Public Testimony Sign-Up Sheet

Agenda Item C-4(b) Salmon Bycatch

	NAME (PLEASE PRINT)	AFFILIATION
1	~~Art Nelson~~	~~BSFA~~
2	Jon Warrenchuk	Oceana
3	Bubba Cook	WWF
4	GLENN REED	PSPA
5	HENRY MITCHELL	SEAGO
6	Becca Robbins Gisclair	YRDFA
7	John Stey Starkey	AVCP
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		
21		
22		
23		
24		
25		

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-4
OCTOBER 2008

MEMORANDUM

TO: Council, SSC, and AP Members

FROM: Chris Oliver
Executive Director

ESTIMATED TIME
4 HOURS

DATE: September 26, 2008

SUBJECT: BSAI Salmon Bycatch

ACTION REQUIRED

(a) Discussion paper on Chum Salmon Bycatch alternatives
(b) Review Pollock Intercooperative Agreement report (Bering Sea Chinook Management Measures EIS/RIR/IRFA)

BACKGROUND

(a) Discussion paper on Chum Salmon Bycatch alternatives

At the April 2008 Council meeting, the Council took action to bifurcate the analysis of management measures for Chinook and chum salmon to evaluate them separately. The EIS/RIR/IRFA for Chinook salmon bycatch management measures was presented for initial review in June 2008 and staff are currently working on revising that analysis for the public review draft. The draft EIS/RIR/IRFA is expected to be released by NMFS for public review in early December. Final action on the Chinook salmon bycatch management measures is scheduled for April 2009.

For chum salmon bycatch management measures, the Council modified the existing suite of alternatives and scheduled further review of the alternatives and plans for analysis at this meeting. A discussion paper was mailed out on September 12th and is attached as Item C-4(a). This discussion paper summarizes the current bycatch trends by season and sector through August 2008, the current suite of alternatives, NMFS's recommendations that an EIS likely will be needed for this analysis (for the same reasons one was recommended for Chinook salmon bycatch), and information about staff availability and timing to complete the analysis.

At this meeting, the Council will review the current suite of alternatives for chum (non-Chinook) salmon bycatch in the Bering Sea pollock trawl fishery as amended in April 2008. The Council may modify the alternatives at this time and discuss an appropriate timeline for this analysis.

(b) Review Pollock Intercooperative Agreement report (Bering Sea Chinook Salmon Bycatch Management Measures EIS/RIR/IRFA)

At the June 2008 Council meeting, the Council reviewed an initial draft EIS/RIR/IRFA to evaluate the impacts of a suite of bycatch reduction management measures for Chinook salmon in the Bering Sea pollock trawl fishery. The Council selected a preliminary preferred alternative (PPA) to be included and analyzed in the draft EIS/RIR/IRFA. The Council's June motion identifying the specific elements and

options for inclusion in this PPA is attached as Item C-4(b)(1). Staff are currently working to finalize analysis of the PPA and prepare the public review draft of the EIS/RIR/IRFA. In conjunction with this, an outreach plan has been developed for providing further information to various Alaskan communities on the Council's schedule for action and the availability of the draft EIS/RIR/IRFA. A flyer containing an overview of the Council action and dates of scheduled meetings is attached as Item C-4(b)(2).

The schedule for the Chinook Salmon Bycatch Draft EIS is the following:

End of September	Council submits Draft EIS to NMFS for review.
October	Outreach meetings in Alaska (possible February Nome meeting)
December 5	Draft EIS is published for public review with a 60 day comment period
December 5, 2008 - February 3, 2009	Public comment period
February 3 - March 13, 2009	NMFS prepares Comment Analysis Report for Council
April 2009	Final action by Council

The Council's PPA includes a specified cap level of 68,392 Chinook salmon (Annual scenario 1) "if an ICA is in place that provides explicit incentive(s) for each participant to avoid salmon bycatch in all years". The hard cap in the absence of such an approved ICA (Annual scenario 2) would be 47,591 Chinook salmon. The Council requested that the pollock industry develop the specifics of an ICA that meet the requirements of the PPA, and present information about their progress to the Council at this meeting. Representatives from the pollock industry will provide these progress reports under this agenda item.

Given the schedule for the draft EIS and the fact that the Council's PPA does not include detailed requirements for elements of an ICA, no specific incentive program under the ICA will be analyzed in the draft EIS/RIR/IRFA. The analysis will include a description of the general requirements in the Council's PPA and the process for reviewing and approving the proposed ICA. However, only the impacts of the different cap levels in the PPA will be analyzed in detail in the EIS/RIR/IRFA.

The National Marine Fisheries Service has expressed some concerns over ambiguities in the Council's PPA. A letter submitted from the agency to the Council detailing the nature of these concerns is attached as Item C-4(b)(3). One of their concerns relates to the hypothetical possibility of the overall cap level of 68,392 being exceeded because of the proposed process for accruing bycatch against the backstop cap for vessels that opt out of the ICA. Further explanation of this is provided in the letter and is displayed graphically in a figure attached as Item C-4(b)(4). NMFS staff will provide an overview of the issues addressed in this letter.

CHUM SALMON BYCATCH DISCUSSION PAPER

OCTOBER 2008

At the April 2008 Council meeting, the Council took action to bifurcate the analysis of management measures for Chinook and chum salmon to evaluate separately. The EIS/RIR/IRFA for the Chinook salmon management measures analysis was presented for initial review in June 2008 and staff are currently working on revising that analysis for the public review draft. Final action on the Chinook salmon bycatch management measures is scheduled for April 2009.

For Chum salmon bycatch management measures, the Council modified the existing suite of alternatives (see attached April 2008 Council motion for Action 2: Non-Chinook) and indicated that further review and modification would be scheduled for the October 2008 Council meeting.

At this meeting, the Council will review the current suite of alternatives for Chum (Non-Chinook) salmon bycatch in the EBS pollock trawl fishery as amended in April 2008. The Council may modify the alternatives at this time and discuss an appropriate timeline for this analysis. Information contained in this paper summarizes the current bycatch trends by season and sector through August 2008, the current suite of alternatives and considerations for the subsequent analysis with respect to appropriate NEPA analyses necessary as well as staff timing and availability.

TRENDS IN NON-CHINOOK (CHUM) BYCATCH

For catch accounting and PSC limits 4 species of salmon (Sockeye, Coho, Pink and Chum) are aggregated into an 'other salmon' or non-Chinook salmon species category. Chum salmon comprises over 99.6% of the total catch in this category (Table 1).

The majority of non-Chinook bycatch occurs in the pollock trawl fishery. Historically, the contribution of non-Chinook bycatch from the pollock trawl fishery has ranged from a low of 88% of all bycatch to a high of >99.5% in 1993. Since 2002 bycatch of non-Chinook salmon in the pollock fishery has comprised over 95% of the total. Total catch of non-Chinook salmon in the pollock fishery reached an historic high in 2005 at 705,963 fish (Table 2; Figure 1). Bycatch of non-Chinook salmon in this fishery occurs almost exclusively in the B season. Bycatch since 2005 has declined substantially, with the 2007 total of 94,072.

Bycatch rates for chum salmon (chum salmon/mt of pollock) from 1991-2007 are shown in Figure 2. Currently the Chum Salmon Savings Area as shown in Figure 2 is invoked in the month of August annually and when triggered in September, however the fleet is exempt from these closures under regulations for the salmon bycatch reduction intercooperative agreement implemented in 2007 under Amendment 84.

Table 1. Composition of bycatch by species in the non-Chinook salmon category from 2001-2007

Year	sockeye	coho	pink	chum	Total	% chum
2001	12	173	9	51,001	51,195	99.6%
2002	2	80	43	66,244	66,369	99.8%
2003	29	24	72	138,772	138,897	99.9%
2004	13	139	107	352,780	353,039	99.9%
2005	11	28	134	505,801	505,974	100.0%
2006	11	34	235	221,965	222,245	99.9%
2007	3	139	39	75,249	75,430	99.8%

*source NMFS catch accounting, extrapolated from sampled hauls only

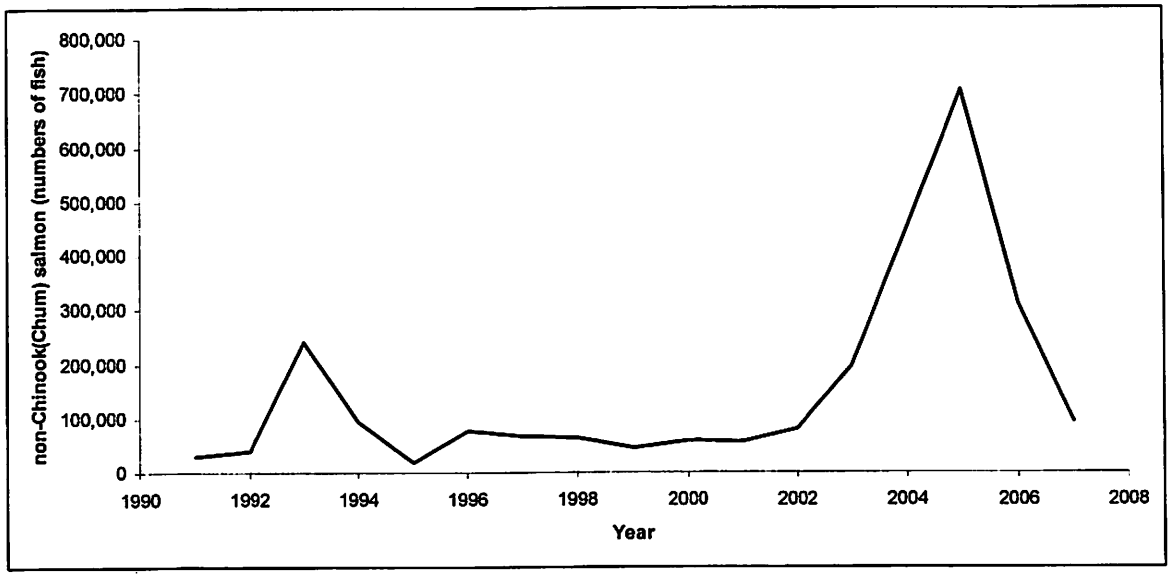


Figure 1. Non-Chinook salmon bycatch in the EBS pollock trawl fishery 1991-2007. Note 1991-1993 values do not include CDQ.

Table 2. Non-Chinook salmon catch (numbers of fish) in the BSAI pollock trawl fishery (all sectors) 1991-2008, CDQ is indicated separately and by season where available. 'na' indicates that data were not available in that year.

Year	Annual with CDQ	Annual without CDQ	Annual CDQ only	A season With CDQ	B season With CDQ	A season Without CDQ	B season Without CDQ	A season CDQ only	B season CDQ only
1991	Na	28,951	na	na	na	2,850	26,101	na	na
1992	na	40,274	na	na	na	1,951	38,324	na	na
1993	na	242,191	na	na	na	1,594	240,597	na	na
1994	92,672	81,508	11,165	3,991	88,681	3,682	77,825	309	10,856
1995	19,264	18,678	585	1,708	17,556	1,578	17,100	130	456
1996	77,236	74,977	2,259	222	77,014	177	74,800	45	2,214
1997	65,988	61,759	4,229	2,083	63,904	1,991	59,767	92	4,137
1998	64,042	63,127	915	4,002	60,040	3,914	59,213	88	827
1999	45,172	44,610	562	362	44,810	349	44,261	13	549
2000	58,571	56,867	1,704	213	58,358	148	56,719	65	1,639
2001	57,007	53,904	3,103	2,386	54,621	2,213	51,691	173	2,930
2002	80,652	77,178	3,474	1,377	79,274	1,356	75,821	21	3,453
2003	195,135	186,779	8,356	3,946	191,189	3,709	183,070	237	8,119
2004	447,626	437,429	10,197	438	447,187	409	437,019	29	10,168
2005	705,963	698,270	7,693	599	705,364	567	697,703	32	7,661
2006	310,545	309,343	1,202	2,525	308,020	2,460	306,883	65	1,137
2007	94,072	87,592	6,480	8,546	85,526	7,390	80,202	1,156	5,324
2008	8,685	8,444	241	na	na	na	na	na	na

2008 data through 8/23/08

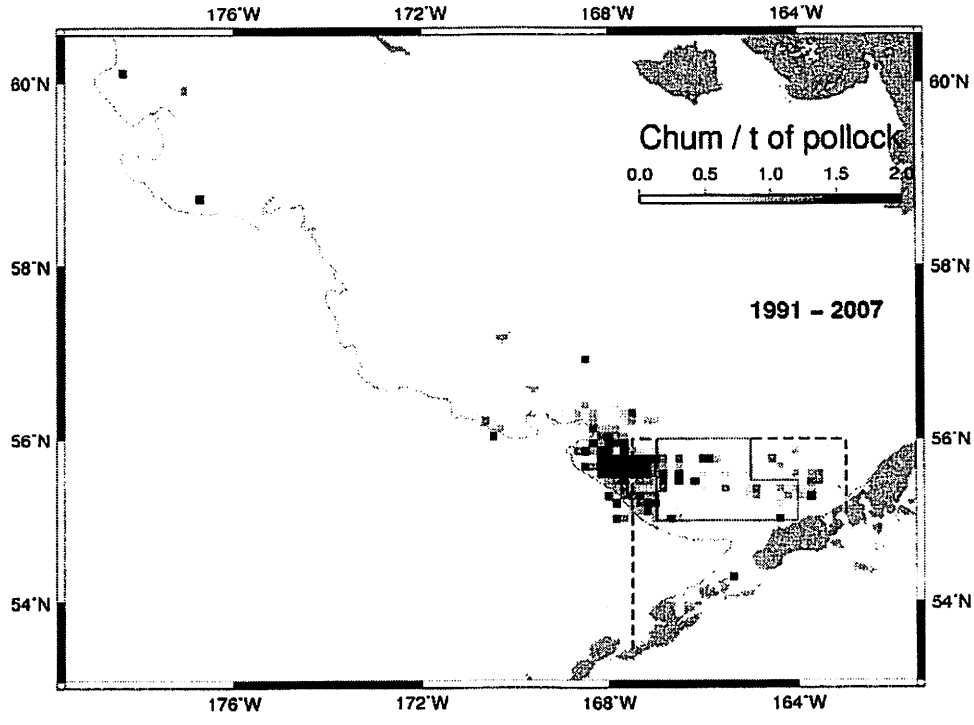


Figure 2. Historical chum B-season bycatch rates 1991-2007. Note the Chum Salmon Savings Area closure (solid line) and the Catcher Vessel Operational Area (dotted line).

Bycatch by sector from 1997-2008 (to date) is summarized in Table 3. Annual percentage contribution to the total amount by year and sector (non-CDQ) from 1997-2007 is summarized in Table 4.

Table 3 Non-Chinook bycatch in the EBS pollock trawl fishery 1997-2008 by sector. CP = catcher processor, M= Mothership, S = Shoreside catcher vessel fleet. CDQ where available is listed separately by the sector in which the salmon was caught. For confidentiality reasons CDQ catch by sector in 2008 to date cannot be listed separately. Source NMFS catch accounting (data queries run on 2/10/08 through 2007 and 8/23/08 for 2008

Year	CP	M	S	CP-CDQ	M-CDQ	S-CDQ	Total
1997	23,131	15,018	23,610	3,663	297	269	65,988
1998	8,119	6,750	49,173	na	na	na	64,042
1999	2,312	212	42,087	326	185	150	45,271
2000	4,930	509	51,428	1,161	287	256	58,571
2001	20,356	8,495	25,052	1,950	1,153	0	57,007
2002	9,303	13,873	54,002	2,051	1,423	0	80,652
2003	22,831	11,895	152,053	6,049	2,307	0	195,135
2004	76,159	13,330	347,940	8,257	1,940	0	447,626
2005	63,266	15,314	619,691	3,136	4,557	0	705,963
2006	18,180	2,013	289,150	929	273	0	310,545
2007	27,245	5,427	54,920	2,840	3,640	0	94,071
2008*	1,074	317	7,162	--	--	--	8,444

*through 8/23/08

Table 4 Percent of total annual non-Chinook salmon catch by sector by year 1997-2007 (CDQ not included in sector totals) CP = catcher processor, M= Mothership, S = Shoreside catcher vessel fleet.

Year	CP	M	S
1997	35%	23%	36%
1998	13%	11%	77%
1999	5%	0%	93%
2000	8%	1%	88%
2001	36%	15%	44%
2002	12%	17%	67%
2003	12%	6%	78%
2004	17%	3%	78%
2005	9%	2%	88%
2006	6%	1%	93%
2007	29%	6%	58%

HATCHERY RELEASES OF CHUM

Commercial salmon fisheries exist around the Pacific Rim with most countries releasing salmon fry in varying amounts by species. The North Pacific Anadromous Fish Commission summarizes information on hatchery releases by country and by area where available. Reports submitted to the NPAFC were used to summarize hatchery information by Country and by US state below (Table 5, Table 6). For more information see the following: Russia (Anon., 2007; TINRO-centre 2006; 2005); Canada(Cook and Irvine, 2007); USA (Josephson, 2007; Eggers, 2006; 2005; Bartlett, 2007; 2006; 2005); Korea (SRT 2005, 2006). Chum salmon hatchery releases by country are shown below in Table 5.

For chum salmon, Japanese hatchery releases far exceed releases by any other Pacific Rim country. This is followed by the US and Russia. A further break-out of hatchery releases by area in the US show that the majority of chum salmon fry releases occur in the Alaska region (Table 6).

Combined Asian hatchery releases in 2006 (Russia, Japan, Korea) account for 76% of the total releases while Alaskan chum releases account for 24% of the total releases. Chum enhancement projects in Alaska are not active in the AYK region.

Table 5. Hatchery releases of juvenile chum salmon in millions of fish.

Year	Russia	Japan	Korea	Canada	US	Total
1999	278.7	1867.9	21.5	172.0	520.8	2,860.9
2000	326.1	1817.4	19.0	124.1	546.5	2,833.1
2001	316.0	1831.2	5.3	75.8	493.8	2,722.1
2002	306.8	1851.6	10.5	155.3	507.2	2,831.4
2003	363.2	1840.6	14.7	136.7	496.3	2,851.5
2004	363.1	1817.0	12.9	105.2	630.2	2,928.4
2005	387.3	1844.0	10.9	131.8	596.9	2,970.9
2006	344.3	1858.0	7.3	107.1	578.8	2,895.5
2007	*	*	13.8	*	*	

*2007 data not yet available

Table 6. US west coast hatchery releases of juvenile chum salmon in millions of fish

Year	Alaska	Washington	Oregon	California	Idaho	Combined WA/OR/CA/ID	Total
1999	460.9	59.9	0	0	0		520.8
2000	507.7	38.8	0	0	0		546.5
2001	465.4	28.4	0	0	0		493.8
2002	450.8	56.4	0	0	0		507.2
2003	435.6	60.7	0	0	0		496.3
2004	578.5					51.7	630.2
2005	549.0					47.9	596.9
2006	541.2					37.6	578.8

STOCK OF ORIGIN INFORMATION FOR CHUM BYCATCH

A study conducted by the National Marine Fisheries Service evaluated bycatch samples of chum salmon from the 1994-1995 pollock trawl fishery in the Eastern Bering Sea and employed genetic stock identification (GSI) methodology to evaluate the stock composition of these bycaught fish (Wilmot et al., 1998). Results from this study indicated that in 1994 between 39-55% of samples were of Asian origin, 20-35% were western Alaskan stocks, and 21-29% were from the combined Southeastern Alaska, British Columbia and Washington stocks. (Wilmot et al., 1998). The 1995 samples indicated a range of 13-51% Asian, 33-53% western Alaska, and 9-46% Southeastern Alaska, British Columbia or Washington stocks (Wilmot et al., 1998). Estimates for immature versus maturing fish differed with both years indicating that maturing fish indicating a higher contribution from BC than the contribution from the immature fish

(Wilmot et al., 1998). Differences in relative stock composition also varied temporally throughout the B season and by region (Wilmot et al. 1998). Additional work is currently underway at the Auke Bay Laboratory to evaluate more recent chum bycatch samples from the pollock fishery for stock composition estimates. Results will likely be available in late 2008.

Additional studies of research trawl caught fish in the Bering Sea have looked at the origin and distribution of chum salmon (Urawa et al. 2004;). Genetic stock identification (GSI) with allozyme variation was used to determine the stock origin of chum salmon caught by a trawl research vessel operating in the central Bering Sea from late August to mid September 2002 (Urawa et al. 2004). Results indicated that the estimated stock composition for maturing chum salmon was 70% Japanese, 10% Russian and 20% North American stocks, while immature fish were estimated as 54% Japanese, 33% Russian, and 13% North American (Urawa et al. 2004). Stock composition of North American fish was identified for Northwest Alaska, Yukon, Alaskan Peninsula/Kodiak, Susitna River, Prince William Sound, Southeast Alaska/Northern British Columbia and Southern British Columbia/Washington State. Of these the majority of mature chum salmon for North America stocks came from Southern BC/Washington State and Alaska Peninsula/Kodiak (Urawa et al. 2004). For immature chum salmon, the largest contribution for North American stocks came from Southeast Alaska/Northern BC, followed by Alaska Peninsula/Kodiak and Southern BC/Washington State.

DESCRIPTION OF NON-CHINOOK SALMON (CHUM) ALTERNATIVES

The following alternatives are currently under consideration by the Council. The alternative description below includes all amendments made at the April 2008 Council meeting[1].

1.1 Alternative 1: Status Quo (non-Chinook)

Alternative 1 retains the current program of Chum Salmon Savings Area (SSA) closures triggered by separate non-CDQ and CDQ caps by species with the fleet's exemption to these closures per regulations for Amendment 84.

For chum salmon, the Chum Salmon Savings Area was established in 1994 by emergency rule, and then formalized in the BSAI Groundfish FMP in 1995 under Amendment 35 (ADF&G 1995b). This area is closed to pollock trawling from August 1 through August 31. Additionally, if 42,000[2] 'other" salmon are caught in the Catcher Vessel Operational Area (CVOA) during the period August 15-October 14, the area remains closed to pollock trawling for the remainder of the period September 1 through October 14 in the Chum Salmon Savings Area. As catcher processors are prohibited from fishing in the CVOA during the "B" season, unless they are participating in a CDQ fishery, only catcher vessels and CDQ fisheries are affected by the PSC limit.

Amendment 84 to the BSAI groundfish FMP exempted vessels from both the Chum and Chinook SSAs if triggered provided they participate in the salmon bycatch inter-cooperative agreement (ICA) with the voluntary rolling hot spot (VRHS) system.

Under the status quo, the CDQ Program would continue to receive allocations of 10.7 percent of the non-Chinook salmon PSC limit as "prohibited species quota reserves" or PSQ reserves. The PSQ reserves are further allocated among the six CDQ groups based on percentage allocations approved by NMFS on

[1] Note that the option 2 'cap set relative to salmon returns" as indicated in the original motion has been deleted here for consistency with discussion at the June 2008 Council meeting regarding the infeasibility of applying this cap framework at this time to salmon species.

[2] This number is inclusive of the allocation to CDQ groups. Non-CDQ 'other salmon' limit is 38,850.

August 8, 2005. The salmon savings areas would continue to be closed to vessels directed fishing for pollock CDQ for a particular CDQ group when that group's salmon PSQ is reached. The CDQ groups would continue to be exempt from the salmon savings area closures if they participate in the salmon bycatch intercooperative agreement.

1.2 Alternative 2: Hard Cap (non-Chinook)

This alternative would establish a non-Chinook salmon bycatch cap on the pollock fishery which, when reached would require all directed pollock fishing to cease. Only those non-Chinook caught by the directed pollock fleet would accrue towards the cap and fishery closures upon achieving the cap would apply only to directed fishing for pollock.

In order to select this alternative, the Council must choose one of the options under Component 1, Hard Cap Formulation (see below). If the Council does not select any options under the further components, Alternative 2 would be applied at the fishery level, as a single hard cap to all combined sectors. The CDQ Program would receive an allocation of 10.7% of any hard cap established for non-Chinook salmon in the BS. The CDQ allocation would be further allocated among the six CDQ groups based on percentage allocations currently in effect. Each CDQ group would be prohibited from exceeding its non-Chinook salmon allocation. This prohibition would require the CDQ group to stop directed fishing for pollock CDQ once its cap is reached because further directed fishing for pollock would likely result in exceeding the cap.

The remaining 89.3% of the hard cap would be allocated to the non-CDQ sectors (inshore catcher vessel sector, offshore catcher processor sector, and mothership sector) combined. All bycatch of non-Chinook salmon by any vessels in any of these three sectors would accrue against the cap, and once the cap was reached, NMFS would prohibit directed fishing for pollock by all three of these sectors at the same time.

If the hard cap is to be subdivided by sector (under Component 2), two options are provided for the allocation. Options for sector transfer are included in Component 3. Further subdivision of an inshore sector cap to individual inshore cooperatives is discussed under Component 4 (cooperative provisions).

1.2.1 Component 1: Hard Cap Formulation

Component 1 would establish a hard cap number based upon averages of historical numbers and other considerations as noted below. Component 1 sets the formulation for the overall cap: this can be either applied to the fishery as a whole, or applying Components 2 and 4 may be subdivided by sector (Component 2) and to cooperative (Component 4).

Option 1: Range of numbers for hard cap formulation

A range of numbers is established for consideration as hard caps for non-Chinook salmon. Table 5 lists the numbers in numerical order lowest to highest for overall caps. Here the CDQ allocation of the cap is 10.7% of the total cap, with the remainder for the combined non-CDQ fishery.

Table 7 Range of suboptions for hard cap for non-Chinook with breakout for CDQ allocation (10.7%) and remainder for non-CDQ fleet

Sub Option	Non-Chinook	CDQ	Non-CDQ
i)	58,176	6,225	51,951
ii)	76,252	8,159	68,093
iii)	147,204	15,751	131,453
iv)	203,080	21,730	181,350
v)	220,614	23,606	197,008
vi)	347,984	37,234	310,750
vii)	488,045	52,221	435,824

The following section provides the originating rationale (by suboption number) for each cap number listed in Table 7. Suboption i-ii (58,176 and 76,252, the low end of the range of caps considered) represent the 5 year average from 1997-2001 (i) and the 10 year average 1992-2001 (suboption ii). These year combinations were chosen specifically in an attempt to be responsive to considerations relative to bycatch levels prior to accession to the Yukon River Agreement (signed in 2002).

Suboptions iii-vii refer to average bycatch numbers by the pollock pelagic trawl fishery over a range of historical year combinations from 1997 through 2006, dropping some years over the period under consideration in some options. Suboption iii) is the 10 year average (1997-2006) with the highest year (2005) dropped from the years over which average occurred while suboption iv) is the 10 year average (1997-2006) with the lowest year (1999) dropped from the years over which average occurred. Suboption v) is the straight 10 year average (including all years 1997-2006), vi) is the 5 year average (2002-2006) and vii) is the three year average for the most years under consideration (2004-2006).

For analytical purposes the following range of numbers will be utilized:

Table 8 Range of non-Chinook salmon caps for use in the analysis of impacts.

	Non-Chinook	CDQ	Non-CDQ
i)	58,000	6,206	51,794
ii)	206,300	22,074	184,226
iii)	353,000	37,771	315,229
iv)	488,000	52,216	435,784

1.2.1.1.1 Suboption: Periodic adjustments to cap based on updated bycatch information.

Under this suboption, the Council will reassess updated salmon bycatch information after a certain number of years and determine if adjustments to the hard cap implemented under this action are needed. If the Council selects this option, it would specify when the reassessment of salmon bycatch information would occur. Any revisions to the salmon bycatch management measures would require additional analysis and rulemaking. The Council may reassess any management measure at any time and does not need to specify a particular time for reassessment of the salmon bycatch management measures.

1.2.2 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, the inshore catcher vessel (CV) fleet, the mothership fleet and the offshore catch processor (CP) fleet. The catch of salmon would be tabulated on a sector level basis, and if the total catch in that sector reaches the cap specified for that sector, NMFS would close directed fishing for pollock by that sector for the remainder of the season. The remaining

sectors may continue to fish unless they too reach their specific sector level cap. Options for hard caps are as specified under component 1, options 1 and 2. However using each of those options (and suboptions) for cap formulation, the cap is then subdivided into sector level caps according to the following formulas:

Divide the final cap by sectors based on:
Option 1) 10% of the cap to the CDQ sector, and the remaining allocated as follows: 50% inshore CV fleet; 10% for the mothership fleet; and 40% for the offshore CP fleet.

This option is intended to follow the percentage allocation established for pollock under the AFA. Application of these percentages results in the following range of caps by sector, based upon the range of caps in component 1, option 1. Note that here the CDQ allocation of salmon is slightly lower than that assumed as a default under component 1 (10% rather than 10.7%).

Table 9 Sector split caps resulting from option 1 percentage allocation: 10% CDQ and the remaining 90% divided 50% inshore CV fleet; 10% for mothership fleet; 40% for the offshore CP fleet

Option 1) Sector level caps

Sub Option	Fishery cap #s Non-Chinook	CDQ	Inshore CV	Mothership	Offshore CPs
i)	58,176	5,818	26,179	5,236	20,943
ii)	76,252	7,625	34,313	6,863	27,451
iii)	147,204	14,720	66,242	13,248	52,993
iv)	203,080	20,308	91,386	18,277	73,109
v)	220,614	22,061	99,276	19,855	79,421
vi)	347,984	34,798	156,593	31,319	125,274
vii)	488,045	48,805	219,620	43,924	175,696

For analytical purposes the following ranges will be utilized (Table 10):

Table 10 Range of sector level non-Chinook caps for use in the analysis of alternatives

	Non- Chinook	CDQ	Inshore CV	Mothership	Offshore CPs
i)	58,000	5,800	26,100	5,220	20,880
ii)	201,300	20,130	90,585	18,117	72,468
iii)	345,000	34,500	155,250	31,050	124,200
iv)	488,000	48,800	219,600	43,920	175,680

Option 2) Historical average of percent bycatch by sector based on:

a) 3 year (2004-2006) average CDQ 1%; inshore CV fleet 86%; mothership fleet 2%; offshore CP fleet 11%

b) 5 year (2002-2006) average: CDQ 2%; inshore CV fleet 84%; mothership fleet 3%; offshore CP fleet 11%.

c) 10 year (1997-2006) average: CDQ 2%; inshore CV fleet 82%; mothership fleet 4%; offshore CP fleet 12%.

Under option 2, the subdivision of caps to each sector is now based upon historical average percent bycatch by sector over 3, 5 and 10 year time periods.

Option 2a uses the historical averages of percent bycatch by sector from the most recent time period under consideration in this analysis (2004-2006). This results in the following average percentages by sector: CDQ 1%; shore-based CV fleet 86%; mothership fleet 2%; offshore CP fleet 11%. Those percentages are applied to the range of caps under consideration in component 1, option 1 (Table 11).

Table 11 Sector level caps based upon historical average percent bycatch from 2004-2006 (option 2a)

Option 2a) Sector level caps (2004-2006 average)

Sub Option	Fishery cap #s Non-Chinook	CDQ 1%	Inshore CV 86%	Mothership 2%	Offshore CPs 11%
i)	58,176	582	50,031	1,164	6,399
ii)	76,252	763	65,577	1,525	8,388
iii)	147,204	1,472	126,595	2,944	16,192
iv)	203,080	2,031	174,649	4,062	22,339
v)	220,614	2,206	189,728	4,412	24,268
vi)	347,984	3,480	299,266	6,960	38,278
vii)	488,045	4,880	419,719	9,761	53,685

For analytical purposes the following range of sector split caps would be utilized for this option:

Table 12 Range of sector level caps (option 2a) for use in the analysis of impacts

	Non-Chinook	CDQ	Inshore CV	Mothership	Offshore CPs
i)	58,000	580	49,880	1,160	6,380
ii)	201,300	2,013	173,118	4,026	22,143
iii)	345,000	3,450	296,700	6,900	37,950
iv)	488,000	4,880	419,680	9,760	53,680

Option 2b considers the historical averages of percent bycatch by sector from the 5 year time period (2002-2006). This results in the following average percentages by sector: CDQ 2%; inshore CV fleet 84%; mothership fleet 3%; offshore CP fleet 11%. Those percentages are applied to the range of caps under consideration in component 1, option 1 (Table 13).

Table 13 Sector level caps based upon historical average percent bycatch from 2002-2006 (option 2b)

Option 2b) Sector level caps (2002-2006 average)

Sub Option	Fishery cap #s Non-Chinook	CDQ 2%	Inshore CV 84%	Mothership 3%	Offshore CPs 11%
i)	58,176	1,164	48,868	1,745	6,399
ii)	76,252	1,525	64,052	2,288	8,388
iii)	147,204	2,944	123,651	4,416	16,192
iv)	203,080	4,062	170,587	6,092	22,339
v)	220,614	4,412	185,316	6,618	24,268
vi)	347,984	6,960	292,307	10,440	38,278
vii)	488,045	9,761	409,958	14,641	53,685

For analytical purposes the following range of sector split caps for this option would be utilized (Table 14):

Table 14 Range of sector level non-Chinook salmon caps (option 2b) for use in the analysis of impacts

	Non-Chinook	CDQ	Inshore CV	Mothership	Offshore CPs
i)	58,000	1,160	48,720	1,740	6,380
ii)	201,300	4,026	169,092	6,039	22,143
iii)	345,000	6,900	289,800	10,350	37,950
iv)	488,000	9,760	409,920	14,640	53,680

Option 2c considers the historical averages of percent bycatch by sector from the 10 year time period (1997-2006). This results in the following average percentages by sector: CDQ 2%; inshore CV fleet 82%; mothership fleet 4%; offshore CP fleet 12%. Those percentages are applied to the range of caps under consideration in component 1, option 1 (Table 15).

Table 15 Sector level caps based upon historical percent bycatch from 1997-2006 (option 2c)

Option 2c) Sector level caps (1997-2006 average)

Sub Option	Fishery cap #s Non-Chinook	CDQ 2%	Inshore CV 82%	Mothership 4%	Offshore CPs 12%
i)	58,176	1,164	47,704	2,327	6,981
ii)	76,252	1,525	62,527	3,050	9,150
iii)	147,204	2,944	120,707	5,888	17,664
iv)	203,080	4,062	166,526	8,123	24,370
v)	220,614	4,412	180,903	8,825	26,474
vi)	347,984	6,960	285,347	13,919	41,758
vii)	488,045	9,761	400,197	19,522	58,565

For analytical purposes the following range of sector split caps for this option will be utilized:

Table 16 Range of sector level non-Chinook caps for use in the analysis of impacts (option 2c)

	Non-Chinook	CDQ	Inshore CV	Mothership	Offshore CPs
i)	58,000	1,160	47,560	2,320	6,960
ii)	201,300	4,026	165,066	8,052	24,156
iii)	345,000	6,900	282,900	13,800	41,400
iv)	488,000	9,760	400,160	19,520	58,560

1.2.3 Component 3: Sector Transfer

Options under this component may be selected only if the Council recommends allocating salmon bycatch among the sectors under Component 2.

If the Council does recommend salmon bycatch allocations to the sectors under Component 2 but does not select one of these options, the salmon bycatch available to each sector could not change during the year and NMFS would close directed fishing for pollock once each sector reached its Chinook salmon bycatch allocation. The CDQ allocations would continue to be managed as they are under status quo, with further allocation of the salmon bycatch cap among the six CDQ groups, transferable allocations within the CDQ Program, and a prohibition against a CDQ group exceeding is salmon bycatch allocation.

Options 1 and 2 are mutually exclusive, which means that the Council may select Option 1 to allow transferable salmon bycatch allocations at the sector level or Option 2 to require NMFS to manage the reapportionment of salmon bycatch from one sector to another.

1.2.3.1 Option 1: Transferable salmon bycatch caps

Option 1) Transfer salmon bycatch among sectors (industry initiated)

Suboption: Limit transfers to the following percentage of salmon that is available to the transferring entity at the time of transfer:

a) 50%
b) 70%
c) 90%

If a transferring entity had completed all of its pollock harvest with some salmon remaining, it could only transfer up to a specified percent of that salmon bycatch to another entity with pollock still remaining for harvest. Under this circumstance, this transfer provision would mean that not all salmon bycatch allocated would be available for use by entities other than the original recipient of the allocation.

Transfers are voluntary requests, initiated by the entity receiving a salmon bycatch cap, for NMFS to move a specific amount of a salmon bycatch cap from one entity to another entity.

Option 1 would require that each sector receiving a transferable salmon bycatch cap be represented by a legal entity that could:

- represent all vessels eligible to participate in the particular AFA sector and receive an annual permit for a specific amount of salmon bycatch on behalf of all of those vessels,
- be authorized by all members of the sector to transfer all or a portion of the sector's salmon bycatch cap to another sector or to receive a salmon bycatch transfer from another sector on behalf of the members of the sector,
- be responsible for any penalties assessed for exceeding the sector's salmon bycatch cap (i.e., have an agent for service of process with respect to all owners and operators of vessels that are members of the legal entity).

Once transferable salmon bycatch hard caps are allocated to a legal entity representing an AFA sector or to a CDQ group, NMFS does not actively manage these allocations. Each entity receiving a transferable hard cap would be prohibited from exceeding that cap and would be responsible to control its pollock fishing to prevent exceeding its salmon bycatch cap. Any overages of the salmon bycatch cap would be reported to NMFS Enforcement for possible enforcement action against the responsible entity.

1.2.3.2 Option 2: Rollover unused salmon bycatch to other sectors

Option 2) NMFS actively manages the salmon bycatch allocations to the non-CDQ sectors and would rollover unused salmon bycatch to other sectors still fishing based on the proportion of pollock remaining for harvest.

A "rollover" is a management action taken by NMFS to "reapportion" or move salmon bycatch from one sector to another through a notice in the Federal Register. Rollovers are an alternative to allowing one sector to voluntarily transfer salmon bycatch to another sector.

Under this option, if a non-CDQ AFA sector has completed harvest of its pollock allocation without using all of its salmon bycatch allocation, and sufficient salmon bycatch remains to be reapportioned, NMFS would reapportion the unused amount of salmon bycatch to other AFA sectors, including CDQ. Any reapportionment of salmon bycatch by NMFS would be based on the proportion each sector represented of the total amount of pollock remaining for harvest by all sectors through the end of the year. Successive reapportionment actions would occur as each non-CDQ sector completes harvest of its pollock allocation.

The CDQ groups could receive rollovers of salmon bycatch from other sectors. However, because the CDQ groups will each receive a specific, transferable allocation of salmon bycatch (as occurs under status quo), unused salmon bycatch would not be reapportioned from an individual CDQ group to other CDQ groups or other AFA sectors. CDQ groups with unused salmon bycatch could transfer it to another CDQ group, as is currently allowed in the CDQ Program

Options 1 and 2 are mutually exclusive.

1.2.4 Component 4: Cooperative provisions

Options under this component may be selected only if the Council recommends allocating salmon bycatch among the sectors under Component 2 and makes an allocation of salmon bycatch to the inshore sector. Component 4 would allow further allocation of transferable or non-transferable salmon bycatch allocations to the inshore cooperatives.

Each inshore cooperative and the inshore open access fishery (if the inshore open access fishery existed in a particular year) would receive a salmon allocation managed at the cooperative level. If the cooperative or open access fishery salmon cap is reached, the cooperative or open access fishery must stop fishing for pollock.

The initial allocation of salmon by cooperative within the shore-based CV fleet or to the open access fishery would be based upon the proportion of total sector pollock catch associated with the vessels in the cooperative or open access fishery. The annual pollock quota for this sector is divided up by applying a formula in the regulations which allocates catch to a cooperative or the open access fishery according to the specific sum of the catch history for the vessels in the cooperative or the open access fishery. Under 679.62(e)(1), the individual catch history of each vessel is equal to the sum of inshore pollock landings from the vessel's best 2 of the 3 years 1995 through 1997, and includes landings to catcher/processors for vessels that made landings of 500 mt or more to catcher/processors from 1995 through 1997. Each year, fishing permits are issued by cooperative, with the permit application listing the vessels added or subtracted. Fishing in the open access fishery is possible should a vessel leave their cooperative, and the shore-based CV quota allocation is partitioned to allow for an allocation to an open access fishery under these circumstances.

The range of cooperative level allocations are based upon the 2008 pollock quota allocations and the options for the range of sector splits for the inshore CV fleet based upon component 2, options 1 and 2 applied to component 1 options 1 and 2 (Table 17–Table 20). All inshore sector catcher vessels have been part of a cooperative since 2005. However, if this component is selected by the Council, regulations would accommodate allocations of an appropriate portion of the salmon bycatch cap to the open access fishery if, in the future, a vessel or vessels did not join a cooperative. For analytical purposes, the range of cooperative allocations would be analyzed using the ranges as indicated in Table 21 and Table 22.

Table 17 Inshore cooperative allocations resulting from application of component 2, option 1 allocation to the inshore CV fleet (50% of allocation after 10% to CDQ)

			Inshore cooperative allocation:							
Cap Suboption	Overall fishery cap level Non-Chinook	Resulting Inshore sector allocation	31.145% Akutan CV Assoc	1.146% Arctic Enterprise Assoc	9.481% Northern Victor Fleet coop	2.876% Peter Pan Fleet coop	12.191% Unalaska coop	24.256% Unisea Fleet coop	18.906% Westward Fleet coop	0.000% open access AFA vessels
i)	58,176	26,179	8,154	300	2,482	753	3,192	6,350	4,949	0
ii)	76,252	34,313	10,687	393	3,253	987	4,183	8,323	6,487	0
iii)	147,204	66,242	20,631	759	6,280	1,905	8,076	16,068	12,524	0
iv)	203,080	91,386	28,462	1,047	8,664	2,628	11,141	22,167	17,277	0
v)	220,614	99,276	30,920	1,138	9,412	2,855	12,103	24,080	18,769	0
vi)	347,984	156,593	48,771	1,795	14,847	4,504	19,090	37,983	29,605	0
vii)	488,045	219,620	68,401	2,517	20,822	6,316	26,774	53,271	41,521	0

Table 18 Inshore cooperative allocation resulting from application of component 2, option 2a allocation to the inshore CV fleet (average historical bycatch from 2004-2006)

			Inshore cooperative allocation:							
Cap Suboption	Overall fishery cap level Non-Chinook	Resulting Inshore sector allocation	31.145% Akutan CV Assoc	1.146% Arctic Enterprise Assoc	9.481% Northern Victor Fleet coop	2.876% Peter Pan Fleet coop	12.191% Unalaska coop	24.256% Unisea Fleet coop	18.906% Westward Fleet coop	0.000% open access AFA vessels
i)	58,176	50,031	15,582	573	4,743	1,439	6,099	12,136	9,459	0
ii)	76,252	65,577	20,424	752	6,217	1,886	7,994	15,906	12,398	0
iii)	147,204	126,595	39,428	1,451	12,003	3,641	15,433	30,707	23,934	0
iv)	203,080	174,649	54,394	2,001	16,558	5,023	21,291	42,363	33,019	0
v)	220,614	189,728	59,091	2,174	17,988	5,457	23,130	46,020	35,870	0
vi)	347,984	299,266	93,206	3,430	28,373	8,607	36,484	72,590	56,579	0
vii)	488,045	419,719	130,721	4,810	39,794	12,071	51,168	101,807	79,352	0

Table 19 Inshore cooperative allocation resulting from application of component 2, option 2b allocation to the inshore CV fleet (average historical bycatch from 2002-2006)

			Inshore cooperative allocation:							
			31.145%	1.146%	9.481%	2.876%	12.191%	24.256%	18.906%	0.000%
Cap Suboption	Overall fishery cap level Non-Chinook	Resulting Inshore sector allocation	Akutan CV Assoc	Arctic Enterprise Assoc	Northern Victor Fleet coop	Peter Pan Fleet coop	Unalaska coop	Unisea Fleet coop	Westward Fleet coop	open access AFA vessels
i)	58,176	48,868	15,220	560	4,633	1,405	5,957	11,853	9,239	0
ii)	76,252	64,052	19,949	734	6,073	1,842	7,809	15,536	12,110	0
iii)	147,204	123,651	38,511	1,417	11,723	3,556	15,074	29,993	23,378	0
iv)	203,080	170,587	53,129	1,955	16,173	4,906	20,796	41,378	32,251	0
v)	220,614	185,316	57,717	2,124	17,570	5,330	22,592	44,950	35,036	0
vi)	347,984	292,307	91,039	3,350	27,714	8,407	35,635	70,902	55,263	0
vii)	488,045	409,958	127,681	4,698	38,868	11,790	49,978	99,439	77,507	0

Table 20 Inshore cooperative allocation resulting from application of component 2, option 2c allocation to the inshore CV fleet (average historical bycatch from 1997-2006)

			Inshore cooperative allocation:							
			31.145%	1.146%	9.481%	2.876%	12.191%	24.256%	18.906%	0.000%
Cap Suboption	Overall fishery cap level Non-Chinook	Resulting Inshore sector allocation	Akutan CV Assoc	Arctic Enterprise Assoc	Northern Victor Fleet coop	Peter Pan Fleet coop	Unalaska coop	Unisea Fleet coop	Westward Fleet coop	open access AFA vessels
i)	58,176	47,704	14,858	547	4,523	1,372	5,816	11,571	9,019	0
ii)	76,252	62,527	19,474	717	5,928	1,798	7,623	15,166	11,821	0
iii)	147,204	120,707	37,594	1,383	11,444	3,472	14,715	29,279	22,821	0
iv)	203,080	166,526	51,864	1,908	15,788	4,789	20,301	40,392	31,483	0
v)	220,614	180,903	56,342	2,073	17,151	5,203	22,054	43,880	34,202	0
vi)	347,984	285,347	88,871	3,270	27,054	8,207	34,787	69,214	53,948	0
vii)	488,045	400,197	124,641	4,586	37,943	11,510	48,788	97,072	75,661	0

Table 21 Range of cooperative level caps for use in analysis of impacts of component 4 as applied to component 2, option 1

			Inshore cooperative allocation:							
Cap Suboption	Overall fishery cap level Non-Chinook	Resulting Inshore sector allocation	31.145% Akutan CV Assoc	1.146% Arctic Enterprise Assoc	9.481% Northern Victor Fleet coop	2.876% Peter Pan Fleet coop	12.191% Unalaska coop	24.256% Unisea Fleet coop	18.906% Westward Fleet coop	0.000% open access AFA vessels
i)	58,000	26,100	8,129	299	2,475	751	3,182	6,331	4,934	0
ii)	206,300	90,585	28,213	1,038	8,588	2,605	11,043	21,972	17,126	0
iii)	353,000	155,250	48,353	1,779	14,719	4,465	18,927	37,657	29,352	0
iv)	488,000	219,600	68,394	2,517	20,820	6,316	26,771	53,266	41,518	0

Table 22 Cap ranges for analysis of hard cap component 2, option 2 (a-c) for component 4 cooperative provision

			Inshore cooperative allocation:							
Cap Suboption	Overall fishery cap level Non-Chinook	Resulting Inshore sector allocation	31.145% Akutan CV Assoc	1.146% Arctic Enterprise Assoc	9.481% Northern Victor Fleet coop	2.876% Peter Pan Fleet coop	12.191% Unalaska coop	24.256% Unisea Fleet coop	18.906% Westward Fleet coop	0.000% open access AFA vessels
2a(i)	58,000	49,880	15,535	572	4,729	1,435	6,081	12,099	9,430	0
2a(ii)	206,300	173,118	53,918	1,984	16,413	4,979	21,105	41,992	32,730	0
2a(iii)	353,000	296,700	92,407	3,400	28,130	8,533	36,171	71,968	56,094	0
2a(iv)	488,000	419,680	130,709	4,810	39,790	12,070	51,163	101,798	79,345	0
2b(i)	58,000	48,720	15,174	558	4,619	1,401	5,939	11,818	9,211	0
2b(ii)	206,300	169,092	52,664	1,938	16,032	4,863	20,614	41,015	31,969	0
2b(iii)	353,000	289,800	90,258	3,321	27,476	8,335	35,330	70,294	54,790	0
2b(iv)	488,000	409,920	127,670	4,698	38,865	11,789	49,973	99,430	77,499	0
2c(i)	58,000	47,560	14,813	545	4,509	1,368	5,798	11,536	8,992	0
2c(ii)	206,300	165,066	51,410	1,892	15,650	4,747	20,123	40,038	31,207	0
2c(iii)	353,000	282,900	88,109	3,242	26,822	8,136	34,488	68,620	53,485	0
2c(iv)	488,000	400,160	124,630	4,586	37,939	11,509	48,784	97,063	75,654	0

1.2.4.1 Cooperative transfer options

These options would only apply if the Council selected sector allocations under Component 2 and further allocated the inshore sector allocation among the cooperatives and the inshore open access fishery (if the inshore open access fishery existed in a particular year) under Component 4.

When a salmon cooperative cap is reached, the cooperative must stop fishing for pollock and may:

Option 1) Transfer (lease) its remaining pollock to another inshore cooperative for the remainder of the season or year. Allow inter-cooperative transfers of pollock to the degree currently authorized by the AFA.

Option 2) Transfer salmon bycatch from other inshore cooperatives (industry initiated)

Suboption: Limit transfers to the following percentage of salmon that is available to the transferring entity at the time of transfer:

a) 50%
b) 70%
c) 90%

The Council could select Option 1 or Option 2 or both.

1.3 Alternative 3: Triggered closures (non-Chinook)

Triggered closures are regulatory time area closures that are invoked when cap levels are reached. Cap levels for triggered closures would be formulated in a way similar to those specified under alternative 2.

If the trigger cap is not further allocated among the non-CDQ sectors under Component 3, sector allocation, the CDQ Program would receive an allocation of 10.7 percent of the BS Chinook salmon trigger cap. This CDQ allocation would be further allocated among the six CDQ groups based on percentage allocations currently in effect. Each CDQ group would be prohibited from directed fishing for pollock inside the closure area(s) when that group's trigger cap is reached.

1.3.1 Component 1: Trigger Cap Formulation

The trigger cap amount will be within the range of hard caps established under Alternative 2.

1.3.2 Component 2: Sector Allocation

Sector allocations are equivalent to those under consideration for hard caps.

1.3.3 Component 3: Sector Transfer

Option 1) Transfer salmon bycatch among sectors (industry initiated)

Suboption: Limit transfers to the following percentage of salmon that is available to the transferring entity at the time of transfer:

a) 50%
b) 70%
c) 90%

Option 2) NMFS will rollover unused salmon bycatch to other sectors and other cooperatives still fishing based on the proportion of pollock remaining for harvest.
The above options are mutually exclusive.

1.3.4 Component 4: Area option

This closure was identified by rate-based analysis delineating regions where average bycatch rate exceeded 0.9 chum salmon per ton of pollock (Figure 3). Over the entire B season, this area accounts for 49% of the chum salmon on average (1994-2007) and only 12% of the pollock catch (Figure 3)

Table 23 Area closure coordinates

55° 53'	165° 30'	56° 00'	169° 15'
55° 00'	166° 38'	56° 23'	167° 23'
55° 00'	167° 45'	55° 53'	167° 00'
55° 23'	168° 15'	55° 53'	165° 30'

Small area

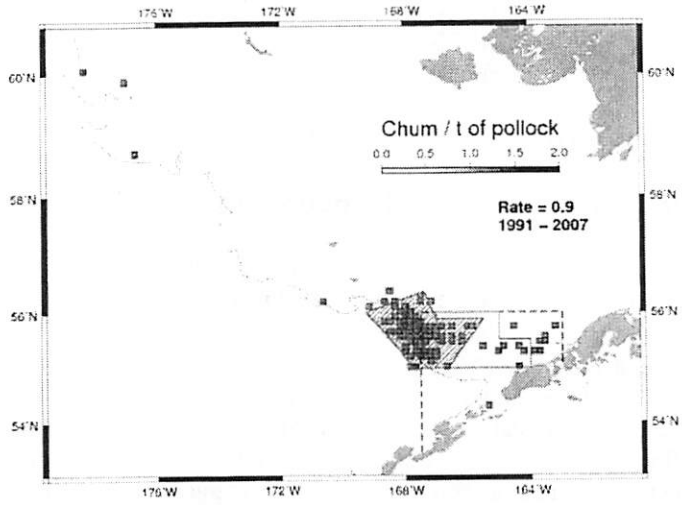


Figure 3 B-season chum salmon proposed closure over different rates based on 1991-2007 NMFS observer data. Filled in 10x10km cells represent locations where the average bycatch rate exceeded 0.9 chum salmon per t of pollock.

Table 24 Average seasonal proportions by periods for 1993-2007 based on NMFS observer data (effort is relative hours towed, salmon are relative numbers, and pollock are relative tons).

Periods	Seasonal pollock proportion	Seasonal "other" salmon proportion	Seasonal effort proportion
Jun 1-7	0%	1%	1%
Jun 8-14	1%	1%	1%
Jun 15-21	2%	2%	2%
Jun 22-30	4%	3%	3%
Jul 1-7	4%	4%	3%
Jul 8-14	4%	2%	4%
Jul 15-21	4%	6%	3%
Jul 22-31	7%	6%	6%
Aug 1-7	5%	9%	5%
Aug 8-14	6%	5%	5%
Aug 15-21	7%	10%	7%
Aug 22-31	11%	7%	11%
Sep 1-7	9%	9%	9%
Sep 8-14	8%	9%	9%
Sep 15-21	8%	9%	9%
Sep 22-30	8%	5%	9%
Oct 1-7	5%	5%	6%
Oct 8-14	4%	4%	4%
Oct 15-21	2%	2%	3%
Oct 22-31	2%	1%	2%

Table 25 Average 1993-2007 seasonal pattern of other salmon bycatch per t of pollock in and outside of candidate closure area by different periods.

Area	Periods	Rate In	Rate Outside	Pollock inside	Chum Inside	Effort Inside
Small	All of B	1.216	0.144	5%	33%	5%
Small	Jun 1-7	-	0.338	0%	0%	0%
Small	Jun 8-14	0.221	0.186	0%	0%	0%
Small	Jun 15-21	0.034	0.283	3%	0%	3%
Small	Jun 22-30	0.372	0.161	3%	6%	3%
Small	Jul 1-7	0.040	0.255	5%	1%	4%
Small	Jul 8-14	0.289	0.104	12%	27%	11%
Small	Jul 15-21	2.473	0.118	8%	66%	8%
Small	Jul 22-31	0.965	0.131	5%	28%	5%
Small	Aug 1-7	3.137	0.138	8%	66%	7%
Small	Aug 8-14	0.607	0.166	6%	18%	6%
Small	Aug 15-21	1.363	0.200	6%	32%	7%
Small	Aug 22-31	0.833	0.109	3%	21%	4%
Small	Sep 1-7	0.970	0.148	6%	30%	7%
Small	Sep 8-14	2.199	0.137	3%	37%	4%
Small	Sep 15-21	1.519	0.128	6%	44%	6%
Small	Sep 22-30	0.963	0.108	4%	25%	4%
Small	Oct 1-7	0.940	0.128	6%	33%	6%
Small	Oct 8-14	1.538	0.153	3%	26%	3%
Small	Oct 15-21	0.817	0.152	7%	29%	7%
Small	Oct 22-31	0.383	0.111	14%	37%	12%

1.3.4.1.1 Suboption: Periodic adjustments to areas based on updated bycatch information.

Under this suboption, the Council will reassess updated salmon bycatch information after a certain number of years and determine if adjustments to any area options implemented under this action are needed. If the Council selects this option, it would specify when the reassessment of salmon bycatch information would occur. Any revisions to the salmon bycatch management measures would require additional analysis and rulemaking. The Council may reassess any management measure at any time and does not need to specify a particular time for reassessment of the salmon bycatch management measures.

CONSIDERATIONS FOR ANALYSIS

Any measures under consideration for chum salmon bycatch management by the Council will be analyzed separately from actions currently under consideration for Chinook salmon bycatch. Chinook salmon bycatch measures are being analyzed in the Chinook Salmon Bycatch Management Measures EIS/RIR/IRFA scheduled for public release in early December for a public comment period. Final action by the Council on that analysis is scheduled for April 2009 after which regulations to promulgate changes to the current program will be drafted.

The specific NEPA analysis (EA or EIS) required for any chum management measures under consideration has not yet been determined. NMFS determined that an EIS was necessary at the time the Council still had Chinook salmon and non-Chinook (chum) salmon bycatch management measures together in the same analytical document. Reasons for this determination were identified by NMFS and discussed at the October 2007 Council meeting. These include the following:

- An EA must conclude that there are no significant impacts associated with the preferred alternative. Two sources of uncertainty have been identified during salmon bycatch workgroup meetings, and in the current discussion paper. These include:
    - The extent to which recent increases in salmon bycatch in the groundfish fisheries are associated with increases in salmon biomass in the BSAI is not known.
    - The effects of increased bycatch in the groundfish fisheries on western Alaska salmon stocks, and the effects of salmon bycatch in the groundfish fisheries to the human environment, including subsistence and commercial fisheries in western Alaska, are not known.
- NAO 216-6 lists several situations which need to be considered to determine if the action has significant effects. Paragraph 6.02a requires an EA to determine if "The proposed action may be reasonably expected to jeopardize the sustainability of any non-target species." If the proposed action is expected to jeopardize non-target stocks, or if there is not enough information to determine if the action is expected to jeopardize non-target species, then the EA cannot come to FONSI. For the reasons described above, we are concerned about the Council's ability to come to FONSI.

- In contrast, an EIS must disclose known relevant impacts, identify the most current information, and identify the unknowns and the relevance of those unknowns.

- NAO 216-6 4.01g, 5.03b.1, and 6.03d.1 state that an EA must contain sufficient evidence to determine the level of significance of the impacts.
- An EA would contain most of the content that would be required in an EIS.
- The Council may initiate either an EA or and EIS. However, an EIS would be required if the analysis can ultimately not conclude FONSI. All of the required processes, including scoping, would need to be completed. This would delay the action further.

Further as noted in the scoping notice for the Salmon Bycatch Reduction Measures EIS (which addressed both Chinook and non-Chinook salmon): "NMFS and the Council have determined the preparation of an Environmental Impact Statement (EIS) may be required for this action because some important aspects of the impacts of salmon bycatch in the BSAI on the salmon stocks of origin and users of these salmon are uncertain or unknown and may result in significant impacts on the human environment not previously analyzed."

In addition to the mandatory NEPA timing and notification requirements involved in production of an EIS, the analysts themselves are currently fully tasked with production of the Chinook salmon analysis. It is assumed that many if not all of the current analysts on the Chinook salmon project would be tasked to work on any subsequent chum salmon analysis. As a result, the timeline for such an analysis must also consider the timeline for the Chinook analysis as described above.

COUNCIL ACTION AT THIS MEETING

The Council at this meeting may choose to do the following:

1. Review and revise as necessary the current suite of alternatives for chum salmon bycatch management measures for the EBS pollock fleet
2. Discuss NEPA analytical documentation requirements (EA vs. EIS), staff availability for analysis and timing of resulting Council action.

ATTACHMENT 1 BSAI SALMON BYCATCH MOTION APRIL 2008

[Non-Chinook portion of Council motion only]
Strike-out refers back to March 2008 staff discussion paper description of alternatives while underline represents additions.

Alternatives and options

This action shall be bifurcated such that the analysis outlined under Action 1 for Chinook comes back to the Council for Initial Review in June and Action 2 (non-Chinook) comes back in October.

~~**Option B (applies to Alternatives 3 and 4 only):**~~
~~Exempt those vessels participating in a VRHS system from area closures~~

ACTION 2: NON-CHINOOK SALMON (CHUM)

Alternative 1: Status Quo (non-Chinook)

Alternative 2: Hard Cap (non-Chinook)

Component 1: Hard Cap Formulation

Option 1: Range of numbers for hard cap formulation

Range of suboptions for hard cap for non-Chinook with breakout for CDQ allocation (10.7%) and remainder for non-CDQ fleet

Sub Option	Non-Chinook	CDQ	Non-CDQ
i)	58,176	6,225	51,951
ii)	76,252	8,159	68,093
iii)	147,204	15,751	131,453
iv)	203,080	21,730	181,350
v)	220,614	23,606	197,008
vi)	347,984	37,234	310,750
vii)	488,045	52,221	435,824

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

Component 2: Sector Allocation

Divide the final cap by sectors based on:

Option 1) 10% of the cap to the CDQ sector, and the remaining allocated as follows:
50% inshore CV fleet; 10% for the mothership fleet; and 40% for the offshore CP fleet.

Option 2) Historical average of percent bycatch by sector based on:

a) 3 year (2004-2006) average CDQ 1%; inshore CV fleet 86%; mothership fleet 2%; offshore CP fleet 11%.

b) 5 year (2002-2006) average: CDQ 2%; inshore CV fleet 84%; mothership fleet 3%; offshore CP fleet 11%.

c) 10 year (1997-2006) average: CDQ 2%; inshore CV fleet 82%; mothership fleet 4%; offshore CP fleet 12%.

Component 3: Sector Transfer

Option 1) Transfer salmon bycatch among sectors (industry initiated)

Suboption: Limit transfers to the following percentage of salmon that is available to the transferring entity at the time of transfer:

d) 50%
e) 70%
f) 90%

Option 2) NMFS will rollover unused salmon bycatch to other sectors still fishing based on the proportion of pollock remaining for harvest.

The above options are mutually exclusive.

Component 4: Cooperative provisions

Cooperative transfer options

When a salmon coop cap is reached, the coop must stop fishing for pollock and may:

Option 1) Lease their remaining pollock to another coop (inter-cooperative transfer) within their sector for that year (or similar method to allow pollock harvest with individual coop accountability.

Option 2) Transfer salmon bycatch from other inshore cooperatives.

Suboption: Limit transfers to the following percentage of salmon that is available to the transferring entity at the time of transfer:

a) 50%
b) 70%
c) 90%

~~Rollover suboption: NMFS will rollover unused salmon bycatch to other sectors and inshore cooperatives still fishing.~~

~~**Alternative 3: Fixed closures (non-Chinook)**~~

Alternative 3 ~~4~~: Triggered closures (non-Chinook)

Component 1: Trigger Cap Formulation

~~Cap formulation for trigger caps is equivalent to those under consideration for hard caps.~~

The trigger cap amount will be within the range of hard caps established under Alternative 2.

Component 2: Sector Allocation

Sector allocations are equivalent to those under consideration for hard caps.

Component 3: Sector Transfer

Option 1) Transfer salmon bycatch among sectors (industry initiated)

Suboption: Limit transfers to the following percentage of salmon that is available to the transferring entity at the time of transfer:

d) 50%
e) 70%
f) 90%

Option 2) NMFS will rollover unused salmon bycatch to other sectors and other cooperatives still fishing based on the proportion of pollock remaining for harvest.

The above options are mutually exclusive.

Component 4: Area options

Option 1: Areas (note all B season closures for non-Chinook)

~~i. Adjust area according to the number of salmon caught~~
~~ii. Single area closure~~
~~iii. Multiple area closures~~
~~Candidate areas (need to fold into above)~~
~~i. August B season candidate closure~~

Option 1a) Small closure
~~**Option 1b)** Medium closure~~
~~**Option 1c)** Large closure~~
~~**Option 2)** Expanding area closure~~

Suboption: Periodic adjustments to areas based on updated bycatch information.

Comparison of NMFS survey estimates of pollock biomass in the CVOA with pollock catch within the same region (1998-2007) suggests that expected CPUE in this region may be lower. This should be explicitly considered for the potential effect on salmon bycatch patterns in the EIS.

June 2008 Council motion on Bering Sea Chinook Salmon Bycatch EIS/RIR/IRFA

MOTION

The Council directs staff to provide analysis on the preliminary preferred alternative specified below in addition to those in the existing analysis and release the resulting EIS/RIR/IRFA for public review. For a complete description of alternatives in the existing analysis, see Chapter 2 of the BSAI Salmon Bycatch EIS Initial Review Draft (dated May 15, 2008).

Alternative 4: Preliminary preferred alternative

Alternative 4 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. Components 2-4 specify the allocation and transferability provisions associated with the cap.

Component 1: Hard cap with option for ICA regulated incentive system

Annual scenario 1: Hard cap with an ICA that provides explicit incentive(s) to promote salmon avoidance in all years

Hard cap if an ICA is in place that provides explicit incentive(s) for each participant to avoid salmon bycatch in all years:

Overall cap: 68,392, allocated by season and under Components 2-4 as described below

For those operations that opt out of such an ICA, the hard cap will be established as follows:

Overall cap: 32,482
CDQ allocation: 2,436
Non-CDQ cap: 30,046

All salmon bycatch attributed to the AFA pollock trawl fleet will accumulate against this lower cap, but only those operations not in the ICA will be required to stop fishing when the CDQ or non-CDQ cap has been reached. This backstop cap of 32,482 will not be allocated by sector, so all other components in Alterative 4 are not relevant to this backstop cap. (In absence of a sector allocation for this backstop cap a 7.5% allocation applies to the CDQ sector by default, and the remaining 92.5% is set as the non-CDQ cap.)

ICA requirements:

- An ICA must provide incentive(s) for each vessel to avoid salmon bycatch under any condition of pollock and salmon abundance in all years.
- Incentive measures must include rewards for salmon bycatch avoidance and/or penalties for failure to avoid salmon bycatch at the vessel level.
- The ICA must specify how those incentives are expected to promote reductions in actual individual vessel bycatch rates relative to what would have occurred in absence of the incentive program. Incentive measures must promote salmon savings in any condition of pollock and salmon abundance, such that they are expected to influence operational decisions at bycatch levels below the hard cap.

Annual reporting:

- The ICA must be made available for Council and public review.
- An annual report to the Council will be required and must include:
  1) a comprehensive explanation of incentive measures in effect in the previous year,
  2) how incentive measures affected individual vessels, and
  3) evaluation of whether incentive measures were effective in achieving salmon savings beyond levels that would have been achieved in absence of the measures.

Annual scenario 2: Hard cap in absence of an ICA with explicit incentive(s) to promote salmon avoidance

Hard cap in absence of an ICA that provides explicit incentive(s) to all participants to avoid salmon bycatch in all years:

Overall cap: 47,591, allocated by season and under Components 2-4 as described below

Seasonal distribution of caps
Any hard cap would be apportioned between the pollock A and B seasons. The seasonal distribution is ~~58/42~~ **70/30**, based on the average distributional ratio of salmon bycatch between A and B seasons in the 2000-2007 period.

Seasonal rollover of caps
Unused salmon from the A season would be made available to the recipient of the salmon bycatch hard cap in the B season within each management year at an amount up to 80% of the recipient's unused A season bycatch cap.

Component 2: Sector allocation
Separate sector level caps will be distributed within each season 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, as follows:

> **A season:** CDQ 9.3%; inshore CV fleet 49.8%; mothership fleet 8.0%; offshore CP fleet 32.9%
> **B season:** CDQ 5.5%; inshore CV fleet 69.3%; mothership fleet 7.3%; offshore CP fleet 17.9%
>
> This distribution is based on the 5-year (2002-2006) historical average of the annual proportion of salmon bycatch by sector within each season, adjusted by blending the bycatch rate for CDQ and non-CDQ partner sectors. It is also weighted by the AFA pollock allocation for each sector; in each season, the proportional allocation by sector comprises the adjusted 5-year historical average by sector weighted by 0.75 for the salmon bycatch history and the AFA pollock allocation by sector weighted by 0.25.

Component 3: Sector transfers
Allocate salmon bycatch caps to each sector and allow the entity representing each non-CDQ sector and the CDQ groups to transfer salmon bycatch ~~trigger~~ caps among the sectors and CDQ groups. (NMFS does not actively manage the salmon bycatch allocations).

Component 4: Cooperative provisions
Each inshore cooperative and the inshore open access fishery (if the inshore open access fishery existed in a particular year) shall receive a salmon allocation managed at the cooperative level. If the cooperative or open access fishery salmon cap is reached, the cooperative or open access fishery must stop fishing for pollock.

The initial allocation of salmon by cooperative within the shore-based CV fleet or to the open access fishery would be based upon the proportion of total sector pollock catch associated with the vessels in the cooperative or open access fishery.

Cooperative transfers
When a salmon cooperative cap is reached, the cooperative must stop fishing for pollock and may transfer salmon bycatch from other inshore cooperatives, CDQ groups, or entities representing non-CDQ groups (industry initiated).

The North Pacific Fishery Management Council is Evaluating Measures to Limit Chinook Salmon Bycatch in the Bering Sea Pollock Fishery

Salmon and pollock are both important fisheries for Alaska. Salmon support large and critically important commercial, recreational, and subsistence fisheries throughout Alaska and elsewhere, and are the basis of a cultural tradition in many parts of the state. At the same time, the commercial pollock fishery produces significant revenue for the State of Alaska, and participation in the fishery (through royalties and employment) is important for the western Alaska Community Development Quota communities.

Salmon are caught unintentionally in the offshore Bering Sea pollock trawl fishery, and may not be kept. Despite bycatch control measures implemented in the pollock fishery since the mid-1990s, Chinook salmon bycatch has increased over time, and reached an historic high in 2007. The North Pacific Fishery Management Council (Council) is required by the Magnuson-Stevens Fishery Conservation and Management Act to balance minimizing salmon bycatch, to the extent practicable, with achieving optimal yield from the pollock fisheries.

The Council is developing new measures to limit Chinook salmon bycatch

The Council is preparing a draft environmental impact statement (EIS) that evaluates the following management measures to limit Chinook salmon bycatch in the Bering Sea pollock trawl fishery:

- caps on the amount of Chinook salmon bycatch allowed in the pollock fisheries,
  - limits under consideration range from annual amounts of 29,300 - 87,500 Chinook, divided seasonally into a winter and a summer/fall pollock fishery
- seasonal closure of the pollock fishery when these bycatch limits are reached, and/or
- seasonal closure of areas where high salmon bycatch has traditionally occurred.

Council's preliminary preferred alternative

In June 2008, the Council identified a preliminary preferred alternative (PPA), to focus public comment on the current direction being considered by the Council. Under the PPA, the annual cap level would be 68,392 Chinook, provided the pollock industry develops a self-regulated, incentive-based program to avoid salmon bycatch. If an acceptable program is not proposed, the PPA mandates a lower cap of 47,591 Chinook. The pollock industry intends to present their proposed program to the Council prior to April 2009, when the Council will make its final decision on a preferred alternative.

The Council is seeking public input

The Council is seeking input from local residents and communities, as well as agencies, organizations, and the general public, prior to making a decision in April 2009. Interested stakeholders are encouraged to contact the Council with their concerns as the Council proceeds with this effort. For ways to provide comments to the Council or to its partner, the National Marine Fisheries Service (NMFS), see the back page of this flyer.

HOW TO PROVIDE COMMENTS

Write a letter to the Council or NMFS. The public comment period on the draft EIS will be open from early December (when the draft EIS is published) to early February 2009. Send letters by mail or fax to:

North Pacific Fishery Management Council
605 W 4th Ave Suite 306
Anchorage, AK 99501
Fax: (907) 271-2817

National Marine Fisheries Service
Alaska Regional Office
PO Box 21668
Juneau, AK 99802
Fax: (907) 586-7249

Attend a regional meeting. Council and NMFS staff plan to attend several regional meetings to present information on the Council's action and the likely impacts. Details of the meeting locations will be posted on the Council website:

Dillingham	October 7	Bristol Bay Federal Subsistence Regional Advisory Council meeting
Bethel	October 8	Association of Village Council Presidents meeting
Nenana	October 15	Eastern Interior Federal Subsistence Regional Advisory Council meeting
Kotzebue	October 16	Northwest Arctic Federal Subsistence Regional Advisory Council meeting
McGrath	October 28	Western Interior Federal Subsistence Regional Advisory Council meeting

Testify at the April 2009 Council meeting, when the Council will make its final decision. The April Council meeting will take place from March 30 - April 7, 2009, at the Hilton Hotel, in Anchorage. The draft agenda will be posted on the Council website in early March. You may also send a letter by mail or fax to the Council for the April meeting, to the address listed above. In order for the letter to be circulated to Council members, it must be received by March 25, 2009.

Council website: http://www.fakr.noaa.gov/npfmc

Proposed timeline for the Council's Chinook salmon bycatch action:

- September 29-October 7 2008 – Council meeting in Anchorage. Council receives report from Pollock industry on progress towards an incentive-based bycatch reduction program.
- Early December 2008 – Draft EIS available for public review, begins 60-day public comment period. The draft EIS will be available to download from the Council website; if you need a hard copy, contact the Council office and we will put you on the mailing list.
- Early February 2009 – Public comment period ends.
- March 30 - April 7, 2009 – Council meeting in Anchorage. Council reviews comments on the draft EIS and decides on a final preferred alternative, to be recommended to the Secretary of Commerce.
- April 2009 to December 2010 – NMFS reviews the Council's preferred alternative, writes regulations; regulations go out for public review; the Secretary of Commerce makes a final decision.
- January 2011 – Management measures are implemented in the Bering Sea pollock fishery.

Chum salmon bycatch

The Council also intends to evaluate options to limit chum salmon bycatch in the pollock fishery. Similar alternatives have been proposed for limiting chum salmon bycatch as for Chinook. The Council will tentatively review the alternatives at the October 2008 Council meeting in Anchorage. An analysis will then be developed by staff, and reviewed by the Council in the spring and summer of 2009.

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

August 18, 2008

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

Dear Chairman Olson:

We have been coordinating with staff of the North Pacific Fishery Management Council (Council) and the Alaska Department of Fish and Game in the development of the draft environmental impact statement (EIS) to control Bering Sea Chinook salmon bycatch. One aspect of that analysis is an assessment of Alternative 4, the Council's preliminary preferred alternative (PPA) adopted at its June 2008 meeting. We have identified two issues concerning the Council's intent for the PPA. Depending on your assessment of these issues, the PPA may require Council refinement and further direction for staff analysis in the draft EIS if the Council continues to support Alternative 4 as the PPA.

Issue 1. Component 1, annual scenario 1 of the PPA would establish a hard cap of 68,392 Chinook salmon if the pollock industry formed an intercooperative agreement (ICA) that incorporates economic incentives to avoid salmon bycatch. This cap would be apportioned among AFA sectors, inshore cooperatives, and the CDQ groups as transferrable bycatch allocations. Annual scenario 1 allows for "operations", which we interpret to mean individual AFA eligible vessels or CDQ groups, to opt out of the ICA; but the bycatch by such operations would accrue against a backstop cap of 32,482 Chinook salmon. Under the PPA, all of the Chinook salmon bycatch by vessels that remain in the ICA also would accrue against the backstop cap. The PPA is silent on how the bycatch of salmon in the "opt-out" fishery would be accounted for in the sector allocations under the ICA.

We understand the Council's intent that the PPA would establish a hard cap. However, the Council provided no direction to staff on how this would be accomplished under annual scenario 1 and the proposed provision for an "opt out" fishery. Lacking further direction from the Council, we will assume for analytical purposes that the Chinook salmon harvested under the backstop cap in the "opt out" fishery would not be deducted from the 68,392 salmon allocated among the sectors, cooperatives, and CDQ groups participating in the ICA. Thus, if vessels fishing with transferable bycatch allocations under the ICA catch the full amount of those allocations, any bycatch in the "opt out" fishery would result in total Chinook salmon bycatch exceeding 68,392 salmon. Even if the ICA were successful in reducing Chinook salmon bycatch below the 68,392 cap, total bycatch could still exceed 68,392 salmon if the vessels fishing in the "opt out" fishery raced for pollock at the expense of Chinook bycatch and caught more salmon

than vessels fishing under the ICA were able to save. The exact amount by which the total bycatch could exceed 68,392 salmon under annual scenario 1 is unknown and depends on many assumptions and circumstances in the fishery, though it clearly could not exceed 32,482. If the Council continues to endorse the option for an "opt out" fishery and the concept of a hard cap, it would need to provide guidance to staff on how to allocate the hard cap between ICA participants and the "opt out" fishery so that the cumulative salmon bycatch between these two groups of pollock harvesters does not exceed 68,392 (see option 2 below).

Option 1: Remove the backstop cap from the PPA and set a hard cap of 47,591 Chinook salmon unless 100 percent of the vessel owners and CDQ groups eligible to participate in the AFA pollock fisheries form an ICA that meets the ICA requirements set forth in the PPA. If those conditions are met, then the cap would be increased to 68,392 Chinook salmon and allocated among the sectors, inshore cooperatives, and CDQ groups as described in the PPA. NMFS is aware that industry members have expressed significant doubt that an ICA with 100 percent participation could be formed. Regardless, if the Council does not schedule further discussion and possible refinement of the PPA at its October meeting, we will include a discussion of this option in the draft EIS so that it could be available for selection by the Council as a modification of the PPA at final action in April 2009.

Option 2: The Council could revise the PPA to ensure that the 68,352 cap can be managed as a "hard cap". A number of ways exist to accomplish this. For example, the "opt out" fishery could be allocated a portion of the 32,482 backstop cap based on participants' respective pollock catch history and this amount of Chinook salmon could be subtracted from the transferable bycatch allocations to sectors, CDQ groups and inshore cooperatives under the ICA. Thus two separate bycatch limits would be created for ICA and non-ICA pollock harvesters that, when added together, would not exceed the 68,352 cap. Council direction would be required to clarify the nature of the pollock history used to derive the aggregate "opt out" fishery bycatch limit for catcher vessels, motherships, and catcher/processors and how this amount would be prorated as reductions in sector, CDQ group, and inshore cooperative allocations under the ICA. This option also would require additional analysis of the revised PPA. These additional steps would mean that the draft EIS would not be completed in time to be released by early December and for the Council to take final action in April 2009.

Option 3: Change Council intent for the PPA and instead of a hard cap, establish a range of allowable Chinook salmon bycatch, e.g., 68,392 salmon plus some part of the 32,482 backstop cap. No additional action is needed from the Council to analyze this option because staff already is conducting this analysis through the assessment of the current PPA in the draft EIS. The Council could choose to adopt this alternative approach when it takes final action in April 2009.

Issue 2. Council discussion at its June 2008 meeting confirmed its intent that the PPA provide only for a single ICA. However, the PPA does not provide clear guidance about ICA formation, i.e., which entities must be a part of the ICA in order to operate under the 68,392 cap. The PPA does anticipate less than 100 percent ICA participation by inclusion of the backstop cap and

language referring to "those operations that opt out of such an ICA". Allowing for less than 100 percent ICA participation under the PPA seems wise given the possibility that not all operations that fish for pollock will join the ICA. However, the PPA does not specify whether there are minimum levels of participation or sector composition required for the ICA to be valid. Absent additional clarification from the Council, NMFS assumes that there are no minimum participation or composition requirements for the ICA because none was specified in the PPA. This assumption means that entire sectors, inshore cooperatives, or CDQ groups could opt to not participate in the ICA, as well as any number of individual vessels within the catcher/processor, mothership, or inshore sectors. Ultimately, the Council may need to provide direction as to its intent if more than one ICA proposal were submitted to NMFS and if NMFS would be expected to choose which of the competing ICAs was the appropriate one.

In conclusion, if the Council would like to change the PPA to address these or other issues, we recommend that this occur as soon as practicable. Postponing major changes to the PPA until the scheduled final action in April 2009 may necessitate a new draft EIS or a supplement to the draft EIS and would delay implementation of the Council's preferred alternative.

Even though the PPA is labeled as such, the Council still maintains the flexibility to choose any of the alternatives under consideration at final action. Further, the more streamlined and simple new Chinook salmon bycatch management measures are, the better positioned NMFS will be to meet the Council's expectations for an implementation date.

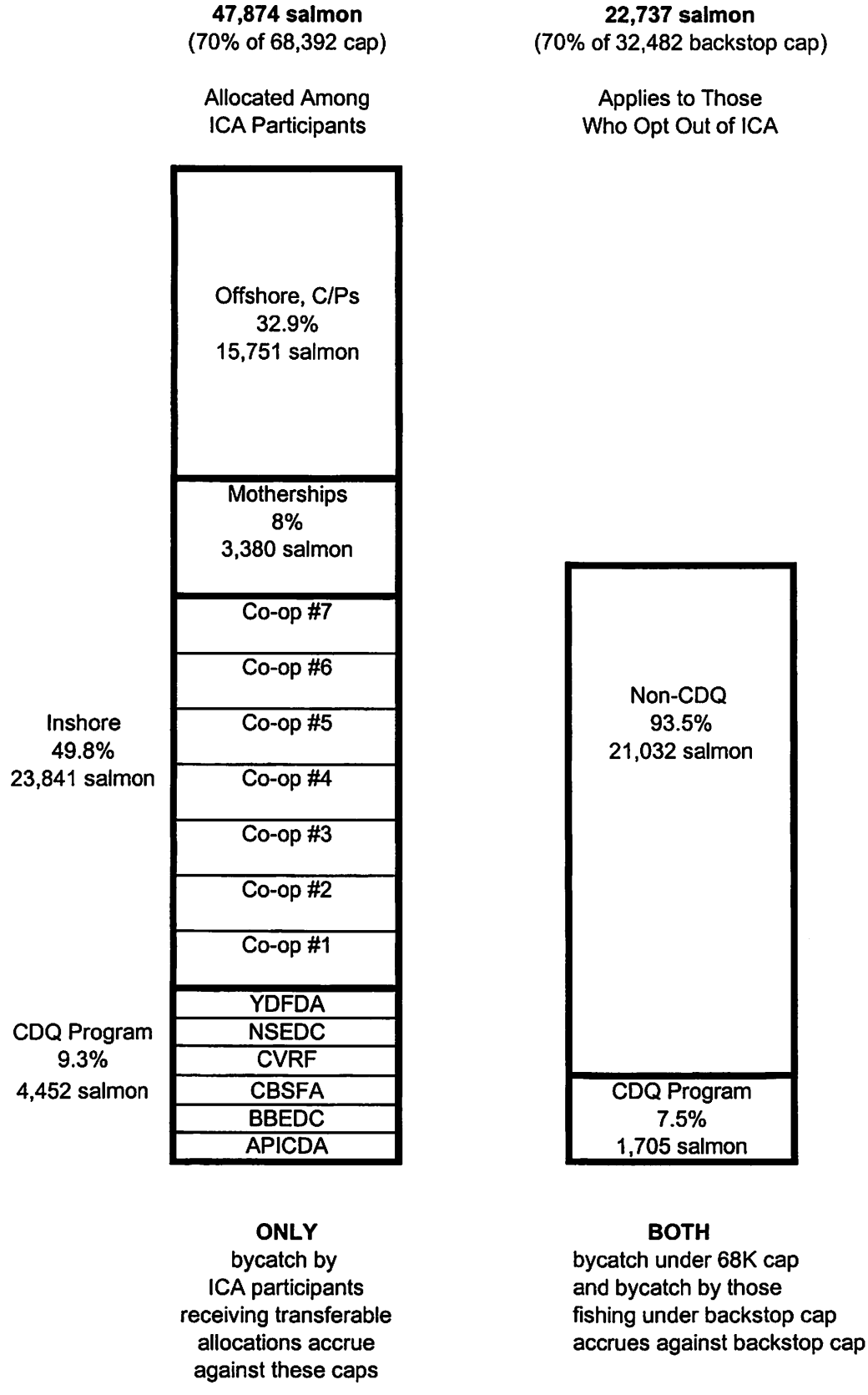
Sincerely,

Robert D. Mecum

Robert D. Mecum
Acting Regional Administrator

Figure 1. How 68K Hard Cap Could be Exceeded Under the PPA

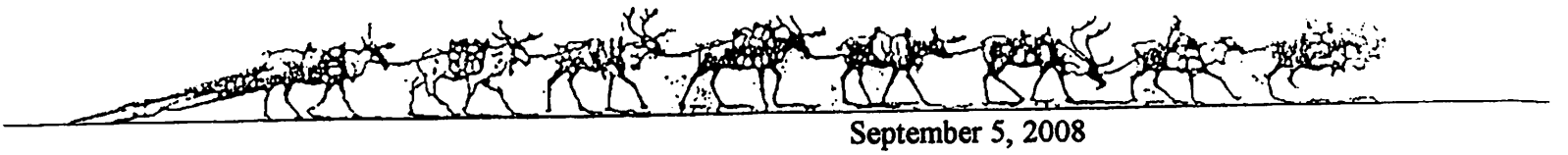
Using A-season allocations



TOTAL BYCATCH = Bycatch by ICA participants under 68K cap + bycatch by vessels fishing under backstop cap.
Total could exceed 68,392 cap if allocations under 68K cap are fully utilized and some vessels fish under the backstop cap.
Total amount over 68K would be amount caught by those fishing under backstop cap.

STEBBINS COMMUNITY ASSOCIATION
P.O. Box 71002
Stebbins, Alaska 99671
PH. (907) 934-3561 / FAX 934-3560
Email: stebbins_ira@yahoo.com

AGENDA C-4
Supplemental
OCTOBER 2008



September 5, 2008

Doug Mecum
Acting Regional Administrator
NMFS Alaska Region
P.O. Box 21668
Juneau, Alaska 99802

Re: Salmon Bycatch EIS Government-to-Government Consultation

Dear Mr. Mecum,

Please consider this letter as a formal request for government-to-government consultation regarding the Bering Se Chinook salmon Bycatch Management EIS. We understand that the Bycatch EIS is being completed by the National Marine Fisheries Service at a very fast pace. We request that this consultation take place at your earliest convenience, prior to any decision making.

We are aware that NMFS has no specific tribal consultation process or protocols. As such, we request a face-to-face meeting take place where NMFS can provide EIS details, followed by a question and answer period, and opportunity for meaningful discussion and tribal input. We a specifically concerned about how salmon bycatch rates in the Pollock industry have and will impact subsistence fishing and small-scale commercial fishing in our community.

If you require any additional information, please contact me at (907)934-2653 or stebbins_ira@yahoo.com.

Sincerely,

Frederick J. Pete, Sr.

Frederick J. Pete, Sr.
IRA Council President

Cc: North Pacific Fisheries Management Council, 605 West 4th, Suite 306, Anchorage, Alaska 99501
Loretta Bullard, President Kawerak, Inc. P.0. Box 948, Nome, Alaska 99671

Nunapiglluraq Corporation
P.O. Box 20187
Kotlik, Alaska 99620-0187
(907) 899-4453 Phone
(907) 899-4202 Fax

Resolution 2008-04

Requesting the North Pacific Fishery Management Council to Immediately halt the large scale waste of Chinook salmon in the Prosecution of the Bering Sea trawl fishery.

WHEREAS, Nunapiglluraq Corporation is the Native village corporation of Hamilton, established by ANCSA; and

WHEREAS, Nunapiglluraq Corporation is a village corporation in Kotlik, Alaska, along the Lower Yukon River, where commercial fishing is a primary source of income, and where 75% of the residents of Kotlik are commercial and subsistence users, and

WHEREAS, the 2008 chinook salmon returns on the Yukon River, once again, failed to return in sustainable numbers; and

WHEREAS, The Alaska Department of Fish & Game, in cooperation with the U.S. Fish & Wildlife Service, opened the 2008 subsistence salmon harvest season with windows regulation of two-36 hour openings per week in the Lower Yukon River; and

WHEREAS, the return of the Yukon River Chinook salmon have been but a trickle amounting to 30,000 chinook to date, whereas, on the average, the return has been 60,000; and

WHEREAS, since 2001 to date, the Chinook salmon intercepted and wasted by the Bering Sea Trawl Fishery is 457,573 fish; and

WHEREAS, according to studies conducted by Dr. Kate Myers, 56% of Chinook harvested in the Bering Sea trawl fishery are bound for the western Alaska rivers and streams for a total of 256,240 salmon; and

WHEREAS, according to the same study, 40% of the wasted by-catch, or 102,496 chinook salmon, would have returned to spawn and provide for subsistence uses in the Yukon River at any given time, including this year; and

WHEREAS, according to the Alaska Department of Fish & Game, eighty percent of the subsistence harvest of chinook salmon in the state of Alaska are taken by the residents of the Yukon and Kuskokwim Rivers, and

WHEREAS, chinook salmon are an important food source with important connections to our social systems; and

WHEREAS, according to the iEARN website (last accessed 06/23/08), the following occurred to the Plains Indians, "Probably one of the most ruinous acts to the Indians was the disappearance of the buffalo. For the Indians who lived on the Plains, life depended on the buffalo. At the beginning of the nineteenth century, there were an estimated forty million buffalo, but between 1830 and 1888 there was a rapid, systematic extermination culminating in the sudden slaughter of the only two remaining Plain herds. By around 1895, the formerly vast buffalo populations were practically extinct. The slaughter occurred because of the economic value of buffalo hides to Americans and because the animals were in the way of the rapidly westward expanding population. The end result was wide scale starvation and the social and cultural disintegration of many Plain tribes.", and

WHEREAS, the economic value of the plains buffalo leading to the demise of the buffalo and the economic value of the Bering Sea Pollock leading to the demise of the chinook salmon could potentially contribute to the same effects on the Yupik people of the AVCP region; and

WHEREAS, in an announcement by the Alaska Department of Fish & Game, in cooperation with the U.S. Fish & Wildlife service, issued on June 22, 2008, the subsistence chinook salmon fishery was placed on further restriction to two-18 hour openings with a maximum gear of six inches or smaller; and

WHEREAS, in the meantime, the Bering Sea Trawl fishery continues without restrictions, blatantly wasting our future chinook salmon resources, depriving us of our subsistence needs for this year, and threatening our subsistence way of life; and

NOW THEREFORE BE IT RESOLVED THAT the Native Village Corporation of Hamilton, Nunapiglluraq Corporation, request the National Marine Fisheries Service, through emergency authority of the North Pacific Fishery Management Council, to close the Bering Sea Trawl fishery to protect the Yukon River chinook salmon from further degradation and possible extinction until such time the Bering Sea Trawl

fishery can prosecute their fishery without impacting the subsistence fishery or causing undue harm to non-target species; and

BE IT FURTHER RESOLVED THAT the State of Alaska and Federal Subsistence Board joins our request to ensure the continued sustainability of our chinook salmon resources and subsistence fishery on the Yukon River.

ADOPTED AND PASSED BY THE NATIVE VILLAGE CORPORATION OF HAMILTON, Nunapiglluraq Corporation, at a meeting held on July 3, 2008, where a duly constituted quorum was present, with 4 for, 0 against, 0 abstaining.

Certified:

President, George A.E. Williams

Secretary Thomas Okitkun

Nome Eskimo Community
Box 1090
Nome, Alaska 99762
Phone (907) 443-2246
Fax (907) 443-3539

September 9, 2008

Doug Mecum
Acting Regional Administrator
National Marine Fisheries Service (NMFS) Alaska Region
P.O. Box 21668
Juneau, Alaska 99802

RE: Salmon Bycatch, Environmental Statement, Tribal Consultation

Dear Mr. Mecum:

Nome Eskimo Community (NEC) a federally recognized tribe is formally requesting tribal consultation, in regards to the Bering Sea and Aleutians Islands, Salmon Bycatch, Environmental Impact Statement (EIS) for chum and Chinook salmon. It is our understanding that the North Pacific Fisheries Management Council (NPFMC) will decide on salmon bycatch management measures sometime in April 2009 based upon its discussions between now and then. The EIS is extraordinarily complex and numerous organizations are developing comments in anticipation of the various alternatives discussed in the EIS so that effective conservation measures are in place. NEC would like to engage NMFS in an interactive dialogue about the EIS in Nome, at NMFS' convenience sometime before January 2009. NEC tribal staff have fully reviewed the EIS dated 5/15/2008 and expects our consultation request to augment our understanding of the following:

- Description of alternatives
  - The transfers and seasonal considerations are very confusing
- Salmon bycatch data needs and requirements
  - It is not clear how the various bycatch limits represent conservation measures
  - Norton Sound components are not included
- Description of NMFS tribal consultation process
- How this EIS informs the decision making process
- The role of tribe in decision making
- How alternatives will impact subsistence fishing
- How the alternatives will impact salmon escapement in Norton Sound

NEC feels that meaningful consultation will be fulfilled by a face to face meeting in Nome to address our bulleted points so that we may fully consider impacts to our local fisheries in light of the information in the EIS. It will also be an opportunity for NMFS to hear first hand concerns that we may have outside of a regularly scheduled NPFMC meeting. NEC expects that such a meeting would not need to be any longer than 8 hours (normal business work day). NEC staff are willing to discuss agenda items so that it is clear how the meeting will proceeding an organized manner that is meaningful to both parties. If you have any questions please feel free to contact Austin Ahmasuk, Tribal Resource Specialist at above address. Thank you for your time and consideration.

Sincerely,

NOME ESKIMO COMMUNITY

Alfred Sahlin, President

CC: Loretta Bullard, Kawerak, Inc., P.O. Box 948, Nome, AK 99762
North Pacific Fisheries Management Council, 605 West 4th, Suite 306, Anchorage, AK 99501

F/V SEADAWN FISHERIES, INC.
P. O. Box 352
Newport, Oregon 97365
(541) 867-3911 Phone
(541) 867-3913 Fax

September 21, 2008

Eric A. Olson, Chairman
North Pacific Fishery Management Council
605 W. 4th Avenue, Suite 306
Anchorage, AK 99501-2252

RE: Agenda Item C-4 - BSAI Salmon Bycatch

Dear Chairman Olson and Council Members:

I am the managing owner of the F/V SEADAWN which is a family owned and operated, independent, 124 foot AFA catcher vessel which has been engaged in the Pollock fishery since 1987. The SEADAWN delivers inshore to Unisea, Inc.

The profit margin to the Inshore Catcher Vessel is rapidly dwindling as fuel prices, shipyard prices and the cost of what looks like 100% observer costs are skyrocketing. We are very concerned about the future of the Pollock fishery for our vessel given the added costs and hardships which will be imposed on us as a result of what appears to be the Council's intention with regard to imposing a Chinook Salmon Bycatch Cap with a variety of additional restrictions. This is not just about the owners, as my Captains (including my son) and crew have, for the most part, been in this business as well for 20 years and hope to have a future but are frightened by the rising costs and fish which is increasingly harder and more expensive to catch.

I have been participating in the process as a UCB Board Member and as a delegate to the Intercoop Organization. The Industry process through the Intercoop is and has been a successful one however, that process and its results are dependent upon the regulations that ultimately come down from this Council. My concern is that the Council plan include the opportunity for survival of Independent catcher vessels, and not just for the large factory trawler organizations and vertically integrated companies because the Industry political process is dominated by the larger corporate participants and if left unchecked will likely disadvantage what's left of the smaller family owned participants in the Pollock fishery. It is with that background that I offer the following comments:

1. Of utmost importance is that the Industry (including smaller AFA catcher vessels) receive the benefit of the highest cap possible under the Preferred Alternative. That cap will only be available if an ICA is in place. In that regard, it is important that the Council requires a high participation level of vessels in order for there to be a sufficient critical mass of participation for the ICA to be valid. The participation level that must be required is a sufficient number to make certain that the large corporate participants including factory trawler companies and vertically integrated processor/catcher vessel companies will give proper respect and consideration for the survival needs of the smaller, independent and mostly Inshore Catcher Vessels. If they can simply ignore our right to survive and still have a valid ICA we will be forced to either accept the terms they dictate or be stuck with the draconian lower cap. An alternative that might be preferable to all would be to allow for more than one ICA so possibly catcher vessels (which are dramatically different from factory trawlers, both economically and operationally) can have their own ICA.

2. It is critical for the survival of the Independent catcher vessels that the Sector allocation of salmon be fair and equitable because as Independent vessels many of us will not have access to acquire additional salmon on an equal basis with large companies. Our profit margins are much lower than either factory trawlers or vertically integrated companies and as such, in the real world, our initial allocation will be our limit and we will not be able to successfully bid against companies like American Seafoods, Trident Seafoods and other large corporate AFA companies for additional salmon. It is for that reason that it is so important to the Independent catcher vessels that the initial allocation be fair.

In Component 2 of the Preliminary Preferred Alternative the Council has proposed a distribution based on a five year historical average. I support that proposed sector allocation as it is fair for all participating sectors because it is based on each Sector's true history and thereby, treats all Sectors equally. However, I am concerned because it is common knowledge that although most of the catcher vessel participants are reasonably satisfied with the proposed sector allocation by the Council, the factory trawlers will be continuously lobbying members of this Council for a change based on prorata allocation rather than history, which would, of course, give factory trawlers a better opportunity to survive than catcher vessels. This would be devastating to Inshore Catcher Vessels which among them still contain the last independent, family owned vessels including a significant number of Alaska based AFA vessels. We cannot survive based on a prorata allocation. It simply is not the history nor does it represent the operating limitations of Inshore Catcher Vessels. Whereas, the factory trawlers have the ability to fish and process in the Bering Sea wherever they please, the catcher vessels are limited by virtue of the fact that they are forced to deliver their product inshore and as a result have a higher bycatch rate. It is not a voluntary thing. Unless the rules are

changed and we are given an opportunity equal to the factory trawlers to deliver offshore, the history of our fishery must be respected so we have a future. Inshore Catcher Vessels must be allocated salmon based on their history or we will not be able to catch our Pollock. This is totally fair and equitable in that the other sectors will also be allocated salmon based on history. So I support the Council's Preferred Alternative under Component 2 and urge the Council to rebuke the lobbying efforts of the factory trawlers because to accept their arguments will be to extend to them a disproportionate ability to survive and will damage the entire Inshore sector including the shore based processors and the communities in Alaska dependent on our vessels delivering Pollock ashore.

In conclusion, I hope that the Council will analyze and consider the unique needs and problems of the Independent, family owned, AFA Catcher Vessels that are still in this fishery. We are definitely a minority in this AFA Industry which is dominated by corporate giants but, hopefully, the Council will protect our right to survive or there is likely to be more consolidation and resulting losses of jobs in communities where most of these smaller AFA vessels are based.

Sincerely,

Fred A. Yeck

· *Representative Mary Sattler Nelson*
State Capitol • Juneau, Alaska 99801-1182
Phone: (907) 465-4942 • Fax: (907) 465-4589
Rep.Mary.Nelson@legis.state.ak.us

House District 38
Yukon Kuskokwim Delta

Akiachak
Akiak
Atmautluak
Bethel
Chefornak
Eek
Goodnews Bay
Kasigluk
Kipnuk
Kongiganak
Kwethluk
Kwigillingok
Lower Kalskag
Mekoryuk
Mertarvik
Napakiak
Napaskiak
Newtok
Nunapitchuk
Ohogamiut
Oscarville
Platinum
Quinhagak
Toksook Bay
Tuluksak
Tununak
Tuntutuliak
Umkumiute
Upper Kalskag

North Pacific Fishery Management Council
605 West 4th, Suite 306
Anchorage, Alaska 99501

RECEIVED
SEP 22 2008
N.P.F.M.C.

Dear MPFMC members:

The Bush Caucus, comprised of rural members of the Alaska State Senate and House of Representative members is extremely concerned about the high level of salmon bycatch in the Bering Sea/Aleutian Islands (BSAI) pollock fishery and the impacts of that bycatch on the commercial and subsistence users who depend on healthy salmon stocks. The current management system has failed and we urge The National Marine Fisheries Service (NMFS) and North Pacific Fishery Management Council (NPFMC) to take immediate action to protect threatened salmon stocks and the people who depend on them.

Since the Voluntary Rolling Hotspot Agreement of 2007 the salmon bycatch numbers have skyrocketed with more than 130,000 Chinook and over 700,000 chum salmon being caught and discarded last year alone. This agreement was clearly unsuccessful and new management practices must be implemented immediately.

We understand the Council has begun the process to make changes pursuant to salmon bycatch management. However, that process will not lead to changes in the water this year and maybe not even next year. Given the magnitude of the problem we feel it would be appropriate for the council to make immediate changes by emergency order before even more damage is done.

Wild salmon are essential to Alaska's subsistence, commercial and sport fisheries. The same cannot be said of pollock. According to the Alaska Department of Labor, salmon generate more jobs than any other fishery in Alaska and accounted for 49% of fishing employment by species in 2004. In some rural communities, particularly in Western Alaska, summer salmon harvests are often the only available source of income. In addition, salmon caught as bycatch in the Bering Sea and Aleutian Islands include stocks from the lower 48 that are the subject of long-standing legal disputes in Oregon and throughout the Pacific Northwest.

Genetic testing suggests many of the salmon in question would be bound for the Yukon River, which winds through Alaska and eventually into Canada. Salmon are critical to the subsistence way of life for Alaska Native communities along the river. In addition, due in part to salmon bycatch in the pollock fishery, only an estimated 24,585 Chinook made it to the Canadian border in 2007. This resulted in no

commercial fishery, no sport fishery, and limited subsistence harvest from the Canadian side of the Yukon River. 2008 is promising to have some of the worst salmon returns of all time for Yukon River fishermen and emergency action is not only warranted but vital. We strongly encourage the council to rectify this problem now and not delay pursuing a solution for another year and a half.

Your favorable consideration of this request is greatly appreciated.

Sincerely,

Albert Kookesh

Senator Albert Kookesh
Bush Caucus Co-Chair

Mary Nelson

Rep. Mary Nelson Co-Chair
Bush Caucus Co-Chair

Cc Senator Ted Stevens
Senator Lisa Murkowski
Representative Don Young

Governor Sarah Palin

World Wildlife Fund
Kamchatka/Bering Sea Ecoregion
406 G. Street, Suite 303
Anchorage, AK 99501 USA

Tel: (907) 279-5504
Fax: (907) 279-5509

www.worldwildlife.org

September 24, 2008

Mr. Eric Olson, Chair
North Pacific Fishery Management Council
605 W. 4th Street, Suite 306
Anchorage, AK 99501-2252

Mr. Doug Mecum
Acting Regional Administrator
NOAA Fisheries, Alaska Region
709 W. 9th Street
Juneau, AK 99802-1668

Re: Salmon Bycatch C-4

Dear Mr. Olson and Mr. Mecum,

The World Wildlife Fund (WWF) appreciates the opportunity to comment on the salmon bycatch reduction measures being considered for analysis by the North Pacific Fishery Management Council (Council). We submit this letter in continued support of salmon bycatch reduction efforts in the Bering Sea and Aleutian Islands (BSAI) pollock fisheries. We continue to recommend that the Council expedite the analysis of its preliminary preferred alternative and other mechanisms to minimize and reduce salmon bycatch in the BSAI pollock fishery and take the urgent action necessary to protect salmon stocks throughout the North Pacific.

Although salmon bycatch appears to have retreated substantially this year, this should not be reason for inaction or consideration of diluted measures. With respect to potential or already occurring cumulative environmental impacts on BSAI salmon populations, such as changes in climate and marine species distribution, impacts of ocean acidification, and planned offshore oil and gas development in Arctic waters and the Bering Sea, it is especially important to implement measures to further reduce and prevent salmon bycatch. Cumulative impacts on salmon populations, coupled with a lack of a cap on bycatch for BSAI salmon can potentially be devastating to local communities, especially Native peoples throughout Alaska, Russia and Canada as well as Pacific Northwest residents who were dramatically affected by the Pacific Coast salmon fishery shutdown this year.

As evidenced by the historic inattention that led to excessive bycatch of salmon in the pollock fishery in the 2007 season, we cannot simply go back to business as usual because salmon bycatch is lower this year. Although a reduction in overall salmon bycatch levels has occurred, the Council must take decisive action to prevent future excessive bycatch of salmon stocks throughout the North Pacific. The best way to achieve that protection is through the implementation of an adequately precautionary cap.

We encourage the pollock fleet to continue to seek measures and techniques to reduce salmon bycatch. However, the abililty of the VRHS to achieve meaningful total reductions in salmon bycatch remains questionable. In 2007, the pollock fleet claimed that the salmon were so numerous that they could not avoid them, resulting in the high bycatch of salmon because they simply could not be avoided. This year the pollock fleet has achieved a reduced level of

bycatch and some claim that the VRHS is working while ignoring that salmon numbers are down. This *post hoc ergo propter hoc* rationale fails to adequately address the true effectiveness of the VRHS and, moreover, fails to recognize the need for a maximum bycatch limit that would have prevented the overly excessive salmon bycatch in the 2007 season.

The Council should also consider that many of the traditional salmon harvest fisheries throughout the state of Alaska were lower than expected this year, and in many cases substantially lower than historical catch levels. Many salmon fisheries also reported much later harvests compared to historical fishing periods. These variable factors may have had unforeseen and poorly understood impacts on BSAI salmon bycatch levels that emphasizes the need for increased resiliency in the management process. As we have seen with the salmon stocks originating in the lower 48, a lack of resiliency built into the management process can lead to catastrophic results. A reasonable maximum cap can build in the appropriate resiliency to ensure that a similar catastrophe does not occur in the future in the North Pacific.

WWF continues to support a rigorous analysis of a reasonable range of reasonable alternatives to reduce salmon bycatch while minimizing the economic impact to the pollock fleet. We support the proposed preliminary preferred alternative overall cap of 47,591 Chinook salmon as a maximum cap. Additionally, we recommend that the Council not consider the proposed 47,591 maximum cap as a goal to be met in the development of additional measures, but an absolute value in a range that must not be exceeded under any circumstance. Furthermore, the Council should carefully consider the recommendations of the Yukon River Panel, Federal Subsistence Board, the US Fish and Wildlife Service, the Community Development Quota groups, and the Regional Advisory Councils in considering further measures under this analysis.

In conclusion, WWF again encourages the Council to move quickly to finalize alternatives for the Salmon Bycatch agenda item C-4 in order to achieve an effective solution as soon as possible. Most importantly, flexibility in the strategy and alternatives is important to minimize adverse effects on the pollock fishery, but should not preclude decisive action to protect salmon stocks and the communities, commercial fisheries, and subsistence fisheries that depend on them.

Thank you for your time and consideration of these comments.

Respectfully,

Alfred Lee "Bubba" Cook Jr.
Kamchatka/Bering Sea Ecoregion Senior Fisheries Program Officer
World Wildlife Fund

OCEANA | Protecting The World's Oceans
175 South Franklin Street, Suite 418 Juneau, AK 99801 USA
+1.907.586.4050 www.oceana.org

September 24, 2008

Mr. Eric Olson, Chair
North Pacific Fishery Management Council
605 W. Fourth Avenue, Suite 306
Anchorage, AK 99501-2252

Mr. Doug Mecum, Regional Administrator
NOAA Fisheries, Alaska Region
709 West Ninth Street
Juneau, AK 99802-1668

RE: Salmon Bycatch in the Bering Sea Pollock Fishery

Dear Chairman Olson and Mr. Mecum,

The people of Alaska depend on healthy salmon populations for our economy, recreation, culture, and subsistence. Accordingly, the Council and the National Marine Fisheries Service (NMFS) must take immediate action to minimize the wasteful bycatch of salmon in the groundfish fisheries that you manage. The Council must consider and should adopt an alternative that sets a hard cap on Chinook salmon bycatch no higher than **40,435** salmon with a mechanism to reduce that number annually. In addition, funding should be secured for comprehensive management of salmon and research, including identification of the stock-of-origin and age of every salmon caught as bycatch.

Chinook salmon returns in 2008 were dismal throughout the Pacific. Subsistence harvests of Chinook were restricted in the Shaktoolik, Unalakleet, and Yukon Rivers again this year. Too few Chinook survived to make the long journey into the Canadian Yukon, thereby violating the U.S./Canada Yukon River Salmon Agreement. Further south, Chinook salmon fisheries in the Pacific Northwest were severely curtailed or shut down. Whether considered individually or in aggregate, these issues amount to a 'Salmon Crisis' in the Pacific. To address this crisis, it is imperative that you minimize salmon bycatch in the groundfish fisheries by putting in place an immediate absolute cap based on a conservative recommendation from NMFS.

As we have explained in our previous letters on this issue, NMFS's obligations under the law are clear. The Magnuson-Stevens Act explicitly requires that NMFS "to the extent practicable and in the following priority—(A) minimize bycatch; and (B) minimize the mortality of bycatch which cannot be avoided." 16 U.S.C. § 1853(a)(11). This requirement is reinforced in National Standard 9, with which all Fishery Management Plans must be consistent, and which restates the requirement to minimize bycatch to the extent practicable. *See id.* § 1851(a)(9). When it added these provisions to the Act, Congress was very clear that its intent was to halt the "shameful waste" occurring in the nation's fisheries. 142 Cong. Rec. S10,794, at 10,820 (1996).

In addition, it is clear that at least some of the salmon caught in the groundfish fisheries are from the Lower Columbia and Upper Willamette stocks that are protected under the Endangered Species Act. The fact that NMFS has allowed the groundfish fisheries to violate the terms of its incidental take statement every year since 2003 calls into question compliance with the Endangered Species Act as well.

It is clear that the most effective way to comply with the mandates of the Magnuson-Stevens Act and Endangered Species Act is to promptly put in place a hard cap on the number of salmon that may be caught in the groundfish fisheries. By reducing and minimizing wasteful bycatch and placing an absolute hard cap on salmon, more salmon will survive to spawn in the rivers and streams of Alaska and the Pacific Northwest.

The Council must first start with a reasonable bycatch cap that will provide a conservation benefit to returning salmon populations. Analyses in the draft EIS indicate an obvious and intuitive point: the lower the bycatch cap, the greater the conservation benefit to salmon. In order to minimize salmon bycatch while allowing for the continued pollock fishery, the Council must start by looking for a level that reflects periods when Chinook salmon were getting back to our salmon rivers, in-river salmon fisheries were healthy, compliance with the Yukon River Salmon Agreement happened, and large, profitable catches of pollock occurred. Accordingly, the Council should begin with a bycatch cap no higher than 40,435 Chinook salmon. This number is calculated from a 16-year time series of salmon bycatch in the pollock fishery from 1992 to 2007 while dropping the lowest and highest years of bycatch in 2000 and 2007.

Setting a reasonable immediate Chinook salmon bycatch cap no higher than 40,435 salmon is only the first step. The goal must be to further minimize and reduce salmon bycatch through a descending hard cap. We should expect that through innovations in fishing gear and fishing techniques, research on salmon behavior and habitat, and improvements in management we could further reduce salmon bycatch. Accordingly, the Chinook bycatch cap should be a declining cap, subject to annual review for the amount by which the cap should be decreased. This review should include information on escapement goals and success in meeting those goals, subsistence and commercial salmon needs, updates on the stock-of-origin of the bycatch, and new insights in ocean research.

Further, there are a variety of programs – including incentive programs – that may have promise for managing bycatch under a hard cap. In no way, however, should an incentive program be an excuse to allow higher bycatch of salmon. Setting a cap that is too high, whether there are incentive programs or not, undermines your responsibility to minimize salmon bycatch. In fact, any reliance on an incentive program as a factor in setting the cap must be adequately justified and documented. Additionally, giving away quotas of salmon to the pollock fleet does not address the issue of reducing and minimizing salmon bycatch. We are strongly opposed to giving away ownership of salmon by allowing the pollock fleet to own salmon quotas. No commercial salmon fisherman, charter boat operator, sport fisherman, or subsistence harvester is given salmon quotas. All operate under salmon harvest guidelines and restrictions, but none are guaranteed to catch a salmon.

While you have tasked the pollock fleet to come up with Interco-operative Agreements to self-manage salmon bycatch, the development of such proposals should not delay setting a hard cap on salmon bycatch. If they are to be considered by the Council, however, the existing Salmon Bycatch Workgroup should review such proposals and give recommendations to the Council. Again, should these agreements factor in any way into the cap that is set, that reliance must be justified and based on appropriate, documented evidence.

Thus, we will work with you and help you to:

1. **Establish a descending hard cap for Chinook salmon bycatch in Alaska's groundfish fisheries.**

2. **Secure adequate funds to ensure rebuilding and sustainable Chinook escapement through comprehensive management and co-management of salmon by managing for all life-stages of salmon from in-river to estuary to ocean and return.**

3. **Secure funding for research including identification of the stock-of-origin and age of all Chinook salmon caught as bycatch.**

The Council must consider and should adopt an alternative that sets a hard cap on Chinook salmon bycatch no higher than 40,435 salmon with a mechanism to reduce that number annually. We appreciate your attention to the matter and will continue to work with you on this issue.

Sincerely,

Jim Ayers
Vice President

DID NOT APPEAR
PROVIDED BY B. COOK
WWF

C-4(b)

Testimony of Verner Stor Wilson III, October 6, 2008

North Pacific Fishery Management Council Testimony, October, 2008

Quyana (thank you) all very much for hearing my testimony. It is my first time attending Council deliberations. My name is Verner Stor Wilson III and I am Finnish, Central and Siberian Yup'ik born and raised at Dillingham on the shores of Bristol Bay. My Yup'ik name is Dikaqpuq after a point on Saint Lawrence Island where my mom is from. I am here today representing the World Wildlife Fund's Kamchatka/Bering Sea Ecoregion. I recently graduated from Brown University with a degree in Environmental Studies, and decided to join WWF because they are an internationally–respected, science-based environmental organization who stands up for fisheries and wildlife as well as the people who depend on them. I am proud to say that I hail from the same town as Eric Olson, the Chair of the Council that we are so proud of in Dillingham. As a young adult, I am also proud to say that many of our fisheries throughout Alaska are among the strongest in the world, with help from you and your expertise here at the Council. Science magazine has said that 50% of the world's fisheries are on the path toward extinction from cumulative impacts including climate change, ocean acidification and activities like offshore drilling development, mining, and especially mismanagement and overfishing. The Council should take pride in its international reputation as a model fisheries management organization.

Here in the Bering Sea, we continue to support the Council's efforts to reduce salmon bycatch in the pollock fishery. We believe that everyone's goal should be to achieve zero bycatch. Although significant reductions in salmon bycatch were achieved this year, we must ensure that 2007's overly excessive bycatch level is never repeated. Therefore, WWF supports the preliminary preferred alternative maximum cap of 47,591 Chinook salmon. While we believe that additional reductions could and should be achieved, we believe that this cap provides a reasonable bar from which to work to achieve further reductions. More importantly, to protect the resiliency of our important salmon stocks, this cap should not be exceeded under any circumstances. The cap should provide an additional level of insurance for all in the North Pacific who depend on salmon for food, income and a livelihood. The pollock industry, through its continued measures and techniques to reduce bycatch should find this achievable.

As a Yup'ik Eskimo who has depended on our rich fisheries, I understand those who are heavily dependent on salmon throughout Alaska. Whether it was eating fish for breakfast, lunch AND dinner at fish camp, salmon helped my family make it through the day. It also helped our financial wellbeing by giving us a healthy traditional food instead of buying expensive outside groceries. Whether it was milk at $8 a gallon in Dillingham, or processed sugar and soda that causes numerous health problems for native communities around the state, salmon reduces our dependence on these foods and at the same time gives us rich nutrients like omega 3 fatty acids that nourish children like my niece and nephews and helped my grandma and grandpa survive. It is heartbreaking to hear that communities in Alaska, Canada, and Russia cannot reap these benefits in some years, on top of all the socioeconomic struggles that they face. We must be mindful of the lower than expected harvest levels of salmon this year throughout Alaska, the salmon shutdown along the West Coast, and what it means to their communities. So it is important that people throughout the North Pacific continue to reap the benefits of plentiful salmon returning to the rivers from the Pacific Northwest to Russia. Continued efforts to reduce salmon bycatch through the proposed cap in the pollock fishery will help achieve that important goal. Most importantly, we must recognize the urgency of setting the appropriate cap as soon as possible and not allow the details to maintain and reduce bycatch further within that cap to delay implementation of this important issue.

Again, we thank the Council for its continued efforts, and commend the efforts of the pollock fleet to reduce its bycatch. We offer to assist the Council and NOAA in achieving the goal of reducing salmon bycatch in the pollock fisheries. We are currently seeking additional funding for more research on genetic stock-of-origin as well as research on the effects of ocean conditions on salmon. Without everyone's efforts to reduce salmon bycatch and to properly manage the fisheries for all of our wellbeing, we wouldn't have the remaining great fisheries we have today.

Submitted to NPFMC by At-Sea Processors Association
October 2008

C-4(b)

University of Alaska Fairbanks
Pollock Conservation Cooperative Research Center

Announcement of Availability of Funds

PROPOSALS DUE: Friday, October 17, 2008 by 5:00 pm ADT

The Pollock Conservation Cooperative Research Center (PCC Research Center) at the University of Alaska Fairbanks (www.sfos.uaf.edu/pcc/) announces an opportunity for funding of marine research in the North Pacific Ocean and Bering Sea. Proposals, including one original with all required institutional signatures and an electronic file, must be received by 5:00 pm ADT, October 17, 2008. Send the electronic format proposal (MS Word or PDF) to:

Dean Denis Wiesenburg - wiesenburg@sfos.uaf.edu

with proposal hard copy mailed or delivered to:

Pollock Conservation Cooperative Research Center
School of Fisheries and Ocean Sciences
University of Alaska Fairbanks
P. O. Box 757220
Fairbanks, AK 99775-7220

Submitters will be notified upon receipt of proposals. Start date of the proposal is to be set no earlier than April 1, 2009. Awarding will be made on a yearly basis but faculty are encouraged to submit a multi-year budget based on project needs. Award decisions will be made by February 15, 2009.

Funding for the PCC Research Center is provided by members of the Pollock Conservation Cooperative (PCC), a fishing cooperative of companies that operate catcher/processors in the Bering Sea and Aleutian Islands pollock fishery.

For the 2009 funding cycle, the Center has a total of up to $350,000 available for projects.

The PCC Research Center was established in February 2000 and seeks to improve knowledge about the North Pacific Ocean and Bering Sea through research and education, relevant to the commercial fisheries of the Bering Sea and Aleutian Islands.

The Center provides:

(1) grants to faculty and research stipends to graduate students for research on pollock, other groundfish species, the fisheries for these species, and on marine mammals;

(2) funding for marine education, technical training, and equipment; and

(3) funding for research in the area of marine resource economics.

While proposals in any of the above areas will be accepted, the PCC Research Center annually identifies subjects of particular interest and gives the highest consideration to proposals within these areas.

PCCRC Research Priorities for 2009

For the 2009 funding cycle, the PCC Research Center is especially interested in trying to improve knowledge through research and education in the following subject areas:

1. **Factors Influencing the Sustainability of Steller Sea Lion Populations**

   Proposals to assist in the evaluation of:

   a) the "fishery competition hypothesis" by exploiting a diverse range of evidence using statistical maximum-likelihood modeling experiments. The recovery plan for the endangered Steller sea lion (SSL) recommends a long-term, field-based adaptive management experiment to test the fishery competition hypothesis. However, such an experiment is challenging to construct, would require 10-15 years before any conclusions could be drawn, and may not provide an unequivocal result. There are alternative approaches that may be more effective and may better align with the risk assessment framework now being used, albeit implicitly and informally, to assess the potential causes of the SSL decline. For example, existing analyses (e.g., Wolf and Mangel 2004 [www.soe.ucsc.edu/~msmangel/Steller%20final.pdf]) could be extended to incorporate state-space (or hidden process) models. What is desired is a type of meta-analysis which evaluates the likelihood of the hypothesis by combining all available data and studies, not just data from a single study.

   b) population viability analysis as a tool to assess extinction risk in the western population of Steller sea lions;

   c) natality studies as a tool to assess changes in mortality and survival in the western population of Steller sea lions.

2. **Alaska Pollock Stock Dynamics**

   General environmental factors affecting pollock stocks, including e.g. the impacts of global warming on stock abundance, the relationship of primary and secondary production levels and pollock recruitment, and temperature changes as they relate to pollock roe maturation.

3. **Salmon Ecology in the Bering Sea**

   Proposals to assist in the understanding of:

   a) feeding and migration behavior of salmon in the Bering Sea;

   b) the effects of climate and water temperature on plankton production and the ocean survival of salmon;

   c) the mechanisms that affect the co-occurrence of pollock and salmon populations in the Bering Sea, e.g. food availability and predation;

   d) the occurrence of salmon diseases and their impacts on salmon survival and reproduction;

e) the impacts of Asian hatchery-produced salmon on the survival and reproduction of wild salmon in the Bering Sea.

4. **Salmon Assessment and Bycatch Reduction Technologies**

Proposals to assist in the development of:

a) technology and methods to monitor salmon returning to natal rivers including sonar, weir counting and/or other innovative means to assess in-river migration;

b) technology and methods to identify salmon stream-of-origin;

c) technology and/or gear modifications designed to reduce the incidental catch of salmon in the Alaska pollock fisheries.

Proposal Review Process

Proposals to the Center will be peer reviewed, then prioritized by a seven-member Advisory Board, which is comprised of three members representing the PCC, one member representing fisheries management agencies, and three members representing the University of Alaska Fairbanks. Proposers may be asked to respond in writing to written questions from the Advisory Board as part of the selection process. The Dean of the UAF School of Fisheries and Ocean Sciences reviews the PCC Research Center Advisory Board recommendations and selects the projects to be funded. The PCC Research Center welcomes projects with funding from multiple sources.

Program Reporting Requirements

Annual progress reports and a final report will be required of all projects, in electronic format, in MS Word and PDF. Final reports must be accepted by the Dean of the UAF School of Fisheries and Ocean Sciences and must be submitted no less than 15 days prior to the end of the project. All principal investigators will be required to present research updates at a January PCC Research Center Advisory Board meeting in Alaska. PI's may also be asked to present reports at the Alaska Marine Science Symposium held in Anchorage concurrently with the Advisory Board meeting. Failure to meet reporting requirements in a timely manner may result in withheld reimbursements.

The required standardized format for the final report and acknowledgements is available on the PCCRC website at www.sfos.uaf.edu/pcc/guidelines/index.html. A thesis written as a result of the project research is not acceptable as a final report.

Proposal Content

One principal investigator on each project must be a faculty member or research staff member of the University of Alaska, who must participate significantly in the project. Proposals must be submitted through the University of Alaska. Proposals are limited to 15 pages with 1-inch margins (minimum) and type size no smaller than 10 point. All sections listed below except References, Cover, and CVs (and figures) are to be included in the 15-page limit:

Cover with original signatures

Abstract

Background and relevance to research priorities

Objectives/Hypotheses

Methods/Analyses

References

Timeline including work schedule and reporting deadlines

Short description of results of previous work funded by the PCCRC

Curriculum vitae for each principal investigator (limited to 2 pages each)

Budget justification/Summary

Budget including personnel, travel (include costs for annual presentations), services, supplies, equipment (items above $5000), graduate tuition, and subawards (All subawards from UAF need to provide:

1. Budget and budget justification
2. Statement of work
3. Letter from organization's AOR (not investigator) acknowledging commitment to the project.

List of other funding sources to which the proposer has submitted the proposal

Names and email addresses of three potential reviewers should be submitted by e-mail to wiesenburg@sfos.uaf.edu.

Special Considerations:

- PCC Research Center awards cannot support indirect (F&A) costs.

- PCC Research Center awards are contingent upon evidence of UAF Institutional Animal Care and Use Committee (IACUC) authorization or Human Subjects Application (IRB) approval where appropriate.

For further information about this request for proposals, please contact Denis Wiesenburg at the UAF School of Fisheries and Ocean Sciences at 907-474-7210 or via e-mail at wiesenburg@sfos.uaf.edu.

Pollock Conservation Cooperative Research Center
School of Fisheries and Ocean Sciences
University of Alaska Fairbanks
P. O. Box 757220
Fairbanks, AK 99775-7220

ICA ELEMENTS FOR REDUCING CHINOOK SALMON BYCATCH AT ALL ENCOUNTER LEVELS

- HOT SPOT CLOSURE PROGRAM
- INDIVIDUAL BYCATCH LIMITS
- MARKET BASED INCENTIVES

ICA requirements to participate in the 68,392 hard cap scenario

(as specified in the PPA)

- An ICA must provide incentive(s) for each vessel to avoid salmon bycatch under any conditions of pollock and salmon abundance in all years

- Incentive measures must include rewards for salmon bycatch avoidance and/or penalties for failure to avoid salmon bycatch at the vessel level.

ICA requirements to participate in the 68,392 hard cap scenario
(as specified in the PPA)

- The ICA must specify how those incentives are expected to promote reductions in actual individual vessel bycatch rates relative to what would have occurred in absence of the incentive program. Incentive measures must promote salmon savings in any condition of pollock and salmon abundance, such that they are expected to influence operational decisions at bycatch levels below the hard cap.

PPA Incentive Requirements

- Provide incentives at the individual vessel level
- Incentivize vessels to avoid Chinook bycatch at all levels of abundance in all years
- Reward vessels that successfully avoid Chinook and/or penalize vessels that fail to avoid Chinook
- Incentives must influence fishing decisions at levels below the hard cap

Three point plan for meeting the criteria required in the PPA

- HOT SPOT CLOSURE PROGRAM
- INDIVIDUAL BYCATCH LIMITS
- MARKET BASED INCENTIVES

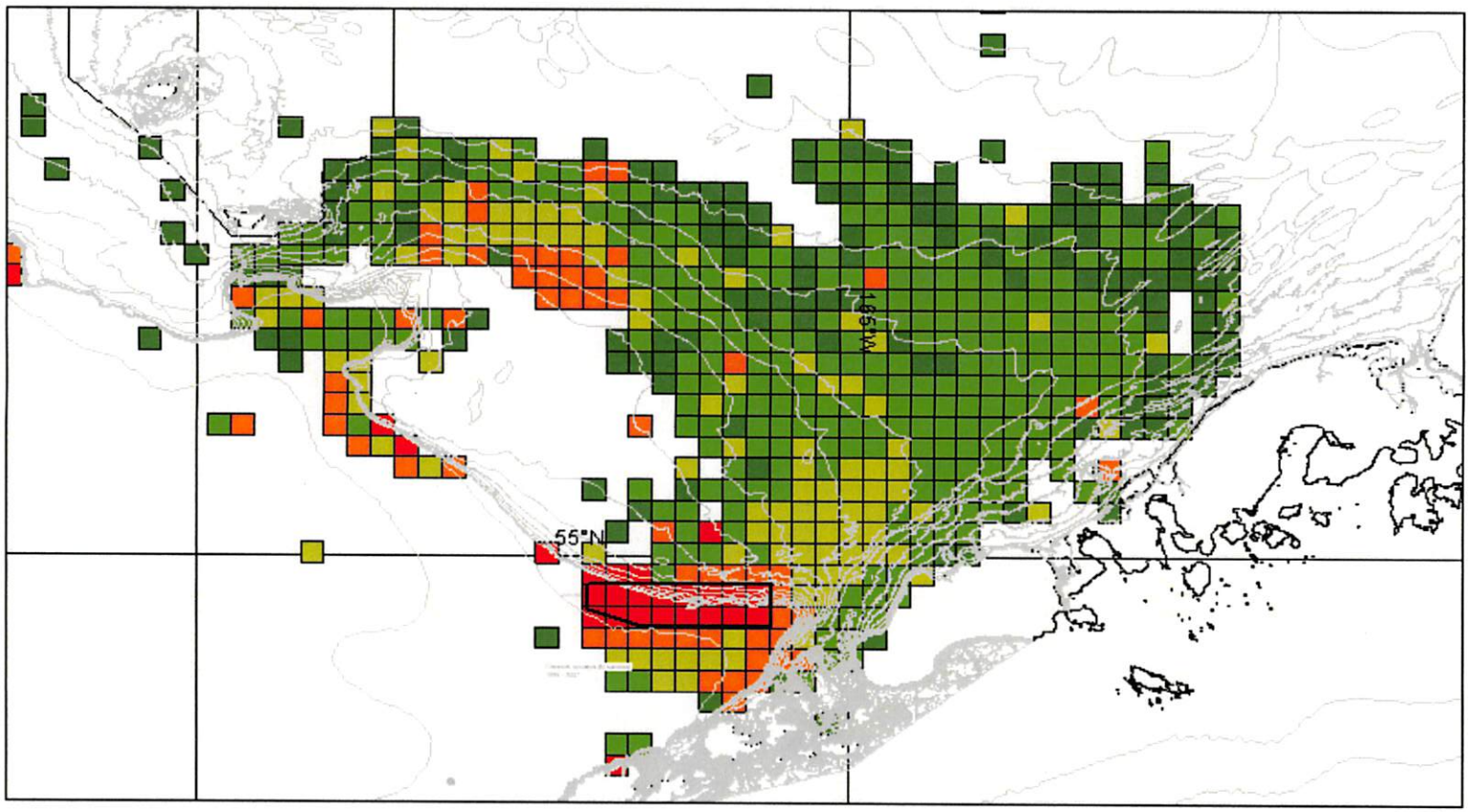
Hot Spot Closure Program

Two Types of Closures

- Fixed Closure Area in the A Season
- Rolling Closures for Both A and B Seasons

• Fixed Closure Area - A Season

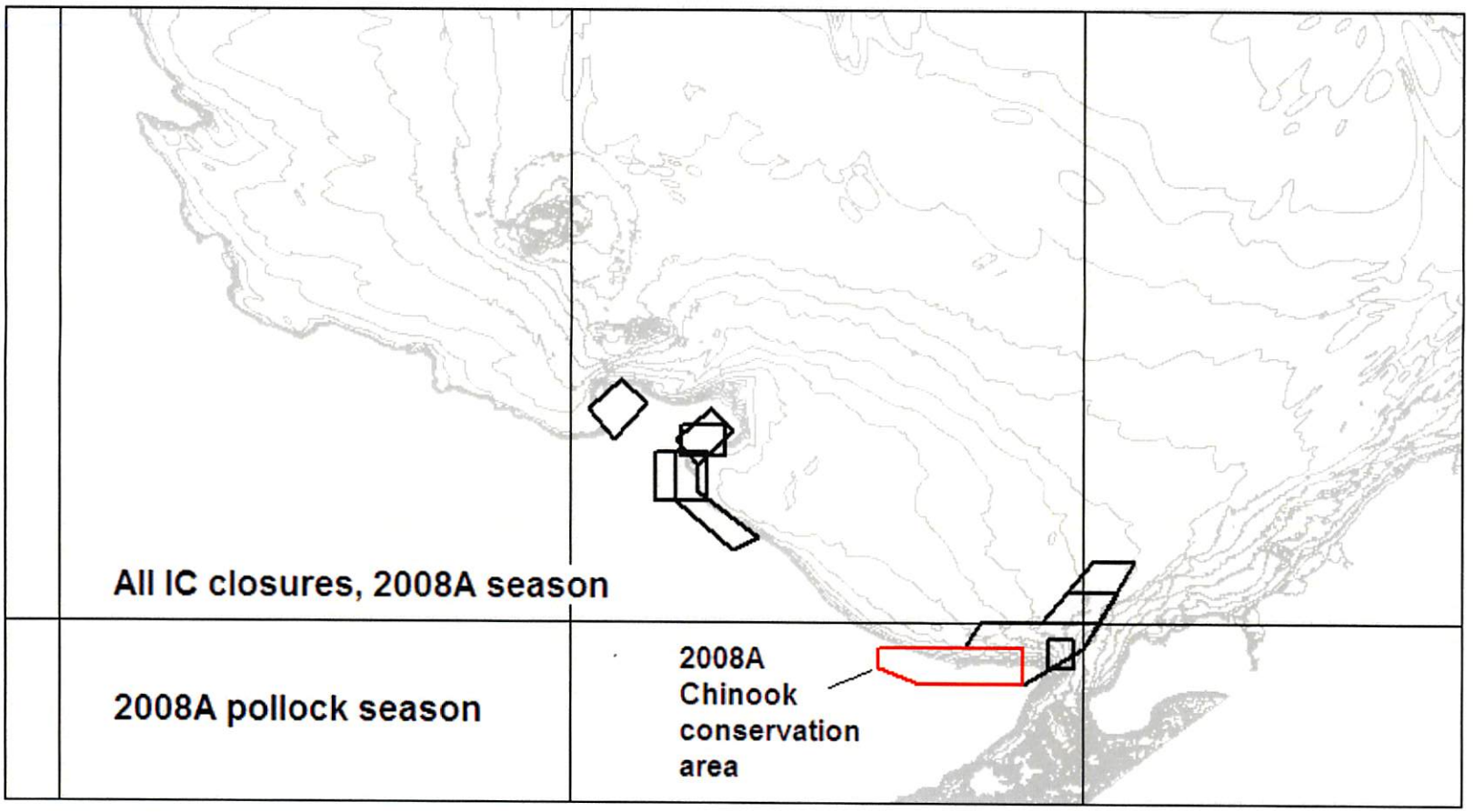
The "consistently hot" hot spot; increases area available for rolling hot spot closures.



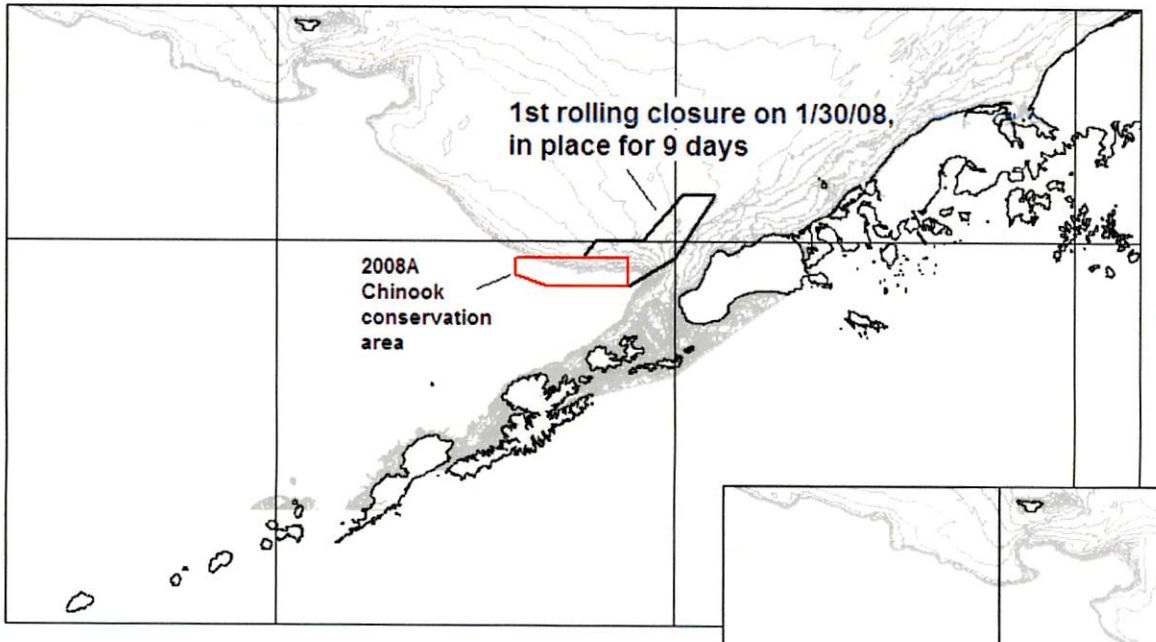
Fixed closure area as implemented for the 2008 A season – *Area based on Chinook bycatch 1995-2007*

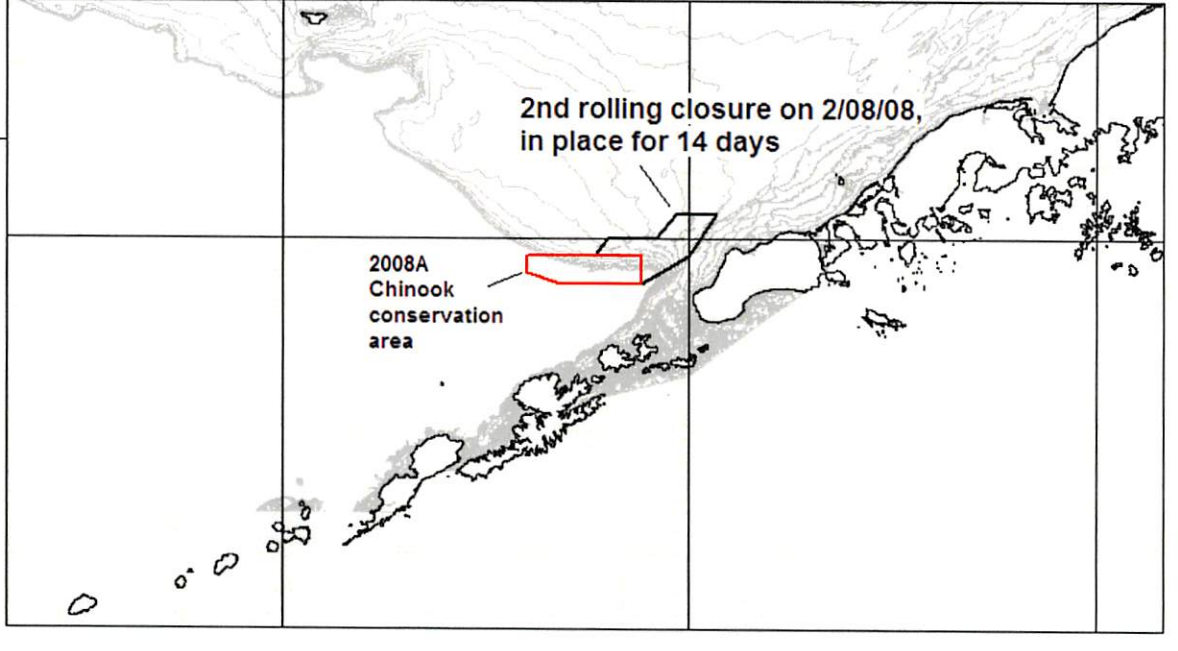
IC salmon closures, 2007 A

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

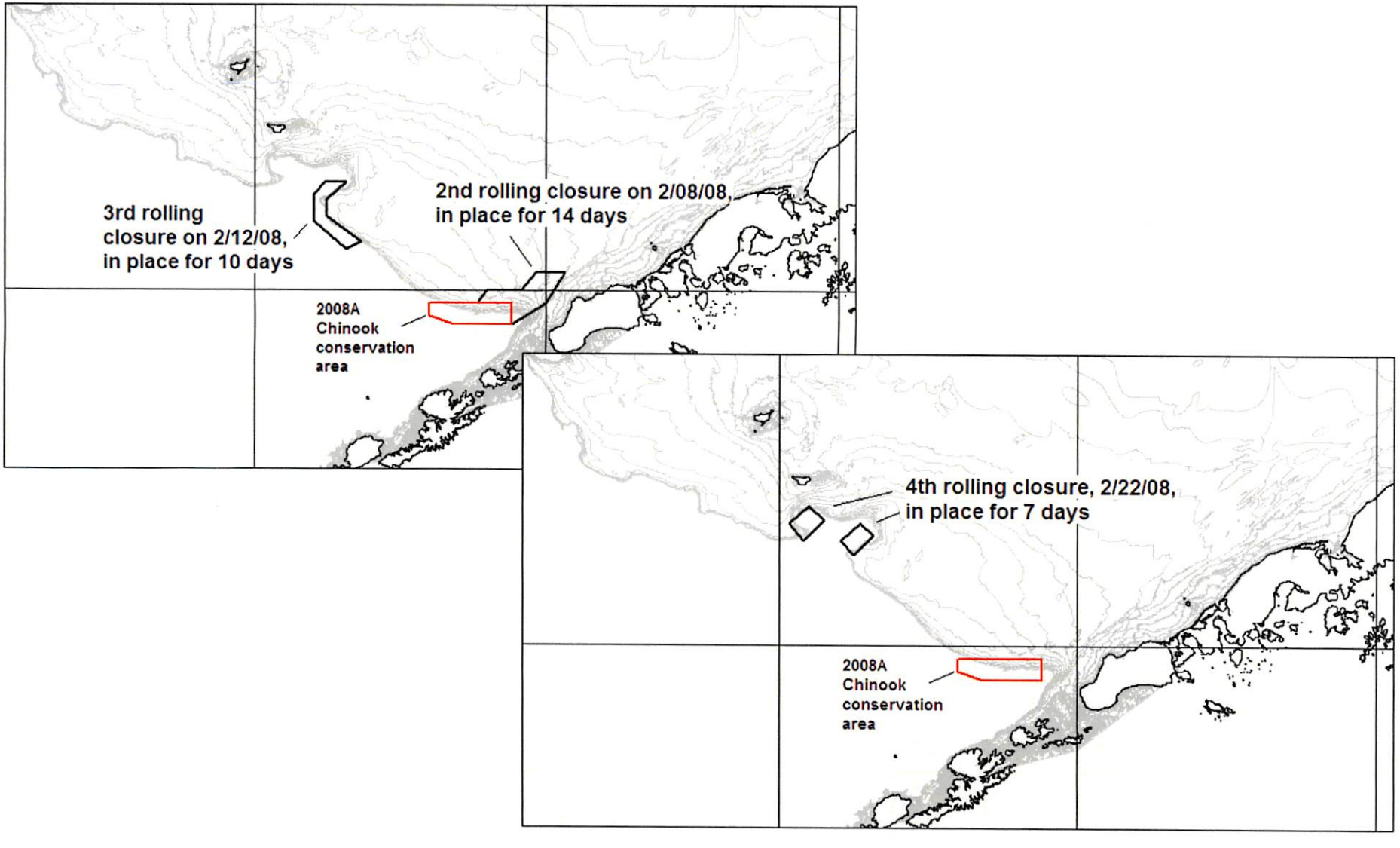


- Rolling Closures for Both A and B Seasons





Rolling Closures for Both A and B Seasons



Hot Spot Closures and the PPA Incentive Requirements

- Fixed and rolling hot spots are not an incentive based program, but work well in conjunction with incentive programs
  - Fixed and rolling closures reduce the fleet-wide bycatch of Chinook Salmon in all levels of abundance
  - Information provided by hot spot closures inform fishermen of current bycatch conditions and trends
  - This information will be one of the most important tools for successful incentive programs

Improving the Current Hot Spot Closure Program

- Shift from cooperative based closures to finer scale closure assignments.
  - C/P and inshore vessels are assigned individual tier levels
  - Mothership catcher vessels are assigned tier status at the mothership fleet level.
    - 3 mothership operations = 3 fleet tier assignments independent from each other

Individual Vessels with higher bycatch will no longer fish under the cover provided by lower bycatch vessels in the same cooperative

INDIVIDUAL BYCATCH LIMITS

- Sector and Inshore Coop allocations taken to the individual vessel level
- All vessels are allocated an individual amount of salmon encounter credits
- Vessels must stop fishing before exceeding their available salmon encounter credits

- Sector and Inshore Coop allocations taken to the individual vessel level

  - Individual vessel Incentives start with individual vessel responsibilities created by vessel level bycatch limits
  - No cover provided for individuals with high bycatch
  - Fishermen must make operational decisions at bycatch levels below the hard cap

- All vessels are allocated an individual set of salmon credits

First Year Example: (done pro rata to pollock)

- An Inshore Cooperative is allocated a bycatch limit of 2,900 Chinook salmon for the upcoming A season.
- The coop has agreed that Vessel A has access to 9% of the coop's pollock allocation
- Vessel A is provided an individual bycatch cap of 261 credits – 9% of the coop's 2,900 bycatch limit

- All vessels are allocated an individual set of salmon credits

- Vessels will hold on to their credits until they absolutely don't need them to harvest their pollock
- Vessels may hang on to unused credits to create an opportunity to harvest additional pollock
- Stranding of unused credits will occur each year

Stranding results in an unrealized bycatch level well below the hard cap.

- Vessels must stop fishing before exceeding their available salmon credits.

Vessels with exhausted salmon credits have a limited set of options:

- Find additional salmon credits from another vessel, if and when they become available
- Allow another vessel(s) with available credits to harvest uncaught pollock
- Forgo the harvest of their pollock

MARKET BASED INCENTIVES

- Legacy Program – Create forward looking incentives to reduce by-catch this year by rewarding and penalizing vessels through subsequent annual credit allocations, effective at all levels of abundance

- Incentives created by trading mechanisms

"Market Based Incentives" = economic incentives.

• Legacy Program

- Subsequent Credit Allocation Adjustments Based on Vessel By-catch Avoidance Record
  - EXAMPLE:
    - Year 1 – Each vessel receives salmon credits pro rata to their pollock allocation (previous example)
    - Year 2 and each year thereafter each vessel receives salmon credits based on 3 criteria:
      - 1/3 based on vessel's original pro rata allocation
      - 1/3 based on vessel's previous year's allocation
        - » -creates CUMULATIVE record of behavior.
      - 1/3 based on vessel's previous year relative bycatch performance

• Legacy Program

➢ Subsequent Credit Allocation Adjustments

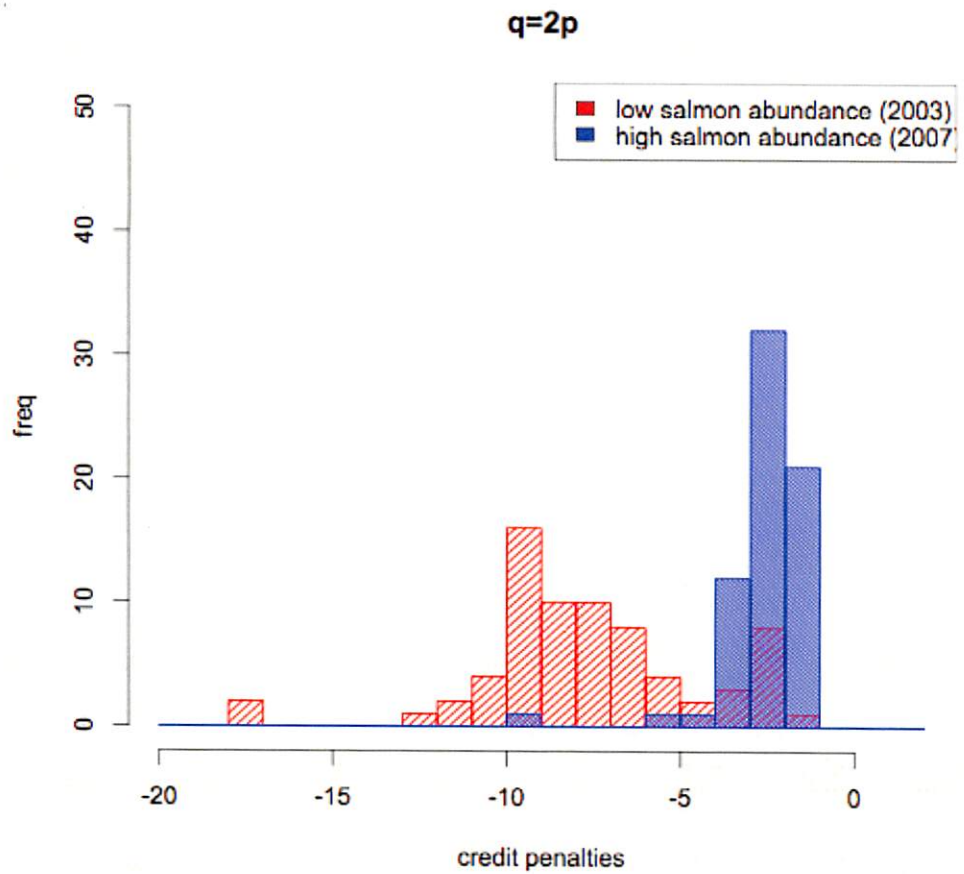
– Individual vessel incentives

- Every vessel's future allocation of credits at risk of being reduced regardless of the number of salmon taken
- Creates behavior that will conserve available credits due to unknown future needs
- Rewards the best performing vessels with additional future bycatch credits
- Penalizes poor performing vessels by reducing future bycatch credits
- Incentive strongest during low encounter years

• Legacy Program

Individual vessel incentives

Every vessel's future allocation of credits is at risk of being reduced if their relative performance is poor. This penalty is greater during low salmon abundance years.



• Trade Generated Incentives

Vessels may need credits beyond their allocation to harvest their pollock for a variety of reasons, some beyond their control. They are provided the opportunity to acquire additional credits, but have to make several difficult choices:

1. Securing additional credits is expensive
2. Securing additional credits does not guarantee the harvest of their remaining pollock
3. Catching the additional bycatch may result in a reduced allocation in the following year unless they fish cleaner

• Trade Generated Incentives

The result of trading are:

- Strong incentives to fish clean in order to be a seller, not a buyer, of credits.
- Buyers may be doubly penalized by the cost of buying additional credits and the reduction of future allocations under the Legacy Program
- Creates an "out" for unfortunate bycatch circumstances

Program Summary

- Hard Cap – Sets upper limit on Chinook bycatch
- Hot Spot Closures – Reduces Chinook bycatch at all levels of abundance
- Individual Bycatch Limits
  - ➢Individual vessel responsibilities and incentives
  - ➢operational decisions at bycatch levels below the hard cap
  - ➢Results in realized bycatch levels below the hard cap
- Market Based Incentives – Rewards and penalizes vessels at all levels of Chinook abundance

Joe Plesha
C-4(b)

Analysis of an Incentive-Based Chinook Salmon Bycatch Avoidance Proposal for the Bering Sea Pollock Fishery

By

Levis A. Kochin[*]
Christopher C. Riley[**]
Ana Kujundzic[***]
Joseph T. Plesha[#]

September 29, 2008

Abstract

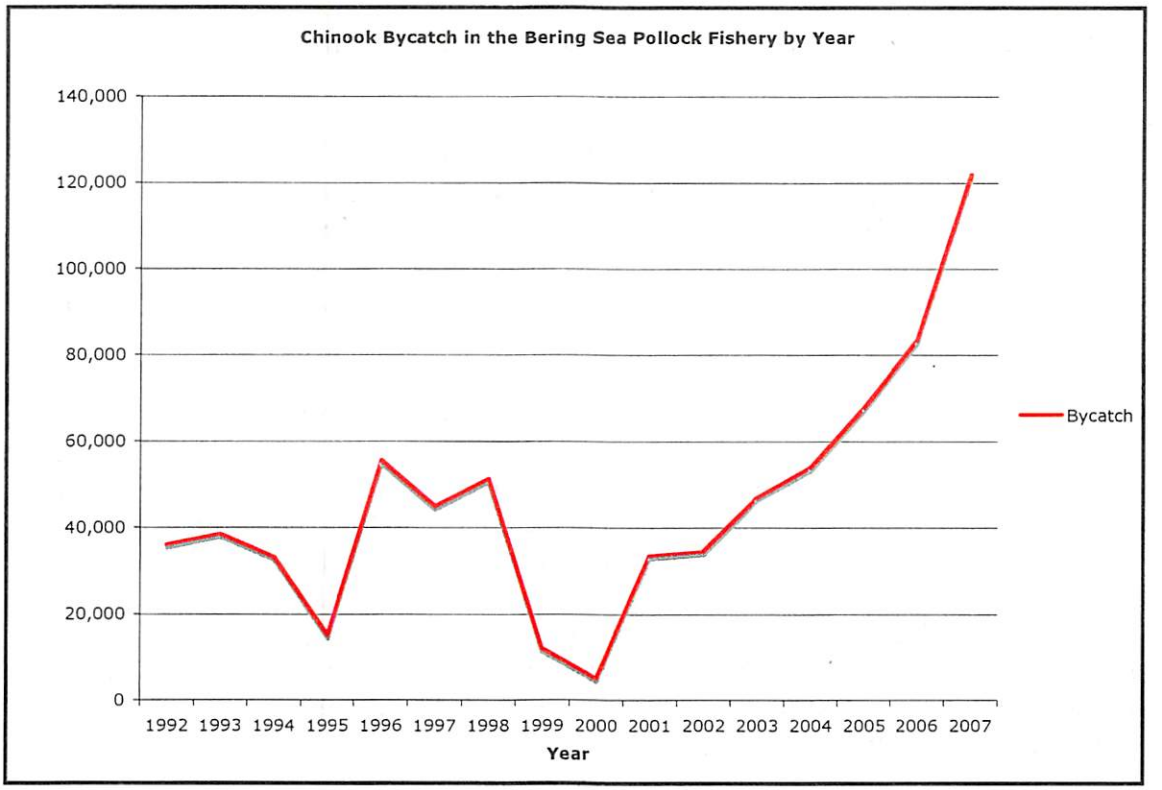
Too many Chinook salmon are incidentally harvested in the Bering Sea pollock fishery, and the North Pacific Fishery Management Council is considering measures to reduce the bycatch of Chinook salmon. In June of 2008 the Council adopted a Preferred Preliminary Alternative that allows the pollock industry, on its own initiative, to develop a program that "provides explicit incentives for each participant to avoid salmon bycatch in all years." This paper is a response to that invitation. The concept at the heart of this paper is an incentive-based proposal in which each pollock vessel puts up a financial ante that is redistributed among the pollock harvesting fleet in proportion to each vessel's success in avoiding Chinook salmon. This incentive-based proposal operates to provide very strong incentives to avoid Chinook, especially when Chinook abundance is low. The paper describes the incentive-based proposal and how it interacts with a transferable hard cap to create incentives to minimize Chinook bycatch. The paper also examines the reduction in bycatch predicted to result from these incentives.

I. Introduction

Chinook salmon found in the Bering Sea originate from a wide range of geographic locations including Alaska, British Columbia and the Pacific coast, but they are predominantly of Western Alaska origin. These salmon are highly valued for economic, social and cultural reasons. There is a general concern for the health of Chinook salmon stocks. Recent Chinook returns to river systems in Western Alaska have been at such low levels that restrictions have been placed on even subsistence harvest.

Despite general concerns over the recent low levels of Chinook returns to Western Alaska river systems, the bycatch of these salmon in the Bering Sea pollock fishery has grown dramatically, with the total catch of Chinook in the pollock fishery reaching a historic high in the year 2007 at 120,808 salmon.

Figure 1. Chinook Salmon Bycatch in the Bering Sea Pollock Fishery, 1992-2007.



The total Alaska harvest of Chinook salmon has averaged approximately 600,000[1] fish since 1970, so the bycatch of Chinook in the pollock fishery represents a significant percentage of all salmon harvested in the subsistence, commercial and recreational fisheries statewide.

Although Chinook bycatch in the pollock fishery has decreased in 2008, the reasons for the reduction are not known. It may be because of increased industry efforts to avoid salmon, that there are fewer Chinook salmon commingling with schools of pollock, that salmon abundance in general has declined, or some combination of these factors.

The rationalization of the Bering Sea pollock fishery by the American Fisheries Act (AFA) has made it the most valuable fishery under federal management. The AFA allocates the privilege to harvest pollock to the Western Alaska community development quota program, and fishing vessel cooperatives in the inshore, catcher/processor and mothership sectors of the industry. Through these pollock cooperatives, owners of AFA-eligible pollock harvesting vessels have received quota of great value.

There is currently no limit on the number of Chinook salmon that can be taken in the pollock fishery; consequently, the North Pacific Fishery Management Council is in the process of recommending measures to protect Chinook salmon stocks. Under the National Standards of the Magnuson-Stevens Act (MSA), Fishery Management Plans shall achieve "optimum yield" from each fishery while minimizing bycatch, "to the extent practicable." In other words, the MSA seeks the optimal balance between maximizing reductions in Chinook salmon bycatch and minimizing damage to the pollock industry.

In June of 2008 the Council adopted a Preferred Preliminary Alternative (PPA) that provides a well-designed program to reduce Chinook bycatch while offering the opportunity for the Bering Sea pollock fishery to be fully harvested. The Council's motion provides that a hard cap of 47,591 salmon will be imposed upon the pollock fleet if the pollock industry does not adopt a voluntary incentive-based program to avoid Chinook bycatch.

Hard bycatch caps (some assigned and transferable, and some not) are a traditional method employed by managers to place limits on bycatch. A hard cap of 47,591 appears to be a reasonable balance between protecting Chinook salmon and allowing the pollock fishery to be harvested. Chinook bycatch in the pollock fishery, however, is highly variable. Some years Chinook abundance in the Bering Sea is low and a hard cap of 47,591 will do little to create incentives for the pollock fleet to avoid salmon. In other years Chinook abundance is much greater, as evidenced by the fact that the pollock fishery has exceeded 47,591 Chinook in six of the past twelve years. In years of high Chinook abundance a hard cap at this level would likely close the fishery prior to the Total Allowable Catch (TAC) of pollock being harvested.

When Chinook salmon are scarce, the biological value of each bycaught salmon is high because each fish is important as brood stock for future generations; however, the scarcity of Chinook salmon also means that fewer will be caught in the pollock fishery and a hard cap of 47,591 would not be exceeded even if no efforts were made by the fleet to avoid salmon bycatch. Because the hard cap would not be reached, there would be no incentive for the pollock fleet to avoid catching Chinook salmon during the time they are of the greatest biological value.

Conversely, if Chinook salmon are extremely abundant, the biological cost to the salmon resource of catching one salmon would be lower. But this is precisely the time when a hard cap of 47,591 would be very costly to the pollock fleet. Enormous efforts will be devoted to avoiding catching Chinook salmon. If these efforts are unsuccessful, the pollock fishery would be shut down by the 47,591 hard cap well before the pollock TAC is harvested and precisely when Chinook bycatch might be doing the least damage to the salmon fishery.

The PPA recognizes the shortcomings of a simple 47,591 hard cap. The Council's motion invites the pollock industry, on its own initiative, to develop a program that "provides explicit incentives for each participant to avoid salmon bycatch in *all years*." The program must create incentives for "each vessel to avoid salmon under *any condition of salmon abundance in all years*," and the incentive measures "*must include rewards for salmon bycatch avoidance and/or penalties for failure to avoid salmon bycatch* at the vessel level." If such an incentive-based program is developed and carefully analyzed by the industry, the Council will consider recommending a Chinook salmon hard cap of 68,392, a level which is unlikely to be constraining on the pollock fishery.

In other words, the Council will consider a more liberal hard cap of 68,392 if the pollock industry can develop an incentive-based program that will reduce Chinook bycatch *better than* a hard cap of 47,591. The industry's proposal must also provide these incentives during all years and at all levels of salmon abundance, even when Chinook salmon are at chronically low abundance levels. That is a hard standard to meet.

Prior to its final vote on measures to manage Chinook bycatch, the Council will have the opportunity to judge whether any programs developed and fully analyzed by the pollock industry achieve its intent for an incentive-based program.[2]

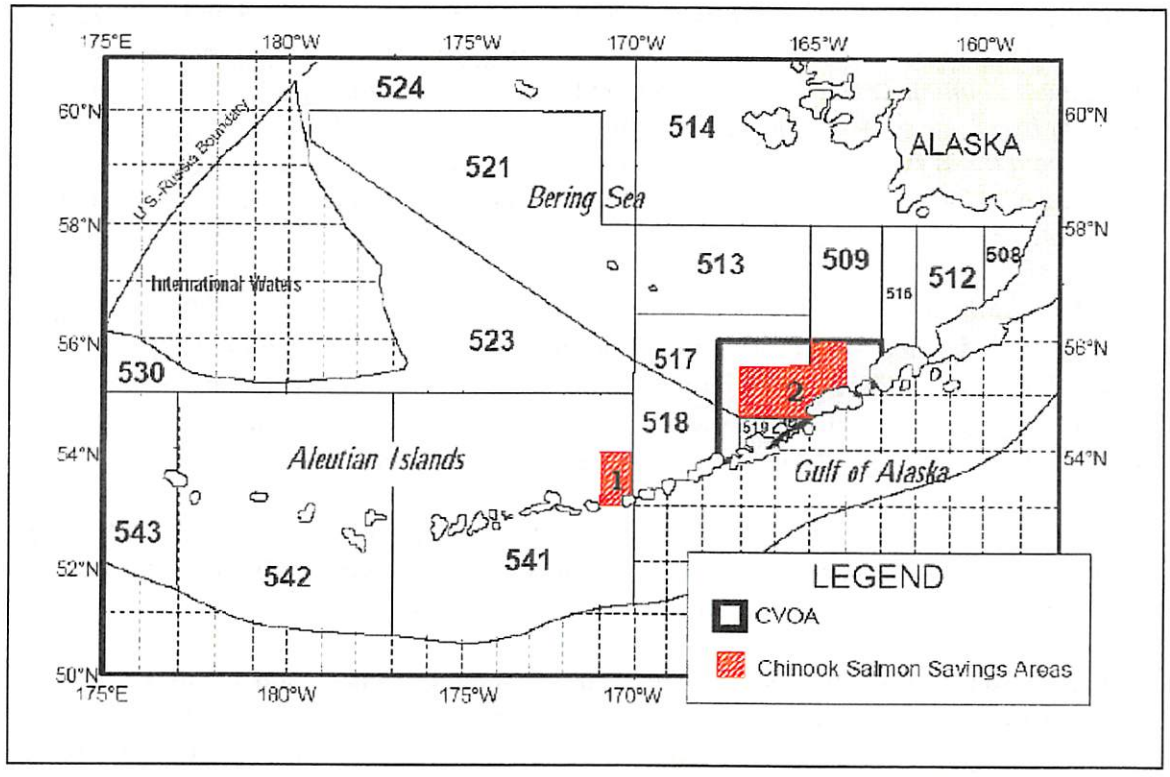
This paper describes and reviews a proposal that we believe is responsive to the Council's concerns for Chinook salmon protection and its request for a powerful incentive-based Chinook salmon avoidance program. The proposal includes three basic elements: Continuation of the current Chinook bycatch avoidance measure (the Rolling Hotspot Closure program), a hard cap of 68,392 which will be allocated through the pollock cooperatives to each vessel and is transferable, and an individual vessel incentive-based bycatch avoidance program that "provides explicit incentives for each participant to avoid salmon bycatch in all years" by creating a high marginal value for each Chinook salmon taken by the fleet.

The intent of the proposal is to create strong economic incentives for all vessels harvesting pollock to avoid Chinook salmon bycatch at all levels of salmon abundance, even during periods of chronically low Chinook abundance. In other words, the proposal's goal is to have the pollock industry — "to the extent practicable" — minimize its bycatch of Chinook salmon while achieving the "optimum yield" from the extremely valuable pollock fishery.

II. Rolling Hotspot Closure Program

In 1995 the Council established triggered Chinook Salmon Savings Areas that were closed to all pollock fishing if 29,000 Chinook salmon were taken.[3] The Chinook Salmon Savings Area closed approximately 5,000 square miles, a substantial portion of the Catcher Vessel Operation Area, making the closure very restrictive if the threshold of 29,000 Chinook was exceeded. Below is a chart showing the triggered closure area.

Figure 2. Chinook Salmon Savings Area and the CVOA.



The Council was concerned, however, that "salmon bycatch may be higher outside the savings areas than inside."[4] Although AFA cooperatives had been operating under an inter-cooperative agreement that included rolling hot spot closures for Chinook salmon since 2003, the Council formally authorized the RHC program to replace the large triggered closure area when it passed Amendment 84 in October of 2006. The Council's decision was strongly supported by the inshore pollock fleet, which had much of its best fishing grounds closed when the 29,000 Chinook threshold was reached. The analysis before the Council stated, "salmon bycatch is expected to *decrease* under this alternative [the RHC program], given the flexible system provided by dynamic hot spot management of the pollock fleet."[5]

To understand its strengths and weaknesses it is important to know how the RHC program actually works. As detailed below, the RHC program temporarily limits fishing

access for some vessels to areas of the Bering Sea where Chinook salmon bycatch is greater than a specified "Base Rate" of bycatch.

"A" Season Base Rate Calculation

The initial "A" season Base Rate is equal to the prior year's "A" season Chinook bycatch rate, except that the initial base rate cannot be greater than 0.06 nor less than 0.04. The Base Rate is adjusted during the "A" season in response to the actual Chinook bycatch experienced during the season. Starting on February 14, and continuing weekly thereafter, the three-week average bycatch rate is calculated and the lower of initial Base Rate or the recalculated Base Rate is used.

Tier Structure

* Cooperatives with Chinook bycatch rates of 75% or less of the Base Rate are in Tier 1.

* Cooperatives with Chinook bycatch rates greater than 75% but less than or equal to 125% of the Base Rate are in Tier 2.

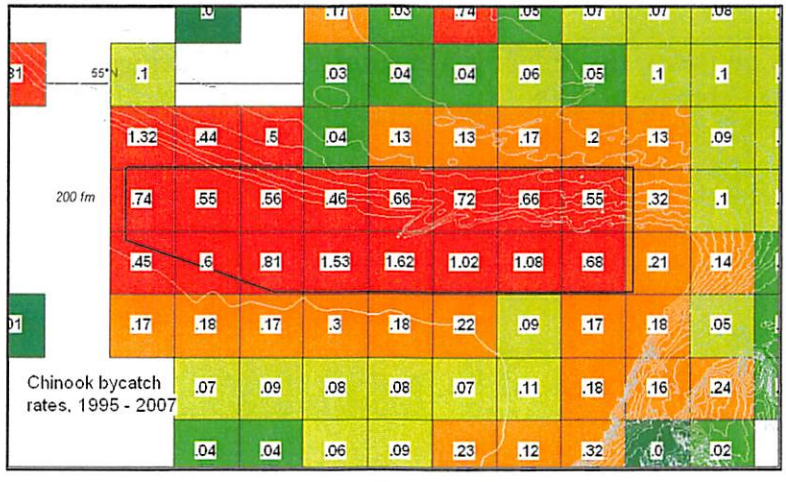
* Cooperatives with Chinook bycatch rates of greater than 125% of the Base Rate are in Tier 3.[6]

Establishment of Chinook Savings Areas

On January 30 and each Monday and Thursday thereafter, one or more Chinook Savings Areas are established. Chinook Savings Areas are established "as SeaState determines appropriate to address Chinook bycatch."

In addition to these Chinook Savings Areas, the industry agreed to modify the RHC program to close for the entire "A" season an area of the so-called horseshoe region. This area was closed to all pollock fishing starting in 2008.

Figure 3. Chinook bycatch rates for the combined years 1995-2007 in and around area closed to pollock fishing in 2008 under the modified RHC program.



Limitations on Establishment of Chinook Savings Areas

To qualify as a potential Chinook Savings Area, it must be an area where (1) a substantial amount of pollock is harvested (roughly defined as two percent or more of that week's pollock catch), and (2) Chinook salmon bycatch exceeds the Base Rate. Chinook Savings Areas, furthermore, cannot exceed 500 square miles West of 168 degrees West longitude. The total area of all Chinook Savings areas cannot exceed 1,500 square miles. No more than two Chinook Savings Areas West of 168 degrees West longitude and two East of 168 degrees West longitude are allowed.

Publication of Savings Areas and Tier Status

Closures are announced on Thursdays (effective at 6:00 PM on Friday) and Mondays (effective at 6:00 PM on Tuesday). Chinook Savings Areas work as follows: The Chinook Savings Areas announced on Thursday, and as updated by Monday, are closed to pollock fishing by Tier 3 Coop vessels for seven days beginning Friday at 6:00 PM. Chinook Savings Areas announced on Thursday are closed to fishing by Tier 2 Coop vessels from Friday at 6:00 PM through 6:00 PM the following Tuesday. Tier 1 Coop vessels may fish in all Chinook Savings Areas.

Distribution of Information to the Fleet

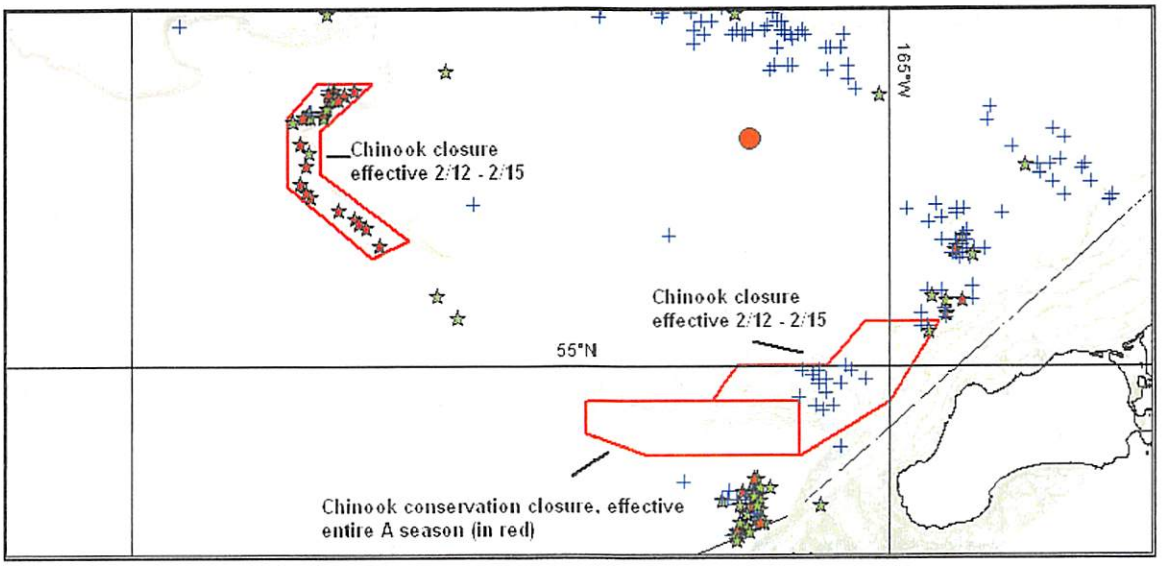
Each Monday and Thursday announcement includes an update on pollock harvest and Chinook bycatch by sector and in total, each Coop's rolling two week bycatch rate and associated Tier status (Thursday's announcement only). The announcement also gives chart coordinates describing each Chinook Savings Area, Chinook bycatch rates for each ADF&G statistical area where there has been directed pollock fishing in the previous week, and a vessel performance list (Thursday's announcement only).

"B" Season Base Rate Calculation

For the entire 2008 "B" season, the Chinook salmon Base Rate is 0.05.[7] (Because Chinook bycatch this year is below the 0.05 Base Rate, there will be no Chinook Savings Areas implemented until late in this year's "B" season.) For 2009 and beyond, the Chinook salmon Base Rate will be determined by using the prior year's Chinook bycatch rate for the same period of time.

For illustrative purposes, figure four is a chart of Chinook Savings Areas under the RHC program during February of 2008.

Figure 4. Chinook Savings Areas during the week of February 12, 2008.



Brief Analysis of the RHC Program

The RHC program provides the pollock fleet with extremely useful information on areas of high Chinook bycatch on a timely basis. Modification of the RHC program in 2008 to close for the entire "A" season an area of the horseshoe will significantly reduce Chinook bycatch from levels seen in previous years. The RHC program also reduces pollock fishing effort in areas with the highest bycatch rates outside of this permanently closed area. If there is an area with high Chinook bycatch and also an exceptionally high percentage of pollock roe, for example, the RHC program can limit access to this area.

A simple model will show how the RHC program can limit access to areas of high pollock roe value when a substantial marginal value per salmon may not:

The average roe recovery for the catcher/processor sector was approximately 5.5% in 2008. It is not unusual, however, for roe recovery in the deeper waters of the "mushroom" area of the Bering Sea to be 7%. The average value of pollock roe for the catcher processor sector in 2008 was approximately $5.80 per pound. The additional value per metric ton of pollock fishing in the mushroom, as opposed to other areas, can be calculated as follows:

Average roe recovery rate =	5.5%
Average price of pollock roe per pound =	$5.80
Value of roe per MT of pollock harvest =	$703
Roe recovery rate in mushroom =	7%
Average price of pollock roe per pound =	$5.80
Value of roe per MT of pollock harvest in mushroom =	$895

Difference between mushroom and average roe value per MT = $192

It is important to understand that fishable quantities of pollock do not always appear in the deep of the mushroom area. When there are pollock in the mushroom, however, there is typically Chinook bycatch at rates three to five times higher than average bycatch rates elsewhere.

If the average Chinook bycatch rate for the catcher/processor fleet is .03 Chinook salmon per metric ton of pollock, the bycatch rate in the mushroom area could be .12 (at four times the average rate elsewhere). The difference between the average bycatch rate and the bycatch rate in the mushroom area is therefore .09 in this example.

Given that the value of roe pollock is $192 greater per metric ton in the mushroom and the bycatch rate .09 per metric ton higher, it would take a marginal value of $2,131 ($192 divided by .09) for each Chinook salmon to provide an economic incentive large enough for a vessel to choose to fish pollock outside of the mushroom.

Under the RHC program, with bycatch rates three to five times greater in the mushroom, vessels that fish in the mushroom area would likely cause their coop to be in Tier 1 or Tier 2, and therefore be precluded from fishing for pollock in that area for a week or four days respectively.

But the RHC program has obvious limitations. The Base Rate for the "A" season is initially based on the bycatch rate of the previous year, which may or may not reflect bycatch in the current year. Chinook bycatch typically declines as the "A" season progresses, which may allow vessels to harvest salmon below the adjusted Base Rate while avoiding costly measures to avoid salmon bycatch. The RHC program is not sector-specific yet each pollock sector has inherently different bycatch rates due to operational distinctions.

The RHC program, moreover, does not provide "explicit incentives for *each participant* to avoid salmon bycatch in all years." Under the RHC program, once a cooperative is likely to be operating in Tier 3, vessels within that cooperative have no incentive to avoid Chinook bycatch. Vessels in such a cooperative will target the best pollock fishing within the areas open to fishing, and Chinook bycatch will be a secondary consideration. (In fact, these vessels would have a perverse incentive to increase salmon harvests, as more bycatch would ultimately increase the Base Rate.) The areas immediately outside of the Chinook Savings Areas often have relatively high salmon bycatch rates. Vessels in Tier 3 cooperatives can fish immediately outside of the Chinook Savings Areas without restrictions. Additionally, the RHC program is coop specific, so vessels within a cooperative can fish in high bycatch areas if they know that their cooperative, as a whole, has lower than average bycatch.

The effectiveness of the RHC program would be improved, obviously, if the Chinook Savings Area size were increased substantially beyond its current restrictions. But

regardless of the size of the Chinook Savings Area, vessels fishing outside of the closed grounds can fish pollock without concern for Chinook bycatch.

Although the RHC program helps to reduce Chinook bycatch, it is an example of a "command-and-control" regulation. The only way to achieve "explicit incentives for each participant to avoid salmon bycatch in all years" and to create incentives for "each vessel to avoid salmon under any condition of salmon abundance" is the use of a market-based approach.

III. Discussion of Command and Control vs. Market Based Incentives

Under command-and-control regulations, an agency establishes compliance goals and then dictates the means that regulated firms must use to meet those goals. The Clean Air Act, for example, calls for a reduction in emissions in order to fight ozone depletion. The Environmental Protection Agency then defines what technology must be used to achieve that goal. Under the RHC program, the Council seeks to reduce Chinook bycatch in the pollock fishery by defining areas in which pollock fishing effort is to be limited.

The distinction between command-and-control and market-based regulations is often found in pollution control schemes. Economic theory and actual experience indicate that regulations which attempt to internalize and privatize the social costs of pollution through the market-based approach almost always achieve a given level of pollution reduction at a lower cost than the command-and-control approach. In the market-based approach, the individual firm is incentivized to reduce emissions by whatever means are least costly; whether in its own operations or by paying other firms to reduce emissions beyond target levels.

The market-based approach to fishery management has been successful around the world. By providing private incentives to those who receive allocations of transferable harvesting quota, large economic gains have been achieved, together with reduced ecological impacts. No case provides a better example of this than the Alaska pollock fishery. Prior to passage of the AFA, for example, fishery managers attempted to maximize the value of output from the pollock fishery by a command-and-control regulation: the banning of "roe stripping." This regulation was only partially successful. The AFA incorporated a market-based approach to fishery management, allocating to private entities transferable shares of the total pollock catch, giving those entities the discretion to fish without racing against one another. The pollock fishery now yields a considerably greater volume of edible product with increased value per volume of raw fish. After enactment of the AFA, product recovery in the pollock fishery increased from approximately seventeen percent to over thirty percent. (In addition there has been a reduction in the use of inputs such as vessels and fuel.)

Market-based regulatory systems, such as the two that will be discussed in this paper, all have one thing in common: They influence behavior by making desirable actions more profitable and those actions deemed undesirable less profitable. The workings of

market-based regulatory systems can be described in the language of costs and benefits. To help describe the market-based mechanisms for bycatch reduction proposed in this paper, definitions of two frequently used terms are provided below:

Marginal Value. Marginal value is the change in total value (before deducting any incremental cost) that arises when the quantity produced changes by one unit. The marginal value of avoiding a Chinook salmon is the expected gain to the vessel as a result of avoiding that salmon. It is expressed in "dollars per avoided Chinook salmon." The marginal value of avoiding a Chinook salmon could be, among other things, the proceeds from the sale of any transferable bycatch allowance or the avoided cost of having to buy bycatch allowance from someone else. Marginal value could also be the expected proceeds from the incentive-based program described in this paper for avoiding one Chinook salmon.

Marginal Cost. Marginal cost refers to the incremental cost that arises when the quantity produced changes by one unit. The marginal cost of avoiding one Chinook salmon is the expected cost to the vessel as a result of avoiding that salmon. It is expressed in "dollars per avoided Chinook." The marginal cost of avoiding a Chinook salmon could be the cost of fishing at a more distant location, or where the catch of pollock is less. It could be harvesting pollock with a lower roe content or lower recovery rate for primary product. It could be the cost of fishing at a different time of year. It could also be the extra operational cost of fishing pollock with trawl gear that includes a salmon excluder device.

A rational pollock harvester will not knowingly take a Chinook salmon as bycatch when the expected marginal value of avoiding that salmon exceeds the marginal cost of avoiding it.

For all incentive-based bycatch avoidance programs, prompt (ideally, "real time") collection and dissemination of bycatch information will be extremely important to assist the fleet avoid Chinook bycatch. The Chinook bycatch rates now disseminated under the RHC program are valuable to the fleet and should be continued. It would be useful to have this information released to the fleet on a more frequent basis.[8]

IV. Transferable Bycatch Allowance Allocated To Vessels

Description of the Proposal

The Council's PPA creates a hard cap on the total number of Chinook salmon that can be taken in the pollock fishery. This hard cap is, by itself, a command-and-control regulation. Once the hard cap is reached, the pollock fishery will close. A simple hard cap, however, provides a very weak incentive to conserve bycatch because each individual vessel bears the entire cost of avoiding a Chinook salmon, while the benefit of its efforts will be spread among the entire fleet. A simple hard cap alone, therefore, will result in a "race-to-use-bycatch" which produces the same problems as the "race-to-fish" resulting from an open access fishery.

The second element of this paper's bycatch avoidance proposal is that the Chinook bycatch allowed under the hard cap be allocated through each pollock cooperative to individual pollock harvesting vessels based on those vessels' allocation of pollock under the AFA. In the case of the catcher/processor sector, the hard cap is allocated to each company in proportion to its pollock allocation under the Pollock Conservation Cooperative (PCC) agreement, and is assigned as appropriate to each vessel. To provide efficient incentives, bycatch allocations are transferable. For purposes of this paper, this allocation is referred to as Transferable Bycatch Allowance (TBA).

Brief Analysis of the TBA Program

Because TBA will be assigned to individual vessels, these vessels will obviously have a greater incentive to avoid Chinook salmon. Both the cost and the benefit of avoiding Chinook salmon bycatch will accrue to the individual vessel. The TBA induces an explicit marginal value on not catching Chinook salmon as it allows the vessel holding TBA to harvest its allocation of pollock and creates a privilege to take Chinook that can be sold to other vessels that may require additional bycatch.

TBA available after the pollock TAC is fully harvested, however, is valueless. TBA has value to vessels that avoid Chinook bycatch only if there is some chance of the industry-wide hard cap being reached. The value of TBA, at any given moment, equals the value of TBA if the hard cap reached is multiplied by the probability that the hard cap is indeed reached. If the probability of the industry-wide hard cap being reached is expected to be near zero, the marginal value of avoiding a Chinook salmon imposed by the hard cap is also near zero. The ability of TBA to induce marginal value therefore vanishes at chronically low bycatch rates where even at the start of a fishing season harvesters expect a very low probability of reaching the hard cap.

If Chinook salmon are in low abundance such that bycatch rates are extremely low, TBA from a hard cap of even 47,591 will not create large incentives for the pollock fleet to avoid bycatch. For example, if the hard cap were 50,000 Chinook and the TAC of pollock was 1,000,000 metric tons with a lease value of $300 per metric ton, and everyone believed that the TAC of pollock could not be harvested under the hard cap, then all of the $300,000,000 value of the pollock quota would accrue to holders of TBA. Each of the 50,000 Chinook TBA would then be worth $6,000. If there were only one percent chance that the TAC could not be taken under the hard cap, however, the value of each TBA would be one percent of $6,000, or just $60.

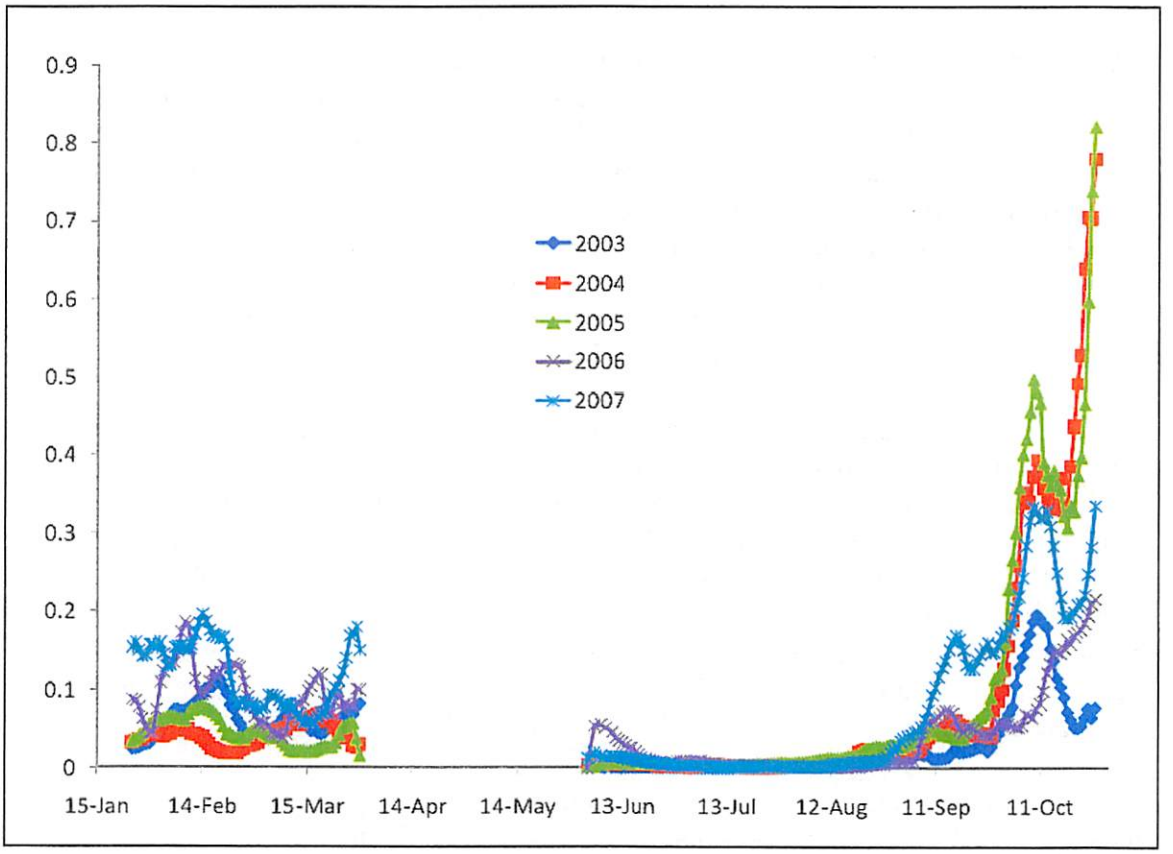
Yet it is precisely during periods of low Chinook abundance that Chinook protection is most urgent. The only way for TBA to securely protect Chinook during periods of extremely low abundance is if the hard cap is set at levels appropriate for low abundance years (for example, 15,000 salmon). Any cap designed to protect Chinook in very low abundance years, however, will necessarily impose enormous costs on the pollock industry in the form of forgone pollock harvest when Chinook are more abundant.

Another characteristic of TBA is that it is inherently self-limiting. To the extent TBA reduces bycatch rates, it also reduces the probability that the overall hard cap will be reached and thereby reduces the marginal value of avoiding bycatch.

The larger the hard cap, the less the marginal value created by TBA because for TBA to induce a marginal value, the pollock industry must have some expectancy of reaching the hard cap. It is likely that a hard cap of 47,591 will be reached in some years. Even in the year 2007, however, when bycatch in the pollock fishery was a record high 120,848 Chinook salmon, it may have been possible to stay under the 68,392 hard cap.

For example, SeaState estimates that had the now fixed closed area been in place during the 2007 "A" season, about 13,400 fewer Chinook salmon would have been taken.[9] During the "B" season, the Chinook salmon bycatch rate spikes dramatically after September 15th.

Figure 5. Chinook bycatch rates per metric ton of pollock, 2003 through 2007.



In 2007 there were 37,592 Chinook salmon taken as bycatch in the pollock fishery after September 15th. Given that the pollock industry would have been aware of the likelihood of approaching a 68,392 hard cap, the fleet would have taken extreme measures to harvest all of its pollock from June to early September, when Chinook bycatch can be

extremely low. If just the estimated savings from the newly closed area in the "A" season and "B" season bycatch after September 15th is subtracted, the Chinook bycatch in 2007 would have been reduced by about 51,000 salmon. Given these assumptions, the 68,392 Chinook hard cap would still have been exceeded by about 1,400 salmon. But it appears that even in 2007, a year that was far-and-away the worst bycatch year on record (the bycatch of Chinook salmon in 2007 was 149% of the *second* highest Chinook bycatch year on record[10]), it may have been possible for the industry to be under the 68,392 hard cap. The marginal value induced by TBA from a hard cap of 68,392, therefore, would be relatively small in most years.

It will be easier in the future, furthermore, for the pollock fleet to concentrate more of its fishing effort in June and July because the Pacific whiting fishery will soon be rationalized. There are a large number of pollock catcher vessels and catcher/processor vessels that also participate in the whiting fishery. Currently there is a "race-for-bycatch" caused by very low rockfish hard caps, which are not allocated among the catcher/processor, mothership and inshore sectors. As a result, the harvesting of Pacific whiting currently occurs predominantly in the spring and summer months (ironically, when rockfish bycatch is highest and product recovery from the whiting fishery relatively low). With rockfish bycatch allocated by sector and the whiting fishery rationalized, it will be possible for the pollock fleet, which also fishes whiting, to concentrate its whiting effort in the fall — when whiting is most valuable and rockfish bycatch nonexistent — and fish pollock during the summer, when Chinook salmon bycatch is minimal.

Bycatch Avoidance cost as a function of bycatch rates

It appears that the differences in bycatch rates between different areas are proportionally constant across time and distance. In other words, when the bycatch rate is fifty percent of the normal bycatch rate, it is about fifty percent at both the "hot spot" and a clean fishing area. Therefore, we should expect the marginal cost of avoidance to be proportional to the inverse of the bycatch rate. So if the bycatch rate falls in half, the marginal cost of avoiding Chinook salmon doubles. As Chinook become scarce, the cost of avoiding them rises hyperbolically. Examples 1 through 5 in section seven illustrate this point.

This has important implications. The biological value of a Chinook salmon is higher during seasons of low abundance. It will be shown later in this paper that incentives induced by TBA diminish as bycatch rates fall. If the marginal cost of avoidance rises hyperbolically as bycatch rates fall, any incentive system that is intended to complement the induced incentives inherent in a TBA program, will be either targeted at low bycatch rate conditions, extremely expensive, or ineffective. A simple fee of $500 per Chinook salmon taken as bycatch, for example, would be extremely expensive for the pollock industry, but would not create a large enough incentive to induce significant behavioral changes by the pollock fleet when Chinook stocks are at low abundance levels.

V. Explicit Economic Incentive Program for Each Participant to Avoid Chinook Salmon in All Years — ("The Game")

Description of the Proposal

The Council's motion states that incentive measures "*must include rewards for salmon bycatch avoidance and/or penalties for failure to avoid salmon bycatch* at the vessel level." The explicit incentive-based program, which is called "the Game"[11] in this paper, is designed specifically to provide financial rewards to those vessels that have low Chinook salmon bycatch relative to other vessels in the pollock fleet, while penalizing those vessels with high bycatch.[12]

Under the Game, each pollock-harvesting vessel has a deficit on its gross stock balance sheet of a certain amount of money per pound for each pound of pollock harvested. For purposes of this paper, we have used a penny per pound of pollock as the "ante" so that the vessel starts the season with the knowledge that one cent will be deducted from the vessel's gross stock per pound of pollock harvested.

At one penny per pound of pollock and a pollock TAC of a million metric tons, the inshore sector will develop a "Fund" just short of $10,000,000 to reward clean fishing practices. The catcher/processor sector will have a fund of about $8,000,000 and the mothership sector will generate a fund of about $2,000,000. That is collectively almost $20,000,000 available to influence fishing behavior.

The Game works as follows: A vessel's bycatch rate is defined as the number of Chinook salmon caught per metric ton of pollock. The vessel with the highest bycatch rate receives nothing from the Fund. Vessels with a bycatch below the highest rate receive money back from the Fund based on the following formula: A vessel's bycatch rate is subtracted from the vessel with the highest bycatch rate to determine the "Chinook Undercatch Rate." The "Undercatch Rate" for each vessel is then multiplied by that vessel's harvest of pollock to determine the actual number of undercaught Chinook relative to the vessel with the worst bycatch rate. The percent of Chinook salmon not caught per metric ton of pollock is then calculated for each vessel relative to the total number of undercaught Chinook salmon in that sector. The percent of Chinook salmon not caught by a vessel is then multiplied by the total amount in the Fund to determine the rebate that vessel will receive.

The Game must be sector-specific, as each sector has inherently different bycatch rates. This Game is not connected with TBA that each vessel might receive, nor with 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.

Figure six, below, is a simple model of the Game as played in a fishery with five vessels at average Chinook salmon abundance levels.

Figure 6. Hypothetical model of the Game with five vessels at average bycatch levels.

Vessel/ Player	Tons of pollock harvested	Money put in to the Game	Number of Chinook Caught	Chinook bycatch rate (# per ton of pollock)	Chinook Undercatch rate	Number of Undercaught Chinook relative to Worst Player "Dirty Harry"	Game Payout
Harry	1,000	$22,000	100	0.1	0	0	0
Ana	1,000	$22,000	50	0.05	0.05	50	$19,411.76
Buddy	1,000	$22,000	40	0.04	0.06	60	$23,294.12
Chris	1,000	$22,000	30	0.03	0.07	70	$27,176.47
Julia	2,000	$44,000	40	0.02	0.08	160	$62,117.65
Total	6,000	$132,000	260	0.043		340	$132,000.00

At the end of each fishing season, the money is refunded based on the proportion of undercaught salmon credited to a particular vessel. For example, Julia earns 160 ÷ 340 x 132,000 = $62,117.65. In the table above, Harry has the highest bycatch rate at the end of the fishing season. He is the "Dirty Harry" because he has the highest ratio of Chinook bycatch to pollock harvested. The marginal value of each salmon harvested in this example is $388. Figure seven, below, shows the same fleet with *low* Chinook salmon abundance levels.

Figure 7. Hypothetical model of the Game with five vessels at low bycatch levels.

Vessel/ Player	Tons of pollock harvested	Money put in to the Game	Number of Chinook Caught	Chinook bycatch rate (# per ton of pollock)	Chinook Undercatch rate	Number of Undercaught Chinook relative to Worst Player "Dirty Harry"	Game Payout
Harry	1,000	$22,000	10	0.01	0	0	0
Ana	1,000	$22,000	5	0.005	0.005	5	$19,411.76
Buddy	1,000	$22,000	4	0.004	0.006	6	$23,294.12
Chris	1,000	$22,000	3	0.003	0.007	7	$27,176.47
Julia	2,000	$44,000	4	0.002	0.008	16	$62,117.65
Total	6,000	$132,000	26	0.004		34	$132,000.00

In this model, the amount of Chinook bycatch drops and the reward for each Chinook that remains uncaught increases. The marginal value for vessels avoiding a Chinook in this example is $3,882.[13]

Brief Analysis of the Game

The Game transfers money from those who have high bycatch rates to those who have low bycatch rates within each sector. Except for inducing the pollock industry to incur cost to avoid Chinook bycatch, the Game itself has no net cost to the industry as a whole.

Using methods detailed in the mathematical appendices, the marginal value of each Chinook avoided has been calculated. The factors that determine the marginal value of each salmon include the amount of money in the Fund, the spread of the bycatch rates of

the vessels in each sector, and the number of vessels participating in the sector. The smaller the spread of bycatch rates, the larger the marginal value per Chinook.[14]

As salmon abundance decreases and bycatch rates fall, the marginal value of each Chinook salmon avoided increases in the Game. This is important for three reasons: As Chinook abundance decreases, reduction of bycatch is increasingly urgent to protect the reproductive capacity of the stock. As Chinook abundance decreases, the marginal value of TBA decreases, and may be near zero, so the Game creates a large marginal value for avoiding Chinook salmon when the impact of the hard cap is minimal. In addition, as salmon abundance decreases and bycatch rates fall, the marginal cost of avoiding each Chinook salmon increases. Consequently the marginal value of avoiding salmon must also increase if the financial incentives to avoid salmon are to be effective.

VI. The Marginal Value of Avoiding Chinook Induced by TBA and the Game

The marginal values induced by TBA and the Game were estimated using the mathematical model described in Appendices A through D. (Those wanting a copy of the model can email Joe Plesha at joeplesha@tridentseafoods.com.) Using the historical bycatch rates, we estimated the expected probability that any given bycatch hard cap would be reached. Using this model it is possible to calculate the expected marginal value of avoiding Chinook bycatch caused by TBA from a hard cap of 47,591, and the combination of TBA from a cap of 68,392 and the Game. The model assumes there is 100% rollover of TBA between the "A" and "B" seasons. The model also assumes that TBA is transferable between sectors; therefore the value of TBA is calculated for the catcher/processors and the inshore catcher vessel sectors combined.

Figure 8. Marginal value of Chinook salmon at differing expected annual bycatch rates (ABR) with TBA from a hard cap of 47,591 and 68,392.

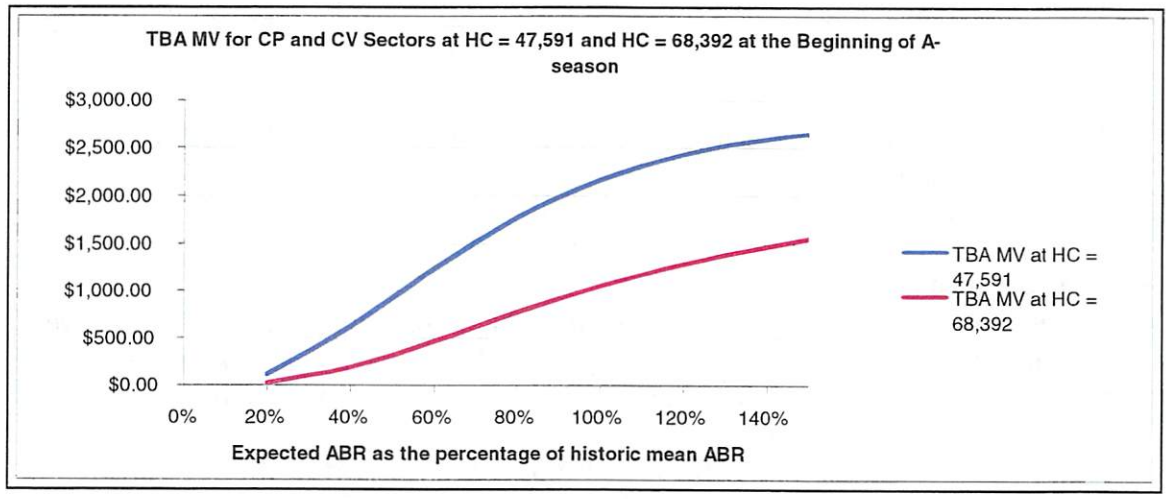
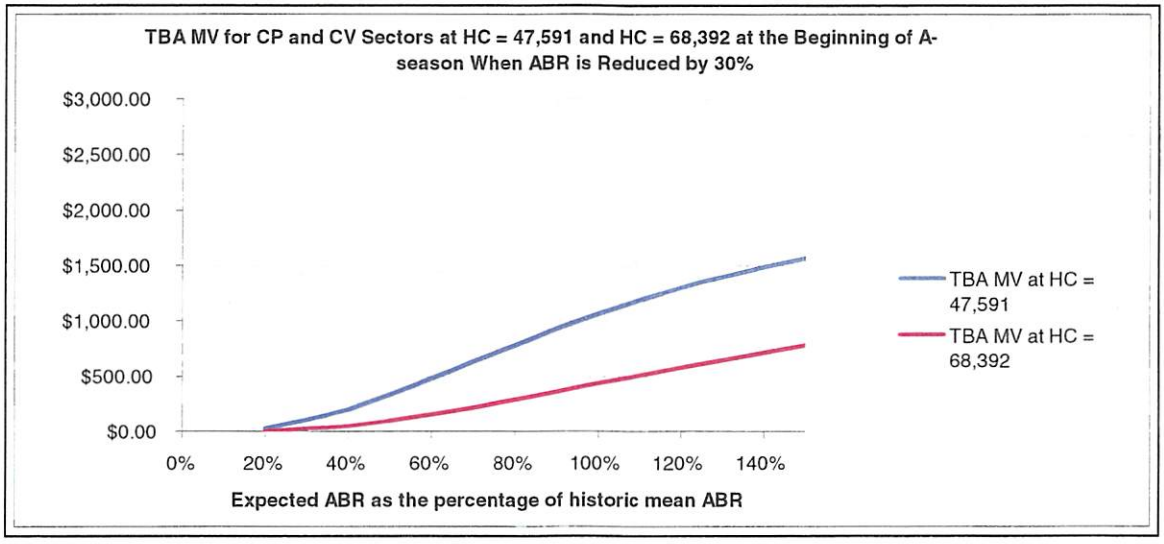


Figure eight shows marginal value of Chinook bycatch at various expected bycatch levels for the year. It is based on the historical bycatch rates from the past ten years. The marginal value of TBA falls as bycatch rates are reduced and the probability of the industry reaching the hard cap lessens. If the impact of industry's efforts to avoid salmon is a reduction in Chinook bycatch of thirty percent, then the marginal value of TBA is much less.

Figure 9. Marginal value of Chinook salmon at differing expected annual bycatch rates (ABR) with TBA from a hard cap of 47,591 and 68,392 with a thirty percent reduction in bycatch rates caused by the incentive-based bycatch avoidance program.

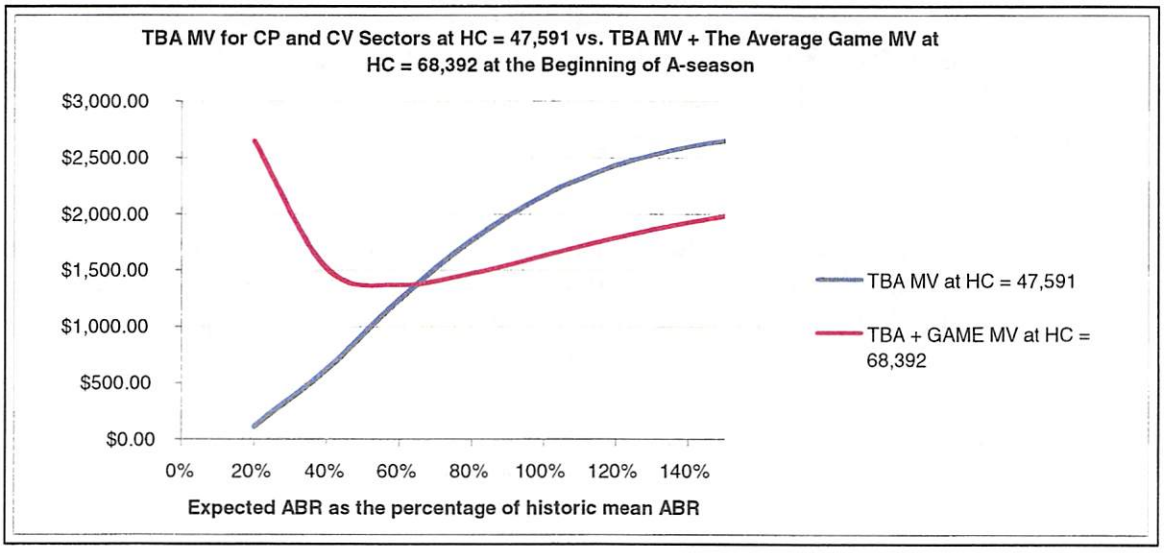


We assume there will be strong incentives to reduce bycatch resulting from the Council's actions. Figure nine shows that if the pollock industry starts the season expecting to reduce its overall bycatch rate by just thirty percent, the marginal value induced by TBA is relatively small, especially with a hard cap of 68,392.

Because the marginal *cost* of avoiding salmon will increase as Chinook abundance decreases, there will be little, if any, net economic incentive to avoid catching Chinook salmon with just TBA from a hard cap of 68,392 if Chinook abundance is low. Something more is needed. The Game complements TBA from a hard cap of 68,392 because together the Game and TBA induce significant marginal values for each Chinook avoided at all levels of salmon abundance, but especially during periods of low abundance when a hard cap alone is ineffective.

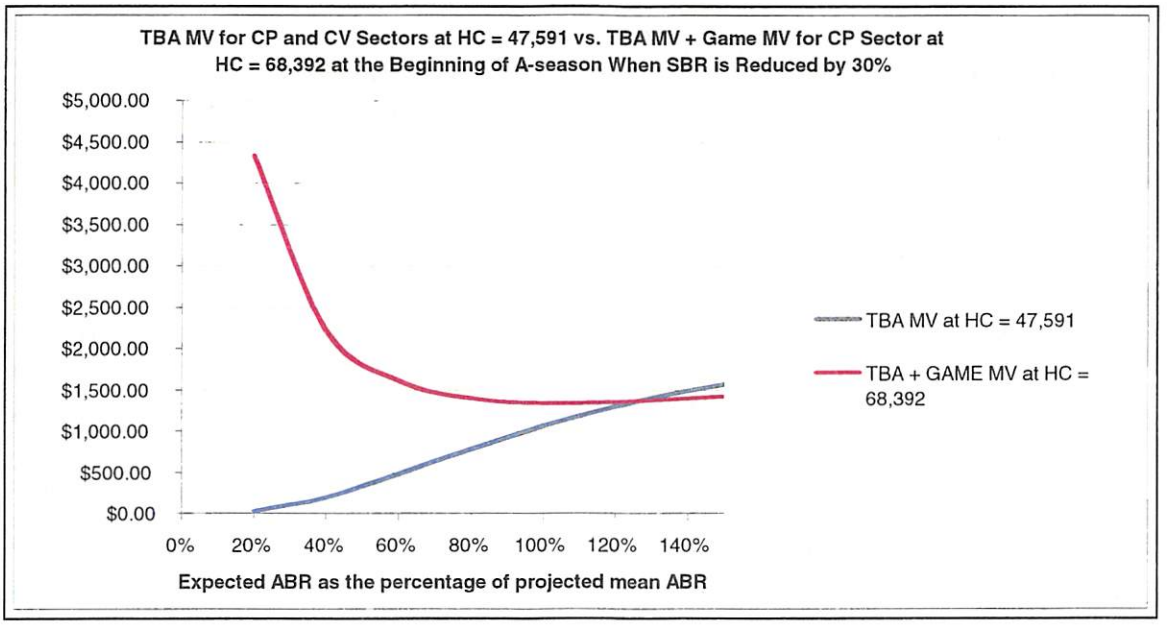
To illustrate this point, figure ten below, shows the marginal value of Chinook bycatch induced by a hard cap of 47,591 and a hard cap of 68,392 with the Game.

Figure 10. Marginal value of Chinook salmon at differing expected annual bycatch rates (ABR) with TBA from a hard cap of 47,591 and 68,392 and the Game.



If the pollock industry expects it will reduce its Chinook bycatch by thirty percent as a result of the incentives resulting from the these bycatch avoidance programs, the marginal value of TBA will decrease, but the marginal value of the Game will increase substantially.

Figure 11. Marginal value of Chinook salmon at differing annual bycatch rates (ABR) with TBA from a hard cap of 47,591, and 68,392 with the Game if the pollock industry expects a thirty percent reduction in bycatch rates caused by the incentive-based bycatch avoidance program.



Most participants in the pollock fishery believe Chinook bycatch will sharply decline with the imposition of hard caps and a meaningful incentive-based avoidance program. If the Chinook bycatch rates decline by just thirty percent, the marginal value of avoiding Chinook is modest even with a hard cap of 47,591 in comparison to the marginal value induced by the Game and a hard cap of 68,392.

Figure eleven clearly illustrates the advantages that a hard cap of 68,392 and the Game have in comparison to a hard cap of 47,591. For those seeking to protect Chinook salmon, a hard cap of 68,392 along with the Game is far preferable to a simple 47,591 hard cap. The Game and a 68,392 hard cap induces significant marginal values for avoiding salmon during all years and at all levels of salmon abundance, especially when Chinook salmon are in low abundance and protection is most needed and avoiding Chinook salmon most costly.

That is the intention of the Council's PPA. If the pollock industry can develop an incentive-based program that induces behavior to protect salmon better than the hard cap of 47,591, the Council may allow the more liberal hard cap of 68,392. The program outlined in this paper strives to achieve the Council's goal.

VII. Incentives TBA and the Game Will Have on the Pollock Fleet's Efforts to Avoid Chinook Bycatch

Incentive for a Vessel to Move to Areas of Lower Chinook Bycatch. A substantial marginal value for each Chinook avoided will create incentives for the pollock fleet to move its fishing location to areas of lower bycatch. The examples below provide information on the distances that a vessel will travel to avoid Chinook under the Council's Preferred Preliminary Alternative.

Example 1. The beginning of the season, Catcher/processor under TBA from a 47,591 hard cap with the industry having bycatch at its historically average rate:
Assume that a catcher/processor is fishing in an area of moderately high bycatch rate (Area A) and there is an area of moderately low bycatch (Area B) a distance away. The vessel expects pollock to be available in Area A for an additional twenty-four hours. The vessel also expects pollock to be available in Area B for twenty-four hours after the vessel's arrival. The vessel expects to catch twenty metric tons of pollock per hour at either location. The catcher/processor's cruising speed is ten nautical miles per hour. The total daily cost of traveling is about $54,000 or $2,250 per hour. The cost of traveling one mile is therefore $225.

Assume that the seasonal bycatch rate for the catcher/processor sector is 0.03 Chinook per metric ton of pollock (which is the historical bycatch rate observed for the sector over the last ten years). For simplicity of this example, it is also assumed the vessel's processing rate is in excess of twenty metric tons of pollock per hour so that the catcher/processor is unable to gain any advantage by processing during transit.

Area A's Chinook bycatch rate is 150% of the 0.03 average, or 0.045 Chinook per metric ton of pollock. Area B's Chinook bycatch rate is 50% of the 0.03 average, or 0.015 Chinook per metric ton of pollock.

How far will the vessel move to reduce its bycatch of Chinook?

The catcher/processor catches 21.6 Chinook per day while in Area A.
(20 MT per hour x 0.045 x 24 hours = 21.6 Chinook per day.)

The catcher/processor catches 7.2 Chinook per day while in Area B.
(20 MT per hour x 0.015 x 24 hours = 7.2 Chinook per day.)

The marginal value induced by TBA under the model in a year of historically average bycatch rates would be $2,164.25 per Chinook salmon, with a 40,643 Chinook hard cap for the catcher/processor and catcher vessel sectors combined. We assume that the two sectors can freely trade their bycatch allowances. A rational harvester will move if the marginal value of avoiding Chinook is greater than the marginal cost. By moving from Area A to Area B, the catcher/ processor will save 14.4 Chinook per day (21.6 – 7.2 =

14.4) which is worth $31,165.2 (14.4 x $2,164.25 = $31,165.20). The catcher/processor in our example will move a maximum of 138.5 nautical miles to Area B (31,165.20 ÷ 225 = 138.5) to avoid 14.4 Chinook salmon.

Example 2. Catcher/processor under TBA from a 47,591 hard cap with the industry having bycatch *below* its historically average rate at the beginning of the season:
Now assume a standard bycatch rate is reduced by 30% of the historical average of 0.03 Chinook per metric ton of Pollock due to industry efforts to avoid Chinook, or 0.021 Chinook per metric ton of pollock (0.7 x 0.03 = 0.021). Area A's Chinook bycatch rate is 150% of the 0.021 average, or 0.0315 Chinook per metric ton of pollock. Area B's Chinook bycatch rate is 50% of the 0.021 average, or 0.0105 Chinook per metric ton of pollock.

How far will the vessel move to reduce its bycatch of Chinook?

The catcher/processor catches 15.12 Chinook per day while in Area A.
(20 MT per hour x 0.0315 x 24 hours = 15.12 Chinook per day.)

The catcher/processor catches 5.04 Chinook per day while in Area B.
(20 MT per hour x 0.0105 x 24 hours = 5.04 Chinook per day.)

The marginal value of TBA under the model in a year of bycatch rates that are 30% of the historical average would be only $1,062.54 per Chinook salmon, with a 40,643 Chinook hard cap for the catcher/processor and catcher vessel sectors combined. By moving from Area A to Area B, the catcher/processor will save 10.08 Chinook per day (15.12 – 5.04 = 10.08) which is worth $10,710.40 (10.08 x $1,062.54 = $10,710.40). The catcher/processor in this example will move a maximum of 47.6 nautical miles to Area B (10,710.40 ÷ 225 = 47.6) to avoid 10.08 Chinook salmon.

Example 3. Catcher/processor under the Game and TBA from a 68,392 hard cap with the industry having bycatch *below* its historically average rate:
Now assume that the average bycatch rate is reduced by 30% of its historical average, but the catcher/processor is operating under TBA from a hard cap of 68,392 and the Game. By moving from Area A to Area B, the catcher/processor will still save 10.08 Chinook per day as in the previous example. The marginal value induced by TBA, however, is only $434.42. The marginal value induced by the Game is $904.12. The combined marginal value of TBA and the Game is $1,338.54. The 10.08 Chinook salmon saved by moving to Area B would be worth $13,492.48 (10.08 x $1,338.54 = $13,492.48). The catcher processor in this example will move 60 nautical miles ($13,492.48 ÷ 225 = 60) to avoid 10.08 Chinook salmon.

Example 4. Catcher/processor under TBA from a 47,591 hard cap with the industry having bycatch *below* its historically average rate:
Now assume a particular year's average bycatch rate is 60% below the projected average bycatch rate, caused by natural conditions, after the industry's efforts have already taken place as shown in example 3. The catcher/processor is operating under TBA from a hard cap of 47,591 and the Game.

Area A's Chinook bycatch rate is 150% of 0.0084 (0.0084 = 0.021 x 0.4), or 0.0126 Chinook per metric ton of pollock. Area B's Chinook bycatch rate is 50% of 0.0084, or 0.0042 Chinook per metric ton of pollock.

How far will the vessel move to reduce its bycatch of Chinook?

The catcher/processor catches 6.05 Chinook per day while in Area A.
(20 MT per hour x 0.0126 x 24 hours = 6.05 Chinook per day.)

The catcher/processor catches 2.02 Chinook per day while in Area B.
(20 MT per hour x 0.0042 x 24 hours = 2.02 Chinook per day.)

By moving from Area A to Area B, the catcher/processor will save 4.03 Chinook per day (6.05 – 2.02 = 4.03). The marginal value induced by TBA is only $196.62. The 4.03 Chinook salmon saved by moving to Area B would be worth $792.38 (4.03 x $196.62 = $792.38). The catcher processor in this example will move 3.5 nautical miles ($792.38 ÷ 225 = 3.5) to avoid 4.03 Chinook salmon.

Example 5. Catcher/processor under the Game and TBA from a 68,392 hard cap with the industry having bycatch *below* its historically average rate:
Now assume a particular year's average bycatch rate is 60% below the projected average bycatch rate, caused by natural conditions, after the industry's efforts have already taken place as shown in example 3. The catcher/processor is operating under TBA from a hard cap of 68,392 and the Game.

Area A's Chinook bycatch rate is 150% of 0.0084 (0.0084 = 0.021 x 0.4), or 0.0126 Chinook per metric ton of pollock. Area B's Chinook bycatch rate is 50% of 0.0084, or 0.0042 Chinook per metric ton of pollock.

How far will the vessel move to reduce its bycatch of Chinook?

The catcher/processor catches 6.05 Chinook per day while in Area A.
(20 MT per hour x 0.0126 x 24 hours = 6.05 Chinook per day.)

The catcher/processor catches 2.02 Chinook per day while in Area B.
(20 MT per hour x 0.0042 x 24 hours = 2.02 Chinook per day.)

By moving from Area A to Area B, the catcher/processor will save 4.03 Chinook per day (6.05 – 2.02 = 4.03). The marginal value induced by TBA is only $51.08. The marginal value induced by the Game is $2,169.77. The combined marginal value of TBA and the Game is $2,220.85. The 4.03 Chinook salmon saved by moving to Area B would be worth $4,486.12 (4.03 x $2,220.85 = $8,950.03). The catcher processor in this example will move 39.8 nautical miles ($8,950.03 ÷ 225 = 39.8) to avoid 4.03 Chinook salmon.

Table 1. Distance a catcher/processor will travel to avoid a particular number of Chinook salmon under Examples 1 through 5.

Bycatch Rate (Chinook/ MT of pollock)	Hard Cap (Number of Chinook)	MV of TBA ($/Chinook Avoided)	MV of the Game ($/Chinook Avoided)	Total MV	Bycatch Reduced by Industry Effort	Chinook Abundance	Maximum Distance Traveled to Avoide Chinook (Miles)
0.03	47,591	$2,164.25	N/A	$2,164.2	0	100% (Normal)	**138.5**
0.021	47,591	$1,062.54	N/A	$1,062.5	-30%	100% (Normal)	**47.6**
0.021	68,392	$434.42	$904.12	$1,338.5	-30%	100% (Normal)	**60**
.0084	47,591	$196.62	N/A	$196.62	-30%	40% (Low)	**3.5**
.0084	68,392	$51.08	$2,169.7	$2,220.8	-30%	40% (Low)	**39.8**

The squares in Figure 3 are approximately six miles on each side. It is clear from Figure 3 that moving forty miles can take a vessel from an area of very high Chinook salmon bycatch rates to areas of much lower bycatch rates. The decision to move will not only be motivated by bycatch conditions at that time. Bycatch rates over a shorter period of time will show even more variability than the twelve year averages that are shown in Figure 3.

Incentive for a Vessel to Change Its Time of Fishing From October to June.
Chinook bycatch is far greater after September 15th. The examples below analyze whether the pollock industry will move its production from the fall to summer under the proposed hard caps.

Example 6. Fishing at a different time when HC=47,591
Fishing during early October yields recovery of 0.316 pounds of edible product per pound of fish, with a value, at current prices, of $1,111.86 per metric ton. Fishing during the second week of June yields 0.3034 pounds of edible product per pound of fish, with a value of $980.34 per metric ton. This means that for every metric ton of pollock harvested in June rather than in October, the value of the finished products is $131.52

less than if the fish had been harvested in October. If a catcher vessel shifts one trip catching 500 metric tons of pollock from October to June, there is a loss of $65,760.

Consider the situation of a processor-owned catcher vessel where all the economic consequences of fishing timing decisions are reflected in its decisions. If for June, the average bycatch rate for the catcher vessel sector is 0.01 Chinook per metric ton of pollock, and for October the bycatch rate is 0.2 Chinook metric ton of pollock (see Figure 5), the number of Chinook expected to be caught in one trip of June fishing is 0.01 x 500 = 5 Chinook; and in one trip in October fishing is 0.2 x 500 = 100 Chinook. The number of Chinook saved by shifting one trip from October to June is 95 salmon. The loss of revenue as a result of this change and the reduced Pollock recovery that results from this change is $65,760. The marginal cost of avoidance is equal to $692.21 (65,760 ÷ 95 = $692.21).

The marginal value of TBA at the end of "A" season in an average year with the overall hard cap of 47,591 Chinook is expected to be $2,197.16. Therefore, a rational fisherman would be incentivized to shift one trip from October to June.

At the expected annual bycatch rate of 60% of the average, however, TBA would be worth only $178. In this case of a low Chinook abundance, the average bycatch rate for June for the catcher vessel sector would be 0.01 x 0.6 = 0.006 Chinook per metric ton of pollock and for October would be 0.2 x 0.6 = 0.12 Chinook per metric ton of pollock. The number of Chinook expected to be caught in one trip of June fishing is 0.006 x 500 = 3 Chinook and in one trip in October fishing is 0.12 x 500 = 60 Chinook. The number of Chinook saved by shifting one trip from October to June is 57 Chinook. The marginal cost of avoidance is equal to $1,153.68 (65,760 ÷ 57 = $1,153.68). We can see that in a year of a low Chinook abundance, with TBA from a hard cap of 47,591 Chinook, it would be profitable to move fishing effort from the low bycatch in June to the high bycatch in October.

Example 7. Fishing at the different time when HC=68,392 with the Game in place: Fishing during early October yields recovery of 0.316 pounds of edible product per pound of fish, with a value, at current prices, of $1,111.86 per metric ton. Fishing during the second week of June yields 0.3034 pounds of edible product per pound of fish, with a value of $980.34 per metric ton. This means that for every metric ton of pollock harvested in June rather than in October, the value of the finished products is $131.52 less than if the fish had been harvested in October. If a catcher vessel shifts one trip catching 500 metric tons of pollock from September to June, there is a loss of $65,760.

Consider again the situation of a processor-owned catcher vessel where all the economic consequences of fishing timing decisions are reflected in its decisions. If for June, the average bycatch rate for the catcher vessel sector is 0.01 Chinook per metric ton of pollock, and for October is 0.2 Chinook per metric ton of pollock. (see Figure 5), the number of Chinook expected to be caught in one trip of June fishing is 0.01 x 500 = 5 Chinook and in one trip in October fishing is 0.2 x 500 = 100 Chinook. The number of Chinook saved by shifting one trip from October to June is 95 Chinook. The loss of

revenue as a result of this change and the reduced pollock recovery that results from this change is $65,760. The marginal cost of avoidance is equal to $692.21 (65,760 ÷ 95). The marginal value of TBA at the end of "A" season in an average year with the overall hard cap of 68,392 Chinook is expected to be $315. The marginal value of the Game at the end of "A" season in an average year with the overall hard cap of 68,392 Chinook is expected to be $871, so the total marginal value of avoiding a Chinook is expected to be $1,186. Therefore, a rational harvester would still be incentivized to shift one trip from October to June.

In fact, at the expected annual bycatch rate of 60% of the average, TBA would be worth only $178. In this case of low Chinook abundance, the average bycatch rate for June for the catcher vessel sector would be 0.01 x 0.6 = 0.006 Chinook per of pollock and for October would be 0.2 x 0.6 = 0.12 Chinook per metric ton of pollock. The number of Chinook expected to be caught in one trip of June fishing is 0.006 x 500 = 3 Chinook. In one trip in October fishing the number of Chinook expected to caught is 0.12 x 500 = 60. The number of Chinook saved by shifting one trip from October to June is 57 Chinook. The marginal cost of avoidance is equal to $1,153.68 (65,760 ÷ 57 = $1,153.68). Because the marginal value is still greater than the marginal cost, even in a year of a low Chinook abundance, having TBA and the Game in place at the hard cap of 68,392, would make it profitable to move fishing effort from October to June.

Incentive for a Vessel to Use an Excluder Device with its Trawl Gear. The pollock industry is working to develop an effective salmon excluder device to use with pollock trawl gear. This excluder device is being designed to allow a significant percentage of Chinook salmon to escape from being caught in the trawl net's cod end.

Tests of salmon excluder devices suggest that when properly operated they can reduce the bycatch of Chinook by twenty percent. Some pollock that would otherwise be caught in the trawl net also escapes are a result of the Salmon excluded device. Early tests show about five percent of the pollock that would otherwise be harvested escapes as a result of operating salmon excluder gear. The operation of a salmon excluder requires skill on the part of the captain. Simply ordering the salmon excluder be on the vessel would probably not result in a significant reduction of salmon bycatch.

The cost to purchase a salmon excluder is only about $6,000. Although salmon excluders reduce Chinook bycatch by twenty percent, they result in increased fishing costs. Pollock vessels will therefore not likely use an excluder without incentives.

Example 8. Catcher/processor during the "A" season:
If the catch rate of a catcher/processor, as limited by its processing capacity, is about twenty metric tons per hour, the vessel will harvest 400 metric tons of pollock in a twenty-hour period. Using a salmon excluder device, however, the catcher/processor will now take twenty-one hours to harvest the same 400 metric tons.

Assume the average bycatch rate during the "A" season is .05 Chinook per metric ton of pollock. At that rate, the catcher/processor would expect to have twenty Chinook salmon as bycatch in its harvest of its 400 metric tons of pollock. (400 x .05 = 20) Using the excluder will reduce the vessel's bycatch by twenty percent and therefore reduce the bycatch from twenty to sixteen salmon (20 x .20 = 16), thus saving four Chinook salmon.

Using the excluder would require the catcher/processor to fish one additional hour in order to harvest the same amount of pollock as it would without the device. The cost of the catcher/processor fishing is about $2,500 per hour. The marginal cost of using the salmon excluder is $625. ($2,500 divided by the four salmon avoided.) The marginal values induced by the Game and TBA from a hard cap of 68,392 would provide the incentive necessary to cause this catcher/processor to use and properly operate a salmon excluder device during the "A" season. Just TBA from a hard cap of 47,591, however, would not create marginal values required to induce the vessel to use a salmon excluder during the "A" season in periods of even moderately low Chinook abundance.

Example 9. Catcher/processor during the "B" season:
During the summer months of the pollock "B" season, salmon bycatch rates are extremely low, perhaps ten percent of the "A" season rates. If we assume that the Chinook bycatch rate while fishing pollock in July is .005, the catcher/processor in the above example will take only two salmon as bycatch in its harvest of 400 metric tons of pollock without using an excluder (400 x .005 = 2). Using the excluder will reduce the vessel's expected bycatch of Chinook to 1.6 salmon (2 x .20 = .16), thus reducing its bycatch by .4 Chinook salmon; however, the cost of using the excluder device will still be $2,500 for the extra hour it takes to harvest 400 metric tons of pollock. The expected marginal cost of using the excluder is therefore $6,250. ($2,500 divided by the .4 salmon avoided.) Under the typical conditions of fishing pollock in the early summer, therefore, it is unlikely that the pollock fleet will effectively use a salmon excluder because the marginal cost of using the device significantly exceeds the marginal value of the salmon that would be avoided.[15]

Example 10. Catcher vessel delivering onshore during the "A" season:
A catcher vessel delivering onshore has different financial considerations to make. A catcher boat's fishing during "A" season is not limited by the vessel's processing capacity and a catcher vessel's harvest rate can exceed twenty metric tons per hour. Twenty metric tons per hour is a general approximation, however, of the average hourly production during "A" season for a catcher vessel. The catcher vessel would then take 400 metric tons of pollock in twenty hours, assuming it had the hold capacity.

Assuming the "A" season Chinook bycatch rate is of .05, the catcher vessel would expect to have twenty Chinook salmon as bycatch in its harvest of its 400 metric tons of pollock (400 x .05 = 20). Using the excluder would reduce the vessel's bycatch by twenty percent and therefore reduce the bycatch from twenty to sixteen salmon (20 x .20 = 16), thus saving four Chinook salmon.

The cost of pollock fishing for a catcher vessel is about $600 per hour. Using the excluder would require the vessel to fish for an additional hour to harvest the same amount of pollock it would take without the excluder device. The marginal cost of using the salmon excluder would be $150. ($600 divided by the four salmon avoided.) There would be an economic incentive for the catcher vessel to use the excluder device during the "A" season with a hard cap of 68,392 together with the Game, and with just a hard cap of 47,591 (except under conditions of very low Chinook abundance).

Example 11. Catcher vessel during the "B" season:
During the summer of the "B" season harvest rates can fall to approximately ten to fifteen metric tons per hour. Assume the vessel is harvesting ten metric tons an hour for twenty hours, for purposes of this example. If the bycatch drops to .005 Chinook salmon per metric ton during the summer of the "B" season, the catcher vessel would expect to have only 1 Chinook salmon as bycatch in its harvest of 200 metric tons of pollock (200 x .005 = 1). Using the excluder would reduce the vessel's bycatch by twenty percent and therefore reduce the expected bycatch from 1 by .8 salmon (1 x .20 = .8), thus saving .2 Chinook salmon.

The cost of pollock fishing for a catcher vessel is still about $600 per hour. Using the excluder would require the vessel to fish for an additional hour to harvest the same amount of pollock it would take in twenty hours without the excluder device. The marginal cost of using the salmon excluder would now be $3,000 ($600 divided by the .2 salmon expected to be avoided). Both TBA from a hard cap of 68,392 with the Game, and TBA from a hard cap of 47,591 would be unlikely to create a marginal value greater than $3,000.

VIII. Issues Raised by the Department of Commerce to the Council's Motion

The "Opt Out" Fishery
The Council's motion provides that if an incentive-based program[16] is developed by the industry that "provides explicit incentives for each participant to avoid salmon bycatch in all years" then the Council may establish a hard cap of 68,392. Those pollock harvesters that do not participate in the incentive-based program (i.e., "opt out") will fish against a backstop cap of 32,482 Chinook salmon. Once a total of 32,482 Chinook salmon is taken as bycatch in the pollock fishery, any pollock vessel in the "opt out" fishery must stop fishing.

In an August 18, 2008, letter to the North Pacific Council, the Department of Commerce noted that the "opt out" fishery could potentially allow the 68,392 hard cap to be exceeded because the Chinook salmon in the 32,482 "opt out" category would not be deducted from the 68,392 hard cap.[17] If vessels fishing under the incentive-based program have Chinook bycatch approaching the 68,392 hard cap, total bycatch could exceed the hard cap because vessels fishing in the "opt out" fishery would also have

some level of Chinook bycatch. For example, if the vessels in the incentive-based program had a total bycatch of 55,000 Chinook and the vessels in the "opt out" fishery had a bycatch of 15,000 Chinook, the total bycatch would be 70,000 and thus exceed the 68,392 hard cap.

The letter from Commerce also provides an option to eliminate the possibility of exceeding the hard cap. The "opt out" fishery could be allocated a portion of the 32,482 cap based on the opting out participants' respective pollock catch histories. Chinook salmon from vessels that opted out would be subtracted from the 68,392 hard cap. This would result in two separate bycatch limits: one cap for those who participate in an incentive-based program who receive a portion of the 68,352 hard cap; another for those who opt out of the incentive-based program who have allocated to the "opt out" fishery their percentage of the pollock catch history multiplied by their sector's Chinook bycatch allocation and the 32,482 "opt out" cap.

The alternative of separately managing the hard cap of 68,393 and the "opt out" cap of 32,482 is not in the Council's motion, nor currently in the analysis being undertaken as part of the Environmental Impact Statement (EIS). It is a reasonable alternative that meets the intent of the Council's motion by assuring that the 68,352 hard cap is not exceeded, regardless of the number of participants who "opt out" of any incentive-based bycatch avoidance program. This alternative does not require a Supplemental EIS because the proposal does not contain additional changes in the environment that are not already being analyzed. As a result of the Council's PPA, the 68,392 hard cap is already being fully analyzed in the EIS as a cap that is not intended to be exceed by the pollock fleet. The EIS will examine the 68,392 hard cap's impact on Chinook salmon, pollock and other species of fish, as well as those reliant upon those resources. The EIS also examines how the pollock fleet and other impacted parties will be affected by the 68,392 hard cap. In summary, this proposal does not create changes to the environment that are not already being analyzed in the EIS so it would not require a Supplemental EIS.

For the inshore and mothership harvesting vessels, it is easy to calculate the portion of the 32,482 Chinook that should be allocated to the "opt out" pool, based on the opting out participants' respective pollock catch histories as defined by the AFA. The AFA already allocates a percentage of the pollock TAC to each vessel in a cooperative based on that vessel's catch history. Assuming the inshore sector receives 65% of the total Chinook hard cap, for example, if an inshore catcher vessel with 2.5% of the inshore pollock TAC opted out of an incentive-based program, it would bring into the "opt out" fishery 2.5% of the inshore sector's percentage allocation of Chinook bycatch hard cap (65%) multiplied by 30,046 (the Non-CDQ "opt out" cap). That boat would therefore bring to the "opt out" fishery approximately the following amount of Chinook bycatch allowance:

2.5% x 65% = 1.625% x 30,046 = 488 Chinook salmon.

These 488 salmon would be available for all vessels in the "opt out" fishery to take as bycatch in the pollock fishery and would be deducted from the 68,392 hard cap. There

would therefore be two separate bycatch limits and the 68,392 hard cap could not be exceeded.

It is not as simple to determine the number of Chinook bycatch allowance a catcher/processor or catcher vessel delivering to a catcher/processor would bring into the "opt out" fishery. Under the terms of the Pollock Conservation Cooperation (PCC), membership agreement pollock are not allocated to specific catcher/processor vessels, but instead to specific companies.

The PCC Board of Directors formally took the position of recommending that any catcher/processor which opted out of an incentive-based program have Chinook bycatch allocated to the opt out category based on the catch history of the catcher/processor fleet for 2006. This follows the basic approach of allocating Chinook bycatch allowance to each vessel based on that vessel's pollock catch history. The year 2006 was used because it was one of the few years the American Dynasty fished pollock during both the "A" and "B" seasons; therefore the year is a good approximation of the relative harvesting capacity of each vessel in the catcher/processor fleet. The catch history of the catcher/processor fleet in 2006 (or any other year) does not match the pollock allocated to PCC members because many PCC member companies harvest pollock allocated to High Seas Catcher's Cooperative (HSCC) vessels. Therefore the 2006 history has to be adjusted so that the catcher/processor fleet pollock harvest equals the percentage of pollock allocated to each company under the PCC membership agreement.

The PCC-recommended percentage of Chinook bycatch allowance to each vessel, in the event that vessel opts out of the incentive-based program, is shown in the last column of the table below. (See table 2, below.)

Table 2. Percentage of offshore catcher/processor sector's Chinook allocation that each vessel would take into the opt out fishery if it opted out of the incentive-based bycatch avoidance program (right hand column).

	Company	Vessel	Percent of Non-CDQ TAC	Percent of C/P Sector's Pollock Allocation	2006 Harvest History of C/Ps	Adjusted History to Conform to PCC Pollock Allocation	Factoring in the Ocean Peace 1/2 of 1% Allowance
AFA C/P's PCC Agreement	American	Dynasty			5.33%	4.9569%	**4.932%**
		Triumph			7.83%	7.2819%	**7.246%**
		Eagle			6.56%	6.1008%	**6.070%**
		Hawk			9.13%	8.4910%	**8.449%**
		Jaeger			7.98%	7.4214%	**7.384%**
		Rover			6.91%	6.4263%	**6.394%**
		Highland Light			5.55%	5.1615%	**5.136%**
		Total =	18.336%	45.8400%	49.29%	45.8400%	
	Trident	Island			5.62%	5.6233%	**5.595%**
		Seattle			5.50%	5.5032%	**5.476%**
		Kodiak			5.93%	5.9335%	**5.904%**
		Total =	6.824%	17.0600%	17.05%	17.0600%	
	Glacier	Pacific Glacier			5.19%	5.0870%	**5.062%**
		Northern Glacier			3.20%	3.1365%	**3.121%**
		Alaska Ocean			7.48%	7.3315%	**7.295%**
		Total =	6.222%	15.5550%	15.87%	15.5550%	
	Arctic Storm	Storm	1.841%	4.6025%	6.65%	4.6025%	**4.579%**
	Arctic Fjord	Fjord	1.792%	4.4800%	6.10%	4.4800%	**4.458%**
	Starbound	Starbound	1.585%	3.9625%	5.04%	3.9625%	**3.943%**
		Subtotal =	**36.600%**		100.00%	**91.5000%**	
High Seas Coop Agreement	American	Challenger	0.5590%	1.3975%			**1.391%**
		Harvester Ent.	0.4325%	1.0813%			**1.076%**
		Tracy Anne	0.4642%	1.1605%			**1.155%**
	Aleutian Spray	Muir Milach	0.4538%	1.1345%			**1.129%**
	Neahkahnie	Neahkahnie	0.6679%	1.6698%			**1.661%**
	Sea Storm	Sea Storm	0.8226%	2.0565%			**2.046%**
		Subtotal =	**3.4000%**	**8.5000%**		**8.5000%**	
		Total Offshore =	**40.0000%**			**100.0000%**	
AFA Maximum	Ocean Peace	Ocean Peace	0.500%				**0.500%**
	(No more than 1/2 of 1% of Offshore)					***Total =***	***100.000%***
AFA Eligible Not Fishing Pollock	Trident	U.S. Enterprise	0.000%				**0.000%**
		American Ent.	0.000%				**0.000%**
	American	Katie Anne	0.000%				**0.000%**
Not Eligible	(Foreign)	Endurance	0.000%				Not Eligible

The first column of the spreadsheet shows the percentage of pollock that each company receives under the PCC agreement, and the percentage of pollock that each vessel receives under the HSCC agreement.[18]

Because Chinook salmon bycatch will be allocated by sector, each vessel eligible to harvest pollock in the offshore catcher/processor sector must have its Chinook salmon opt out percentage expressed as a percentage of the entire sector. Under the AFA, the offshore catcher/processor sector receives forty percent of the non-CDQ pollock TAC.[19] Eight and a half percent of that forty percent, however, is reserved for catcher vessels harvesting pollock for processing by catcher/processors (i.e., vessels in the HSCC).[20] The second column of the spreadsheet divides each vessel's percent of the pollock allocation by forty percent, determining each PCC company's and each HSCC vessel's percentage of the total offshore catcher/processor pollock allocation.

The third column shows the catch history of each catcher/processor vessel using the fleet's catch history in 2006.

PCC members have agreed that each company's total Chinook bycatch allowance percentage will equal that company's percentage of pollock allocated under the PCC agreement. The fourth column adjusts the 2006 history so it equals each company's pollock allocation under the PCC agreement.

To take the one-half of one percent allocation reserved in the AFA for the Ocean Peace[21] into account, the fifth column allocated to that vessel is one-half of one percent, which is then adjusted for all of the other vessels in the offshore catcher/processors sector accordingly.

To determine the actual number of Chinook salmon that each catcher/processor would take into the "opt out" fishery, the vessel's percentage in the right hand column would be multiplied by the offshore catcher/processor sector's Chinook allocation and then multiplied by the non-CDQ portion of the "opt out" cap.

If the Island Enterprise opted out of the incentive-based program, for example, it would bring the following amount of Chinook salmon into the "opt out" fishery:

5.595% x 28% (the assumed catcher/processor sector's percentage of the Chinook bycatch hard cap) = 1.566% x 30,046 = 471 Chinook salmon.

There are three AFA-eligible catcher/processor vessels that currently do not harvest pollock. These vessels are the Katie Ann, owned by American Seafoods; and the U.S. Enterprise and the American Enterprise, owned by Trident Seafoods. The PCC has recommended that these three vessels not receive a salmon bycatch allowance and be prohibited from opting out of the incentive-based bycatch avoidance program.

The Endurance is also a catcher/processor vessel listed as eligible to fish pollock in the AFA. The Endurance, however, is no longer documented as a vessel of the United States; therefore, the Endurance is not eligible to fish in the United States Exclusive Economic Zone.

Required Level of Participation in the Incentive-Based Program

The second issue raised by the Department of Commerce's letter to the Council is whether there are minimum levels of participation or sector composition required for the incentive-based program to be acceptable. The Department's letter notes that absent additional clarification from the Council, it is assumed that there are no minimum participation or composition requirements because none were specified in the Council's motion.

This issue seems to be a question of policy, not law. Prior to a final vote by the Council on the Chinook bycatch issue, it is the pollock industry's responsibility to develop an

incentive-based program that the Council believes is sufficient to warrant recommendation of a hard cap of 68,392 with the backstop cap of 32,484. If the Council is not convinced the industry has developed a strong incentive-based program it can simply recommend a hard cap of 47,591. The Council will make this recommendation based on the proposed incentive-based program's ability to create strong incentives to avoid Chinook salmon bycatch at all levels of salmon abundance. As part of the Council's consideration, it may be appropriate to consider the level of participation in the program.

A compelling argument can be made that regardless of the level of industry participation in the program, an incentive-based program as outlined in this paper would justify the Council approving a hard cap of 68,392 if the backstop cap of 32,484 is managed separately.

The Purpose and Need Statement for the EIS notes "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." An incentive-based program such as the Game and TBA from a 68,392 hard cap is clearly better than a simple hard cap of 47,591 at achieving optimum yield (by providing a greater likelihood that entire pollock TAC is harvested) while reducing bycatch at low levels of Chinook abundance to the extent practicable, as required by the MSA's National Standards and described in the Purpose and Need Statement.

Is the Incentive-Based Proposal "Practical" for the Pollock Fleet?

Claims that it is not practical for the pollock industry to participate in the Game have been raised, based on the Game's potential cost to vessels with relatively high Chinook bycatch rates. When vessel owners express concern over the cost of the Game, they cite a penny per pound of pollock as an excessive cost for vessels that have the highest bycatch rates.

The Game will create incentives for the pollock fleet to take practical measures to avoid Chinook salmon. In that sense there is a cost to the industry. The average cost to the pollock industry of the Game itself, however, is zero. Assuming a vessel takes practical measures to avoid salmon, the wins and losses from the Game quickly even out.

Hind casting the pollock industry's gains and losses under the Game from the years 2000 through 2007 shows how small the average cost of the Game is per vessel. This is especially true when the gains and losses are expressed in terms of the pounds of pollock harvested by each vessel. Over this eight-year period, the Game results in gains and losses to each vessel in both the catcher/processor and the inshore fleet measured in tenths of a cent to thousands of a cent for each pound of pollock harvested.

Figure 12. Hind cast of gains and losses to each vessel in the pollock catcher/processor fleet under the Game, 2000-2007.

Vessel Name	Total Gains/Losses 2000-2007	Gains/Losses /lb. pollock
Alaska Ocean	$1,034,221	$0.001591
Dynasty	-$1,859,648	-$0.008285
Triumpth	-$944,631	-$0.001316
Eagle	$641,596	$0.000933
Hawk	$189,926	$0.000260
Jaeger	$834,131	$0.001177
Rover	$2,360,549	$0.003567
Fjord	$287,283	$0.000246
Strom	$308,827	$0.000531
Northern Glacier	-$537,858	-$0.001989
Pacific Glacier	$616,433	$0.001421
Highland Light	$2,362,468	$0.004935
Starbound	-$566,699	-$0.001287
Island Enterprise	-$2,076,952	-$0.004084
Kodiak Enterprise	-$1,557,396	-$0.002998
Seattle Enterprise	-$1,063,106	-$0.002613

Figure 13. Hind cast of gains and losses to each vessel in the inshore pollock fleet under the Game, 2000-2007.

Vessel Name	Total Gains/Losses 2000-2007	Gains/Losses /lb. pollock
Alaska Rose	-$66,512	-$0.000334
Alaska Command	-$226,491	-$0.000671
Aldebaran	-$97,562	-$0.000616
Alsea	$32,493	$0.000166
Alyeska	-$25,301	-$0.001610
Amber Dawn	-$4,282	-$0.001152
American Beauty	$81,409	$0.001734
American Eagle	$19,029	$0.000156
Anita J	-$49,394	-$0.000545
Arctic Explorer	$134,275	$0.000652

Arctic Wind	$190,437	$0.001175
Arcturus	-$212,322	-$0.001281
Argosy	$53,796	$0.000286
Auriga	$104,241	$0.000292
Aurora	$219,875	$0.000582
Bering Rose	-$426,222	-$0.002095
Blue Fox	$31,047	$0.001807
Bristol Explorer	-$41,877	-$0.000239
Cailin Ann	$170,344	$0.001353
Cape Kiwanda	$11,051	$0.000920
Chelsea K	$17,528	$0.00003251
Collier Brothers	$7,980	$0.00099153
Columbia	-$294,727	-$0.001767
Commodore	-$147,467	-$0.001126
Defender	$237,549	$0.000584
Destination	-$302,218	-$0.001224
Dominator	$8,324	$0.000039
Dona Martita	-$106,611	-$0.002121
Elizabeth F	$67,950	$0.001796
Excaliber II	$95,564	$0.001857
Exodus	$50,017	$0.002494
Fierce Allegiance	$124,111	$0.000752
Gladiator	-$20,496	-$0.000129
Gold Rush	$95,341	$0.002137
Golden Dawn	-$41,165	-$0.000188
Golden Pisces	$129,032	$0.002880
Great Pacific	-$279,039	-$0.002071
Gun Mar	$473,894	$0.001758
Half Moon Bay	$17,469	$0.000298
Hazel Lorraine	$23,802	$0.000773
Hickory Wind	$36,982	$0.001489
Intrepid Explorer	$30,627	$0.000711
Leslie Lee	$99,122	$0.001714
Lisa Melinda	-$2,098	-$0.000143
Majesty	$64,617	$0.001157
Marcy J	$29,950	$0.002124
Margaret Lyn	-$5,256	-$0.001552
Mar Gun	$11,823	$0.001454
Mark I	-$19,427	-$0.004626
Miss Berdie	$4,651	$0.000146
Morning Star	-$541,456	-$0.002840
Nordic Explorer	$7,848	$0.000346
Nordic Fury	-$1,615	-$0.000124
Nordic Star	$86,490	$0.000743
Northern Patroit	-$249,213	-$0.000871
Northwest Explorer	-$118,747	-$0.000793
Ocean Explorer	$60,072	$0.000358
Ocean Hope 3	-$14,328	-$0.000353
Ocean Leader	$48,451	$0.001859
Oceanic	$97,107	$0.002595

Pacific Challenger	-$45,118	-$0.002979
Pacific Explorer	$234,346	$0.001482
Pacific Fury	$491	$0.000855
Pacific Knight	-$26,813	-$0.001139
Pacific Monarch	$2,247	$0.003632
Pacific Prince	$56,512	$0.000189
Pacific Ram	-$13,320	-$0.000911
Pacific Viking	-$109,602	-$0.000927
Pegasus	$20,790	$0.000350
Peggy Jo	-$12,432	-$0.000431
Perseverance	$17,296	$0.001582
Poseidon	-$154,698	-$0.001119
Predator	-$20,046	-$0.001035
Progress	-$6,308	-$0.000055
Raven	$32,860	$0.000608
Royal American	$95,002	$0.000773
Royal Atlantic	$229,333	$0.001574
Sea Wolf	-$289,767	-$0.001582
Seadawn	$128,521	$0.000820
Seeker	$35,302	$0.000993
Sovereignty	-$313,548	-$0.001163
Starfish	$76,011	$0.000414
Starlite	$220,794	$0.001514
Starward	$87,419	$0.000891
Storm Petrel	$43,202	$0.000288
Sunset Bay	$20,757	$0.000584
Topaz	$4,121	$0.000758
Traveler	-$23,977	-$0.002379
Vanguard	$13,463	$0.001575
Viking	$66,634	$0.000292
Viking Explorer	-$118,999	-$0.000808
Walter N	$68,395	$0.001380
Western Dawn	$30,995	$0.000857
Westward I	-$30,342	-$0.000155

The Game along with TBA from a hard cap of 68,392 will create incentives for the pollock fleet to take measures to avoid Chinook salmon bycatch. Given the value of the pollock fishery, it would seem that the program outline in this paper to reduce Chinook is practical in that it does not create excessive cost on the industry.

IX. Conclusion

The Council's PPA has two alternatives: A hard cap on Chinook salmon of 47,591; and, if the pollock industry develops a program that "provides explicit incentives for each participant to avoid salmon bycatch," then the Council will consider a Chinook salmon hard cap of 68,392, a level much less likely to be constraining on the pollock fishery. The Council will consider the more liberal hard cap of 68,392 if the pollock industry can document that its incentive-based program will reduce Chinook bycatch better than a

hard cap of 47,591. The industry's proposal must also provide these incentives during all years and at all levels of salmon abundance.

The incentive-based proposal outlined in this paper meets those objectives. It includes continuation of the Rolling Hotspot Closure program, a hard cap of 68,392 which will be allocated through the pollock cooperatives to each vessel and is transferable, and a Game that transfers money from those vessels with the highest relative Chinook bycatch rates to those with the lowest bycatch rates within each sector.

The analysis in this paper is based on a model that is detailed in the mathematical Appendices. The model uses historical bycatch data to project likely marginal values of avoiding Chinook salmon at differing annual bycatch rates.

We have shown how the incentives provided by TBA and the Game will induce the pollock industry to move vessels to avoid areas of high Chinook bycatch, shift fishing effort from times of high bycatch to times of low bycatch, and to use newly developed salmon excluder devices with their trawl gear. In combination, the Game and TBA complement each other. Together they effectively create a large marginal value for avoiding Chinook salmon bycatch during all years and at all levels of salmon abundance.

The proposal of TBA under a hard cap of 68,392 along with the Game is more effective at reducing Chinook bycatch, especially at low levels of Chinook salmon abundance when Chinook are particularly valuable, than a hard cap of 47,591 by itself, while providing the pollock industry a greater chance of achieving optimum yield from the pollock fishery.

---

* Associate Professor of Economics, University of Washington. Ph.D., University of Chicago, 1975. Principal, Financial Kochin Consultants. Consultant to Trident Seafoods Corporation.

** B.A., Economics, -University of Washington, 1988. Director of Research and Development, Trident Seafoods Corporation.

*** B.S., Economics, University of Washington 2008. Consultant to Trident Seafoods Corporation.

J.D., Seattle University. Chief Legal Officer, Trident Seafoods Corporation.

[1] Initial Draft EIS for the Bering Sea/Aleutian Islands Chinook Salmon Bycatch Management, May 15, 2008. p. 155.

[2] Because elements of the industry developed incentive-based program will not be incorporated in regulation, the Council will have to trust industry to follow through with its promise to implement the incentive-based program it presents to the Council.

[3] BSAI Amendment 21b as revised by BSAI Amendment 58. The timing of the closure depended upon when the limit was reached. If the limited was reached prior to April 15, the areas closed immediately through April 15. After April 15 the areas reopened, but were closed from September 1 through December 31. If the limit was reached after April 15 but before September 1, the areas closed on September 1 through the end of the year. If the limit was reached after September 1, the areas closed immediately through the end of the year.

[4] Initial Review Draft EA/RIR/IRFA for Modifying existing Chinook and chum salmon savings areas, NPFMC, May 23.2005. p. ii.

[5] Initial Review Draft EA/RIR/IRFA for Modifying existing Chinook and chum salmon savings areas, NPFMC, May 23.2005. p. ii.

[6] The RHC program does not include a tier assignment for Chinook salmon during the "B" season. Instead all Chinook Savings Area closures that were instituted applied to all cooperatives (and thus all pollock vessels). It was deemed appropriate to close areas for all pollock fishing because: "1) Chinook bycatch tends to increase by week in the 'B' season and thus the 'backward looking' system of imposing tier assignments and closures based on previous week's bycatch rates is not adequately responsive to changing conditions in the fishery, and 2) the fishery is spread out over a larger area in the 'B' season and conditions tend to change more rapidly than in the 'A' season." Initial Review Draft EA/RIR/IRFA for Modifying existing Chinook and Chum Salmon Savings Areas, NPFMC, May 23, 2005. p. 45.

[7] 50 C.F.R. §679.21.

[8] A detailed proposal by Levis Kochin is in Appendix I.

[9] Memo from SeaState to IC Representatives, August 7, 2007.

[10] During 2006 Chinook bycatch in the pollock fishery was 81,341 salmon.

[11] The authors apologize to those who are troubled by use of the word "game." We do not mean to diminish the importance of the Chinook salmon bycatch issue nor the

Game's ability to create powerful economic incentives for the pollock industry to avoid Chinook salmon. From the time it was first conceived, however, and throughout the many hours of discussing and writing this analysis, we have referred to the individual vessel Chinook bycatch avoidance incentive program as "the Game." For the sake of simplicity we continue to call it the Game in this paper. And, truth be told, it is a game in that each player antes money to play and then wins or loses based on how well that player performs.

[12] The Game is a response to the problems of fixed quotas when there is little information on fish stocks as discussed by Weitzman, *Landing Fess vs. Harvest Quotas with Uncertain Fish Stocks*, 2001.

[13] Except for the worst performer in this example, Dirty Harry, who would not receive a refund in the model if he avoided a Chinook.

[14] The spread between bycatch rates of inshore catcher vessels is considerably larger than the spread between the catcher/processor sector. Therefore the Game provides greater marginal value at a one cent ante for the offshore sector than for the inshore fleet.

[15] Given that other measures to reduce Chinook bycatch are cheaper, there is no reason to order the industry to take this ineffective measure.

[16] This paper uses the term "incentive-based program" instead of ICA. Council's motion notes that an "ICA" must provide "explicit incentive(s) for each participant to avoid salmon bycatch in all years." But the ICA contemplated by the Council's motion is not the type of Inter-Cooperative Agreement currently in existence. The existing RHC program ICA includes all pollock harvesting vessels (except for the vessel Ocean Peace) in every cooperative, and all of the CDQ groups. The regulations implementing the existing ICA require that the parties to the ICA be "AFA cooperatives or CDQ groups." (50 CFR §679.21(g)(g).) The ICA contemplated by the Council's motion, however, clearly provides that not all pollock participants need participate in the program that "provides explicit incentive(s) for each participant to avoid salmon bycatch in all years." For that reason, it is perhaps preferable to refer to the program that allows the Council to recommend a hard cap of 68,392 as the "incentive-based" bycatch avoidance program instead of the ICA.

[17] Letter from Robert D. Mecum, Acting Regional Administrator, NOAA, to Mr. Eric Olson, Chairman, North Pacific Fishery Management Council, August 18, 2008.

[18] The High Seas Catchers' Cooperative (HSCC) includes seven catcher vessels that have a total of 3.4% of pollock catch history that is eligible to be harvested by the catcher/processor fleet. Similar to the PCC agreement, these seven vessels formed a private cooperative to divide the available pollock allocation among themselves. Unlike the PCC agreement, however, each of the seven vessels in the HSCC is allocated a

specific percentage of pollock. Therefore, each of the vessels has a specific pollock allocation.

[19] Section 206(b)(2) of the AFA.

[20] Section 210(c) of the AFA.

[21] Section 208(e)(21) of the AFA.

References

Hannesson, Roenvaldur and John Kennedy. *Landing Fees versus Fish Quotas.* Land Economics. November 2005. 81(4):518-529.

Haynie, Alan. *Incentives for Bycatch Avoidance: Hotspot Closures and Individual Bycatch Quotas.* Alaska Fisheries Science Center. Seattle, 2007.

Helle, John .*The Bering Aleutian Salmon International Survey.* AFSC Quarterly Report January, February and March 2007.

Karp, William A., Karl Haflinger and Joshua G. Karp. Intended and Unintended Consequences: Fisher responses to bycatch reduction requirements in the Alaska Groundfish Fisheries. International Council for the Exploration of the Sea. 2006 Annual Science Conference, Aberdeen, Scotland. September 20th, 2005.

Lee, Jeannette J. *Pollock Fishery under Scrutiny due to Bycatch.* The Associated Press June 25th, 2008.

Miller, Scott A. *Internal Regulatory Flexibility Analysis of Measures to Reduce Chinook Salmon Bycatch in the Bering Sea and Aleutian Islands Pollock Fishery.* NPFMC Review June 2008.

Miller, Scott A. *Regulatory Impact Review of Measures to Reduce Chinook Salmon Bycatch in the Bering Sea and Aleutian Islands Pollock Trawl FIshery.* NPFMC Review June 2008. Initial Review Draft May 15th 2008.

North Pacific Fishery Management Council National Marine FIsheries Service. *Draft Environmental Impact Statement for Bering Sea/Aleutian Islands Chinook Salmon Bycatch Management.* NPFMC Review May 15th, 2008.

Sanchirico, James. An *Overview of the Economic Benefits of Cooperatives and Individual Fishing Quota Systems.* Department of Environmental Science and Policy. July 9th, 2008.

Sanchirico, James and Richard Newell. *Catching Market Efficiencies; Quota Based Fisheries Management.* Resources for the Future, 2003.

Sanchirico, James and Daniel Holland, Kathryn Quigley and Mark Fina. *Catch Quota Balancing in Multispecies Individual Fishing Quotas.* Discussion Paper November 2005, RFF DP 05-54. Washington, DC.

Sanchirico, James and Suzi Kerr and Richard Newell. I*ndividual Transferable Quotas and Bycatch Management: Preliminary Evidence from the New Zealand Experience.* International Institute of Fisheries Economics and Trade. Oregon State University, 2000.

Trident Seafoods Corporation, Annual Akutan factory production report, 2007.

Weitzman, Martin L. *Landing Fees vs Harvest Quotas with Uncertain Fish Stocks.* Journal of Environmental Economics and Management 43, 323-338. Harvard University, 2001.

Witherell. *An Overview of Salmon Bycatch in Alaska Groundfish Fisheries.* Alaska Fishery Research Bulletin Vol. 9 No. 1, Summer 2002.

Agenda C-4(b) Supplement Oct. 2008

STATE OF ALASKA

SARAH PALIN, GOVERNOR

333 RASPBERRY ROAD
ANCHORAGE, AK 99518
PHONE: (907) 267-2104
FAX: (907) 267-2442

DEPARTMENT OF FISH AND GAME

DIVISION OF COMMERCIAL FISHERIES

MEMORANDUM

TO: John Hilsinger

FROM: Dani Evenson, Tim Baker, Doug Molyneaux, Scott Kent, and Dan Bergstrom

DATE: September 10, 2008

SUBJECT: 2008 Chinook salmon stock status, western Alaska

Western Alaska Chinook Salmon Stock Status 2008

Western Alaska includes the Bristol Bay, Kuskokwim, Yukon, and Norton Sound areas, The Nushagak, Kuskokwim, Yukon, Unalakleet, Shaktoolik and Kwiniuk rivers make up the Chinook salmon index stocks for this region. In general, these western Alaska Chinook salmon stocks declined sharply in 2007 and declined even further in 2008. In some of these areas, the 2008 Chinook salmon run was one of the poorest on record. The 2008 preliminary total run estimates from each of these river systems were below the projected or forecasted run sizes. Further, all of the Chinook salmon runs were at least three days later than average which adds uncertainty to the management of the fisheries, as managers must determine inseason whether a run is weak or simply late, or in this case, both weak and late. On the heels of the below average 2007 Chinook salmon runs in western Alaska, management of the 2008 fisheries was conservative. No directed Chinook salmon commercial fisheries occurred in the Yukon River or in Norton Sound, and only small commercial fisheries occurred in the Nushagak and Kuskowkwim rivers. Sport fisheries were restricted in the Yukon, Unalakleet, and Shaktoolik rivers. More significantly, the subsistence fisheries in the Yukon River and in the Unalakleet and Shaktoolik subdistricts of Norton Sound were restricted. Despite conservative management, many of the escapement goals were not met.

Stock: Nushagak River Chinook salmon

Area: Bristol Bay

BOF Classification: none

The 2008 total run of Chinook salmon to the Nushagak River was 130,783. The total run was 29,817 (18%) less than the forecast of 160,000 Chinook salmon, 15% less than the recent 20-year (1988-2007) average of 153,358 and 19% less than the recent 10-year (1998-2007) average of 162,179 (Figure 1).

Spawning escapement of Chinook salmon in the Nushagak River was 88,452, which exceeded the sustainable escapement goal (SEG) range of 40,000-80,000. A total of 42,331 Chinook salmon were harvested in the commercial (18,618), subsistence (16,642) and sport (7,071) fisheries in the Nushagak District and River. The commercial harvest of 18,618 Chinook salmon was 67% below the anticipated harvest of 56,000 Chinook salmon. The anticipated harvest was estimated based on an average exploitation rate of 35% in the Nushagak District commercial salmon fishery from 2003-2007. When management of the commercial fishery shifted from being based on the preseason forecast to inseason escapement data, no further directed openings occurred because of the late run timing and indications that the run was less than forecasted. The actual exploitation rate in 2008 was 14%. The commercial harvest in 2008 was one of smallest harvests of Chinook salmon in the Nushagak District since 1966; only Chinook salmon harvests in 1999 (10,893), 2000 (12,055) and 2001 (11,568) have been smaller.

The 2008 age composition of total run was 1% (929) age-1.1, 27% (35,676) age-1.2, 43% (56,260) age-1.3, 28% (36,534) age-1.4 and 1% (1,384) age-1.5%. The number of age-1.1 (929 vs. 1,000), age-1.3 (56,620 vs. 56,000) and age-1.5 (1,384 vs. 2,000) Chinook salmon were similar to the forecast, while the number of age-1.2 (35,676 vs. 53,000) and age-1.4 (36,534 vs. 48,000) were less than the forecast.

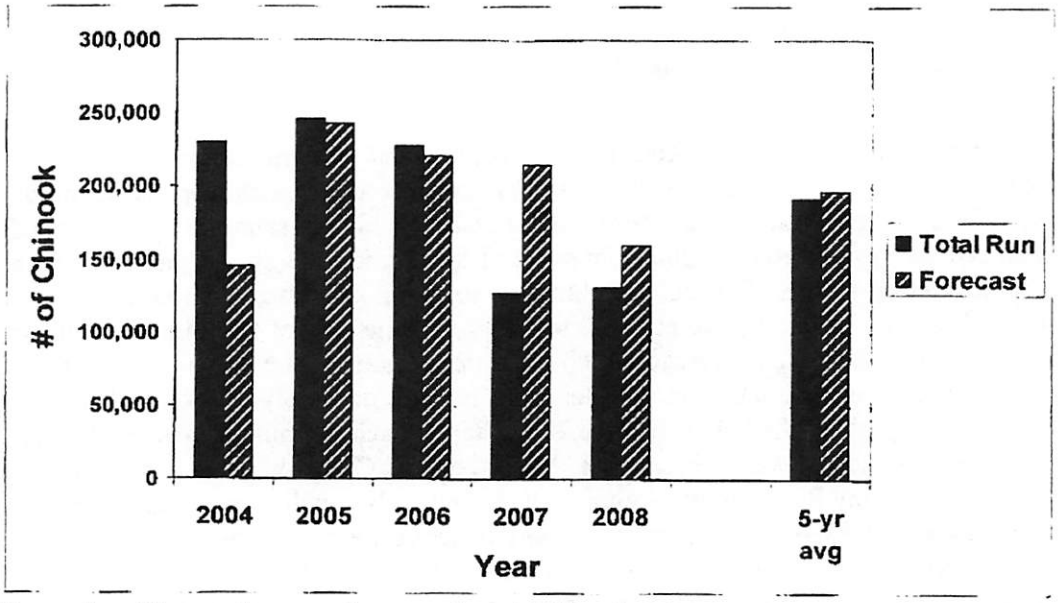


Figure 1. – Observed versus forecasted total Chinook salmon runs, Nushagak River, 2004-2008 and 5-year average. 2008 data are preliminary.

Stock: Kuskokwim River Chinook salmon

Area: Kuskokwim River

BOF Classification: none

Kuskokwim River Chinook salmon abundance is generally on a decline following a period of exceptionally high abundance years in 2004, 2005, and 2006 that ranged from 360,000 to 425,000 fish (Figure 2). Abundance is estimated to have decreased in 2007 to about 250,000 fish, and may have declined a bit more in 2008 to about 225,000 fish. The 2007 and 2008 values are preliminary considering that the subsistence harvests estimates are not yet available. Annual subsistence harvest averages about 72,000 fish +/- 9,000. Kuskokwim River Chinook salmon were listed by the BOF as a Stock of Yield Concern in September 2000, but the finding was rescinded in January 2007.

Chinook salmon abundance in the 2008 season was expected to be about average, and comparable to 2007; inseason indicators suggested that to be the case, but actual abundance may have been lower than expected. Achievement of tributary escapement goals was mixed with 6 of 11 streams falling below goal, 3 within their respective SEG ranges, and 2 above range. Subsistence harvest needs are thought to have been met, and there is some speculation that subsistence harvest may have been above average in partial compensation for sharp increases in local fuel and food costs. A modest commercial harvest of 8,881 fish was allowed in 2008; of note, managers required use of gillnets with 6 inch or smaller mesh size, which effectively focused harvest on male Chinook salmon that accounted for about 90 percent of the commercial harvest, plus allowed for optimizing concurrent sockeye harvest. Overall Chinook salmon exploitation rate in 2008 is estimated to have been near 40%, compared to the 10-year average of 29%. Most of the harvest was likely on larger Chinook salmon, which subsistence fishers tend to select for through the use of gillnets with 8 inch or larger mesh size.

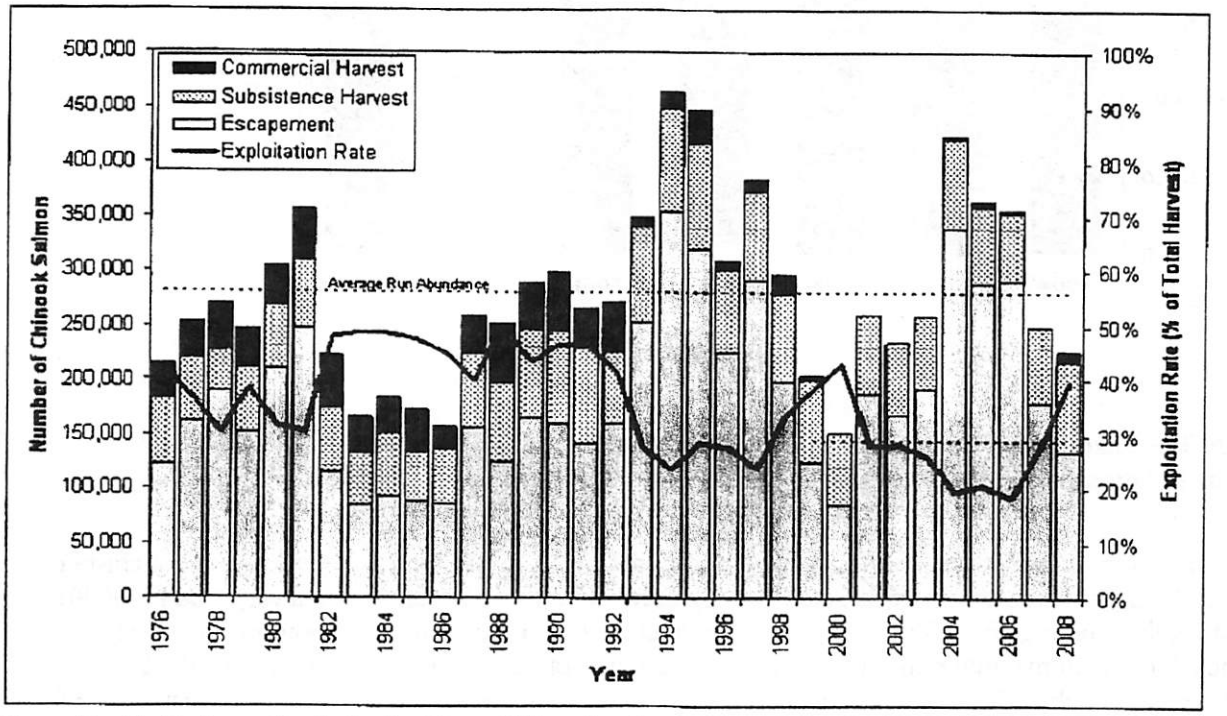


Figure 2.– Preliminary Kuskokwim River Chinook salmon run reconstruction and exploitation rate, 1976-2008.

Stock: Yukon River Chinook salmon

Area: Yukon River

BOF Classification: Stock of Yield Concern

The 2008 total run of approximately 151,000 Chinook salmon was insufficient to fully support any directed fisheries, including subsistence. The 2008 run was approximately 36% below the recent 5-year (2003-2007) average of 235,000 Chinook salmon and 21% below the 10-year (1998-2007) average of 190,000 (Figure 3). The 2008 run was expected to be below average and similar to the 2007 run of approximately 178,000. However, the run was anticipated to provide for escapements, support a normal subsistence harvest, and a small commercial harvest. By June 20, the historical midpoint of the run, all indicators pointed to a weak Chinook salmon run which was disappointing because of large spawning escapement in the parent years that produced this season's run. At that time, it was clear that there was no surplus available for a directed Chinook salmon commercial fishery and that sport and subsistence fisheries on the mainstem Yukon River would need to be reduced to provide adequate numbers of Chinook salmon on the spawning grounds.

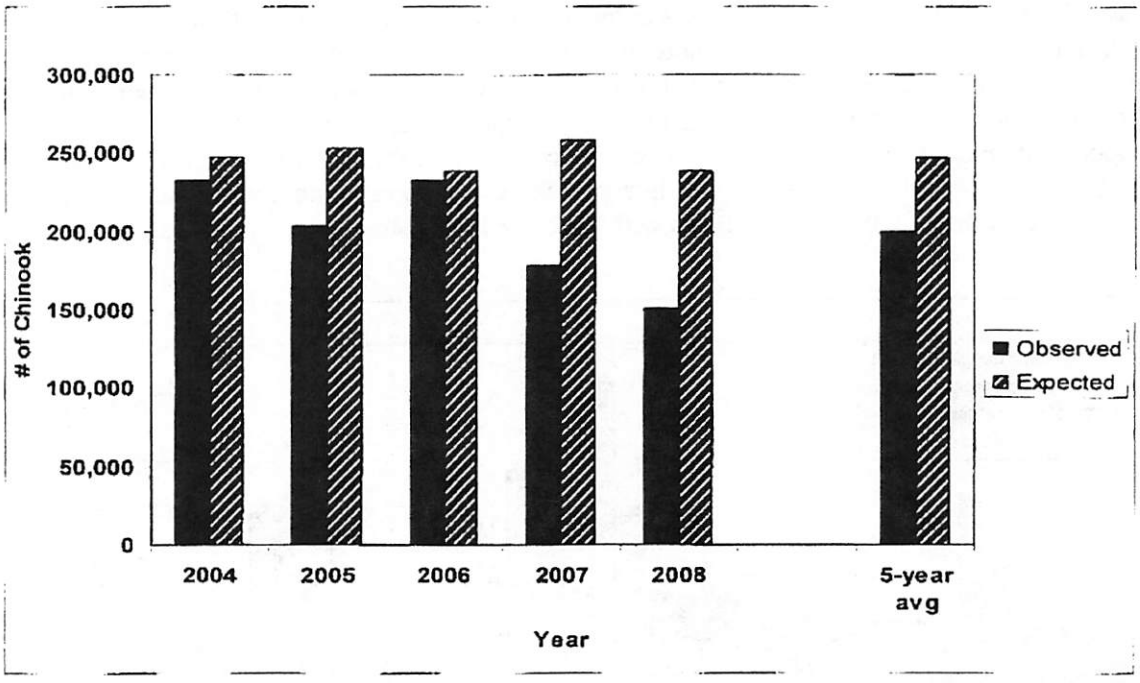


Figure 3. – Yukon River Chinook salmon observed versus expected total runs based on S/R and Sibling Relationships, 2004-2008, and 5-year average. 2008 data are preliminary.

Sport fishing bag and possession limits were reduced from 3 to 1 Chinook salmon on the mainstem Yukon River, however, the sport fish harvest only occurs in a few tributaries and is very small (<3000). Additionally, commercial fishing targeting an abundant summer chum salmon run with gillnets restricted to 6 inch maximum mesh size was delayed until July 2 in order to allow most of the Chinook run to pass through. This resulted in reducing what could have been a harvest of greater than 300,000 chum salmon to 126,000. Approximately 4,300 Chinook salmon were taken incidentally during summer chum directed openings.

In an effort to conserve Chinook salmon, it was also necessary to reduce the subsistence fishery (typically around 50,000 fish) throughout the mainstem of the Yukon River. Subsistence fishing time was reduced by half for approximately two weeks implemented chronologically with the Chinook migration and mesh size restrictions (<6-inch mesh) were implemented in the lower river districts. Fishers were affected from the mouth of the river to across the border into Canada. Fishers reported harvesting as little as 40% of their needs in some locations in Alaska and the Aboriginal Fishery in Canada harvested half of their average take. Historically, Chinook salmon subsistence fishing restrictions have only been implemented once before, in July of 2000 after the run was nearly over.

High water levels hampered efforts to accurately assess escapement in 2008 through tower counts and aerial surveys; thus, most sustainable escapement goals (SEG) could not be assessed (Table 1). Based on the available data, it appears that the lower end of the biological escapement goals (BEG) in the Chena and Salcha rivers, the largest producing tributaries of Chinook salmon in the Alaska portion of the drainage, were met. Typically, about 50% of the Chinook salmon production occurs in Canada; hence, the US/Canada Yukon River Panel agreed to one year Canadian Interim Management Escapement Goal (IMEG) of >45,000 Chinook salmon based on the Eagle sonar program is a top priority. The preliminary estimated escapement into Canada is approximately 32,500 or 28% below the goal.

Table 1 – Yukon River Chinook salmon escapement goals, 2008.

Stream	Current Goal	Type of Goal	2008
East Fork Andreafsky River Aerial	960–1,900	SEG	278[1]
West Fork Andreafsky River Aerial	640–1,600	SEG	262[1]
Anvik River Index Aerial	1,100–1,700	SEG	992[1]
Nulato River Aerial (Forks Combined)	940–1,900	SEG	922
Gisasa River Aerial	420–1,100	SEG	487
Chena River Tower	2,800–5,700	BEG	3,080[3]
Salcha River Tower	3,300–6,500	BEG	N/A
Canadian Border	<45,000	IMEG[2]	32,500[3]

[1]Rated as incomplete and/or poor survey conditions resulting in minimal or inaccurate counts.

[2]The US/Canada Yukon River Panel agreed to a one year Canadian Interim Management Escapement Goal (IMEG) of >45,000 Chinook salmon based on the Eagle sonar program. In order to meet this goal, the passage at Eagle Sonar must include a minimum of 45,000 fish for escapement, provide for a subsistence harvest in the community of Eagle of approximately 2,000 fish, and incorporate the US/Canada Yukon River Panel allowable catch (20%-26% of the total allowable catch); this would have resulted in necessary count of approximately 53,000 fish at Eagle Sonar in order to meet the spawning escapement goal in 2008.

[3]Data are preliminary.

Stock: Unalakleet River Chinook salmon

Area: Norton Sound Chinook salmon, Subdistricts 5 & 6

BOF Classification: Stock of Yield Concern

The 2008 Norton Sound Chinook salmon run is arguably the poorest run on record. At the onset of the season, a directed Chinook salmon commercial fishery was not expected, and early closures to the subsistence and sport fisheries were anticipated for Subdistricts 5 and 6 in early July. There was some optimism about meeting escapement needs while also avoiding an early closure, which was based on a combination of factors. These included: 1) sufficient escapements observed during the predominant brood years (2002 and 2003) for the 2008 return, 2) a restrictive subsistence fishing schedule that provides escapement windows throughout the run, and 3) mesh-size restrictions that were planned for the Unalakleet River on June 30, which were aimed at conserving age-5 and -6 Chinook salmon during their peak migration period.

The Unalakleet and Shaktoolik Rivers are the largest producers of Chinook salmon in Norton Sound. Management of Subdistricts 5 (Shaktoolik) and 6 (Unalakleet) Chinook salmon is based largely on subsistence catch indices collected inseason and passage estimates at a counting tower located on the North River, an important Chinook salmon spawning tributary of the Unalakleet River. Except for aerial surveys, escapements are not monitored in Shaktoolik, but Shaktoolik and Unalakleet Chinook salmon are managed as one unit as previous tagging studies have shown an intermingling of salmon stocks in these subdistricts. Chinook salmon aerial surveys were not flown this season due to overcast conditions during peak spawning periods.

By July 2nd, it was clear that the Unalakleet River Chinook salmon run had later than average run timing and was a very weak run. It seemed that if there was any chance of meeting escapement needs, an early closure was necessary, and the sport and subsistence fisheries were closed effective 8 p.m. Saturday, July 5. The decision to close the Chinook fishery was based largely on the June 30-July 2 reported Unalakleet Subdistrict marine subsistence catch of 145 Chinook salmon, a three-fold decrease from the previous 48-hour period's catch of 460 Chinook salmon. As of July 2, only 36 Chinook were counted by the North River tower, and July 2nd is the historical quarter point of the run. Despite proactive restrictions and the eventual closure, the Chinook salmon escapement fell short of the North River tower-based SEG range of 1,200-2,600 for the 4th time since 2004 (Table 2, Figure 4). In addition, the North River tower Chinook salmon escapement of 924 was the second lowest on record. The 2008 Unalakleet River total run size estimate of 3,908 Chinook was 21 percent below the previous record low of 4,961 Chinook in 2005 (Table 2).

The department anticipates that it will continue to be difficult to reach escapement goals in the Unalakleet watershed for the foreseeable future, even with restrictions and early closures to subsistence and sport fisheries. Prior to 2008, the 2004-2006 escapements at the North River tower were the three lowest on record and well below the lower end of the SEG range.

Table 2.–Estimated escapement, total harvest, and total run, Unalakleet River Chinook salmon, 1984-1986 and 1996-2008.

Year		North River Tower Operating Period	Escapement [a] North River	Escapement [a] Unalakleet River	Total Harvest	Total Run	Exploitation Rate (%)
1984		June 25-July 28	2,844	7,368	8,493	15,861	53.5
1985		June 27-Aug 31	1,426	3,694	14,197	17,891	79.4
1986	b	June 25-July 18	1,613	4,179	6,683	10,862	61.5
c		c					
1996		June 16-July 25	1,197	3,101	6,922	10,023	69.1
1997		June 16-Aug 21	4,185	10,842	14,100	24,942	56.5
1998		June 15-Aug 12	2,100	5,440	10,889	16,329	66 7
1999	d	June 30-Aug 31	1,639	4,246	5,033	9,279	54.2
2000		June 17-Aug 12	1,046	2,710	3,356	6,066	55.3
2001	d	July 05-Sept 15	1,791	4,640	3,176	7,816	40.6
2002		June 19-Aug 29	1,505	3,899	2,915	6,814	42.8
2003		June 15-Sept 13	1,452	3,762	2,692	6,454	41.7
2004		June 15-Sept 14	1,125	2,915	3,157	6,072	52.0
2005		June 15-Sept 15	1,015	2,630	2,331	4,961	47.0
2006		June 18-Sept 15	906	2,347	2,931	5,278	55.5
2007	e	June 16-Sept 5	1,950	5,052	1,999	7,051	28.4
2008	e	June 19 - ?	924	2,394	1,514	3,908	38.7
2003-2007 Average			1,290	3,341	2,622	5,963	45

[a] Drainage-wide escapement estimate calculated by expanding tower counts by 0.386, the average proportion of Chinook salmon migrating into the North River. 1997 and 1998 (Wuttig, 1999)

[b] Subsistence harvest data unavailable in 1986. The average subsistence harvest from 1981-1985 substituted for 1986.

[c] North River Tower not operational from 1987-1995.

[d] Projected started late. Tower counts were expanded based on average run timing (Estensen and Evenson 2006)

[e] Sport fish harvest unavailable. The average sport fish harvest of 321 Chinook from 2002-2006 was substituted.

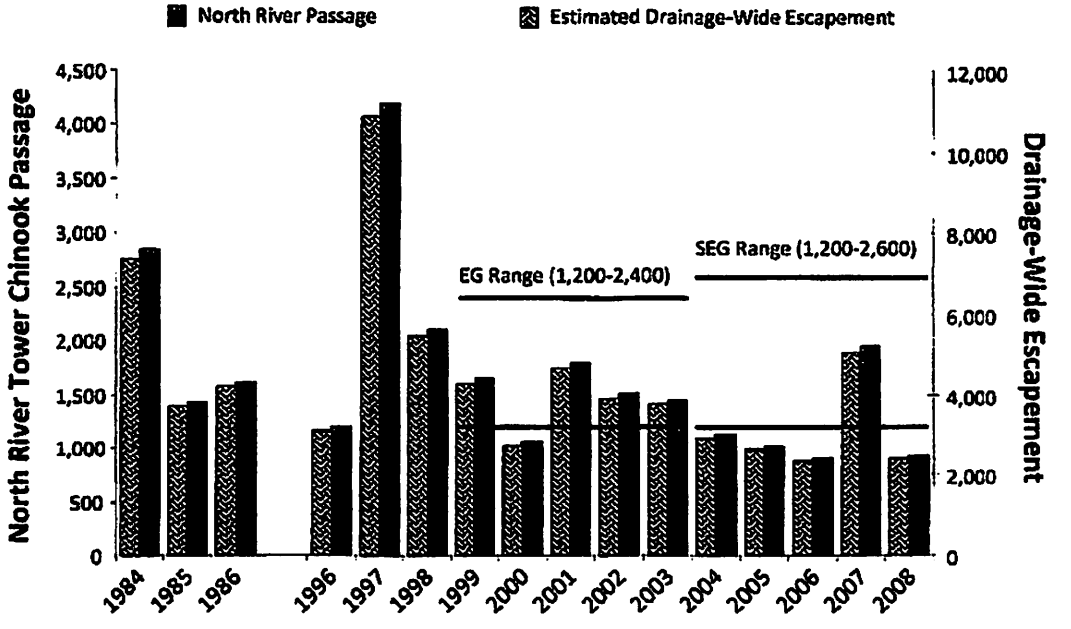


Figure 4.–Chinook salmon escapement at the North River counting tower and estimated escapement for the Unalakleet River drainage, 1984-1986 and 1996-2008.

7/8

Stock: Kwiniuk River Chinook salmon

Area: Norton Sound Chinook salmon, Subdistricts 3 & 4

BOF Classification: None

Chinook salmon runs also occur in the Kwiniuk and Tubutulik Rivers of the Moses Point Subdistrict (Subdistrict 3), and in the Inglutalik and Ungalik Rivers of the Norton Bay Subdistrict (Subdistrict 4). Except for aerial surveys, Chinook salmon escapements are not monitored in the Norton Bay Subdistrict. However, in the Moses Point Subdistrict, the Kwiniuk River tower is used to monitor Chinook escapements and has an SEG range of 300-550 Chinook. The Kwiniuk River Chinook salmon estimated escapement of 246 was the 4th lowest on record and represented the third consecutive year in which the tower count fell short of the SEG (Figure 5). Poor escapements since 2005 suggest that the 2009 return will be below average, but age-class data are lacking for this stock.

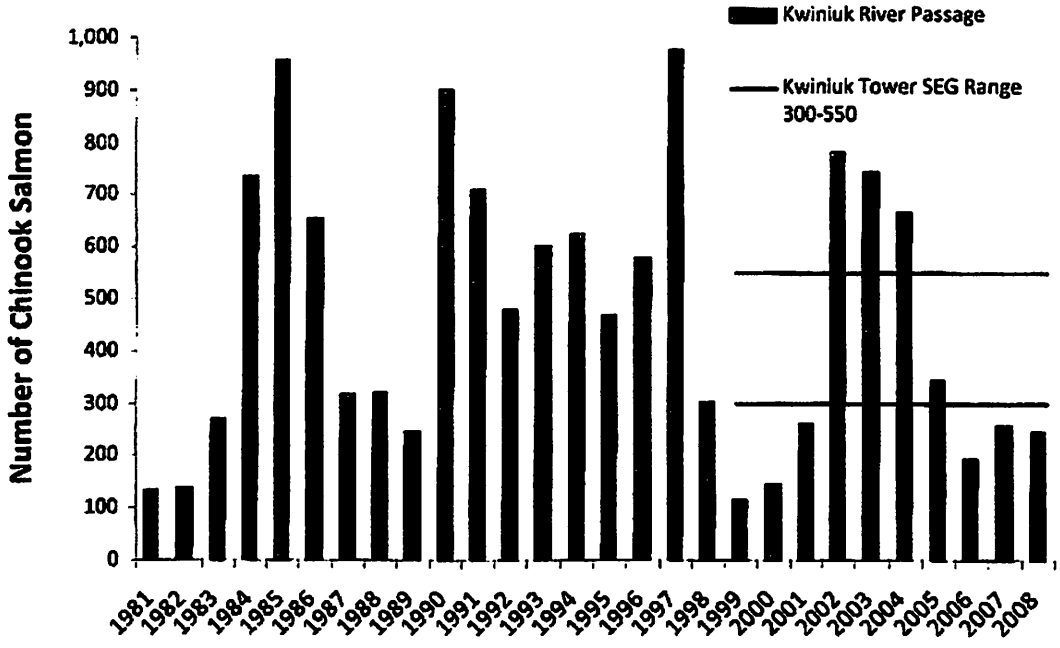


Figure 5.–Annual estimated Chinook salmon passage at the Kwiniuk River tower, Subdistrict 3, Norton Sound, 1981-2008.