historically, and at present, in potentially affected non-Chinook (chum) salmon fisheries in western Alaska. Sections 3.1 through 3.4 describe salmon fisheries management, the importance of subsistence harvests, subsistence harvests by region, and sport and personal use harvests.

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%) (Figure 3-7 in the RIR). 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%)[1] (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%) (see Table 3-5 and Figure 3-9 of the RIR). 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, *in prep*). Detailed information by region is provided in Section 3.3 of the RIR.

[1] 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.

The remaining sections of Chapter 3 describe the commercial chum salmon fisheries by region. The RIR 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. These sections of Chapter 3 summarize the recent management actions, as well as recent harvest conditions, in comparison with historic averages.

Also included in Chapter 3 is an evaluation of regional dependence on salmon fishery resources. The Alaska Department of Labor and Workforce Development (ADOLWD) prepares regional level analyses of community involvement in commercial fisheries. ADOLWD has given permission for inclusion of these analyses in this document in order to provide background information on the extent of community involvement in the commercial salmon fisheries. In addition, ADOLWD has provided analysis of involvement at the processing level by species, which provides useful information on the diversity, or lack thereof, of local fisheries based economies within the several regions analyzed. The RIR provides these analyses for the Northern, Yukon Delta, Bristol Bay, and Aleutian/Pribilof regions as defined by ADOLWD. The information provided somewhat summarizes ADOLWD data themselves, thus they will not be recreated here. However, several findings stand out as follows:

- All regions except the Aleutian/Pribilof region are principally dependent on salmon fisheries for their fisheries based economies; however, chum is not specifically tabulated and the treatment of relative proportion of chum harvest and value presented in the commercial salmon fisheries overviews provide that level of information.

- The Aleutian/Pribilof area has highly diversified fisheries based economies that rely on groundfish, crab, halibut, herring, sablefish, and salmon.

- The scale of regional seafood based economic value is significantly higher for the Aleutian Pribilof and Bristol Bay areas than areas further north. This is due to the diversification of the Aleutian/Pribilof area, and the size of the Bristol Bay commercial sockeye salmon fisheries relative to salmon fisheries further north.

- These regional presentations serve to identify relative dependence on salmon resources as well as other fishery resources and show that effects on salmon resources may affect all regions while impacts on the pollock fishery would principally affect the Aleutian/Prbilof region.

Potential Benefits (Salmon Saved) 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) under the proposed alternatives.

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 2003 to 2010. 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. Exactly how those fish would be used is the fundamental, and exceedingly difficult, question to answer in order to provide a balanced treatment of costs and benefits.

Measuring the potential economic benefit of non-Chinook salmon saved, in terms of effects on specific subsistence, commercial, sport, and personal use fisheries is problematic. The proportion of AEQ estimated non-Chinook salmon that might be taken in each of the various fisheries is a function of many variables including overall run strength, subsistence management strategies, commercial management strategies, availability of commercial markets, the effect of weather on catch (e.g. high water), and potentially, on management of other salmon runs as well. Lacking estimates of the proportion of AEQ non-Chinook salmon that would be caught by each user group, it is not possible to estimate economic benefits in terms of gross revenues or other monetary values for those user groups due to changes in AEQ non-Chinook salmon under each alternative.

Without an estimate of changes in commercial catches, it is not possible to accurately estimate changes in gross revenue for the commercial non-Chinook salmon fishermen from changes in AEQ non-Chinook salmon under the alternatives. Estimating changes in commercial non-Chinook salmon gross revenues would require two unrealistic assumptions. First, the analysts would have to assume the portion of the AEQ non-Chinook salmon that would be caught by the commercial fisheries, such as the simple assumption that the commercial fishery would catch all of the returning AEQ non-Chinook salmon. This assumption would not be realistic because the subsistence use of non-Chinook salmon has priority over commercial use. Thus, in some river systems, increases in non-Chinook salmon returns might be caught wholly by subsistence fishermen.

Second, to estimate changes in gross revenues, one must also make an assumption of average weight per fish and determine an appropriate average price per pound by river system. In some rivers systems, directed commercial non-Chinook salmon fisheries have not occurred in recent years. Thus, average weight and average price proxy values from other areas would have to be used, which creates additional uncertainty in the estimates of potential commercial value. Further, the total social and cultural value of subsistence non-Chinook salmon catch cannot be evaluated in a way that is directly comparable to the monetary value of potential increases in commercial non-Chinook salmon catch or forgone gross revenues from the pollock fleet. Estimates of changes to the gross revenues to the commercial non-Chinook salmon fishery may mask the true subsistence value, tempting the reader to focus on the monetary estimates of commercial value when the non-monetary value of subsistence harvests is very important and cannot be reflected in terms of gross revenues.

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 introduction of this RIR.

Note that the following summarizes the potential benefits of the action alternatives. The potential benefits of the status quo (Alternative 1) are referenced in Section 5.2, but summarized in Chapter 5 of the EA. Recall also that the benefits estimated under each of the action alternatives assume that the status quo rolling hotspot system is also maintained.

Potential Benefits of Alternative 2: Hard Caps

Alternative 2 proposes to establish a hard cap of non-Chinook salmon on the Bering Sea pollock fishery; when the cap is reached, it would close directed pollock fishing for the remainder of the year. The potential benefits of Alternative 2, in terms of non-Chinook salmon saved, are analyzed in Section 5.3. The effects of Alternative 2 under three primary sector allocation scenarios are analyzed. Refer to Table 5-1 of the RIR for these data. Under allocation scenario 1, total non-Chinook salmon saved 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 531,651 salmon in 2005. The CP sector is estimated to have non-Chinook salmon saved of between zero and 69,811 (2004) under the 50,000 cap. The mothership sector estimates range from zero to 13,115 salmon, while the CDQ sector estimates ranged from zero to 9,341 salmon. The effect of allocation scenario 2 is to slightly increase the number of salmon saved in the CV sector while slightly lowering these numbers in all other sectors. Sector allocation scenario 3 further increases CV non-Chinook salmon saved while reducing the estimates in the other sectors.

If the hard cap level is increased to 200,000 fish, the salmon saved estimates are, as expected, lower and the hard cap is a binding constraint in fewer years. What is also apparent is that the salmon savings accrue mostly, and in some cases only, from the CV sector. This is simply a function of the CV sector having the highest proportion of non-Chinook PSC of all sectors. Under allocation scenario 1, the total non-Chinook salmon saved in the CV sector under the 200,000 cap are estimated to range from zero, in recent years of low PSC, to as high as 402,354 salmon in 2005. The CP sector is estimated to have non-Chinook salmon saved of between zero and 53,557 salmon (2004) under the 200,000 cap. The mothership sector estimates ranged from zero to 7,139 salmon, whilie the CDQ sector estimates ranged from zero to 4,235 salmon. The effect of allocation scenario 2 is to substantially increase the salmon saved in the CV sector, while reducing the salmon saved in all other sectors. Sector allocation scenario 3 further increases CV non-Chinook salmon saved while reducing the estimates in the other sectors to zero in all but 2004 for catcher processors.

As the hard cap level is increased to 353,000 salmon, the salmon saved estimates continue to decline relative to the two lower caps and the salmon savings accrue mostly, and in some cases only, from the CV sector. 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. Under allocation scenario 1 , the total non-Chinook salmon saved in the CV sector under the 353,000 cap are estimated to range from zero, in recent years of low PSC, to as high as 295,269 fish in 2005. The CP sector is estimated to have non-Chinook salmon saved of between zero and 38,904 fish (2004) under the 353,000 cap. The mothership sector estimates ranged from zero to 968 (only in 2005), while the CDQ sector estimates are all zero. The effect of allocation scenarios 2 and 3 is to eliminate salmon savings in all but the CV sector.

In sum, the greatest benefits under Alternative 2, in numbers of adult non-Chinook salmon saved, would occur in the highest bycatch years (2004 and 2005) and under the most restrictive hard cap of 50,000 salmon, with the greatest savings coming from the CV sector.

Potential Benefits of Alternative 3: Triggered Closures

Alternative 3 proposes a series of time and area closures that would be triggered when specified cap levels (an amount of non-Chinook salmon) are reached. The potential benefits of Alternative 3 are analyzed in Section 5.4. Refer to Tables 5-3 through 5-6 of the RIR for these data. Comparing the alternatives on the relative impact on chum salmon savings (in terms of AEQ) together with the relative change in pollock that would be diverted to areas outside of the closed areas suggests that relatively little benefit (in terms of bycatch reduction) is estimated by using low trigger cap levels. For example, computing averages over the different sector allocations and trigger options shows that the benefit for

greater salmon savings at lower cap levels is much lower than the relative costs of redistributing pollock fishing effort.

Since results from genetic analysis indicate that proportionately more western Alaska chum salmon occur during the early part of the B season (June-July) compared to later in the B season (August-October), then the relative benefit of reducing salmon bycatch is worth examining. Summarizing years (2003-2010) and sectors suggests that trigger option 3 results in the lowest reduction in bycatch for all sector splits and cap levels (See EA Chapter 5). Trigger option 2a, which was designed to improve early-season salmon savings, performed better than the other options in June-July, particularly for the high cap level. At the low trigger cap level and third sector allocation scheme, option 2a performs similarly to options 1 and 2. Option 3 performs poorly during the early period since under this option, closures would generally occur later in the season since cap limits are based on season rather than monthly limits.

To evaluate the benefits of different alternatives to western Alaska chum salmon, absolute numbers of salmon saved were computed assuming the highest AEQ mortality year (106,700 chum for western Alaska in 2005) and assuming an average AEQ year (23,428 chum salmon) (see Table 5-3 through Table 5-6 of the RIR). For contrast, values in parentheses in this table assume the proportion of chum bycatch in June-July was 42% (the proportion observed in 2009), whereas the main numbers were computed using an average proportion of June-July bycatch (12% based on 1991-2009 data). Both the total western Alaska AEQ values and the amount of salmon saved by alternative are relatively small compared to total run size estimates for these rivers that have averaged 3.45 million fish. Similarly, the tables referenced provide salmon savings under the highest AEQ salmon year compared to the averages for the component Alaskan chum salmon stocks (given the ability of genetic analysis to resolve river of origins).

Potential Benefits of Alternative 4: Closure with a rolling hotspot exemption

Alternative 4 is similar to status quo, with a rolling hotspot system in regulation. Participants in a vessel-level RHS would be exempt from the regulatory closure system proposed under Alternative 4. The area closure under Alternative 4 represents a large area closure encompassing 80% of the historical non-Chinook bycatch. Under the alternative, the closure could be fixed for the entire B season, or the Council could select a trigger cap that would close the area when reached. The sector allocation suboptions for the triggered cap are the same as those proposed under Alternative 2. Refer to Table 4-3 of the RIR for the summary of this alternative.

Potential Impacts of the Proposed Action on the Pollock Fishery

The proposed action is not designed to close the pollock fishery; it is intended to create incentives for pollock fishermen to avoid non-Chinook salmon. Thus, the impacts on the pollock industry are reported as potentially forgone gross revenue or revenue at risk, depending on the alternative, and are not reported as industry losses of revenue. The RIR does not identify these 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. The Council's intent is to incentivize non-Chinook salmon PSC avoidance in order to reduce it in all years of abundance, and the caps 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 reduction in pollock harvest.

While the hard caps (**Alternative 2**) have the potential effect of fishery closure and resulting forgone pollock fishery gross revenues, the triggered closures (Alternatives 3 and 4) do not directly create forgone earnings, 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 any 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 greatest adverse economic impact on the pollock fishery is estimated to 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 $489 million in foregone revenue. That gross value is composed of $214 million from the CV sector, $206 million from the CP sector, $51million from the mothership sector, and $19 million from the CDQ sector.

As expected, as the hard cap amount increases, the adverse economic impacts on the pollock fisheries are estimated to decrease, all else being equal. As the hard cap level is increased to 200,000 fish, the potentially forgone revenue estimates are lower and the hard cap is a binding constraint in fewer years. What is also apparent is that the potentially forgone revenue accrues mostly, and in some cases only, in the CV sector. This is simply a function of the CV sector having the highest proportion of non-Chinook PSC of all sectors. As the hard cap level is increased to 353,000 fish, the potentially forgone revenue estimates continue to decline relative to the two lower caps and the impacts accrue mostly, and in some cases only, in the CV sector. As is the case of the 200,000 cap, this is a function of the CV sector having the highest proportion of non-Chinook PSC of all sectors.

The effect of hard cap allocation scenarios and cap levels on shoreside value added in dollars, percent of B season total gross revenue, and percent of annual total gross revenue, is shown in Table 6-25 through Table 6-27 of the RIR, respectively. 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 $150 million, or approximately 97 percent of B season total gross revenue and approximately 50 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 with greater effect on the CV, and thus shoreside, sector under allocation scenario 3.

Shoreside value added under **Alternative 3** in dollars, percent of B season total gross revenue, and in percent of annual total gross revenue, are provided in Table 6-28 through 6-39 of the RIR. 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 $63 million, or approximately 40 percent of B season total gross revenue and approximately 20 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 analysis of Alternative 2, they vary similarly with decreasing impact as the trigger cap is increased, but with greater effect on the CV, and thus shoreside, sector under allocation scenario 3. In the tables provided, estimates are provided for each of options 1, 2, 2a, and 3 under Alternative 3. As is the case with the analysis of CV first wholesale gross revenue at risk under Alternative 2, options 2 and 2a tend to increase impacts on the CV, and thereby the shoreside, sector slightly, while option 3 substantially reduces the potential impact on the CV and shoreside sector.

There are several options for triggered area closures under Alternative 3. Summarizing years (2003-2010) and sectors suggests that a trigger closure under Alternative 3, option 3 results in the lowest reduction in bycatch for all sector splits and cap levels. Trigger closure option 2a, which was designed to improve early-season salmon savings in order to target a higher salmon savings during the portion of the season in which a higher relative percentage of the bycatch is of western Alaska stock, performed better than the

other options in June-July, particularly for the high cap level. At the low trigger cap level and third sector allocation scheme, option 2a is estimated to perform similarly to options 1 and 2. Option 3 performed poorly during the early period, since under this option, closures would generally occur later in the season since cap limits are based on season rather than monthly limits.

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. 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 management 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 RIR addresses 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 change directly with the level of activity, recognizing that variable inputs must be used if production exceeds zero.

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

Information on all of the categories of cost and additional safety-related issues are discussed in detail in the RIR.

Alternative 4 is essentially a rolling hotspot system, similar to the current approach under status quo, with a large area closure for those who do not participate. While impacts in terms of revenue at risk have been provided for Alternative 4 in the RIR, they are intended to identify the considerable incentive for participation in the rolling hotspot system. As such, it appears likely that most, if not all, vessel operators

would be motivated to participate in a rolling hotspot system, thereby eliminating any potential revenue at risk under this alternative. As a result, it is not possible to predict whether any vessel may choose not to participate, and thereby have vessel specific revenue at risk, which would potentially generate shoreside value added "at risk" as well. Thus, the analysis does not provide that breakout as it would be inappropriate to imply that such likelihood exists.

Environmental Justice

An environmental justice analysis, as required under E.O. 12899, is provided in Chapter 7. Under the 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.

This chapter relies on U. S. Census data from the 2000 census, as the release of the various 2010 census data needed to update this chapter did not begin until late April of 2011. This chapter will be reviewed and updated, as necessary, with 2010 census data prior to the Council's final action. While some changes in the demography of minority and low income populations will likely be revealed in the 2010 census data, the information presented is not expected to be fundamentally altered.

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.

A significant part of the population in the impacted area is made up of Alaska Natives. Table 7-1 of the RIR 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 are comprised of less than 44 percent Alaskan Native peoples.

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. The chapter provides a brief list of minority ethnic groups within the region, depending primarily on Langdon and Krauss (Langdon 2002; Krauss 1982):

- 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.
- 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 (listed in Chapter 7) may be especially affected by this action.
- 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.

- 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 Copper River delta.

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.

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 Council final action. 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 to this RIR identifies and describes other marine resource users and potential effects on other marine resources. In sum, at present, it is not possible to evaluate the comprehensive suite of potential effects on minority and low income populations. It is anticipated that such evaluation will be completed and provided in the public review draft analysis for consideration by the Council at final action.

Initial Regulatory Flexibility Analysis

The initial regulatory flexibility analysis (IRFA), as required under the Regulatory Flexibility Act (RFA), is contained in Chapter 10. The IRFA evaluates the potential adverse economic impacts on directly regulated small entities resulting from the proposed action. This requirement 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 criteria to determine whether a directly regulated entity is 'small', is provided in Section 10.4. The directly regulated entities under this action are those that participate in the directed pollock trawl fishery in the Bering Sea (i.e., the AFA pollock fleet and the CDQ groups which receive direct BS pollock allocations). Of those entities, only the six CDQ groups are identified as 'small' entities under the RFA, due to their status as non-profit corporations. As described in the regulations implementing the RFA (13 CFR 121.103), the CDQ groups' affiliations with other large entities (i.e., the AFA pollock fleet), do not define them as large entities.

Chapter 10, among other issues, provides the number of large and small entities directly regulated by the proposed action, describes the small entities directly regulated by the proposed action, describes the recordkeeping, reporting, and other compliance requirements that may be needed to implement the action alternatives, and describes the primary alternatives in the context of those that may minimize adverse impacts on the identified small entities. As is required, the IRFA will be fully completed upon the selection of a preferred alternative.

Item C-5(j) Council motion February 2011

C-3(a) BSAI Chum salmon bycatch
February 4, 2011

The Council adopts the following problem statement and moves the analysis for initial review.

Problem statement:

Magnuson-Stevens Act National Standards direct management Councils to balance achieving optimum yield with bycatch reduction as well as to minimize adverse impacts on fishery dependent communities. Non-Chinook salmon (primarily made up of chum salmon) prohibited species bycatch (PSC) in the Bering Sea pollock trawl fishery is of concern because chum salmon are an important stock for subsistence and commercial fisheries in Alaska. There is currently no limitation on the amount of non-Chinook PSC that can be taken in directed pollock trawl fisheries in the Bering Sea. The potential for high levels of chum salmon bycatch as well as long-term impacts of more moderate bycatch levels on conservation and abundance, may have adverse impacts on fishery dependent communities.

Non-Chinook salmon PSC is managed under chum salmon savings areas and the voluntary Rolling Hotspot System (RHS). Hard caps, area closures, and possibly an enhanced RHS may be needed to ensure that non-Chinook PSC is limited and remains at a level that will minimize adverse impacts on fishery dependent communities. The Council should structure non-Chinook PSC management measures to provide incentive for the pollock trawl fleet to improve performance in avoiding non-Chinook salmon while achieving optimum yield from the directed fishery and objectives of the Amendment 91 Chinook salmon PSC management program. Non-Chinook salmon PSC reduction measures should focus, to the extent possible, on reducing impacts to Alaska chum salmon as a top priority.

The Council recommends the Council move this analysis forward for initial review analysis in June with the following changes/additions and asks staff to incorporate the SSC and AP comments to the extent practicable.

1. Change Component 5 – Rolling Hot Spot Program and its associated sub-option to its own alternative, Alternative 4 as revised. [see below for Alternative 4 description as revised]
2. Expanded discussion of the sampling utilized in genetic stock analysis, including any caveats associated with the results of genetic stock analyses;
3. Expand discussion of impacts of chum bycatch reduction measures on Chinook bycatch.
4. Under the status quo, discussion of the Rolling Hotspot System (RHS) should include separate examination of the pre-2007 and post 2007 RHS agreements.
5. Add a suboption to Alternative 3, Component 1B, Option 2:
   'a monthly trigger limit application that redistributes the monthly percentage such that trigger limits are lower in months where the chum bycatch component is made up of relatively higher contribution from western Alaska'.

New Alternative 4:

Similar to Status Quo (with RHS system in regulation), participants in a vessel-level (platform level for Mothership) RHS would be exempt from a regulatory closure system representing a large area closure encompassing 80% of historical bycatch.

Option to manage the area as a trigger area closure with trigger cap limit options of 50,000 and 200,000. Under this option allocation to sectors to be consistent with Component 2 under Alternative 3.

C-5 BSAI Non-Chinook Salmon PSC

The ~~AP recommends the~~ Council requests staff ~~to~~ revise the analysis as described below and bring it back for initial review ~~again in December 2011~~.

Add the following option under Alternative 2, Component 1:

> Option: Apply a hard cap (non-Chinook PSC limit) to vessels participating in the directed pollock fishery during June and July, in aggregate. This hard cap, if exceeded, would require all vessels affected by the cap to stop fishing until August 1.
>
> *The components under Alternative 2 for cap level, sector allocation, sector transfer, cooperative allocation, and cooperative transfer options would apply (see EA pages 28-35). A hard cap applicable only to June and July will be derived from the range of options for B-season hard cap levels, adjusted to reflect the average proportion of non-Chinook salmon PSC in June and July relative to the B-season total.*

Remove current Alternative 3 as a stand-alone alternative, and incorporate elements in the alternative as described below.

1. Revise Alternative 4 to read:

Alternative ~~4~~ 3

Rolling Hot Spot (RHS) system – ~~similar to status quo~~ (with RHS in regulation), participants in a vessel-level (platform level for Mothership fleet) RHS would be exempt from:

> ~~Option 1: a hard cap (selected from the range in Alternative 2)~~
> ~~Suboption: In addition to the RHS, the fleet would be subject to a large area trigger closure (encompassing 80% of historical bycatch) with Components 1-3 under Alternative 3 for cap level, application of trigger caps, sector allocations and cooperative provisions.~~
>
> ~~Option 2:~~ a large area trigger closure (encompassing 80% of historical ~~bycatch~~) non-Chinook prohibited species catch (PSC) with the trigger cap level options ~~Components 1-3~~ under what was formerly Alternative 3 (see EA pages 35-36) ~~for cap level, application of trigger caps, sector allocations and cooperative provisions~~. This closure would apply to 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, and would not be subject to sector or cooperative level allocations.

In addition to the RHS, vessels in the RHS system would be subject to

> Option 1: a trigger closure encompassing 80% of historical non-Chinook salmon PSC estimates in
>
> > Suboption 1: the June and July pollock fishery, in aggregate. This trigger closure would only apply in June and July.
> >
> > Suboption 2: the B season pollock fishery. This trigger closure would apply for the full B season.

Option 2: a trigger closure encompassing 60% of historical non-Chinook salmon PSC estimates in

Suboption 1: the June and July pollock fishery, in aggregate. This trigger closure would only apply in June and July.

Suboption 2: the B season pollock fishery. This trigger closure would apply for the full B season.

Apply the components under what was formerly Alternative 3 for trigger cap levels, sector allocations, and cooperative provisions (see EA pages 35-43). Trigger closures that are applicable only to June and July will be derived from the range of options for B-season trigger cap levels, adjusted to reflect the average proportion of non-Chinook salmon PSC in June and July relative to the B-season total.

Alternatives 2 and 3 are not mutually exclusive.

2. Analyze parameters of the RHS program under Alternative 4-3 that could be adjusted by the council including:
    - Modification of RHS to operate at a vessel level, instead of at the cooperative level;
    - Faster reaction/closure time (shorter delay between announcement and closure);
    - Amount of closure area;
    - Adjustments that would address timing and location of bycatch of Western Alaska chum stocks;
    - Base rates;
    - Possibilities by which the tier system may be amended to provide further incentives to reduce chum bycatch.

3. Make the following revisions to the Draft EA
    - Add caveats to all sections describing the impacts to specific stocks describing the limitations of the stock identification and AEQ information;
    - Where run size impacts are presented for aggregated stocks (i.e. Western Alaska, coastal Western Alaska), clarify that these aggregations may mask impacts on smaller runs (i.e. Norton Sound);
    - Revise the analysis of pollock fishery impacts and potential foregone revenue for ~~Alternative 3~~ trigger area closures to present actual numbers for each year;
    - Include the discussion previously requested by the Council ~~of~~ for "a discussion of the meaningfulness of fines, including histograms of number and magnitude of fines over time as well as a comparison of penalties under the RHS program to agency penalties and enforcement actions for violating area closures."
    - Include a qualitative discussion of the impacts on salmon fisheries, i.e. impacts of fishing restrictions on drying fish, lower CPUEs, gas costs, increased travel time, fish camps and culture;
    - Include an expanded discussion of Norton Sound salmon fisheries by district including escapement and harvest information for an expanded time period and a full discussion of the tier II fishery.
    - ~~Add to Alternative 3, Component 4: apply trigger closures only in June and July.~~
    - ~~apply restriction to the June and July portions of Pollock fishery.~~
    - Expand discussion of cumulative effects of the Area M commercial fishery on other western Alaska stocks.

~~*Motion passed 19-0*~~

C-5 BSAI Non-Chinook Salmon PSC

The ~~AP recommends the~~ Council requests staff ~~to~~ revise the analysis as described below and bring it back for initial review ~~again in December 2011~~.

Add the following option under Alternative 2, Component 1:

> Option: Apply a hard cap (non-Chinook PSC limit) to vessels participating in the directed pollock fishery during June and July, in aggregate. This hard cap, if exceeded, would require all vessels affected by the cap to stop fishing until August 1.
>
> *The components under Alternative 2 for cap level, sector allocation, sector transfer, cooperative allocation, and cooperative transfer options would apply (see EA pages 28-35). A hard cap applicable only to June and July will be derived from the range of options for B-season hard cap levels, adjusted to reflect the average proportion of non-Chinook salmon PSC in June and July relative to the B-season total.*

Remove current Alternative 3 as a stand-alone alternative, and incorporate elements in the alternative as described below.

1. Revise Alternative 4 to read:

Alternative 4~~-~~3

Rolling Hot Spot (RHS) system – ~~similar to status quo (~~with RHS in regulation~~)~~, participants in a vessel-level (platform level for Mothership fleet) RHS would be exempt from~~:~~

> ~~Option 1: a hard cap (selected from the range in Alternative 2)~~
> ~~Suboption: In addition to the RHS, the fleet would be subject to a large area trigger closure (encompassing 80% of historical bycatch) with Components 1-3 under Alternative 3 for cap level, application of trigger caps, sector allocations and cooperative provisions.~~
>
> ~~Option 2:~~ a large area trigger closure ~~(~~encompassing 80% of historical ~~bycatch)~~ non-Chinook prohibited species catch (PSC) with the trigger cap level options ~~Components 1-3~~ under what was formerly Alternative 3 (see EA pages 35-36) ~~for cap level, application of trigger caps, sector allocations and cooperative provisions~~. This closure would apply to 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, and would not be subject to sector or cooperative level allocations.

In addition to the RHS, vessels in the RHS system would be subject to

> Option 1: a trigger closure encompassing 80% of historical non-Chinook salmon PSC estimates in
>
> > Suboption 1: the June and July pollock fishery, in aggregate. This trigger closure would only apply in June and July.
> >
> > Suboption 2: the B season pollock fishery. This trigger closure would apply for the full B season.

Option 2: a trigger closure encompassing 60% of historical non-Chinook salmon PSC estimates in

Suboption 1: the June and July pollock fishery, in aggregate. This trigger closure would only apply in June and July.

Suboption 2: the B season pollock fishery. This trigger closure would apply for the full B season.

Apply the components under what was formerly Alternative 3 for trigger cap levels, sector allocations, and cooperative provisions (see EA pages 35-43). Trigger closures that are applicable only to June and July will be derived from the range of options for B-season trigger cap levels, adjusted to reflect the average proportion of non-Chinook salmon PSC in June and July relative to the B-season total.

Alternatives 2 and 3 are not mutually exclusive.

2. Analyze parameters of the RHS program under Alternative ~~4~~ 3 that could be adjusted by the council including:
   - Modification of RHS to operate at a vessel level, instead of at the cooperative level;
   - Faster reaction/closure time (shorter delay between announcement and closure);
   - Amount of closure area;
   - Adjustments that would address timing and location of bycatch of Western Alaska chum stocks;
   - Base rates;
   - Possibilities by which the tier system may be amended to provide further incentives to reduce chum bycatch.

3. Make the following revisions to the Draft EA
   - Add caveats to all sections describing the impacts to specific stocks describing the limitations of the stock identification and AEQ information;
   - Where run size impacts are presented for aggregated stocks (i.e. Western Alaska, coastal Western Alaska), clarify that these aggregations may mask impacts on smaller runs (i.e. Norton Sound);
   - Revise the analysis of pollock fishery impacts and potential foregone revenue for ~~Alternative 3~~ trigger area closures to present actual numbers for each year;
   - Include the discussion previously requested by the Council ~~of~~ for "a discussion of the meaningfulness of fines, including histograms of number and magnitude of fines over time as well as a comparison of penalties under the RHS program to agency penalties and enforcement actions for violating area closures."
   - Include a qualitative discussion of the impacts on salmon fisheries, i.e. impacts of fishing restrictions on drying fish, lower CPUEs, gas costs, increased travel time, fish camps and culture;
   - Include an expanded discussion of Norton Sound salmon fisheries by district including escapement and harvest information for an expanded time period and a full discussion of the tier II fishery.
   - ~~Add to Alternative 3, Component 4: apply trigger closures only in June and July.~~
   - ~~apply restriction to the June and July portions of Pollock fishery.~~
   - Expand discussion of cumulative effects of the Area M commercial fishery on other western Alaska stocks.

~~*Motion passed 19-0*~~

Bering Sea Non-Chinook Salmon Bycatch Management

Initial Review
Draft Environmental Assessment

Chapter layout

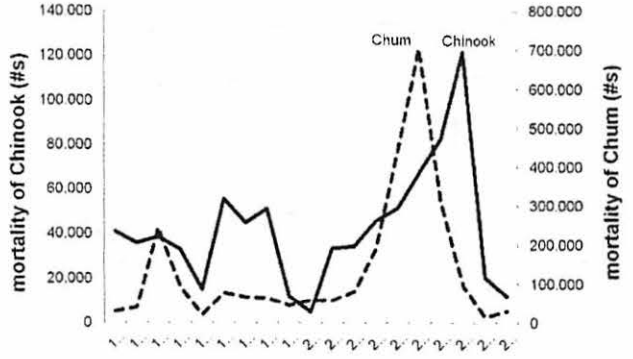
1. Introduction purpose and need
2. Description of alternatives
3. Methodology (including historical impacts)
4. Pollock
5. Chum
6. Chinook
7. Other marine resources
8. Cumulative effects

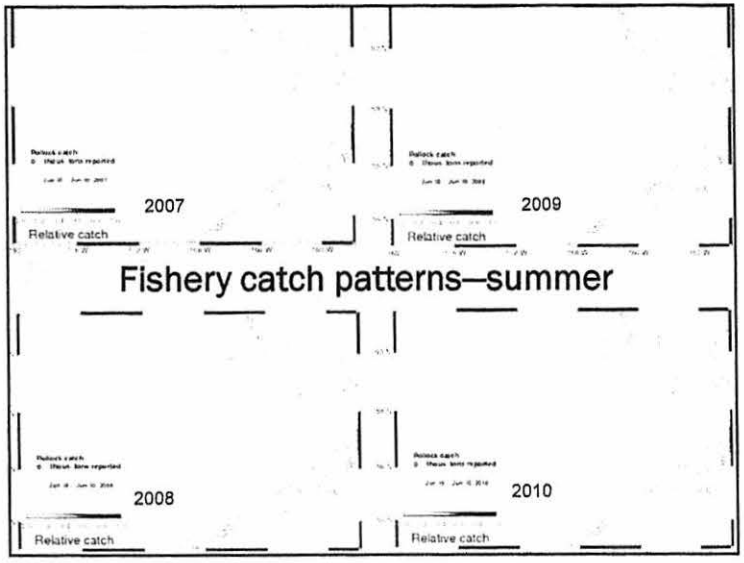
Salmon bycatch trends

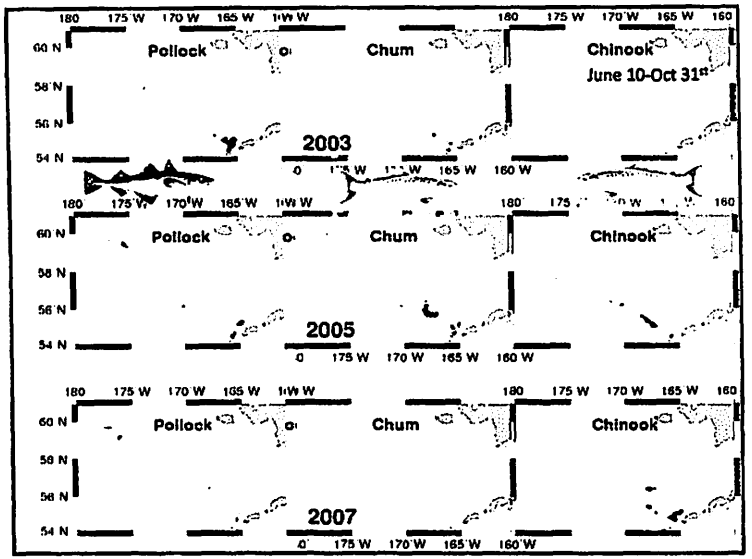
Pollock fishery

Offshore catcher processors
Motherships

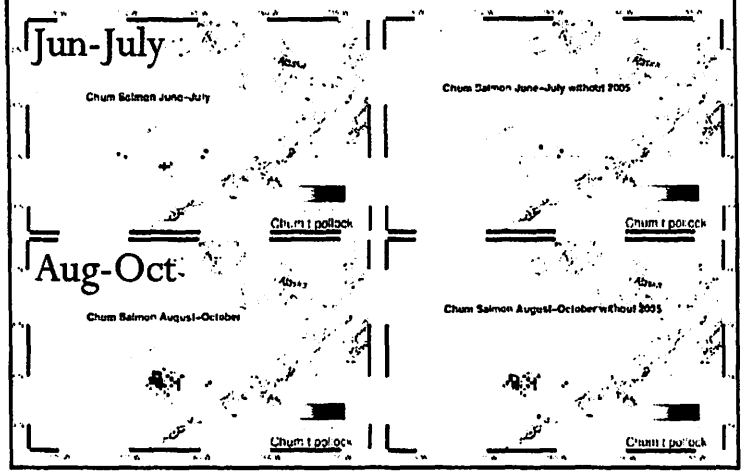
Inshore catcher vessels
CDQ







Spatial bycatch pattern by month



Problem statement

"Magnuson-Stevens Act National Standards direct management Councils to balance achieving optimum yield with bycatch reduction as well as to minimize adverse impacts on fishery dependent communities. ***Non-Chinook salmon (primarily made up of chum salmon) prohibited species bycatch (PSC) in the Bering Sea pollock trawl fishery is of concern because chum salmon are an important stock for subsistence and commercial fisheries in Alaska.*** *There is currently no limitation on the amount of non-Chinook PSC that can be taken in directed pollock trawl fisheries in the Bering Sea. The potential for high levels of chum salmon bycatch as well as long-term impacts of more moderate bycatch levels on conservation and abundance, may have adverse impacts on fishery dependent communities.*

Non-Chinook salmon PSC is managed under chum salmon savings areas and the voluntary Rolling Hotspot System (RHS). Hard caps, area closures, and possibly an enhanced RHS may be needed to ensure that non-Chinook PSC is limited and remains at a level that will minimize adverse impacts on fishery dependent communities. The Council should structure non-Chinook PSC management measures to provide incentive for the pollock trawl fleet to improve performance in avoiding non-Chinook salmon while achieving optimum yield from the directed fishery and objectives of the Amendment 91 Chinook salmon PSC management program. Non-Chinook salmon PSC reduction measures should focus, to the extent possible, on reducing impacts to Alaska chum salmon as a top priority."

Current chum alternatives

Measures considered:

Status quo (Alt 1)

Hard caps (Alt 2)

Range: 50,000-353,000

- Based on history (1997-2009)
- Divided by sector similar to Chinook
- No incentive program currently included in alts

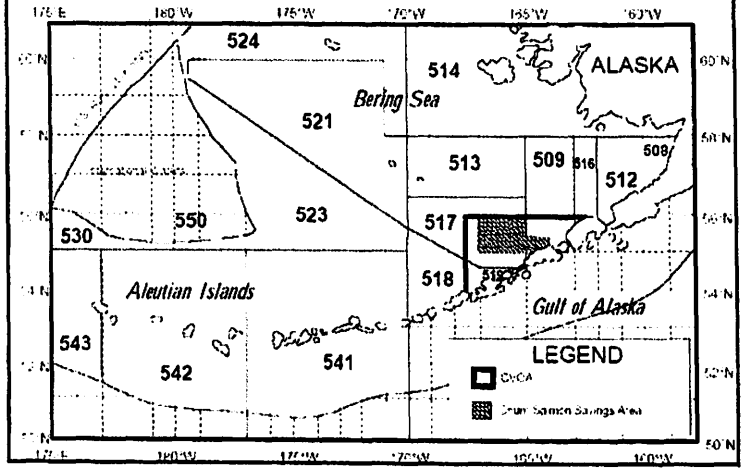
Triggered time/area closures (Alt 3)

- Monthly closure system based on proportions of historical bycatch
- Caps range from 25,000 to 200,000

Exempted area closure system (Alt 4)

Alternative 1 status quo

- Chum salmon savings area

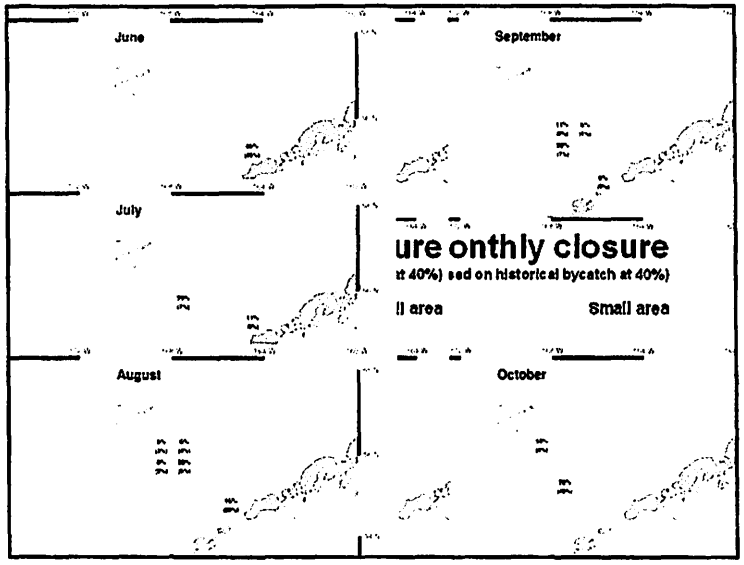


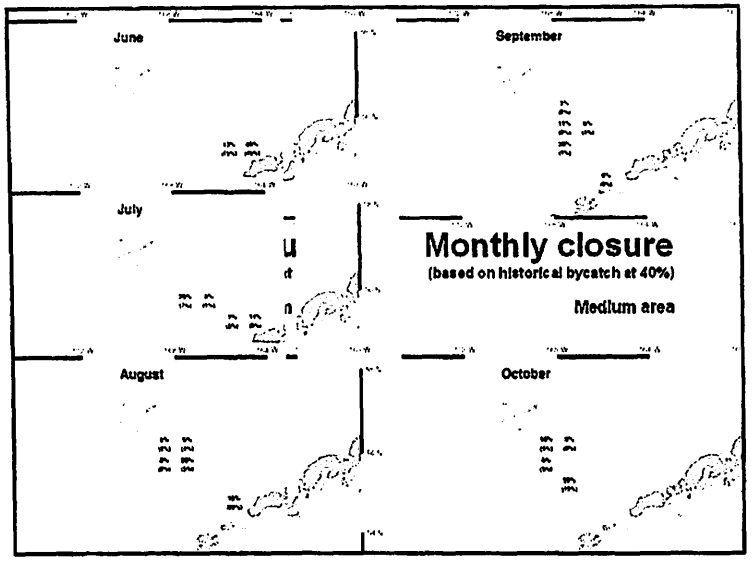
Alternative 2 components and options analysis

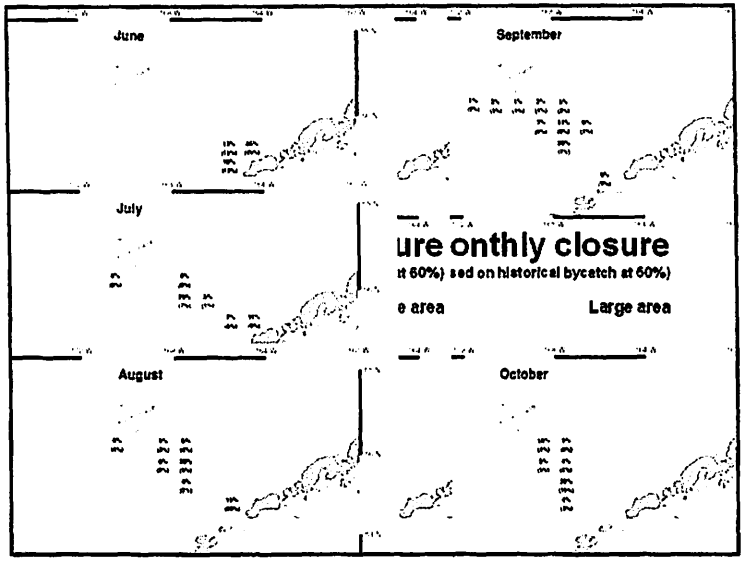
Setting the hard cap (Component 1)	Option 1: Select from a range of numbers	Non Chinook		CDQ	Non CDQ
		50,000		5,350	44,650
		200,000		21,400	178,600
		353,000		37,771	315,229
Allocating the hard cap to sectors (Component 2)*		CDQ	Inshore CV	Mothership	Offshore CP
	1: Option 2ii	10%	45%	9%	36%
	2: Option 4ii	3%	70%	6%	21%
	3: Suboption	10.7%	44.7%	8.7%	35.6%
Sector transfers (Component 3)	No transfers				
	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.			
Allocating the hard cap to cooperatives (Component 4)	No allocation	Allocation managed at the inshore CV sector level.			
	Allocation	Allocate cap to each cooperative based on that cooperative's proportion of pollock allocation.			
	Cooperative Transfers	Option 1	Lease pollock among cooperatives in a season or a year		
		Option 2	Transfer salmon PSC (industry initiated)		
		Suboption: Maximum amount of transfer limited to the following percentage of salmon remaining:		a	50%
				b	70%
				c	90%

Alternative 3

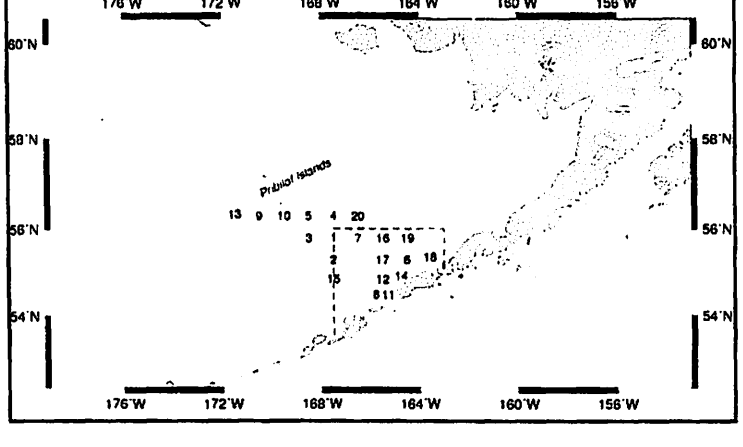
Setting the cap (Component 1)	1A How to formulate the cap	Select a cap from a range of numbers 25,000 -200,000 (same range as Alternative 2)			
	1B How to apportion cap by season	Option 1: monthly apportionment of cap			
		Option 2: monthly threshold and within monthly limit			
		Option 2a: As 2 but lower cap in June-July			
		Option 3: single limit monthly limit			
Allocating the hard cap to sectors (Component 2)		CDQ	Inshore CV	Mothership	Offshore CP
	1 Option 2ii	6.7%	63.3%	6.5%	23.6%
	2 Option 4ii	10.7%	44.7%	8.7%	35.6%
	3 Option 6	3.4%	81.5%	4.0%	11.1%
Cooperative Provisions (Component 3)	Voluntary transfers among sectors are allowed				
	NMFS can reapportion unused salmon to other sectors based on their proportion of remaining pollock (except not from CDQ groups)				
Area and Timing Options (Component 4)	a	Area closure groupings by month that represent 40% of historical PSC			
	b	Area closure groupings by month that represent 55% of historical PSC			
	c	Area closure groupings by month that represent 60% of historical PSC			







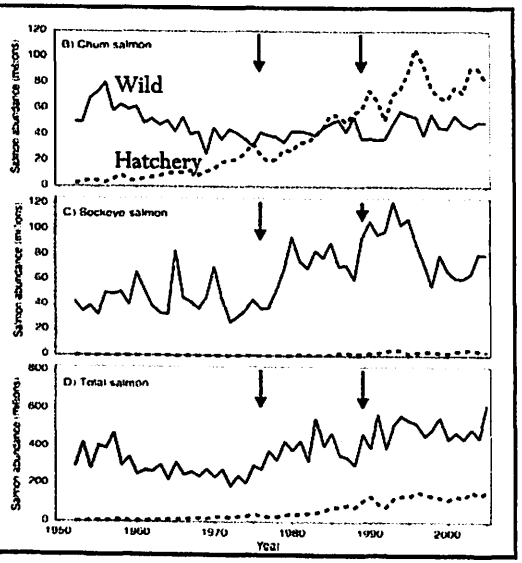
Alternative 4:
Fleet bycatch management with non-participant closure 80% of historical bycatch



Chapter 5, Chum salmon

- Hatchery releases
- Migration
- Stock status for Alaska
- Impact of alternatives

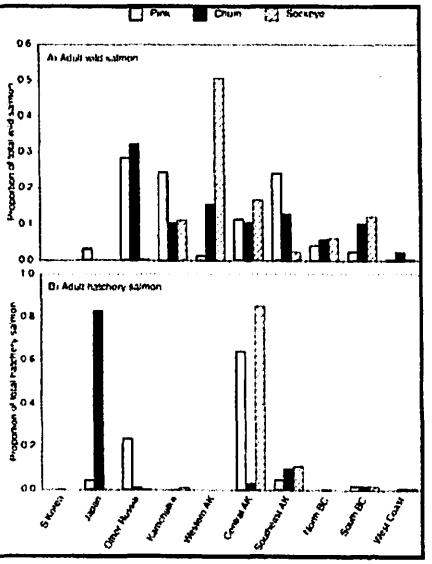
Ruggerone et al. 2009



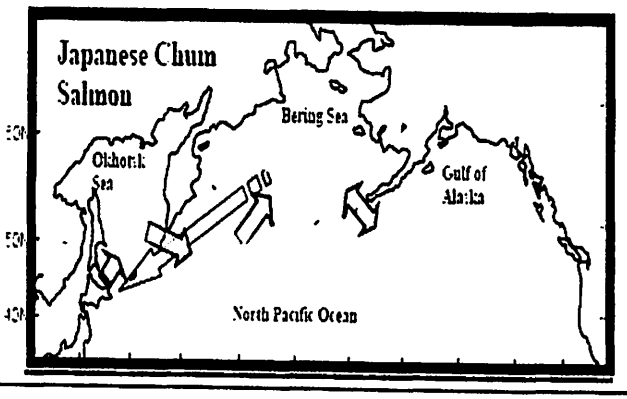
Wild

Hatchery

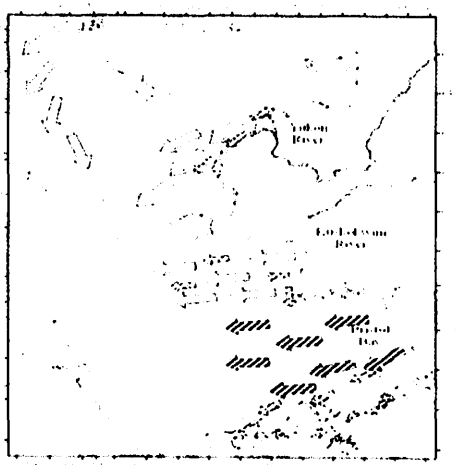
by region



General migration patterns for Japanese chum salmon

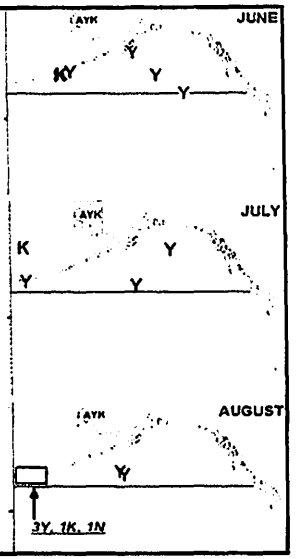


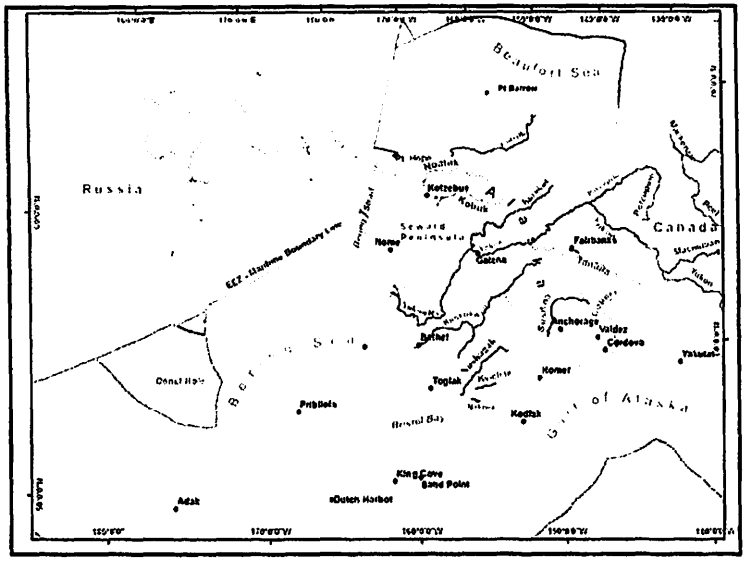
Migration patterns for WAK chum salmon



Myers' et al. AYK Tagged chum recoveries

Figure 5-8.
Page 4 of EA supplement





State of Alaska Salmon Management

- Management definitions:
- Healthy stock: annual runs to meet escapement goals and potential harvestable surplus to support optimum or maximum yield.
- Depleted stock: conservation concern for the stock. Stock of concern designation
  - Yield < Management < Conservation

Escapement

- Annual estimated size of spawning stock. Quality of escapement indicated by numbers of fish, sex ratio, age composition, temporal entry to the system, spatial distribution

Scientifically defensible escapement goals defined

- BEG = biological escapement goal
  - Provides greatest potential for maximum sustainable yield
- SEG = sustainable escapement goal
  - Index of escapement known to provide sustained yield over a 5 to 10 year period
  - Used when a BEG cannot be estimated
- SET = sustainable escapement threshold
  - Level of escapement below which the ability of the stock to sustain itself is jeopardized
- OEG = optimum escapement goal
  - Management objective for escapement that considers both biological and allocative factors.
  - May differ from a BEG or SEG

Figure 5-8

Bristol Bay

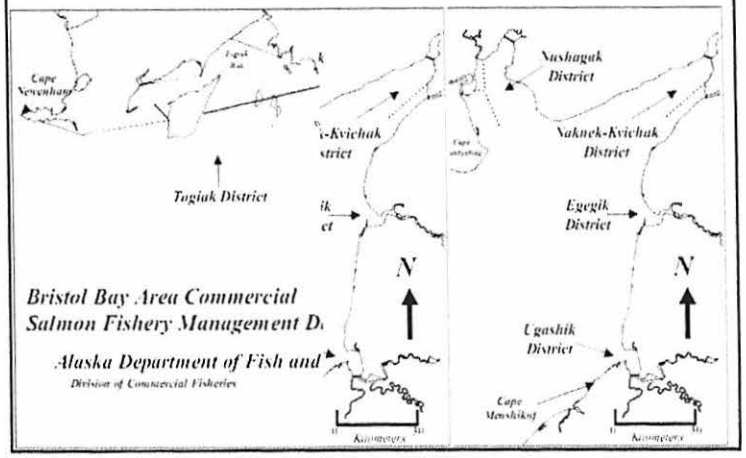


Figure 5-9

Bristol Bay

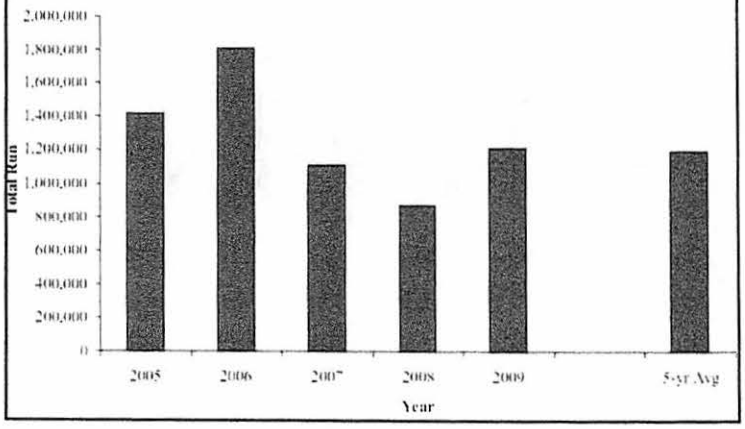
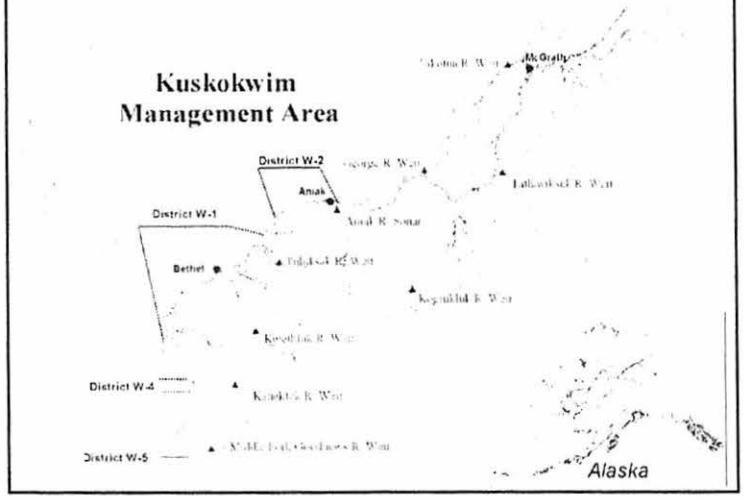


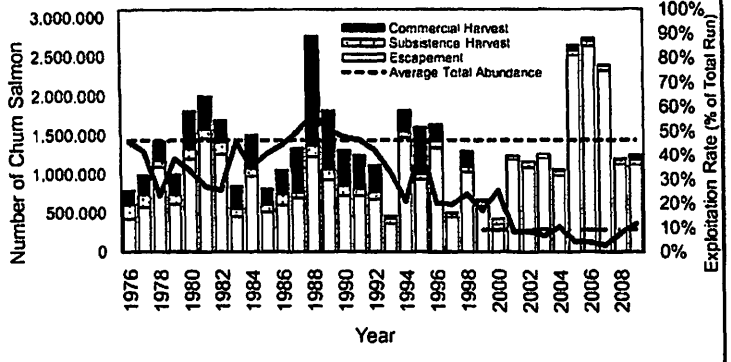
Figure 5-10

Kuskokwim River



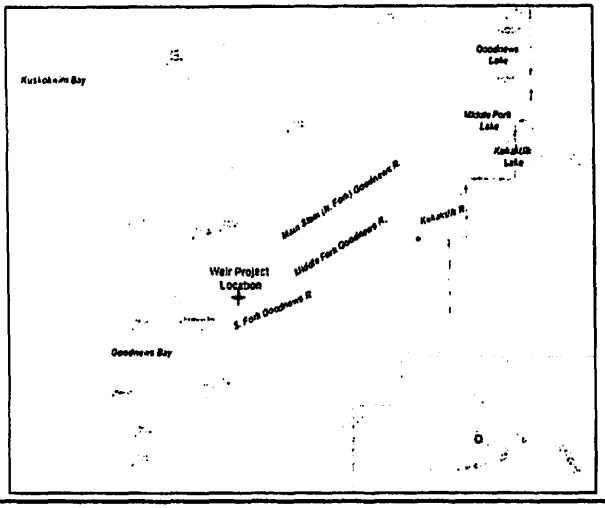
Kuskokwim River

Figure 5-11



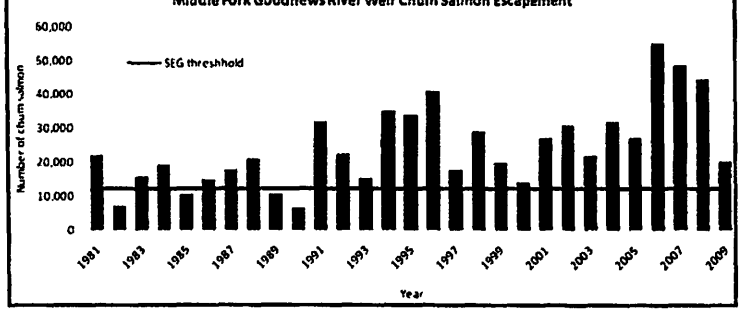
Kuskokwim Bay

Figure 5-18



Kuskokwim Bay

Figure 5-19



Yukon River drainage

Figure 5-21

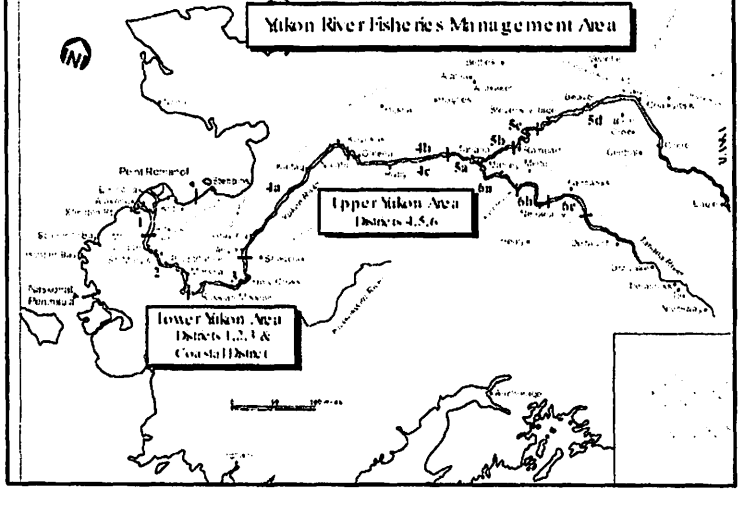
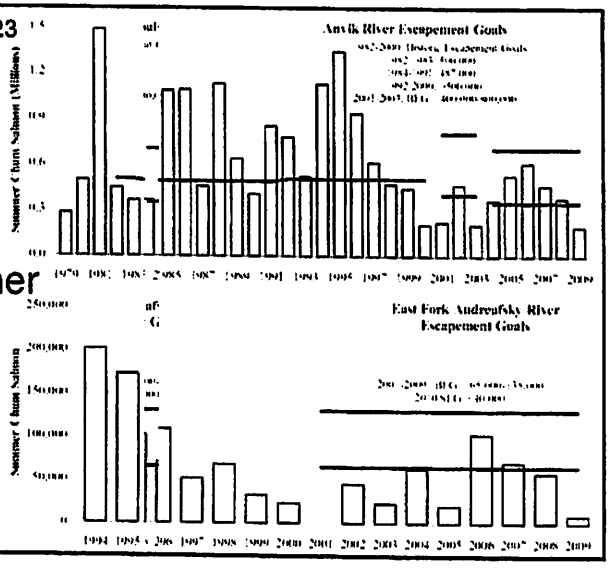


Figure 5-23

Yukon Summer



Yukon fall

Figure 5-26

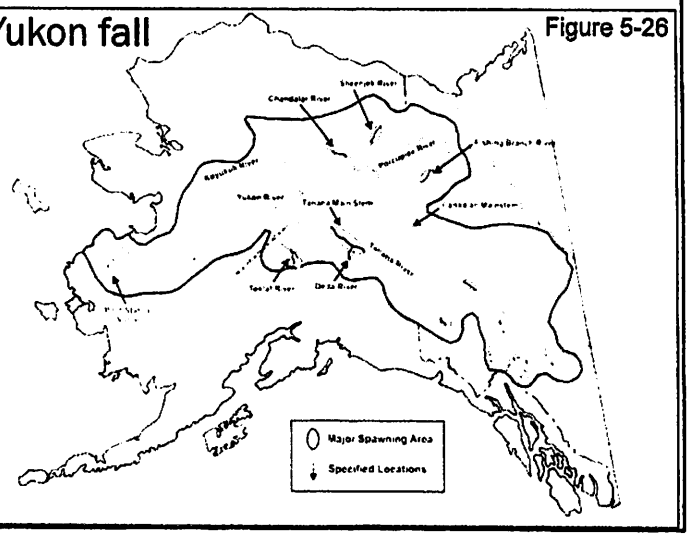
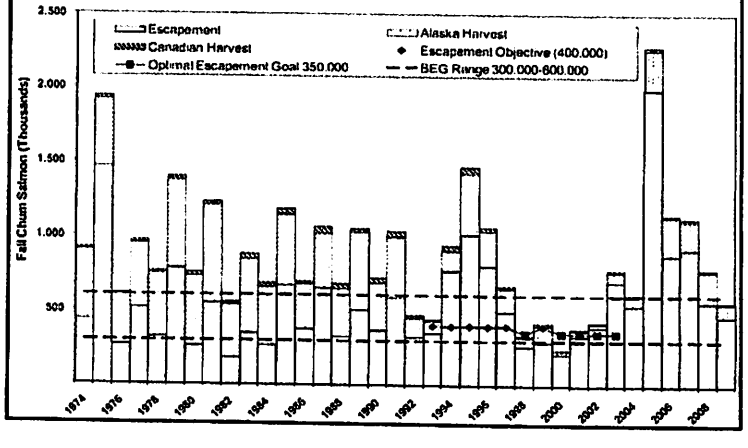


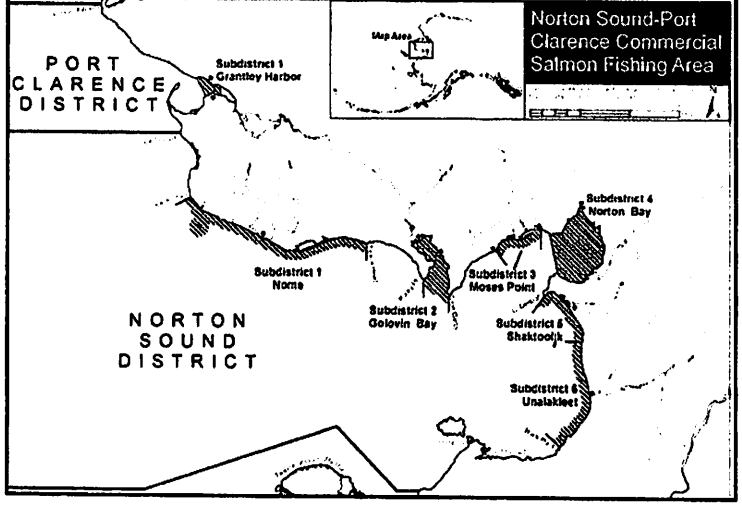
Figure 5-27

Yukon fall



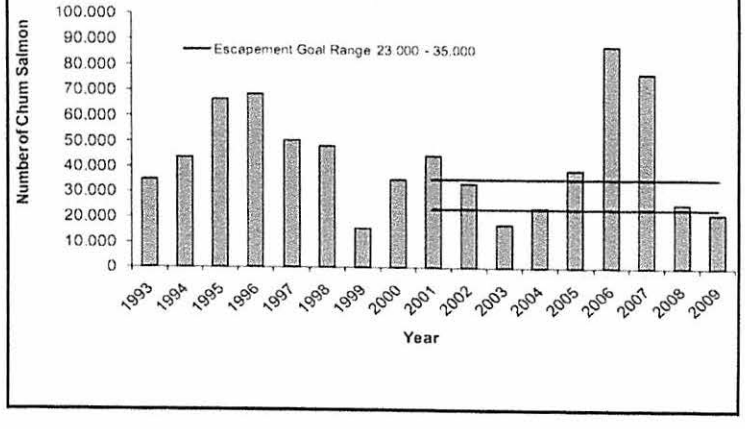
Norton Sound

Figure 5-32



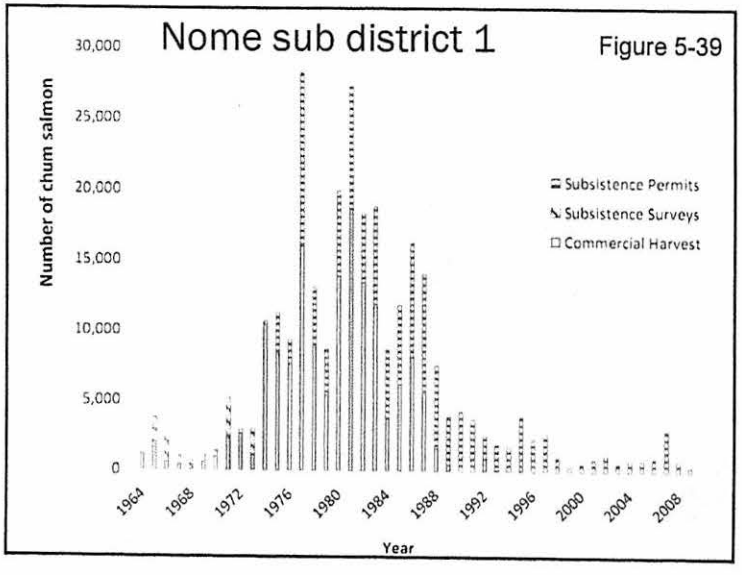
Nome sub district 1

Figure 5-33



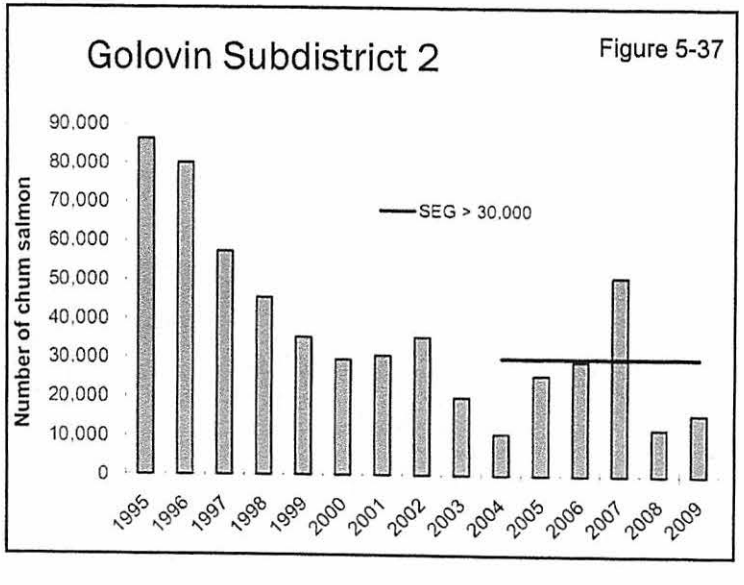
Nome sub district 1

Figure 5-39



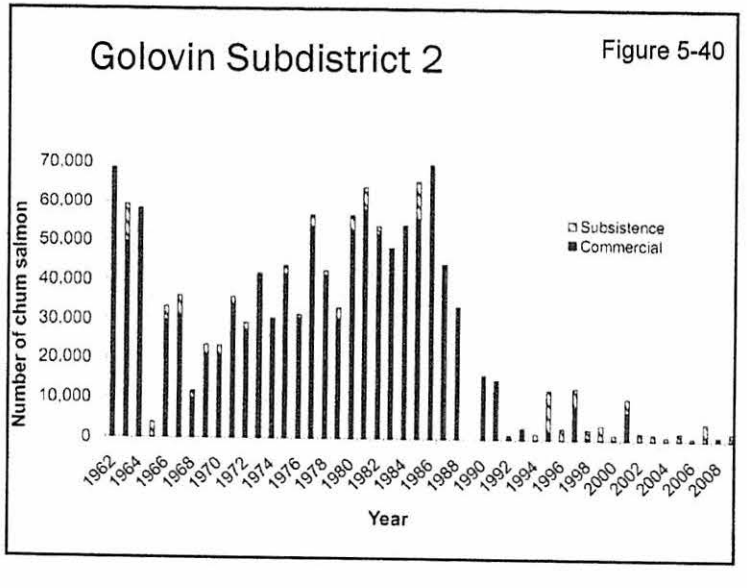
Golovin Subdistrict 2

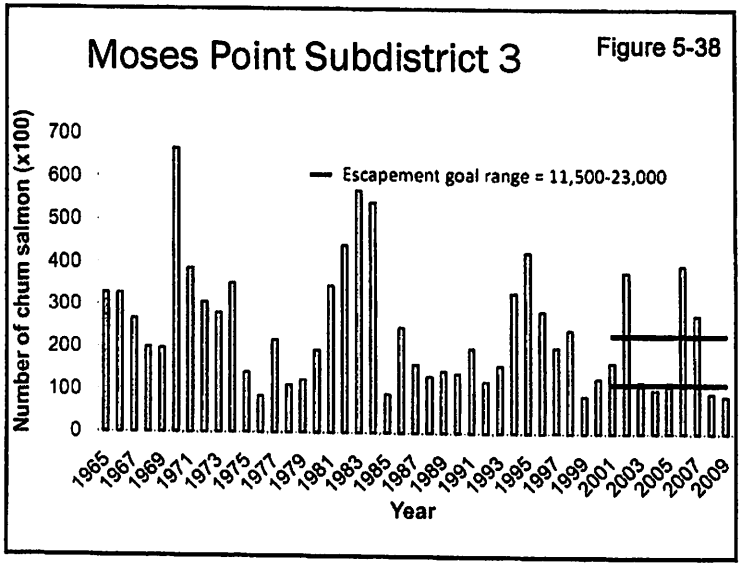
Figure 5-37

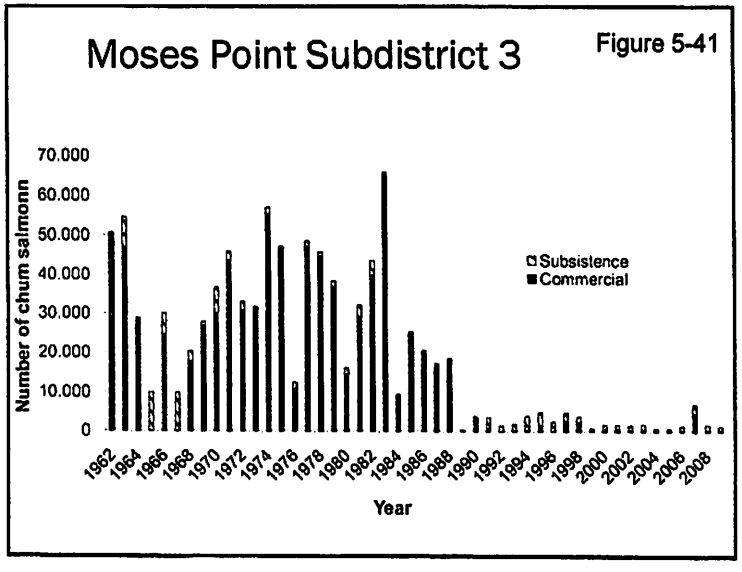


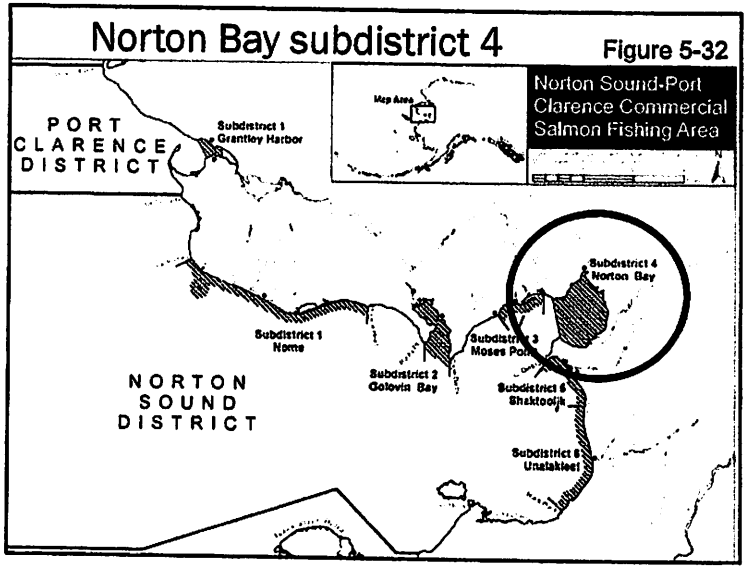
Golovin Subdistrict 2

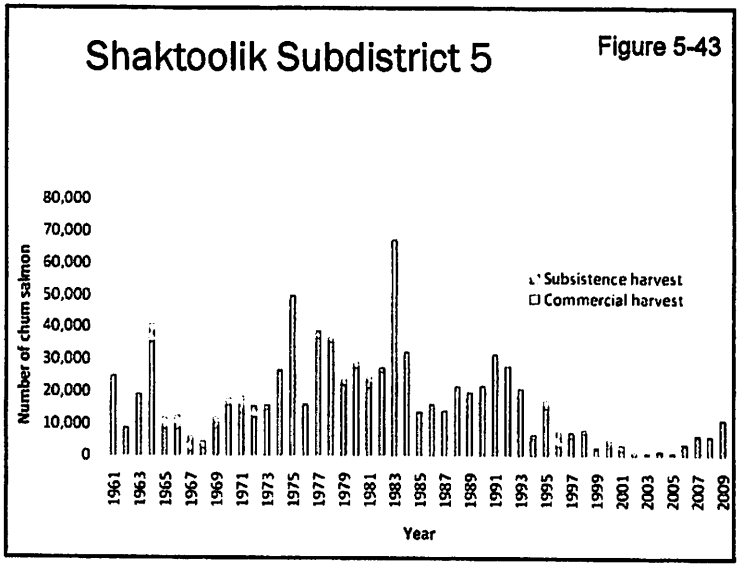
Figure 5-40




Moses Point Subdistrict 3
Figure 5-38
Number of chum salmon (x100)
700
600
500
400
300
200
100
0
Escapement goal range = 11,500-23,000
1965 1967 1969 1971 1973 1975 1977 1979 1981 1983 1985 1987 1989 1991 1993 1995 1997 1999 2001 2003 2005 2007 2009
Year

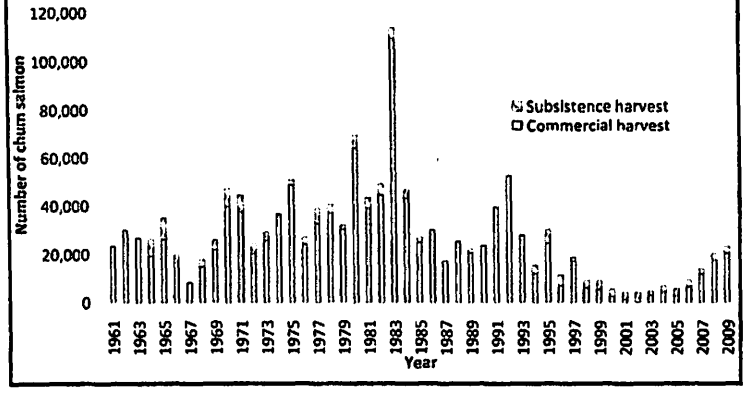

Moses Point Subdistrict 3
Figure 5-41
Number of chum salmonn
70.000
60.000
50.000
40.000
30.000
20.000
10.000
0
Subsistence
Commercial
1962 1964 1966 1968 1970 1972 1974 1976 1978 1980 1982 1984 1986 1988 1990 1992 1994 1996 1998 2000 2002 2004 2006 2008
Year


Norton Bay subdistrict 4
Figure 5-32
Norton Sound-Port Clarence Commercial Salmon Fishing Area
PORT CLARENCE DISTRICT
Subdistrict 1 Grantley Harbor
NORTON SOUND DISTRICT
Subdistrict 1 Nome
Subdistrict 2 Golovin Bay
Subdistrict 3 Moses Point
Subdistrict 4 Norton Bay
Subdistrict 5 Shaktoolik
Subdistrict 6 Unalakleet


Shaktoolik Subdistrict 5
Figure 5-43
Number of chum salmon
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
Subsistence harvest
Commercial harvest
1961 1963 1965 1967 1969 1971 1973 1975 1977 1979 1981 1983 1985 1987 1989 1991 1993 1995 1997 1999 2001 2003 2005 2007 2009
Year

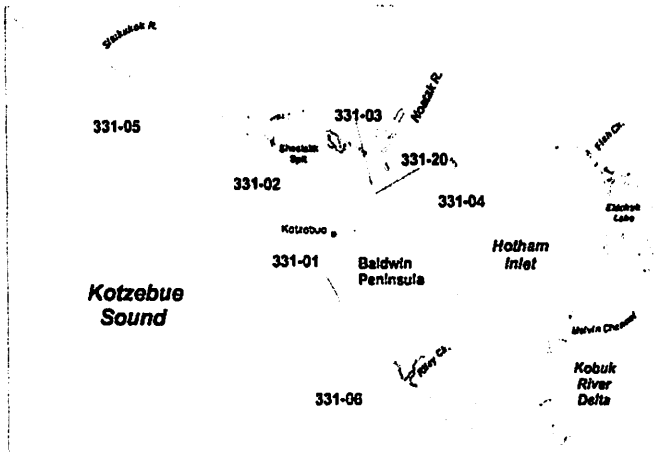
Unalakleet Subdistrict 6

Figure 5-44



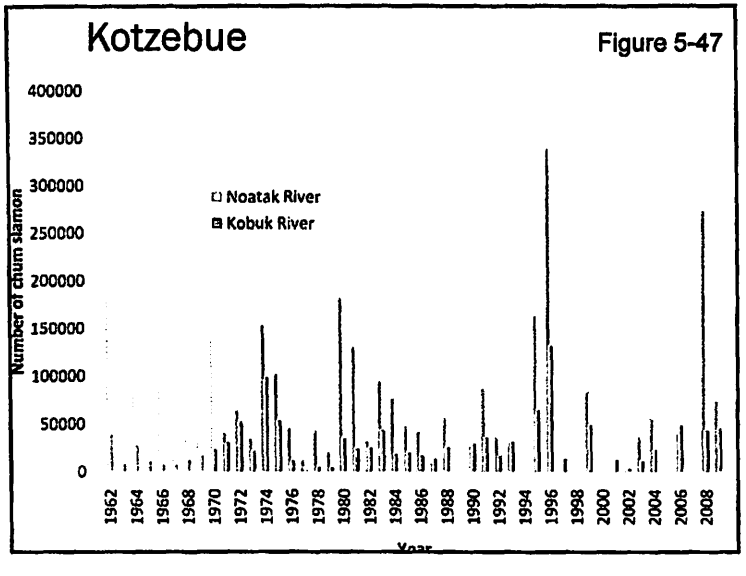
Kotzebue

Figure 5-46



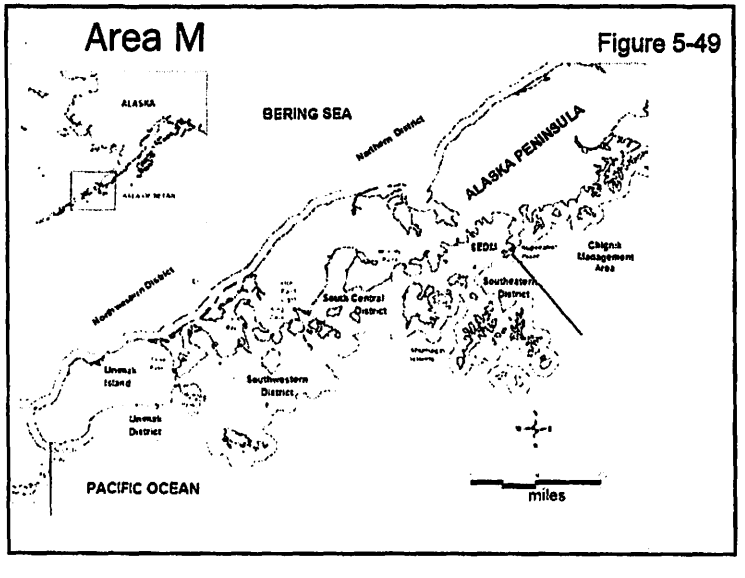
Kotzebue

Figure 5-47



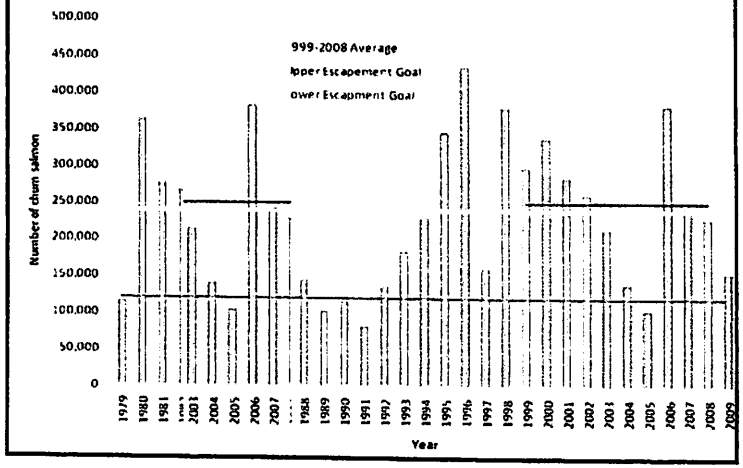
Area M

Figure 5-49



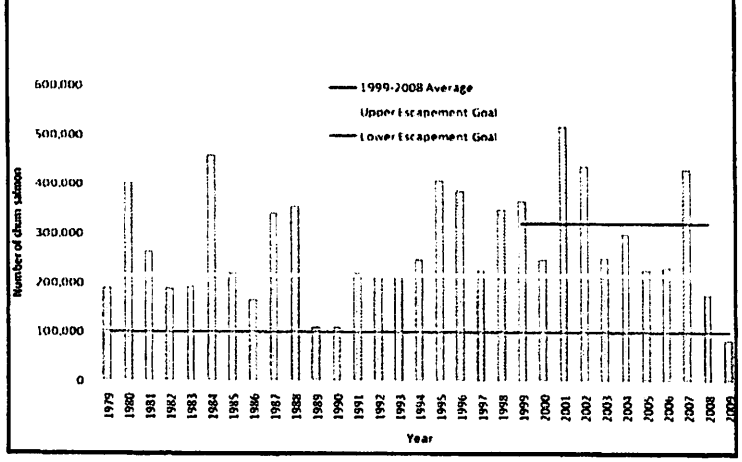
N AK Northern district

Figure 5-50



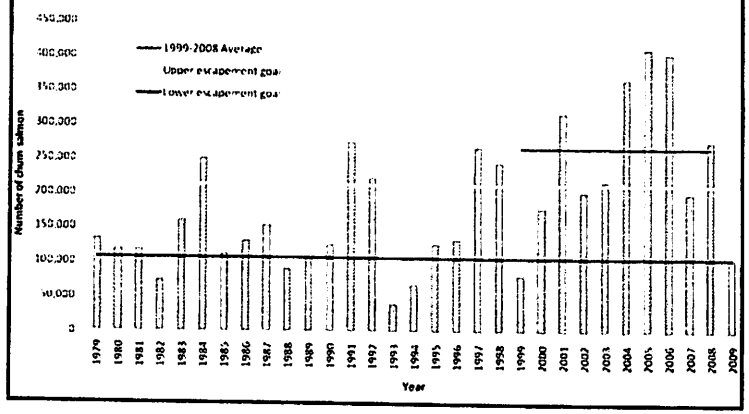
N AK Northwestern district

Figure 5-51



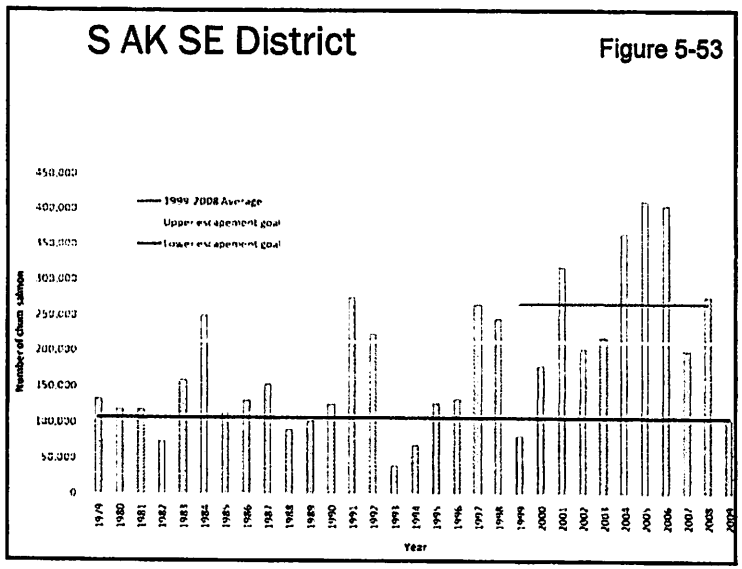
S AK Management (Unimak)

Figure 5-52



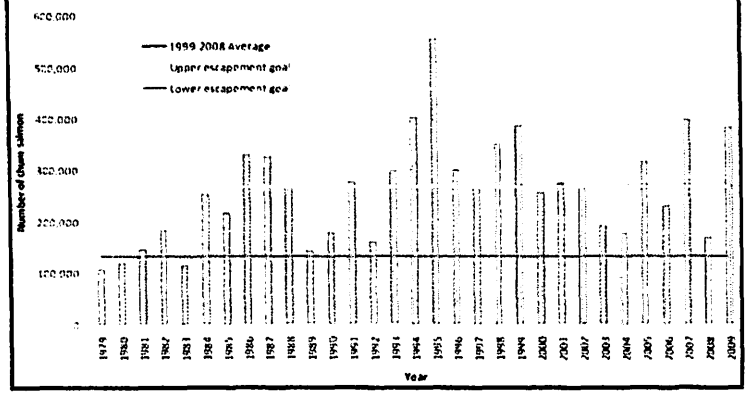
S AK SE District

Figure 5-53



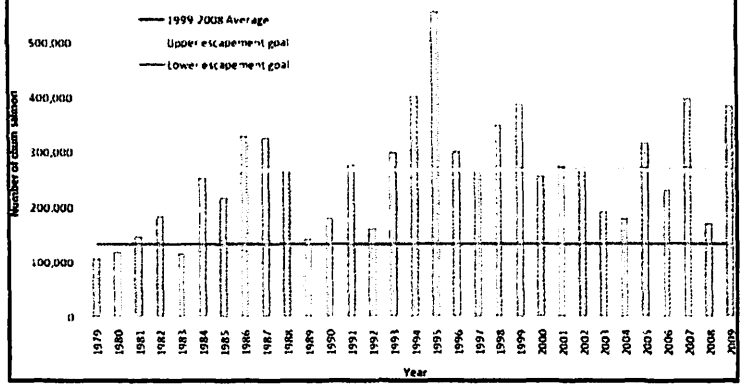
S AK SW District

Figure 5-54



S AK S Central District

Figure 5-55



Chum salmon stock performance summaries

Table ES-10. Overview of Alaskan chum salmon stock performance, 2010.

Chum salmon stock	Total run size?	Escapement goals met?	Subsistence fishery?	Commercial fishery?	Sport fishery?	Stock of concern?
Bristol Bay	Above average	1 of 1	Yes	Yes	Yes	No
Kuskokwim Bay	Above average	2 of 2	Yes	Yes	Yes	No
Kuskokwim River	Average	2 of 2	Yes	Yes	Yes	Yield concern discontinued 2007
Yukon River summer run	Average	2 of 2	Yes	Yes, but limited by low Chinook	Yes	Management concern discontinued 2007
Yukon River fall run	Below average	6 of 8	Restrictions	Limited late season (Tanana River)	No	Yield concern discontinued 2007
Eastern Norton Sound	Above average	1 of 1	Yes	Yes	Yes	No
Northern Norton Sound	Above average	7 of 7	Yes	Yes	Yes, except for Nome Subdistrict	Yield concern since 2000
Kotzebue	Above average	6 of 6	Yes	Yes	Yes	No
North Peninsula	Average	2 of 2	Yes	Yes	Yes	No
South Peninsula	Below average	2 of 4	Yes	Yes	Yes	No
Aleutian Islands	n a	n a	Yes	Yes	Yes	No
Kodiak	Below average	2 of 2	Yes	Yes	Yes	No
Chignik	Average	1 of 1	Yes	Yes	Yes	No
Upper Cook Inlet	Above average	1 of 1	Yes	Yes	Yes	No
Lower Cook Inlet	Average	9 of 12	Yes	Yes	Yes	No
Prince William Sound	Average	5 of 5	Yes	Yes	Yes	No
Southeast	Below average	6 of 8	Yes	Yes	Yes	No

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

Chapter 3 Methods

Analysis: impacts of bycatch

- Bycatch impact on returning salmon
  - I.e., adult equivalents (AEQ)
- Information needed:
  - Ocean mortality estimate
    - How many would naturally have died in the ocean
  - Ages of fish in bycatch
    - To estimate how many would be mature each year
  - Maturity estimate by river system
    - % by age that would return to river
- Combine with genetics

Chum salmon in pollock fishery

Salmon bycatch comprises

juveniles and **adults**

Some fraction would have returned to spawn in that year

Steps

1. Estimate age composition
   a) Convert length frequencies with age-length keys
   b) Incorporate estimates of uncertainty in both
2. Estimate proportion at sea that would have returned to spawn
   Based on in-river age compositions (iterative solution)
3. Compute age-lagged impact of bycatch on salmon returns: the Adult Equivalent mortality (**AEQ**)

Observer data...

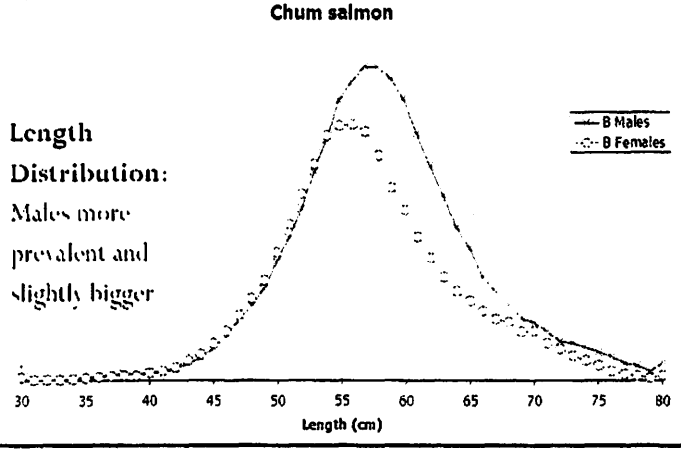
Fish measured

- By season and area

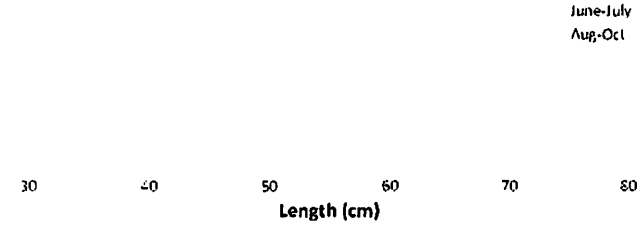
Age compositions

- From scales, generally in conjunction with genetics studies
- NPFMC paid for chum ages in 2010

Biological characteristics of chum salmon bycatch



Seasonal size compositions



Page 73 (pdf 130)

Chum salmon ...rtions Proportions at length

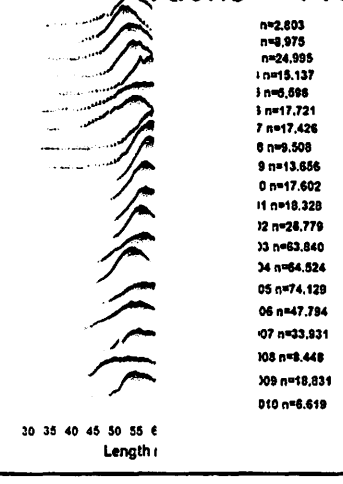


Figure 3-1
n = number of chum measured by NMFS observers on pollock boats

Page 73 (pdf 130)

Chum maturity rates in Alaska rivers

Table 3-5. In-river maturity-at-age distribution of chum salmon by region. Note that the column "relative weight" was used for computing a weighted mean maturity rate for chum salmon arising from relative run sizes presented in section 5.0.

		Age-specific in-river maturity				
Region	Rel. weight	3	4	5	6	7
Norton Sound	0.14	4.8%	50.4%	40.7%	4.0%	0.1%
Yukon R. summer	0.17	1.4%	52.9%	42.7%	3.1%	0.0%
Yukon R. fall	0.17	3.8%	67.8%	27.5%	0.9%	0.0%
Nushagak	0.16	2.0%	64.0%	32.0%	1.0%	0.0%
Kuskokwim	0.35	1.9%	63.8%	33.3%	1.1%	0.0%
Weighted mean		2.6%	60.8%	34.7%	1.8%	0.0%

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$AEQ_t = \sum_{a=3}^{7} c_{t,a} \gamma_{t,a}$ + Fish caught in earlier years that would have survived:

$\gamma_{t,3}(1-\gamma_{t,3})s_{t,3}c_{t-1,4} + \ldots$

Estimates of chum bycatch impact on returning salmon

Table 3-7 Estimated chum bycatch by year, their age-equivalent removals to mature returning salmon (AEQ, with upper and lower confidence intervals from simulations) and removals by chum salmon brood year (last two columns) using natural mortality scenario 2

Bycatch year	Annual bycatch	Mean AEQ	AEQ 5th percentile	AEQ 95th percentile	Brood year	Estimated bycatch
1991	28,951	16,884	11,791	18,754	1988	86,108
1992	10,271	31,539	27,733	38,968	1989	160,135
1993	242,191	154,290	136,556	172,786	1990	119,973
1994	92,672	132,571	100,609	188,132	1991	38,621
1995	19,261	47,918	36,212	75,268	1992	48,896
1996	77,236	53,984	47,699	61,907	1993	62,179
1997	65,988	60,301	51,509	80,216	1994	64,948
1998	64,042	66,699	59,521	78,001	1995	16,865
1999	45,172	48,279	41,618	61,929	1996	54,118
2000	58,571	52,581	45,178	61,074	1997	57,182
2001	57,007	52,743	46,109	65,963	1998	90,286
2002	80,782	69,344	61,280	82,058	1999	190,325
2003	189,185	141,869	125,711	171,351	2000	376,947
2004	440,459	325,945	292,873	377,794	2001	631,926
2005	704,586	567,893	501,585	671,478	2002	285,480
2006	309,644	419,542	335,631	591,359	2003	97,811
2007	93,786	150,434	116,769	211,919	2004	37,342
2008	15,157	45,958	34,578	70,515	2005	31,239
2009	46,129	36,435	31,102	43,711	2006	16,959
2010	13,294	21,765	15,983	32,509		
2011		*4,979*	*3,443*	*9,007*		
2012		*464*	*255*	*1,025*		

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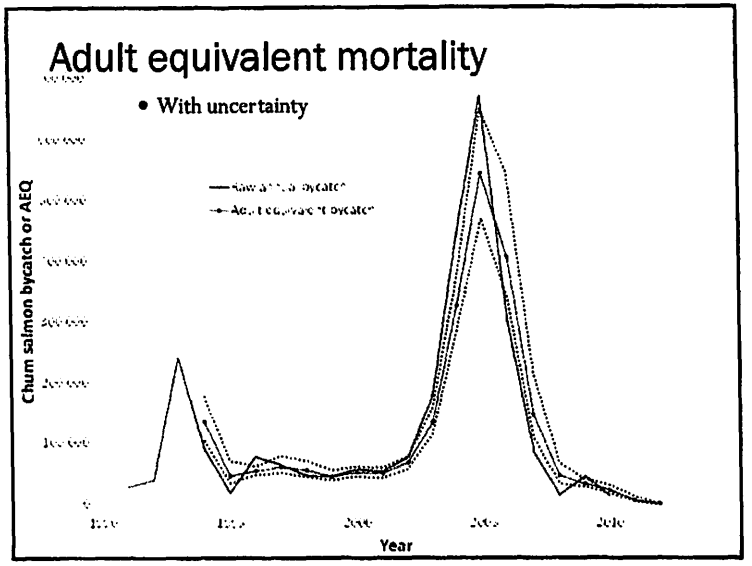
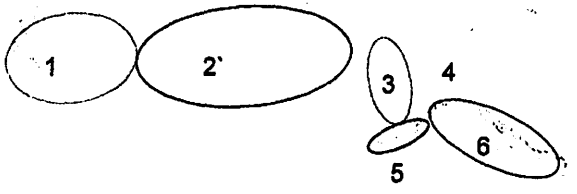
Adult equivalent mortality



Application of genetics data

Broad areas for stock ID resolution



Note:
Area "6" named "Pacific NW" but includes PWS, SE AK, BC, and Washington state.

Problem: How to apply genetics data to estimate stock composition of bycatch?

- Need:

Samples to ***bycatch***

- Samples typically ***out of proportion*** to bycatch

Approaches to fitting genetic composition data

Integrated model

Parameters are proportions:

- Each year (2005-2009) and
- Strata (Jun-Jul and Aug-Oct)

Purpose to allow tests for effects (e.g., year) and for combining with AEQ

Choices for objective function

1. Multivariate normal (output from genetics program)
2. Multinomial (N = number of **fish** sampled)
3. Multinomial (N = number of **hauls** sampled)

Table 3-10. Sample sizes (numbers of B-season chum salmon) available for genetic stock-composition estimates (by sub-season stratified samples) compared to the number of hauls and the actual bycatch levels, 2005-2009. Note that bycatch totals may differ slightly from official totals due to minor differences encountered when matching spatially disaggregated data.

Updated in document (typos)

Year	2005	2006	2007	2008	2009
Number of chum used in genetics sampling					
Jun-Jul	480	356	240	468	635
Aug-Oct	542	974	1033	464	801
Total	1,022	1,330	1,273	932	1,436
Number of hauls samples were collected					
Jun-Jul	199	112	136	57	180
Aug-Oct	229	468	464	158	251
Total	428	580	600	215	431
Bycatch of non-Chinook salmon					
Jun-Jul	238,338	177,663	13,352	5,544	23,890
Aug-Oct	432,818	125,405	71,742	9,027	21,455
Total	671,156	303,068	85,094	14,571	45,346

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June-July Avg. 2005-2009

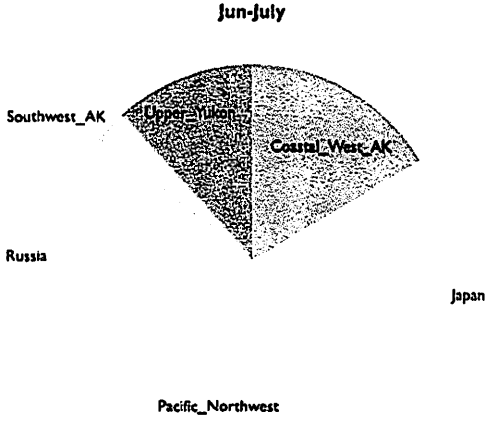

Figure 3-16, Page 91 (pdf 148)

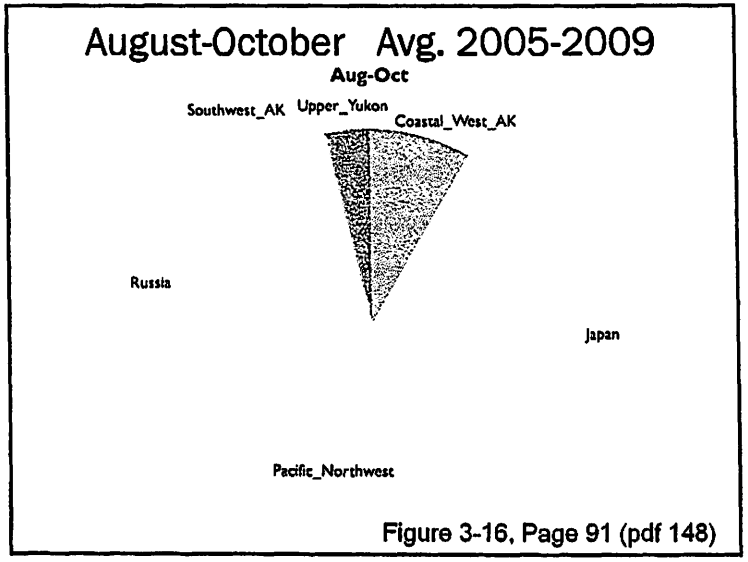

Figure 3-16, Page 91 (pdf 148)

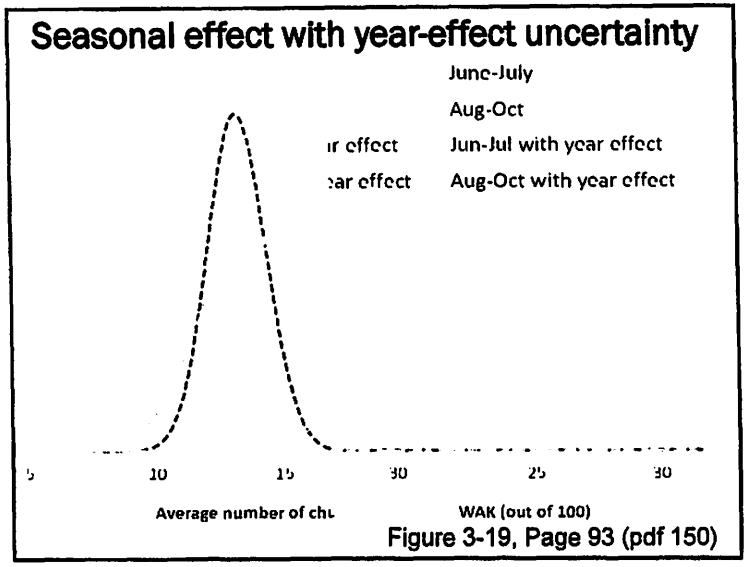

Figure 3-19, Page 93 (pdf 150)

Applying genetics results to AEQ

Need to bridge lag effect of juvenile chum salmon to region of origin

Example:

- 100 fish projected from last year's bycatch would have returned this year
  - Then last year's genetic estimates of the bycatch would apply (not this year's)

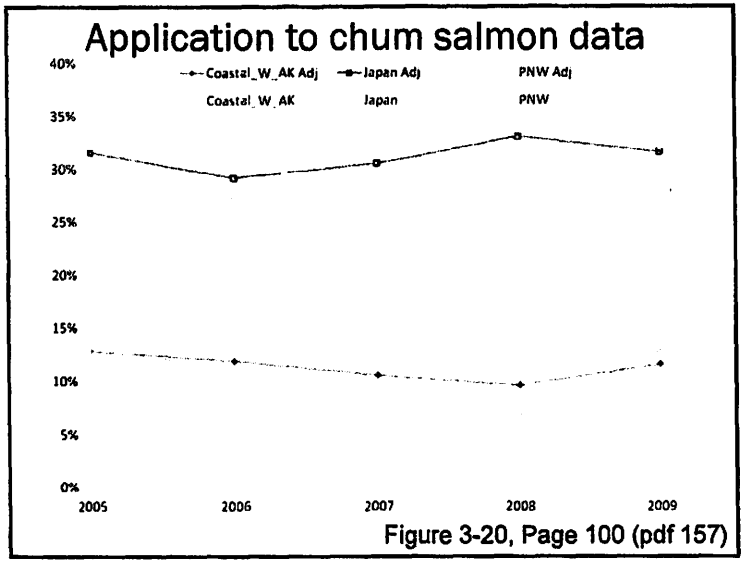

Figure 3-20, Page 100 (pdf 157)

Lag-corrected stock composition estimates

Table 3-13 Time series in top panel, total composition estimates of AEQ (percentages in top panel, total numbers) 1994-2004 and ... sed on B-season stratified samples. *Note—for 1994-2004 and 2010 ... estimates includes data were applied to the bycatch levels. All estimates include the lag-... different ... nts for the proportion of AEQ being caught in different calendar*

	AEQ	[illegible]K	UppYukon	Japan	AKBC WA	Russia	SWAK	UppYukon
1994	152,571	106	5,001	18,538	23,170	40,730	2,490	5,005
1995	17,048	[illegible]	2,011	17,407	8,540	11,761	809	2,012
1996	53,064	[illegible]	2,20	19,786	9,204	16,792	[illegible]	2,207
1997	99,501	[illegible]	2,45	22,153	10,218	18,564	1,192	2,455
1998	66,600	214	2,67	24,534	11,262	20,828	1,214	2,678
1999	48,279	385	1,05	17,753	8,100	15,070	885	1,052
2000	52,581	105	2,00	18,576	9,912	15,551	1,065	2,001
2001	52,743	103	2,58	18,458	9,891	15,065	1,003	2,580
2002	69,544	128	3,05	24,921	12,338	21,118	1,528	3,051
2003	141,566	230	6,44	46,713	28,540	42,047	2,736	6,444
2004	325,015	140	15,16	119,533	60,030	97,582	6,110	15,162
2005	567,895	162	34,09	170,225	119,351	158,205	13,409	34,093
2006	410,542	362	31,42	122,118	101,412	106,288	8,562	31,425
2007	150,434	106	11,03	45,878	33,427	41,074	2,666	[illegible]
2008	45,088	172	3,14	15,170	10,313	15,124	772	3,148
2009	46,458	183	1,39	11,481	7,800	9,046	1,355	1,392
2010	21,765	191	1,20	6,041	5,201	5,501	791	1,204
2011	4,079	80	51	1,482	1,221	1,197	109	517
2012	464	14	5	133	118	109	14	56

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Approaches to evaluate impacts on Alaskan river systems

Table 5-74. Estimates of chum salmon run sizes by broad regions, 1991-2009. WAK includes coastal western Alaska and Upper Yukon (Fall run). These values only include regions where estimates were available and may be considered conservative.

	WAK run size	Coastal WAK	Upper Yukon	SW Alaska (Area M)
1991	3,051,585	2,021,357	1,030,228	1,029,576
1992	2,324,051	1,850,952	473,099	877,674
1993	1,893,485	1,449,782	443,703	955,646
1994	2,918,361	1,979,216	939,145	1,170,604
1995	4,009,752	2,539,450	1,470,302	1,735,854
1996	3,403,884	2,342,939	1,060,945	1,433,400
1997	1,736,543	1,071,653	664,890	1,197,250
1998	1,428,365	1,094,424	333,941	2,771,735
1999	1,512,520	1,092,383	420,137	1,391,480
2000	1,207,211	967,912	239,299	1,110,175
2001	3,053,952	2,671,211	382,741	1,557,147
2002	2,840,937	2,415,549	425,388	1,304,489
2003	3,488,094	2,713,202	774,892	958,277
2004	3,004,884	2,390,715	614,169	1,173,828
2005	7,206,714	4,920,018	2,286,696	1,300,567
2006	6,891,139	5,746,681	1,144,458	1,380,181
2007	5,327,156	4,195,333	1,131,823	1,401,451
2008	3,715,641	2,933,212	782,429	997,037
2009	3,403,125	2,843,270	559,855	750,821
Median	3,051,585	2,390,715	664,890	1,197,250

Historical impact rates

Table 5-75. Estimated median impact of the pollock fishery (based on regional AEQ estimates from Table 3-13) on chum salmon assuming run size estimates presented in Table 5-74 (with an assumed 10% CV) by broad regions, 1994-2009. WAK includes coastal western Alaska and Upper Yukon (Fall run). Italicized values are extrapolated from 2005-2009 stratum-specific mean bycatch stock composition estimates and as such have higher levels of uncertainty. They do account for the amount of bycatch that occurred within each stratum and the estimates of total run strength. Values in parentheses are the 5th and 95th percentile from the integrated combined AEQ-Genetic-run-size uncertainty model.

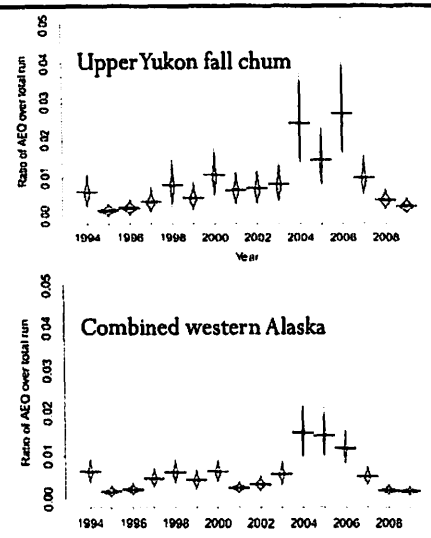
	Coastal WAK	Upper Yukon	WAK (coastal Upper Yukon)	SW Alaska
1994	*0.62% (0.43%-0.88%)*	*0.61% (0.39%-0.93%)*	*0.62% (0.45%-0.85%)*	*0.11% (0.00%-0.27%)*
1995	*0.18% (0.12%-0.25%)*	*0.14% (0.08%-0.22%)*	*0.16% (0.11%-0.23%)*	*0.03% (0.00%-0.07%)*
1996	*0.21% (0.15%-0.29%)*	*0.20% (0.12%-0.31%)*	*0.21% (0.15%-0.28%)*	*0.04% (0.00%-0.09%)*
1997	*0.51% (0.35%-0.72%)*	*0.35% (0.21%-0.56%)*	*0.46% (0.33%-0.61%)*	*0.05% (0.00%-0.13%)*
1998	*0.55% (0.38%-0.78%)*	*0.78% (0.46%-1.23%)*	*0.61% (0.44%-0.82%)*	*0.02% (0.00%-0.06%)*
1999	*0.40% (0.28%-0.56%)*	*0.45% (0.27%-0.71%)*	*0.42% (0.30%-0.57%)*	*0.04% (0.00%-0.08%)*
2000	*0.52% (0.37%-0.70%)*	*1.05% (0.70%-1.55%)*	*0.63% (0.48%-0.81%)*	*0.04% (0.00%-0.10%)*
2001	*0.19% (0.13%-0.26%)*	*0.67% (0.43%-0.96%)*	*0.25% (0.19%-0.32%)*	*0.03% (0.00%-0.07%)*
2002	*0.27% (0.19%-0.37%)*	*0.70% (0.45%-1.05%)*	*0.34% (0.25%-0.44%)*	*0.05% (0.00%-0.12%)*
2003	*0.49% (0.35%-0.66%)*	*0.80% (0.52%-1.20%)*	*0.57% (0.43%-0.74%)*	*0.14% (0.00%-0.34%)*
2004	*1.28% (0.92%-1.74%)*	*2.40% (1.50%-3.42%)*	*1.52% (1.14%-1.98%)*	*0.25% (0.00%-0.62%)*
2005	1.47% (1.11%-1.92%)	1.42% (0.98%-2.03%)	1.45% (1.15%-1.85%)	0.81% (0.30%-1.47%)
2006	0.86% (0.63%-1.16%)	2.65% (1.87%-3.67%)	1.16% (0.90%-1.49%)	0.45% (0.25%-0.75%)
2007	0.38% (0.28%-0.51%)	0.98% (0.70%-1.35%)	0.51% (0.39%-0.66%)	0.10% (0.05%-0.17%)
2008	0.14% (0.10%-0.19%)	0.40% (0.29%-0.57%)	0.19% (0.14%-0.26%)	0.02% (0.01%-0.07%)
2009	0.15% (0.12%-0.20%)	0.24% (0.15%-0.36%)	0.17% (0.13%-0.22%)	0.18% (0.10%-0.29%)

Historical impact rates summary

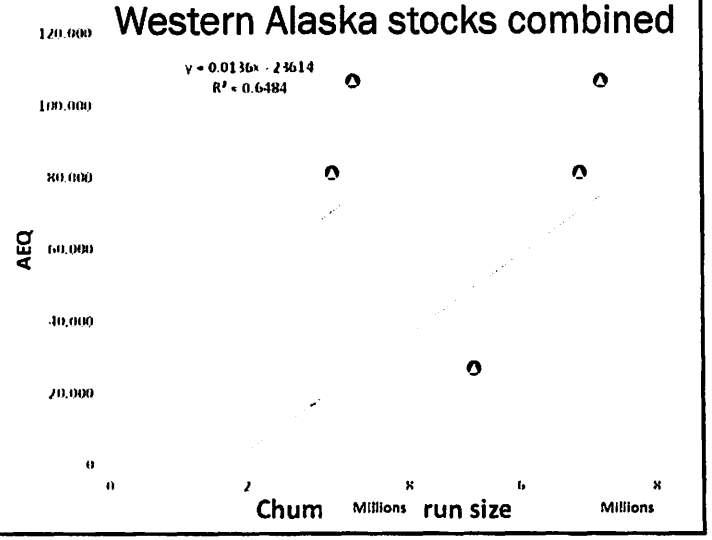
impact rate (2005-2009) by region (with ranges over this period):

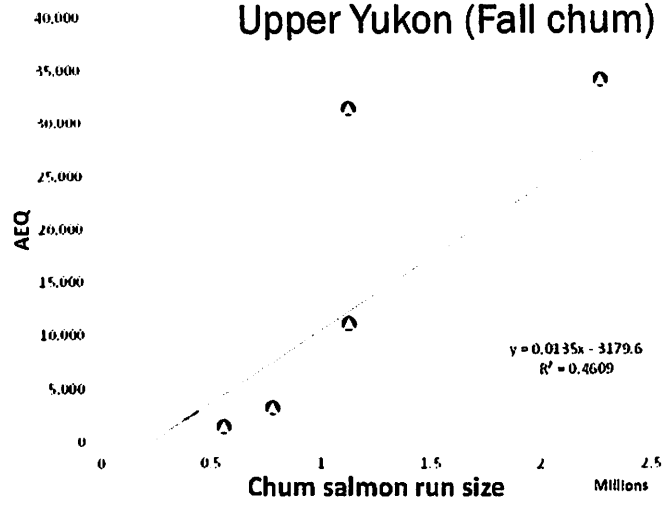
Coastal west Alaska	0.6%	(0.1% - 1.5%)
Upper Yukon	1.2%	(0.2% - 2.7%)
Combined WAK	0.7%	(0.1% - 1.5%)
Southwest Alaska	0.4%	(0.1% - 1.0%)

Impact Rates



Is bycatch related to run size?





Evaluating status quo measures for chum salmon bycatch/PSC reduction

Alan Haynie, PhD

Alaska Fisheries Science Center

Council Presentation
Nome, June 2011

The Council specifically requested the following analysis

- In depth description of the rolling hot spot regulations (Amendment 84), focusing on parameters that could be adjusted if the Council found a need to refine the program to meet objectives under Component 7.
- Specifically analyze:
  a. the base rate within the RHS program;
  b. the options for revising the tier system within the RHS program.

Highlights / Overview

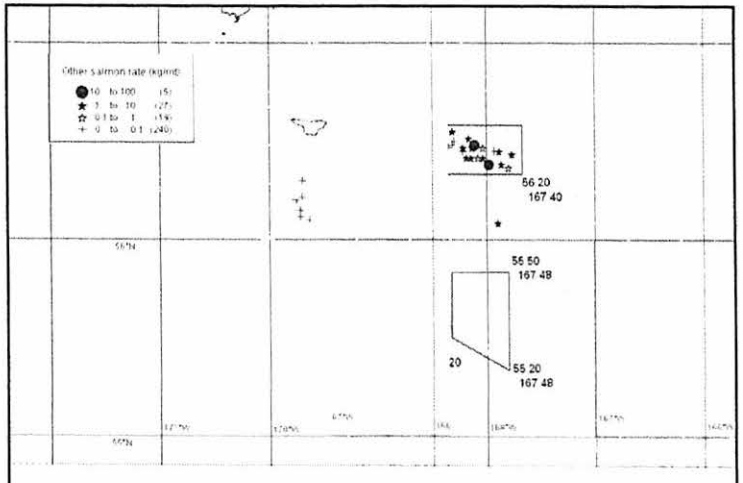
- Examination of post-closure impacts indicates an 8% chum PSC reduction is observable after closure implementation
- Historical application of hotspot closure rules suggests an average reduction of 9-22 percent across different models
  - Chinook PSC/bycatch was reduced significantly when targeting chum alone
  - The freshness of data is very important in closure effectiveness;
  - Base rate variation in the rolling hotspot (RHS) range has little impact
  - Larger number of closed areas at a given time leads to more PSC/bycatch reduction, but at a decreasing rate.
- Various parameters could be adjusted in the RHS system to improve its effectiveness.

SeaState Hotspot Closure Details

SeaState has the power to close areas based on a cooperative's PSC/bycatch rate for 3-7 days

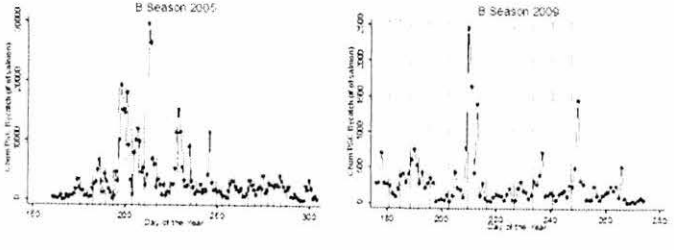
- Closures can be extended for additional time and have been for up to 4 weeks
- Closures more likely to be extended in low bycatch periods

Small amount of fishing inside of closures by Tier 1 & Tier 2 vessels (<1% by CP/MS/CDQ, 5% by CVs)



Sample Chum / "Other Salmon" hotspot closures, 8/15/06

Daily variation in the chum PSC rates, 2005 & 2009 (from Figure 5-84)



Vertical lines represent days with closures were implemented. Most seasons are marked by several peaks that last several days.

Chum PSC rates (2003-2010) Before/After RHS Implementation

- Near the time of implementation, we should be able to detect an effect on average even if there is lots of variation from day to day
- 8% reduction in mean chum PSC
  - Variously statistical tests provide evidence of reduction

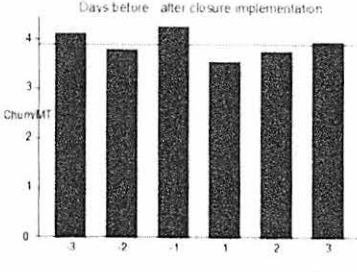


Figure 5-85

Examination of historical chum PSC/bycatch before hotspot system (1993 – 2000)

General Method

- "Implement" hotspot data on the fishery from 1993-2000
- Redistribute effort to other areas based on sector-level PSC/bycatch rates
- Estimate bycatch reduction & how much pollock is moved as a result of this process

Advantages

- Can vary parameters to account for uncertainty (e.g., starting day of closures, window of information considered, etc.)
- Can also test how variation in different parameters impacts the size of salmon reduction (e.g., closure size, base rate, how old the information is in creating the closure)

Figure 5-86. Salmon PSC catch by Bering sea pollock fishery, 1992-2000

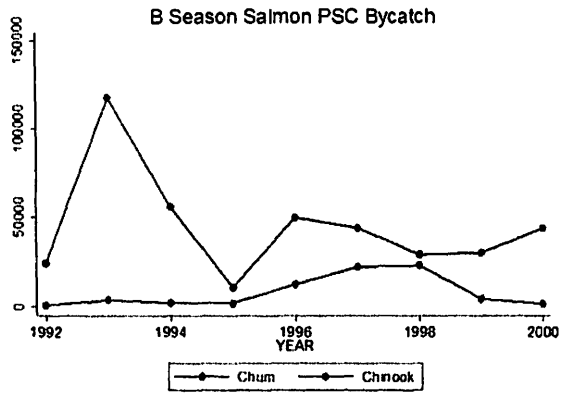


Table 5-62. Three model suites developed to mimic actual Rolling Hotspot Program

	Model 1	Model 2	Model 3
Model Name	Baseline	High-end	Low-end
Stat Areas closed	1 or 2	2	1
Days of closures	3 or 7	3	3 or 7 or 12
Base rate	0.06, 0.19	0.06, 0.19	0.19
Min pollock proportion	0.02	0.02	0.02
Information lag	2 or 3	2	3
Days to use in decision	3, 4, 5	3, 4, 5	3,4,5
Starting day	0, 1, 2	0, 1, 2	0,1,2
# of Closures per year (Avg)	16.7	23.7	11.6
Models in model suite	192	36	24

Three model suites are intended to bracket RHS program parameters and to account for uncertainty.

Table 5-63. Percent chum reduced per year with different models, 1993-2000

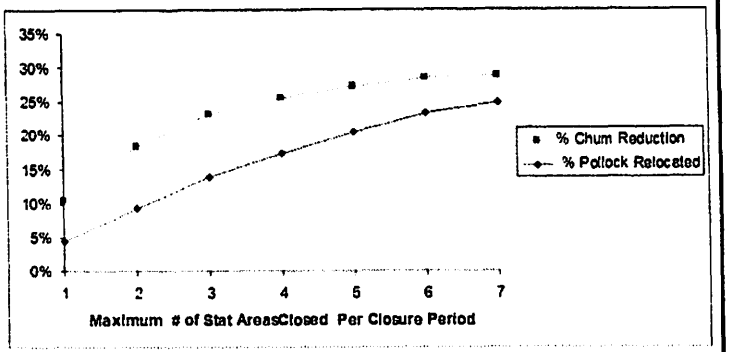
	Baseline		High-end		Low-end	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
1993	0.147	0.062	0.237	0.028	0.087	0.04
1994	0.132	0.053	0.206	0.044	0.104	0.044
1995	0.044	0.025	0.048	0.025	0.043	0.035
1996	0.147	0.116	0.238	0.049	0.076	0.052
1997	0.133	0.049	0.172	0.024	0.085	0.027
1998	0.123	0.071	0.198	0.032	0.069	0.045
1999	0.159	0.06	0.245	0.063	0.077	0.056
2000	0.277	0.098	0.404	0.045	0.167	0.091
Total	14.5%	0.093	21.9%	0.101	8.9%	0.062

On average, no significant difference in effectiveness of closures at high and low annual chum PSC levels.

Table 5-64. Percent pollock reallocated per year with different RHS configurations, 1993-2000

	Baseline		High-end		Low-end	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
1993	0.081	0.034	0.122	0.013	0.054	0.02
1994	0.088	0.046	0.128	0.02	0.065	0.039
1995	0.039	0.02	0.043	0.019	0.035	0.027
1996	0.066	0.029	0.095	0.009	0.04	0.013
1997	0.087	0.043	0.127	0.018	0.048	0.021
1998	0.063	0.026	0.081	0.017	0.039	0.016
1999	0.038	0.022	0.058	0.025	0.013	0.006
2000	0.09	0.04	0.124	0.04	0.048	0.022
Total	**6.9%**	0.039	**9.7%**	0.038	**4.3%**	0.026

Figure 5-88. Percentage reduction in Chum bycatch and pollock reallocated with different number of closures.



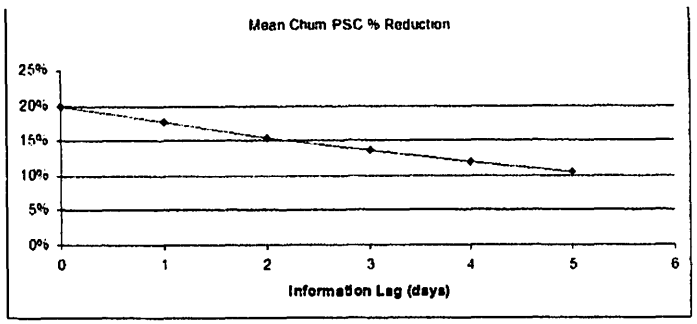
Closing more areas reduces chum PSC further, but at a decreasing benefit per % of pollock effort relocated.

Table 5-65. Proportion of Chinook PSC reduced per year with different PRHS configurations, 1993-2000

	Baseline		High-end		Low-end	
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
1993	0.059	0.042	0.104	0.026	0.029	0.02
1994	0.115	0.054	0.156	0.026	0.083	0.053
1995	0.029	0.027	0.041	0.03	0.007	0.007
1996	0.144	0.092	0.214	0.022	0.077	0.033
1997	0.109	0.054	0.17	0.039	0.062	0.035
1998	0.125	0.043	0.169	0.034	0.094	0.035
1999	0.11	0.054	0.138	0.056	0.065	0.024
2000	0.075	0.045	0.086	0.051	0.033	0.024
Total	**9.6%**	0.065	**13.6%**	0.062	**5.6%**	0.042

Note: these Chinook reductions are for closures focused on reducing chum, not closures that actually target Chinook PSC.

Figure 5-89. Information lag and chum PSC reduction effectiveness



There is approximately a 1.25 day delay from when closures are announced and implemented. Thus the current RHS system has an information delay of 1-4 days depending on when shore-side delivery information is received. A shorter delay would likely improve effectiveness.

Table 5-67. Average simulated chum PSC reductions for different base rates, for the baseline PRHS configuration, 1993-2000.

	Base Rate (short-term)						
Year	0.01	0.02	0.06	0.12	0.19	0.3	0.4
1993	0.147	0.147	0.147	0.146	0.146	0.136	0.135
1994	0.13	0.132	0.124	0.128	0.128	0.128	0.125
1995	0.087	0.089	0.051	0.044	0.029	0.027	0.017
1996	0.034	0.022	0.165	0.16	0.156	0.144	0.111
1997	0.104	0.104	0.104	0.103	0.099	0.095	0.085
1998	0.116	0.116	0.114	0.114	0.104	0.083	0.077
1999	0.198	0.197	0.168	0.157	0.143	0.128	0.124
2000	0.304	0.304	0.268	0.28	0.258	0.214	0.176
Total	0.140	0.138	0.148	0.141	0.133	0.119	0.108

Note that the base rate displayed is for the 2-5 day reference period of the model (not the 3-week window or the fixed annual level that has been features of the Sea State model). Why isn't the lowest base rate the best? It closes areas based on very low PSC that is not always a good predictor of higher PSC in the subsequent period.

Features that have an unknown impact on the reduction estimates:

- *The smaller, targeted nature of the RHS closures.*
  - On the one hand, the smaller closures can target hotspots that cross multiple statistical areas, but smaller areas are also closed in the current RHS system
- *American Fisheries Act (AFA)*
- *The Steller Sea Lion Conservation Area (SCA Emergency Closure in 2000*
- *Average Chinook and Chum PSC levels were much higher from 2003*-2010 than in the previous decade

Features that could lead to an understatement of estimates of hotspot reductions:

- Sea State balances available information, historical experience, and predictions about how salmon are likely to move to implement closures, while these historical RHS-like closures uses a fixed window of information in recent days to design closures.
- Unmeasured bycatch reduction may occur because the announcement of a SeaState closures may lead vessels to start fishing outside of a RHS closure after it is announced.

Features that could lead to this being an overstatement of estimates of hotspot reductions:

- Bycatch rates are assumed to be the daily average rate for the sector on each day of relocation. Examining the bycatch rates from 2003-2010 of vessels that are moved out of RHS closures, they have higher than average rates.
  - Applying these rates to the simulation would reduce salmon reduction by approximately 1/3.
  - However, for CVs, an unknown portion of this increase is due to how salmon from a trip that starts and ends after a closure are divided between all hauls of a trip, so some portion of this different may be due to accounting.
- The areas closed by the simulation can be much larger at times than the RHS closures, especially when two high bycatch areas are closed in core catcher vessels fishing areas. The "low-end" estimate only closes one area to attempt to account for this.

Summary of chum and Chinook PSC closure interactions (based on current & historical analysis)

- In historical simulations, chum closures also lead to Chinook PSC reductions; similar results from Chinook closures
- Correlation of high chum and Chinook areas are present in current period
- SeaState is able to pay attention to both Chinook and chum PSC in a manner that triggered closures would not allow
- Amendment 91 measures provide strong measures to reduce/avoid Chinook
  - Evidence suggests that these measures will likely lead to addition chum reductions in the future. This suggests that status quo with Amendment 91 may be better than per-A91 measures.
- The observed correlation of Chinook and chum suggest that taking action to protect chum is on average unlikely to worsen Chinook PSC, though it is possible that chum protection measures have the potential at times to impact Chinook PSC.

Parameters to adjust to improve program effectiveness

- **Base rate**
  - In historical simulation, not a significant impact in reducing base rate; increasing base rate could raise PSC rates
- **Closure area limitation**
  - Allowing more closed areas in historical simulation leads to further bycatch reduction
- **Reduce delay** from closure announcement and implementation
  - Reducing the time to implement closures is likely to increase effectiveness (though potentially increase costs of vessels moving)
- **Tier system**
  - Tier 1&2 vessels frequently choose to fish outside of areas
  - Chum RHS program applies to cooperatives instead of vessels (or both cooperative and individual)
  - System could be adjusted to provide stronger individual incentives to avoid high bycatch areas (such as larger and/or longer areas)

Alternative 2, Hard caps

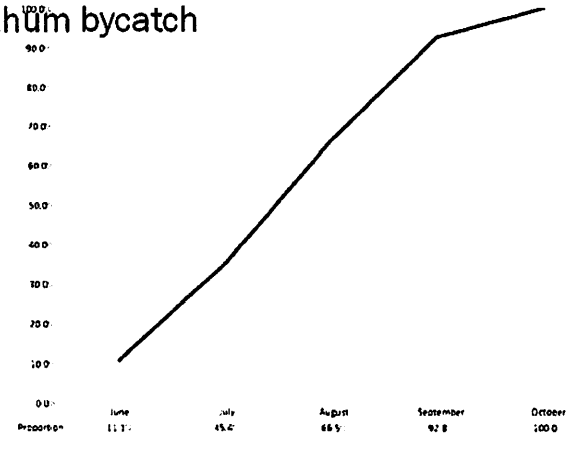
Analyzed similar approach for Chinook EIS

- Date of closure
- Amount of salmon saved and forgone pollock
- 2003-2010 data

Alternative 3, component 1B Application of trigger cap

- EBS-wide cap
  - Cumulative through the B-Season
  - Closure areas:
    - Change each month
    - Computed based on history
    - Ranked according to chum and pollock

Average monthly proportion of chum bycatch



Monthly trigger Option 1 Alternative 3 -Values applied to cap

Monthly proportion of non-Chinook salmon limit that specifies option 1 of Alternative 3.

Month	Option 1 : monthly threshold cumulative proportion
June	11.1%
July	35.4%
August	66.5%
September	92.8%
October	100.0%

Alternative 3 Component 1B Options

- Option 1
  - Close areas based on monthly sector allocated caps
    - Reopens if below cumulative
- Option 2
  - Same as 1 but also with monthly cap
- Option 2a
  - As for option 2, but seasonally shifted
- Option 3
  - Simple cumulative cap, when reached monthly areas remain closed

Alternative 3, option 2a

Designed to add protection to western Alaska stocks

Page 37 (pdf 94) description:

$$C_{Jun-Jul} = rC$$

$$r = \frac{p_{Aug-Oct}}{p_{Jun-Jul}}$$

$r = 0.565$, so cap (C) is more constraining in June-July

Trigger closure approach uses historical data

With data resolved to week and ADFG area

1. Sort by year, sector, week (track month)
2. Monitor catch against cap
   - *If exceeds:* trigger closure for the rest of that month for that sector go to step 3.
   - *Otherwise:* Continue with history as observed…
3. Sectors closed from trigger areas:
   1. Catch chum at rate experienced outside area (based on pollock).

Problem with historical data approach

Historical data had **poor contrast** among the trigger closure (Alt 3) options (1, 2, 2a, and 3)

As presented at February 2011 meeting

Only 8 years of data

4 below average, 2 lower than lowest caps

Other caveats…

Data/approach characteristics:

Before amendment 91 regulations

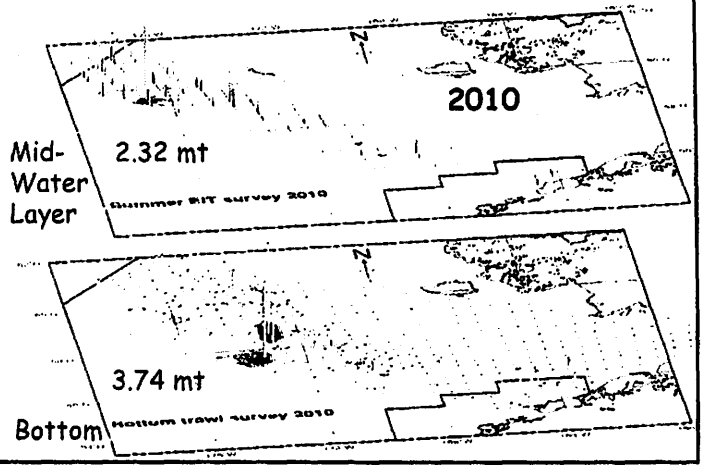
Rolling hotspot closures in effect

Assumes pollock available outside closures

Alternative 4 methods

- Treated qualitatively similar to Alternative 2

Chapter 4 pollock stock status and impacts



Estimated forgone pollock for Alt 2

- Hard cap by sector (tons)

Table 4-1. Estimated forgone pollock (in metric tons) by sector and year under 3 different allocation schemes and hard caps for 2003-2010 for the B season.

2B (sector allocation 1)

Cap:	50,000				200,000				353,000			
	CDQ	CP	MI	CV	CDQ	CP	MI	CV	CDQ	CP	MI	CV
2003	33,922	67,813	41,054	194,789			8,602					
2004	74,003	29,215	56,625	191,609	25,223	226,957	9,645	74,207		121,849		24,294
2005	28,754	282,067	68,887	286,835	12,031	105,591	24,481	238,300		68,329	5,682	198,357
2006		223,513		345,480				219,952				
2007	16,499	85,750	24,022	61,265								
2008												
2009												
2010												

Dates of closures

Table 4-3. Estimated week of sector-specific pollock fishery closures due to hypothetical hard caps (column sections) for three different allocation schemes (row sections) for the B season (2003-2010). A blank cell indicates that the fishery would have remained open.

2B (sector allocation 1)

Cap:	50,000				200,000				353,000			
	CDQ	CP	MI	CV	CDQ	CP	MI	CV	CDQ	CP	MI	CV
2003	13-Sep	23-Aug	16-Aug	16-Aug			27-Sep					
2004	15-Aug	26-Jan	18-Jul	8-Aug	19-Sep	11-Jul	26-Sep	12-Sep		8-Aug		3-Oct
2005	16-Aug	28-Jan	28-Jun	12-Jul	13-Sep	23-Aug	23-Aug	26-Jul		6-Sep	27-Sep	2-Aug
2006		26-Jul		14-Jun				2-Aug				
2007	23-Aug	23-Aug	23-Aug	13-Sep								
2008												
2009												
2010												

Estimated forgone pollock for Alt 2

- Overall sectors, proportional

Table 4-4. Hypothetical forgone pollock (percent) based on closures due to hard caps (column sections) for three different allocation schemes (row sections) for the B season (2003-2010 and relative for all years combined).

2B (sector allocation 1)	50,000	200,000	353,000
2003	35%	1%	0%
2004	74%	40%	17%
2005	79%	45%	32%
2006	67%	26%	0%
2007	26%	0%	0%
2008	0%	0%	0%
2009	0%	0%	0%
2010	0%	0%	0%
All years	46%	18%	8%

Alternative 3 pollock diverted

Table 4-9. Average proportion of pollock catch that would be estimated to be diverted from closed areas for different cap, sector allocations, and trigger options summarizing over years and sectors.

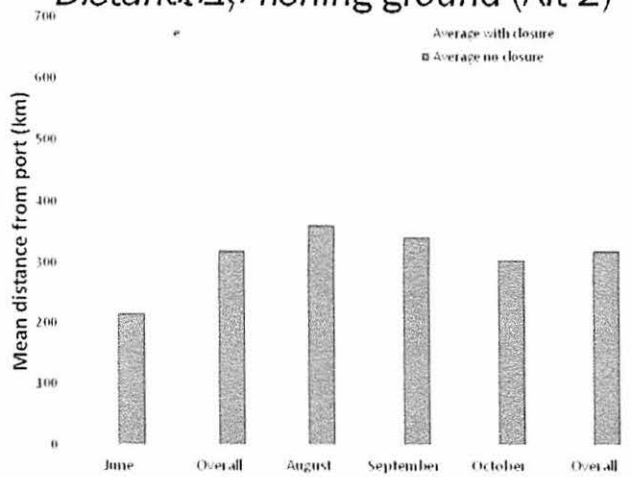
	Cap		
2ii (sector allocation 1)	25,000	75,000	200,000
Option 1	11.3%	8.1%	3.7%
Option 2	11.4%	8.5%	4.3%
Option 2a	9.7%	6.4%	2.5%
Option 3	12.0%	9.1%	5.0%
4ii (sector allocation 2)	25,000	75,000	200,000
Option 1	9.6%	8.5%	4.7%
Option 2	10.1%	8.9%	5.3%
Option 2a	7.8%	6.8%	3.2%
Option 3	10.8%	9.6%	5.8%
6 (sector allocation 3)	25,000	75,000	200,000
Option 1	11.9%	9.3%	6.1%
Option 2	12.0%	9.7%	6.5%
Option 2a	10.3%	7.7%	4.5%
Option 3	12.7%	10.3%	7.0%

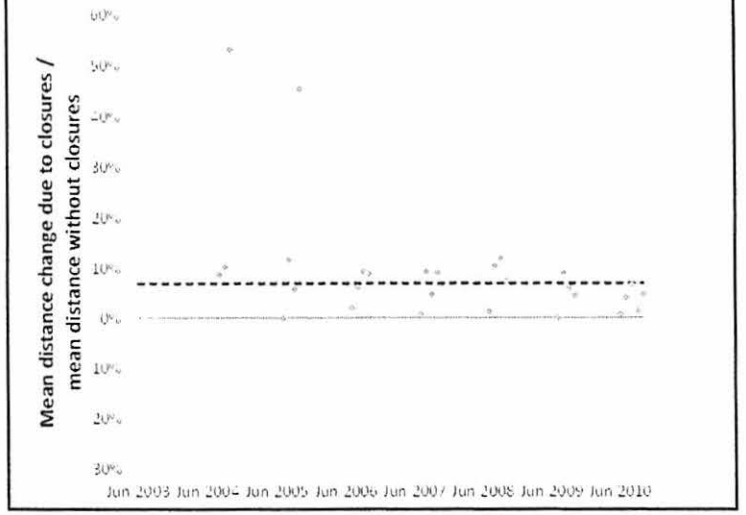
Alternative 3 pollock diverted (2003-2010)

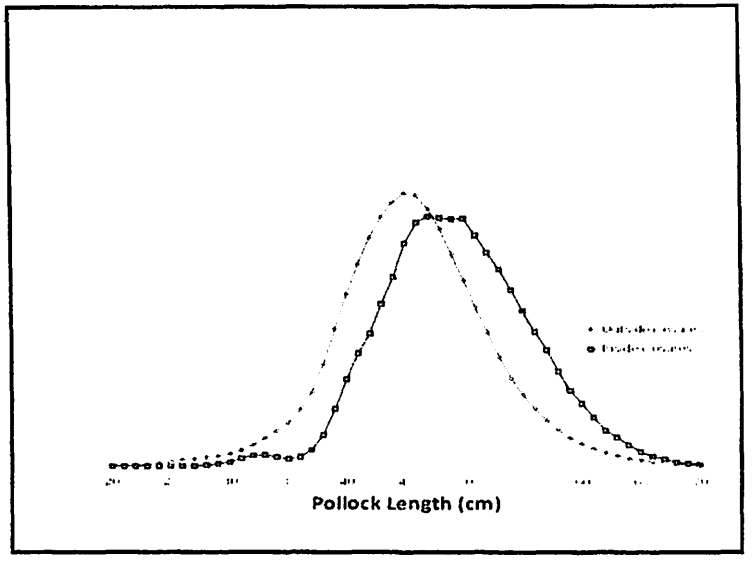
Table 4-10. Amount of pollock catch that is estimated to be diverted from closed areas for different cap, sector allocations, and **trigger** options summing over years (2003-2010) and sectors for Alternative 3.

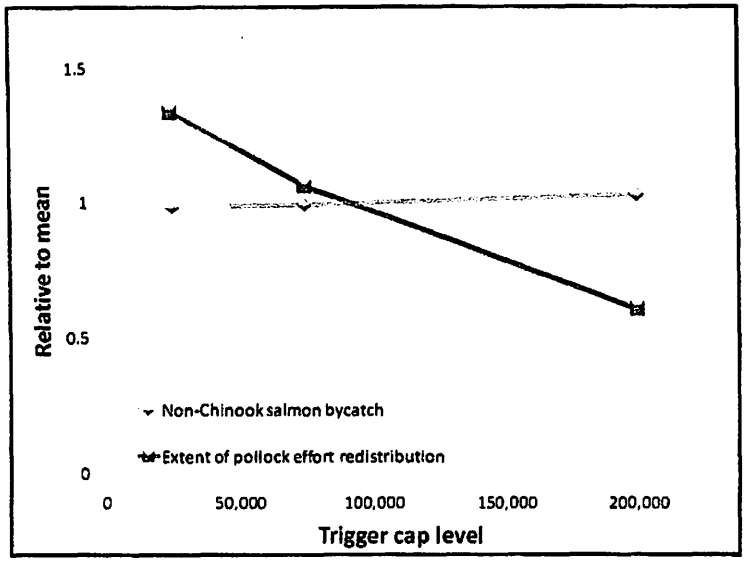
	Cap		
2ii (sector allocation 1)	25,000	75,000	200,000
Option 1	656,650	470,808	214,922
Option 2	665,230	498,290	254,013
Option 2a	699,395	531,389	291,791
Option 3	564,907	371,748	148,428
4ii (sector allocation 2)	25,000	75,000	200,000
Option 1	670,559	493,091	276,087
Option 2	682,565	518,093	385,043
Option 2a	721,676	560,185	411,786
Option 3	577,255	398,927	250,736
6 (sector allocation 3)	25,000	75,000	200,000
Option 1	693,978	540,523	355,408
Option 2	698,751	562,214	363,276
Option 2a	740,021	597,951	363,947
Option 3	602,365	446,560	266,632

Distance to fishing ground (Alt 2)









Impacts of alternatives on Chum

Historical AEQ

Table 5-76 Estimated historical adult equivalent mortality (AEQ) due to pollock fishery bycatch by river system with upper 95% confidence value shown in parenthesis

	Coastal WAK		Upper Yukon		WAK (coastal WAK + Upper Yukon)		SW Alaska	
1994	12,543	(16,781)	5,803	(8,533)	18,446	(23,556)	2,542	(3,062)
1995	4,502	(6,327)	2,063	(3,137)	6,566	(8,827)	804	(1,164)
1996	5,014	(6,582)	2,206	(3,258)	7,220	(9,842)	892	(1,297)
1997	5,857	(7,430)	2,435	(3,625)	8,022	(10,219)	1,102	(1,463)
1998	6,171	(8,192)	2,676	(3,993)	8,847	(11,215)	1,215	(1,628)
1999	4,473	(5,945)	1,950	(2,917)	6,424	(8,322)	882	(1,187)
2000	5,100	(6,513)	2,603	(3,542)	7,704	(9,321)	1,066	(1,114)
2001	5,103	(6,551)	2,589	(3,551)	7,693	(9,391)	1,063	(1,121)
2002	6,558	(8,551)	3,081	(4,363)	9,639	(11,975)	1,325	(1,598)
2003	13,383	(17,424)	6,443	(9,056)	19,926	(24,398)	2,748	(3,185)
2004	31,261	(40,162)	15,401	(21,263)	46,663	(56,804)	6,446	(7,176)
2005	72,620	(90,760)	34,095	(46,311)	106,700	(127,475)	13,401	(18,805)
2006	49,776	(63,817)	31,440	(41,961)	81,216	(98,710)	8,562	(10,148)
2007	15,855	(20,688)	11,056	(13,803)	26,871	(33,648)	2,362	(2,334)
2008	3,038	(5,401)	3,104	(4,291)	7,152	(9,311)	708	(708)
2009	3,332	(5,442)	1,429	(1,980)	5,761	(7,000)	1,306	(2,133)
Mean	15,599	(19,785)	8,050	(11,035)	23,428	(28,688)	2,920	(3,629)

Historical AEQ

	AK-BC-WA		Japan		Russia		Total	
1994	24,165	(30,615)	48,440	(57,392)	40,967	(48,726)	133,219	(152,151)
1995	8,561	(11,587)	17,696	(22,271)	14,973	(18,880)	48,344	(59,264)
1996	9,341	(11,770)	20,019	(22,697)	16,966	(19,226)	54,095	(56,750)
1997	10,349	(13,243)	22,390	(25,839)	18,983	(22,068)	60,389	(65,922)
1998	11,424	(14,610)	24,851	(28,604)	21,096	(24,223)	66,880	(72,697)
1999	8,268	(10,641)	17,934	(20,963)	15,218	(17,802)	48,382	(53,725)
2000	10,233	(12,418)	18,610	(21,088)	15,726	(17,786)	52,723	(56,157)
2001	10,217	(12,501)	18,737	(21,357)	15,794	(18,119)	52,932	(57,173)
2002	12,619	(15,616)	25,249	(28,649)	21,373	(24,273)	69,493	(73,947)
2003	26,174	(32,180)	51,308	(57,835)	43,424	(48,861)	142,273	(148,123)
2004	61,564	(75,071)	116,730	(131,388)	98,520	(111,321)	326,777	(340,222)
2005	111,183	(132,586)	180,100	(206,071)	159,038	(185,105)	569,091	(602,556)
2006	102,437	(119,942)	122,723	(145,114)	106,237	(126,746)	419,286	(469,973)
2007	33,814	(41,702)	46,217	(55,548)	42,483	(50,542)	150,676	(177,152)
2008	10,507	(13,133)	15,332	(18,819)	13,105	(16,472)	46,493	(56,519)
2009	8,109	(9,526)	12,012	(13,732)	9,325	(10,871)	36,520	(39,747)
Mean	28,685	(34,821)	47,397	(54,842)	40,827	(47,564)	142,348	(155,130)

Alternative 2 hard cap by sector

Table 5-77. Estimated non-Chinook salmon 3 different allocatd year under 3 different allocation schemes and hard caps for 2003hat these apply onl.son. Note that these apply only to the bycatch totals by year (without tilent chum mortali'adult equivalent chum mortality).

2ii (sector allocation 1)

Cap:	50,000				353,000				353,000			
	CDQ	CP	M	CV	CDQ	CP	V	CV	CDQ	CP	M	CV
2003	2,525	12,460	8,486	102,571								
2004	9,341	69,811	8,532	289,078	4,2	38,904		189,933		38,904		41,944
2005	6,875	56,267	13,115	531,651	2,2	24,064	968	402,354		24,064	968	295,269
2006		11,644		250,957				121,110				
2007	3,956	17,763	2,922	10,515								
2008												
2009												
2010												

Alternative 2 hard cap by sector

Table 5-78. Estimated non-Chinook salmon saved (relative to actual estimates) by sector and year under 3 different allocation schemes and **hard caps** for 2003-2010 for the B season in proportions.

2ii (sector allocation 1)

Cap:	50,000				200,000				353,000			
	CDQ	CP	M	CV	CDQ	CP	M	CV	CDQ	CP	M	CV
2003	60%	70%	81%	72%			24%					
2004	85%	93%	81%	88%	39%	71%	27%	58%		52%		13%
2005	82%	91%	87%	94%	26%	68%	47%	71%		39%	6%	52%
2006		68%		89%				43%				
2007	71%	81%	59%	21%								
2008												
2009												
2010												

Alt 2 chum saved by hard cap

Table 5-79. Estimated total chum salmon saved (from all sources: top section) relative to AEQ mortality for different hypothetical **hard caps** and sector allocations by year for Alternative 2. Proportions of hypothetical salmon saved are shown in the bottom section.

	50,000			200,000			353,000		
Total	2ii	4ii	6	2ii	4ii	6	2ii	4ii	6
2003	103,245	107,424	110,247	2,087	13,584	43,907	0	0	0
2004	291,794	296,197	300,599	194,034	195,262	190,041	62,599	83,840	147,100
2005	533,858	528,411	528,027	398,156	408,631	437,236	281,275	318,051	393,771
2006	366,423	357,716	362,094	168,975	218,610	268,831	0	83,376	177,282
2007	63,800	66,111	63,150	0	0	0	0	0	0
2008	0	0	0	0	0	0	0	0	0
2009	0	6,032	13,422	0	0	0	0	0	0
Total	1,359,119	1,361,891	1,377,540	763,252	836,087	940,105	343,875	485,266	718,153
	50,000			200,000			353,000		
Proportion	2ii	4ii	6	2ii	4ii	6	2ii	4ii	6
2003	72%	75%	77%	1%	9%	31%	0%	0%	0%
2004	88%	90%	91%	59%	59%	58%	19%	25%	45%
2005	94%	93%	93%	70%	72%	77%	49%	56%	69%
2006	87%	85%	86%	40%	52%	64%	0%	20%	42%
2007	42%	44%	42%	0%	0%	0%	0%	0%	0%
2008	0%	0%	0%	0%	0%	0%	0%	0%	0%
2009	0%	16%	37%	0%	0%	0%	0%	0%	0%
Total	80%	80%	81%	45%	49%	55%	20%	29%	42%

Estimated proportion of Alaska chum salmon saved relative to AEQ mortality year for different **hard caps** and sector allocations by year for Alternative 2.

Sector allocation option	Hard Cap 50,000	200,000	353,000
2ii	80%	45%	21%
4ii	80%	50%	29%
6	81%	56%	43%

Trigger closure results by region

- Tables 5-88 through 5-92 Coastal west Alaska

Highest AEQ mortality (72,610 chum)

		25,000		75,000		200,000
2ii (sector allocation 1)						
Option 1	8,621	(10,915)	8,055	(9,847)	5,956	(6,502)
Option 2	8,557	(10,872)	8,119	(9,888)	6,275	(6,713)
Option 2a	8,592	(10,995)	8,269	(10,410)	6,786	(8,490)
Option 3	8,480	(10,424)	7,571	(8,161)	5,092	(3,671)
4ii (sector allocation 2)						
Option 1	8,574	(10,934)	8,190	(10,134)	6,519	(7,743)
Option 2	8,574	(10,934)	8,190	(10,134)	6,838	(7,952)
Option 2a	8,592	(10,995)	8,322	(10,593)	7,120	(8,934)
Option 3	8,524	(10,578)	7,829	(8,877)	5,496	(4,361)
6 (sector allocation 3)						
Option 1	8,592	(10,995)	8,342	(10,483)	6,986	(8,647)
Option 2	8,592	(10,995)	8,342	(10,483)	7,113	(8,730)
Option 2a	8,592	(10,995)	8,429	(10,789)	7,188	(9,351)
Option 3	8,522	(10,750)	8,060	(9,501)	6,110	(5,957)

Average AEQ mortality (15,399 chum)

		25,000		75,000		200,000
2ii (sector allocation 1)						
Option 1	1,829	(2,315)	1,708	(2,088)	1,263	(1,379)

Trigger closure results by region

- Tables 5-88 through 5-92

Highest AEQ mortality (72,610 chum)

		25,000
2ii (sector allocation 1)		
Option 1	8,621	(10,915)
Option 2	8,557	(10,872)
Option 2a	8,592	(10,995)
Option 3	8,480	(10,424)

Trigger closure results by region

- Tables 5-88 through 5-92

Average AEQ mortality (15,399 chum)

		25,000
2ii (sector allocation 1)		
Option 1	1,829	(2,315)
Option 2	1,815	(2,306)
Option 2a	1,822	(2,332)
Option 3	1,798	(2,210)

Table ES-12. Estimated relative reduction in chum salmon bycatch and diverted pollock catch by sector allocation (panels) and trigger cap levels for different trigger closure options.

2ii (sector allocation 1)

	25,000		75,000		200,000	
	Chum	Pollock	Chum	Pollock	Chum	Pollock
Option 1	13.6%	11.3%	12.5%	8.1%	8.6%	3.7%
Option 2	13.6%	11.4%	12.6%	8.5%	9.0%	4.3%
Option 2a	13.8%	12.0%	13.1%	9.1%	10.7%	5.0%
Option 3	13.2%	9.7%	10.9%	6.4%	5.9%	2.5%

4ii (sector allocation 2)

	25,000		75,000		200,000	
	Chum	Pollock	Chum	Pollock	Chum	Pollock
Option 1	13.1%	9.6%	12.8%	8.5%	9.9%	4.7%
Option 2	13.1%	10.1%	12.8%	8.9%	10.3%	5.3%
Option 2a	13.5%	10.8%	13.3%	9.6%	11.2%	5.8%
Option 3	11.9%	7.8%	11.6%	6.8%	6.6%	3.2%

6 (sector allocation 3)

	25,000		75,000		200,000	
	Chum	Pollock	Chum	Pollock	Chum	Pollock
Option 1	13.7%	11.9%	13.2%	9.3%	10.9%	6.1%
Option 2	13.7%	12.0%	13.2%	9.7%	11.1%	6.5%
Option 2a	13.7%	12.7%	13.4%	10.3%	11.7%	7.0%
Option 3	13.5%	10.3%	12.2%	7.7%	8.3%	4.5%

Summary of trigger closures

- Areas identified work
  - Likely underestimate total due to past spatial closures
- Inter-annual variability high

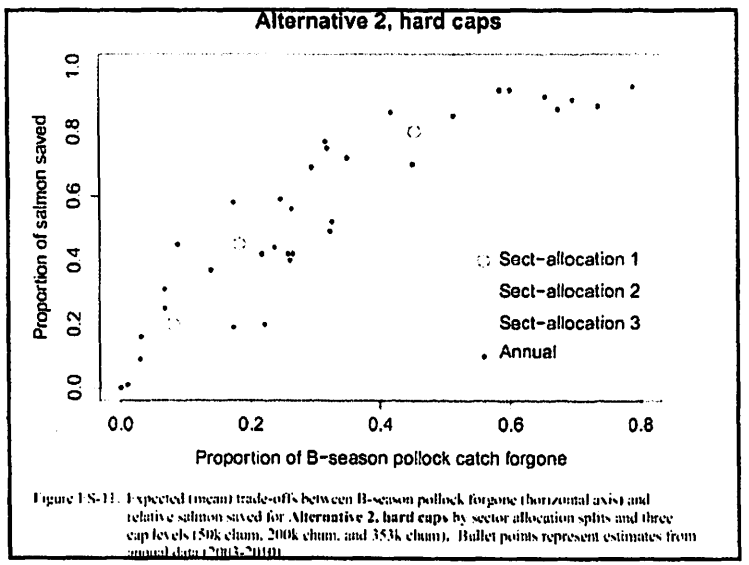
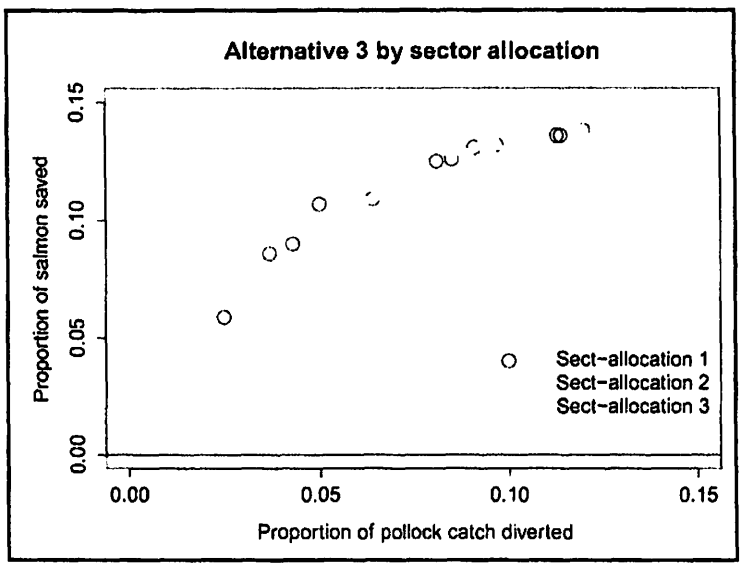
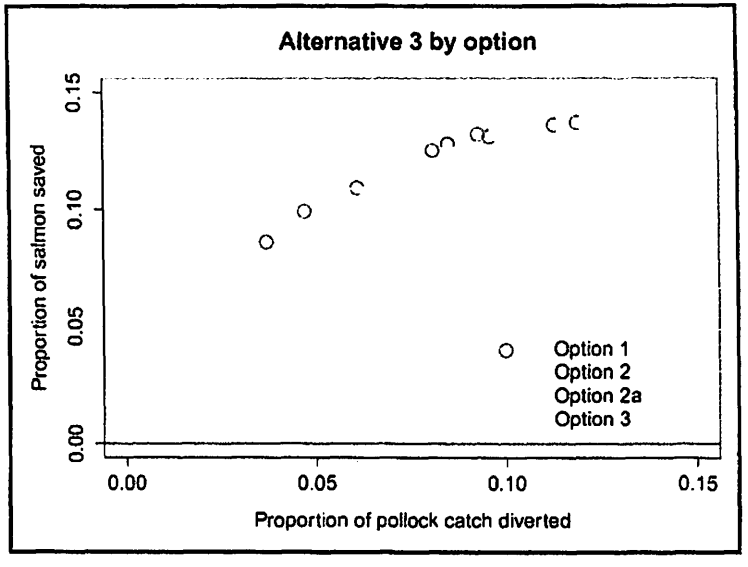


Figure ES-11. Expected (mean) trade-offs between B-season pollock forgone (horizontal axis) and relative salmon saved for **Alternative 2, hard caps** by sector allocation splits and three cap levels (50k chum, 200k chum, and 353k chum). Bullet points represent estimates from annual data (2003-2010).





Impacts on Chinook

Chinook salmon stock performance summaries

Table 6-3 Overview of Alaskan Chinook salmon stock performance, 2010.

Chinook salmon stock	Total run size[1]	Escapement goals met?[2]	Subsistence fishery?	Commercial fishery?[3]	Sport fishery?	Stock of concern?
Bristol Bay	Poor	0 of 1[4] (4 not surveyed)	Restricted on Nushagak	Limited in Nushagak District	Restricted, closed on Nushagak	No
Kuskokwim	Poor	3 of 7 (7 not surveyed)	Yes, 2 tributaries closed	Some on Kuskokwim River, limited in Bay	2 tributaries closed	No
Yukon	Poor	3 of 7	Yes	No directed, some incidental take with chum	1 tributary closed	Yield
Norton Sound	Poor	1 of 3 (2 not surveyed)	Yes, with restrictions	No	No	Yield
Alaska Peninsula	Below average	1 of 1	Yes	Yes	Yes	No
Kodiak	Below average	1 of 2	Karluk closed	Restricted in Karluk and Ayakulik areas	Karluk closed	Management
Chignik	Average	1 of 1	Yes	Yes	Yes	No
Upper Cook Inlet	Below average	4 of 19 (2 not surveyed)	Yes	Restricted in Northern District	Various restrictions	6 stocks of concern
Lower Cook Inlet	Below average	2 of 3	Yes	Yes	Yes	No
Prince William Sound	Below average	0 of 1	Yes	Yes	Yes	No
Southeast	Average	9 of 11	Yes	Yes	Yes	No

[1] Some aerial survey-based escapement goals were not assessed due to inclement weather or poor survey conditions, therefore we do not know if the escapement goals were met for these systems.
[2] The Chinook salmon escapement goal was not met on the Nushagak River in 2010.

Overall Chinook saved for Alt 3 chum closures

Table 6-8. Percentage reduction in Chinook bycatch expected for triggered closures for different chum salmon caps (top row), sector allocation schemes, and trigger closure options integrated over years and sectors.

	25,000	75,000	200,000
2B (sector allocation 1)			
Option 1	3.4%	3.2%	2.4%
Option 2	3.4%	3.2%	2.6%
Option 2a	3.4%	3.3%	2.7%
Option 3	3.1%	2.9%	2.2%
4B (sector allocation 2)			
Option 1	3.3%	2.9%	2.4%
Option 2	3.3%	3.0%	2.6%
Option 2a	3.4%	3.1%	2.7%
Option 3	3.0%	2.6%	2.2%
6 (sector allocation 3)			
Option 1	3.3%	3.3%	2.5%
Option 2	3.3%	3.4%	2.5%
Option 2a	3.4%	3.4%	2.6%
Option 3	3.1%	3.0%	2.2%

Seasonal Chinook saved for Alt 3

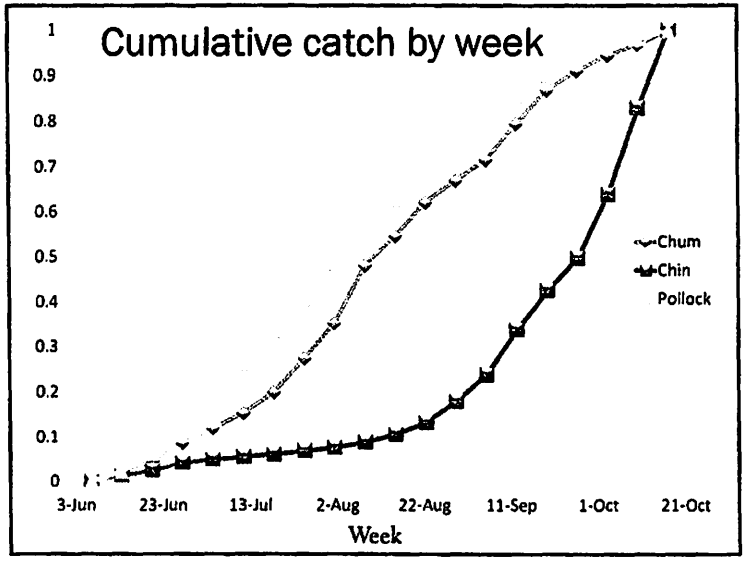
Table 6-7. Percentage reduction in Chinook bycatch expected for triggered closures for different chum salmon caps (top row), sector allocation schemes, and trigger closure options integrated over years and sectors by sub-season.

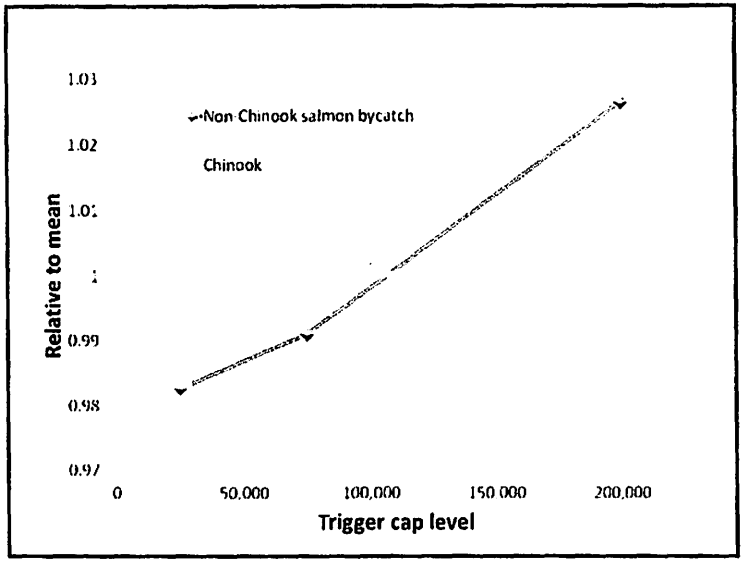
Cap:	25,000		75,000		200,000	
2ii (sector allocation 1)	June-July	Aug-Oct	June-July	Aug-Oct	June-July	Aug-Oct
Option 1	7.4%	3.1%	5.3%	3.0%	2.0%	2.4%
Option 2	7.4%	3.1%	5.3%	3.0%	2.0%	2.6%
Option 2a	8.0%	3.1%	6.4%	3.0%	4.2%	2.6%
Option 3	3.2%	3.1%	1.4%	3.0%	0.1%	2.4%
4ii (sector allocation 2)	June-July	Aug-Oct	June-July	Aug-Oct	June-July	Aug-Oct
Option 1	7.4%	3.0%	5.6%	2.7%	2.5%	2.4%
Option 2	7.4%	3.1%	5.6%	2.8%	2.5%	2.6%
Option 2a	7.9%	3.1%	6.8%	2.8%	4.5%	2.6%
Option 3	3.1%	3.0%	1.6%	2.7%	0.3%	2.4%
6 (sector allocation 3)	June-July	Aug-Oct	June-July	Aug-Oct	June-July	Aug-Oct
Option 1	7.7%	3.0%	6.1%	3.1%	3.9%	2.3%
Option 2	7.7%	3.0%	6.1%	3.2%	3.9%	2.4%
Option 2a	7.9%	3.0%	6.9%	3.2%	5.3%	2.4%
Option 3	4.3%	3.0%	1.9%	3.1%	0.7%	2.3%

Chinook under Alternative 3

Table 6-6. Example expected percentage reduction in Chinook bycatch for triggered closures for a cap of 75,000 chum under the sector allocation scheme 2 by year and trigger closure options. Shaded cells represent instances of negative values (i.e., Chinook bycatch would have increased with triggered closure scheme in effect).

Cap=75,000	4ii (sector allocation 2)				
Option 1	CDQ	CP	MS	CV	All Sectors
2003	3.0%	2.4%	2.4%	-6.5%	-0.2%
2004	0.0%	4.3%	-1.7%	7.1%	1.0%
2005	0.0%	0.0%	1.0%	13.4%	2.5%
2006	0.0%	0.3%	0.0%	6.8%	1.0%
2007	-0.7%	4.0%	0.2%	-8.4%	-1.7%
2008	-0.3%	2.2%	0.0%	2.7%	0.1%
2009	0.0%	0.0%	0.1%	11.3%	0.2%
2010	-	0.0%	9.2%	5.5%	0.1%
Option 2	CDQ	CP	MS	CV	All Sectors
2003	3.6%	2.6%	2.7%	-6.4%	-0.2%
2004	0.0%	4.3%	-2.4%	7.7%	1.0%
2005	0.0%	0.0%	1.0%	13.4%	2.5%
2006	0.0%	0.3%	0.0%	6.8%	1.0%
2007	-0.7%	4.1%	0.2%	-8.4%	-1.7%
2008	-0.3%	2.2%	0.0%	2.7%	0.1%
2009	0.0%	0.0%	0.1%	11.3%	0.2%
2010	-	0.0%	9.2%	5.5%	0.1%





Other Marine resources

- Status of and potential impacts of alternative management measures on:
  - Other fish species
  - Marine mammals
  - Seabirds
  - Essential fish habitat
  - Ecosystem

Cumulative effects

Table 8-1. Reasonably foreseeable future actions

Ecosystem-sensitive management	• Ongoing Research to understand the interactions between ecosystem components • Increasing protection of ESA-listed and other non-target species • Increasing integration of ecosystems considerations into fisheries management
Traditional management tools	• Authorization of pollock fishery in future years • Increasing enforcement responsibilities • Technical and program changes that will improve enforcement and management • Development of a Salmon Excluder Device
Other Federal, State, and international agencies	• State management of salmon fisheries • Hatchery release of salmon • Future exploration and development of offshore mineral resources • Expansion and construction of boat harbors • Other State actions
Private actions	• Commercial pollock and salmon fishing • CDQ investments in western Alaska • Subsistence harvest of chum salmon • Sport harvest of chum salmon • Increasing levels of economic activity in Alaska's waters and coastal zone

Area M stock of origin information

Outreach Plan Development

- Recommended by Rural Community Outreach Committee (2009) and Council
- Developed by staff with input from Committee, NMFS, and affected stakeholders
- Work in progress as we receive feedback from the public and participate in outreach meetings

Outreach Plan Intent

- To improve the Council's analysis and decision-making process on the proposed action
- To maintain and promote 2-way communication with AK Native and rural communities

Outreach Component

1. Direct mailings to 600+ community governments, Native corporations, regional non-profit Native corporations, tribes, Federal Subsistence RACs, CDQ, ADF&G regional coordinators, State and Congressional representatives
2. Statewide teleconference May 2010
3. Community outreach meetings
   - 7 meetings in Winter 2011
4. Radio interviews
5. Documentation of results

Community outreach meetings

- 2 Council members and staff analysts attended
- Feedback and concerns documented in final analysis

Yukon River Panel	April and Dec 6 – 9, 2010; Anchorage
Yukon River Drainage Fisheries Assn annual meeting	Feb 14 – 17, 2011; Mountain Village
Bering Strait Regional Conference	Feb 22 – 24, 2011; Nome
Yukon-Kuskokwim Delta Regional Advisory Council	Feb 23 – 24, 2011; Mountain Village
Western Interior Regional Advisory Council	March 1 – 2, 2011; Galena
Eastern Interior Regional Advisory Council	March 3 – 4, 2011; Fairbanks
Bristol Bay Regional Advisory Council	March 9 – 10, 2011; Naknek
Tanana Chiefs Conference annual meeting	Mar 15 – 19, 2011; Fairbanks

Science, Service, Stewardship

Non-Chinook (chum) Salmon Prohibited Species Catch Mitigation Measures Initial Regulatory Impact Review/Regulatory Flexibility Analysis

Scott A. Miller,
NOAA Fisheries,
Industry Economist,
Alaska Region Analytical Team

June 9, 2011

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Regulatory Impact Review Organization

- Statutory Language
- Pollock Fishery Description
  - —Management, Harvests, and Markets
  - —VRHS Summary (Dr. Haynie)
  - —Donation Program
  - —CDQ Program Overview
- Potentially Affected Salmon Fisheries: Subsistence and Commercial fisheries importance and descriptions.
- Fishing Industry Importance to Communities
- Analysis of Alternatives
  - Salmon Savings and Adult Equivalency (EA-Dr. Ianelli)
  - Direct Effects Analysis on Pollock Fishery
  - Potential Shoreside Impacts
- Environmental Justice

2

Initial Regulatory Flexibility Analysis

- The six CDQ entities are defined as directly regulated small entities.
- All others are American Fisheries Act Affiliated large entities under the Regulatory Flexibility Act.
- Potential Impacts on CDQ entities is specifically provided in the analysis
- Throughout this presentation of RIR, CDQ impacts are highlighted and also are reported in the IRFA.

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Prohibited Species Donation Program

- The Prohibited Species Donation (PSD) program was initiated to reduce the amount of edible protein discarded under PSC regulatory requirements for salmon and halibut.
- NMFS implemented the PSD program for salmon and the first donations were received in 1996.
- Since the program began, in 1996, SeaShare (formerly Northwest Food Strategies) of Bainbridge Island, Washington, has been the sole recipient of a PSD permit for salmon from NMFS.

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PSD Program Continued

- Many trawl vessels and all three major shoreside processors operating from Dutch Harbor have participated in the PSD program since its inception.
- The shoreside processors Alyeska Seafoods, Inc., and Unisea, Inc., have participated every year; Westward Seafoods, Inc., has participated less frequently.
- Program statistics do not separate salmon species. The total processed or finished weight of Chinook and non-Chinook salmon distributed, to Pacific Northwest food banks, has ranged from about 38,700 pounds in 1999 up to about 483,400 pounds in 2005.

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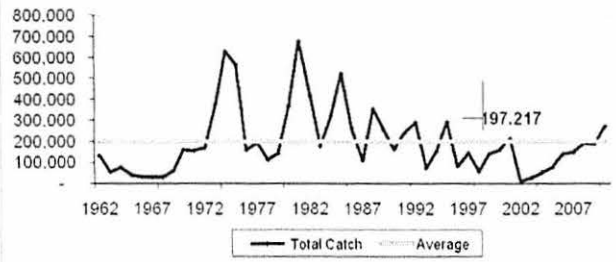
Potentially Affected Chum Salmon Fisheries

- Focused on Western Alaska Stocks of Origin
  - Kotzebue
  - Norton Sound
  - Kuskokwim
  - Yukon
  - Bristol Bay
  - Alaska Peninsula/Area M
- Reviewed Subsistence, Commercial, Sport, and Personal Use data provided by ADF&G contributors
- Reviewed ADOL analysis of fisheries workforce and revenue by region.

6

Historic Commercial Chum Salmon Catch, Kotzebue Sound District, 1962-2010



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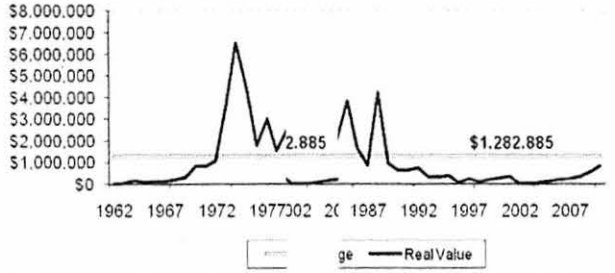
Historic Real Value ‹mon nmercial Chum Salmon Catch, Kotzebue 0 ɪ District, 1962-2010



Kotzebue 2011 Outlook

- The outlook for the 2011 season is 230,000 to 260,000 chum salmon, if market conditions can accept that level of harvest

Menard, 2011. 2011 Kotzebue Sound Fisheries Management Plan. RIR NO. 3A11-02ADF&G, Anchorage

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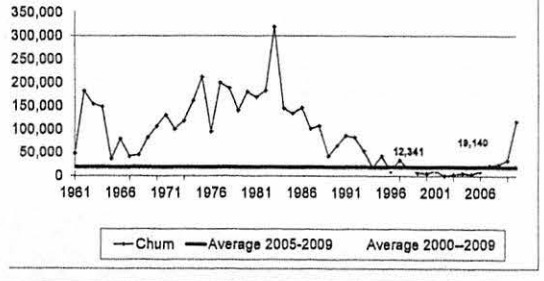
Annual Commercial Chum Salmon Catch, Norton Sound District, 1961-2010



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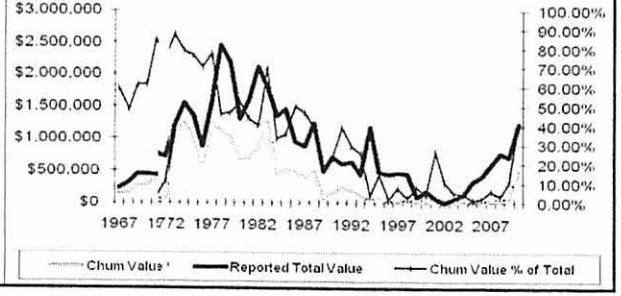
Historical Real Value of Commercial Chum Catch, Norton Sound, 1967-2010



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Norton Sound 2011 Outlook

- Norton Sound Chum salmon runs are expected to be above average, and more commercial fishing targeting chum salmon is expected.
- Buyer Interest in chum salmon has been increasing in recent years and the harvest could be 90,000 to 120,000 fish and may easily surpass last year's harvest of 118,000 chum salmon, which was the best harvest in 25 years.
- The department if cautiously optimistic that most salmon runs in Norton Sound will be average and that the chum salmon run will be above average

Menard, 2011b,. 2011 Norton Sound Salmon Fisheries Management Plan. RIR NO. 3A11-03 ADF&G, Anchorage Alaska

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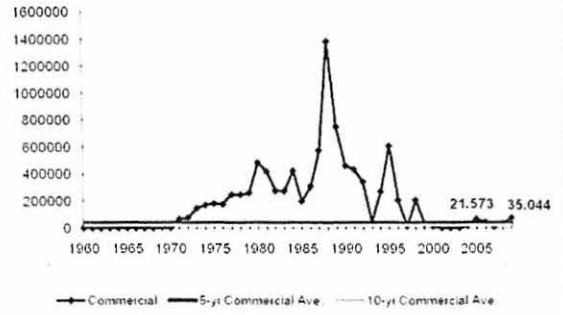
Historical Commercial Chum Catch, Kuskokwim River, 1960-2009.



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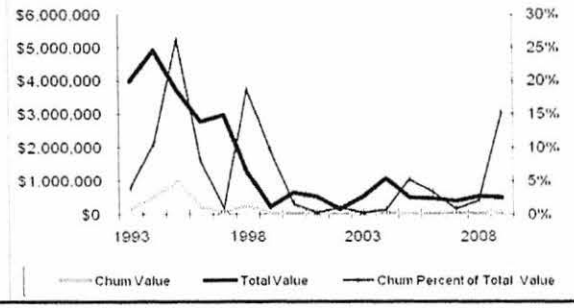
Historical Real Value of Commercial Chum Catch, Kuskokwim River, 1993-2009



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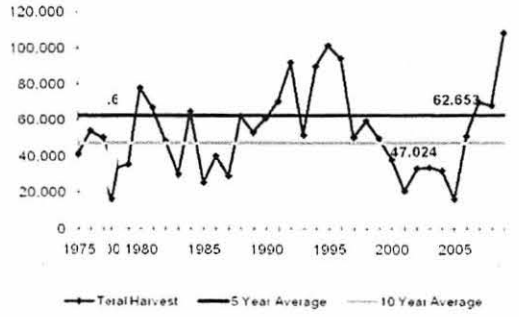
Historical Commercial Chum Catch, Kuskokwim Bay Area, 1975-2009.



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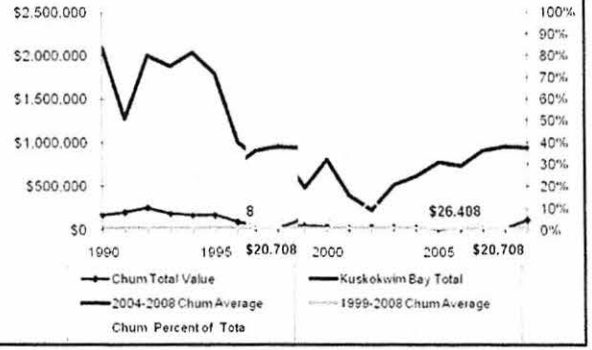
Kuskokwim Chum Co to Total V ial Real Value Relative to 990-2009



Kuskokwim 2011 Outlook

- The Kuskokwim Area has no formal forecast for salmon returns. Broad expectations are developed based on parent year escapements and recent year tends.
- 2011 chum salmon returns are expected to exceed the 2010 abundance with anticipated surpluses for commercial harvest ranging from 200,000 to 300,000 chum. Markets and processing capacity are expected to be similar to last year.

ADF&G 2011. Kuskokwim Area News Release 1: 2011 Kuskokwim Area Salmon Outlook and Management Report. ADF&G, Bethel Alaska.

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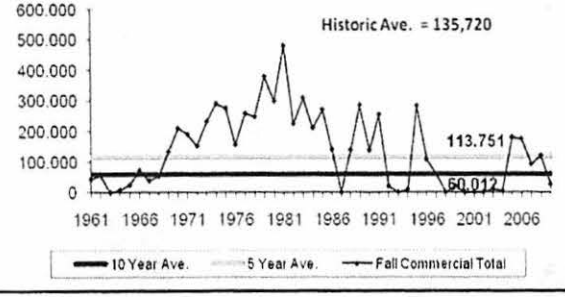
Annual Total Commercial Fall Chum Salmon Catch, Alaska Yukon, 1961-2009



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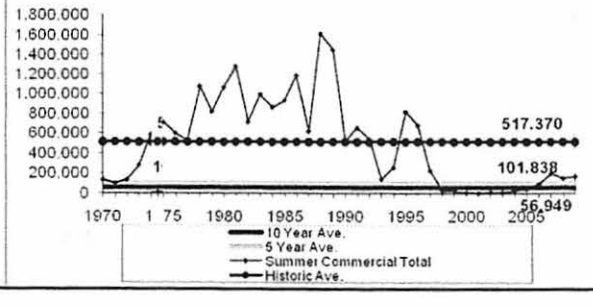
Annual Total Commercial Summer Chum Salmon Catch, Alaska Yukon, 1970-2009



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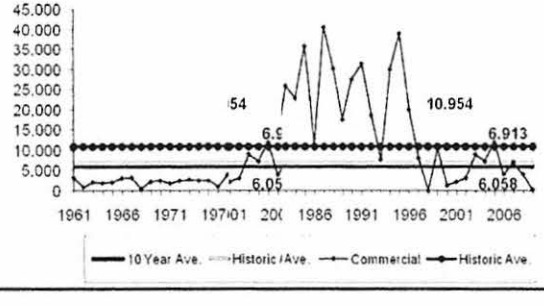
Annual Total Commercial Chum Salmon Catch, Canadian Yukon, 1961-2009



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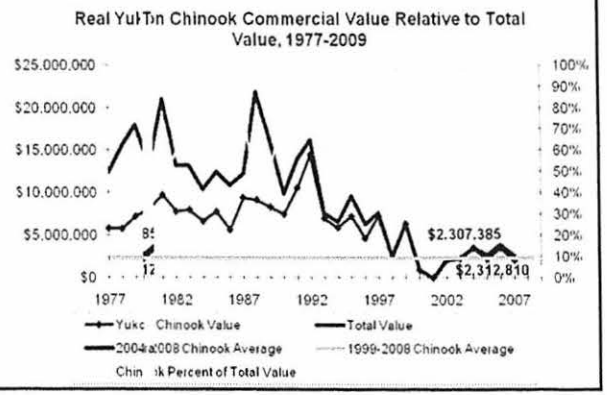

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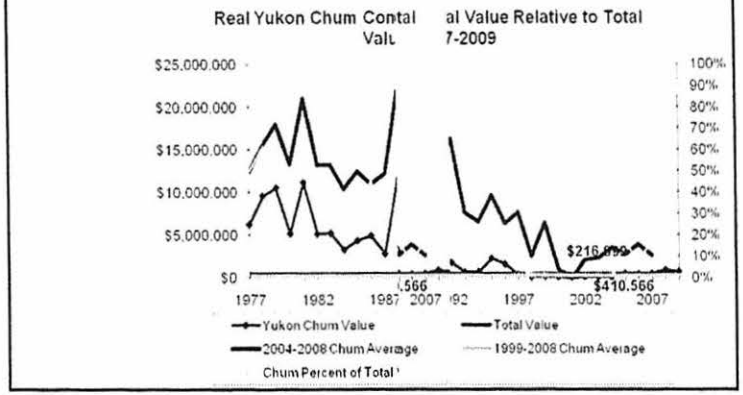

Yukon 2011 Summer Chum Outlook

- It is expected that total Yukon River summer chum run will be similar to the 2010 run of 1.6 million fish.
- The 2011 summer chum run will likely be average and is anticipated to provide for escapements, a normal subsistence harvest, and a surplus for commercial harvest.
- Summer chum runs have provided for a harvestable surplus in each of the past 8 years (2003-2010)
- The commercially harvestable surplus could range from 300,000 to 600,000 summer chum salmon
- HOWEVER: Actual harvest of summer chum in 2011 will likely be affected by a potentially poor Chinook salmon run.

ADF&G

Hayes, Steven J., Estensen, Jeff L., 2011. 2011 Yukon Area Subsistence, Personal Use, and Commercial Salmon Fisheries Outlook and Management Strategies, RIR No. 3A11-04, May 2011. ADF&G Division of Commercial Fisheries , Anchorage Alaska.

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Yukon 2011 Fall Chum Outlook

- The 2011 Fall chum forecast is a point estimate of 737,000 fish with a range of 605,000 to 870,000 fish (80% CI).
- Based on the preseason forecast, it is anticipated that the 2011 fall chum salmon run size will be sufficient for escapement and subsistence uses, and may support a commercial harvest ranging from 50,000 to 300,000 fish.

Hayes, Steven J., Estensen, Jeff L., 2011. 2011 Yukon Area Subsistence, Personal Use, and Commercial Salmon Fisheries Outlook and Management Strategies, RIR No. 3A11-04, May 2011. ADF&G Division of Commercial Fisheries , Anchorage Alaska.

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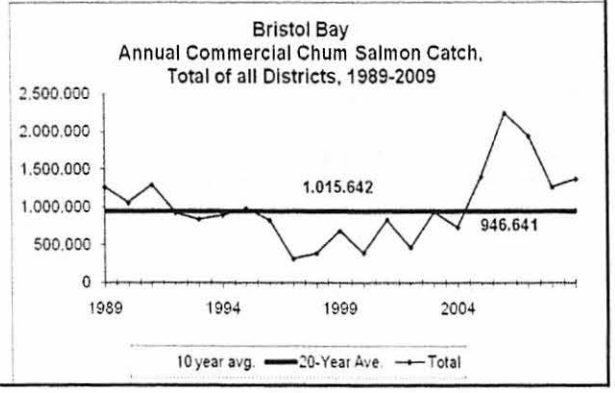

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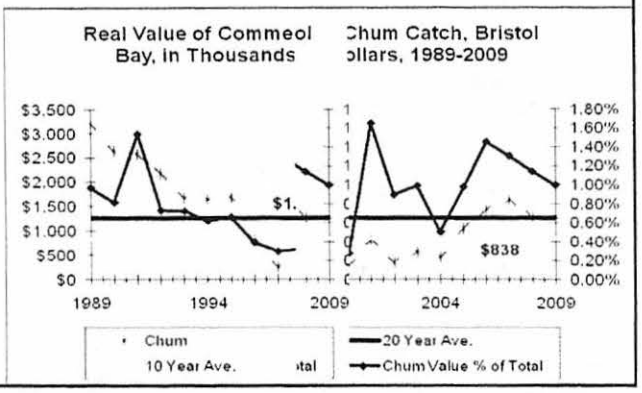

Bristol Bay 2011 Outlook

- The forecasted Bristol Bay sockeye salmon run fro 2011 is approximately 38.5 million fish with 28.5 million fish potentially available for commercial harvest.
- The Bristol Bay outlook does not include a chum forecast.

ADF&G 2011b, Bristol Bay Area News Release : (04/01/2011) Bristol Bay 2011 Outlook for Commercial Salmon Fishing. ADF&G, King Salmon Alaska.

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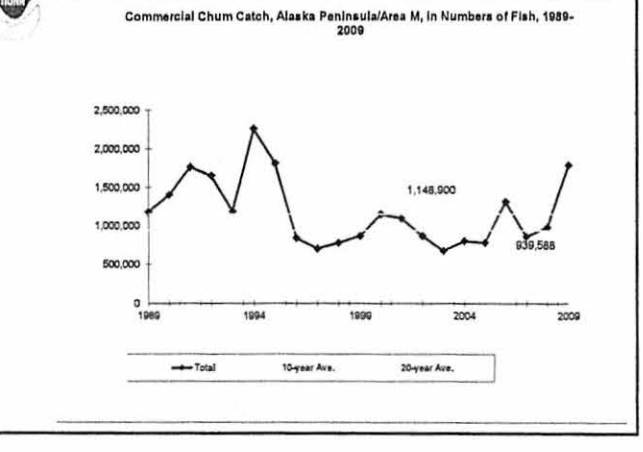

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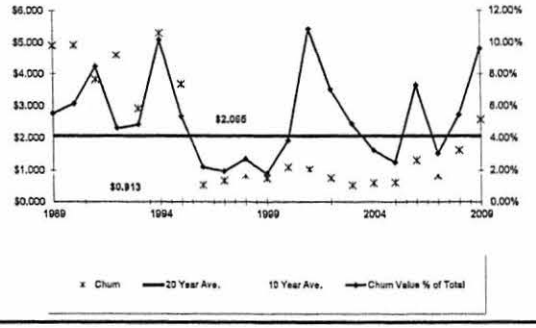
Real Value of Commercial Chum Catch, Alaska Peninsula, in Millions of Dollars, 1989-2009



NOAA FISHERIES SERVICE

Alaska Peninsula/ Area M 2011 Outlook

ADF&G does not issue a chum forecast for this area.

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Summary Of Commercial Chum Overview

- After experiencing declines from the late 1990's through the early 2000s, many Western Alaska chum salmon commercial fisheries are improving; However, specific runs in the Nome Subdistrict of Norton Sound and the upper Yukon remain poor and commercially restricted.
- Commercial chum salmon value is of greater importance at present, versus historically, in several areas due to declines in Chinook salmon commercial fisheries.
- A notable exception; the Yukon river chum commercial salmon fisheries, both Summer and Fall, as well as the Canadian Yukon commercial chum fishery have not sustained improved harvest and have had poor, relative to historic catch and value, commercial harvests in recent years.

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Regional Dependence on Fishery Resources

- The Alaska Department of Labor and Workforce Development (ADOLWD) prepares regional level analyses of community involvement in fisheries.
- In addition, ADOLWD has provided analysis of involvement at the processing level by species, which provides useful information on the diversity, or lack thereof, of local fisheries based economies within the several regions analyzed.
- The RIR provides these analyses for the Northern, Yukon Delta, Bristol Bay, and Aleutian/Pribilof regions as defined by ADOLWD.

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Regional Dependence Findings

- All regions except the Aleutian/Pribilof region are principally dependent on salmon fisheries for their fisheries based economies; however, chum is not separately tabulated.
- The Aleutian/Pribilof area has highly diversified fisheries based economies that rely on groundfish, crab, halibut, herring, sablefish, and salmon.
- The scale of regional seafood based economic value is significantly higher for the Aleutian Pribilof and Bristol Bay areas than areas further north. This is due to the diversification of the Aleutian/Pribilof area, and the size of the Bristol Bay commercial sockeye salmon fisheries relative to salmon fisheries further north.
- These regional presentations serve to identify relative dependence on salmon resources as well as other fishery resources and show that effects on salmon resources may affect all regions while impacts on the pollock fishery would principally affect the Aleutian/Pribilof region.

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Importance of chum salmon to Western Alaska Limited Entry Permit Holders (See Addenda)

- Northwest: 92 percent In 2010: average revenue was $12,654.
- Nome: 41 percent in 2010: average revenue was $4,135.
- Yukon-Koyukuk: 13 percent in 2010, average revenue was $2,575, historically as much as 31 percent and average revenue of $7,851 (2000).
- Bethel: 9 percent in 2010: average revenue was $762
- Dillingham and Bristol Bay: less than three percent due to Sockeye value.
- Lake and Peninsula: 7 percent in 2010: average revenue was $6918 (historic high)
- Wade Hampton: 87 percent in 2009 average revenue was $1,628
- Aleutians East: 20 percent in 2010, average revenue was $11,836
- Aleutians West: 8 percent in 2010, average revenue was $10180.,

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Overview of Costs and Benefits (1)

Passive Use Benefits

- — salmon are clearly valuable because they contributes 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 whales of various species)
- — To the best of the analysts' knowledge, there has been no study published to date concerning the passive-use value of Bering Sea non-Chinook salmon.
- — 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.

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Overview of Costs and Benefits (2)

Fleet Operational Effects (mitigating behavior)

- — mitigating a triggered area closure by re-deploying fishing effort, using the same fishing gear and methods, to known adjacent fishing grounds
- — switching to a different target fishery in an area unaffected by non-Chinook salmon PSC minimization measures;
- — mitigating the risk of a hard cap induced closure by speeding up harvesting and processing activities (race for fish).

Cost of Mitigating Behavior

- — Travel Costs and Learning/prospecting costs
- — PSC avoidance measure costs (excluder or avoidance)
- — Reduced harvesting efficiency (reduced CPUE)
- — Gear Conflicts
- — Processing inefficiencies (throughput)
- — Safety

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Overview of Costs and Benefits (3)

Minimization of Adverse Effects
- — Voluntary Transfers
  - Requires entity formation and is "voluntary!"
- — Rollovers (NMFS managed)
- — Cooperative Provisions
  - 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 by cooperative converts the allocation by sector into smaller allocations at the inshore cooperative level where each inshore cooperative would then have to manage the operations of its members to stay under their specific cap, or stop fishing. As such, they have incentive to avoid PSC to stay within their PSC allowance.
- — Intercooperative Transfers
  - allows intercooperative leases of Chinook salmon PSC allocations or industry initiated transfers with the suboptions of 50%, 70% and 90% as defined for sector transfers.

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Overview of Costs and Benefits (4)

Product Quality and Markets.
- —Production inefficiency may affect product quality
- —Reduced catch may affect markets and market prices
- —Market effect not quantifiable at this time

Consumers
- —Potential for reduced consumption, and higher costs
- —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).

Impacts to Related Fisheries and Dependent Communities.

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Salmon Savings, Foregone Revenue, and Revenue at Risk Methodology

- Salmon Savings from EA projections by scenario (Ianelli)
- Projected potentially forgone TAC from EA projection of fishery closure/area closure dates.
- Round weight equivalent product prices applied to retained catch to produce gross first wholesale revenue by species, by sector, by year and for each alternative scenario
- Gross first wholesale revenue, all species, all areas, equals fleet sector status quo
- Percent of Total Revenue shows worst case scenario potential impacts relative to sector total revenue.

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Comparison of Salmon Savings with Subsistence and Commercial Catches by area

- Catch statistics from Subsistence and Commercial salmon description sections (Ch 3) were summed to correspond to the AEQ analysis areas (Coastal West Alaska, Upper Yukon, SW)
- Catch rate (as percent of total run size) is calculated and multiplied by AEQ estimates (EA: Dr. Ianelli) for the high bycatch year (2005) for Alternative 2, and the Prototypical year for Alternative 3 under the most restrictive cap and trigger (50k/25K) and under allocation scenario 2ii.
- Estimates subsistence and commercial proportion of AEQ based on historic proportions of catch in the total run by area.
- Does NOT imply an allocation of AEQ, simply shows the proportions. .

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Alternative 2 AEQ Salmon Savings to Catch Comparison: 50,000 cap, 2ii, 2005

AEQ Area	Coastal WAK	Upper Yukon	SW Alaska
Total Run Size	4,920,000	2,290,000	1,300,000
2005 Subsistence Catch	166,185	91,667	716
2005 Commercial Catch	1,594,273	180,162	781,992
2005 AEQ Salmon Saved	**67,955**	**31,905**	**12,542**
Subsistence harvest rate	3%	4%	0%
Subsistence portion of AEQ	**2,295**	**1,279**	**7**
Commercial harvest rate	32%	8%	60%
Commercial portion of AEQ	**22,020**	**2,514**	**7,544**

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Alternative 3 AEQ Salmon Savings to Catch Comparison: 25,000 trigger, 2ii option 1, 12% June-July

AEQ AREA	High AEQ Year			Average AEQ Year		
	Coastal WAK	Upper Yukon	SW Alaska	Coastal WAK	Upper Yukon	SW Alaska
Total Run Size	4,920,000	2,286,000	1,300,000	4,920,000	2,286,000	1,300,000
2005 Subsistence Catch	166,185	91,667	716	166,185	91,667	716
2005 Commercial Catch	1,594,273	180,162	781,992	1,594,273	180,162	781,992
Prototypical Year AEQ Salmon Saved	**8,621**	**4,048**	**1,591**	**1,829**	**954**	**347**
Subsistence harvest rate	3.4%	4.0%	0.1%	3.4%	4.0%	0.1%
Subsistence portion of AEQ	**291**	**162**	**1**	**142**	**125**	**17,729**
Commercial harvest rate	32%	8%	60%	32%	8%	60%
Commercial portion of AEQ	**2,794**	**319**	**957**	**593**	**75**	**209**

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Alternative 3 AEQ Salmon Savings to Catch Comparison: 25,000 trigger, 2ii option 1, 42% June-July

AEQ AREA	High AEQ Year			Average AEQ Year		
	Coastal WAK	Upper Yukon	SW Alaska	Coastal WAK	Upper Yukon	SW Alaska
Total Run Size	4,920,000	2,286,000	1,300,000	4,920,000	2,286,000	1,300,000
2005 Subsistence Catch	166,185	91,667	716	166,185	91,667	716
2005 Commercial Catch	1,594,273	180,162	781,992	1,594,273	180,162	781,992
Prototypical Year AEQ Salmon Saved	**10,915**	**5,125**	**2,014**	**2,315**	**1,207**	**439**
Subsistence harvest rate	3.4%	4.0%	0.1%	3.4%	4.0%	0.1%
Subsistence portion of AEQ	**369**	**206**	**1**	**78**	**48**	**0**
Commercial harvest rate	32.4%	7.9%	60.2%	32.4%	7.9%	60.2%
Commercial portion of AEQ	**3,537**	**404**	**1,211**	**750**	**95**	**264**

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Direct Effects of Alternative 2 (Hard Caps): Potentially Foregone Revenue (see tables beginning on page 220

- 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.
- Scenario 1, with 50,000 cap
- Total estimates are approximately $489 million
  - $214 million from the CV sector,
  - $206 million from the CP sector,
  - $51million from the Mothership sector,
  - $19 million from CDQ pollock fisheries.
- As the hard cap level is increased to 200,000 fish the potentially forgone revenue estimates are lower and the hard cap is a binding constraint in fewer years.
- What is also apparent is that the potentially forgone revenue accrues mostly, an in some cases only, in the CV sector.
- As the hard cap level is increased to 353,000 fish the potentially forgone revenue estimates continue to decline relative to the two lower caps and the impacts accrue mostly, an in some cases only, in the CV sector.

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Table 6-4: Estimated hypothetical forgone pollock gross revenue ($ millions), in the B season by sector and year under three different allocation schemes and hard caps, 2003-2009.

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	$19.39	$35.65	$24.16	$124.61	$203.81			$5.06		$5.06					
2004	$39.98	$168.68	$33.46	$117.71	$359.83	$13.63	$128.80	$5.70	$45.57	$193.70		$69.15		$14.92	$84.07
2005	$18.97	$205.51	$50.86	$213.66	$489.00	$7.94	$76.93	$18.07	$177.51	$280.46		$49.78	$4.20	$147.75	$201.73
2006		$161.61		$254.50	$416.11				$162.03	$162.03					
2007	$14.14	$75.28	$21.66	$50.12	$161.20										
2008															
2009															

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	$6.93	$12.88	$12.52	$140.25	$172.59				$16.70	$16.70					
2004	$27.99	$162.51	$28.08	$123.01	$341.60		$69.15		$52.40	$121.55				$35.06	$35.06
2005	$15.34	$92.66	$49.91	$215.24	$373.15		$44.61	$8.11	$185.35	$238.08				$165.71	$165.71
2006		$63.71		$254.50	$318.20				$202.18	$202.18				$137.57	$137.57
2007	$11.82	$57.29	$16.41	$61.75	$147.27										
2008															
2009				$17.94	$17.94										

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			$10.35	$158.38	$168.73				$37.89	$37.89					
2004	$19.52	$150.04	$20.05	$132.96	$322.58		$9.02		$80.11	$89.13				$45.57	$45.57
2005	$12.64	$82.44	$47.88	$220.86	$363.82				$198.75	$198.75				$185.35	$185.35
2006				$259.53	$259.53				$226.28	$226.28				$165.10	$165.10
2007	$4.04	$42.00	$5.86	$81.56	$133.47										
2008															
2009				$77.90	$77.90										

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Potential Impacts in Percent of B Season Total Revenue

- Potentially forgone revenue in the CV sector can represent nearly 95% 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 76% and the CDQ sector as much as 78% 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 all impacts , albeit at reduced levels due to the larger cap, within the CV sector under scenario 2 and 3.

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Table 6-5: Estimated hypothetical forgone pollock gross revenue, as a percent of B season total gross revenue, by sector and year under three different allocation schemes and hard caps, 2003-2009.

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	39.9%	16.4%	11.1%	50.0%	39.5%			2.3%		1.0%				0.0%	
2004	78.3%	76.2%	15.1%	52.2%	72.3%	26.7%	58.2%	2.6%	20.2%	38.9%		31.2%		6.6%	16.9%
2005	30.3%	72.6%	18.0%	78.1%	79.0%	12.7%	27.2%	6.4%	64.9%	45.3%		17.6%	1.5%	54.0%	32.6%
2006		56.2%		94.7%	67.1%				60.3%	26.1%					
2007	20.1%	24.8%	7.1%	20.0%	25.8%										
2008															
2009															

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	14.3%	5.9%	5.8%	56.3%	33.5%				6.7%	3.2%					
2004	54.8%	73.4%	12.7%	54.6%	68.6%		31.2%		23.2%	24.4%				15.6%	7.0%
2005	24.5%	32.7%	17.6%	78.7%	60.3%		15.8%	2.9%	67.8%	38.4%				60.6%	26.8%
2006		22.2%		94.7%	51.3%				75.2%	32.6%				51.2%	22.2%
2007	16.8%	18.9%	5.4%	24.6%	23.6%										
2008															
2009				7.2%	3.2%										

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			4.8%	63.5%	32.7%				15.2%	7.4%					
2004	38.2%	67.8%	9.1%	59.0%	64.8%		4.1%		35.5%	17.9%				20.2%	9.2%
2005	20.2%	29.1%	16.9%	80.7%	58.7%				72.7%	32.1%				67.8%	29.9%
2006				96.6%	41.8%				84.2%	36.5%				61.4%	26.6%
2007	5.7%	13.8%	1.9%	32.5%	21.4%										
2008															
2009				31.2%	14.0%										

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Potential Impacts in Percent of Annual Total Revenue

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 fairly high.

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Direct Effects of Alternative 3 (Triggered Closures) Revenue At Risk (see tables beginning on page 224)

- Table 6-7 provides estimates of revenue at risk, by sector, under option 1 of Alternative 3 for 2003-2009. Table 6-8 provides these numbers as a percent of B season total revenue by sector and Table 6-9 provides these numbers as a percent of total annual revenue by sector.
- Allocation scenario 1, 25,000 cap.
  - The CV sector is estimated to have had as much as $96 million in revenue at risk out of the $101 million total for all fleet sectors combined.
  - This represents approximately 35 percent of the CV B season total gross revenue and approximately 19 percent of total gross revenue.
- Relaxing the trigger caps has the result of decreasing the revenue at risk.
- 2005 CV revenue at risk decreases from $96 million to $72 million and $39 million as the trigger cap is relaxed to 75,000 and then 200,000, respectively.
- 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 $96 million to $100 million, and $107 million.

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Table 6-7 Estimated hypothetical gross revenue at risk ($ millions) due to diverted fishing activities based on historical fishing grounds, temporal and spatial patterns, by sector allocation (panels) and trigger cap levels for Alternative 3, Option 1, 2003-2009.

2ii (sector allocation 1)

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	$7.71	$2.56	$5.03	$90.88	$106.18	$5.35	$2.09	$3.60	$59.07	$70.11	$0.83	$1.27	$1.75	$17.17	$21.02
2004	$1.12	$6.12	$5.04	$44.71	$56.99	$0.32	$5.23	$2.16	$26.50	$34.20	$0.13	$3.30	$0.03	$6.65	$10.11
2005	$0.00	$0.06	$5.39	$96.02	$101.47	$0.00	$0.00	$2.01	$71.88	$73.89	$0.00	$0.00	$0.20	$38.60	$38.80
2006	$0.00	$1.68	$0.00	$57.55	$59.23	$0.00	$0.84	$0.00	$51.70	$52.54	$0.00	$0.00	$0.00	$35.21	$35.21
2007	$0.23	$2.60	$0.05	$21.00	$23.88	$0.23	$2.35	$0.04	$14.12	$16.74	$0.18	$1.91	$0.03	$7.50	$9.62
2008	$0.07	$0.31	$0.00	$59.68	$60.06	$0.04	$0.24	$0.00	$50.14	$50.43	$0.00	$0.15	$0.00	$27.10	$27.25
2009	$0.00	$0.00	$1.00	$37.98	$38.98	$0.00	$0.00	$0.67	$22.18	$22.86	$0.00	$0.00	$0.18	$4.78	$4.96

4ii (sector allocation 2)

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	$6.60	$2.30	$4.74	$96.57	$110.22	$2.28	$1.53	$2.19	$68.41	$74.40	$0.00	$2.64	$3.29	$16.08	$22.01
2004	$0.71	$5.72	$3.57	$46.69	$56.69	$0.17	$3.94	$1.06	$32.21	$37.37	$0.00	$15.43	$0.00	$27.98	$43.41
2005	$0.00	$0.01	$4.22	$100.01	$104.25	$0.00	$0.00	$0.26	$75.36	$75.62	$0.00	$0.00	$0.43	$37.08	$37.52
2006	$0.00	$1.24	$0.00	$58.18	$59.42	$0.00	$0.16	$0.00	$52.66	$52.82	$0.00	$0.00	$0.00	$60.18	$60.18
2007	$0.23	$2.51	$0.04	$21.86	$24.64	$0.21	$1.91	$0.04	$16.01	$18.16	$0.20	$7.58	$0.04	$1.51	$9.33
2008	$0.06	$0.28	$0.00	$60.83	$61.16	$0.01	$0.18	$0.00	$54.14	$54.34	$0.00	$0.00	$0.00	$27.82	$27.82
2009	$0.00	$0.00	$0.89	$39.95	$40.84	$0.00	$0.00	$0.39	$24.52	$24.91	$0.00	$0.00	$2.05	$27.15	$29.20

6 (sector allocation 3)

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	$5.33	$2.09	$4.31	$103.66	$115.40	$0.66	$0.95	$2.02	$79.19	$82.81			$2.37	$16.89	$19.26
2004	$0.32	$5.21	$2.76	$49.52	$57.81	$0.08	$2.49	$0.16	$37.28	$40.01		$0.82		$32.80	$33.62
2005			$3.33	$106.80	$110.13			$0.23	$86.37	$86.60			$0.16	$41.85	$42.01
2006		$0.72		$58.18	$58.90				$55.72	$55.72				$64.45	$64.45
2007	$0.23	$2.35	$0.04	$24.33	$26.95	$0.18	$1.69	$0.03	$17.73	$19.64	$0.12	$4.11	$0.04	$2.28	$6.54
2008	$0.04	$0.24		$60.83	$61.12		$0.10		$56.05	$56.15				$33.51	$33.51
2009			$0.82	$43.87	$44.68			$0.21	$31.01	$31.22				$32.47	$32.47

Table 6-8 Estimated hypothetical B season gross revenue at risk, as a percent of B season total gross revenue, due to diverted fishing activities based on historical fishing grounds, temporal and spatial patterns, by sector allocation (panels) and trigger cap levels for Alternative 3, Option 1, 2003-2009.

2ii (sector allocation 1)

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	15.9%	1.2%	2.3%	36.5%	20.6%	11.0%	1.0%	1.7%	23.7%	13.6%	1.7%	0.6%	0.8%	6.9%	4.1%
2004	2.2%	2.8%	2.3%	19.8%	11.4%	0.6%	2.4%	1.0%	11.8%	6.9%	0.3%	1.5%	0.0%	3.0%	2.0%
2005	0.0%	0.0%	1.9%	35.1%	16.4%	0.0%	0.0%	0.7%	26.3%	11.9%	0.0%	0.0%	0.1%	14.1%	6.3%
2006	0.0%	0.6%	0.0%	21.4%	9.6%	0.0%	0.3%	0.0%	19.2%	8.5%	0.0%	0.0%	0.0%	13.1%	5.7%
2007	0.3%	0.9%	0.0%	8.4%	3.8%	0.3%	0.8%	0.0%	5.6%	2.7%	0.3%	0.6%	0.0%	3.0%	1.5%
2008	0.1%	0.1%	0.0%	21.1%	8.6%	0.1%	0.1%	0.0%	17.7%	7.3%	0.0%	0.0%	0.0%	9.6%	3.9%
2009	0.0%	0.0%	0.4%	15.2%	7.0%	0.0%	0.0%	0.3%	8.9%	4.1%	0.0%	0.0%	0.1%	1.9%	0.9%

4ii (sector allocation 2)

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	13.6%	1.1%	2.2%	38.7%	21.4%	4.7%	0.7%	1.0%	27.4%	14.4%	0.0%	1.2%	1.5%	6.4%	4.3%
2004	1.4%	2.6%	1.6%	20.7%	11.4%	0.3%	1.8%	0.5%	14.3%	7.5%	0.0%	7.0%	0.0%	12.4%	8.7%
2005	0.0%	0.0%	1.5%	36.6%	16.8%	0.0%	0.0%	0.1%	27.5%	12.2%	0.0%	0.0%	0.2%	13.6%	6.1%
2006	0.0%	0.4%	0.0%	21.7%	9.6%	0.0%	0.1%	0.0%	19.6%	8.5%	0.0%	0.0%	0.0%	22.4%	9.7%
2007	0.3%	0.8%	0.0%	8.7%	3.9%	0.3%	0.6%	0.0%	6.4%	2.9%	0.3%	2.5%	0.0%	0.6%	1.5%
2008	0.1%	0.1%	0.0%	21.5%	8.8%	0.0%	0.1%	0.0%	19.1%	7.8%	0.0%	0.0%	0.0%	9.8%	4.0%
2009	0.0%	0.0%	0.4%	16.0%	7.3%	0.0%	0.0%	0.2%	9.8%	4.5%	0.0%	0.0%	0.8%	10.9%	5.2%

6 (sector allocation 3)

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	11.0%	1.0%	2.0%	41.6%	22.4%	1.4%	0.4%	0.9%	31.8%	16.1%	0.0%	0.0%	1.1%	6.8%	3.7%
2004	0.6%	2.4%	1.2%	22.0%	11.6%	0.2%	1.1%	0.1%	16.5%	8.0%	0.0%	0.4%	0.0%	14.6%	6.8%
2005	0.0%	0.0%	1.2%	39.0%	17.8%	0.0%	0.0%	0.1%	31.6%	14.0%	0.0%	0.0%	0.1%	15.3%	6.8%
2006	0.0%	0.3%	0.0%	21.7%	9.5%	0.0%	0.0%	0.0%	20.7%	9.0%	0.0%	0.0%	0.0%	24.0%	10.4%
2007	0.3%	0.8%	0.0%	9.7%	4.3%	0.3%	0.6%	0.0%	7.1%	3.1%	0.2%	1.4%	0.0%	0.9%	1.0%
2008	0.1%	0.1%	0.0%	21.5%	8.8%	0.0%	0.0%	0.0%	19.8%	8.1%	0.0%	0.0%	0.0%	11.8%	4.8%
2009	0.0%	0.0%	0.3%	17.6%	8.0%	0.0%	0.0%	0.1%	12.4%	5.6%	0.0%	0.0%	0.0%	13.0%	5.8%

Table 6-9: Estimated hypothetical B season gross revenue at risk, as a percent of total annual revenue, due to diverted fishing activities based on historical fishing grounds, temporal and spatial patterns, by sector allocation (panels) and trigger cap levels for Alternative 3, Option 1, 2003-2009.

2ii (sector allocation 1)

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	7.5%	0.5%	1.1%	19.9%	10.3%	5.2%	0.4%	0.8%	13.0%	6.8%	0.8%	0.3%	0.4%	3.8%	2.0%
2004	1.0%	1.2%	1.0%	10.0%	5.3%	0.3%	1.0%	0.4%	5.9%	3.2%	0.1%	0.6%	0.0%	1.5%	0.9%
2005	0.0%	0.0%	0.9%	17.9%	8.0%	0.0%	0.0%	0.3%	13.4%	5.8%	0.0%	0.0%	0.0%	7.2%	3.1%
2006	0.0%	0.3%	0.0%	11.1%	4.7%	0.0%	0.1%	0.0%	10.0%	4.2%	0.0%	0.0%	0.0%	6.8%	2.8%
2007	0.2%	0.4%	0.0%	4.2%	1.9%	0.2%	0.4%	0.0%	2.8%	1.3%	0.1%	0.3%	0.0%	1.5%	0.8%
2008	0.0%	0.0%	0.0%	11.1%	4.5%	0.0%	0.0%	0.0%	9.3%	3.8%	0.0%	0.0%	0.0%	5.0%	2.0%
2009	0.0%	0.0%	0.2%	8.5%	3.8%	0.0%	0.0%	0.1%	5.0%	2.2%	0.0%	0.0%	0.0%	1.1%	0.5%

4ii (sector allocation 2)

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	6.4%	0.5%	1.0%	21.2%	10.7%	2.2%	0.3%	0.5%	15.0%	7.3%	0.0%	0.6%	0.7%	3.5%	2.1%
2004	0.6%	1.1%	0.7%	10.5%	5.2%	0.1%	0.8%	0.2%	7.2%	3.5%	0.0%	3.0%	0.0%	6.3%	4.0%
2005	0.0%	0.0%	0.7%	18.7%	8.2%	0.0%	0.0%	0.0%	14.1%	6.0%	0.0%	0.0%	0.1%	6.9%	3.0%
2006	0.0%	0.2%	0.0%	11.2%	4.8%	0.0%	0.0%	0.0%	10.2%	4.2%	0.0%	0.0%	0.0%	11.6%	4.8%
2007	0.2%	0.4%	0.0%	4.4%	2.0%	0.2%	0.3%	0.0%	3.2%	1.5%	0.1%	1.3%	0.0%	0.3%	0.8%
2008	0.0%	0.0%	0.0%	11.3%	4.6%	0.0%	0.0%	0.0%	10.0%	4.1%	0.0%	0.0%	0.0%	5.2%	2.1%
2009	0.0%	0.0%	0.2%	9.0%	4.0%	0.0%	0.0%	0.1%	5.5%	2.4%	0.0%	0.0%	0.4%	6.1%	2.8%

6 (sector allocation 3)

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	5.2%	0.4%	0.9%	22.7%	11.2%	0.6%	0.2%	0.4%	17.4%	8.1%	0.0%	0.0%	0.5%	3.7%	1.9%
2004	0.3%	1.0%	0.5%	11.1%	5.3%	0.1%	0.5%	0.0%	8.4%	3.7%	0.0%	0.2%	0.0%	7.3%	3.1%
2005	0.0%	0.0%	0.6%	19.9%	8.7%	0.0%	0.0%	0.0%	16.1%	6.9%	0.0%	0.0%	0.0%	7.8%	3.3%
2006	0.0%	0.1%	0.0%	11.2%	4.7%	0.0%	0.0%	0.0%	10.8%	4.5%	0.0%	0.0%	0.0%	12.4%	5.2%
2007	0.2%	0.4%	0.0%	4.9%	2.2%	0.1%	0.3%	0.0%	3.5%	1.6%	0.1%	0.7%	0.0%	0.5%	0.5%
2008	0.0%	0.0%	0.0%	11.3%	4.6%	0.0%	0.0%	0.0%	10.4%	4.2%	0.0%	0.0%	0.0%	6.2%	2.5%
2009	0.0%	0.0%	0.2%	9.8%	4.3%	0.0%	0.0%	0.0%	6.9%	3.0%	0.0%	0.0%	0.0%	7.3%	3.2%

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Effects of Options 2, 2a, and 3

- Table 6-18 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 1, under each of options 2, 2a, and 3.
- Each of these options are shown to have essentially the same effects as discussed above for option 1. The primary difference between these options is that option 2 and option 2a both increase the potential impacts on the CV fleet, while option 3 considerably decreases that impact.

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Effects of Alternative 4 on Fleet Revenue.

- Table 6-19 provides estimates of the revenue placed at risk under Alternative 4. Table 6-20 provides these estimates in terms of annual total gross revenue.
- What is immediately apparent is that the large area triggered closure of Alternative 4 would have the potential to crease large impacts on the CV and CDQ sectors and lesser impacts on the CP and Mothership sectors.
- What this means is that the large area closure would likely provide considerable incentive for participation in the RHS, which would entirely mitigate revenue at risk for those who choose to participate. It is not possible; however, to predict whether any vessel operator may choose to forgo participating in the RHS.

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Effects of Alternative 4 on Salmon Savings: EA Table 5-93 Sector-specific estimated proportion of chum salmon bycatch (and by extension, AEQ mortality) reduction that would hypothetically have occurred had the large area closure for Alternative 4 been in place, 2003-2010.

	CDQ	CP	MS	CV	Mean
2003	21%	53%	24%	12%	17%
2004	52%	70%	42%	13%	25%
2005	28%	44%	47%	15%	18%
2006	69%	75%	77%	22%	25%
2007	50%	65%	64%	48%	53%
2008	92%	85%	88%	45%	52%
2009	49%	73%	67%	56%	58%
2010	84%	64%	47%	30%	39%
Mean	57%	66%	54%	30%	36%

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Table 6-19: Amount of revenue at risk ($millions) due to pollock catch that is estimated to be diverted from closed areas, by sector, for Alternative 4 large closure area, 2003-2009

Year	CDQ	CP	M	CV	All fleet
2003	$45.76	$70.31	$37.59	$370.13	$523.79
2004	$43.38	$92.23	$37.88	$313.10	$486.59
2005	$34.35	$140.47	$36.42	$345.24	$556.48
2006	$31.10	$110.37	$22.09	$297.12	$460.68
2007	$29.55	$104.97	$27.56	$214.95	$377.04
2008	$15.35	$49.56	$13.81	$199.42	$278.14
2009	$28.72	$81.97	$20.51	$184.22	$315.43

Table 6-20: Amount of revenue at risk ($millions) due to pollock catch that is estimated to be diverted from closed areas, by sector, for Alternative 4 large closure area, 2003-2009

Year	CDQ	CP	M	CV	All fleet
2003	44.4%	15.0%	8.0%	81.2%	51.0%
2004	37.4%	17.7%	7.3%	70.2%	45.0%
2005	26.2%	23.5%	6.1%	64.4%	44.0%
2006	23.4%	18.5%	3.7%	57.4%	36.9%
2007	21.3%	17.4%	4.6%	43.0%	30.4%
2008	10.6%	7.7%	2.1%	36.9%	20.9%
2009	26.2%	17.3%	4.3%	41.3%	30.6%

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Potential Effects On Shoreside Value Added Processing Under Alternative 2 (Tables Begin on page 241)

- As shown in Table 6-25 through Table 6-27, 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, respectively.
- 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 $150 million, or approximately 97 percent of B season total gross revenue and approximately 50 percent of total annual gross revenue.
- The vast majority of the potential impact is attributable to the Akutan and Dutch Harbor area.

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Potential Effects On Shoreside Value Added Processing Under Alternative 3 (Tables Begin on page 244)

- Table 6-28 through Table 6-39 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 Alternative 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 $63 million, or approximately 40 percent of B season total gross revenue and approximately 20 percent of total annual gross revenue. The vast majority of the potential impact is attributable to the Akutan and Dutch Harbor area.

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Alternative 4 and Shoreside Effects

- This analysis does not include a breakout of shoreside value added under Alternative 4.
- Alternative 4 is essentially a rolling hotspot system with a large area closure for those who do not participate. While impacts in terms of revenue at risk have been provided for Alternative 4, they are provided to identify the considerable incentive for participation in the rolling hotspot system.
- It appears likely that most, if not all, vessel operators would be motivated to participate in a rolling hotspot system, thereby eliminating any potential revenue at risk under this Alternative. As a result, it is not possible to predict whether any vessel may choose not to participate, and thereby have vessel specific revenue at risk, which would potentially generate shoreside value added "at risk" as well. Thus, the analysis does not provide that breakout as it would be inappropriate to imply that such likelihood exists.

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