Public Testimony Sign-Up Sheet
Agenda Item C-2 SALMON BYC

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	NAME (PLEASE PRINT)	AFFILIATION
1	RANDY ALVAREZ	OSM + Personal
2	RAY COLLINS	WISRC
3	RAY COLLINS	Personal
4	PETE PROBASCO	OSM - USFWS
5	Jon Warrenchuk	Oceana
6	Raymond Oney	Y/K RAC
7	Larson Hunter	CVRF
8	PAT IVANOFF	SNSAC
9	Andrew Bassich	YRP / Eagle AC
10	David Bill Sr	BSFA & BSEAG
11	Bubba Cook	WWF
12	JOHN GRUVER	Pollock Intercoop
13	KARL HAFLINGER	Sea State
14	Larry Cotter	APICDA
15	Jennifer Hooper	AVCP
16	Terry Leitzell	Icicle Seafoods
17	Paul Peyton	BBEDC
18	Stephanie Madsen & BRENT PAINE	APA, UCB
19	Mike Hyde	American Seafood
20	JOE PLESHA	TRIDENT SEAFOODS
21	Becca Robbins Gisclair	YRDFA
22	Donna Parker	Arctic Storm
23	Frank Kelty / Shirley Marquardt	City of Unalaska
24		
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NOTE to persons providing oral or written testimony to the Council: Section 307(1)(I) of the Magnuson-Stevens Fishery Conservation and Management Act prohibits any person " to knowingly and willfully submit to a Council, the Secretary, or the Governor of a State false information (including, but not limited to, false information regarding the capacity and extent to which a United State fish processor, on an annual basis, will process a portion of the optimum yield of a fishery that will be harvested by fishing vessels of the United States) regarding any matter that the Council, Secretary, or Governor is considering in the course of carrying out this Act.

AGENDA C-2
JUNE 2008

MEMORANDUM

TO: Council, SSC and AP Members

FROM: Chris Oliver
Executive Director

DATE: May 20, 2008

SUBJECT: Chinook Salmon Bycatch EIS/RIR/IRFA

ESTIMATED TIME
8 HOURS

ACTION REQUIRED

Initial review of the Bering Sea Chinook Salmon Bycatch Management EIS/RIR/IRFA

BACKGROUND

The initial review draft of the Chinook Salmon EIS/RIR/IRFA was completed and mailed out on May 16th. This document analyzes the impacts associated with the suite of management alternatives for Chinook salmon as modified by the Council in April 2008. At that time, the Council bifurcated the analysis in order to evaluate Chinook and chum salmon in different amendment packages. Discussion of the chum salmon alternatives is currently scheduled for October 2008. The Chinook salmon bycatch analysis is scheduled for initial review at this meeting.

The executive summary of the analysis is attached as **Item C-2(a)**. The tables of contents for the EIS/RIR/IRFA are included as **Item C-2(b)**. At this meeting the Council may choose to select a preliminary preferred alternative (PPA). Due to the complexities of the alternatives included for analysis, selection of a PPA at the time is desirable in order to focus the impacts analysis and indicate to the public in the draft EIS/RIR/IRFA (to follow) the direction the Council is considering in their choice of preferred alternative. Final selection of a preferred alternative will occur at final action. Should the Council identify a PPA at this meeting, it is the intent of staff to analyze it and include discussion of the PPA and related impacts thereof in the draft EIS/RIR/IRFA prior to its release. The current schedule for Council action on this analysis is for initial review in June, release of the draft EIS/RIR/IRFA for public comment over the summer and final action by the Council in December 2008. A detailed schedule including a time-frame for both a 45 day and 60 day public comment period and the time frame for analysis in order to meet December final action is attached as **Item C-2(c)**.

EXECUTIVE SUMMARY

This Environmental Impact Statement/Regulatory Impact Review/Initial Regulatory Flexibility Analysis (EIS/RIR/IRFA) provides decision-makers and the public with an evaluation of the environmental, social, and economic effects of alternative Chinook salmon bycatch reduction measures for the Bering Sea pollock fishery. The EIS/RIR/RIFA is intended to serve as the central decision-making document for management measures developed by the North Pacific Fishery Management Council (Council or NPFMC) and the National Marine Fisheries Service (NMFS or NOAA Fisheries) and to implement the provisions of the proposed action. If a preferred alternative is adopted, this EIS will result in an amendment to the Bering Sea/Aleutian Islands Fishery Management Plan for Groundfish of the Bering Sea and Aleutian Islands Management Area (BSAI FMP), and associated regulatory changes.

Purpose and Need

The purpose of Chinook salmon bycatch management in the Bering Sea pollock fishery is to minimize Chinook salmon bycatch to the extent practicable while achieving optimum yield from the pollock fishery. Minimizing Chinook salmon bycatch while achieving optimum yield is necessary to maintain a healthy marine ecosystem, ensure long-term conservation and abundance of Chinook salmon, provide maximum benefit to fishermen and communities that depend on Chinook salmon and pollock resources, and comply with the Magnuson-Stevens Act and other applicable federal law. National Standard 9 of the Magnuson-Stevens Act requires that conservation and management measures shall, to the extent practicable, minimize bycatch. National Standard 1 of the Magnuson-Stevens Act requires that conservation and management measures prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the United States fishing industry.

The Council and NMFS have limited the scope of this EIS to measures that address Chinook salmon bycatch, because of the need for immediate action to reduce Chinook bycatch. Chinook salmon is a highly valued species and a species of concern that warrants specific protection measures. The Council is also concerned about non-Chinook salmon bycatch in the Bering Sea pollock trawl fishery, and had originally intended to address non-Chinook salmon as part of this action. Existing measures to reduce non-Chinook salmon bycatch will remain in place, however, and the Council will address revising them in a subsequent action.

Description of Alternatives

Three broad alternatives are considered in this analysis. These alternatives are not intended to be mutually exclusive, and the Council may choose to select elements from more than one alternative to formulate its preferred alternative.

Alternative 1: Status Quo

Alternative 2: Hard cap

Alternative 3: Triggered closures

There are detailed options and suboptions for each alternative, as described below.

Alternative 1: Status Quo

Alternative 1 retains the current program of Chinook Salmon Savings Area (SSA) closures triggered by separate non-CDQ and CDQ Chinook caps. Pollock vessels participating in the salmon bycatch reduction inter-cooperative agreement (ICA), under regulations implemented for BSAI FMP Amendment 84, are exempt from these closures. Only vessels directed fishing for pollock are subject to the SSA closures and ICA regulations.

Alternative 2: Hard cap

Alternative 2 would establish a Chinook salmon bycatch cap for each pollock fishery season which, when reached, would require all directed pollock fishing to cease for that season.

Four components, and options for each component, are included under this alternative. These components describe how the cap is formulated (Component 1), whether and how to allocate the cap to sectors (Component 2), whether and how salmon can be transferred among sectors (Component 3), and whether and how the cap is allocated to cooperatives (Component 4).

Component 1: Hard cap formulation

Two options provide different ways to establish the cap level. The annual cap will be allocated between the A and B seasons. Absent further Council action under Components 2 and 4, the hard cap will be managed at the fishery level, resulting in separate hard caps for the CDQ Program, and the combined non-CDQ fleet.

Option 1: Select from a range of numbers

The Council may choose an annual hard cap (which is subsequently apportioned seasonally per options below) from within a specified range of numbers (Table 1).

Table 1 Range of numbers for overall hard cap

Suboption	Overall fishery cap (number of Chinook salmon)	CDQ allocation	Non-CDQ cap (all sectors combined)
i)	87,500	6,563	80,938
ii)	68,392	5,129	63,263
iii)	57,333	4,300	53,033
iv)	47,591	3,569	44,022
v)	43,328	3,250	40,078
vi)	38,891	2,917	35,974
vii)	32,482	2,436	30,046
viii)	29,323	2,199	27,124

For the analysis in this EIS, only a subset of the range is used to understand the impacts of the alternative. The subset includes the upper and lower endpoints of the range, and two equidistant midpoints (Table 2).

Table 2 Range of Chinook salmon hard caps, in numbers of fish, for use in the analysis of impacts

	Chinook	CDQ	Non-CDQ
i)	87,500	6,563	80,938
ii)	68,100	5,108	62,993
iii)	48,700	3,653	45,048
iv)	29,300	2,198	27,103

Option 2: Index Cap (cap set relative to salmon returns)

Under this option, the Council would specify an acceptable run-size impact level (and a maximum probability of error), for a candidate river system. This impact level would feed into an established procedure that calculates a corresponding overall salmon bycatch cap level. The procedure could be modified as scientific information improves. The range of values analyzed for this option in the EIS are equivalent to those in Table 2; the distinction lies in the process employed to set, modify, and update the cap itself.

Options 1-1 through 1-4: Seasonal allocation of caps
The annual caps under either Option 1 or Option 2 will be allocated seasonally. Four options determine how the specified cap could be seasonally allocated (Table 3).

Table 3 Seasonal distribution of caps between the A and B seasons

Option	A season	B season
1-1	70%	30%
1-2	58%	42%
1-3	55%	45%
1-4	50%	50%
Suboption	Rollover unused salmon from the A season to the B season, within a calendar year	

Component 2: Sector Allocation

If this component is selected, the hard cap would be managed at the sector level for the fishery. This would result in separate sector level caps for the CDQ sector and the three remaining AFA sectors: the inshore catcher vessel (CV) sector, the mothership sector, and the offshore catcher processor (CP) sector. The sector allocation could occur in one of 5 different ways (Table 4).

Table 4 Sector allocation of caps

Component 2	Options	CDQ	Inshore CV	Mothership	Offshore CP
Not selected	--	7.5 %	92.5 %; managed at the combined fishery-level for all three sectors		
Selected	Option 1	10 %	45 %	9 %	36 %
	Option 2a	3 %	70 %	6 %	21 %
	Option 2b	4 %	65 %	7 %	25 %
	Option 2c	4 %	62 %	9 %	25 %
	Option 2d	6.5 %	57.5 %	7.5 %	28.5 %

Component 3: Sector Transfer

This component is only available if Component 2 is also selected. If Component 3 is selected, it would determine by which of two mechanisms salmon could be moved between sectors, to allow a sector to continue fishing for pollock even if their sector-specific bycatch limit (as defined under the options in Component 2) is reached (Table 5).

Table 5 Transferring salmon amongst sectors

Component 3	Options	Sector Transfer		
Not selected	--	No transfer of salmon across sectors		
Selected	Option 1	Caps are transferable by sector, transfers initiated by industry		
		Suboption Maximum amount of transfer limited to the following percentage of salmon remaining:	a	50 %
			b	70 %
			c	90 %
	Option 2	NMFS rolls over unused salmon bycatch to sectors still fishing, based on proportion of pollock remaining to be harvested		

Component 4: Cooperative provisions

This component is only available if the Council recommends allocating salmon bycatch among the sectors under Component 2. Component 4 would further allocate the inshore sector's transferable or non-transferable salmon bycatch allocations to the inshore cooperatives (Table 6).

Table 6 Inshore cooperative-level salmon allocations, and transfer options

Component 4		Options	Cooperative Provisions		
Not selected		--	Allocation managed at combined inshore CV sector-level		
Selected	Allocation	--	Allocations of inshore CV sector salmon bycatch cap to cooperatives mirrors the proportions of the 2008 pollock quota allocations to cooperatives		
	Transfer	Option 1	Transfer or lease pollock among cooperatives, for season or year		
		Option 2	Caps are transferable by cooperative, transfers initiated by industry		
			Suboption Maximum amount of transfer limited to the following percentage of salmon remaining:		
			Suboption Maximum amount of transfer limited to the following percentage of salmon remaining:	a	50 %
				b	70 %

Alternative 3: Triggered Closures

Triggered closures are regulatory time and area closures that are invoked when specified cap levels are reached. Cap levels for triggered closures would be formulated using one of the options described under Alternative 2. Closures may involve a single area (as in the A season) or multiple areas (as in the B season). Once specified areas are closed, pollock fishing could continue outside of the closure areas until either the pollock allocation is reached or the pollock fishery reaches a seasonal (June 10) or annual (November 1) closure date.

Five components are included under this alternative. These components describe how the cap is formulated (Component 1), who manages the closures (Component 2), how the cap is subdivided (Component 3), whether and how salmon can be transferred among sectors (Component 4), and the specific area closure options (Component 5). The areas themselves, as described in Component 5, are the same areas regardless of who manages the closure (Component 2).

Component 1: Trigger caps

The trigger caps considered under Alternative 3 parallel Component 1, with all its options, under Alternative 2 (Table 1 to Table 3).

Component 2: Management

Triggered area closures could be managed in a number of different ways, depending on the combination of components and options selected by the Council. Under Component 2, without Option 1 (management by the intercooperative agreement) or under Components 3 and 4, NMFS would manage a single trigger cap for the non-CDQ pollock fisheries. Once the trigger cap is reached, NMFS would close the trigger areas, selected by the Council under Component 5, to directed fishing for pollock by all vessels fishing for the non-CDQ sectors.

Under Component 2, Option 1, a NMFS-approved salmon bycatch reduction intercooperative agreement (ICA) would manage, through its contract, any subdivision of the seasonal trigger caps at the sector level, inshore cooperative, or individual vessel level. The ICA would enforce the area closures for the designated group or entity when subdivided caps established by the ICA are reached. The subdivision of the trigger caps under the ICA would not be proscribed by the Council or NMFS regulations. The ICA would decide how to manage participating vessels to avoid reaching the trigger closures as long as possible during each season. However, NMFS regulations would require that the ICA include a provision such that once the overall trigger cap selected under Component 1 is reached, the area(s) selected under Component 5 would be closed to ICA participants.

Component 3: Sector Allocation

Sector allocation options under Alternative 3 are equivalent to those under consideration for Component 2, Alternative 2 (Table 4). Upon reaching a sector-specific cap, that sector would be prohibited from fishing in the area selected under Component 5 for the remainder of the season.

Component 4: Sector Transfer

Sector transfer provisions are equivalent to those under consideration for Component 3, Alternative 2 (Table 5). Options under this component may be selected only if the Council recommends allocating the salmon bycatch trigger cap among the sectors.

Component 5: Area Closures

Two different area closures are proposed for Chinook under this component. The areas differ by season. For the A season closure (Fig. 2), once triggered the area would remain closed for the remainder of the season. For the B season closures (Fig. 2), all three areas close simultaneously. If the B season areas are triggered prior to August 15th, the areas would remain open until August 15th and then close for the remainder of the year. If triggered anytime after August 15th, the area would close immediately and remain closed for the duration of the season.

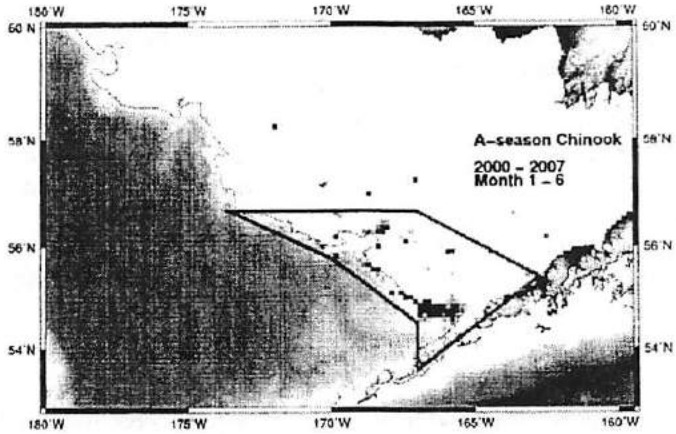

Fig. 1 Proposed A season area closure under Alternative 3.

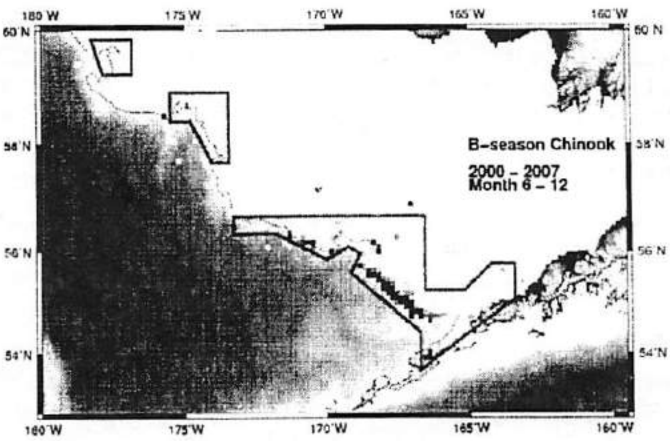

Fig. 2 Proposed B season area closures under Alternative 3.
Note: all three areas close simultaneously.

Environmental Consequences of the Alternatives

Due to the complexity of the alternatives, the number of possible combinations of options and sub-options within the suite of alternatives, and the need for contrast in order to understand the relative impact of alternative combinations, a subset of actual cap combinations was analyzed in detail. This subset included the four annual caps identified for impact analysis (Table 2), three of the four seasonal distribution options (Table 3), and three of the five sector allocation options (Table 4). This subset of options, while still complex, provides a simplified approach to evaluating distinctions between alternatives and options, and provides an overview of the entire range of impacts for the broader suite of alternatives and options in this analysis. The subset of combinations was analyzed for impacts on pollock, Chinook salmon, chum salmon, and the related economic analyses included in the RIR. For the remaining resource categories considered in this analysis, marine mammals, seabirds, other groundfish, EFH and environmental justice, impacts of the suite of alternatives were evaluated qualitatively.

Pollock stocks

The management measures to reduce Chinook salmon bycatch would likely result in the fishery closing earlier, before the full pollock TAC could be harvested (based on 2003-2007 data and assuming the behavior of the fishermen would be the same). The proposed Chinook management measures generally mean that it will be more difficult to catch the full TAC for EBS pollock. Consequently, the pollock fishing mortality rates may be lower than biologically acceptable levels which would reduce the impact of fishing on the stock. If Alternative 2 (hard caps) are selected, the fishermen will go to greater extremes to avoid salmon bycatch, and this may impact pollock stocks accordingly.

Operating under seasonal hard caps (fleet-wide or by sector) may result in the fishery focusing on younger (or older) ages of pollock than otherwise would have been taken. Since these changes would be monitored and updated in future stock assessments, the risk to the stock is considered minor since conservation goals of maintaining spawning biomass would remain central to the assessment. Changes in fishing patterns could result in lower ABC and TAC levels overall, depending on how the age composition of the catch changed. Seasonal data of the size at age of pollock caught show that early in the season, the lengths- and especially the weights-at-age are smaller. Should the fishery focus effort earlier in the B-season then the yield per individual pollock will be lower. Spatially, a similar tendency towards smaller pollock occurs as the fleet ventures further from traditional fishing grounds. Again, these factors would be eventually accounted for in the stock assessment analysis since updated mean weights-at-age are computed. Smaller fish-at-age would likely result in a lower ABC and TAC.

The impact of Alternative 3 (triggered closures) on pollock fishing was evaluated in a similar way. The assumption that the pollock TAC may be attainable depends on the difficulty in finding pollock after the closure areas are triggered. 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 shore-based catcher vessels 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 Alternative 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 further away from the core fishing grounds north of Unimak Island. Both of these effects have would appear to result in catches of pollock that were considerably smaller in mean sizes-at-age. The consequence of this impact would, based on future assessments, likely result in smaller quotas since the resource utilization would be accumulating the benefits of the summer-season growth period.

Chinook salmon

The individual combinations of management options evaluated were reduced to 36 (combinations of four hard caps, three A-B season splits, and three sector-specific allocations), as described above. The analysis evaluated data from 2003-2007 for seasonal patterns in bycatch, for the fleet as a whole and for each sector separately. For each year, 2003-2007, the date that a proposed cap would have gone into effect was estimated, and from there, the subsequent values of foregone catch were tabulated along with total salmon bycatch levels. Since most of the management combinations evaluated distribute the bycatch cap by season and to sectors, the overall annual Chinook bycatch totals would have fallen below the overall annual cap for the analysis period. This is due to the fact that the inter-annual variability is such that in some years, a sector will close for a season, while other sectors remain open (all sectors within both seasons would need to reach their cap for the fleet to reach the total bycatch cap).

For the 36 scenarios, the hypothetical annual bycatch would have been the highest (77,240 Chinook) in 2007 under Option 2a, with a 50:50 A/B split, and an overall cap of 87,500. The lowest hypothetical bycatch scenario was also recorded from 2007 (9,360 Chinook) for option 2d, a 70:30 A/B split, and an overall cap of 29,300.

Propagating the hypothetical bycatch numbers forward to compute adult equivalent impacts (AEQ bycatch) provides a means to evaluate the impact of bycatch on spawning stocks of Chinook salmon as a whole. This is critically important in order to assess the impacts of any annual bycatch tally to subsequent mature returning salmon since much of the Chinook bycatch are immature. For each of the 36 alternatives analyzed, had these measures been in place (and assuming that fleet behavior is well approximated) results indicate that fewer Chinook would have been removed from the system, except in years where bycatch level was already low (e.g., in 2003 when the AEQ was less than 1% higher for the cap option set at 87,500 and A-B split at 58/42 under option 2d). On average, the different options resulted in AEQ bycatch that was from 88% to 34% of the estimated AEQ mortality that was estimated to have occurred. This implies that if in a particular year the AEQ bycatch mortality had translated to a 4% impact rate (defined as the AEQ mortality divided by the actual number of returning salmon in that year) to a particular river system, then the added management measures would lower that rate to 1.4% - 3.5%.

The next step in evaluating bycatch impacts is to relate the AEQ values to particular river systems and regions where the Chinook would have spawned. Applying available genetics and scale-pattern data showed that the clearest results were for western Alaska river systems. Since the genetics results are limited in the ability to distinguish among these stocks, we used the results from scale-pattern analyses to provide estimates to western Alaska rivers. For each cap alternative and option, the proportional breakouts of west Alaska Chinook based on Myers et al.'s (2003) proportions were derived. These values are based on medians from the simulation model and are applied to mean proportional assignments to regions within each stratum (A-season (all areas), and B-seasons broken out geographically be east and west of 170°W. For the least constraining option, results suggest that over 3,000 western Alaska AEQ Chinook would have been saved had those measures been in place in 2006 and 2007. Under the most constraining option, the number of AEQ Chinook saved to these rivers would have been over 26,000 in 2006 and over 33,000 in 2007.

In a high-bycatch year such as 2007, some management options also result in higher AEQ salmon mortalities for some systems (e.g., for a number of options for the middle Yukon and Upper Yukon rivers). Given that Chinook from these rivers tend to be found most commonly in the NW during the B season, and that the proportion attributed to that stratum increases from the estimated 8% to over 44% for some options, the relative stock composition of the AEQ bycatch as a whole can change. These complexities reveal the difficulty in predicting how any management action will affect specific stocks of salmon, particularly since their relative effects appears to vary in different years.

Chum salmon

As with the pollock and Chinook analysis, chum bycatch levels were tabulated on a fleetwide basis given estimated closure dates for the years 2003-2007. Impacts were evaluated three ways: hard caps alone; hard caps in combination with triggered area closures; and the possible effect of concentrating effort earlier in the B-season so that Chinook bycatch could be minimized. The first two effects resulted in reducing the overall chum salmon bycatch whereas the planned shortened season lengths results were variable, but resulted in about the same overall amounts of bycatch than if the season had not been shortened.

Other groundfish

The hard cap would not be expected to drastically change the footprint of the fishery from the status quo. Groundfish fishery management, which maintains harvests at the TAC and prevents overfishing, would remain the same under Alternative 2. The rate and type of incidentally caught groundfish are expected to vary largely in the same manner as the status quo. To the extent that Alternative 2 would not allow additional fishing after a cap was reached, the incidental catch of groundfish could diminish in relative amounts and perhaps in numbers of species. Under Alternative 2, the fleet would not be expected to fish for extended periods in areas marginal for pollock, and thus is not expected to incur radically different incidental catch. If a hard cap closes the pollock fishery especially early in the fishery year, the fleet may increase focus on alternate fisheries to attempt to make up for lost catch.

Under Alternative 3, assuming that closures are driven by an association of a high concentration of pollock and Chinook salmon, displacing the fleet from that area and allowing the fishery to continue elsewhere may shift incidental groundfish catch from the current patterns. The degree to which incidental groundfish catch will vary in relation to status quo depends on the selected closed areas and the duration of the closures. To the extent that Alternative 3 displaces the pollock fleet away from the center of pollock concentration and into the other groundfish preferred habitat, change would occur in incidental groundfish species catch.

Other prohibited species and forage fish

The impacts of the alternatives on other prohibited species (i.e. besides Chinook and non-Chinook salmon examined separately) are evaluated in this analysis. The extent to which the alternatives would change the catch of steelhead trout, Pacific halibut, Pacific herring, red king crab, Tanner crab, and snow crab is unknown but prohibited species catch limits constrain the catch of these species in the Bering Sea trawl fisheries and this is anticipated to limit any impacts for those species.

Forage fish (primarily capelin and eulachon) are not anticipated to be impacted adversely by these alternatives. Alternatives 2 and 3 will likely constrain the pollock fishery, reducing fishing effort and the associated incidental catch of forage fish.

Other marine resources

Potential impacts of the alternatives on marine mammals and seabirds are expected to be limited. Alternative 2, for hard caps, would potentially lead to a decrease in the incidental takes of marine mammals and seabirds due to relative constraints by season on the pollock fishery. Alternative 3 could impact marine mammals if the fishery were shifted northward outside of the large scale area closure. However, the current protection measures and area closures for marine mammals remain in place, and reduce the interaction with Steller sea lions, and northern fur seals in these regions. The overall effect of shifting the pollock fishery and the resulting incidental takes of seabirds and marine mammal species such as bearded seals, killer whales, Dall's porpoise and fin whales is unknown given the lack of precise information in these regions. A northward shift in the pollock fishery outside of the triggered closure would likely decrease interaction with Steller sea lions as they are primarily taken in the southern portion of the Bering Sea.

The total amount of pollock harvested may decrease under the alternatives and options which restrict the pollock fishery. Under each alternative, the impact of the pollock fishery on Essential Fish Habitat is not expected to change beyond those previously identified in the Final Environmental Impact Statement for Essential Fish Habitat Identification and Conservation in Alaska (NMFS 2005).

Environmental Justice

The disproportionality of the adverse impact to identified minority or low-income populations is the key factor under environmental justice analysis. A significant proportion of the population in the impacted area is Alaska Native. The alternatives may disproportionately affect low income or minority communities by reducing salmon bycatch and increasing the numbers of Chinook salmon returning to natal streams in western Alaska. The alternatives may disproportionately impact low income or minority communities by affecting the way pollock vessels interact with a number of resources including chum salmon, marine mammals, seabirds, essential fish habitat, other groundfish species, forage species, prohibited species as well as by affecting the resources available to CDQ groups, and by affecting the shoreside deliveries of pollock by catcher vessels.

Regulatory Impact Review

This Regulatory Impact Review (RIR) examines the costs and benefits of a proposed regulatory amendment to change Chinook salmon bycatch reduction measures in the Bering Sea and Aleutian Islands (BSAI) area pollock trawl fishery.

Market failure rationale

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

> in order to establish the need for the proposed action, the analysis should discuss whether the problem constitutes a significant market failure. If the problem does not constitute a market failure, the analysis should provide an alternative demonstration of compelling public need, such as improving governmental processes or addressing distributional concerns. If the proposed action is a result of a statutory or judicial directive, that should be so stated.[1]

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

Groundfish that are the target of the BSAI trawl fisheries, and the salmon bycatch these fisheries take, are both common property resources. However, both are subject to systems of stock and allocation management. These management systems include forms of ownership of access and/or harvest allocation privileges. Trawl vessels operating in the BSAI groundfish fisheries do not have ownership or access privileges to salmon. Similarly, salmon harvesters operating in the waters of and off Alaska do not have ownership or access privileges to groundfish.

Bycatch of salmon in the BSAI trawl fisheries reduces the common property pool of the salmon resource. Such reductions may reduce the targeted subsistence, commercial, personal use, and sport catch of salmon, and thereby the revenue of salmon harvesters who have ownership of salmon access privileges (e.g. Alaska Limited Entry permits) and/or established harvesting rights (e.g. subsistence) and harvesting history. This may, over time, reduce the value of salmon access ownership privileges as well as reducing the socioeconomic and cultural benefits for subsistence users. The market; however, has no mechanism by which groundfish harvesters may compensate salmon harvesters for such losses. Further, the market cannot value the cultural significance of the subsistence lifestyle. Thus, salmon bycatch reduction measures are imposed to reduce, to the extent practicable, this market failure. The goal of the action considered in this RIR is to improve salmon bycatch reduction in the BSAI pollock trawl fisheries and, thereby, further mitigate the effects of market failure.

Potentially Affected Fisheries

This RIR provides an overview of the directly affected BSAI pollock trawl fishery. A detailed treatment of the Western Alaska Chinook salmon fisheries, and dependent communities, that are thought to be most affected by Chinook salmon bycatch in the pollock fishery is also provided. The discussion of potentially affected salmon fisheries is intended to determine which Western Alaska Chinook salmon fisheries have been experiencing declining Chinook runs in recent years and whether related harvest fisheries opportunities have been impacted.

The BSAI Pollock fishery

Until 1998, the Bering Sea directed pollock fishery had been an open access fishery, commonly characterized as a "race for fish." In 1998, however, Congress enacted the American Fisheries Act (AFA) to rationalize the fishery by limiting participation and allocating specific percentages of the BSAI directed pollock fishery TAC among the competing sectors of the fishery. The AFA also allowed for the development of pollock industry cooperatives. Ten such cooperatives were developed as a result of the AFA: seven inshore co-ops, two offshore co-ops, and one mothership co-op. In the 2006 Bering Sea pollock trawl fishery, 90 catcher vessels participated in harvesting pollock, a slight decline since 2002, when 98 vessels participated in the fishery. Catcher processors also declined in the same period, from 31 operating the BSAI in 2002 to 19 by 2006.

Pollock is apportioned in the BSAI between inshore, offshore, and mothership sectors after allocations are subtracted for the CDQ program and incidental catch allowances. The BSAI pollock fishery is further divided into two seasons – the winter "A" roe season and the summer "B" season, which is largely non-roe.

The pollock fishery in waters off Alaska is the largest U.S. fishery by volume, and the economic character of that fishery centers on the products produced from pollock. In the U.S., Alaska pollock catches are processed mainly for roe, surimi, and fillet products. Fillet production has increased particularly rapidly due to increased harvests, increased yields, and the shift by processors from surimi to fillet production made possible under the AFA.

Export of Alaska pollock products constitutes a major aspect of the U.S. pollock industry. Almost all U.S. pollock roe is exported, primarily to Japan and Korea, along with a substantial part of U.S. surimi; and American producers of fillets also have increased exports, especially to Europe where a stronger market for U.S. pollock has emerged from the declining catch of other whitefishes in European waters and the depreciation of the dollar against the Euro.

In October 2005, to reduce the pollock fisheries' bycatch of Pacific salmon, the North Pacific Fisheries Management Council (Council) adopted Amendment 84 to the BSAI Fisheries Management Plan. The Council developed Amendment 84 to attempt to resolve the bycatch problem through the AFA pollock cooperatives. The amendment exempts pollock vessels from Chinook and Chum Salmon Savings Area closures if the vessels participate in an intercooperative agreement (ICA) to reduce salmon bycatch. Through the ICA, the cooperatives reduce salmon bycatch by a method called the "voluntary rolling hotspot system" (VRHS).

While the inter-cooperative reports on Chinook salmon bycatch indicate that the VRHS has reduced Chinook salmon bycatch rates compared with what they would have been without the measures, concerns remain because of escalating amounts of Chinook salmon bycatch through 2007. From 1990 through 2001, the Bering Sea Chinook salmon bycatch average was 37,819 salmon annually. Since 2002, Chinook salmon bycatch numbers have increased substantially. The averages from 2002 to 2007 were 82,311 Chinook salmon, with a bycatch peak of 122,000 Chinook salmon in 2007.

Western Alaska Salmon Fisheries

This RIR provides an extensive treatment of Chinook salmon fisheries in Western Alaska. The major Chinook fisheries occur in the Norton Sound Region, Kuskokwim area, The Yukon River, and in the Nushagak and Togiak Districts of the Bristol Bay Region.

Norton Sound

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

A Chinook salmon management plan for Subdistricts 5 and 6 (Shaktoolik and Unalakleet) was established to address the poor Chinook salmon runs in the 2000s. This plan placed a series of restrictions on subsistence harvest of Chinook salmon. Overall subsistence salmon harvest in the Norton Sound region peaked in 1996), with 129,046 fish caught. A downward trend in overall harvest occurred in the late 1990s, but the 2002 harvest of 103,488 fish was above historic averages. Since then, overall harvest has trended downward and the 2007 harvest of 48,694 fish was well below the 84,950 fish five year average. Within these overall trends are downward trends in subsistence catch of Chinook salmon since the late 1990s. Norton Sound area subsistence Chinook harvests peaked in 1997 at 8,989 fish. Since then, subsistence Chinook harvests have declined in nearly every year and the 2007 harvest of 2,646 fish was the lowest level recorded since 1994. Note; however, that prior to 1994, and between 2004-2006, subsistence surveys were not completed in all subdistricts.

Within the Norton Sound area, the subdistricts that have been most affected by declining Chinook salmon runs have been the Shaktoolik and Unalakleet subdistricts In the Shaktoolik subdistrict, the peak subsistence Chinook Catch of 1,275 fish occurred in 1995. Since then, catch declined through the late 1990s before rising to 1,230 fish in 2002. Since 2002, Shaktoolik subsistence Chinook catches have trended downward to a low of 382 fish in 2006. The 2007 harvest of 515 fish was well below the 5 and 10 year averages.

In the Unalakleet district, the peak subsistence Chinook catch of 6,325 fish occurred in 1997. Since then, the catch has trended downward through the 2000s. The 2007 harvest of 1,665 fish was the lowest level recorded since complete surveys began in 1994.

Norton Sound commercial Chinook catches trended downward in the late 1990s and early 2000s. As recently at 1997, more than 12,000 Chinook were commercially harvested in the region; however, by 2000 the harvest had declined to 752 fish. By 2004, no commercial Chinook harvest was allowed.

Norton Sound Region Chinook value peaked in 1985 at $452,877, when it represented more then 55 percent of the overall value. Chinook value has fluctuated since the 1980s and rose to $225,136 in 1997 when it was nearly 62 percent of the overall value. During the 2000s, Chinook value has declined as the run has declined and has been restricted to incidental catch value since 2004. In 2007, no value was earned form from Chinook target fisheries and just $113 was earned from incidental catch in other salmon fisheries. Similar to subsistence Chinook catch, the impact of declines in commercial Chinook catch have been felt most in the Shaktoolik and Unalakleet districts.

Kuskokwim Area

From the beginning of the 2007 season there was a good showing of Chinook, chum, and sockeye salmon throughout the Kuskokwim Area; however, run timing for these species was approximately 5 to 7 days late compared to average. Chinook salmon abundance was characterized as average to above average while sockeye and chum salmon abundance was characterized as above average. Coho salmon abundance was characterized as average to below average with overall early run timing. Amounts necessary for subsistence use is expected to have been achieved throughout the area.

The Alaska Board of Fisheries (BOF) met in Anchorage from January 31 to February 5, 2007, to review regulatory fisheries proposals concerning the Arctic-Yukon-Kuskokwim (AYK) areas. The BOF discontinued the stock of yield concern designations for the Kuskokwim River Chinook and Chum stocks based on Chinook and chum salmon runs being at or above the historical average each year since 2002.

Yukon River

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

There was an increasing trend in overall Lower Yukon subsistence catch through the early 1990s. Since 1993, when lower Yukon total subsistence Chinook catch was 28,513 fish, catch has trended downwards. The 2007 lower Yukon Chinook subsistence catch of 20,514 fish was below the ten year average but above the 5 year average. In Districts 1 and 3 the 2007 catch was below both the 5 and 10 year averages; however, the 2007 district 2 subsistence Chinook catch of 10,496 was the greatest since 2001 and well above both the 5 and 10 year averages.

Historic subsistence Chinook catch numbers in the Upper Yukon River, by district have been at historically high levels during the early to mid 2000s, and above averages in 2007. District 4 2007 catches were below the 5 year average and close to the 10 year average, while Districts 5 and 6 had catches greater than both averages in 2007. Canadian aboriginal subsistence catch declined steadily in the 2000s. The 2007 catch of 5,000 fish is well below the 5 and 10 year averages of 6,375 and 6,801, respectively. The small Porcupine aboriginal catch has exceeded the 5 and 10 year averages in each of the years since 2003.

Lower Yukon Chinook commercial harvests have trended downwards since the mid 1990s when nearly 120,000 Chinook were harvested. By 2001, there were no commercial Chinook openings in the Yukon River. Since 2001, the Chinook run has improved enough to allow for commercial openings with a peak harvest during that period of 52,548 in 2004. Since 2004, however, runs have weakened and catch has fallen steadily.

The 2007 lower Yukon Chinook catches were well below the five year and ten year averages in Districts one and 2 as well as overall. In district 3, the 2007 commercial Chinook catches were the first recorded since 1999. Historically, however, District 3 has had commercial Chinook harvests numbering more than 5,000 fish. Overall, upper Yukon commercial Chinook harvests have been well below historic levels during the 2000s, and the 2007 harvests were below 5 year and 10 year averages in all parts of the Upper Yukon.

Alaska Yukon Chinook commercial harvest value peaked in 1992 at just over $10 million, approximately 99 percent of which came from the lower Yukon. As harvest trended downward in the late 1990s so did Chinook value and by 2001, there were no commercial Chinook openings in the Yukon River, partly due to the need to conserve chum stocks. Since 2001, the Chinook and chum runs have improved enough to allow for commercial openings; however, the catch, and value, are still much lower than historic levels and the 2007 harvest was worth just under $2 million.

The 2008 run is expected to be below average and similar to the 2007 run, although, it is anticipated that the 2008 run will provide for escapements, support a normal subsistence harvest, and a below average commercial harvest. If inseason indicators of run strength suggest sufficient abundance exists to have a commercial Chinook salmon fishery, the U.S. commercial harvest could range from 5,000 to 30,000 Chinook salmon including the incidental harvest taken during anticipated summer chum salmon directed periods. The run of Canadian-origin Upper Yukon River Chinook salmon in 2008 is expected to be below average. The preseason outlook is for approximately 111,000 Canadian-origin Chinook salmon. However, due to the relationship between the expected and observed run size in 2007, expected 2008 run size could be as low as 80,000 fish.

Bristol Bay Region

In 2007, Chinook salmon escapement into the Nushagak River was 60,000, 80% of the 75,000 inriver goal. Harvest was 51,000 Chinook in the Nushagak District. Peak Chinook salmon production in the early 1980's resulted in record commercial harvests and growth of the sport fishery. Declining run sizes and the question of how to share the burden of conservation among users precipitated the development of a management plan for Nushagak Chinook salmon. Since the plan was adopted in 1992, the Nushagak-Mulchatna Chinook Salmon Management Plan (NMCSMP) has governed management of the Nushagak Chinook salmon fisheries (5 AAC 06.361). The plan was amended in 1995, 1997, and 2003.

Bristol Bay Subsistence Chinook harvests hit a 20 year high of 21,231 in 2003 but have fallen significantly with 12,617 and 16,002 fish harvested bay wide in 2006 and 2007 respectively. The 20 year average is presently 15,438. While it appears that subsistence Chinook harvests in the Bristol Bay area have improved over historic levels, there were declines in subsistence Chinook harvests in the Naknek-Kvichak District during the late 1990s and early 2000's. The Nushagak District had a similar decline, rebounded to a record catch in 2003, but then declined for the next four years before recovering to 13,615 fish, or just above the 10 year average, in 2007.

Overall, Bristol Bay commercial Chinook salmon harvests in 2007 were below the recent 20-year averages in all districts. The 2007 bay-wide commercial harvest of 62,670 Chinook was below the 20-

year average of 66,607. The main factor here was the unexpected shortfall in the Nushagak District where the harvest was only 51,350. This was well below the expected harvest of 140,000.

Alternatives Considered

The analysis of alternatives considers two action alternatives as well as multiple components and options under each alternative. Alternative 2 is a hard cap on Chinook salmon bycatch while Alternative 3 would invoke a large area closure when a triggering amount of Chinook salmon are caught. These alternatives contain multiple components and options that would provide for sector level allocations, a range of seasonal split options, a range of bycatch allocations options, the potential for transferability or rollovers of unused bycatch allocations, cooperative level allocations and transfers as well as the possibility of a system similar to the present VRHS system. Given the extensive number of combinations of possible scenarios, the analysis has focused on a subset of those combinations in order to attempt to define direct adverse effects in terms of potentially foregone revenue and revenue at risk and potential benefits in terms of the number of salmon potentially not bycaught, or "saved."

The various provisions for transferability, rollovers, and cooperative provisions are treated qualitatively and in a generally comprehensive way. Such options allow flexibility with regard to allowing more pollock to be harvested by moving bycatch allocations around to those who are in need of them most. As such these provisions would likely improve the economic yield of the pollock fishery by mitigating impacts on revenue. However, if greater salmon conservation than a hard cap or triggered closure might provide is a goal, then limiting transferability would tend to save more Chinook salmon and several levels of limits are available in the alternative set.

Management and Enforcement Implications

Due to the complexity of the alternative set and the large number of combinations of alternatives, components and options, management and enforcement issues have been given extensive treatment within the sections on analysis of each alternative in this RIR. Due to the complexity of the issues, it is not possible to adequately summarize that treatment here. Thus, careful consideration of management and enforcement issues described within the text is necessary to understand the implication of the proposed actions.

Direct Effects Alternative 2: Hard Caps.

Salmon Saved

This RIR draws heavily on an analysis of hypothetical reductions in coastal-west Alaska specific adult equivalent Chinook salmon bycatch areas that is contained within the EIS. The values are based on median Adult Equivalency (AEQ) values and mean proportions regional assignments within strata (A-season, and NW and SE B seasons) genetics data collected from 2005-2007. The proportional breakouts of west Alaska Chinook is from Myers et al. 2004. The RIR reproduces output from the AEQ analysis for Western Alaska River System, specifically the Yukon, Bristol Bay, and Kuskokwim areas.

The potential benefit of Chinook salmon bycatch reduction, in terms of Yukon River salmon adult equivalency, increases as the cap decreases and bycatch increases the greatest adult equivalence benefits would have occurred in years when bycatch was highest (i.e. 2007). For the Yukon River, maximum estimated adult equivalent salmon benefits, in numbers of fish, are 13,300 fish under the most constraining hard cap of 29,300 Chinook in the 2007 year. As the hard cap is increased, the benefits in terms of AEQ estimates necessarily decrease as more Chinook are allowed to be bycaught. With a hard cap of 48,700 Chinook the maximum benefit of 10,027 fish is from the 2007 year. The low end AEQ estimate of 738 fish occurs in the 2004 year. As the cap is further increased, the AEQ estimates decrease and with the highest cap of 87,500 Chinook maximum benefit of 5,499 fish is estimated for the 2007 year. The least benefit under this cap is actually negative. A thorough review of the tabular data shows a nearly continuous range of potential benefits, in numbers of adult Chinook, from less than zero to 13,300.

For the Bristol Bay Region, the maximum estimated AEQ salmon benefits, in numbers of fish, are 11,305 fish under the most constraining hard cap of 29,300 Chinook in 2007. With a hard cap of 48,700 Chinook the maximum benefit of 8,523 fish is from the 2007 year. The low end AEQ estimate, under a 48,700 cap, of 653 fish occurs in the 2004 year. As the cap is further increased, the AEQ estimates decrease and with the highest cap of 87,500 Chinook maximum benefit of 4,674 fish is estimated for the 2007 year. The least benefit under this cap is actually negative. A thorough review of the tabular data shows a nearly continuous range of potential benefits, in numbers of adult Chinook, from less than zero to 11,305, depending on cap, split, option, and year.

For the Kuskokwim Region, the maximum estimated adult equivalent salmon benefit in numbers of fish is 8,645 fish under the most constraining hard cap of 29,300 Chinook in the 2007 year. With a hard cap of 48,700 Chinook the maximum benefit of 6,517 fish is from the 2007 year. The low end AEQ estimate, under a 48,700 cap, of 671 fish occurs in the 2004 year. As the cap is further increased, the AEQ estimates decrease and with the highest cap of 87,500 Chinook maximum benefit of 3,574 fish is estimated for the 2007 year. The least benefit under this cap is negative. A thorough review of the tabular data shows a nearly continuous range of potential benefits, in numbers of adult Chinook, from less than zero to 8,645 depending on cap, split, option, and year.

The maximum benefit to the Western Alaska region would be approximately 33,250 fish during the most severe bycatch year of 2007, and for the most restrictive cap and option as discussed previously. In the 2004 year, the lowest bycatch year in the period, that maximum benefit is 11,328. The minimum benefit in the 2007 year would have been 3,167 fish, but in 2004, the minimum is estimated to be negative. These data demonstrate that the scenarios analyzed here have a broad range of potential benefits that depend on the level of cap and the severity of the bycatch year as well as on how restrictive the splits and/or options are. Further, not all scenarios provide salmon savings benefit.

Potentially Foregone Revenue

Under the Chinook salmon bycatch hard cap scenarios included in this alternative, the pollock trawl fishery, and/or specific sectors that participate in it (depending on allocations of hard caps) would be required to stop fishing once a specific hard cap is reached. In such a circumstance, any remaining TAC that is not harvested when the cap is reached would remain unharvested unless specific provisions of the hard cap alternative dealing with transfers, rollovers, and/or cooperative level management are applied in order to mitigate potential losses in revenue due to unharvested pollock TAC.

The RIR provides hypothetical estimates of foregone pollock first wholesale revenue by year and season under Chinook bycatch option for fleet wide caps, and for CDQ versus non-CDQ. As expected, the greatest impact would have occurred in the highest bycatch year (2007) and under the most restrictive bycatch cap of 29,300. In the A season, the greatest effect occurs under the 50/50 seasonal split because of the higher roe pollock price in the A season. The B season impact has the reverse situation with effects being greatest under the 70/30 split, which constrains B season revenue more. The maximum A season impact was $529.4 million in 2007 under the 50/50 split and the 29,300 cap. That value is composed of $482.7 million from non-CDQ and $46.7 million from CDQ fisheries. In the B season, the maximum impact is $179.9 million in 2007 with the 293,300 cap and the 70/30 split. In percentage terms the A season maximum impact represents 84 percent of total revenue and the B season total impact is 30 percent of total B season revenue.

As is expected, as the hard cap is increased the impacts decrease. However, in the 2007 year when bycatch was highest, even the 87,500 cap would have resulted in total foregone revenue of $322.6 million in the A season, with no CDQ impact. The impact would have been $72.9 million in the B season, with CDQ impact only under the 70/30 split. These values are 51% and 12% of total revenue for the A and B seasons respectively. Thus, in a high bycatch year, even the highest cap has significant potential impacts. Also evident is that as the cap increases, the effect of the split is increased. For example, the $322.6 million A season impact under the 50/50 split would have been $134.8 million under the 70/30 split. The reverse pattern is, of course, observed in the B season.

Impacts estimated for 2004, which is among the lowest bycatch year, are considerably smaller than those estimated for 2007 but are still significant in some cases. In the 2004 A season total impact under the 29,300 cap is estimated to have been $128 million under the 50/50 split, all coming from non-CDQ fishery participation. Under the 70/30 split that amount drops to $64.3 million. With the exception of $200.000 in estimated impact under the 50/50 split and a 48,700 cap, none of the other caps would have caused foregone revenue impacts in 2004. In the B season, 2004 foregone revenue estimates are greatest under the 29,300 cap and 70/30 split, where $82.7 million is the estimated impact.

Overall, the impacts of the hard caps are greatest in the A season, when roe value is highest and in the years when bycatch has been largest. Further, the seasonal split definitely affects the impact values. Even in the second highest bycatch year of 2006, A season impacts under even the largest cap of 87,500 Chinook are estimated have been $183.6 million, which is 29 percent of total first whole sale revenue in the pollock fishery. However, in lower bycatch years of 2003, 2004, and 2005, there was very little A season impact at the 68,100 cap level, and in percentage terms, this is also true of the B season. The RIR also provides these effects broken out by sector and by year in a series of lookup tables.

Direct Effects of Alternative 3: Triggered Closures

Salmon Savings:

The triggered Closures analyzed here are based on hard caps that are formulated in the same manner as those formulated under Alternative 2. In other words, the triggers may be chosen from within the set of hard caps and would be used to trigger the closure areas identified in the Alternative set (discussed in detail in the EIS) for the A and B seasons. The difference here is that the triggered closure does not cap salmon bycatch but rather used the cap number to trigger the closure, which moves fishing effort outside of the trigger-closure area.

To determine the effects of the triggered closure on salmon bycatch, the EIS presents an analysis of both pollock catch and Chinook salmon bycatch within and outside the trigger-closure area in each of the years 2003-2007. That methodology has estimated the numbers of Chinook salmon that are potentially saved by moving effort outside of the closure areas and the following tables, taken from the EIS, document those numbers as potential benefits in terms of the number of Chinook potentially saved under each trigger, option, and seasonal split. These estimates are based on changed catch rates of Chinook inside and outside the trigger-closure area. The AEQ analysis presented previously in the discussion of Alternative 2 has not been specifically re-created for the trigger-closure analysis at this time, thus it is not possible to relate these savings in Chinook salmon to specific Western Alaska River systems.

The maximum Chinook saved of 40,311 fish would come from the lowest cap in the highest bycatch year (2007) and occurs for all but the 70/30 split, which had 36,899 Chinook saved. Thus, the 70/30 split reduces estimated Chinook savings overall in all years under the 29,300 trigger. In the low bycatch year of 2004, the maximum Chinook savings under the trigger-closure with the 29,300 cap is 5,224 fish and is greatest under the 50/50 split option. In general, in the more moderate bycatch years the 50/50 split results in the greatest Chinook savings under both the 29,300 and 48,700 triggers. Note, however, that the 48,700 trigger level is not estimated to save any Chinook salmon in 2004. Further, the higher triggers are only expected to save salmon in the highest bycatch years of 2006 and 2007. Under the high trigger of 87,500, the maximum Chinook salmon saved would have come from the 50/50 split and would have been 12,098 and 15,088 in 2006 and 2007, respectively.

B season Chinook savings show a different pattern than in the A season. As expected, the maximum number of Chinook saved, 36,290 comes from the lowest trigger of 29,300 fish in the highest overall bycatch year (2007), and from the 70/30 split. However, even the 87,500 trigger with the 70/30 split is expected to save Chinook salmon with savings of 2,680, 11,300 and 20,322 expected for 2004, 2005, and 2007 respectively. There are some instances when the trigger closure is shown to produce a negative savings of Chinook salmon. That finding implies that in some years, the catch rate of Chinook outside the B season triggered closure area is actually higher than inside of it. In the 2005 season this would have been the case under a 48,700 trigger with either the 58/42 or 55/45 splits and with a 70/30 split under the 68,100 trigger.

Revenue at Risk

While the hard caps of Alternative 2 have the potential effect of fishery closure and resulting foregone pollock fishery revenue, the triggered closures don't directly create foregone revenue, but rather, they place revenue at risk of being foregone. When the closure is triggered, vessels must be relocated outside the closure areas and operators must attempt to catch their remaining allocation of pollock TAC outside the closure area. Thus, the revenue associated with remaining allocation is placed at risk of not being earned if the fishing outside the closure area is not sufficiently productive to offset any operational costs associated with relative harvesting inefficiencies outside the closure area.

The data show that in the highest bycatch years and under the most restrictive trigger levels, revenue at risk would be about $485 million in the A season for all vessels combined. That represents 77% of the 2007 estimated total A season first wholesale revenue of the pollock fleet. As the trigger is increased, the impacts decrease; however, the least restrictive A season trigger (70/30 split) of 87,500 still results in $125.2 million in revenue at risk, or a bout 21% of the overall first wholesale revenue of all pollock vessels combined. In lower bycatch years (e.g. 2003, 2004, and 2005), the larger triggers of 87,500 and 68,100 do not cause triggers to be hit, and thus there is no revenue at risk. However, in the low bycatch year of 2004 even the lowest trigger of 29,300 would place $33.2 million (70/30 split) to $97.4 million (50/50s split) at risk. These values are 11 percent and 31 percent of total revenue respectively.

The revenue at risk in the B season is greatest under the 70/30 split and is as much as $117.38 million in the worst case (2006, 29,300, 70/30), or 17 percent of total B season revenue. At the 29,300 trigger, and 70/30 split, the B season revenue at risk remains above 15 percent in all years except 2003. Even under the 87,500 trigger with a 70/30 split, more than $50 million, or 8 percent of total first wholesale revenue, would have been placed at risk in 2007. Ignoring the 2007 year; however, only the 29,300 trigger generates revenue at risk in excess of 10 percent of total first wholesale value.

RIR Conclusions

This RIR represents an initial review draft analysis of potential effects of a wide range of Chinook salmon bycatch alternatives on the BSAI pollock trawl fleet and attempts to demonstrate benefits in terms of the numbers of Chinook salmon that would be saved by the alternatives. This analysis has demonstrated that potential impacts range from zero to more than half a billion dollars under the most restrictive scenario and in the highest bycatch year, and that even the least restrictive measures may have large consequences in terms of foregone revenue and/or revenue at risk in high bycatch years. What has also been shown is that in those cases of greatest impact, there is also the potential for the greatest benefit in terms of Chinook salmon saved, with as many as 32,250 fish estimated to return to Western Alaska Rivers as adults. It is hoped that this initial analysis of this very complex alternative set will provide sufficient information for selection of a preliminary preferred alternative that can be analyzed with greater specificity regarding both direct and indirect effects.

Initial Regulatory Flexibility Analysis

The document contains an Initial Regulatory Flexibility Analysis (IRFA) which evaluates the impacts of the alternatives under consideration on directly regulated small entities to address the statutory requirements of the Regulatory Flexibility Act (RFA) as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA). The only small entities directly regulated by this action are the six Western Alaska CDQ groups. This IRFA is preliminary until NMFS develops the implementing regulations for this action.

Next step for the Council: Identifying a preliminary preferred alternative

The interplay between all of the alternatives, options and suboptions provides a complicated suite of combinations for analysis. Thus to the extent practicable, analysts summarized the impacts quantitatively, for the main impact categories (pollock, Chinook and chum salmon, economic impacts), as well as qualitatively, by reducing the analyzed range to 36 combinations as described previously.

All caps apply either to the A-season or the B-season. Options under Alternative 2 (or Alternative 3) Component 1, Options 1-1 to 1-4 (Section 2.2.1.3) provide the relative distribution of an annual cap by season. The seasonal cap allocations influence the extent to which different overall fishery cap levels would be constraining. While a suboption may permit underages (i.e., when catch is less than the cap level within a season) to be rolled over from the A season to the B season, within a calendar year, overages are not permitted and reaching a seasonal cap would result in a closure for the remainder of that season for the fishery (or if subdivided, sector) that reached the respective cap. The combination of which seasonal allocations are selected with how sector caps are distributed drives the degree to which individual sectors are constrained and affects total bycatch numbers by sector differently in different years (Table 8). The selection of seasonal/sector caps will depend on trade-offs for salmon saved and pollock foregone (Fig. 3).

As the Council begins to identify the choice of a preferred alternative or select specific aspects to be included in a preferred alternative, it will greatly enhance staff's ability to ensure those specific impacts are analyzed in the different combinations in which they occur.

Table 9 summarizes the specific choices for the Council in building a preferred alternative. As noted previously, the preferred alternative may be constructed of a combination of elements from the range of alternatives. This table is provided to assist the Council and the public with understanding step-by-step what each of the decision points are in building a preferred alternative. Should the Council identify a preferred alternative in June, it will be included in the analysis prior to the draft EIS being released for public comment and review in the summer of 2008.

This version of the EIS is put forward as an initial review draft at the June 2008 Council meeting, to assist the public and the Council with understanding the analysis to date. This document will be modified following review at the June meeting, and will be published as a draft EIS, for public comment over the summer.

Table 7 Hypothetical Chinook salmon bycatch mortality **totals** under each cap and management option, 2003–2007. The shading relate to the relative magnitude of bycatch for each policy and year.

Cap	AB Split	Option	2003	2004	2005	2006	2007
87,500	50/50	opt1(AFA)	46,993	49,509	52,176	49,972	59,529
		opt2a	40,080	53,496	57,425	59,638	[illegible]
		opt2d	46,108	54,028	52,176	64,624	70,634
	58/42	opt1(AFA)	46,993	43,657	45,534	[illegible]	72,921
		opt2a	43,797	53,243	58,454	[illegible]	[illegible]
		opt2d	46,993	49,509	52,176	[illegible]	70,403
	70/30	opt1(AFA)	46,993	40,893	42,522	58,102	[illegible]
		opt2a	45,686	45,847	45,534	[illegible]	70,633
		opt2d	46,993	43,125	45,534	[illegible]	[illegible]
68,100	50/50	opt1(AFA)	44,606	43,657	45,534	40,133	47,329
		opt2a	39,344	50,215	48,403	56,272	60,442
		opt2d	40,474	49,509	51,340	42,806	50,835
	58/42	opt1(AFA)	46,993	40,893	45,534	40,133	54,534
		opt2a	39,293	47,271	49,560	54,763	58,283
		opt2d	44,128	43,657	45,534	51,492	58,027
	70/30	opt1(AFA)	46,993	38,192	40,441	51,094	56,959
		opt2a	38,927	41,474	44,581	59,964	60,411
		opt2d	46,666	39,771	42,522	52,063	62,088
48,700	50/50	opt1(AFA)	33,736	38,202	35,897	32,097	34,497
		opt2a	34,470	37,152	37,741	32,151	35,951
		opt2d	36,668	40,586	39,919	32,708	39,951
	58/42	opt1(AFA)	36,655	38,192	38,549	32,239	29,088
		opt2a	34,279	37,147	39,146	28,949	35,915
		opt2d	38,337	38,806	40,106	32,097	41,904
	70/30	opt1(AFA)	42,505	34,473	39,359	34,057	35,717
		opt2a	37,063	33,073	37,369	43,711	42,388
		opt2d	39,435	36,365	39,605	29,950	37,453
29,300	50/50	opt1(AFA)	22,634	23,892	22,318	18,412	12,670
		opt2a	23,864	24,893	26,017	24,714	15,010
		opt2d	25,416	25,145	25,359	17,725	14,765
	58/42	opt1(AFA)	23,562	24,293	25,140	16,848	17,482
		opt2a	24,909	26,910	24,863	24,519	12,285
		opt2d	24,495	27,857	24,568	22,482	13,925
	70/30	opt1(AFA)	24,168	25,313	24,844	19,323	16,378
		opt2a	27,678	25,689	27,761	20,035	19,209
		opt2d	25,295	25,325	27,037	21,154	9,358

Table 8 Hypothetical adult equivalent Chinook salmon bycatch mortality **totals** under each cap and management option, 2003–2007. Numbers are based on the median AEQ values with the original estimates shown in the second row. Right-most column shows the mean over all years relative to the estimated AEQ bycatch. The shadings and the pies relate to the relative AEQ bycatch for each policy and year.

	2003	2004	2005	2006	2007	
No Cap	**33,215**	**41,047**	**47,268**	**61,737**	**78,814**	
Cap, AB, sector						
87,500 70/30 opt2d	32,903	38,255	38,479	49,058	[illegible]	82%
87,500 70/30 opt2a	33,081	38,485	38,753	49,986	[illegible]	82%
87,500 70/30 optl	32,864	37,582	36,635	43,381	51,106	77%
87,500 58/42 opt2d	33,368	39,856	42,197	[illegible]	[illegible]	82%
87,500 58/42 opt2a	32,143	39,887	44,402	[illegible]	[illegible]	88%
87,500 58/42 optl	33,108	38,163	38,155	[illegible]	[illegible]	78%
87,500 50/50 opt2d	33,010	40,943	42,928	[illegible]	[illegible]	83%
87,500 50/50 opt2a	30,747	38,967	43,140	[illegible]	[illegible]	82%
87,500 50/50 optl	33,151	39,747	[illegible]	[illegible]	43,599	77%
68,100 70/30 opt2d	33,162	36,866	36,314	40,583	45,112	73%
68,100 70/30 opt2a	29,981	34,695	36,854	[illegible]	[illegible]	74%
68,100 70/30 optl	32,948	36,791	35,507	39,891	42,666	72%
68,100 58/42 opt2d	32,364	37,417	37,704	[illegible]	43,194	73%
68,100 58/42 opt2a	30,023	36,658	39,105	[illegible]	45,139	74%
68,100 58/42 optl	33,108	37,477	37,402	35,895	38,137	69%
68,100 50/50 opt2d	30,769	37,607	[illegible]	38,952	38,063	71%
68,100 50/50 opt2a	30,084	37,224	39,182	43,200	45,144	74%
68,100 50/50 optl	32,342	37,659	38,203	36,334	35,679	69%
48,700 70/30 opt2d	29,249	33,665	33,408	30,077	28,277	59%
48,700 70/30 opt2a	28,798	31,431	31,021	33,765	34,297	61%
48,700 70/30 optl	30,155	33,547	33,374	31,735	29,376	60%
48,700 58/42 opt2d	29,987	33,692	34,121	30,697	30,120	61%
48,700 58/42 opt2a	27,722	31,175	32,007	28,025	27,065	56%
48,700 58/42 optl	28,349	33,201	33,788	30,543	25,454	58%
48,700 50/50 opt2d	28,797	33,773	33,600	30,876	29,647	60%
48,700 50/50 opt2a	26,949	30,859	31,139	28,650	27,215	55%
48,700 50/50 optl	26,854	31,947	31,278	29,530	26,716	56%
29,300 70/30 opt2d	19,200	22,679	23,095	20,513	13,338	38%
29,300 70/30 opt2a	21,115	23,813	23,825	20,612	17,220	41%
29,300 70/30 optl	19,252	22,524	21,886	19,101	15,220	37%
29,300 58/42 opt2d	18,963	23,646	22,393	20,476	15,041	38%
29,300 58/42 opt2a	19,376	23,043	22,132	20,827	15,039	38%
29,300 58/42 optl	18,259	21,267	21,286	18,331	14,924	36%
29,300 50/50 opt2d	19,122	22,130	21,382	18,665	14,048	36%
29,300 50/50 opt2a	19,123	21,927	21,513	20,925	16,004	38%
29,300 50/50 optl	17,104	20,672	19,676	17,542	13,161	34%

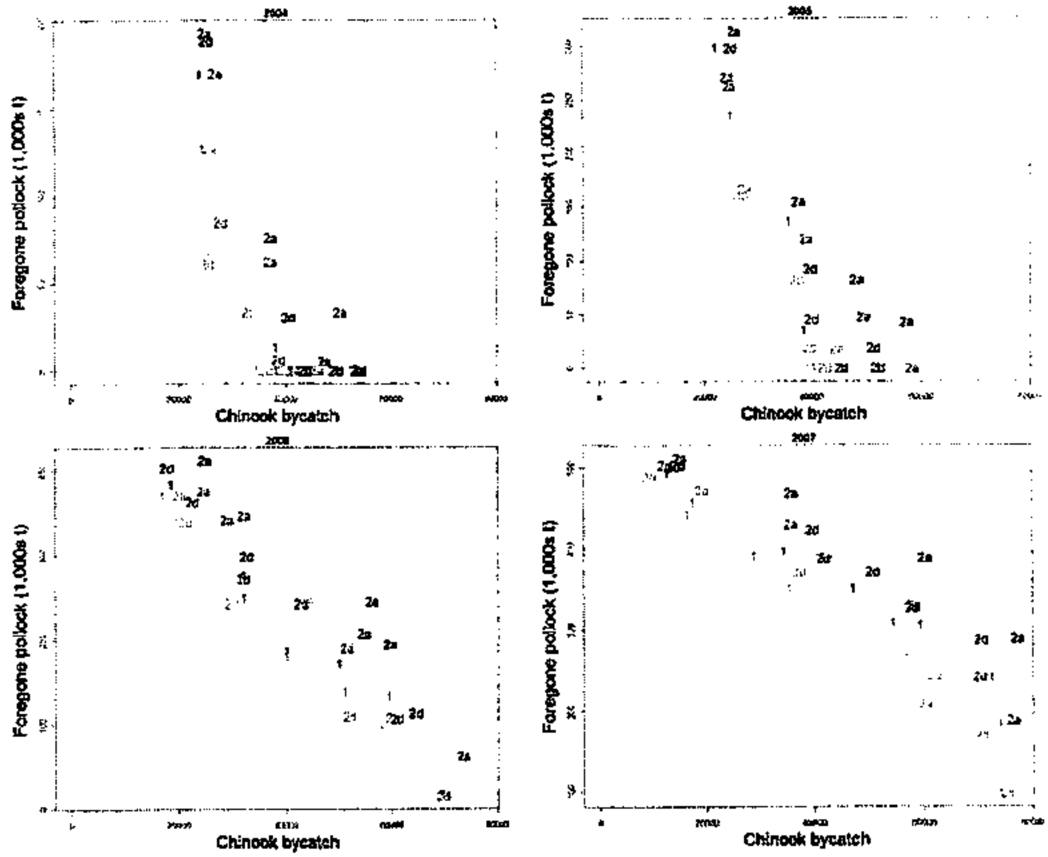

Fig. 3 Examples of trade-offs in hypothetical Chinook AEQ bycatch (horizontal axis) and foregone pollock (vertical axis) had the suite of 36 management options been in plact for 2004 (upper left) through 2007 (lower right). The symbols plotted denote the sector split options and the colors represent the different A-B season splits.

Table 9 Preferred alternative choices

Do you want to retain the existing triggers and closures? (Alternative 1)	**No**	Existing salmon PSC limits and salmon savings areas will be removed from the FMP
	Yes	Existing salmon PSC limits and salmon savings areas will remain in the FMP; exemption from the area closures will continue to apply to vessels participating in VRHS system

Do you want a hard cap? (Alternative 2)	**No**	No hard cap						
	Yes	**How to formulate it?** (Component 1)	Option 1 (i-viii): Select from a range of numbers	Suboption: adjust periodically based on updated bycatch information				
			Option 2: Index cap is set relative to salmon returns					
		How to apportion the cap by season? (Component 1)	Option 1-1: 70/30 (A-season/B-season) Option 1-2: 58/42 (A-season/B-season) Option 1-3: 55/45 (A-season/B-season) Option 1-4: 50/50 (A-season/B-season)					
		Subdivide among sectors? (CDQ, Inshore CV, mothership, offshore CP)	**No**	separate cap only for CDQ Program, otherwise cap applies to all non-CDQ sectors as a whole				
			Yes	**How?** (Component 2)	Option 1: same as pollock allocations, 10% CDQ, 45% inshore CV, 9% mothership, 36% offshore CP			
					Option 2 (a-c): Cap is set based on historical average bycatch use by sector Option 2 (d): Midpoint of the range provided by Option 1 and 2 (a-c)			
				Allow bycatch transfers among sectors? (Component 3)	Option 1: yes, transferable salmon bycatch caps			
					Option 2: NMFS rolls over unused salmon bycatch to sectors that are still fishing			
				Subdivide inshore CV cap among cooperatives? (Component 4)	**No**	Inshore CV cap applies at sector level		
					Yes	Inshore CV cap will be subdivided among cooperatives based on the cooperative's pollock allocation		
						Allow bycatch transfers among cooperatives?	Option 1: no, cooperatives may lease pollock to another cooperative	
							Option 2: yes, industry may initiate transfers	
							Suboption: NMFS rolls over unused salmon bycatch to cooperatives that are still fishing	

Table 9 Preferred alternative choices (continued)

Do you want a new triggered closure? (Alternative 3)	**No**	No trigger caps and closures				
	Yes	**How to formulate cap?** (Component 1; same options as for hard cap)	Option 1 (i-viii): Select from a range of numbers			Suboption: adjust periodically based on updated bycatch information
			Option 2: Index cap is set relative to salmon returns			
		How to apportion the cap by season? (Component 1)	Option 1-1: 70/30 (A-season/B-season) Option 1-2: 58/42 (A-season/B-season) Option 1-3: 55/45 (A-season/B-season) Option 1-4: 50/50 (A-season/B-season)			
		How will the cap be managed? (Component 2)	NMFS would manage the trigger closures.			
				Option: Allow participants in the intercooperative agreement to manage their own cap. NMFS continues to manage trigger closures for non-participants.		
		Subdivide cap among sectors? (CDQ, inshore CV, mothership, offshore CP)	**No**	separate cap only for CDQ Program, otherwise cap applies to all non-CDQ sectors as a whole		
			Yes	**How?** (Component 3; same options as for hard cap)	Option 1: same as pollock allocations, 10% CDQ, 45% inshore CV, 9% mothership, 36% offshore CP	
					Option 2 (a-c): Cap is set based on historical average bycatch use by sector Option 2 (d): Midpoint of the range provided by Option 1 and 2 (a-c)	
				Allow transfer among sectors? (Component 4; same options as for hard cap)	Option 1: yes, transferable salmon bycatch caps	
					Option 2: NMFS rolls over unused salmon bycatch to sectors that are still fishing	
		Apportion by season?				
		What areas? (Component 5; Council may select both A and B season closures)	Option 1: A season closure			Suboption: adjust periodically based on updated bycatch information
			Option 2: B season closures			
		Duration of closures?	A-season: once triggered, areas remain closed for remainder of season B-season: If trigger is reach prior to August 15th, areas remain open until August 15th and then close for remainder of season			

AGENDA C-2(b)
JUNE 2008

INITIAL REVIEW DRAFT ONLY
NPFMC REVIEW
JUNE 2008

Draft

Environmental Impact Statement

for

Bering Sea/Aleutian Islands Chinook Salmon

Bycatch Management

May 15, 2008

North Pacific Fishery Management Council

National Marine Fisheries Service

Note: This document will be revised to form the Draft Environmental Impact Statement

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INITIAL REVIEW DRAFT ONLY
NPFMC REVIEW
JUNE 2008

APPENDIX A

REGULATORY IMPACT REVIEW

Of Measures to Reduce Chinook Salmon Bycatch in the Bering Sea and Aleutian Islands Pollock Trawl Fishery

Initial Review Draft
May 15, 2008
Scott A. Miller

Note: This document will be revised to form the Draft Environmental Impact Statement

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Bering Sea Chinook Salmon Bycatch Management EIS/RIR/IRFA

Draft 2008 timeline: note timelines after Council action in June are dependant upon action by SSC/Council in June and necessary data/analytical tasks.

Dates	Tasks/Milestones
60-day public comment period	
June 11-July 2	Analysts revise document according to SSC requests and Council's preferred alternative,
July 3	Council forwards document to NMFS
July 7-23	Regional, GCAK, and NEPA review of document, revisions made by analysts accordingly during this time period as requested
July 23-August 15	NMFS production of public review draft EIS/RIR/IRFA, printing, filing with EPA, and mailing
August 15-October 14	**60-day** public comment period
September 29-October 7	October Council meeting
October 14 to November Council mailing	Prepare comment analysis report (CAR)
December 8-16	December Council meeting: Final action on Chinook salmon bycatch reduction measures
Dates	**Tasks/Milestones**
45-day public comment period	
June 11-July 18	Analysts revise document according to SSC requests and Council's preferred alternative,
July 21	Council forwards document to NMFS
July 22 – August 6	Regional, GCAK, and NEPA review of document, revisions made by analysts accordingly during this time period as requested
August 6 - 29	NMFS production of public review draft EIS/RIR/IRFA, printing, filing with EPA, and mailing
August 29-October 13	**45-day** public comment period
September 29-October 7	October Council meeting
October 13 to November Council mailing	Prepare comment analysis report (CAR)
December 8-16	December Council meeting: Final action on Chinook salmon bycatch reduction measures

Appendix C. Chinook salmon bycatch-at-age methods and evaluation

1.1 Introduction

Currently, accurate in-season salmon abundance levels are unavailable and management must rely on analyses of historical data for developing alternatives. Developing regulations designed to reduce the impact of bycatch requires methods that appropriately relate these impacts to their respective salmon populations. A stochastic "adult equivalence" model was developed that accounts for sources of uncertainty. This extends from Witherell et al.'s (2002) evaluation and relaxes a number of assumptions. Such stochastic simulation approaches for evaluating management measures provide insight on the types of data required to better achieve objectives (e.g., Criddle 1996).

In 2007, the Council reviewed the methodology and encouraged refinements. In particular, these included:

a) Improving estimates of the salmon bycatch age composition,
b) Deriving realistic salmon maturation schedules which consider historical brood-year data,
c) Use of updated genetics information on stock origin,
d) Use of updated run size information, and
e) Refining the adult equivalent model to include a broader range of inputs (e.g., brood-year maturation rates and age specific natural mortality rates)

These updates and revisions were presented at the April 2008 Council meeting where further guidance for refinements was provided. This included explicit seasonal allocation of alternative cap levels and improved estimates of at sea survival. What follows is an update of the methods presented at the April 2008 Council meeting which describes the methods and data used to estimate AEQs and application to seasonal and sector allocations of cap levels currently proposed as alternative management actions.

1.2 Methods

Overall salmon bycatch levels are estimated based on extensive observer coverage. For the pollock fishery, the vast majority of tows are observed either directly at sea or based on offloading locations aboard motherships or shore-based processing plants. The observer data is used to allow inseason manager evaluate when to open and close all groundfish fisheries based on catch levels of prohibited species bycatch, such as salmon and halibut, and of target groundfish species. The process of applying observer data (in addition to other landings information) to evaluate fishery season length has relied on a pragmatic approach that expands the observed bycatch levels to extrapolate to unobserved fishing operations. More statistically rigorous estimators have been developed (Miller 2005) that can be applied to the North Pacific groundfish fisheries but these so far have not been implemented for inseason management purposes. Nonetheless, these estimators suggest that for the Eastern Bering Sea pollock fishery, the levels of salmon bycatch are precisely estimated with coefficients of variation of around 5%. This indicates that, assuming that the observed fishing operations are unbiased relative to unobserved tows, the total salmon bycatch levels are precisely estimated for the fleet as a whole. For the purposes of this analysis, imprecision on the total annual salmon bycatch is considered negligible.

1.2.1 Salmon catch-at-age estimation methods

In order to appropriately account for the impact of salmon bycatch in the groundfish fisheries it is desirable to correct for the age composition of the bycatch. For example, the impact a bycatch level of 10,000 adult mature salmon would have is likely greater than the impact of 10,000 incidentally caught salmon that just emerged from rivers and expected to return for spawning in several years time. Hence, estimation of the age composition of the bycatch (and the measure of uncertainty) is critical.

Estimates of both length and age composition and their variance estimates were approximated using at two-stage bootstrap method. For a given year the first stage samples, with replacement, among all tows from which salmon were measured. Given this collection of tows, the individual fish measurements were resampled with replacement and all stratum-specific information was carried with each record. A separate process was carried out on the samples from which age data were collected following a similar two-stage approach. Once a sample of lengths and ages were obtained, age-length keys were constructed and applied to the catch-weighted length frequencies to compute age composition estimates. This process was repeated 100 times and the results stored to obtain a distribution of both length and age compositions.

Three years of length-at-age data were available from Myers et al. (2003). These data are based on salmon scale samples collected by the NMFS groundfish observer program from 1997-1999 and processed for age determination (and river of origin) by scientists at the University of Washington (Table 1). Extensive salmon bycatch length frequency data are available from the NMFS groundfish observer program since 1991 (Table 2). The age data were used to construct age length keys for nine spatio-temporal strata (one area for winter, two areas for summer-fall, for each of three fishery sectors). Each stratum was weighted by the NMFS Regional Office estimates of salmon bycatch (Table 3). To the extent possible, sex-specific age-length keys within each stratum were created and where cells were missing, a "global" sex-specific age-length key was used. The global key was simply computed over all strata within the same season. For years other than 1997-1999, a combined-year age-length key was used (based on all of the 1997-1999 data). This method was selected in favor of simple (but less objective) length frequency slicing based on evaluations of using the combined key on the individual years and comparing age-composition estimates with the estimates derived using annual age-length keys. The reason that the differences were minor are partially due to the fact that there are only a few age classes in the salmon bycatch and these are fairly well determined by their length at-age distribution (Figure 1).

1.2.1 Genetics sample composition

Scientists with Alaska Department of Fish and Game have developed a DNA baseline to resolve the stock composition mixtures of Chinook salmon in the Bering Sea (Templin et al. In prep.). This baseline includes 24,100 individuals sampled from over 176 rivers from the Kamchatka Peninsula, Russia, to the Central Valley in California (Table 4). The genetic stock identification (GSI) study used classification criteria whereby the accuracy of resolution to region-of-origin is must be greater than or equal to 90%. This analysis identified 15 regional groups for reporting results. For this report, minor components in the bycatch are combined into the "other" category for clarity which results in a total of 9 stock units.

This study analyzed samples taken from the bycatch during the 2005 B season, both A and B seasons during 2006, and a sample from an excluder test fishery during the 2007 A season. Where possible, the genetics samples from the bycatch were segregated by major groundfish bycatch regions. Effectively, this entailed a single region for the entire fishery during winter (which is typically concentrated in space to the region east of 170°W) and two regions during the summer, a NW region (west of 170°W) and a southeast region (east of 170°W). The genetic sampling distribution varies considerably by season and region compared to the level of bycatch (as reported by NMFS Regional Office; Table 3).

The samples used in the analysis were obtained during a feasibility study to evaluate using scales and other tissues as collected by the NMFS observer program for genetic sampling. Unfortunately, during this feasibility study, the collected samples failed to cover the bycatch in groundfish fisheries in a comprehensive manner. For example, in 2005 most sampling was completed prior to the month (October) when most of the bycatch occurred (Figure 2).

For the purposes of assigning the bycatch to region of origin, the level of uncertainty is important to characterize. While there are many approaches to implement assignment uncertainty, the method chosen here assumes that the stratified stock composition estimates are unbiased and that the assignment uncertainty based on a classification algorithm (Seeb and Templin, In Prep; Table 6) adequately represents the uncertainty (i.e., the estimates and their standard errors are used to propagate this component of uncertainty). Inter-annual variability is also introduced in two ways: 1) by accounting for inter-annual variability in bycatch among strata; and 2) by using the point estimates (and errors) from the data (Table 6) over the different years (2005-2007) while weighting appropriately for the sampling intensity. The 2005 B-season results were given one third of the weight since sampling effort was low during October of that year (relative to the bycatch) while the 2006 B-season stock composition data was given two-thirds of the weight in simulating stock apportionments. For the A season, the 2007 data (collected from a limited number of tows) were given one fifth the weight while the 2006 was weighted 4 times that value.

The procedure for introducing variability in regional stock assignments of bycatch followed a Monte Carlo procedure with the point estimates and their variances used to simulate beta distributed random variables (which have the desirable property of being bounded by 0.0 and 1.0) and applied to the catch weightings (for the summer/fall (B) season) where areas are disaggregated. Areas were combined for the winter fishery since the period of bycatch by the fishery is shorter and from a more restricted area.

1.2.2 Estimating adult equivalence and impact rate

The impact of bycatch on salmon runs is the primary output statistic. This measure relates the historical bycatch levels relative to the subsequent returning salmon run k in year t as:

$$u_{t,k} = \frac{C_{t,k}}{C_{t,k} + S_{t,k}} \qquad (1)$$

where $C_{t,k}$ and $S_{t,k}$ are the bycatch and stock size (run return) estimates of the salmon species in question. The calculation of $C_{t,k}$ includes the bycatch of salmon returning to spawn in year t and the bycatch from previous years for the same brood year (i.e., at younger, immature ages). This latter component needs to be decremented by ocean survival rates and maturity schedules. This sum of catches (at earlier ages and years) can thus be represented as:

$$C_{t,k} = \sum_{a=1}^{A} c_{i,a,k}\, s_a \gamma_{a,k} \qquad i = t - A + a \qquad (2)$$

where $c_{i,a,k}$ is the catch of age a fish in year i, A is the oldest age of their ocean phase, $s_{i,a,k}$ is the proportion of salmon surviving from age a to $a+1$, and $\gamma_{a,k}$ is the proportion of salmon at sea that will return to spawn at age a. Maturation rates vary over time and among stocks detailed information on this is available from a wide variety of sources. For the purpose of this study, an average over putative stocks was developed based on a variety of studies (Table 7)

To carry out the computations in a straightforward manner, the numbers of salmon that remain in the ocean (i.e., they put off spawning for at least another year) are tracked through time until age 7 where for this model, all Chinook in the ocean at that age are considered mature and will spawn in that year.

Stochastic versions of the adult equivalence calculations acknowledge both run-size inter-annual variability and run size estimation error, as well as uncertainty in maturation rates, the natural mortality rates (oceanic), river-of-origin estimates, and age assignments. The variability in run size can be written as (with $\dot{S}_{t,k}$ representing the stochastic version of $S_{t,k}$):

$$\dot{S}_{t,k} = \bar{S}_k e^{\varepsilon_t + \delta_t} \quad \varepsilon_t \sim N\left(0,\sigma_1^2\right), \quad \delta_t \sim N\left(0,\sigma_2^2\right) \qquad (3)$$

where σ_1^2, σ_2^2 are specified levels of variability in inter-annual run sizes and run-size estimation variances, respectively.

The stochastic survival rates were simulated as:

$$\dot{s}_{a,k} = 1 - \exp(-M_a + \delta), \qquad \delta \sim N(0, 0.1^2) \qquad (4)$$

whereas the maturity in a given year and age was drawn from beta-distributions:

$$\dot{\gamma}_{a,k} \sim B(\alpha_a, \beta_a) \qquad (5)$$

with parameters α_a, β_a specified to satisfy the expected value of age at maturation (Table 7) and a pre-specified coefficient of variation term (provided as model input).

Similarly, the parameter responsible for assigning bycatch to river-system of origin was modeled using a combination of years and "parametric bootstrap" approach, also with the beta distribution:

$$\dot{p}_k \sim B(a_k, b_k) \qquad (6)$$

again with α_a, β_a specified to satisfy the expected value the estimates and variances shown in Table 6. For the purposes of this study, the estimation uncertainty is considered as part of the inter-annual variability in this parameter. The steps (implemented in a spreadsheet) for the AEQ analysis can be outlined as follows:

1. Select a bootstrap sample of salmon bycatch-at-age ($\phi_{t,a}$) for all years and strata;
2. Sum the bycatch-at-age for each year and proceed to account for year-of-return factors (e.g., stochastic maturation rates and ocean survival (Eqs. 2-5);
3. Partition the bycatch estimates to stock proportions (by year and area) drawn randomly from each parametric bootstrap;
4. Sum over all bycatch years and compare with run-size estimates for impact rate calculations;
5. Repeat 1-3 200 times;
6. Based on updated genetics results, assign to river of origin components ($\dot{p}_k$, Eq. 6).
7. Compile results over all years and compute frequencies from which relative probabilities can be estimated;

Sensitivity analyses on maturation rates by brood year were conducted and contrasted with alternative assumptions about natural mortality schedules during their oceanic phase as follows:

Model	3	4	5	6	7
1 - None	0.0	0.0	0.0	0.0	0.0
2 - Variable	0.3	0.2	0.1	0.05	0.0
3 - Constant	0.2	0.2	0.2	0.2	0.0

Evaluations of alternative Chinook salmon caps were done based on re-casting historical catch levels as if a cap proposal had been implemented. Since the alternatives all have specific values by season and sector, the effective limit on Chinook bycatch levels can vary for each alternative and over different years. This is caused by the distribution of the fleet relative to the resource and the variability of bycatch rates by season and years. To capture the effect of an alternative policy, the 2003-2007 mean "effective" cap for each alternative was computed and used as the seasonal limit for evaluation purposes (Table 8). These values were then used in the AEQ simulation model as season-specific caps. This means that the minimum of the historical season-specific bycatch and the effective cap level given in Table 8 was applied for estimating the AEQ for each policy.

1.3 Results

1.3.1 Chinook salmon catch-at-age

The uncertainty in the distribution of seasonal length frequencies have improved over time (Figure 3). Applying these length frequencies (and associated uncertainty based on bootstrap sampling) results in annual totals of Chinook salmon bycatch by age as shown in Table 9. When broken out by season there is some correlation between B season levels at one age and subsequent A season levels of the next age group (Table 10). Estimates of uncertainty due to age-specific bycatch sampling (for age and length) varied by season but showed some improvement (smaller values of coefficients of variation) for the main bycatch age groups in recent years (Table 11; Figure 4). For the evaluations of uncertainty in age assignments and impact analysis, the bootstrap samples of age composition were used and has the added advantage that the covariance structure is retained (e.g., Figure 5).

1.3.2 Chinook salmon bycatch stock composition

Application of GSI to estimate the composition of the bycatch by reporting region suggests that, if the goal is to provide estimates on the stock composition of the bycatch, there need is to adjust for the magnitude of bycatch occurring within substrata (e.g., east and west of 170°W during the B season, top panels of Figure 6). Applying the stock composition results presented in Table 6 over different years and weighted by catch gives stratified proportions that have similar characteristics to the raw genetics data (Table 12). Importantly, these stratified stock composition estimates can be applied to bycatch levels in other years which will result in overall annual differences in bycatch proportions by salmon stock region. This approach assumes that the salmon from early years were of similar stock composition, until planned investigations analyzing historical scale samples are complete, the degree of temporal variation in stock composition within season and spatial strata are unknown. These simulations can be characterized graphically in a way that shows the covariance structure among regional stock composition estimates (e.g., Figure 7).

Given the bycatch by strata estimates, it is possible to use the genetic composition data to estimate the historical expected stock proportions. **However, this assumes the genetics data collected from 2005-2007 adequately represents the historical pattern. Clearly, it is preferable to have genetics samples for the historical period analyzed rather than assuming the stratum-specific stock composition estimates from the recent period reflect the past.** That caveat stated, it is still interesting to note how historical annual bycatch composition varies depending on the locales of where Chinook are taken as bycatch (Figure 8) with median values presented in Table 13. To gain an appreciation of the impact, the Pacific Northwest group (PNW, also noted in some figures as BC+WA+OR) and the Upper Yukon River annual proportions in the bycatch are strongly affected by the locales and seasons of where the bycatch occurred (Figure 9). Myers et al. (2003) found similar area-specific patterns in their bycatch.

1.3.3 AEQ estimation

Using the weighted mean maturation schedule and the variable age-specific ocean mortality, the adult equivalents due to salmon mortality induced by the pollock fishery averaged about two thirds of the nominal (reported) annual bycatch in recent years (Figure 10). The AEQ model was shown to be sensitive to natural mortality assumptions but had little qualitative difference in the trend over time

(Figure 11). For the stochastic version, under Model 2 assumptions (decreasing mean age-specific natural mortality with age) results show a fair amount of uncertainty in the estimates of AEQ mortality (Figure 12).

Applying the stochastic (via the parametric bootstrap) time series of genetic stock components (**see caveat above about extending stock composition estimates over an earlier period**) to available run-size estimates allows computation of an *impact* or exploitation rate due to the pollock fishery bycatch. For the Upper Yukon River, this impact rate was well below 0.7% (Figure 13). For the "Coastal west Alaska" group, the impact rate estimates were considerably higher and have increased in recent years (Figure 14). Overall, from this analysis it appears that there is about a 10% chance that the coastal west Alaska group has experienced an exploitation rate greater than 3.5%. However, the apparent increasing trend (consistent with increases in overall bycatch levels) warrants further monitoring.

For groups of Chinook stocks where run size information is incomplete it is possible to simply present the estimates of total adult equivalent mortality due to bycatch. For example, the estimates of Chinook mortalities that originated from stocks south of Alaska (Canada and the lower 48 states) range from around 3,000 fish during 2000, to as high as 13,000 fish in recent years (Figure 15).

1.3.4 Application to alternative cap scenarios

In Chapter 5 above, application to the subset of 36 bycatch alternatives for evaluation were presented. For each cap alternative and option, the hypothetical Chinook AEQ mortality totals under each cap and management option for 2003-2007 shows a fair amount of variability over different options and years (Table 14). For the western Alaska stocks, Myers' et al. (2003) scale pattern results were used to further break down these to river of origin (also presented in Chapter 5). Additionally, based on tables presented in Chapters 2 and 4, the savings in Chinook bycatch can be plotted relative to forgone pollock to show the trade-offs among alternatives (Figure 16).

1.4 Discussion

Myers' et al. (2003) recommended that NMFS estimate the variance of bycatch-at-age. Miller (2006) developed estimators on total salmon bycatch by the EBS trawl fleet and found that the CVs (coefficients of variation) of the estimates under the current sampling regime were on the order of 5% (assuming that hauls from unobserved vessels had the same bycatch pattern as that of observed vessels). This study provides an additional component of sampling variability attributed to length and age collections.

The samples from which Myers' et al. (2003) estimated ages were out of proportion relative to the bycatch. For example, in 1997 some 51% of the scale samples were from the A season whereas this represented only about 23% of the overall bycatch for that year (Table 15). Myers et al. corrected for the bycatch levels and achieved proportions at age similar to what was found in this study. However, during this period (1997-1999) the observers sampled over 41,500 Chinook salmon for lengths (compared to the estimated total Chinook bycatch over this period of 107,500 salmon). In this study, these length frequencies are combined with the age data to have a more complete sampling frame. An added benefit of including the length frequency samples is that scale sampling is impacted by the size of the fish. Fish that lose scales more easily are more often rejected for sample quality and scale loss tends to be higher for smaller fish. Having a complete length frequency set (where such sample rejection is unlikely to occur) should enhance the reliability of the age composition estimates. Having age structures read over more years would improve the estimates shown here and would help if further multi-stock models are constructed.

The time series of bycatch age composition estimates have only been briefly evaluated. Application extensions to these data can be explored with in-river brood year variability (e.g., Figure 17).

The stock composition estimates based on the genetics are qualitatively very similar to the scale-pattern study presented by Myers et al. (2003). The age composition, genetics, and modeling approach presented here should help to provide some foundation for evaluating the EIS that is being developed by NMFS and the Council and provide guidance for decisions on appropriate measures to reduce bycatch impacts. For example, it is possible to examine how a cap would have changed the impact rates historically. This can serve to illustrate the expected result of future cap regulation alternatives.

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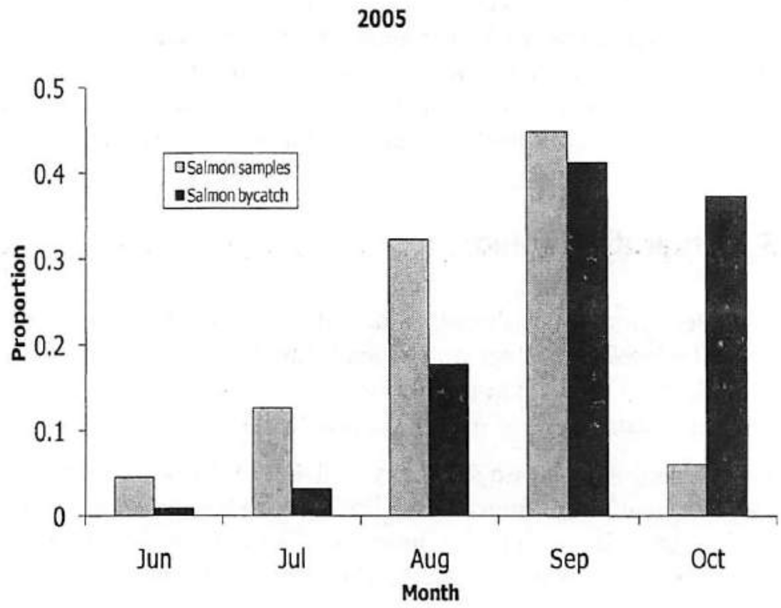
FIGURES



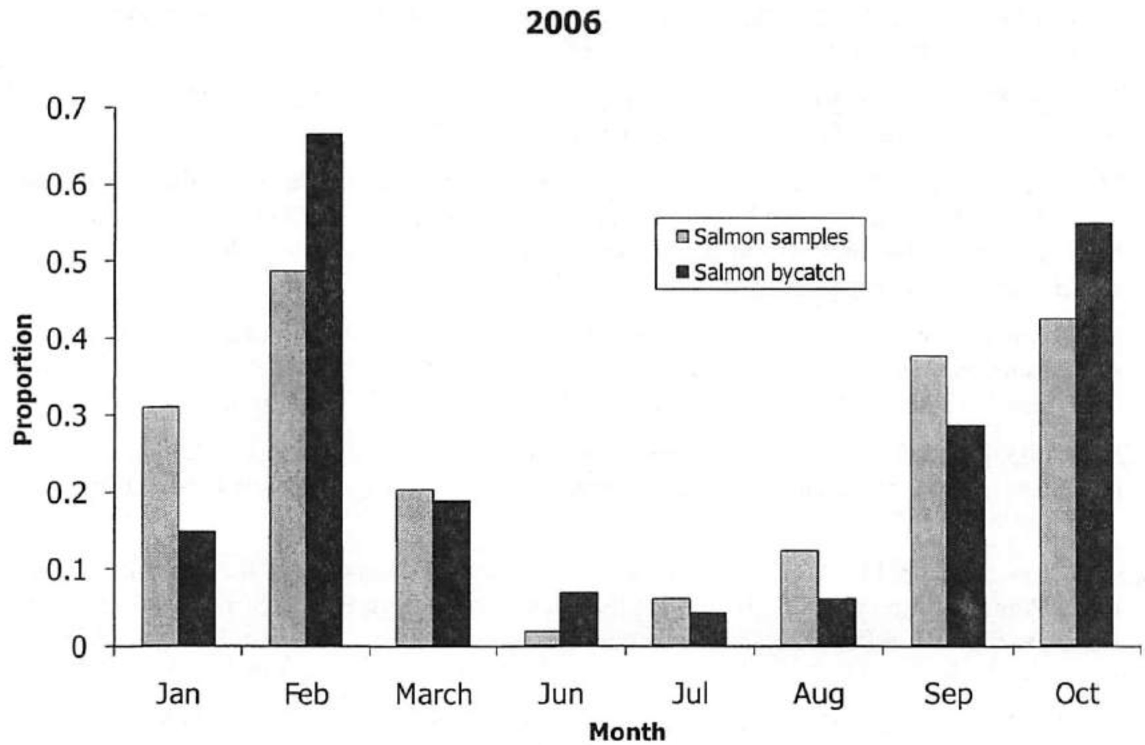


Figure 1. Proportion of Chinook salmon samples collected for genetics compared to the proportion of bycatch by month for 2005 B-season only (top panel) and 2006 A and B season combined (bottom panel).

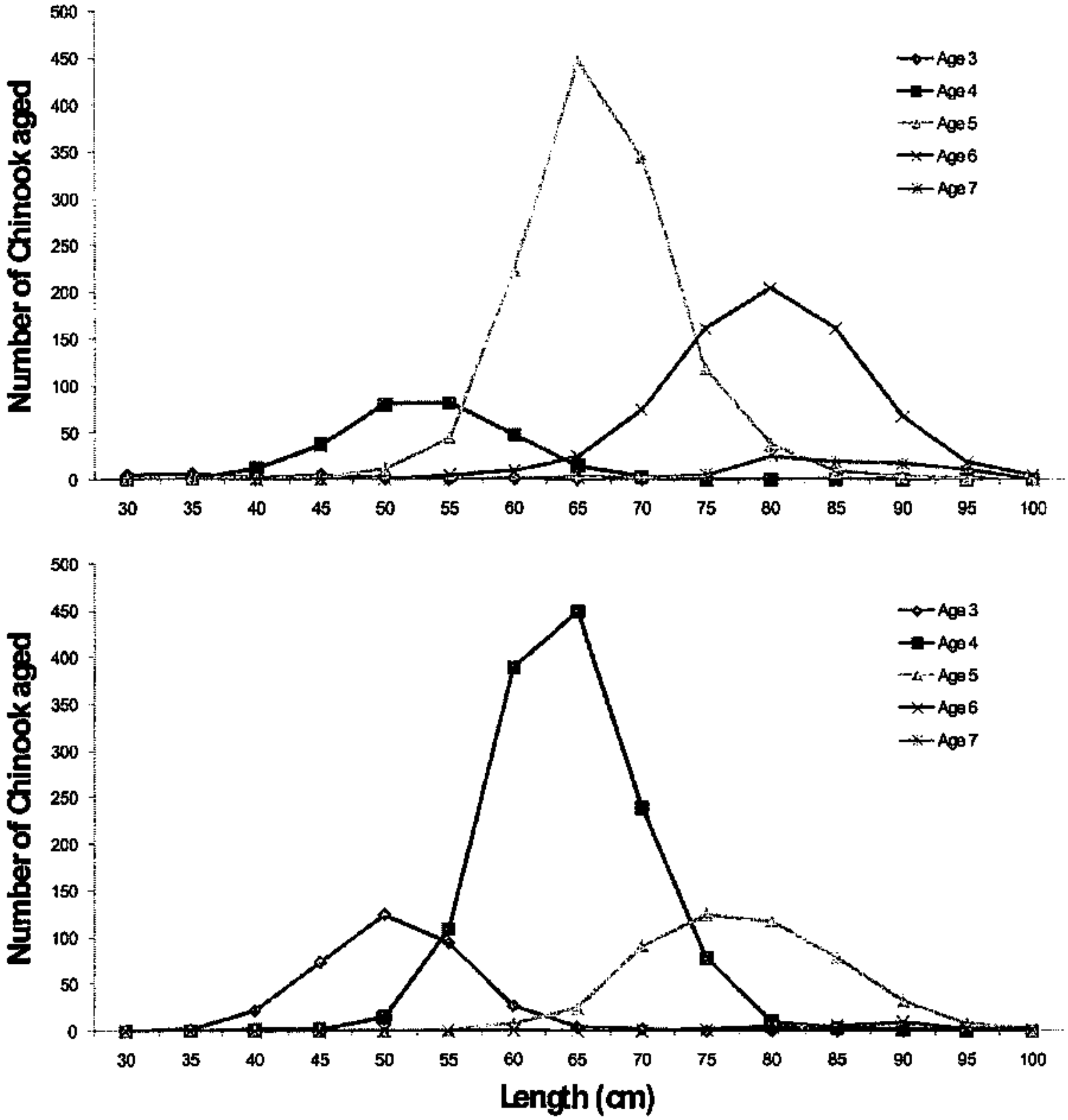


Figure 2. Summary distribution of age samples by length collected by the NMFS groundfish observer program during 1997-1999 and analyzed by University of Washington scientists (Myers et al. (2003) for the A-season (top panel) and B season (bottom panel).

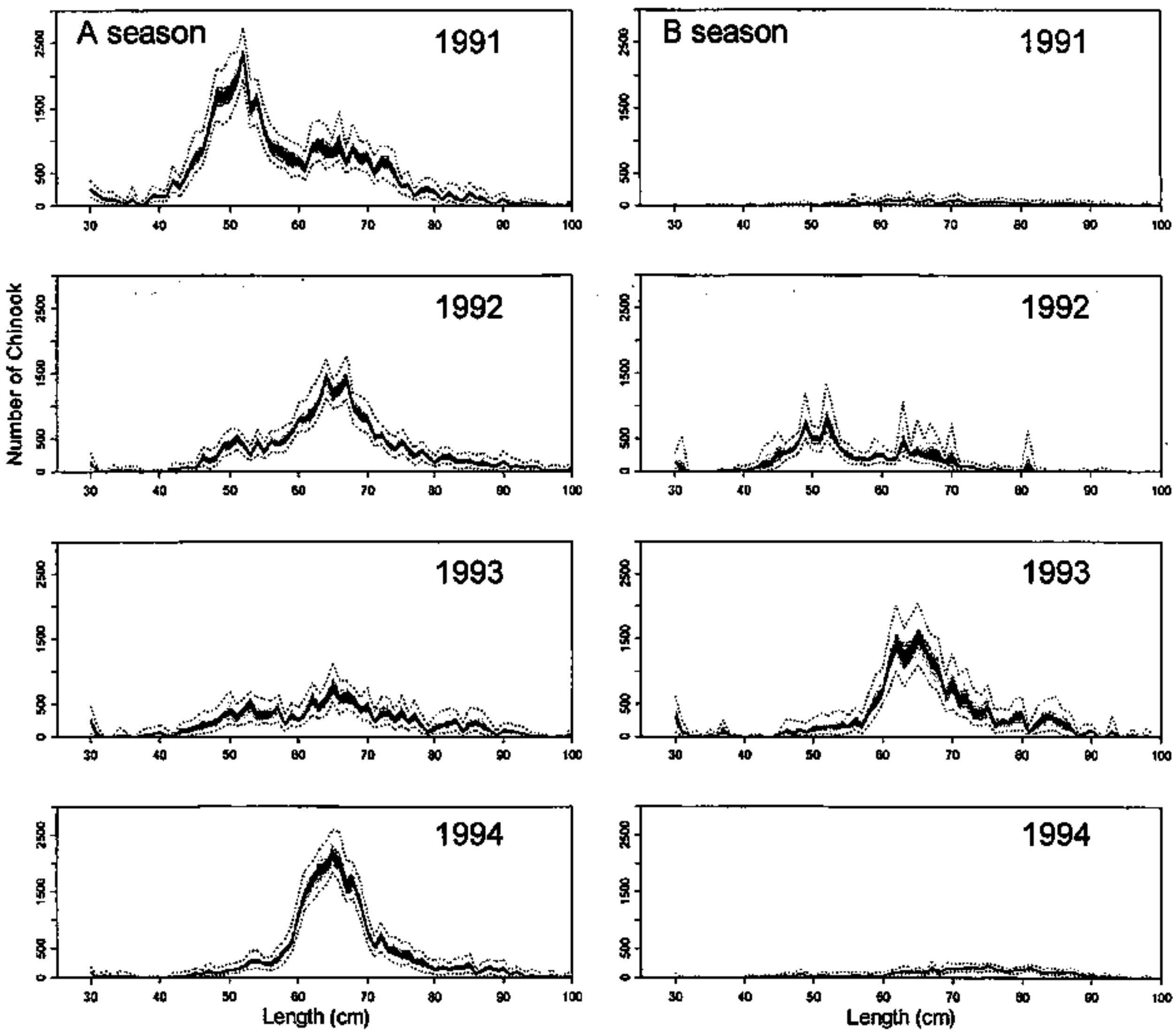


Figure 3. Length frequency by season and year of Chinook salmon occurring as bycatch in the pollock fishery. Error distributions based on two-stage bootstrap re-sampling procedure.

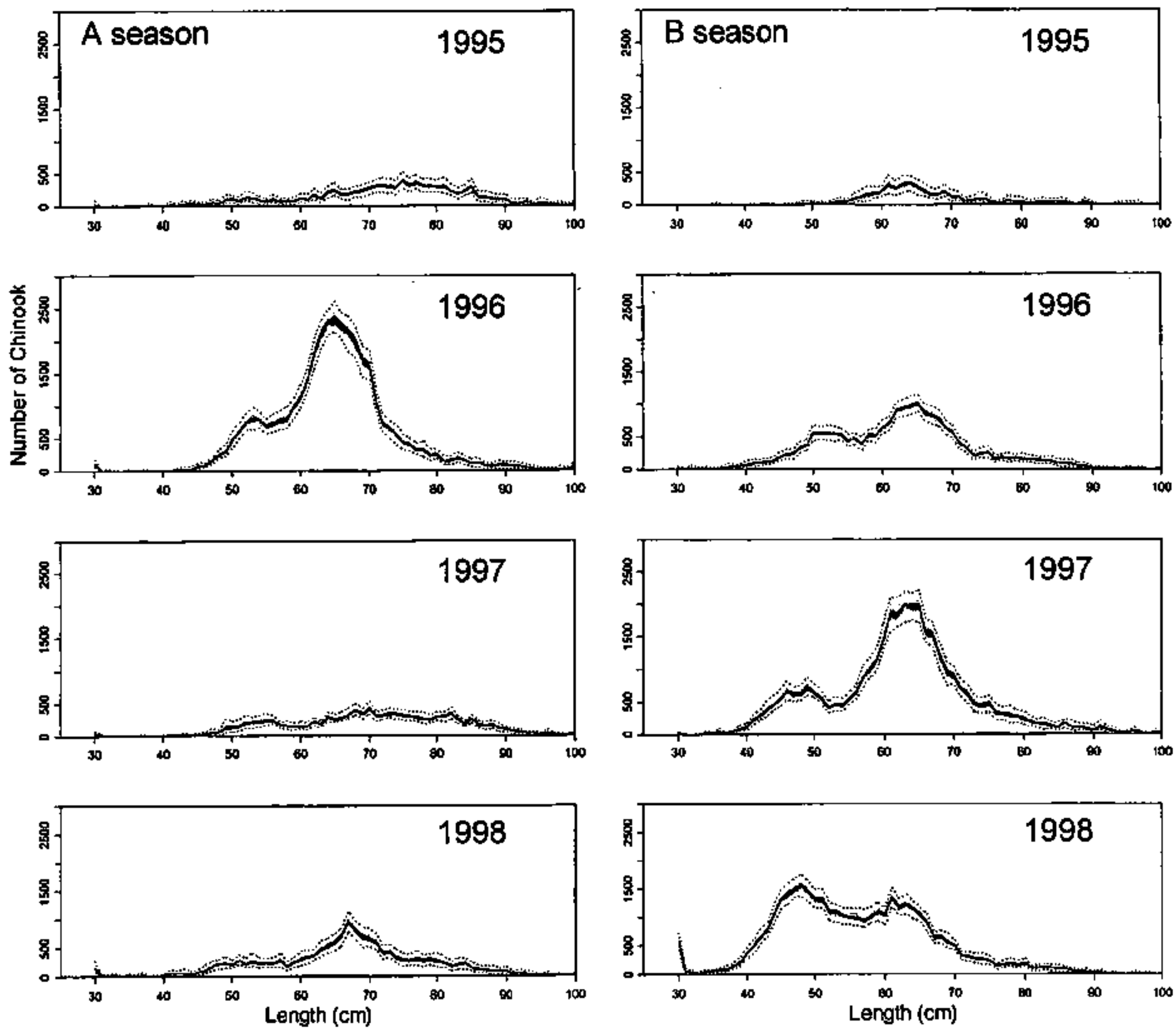


Figure 3. (continued) Length frequency by season and year of Chinook salmon occurring as bycatch in the pollock fishery. Error distributions based on two-stage bootstrap re-sampling procedure.

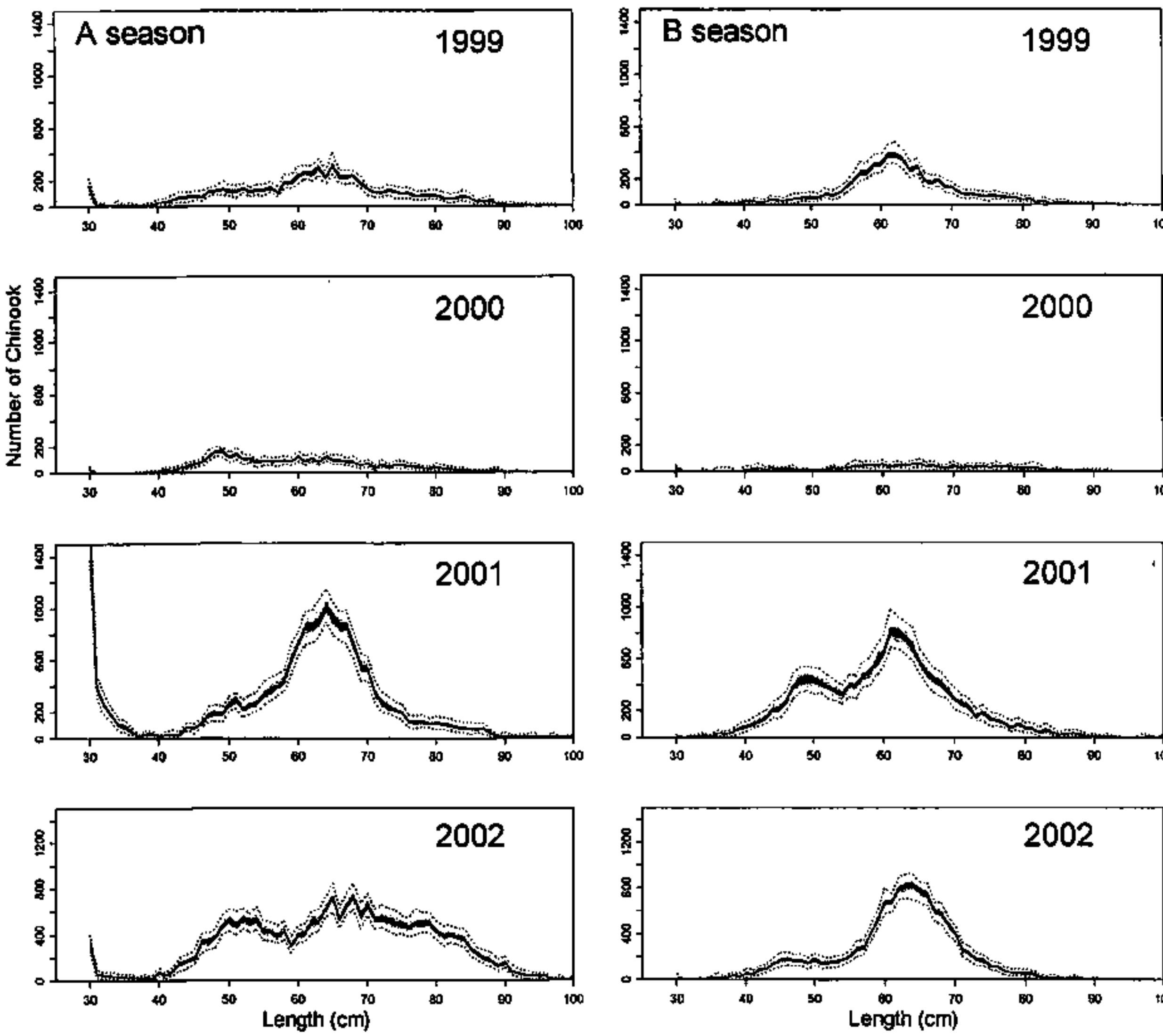


Figure 3. (continued) Length frequency by season and year of Chinook salmon occurring as bycatch in the pollock fishery. Error distributions based on two-stage bootstrap re-sampling procedure.

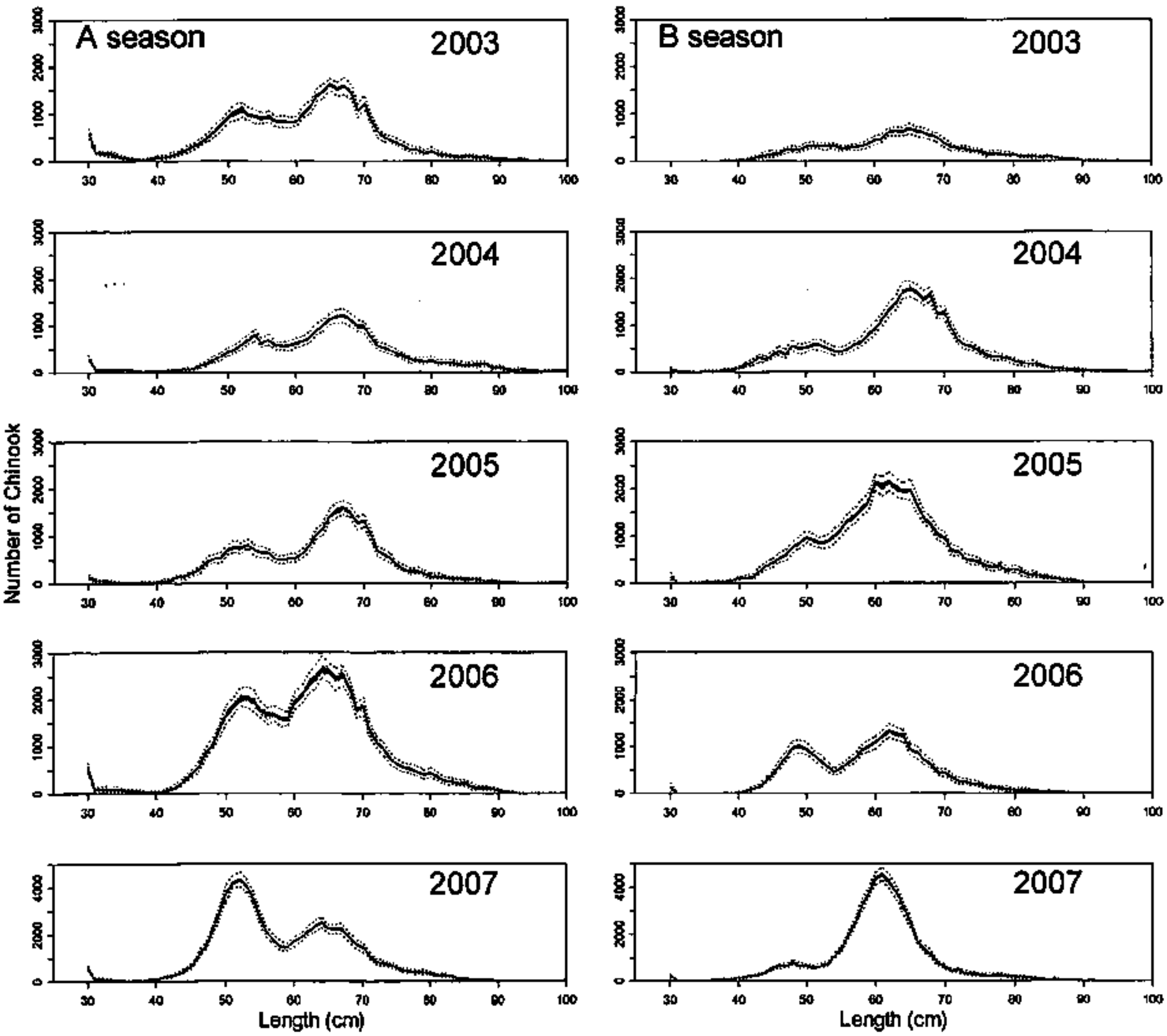


Figure 3. (continued) Length frequency by season and year of Chinook salmon occurring as bycatch in the pollock fishery. Error distributions based on two-stage bootstrap re-sampling procedure.

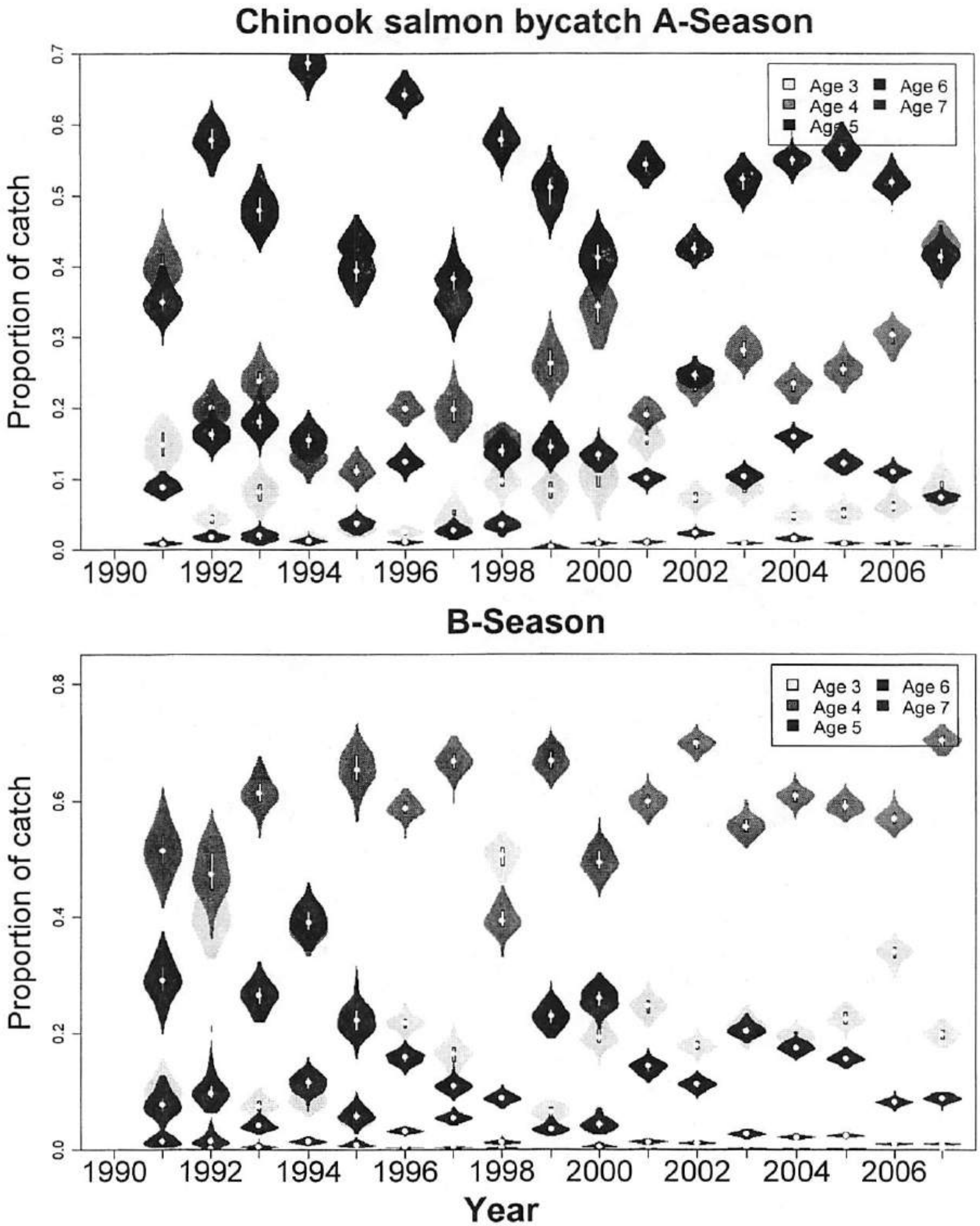


Figure 4. Chinook salmon bycatch age composition by year and A-season (top) and B-season (bottom). Vertical spread of blobs represent uncertainty as estimated from the two-stage bootstrap re-sampling procedure.

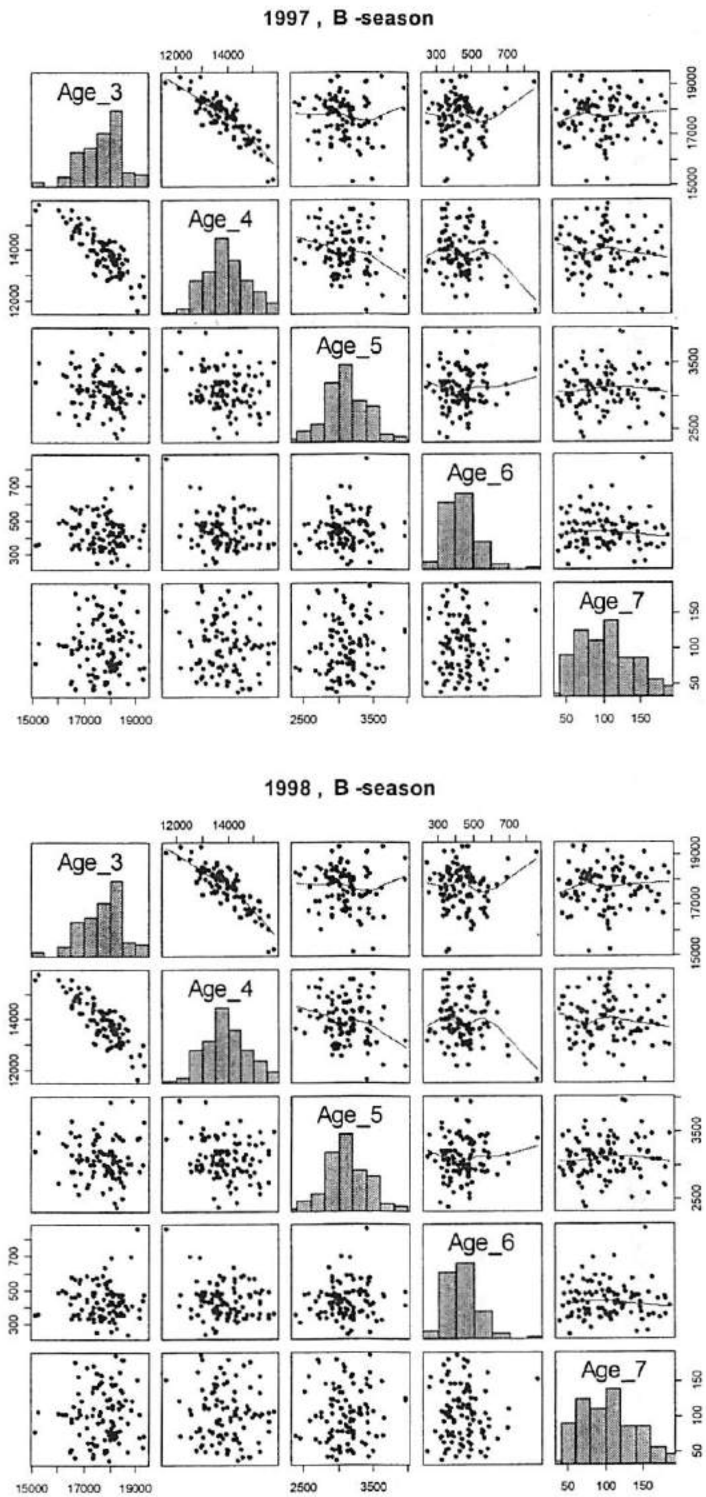


Figure 5. Bootstrap estimates of Chinook salmon bycatch example showing correlation of bycatch at different ages for the B-season in 1997 (top) and 1998 (bottom).

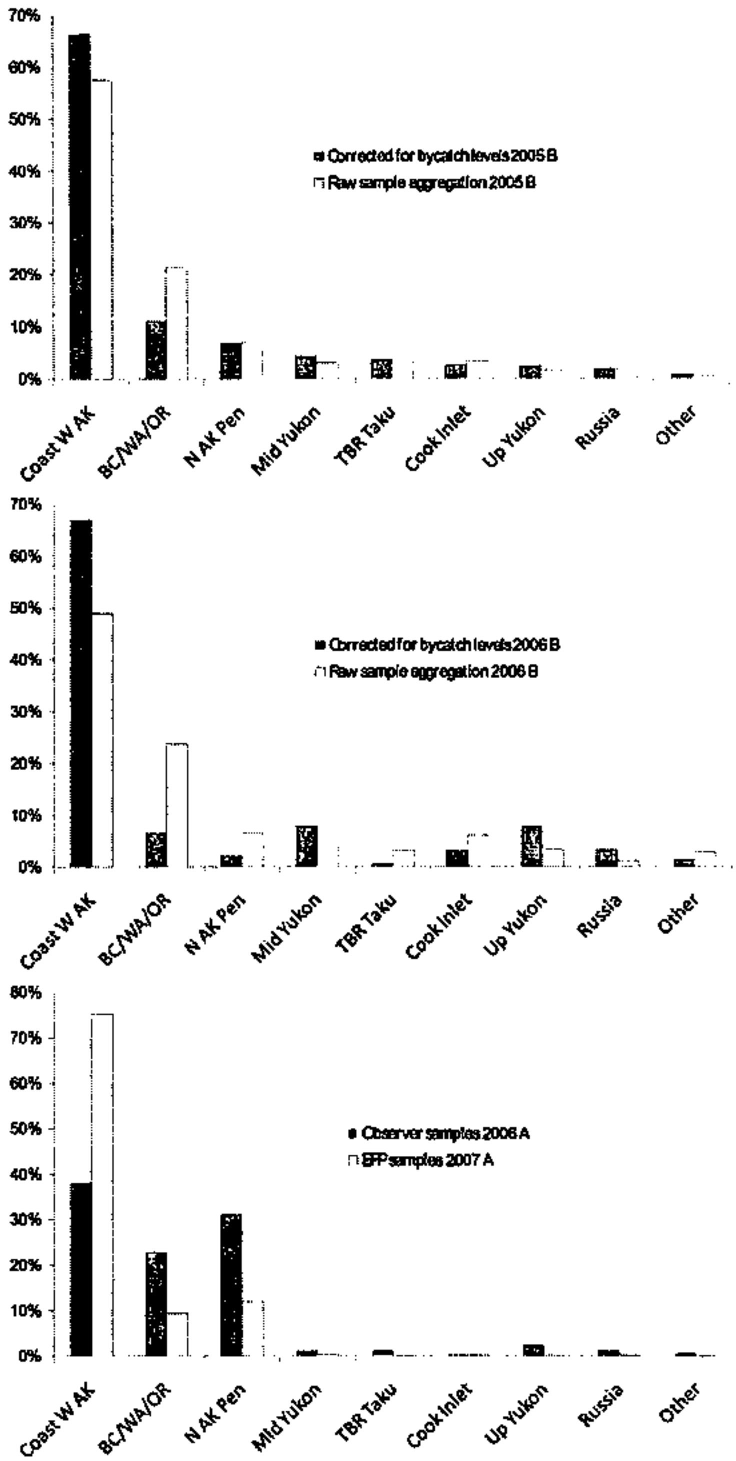


Figure 6. Chinook salmon bycatch results by reporting region for 2005 B season (top), 2006 B season (middle), and the 2006 and (partial sample) of 2007 A seasons (bottom). The top two panels include uncorrected results where bycatch differences between regions (east and west of 170°W) are ignored (empty columns).

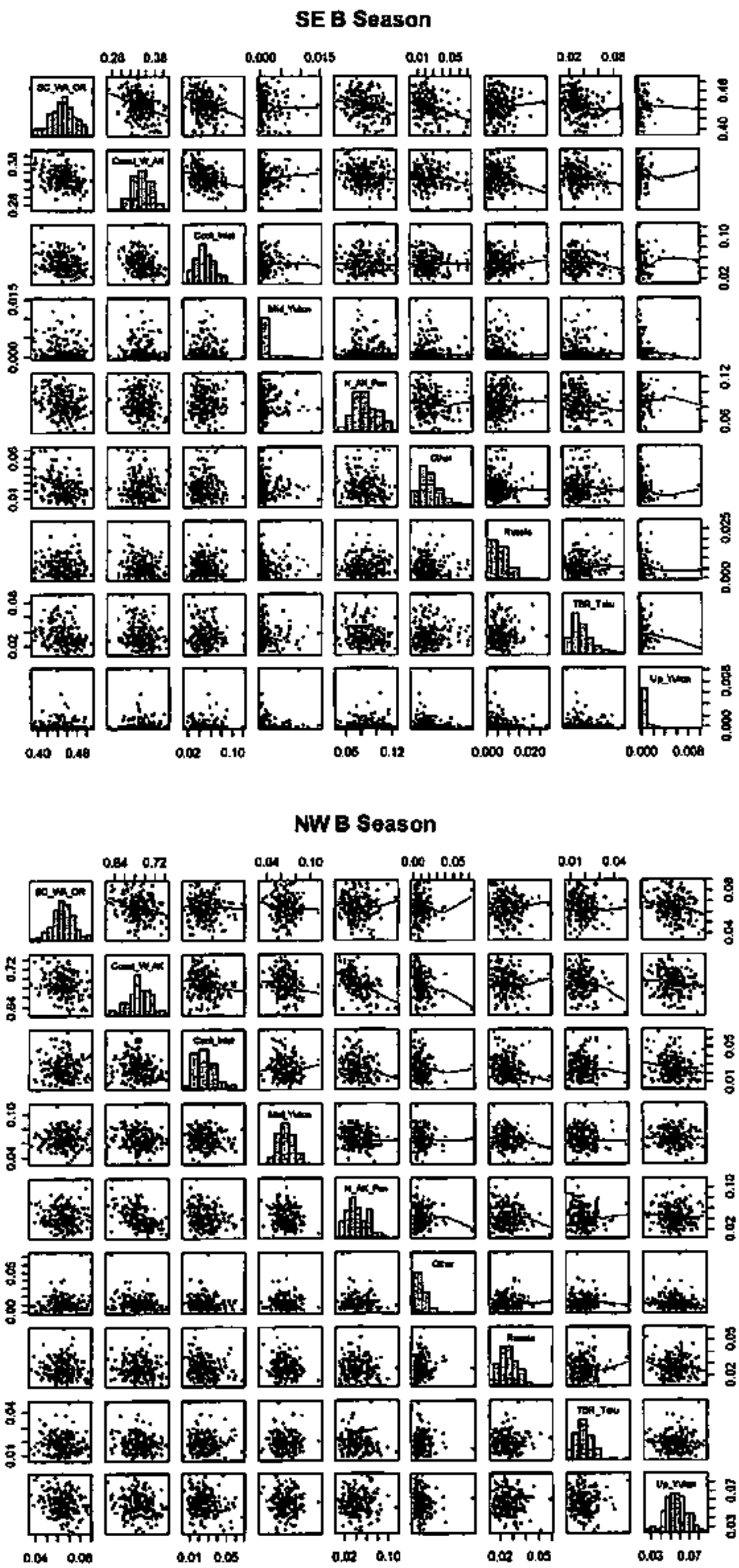


Figure 7. Simulated Chinook salmon stock proportion by region for the B season based on reported standard error values from ADFG analyses and assuming that the 2006 data has better coverage and is hence weighted 2:1 compared to the 2005 B-season data.

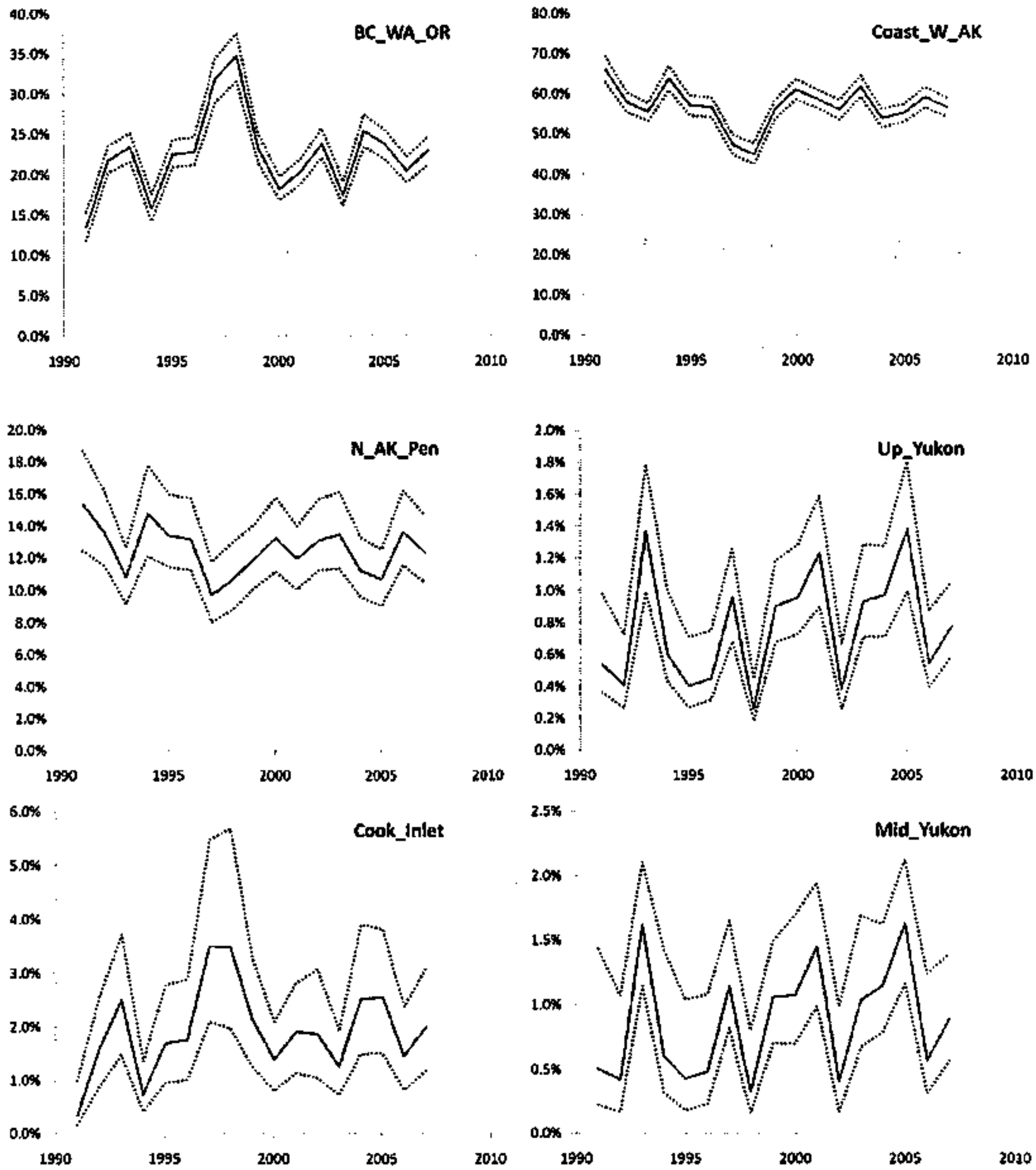


Figure 8. Chinook salmon bycatch results by genetics reporting regions for 2005 B season (top), 2006 B season (middle) and 2006 and (partial sample) of 207 season (bottom). The top two panels include uncorrected results where bycatch differences between regions (east and west of 170°W) are ignored (empty columns).

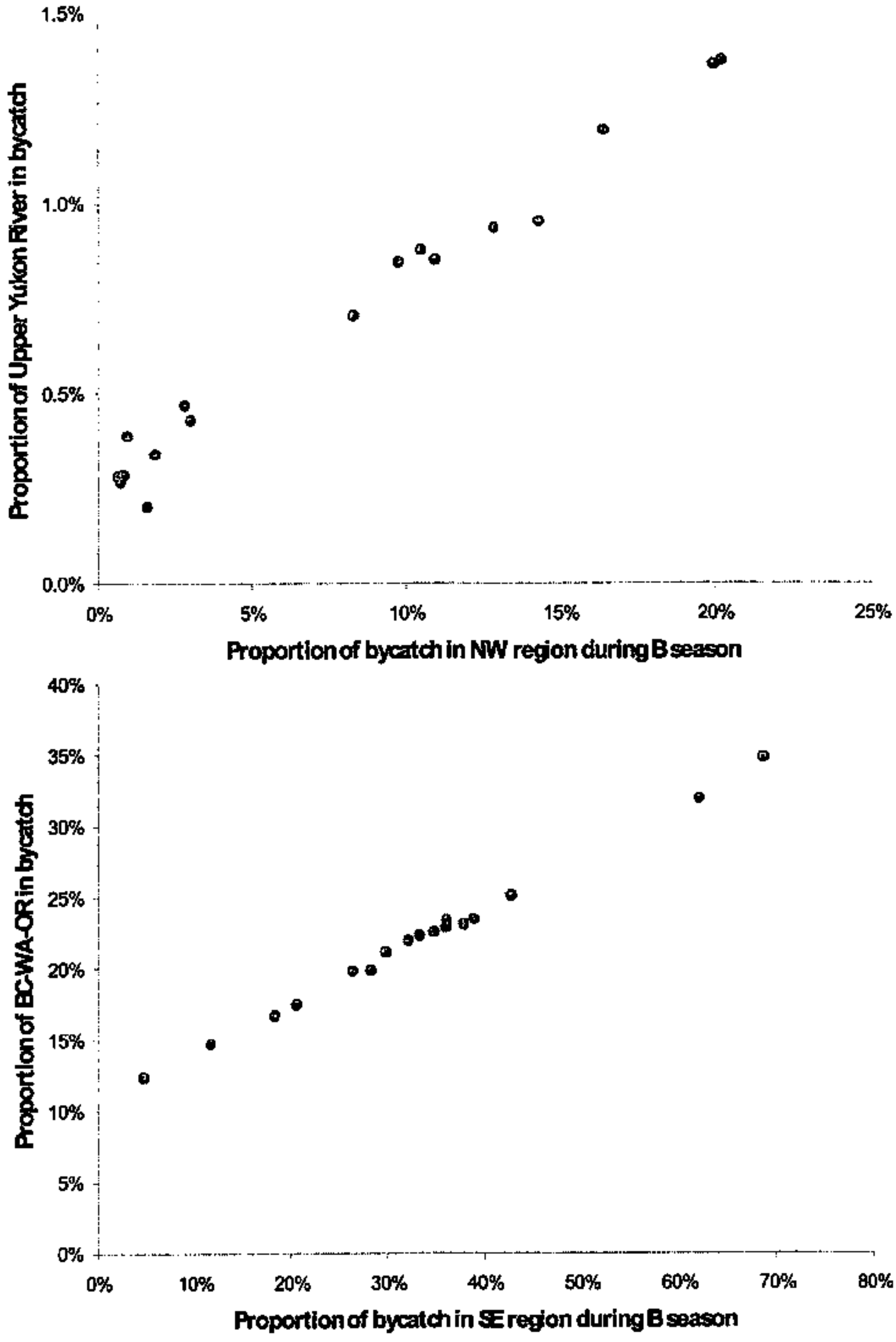


Figure 9. Figure showing how the overall proportion of Upper Yukon River relates to the bycatch proportion that occurs in the NW region (west of 170°W; top panel) and how the proportion of the BC-WA-OR (PNW) relates to the SE region (east of 170°W; bottom panel) during the summer-fall pollock fishery, 1991-2007.

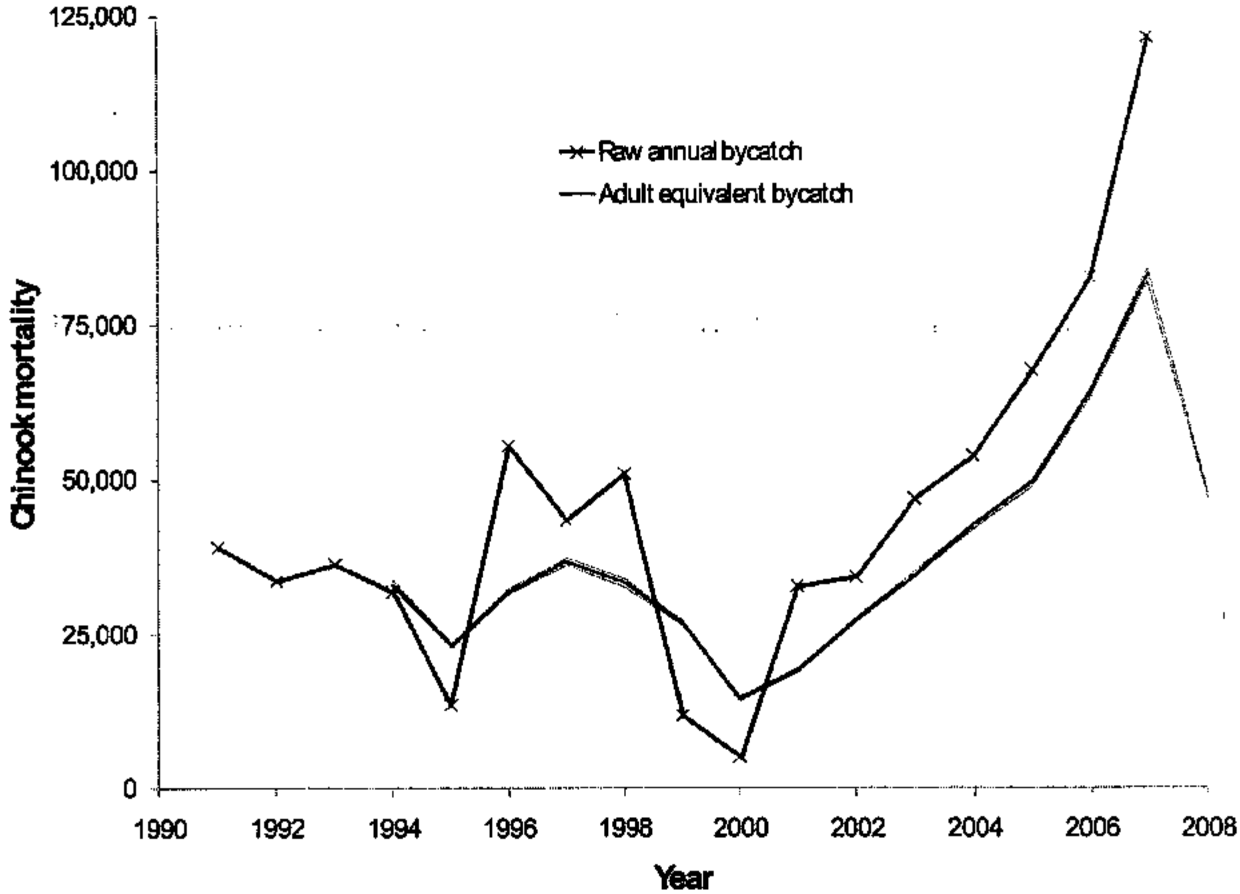


Figure 10. Time series of median Chinook adult equivalent bycatch from the pollock fishery, 1991-2007 compared to the annual totals. Dashed lines show the uncertainty due to the bootstrap age compositions of Chinook bycatch.

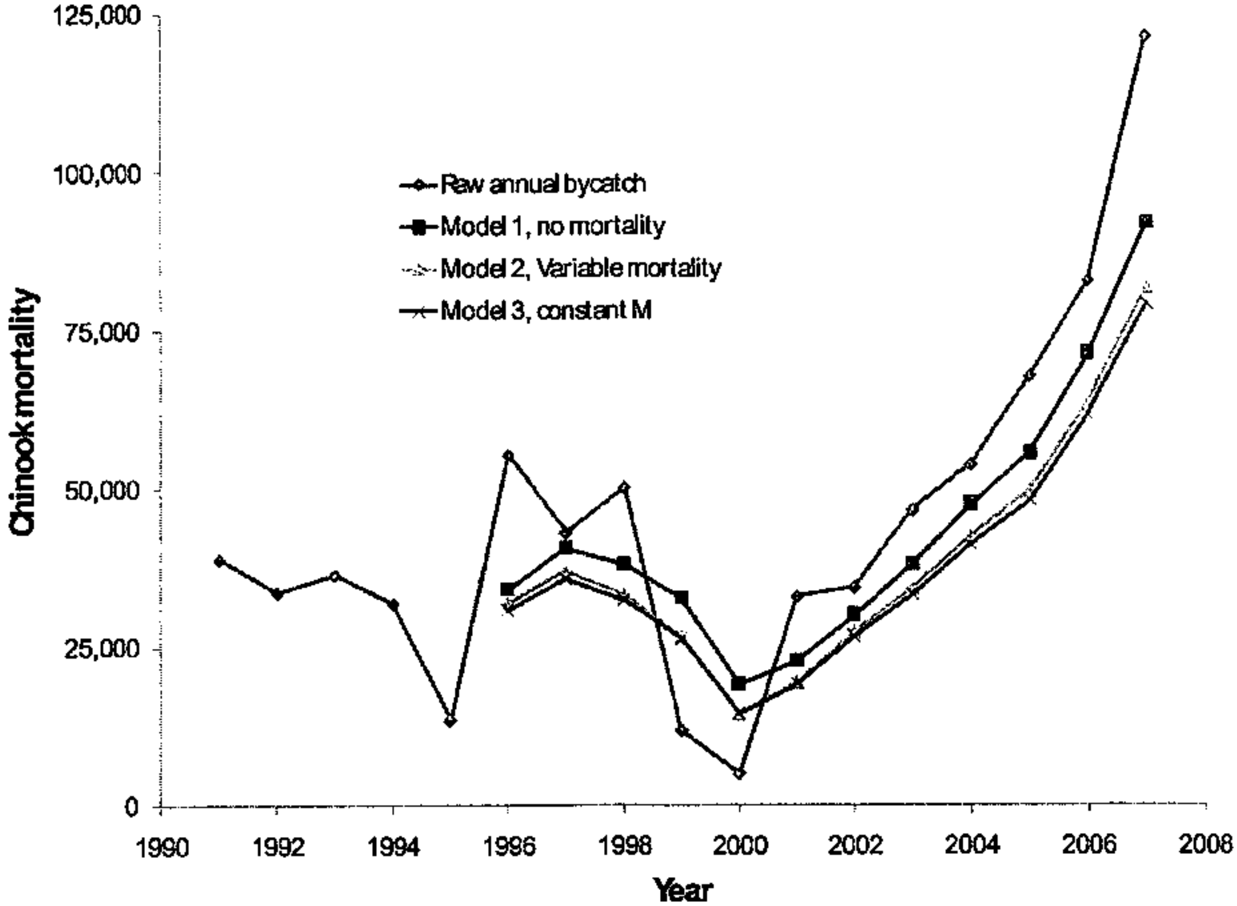


Figure 11. Time series of Chinook adult equivalent bycatch from the pollock fishery, 1991-2007 compared to the annual totals under different assumptions about ocean mortality rates.

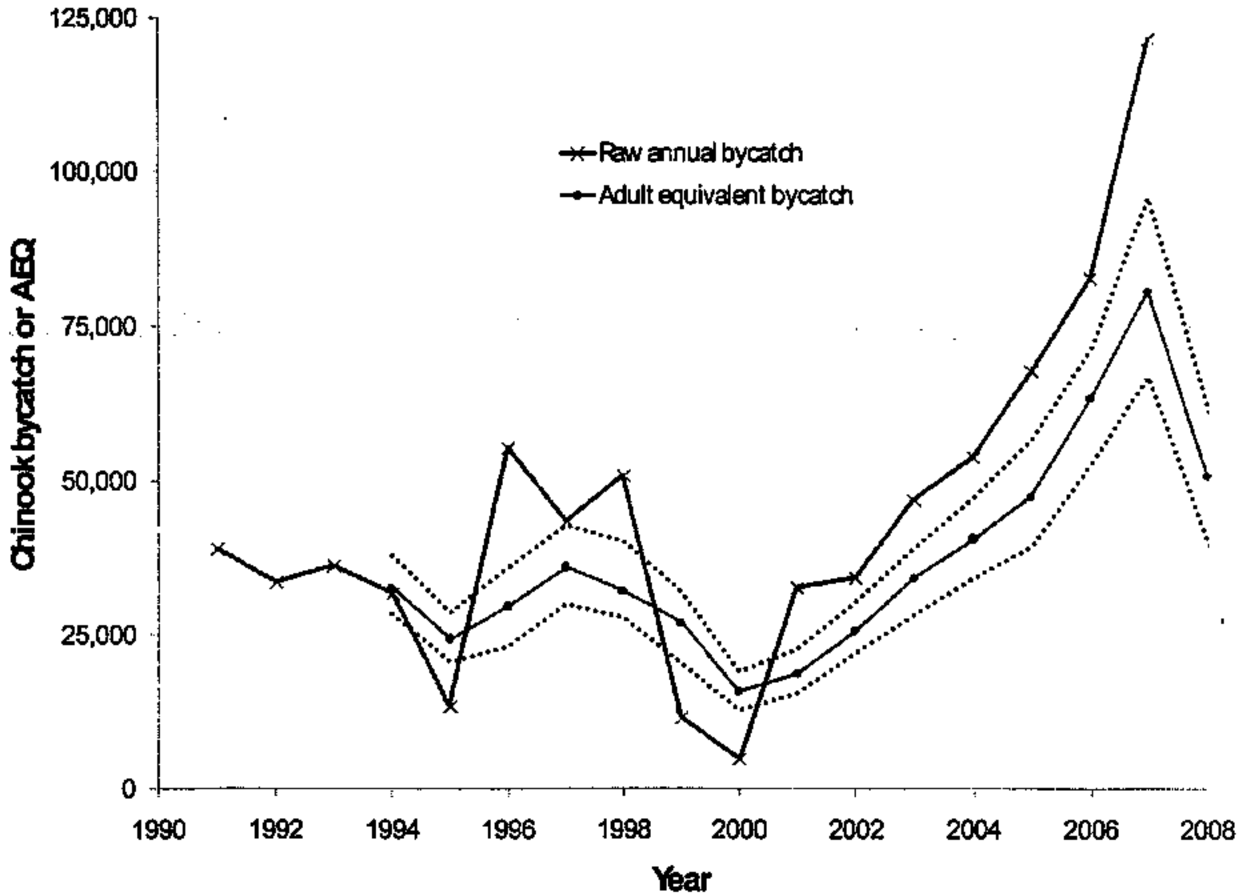
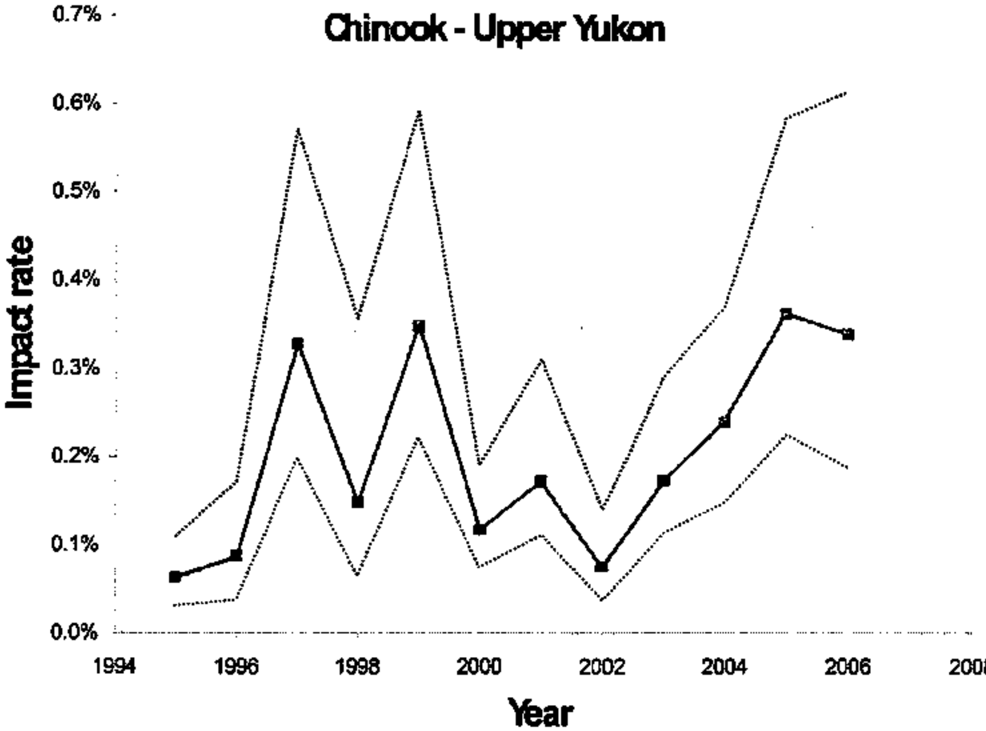


Figure 12. Time series of Chinook adult equivalent bycatch from the pollock fishery, 1991-2007 compared to the annual totals with stochasticity in the bycatch age composition (via bootstrap samples), maturation rate (CV=0.1), natural mortality (Model 2, CV=0.1).



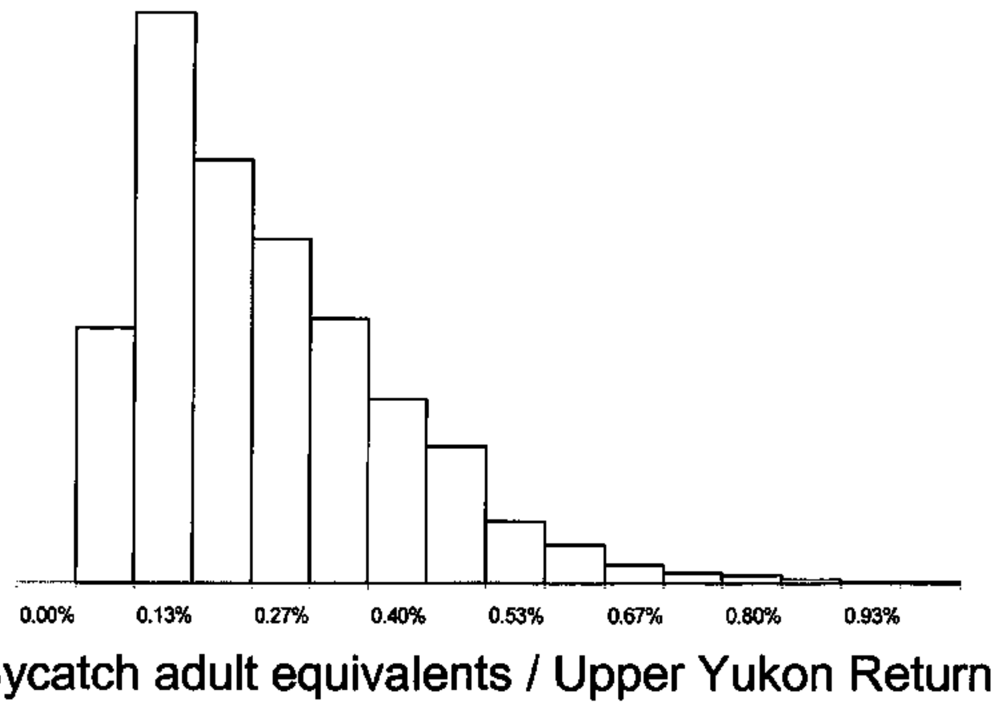
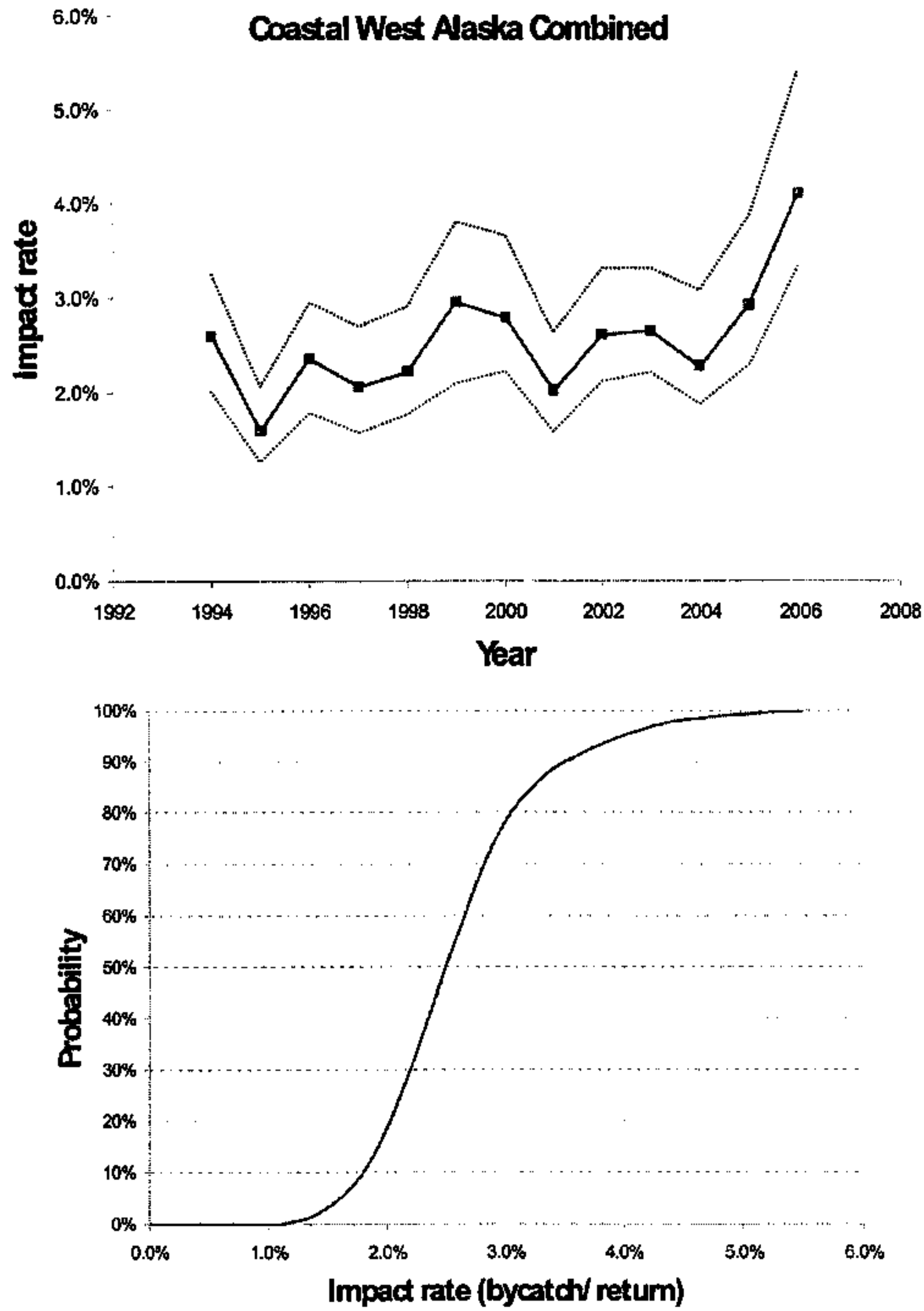


Figure 13. Annual estimates of pollock fishery impacts on Upper Yukon returns, 1995-2006 (top panel) with stochasticity in natural mortality (Model 2, CV=0.1), maturation rate (CV=0.1), stock composition (as detailed above), and run size. The lower panel shows relative frequency of different impact levels given the simulations and bycatch history.



Bycatch adult equivalents / Coast W AK Return

Figure 14. Annual estimates of pollock fishery impacts on Coastal west Alaska returns, 1994-2006 (top panel) with stochasticity in natural mortality (Model 2, CV=0.1), bycatch age composition (via bootstrap samples), maturation rate (CV=0.1), stock composition (as detailed above), and run size. The lower panel shows cumulative frequency of different impact levels given the simulations and bycatch history.

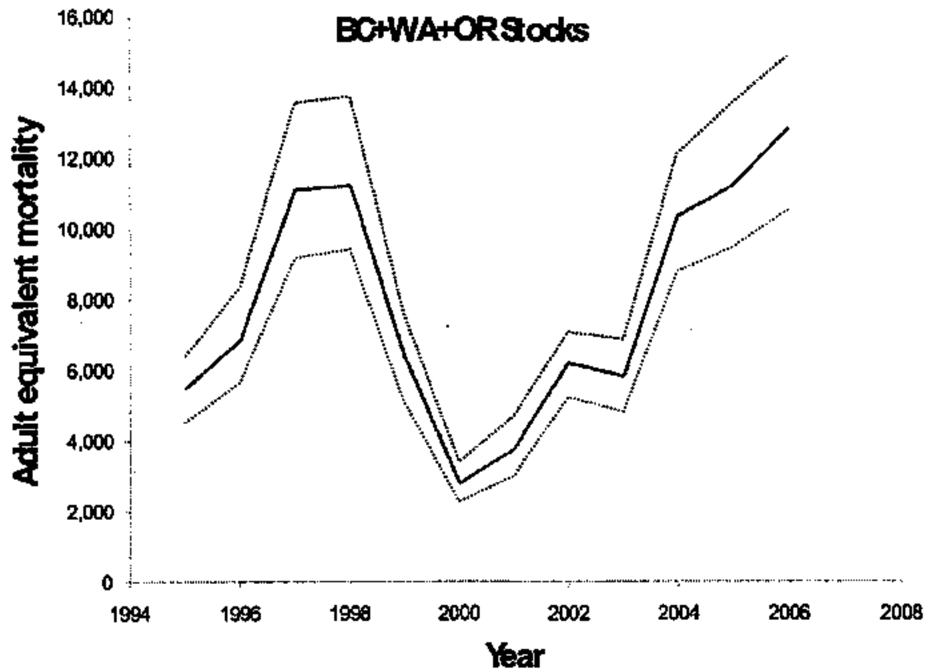


Figure 15. Annual estimated pollock fishery adult equivalent removals on stocks from the BC, WA, and Oregon returns, 1995-2007 with stochasticity in natural mortality (Model 2, CV=0.1), bycatch age composition (via bootstrap samples), maturation rate (CV=0.1), and stock composition (as detailed above).

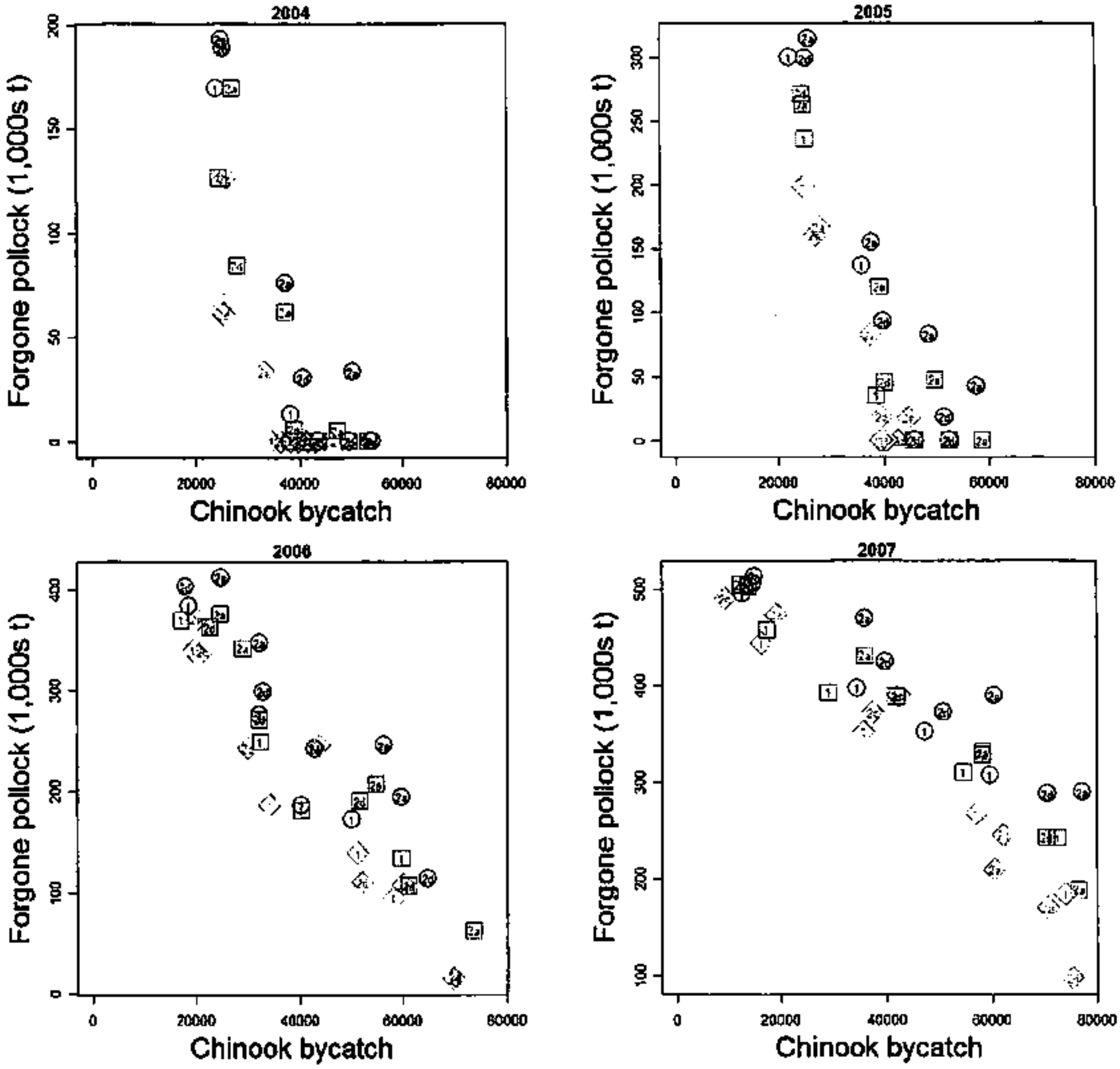


Figure 16. Examples of trade-offs in hypothetical Chinook AEQ bycatch (horizontal axis) and forgone pollock (vertical axis) had the suite of 36 management options been in place for 2004 (upper left) through 2007 (lower right). The text plotted denote the sector split options and the symbols (and colors) represent A-B season splits: circle=50:50, square=58:42, diamond=70:30.

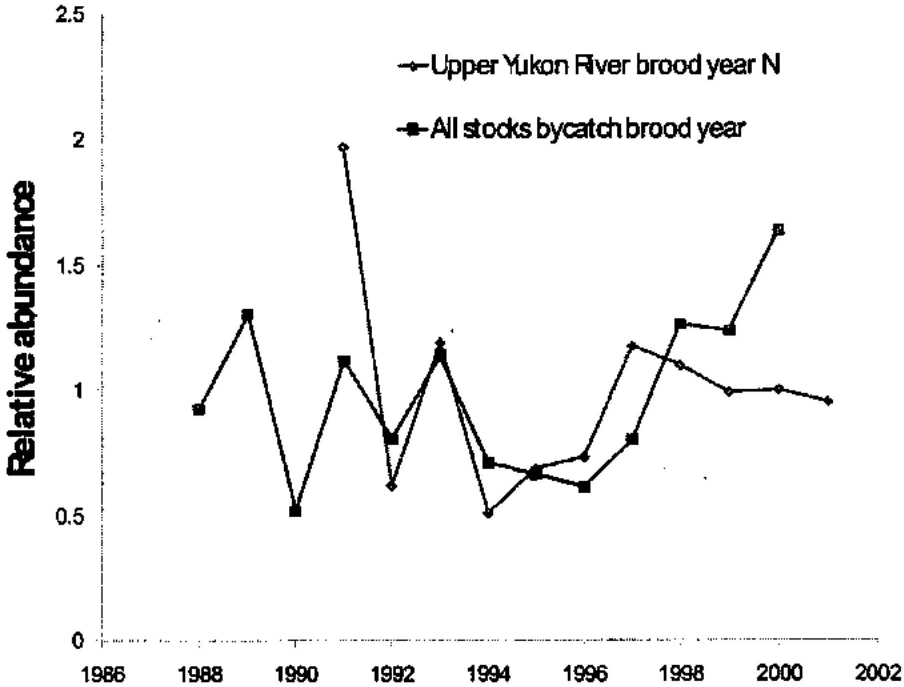


Figure 17. Chinook bycatch brood-year relative strength compared to the brood year variability observed in the Upper Yukon.

TABLES

Table 1. Summary of Chinook salmon bycatch age data from Myers et al (2003) used to construct age-length keys for this analysis.

Year	A	B	Total
1997	842	756	1,598
1998	873	826	1,699
1999	645	566	1,211
Total	2,360	2,148	4,508

Table 2. The number of Chinook salmon measured for lengths in the pollock fishery by season (A and B), area (NW=east of 170°W; SE=west of 170°W), and sector (S=shorebased catcher vessels, M=mothership operations, CP=catcher-processors). *Source: NMFS Alaska Fisheries Science Center observer data.*

Season	**A**	**A**	**A**	**B**	**B**	**B**	**B**	**B**	**B**	
Area	**All**	**All**	**All**	**NW**	**NW**	**NW**	**SE**	**SE**	**SE**	
Sector	**S**	**M**	**CP**	**S**	**M**	**CP**	**S**	**M**	**CP**	**Total**
1991	2,227	302	2,569		25	87	221	10	47	5,488
1992	2,305	733	889	2	4	14	1,314	21	673	5,955
1993	1,929	349	370	1	11	172	298	255	677	4,062
1994	4,756	408	986	3	93	276	781	203	275	7,781
1995	1,209	264	851		8	31	457	247	305	3,372
1996	9,447	976	2,798		17	161	5,658	1,721	493	21,271
1997	3,498	423	910	12	303	839	12,126	370	129	18,610
1998	3,124	451	1,329		38	191	8,277	2,446	1,277	17,133
1999	1,934	120	1,073		1	627	1,467	97	503	5,822
2000	608	17	1,388	4	40	179	564	3	120	2,923
2001	4,360	268	3,583		25	1,816	1,597	291	1,667	13,607
2002	5,587	850	3,011		23	114	5,353	520	494	15,952
2003	9,328	1,000	5,379	258	290	1,290	4,420	348	467	22,780
2004	7,247	594	3,514	1,352	557	1,153	8,884	137	606	24,044
2005	9,237	694	3,998	4,081	244	1,610	10,336	45	79	30,324
2006	17,875	1,574	5,716	685	66	480	12,757	3	82	39,238
2007	16,008	1,802	9,012	881	590	1,986	21,725	2	801	52,807

Table 3. Chinook salmon bycatch in the pollock fishery by season (A and B), area (NW=east of 170°W; SE=west of 170°W), and sector (S=shorebased catcher vessels, M=mothership operations, CP=catcher-processors). *Source: NMFS Regional Office, Juneau.*

Season	A	A	A	B	B	B	B	B	B	
Area	All	All	All	NW	NW	NW	SE	SE	SE	
Sector	S	M	CP	S	M	CP	S	M	CP	Total
1991	10,192	9,001	17,645	0	48	318	1,667	103	79	39,054
1992	6,725	4,057	12,631	0	26	187	1,604	1,739	6,702	33,672
1993	3,017	3,529	8,869	29	157	7,158	2,585	6,500	4,775	36,619
1994	8,346	1,790	17,149	0	121	771	1,206	452	2,055	31,890
1995	2,040	971	5,971		35	77	781	632	2,896	13,403
1996	15,228	5,481	15,276		113	908	9,944	6,208	2,315	55,472
1997	4,954	1,561	3,832	43	2,143	4,172	22,508	3,559	1,549	44,320
1998	4,334	4,284	6,500		309	511	27,218	6,052	2,037	51,244
1999	3,103	554	2,694	13	12	1,284	2,649	362	1,306	11,978
2000	878	19	2,525	4	230	286	714	23	282	4,961
2001	8,555	1,664	8,264	0	162	5,346	3,779	1,157	4,517	33,444
2002	10,336	1,976	9,481	0	38	211	9,560	1,717	1,175	34,495
2003	16,488	2,892	14,428	764	864	2,962	6,437	1,076	1,081	46,993
2004	12,376	2,092	9,492	2,530	1,573	2,844	21,171	503	1,445	54,028
2005	14,097	2,111	11,421	8,873	744	4,175	26,113	144	168	67,847
2006	36,039	5,408	17,306	936	175	1,373	21,718	25	178	83,159
2007	35,458	5,860	27,943	1,672	3,494	4,923	40,079	50	2,225	121,704

Table 4. Table of Chinook baseline collections used in analysis of bycatch mixtures for genetics studies (from Templin et al. In Prep.).

No.	Region	Location	Years	N
1	Russia	Bistraya River	1998	94
2		Bolshaya River	1998, 2002	77
3		Kamchatka River (Late)	1997, 1998	119
4		Pakhatcha River	2002	50
5	Norton Sound	Pilgrim River	2005, 2006	82
6		Unalakleet River	2005	82
7		Golsovia River	2005, 2006	111
8	Coast W AK (Lower Yukon)	Andreafsky River	2002, 2003	236
9		Anvik River	2002	95
10		Gisasa River	2001	188
11		Tozitna River	2002, 2003	290
12	Middle Yukon	Henshaw Creek	2001	147
13		S. Fork Koyuk	2003	56
14		Kantishna River	2005	187
15		Chena River	2001	193
16		Salcha River	2005	188
17		Beaver Creek	1997	100
18		Chandalar River	2002, 2003, 2004	175
19		Sheenjek River	2002, 2004, 2006	51
20	Upper Yukon	Chandindu River	2000, 2001, 2003	247
21		Klondike River	1995, 2001, 2003	79
22		Stewart River	1997	99
23		Mayo River	1992, 1997, 2003	197
24		Blind River	2003	134
25		Pelly River	1996, 1997	140
26		Little Salmon River	1987, 1997	100
27		Big Salmon River	1987, 1997	117
28		Tatchun Creek	1987, 1996, 1997, 2002, 2003	369
29		Nordenskiold River	2003	55
30		Nisutlin River	19,871,997	56
31		Takhini River	1997, 2002, 2003	162
32		Whitehorse Hatchery	1985, 1987, 1997	242
33	Coast W AK (Kuskokwim)	Goodnews River	1993, 2005, 2006	368
34		Arolik River	2005	147
35		Kanektok River	1992, 1993, 2005	244
36		Eek River	2002, 2005	173
37		Kwethluk River	2001	96
38		Kisaralik River	2001, 2005	191
39		Tuluksak River	1993, 1994, 2005	195
40		Aniak River	2002, 2005, 2006	336
41		George River	2002, 2005	191
42		Kogrukluk River	1992, 1993, 2005	149
43		Stony River	1994	93
44		Cheeneetnuk River	2002, 2006	117
45		Gagaryah River	2006	190
46		Takotna River	1994, 2005	176
47	Upper Kuskokwim	Tatlawiksuk River	2002, 2005	191
48		Salmon River (Pitka Fork)	1995	96
49	Coast W AK (Bristol Bay)	Togiak River	1993, 1994	159
50		Nushagak River	1992, 1993	57
51		Mulchatna River	1994	97
52		Stuyahok River	1993, 1994	87
53		Naknek River	1995, 2004	110
54		Big Creek	2004	66
55		King Salmon River	2006	131
56	N. AK Peninsula	Meshik River	2006	42
57		Milky River	2006	67
58		Nelson River	2006	95
59		Black Hills Creek	2006	51
60		Steelhead Creek	2006	93
61	S. AK Peninsula	Chignik River	1995, 2006	75
62		Ayakulik River	1993, 2006	136
63		Karluk River	1993, 2006	140

Table 4. (continued) Table of Chinook baseline collections used in analysis of bycatch mixtures for genetics studies (from Templin et al. In Prep.).

No.	Region	Location	Years	N
64	Cook Inlet	Deshka River	1995, 2005	251
65		Deception Creek	1991	67
66		Willow Creek	2005	73
67		Prairie Creek	1995	52
68		Talachulitna River	1995	58
69		Crescent Creek	2006	164
70		Juneau Creek	2005, 2006	119
71		Killey Creek	2005, 2006	266
72		Benjamin Creek	2005, 2006	205
73		Funny River	2005, 2006	220
74		Slikok Creek	2005	95
75		Kenai River (mainstem)	2003, 2004, 2006	302
76		Crooked Creek	1992, 2005	306
77		Kasilof River	2005	321
78		Anchor River	2006	200
79		Ninilchik River	2006	162
80	Upper Copper River	Indian River	2004, 2005	50
81		Bone Creek	2004, 2005	78
82		E. Fork Chistochina River	2004	145
83		Otter Creek	2005	128
84		Sinona Creek	2004, 2005	157
85	Lower Copper River	Gulkana River	2004	211
86		Mendeltna Creek	2004	144
87		Kiana Creek	2004	75
88		Manker Creek	2004, 2005	62
89		Tonsina River	2004, 2005	75
90		Tebay River	2004, 2005, 2006	68
91	Northern SE AK	Situk River	1988, 1990, 1991, 1992	143
92		Big Boulder Creek	1992, 1993, 1995, 2004	178
93		Tahini River	1992, 2004	169
94		Tahini River (LMH) Pullen Creek Hatchery	2005	83
95		Kelsall River	2004	96
96		King Salmon River	1989, 1990, 1993	144
97	Coast SE AK	King Creek	2003	143
98		Chickamin River	1990, 2003	56
99		Chickamin River - Little Port Walter	1993, 2005	126
100		Chickamin River - Whitman Lake Hatchery	1992, 1998, 2005	331
101		Humpy Creek	2003	94
102		Butler Creek	2004	95
103		Clear Creek	1989, 2003, 2004	166
104		Cripple Creek	1988, 2003	143
105		Genes Creek	1989, 2003, 2004	95
106		Kerr Creek	2003, 2004	151
107		Unuk River - Little Port Walter	2005	150
108		Unuk River - Deer Mountain Hatchery	1992, 1994	147
109		Keta River	1989, 2003	144
110		Blossom River	2004	95
111	Andrew Cr	Andrews Creek	1989, 2004	152
112		Crystal Lake Hatchery	1992, 1994, 2005	397
113		Medvejie Hatchery	1998, 2005	273
114		Hidden Falls Hatchery	1994, 1998	155
115		Macaulay Hatchery	2005	94
116	TBR Taku	Klukshu River	1989, 1990	174
117		Kowatua River	1989, 1990	144
118		Little Tatsemeanie River	1989, 1990, 2005	144
119		Upper Nahlin River	1989, 1990	130
120		Nakina River	1989, 1990	141
121		Dudidontu River	2005	86
122		Tahltan River	1989	95

Table 4. (continued) Table of Chinook baseline collections used in analysis of bycatch mixtures for genetics studies (from Templin et al. In Prep.).

No.	Region	Location	Years	N
123	BC/WA/OR	Kateen River	2005	96
124		Damdochax Creek	1996	65
125		Kincolith Creek	1996	115
126		Kwinageese Creek	1996	73
127		Oweegee Creek	1996	81
128		Babine Creek	1996	167
129		Bulkley River	1999	91
130		Sustut	2001	130
131		Ecstall River	2001, 2002	86
132		Lower Kalum	2001	142
133		Lower Atnarko	1996	144
134		Kitimat	1997	141
135		Wannock	1996	144
136		Klinaklini	1997	83
137		Nanaimo	2002	95
138		Porteau Cove	2003	154
139		Conuma River	1997, 1998	110
140		Marble Creek	1996, 1999, 2000	144
141		Nitinat River	1996	104
142		Robertson Creek	1996, 2003	106
143		Sarita	1997, 2001	160
144		Big Qualicum River	1996	144
145		Quinsam River	1996	127
146		Morkill River	2001	154
147		Salmon River	1997	94
148		Swift	1996	163
149		Torpy River	2001	105
150		Chilko	1995, 1996, 1999, 2002	246
151		Nechako River	1996	121
152		Quesnel River	1996	144
153		Stuart	1997	161
154		Clearwater River	1997	153
155		Louis Creek	2001	179
156		Lower Adams	1996	46
157		Lower Thompson River	2001	100
158		Middle Shuswap	1986, 1997	144
159		Birkenhead Creek	1997, 1999, 2002, 2003	93
160		Harrison	2002	96
161		Makah National Fish Hatchery	2001, 2003	94
162		Forks	2005	150
163		Upper Skagit River	2006	93
164		Soos Creek Hatchery	2004	119
165		Lyons Ferry Hatchery	2002, 2003	191
166		Hanford Reach	2000, 2004, 2006	191
167		Lower Deschutes River	2002	96
168		Lower Kalama	2001	95
169		Carson Stock - Mid and Upper Columbia spring	2001	96
170		McKenzie - Willamette River	2004	95
171		Alsea	2004	93
172		Siuslaw	2001	95
173		Klamath	1990, 2006	52
174		Butte Creek	2003	96
175		Eel River	2000, 2001	88
176		Sacramento River - winter run	2005	95

Table 5. NMFS regional office estimates of Chinook salmon bycatch in the pollock fishery compared to genetics sampling levels by season and region, 2005-2007 (SE=east of 170°W, NW=west of 170°W).

			Area			Area	
		Season	SE	NW	Total	SE	NW
Bycatch	2005	B	26,425	13,793	40,217	66%	34%
	2006	B	21,922	2,484	24,405	90%	10%
	2006	A			58,753		
	2007	A			69,261		
Genetic Samples	2005	B	489	282	771	63%	37%
	2006	B	286	304	590	48%	52%
	2006	A			801		
	2007	A			360		

Table 6. ADFG estimates of stock composition based on genetic samples stratified by year, season, and region (SE = east of 170°W, NW = west of 170°W). Standard errors of the estimates are shown in parentheses and were used to evaluate uncertainty of stock composition. *Source: ADFG preliminary data.*

Year / Season / Area	PNW	Coast W AK	Cook Inlet	Middle Yukon	N AK Penin	Russia	TBR	Upper Yukon	Other
2005 B SE	45.3%	34.2%	5.3%	0.2%	8.8%	0.6%	3.3%	0.0%	2.4%
N = 282	(0.032)	(0.032)	(0.019)	(0.003)	(0.021)	(0.005)	(0.016)	(0.001)	(0.015)
2005 B NW	6.5%	70.9%	2.2%	4.7%	6.7%	2.0%	3.5%	2.8%	0.7%
N = 489	(0.012)	(0.047)	(0.011)	(0.013)	(0.042)	(0.007)	(0.012)	(0.009)	(0.008)
2006 B SE	38.4%	37.2%	7.5%	0.2%	7.0%	0.6%	4.3%	0.1%	4.7%
N = 304	(0.029)	(0.032)	(0.020)	(0.004)	(0.019)	(0.005)	(0.017)	(0.002)	(0.020)
2006 B NW	6.4%	67.3%	3.0%	8.0%	2.1%	3.3%	0.5%	8.0%	1.4%
N = 286	(0.016)	(0.035)	(0.020)	(0.020)	(0.016)	(0.013)	(0.007)	(0.019)	(0.014)
2006 A All	22.9%	38.2%	0.2%	1.1%	31.2%	1.1%	1.1%	2.3%	1.9%
N = 801	(0.015)	(0.038)	(0.004)	(0.005)	(0.039)	(0.004)	(0.007)	(0.006)	(0.011)
2007 A All	9.4%	75.2%	0.1%	0.5%	12.0%	0.2%	0.1%	0.1%	2.4%
N = 360	(0.016)	(0.031)	(0.004)	(0.005)	(0.025)	(0.003)	(0.002)	(0.003)	(0.014)

Table 7. Range of estimated mean age-specific maturation by brood year used to compute adult equivalents. The weighted mean value is based on the relative Chinook run sizes between the Nushagak and Yukon Rivers since 1997. *Sources: Healey 1991, Dani Evenson (ADFG, pers. Comm.), Rishi Sharma (CRITFC, pers. Comm.).*

	Weight	Age 3	Age 4	Age 5	Age 6	Age 7
Yukon	2.216	1%	13%	32%	49%	5%
Nushagak since 82	1.781	1%	21%	38%	39%	2%
Nushagak since 66	0	0%	17%	36%	43%	3%
Goodnews	0	0%	20%	31%	45%	4%
SE Alaska (TBR)	0.3	0%	18%	40%	37%	5%
BC, WA, OR, & CA	0.7	3%	28%	53%	14%	1%
Weighted mean		1%	18%	37%	40%	3%

Table 8. Chinook salmon effective bycatch "caps" in the pollock fishery by season (A and B) based on average values of the caps (if they occurred) had they been applied from 2003-2007.

Cap, A/B, sector	A season	B season	Total
87,500 50/50 opt1	31,099	24,339	55,438
87,500 50/50 opt2a	31,950	32,844	64,793
87,500 50/50 opt2d	36,899	28,791	65,690
87,500 58/42 opt1	44,118	20,321	64,439
87,500 58/42 opt2a	41,653	30,463	72,116
87,500 58/42 opt2d	42,234	24,258	66,492
87,500 70/30 opt1	49,368	16,277	65,644
87,500 70/30 opt2a	44,665	18,427	63,092
87,500 70/30 opt2d	55,376	17,815	73,191
68,100 50/50 opt1	27,784	18,272	46,056
68,100 50/50 opt2a	26,459	28,264	54,723
68,100 50/50 opt2d	25,196	24,258	49,455
68,100 58/42 opt1	29,569	17,581	47,150
68,100 58/42 opt2a	28,587	21,247	49,834
68,100 58/42 opt2d	32,676	19,997	52,674
68,100 70/30 opt1	41,021	13,253	54,274
68,100 70/30 opt2a	35,980	15,495	51,475
68,100 70/30 opt2d	42,234	14,640	56,874
48,700 50/50 opt1	19,292	16,196	35,488
48,700 50/50 opt2a	18,053	17,439	35,493
48,700 50/50 opt2d	21,242	16,725	37,966
48,700 58/42 opt1	21,142	13,253	34,394
48,700 58/42 opt2a	19,592	15,495	35,087
48,700 58/42 opt2d	23,610	14,640	38,250
48,700 70/30 opt1	27,784	10,225	38,009
48,700 70/30 opt2a	26,459	12,262	38,721
48,700 70/30 opt2d	25,196	11,612	36,809
29,300 50/50 opt1	9,761	10,225	19,985
29,300 50/50 opt2a	10,637	12,262	22,900
29,300 50/50 opt2d	10,070	11,612	21,682
29,300 58/42 opt1	12,725	8,740	21,465
29,300 58/42 opt2a	12,177	10,520	22,697
29,300 58/42 opt2d	12,031	10,634	22,665
29,300 70/30 opt1	15,120	6,885	22,005
29,300 70/30 opt2a	17,010	7,065	24,074
29,300 70/30 opt2d	14,859	6,775	21,634

Table 9. Calendar year age-specific Chinook salmon bycatch estimates based on the mean of 100 bootstrap samples of available length and age data. Age-length keys for 1997-1999 were based on Myers et al. (2003) data split by year while for all other years, a combined-year age-length key was used.

Year	Age 3	Age 4	Age 5	Age 6	Age 7	Total
1991	5,624	15,901	13,486	3,445	347	38,802
1992	5,136	9,528	14,538	3,972	421	33,596
1993	2,815	16,565	12,992	3,673	401	36,446
1994	849	5,300	20,533	4,744	392	31,817
1995	498	3,895	4,827	3,796	367	13,382
1996	5,091	18,590	26,202	5,062	421	55,366
1997	5,855	23,972	7,233	5,710	397	43,167
1998	19,168	16,169	11,751	2,514	615	50,216
1999	870	5,343	4,424	1,098	21	11,757
2000	662	1,923	1,800	518	34	4,939
2001	6,512	12,365	11,948	1,994	190	33,009
2002	3,843	13,893	10,655	5,469	489	34,349
2003	5,703	16,723	20,124	3,791	298	46,639
2004	6,935	23,740	18,371	4,406	405	53,858
2005	10,466	30,717	21,886	4,339	304	67,711
2006	11,835	31,455	32,452	6,636	490	82,869
2007	16,174	66,024	33,286	5,579	357	121,419

Table 10. Age specific Chinook salmon bycatch estimates by season and calendar age based on the mean of 100 bootstrap samples of available length and age data.

Year/season	Age 3	Age 4	Age 5	Age 6	Age 7	Total
1991	**5,624**	**15,901**	**13,486**	**3,445**	**347**	**38,802**
A	5,406	14,764	12,841	3,270	313	36,593
B	218	1,137	646	174	34	2,209
1992	**5,136**	**9,528**	**14,538**	**3,972**	**421**	**33,596**
A	1,017	4,633	13,498	3,798	408	23,355
B	4,119	4,895	1,040	174	13	10,241
1993	**2,815**	**16,565**	**12,992**	**3,673**	**401**	**36,446**
A	1,248	3,654	7,397	2,778	290	15,368
B	1,567	12,910	5,595	895	111	21,078
1994	**849**	**5,300**	**20,533**	**4,744**	**392**	**31,817**
A	436	3,519	18,726	4,211	326	27,218
B	413	1,781	1,807	533	66	4,599
1995	**498**	**3,895**	**4,827**	**3,796**	**367**	**13,382**
A	262	1,009	3,838	3,534	327	8,969
B	236	2,885	989	263	40	4,413
1996	**5,091**	**18,590**	**26,202**	**5,062**	**421**	**55,366**
A	863	7,187	23,118	4,431	349	35,947
B	4,228	11,403	3,085	632	71	19,418
1997	**5,855**	**23,972**	**7,233**	**5,710**	**397**	**43,167**
A	456	2,013	3,595	3,899	271	10,234
B	5,399	21,958	3,638	1,811	126	32,933
1998	**19,168**	**16,169**	**11,751**	**2,514**	**615**	**50,216**
A	1,466	2,254	8,639	2,079	512	14,950
B	17,703	13,915	3,112	435	103	35,266
1999	**870**	**5,343**	**4,424**	**1,098**	**21**	**11,757**
A	511	1,639	3,151	898	18	6,217
B	360	3,704	1,272	200	3	5,540
2000	**662**	**1,923**	**1,800**	**518**	**34**	**4,939**
A	365	1,167	1,406	453	26	3,416
B	298	757	395	66	8	1,522
2001	**6,512**	**12,365**	**11,948**	**1,994**	**190**	**33,009**
A	2,840	3,458	9,831	1,798	171	18,098
B	3,672	8,907	2,117	196	19	14,910
2002	**3,843**	**13,893**	**10,655**	**5,469**	**489**	**34,349**
A	1,580	5,063	9,234	5,328	478	21,683
B	2,263	8,830	1,421	141	11	12,666
2003	**5,703**	**16,723**	**20,124**	**3,791**	**298**	**46,639**
A	2,941	9,408	17,411	3,437	267	33,464
B	2,763	7,315	2,713	354	31	13,175
2004	**6,935**	**23,740**	**18,371**	**4,406**	**405**	**53,858**
A	1,111	5,520	13,090	3,763	354	23,838
B	5,824	18,220	5,282	643	51	30,020
2005	**10,466**	**30,717**	**21,886**	**4,339**	**304**	**67,711**
A	1,407	6,993	15,563	3,361	226	27,550
B	9,059	23,724	6,323	978	78	40,161
2006	**11,835**	**31,455**	**32,452**	**6,636**	**490**	**82,869**
A	3,604	17,574	30,447	6,404	465	58,494
B	8,231	13,881	2,005	232	25	24,374
2007	**16,174**	**66,024**	**33,286**	**5,579**	**357**	**121,419**
A	5,791	29,269	28,648	5,059	317	69,084
B	10,384	36,755	4,638	520	40	52,336

Table 11. Estimates of coefficients of variation of Chinook salmon bycatch estimates by season and calendar age based on the mean of 100 bootstrap samples of available length and age data.

A season	Age 3	Age 4	Age 5	Age 6	Age 7
1991	14%	6%	6%	10%	31%
1992	20%	9%	4%	9%	27%
1993	22%	9%	5%	10%	37%
1994	27%	12%	3%	10%	30%
1995	25%	12%	5%	6%	22%
1996	19%	6%	2%	9%	21%
1997	35%	12%	6%	7%	28%
1998	16%	9%	3%	10%	23%
1999	19%	10%	5%	11%	91%
2000	25%	9%	6%	9%	27%
2001	10%	6%	3%	7%	22%
2002	15%	6%	3%	4%	16%
2003	14%	6%	3%	8%	21%
2004	15%	6%	2%	5%	20%
2005	18%	6%	3%	7%	23%
2006	17%	5%	3%	7%	22%
2007	22%	5%	4%	8%	25%
B season	**Age 3**	**Age 4**	**Age 5**	**Age 6**	**Age 7**
1991	23%	8%	12%	27%	67%
1992	9%	9%	25%	69%	87%
1993	19%	4%	9%	20%	65%
1994	17%	6%	6%	14%	27%
1995	21%	5%	12%	23%	48%
1996	6%	3%	7%	11%	29%
1997	12%	3%	10%	12%	39%
1998	5%	6%	9%	23%	36%
1999	16%	3%	8%	22%	149%
2000	9%	5%	8%	25%	49%
2001	7%	3%	8%	20%	52%
2002	6%	2%	8%	17%	43%
2003	8%	3%	5%	15%	32%
2004	6%	2%	5%	12%	30%
2005	5%	2%	5%	10%	23%
2006	4%	3%	8%	15%	33%
2007	6%	2%	7%	13%	28%

Table 12. Mean values of catch-weighted stratified proportions of stock composition based on genetic sampling by season, and region (SE=east of 170°W, NW=west of 170°W). Standard errors of the estimates (in parentheses) were derived from 200 simulations based on the estimates from Table 6 and weighting annual results as explained in the text.

Season / Area	PNW	Coast W AK	Cook Inlet	Middle Yukon	N AK Penin	Russia	TBR	Upper Yukon	Other
B SE	45.0%	34.7%	5.1%	0.1%	8.6%	0.6%	3.4%	0.0%	2.4%
	(0.025)	(0.024)	(0.017)	(0.002)	(0.016)	(0.004)	(0.014)	(0.001)	(0.014)
B NW	6.4%	68.9%	2.6%	6.6%	4.4%	2.7%	1.8%	5.6%	1.0%
	(0.010)	(0.023)	(0.012)	(0.011)	(0.019)	(0.007)	(0.006)	(0.012)	(0.008)
A All	12.1%	67.7%	0.1%	0.6%	16.0%	0.4%	0.2%	0.6%	2.3%
	(0.012)	(0.021)	(0.003)	(0.004)	(0.019)	(0.002)	(0.002)	(0.003)	(0.010)

Table 13. Median values of stochastic simulation results of AEQ Chinook mortality attributed to the pollock fishery by region, 1994-2007. These simulations include stochasticity in natural mortality (Model 2, CV=0.1), bycatch age composition (via bootstrap samples), maturation rate (CV=0.1), and stock composition (as detailed above). **NOTE: these results are based on the assumption that the genetics findings from the 2005-2007 data represent the historical pattern of bycatch stock composition (by strata).**

	BC, WA, OR, and CA	Coastal W. AK	Cook Inlet	Middle Yukon	N. Alaska Peninsula	Other	Russia	Upper Yukon	TBR (SE)	Total
1994	5,198	21,518	242	201	4,898	714	147	194	198	33,310
1995	5,635	14,084	415	104	3,302	532	112	96	279	24,559
1996	6,974	17,025	520	154	3,939	632	142	137	364	29,886
1997	11,376	16,895	1,276	413	3,364	715	277	343	783	35,442
1998	10,967	14,218	1,110	103	3,382	696	165	87	711	31,439
1999	6,429	15,099	573	297	3,193	561	188	245	387	26,973
2000	2,815	9,383	219	167	2,106	330	99	147	152	15,418
2001	3,694	10,473	349	260	2,141	375	149	221	238	17,899
2002	6,236	14,516	509	106	3,467	609	117	96	341	25,997
2003	5,743	20,065	398	356	4,424	679	207	311	292	32,475
2004	10,164	21,904	1,018	466	4,592	859	305	393	685	40,386
2005	11,169	25,462	1,203	767	5,107	923	439	645	772	46,487
2006	12,719	36,337	892	363	8,355	1,348	290	339	633	61,275
2007	18,079	44,380	1,597	694	9,743	1,688	485	608	1,069	78,344

Table 14. Hypothetical adult equivalent Chinook salmon bycatch mortality **totals** under each cap and management option, 2003-2007. Numbers are based on the median AEQ values with the original estimates shown in the second row. Right-most column shows the mean over all years relative to the estimated AEQ bycatch. The shadings and the pies relate to the relative AEQ bycatch for each policy and year.

	2003	2004	2005	2006	2007	
No Cap	**33,215**	**41,047**	**47,268**	**61,737**	**78,814**	
Cap, AB, sector						
87,500 70/30 opt2d	32,903	38,255	38,479	49,058	56,397	82%
87,500 70/30 opt2a	33,081	38,485	38,753	49,986	54,164	82%
87,500 70/30 opt1	32,864	37,582	36,635	43,381	51,106	77%
87,500 58/42 opt2d	33,368	39,856	42,197	47,135	51,981	82%
87,500 58/42 opt2a	32,143	39,887	44,402	54,960	59,119	88%
87,500 58/42 opt1	33,108	38,163	38,153	44,338	51,012	78%
87,500 50/50 opt2d	33,010	40,943	42,928	49,228	51,971	83%
87,500 50/50 opt2a	30,747	38,967	43,140	47,977	53,212	82%
87,500 50/50 opt1	33,151	39,747	41,912	43,139	43,599	77%
68,100 70/30 opt2d	33,162	36,866	36,314	40,583	45,112	73%
68,100 70/30 opt2a	29,981	34,695	36,854	44,290	47,643	74%
68,100 70/30 opt1	32,948	36,791	35,507	39,891	42,666	72%
68,100 58/42 opt2d	32,364	37,417	37,704	40,948	43,194	73%
68,100 58/42 opt2a	30,023	36,658	39,105	43,534	45,139	74%
68,100 58/42 opt1	33,108	37,477	37,402	35,895	38,137	69%
68,100 50/50 opt2d	30,769	37,607	41,249	38,952	38,063	71%
68,100 50/50 opt2a	30,084	37,224	39,182	43,200	45,144	74%
68,100 50/50 opt1	32,342	37,659	38,203	36,334	35,679	69%
48,700 70/30 opt2d	29,249	33,665	33,408	30,077	28,277	59%
48,700 70/30 opt2a	28,798	31,431	31,021	33,765	34,297	61%
48,700 70/30 opt1	30,155	33,547	33,374	31,735	29,376	60%
48,700 58/42 opt2d	29,987	33,692	34,121	30,697	30,120	61%
48,700 58/42 opt2a	27,722	31,175	32,007	28,025	27,065	56%
48,700 58/42 opt1	28,349	33,201	33,788	30,543	25,454	58%
48,700 50/50 opt2d	28,797	33,773	33,600	30,876	29,647	60%
48,700 50/50 opt2a	26,949	30,859	31,139	28,650	27,215	55%
48,700 50/50 opt1	26,854	31,947	31,278	29,530	26,716	56%
29,300 70/30 opt2d	19,200	22,679	23,095	20,513	13,338	38%
29,300 70/30 opt2a	21,115	23,813	23,825	20,612	17,220	41%
29,300 70/30 opt1	19,252	22,524	21,886	19,101	15,220	37%
29,300 58/42 opt2d	18,963	23,646	22,393	20,476	15,041	38%
29,300 58/42 opt2a	19,376	23,043	22,132	20,827	15,039	38%
29,300 58/42 opt1	18,259	21,267	21,286	18,331	14,924	36%
29,300 50/50 opt2d	19,122	22,130	21,382	18,665	14,048	36%
29,300 50/50 opt2a	19,123	21,927	21,513	20,925	16,004	38%
29,300 50/50 opt1	17,104	20,672	19,676	17,542	13,161	34%

Table 15. Comparison of sampling levels from Myers' et al. (2003) study and NMFS regional office estimates of Chinook bycatch levels from the pollock fishery, 1997-1999.

Year	Area	Season	Myers' age samples	Bycatch Estimate	Myers' age samples	Bycatch Estimate
1997	All	A	874	10,347	51%	23%
1997	SE	B	651	27,616	39%	62%
1997	NW	B	158	6,358	9%	14%
1998	All	A	906	15,118	51%	30%
1998	SE	B	730	35,307	41%	69%
1998	NW	B	138	820	8%	2%
1999	All	A	652	6,352	53%	53%
1999	SE	B	456	4,317	37%	36%
1999	NW	B	122	1,310	10%	11%

AGENDA C-2
Supplemental
JUNE 2008

April 25, 2008

RECEIVED
MAY 7 2008
N.P.F.M.C.

North Pacific Fisheries Management Council
605 West 4th Ave.
Suite 306
Anchorage, AK 99501
Att: Salmon By-catch Problem

Dear Council Members:

We are subsistence salmon setnet fishermen in Nome sub-district who have been concerned about the huge by-catch of kings and chums in the Bering Sea. Scientists believe many of these salmon could be headed for Western Alaska. We have fished each year for about twenty years in the ocean and supply an extended family of fourteen people in five households, also trading for halibut, sheefish and crab. Of all the salmon, the chum/pink runs are the most important to most families in the Nome sub-district. Each year we saw our chum salmon runs go down until finally for several years we had to fish Tier II. chums. We willingly complied with this in hopes it would help our chum salmon. This also affected the pink salmon catch because they overlap runs, causing total closures. We are also aware of the serious reduction in king salmon in the Unalakleet River just east of here, and in other western Alaska rivers. We refer you to State Fish and Game available studies on these problems.

In addition to the importance for subsistence, salmon is the main source of cash income for many families in the communities east of Nome. Lately, all of low and middle-income western Alaskans are suffering economically more than usual due to excessive increases in energy costs. Gas can run up to $7 /gallon in some villages, and we know it will be higher soon. East of us, the Y-K region is also dependent on subsistence salmon and the cash income from commercial fishing, and is experiencing similar and worse reductions in runs.

Our regional CDQ, Norton Sound Economic Development Corp owns shares in pollock boats, and our family and whole community has benefitted much from NSEDC's success with pollock. Naturally we want our pollock fleet to do well. But the pollock fleet is the major source of the by-catch problem. Thus we have concerns on both sides of this issue. Saving our salmon must come first for the sake of all families, and the pollock fleet will still be profitable as it takes necessary improved measures to reduce by-catch. We know that the Council has worked for years on the by-catch problem and that the efforts haven't worked as well as needed. We thank you much for addressing this again, and urge you to take whatever measures necessary to significantly reduce the salmon by-catch in the Bering Sea/Aleutians.

Sincerely,
N. Mendenhall

Perry and Nancy Mendenhall
P.O. Box 1141
Nome, Alaska

CC: Dan Harrelson, Chair, NSEDC Board of Directors
Jim Menard, Biologist, Nome Office, AK Fish and Game

Native Village of Nunapitchuk

Nunapitchuk IRA Council P. O. Box 130 Nunapitchuk, Alaska –99641- Phone (907) 527-5705
Fax (907) 527-5711; E-mail: tribaladmin@yupik.org

North Pacific Fishery Management Council
Chairman Eric Olson
605 West 4th Avenue, Suite 306
Anchorage, AK 99501-2252
Fax# 907-271-2817

5/23/08

Re: Salmon by catch

The IRA Council of Nunapitchuk recommends a 30,000 by-catch limit and fishery should cease when that limit is accomplished. We remember our ancestors who have instructed us not to waste but to take what's needed and quit. The by-catch incidents are wastes and that is not a good practice as we depend on the salmon for commercial and subsistence on the Kuskokwim. Salmon is a very important wild food sustaining our tribe. The Salmon when incidentally caught takes away their annual migration to spawn on our wild Alaska. Another factor is the incidental catch limit established for the false pass fishery introduced by the late pro conservationist Harold Sparks of AVCP which is and was working. Thank you for this opportunity to comment.

Sincerely,

[signature] for

Zechariah C. Chaliak, Sr.
President

Cc: AVCP
Files

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YUKON RIVER DRAINAGE FISHERIES ASSOCIATION

May 27, 2008

Mr. Eric Olson, Chair
North Pacific Fishery Management Council
605 West 4th Avenue, Suite 306
Anchorage, AK 99501

Mr. Doug Mecum, Acting Regional Administrator
NOAA Fisheries, Alaska Region
PO Box 21668
Juneau, AK 99802

Re: Agenda Item C-2 Salmon Bycatch

Dear Mr. Olson, Mr. Mecum and Council members:

The Yukon River Drainage Fisheries Association (YRDFA) appreciates the opportunity to comment again on the issue of salmon bycatch. YRDFA is an association of commercial and subsistence fishermen and women on the Yukon River in Alaska with a mission of promoting healthy, wild salmon fisheries on the Yukon River. While we are pleased to see Chinook salmon bycatch numbers so far in 2008 significantly below the levels experienced in recent years, our concern over the problem of salmon bycatch and the need for long-term solutions has not diminished. YRDFA urges the Council to choose a preliminary preferred alternative of a hard cap set no higher than the 10-year average of 47,591 Chinook salmon (Alternative 2, Option 1, Suboption iv).

As the Council has repeatedly heard, Chinook salmon throughout Western Alaska fulfill vital subsistence needs and commercial harvests. Salmon are also of irreplaceable value to the cultural, spiritual, and nutritional needs of the Alaska Native people of the Western Alaska region. Yet, forecasts for Chinook salmon returns to the Yukon River, home of the world's furthest migrating salmon runs, are for a below-average return which will provide for an extremely limited commercial fishery at best, and no commercial fishing at worst. Subsistence fishermen and women will again operate under time restrictions (the "windows" schedule) this year from the beginning of the season. While in-river users make sacrifices in their catch to ensure escapement goals and our obligations under the Yukon River Salmon Agreement are met, it is essential that the pollock fishery bears this burden as well.

A hard cap of 47,591 Chinook salmon will balance the needs of in-river salmon and salmon fisheries with the pollock fleet's ability to fish for pollock, in accordance with the requirement of National Standard 9 of Magnuson-Stevens Act to "minimize bycatch" to the "extent practicable" [1] A cap at this level will provide much needed protections for Chinook salmon, ensuring that the record high levels of bycatch achieved in recent years never occur again.

[1] Magnuson-Stevens Fishery Management and Conservation Act, 16 U.S.C. §1851(a)(9) (2004).

725 CHRISTENSEN DRIVE, SUITE 3-B • ANCHORAGE, ALASKA 99501
TELEPHONE: 907-272-3141 • 1-877-99YUKON(9-8566)
FAX: 907-272-3142 • EMAIL:info@yukonsalmon.org
WWW.YUKONSALMON.ORG

In addition, the bycatch numbers this year assure us that the pollock fleet has the tools it needs to fish for pollock while keeping salmon bycatch numbers below this hard cap amount. With modifications in fleet behavior the pollock fleet can continue to fish for pollock and avoid the economic impacts of a fishery shutdown. While we commend the pollock fleets efforts through the Voluntary Rolling Hot Spot (VRHS) system and salmon excluder device, we feel that these activities are best undertaken beneath the safeguard of a hard cap implemented by the Council with no exemptions. Finally, triggered closures should be considered only if a Council-implemented hard cap is in place.

Thank you for your continued efforts on this important issue. We look forward to submitting more extensive comments on the Draft Environmental Impact Statement when it is released for public review.

Sincerely,

Rebecca Robbins Gisclair
Acting Executive Director

KAWERAK, INC. ○ P.O. Box 948 ○ Nome, AK 99762

TEL: (907) 443-5231 • FAX: (907) 443-4452

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C hris Oliver, Executive Director
North Pacific Fisheries Management Council
605 W. 4th Avenue
Anchorage, AK 99501

May 26, 2008

Re: Comments to the Council regarding salmon bycatch (Major issue C-2), the Arctic Fisheries Management Plan (D-1a), and Tribal consultation (D-6c)

Dear Mr. Oliver,

Kawerak, Inc. is an Alaska Native non-profit corporation providing programs and services to people of the Bering Strait/Norton Sound region. We represent twenty Tribal governments in this region. Several actions currently under review by the Council have the potential to greatly impact our communities and subsistence lifestyles.

<u>Salmon Bycatch, C-2</u>
Kawerak provided testimony regarding the salmon bycatch EIS to both the Advisory Panel and the Council at the April 2008 meeting (enclosed). As no updated documents have been released, our comments remain essentially the same and are summarized below.

- Appropriate Tribal consultation has not been carried out
- A hard cap should immediately be implemented
- The EIS timeline should be modified so that Tribal consultation can be carried out
- Protocols should be developed outlining the process of Tribal consultation that the Council will follow

At the April 2008 Kawerak, Inc. Board meeting our Board of Directors also passed a resolution incorporating these comments (enclosed). Kawerak strongly believes that this is a critical issue for our communities and calls on the Council to be extremely cautious and to give weight to the needs of subsistence resource dependent communities.

<u>Arctic Fisheries Management Plan, D-1b</u>
Kawerak supports the creation of an Arctic Fisheries Management Plan. With the rapid change that is occurring in the Arctic we need to be pro-active.

The management plan should close all waters north of Bering Strait to commercial fishing for all species, including forage species. The plan should indicate that existing small or subsistence fisheries will not be affected. Residents of the region are concerned about the potential effects of commercial fishing on their subsistence fishing and hunting.

Any conditions for future commercial use of the area under the jurisdiction of the plan should require detailed studies. We believe there is a lack of information regarding our resources, including marine mammals, migratory birds and fish.

All aspects of the development and implementation of such a plan should include government-to-government Tribal consultation. We would like to note that consultation should not be limited to Tribes living at or north of the Bering Strait. Tribes in the Norton Sound region, and even further south, may be significantly affected by actions in the Chuckchi Sea. The Council needs to have clear protocols to identify affected/interested Tribes (these protocols would necessarily be part of overall Tribal consultation protocols; see below).

Tribal Consultation, D-6c
Kawerak would like to, again, request that NMFS and NPFMC immediately create suitable and binding Tribal Consultation protocols.

Kawerak has seen a draft paper (N. Kimball, 7/18/07) outlining possible consultation procedures. We have several comments on this document. The draft appears to have been based off of the 2004 BSAI and GOA groundfish management policy "goal statements." Kawerak recommends that Tribal consultation protocols be developed on the basis of relevant Executive Orders (EO 12898, Environmental Justice; EO 13175 Tribal Consultation and Coordination), the Department of Commerce American Indian and Alaska Native Policy (1995), and Secretarial Order on government-to-government consultations (1997).

Kawerak strongly agrees with the proposed action of hiring a Tribal Liaison. Other Federal entities have used Tribal Liaisons with great benefit to both the entities and the Tribes involved. We recommend that a Liaison be hired as soon as possible.

Another matter of concern regarding this draft is the continued placement of "community" concerns alongside those of Tribes. We would like to emphasize that Federally Recognized Tribes have the status of sovereign nations and are not simply another interested party. We recognize the importance of community and other stakeholder interests, but Tribal concerns should not be addressed in the same context as that of "communities." Doing so dilutes the importance of Tribal concerns.

We recommend that the Council adopt consultation policies from other agencies that are proven to succeed rather than creating an entirely new way of carrying out your government-to-government responsibilities.

If you require any additional information, please contact Julie Raymond-Yakoubian, Social Scientist, at 907-443-4273 or jraymond-yakoubian@kawerak.org.

Sincerely,
KAWERAK, INC.
Eileen Norbert for
Loretta Bullard, President

Enclosures

Date: April 4, 2008
To: North Pacific Fisheries Management Council

From: Julie Raymond-Yakoubian
Anthropologist
Kawerak, Inc.
PO Box 948
Nome, AK 99762

Re: Testimony regarding Agenda Item D-1, salmon bycatch EIS

Mr. Chairman and Council members,

My name is Julie Raymond-Yakoubian. I am an anthropologist with Kawerak in Nome. Kawerak is an Alaska Native regional non-profit that represents 20 tribal governments in the Bering Strait/Norton Sound region. At this point in time we only have one subject to comment on and that is the issue of Tribal Consultation.

Over the past two days I have heard it claimed that consultation has been commenced because some 600+ letters were mailed out to tribes and associated tribal organizations. However, mailing letters with no formal protocol for follow-up or other actions to be taken cannot, in good faith, be considered Tribal Consultation. The fact that only 12 tribal comments were received in response to over 600 letters should obviously indicate that this approach is not working. Letters may, of course, be a component of Tribal Consultation, but in and of themselves do not constitute consultation. It is also not appropriate to put the onus on tribes by noting in such a letter that if they want more detailed information, explanations, or community visits regarding this EIS that they should be the ones to initiate all future contact. It is the responsibility of the Federal entity to ensure that Tribal concerns are addressed and that they are addressed in a meaningful and timely manner so that communities have ample time to consider all the issues and can in fact be involved in the process from start to finish.

We certainly would not want the lack of written responses from Northwest Alaska communities to be interpreted as a lack of interest because that would be dead wrong. Communities in our region have been experiencing low salmon returns and restrictions on subsistence salmon fishing for years. The issue of salmon bycatch is of great interest to and has a huge impact on the communities of our region. This is not just an issue of economic survival, but is also an issue of family, community and cultural survival.

We would also like to note that while Kawerak, along with the communities of our region, believe that immediate action needs to be taken regarding the salmon bycatch issue, we are very concerned about the proposed timeline for this EIS. It seems very unlikely that meaningful consultation can be carried out within this timeline. As such, we recommend that a hard cap be immediately put in place and that EIS timeline be modified so that Tribal Consultation and any other analysis of issues can be addressed as fully and completely as possible.

The Department of Commerce currently has an American Indian and Alaska Native Policy (1995) and a Secretarial Order (1997) which directs that government-to-government consultations will be carried out with Alaska Native tribes. I would like to point out that these documents refer specifically to federally recognized tribes and not "ANCSA corporations." I assume that the policy and order apply to NMFS and the NPFMC because they indicate that they are directed at "all Commerce agencies, bureaus and their components."

We strongly encourage the Council, as well as NMFS, to formally acknowledge these directives and commit to implementing them by developing appropriate protocols outlining the process that all future consultations will follow. These protocols should also be formulated with the input of Alaska Native tribes. We hope that this issue will be taken very seriously and that immediate action will be taken to implement a comprehensive, sensitive and respectful consultation policy and associated protocols.

Thank you for your time.

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KAWERAK
RESOLUTION 2008-03

A RESOLUTION REQUESTING GOVERNMENT TO GOVERNMENT CONSULTATION REGARDING SALMON BY-CATCH IN THE BERING SEA POLLOCK FISHERY

WHEREAS, the St. Lawrence Yupik, Yup'ik and Inupiat people of the Bering Strait Region people depend on salmon to meet their subsistence, economic and cultural needs; and

WHEREAS, the St. Lawrence Yupik, Yup'ik and Inupiat people of the Bering Strait Region are represented by twenty federally recognized tribal governments; and

WHEREAS, Kawerak, Inc. is the Alaska Native Regional Non-profit organization authorized by the Bering Strait Region's twenty federally recognized tribes to advocate for the protection of their customary and traditional hunting and fishing practices; and

WHEREAS, Kawerak, Inc. is charged to strengthen and increase the effective power of participating tribal members in regulatory decision making pertaining to fish and wildlife resource management; and

WHEREAS, the North Pacific Fishery Management Council (NPFMC) is currently conducting an environmental impact assessment of by-catch of salmon by the Pollock fisheries in the Bering Sea which will result in a Environmental Impact Statement; and

WHEREAS, the by-catch of salmon resulting from the Pollock fishery has a direct impact on the Bering Strait Region's salmon resource; and

WHEREAS, the NPFMC is a component of a federal Commerce Agency; and

WHEREAS, the Department of Commerce American Indian and Alaska Native Policy of 1995 and Secretarial Order of 1997 directs all Commerce agencies, bureaus and their components to carry out government to government consultation with Alaska Native Tribes; and

WHEREAS, none of the twenty Bering Strait Region tribes have been invited to participate in a government to government consultation on the subsistence impacts of the Bering Sea Pollock fishery; and

WHEREAS, the twenty Bering Strait Region tribes wish to have the opportunity to participate in a government to government consultation on the subsistence impacts of the Bering Sea Pollock fishery.

NOW THEREFORE BE IT RESOLVED, Kawerak, Inc. requests the NPFMC formally recognize the Department of Commerce American Indian and Alaska Native Policy of 1995 and Secretarial Order of 1997 which directs all Commerce agencies, bureaus and their components to carry out government to government consultation with Alaska Native Tribes; and

BE IT FURTHER RESOLVED, NPFMC immediately develop tribal consultation protocols; and

BE IT FURTHER RESOLVED, NPFMC add a Tribal Liaison to their staff to carry out the consultation protocols; and

BE IT FINALLY RESOLVED, NPFMC ensure the timeline for processing the Environmental Impact Statement of the Bering Sea Pollock fishery be extended to allow for tribal consultation.

Robert Keith, Chairman

Certification:

I, the undersigned Secretary of Kawerak, Incorporated, hereby certify that the foregoing resolution was adopted by the Kawerak Board of Directors at a duly convened meeting on April 11, 2008.

Ellen Richard, Secretary

Western Interior Alaska Subsistence
Regional Advisory Council
c/o Office of Subsistence Management
101 12th Avenue, Room 110
Fairbanks, Alaska 99701
Phone: 1-(907)-456-0277 or 1-800-267-3997
Fax: 1-(907)-456-0208
E-mail: Vince_Mathews@fws.gov

May 27, 2008

Eric A. Olson, Chair
North Pacific Fishery Management Council
605 West Fourth Avenue, Suite 306
Anchorage, Alaska 99501-2252

Re: Preferred Alternative, Salmon Bycatch EIS

Dear Mr. Olson:

The Western Interior Alaska Subsistence Regional Advisory Council (Regional Council) represents 28 Western Interior subsistence communities and rural residents. The Regional Council is authorized by the Alaska National Interest Lands Conservation Act (ANILCA), and chartered under the Federal Advisory Committee Act (FACA). ANILCA in Section 805 and the Regional Council's charter recognize the Regional Council's authority to "initiate, review and evaluate proposals for regulations, policies, management plans, and other matters related to subsistence uses of fish and wildlife on public lands within the region" and to "provide a forum for the expression of opinions and recommendations ... (on) any matter related to the subsistence uses of fish and wildlife on public lands within the region."

The Regional Council strongly recommends that the North Pacific Fishery Management Council (NPFMC) have a harvest cap for Chinook salmon at 29, 323 as the preferred alternative for the Salmon Bycatch Environmental Impact Statement. This recommendation correlates with Alternative 2 (Hard Cap), option 1(iv) found on page 21 of the BSAI Salmon Bycatch EIS Initial Review Draft – May 15, 2008 in Table 2.2. These cap numbers represent the pre-2002 5-year average (1997 – 2001) salmon bycatch levels. The Regional Council strongly felt these caps are reasonable considering the present challenging situations with Western Alaska in-river fisheries. The Alaska Board of Fisheries determined in 2000 the Yukon Chinook salmon to be a Stock of Yield Concern and this determination was held up in 2004 and in 2007. The Yukon River Chinook salmon stock continues to meet the definition of a yield concern based on low harvest levels from 1998-2006.

Rural fishermen (subsistence and commercial) across the Kuskokwim and Yukon River drainages are looking toward another difficult Chinook salmon fishing season because of the below average run projections and the ever-increasing high fuel costs. In-river fishermen no longer can afford to strain the waters in the hope of harvesting enough fish to meet his subsistence needs for his family and his community. He/she has to fish as efficiently and effectively within the fishing period allowed. Studies in the 1990s showed that over 56 percent of the Chinook salmon bycatch in the BSAI pollock fishery are of Western Alaskan origin, with approximately 40 percent of those Yukon River stocks (Kate Myers, et. al, *Estimates of the Bycatch of Yukon River Chinook Salmon in U.S. Groundfish Fisheries in the Eastern Bering Sea, 1997-1999* (March 2004)). These fish are needed to meet escapement needs as well as the subsistence and commercial needs of rural fishermen in Western Alaska. The bycatch waste of 29,000 Yukon River-bound Chinook salmon, for example, is reprehensible and unacceptable. A continuation of this level of salmon bycatch will place an undue burden on the backs of in-river fishermen that have had below average salmon returns since 1999.

The 2007 salmon bycatch increases reflects the decline in pollock biomass and the need for increasing fishing effort to attain harvest quotas. The lower catch of pollock per unit of effort increases the salmon bycatch due to the lower pollock to salmon ratio. The North Pacific Fishery Management Council (NPFMC) needs to give serious attention to the over-harvest of the pollock stock itself. The pollock A&B seasons need to be reduced (effort reduction) as part of the salmon bycatch reduction plan. The entire fishing area in question should be divided into ten areas, or "districts", with each area's cap based on the total salmon bycatch amount divided by ten. When an area reaches its cap, the area is closed and the fleet must move to the remaining open areas. Time-area closures for Chinook and Chum salmon (savings areas) should also be re-implemented for the districts that historically have high bycatch. If the total fishery bycatch cap is attained, the pollock season closes.

The NPFMC's mandate requires it to gain control of and manage this bycatch issue. This is a critical time to re-evaluate past mistakes and manage for the conservation of the pollock fishery resource, as well as provide for a necessary reduction in the bycatch of salmon. It is incumbent on the NPFMC to take conservation measures immediately.

Thank you for the opportunity to share our Regional Council's recommendation on the preferred alternative for the Salmon Bycatch EIS. Please keep me and my Regional Council in the information loop through our regional coordinator, Vince Mathews (contact information in letterhead). I can be reached at 1-907-678-2007; email: wisemanwolf@aol.com.

Sincerely,

Jack Reakoff

Jack Reakoff, Chair

cc: Eric Olson, Chair, North Pacific Fishery Management Council
Michael R. Feagle, Chair, Federal Subsistence Board

Peter J. Probasco, Assistant Regional Director, Office of Subsistence Management
Rod Campbell, Fisheries Liaison, OSM
Steve Klein, Chief, Fisheries Division, OSM
Ann Wilkinson, Chief, Council Coordination Division, OSM
Jill Klein, Executive Director, Yukon River Drainage Fisheries Association
David Bedford, Deputy Commissioner of Fisheries, ADF&G
Sue Entsminger, Chair, Eastern Interior Alaska Subsistence Regional Advisory Council
Lester Wilde, Chair, Yukon-Kuskokwim Delta Subsistence Regional Advisory Council
Western Interior Alaska Subsistence Regional Advisory Council members

AGENDA C-2
Supplemental
JUNE 2008

UNITED STATES DEPARTMENT OF C
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
P.O. Box 21668
Juneau, Alaska 99802-1668

May 30, 2008

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N.P.F.M.C.

Eric Olson, Chairman
North Pacific Fishery Management Council
605 West 4th Avenue, Suite 306
Anchorage, Alaska 99501-2252

Dear Chairman Olson:

At its April 2008 meeting, the North Pacific Fishery Management Council (Council) requested advice about whether the Council's Chinook salmon bycatch management measures could include a fee per salmon that would be collected by the National Marine Fisheries Service (NMFS). Specifically, the Council asked whether a fee per salmon could be used to provide an incentive to reduce bycatch and to support research assessing impacts and methods to further reduce salmon bycatch.

NOAA General Counsel advises that the Magnuson-Stevens Fishery Conservation and Management Act (MSA) provides NMFS limited authority to impose "fees" and "fines." The MSA uses the terms fees and fines for different purposes. Generally, the Council and NMFS may impose fees to recover only the costs of administering the relevant fishery program. Section 304(d)(1) specifically limits the amount of fees to "the administrative costs incurred in issuing the permits." Similarly, in the context of limited access privilege programs, NMFS and the Council must impose fees "that will cover the costs of management, data collection and analysis, and enforcement activities." Thus, the MSA does not authorize NMFS or the Council to impose a fee on a per-salmon basis or collect fees to support research for reducing salmon bycatch. Instead, it allows the assessment of a fee only to recover the costs of administering certain fishery programs.

NOAA General Counsel further advises that NMFS cannot require that a salmon bycatch intercooperative agreement (ICA) contain management measures that NMFS does not have the authority to require directly. Therefore, NMFS cannot implement regulations that would expressly require a salmon bycatch ICA to include fees on salmon bycatch, even if such fees were not directly assessed by NMFS.

Section 313(g)(1) of the MSA authorizes the Council and NMFS to impose a "system of fines" on a per-salmon basis and to use those fines to offset the costs of bycatch reduction research. The fine, however, is limited to $25,000 per vessel per season. The use of the term "fine" in section 313(g)(1) makes this provision a penalty-based program. A concern with a penalty-based program is that it creates greater problems of proof. To prove a violation, NOAA General Council would have to demonstrate that the vessel in question had exceeded a specific bycatch level. Our experience with the Vessel Incentive Program shows that successful prosecution of this type of case requires a commitment of agency resources that is difficult to sustain. Further, since an enforcement action can take a significant amount of time to bring to successful conclusion, there can be no certainty that any fine would be recovered quickly. In short, since the deterrent effect of the $25,000 fine per vessel per season under section 313(g)(1) is relatively inconsequential and given the length of time and agency resources necessary for successful investigations and prosecutions of violations of a fine-per-salmon-penalty program, any prosecution(s) under that program would not likely result in swift enforcement of salmon bycatch exceedances or the collection of substantial and timely funds for research.

Sincerely,

Robert D. Mecum
Acting Administrator, Alaska Region

Bering Sea Pollock Industry Analysis Recommendation

At-sea Processors Association and United Catcher Boats

Case Study "Bookend" Alternatives

	Alt. One	Alt. Two
Hard Cap	87,500	48,700
Triggered Closure	68,100	None
A-B Season Split	70-30	50-50
Sector Spilt	Historic 3-Year	Proportional to Pollock Allocation
Rollovers	Allowed	Prohibited
Transfers	Allowed at 90 percent	Allowed at 50 percent

MEMO

JUNE 2, 2008

TO: NORTH PACIFIC FISHERY MANAGEMENT COUNCIL

FROM: JOE PLESHA

RE: SALMON BYCATCH PROPOSAL

INTRODUCTION

It is important for the pollock fleet to reduce its bycatch of Chinook salmon to the extent practicable. To accomplish this goal there needs to be strong incentives for individual vessels to take all reasonable steps to avoid Chinook salmon. With that in mind, I have tried to develop a proposal that provides economic incentives for the each vessel in the pollock fleet to avoid salmon.

PROPOSAL

1. Industry Funded Incentive. The concept of this provision is to reward those vessels that have low Chinook salmon bycatch relative to other vessels in the pollock fleet. Before the season starts each pollock-harvesting vessel would have a deficit on its gross stock balance sheet of one penny per pound for each pound of pollock harvested. The vessel does not pay anything in, but it starts the season with the knowledge that one penny will be deducted from the ex vessel price of its pollock. Taking the penny off of the vessel's gross stock gives both the IFQ/vessel owner (Under the AFA, pollock harvesting rights are permanently tied to the vessel.) and the crew on the vessel incentive to reduce bycatch.

With one penny per pound of pollock the inshore sector will develop a fund of just short of $10,000,000 to reward clean fishing practices. The Catcher/Processor sector will have a fund of over $7,900,000 and the Mothership sector will generate a fund of about two million dollars. That is collectively almost $20,000,000 available to influence fishing behavior. This money is put into a "Salmon Bycatch Conservation Fund" (call it "the Fund").

The Fund works as follows: Every vessel will have a Chinook salmon bycatch rate depending upon the number of Chinook salmon caught per Metric Ton of pollock. The vessel with the very highest bycatch rate would receive nothing from the Fund. Vessels with a bycatch below the highest rate would receive money back from the Fund based on the following formula. First, you subtract the vessel's bycatch rate from the vessel with the highest bycatch rate to determine the "Chinook Undercatch Rate." Then you multiply the "Undercatch Rate" for that vessel by its actual harvest of pollock to determine the actual number of Chinook salmon it caught less than the worst vessel assuming all vessels caught the same amount of pollock. Next you determine the Percent of Chinook salmon <u>not</u> caught per Metric Ton that vessel had relative to all other vessels in that sector. Please note this must be sector specific, as each sector has inherently different bycatch rates. The percent of Chinook salmon not caught by that vessel is multiplied by the total amount in the Fund to determine the rebate that vessel will receive.

Figure one is a snapshot of the inshore fleet model developed to understand the impact of this component of the proposal. I modeled an inshore fleet of fifty vessels. The snapshot below assumes a pollock TAC of a million Metric Tons and a total industry Chinook salmon bycatch of only 15,000 fish, 65% of which the inshore sector happened to harvest.

Inshore Vessels	Percent of Inshore Harvest	Actual Pollock Harvest (MT)	Contribution to SBCF	Chinook Bycatch Number	Chinook Bycatch Rate/MT	Chinook Undercatch Rate	Total "Under-Catch" of Chinook	Percent of Undercatch	SBCF Rebate	SBCF Profit/ Loss
1	1.58%	7,110	$156,747	298	0.0419039	0.0104948	75	0.5395802	$53,529	-$103,218
2	3.40%	15,300	$337,304	168	0.0110032	0.0413955	633	4.57989151	$454,348	$117,044
3	0.30%	1,350	$29,762	18	0.0130951	0.0393036	53	0.38368748	$38,064	$8,302
4	1.40%	6,300	$138,890	33	0.0051745	0.0472242	298	2.15137444	$213,427	$74,537
5	1.81%	8,145	$179,565	126	0.0155118	0.0368869	300	2.17257509	$215,530	$35,966
6	0.79%	3,555	$78,374	54	0.0151465	0.0372522	132	0.95763994	$95,003	$16,629
7	0.68%	3,060	$67,461	111	0.0361474	0.0162513	50	0.35959987	$35,674	-$31,787
8	1.30%	5,850	$128,969	192	0.0327423	0.0196564	115	0.83151835	$82,491	-$46,478
9	0.67%	3,015	$66,469	64	0.0213559	0.0310428	94	0.67679837	$67,142	$673
10	3.80%	17,100	$376,987	646	0.0378056	0.0145931	250	1.80449482	$179,015	-$197,972
11	2.13%	9,585	$211,311	341	0.0355676	0.016831	161	1.16657955	$115,731	-$95,580
12	0.98%	4,419	$97,421	67	0.0152681	0.0371306	164	1.18649916	$117,707	$20,285
13	1.50%	6,750	$148,811	110	0.0162427	0.036156	244	1.76480002	$175,077	$26,267
14	2.80%	12,600	$277,780	176	0.0139918	0.0384069	484	3.49937782	$347,156	$69,376
15	3.10%	13,950	$307,542	241	0.0172418	0.0351569	490	3.54647047	$351,828	$44,286
16	0.51%	2,295	$50,596	34	0.0147699	0.0376288	86	0.62447325	$61,951	$11,355
17	4.60%	20,700	$456,352	636	0.0307449	0.0216538	448	3.24127051	$321,550	-$134,802
18	0.96%	4,320	$95,239	93	0.0215122	0.0308865	133	0.96485718	$95,719	-$480
19	0.57%	2,565	$56,548	65	0.0253555	0.0270432	69	0.50159944	$49,761	-$6,787
20	3.80%	17,100	$376,987	166	0.0097027	0.042696	730	5.27951454	$523,754	$146,768
21	6.50%	29,250	$644,846	871	0.0297924	0.0226063	661	4.78152358	$474,351	-$170,494
22	2.10%	9,450	$208,335	217	0.0229979	0.0294008	278	2.00910423	$199,313	-$9,021
23	1.10%	4,950	$109,128	145	0.0293901	0.0230085	114	0.82357936	$81,703	-$27,424
24	2.13%	9,585	$211,311	97	0.0101694	0.0422293	405	2.92695901	$290,369	$79,058
25	0.65%	2,925	$64,485	147	0.0503471	0.0020516	6	0.04339376	$4,305	-$60,180
26	2.60%	11,700	$257,938	60	0.0050874	0.0473113	554	4.00278158	$397,096	$139,158
27	3.00%	13,500	$297,621	117	0.008662	0.0437367	590	4.26963964	$423,570	$125,949
28	2.40%	10,800	$238,097	374	0.0346448	0.0177539	192	1.38652549	$137,550	-$100,547
29	1.80%	8,100	$178,573	323	0.0398458	0.0125529	102	0.73525817	$72,941	-$105,631
30	0.87%	3,915	$86,310	128	0.0327687	0.01963	77	0.55572888	$55,131	-$31,179
31	0.41%	1,845	$40,675	75	0.0405246	0.0118741	22	0.15841881	$15,716	-$24,959
32	4.11%	18,495	$407,741	211	0.011435	0.0409637	758	5.47853045	$543,498	$135,757
33	7.10%	31,950	$704,370	1,017	0.0318434	0.0205553	657	4.74904592	$471,129	-$233,241
34	0.79%	3,555	$78,374	16	0.0043797	0.048019	171	1.23442178	$122,461	$44,087
35	2.90%	13,050	$287,700	48	0.0036911	0.0487076	636	4.59640105	$455,986	$168,286
36	3.64%	16,380	$361,113	445	0.0271598	0.0252389	413	2.98947845	$296,571	-$64,542
37	1.60%	7,200	$158,731	96	0.0132903	0.0391084	282	2.03616898	$201,998	$43,267
38	1.93%	8,685	$191,470	147	0.0169563	0.0354424	308	2.22589262	$220,820	$29,350
39	2.78%	12,510	$275,795	423	0.0338375	0.0185612	232	1.67909512	$166,575	-$109,221
40	4.21%	18,945	$417,661	163	0.0086037	0.043795	830	5.99970661	$595,201	$177,540
41	0.53%	2,385	$52,580	42	0.0176807	0.034718	83	0.59876176	$59,400	$6,820
42	0.73%	3,285	$72,421	11	0.003456	0.0489427	161	1.16261007	$115,337	$42,916
43	1.67%	7,515	$165,676	321	0.0426886	0.0097101	73	0.52767176	$52,348	-$113,328
44	0.70%	3,137	$69,147	42	0.0134961	0.0389026	122	0.88233688	$87,532	$18,385
45	1.17%	5,265	$116,072	276	0.0523987	0	0	0	$0	-$116,072
46	0.28%	1,256	$27,679	3	0.0027128	0.0496859	62	0.45108766	$44,750	$17,071
47	1.83%	8,235	$181,549	106	0.0129198	0.0394789	325	2.35093159	$233,224	$51,675
48	1.72%	7,740	$170,636	82	0.010561	0.0418377	324	2.34163938	$232,302	$61,666
49	1.15%	5,175	$114,088	70	0.0135077	0.038891	201	1.45536012	$144,379	$30,291
50	0.92%	4,140	$91,270	35	0.0084619	0.0439368	182	1.3153453	$130,489	$39,218
	100.00%	449,991	$9,920,502	9,750			13,829	100	$9,920,502	$0

Figure one. Model of a 50 vessel inshore fleet with industry-wide bycatch of 15,000 Chinook salmon showing the Salmon Bycatch Conservation Fund rebate formula.

Figure two below is the offshore sector under the same pollock TAC and the same industry-wide Chinook bycatch of 15,000 fish, 29% of which were taken by the offshore catcher/processor sector.

Offshore CP Vessels	Percent of CP Harvest	Actual Pollock Harvest (MT	Contribution to SBCF	Chinook Bycatch Number	Chinook Bycatch Rate/MT	Chinook Undercatch Rate	Total 'Undercatch' of Chinook	Percent of Undercatch	SBCF Rebate	SBCF Profit/ Loss
1	8.01%	28,836	$635,718	223	0.0077374	0.02829453	816	8.9938755	$713,819	$78,100
2	5.30%	19,080	$420,638	182	0.0095456	0.02648626	505	5.5706814	$442,129	$21,492
3	4.30%	15,480	$341,272	126	0.008148	0.02788388	432	4.7580992	$377,637	$36,365
4	11.25%	40,500	$892,863	408	0.0100671	0.02596478	1,052	11.591747	$920,004	$27,141
5	8.36%	30,096	$663,496	113	0.0037625	0.03226942	971	10.705556	$849,670	$186,173
6	4.36%	15,696	$346,034	150	0.0095328	0.02649913	416	4.5849004	$363,891	$17,857
7	3.21%	11,556	$254,764	195	0.0168919	0.01913997	221	2.4381364	$193,508	-$61,256
8	1.30%	4,680	$103,175	51	0.0108333	0.0251986	118	1.2999647	$103,175	-$1
9	4.52%	16,272	$358,733	174	0.0107044	0.02532754	412	4.5430054	$360,566	$1,833
10	3.80%	13,680	$301,589	248	0.0181562	0.01787575	245	2.6956255	$213,944	-$87,645
11	2.89%	10,404	$229,367	47	0.0045335	0.03149838	328	3.6124165	$286,707	$57,341
12	0.98%	3,535	$77,937	19	0.0052968	0.03073506	109	1.1977257	$95,060	$17,123
13	9.87%	35,532	$783,338	469	0.0132098	0.02282209	811	8.9389057	$709,456	-$73,883
14	2.80%	10,080	$222,224	363	0.0360319	0	0	0	$0	-$222,224
15	11.40%	41,040	$904,768	637	0.0155261	0.02050576	842	9.2766801	$736,264	-$168,504
16	5.69%	20,484	$451,590	278	0.0135742	0.02245769	460	5.0709475	$402,467	-$49,123
17	6.98%	25,128	$553,972	127	0.0050688	0.03096313	778	8.5765406	$680,696	$126,724
18	4.98%	17,928	$395,241	89	0.0049366	0.03109527	557	6.145192	$487,727	$92,486
	100.00%	360,007	$7,936,719	3,900	0.0108331	0.02519878	9,072	100	$7,936,719	$0

Figure two. Model of a 18 vessel offshore catcher/processor fleet with industry-wide bycatch of 15,000 Chinook salmon showing the Salmon Bycatch Conservation Fund rebate formula.

With these models you can calculate the value of each Chinook salmon at different bycatch levels. In other words, you can calculate the amount each single Chinook salmon cost a vessel in terms of how much less of a rebate that vessel received from the Fund. Below are the calculations of how much each salmon costs a vessel at Chinook salmon industry-wide bycatch levels of 5,000, 10,000 20,000, 30,000, 50,000, 70,000 and 87,500 salmon.

		Highest Inshore Bycatch Rat	0.0174662
SBCF Rate ($/Pound)	$0.01	**Inshore Cost per Chinook**	**$2,152.12**
Total Chinook Bycatch	**5,000**		
		Highest C/P Bycatch Rate	0.0120106
		C/P Cost per Chinook	**$2,624.65**

		Highest Inshore Bycatch Rat	0.0349325
SBCF Rate ($/Pound)	$0.01	**Inshore Cost per Chinook**	**$1,076.06**
Total Chinook Bycatch	**10,000**		
		Highest C/P Bycatch Rate	0.0240213
		C/P Cost per Chinook	**$1,312.33**

SBCF Rate ($/Pound)	$0.01	Highest Inshore Bycatch Rat	0.0698649
Total Chinook Bycatch	**20,000**	**Inshore Cost per Chinook**	**$538.03**
		Highest C/P Bycatch Rate	0.0480425
		C/P Cost per Chinook	**$656.16**

SBCF Rate ($/Pound)	$0.01	Highest Inshore Bycatch Rat	0.1047974
Total Chinook Bycatch	**30,000**	**Inshore Cost per Chinook**	**$358.69**
		Highest C/P Bycatch Rate	0.0720638
		C/P Cost per Chinook	**$437.44**

SBCF Rate ($/Pound)	$0.01	Highest Inshore Bycatch Rat	0.1746623
Total Chinook Bycatch	**50,000**	**Inshore Cost per Chinook**	**$215.21**
		Highest C/P Bycatch Rate	0.1201063
		C/P Cost per Chinook	**$262.47**

SBCF Rate ($/Pound)	$0.01	Highest Inshore Bycatch Rat	0.2445272
Total Chinook Bycatch	**70,000**	**Inshore Cost per Chinook**	**$153.72**
		Highest C/P Bycatch Rate	0.1681488
		C/P Cost per Chinook	**$187.48**

SBCF Rate ($/Pound)	$0.01	Highest Inshore Bycatch Rat	0.3056591
Total Chinook Bycatch	**87,500**	**Inshore Cost per Chinook**	**$122.98**
		Highest C/P Bycatch Rate	0.2101861
		C/P Cost per Chinook	**$149.98**

If the belief is that this is not incentive enough, even adding a half a cent per pound of pollock to the Fund significantly increases the cost per salmon.

SBCF Rate ($/Pound)	**$0.015**	Highest Inshore Bycatch Rat	0.0174662
Total Chinook Bycatch	**5,000**	**Inshore Cost per Chinook**	**$3,228.18**
		Highest C/P Bycatch Rate	0.0120106
		C/P Cost per Chinook	**$3,936.98**

SBCF Rate ($/Pound)	**$0.015**	Highest Inshore Bycatch Rat	0.0349325
Total Chinook Bycatch	**10,000**	**Inshore Cost per Chinook**	**$1,614.09**
		Highest C/P Bycatch Rate	0.0240213
		C/P Cost per Chinook	**$1,968.49**

		Highest Inshore Bycatch Rat	0.0698649
SBCF Rate ($/Pound)	**$0.015**	**Inshore Cost per Chinook**	**$807.04**
Total Chinook Bycatch	**20,000**		
		Highest C/P Bycatch Rate	0.0480425
		C/P Cost per Chinook	**$984.24**

		Highest Inshore Bycatch Rat	0.1047974
SBCF Rate ($/Pound)	**$0.015**	**Inshore Cost per Chinook**	**$538.03**
Total Chinook Bycatch	**30,000**		
		Highest C/P Bycatch Rate	0.0720638
		C/P Cost per Chinook	**$656.16**

		Highest Inshore Bycatch Rat	0.1746623
SBCF Rate ($/Pound)	**$0.015**	**Inshore Cost per Chinook**	**$322.82**
Total Chinook Bycatch	**50,000**		
		Highest C/P Bycatch Rate	0.1201063
		C/P Cost per Chinook	**$393.70**

		Highest Inshore Bycatch Rat	0.2445272
SBCF Rate ($/Pound)	**$0.015**	**Inshore Cost per Chinook**	**$230.58**
Total Chinook Bycatch	**70,000**		
		Highest C/P Bycatch Rate	0.1681488
		C/P Cost per Chinook	**$281.21**

		Highest Inshore Bycatch Rat	0.3056591
SBCF Rate ($/Pound)	**$0.015**	**Inshore Cost per Chinook**	**$184.47**
Total Chinook Bycatch	**87,500**		
		Highest C/P Bycatch Rate	0.2101861
		C/P Cost per Chinook	**$224.97**

The factors that determine the amount that each salmon are worth include the cents per pound of pollock harvest that are contributed to the Fund, and the Standard Deviation of the bycatch rates. (This makes sense in that, if the entire fleet had the exact same bycatch rate except for one vessel that had a single salmon less bycatch, that single salmon would be worth the value of the entire Fund.)

I have used the actual Standard Deviation for the inshore sector model (using the Standard Deviation from the Akutan Cooperative), but do not have a large enough sample size to know if I have the correct Standard Deviation for the catcher/processor model.

I believe this is interesting because if everyone has incentives to avoid salmon, bycatch rates would likely become ever more similar and the value of each salmon, in terms of the amount of rebate from the Fund it cost, would increase!

The concept of the Salmon Bycatch Conservation Fund has little net cost to the industry as a whole. The cost is borne by those who have high bycatch rates relative to other vessels in the sector.

This proposal is not connected with the salmon bycatch allowance that each vessel might receive, nor any fees imposed on the bycatch of all Chinook. There are no sector allocations to consider nor does the transfer of salmon bycatch allowance to, or from, a vessel impact the proposal.

A. Concerns With Industry Funded Incentive Concept. One question that has been raised regarding this Industry Funded Incentive concept is that it will discourage cooperation between vessels. There is currently a thriving "market" for information between individual fishermen, both within and between cooperatives. The information shared covers fishing conditions, roe quality and quantity as well as other factors of economic interest to vessels. These are reciprocal arrangements.

Under the Industry Funded Incentive proposal, the concern is that there will be less incentive to share information about the location of salmon bycatch. For that reason it would be appropriate to require continual reporting of bycatch. In addition, if you look at the actual costs to an individual vessel for disclosing the location of Chinook bycatch to another vessel, it is relatively small. If that vessel expects to be reciprocally benefited by being warned when there are salmon in the area, it appears there would be a net benefit to continue to share information about salmon bycatch with other vessels in the fleet.

For example, assume that it is known that bycatch for the year will only be 5,000 Chinook salmon such that each salmon is worth $2,152 in rebates from the Fund. Fisherman A warns fisherman B of Chinook in the area. Fisherman B takes advantage of this information and fishes elsewhere. If one Chinook salmon was avoided by fisherman B, it would impose a cost on Fisherman A. This would be expected to cost fisherman A 1/5,000 of $2,152 = $0.43. It would result in a gain to fisherman B, however, of $2,152. Fisherman A would not share the information with fisherman B if he did not expect reciprocal behavior from fisherman B. Now suppose that fisherman B reciprocates to fisherman A later on in the season and fisherman A successfully avoids one Chinook salmon. Fisherman A receives a benefit of $2,152 at a cost to fisherman B of $0.43. The following table summarizes both transactions.

	Costs ($)	Benefit ($)	Profit ($)
Fisherman A	$0.43	$2,152	$2,151.57
Fisherman B	$0.43	$2,152	$2,151.57

In addition to something like this Industry Funded Incentive, there are two additional elements that should be included in any proposal to reduce Chinook salmon bycatch.

2. Funding of Research. It would be appropriate for the industry to also provide funds to support salmon research that would help understand, manage and enhance Chinook salmon runs in Western Alaska. The funding of this research could also be structured in a way that it encourages vessels to avoid salmon bycatch.

3. Market-Based Transfer of Bycatch Allowance. The critical element to providing economic incentives to avoid bycatch is that any bycatch allowance be transferred based on its value. The potential for bycatch allowance having value will, in-and-of itself, create a strong motivation to avoid salmon from the first day of the pollock fishing season.

If the pollock TAC is 1,000,000 Metric Tons and the Chinook bycatch cap of 87,500 is being approached, that means that the bycatch rate is in excess of .0875 Chinook per Metric Ton of pollock. Still a single Chinook salmon will allow its owner to harvest about ten Metric Tons of pollock. Given that the lease rate on pollock is about $300 per Metric Ton, each salmon will have a value of about $3,000 if there is fear that the cap of 87,500 will be reached. Because no one can be sure of the abundance of Chinook salmon on the first days of the fishing season, it is likely that the mere chance of approaching the cap will influence behavior.

There is, however, at least one Suboption in the list of Alternatives that would seriously diminish the economic incentive to avoid Chinook caused by the market-based transfers of bycatch allowance.

A. Precluding the rolling-over of unused salmon from the pollock "A" season to the pollock "B" season.

The alternative to prohibit the rollover of salmon bycatch allowance between A and B pollock seasons is intended to conserve Chinook salmon, but I believe this alternative would significantly reduce the economic incentives for the fleet to avoid salmon bycatch.

The ability to transfer based on market prices creates a significant incentive to avoid salmon, even in years when the cap is not approached. That is because when the A and B seasons start, no one can be sure that the cap will not be reached. Or, to take it to the individual vessel, a skipper and crew does not know whether its particular vessel will exceed its bycatch allowance.

Obviously as the A season progresses and it appears there is even a modest chance to hit the cap, salmon will be extremely valuable and the fleet will take extraordinary efforts to avoid bycatch.

But even if the A season progresses and bycatch is low, the cap will still provide a strong incentive for an individual vessel to avoid salmon. Salmon bycatch rates (and the percentage of bycatch taken) can be highly variable between A and B seasons. A vessel will try to conserve salmon in the A season just so that it has some additional protection for the B season.

As an example, in 1998, the inshore sector took only 14% of its total Chinook bycatch during the A season, and 86% during the B season. That year the industry-wide total Chinook bycatch was about 51,000 salmon. Similarly in the year 1997 the inshore sector took 18% of its total Chinook salmon bycatch amount during the A season. As late as 2005, the inshore sector took only 29% of its Chinook salmon bycatch during the A season.

If I am a vessel captain and I notice that bycatch is low during the A season, and I know every salmon I save during the A season will rollover to the B season, I will have a large incentive to continue to avoid salmon because I am gaining protection for the chance of abnormally high salmon abundance during the B season. If, on the other hand, I know that salmon I save during the A season will simply be taken away, I have no additional incentive to avoid salmon bycatch.

My point is that during times of extremely low Chinook bycatch during the A season, allowing unused bycatch allowance to rollover to the B season provides a very strong incentive for the fleet to continue to avoid salmon. This is because the fleet knows there is a reasonable chance that salmon abundance will be worse during the B season and they may need their unused bycatch allowance for the B season.

It is important it is to have all of the economic incentives working together so that collectively they create a very strong incentive for the fleet to avoid salmon. Not allowing unused salmon bycatch allowance to rollover to the B season takes one of the stronger incentives and removes it from the table. Not allowing rollover of unused bycatch will result in the increase of salmon bycatch and, therefore, I believe it is in the Council's interest to oppose the proposal.

FINAL COMMENT ON HARD CAP

I want to emphasize how extremely fearful the industry is of a hard cap being established which would close the pollock fishery prior to the TAC being harvested, and how important the 87,500 cap level is to the industry.

It seems to me that it the Council's interest is to make sure the pollock industry is taking all reasonable steps to avoid salmon, and it is not in the anyone's interest to prematurely shut down the pollock fishery. If the Council is confident that the incentives are truly in place so that the industry will be taking all reasonable measures to avoid bycatch of Chinook salmon, what benefit is a lower hard cap?

The intent of creating strong economic incentives to avoid salmon bycatch is so that the bycatch levels do not approach the cap. I am not a biologist, but given my understanding of the variability of nature, it seems possible that at some time in the future there may be an abundance of Chinook salmon, both in the ocean and returning to Western Alaska.

Perhaps despite all efforts the pollock industry cannot avoid the Chinook bycatch cap. Yet, under this example, there is not a large cultural or biological concern. Assuming that the pollock industry is doing what it can to avoid Chinook, it should not be closed any earlier than the maximum number allowed by the analysis, in my opinion. I therefore urge the Council to allow for a cap of 87,500 as long as the correct incentive program, in its view, is implemented by the industry.

C -2
Brent Paine
S. Madsen

Bering Sea Pollock Industry Analysis Recommendation

At-sea Processors Association and United Catcher Boats

Case Study "Bookend" Alternatives

	Alt. One	Alt. Two
Hard Cap	87,500	48,700
Triggered Closure	68,100	None
A-B Season Split	70-30	50-50
Sector Spilt	Historic 3-Year	Proportional to Pollock Allocation
Rollovers	Allowed	Prohibited
Transfers	Allowed at 90 percent	Allowed at 50 percent

C-2

May 24, 2008

Southern Norton Sound Fish and Game Committee
Art C. Ivanoff
Box 49
Unalakleet, Alaska 99684

North Pacific Fishery Management Council
Attention: Eric Olsen
605 West 4th Avenue, Suite 306
Anchorage, Alaska 99501

RE: ADDENDUM TO THE PETITION CALLING FOR ZERO TOLERANCE OF ALL BY CATCH OF SALMON SPECIES AND IMPLEMENTING A NEW PROCESS TO REGULATE BY CATCH OF THE SALMON SPECIES.

Dear Mr. Olsen:

The Southern Norton Sound Fish and Game Advisory Committee (SNSAC) submitted a petition in March of 2008 to the North Pacific Fisheries Management Council (Council). We are calling on a new process to regulate, discourage and reduce bycatch of all salmon species. SNSAC reiterates to the Council a call to adopt a new and effective process which calls for;

1. **A zero tolerance policy toward bycatch of all salmon species.** Basic conservation issues and subsistence needs in the AYK are under threat with the current bycatch rate. A zero tolerance approach needs teeth to ensure full compliance and enforcement.

2. **A new process to levy fines that discourage bycatch of all salmon species.** SNSAC is proposing a new regulation that levies a fine of $100,000 for every 1,000 salmon taken in the BSAI. This includes bycatch of chinook, coho, chum, or sockeye salmon. Fines levied against the industry must be obligated to the AYK region using the Bering Sea Fishermen's Association or other fishery related institution.

It is clearly evident that meeting basic escapement goals have been plaguing the Norton Sound Subdistricts 5 and 6 which have impacted commercial, sport and subsistence uses (see below). The Alaska Department of Fish and Game, Sport Fish Division released four (4) Emergency Orders beginning on July 02, 2003 and running up to July 6, 2007. We have referenced one Emergency Order here as outlined;

1. **DEPARTMENT PROHIBITS THE RETENTION OF KING AND CHUM SALMON IN ALL WATERS OF THE UNALAKLEET AND SHAKTOOLIK RIVERS.** The Emergency Order was based on escapement counts along both rivers systems as outlined;

   Escapement counts of king and chum salmon at the North River tower on the Unalakleet River have been low with only 78 king and 88 chum salmon counted through June 30, 2003. During 2001 and 2002, an average of 229 king and 477 chum salmon had been counted by this date. The resulting escapement goal for king salmon were 1,337 (2001) and 1,484 (2002) king salmon, achieving the escapement goal for king salmon of 1,200-2,400 past the tower. Although it is still early in the run, it appears that the escapement goal for king salmon will not be reached in 2003.

This was in fact the case, the Norton Sound Subdistricts 5 and 6 have not been able to reach escapement of between 1,200-2,400 kings until in 2007. Doubt remains by local residents whether Norton Sound Subdistricts 5 and 6 reached the escapement goals as indicated by the Alaska Department of Fish and Game.

> The Department does not have a stock assessment project in the Shaktoolik River, but runs of king and chum salmon generally cycle in accordance with Unalakleet stocks. Subsistence catches at both locations have been lower than in the past years both in the ocean and respective rivers.

Since 2003, the Alaska Department of Fish and Game resorted to closing down subsistence fishing due to efforts in reaching escapement goals. The Alaska Department of Fish and Game approached the community of Unalakleet in February of 2008 suggesting a moratorium on subsistence fishing of king salmon. The commercial fleet from the sub-districts of Shaktoolik and Unalakleet have not fully participated or benefited from the chinook salmon fisheries since 1998. Since that time period, commercial fisheries have been nearly non-existent. Sport fishing along the river systems has been severely impacted and reduced.

In 2006, the Alaska Department of Fish and Game released a report entitled; **Norton Sound Shaktoolik and Unalakleet Subdistricts Chinook Salmon Stock Status and Action Plan, 2007; A Report to the Alaska Board of Fisheries.** The report documents the following;

> In response to the guidelines established in the *Policy For Management of Sustainable Fisheries* (SSFP; 5 ACC 39.222), the Alaska Board of Fisheries (BOF) classified the Norton Sound Subdistricts 5 (Shaktoolik) and Subdistrcits 6 (Unalakleet) Chinook salmon *Oncorhynchus tshawytscha* stock as a stock of concern, specifically a yield stock concern arising from a chronic inability, despite the use of specific management measures, to maintain expected yields, or harvestable surpluses, above a stock's escapement needs;

Previous methods to reduce bycatch in the BSAI have been a disaster. We cannot wait another two years for the process to reduce bycatch; we need different methods that lead to quicker results. We are asking the Council to invoke emergency orders that will take effect immediately. Of all the variables possibly associated with the decline of the AYK Chinook salmon such as climate change, competition of food sources and bycatch, man has control of only one, bycatch.

We believe these measures are warranted.

Sincerely,

Art C. Ivanoff
Southern Norton Sound AC

Cc:	Senator Ted Stevens	Senator Lisa Murkowski
	Congress Don Young	Governor Sarah Palin

C-2

STATEMENTS TO THE NORTH PACIFIC FISHERY MANAGEMENT COUNCIL

Good morning/afternoon Mr. Chairman and Members of the Council:

Thank you very much for this opportunity to speak before you. My name is Raymond Oney. I'm the Yukon-Kuskokwim Delta Subsistence Regional Advisory Council member from Alakanuk in the lowest Yukon River.

The Yukon-Kuskokwim Delta Subsistence Regional Advisory Council was established in 1993 pursuant to the Alaska National Interests Lands Conservation Act (ANILCA) as amended when Congress found the national interest in the proper regulation, protection, and conservation of fish and wildlife on the public lands in Alaska and continuation of the opportunity for a subsistence way of life by residents of rural Alaska.

I direct my statements to the North Pacific Fishery Management Council and its staff on behalf of the Yukon-Kuskokwim Delta Subsistence Regional Advisory Council and the rural people I represent in my region. We are commenting on the scope of the Environmental Impact Statement (EIS) on salmon bycatch reduction measures in the Bering Sea // Aleutian Islands (BSAI) management areas.

The in-river and coastal subsistence users in the Yukon-Kuskokwim Delta are adversely affected by the Pollock Fishery salmon bycatch harvests of Chinook salmon, chum salmon which are important for subsistence use and equally important for the commercial users of salmon for economic dependence by approximately 8,354 subsistence and commercial salmon users in the lower Yukon River and the coastal users near the Yukon River. The steadily increase of salmon bycatch in the Bering Sea / Aleutian Islands pollock fisheries, threatens our way of life in Western Alaska. Salmon provides a primary source of food for us, and the commercial salmon harvest provides the only means of income for many who live in the remote villages of the Yukon river. Salmon is an irreplaceable resource that must be protected by all means.

I'm certain that you have received many letters from throughout the State in response to the Notice of Intent for the Environmental Impact Statement with respect to the intent of regulations to be in place by year 2010 on pollock fishing season. It's my understanding that the Council has proposed a very short 45-day comment period between July and August 2008. Please be aware that approximately 95% (approx. 7,936 people) of the affected users in lower Yukon and coastal sub-region may not be aware of your intent to allow public review and comment, as a result many of their comments may not be received until comment period is over.

In the lower Kuskokwim sub-region that I represent, there are 16 communities who depend on salmon for winter food supply. There are approximately 12,071 rural residents in addition to the lower Yukon River population which totals to20,425 salmon users. These figures do not include population figures in Western Interior and Eastern Interior regions.

Therefore, in conducting the Environmental Impact Statement , North Pacific Fishery Management Council should consider only alternatives which will reduce salmon bycatch. The analysis must take into consideration the broad range of values of salmon to these communities for nourishment, cultural purposes and income, not simply the commercial value.

On my personal note Mr. Chair, commercial fishing for salmon is the only way to live a subsistence life style for many who depend on salmon commercial fishing in the lower Yukon River. Commercial salmon fishers do not have any other income resources to depend on as means of income in summer and fall seasons. As members of the Yukon-Kuskowim Delta Subsistence Regional Advisory Council commented on record in its meetings, commercial salmon fishing is tied with subsistence activities, because without any cash to buy expensive gasoline, oil, and other expenses, it is impossible for most subsistence users to go subsistence salmon fishing. Similar comments can be found on the transcripts of the Yukon-Kuskokwim Delta Subsistence Regional Advisory Council.

This concludes my comments regarding the salmon bycatch Environmental Impact Statement.

C-2

Yukon River Salmon By-Catch

Mr. Chairman, Council Members

For the Record my name is Andrew Bassich

I am a 25 year resident and Subsistence fisher living in the Eagle area.

I currently serve as a Panel Member on the Yukon River Panel, as well as the Eagle AC chairman, and a council member of the EIRAC

Thank you for the opportunity to testify on the Issue of Salmon By-Catch of Western Alaskan Stocks by the Pollock Fleet.

I would like to give you some insights as to the effects this bycatch is having on the Subsistence Users on the upper Yukon River Both in Alaska and in the Yukon Territory

There is no Dollar Value that can be placed on the Resources that we depend on. The Subsistence way of life is a Philosophy of conservation and respect for the resources so critical for our way of life. The most important factor of the resource for Subsistence fishers and hunters is a consistent reliable return of the fish and game to the Region for Personal harvest. It is a way of life that can at times be a struggle and Also rewarding to know of ones ability to Take care of his or her own needs. We only ask to have a reasonable access to the resource.

The Subsistence fishers in Alaska, and in Canada Aboriginal Fishers, cannot continue the current Trend in reduced Harvest.

The Bycatch of Yukon River Chinook may seem to be a very small number on Paper and in Percentages, but it represents a Huge number to the upper Yukon Fisheries.

Information

1. 50% of all Yukon River Chinooks are spawned in Canada. This is not reflected in the Data presented (? Sampling and or Genetic refinement/ methods needs analysis in greater detail)
2. Escapement goals for boarder passage were not met in 2007.
3. The Total Allowable catch for the Yukoners both Aboriginal and Commercial combined is 10,000
4. Total harvest in the Yukon Territory in 2007 was under 5000 Chinook.
5. There has been no Commercial harvest in Canada
6. Total run size for the Yukon has not returned to the pre 2000 run size
7. Run rebuilding plans have been held to most passive (3 year plans) due to the need to allow harvest for Subsistence
8. Upper river fishers need to harvest greater numbers of fish to equal the Historical Pound per fish (fish are getting smaller)
9. Subsistence Fishers are not able to recoup fuel cost through sales of harvest

Many communities in the uppermost region have forgone harvest to insure that critical Spawning occurs. (Teslin Village Yukon Territory)

I can not stress how important it is to recognizing that little numbers in a big industry, Are very big numbers to the Subsistence communities in both Alaska and the Yukon Territory, and that Giving natural resources a Dollar Value is destroying a way of life which has thorough out time been the Draw for people to come to this land. To loose this way of life, and the Spirit it invokes will hurt all Alaskans.

Our view that the current dramatic change in the environment and it effect on the ecosystem are new, and not fully under stood at this time, and that the prudent course of management should be one of conservative management, until such time that better understanding of the changes taking place are achieved.

We feel a Combination of a Trigger of 38,000 Chinook with a hard cap of 47,0000 Chinook will be a prudent reasonable step in addressing this issue. Further more we feel that it is not prudent for the industry to be able to buy or share bycatch quota from one Sector to another as this is a way for those that have high bycatch to be rewarded for such poor practices, as well as allowing for big wealthy identities to have un-fair advantage over smaller operations. Rewarding High By-Catch boats is bad policy. (Do not pet the Dog that is biting you)

We feel that the Industry should put into plan a system that rewards Low by-Catch Boats, and penalizes boats with high bycatch with Economic incentives and penalties

We feel the industry should bare the cost of increased sampling and genetic analysis, to help Scientist and Managers of the resource to make sound long-term regulations.

We recognize and applauded the effort of the industry to come up with new techniques and systems to lower By-Catch, and hope that there will be continued efforts in this area.

However it is clear those recent attempts to reduce By-Catch has proven to be ineffective.

The Following are the Key points of interest to the Upper Yukon Subsistence and Aboriginal Fishers

Key Points

1.Change of Environment and its effects on the Eco System call for Conservative Management, until we have a better understanding of the effect of this change (New Regime)

2. Small numbers, % of Bycatch in the industry and Data presented do not accurately reflect or represent the impacts to Fisheries on the Yukon River

a) Better sampling & genetic analysis is critical to long-term management. (Data out is only as good as Data In)

3.By-Catch of Yukon Chinook Salmon represents 25% of Boarder passage goals as set in the treaty by the Yukon River Panel. **Subsistence fishers are forgoing harvest to insure Spawning.**

4. Hard cap of 47,000 Chinook and Trigger Closers of 38,000 should be put into effect this year under emergency order. Fishers of the region cannot sustain continuing negative impacts to Struggling Yukon Stocks.

5. Industry should bare the Cost of Increased Sampling and Data Analysis.

6. Industry should create a System of rewards and penalties for those vessels who produce Low and High By-catch.

   a) Trading or buying of By-Catch quota should not be implemented

7. United States should make every effort Available to Honor the Agreement made and signed in 2002 with Canada

In closing we urge the Council to take a prudent and conservative approach to Management, during this period of low productivity, uncertainty.

To put a Hard-Cap in place this year, to protect Western Alaskan Stocks and endangered stocks of the North West Coast.

Thanks you.

Andrew Bassich, YRP Member
P.O. Box 11
Eagle, Alaska. 9973 ph 907-547-2390 abassich@gmail.com

C-2

Elizabeth Andrews PhD *Co-Chairs* *Frank Quinn*
Juneau, Alaska, USA *Whitehorse, Yukon, Canada*
Yukon River Panel 100-419 Range Road Whitehorse, Yukon Y1A 3V1

June 3, 2008

Eric Olson, Chair
North Pacific Fishery Management Council
605 West 4th, Suite 306
Anchorage, Alaska 99501-2252

Doug Mecum, Acting Regional Administrator
NOAA Fisheries, Alaska Region
PO Box 21668
Juneau, Alaska 99802-1668

Re: Preferred Alternatives for Bering Sea/Aleutian Islands Chinook Salmon Bycatch

Dear Mr. Olson and Mr. Mecum:

The Yukon River Panel is an international advisory body established under the Yukon River Salmon Agreement for the conservation, management, and harvest sharing of Canadian-origin salmon between the U.S. and Canada. This Agreement is an Annex under the Pacific Salmon Treaty, which means it has the full power and force of a treaty between our two nations. This letter provides our recommendations on the preliminary preferred alternative for Chinook salmon bycatch reduction measures in the Bering Sea pollock fishery as identified in the Initial Review Draft—Bering Sea/Aleutian Islands Chinook Salmon Bycatch Environmental Impact Statement (EIS) dated May 15, 2008[1].

We do not support Alternative 1: Status Quo. The annually increasing salmon bycatch amount that has been harvested since 2001, evidences that the current Chinook Salmon Savings Area closures and the inter-cooperative agreement, under BSAI Fishery Management Plan (FMP) Amendment 84, have not worked to reduce or minimize Yukon Chinook salmon bycatch. It is unrealistic to expect an economic industry as large as the pollock fishery to suspend their harvest

[1] http://www.fakr.noaa.gov/npfmc/current_issues/bycatch/Salmonbycatch508/EISsalmonbycatch508.pdf

of pollock, regardless of the potential impact to Western Alaskan salmon fishing communities, without a regulatory cap.

We support Alternative 2: Hard Cap. We support a hard cap that closely represents the recent 10-year average bycatch by the pollock fishery. Consistent with our previous letter of February 5, 2008, we believe some segment of Yukon River in-river Chinook salmon escapement or harvest is likely reduced when the pollock fishery's salmon bycatch exceeds 37,000 Chinook salmon. We recognize that establishing a Hard Cap suboption nearest to our recommendation - Suboption vi) 38,891 would likely be viewed by the pollock industry participants as unrealistically low.

Our primary concern is when Bering Sea bycatch exceeds 37,000 Chinook salmon, some portion of Yukon River Alaskan and/or Canadian escapements or harvests have been less than expected, reduced, or restricted. In the spirit of cooperation and compromise, we support Alternative 2: Hard Cap set at Suboption iv) 47,591. We believe this is a realistic hard cap amount that would equitably provide for continuation of a responsibly managed and sustainable pollock fishery while reasonably providing for in-river salmon escapements and fisheries. We believe a hard cap of 47,591 addresses the purpose of minimizing Chinook salmon bycatch to the extent practicable while maintaining compliance with the Magnuson-Stevens Act.

It is our understanding that salmon caught as bycatch in the A season are older fish[2], with a higher likelihood of survival and escapement potential. The Panel would support appropriate season and sector splits that maximize Chinook conservation and reduce bycatch.

We also support Alternative 3: Triggered Closures when combined with a hard cap. We believe triggered closures have the potential of decreasing bycatch if this management option is established in conjunction with a hard cap. A hard cap is necessary to ensure the spirit of the Yukon River Salmon Agreement is met, requiring "*increase the in-river run of Yukon River salmon by reducing marine catches and bycatches of Yukon River salmon.*"

The Panel recognizes the Council must consider all stakeholders in this decision. The Panel met with representatives from the industry in April 2008 and per those discussions would support an industry-implemented program that combines Alternative 2 Hard Cap of 47, 591 with Alternative 3 Triggered Closures. Allowing bycatch of Chinook salmon to exceed 47,591 annually would likely jeopardize the U.S. from meeting escapement goals set by the Yukon River Salmon Agreement and a reduced or restricted subsistence and/or commercial harvest would be anticipated.

We support responsibly managed, sustainable fisheries and recognize that nearly every fishery has some level of bycatch. We urge the continuation of genetics data collection and analysis as this is essential for designing a program to avoid catches of Western Alaska Chinook salmon stocks. We request the Council select a hard cap that effectively reduces the number of Yukon

[2] Draft EIS page 143

River Chinook salmon which are caught in the Bering Sea pollock fishery, and contributes to meeting the escapement goals established by the Yukon River Salmon Agreement.
On behalf of the Yukon River Panel, we thank you for your diligent work on this issue and for considering our recommendations in your deliberations.

Sincerely,

Elizabeth Andrews

Elizabeth Andrews
Co-Chair

Frank Quinn
Co-Chair

C-2

Elizabeth Andrews PhD *Co-Chairs* *Frank Quinn*
Juneau, Alaska, USA *Whitehorse, Yukon, Canada*
Yukon River Panel 100-419 Range Road Whitehorse, Yukon Y1A 3V1

June 3, 2008

Eric Olson, Chair
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Sincerely,

Elizabeth Andrews

Elizabeth Andrews
Co-Chair

Frank Quinn
Co-Chair

Review of IC salmon avoidance, 2008 A season

- Karl Haflinger, Sea State Inc

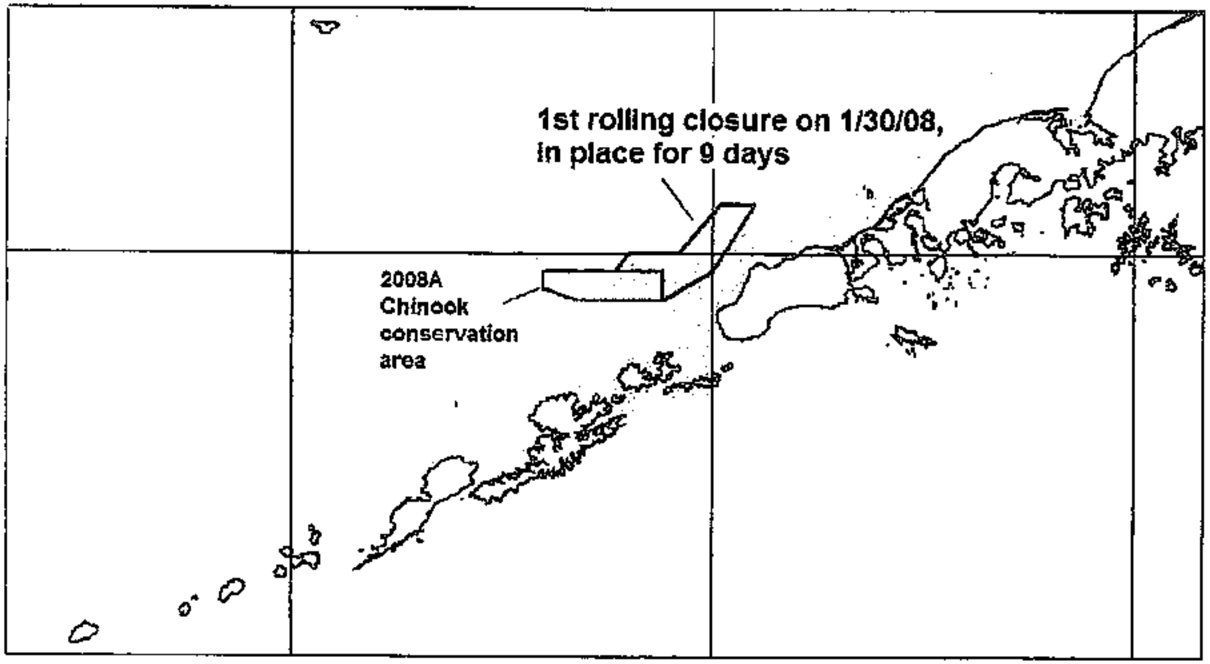
Comparison between 2007 and 2008 A season chinook bycatch

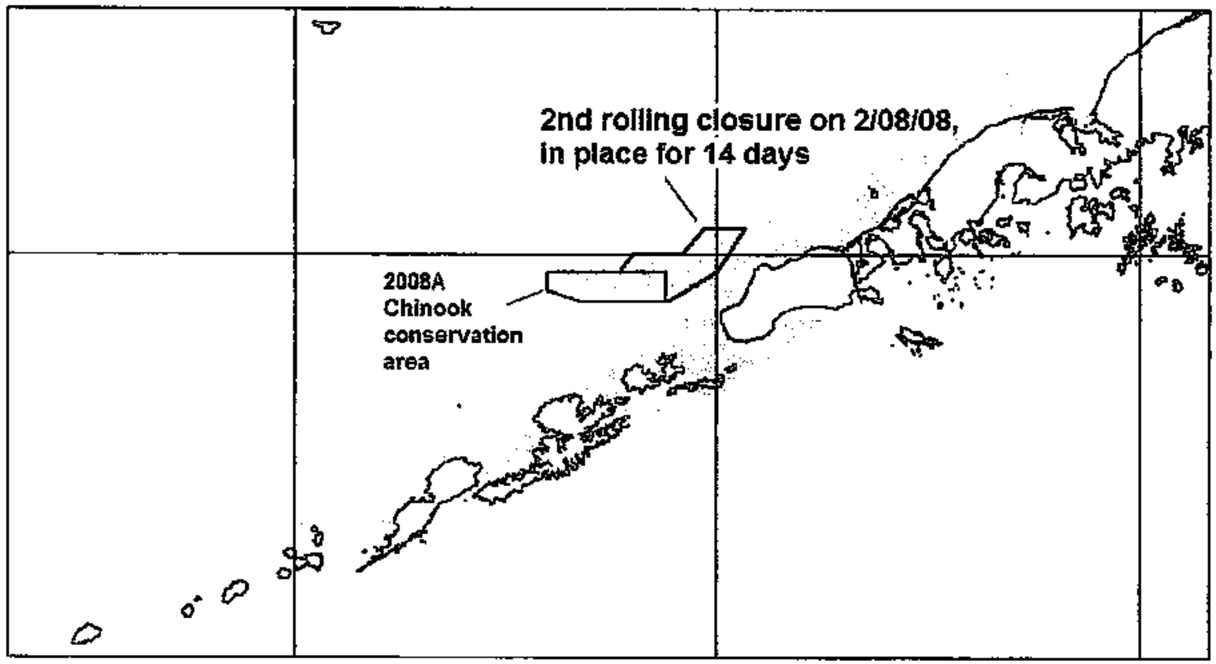
Season	Total pollock	Chinook	Rate (N/mt)
2008A	375,571	13,173	0.035
2007A	544,273	70,845	0.130
Expected bycatch with 2007 TAC and 2008 rate			19,090
Expected bycatch with 2008 TAC and 2007 rate			48,886

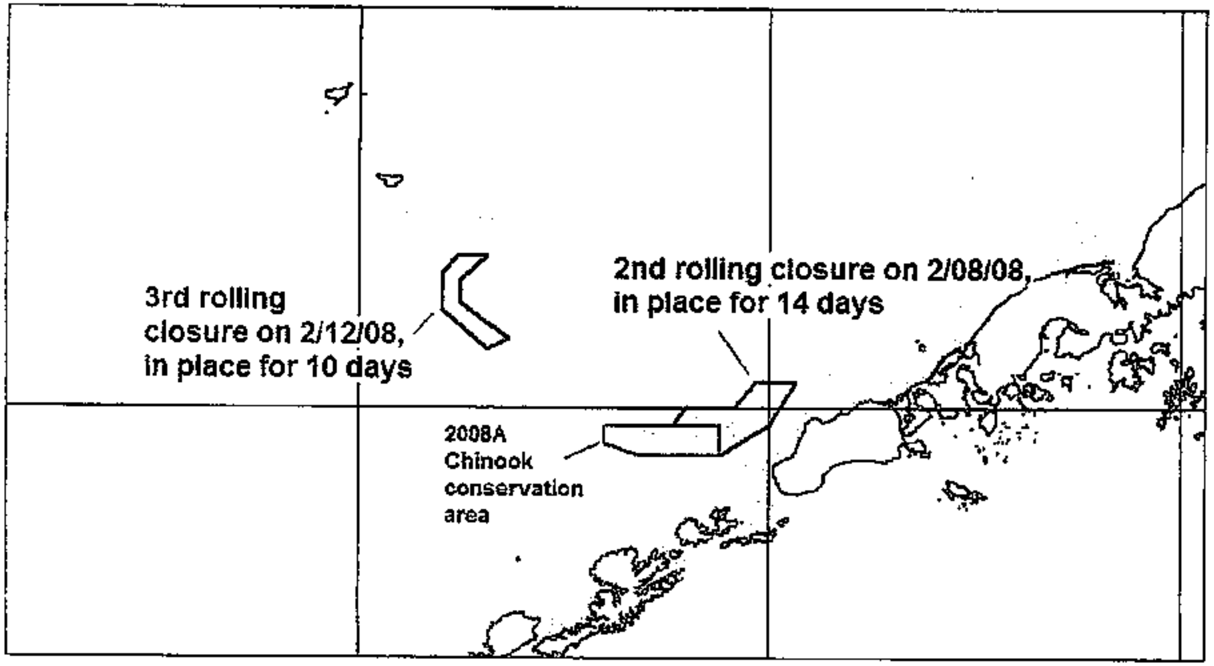
Closure area comparison, 2007 vs. 2008 A seasons

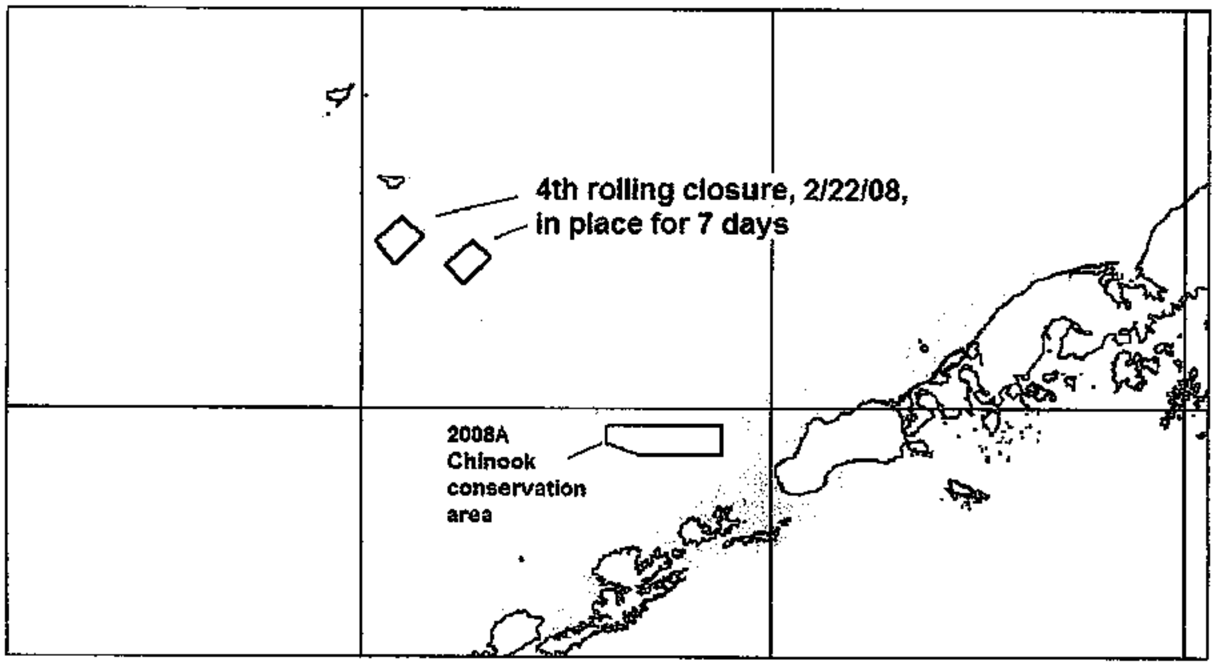
2008 A season		2007 A season	
Total area closed (sq mi)	Date/duration	Total area closed (sq mi)	Date/duration
1,761	2 day 0130_2008	838	2 day 0131_2007
1,761	4 day 0201_2008	1,022	4 day 0202_2007
1,761	3 day 0205_2008	1,022	3 day 0206_2007
1,561	4 day 0208_2008	956	4 day 0209_2007
2,067	3 day 0212_2008	1,101	3 day 0213_2007
2,067	4 day 0215_2008	1,032	4 day 0216_2007
2,067	3 day 0219_2008	1,095	4 day 0223_2007
1,203	4 day 0222_2008	*1,095*	*3 day 0226_2007*
2,028	3 day 0226_2008	*829*	*4 day 0302_2007*
1,679	4 day 0229_2008	*829*	*3 day 0306_2007*
1,093	3 day 0304_2008	*230*	*4 day 0309_2007*
1,471	4 day 0307_2008	*589*	*3 day 0313_2007*
921	3 day 0311_2008	*180*	*4 day 0316_2007*
850	4 day 0314_2008	*538*	*3 day 0320_2007*
1,592	Average (sq mi)	811	Average (sq mi)

Italicized closure in 2007 A season column were advisory


1st rolling closure on 1/30/08,
in place for 9 days
2008A
Chinook
conservation
area

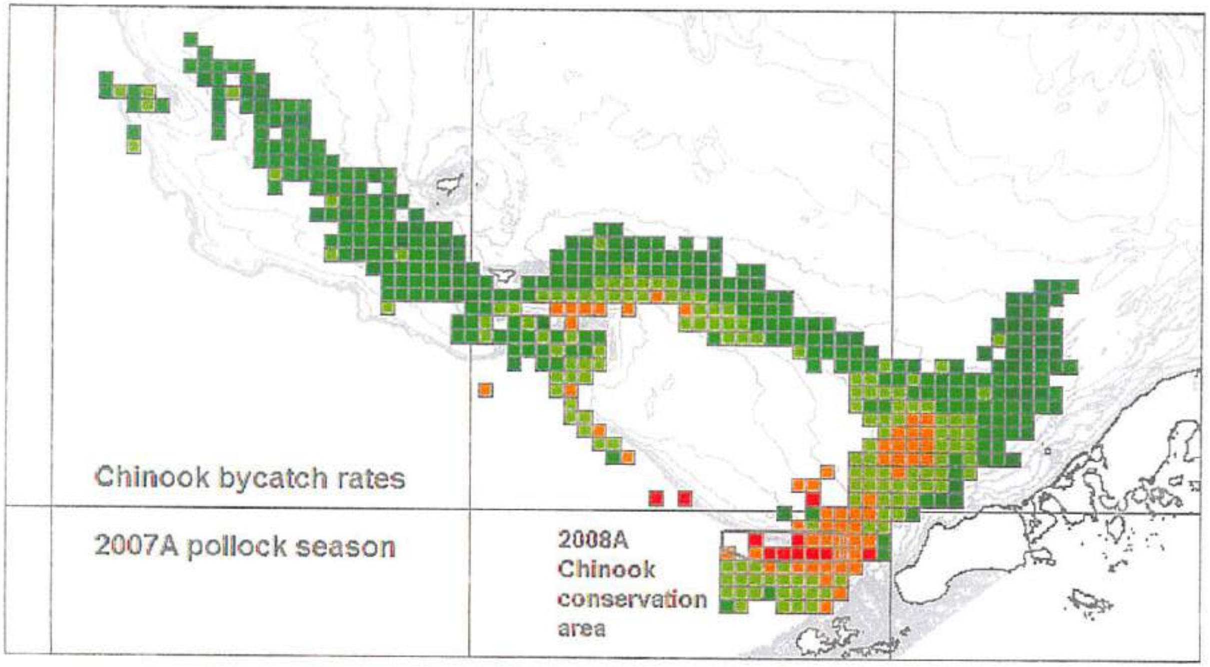

2nd rolling closure on 2/08/08,
in place for 14 days
2008A
Chinook
conservation
area

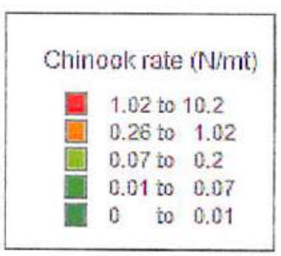

3rd rolling
closure on 2/12/08,
in place for 10 days
2nd rolling closure on 2/08/08,
in place for 14 days
2008A
Chinook
conservation
area

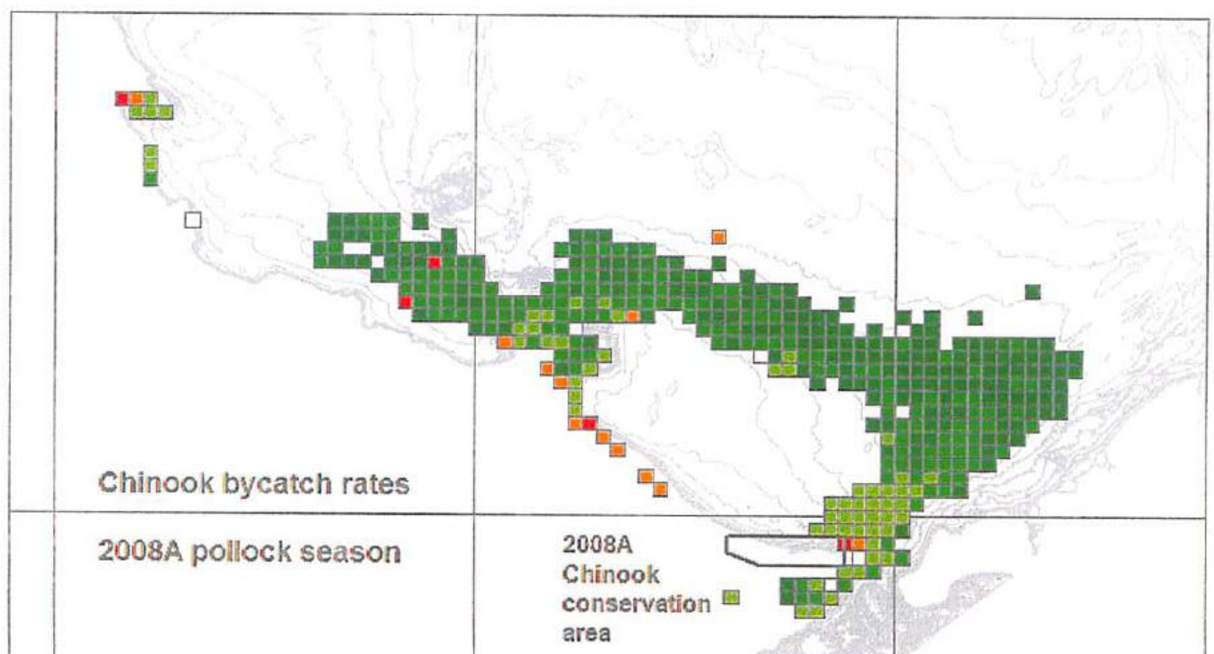

4th rolling closure, 2/22/08,
in place for 7 days
2008A
Chinook
conservation
area

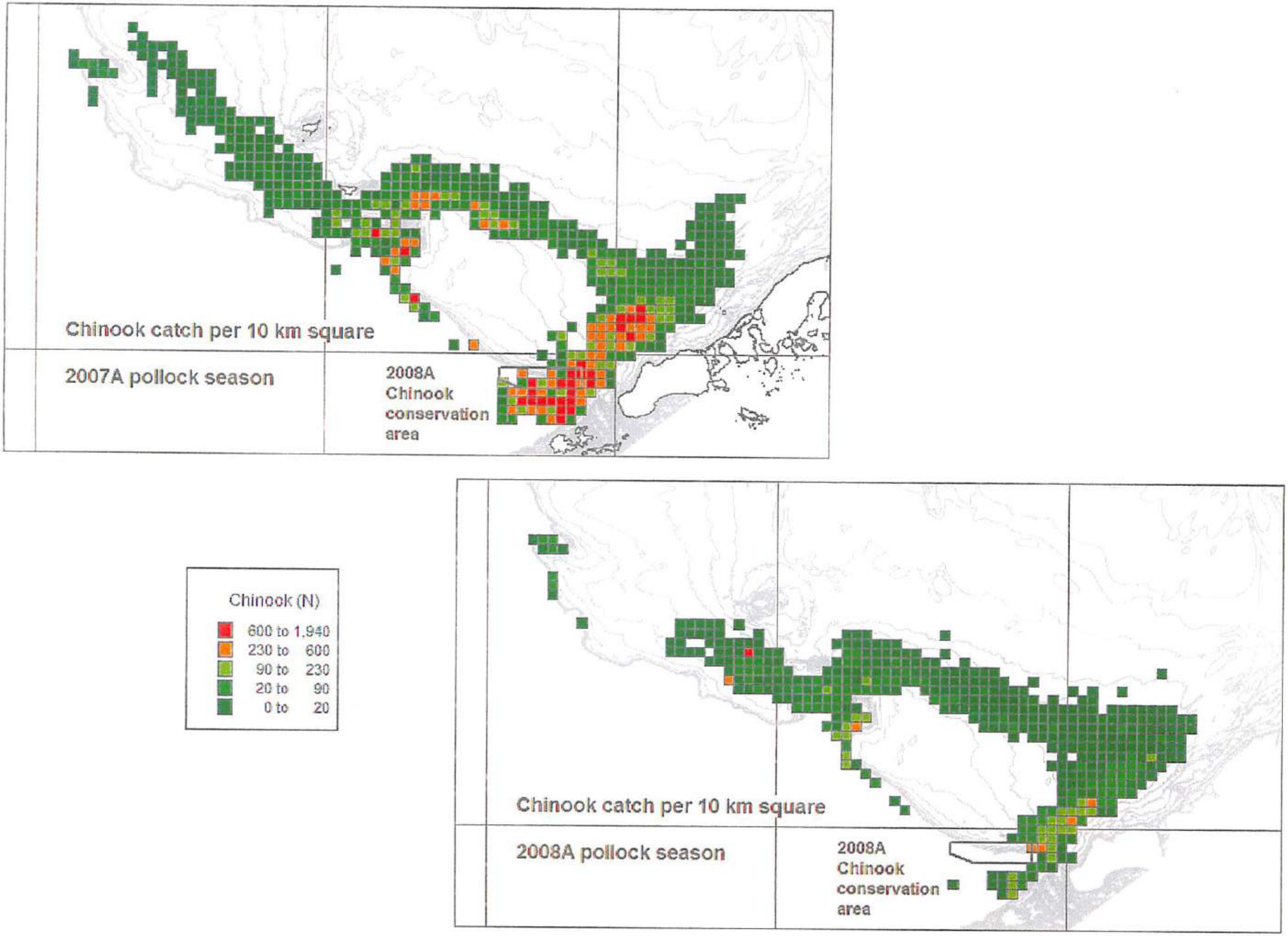
Salmon avoided: Comparison between observed and estimated salmon bycatch from 2008A closure data

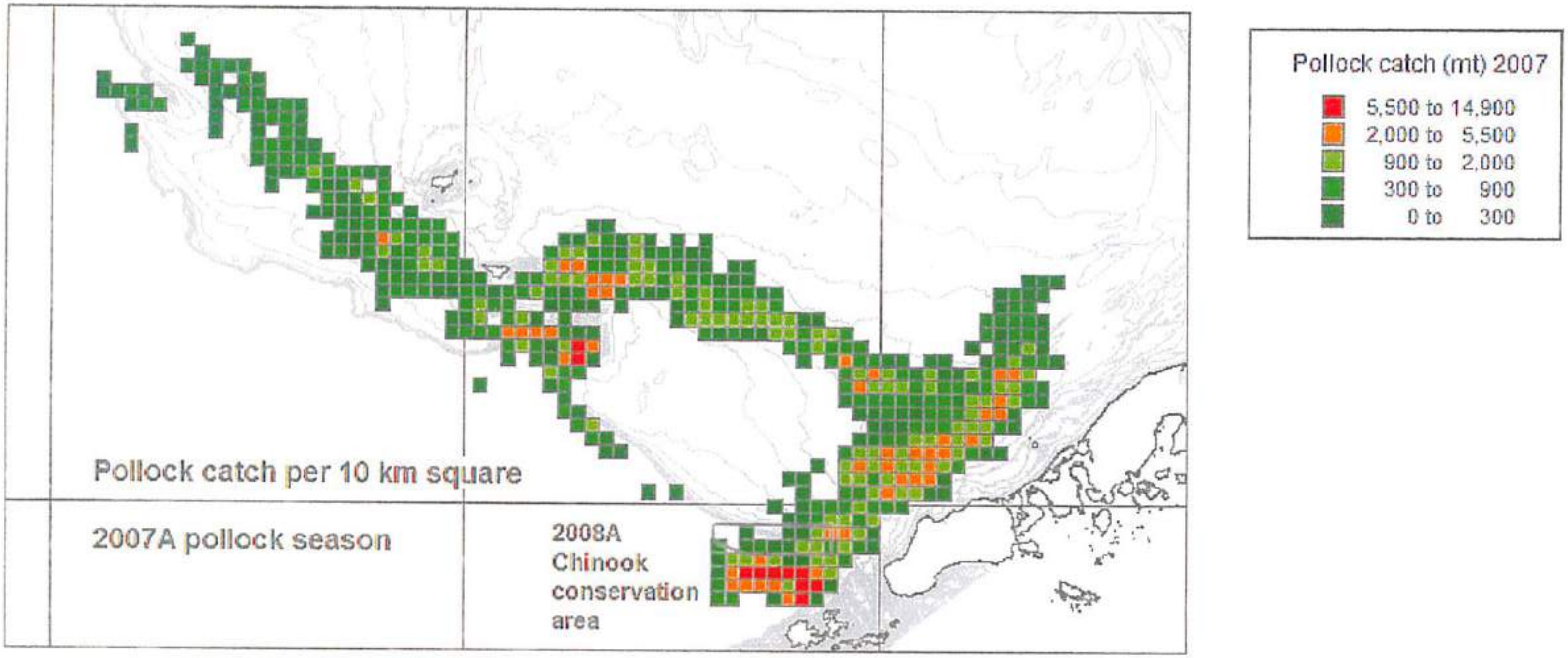
Date	Chinook rate in closure (N/mt)	Chinook rate after closure	Displaced pollock (mt)	Actual chinook bycatch (N)	Est chinook bycatch at closure rate	Chinook saved (Estimated - actual)
01/30/08	0.122	0.025	6,321	155	770	615
02/08/08	0.241	0.045	1,084	49	261	212
02/12/08	0.254	0.048	7,862	374	2,000	1,626
02/22/08	0.122	0.021	5,176	109	632	523
02/22/08	0.147	0.004	1,787	8	264	256
02/29/08	0.110	0.027	1,732	47	190	143
03/14/08	0.065	0.014	3,927	56	254	198
03/21/08	0.025	0.018	331	6	8	2
Totals			28,220	804	4,378	3,574
% reduction	82%					

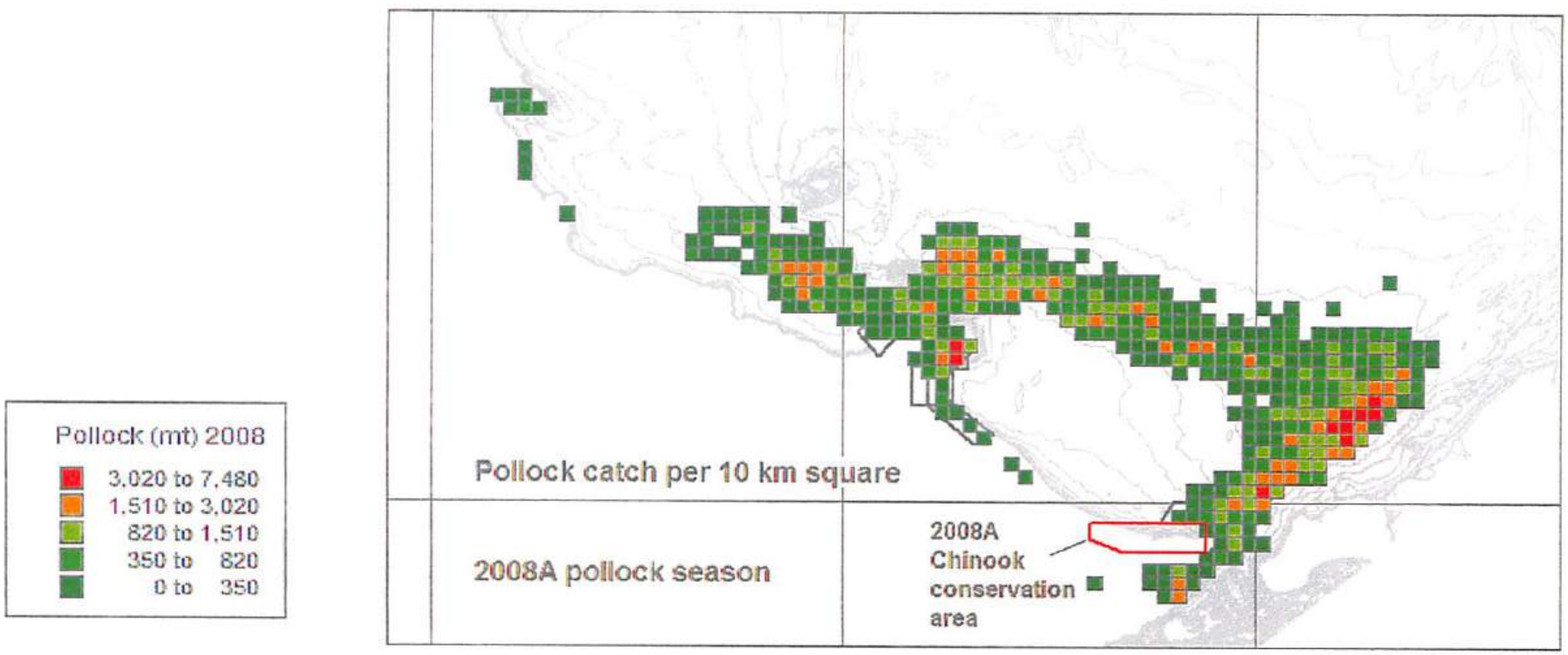

Chinook bycatch rates
2007A pollock season
2008A
Chinook
conservation
area


Chinook rate (N/mt)
1.02 to 10.2
0.26 to 1.02
0.07 to 0.2
0.01 to 0.07
0 to 0.01

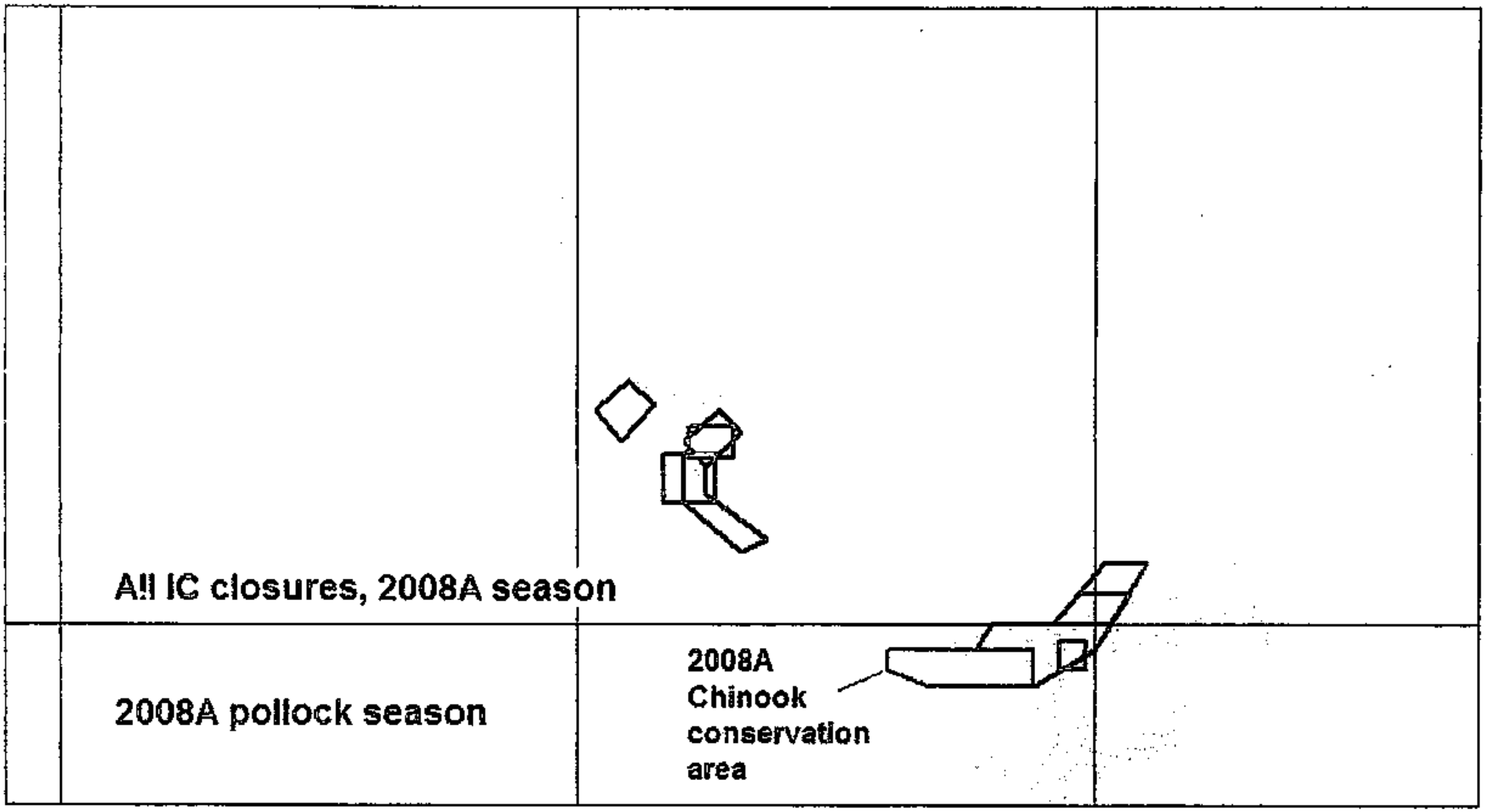

Chinook bycatch rates
2008A pollock season
2008A
Chinook
conservation
area


Chinook catch per 10 km square
2007A pollock season
2008A Chinook conservation area
Chinook (N)
600 to 1,940
230 to 600
90 to 230
20 to 90
0 to 20
Chinook catch per 10 km square
2008A pollock season
2008A Chinook conservation area

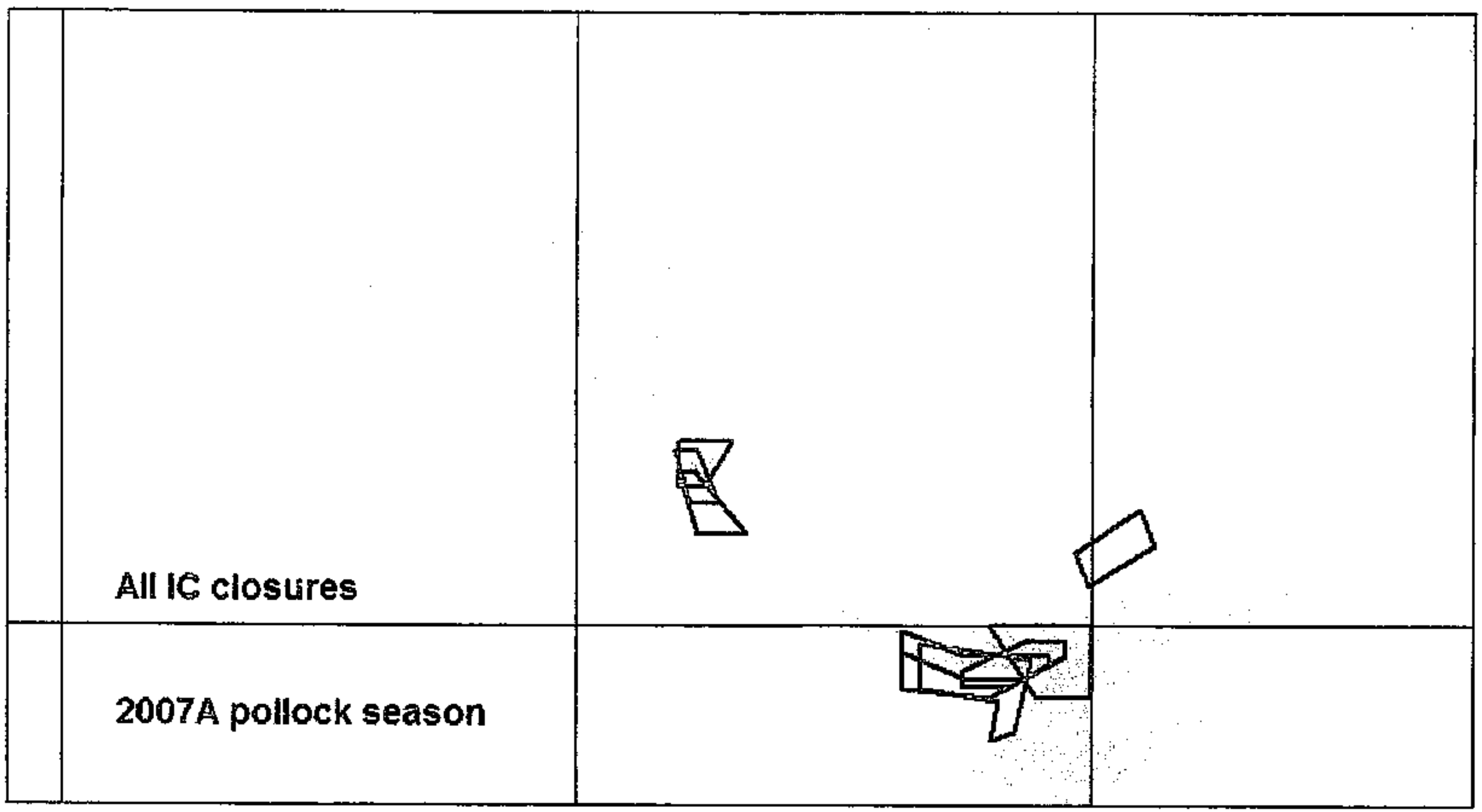

Pollock catch (mt) 2007
5,500 to 14,900
2,000 to 5,500
900 to 2,000
300 to 900
0 to 300
Pollock catch per 10 km square
2007A pollock season
2008A Chinook conservation area


Pollock (mt) 2008
3,020 to 7,480
1,510 to 3,020
820 to 1,510
350 to 820
0 to 350
Pollock catch per 10 km square
2008A pollock season
2008A Chinook conservation area

IC salmon closures, 2008A (red is Chinook conservation area)



IC salmon closures, 2007 A



2007 Highlights Report

FOR THE BOARD OF DIRECTORS

Bering Sea groundfish…

… provide opportunity at home

The following is a summary of CDQ benefits generated for our residents in 2007:

MAY 2008

CVRF – 2007 Highlights

SUMMARY

- $544,000 was awarded in scholarships to 98 CVRF residents
- 82 residents earned $829,148 aboard BSAI vessels owned in whole/part by CVRF
- $3.8 million was spent to build four new fishery support centers in CVRF communities
- 19 full-time jobs for community liaisons
- 12 jobs for CVRF mechanic / welders
- 4 residents completed CVRF's welder/shipyard apprentice program and landed jobs
- 5 residents were hired as interns to work in Quinhagak with ADF&G
- 22 residents received $108,300 in training (medics, heavy equipment, master licenses)
- 7 residents received CVRF loans to pursue commercial fishing opportunities
- 3,048 residents received tax & permit assistance from ABDC, paid for by CVRF
- 20 youth residents attended the Elders and Youth Conference in Fairbanks
- 19 youth from Kipnuk and Tununak earned $14,400 in Youth-to-Work Program
- Dozens of high school students assisted at State tournaments
- 412,502 lbs of halibut were delivered to our plants - a record by our local fleet
- 200 resident fishermen participated in the halibut fishery
- $1.1 million was paid to our halibut fishermen
- $1 million was spent to replace our Tununak halibut plant
- 2.2 million pounds of salmon were processed at our Quinhagak plant – a record
- 145 permit holders from 16 villages delivered salmon to our Quinhagak plant
- $962,000 was paid to our Quinhagak fleet
- $1 million was paid to our Quinhagak processing workers
- 88% of our Quinhagak processing workers were residents of CVRF villages

CVRF – 2007 Highlights

continued…

- o 660,000 pounds of salmon was purchased at our Bethel "Buy and Fly" station
- o $245,000 was paid to fishermen delivering to our Bethel station
- o 261 permit holders from 17 villages delivered to our Bethel station
- o 333 total employees worked at our Quinhagak, Bethel and Halibut plants/stations
- o 82% of these employees were CVRF residents and 95% were from YK Delta villages
- o 7 CVRF tenders, tugs, and barges were operated in our near-shore fisheries
- o 30,000 pounds of halibut were harvested by the CVRF vessel F/V Determination
- o $4.7 million was spent to upgrade CVRF's tender/tug/barge fleet
- o 750 tons of firewood was delivered to residents by CVRF's tug and barge
- o 50 resident fishermen received CVRF fishing safety kits and lifejackets
- o Ground was broken on our new $30 million salmon plant in Platinum
- o $8 million was spent on Platinum construction; the 126-bed dorm was completed
- o $143,207 was spent on salmon research grants/ADF&G-supported weir projects
- o $40,000 was spent on sockeye telemetry work
- o $285,891 was spent for CDQ Project Funds (selected by CVRF villages) for:

public safety buildings, law enforcement, community potlatch, honoring troops, summer clean up by youths, winter trail survival shelters and trail markers, dump site improvements and clean up, community board walks, tribal COPS project, fuel cost assistance, public internet access, youth marine safety, lagoon clean up, and youth and elders conference, to name a few.

- o $40,000 was spent for a community mapping project supported by AK DCCED
- o 22,867 Chinook salmon were commercially harvested by our local fleet
- o $188,000 was paid to the fishermen for Chinook in Quinhagak and Bethel

CVRF – 2007 Highlights

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CVRF – 2007 Highlights

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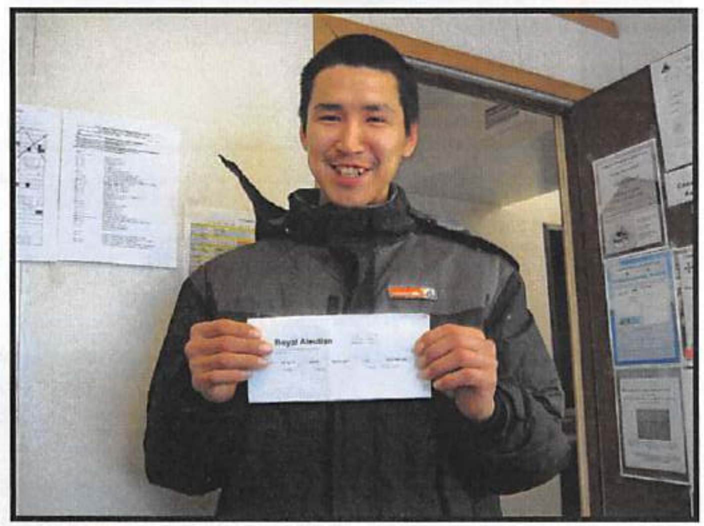

CVRF – 2007 Highlights

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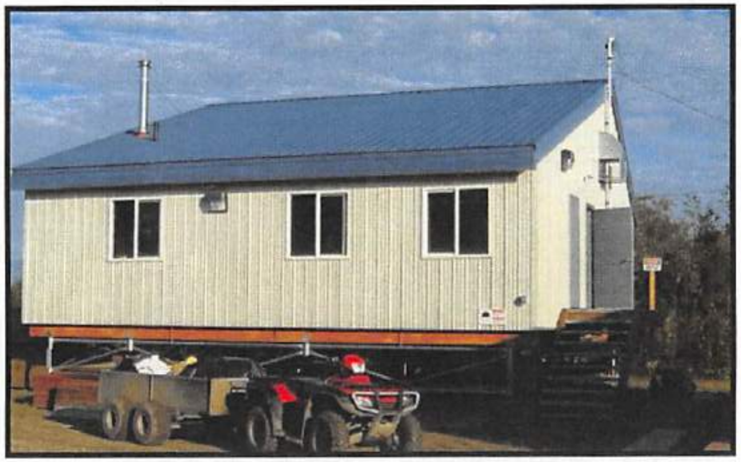
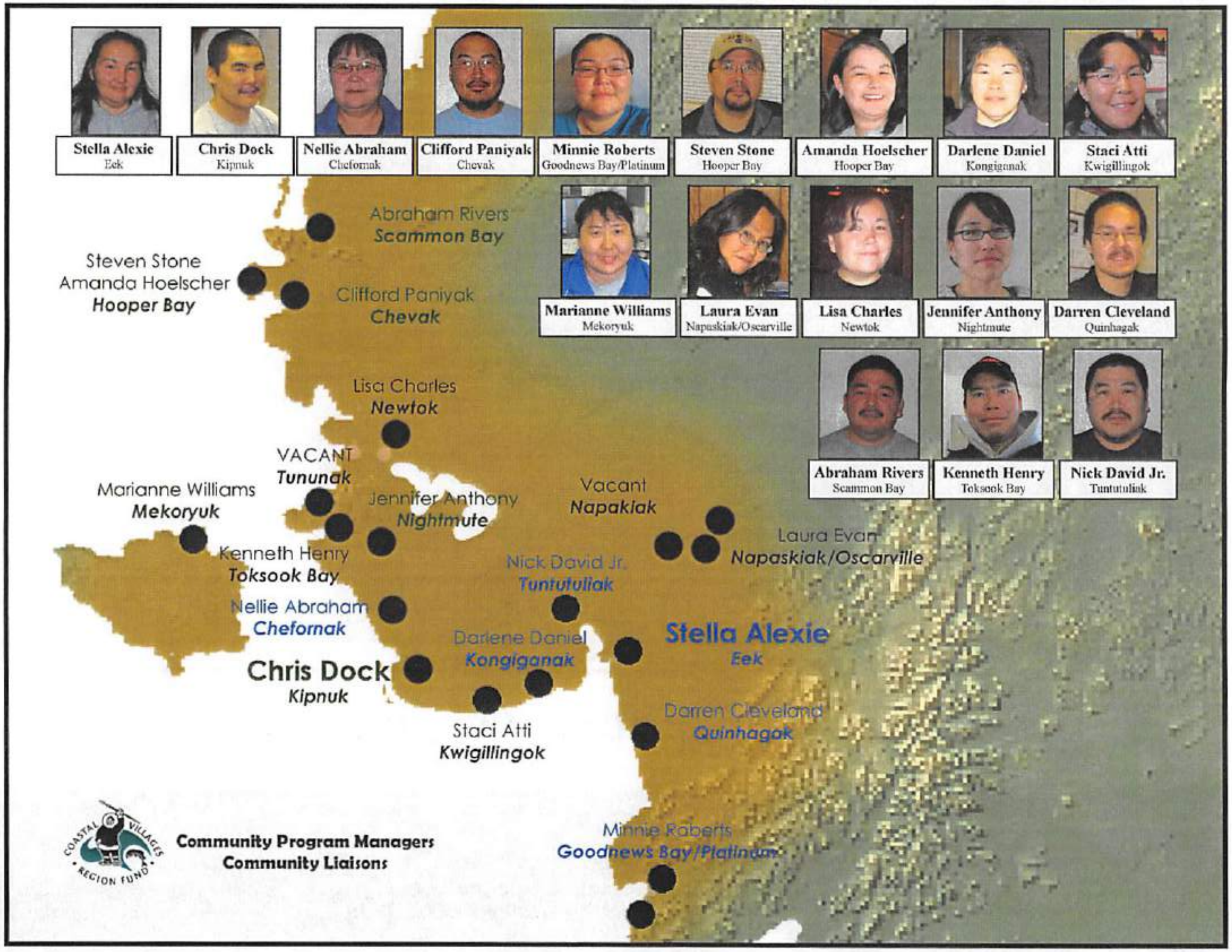


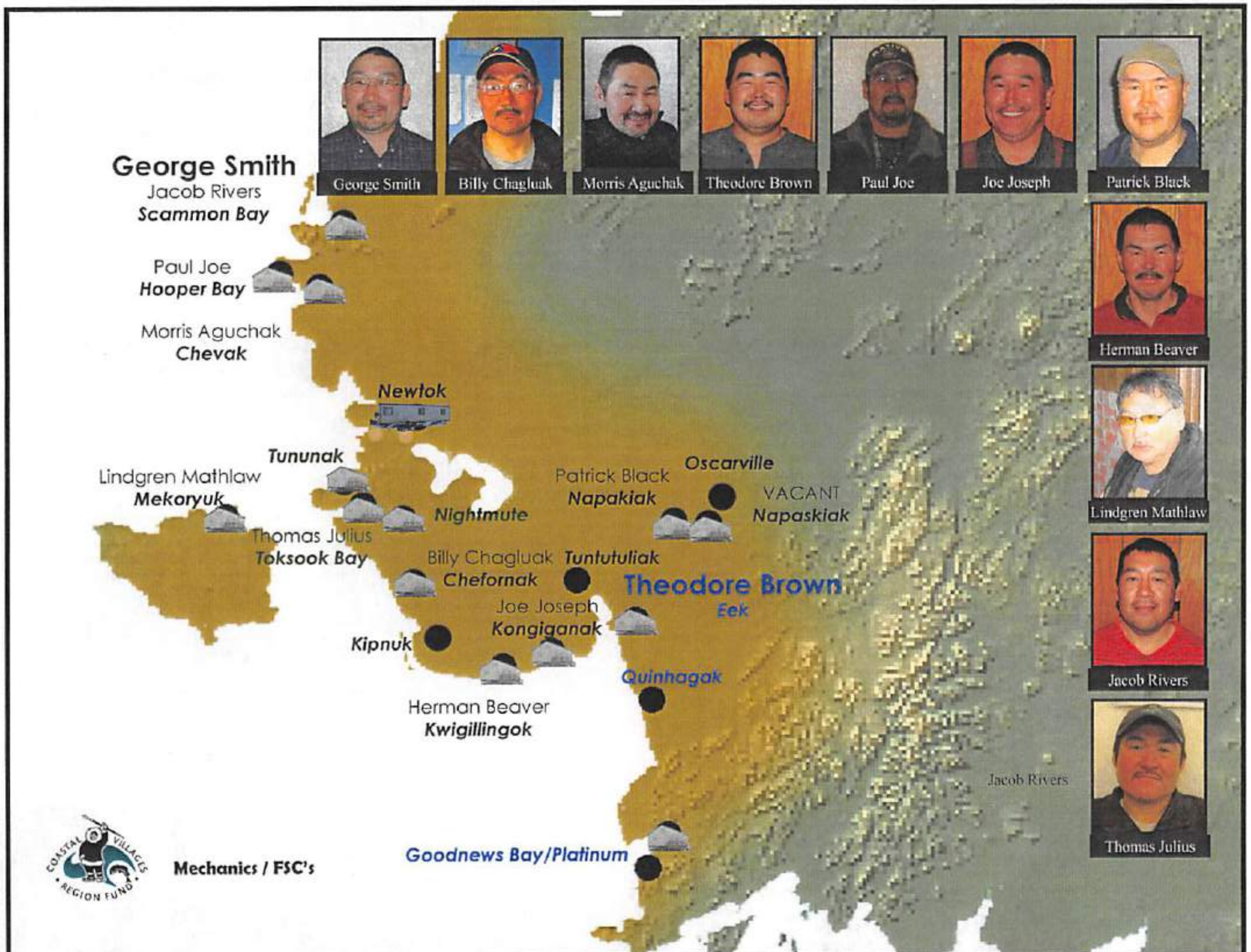
CVRF – 2007 Highlights

19 full-time jobs for community liaisons



CVRF – 2007 Highlights

12 jobs for CVRF mechanic / welders



CVRF – 2007 Highlights

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CVRF – 2007 Highlights

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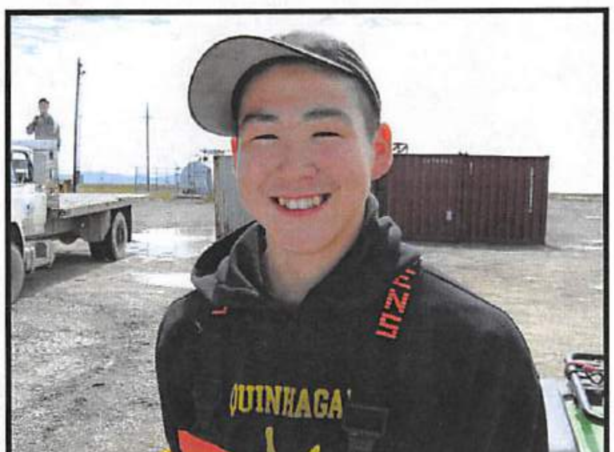

CVRF – 2007 Highlights

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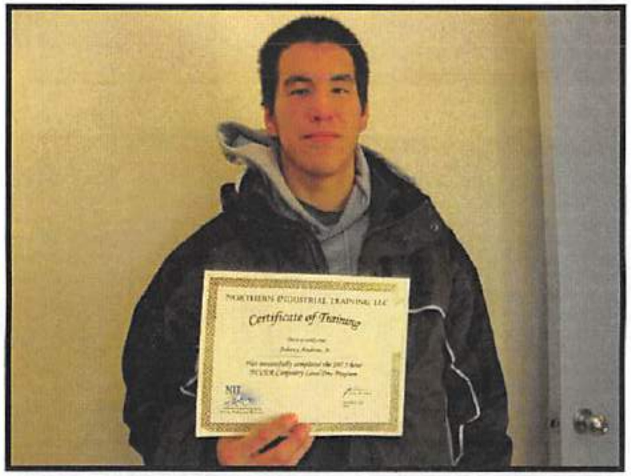

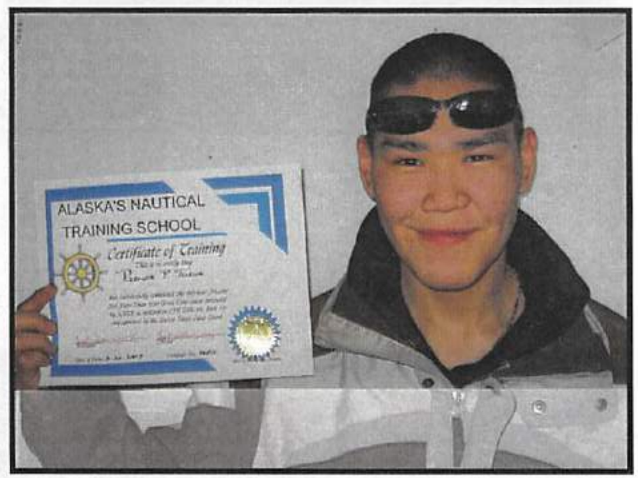

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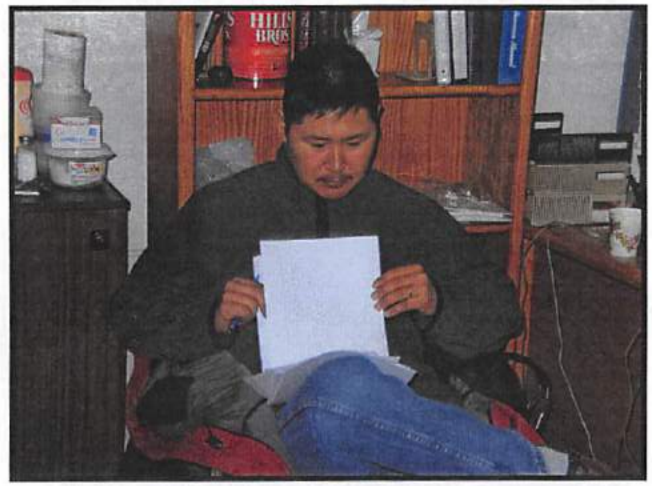

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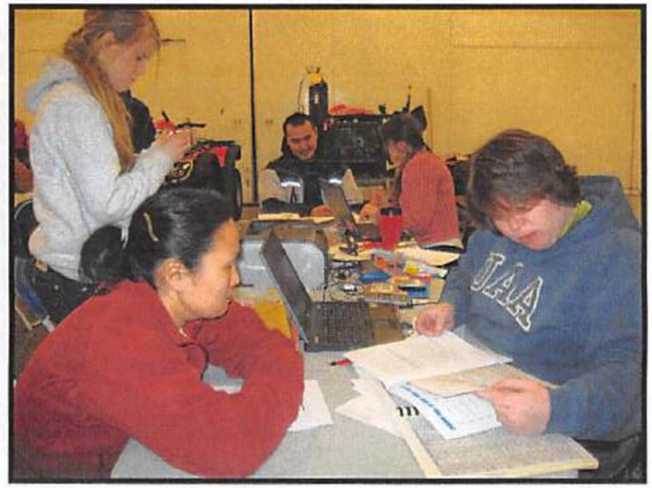

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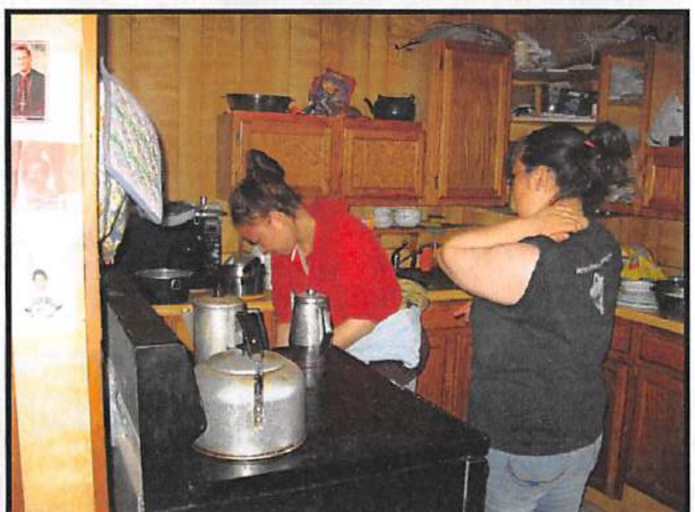

CVRF – 2007 Highlights

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CVRF – 2007 Highlights

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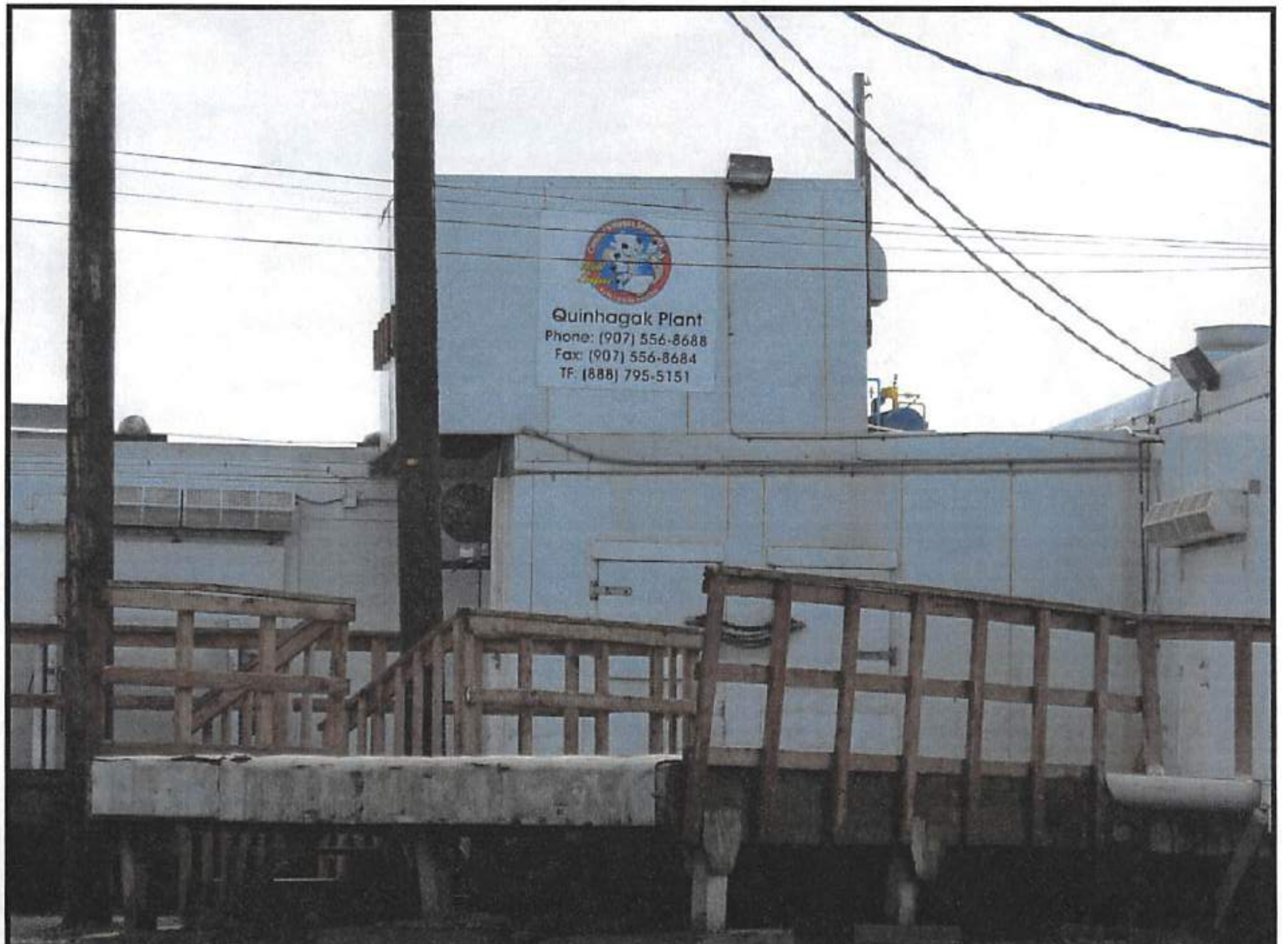

CVRF – 2007 Highlights

145 permit holders from 16 villages delivered salmon to our Quinhagak plant

CVRF – 2007 Highlights

$962,000 was paid to our Quinhagak fleet

CVRF – 2007 Highlights

$1 million was paid to our Quinhagak processing workers

CVRF – 2007 Highlights

88% of our Quinhagak processing workers were residents of CVRF villages

CVRF – 2007 Highlights

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CVRF – 2007 Highlights

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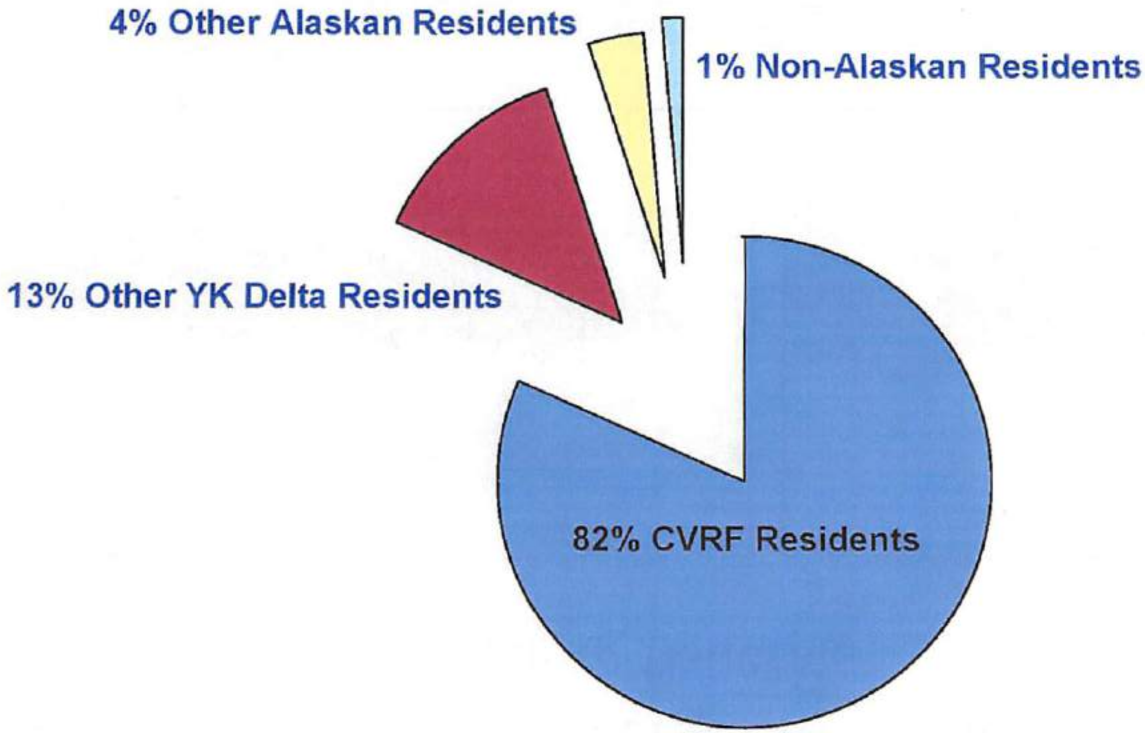

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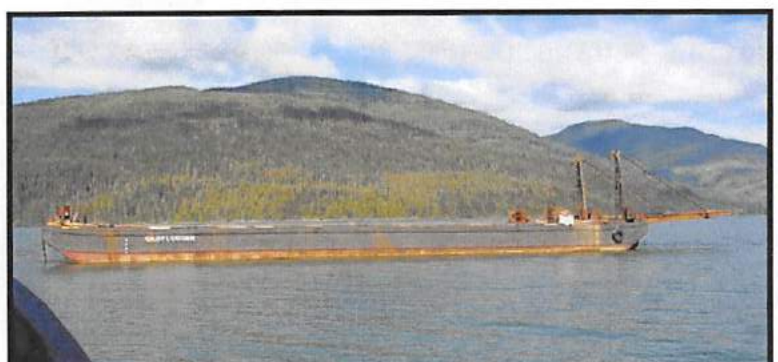

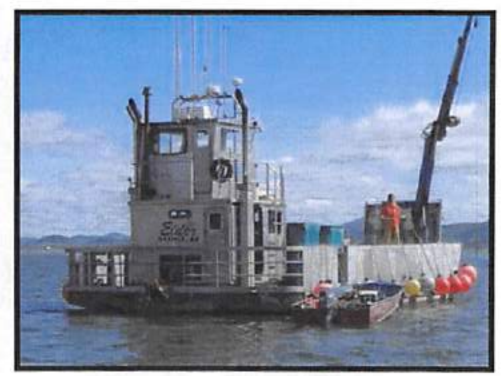

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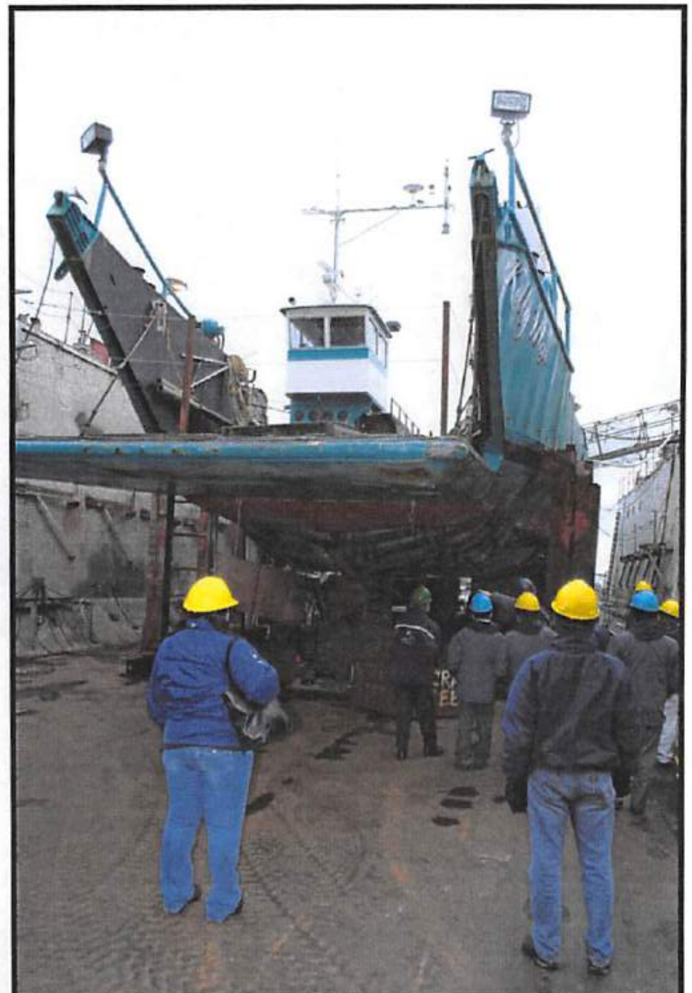

CVRF – 2007 Highlights

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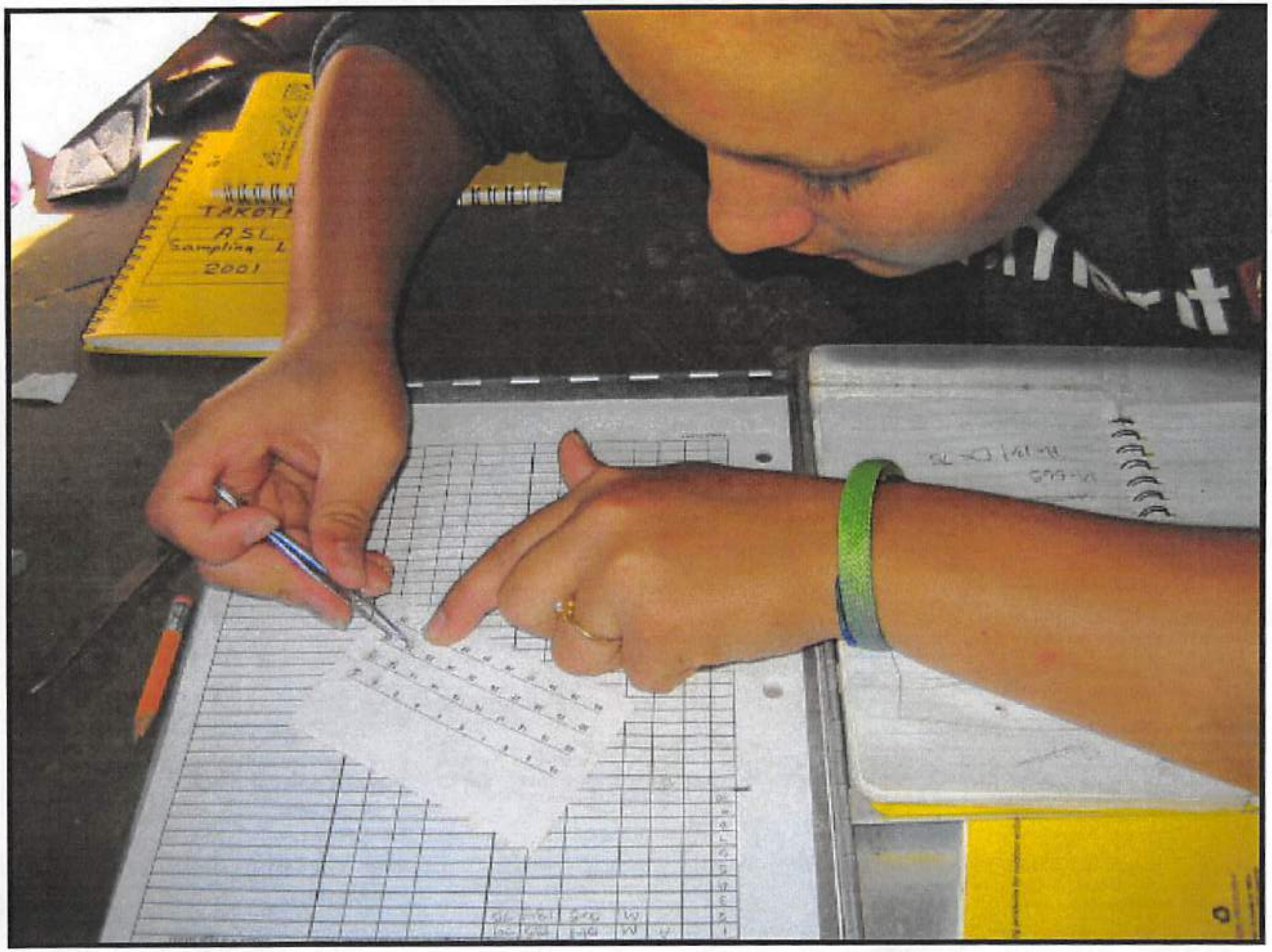

CVRF – 2007 Highlights

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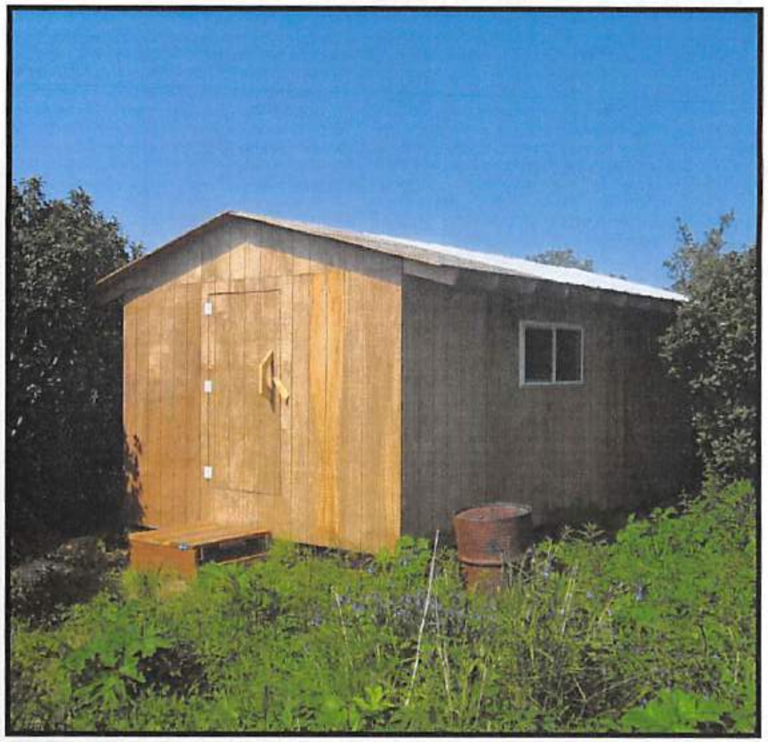

CVRF – 2007 Highlights

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CVRF – 2007 Highlights

22,867 Chinook salmon were commercially harvested by our local fleet

CVRF – 2007 Highlights

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CVRF – 2007 Highlights

Each of these opportunities in 2007 was funded by dollars earned by our 20 communities in the Bering Sea pollock, crab and other federal groundfish fisheries. The federal groundfish fisheries are providing a new era of hope for our people and economic opportunity in our villages. Do not allow your voice to be used by those who want to shut down the federal groundfish fisheries and thereby deprive our people of the opportunities on this list. The issues of salmon bycatch, bottom trawl closures, marine mammal protection, halibut bycatch, and other issues have direct bearing on the federal groundfish fisheries upon which our programs depend. Please call CVRF if you have questions about fisheries management and conservation. Ask the visitors to our communities how they intend to pay for the programs on this list if they succeed in shutting down the federal groundfish fisheries.

CVRF – 2007 Highlights

$245,000 was paid to fishermen delivering to our Bethel station

CVRF – 2007 Highlights

261 permit holders from 17 villages delivered to our Bethel station

C-2

SEA STATE
P.O. Box 74, Vashon, WA 98070

Ph: (206)463-7370
Fax: (206)463-7371
Email: karl@seastateinc.com

April 23, 2008

The tables below show pollock catch and bycatch by sector and season. For reference, total chinook catch and bycatch by year is shown in the first table (Table 1). The next 2 tables (Tables 2a and 2b) show bycatch rates by sector and season for two different time periods: 2000 – 2007 (2a) and 2000 – 2005 (2b). These two different determinations of relative bycatch rates were provided to see how ratios between sectors changed when the most recent years, which were characterized by bycatch higher than we are likely to be allowed by Council action, were eliminated. Note that in tables 2a and 2b the rightmost two columns include a ratio of bycatch rates between C/P and shoreside, and mothership and shoreside sectors. If sectors had bycatch ratios equal to 1.0, then a pro-rata distribution of pollock would be the same as a distribution defined by historical catch.

Data for A and B season, by year and sector, for 2000 – 2007 are shown in Tables 3a and 3b. These are basically the data that are used to generate the summary tables 2a and 2b, and are provided mainly to show the range of bycatch rate ratios that were found over the years. Tables 4a – 4c include pollock catch and chinook bycatch from 2000-2007, by sector.

Table 1. All sectors combined chinook bycatch, 2000 - 2007

Year	Total "A" chinook	Total "B" chinook	Total "A" + "B" chinook	A season chinook %	B season chinook %
2000	3,397	1,685	5,082	67%	33%
2001	16,465	13,586	30,051	55%	45%
2002	22,022	13,301	35,323	62%	38%
2003	30,981	13,420	44,400	70%	30%
2004	21,987	29,196	51,183	43%	57%
2005	26,577	41,475	68,052	39%	61%
2006	57,419	23,922	81,341	71%	29%
2007	70,836	50,012	120,848	59%	41%
Totals	249,683	186,597	436,280	57%	43%

Table 2a. A and B season chinook bycatch rates by sector, 2000 - 2007

Chinook rates, 2000 - 2007 combined	Shoreside	C/P	Mother ships	CDQ	Ratio C/P to Shoreside	Ratio MS to Shoreside
A season	0.065	0.058	0.049	0.027	0.89	0.75
B season	0.049	0.012	0.015	0.011	0.25	0.31

Table 2b. A and B season chinook bycatch rates by sector, 2000 - 2005

Chinook rates, 2000 - 2005 combined	Shoreside	C/P	Mother ships	CDQ	Ratio C/P to Shoreside	Ratio MS to Shoreside
A season	0.038	0.042	0.032	0.023	1.11	0.85
B season	0.036	0.012	0.016	0.010	0.33	0.43

Table 3a. A season bycatch rates by sector, with ratios

Year	Shoreside	C/P	Motherships	CDQ	Ratio C/P to Shoreside	Ratio MS to Shoreside
2000	0.004	0.014	0.001	0.010	3.34	0.126
2001	0.026	0.036	0.030	0.032	1.35	1.15
2002	0.041	0.040	0.034	0.024	0.98	0.83
2003	0.053	0.063	0.049	0.028	1.18	0.93
2004	0.040	0.041	0.035	0.019	1.03	0.88
2005	0.051	0.050	0.036	0.022	0.98	0.71
2006	0.135	0.078	0.094	0.026	0.58	0.70
2007	0.152	0.132	0.099	0.056	0.87	0.65

Table 3b B season bycatch rates by sector, with ratios

Year	Shoreside	C/P	Mother ships	CDQ	Ratio C/P to Shoreside	Ratio MS to Shoreside
2000	0.003	0.002	0.003	0.004	0.89	1.09
2001	0.008	0.032	0.010	0.009	4.20	1.26
2002	0.026	0.003	0.022	0.008	0.12	0.85
2003	0.019	0.010	0.023	0.010	0.55	1.22
2004	0.060	0.009	0.024	0.020	0.14	0.40
2005	0.091	0.013	0.009	0.007	0.15	0.10
2006	0.058	0.004	0.002	0.002	0.08	0.03
2007	0.120	0.021	0.025	0.030	0.18	0.21

Table 4a. Pollock catch and chinook bycatch by sector, 2000 – 2007 : ***CDQ*** *(Note that for 2007 approx 7k mt of CDQ pollock + bycatch was delivered shoreside and is missing from the cdq sector numbers and added to the shoreside sector numbers for that year)*

Year	Sector	A pollock	A chinook	B pollock	B chinook	A chinook rate	B chinook rate
2000	C	45,432	433	60,854	219	0.010	0.004
2001	C	55,798	1,771	84,035	735	0.032	0.009
2002	C	59,379	1,409	89,050	679	0.024	0.008
2003	C	59,528	1,687	89,592	872	0.028	0.010
2004	C	59,739	1,141	89,434	1,821	0.019	0.020
2005	C	59,070	1,291	90,646	619	0.022	0.007
2006	C	60,170	1,583	90,312	155	0.026	0.002
2007	C	55,725	3,102	83,600	2,529	0.056	0.030
Sector total		**454,839**	**12,417**	**677,522**	**7,630**	**0.027**	**0.011**

Table 4b. Pollock catch and chinook bycatch by sector, 2000 – 2007 : ***Motherships***

Year	Sector	A pollock	A chinook	B pollock	B chinook	A chinook rate	B chinook rate
2000	M	38,910	21	59,312	172	0.001	0.003
2001	M	48,342	1,462	72,871	702	0.030	0.010
2002	M	51,294	1,763	77,847	1,691	0.034	0.022
2003	M	51,780	2,551	78,718	1,818	0.049	0.023
2004	M	51,889	1,832	77,333	1,856	0.035	0.024
2005	M	51,398	1,864	79,272	687	0.036	0.009
2006	M	51,669	4,868	79,565	157	0.094	0.002
2007	M	48,739	4,824	72,773	1,826	0.099	0.025
Sector total		**394,020**	**19,184**	**597,691**	**8,910**	**0.049**	**0.015**

Table 4c. Pollock catch and chinook bycatch by sector, 2000 – 2007 : ***Catcher/processors***

Year	Sector	A pollock	A chinook	B pollock	B chinook	A chinook rate	B chinook rate
2000	P	155,009	2,185	236,150	562	0.014	0.002
2001	P	193,523	6,896	289,700	9,329	0.036	0.032
2002	P	205,070	8,275	310,128	953	0.040	0.003
2003	P	207,166	12,992	315,266	3,282	0.063	0.010
2004	P	207,591	8,578	311,997	2,666	0.041	0.009
2005	P	205,642	10,308	312,063	4,169	0.050	0.013
2006	P	208,633	16,199	319,363	1,411	0.078	0.004
2007	P	195,037	25,811	293,505	6,293	0.132	0.021

Sector total		**1,577,671**	**91,244**	**2,388,171**	**28,665**	**0.058**	**0.012**

*Table 4d. Pollock catch and chinook bycatch by sector, 2000 – 2007 : **Shoreside***

Year	Sector	A pollock	A chinook	B pollock	B chinook	A chinook rate	B chinook rate
2000	Shoreside	179,522	758	274,994	732	0.004	0.003
2001	Shoreside	240,740	6,336	367,650	2,820	0.026	0.008
2002	Shoreside	256,019	10,574	389,005	9,978	0.041	0.026
2003	Shoreside	258,266	13,750	392,965	7,446	0.053	0.019
2004	Shoreside	260,247	10,436	379,546	22,852	0.040	0.060
2005	Shoreside	256,885	13,114	396,087	36,001	0.051	0.091
2006	Shoreside	257,734	34,769	384,489	22,199	0.135	0.058
2007	Shoreside	244,470	37,100	328,229	39,364	0.152	0.120
Sector total		**1,953,883**	**126,838**	**2,912,965**	**141,393**	**0.065**	**0.049**