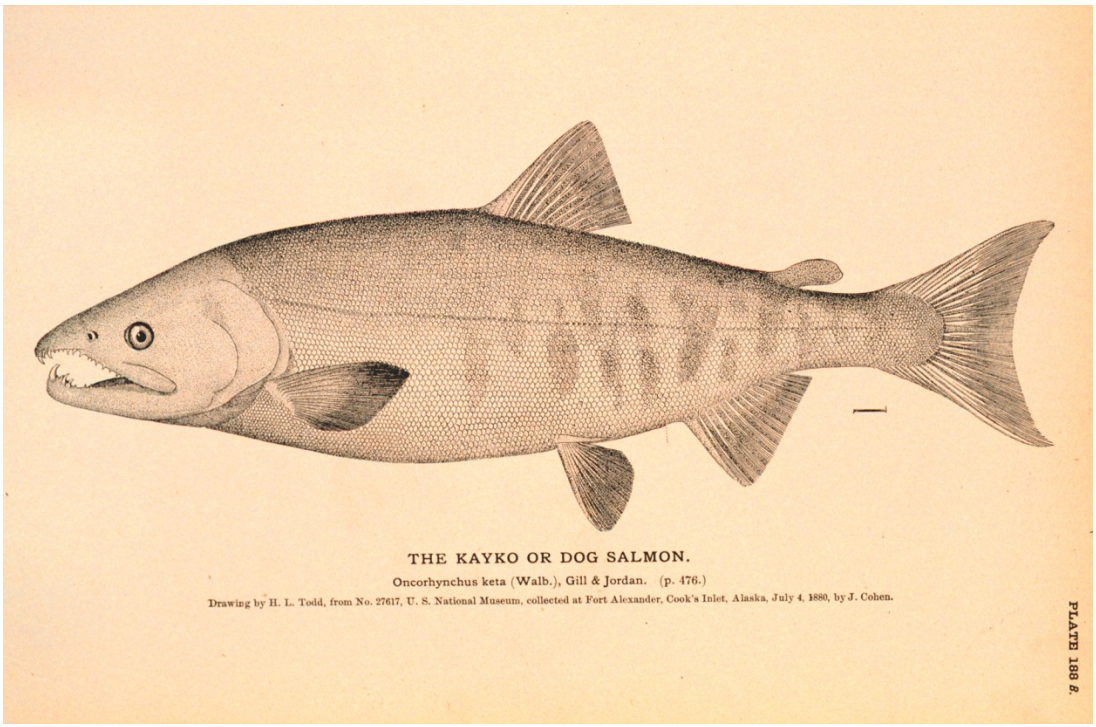
Bering Sea Non-Chinook Salmon PSC Management Measures

Initial Review Draft Environmental Assessment



North Pacific Fishery Management Council

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Executive Summary

This executive summary summarizes the draft Bering Sea Chum Salmon prohibited species catch (PSC) 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 non-Chinook (primarily chum and referred herein as such) PSC in the Bering Sea pollock fishery. The area of the fishery and major river systems are depicted in Figure ES-1.

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.

Several management measures are currently used to minimize chum salmon PSC in the Bering Sea pollock fishery. Chum salmon taken incidentally in groundfish fisheries are classified as prohibited species and, as such, must be either discarded or donated through the Prohibited Species Donation Program. In the mid 1990s, NMFS implemented regulations recommended by the Council to control the bycatch of chum salmon taken in the Bering Sea pollock fishery. These regulations established the Chum SSA and mandated year-round accounting of chum salmon bycatch in the trawl fisheries. An exemption to this closure for the pollock fishery was enacted in regulation in 2007 (and through an exempted fishing permit in 2006) provided the fleet participated in a rolling Hot spot closure program. The Council is now considering whether additional management measures are needed to minimize the bycatch of chum salmon in the Bering Sea pollock fishery.

Note that throughout this document chum salmon bycatch is referred to as chum salmon prohibited species catch (PSC) wherever possible. PSC is a specific definition under the BSAI groundfish FMP and as such any ‘bycatch’ of salmon species is referred to by it’s FMP-level definition to indicate it’s status under the FMP. By Magnuson Act definition this chum salmon is taken as bycatch in the pollock fishery,

however in deference to the specific BSAI FMP designation the specific term used in this analysis of bycatch is 'PSC'.

This EA examines three alternatives to reduce chum salmon PSC 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 2009, the total value of pollock was an estimated $1.03 billion. This increased to $1.06 billion in 2010. 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 2011.

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 2011.

Year	Number of pollock fishing vessels	Pollock TAC (t)	Non-Chinook (chum) salmon PSC (numbers of fish)
2003	110	1,491,760	189,185
2004	113	1,492,000	440,468
2005	109	1,478,000	704,552
2006	105	1,487,756	309,630
2007	108	1,394,000	93,783
2008	108	1,000,000	15,267
2009	106	815,000	46,127
2010	104	813,000	13,222
2011	104	1,252,000	191,445

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 annually and the seasonal proportion of the Bering Sea Chinook salmon prohibited species catch limit to the CDQ Program as follows: A season 9.3% of the overall A season proportion and B season 5.5% of the seasonal proportion.

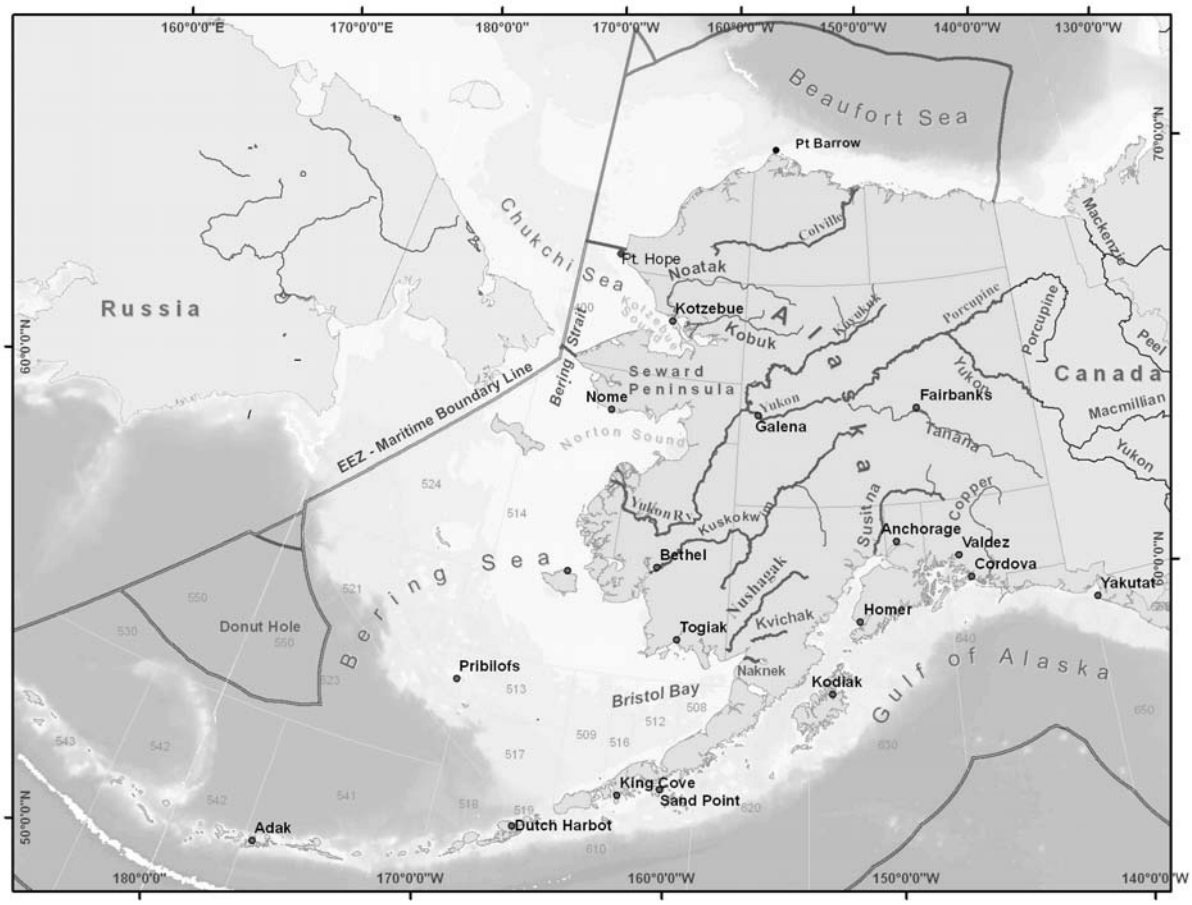

Figure ES-1. Map of the Bering Sea and major connected salmon producing rivers in Alaska and Northwest Canada

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 PSC 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 Chinook PSC 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 for one year.

Several management measures have been used previously to reduce salmon PSC 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 PSC 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 PSC from 2003 to 2011.

The Council started considering revisions to existing chum salmon PSC management measures in 2004 when information from the fishing fleet indicated that it was experiencing increases in chum salmon PSC following the regulatory closure of the Chum Salmon Savings Area. Contrary to the original intent of the area closure, chum salmon PSC 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 PSC 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 PSC 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 PSC of Bering Sea Chinook salmon by recommending the Chinook salmon PSC management program under Amendment 91. The Council had previously indicated its prioritization of a Chinook salmon PSC management program in light of high Chinook salmon PSC 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

[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.

minimize chum PSC to the extent practicable. This analysis evaluates three alternatives to meet that objective.

Chum Salmon stock status

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 chum PSC 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-2).

Table ES-2. Overview of Alaskan chum salmon stock performance, 2011.

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

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

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.

Description of Alternatives

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

Alternative 1: Status Quo (No Action)

Alternative 2: Hard cap

Alternative 3: Triggered closure with rolling hotspot 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 PSC limit 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 PSC limits 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, a closure is proposed to which the fleet would be exempt for participating in an RHS program similar to status quo as well as options to provide additional triggered closures to participants. Note that the alternatives are not mutually exclusive and mixing and matching of compenents of each may be done to create a combined management approach which would represent a new alternative.

Alternative 1: Status Quo (No Action)

Alternative 1 retains the current program of Chum Salmon Savings Area (SSA) closures in the Bering Sea triggered by separate non-Community Development Quota (non-CDQ) and CDQ non-Chinook salmon PSC limits, along with the exemption to these closures by pollock vessels participating in a Rolling Hot Spot intercooperative agreement (RHS ICA) approved by NMFS. The RHS ICA regulations were implemented in 2007 through Amendment 84 to the BSAI FMP. The regulations were revised in 2011 to

remove those provisions of the ICA that were for Chinook PSC management given the new program in place under Amendment 91. Closure of the Chum SSA is designed to reduce the total amount of chum incidentally caught by closing areas with historically high levels of salmon PSC. The RHS ICA operates in lieu of regulatory closures of the Chum SSA and requires industry to identify and close areas of high salmon PSC and move to other areas. Only vessels directed fishing for pollock are subject to the Chum SSA closure and ICA regulations. The ICA for 2011 and the list of vessels and CDQ groups participating in it are appended to this document (Appendix 2).

Chum Salmon Savings Area

Alternative 1 would keep the existing Chum SSA closures in effect (Figure ES-2). The Chum Salmon Savings Area was established in 1994 by emergency rule, and then formalized in the Fishery Management Plan for Groundfish of the Bering Sea and Aleutian Islands Management Area (BSAI FMP) in 1995 under Amendment 35 (ADF&G 1995) This area is closed to all trawling from August 1 through August 31. Additionally, if 42,000 non-Chinook salmon are caught in the Catcher Vessel Operational Area (CVOA) during the period August 15 through October 14, the area remains closed for the 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. (Figure ES-2).

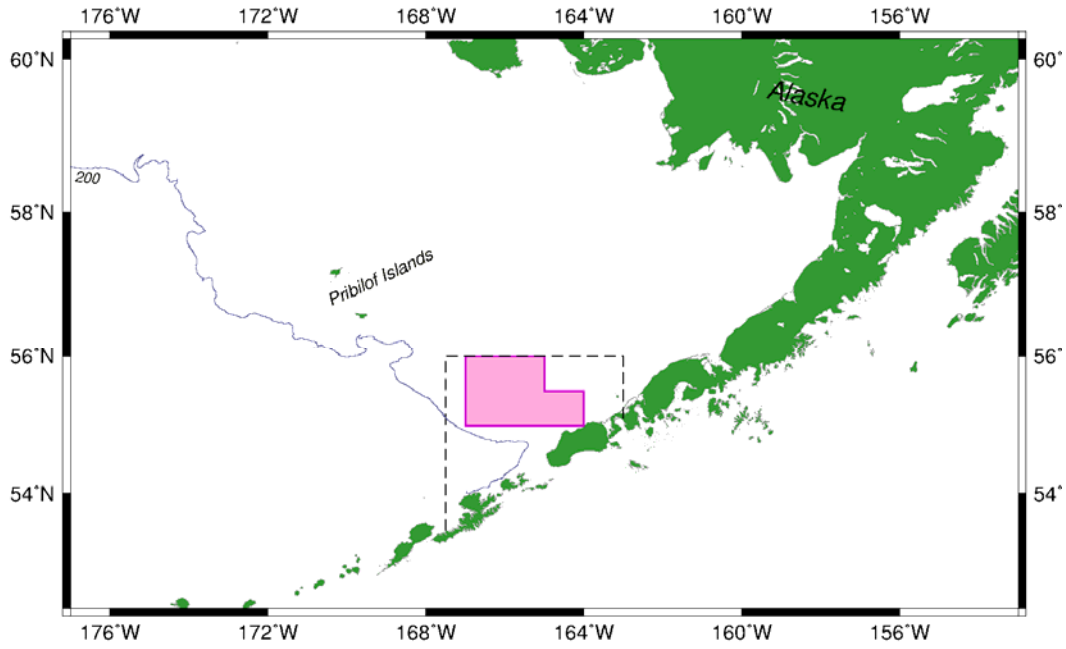

Figure ES-2. Chum Salmon Savings Area (CSSA), shaded, and Catcher Vessel Operational Area (CVOA), dashed line.

PSC limits for the CDQ Program

Under the status quo, the CDQ Program receives an annual allocation of 10.7 percent of the Bering Sea non-Chinook salmon PSC limits as a prohibited species quota (PSQ) reserve. The non-Chinook PSQ reserve is 4,494 salmon annually and the remaining 37,506 non-Chinook salmon make up the PSC limit for the non-CDQ pollock fisheries. NMFS further allocates the PSQ reserves among the six CDQ groups

based on percentage allocations approved by NMFS on August 8, 2005. More information about the CDQ allocations is in a *Federal Register* notice published on August 31, 2006 (71 FR 51804). For non-Chinook salmon, the percentage allocations of the PSQ reserve among the CDQ groups are as follows:

Aleutian Pribilof Island Community Development Association (APICDA)	14%
Bristol Bay Economic Development Corporation (BBEDC)	21%
Central Bering Sea Fishermen's Association (CBSFA)	5%
Coastal Villages Region Fund (CVRF)	24%
Norton Sound Economic Development Corporation (NSEDC)	22%
Yukon Delta Fishery Development Corporation (YDFDC)	14%

Unless exempted because of participation in the RHS ICA, a CDQ group is prohibited from directed fishing for pollock in the Chum SSA when that group's non-Chinook salmon PSQ is reached. NMFS does not issue fishery closures through rulemaking for the CDQ groups. All CDQ groups are participating in the RHS ICA approved in 2011, so they currently are exempt from closure of the Chum SSA.

Rolling Hotspot System Intercooperative Agreement

Regulations implemented under Amendment 84 to the BSAI FMP exempt vessels directed fishing for pollock from closures of both the Chum and Chinook Salmon Savings Areas if they participate in an RHS ICA approved by NMFS (NPFMC 2005). The fleet voluntarily started the RHS program in 2001 for chum salmon and in 2002 for Chinook salmon. The exemption to regulatory area closures for vessels that participated in the RHS was implemented in 2006 and 2007 through an exempted fishing permit. The North Pacific Fishery Management Council (Council) developed Amendment 84 to attempt to resolve the bycatch problem through the American Fisheries Act (AFA) pollock cooperatives. These regulations were implemented in late 2007 and the first RHS ICA approved by NMFS under these regulations was in effect starting in January 2008 (Appendix 2). The ICA was amended for the 2011 season to remove regulations related to the Chinook SSA (and all provisions under the ICA related to Chinook bycatch management) following implementation of Amendment 91.

Chinook Salmon PSC Management Measures under Amendment 91

The Council took final action on Amendment 91, Chinook salmon PSC management measures in the Bering Sea pollock fishery in April 2009. NMFS approved regulations implementing Amendment 91 on August 30, 2010 (72 FR 53026), and the fishery has been operating under the requirements since January 2011. Amendment 91 established two Chinook salmon PSC limits (60,000 Chinook salmon and 47,591 Chinook salmon) for the Bering Sea pollock fishery. For each PSC limit, NMFS issues A season and B season Chinook salmon PSC allocations to the catcher/ processor sector, the mothership sector, the inshore cooperatives, and the CDQ groups. When a PSC allocation is reached, the affected sector, inshore cooperative, or CDQ group is required to stop fishing for pollock for the remainder of the season even if its pollock allocation had not been fully harvested.

NMFS issues transferable allocations of the 60,000 Chinook salmon PSC limit to those sectors that participate in an incentive plan agreement (IPA) and remain in compliance with the performance standard. Sector and cooperative allocations would be reduced if members of the sector or cooperative decided not to participate in an IPA. Vessels and CDQ groups that do not participate in an IPA fish under a restricted opt-out allocation of Chinook salmon. If a whole sector does not participate in an IPA, all members of that sector would fish under the opt-out allocation.

The IPA component is an innovative approach for fishery participants to design industry agreements with incentives for each vessel to avoid Chinook salmon bycatch at all times and thus reduce bycatch below the PSC limits. To ensure participants develop effective IPAs, the final rule required that participants submit annual reports to the Council that evaluate whether the IPA is effective at providing incentives for

vessels to avoid Chinook salmon at all times while fishing for pollock. The sector-level performance standard ensures that the IPA is effective and that sectors cannot fully harvest the Chinook salmon PSC allocations under the 60,000 Chinook salmon PSC limit in most years. Each year, each sector is issued an annual threshold amount that represents that sector's portion of 47,591 Chinook salmon. For a sector to continue to receive Chinook salmon PSC allocations under the 60,000 Chinook salmon PSC limit, that sector must not exceed its annual threshold amount three times within 7 consecutive years. If a sector fails this performance standard, it will permanently be allocated a portion of the 47,591 Chinook salmon PSC limit. Under Amendment 91, NMFS would issue transferable allocations of the 47,591 Chinook salmon PSC limit to all sectors, cooperatives, and CDQ groups if no IPA is approved, or to the sectors that exceed the performance standard.

Alternative 2: Hard cap (PSC limit)

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

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

Setting the Hard Cap

Component 1 would establish the annual PSC limit based upon a range of numbers as shown below. Component 1 sets the overall cap; this could be either applied at the pollock fishery level to the CDQ and non-CDQ fisheries (not allocated by sector within the non-CDQ sectors), or may be subdivided by sector (Component 2) and the inshore sector allocation further allocated among the inshore cooperatives (Component 4).

Range of numbers for a hard cap

There are two options considered under the establishment of a non-Chinook PSC limit for vessels fishing in the directed pollock fishery. These options differ by whether the cap is established for the entire B season (Option 1a) or for June and July only (Option 1b).

Option 1a: Apply a non-Chinook PSC limit to vessels participating in the directed pollock fishery for the entire B season

Under this option the hard cap (non-Chinook PSC limit) would be established for vessels fishing in the directed pollock fishery according to the range of suboptions as shown below and would be applicable for the entire B season. Once reached, this cap would require all vessels affected by the cap to stop fishing for the remainder of the season.

The range of non-Chinook salmon PSC hard caps considered is shown below. As shown below, the CDQ Program would be allocated 10.7 percent of the fishery level cap with the remainder allocated to the combined non-CDQ fishery.

Range of suboptions for Option 1a 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 will be used in the impact analysis 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 (in **bold** above).

Option 1b: Apply a non-Chinook PSC limit to vessels participating in the directed pollock fishery during June and July

Under this option the hard cap (non-Chinook PSC limit) would be established for vessels fishing in the directed pollock fishery during June and July. Once reached, this cap would require all vessels affected by the cap to stop fishing until August 1.

The range of cap suboptions under Option 1b are shown in the table below. They represent the proportion of non-Chinook PSC caught in June and July relative to the B season total during 2003 through 2011. **Bolded** suboptions represent the subset for the analysis.

Range of suboptions for Option 1b cap for non-Chinook with allocations for CDQ Program (10.7%) and remainder for non-CDQ fishery (89.3%)

	Non-Chinook	CDQ	Non-CDQ
1)	**15,600**	**1,669**	**13,931**
2)	23,400	2,504	20,896
3)	39,000	4,173	34,827
4)	**62,400**	**6,677**	**55,723**
5)	93,600	10,015	83,585
6)	**110,136**	**11,785**	**98,351**

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

Alternative 3-Closure with RHS exemption and Trigger closure options for participants

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

Component 1 of this alternative sets the trigger PSC cap level for this large scale closure. PSC from all vessels will accrue towards the cap level selected. However if the cap level is reached, the triggered

closure would not apply to participants in the RHS program. Under Component 2, however, in addition to the large closure for non-RHS participants, a select triggered area closure would apply to RHS participants. Four options of triggered closure areas and time frames are provided under Component 2. Component 3 then sets the trigger PSC cap level for the area selected under Component 2.

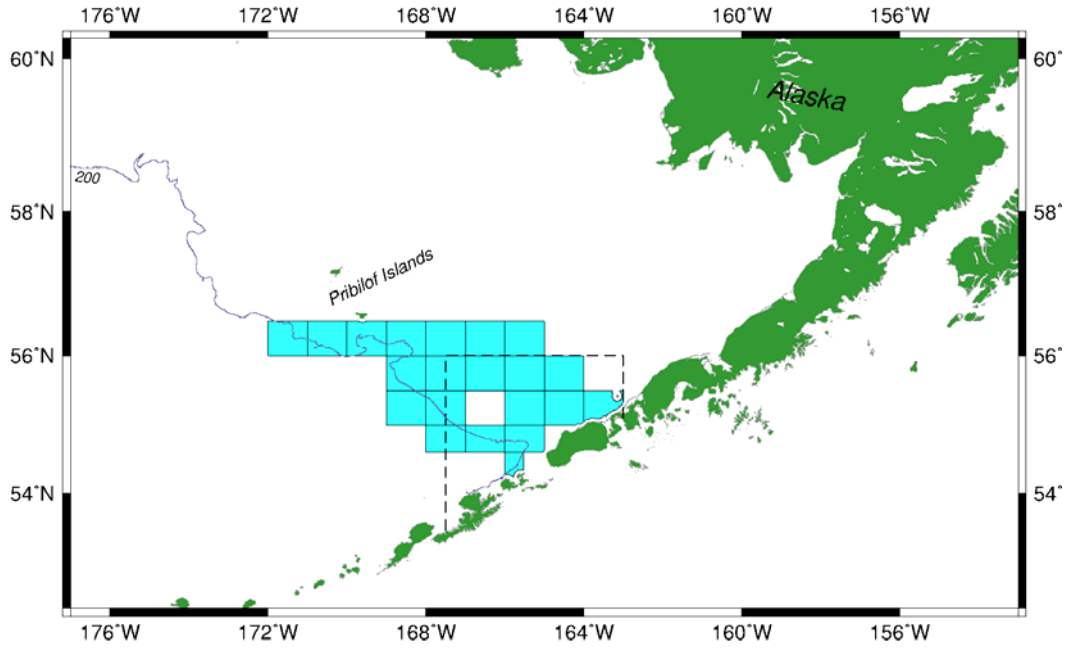

Figure ES-3. Selected area closures covering 80% of B season 2003 through 2011 chum bycatch.

Component 1: 80% Closure aggregate trigger PSC cap levels

The range of non-Chinook salmon PSC caps considered is shown below. As listed here, the CDQ sector allocation of the fishery level cap would be 10.7 percent, with the remainder apportioned to the combined non-CDQ fishery.

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

	Non-Chinook	CDQ	Non-CDQ
1)	**25,000**	**2,675**	**22,325**
2)	50,000	5,350	44,650
3)	**75,000**	**8,025**	**66,975**
4)	125,000	13,375	111,625
5)	**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**).

NMFS would issue pollock fishery closures once either the non-CDQ fishery or a non-CDQ sector reached its salmon bycatch limit. Vessel operators would be prohibited from directed fishing for pollock in a non-Chinook salmon savings area once NMFS closed the area to a fishery or sector. The CDQ sector would not be subject to pollock fishery closures; instead, CDQ groups would have to stop fishing for pollock in the closed areas once they had reached their non-Chinook bycatch allocation.

Vessels participating in the RHS would operate under a different fishery level cap than any vessels not participating in the RHS. NMFS would continue to manage triggered area closures for vessels not participating in the ICA as described in status quo. Vessels participating in the RHS would be exempt from NMFS's area closures, and would instead be subject to the RHS closures.

The process currently used to monitor salmon PSC and issue salmon savings area closures would continue for these closures. NMFS would have to determine whether a vessel was directed fishing for pollock and then match that vessel with its fishery component (CDQ or non-CDQ) or sector. NMFS currently uses a combination of VMS, industry reported catch information, and observer data to monitor vessel activities in special management areas, such as habitat conservation areas and species-specific savings areas (e.g., salmon savings area). These data sources are used by NMFS on a daily basis to monitor fishery limits. Information from VMS is useful for determining vessel location in relation to closure areas, but it may not conclusively indicate whether a vessel is fishing, transiting through a closed area, or targeting a particular species.

Component 2: Trigger closure areas and timing for RHS participants:

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.

Suboption 1a) Trigger closure would apply for the B season (June-October; Figure ES-5)

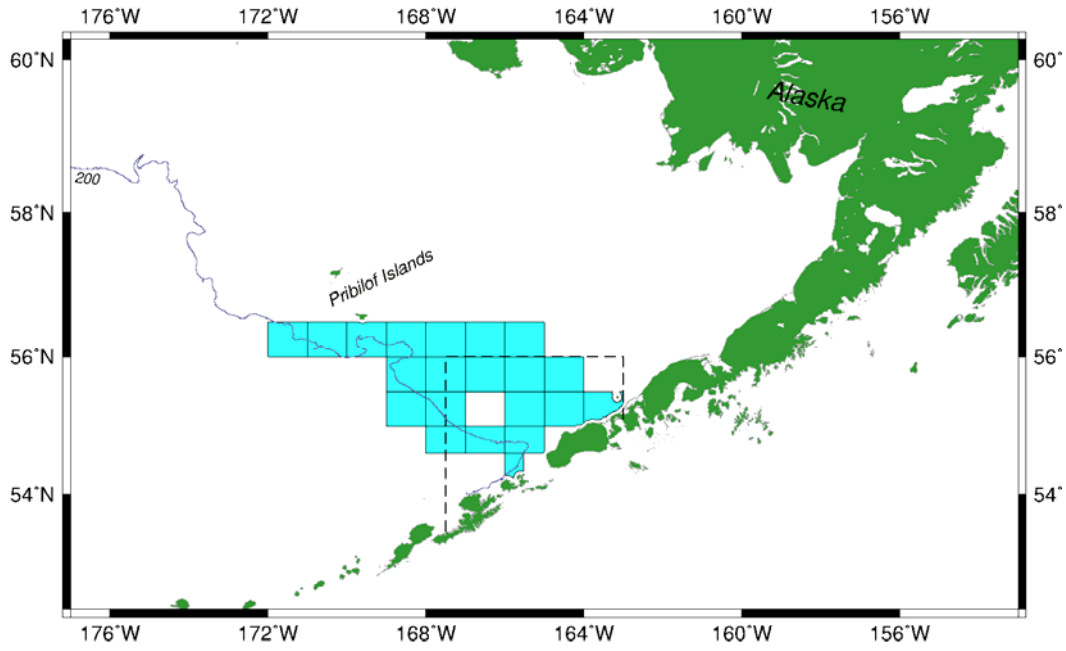

Figure ES-4. Selected area closures covering 80% of B season (Option 1a) 2003-2011 chum bycatch.

Suboption 1b) Trigger closure would only apply in June and July (Figure ES-4).

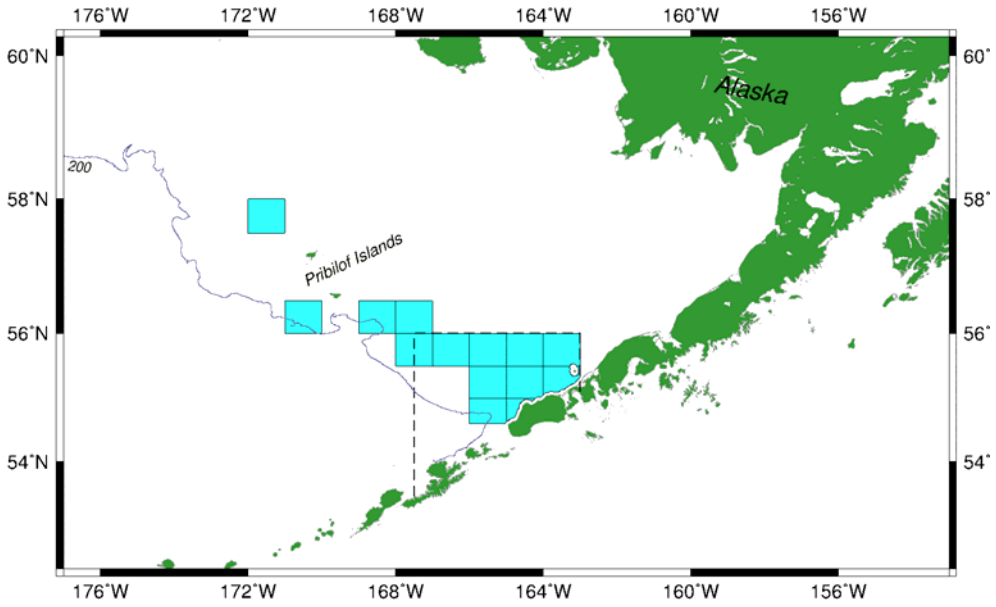

Figure ES-5. Selected area closures covering 80% of June-July (Option 1b) 2003 through 2011 chum bycatch.

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

Suboption 2a) Trigger closure would apply for the B season (June-October; Figure ES-6).

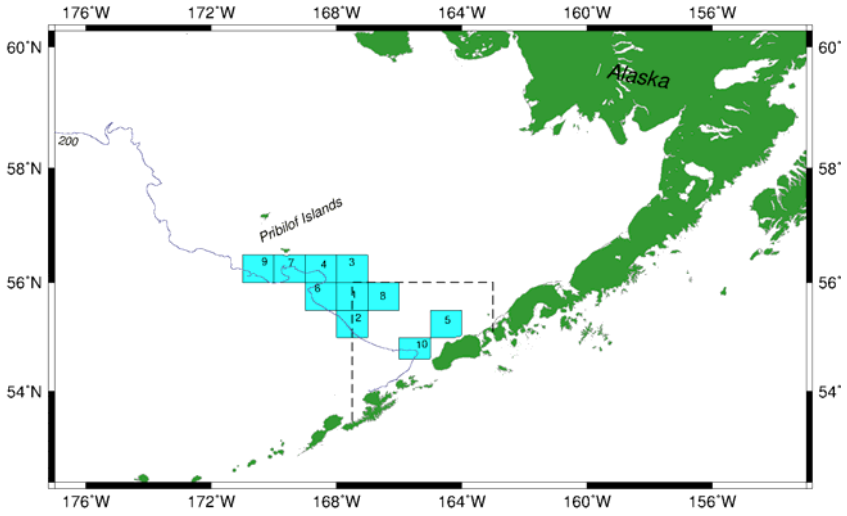

Figure ES-6. Selected area closures covering 60% of B season 2003 through 2011 chum bycatch.

Suboption 2b) Trigger closure would only apply in June and July (Figure ES-7).

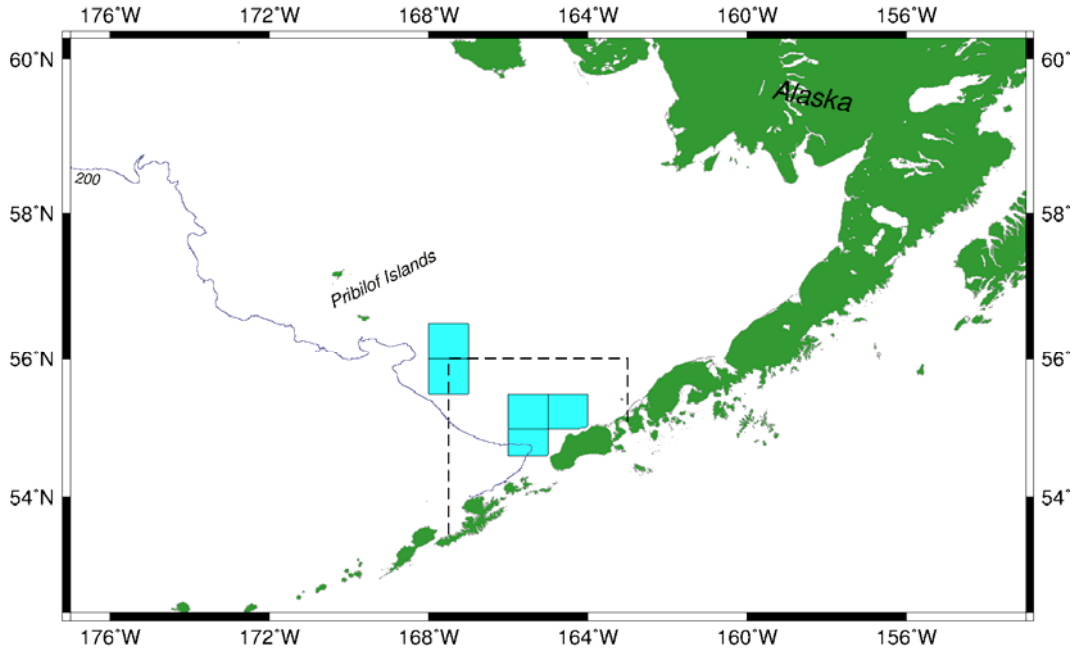

Figure ES-7. Selected area closures covering 60% of June-July 2003 through 2011 chum bycatch.

Component 3: PSC cap levels for trigger closures for RHS participants

PSC cap level options for a given closure selected under Component 2 are shown below. Note that caps for both Option 1 and Option 2 under Component 2 are shown. If Suboption 1b or 2b is selected, then the June-July cap would reflect the proportion of bycatch in June and July.

Range of suboptions for trigger PSC cap levels for non-Chinook with allocations for CDQ (10.7%) and remainder for non-CDQ fishery for RHS participants.

	Total Annual cap (Option 1a or 2a)	CDQ	Non-CDQ	June-July cap (Option 1b or 2b) Total June/July	CDQ	Non-CDQ
1)	25,000	2,675	22,325	7,800	835	6,965
2)	50,000	5,350	44,650	15,600	1,669	13,931
3)	75,000	8,025	66,975	23,400	2,504	20,896
4)	125,000	13,375	111,625	39,000	4,173	34,827
5)	200,000	21,400	178,600	62,400	6,677	55,723

Component 4 and 5 : Sector allocation of trigger cap for RHS participants and cooperative provisions

Sector allocation options and cooperative level provisions under aLternative 3 are the same as those listed under Alternative 2.

A summary of the Alternative 3 Components, option and suboptions for analysis is shown in below (Table ES-6).

Table ES-6. Summary of Alternative 3 components, options and suboptions.

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

Comparison of Alternatives

The following section provides an overview of the three broad alternatives under consideration and the over-arching management measures that would be imposed under each.

Table ES-7 compares the three alternatives, the relative time frame of the management measures being considered by alternative or multiple options within alternatives where applicable, and the action under consideration. Both Alternatives 2 and 3 have options for a management action enacted in June and July only as compared to a similar action enacted for the entire B season. Note that the alternatives are not mutually exclusive thus measures for one alternative may be combined with those in another to form an additional alternative for consideration. For example, a June-July hard cap under Alternative 2 (Alternative 2, Component 1, Option 1b) could be combined with the B season closure to non-participants in the RHS system under Alternative 3 Component 1 to form a new management system that could be analyzed should the Council decide to mix and match amongst alternative components and options to tailor a specific program and objective for management.

Table ES-7. Comparison of over-arching management measures under the three alternatives considered in this analysis

Alternative	**Timing**	**Management action**		
1-Status quo	B season	Exemption to regulatory closure of CSSA (Fig. ES-2.) provided participation in current RHS program		
2-Hard cap	B season (Component 1, Option 1a)	Fishery sectors close for the season when sector-specific cap level is reached		
	June-July (Component 1, Option 1b)	Fishery sectors close until July 31 when sector-specific cap level is reached		
3-Closure area with RHS exemption		***Closure area applies to***	***Closure Area***	***Basis period***
	B season (Component 1)	**Non-**participants of RHS program when **fishery level** caps[1] reached	80% of chum (Figure ES-3)	B season
	B season (Component 2, Suboption 1a)	Participants of RHS program when **sector-level** caps reached	80% of chum (Figure ES-5)	B season
	June-July (Component 2, Suboption 1b)	Participants of RHS program when **sector-level** caps reached	80% of chum (Figure ES-7)	June-July
	B season (Component 2, Suboption 2a)	Participants of RHS program when **sector-level** caps reached	60% of chum (Figure ES-7)	B season
	June-July (Component 2, Suboption 2b)	Participants of RHS program when **sector-level** caps reached	60% of chum (Figure ES-6)	June-July

Managing and Monitoring the Alternatives

The observer and monitoring requirements currently in place to account for Chinook salmon PSC under Amendment 91 also enable NMFS to monitor non-Chinook salmon PSC under a hard cap. Therefore, NMFS does not anticipate changes to observer requirements or additional monitoring provisions under either Alternative 2 or 3.

If the Council allocates hard caps or trigger caps among sectors and cooperatives, NMFS recommends that any entities receiving allocations be the same as those used for Chinook salmon PSC allocations under Amendment 91. Consistent allocation categories for Chinook and non-Chinook salmon would

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

Area closures could be managed in a number of different ways, depending on the combination of components and options selected. Trigger closures would require a sector to stop pollock fishing in certain closure areas when its allocation of non-Chinook salmon PSC is reached. Depending on the selection of subsequent components in this alternative, salmon may be allocated at the fishery level (CDQ and non-CDQ), to each sector (inshore, mothership, catcher/processor, and CDQ), or among the inshore cooperatives.

Under Alternative 3, participants in the RHS would be exempt from the regulatory closure system. Monitoring and enforcement of this alternative is similar to status quo in which ICA members are managed under the RHS and NMFS closes the trigger area for non-ICA members.

The current census data collection program is highly responsive to management needs and provides timely data, especially considering the logistics of the sectors and variation in operation type. However, even with this highly responsive system, a June and July cap results in a very short time period for NMFS to monitor and insure a timely trigger area closure. NMFS would need to project non-Chinook salmon harvest during the week required to publish a *Federal Register* notice and get census information. These projections may result in a trigger closure being made prior to or after the cap being reached.

If the Council recommends a chum salmon bycatch management program under either Alternative 1 or Alternative 3 that provides exemptions to caps or area closures for participants in an approved ICA, NMFS will continue to require that the federal regulations contain sufficient detail to prevent later substantive revisions to the ICA that would reduce its effectiveness.

In addition, NMFS has determined that federal regulations for the RHS may not include specific requirements for the enforcement provisions or penalties that the ICA would impose on its participants. Therefore, in the future, under either Alternative 1 or Alternative 3, the Council could recommend that federal regulations require the RHS ICA to contain a description of the enforcement provisions and penalties that the ICA participants agree to assess on themselves for violation of the ICA provisions. However, the regulations could not include specific requirements for what these penalties must be.

The fishing industry will continue to incur costs associated with the administration of the RHS ICA. However, NMFS has not identified significant costs to the agency for managing or monitoring these alternatives. NMFS Office of Law Enforcement will provide additional information about the costs of enforcing Amendment 91 and the potential costs of the chum salmon bycatch alternatives prior to Council final action.

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 PSC 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 2003-2011 NMFS observer data combined with NMFS regional office catch-accounting. Component 1 of Alternative 3 imposes a large-scale triggered closure to which participants in the RHS program are exempt. This component is examined in two ways: 1-as a separate alternative whereby this is the only component selected and thus the RHS program provides the primary management tool while the large-scale area closure provides the incentive to participate in the RHS, and 2-as the first layer in a series of measures including components 2 through 6 as desirable to provide additional protection to minimize chum PSC. Alternative 3 was thus analyzed quantitatively two ways: 1) as a fixed B season closure should all vessels fail to participate in a rolling hotspot program (RHS) to indicate the relative incentive to participate, and 2) with 100% vessel participation in a rolling hotspot program. Additional triggered closures are imposed under Alternative 3 on the participants of the RHS. For these closures the amount of pollock diverted is estimated in conjunction with the amount of chum salmon saved. For all the alternatives the relative catch of Chinook is also estimated.

Results presented in Chapter 5 include both overall changes in chum salmon PSC 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 PSC predicted under the alternatives. The analysis relies on estimates of chum salmon saved as the measure of economic benefits of the alternatives.

Chum salmon impacts

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 PSC 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 PSC rates in the 1-3 days following RHS closures are approximately 8 percent lower than rates prior to the closure.
- Evaluating the pre-RHS data from 1993-2000, an RHS-like system would likely have reduced chum PSC 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.
- The average percentage of pollock catch that was moved due to RHS closures from 2003-2011 ranged from 7 percent to 21 percent for CVs and was 6 percent or less for other sectors.

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.

Following the criteria used to evaluate the impact of alternative management measures on chum salmon PSC it is clear that the status quo alternative results in adverse impacts since there are incidental takes of the prohibited species in question. However, given the low relative impact rates in most years of the status quo incidental catch levels on aggregate run sizes, even under the status quo, the relative impact of this incidental take on overall in-river returns is likely low. Nonetheless alternatives are evaluated to estimate potential means to minimize the adverse impacts of this incidental catch levels by reducing PSC catch of chum through different management strategies under Alternatives 2 and 3. Moving forward to evaluation of the other alternatives, comparison is made regarding minimizing adverse impacts by a reduction in incidental catch of chum PSC or increasing adverse impacts on chum PSC if the given alternative would result in an increase of incidental catch of chum PSC as compared with status quo.

Adult Equivalent mortality

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-8). 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 due to uncertainty in natural mortality, age composition, and maturation rate is relatively small. For projection purposes, the AEQ model results were fit to the annual bycatch and bycatch lagged by one year using linear regression. Given that over 99% of the variability could be explained this was considered a good approximation for converting bycatch numbers into in-river AEQ estimates.

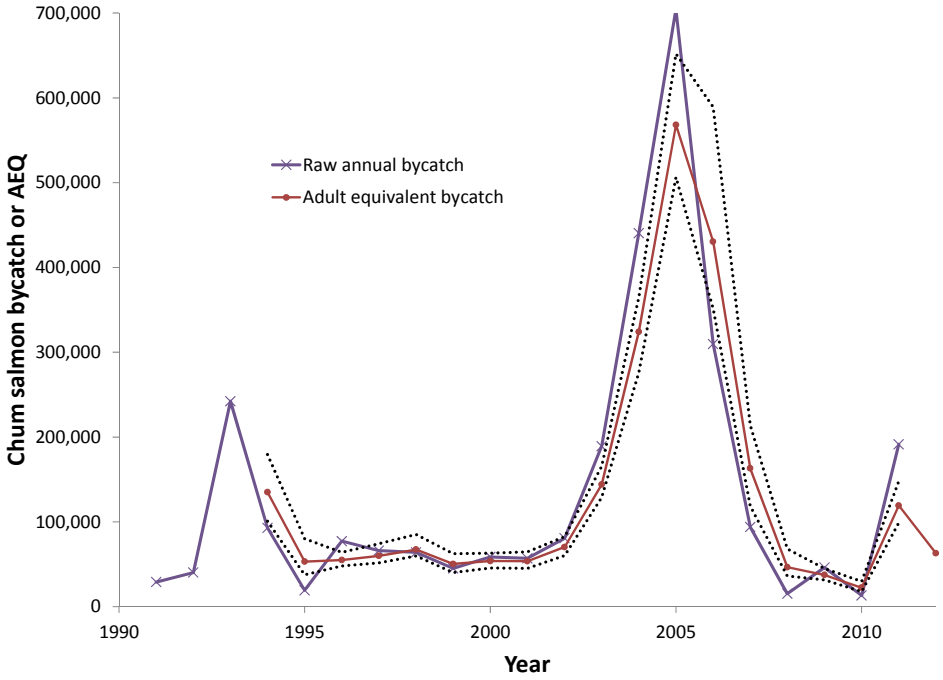

Figure ES-8. Estimated chum bycatch age-equivalent (AEQ) chum bycatch with stochastic (CV=0.4) age-specific oceanic natural mortality scenario 2 and rates compared to the annual tally. Dashed lines represent 5th and 95th percentiles based on 100 simulations. Note that values from 2011 and 2012 are based on predictions from equation 7 (Chapter 3).

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 ES-9).

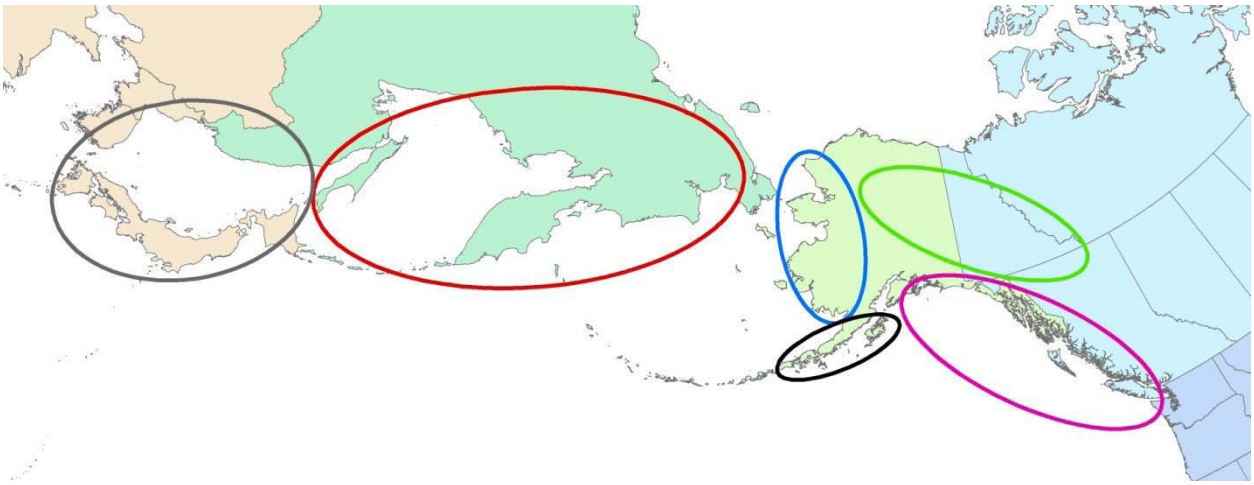

Figure ES-9. Six regional groupings of chum salmon populations used in the analysis including east Asia (grey), north Asia (red), coastal western Alaska (blue), upper/middle Yukon (green), southwest Alaska (black), and the Pacific Northwest (magenta). From Gray et al. 2010.

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. 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 ES-10). 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 ES-11). 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 2.73% estimated on the run that returned in 2006 (Figure ES-11). Combined over the period 2004-2011, the estimated mortality for Upper Yukon and coastal western Alaska was low (Figure ES-12). 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	0.49%	(0.07% - 1.23%)
Upper Yukon	1.26%	(0.17% - 2.73%)
Combined WAK	0.63%	(0.08% - 1.31%)
Southwest Alaska	0.40%	(0.07% - 1.03%)

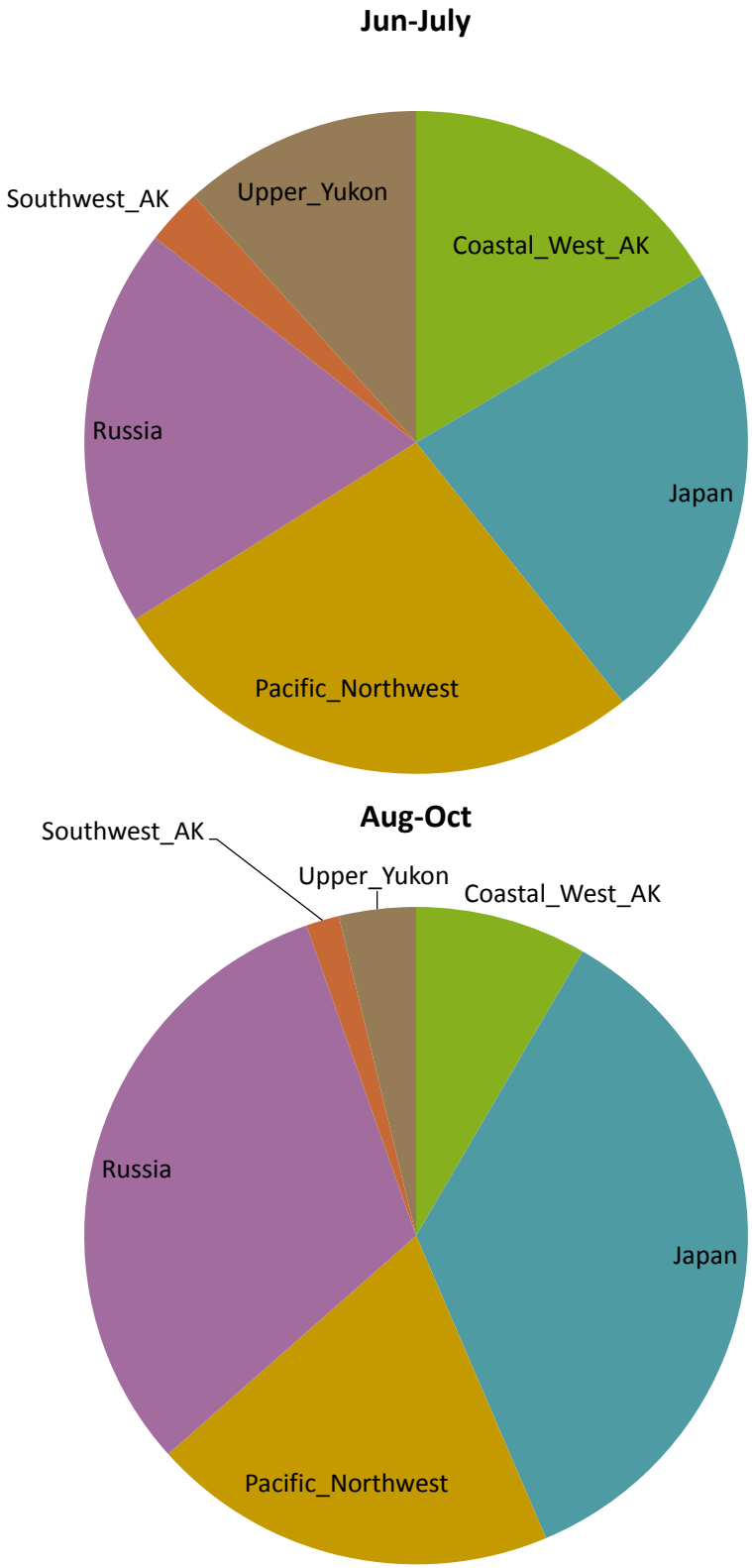

Figure ES-10. Average breakout of bycatch based on genetic analysis by early and late B-season strata, 2005-2009.

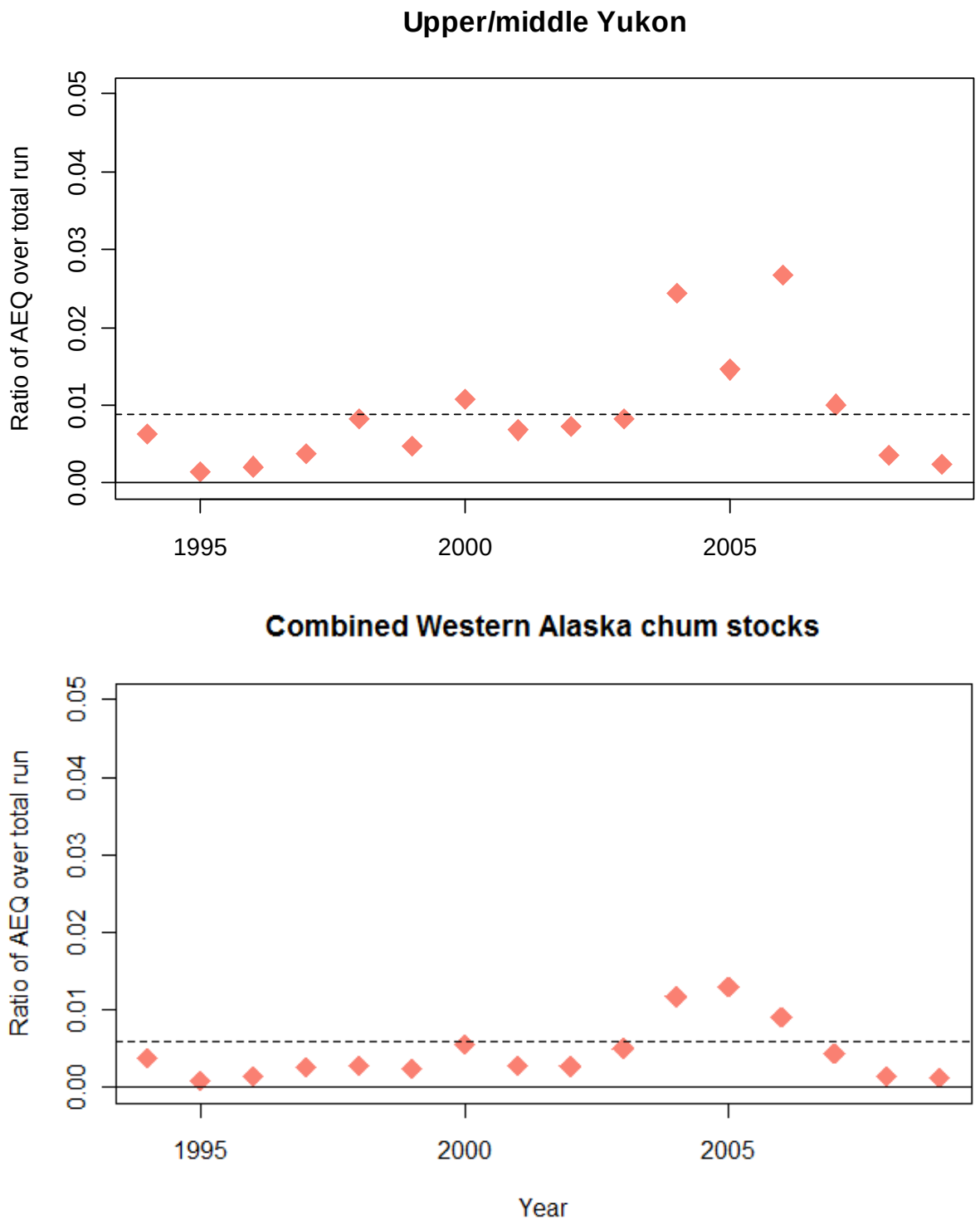

Figure ES-11. Estimated impact rates due to pollock fishery bycatch of chum salmon run sizes for Upper/middle Yukon (top) and for western Alaska stocks (coastal west Alaska stocks plus Upper/middle Yukon combined; bottom). Dashed horizontal line represents the mean value.

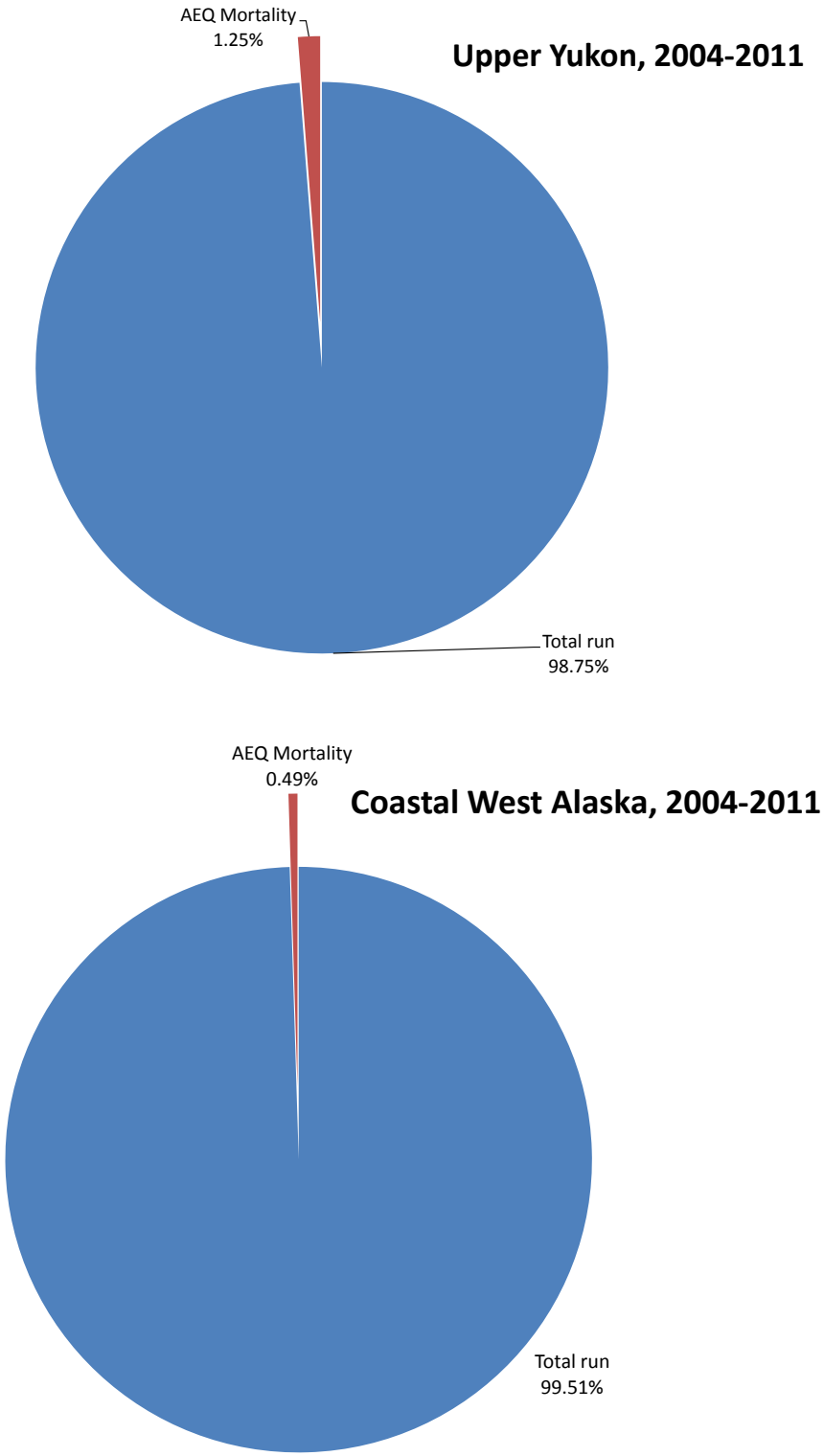

Figure ES-12. Estimated chum 2004-2011 summed AEQ mortality due to pollock fishery bycatch of chum salmon run sizes for Upper/middle Yukon (top) and for coastal western Alaska stocks (bottom).

Alternative 2, hard cap

Under Alternative 2, the hard cap options, estimates are made by year of the number of salmon saved (in AEQ terms) 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. In addition to the caps and sector allocations two options for how the caps would apply were analyzed. For option 1a) they apply over the whole B-season accumulated sector-specific PSC catch of chum salmon. For option 1b) the caps apply only for June-July period. This required accounting for bycatch for these periods to match with genetic stock identification differences. For all evaluations (including for Alternative 3) chum bycatch was converted to AEQ to retain the currency of impact on regional salmon runs.

Under the analyzed options for the hard caps and sector allocations, the numbers of salmon saved is quite high for some years and varies by sector, especially for suboption 1a (Table ES-8). In percentage terms the low cap had the biggest chum salmon savings for most stocks (~80% but lowest savings for the SW Alaska components). This table also shows that different sector allocations had relatively minor impact on savings except for the highest hard cap level which tended to save the most salmon under sector allocation 6 (for option 1a).

For suboption 1b) the numbers of salmon saved was much lower but there was considerable constrast between stocks (Table ES-8). For example, the lowest cap under 1b) reduced the impact on the Upper Yukon on average by 42% but the same option actually increased the estimated AEQ impact on Asian chum salmon. Scrutiny of results summed over years 2004-2011 indicate 1b) is apparently less sensitive to sector allocations than for suboption 1a). For the Upper Yukon different cap levels vary by suboption with 1a at low levels saving more chum whilst at higher cap levels, the savings for 1b is higher (Figure ES-13).

Nearly every option under consideration result in reductions of chum PSC and consequently provide increased returns of adult salmon to their regions of origin. The largest reduction is estimated to occur under a hard cap of 50,000 chum, option 1a for a B-season cap which would have provided an average Coastal western Alaska increased return of 20.3 thousand chum (compared to an average AEQ mortality estimated at 24.2 thousand chum). Given that the average estimated run size for this region for this period is 4.9 million, the ratio of mortality impact is about 0.5% and it seems unlikely that in-river management would have been modified for this amount of returning fish aggregated over all rivers systems in coastal west Alaska given the intricacies of in-season, in-river management as described in Section 5.2.1. In either case, impacts are unlikely to be significantly adverse because they would not diminish protections afforded to chum salmon in the current management of the groundfish fisheries.

Table ES-8. Estimated proportion of Alaska chum salmon saved relative to AEQ mortality year different **hard caps** and sector allocations by year for Alternative 2. Shaded column represents the historical estimated AEQ for years 2004-2011 summed.

	Sector allocation	Estimated AEQ	50,000 1a)	50,000 1b)	200,000 1a)	200,000 1b)	353,000 1a)	353,000 1b)
Coastal WAK	2ii		81%	30%	45%	26%	19%	24%
	4ii		81%	29%	50%	27%	28%	24%
	6		84%	28%	60%	29%	40%	26%
		193,649						
Upper Yukon	2ii		79%	42%	39%	34%	13%	30%
	4ii		79%	42%	45%	35%	23%	30%
	6		81%	42%	57%	38%	35%	32%
		106,722						
SWAK	2ii		42%	14%	24%	12%	9%	11%
	4ii		42%	14%	26%	12%	15%	11%
	6		43%	14%	31%	13%	22%	11%
		68,252						
SEAK-BC-WA	2ii		77%	16%	45%	13%	20%	12%
	4ii		77%	16%	48%	14%	29%	12%
	6		78%	15%	55%	16%	39%	13%
		361,690						
Asia	2ii		82%	-4%	53%	0%	28%	1%
	4ii		83%	-5%	54%	1%	35%	2%
	6		84%	-8%	59%	1%	45%	3%
		968,497						

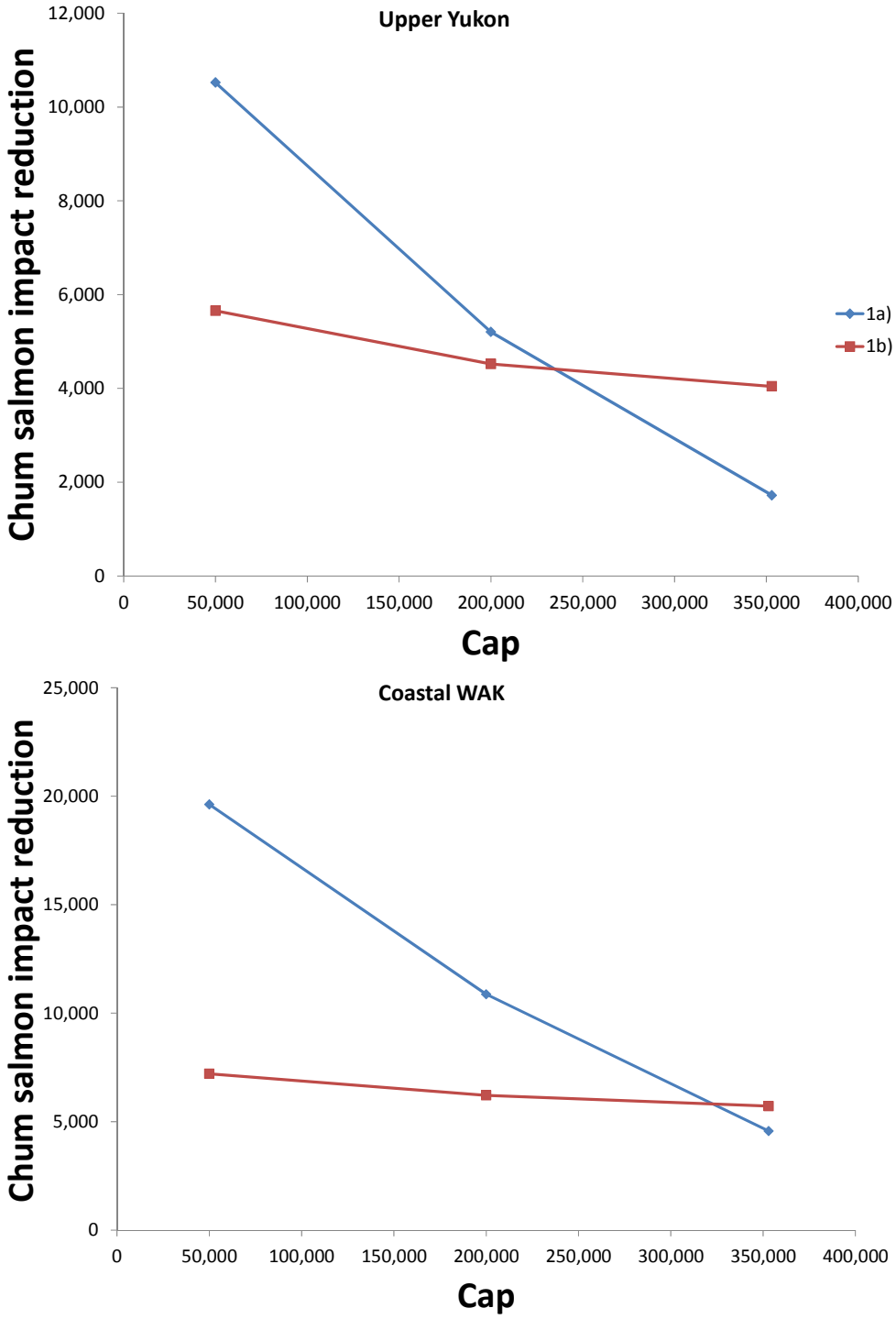

Figure ES-13. Average chum salmon impact reduction (AEQ) by suboption for Alternative 2, sector allocation 2ii, for years 2004-2011 for Upper Yukon (top) and Coastal WAK (bottom). Note that for 1b options the cap considered is that proportion of the B season cap shown in the horizontal axis.

Alternative 3, Triggered area closures

The following describes the options and the closure area and period used for analysis:

Option	Closure area	Period/closure size basis
1a)	80%	B season
1b)	80%	June-July
2a)	60%	B season
2b)	60%	June-July

Due to the difficulty in summarizing the effects of the various caps options and allocations, tables below are intended to highlight the different dimensions of the problem rather than show all results. As noted above, extra accounting is required to evaluate the within-B season impacts of the different components and alternative specifications. For this reason values are presented expanded to the genetics information on chum salmon (available for 2005-2009 and using seasonal average proportions in other years).

Component 1 of Alternative 3 imposes a large-scale triggered closure to which particfiopants in the RHS program are exempt. Given that the current program has 100% participation, it is likely that if this component alone were selected, participation would remain at 100%. Thus the impacts of this component (alone with no other components selected) is best characterized by status quo.

As discussed under Alternative 2, 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. In June 2011, the Council requested that additional consideration be given to analyzing the parameters of the current RHS that could be modified to potentially improve performance. Some specific items that were requested for consideration include the following:

- 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.

Discussion in the analysis in Chapter 5 focusses on qualitative discussion of these additional modifications that could be made within the RHS system itself in conjunction with Component 1 (alone with no other components selected) which would potentially improve the savings estimated to be realized under this program. A summary of the issues discussed in conjunction with each parameter is summarized below:

- **Modification to vessel-level**-Modifications of the RHS program to the vessel-level would follow the current shoreside and catcher-processor Chinook RHS programs. An individual-level system would increase the likelihood that vessels face consequences for high PSC. Because there may also be some advantages to having cooperative-level incentives, a RHS system could also include *both* individual and cooperative-level incentives.
- **Faster closure time**-Sea State strives to have recent information available for deciding which areas to close. There is no easy technical fix to reduce the utilization of information. Shortening the approximately 24-hour delay between when closures are announced and implemented would improve the quality of data and could provide some additional incentive to avoid high-PSC areas immediately

before closures are implemented. However, this would occur at additional cost to the fleet and historical simulation results suggest that the reduction in PSC would be relatively small.

- **Amount of closure area**-Historical simulation results indicate that larger closures are likely to further reduce PSC, but at a decreasing rate as they get larger. Larger areas at high-PSC periods would allow more high-PSC areas to be closed.
- **Timing/location of WAK chum**-The RHS could be adjusted to focus on benefits to Western Alaska stocks by being more active early in the B season. However, if extremely large closures are imposed in this period so that fishing is slowed down significantly, it could have the unintended consequence of pushing a larger amount of fishing effort into October, when Chinook PSC is usually highest.
- **Base rates**-When PSC rates change quickly, the current 3-week moving basis for determining the base rate means that all cooperatives or few cooperatives are subject to closures. The base rate could be based on the most recent behavior to ensure that vessels or cooperatives with relatively high PSC rates in the most recent period would be subject to closures.
- **Modifying Tier system incentives**-Modifying the incentives associated with the tier system has the potential to significantly strengthen the effectiveness of the RHS system. Larger and longer closures or any other reward and penalty could be incorporated into the tier system. If a more stringent chum RHS is developed, vessels could be made exempt from some of the closures if they have relatively low *Chinook* PSC, further increasing the incentive to avoid Chinook PSC as well.

Further information on the methodology and detailed impacts under the RHS system are contained in Chapter 5.

All other discussion of Alternative 3 assumes that Components 2 through 6 are considered and thus triggered closure areas are imposed on RHS participants. As expected, higher cap levels result in reduced overall chum salmon savings and imposing closures in June-July has definite consequences for Asian AEQ chum bycatch (much lower savings) compared 1a) or 2a) and varied by sector split (Table ES-9). The dates of closures across options and sector allocations and caps indicate that higher cap levels result in closures that occur later in the season (for options 1a) and 2a) and for the June-July period, generally occur near the end of July.

Over all options and sector splits for Alternative 3, component 2, the sector split configurations had the least contrast (except for the 200,000 cap and option 2a). These results also indicate that the most effective option for saving chum is indicated by option 1b) and the lowest cap level (25,000). Options 1b) and 2b) of Alternative 3 close an area only in the June July period. This presents a challenge for analysis because the potential reaction by the fleet to such closures could vary. For example, vessels restricted by the closure in the June-July period may choose to fish outside the closure during that period or choose divert their pollock to fish after the end of July or some combination of these strategies. Consequently, we analyzed this type of closure three ways, 1) standing down till the end of July, 2) continue fishing and catch the same amount of pollock in the June-July period but outside of closure area, or 3) some combination of 1) and 2). Additional information on the relative salmon savings, AEQ and region of origin impacts under all of the alternatives is contained in Chapter 5.

Based on the analysis of Alternative 3 and the assumptions inherent in evaluating the relative participation in the RHS program and constraints imposed by area closures (and thus the amount of chum salmon 'saved' under various closures and PSC cap levels), there are nonetheless incidental takes of chum salmon PSC and therefore there is an adverse impact under this alternative. For some suboptions and combinations, this management alternative will likely decrease the chum salmon PSC for Alaska stocks. These suboptions and combinations would thus minimize the adverse impacts of the status quo management. However, bycatch in some options (e.g., option 1b) results in slightly higher or neglible reductions for Asian chum salmon. The impacts under any of the options and suboptions of Alternative 3

impacts are unlikely to be significantly adverse because they would not diminish protections afforded to chum salmon in the current management of the groundfish fisheries.

Component 1 would impose a revised CSSA on non-participants of the RHS system. Taken on it's own with no other components selected, the impacts of component 1 are best characterized by status quo given the current level (100%) of participation in the RHS program. Some considerations by the Council in conjunction with Component 1 may modify parameters of the current RHS program. While it is difficult to examine the potential impacts of these modifications quantitatively, qualitative discussion of the merits of modifying individual parameters was summarized to provide an overview of the likely impacts. It is likely that modification of some of the RHS parameters has the potential to improve the performance of this system in minimizing the adverse impacts of status quo on chum salmon and possibly Chinook salmon as well.

Components 2-6 would impose additional constraints on the RHS participants in addition to the area closures imposed under the RHS system itself. Based on the analysis of the triggered closures, caps and allocations, some options in some years may be very constraining on the pollock fleet. While this analysis focusses on the amount of chum salmon potentially saved by virtue of the constraints applied by additional area closures, it is important to note that if participation in the RHS program itself becomes increasingly constraining and complicated by layered triggered closures on top of the RHS program, the incentive to participate in the program itself may be undermined. The intent of Component 1 is to provide a strong enough incentive to encourage participation in the RHS program. Under this alternative this is done by imposing a large-scale triggered area closure at a range of cap levels. The magnitude of the incentive to participate in the RHS program will depend upon the level of constraint of the cap level selected in conjunction with this provision, particularly if additional components are selected to layer constraints on the participants. If participation in the program becomes equally or nearly as constraining as the risk of non-participation, then the assumptions inherent in this evaluation (of 100% participation) will be invalid.

Table ES-9. Combined chum salmon saved (AEQ) over years 2004-2011 for **Alternative 3**, by region for different cap levels (apportioned by sector and where appropriate in option 1b) and 2b) by June-July) and allocations. The second column lists the summed run-size estimates whereas the 3rd column are the summed AEQ mortality as estimated from 2004-2011.

Region	Run Estimate	Estimated AEQ	Cap	Option	Allocation configuration 2ii	4ii	6
Coastal WAK	39,233,000	193,649	25000	1a)	52%	51%	50%
				1b)	28%	27%	26%
				2a)	39%	40%	38%
				2b)	26%	25%	23%
			75000	1a)	41%	44%	43%
				1b)	29%	29%	28%
				2a)	28%	30%	32%
				2b)	26%	26%	26%
			200000	1a)	22%	26%	37%
				1b)	24%	26%	28%
				2a)	10%	11%	25%
				2b)	22%	24%	25%
Upper Yukon	8,454,000	106,722	25000	1a)	51%	51%	50%
				1b)	39%	38%	37%
				2a)	39%	40%	38%
				2b)	33%	33%	32%
			75000	1a)	40%	43%	43%
				1b)	37%	37%	37%
				2a)	27%	30%	32%
				2b)	32%	33%	33%
			200000	1a)	19%	23%	36%
				1b)	30%	32%	35%
				2a)	8%	9%	25%
				2b)	26%	28%	31%
Asia	NA	968,497	25000	1a)	50%	50%	50%
				1b)	0%	-2%	-5%
				2a)	40%	40%	40%
				2b)	2%	0%	-2%
			75000	1a)	43%	45%	45%
				1b)	4%	4%	2%
				2a)	34%	35%	36%
				2b)	5%	5%	4%
			200000	1a)	31%	33%	38%
				1b)	4%	4%	5%
				2a)	25%	26%	31%
				2b)	5%	5%	7%

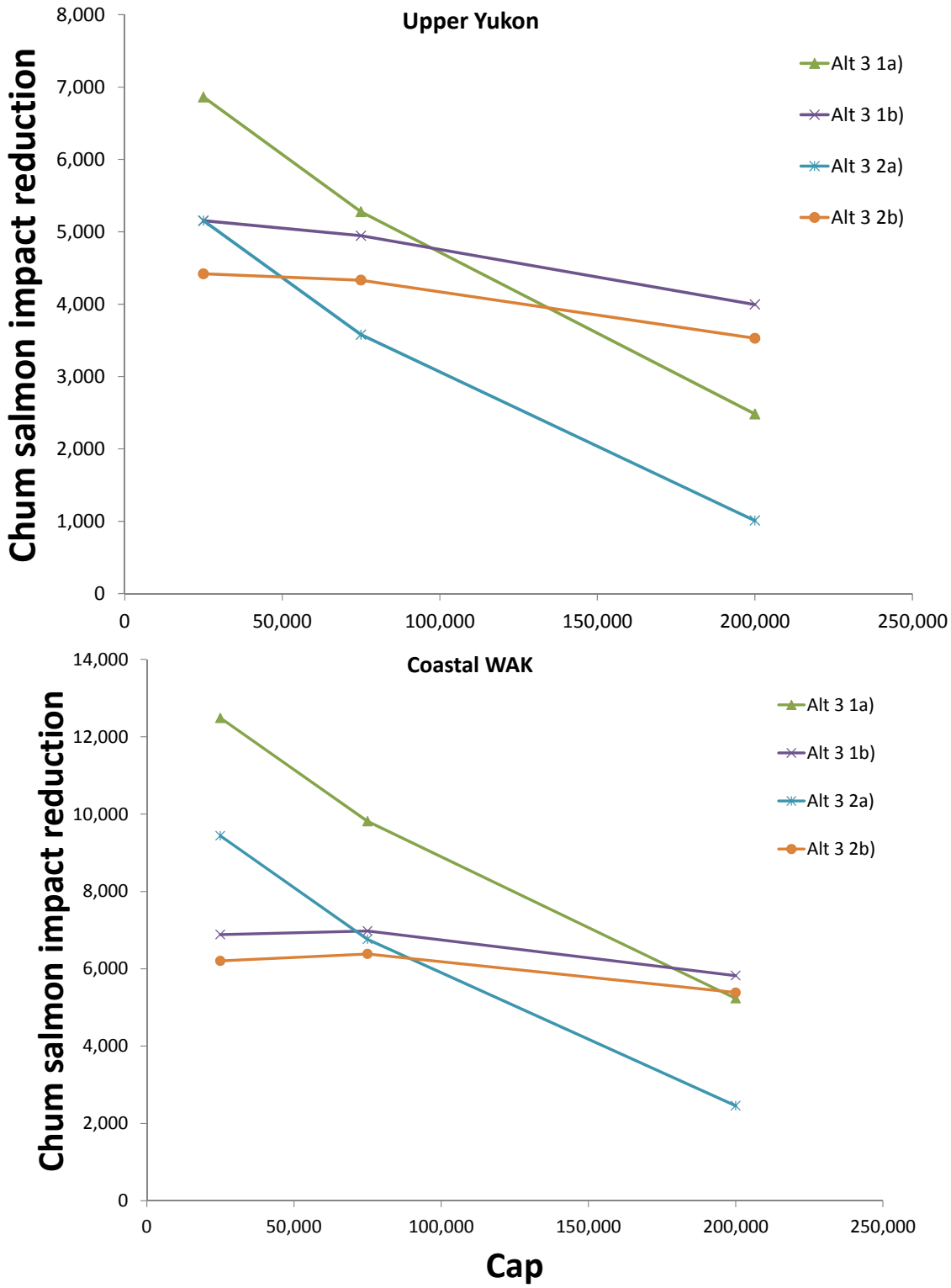

Figure ES-14. Average chum salmon impact reduction (AEQ) by suboption for Alternative 3, sector allocation 2ii, for years 2004-2011 for Upper Yukon (top) and Coastal WAK (bottom). Note that for 1b options the cap considered is that proportion of the B season cap shown in the horizontal axis.

Chinook salmon impacts

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-15). This pattern is reflected through the chum alternatives 2 and 3 and sub-options showing that chum measures which result in more fishing later in the year will result in more Chinook bycatch (i.e., negative savings; Figure ES-16)

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. 2011 was the first season of management under the new PSC management program implemented by Amendment 91. Incidental catch of Chinook salmon by the pollock fishery participants in the 2011 indicated that pollock fishery participants remained well below their limits and with catch much lower than in the recent five years. Total 2011 A-season PSC was 7,136 fish. This compares to Chinook salmon PSC ranging from 7,624 fish in the A season of 2010 to 69,139 fish in the A season of 2007. In the B-season incidental catch of Chinook salmon by the pollock fishery was also well below the seasonal PSC limits with a total B-season bycatch of 18,363. This is higher than B-season PSC in the previous 3 years but is substantially less than the B-season of 2007 where 25,499 fish were taken. The overall 2011 total Chinook PSC was 25,499. While this amount is higher than the recent years (driven by the increase in the B-season) this was nonetheless well below both the overall PSC limit under Amendment 91 as well as the (lower) performance standard established under that management program.

For Alternative 2, the annual impact of chum salmon options indicate that Chinook salmon bycatch will be decreased in many years under option 1a, especially for the lower cap levels. However, option 1b (which would close the fishery only within the June-July period) resulted in increased bycatch of Chinook salmon because of pollock that would be diverted later in the year. All sectors are estimated to have a similar pattern between options. These alternatives and options would increase the adverse impact on Chinook. These impacts are not believed to be significantly adverse in either case because they would not diminish protections afforded to Chinook salmon under the provisions of Amendment 91 in the current management of the groundfish fisheries.

Similar to the hard cap option, Alternative 3 with options that divert pollock into later in the season result in worse bycatch of Chinook salmon. The variability is somewhat greater which likely reflects changes in the spatio-temporal patterns of Chinook salmon bycatch between years. For Option 1b and suboptions, this management alternative will likely increase the bycatch of Chinook salmon due to increased fishing pressure diverted to later in the B season when Chinook rates tend to be higher. These alternatives and options would increase the adverse impact on Chinook. For options 1a and suboptions, as indicated previously, fishing would be less likely to be diverted early in the B season but any increased effort later in the B season would nonetheless be likely to increase Chinook PSC and thus increase the adverse impact of this alternative on Chinook PSC. As with Alternative 2, these impacts are not believed to be significantly adverse in either case because they would not diminish protections afforded to Chinook salmon under the provisions of Amendment 91 in the current management of the groundfish fisheries.

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

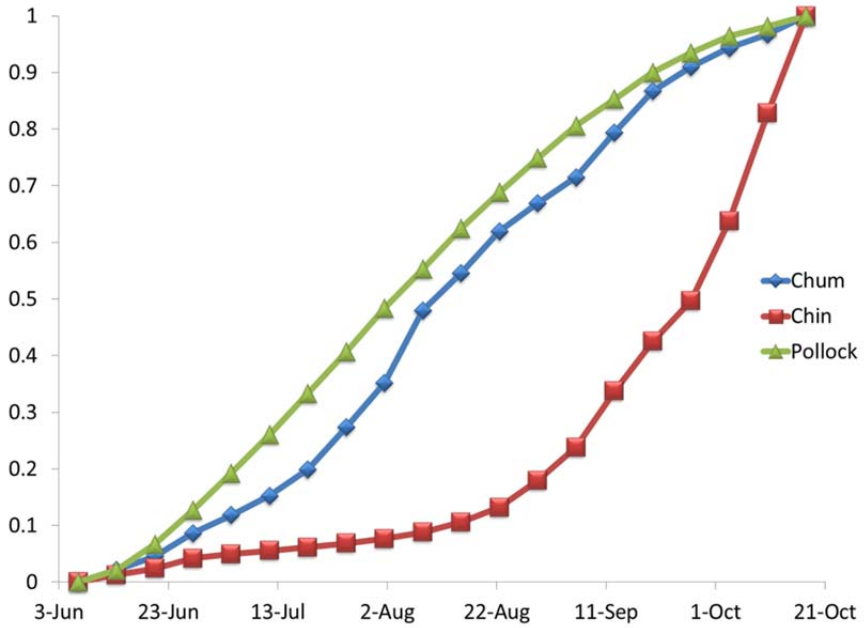

Figure ES-15. Mean relative values of pollock catch (triangles) compared with catch of chum (diamonds) and Chinook (squares) salmon species in the pollock fishery during the B-season.

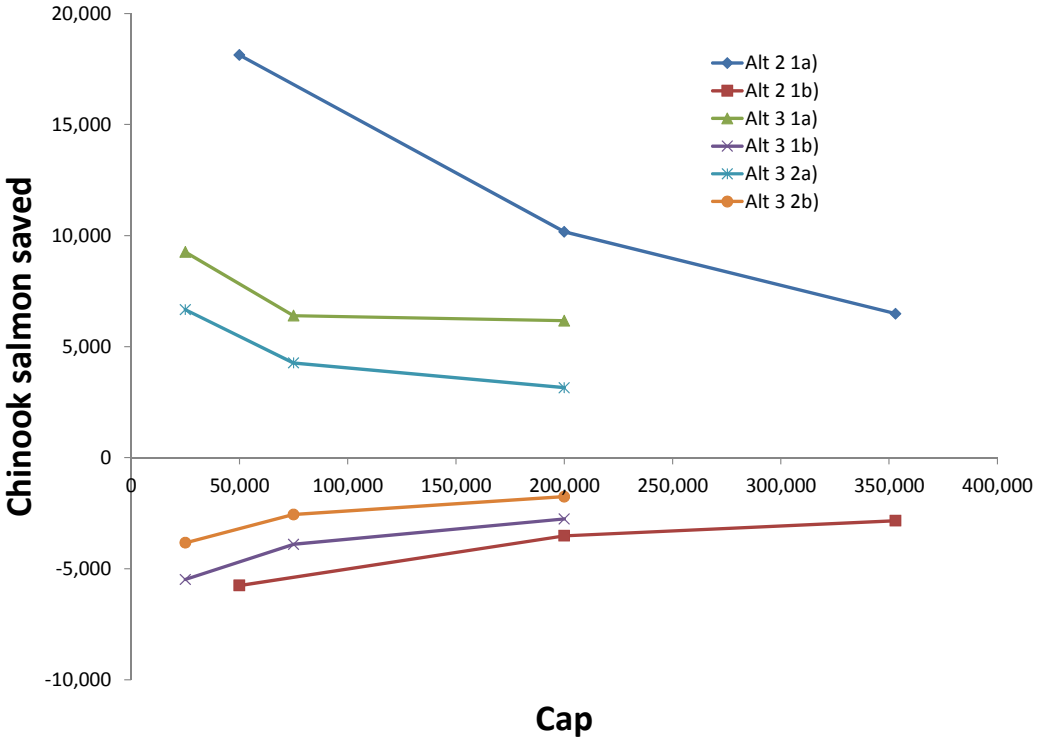

Figure ES-16. Average Chinook salmon saved by suboption for Alternatives 2 and 3 (and their sub-options) given sector allocation 2ii, for years 2004-2011. Note that for 1b options the cap considered is that proportion of the B season cap shown in the horizontal axis.

Pollock stocks

Chapter 4 analyzes the impacts of the alternatives on pollock stocks. Analysis of Alternatives 2 and 3 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 PSC. 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.

Options for maintaining efficiency in the amount that normal pollock grounds must be diverted (while still reducing bycatch) is a challenging problem and can vary considerably from year to year. For example there is a fair amount of variability between sectors for a given allocation scheme, cap, and trigger option

For Alternatives 2 and 3, integrated results over years and sectors to compare the relative impact of the options on the pollock fishery show that the lower cap levels and sector allocation scheme 3 have the largest impact on the pollock fishery. Nonetheless, all hard caps under Alternative 2 show that all sectors would have forgone high levels of pollock catch at most cap levels. In terms of potential tons of pollock that would be diverted under Alternative 3, Options 1b) and 2b) appear to have the lowest impact on pollock fishing among the other trigger closure options given cap and sector allocation scheme (Figure ES-17).

The impact of Alternative 3 (triggered closures to RHS participants, either June-July or B-season) on pollock fishing was evaluated in a similar way to Alternative 2. 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.

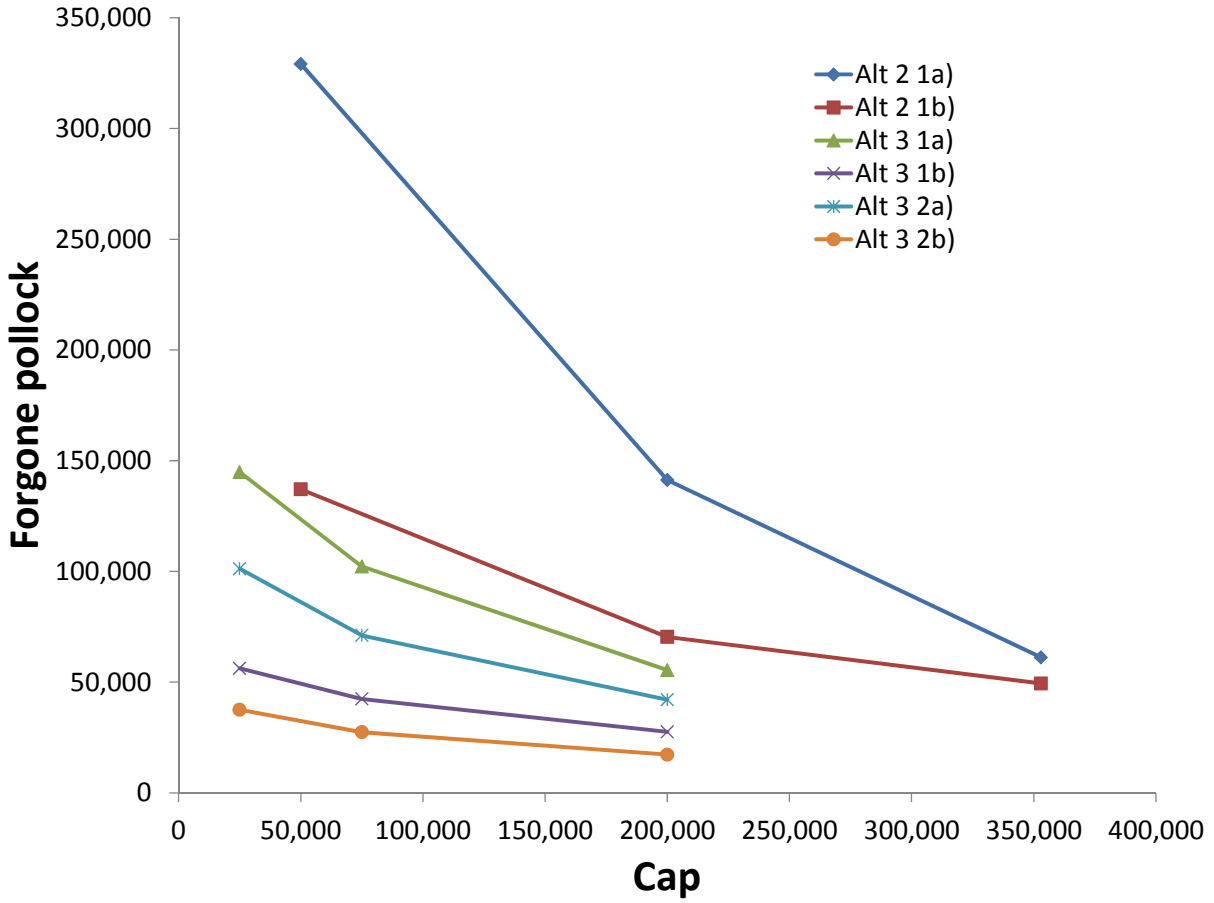

Figure ES-17. Average pollock forgone (t) by suboption for Alternatives 2 and 3 (and their sub-options) given sector allocation 2ii, for years 2004-2011. Note that for 1b and 2b options the cap considered is that proportion of the B season cap shown in the horizontal axis.

Economic Impacts of the Alternatives

The RIR presents considerable background information which establishes conditions under status quo chum salmon management. A description of the pollock fishery, upon which a regulatory action would apply, is provided along with descriptions of current chum salmon management action being undertaken by participants in the pollock fishery. The RIR also recognizes the critical importance of, and cultural reliance on, chum salmon resources in both subsistence and commercial harvest activities throughout Western Alaska and provides a detailed (approximately 150 page) discussion of the utilization of chum salmon resources. This detailed information was provided by the Subsistence Division of the Alaska Department of Fish and game (ADF&G), with commercial data provided by the Commercial Fisheries division of ADF&G, and a substantial effort was made by staff of the ADF&G Inter-jurisdictional Fisheries Division to compile the subsistence portion of this discussion as well as in assisting the analysts with preparation of the commercial fisheries discussion. In addition, a discussion of regions and communities that are principally dependent on salmon fisheries is provided using analysis conducted by, and reprinted with the permission of, the Alaska Department of Labor Workforce Development Division. These discussions inform the analysis of the status quo conditions for comparison with potential impacts of the proposed action alternatives.

The RIR provides an overview of the alternative set and then proceeds with analysis of the economic impacts of the alternatives in terms of the potential benefits of **salmon saved.** It is a fundamental

assumption of this analysis that salmon savings will result in benefits to salmon dependent subsistence, recreational, and commercial fisheries as well as the communities and people who utilize the chum salmon resource!

The RIR utilizes the analysis of changes in chum salmon savings under the alternatives that is contained in Chapter 5 of this Environmental Assessment. The Adult Equivalency (AEQ) estimates represent the potential benefit in numbers of adult chum salmon that would have returned to aggregate regions as applicable in the years 2004 to 2011. These benefits would accrue within natal river systems of stock origin as returning adult fish that may return to spawn or be caught in subsistence, commercial, or sport fisheries. However, given that the average estimated run size for Coastal Western Alaska for this period is 4.9 million chum salmon, the ratio of mortality impact, calculated in the analysis of Chapter 5, is about 0.5%. Thus, it seems unlikely that in-river management would have been modified for this amount of returning fish aggregated over all rivers systems in coastal west Alaska given the intricacies of in-season, in-river management as described in Section 6.2.1 of the EA. Thus, it is simply not possible to quantify exactly how those fish would be used. Consequently, it is simply not possible to quantify comparative levels of benefit that would accrue to users of the chum salmon resource under the action alternatives.

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

The RIR also provides analysis of the estimated impacts, in terms of potentially forgone gross revenue and gross revenue put at risk, of the alternatives on the directed pollock fishery. It is important to note; however, that 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.

Some hard caps (Alternative 2) have the potential effect of fishery closure for the remainder of the season resulting in potentially forgone pollock fishery gross revenues. In contrast, the triggered closure (Alternative 3, Alternative 2, June-July closure option) 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 or stand down during the closure. 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 years (2005 and 2011) and under the most restrictive PSC cap of 50,000 non-Chinook salmon where Alternative 2 Option 1a is estimated to result in approximately $482 million and $519 million in potentially forgone gross revenue in 2005 and 2011, respectively. The 2005 potentially forgone gross value is composed of $209 million from the CV sector, $202 million from the CP sector, $53 million from the Mothership sector, and $18 million from CDQ pollock fisheries. The 2011 potentially forgone gross value is composed of $222 million from the CV sector, $253 million from the CP sector, $78 million from the Mothership sector, and $25 million from CDQ pollock fisheries.

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

The effect of Alternative 2, option 1b (June and July closure option), in the highest bycatch years (2005 and 2011) and under the most restrictive PSC cap of 50,000 non-Chinook salmon is estimated to be approximately $191 million and $330 milion in gross revenue at risk in 2005 and 2011, respectively. That gross value is composed of $83 million from the CV sector, $81 million from the CP sector, and $27 million from the Mothership sector. The 2011 revenue at risk is composed of $163 million from the CV sector, $106 million from the CP sector, $37 million from the Mothership sector, and $24 million from the CDQ pollock fisheries. The changes in impacts as the cap increases and the allocation is changed are similar to those identified for option 1a; however, option 1b results in considerably reduced potential impacts on the pollock fishery when compared to option 1a.

The potential effects of Alternative 3 triggered closures, when compared option to option (i.e. A2 1a to A3 1a etc.), on pollock fishery gross revenue are considerably smaller than those identified under Alternative 2. The potential impact of Alternative 3, option 1a in the years with greatest revenue impacts under this alternative (2004, 2011) and under the most restrictive PSC cap of 50,000 non-Chinook salmon area estimated to be approximately $191 million and $275 million in 2004 and 2011, respectively. The 2004 gross value is composed of $122 million from the CV sector, $47 million from the CP sector, $10 million from the Mothership sector, and $13 million from CDQ pollock fisheries. The 2011 gross value is composed of $196 million from the CV sector, $31 million from the CP sector, $37 million from the Mothership sector, and $11 million from CDQ pollock fisheries.

The potential impact of Alternative 3, option 1b in the years with greatest revenue impacts under this alternative (2004, 2011) and under the most restrictive PSC cap of 50,000 non-Chinook salmon area estimated to be approximately $97 million and $136 million in 2004 and 2011, respectively. The 2004 gross value is composed of $86 million from the CV sector, $4 million from the CP sector, and $8 million from the Mothership sector. The 2011 gross value is composed of $101 million from the CV sector, $10 million from the CP sector, $20 million from the Mothership sector, and $4 million from CDQ pollock fisheries.

The potential impact of Alternative 3, option 2a in the years with greatest revenue impacts under this alternative (2005, 2011) and under the most restrictive PSC cap of 50,000 non-Chinook salmon area estimated to be approximately $131 million and $184 million in 2005 and 2011, respectively. The 2005 gross value is composed of $122 million from the CV sector, $4 million from the CP sector, and $5 million from the Mothership sector. The 2011 gross value is composed of $122 million from the CV sector, $26 million from the CP sector, $26 million from the Mothership sector, and $10 million from CDQ pollock fisheries.

The potential impact of Alternative 3, option 2b in the years with greatest revenue impacts under this alternative (2005, 2011) and under the most restrictive PSC cap of 50,000 non-Chinook salmon area estimated to be approximately $72 million and $65 million in 2005 and 2011, respectively. The 2005 gross value is composed of $63 million from the CV sector, $2 million from the CP sector, and $7 million from the Mothership sector. The 2011 gross value is composed of $54 million from the CV sector, $1 million from the CP sector, $9 million from the Mothership sector, and less than $1 million from CDQ pollock fisheries.

As described under Alternative 2, impacts are reduced as the cap is increased Further, shifting from allocation option 2ii to 4ii and 6 while increasing the cap level concentrates most of the potential impacts on to the CV fleet, with relatively smaller amounts of CP and Mothership impacts also estimated to potentially occur. Complete tabular output of impacts and further discussion are presented in detail in the RIR.

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) 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.

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. While this analysis assumes that the pollock industry will take step to avoid chum salmon bycatch and prevent attainment of a hard cap or attainment of a trigger, it is fully acknowledged that 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. However, lacking actual cost of production data for the pollock fleet is it not possible to quantify potential impacts on pollock operational costs under the alternatives.

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 in either June-July or B-season total, 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 the triggered area closures proposed under Alternative 3, 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 Alternative 3 would also minimize fishery interactions with the seafloor and benthic habitat. Increased fishing pressure outside of triggered closure may increase the potential adverse impact on non-target fish species and interactions with seabirds and marine mamals in these areas but this interaction is unlikely to be significantly different from status quo. This could increase the adverse impact under this alternative but this is not likely to be significantly adverse given the low levels of incidental catch in this fishery and catch of non-targets is unlikely to substantially increase.

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. Per Council request, specific information on the South Alaska Peninsula (Area M) chum harvests including proportion of harvests from the June fishery compared to the annual total as well as the information on the known stock of origin of chum salmon harvested in this fishery is contained in Chapter 8.

This cumulative effects 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. Considering the direct and indirect impacts of the proposed action when added to the impacts of past and present actions previously analyzed in other documents that are incorporated by reference and the impacts of the reasonably foreseeable future actions indicated in Chapter 8, the cumulative impacts of the proposed action are determined to be not significant.

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. Some estimation of changes in fleet behavior under Amendment 91 is summarized in the analysis but this program has only just completed its first year of operation, thus how the Chinook salmon bycatch management measures will be affected by any new management measures imposed for chum salmon bycatch is difficult to predict and is instead listed below simply in terms of Chinook salmon PSC estimated historically under the management constraints analyzed.

Comparison of chum salmon saved, forgone pollock harvest and Chinook salmon saved

Selection of a preferred alternative involves explicit consideration of trade-offs between the potential salmon saved (both chum and Chinook) and the forgone pollock catch, and of ways to maximize the amount of salmon saved and minimize the amount of forgone pollock. More details can be found on comparing these options in Chapter 9 titled "Policy considerations of alternatives relative to chum and Chinook salmon and pollock".

As analyzed Chapters 4, 5 and 6, the impacts of the alternatives on total bycatch numbers of chum salmon and Chinook salmon and forgone pollock would vary by year. This is due to the annual variability in the rate of chum and Chinook 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, option 1a, the lowest forgone pollock catches result in expected reductions of chum salmon bycatch by about 8% to 48%, depending on the sector allocation options and stock considered (Figure ES-18). 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-18). For Alternative 2, option 1b, the Asian stocks have the least amount of chum salmon AEQ saved and generally the savings were relatively insensitive to cap levels and sector splits for the Alaskan stocks and savings were limited to about 40% in the best case whereas pollock diverted was below 20%.

Under Alternative 3, options that require a greater proportion of pollock to be diverted elsewhere have diminishing benefits in terms of increased salmon savings but in general require less pollock diversion than Alternative 2 (Figure ES-19). There are some cap options that provide savings of about 38% for chum salmon AEQ while only impacting the pollock fishery by diverting about 8% of the B-season pollock (e.g., option 1b for Upper Yukon).

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%). It is clear that options which reduce chum salmon bycatch the most do so at the expense of forgone pollock and increased Chinook salmon bycatch (or reduced capabilities to avoid Chinook salmon PSC; Table ES-10). Options that perform better by lowering the forgone pollock while still reducing western Alaska chum salmon AEQ mortality, may do poorer at savings of chum salmon originating from Asian regions (Figure ES-20). The extent that these measures, if enacted without a system like the current RHS program (analyzed under Alternative 1), would reduce chum PSC 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.

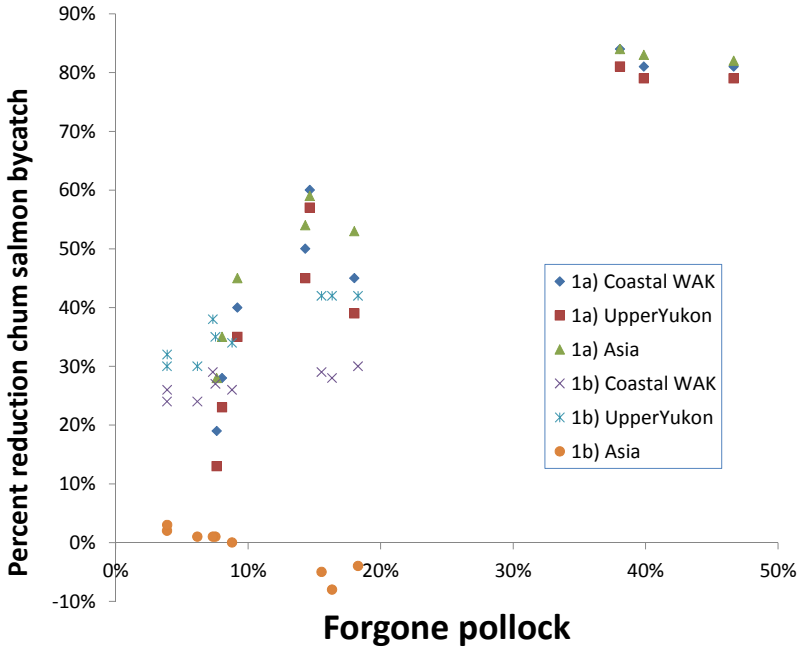

Figure ES-18. Relative reduction of chum salmon AEQ mortality (vertical axis) compared to relative amounts of pollock forgone (or diverted for 1b) by suboption for **Alternative 2**. Each point represents a different combination of sector allocation and cap level summed over 2003-2011. Note that for 1b options the cap considered is that proportion of the B season cap shown in the horizontal axis.

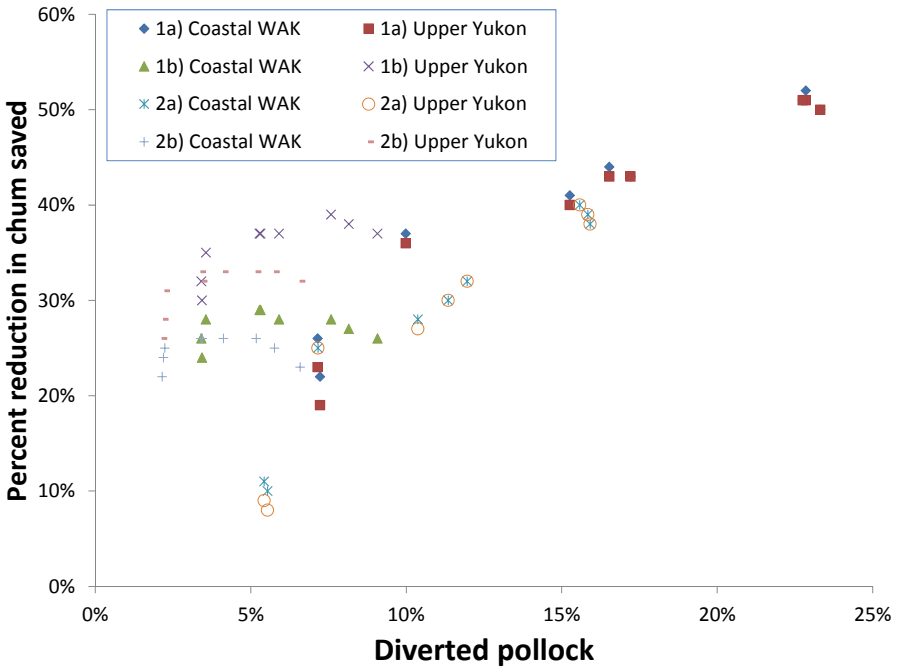

Figure ES-19. Relative reduction of chum salmon AEQ mortality (vertical axis) compared to relative amounts of pollock diverted by suboption for **Alternative 3**. Each point represents a different combination of sector allocation and cap level summed over 2003-2011. Note that for 1b and 2b options the cap considered is that proportion of the B season cap shown in the horizontal axis.

Table ES-10. Summary over alternatives using sector split of 2ii, λ=0 for different cap levels alternatives and their options. Chum AEQ are estimates of the adult equivalent annual **average** (2004-2011) improvements by alternative and option. Western Alaska is Upper Yukon combined with Coastal west Alaska, Asia include chum from Russia and Japan, the total adds these two groups and the remaining stocks. Chinook salmon are saved are absolute reductions (or increases if negative) in bycatch and pollock are in tons with italicized values signifying diverted catch due to closed areas and bold signifies foregone catch as **averaged** over 2003-2011. Note that for 1b and 2b options the cap considered is that proportion of the B season cap shown in the horizontal axis.

			Chum salmon				
			Western Alaska	Asian	Total chum	Pollock	Chinook
Alt 2	1a)	50,000	30,142	99,352	167,897	332,264	17,430
		200,000	16,072	64,724	103,328	128,305	9,212
		353,000	6,288	34,109	50,304	54,350	5,762
	1b)	50,000	12,862	-4,966	16,523	130,318	-5,323
		200,000	10,735	-336	17,500	62,579	-3,127
		353,000	9,761	653	16,821	43,883	-2,522
Alt 3	1a)	25,000	19,347	60,518	104,096	162,719	6,701
		75,000	15,091	52,048	86,885	108,705	5,091
		200,000	7,717	37,696	57,769	51,486	5,517
	1b)	25,000	12,038	530	21,529	53,998	-3,714
		75,000	11,922	4,838	25,866	37,860	-2,636
		200,000	9,817	4,643	21,646	24,449	-1,807
	2a)	25,000	14,592	48,198	81,832	112,802	6,064
		75,000	10,338	41,723	67,051	73,881	4,142
		200,000	3,466	30,095	42,141	39,453	2,848
	2b)	25,000	10,623	2,567	21,177	36,856	-2,576
		75,000	10,713	6,620	25,739	24,516	-1,718
		200,000	8,913	6,085	21,711	15,322	-1,131

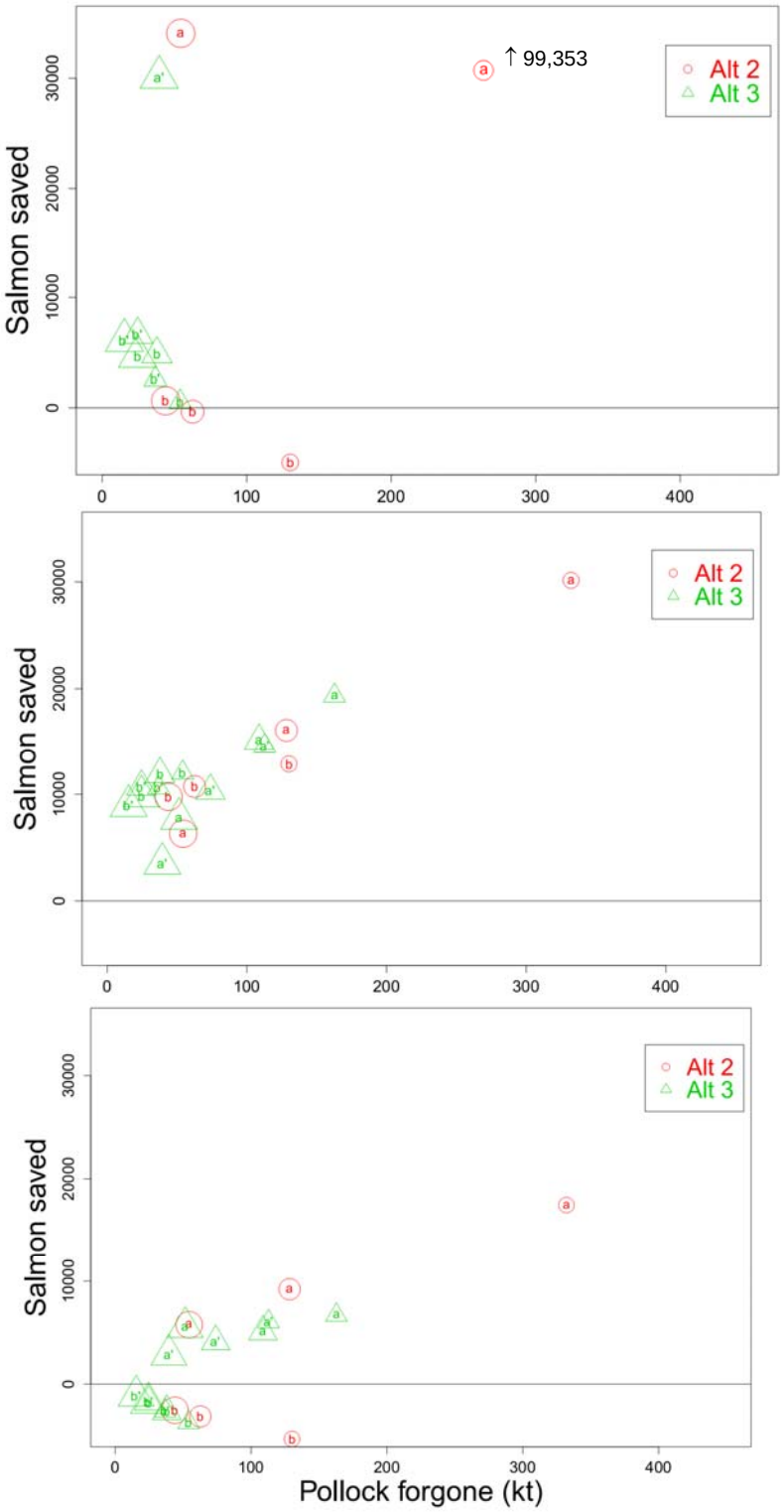

Figure ES-20. Mean expected reduction of salmon mortality (vertical axis) compared to relative amounts of pollock forgone or diverted (thousands of t) for different alternatives, caps and options. Western Alaska stocks include coastal W Alaska and Upper Yukon combined, size of symbols indicates the size of the cap, and letter designations indicate option (and a' and b' are for the 60% area closures for alternative 3 2a) and 2b) options).

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.[2] 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.[3] 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 teleconferences, 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.[4] 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; Nome5
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

[2]This policy priority is identified in the Council's workplan resulting from the Programmatic SEIS.
[3]http://www.fakr.noaa.gov/npfmc/current_issues/bycatch/ChumOutreach1210.pdf.
[4]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.
[5]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 an appendix to this EA/RIR/IRFA (Appendix 4) and posted separately on the Council's website at: http://www.fakr.noaa.gov/npfmc/PDFdocuments/bycatch/ChumOutreach511.pdf.

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.