Annual Report 2020

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Chinook and Chum Salmon Bycatch Reduction

Incentive Plan

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IPA Representative

Stephanie Madsen
At-sea Processors Association
P.O. Box 32817
Juneau, AK 99803
(907) 523-0970
smadsen@atsea.org

Technical Representative

Karl Haflinger
Sea State, Inc.
P.O. Box 74
Vashon, WA 98070
(206) 463-7370
karl@seastateinc.com

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Introduction

Amendment 91 to the Bering Sea and Aleutian Islands Groundfish Fishery Management Plan (BSAI FMP) limits Chinook salmon bycatch in the eastern Bering Sea (EBS) pollock fishery. The rules and regulations implementing Amendment 91 came into force at the start of the 2011 fishery. Amendment 91 is an innovative approach to managing Chinook salmon bycatch in that it combines a prohibited species catch (PSC) limit on the amount of Chinook salmon that may be caught incidentally by the fishery with an incentive plan agreement (IPA) and performance-standard requirement designed to minimize bycatch to the extent practicable in all years. The approach is designed to motivate fishery participants to avoid Chinook salmon bycatch at the individual vessel level under any condition of pollock and Chinook abundance in all years. The vessel-level incentives are created through contracts among the fishery participants.

Amendment 110 to the BSAI FMP expanded the rules and regulations established under Amendment 91 by creating a comprehensive salmon bycatch avoidance plan. Amendment 110 requires incentives for the operator of each vessel to avoid Chinook and chum salmon bycatch under any condition of pollock and Chinook salmon abundance in all years. Under Amendment 110, the Chinook limits established by Amendment 91 will be reduced in years of low Chinook abundance in Western Alaska as determined by a 3-river index. Amendment 110 also requires: (1) the use of salmon excluder devices; (2) penalties for vessels with consistently higher Chinook salmon PSC relative to other vessels fishing at the same time; and (3) fishing restrictions or performance criteria to ensure that Chinook salmon PSC rates in October are not significantly higher than in prior months. The rules and regulations implementing Amendment 110 came into force at the start of the 2017 fishery.

The 50 CFR 679.21(f)(13) stipulates that IPA entities report annually on the following:

- Incentive measures, including the rolling hot spot program and salmon excluder use, in effect in the previous year;
- How incentive measures affected individual vessels;
- How incentive measures affected salmon savings beyond current levels;
    - Effectiveness of measures to ensure that chum salmon were avoided in areas and times where chum salmon are likely to return to western Alaska
    - Effectiveness of restrictions that target vessels that consistently have significantly higher Chinook PSC rates relative to other vessels
    - Effectiveness of restrictions used to ensure that Chinook PSC rates in October are not significantly higher than in prior months
- IPA amendments approved by NMFS since the last annual report and the reasons for amendments;
- Sub-allocation to each participating vessel;
- Number of Chinook PSC and amount of pollock (mt) at the start of each fishing season;
- Number of Chinook PSC and amount of pollock (mt) caught at the end of each season;
- In-season transfers among entities of Chinook salmon PSC or pollock among AFA cooperatives;
- Transfers of Chinook salmon PSC and pollock allocations among IPA vessels.

CP IPA Overview

The Catcher-Processor--Chinook and chum salmon bycatch reduction--Incentive Plan Agreement (CP IPA) is designed to provide the incentives necessary to achieve the goals and objectives of Amendment 91 and 110. The plan builds on experience gained in the development and refinement of time-and-area-based, rolling hot-spot avoidance programs. The plan creates incentives to avoid salmon bycatch by restricting the pollock fishing opportunities of vessels with poor Chinook and/or chum bycatch performance while allowing vessels with good performance increased access to the fishing grounds. Losing access to good pollock fishing raises vessel operating costs and reduces product values. Avoiding grounds restrictions reduces operating costs and allows for the production of higher-valued products (especially during the A-season), thus increasing profits.

The Chinook bycatch limits depend on whether the fishery participants develop IPAs. If IPAs are developed and the 3-river (Yukon, Kuskokwim, and Unalakleet) combined run reconstruction total (3-river index) is determined to be above 250,000 Chinook, then the annual PSC limit in the subsequent year is 60,000 Chinook during any two-out-of-seven years, and 47,591 Chinook in other years. If IPAs are developed and the 3-river index is below 250,000 Chinook, then the subsequent years' annual PSC limit is 45,000 Chinook during any two-out-of-seven years, and 33,318 Chinook in other years. During 2020 the 3-river index was determined to not be in low abundance and all pollock vessels participated in an IPA. The catcher-processor (CP) sector IPA participants included vessels harvesting the American Fisheries Act (AFA) CP Sector and Community Development Quota (CDQ) pollock allocations. For the CP sector, the Chinook PSC limit is 17,040 fish (under the 60,000 fish annual limit) and the pollock quota is 36 percent of the non-CDQ directed fishing allocation. For the CDQ sector, the Chinook PSC limit is 4,896 fish (under the 60,000 fish annual limit) and the pollock quota is 10 percent of the annual directed fishing allocation. Each year the CP IPA participants manage Chinook bycatch using the lower 47,591 (33,318 in low abundance years) fishery "performance standard" limit. When the 3-river index is above 250,000 Chinook, the "performance standard" limit for the CP sector is 13,516 Chinook and the CDQ sector "performance standard" limit is 3,883 Chinook. When the 3-river index is determined to be below 250,000 Chinook, the "performance standard" limit for the CP sector is 9,462 Chinook and the CDQ sector "performance standard" limit is 2,719 Chinook. Pollock and Chinook quotas are further allocated among the seasons and the participating vessels. Table 1 shows the CP IPA "day-one" allocations of pollock and Chinook salmon PSC quota for 2020.

The IPA is designed to provide an incentive for good vessel Chinook and chum bycatch performance under any condition of pollock and Chinook salmon abundance. Primary IPA components include: (1) data gathering, monitoring, reporting, and information sharing; (2) identification of bycatch avoidance areas (BAA); and (3) fishing-area prohibitions for vessels with poor bycatch performance. Additional components include: (4) an A-season closed area of approximately 755 square nautical miles on the northern flank of the Bering Canyon; and (5) a set of conditional, B-season closed areas of approximately 1,295 square miles along the outermost EBS shelf. Vessels are prohibited from fishing in the B-season areas beginning on October 15th and continuing through the end of the season during years when the aggregate bycatch of all plan vessels during the month of September exceeds a preset threshold.

Incentive Measures

THE CHINOOK AND CHUM ROLLING HOT-SPOT (RHS) PROGRAM

One of the most practical and direct methods to create incentives to avoid salmon bycatch is to limit the pollock fishing opportunities of a vessel when bycatch performance is poor. This simple approach works especially well for catcher-processors because efficient processing requires an uninterrupted flow of fish, and this can be achieved most reliably with unrestricted access to the grounds. Because experience has shown that high, local concentrations of pollock may often be found where concentrations of salmon are also high (the vessels can "see" the pollock but not the salmon), limiting access to local areas of relatively high Chinook and chum bycatch is an efficient way to create a financial incentive to avoid salmon bycatch. This is because losing access to good pollock fishing grounds increases vessel operating costs and reduces the amount of products that can be produced during a day of fishing. A vessel that retains nearly unrestricted access to good pollock fishing opportunities avoids costs associated with moving and finding pollock in other areas, and so the vessel can produce higher volumes of higher valued products each day.

The RHS accomplishes this in two steps. The first step is to employ data gathering, reporting, and information sharing to identify local areas of relatively high Chinook and chum abundance on the pollock grounds. Pollock catch and Chinook and chum bycatch records from all fishery participants are gathered, compiled, evaluated, and distributed to IPA participants each week during which an IPA vessel catches pollock. With this information, areas of relatively high Chinook and chum bycatch are identified (hot-spots, or bycatch avoidance areas; BAA). BAA for chum are only identified during the B-season, while BAA for Chinook can occur in both A and B seasons. Should vessels continue to fish in these areas, high salmon bycatch is likely to occur because local concentrations of salmon routinely persist in time and space for several weeks. Access to this information in real time allows vessels to decide where or where not to fish based on where salmon are likely to be concentrated. Data shows that CP vessels are using the information provided through this program to avoid fishing in a BAA, even when not required to do so under the provisions of the IPA. This is demonstrated in more detail under 'Effects of Incentive Measures' below.

The second step is to evaluate vessel Chinook and chum bycatch performance relative to a grounds-wide index of Chinook and chum abundance (the base rate). This base rate fluctuates depending on average vessel performance to reflect the "base" level of Chinook and/or chum abundance on the grounds. The base rate is calculated as the grounds-wide number of Chinook or chum caught per ton of pollock caught. Because the base rate fluctuates depending on pollock and salmon abundance, benchmarking vessel performance against this rate establishes and maintains incentives to avoid salmon bycatch under any condition of pollock and Chinook abundance. The bycatch performance of an IPA vessel must remain below 75% of the base rate in any given week in order for it to maintain unrestricted access to the fishing grounds (i.e. to not be prohibited from fishing in any BAA). The incentive plan components to implement data gathering, reporting, and information sharing to identify areas of relatively higher chum salmon bycatch on the pollock grounds are the same as those used for Chinook salmon, except: 1.) Bycatch Avoidance Areas are identified such that priority is given to areas and times when chum salmon are most likely to return to Western Alaska rivers, and 2.) Chinook protection priorities eliminate chum salmon avoidance measures in areas and times when Chinook avoidance measures take priority. More information about BAA identification methods for both Chinook and chum salmon are detailed within the amended IPA agreement: https://www.fisheries.noaa.gov/webdam/download/90444480.

Vessel performance (number of Chinook per ton of pollock caught) is measured both currently (most recent two weeks) and cumulatively (over the entire fishing season), relative to the base rate. Vessel performance over these time periods is used to create two different incentives. To evaluate current performance, vessel performance is measured during the prior two weeks and compared to the base rate. A two-week period is used

because experience has shown that day-to-day vessel bycatch performance is influenced by random factors associated with changes in weather, winds, water temperatures, and currents, and measuring performance over a two-week period dampens the effects of these random influences. This increases the usefulness of the performance measure in the creation of an incentive for the individual vessel to avoid bycatch.

The IPA rules stipulate that if the current bycatch performance of an IPA vessel is not lower than 75% of the base rate, then the vessel is prohibited from fishing in the identified BAA for seven days (i.e. the following week). If during the following week the current bycatch rate of a vessel operating under a fishing prohibition remains higher than 75 percent of the base rate, then the vessel is prohibited again from fishing in the BAA for an additional seven days. A seven-day fishing prohibition is called a weekly fishing prohibition.

CUMULATIVE CHINOOK BYCATCH PERFORMANCE

The cumulative Chinook bycatch performance of a vessel is measured as the total amount (number) of Chinook salmon bycatch by the vessel during the fishing year relative to the pollock allocation assigned to that vessel (Table 1 shows the "day-one" assignments for 2020). So the measure of cumulative vessel performance accumulates from the first day of fishing through to the last, and is evaluated against a standard designed to magnify the incentive to avoid salmon bycatch during years when the baseline abundance of Chinook is medium and high. Based on analysis of more than a decade of CP catch records, an annual bycatch of 8,500 Chinook indicates a year when Chinook abundance on the grounds traditionally fished by CP vessels is at a medium level, and this number of bycatch Chinook is the basis for the cumulative performance incentive.

Cumulative bycatch performance is evaluated for those vessels that receive a weekly fishing prohibition. For these vessels, if cumulative Chinook bycatch is higher than the medium-abundance standard, then the vessel is prohibited from fishing in the BAA for two weeks. This standard is called the vessel cumulative bycatch amount, and a fourteen-day fishing prohibition is called an extended fishing prohibition. If vessel Chinook bycatch is greater than its cumulative amount, then it is subject to the extended fishing prohibition. Additional information about how the vessel cumulative amount is determined is in the IPA agreement.

CHRONIC VESSEL POOR BYCATCH PERFORMANCE

An incentive to avoid chronic vessel poor bycatch performance was added to the CP IPA in 2015 in advance of the Amendment 110 requirement. This incentive identifies vessels with poor bycatch performance by comparing relative vessel performance over several pollock seasons. At the end of each season, vessels with bycatch performance (Chinook salmon per ton of pollock catch) greater than one and one-half (1.5) standard deviations above the average vessel performance are identified. If a vessel is so identified during three consecutive seasons, then the vessel is designated a poor performance vessel during the following season. All vessels designated as poor performers are prohibited from fishing in any BAA for the entire season. If the following season is a B-season, then these vessels are also prohibited from fishing in the B-season Chinook Salmon Conservation Areas during October. While this provision is designed to identify and penalize chronic poor performers, an incentive for all vessels to improve Chinook bycatch performance is created as all vessels change fishing behavior to avoid being designated a poor performance vessel.

CHINOOK PROTECTION PRIORITY

The Chinook protection priority eliminates chum salmon avoidance incentives during September and October, a period when Chinook abundance on the grounds usually increases. Because in the fall, Chinook often

appear first within the Bering Canyon while chum salmon may still be on the fishing grounds to the northwest, the plan may, for example, adopt Chinook BAA east of 168 degrees West longitude while preserving BAA for chum salmon west of 168 degrees West longitude. The Chinook protection priority was conceived to ensure that the incentives to avoid chum salmon during the B-season do not increase Chinook salmon bycatch.

CHINOOK SALMON CONSERVATION AREAS

Chinook salmon feeding migrations produce concentrations of Chinook in discrete, local areas along the EBS outer continental shelf, and many of these areas are well known to pollock fishermen. Pollock fishermen know the areas because more often than not high concentrations of pollock are found in the areas. However, the precise times during which pollock and Chinook may be concentrated in any local area depends on a host of environmental and physical-oceanographic conditions that change with the seasons and the weather, such that it is not generally possible to know precisely when and where pollock and Chinook are concentrated together before going fishing for pollock.

Analysis of catch records over a decade or more has revealed the existence of one area along the outer continental shelf within which it seems that high concentrations of Chinook salmon exist almost every year during the winter fishery. Based on this analysis, an A-season fishing prohibition within an approximately 735 square mile area is included in the plan as a means to reduce bycatch. The area is called the A-season Chinook Salmon Conservation Area (CSCA; maps and the latitude and longitude coordinates of all CSCA boundaries are provided in the IPA agreement). Figure 1 shows the boundaries of the A-season CSCA.

Analysis of B-season catch records over two decades shows that when migrating Chinook arrive on the outer continental shelf in sufficient numbers during September, the odds that the fishery will encounter high concentrations of Chinook in October appear to increase. To create an incentive to reduce bycatch during the latter portion of the B-season, the CP IPA includes "triggered" fishing prohibitions for three areas of approximately 1,295 square miles along the outermost shelf. These areas are called the B-season Chinook Salmon Conservation Areas (Figure 2). To implement the incentive, all vessels are prohibited from fishing in the areas beginning on October 15th and continuing through to the end of the season during those years when the aggregate bycatch rate for all vessels during the month of September exceeds 0.015 Chinook per metric ton of pollock catch. This performance criteria ensures that Chinook salmon PSC rates in October are not significantly higher than those achieved in the preceding months.

The CP IPA also includes financial penalties for violating a BAA prohibition or for fishing in a CSCA when fishing there is prohibited. These penalties are $10,000 for the first violation, $15,000 for a second violation, and $20,000 for the third and each subsequent violation during the fishing year, with every trawl inside a prohibited area considered a separate violation.

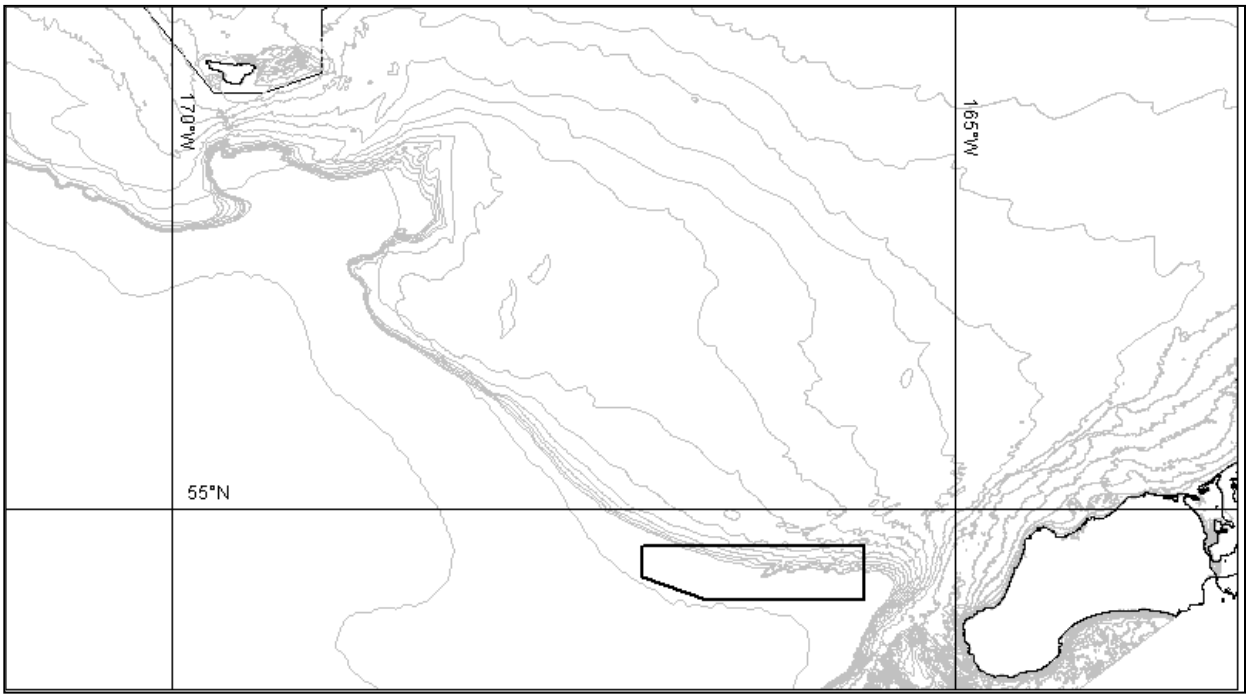

Figure 1. A-season Chinook Conservation Area.

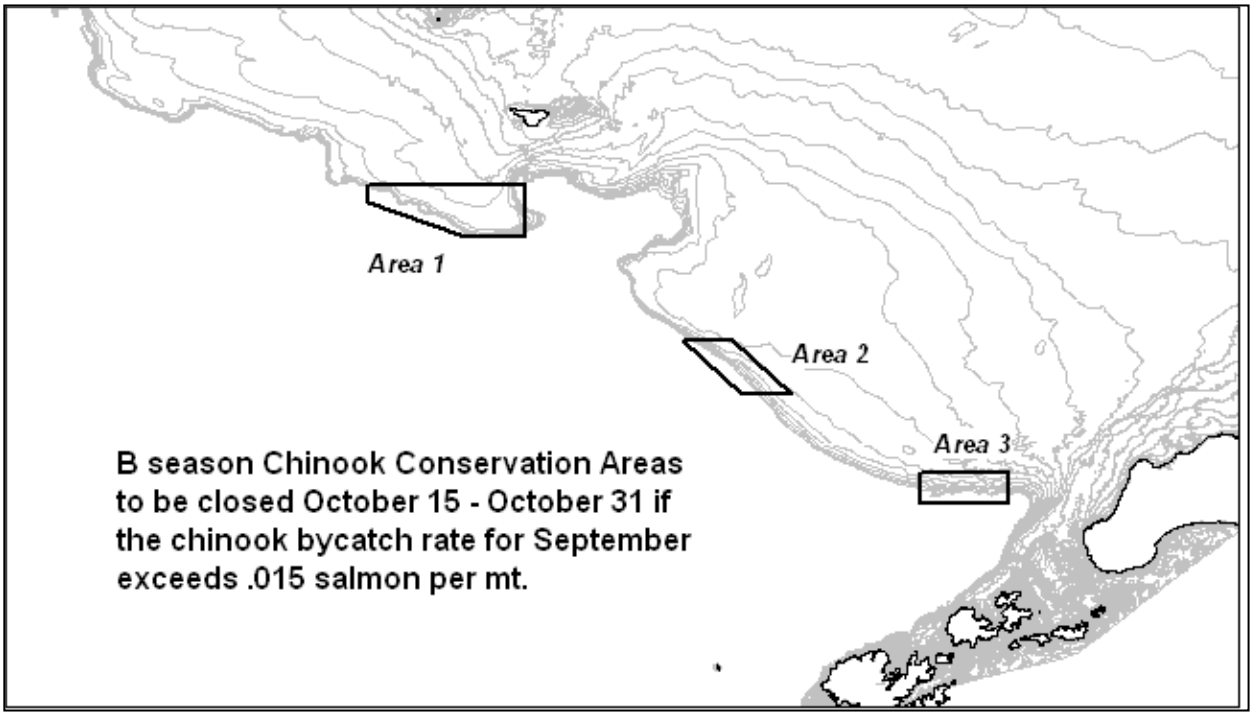

Figure 2. B-season Chinook Conservation Areas.

Management of Vessel Allocations

As discussed in the overview of the CP IPA, Amendment 91 establishes a total Chinook salmon cap of 60,000, with a performance standard of 47,591 Chinook with those amounts lowered in the event of a low-abundance 3-river index as outlined by Amendment 110. If the performance standard is met or exceeded in 3 of

7 consecutive years, then AFA vessels are held to the lower performance standard in perpetuity. Therefore, the CP IPA is structured so that the absolute cap of 60,000 (45,000 in low-abundance years) is never allocated among companies and vessels, unless the CP Salmon Corporation calls a vote and that vote is majority in favor. Instead, the allocation to companies and vessels always starts with the CP portion of the 47,591 (33,318 in low-abundance years) performance standard limit, or 13,516 (9,462 in low-abundance years) Chinook. First, buffers are subtracted from this 13,516 (9,462 in low-abundance years) Chinook, and then the remaining Chinook are allocated by the entity to companies who must then allocate them to their respective vessels before the start of fishing for the year. No company or vessel has received a re-allocation of Chinook salmon from the buffer since the IPA inception.

The CP IPA is designed to work in concert with the bycatch allocation management activities of the entities authorized within Amendment 91 and 110 to perform this task. For example, the plan includes a requirement for the constitution of a limit buffer to ensure that the sector bycatch limits established by Amendment 91 and 110 are conserved. The buffer is made up of contributions from all plan vessels in amounts equal to at least two-thirds of one percent of the vessel Chinook allocation. Because the limit buffer is planned to address some unexpected, unknown event, it is anticipated that the Chinook salmon allocations in the buffer will not be used to harvest the pollock allocation.

The plan also includes a requirement that the Technical Representative notify the allocation management entity when the Chinook bycatch of any plan vessel reaches 95 percent of its Chinook allocation. This requirement was included in the plan to ensure that the entities managing the bycatch allocations of plan vessels have sufficient time to assess the need for and-or timing of stop fishing orders.

CP IPA Allocations and Catches for 2020

Table 1 shows the CP IPA 2020 "day-one" allocations of pollock and Chinook salmon PSC by vessel for 2020 A- and B-seasons. Table 2 shows transfers of pollock and Chinook between CP IPA vessels in 2020. The allocations of Ocean Peace pollock and Chinook have already been allocated to PCC vessels in Table 1. The Table 1 allocations of Chinook salmon include the annual threshold amount (performance standard limit) to the AFA CP sector and the annual threshold amount (performance standard limit) for the CDQ sector. Allocations of Chinook were previously divided 80% to the A-season and 20% to the B-season, however, Table 1 now allocates the entire annual threshold amount to the A-season and any unused allocations in the A-season, automatically get rolled into the B-season. CDQ allocations of Chinook salmon are allocated at the discretion of individual CDQ groups. Table 3 shows 2020 CP IPA pollock catch and Chinook PSC by season and vessel. Vessel bycatch performance is shown by season because the Chinook bycatch environment is different during the A-and B-seasons. During the B-season, and when fishing starts quickly, it is generally possible to complete fishing operations before Chinook salmon arrive on the shelf in the fall to feed. In other years they arrive earlier or fishing continues later, and great effort must be concentrated on limiting the bycatch.

Table 1. CP IPA Day-One Allocations of Pollock and Chinook Salmon, 2020, Including CDQ Pollock and Chinook Allocated to the CP Fleet from CDQ Partners.

	A-season		B-season	
Vessel	Pollock (mt)	Chinook (n)	Pollock (mt)	Chinook (n)
Starbound	18,384	904	28,026	147
American Dynasty	25,899	1349	31,655	22
American Triumph	25,899	1349	31,655	11
Northern Eagle	25,899	1349	31,654	23
Northern Jaeger	25,899	1349	31,654	23
Ocean Rover	25,898	1349	31,654	23
Arctic Fjord	23,080	1268	27,345	0
Arctic Storm	19,265	1119	24,412	0
Northern Hawk	21,197	1178	25,908	168
Alaska Ocean	34,859	2044	42,605	0
Island Enterprise	14,256	777	15,576	0
Kodiak Enterprise	14,256	777	15,576	0
Seattle Enterprise	14,256	778	15,576	0
Ocean Peace	0	0	0	0
Katie Ann	0	0	0	0
Northern Glacier	0	0	0	0
Total 2020 Allocation			642,343	16,007
Allocation Buffer			0	1,392

Table 2. Transfers of pollock and Chinook between CP IPA vessels in 2020.

Date	From vessel	To vessel	Amount (mt or N)	Sector	Species
3/3/20	American Dynasty	Northern Hawk	405	Coop	Pollock A
3/3/20	American Triumph	Northern Hawk	405	Coop	Pollock A
3/3/20	American Dynasty	Northern Hawk	405	Coop	Pollock A
3/3/20	Northern Jaeger	Northern Hawk	405	Coop	Pollock A
3/3/20	Ocean Rover	Northern Hawk	405	Coop	Pollock A
3/3/20	American Dynasty	Northern Hawk	128	Coop	Pollock B
3/3/20	American Triumph	Northern Hawk	128	Coop	Pollock B
3/3/20	American Dynasty	Northern Hawk	129	Coop	Pollock B
3/3/20	Northern Jaeger	Northern Hawk	129	Coop	Pollock B
3/3/20	Ocean Rover	Northern Hawk	129	Coop	Pollock B
3/3/20	American Dynasty	Northern Hawk	6	Coop	Chinook A
3/3/20	American Triumph	Northern Hawk	6	Coop	Chinook A
3/3/20	Northern Eagle	Northern Hawk	6	Coop	Chinook A
3/3/20	Northern Jaeger	Northern Hawk	6	Coop	Chinook A
3/3/20	Ocean Rover	Northern Hawk	6	Coop	Chinook A
3/3/20	American Dynasty	Northern Hawk	12	Coop	Chinook A
3/3/20	American Triumph	Northern Hawk	12	Coop	Chinook A
3/3/20	Northern Eagle	Northern Hawk	12	Coop	Chinook A
3/3/20	Northern Jaeger	Northern Hawk	12	Coop	Chinook A
3/3/20	Ocean Rover	Northern Hawk	12	Coop	Chinook A
6/9/20	Artic Fjord	Arctic Storm	7	Coop	Pollock A
6/9/20	Northern Eagle	American Triumph	674	Coop	Pollock A
6/9/20	Ocean Rover	American Dynasty	467	Coop	Pollock A
6/9/20	Northern Jaeger	American Dynasty	258	Coop	Pollock A
6/9/20	Northern Eagle	American Dynasty	106	Coop	Pollock A
6/9/20	Ocean Rover	Arctic Storm	3	Coop	Pollock A
6/9/20	Northern Jaeger	American Triumph	92	CDQ	Pollock A
6/9/20	Northern Eagle	American Triumph	18	CDQ	Pollock A
6/9/20	Northern Jaeger	American Dynasty	122	CDQ	Pollock A
6/9/20	American Triumph	American Dynasty	49	CDQ	Pollock A
6/9/20	American Triumph	Northern Eagle	7	CDQ	Pollock A
6/9/20	Northern Eagle	American Dynasty	6	CDQ	Pollock A
6/9/20	Northern Eagle	American Triumph	6	CDQ	Pollock A
6/9/20	Northern Eagle	Ocean Rover	5	CDQ	Pollock A
6/9/20	Arctic Storm	Arctic Fjord	6	CDQ	Pollock A
6/9/20	Island Enterprise	Kodiak Enterprise	56	CDQ	Pollock A
6/9/20	Arctic Storm	Ocean Rover	3	CDQ	Pollock B
6/9/20	Northern Eagle	Northern Jaeger	15	CDQ	Chinook A
6/9/20	American Triumph	Northern Jaeger	1	CDQ	Chinook A
6/9/20	Kodiak Enterprise	Island Enterprise	1	CDQ	Chinook A
7/9/20	American Dynasty	Northern Hawk	1040	Coop	Pollock B
7/9/20	American Triump	Northern Hawk	1040	Coop	Pollock B
7/9/20	Northern Eagle	Northern Hawk	1040	Coop	Pollock B
7/9/20	Northern Jaeger	Northern Hawk	1040	Coop	Pollock B
7/9/20	Ocean Rover	Northern Hawk	1040	Coop	Pollock B
10/6/20	Northern Jaeger	Northern Hawk	23	Coop	Pollock B
6/12/20	Ocean Rover	American Dynasty	4	Coop	Pollock B
6/12/20	Ocean Rover	American Triumph	3	Coop	Pollock B
6/12/20	Ocean Rover	Northern Eagle	5	Coop	Pollock B
6/12/20	Ocean Rover	Northern Jaeger	5	Coop	Pollock B
7/7/20	Northern Hawk	American Dynasty	1040	CDQ	Pollock B
7/7/20	Northern Hawk	American Triumph	1040	CDQ	Pollock B

7/7/20	Northern Hawk	Northern Eagle	1040	CDQ	Pollock B
7/7/20	Northern Hawk	Northern Jaeger	1040	CDQ	Pollock B
7/7/20	Northern Hawk	Ocean Rover	1040	CDQ	Pollock B
7/7/20	Northern Hawk	American Dynasty	20	CDQ	Chinook B
7/7/20	Northern Hawk	American Triumph	20	CDQ	Chinook B
7/7/20	Northern Hawk	Northern Eagle	20	CDQ	Chinook B
7/7/20	Northern Hawk	Northern Jaeger	20	CDQ	Chinook B
7/7/20	Northern Hawk	Ocean Rover	20	CDQ	Chinook B
7/7/20	American Dynasty	Northern Eagle	5	Coop	Chinook B
7/7/20	American Triumph	Northern Eagle	16	Coop	Chinook B
7/7/20	American Triumph	Northern Jaeger	67	Coop	Chinook B
7/7/20	American Triumph	Ocean Rover	124	Coop	Chinook B
7/7/20	American Triumph	American Dynasty	4	CDQ	Chinook B
7/7/20	Northern Jaeger	American Dynasty	4	CDQ	Chinook B
7/7/20	Northern Eagle	Ocean Rover	2	CDQ	Chinook B
7/7/20	American Triumph	American Dynasty	5	CDQ	Chinook B
7/7/20	American Triumph	Northern Eagle	5	CDQ	Chinook B
7/7/20	American Triumph	Northern Jaeger	5	CDQ	Chinook B
7/7/20	Ocean Rover	Northern Jaeger	2	CDQ	Chinook B
10/17/20	American Triumph	Ocean Rover	3597	Coop	Pollock B
10/17/20	American Triumph	Northern Eagle	3597	Coop	Pollock B
10/17/20	American Triumph	American Dynasty	3597	Coop	Pollock B
10/17/20	American Triumph	Ocean Rover	109	Coop	Chinook B
10/17/20	American Triumph	Northern Eagle	109	Coop	Chinook B
10/17/20	American Triumph	American Dynasty	109	Coop	Chinook B
10/17/20	Northern Jaeger	Northern Eagle	2921	Coop	Pollock B
10/17/20	Northern Jaeger	Ocean Rover	8000	Coop	Pollock B
10/17/20	Northern Jaeger	Ocean Rover	127	Coop	Chinook B
10/17/20	Northern Jaeger	Northern Eagle	127	Coop	Chinook B
10/17/20	Northern Jaeger	American Dynasty	127	Coop	Chinook B
10/10/20	Seattle Enterprise	Kodiak Enterprise	6108	Coop	Pollock B
10/17/20	American Triumph	Ocean Rover	16	Coop	Chinook B

Table 3. CP IPA Pollock Catch and Chinook Bycatch Performance by Season and Vessel, 2020.

	A-season			B-season		
Vessel	Pollock (mt)	Chinook (n)	Rate (n/mt)	Pollock (mt)	Chinook (n)	Rate (n/mt)
Alaska Ocean	34,607	853	0.025	40,003	922	0.023
American Dynasty	26,477	870	0.033	23,600	498	0.021
American Triumph	26,216	625	0.024	13,952	128	0.009
Arctic Fjord	23,079	700	0.030	25,524	340	0.013
Arctic Storm	19,263	624	0.032	23,749	469	0.020
Island Enterprise	14,045	471	0.034	15,840	202	0.013
Kodiak Enterprise	14,215	424	0.030	18,903	481	0.025
Northern Eagle	24,668	871	0.035	28,691	401	0.014
Northern Hawk	23,178	485	0.021	29,596	130	0.004
Northern Jaeger	25,022	947	0.038	16,537	86	0.005
Ocean Rover	25,001	986	0.039	37,135	724	0.019
Seattle Enterprise	14,131	442	0.031	9,471	80	0.008
Starbound	18,248	632	0.035	25,480	247	0.010
Northern Glacier	0	0		0	0	
Katie Ann	0	0		0	0	
Ocean Peace	0	0		0	0	
Forum Star	0	0		0	0	
American Challenger	0	0		0	0	
Ocean Harvester	0	0		0	0	
Neahkanie	0	0		0	0	
Sea Storm	0	0		0	0	
Muir Milach	0	0		0	0	
Totals	288,150	8,930	0.031	308,482	4,708	0.015
Grand Totals	Pollock A+B (mt) **596,633**		Chinook A+B (n) **13,638**		Rate A+B (n/mt) **0.023**	

Effects of Incentive Measures

This annual report provides a qualitative evaluation and some quantitative information on the effectiveness of the CP IPA in influencing vessel behavior to minimize Chinook bycatch. The CP IPA incentive program is largely an area-based program, and this evaluation relies heavily on spatial analysis of pollock trawl locations as well as the bycatch performance of the individual vessels. To begin an assessment of the IPA incentives on the individual vessels, the aggregate performance of the vessels in the 2016-2020 fisheries (recent 5-year performance) is tabulated and compared to performance during years prior to Amendment 91 regulations. Table 4 shows the aggregate bycatch performance (number of Chinook per ton of pollock caught) of CP IPA vessels 2006-2010, comprising the five years prior to implementation of the CP IPA, and the recent five years under the IPA. It is clear from Table 4 that CP Chinook bycatch performance has greatly improved since the implementation of the IPA, as compared to previous years without incentive measures in place, although it cannot be determined what role environmental conditions and salmon abundance played throughout this time period. The 2020 B-season fishing extended late into October due to COVID-19 delays and poor fishing conditions thereby increasing Chinook bycatch rates over previous B-seasons.

Table 4. Chinook Bycatch Rates (N/mt) in the CP Fleet for 2006-2010 and 2016-2020.

Year	A-season (n/mt)	B-season (n/mt)	A+B-season (n/mt)	A+B season (m/t) five year interval
2006	0.066	0.004	0.029	
2007	0.100	0.017	0.066	
2008	0.027	0.002	0.012	0.028
2009	0.021	0.002	0.010	
2010	0.024	0.000	0.009	
2016	0.032	0.007	0.017	
2017	0.041	0.005	0.021	
2018	0.016	0.005	0.010	0.018
2019	0.032	0.011	0.020	
2020	0.031	0.015	0.023	

Figure 3 shows the range of vessel bycatch performance each year since 2003, during the time period when Chinook are most abundant on the pollock fishing grounds (September-February). In the prior program, the bycatch performance of a pollock cooperative (group of vessels) was evaluated against a performance benchmark, and under some circumstances, incentives to avoid bycatch weakened for an individual vessel. However, if incentive measures are working at the vessel level, one would expect the distribution of Chinook bycatch rates among the vessels to shrink. This is because vessels are accountable for their own Chinook bycatch, and better performers cannot shelter less well performing vessels. Evident from this graph is that, since the IPA began, vessel bycatch rates have been reduced, and also that the variance of rates among vessels has been very small in the IPA years, even relative to previous years with similar average rates. **In other words, Chinook bycatch rates among vessels display a smaller range of values since 2011 than in previous years, providing evidence of the effectiveness of the vessel-level incentives.**

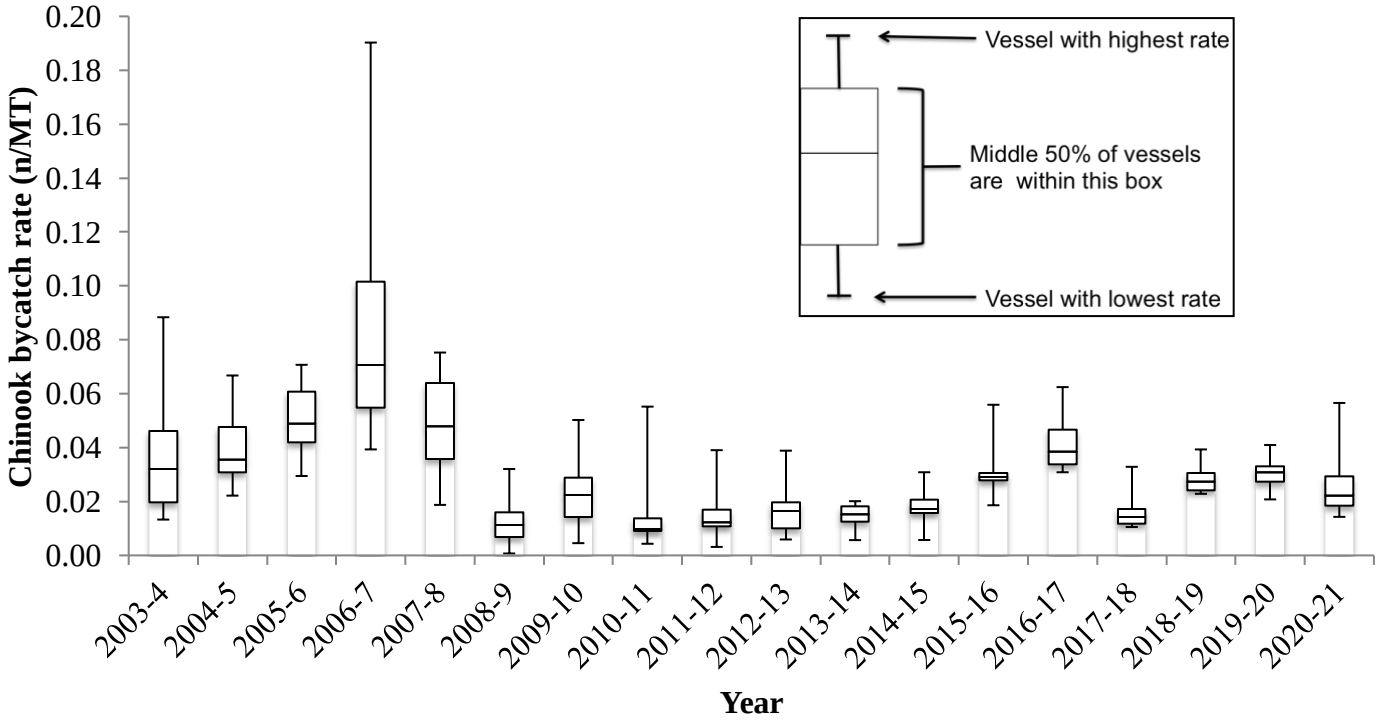

Figure 3. September-February *CP Vessel* Chinook Bycatch Rate Distribution by year 2003-2021.

Another way to look at how incentives have been working at the individual vessel level is to compare the frequency of different levels of Chinook bycatch rates by individual vessels in the period before and after the implementation of Amendment 91. A narrowing distribution of vessel performance in the period since Amendment 91 indicates that vessels are behaving more similarly to each other, thus are exhibiting vessel-level accountability for their Chinook bycatch. Figure 4 shows the distribution of vessel bycatch rates in the A-season of 2010 (pre-Amendment 91), while Figure 5 shows the same distribution in the A-season of 2020 (post-Amendment 91). While average Chinook bycatch rates vary widely from year to year, the sharp narrowing of the distribution of vessel performance around the mean demonstrates more vessel-level accountability in the period since Amendment 91 implementation. The average A-season vessel level bycatch rate variance among the AFA CP fleet has been reduced significantly and there is no tail in the distribution.

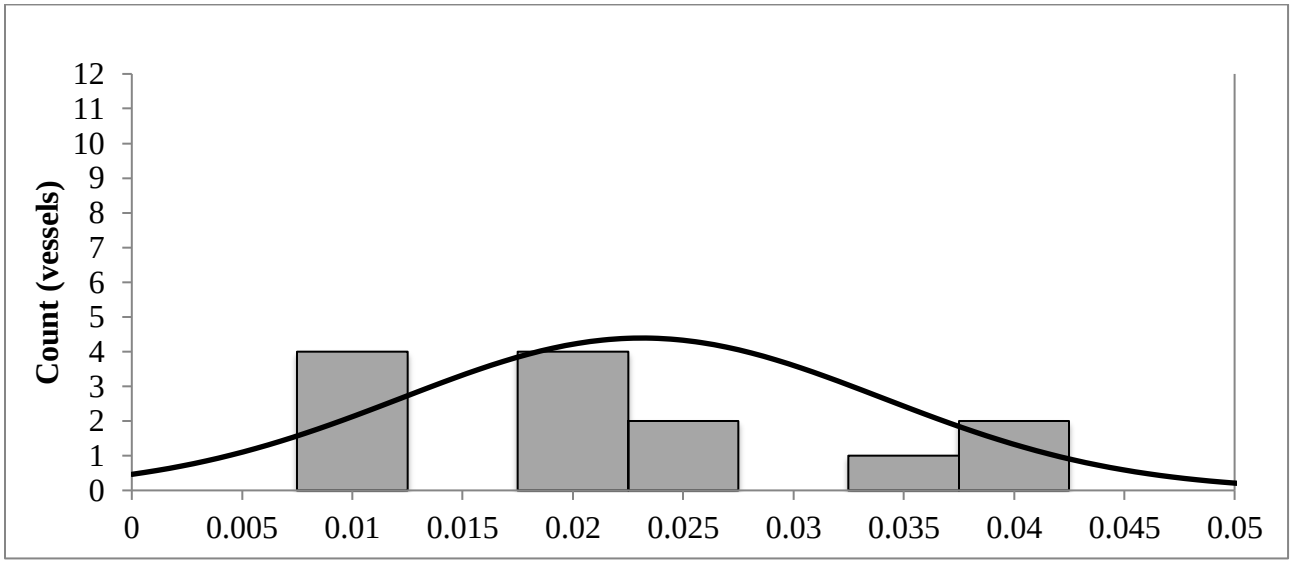

Figure 4. A-season CP Vessel Chinook Bycatch Rate Distribution for 2010 with variance pre-Amendment 91 of 0.00011.

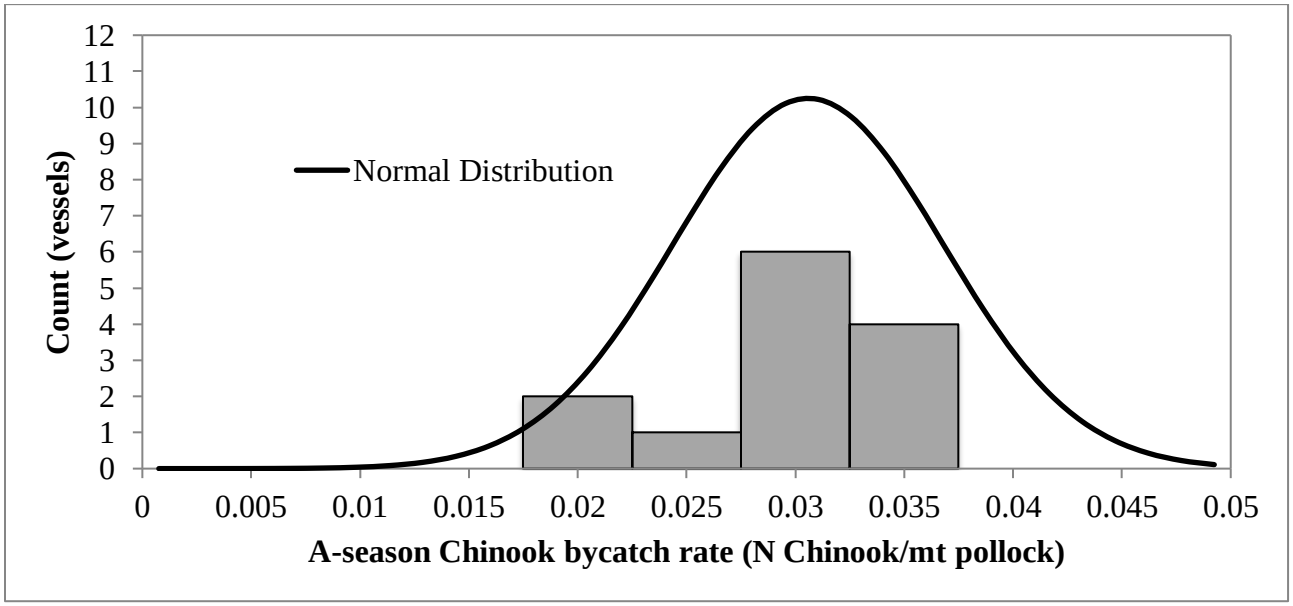

Figure 5. A-season CP Vessel Chinook Bycatch Rate Distribution for 2020 with variance post-Amendment 91 of 0.00003.

The incentive to avoid chronic vessel poor bycatch performance first came into force during 2015, but its provisions applied retroactively to vessel performance during the 2014 A- and B-seasons. The provision states

that any vessel with a season Chinook bycatch rate greater than 1.5 standard deviations from the mean fleet Chinook bycatch rate for three consecutive seasons shall be excluded from all Chinook bycatch avoidance areas during the following season. Over the past ten seasons, nearly all vessels have been outliers in at least one season. Since the outlier provision was implemented, no vessels have been outliers in three consecutive seasons and thereby subject to a season long bycatch avoidance area prohibition. Only one vessel has been an outlier in two consecutive seasons.

Figure 6 below shows the relative performance of the fleet for the 2020 A- and B-seasons. Differences are evident between vessel bycatch performance in A-season versus the B-season; therefore, the provision is applied on a seasonal basis to account for different bycatch environments. During the 2020 A-season, there was one statistically poor performing vessel. During the 2020 B-season there was again just one vessel outlier. The bycatch rate distribution for the B-season was more variable than normal, this was due to some vessels fishing later in the season than usual due to COVID-19 delays. Nonetheless, the average bycatch rate during the B-season was just 1.4 Chinook per 100 tons of pollock catch. The disincentive to chronic poor bycatch performance has proven effective in its first six years of implementation—with vessels strongly avoiding having repeat or chronic poor Chinook bycatch performance. Vessels have strong incentive to change fishing behavior to avoid being an outlier in any consecutive seasons, because although a vessel might have long periods of good relative bycatch performance, one lightning strike trawl can render it an outlier in any given season. Given a constant abundance of Chinook and pollock over time, the incentive provision should encourage a shift in the distribution of vessel bycatch performance to the left.

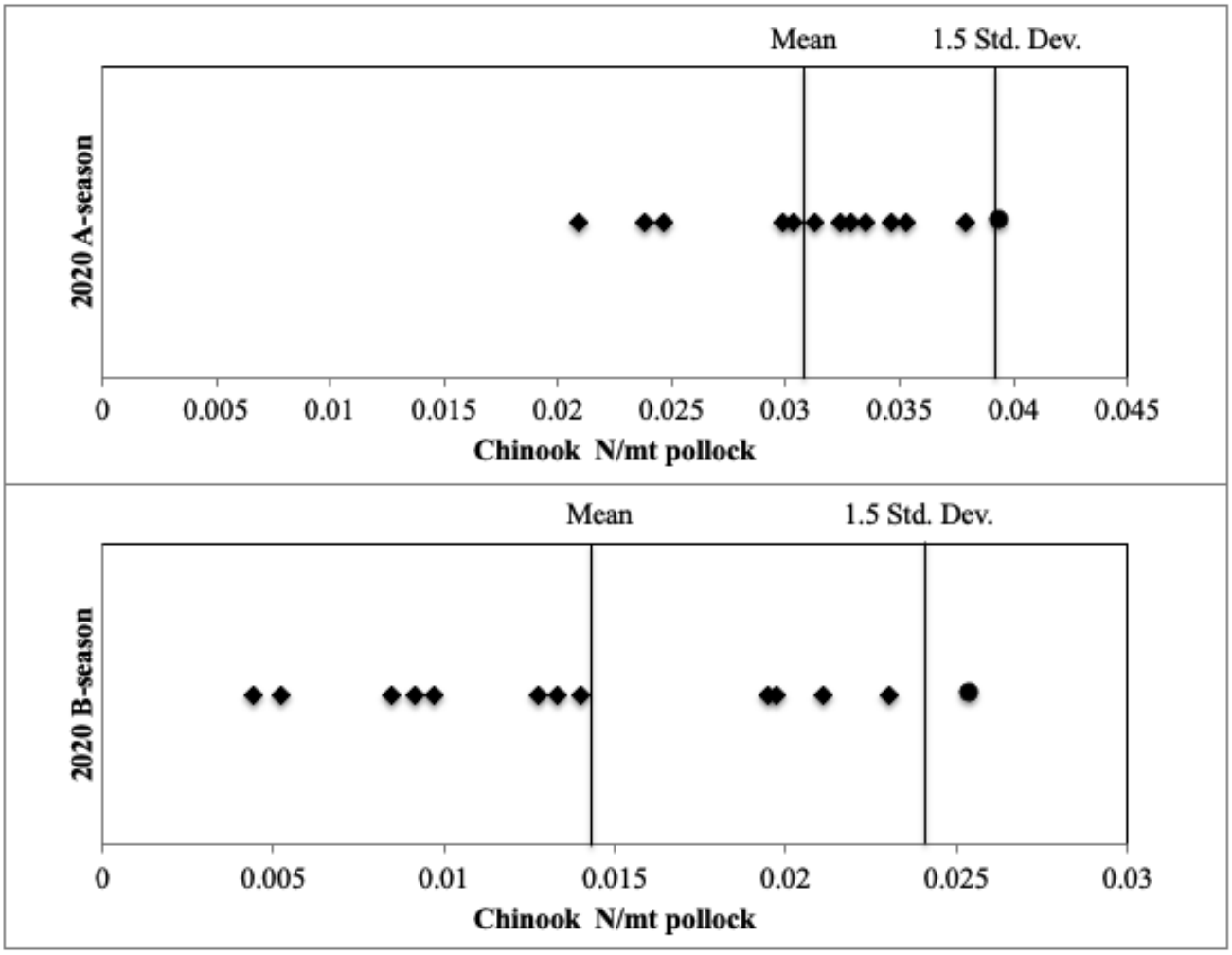

Figure 6. Fleetwide Chinook bycatch ratio distribution for 2020 fishing seasons. Circles denote outlier vessels.

Chinook Bycatch Avoidance Behavior

As mentioned previously, important elements of the CP IPA incentive program include: 1) the provision of real-time information to the fleet concerning areas of relatively high Chinook salmon abundance; and 2) designated time-area closures for vessels with Chinook bycatch rates higher than 75% of the base rate. Over time, data on Chinook bycatch rates on the fishing grounds has revealed certain patterns, with the highest bycatch rates occurring in predictable areas at certain times of the year. Another qualitative metric of the effectiveness of the Incentive Plan Agreement is the spatial contraction of the fishery since Amendment 91 took effect. Figure 7 shows all CP trawl locations between 2000 and 2020 during the time period where Chinook are most often present on the EBS shelf (September-February). The blue dots represent AFA CP trawl locations prior to 2000-2010 (pre-Amendment 91), and demonstrates that fishing effort was generally spread out over a larger area, with the darkest blue (most intensive fishing effort) in areas that are currently closed altogether. The orange dots represent AFA CP haul locations from 2011-2020, with the darkest orange also representing the more intensive fishing effort.

A close examination of the trawl locations in space and time, their bycatch rates, and the bycatch performance of all CP IPA vessels shows clearly that the vessels have changed their fishing strategy to avoid Chinook bycatch. The most salient feature of this changed approach was for vessels to locate initial fishing operations away from the outer margins of the shelf. Depending on the locations of pollock concentrations, any profitable movement of fishing to deeper water has been accomplished via a deliberate, slow, and cautious progression while maintaining awareness of information about Chinook concentrations within the area. Evidence of local Chinook concentrations generally caused vessels fishing in deep water to move fishing to more shallow grounds. This behavior was most pronounced during the A-season and occurred in multiple areas when trawl bycatch rates showed high concentrations of salmon, as e.g., when schools of Chinook salmon move into a local area to feed.

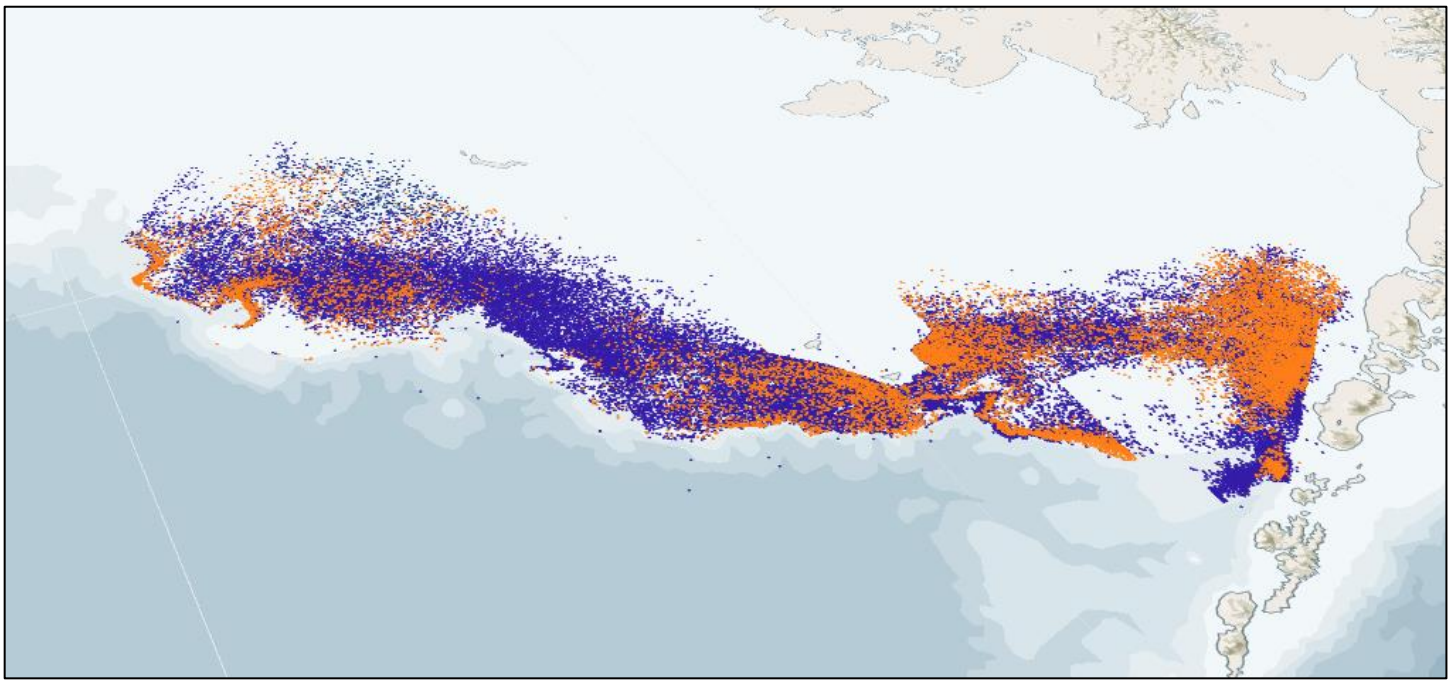

Figure 7. Pollock CP trawl locations between September 1st and February 28th for the years 2000-2010 (blue), 2011-2020 (orange).

As mentioned in the above paragraph, an important component of changing CP fishing behavior subsequent to Amendment 91 is fishing depth, because Chinook salmon are known to occur in deeper areas along the EBS shelf. Comparing effort, pollock and Chinook catches in the five years prior to and five years since Amendment 91, there has been a clear reduction in the amount of fishing effort at depths greater than 130 fathoms, where a large portion of Chinook bycatch has typically been encountered. In recent years, most A-season fishing

has occurred at depths less than 50 fathoms and roe recovery has been significantly reduced as the target fish size and age typically declines in shallower waters.

Another qualitative validation of the effectiveness of the Rolling Hot Spot program is evident when comparing the pattern of total Chinook salmon caught per trawl. Figure 8 plots all AFA CP trawl locations during the winter months as a function of total Chinook catch. The darker areas indicate low Chinook catch per trawl, while the white areas indicate high Chinook catch per trawl. In the pre-Amendment 91 period (top panel), it's clear that vessels remained in high Chinook bycatch areas. In the post-Amendment 91 period (lower panel) all but one of the white areas become diffuse, indicating vessels are not able to remain in areas of high Chinook bycatch.

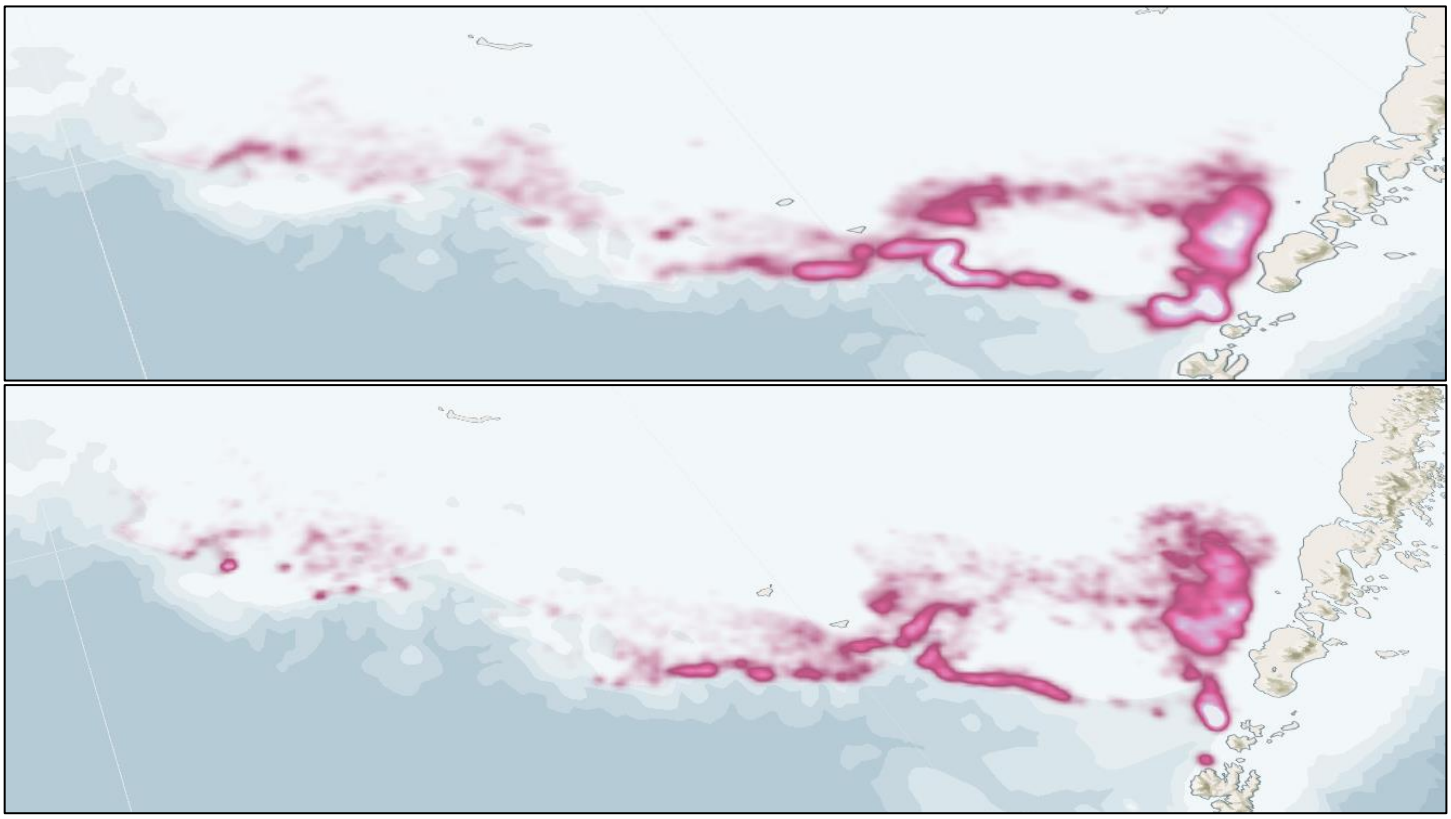

Figure 8. Pollock CP trawl locations as a function of total Chinook catch between September 1st and February 28th for the years 2000-2010 (top panel), 2011-2020 (lower panel). Color scales darkest (lowest Chinook catch number per trawl) to lightest (highest Chinook catch number per trawl).

Under the RHS program, several BAA were designated for the CP fleet during 2020 (Figure 9). The BAA are made known to all vessels on a weekly basis; only those vessels with a Chinook bycatch rate of greater than 75% of the base rate are required to avoid these areas. However, because the designations indicate where Chinook bycatch has been highest over a given week, even vessels that are not required to fish outside the BAA often voluntarily do so, in order to avoid Chinook bycatch. It is important to remember that, due to the way the base rate is calculated, there must be pollock fishing in an area in order for it to become a bycatch avoidance area, so those areas where CPs avoided fishing entirely will not contain any BAA.

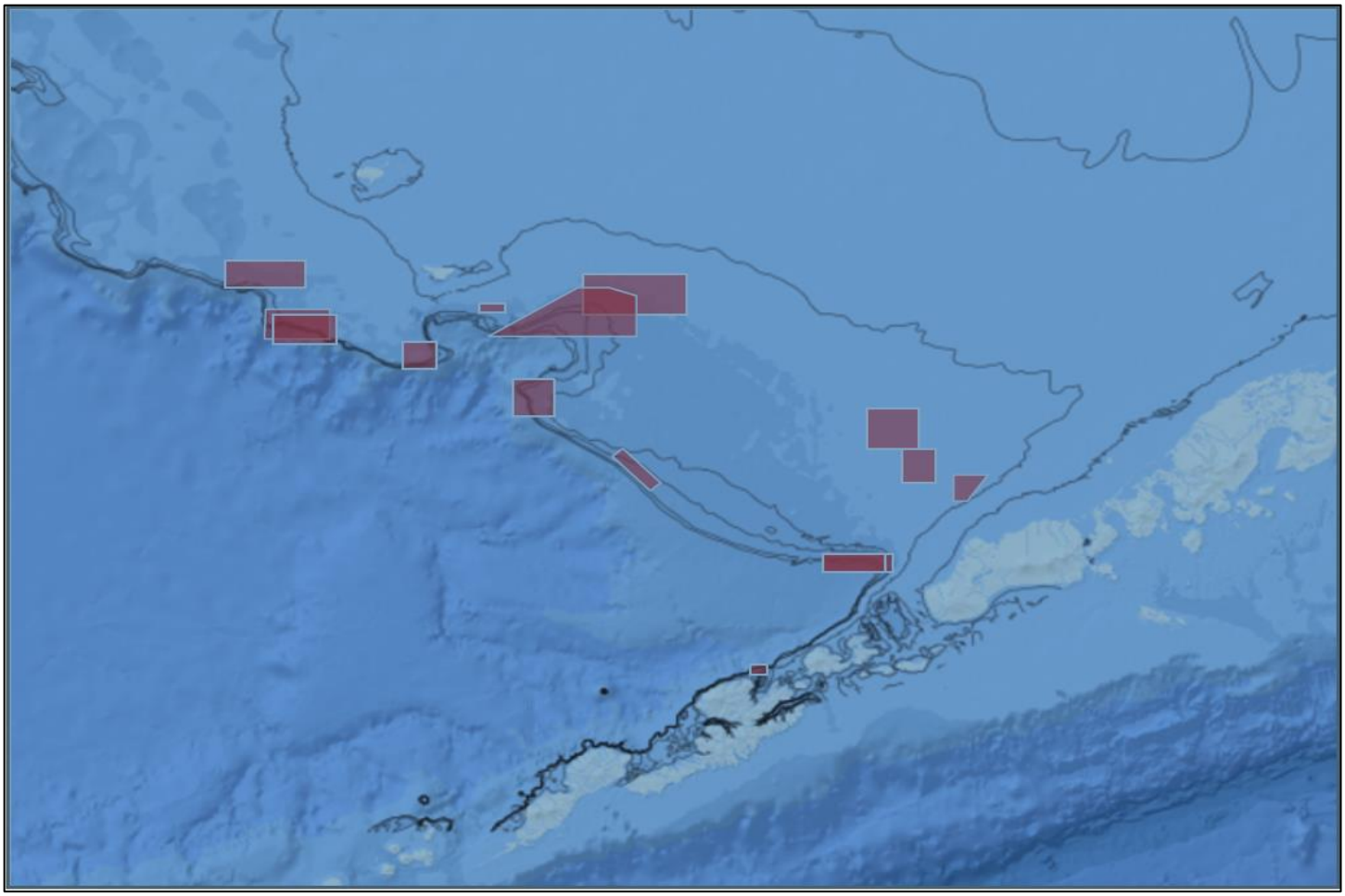

Figure 9. Chinook bycatch avoidance areas for the CP sector, 2020.

Table 5 shows the A-season weeks of 2020 and the number of vessels excluded from designated bycatch avoidance areas for Chinook salmon during each week. There were a total of six CP BAA during the 2020 A-season and seven CP BAA for the B-season, with the B-season Chinook Conservation Areas (Figure 2) closed to all IPA vessels starting October 15th through the end of the season. There were seven vessels subject to an extended (2-week) fishing prohibition during 2020.

Table 5. Number of CP vessels excluded from designated Chinook bycatch avoidance areas during 2020.

Week	1/30	2/13	2/27	3/12	3/27	4/3	9/24	10/1	10/8	10/15	10/22
Number of CPs excluded from BAAs	11	2	8	1	7	7	6	4	7	10	8

Chum Salmon Bycatch Avoidance Behavior

Estimates of the stream-of-origin of chum salmon bycatch show bycatch of western Alaska chum salmon to be most prevalent in NMFS statistical area 509 and least prevalent in area 521. Analyses also indicate that chum salmon from western Alaska make up the greatest proportion of bycatch in the pollock fishery from early June to mid-August. The combined-size limits of chum salmon BAA are largest East of 168 degrees West longitude during the months of June and July to match this pattern of chum salmon abundance. In addition, the base-rate "floor" is lowest during June and July. Both of these program components are estimated to increase the size of candidate BAA when and where chum salmon that are likely to return to western Alaska rivers are

encountered. The figure below shows the fishable areas of the Bering Sea both East and West of 168 degrees West longitude that were closed to pollock fishing by CP IPA vessels during the 2020 B-season.

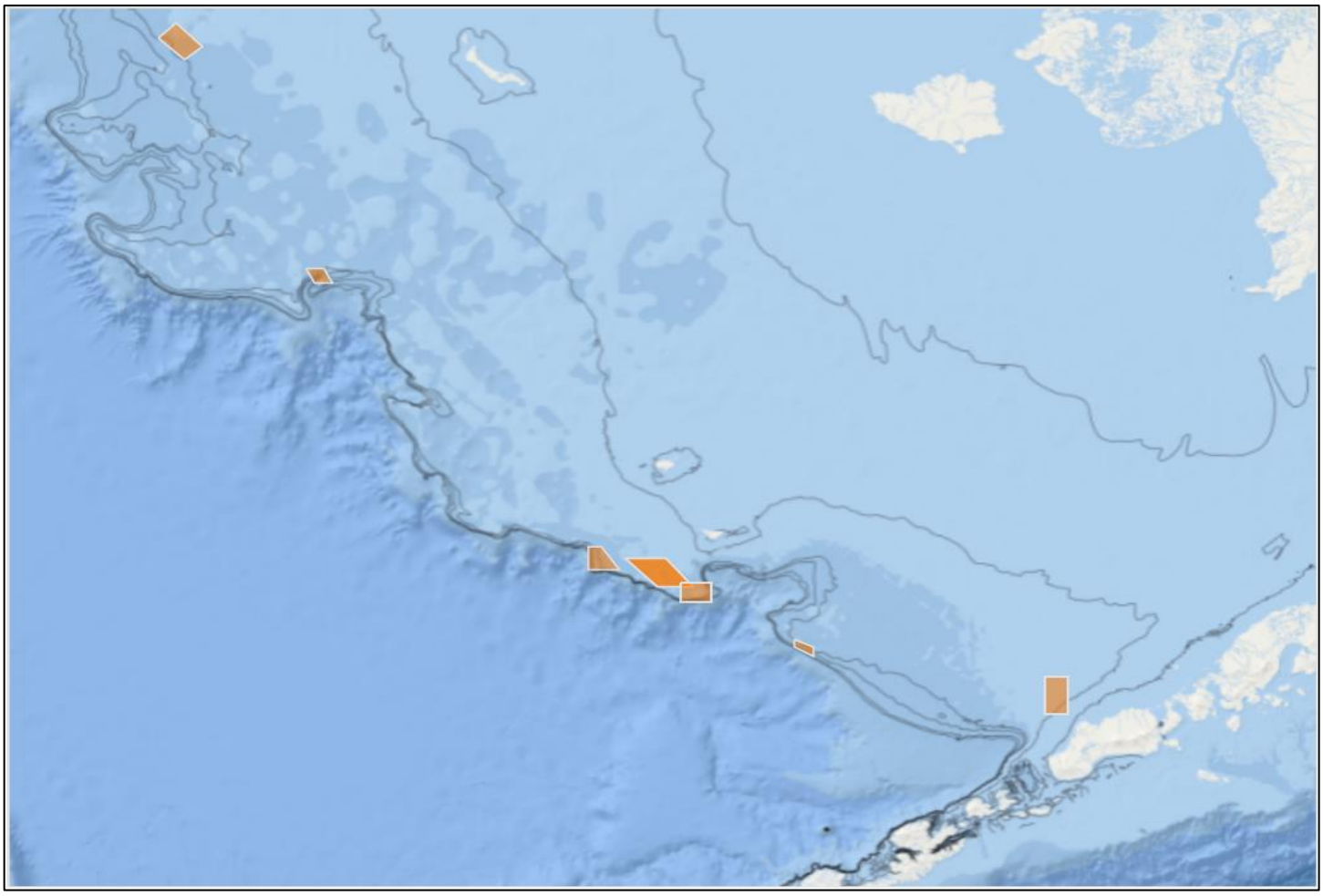

Figure 10. Chum bycatch avoidance areas for the CP sector, B-season, 2020.

Table 6 shows the B-season weeks of 2020 with a chum bycatch avoidance area, and the number of vessels excluded from designated bycatch avoidance areas for chum salmon during those weeks. There were a total of eight CP BAA for the B-season. Peak bycatch occurred during late-August, when a majority of CP IPA vessels were restricted from fishing within the Bycatch Avoidance Areas that were identified, which caused significant movement by the fleet and lost fishing time.

Table 6. Number of CP vessels excluded from chum salmon designated bycatch avoidance areas during the 2020 B-season.

Week	7/30	8/6	8/13	8/20	8/27	9/3	9/10	9/17
Number of CPs excluded from BAAs	2	2	3	8	7	2	3	4

Chinook PSC Rates in October

The aggregate Chinook bycatch rate for all CP IPA vessels exceeded 0.015 during the month of September, therefore the B-season Chinook Conservation Areas as defined in Figure 2 were closed to all IPA vessels beginning October 15th. Due to a late start to the B-season fishing operations, and low catch rates throughout the B-season, some vessels remained on the grounds until the end of October, thus all IPA vessels were forced to avoid three large fishing areas during the last two weeks of the season.

Herring Bycatch and Amendment 91

Section 7.3.5 of the Amendment 91 Final EIS (published December 2009) states the following regarding the impacts to Pacific herring from establishing Chinook salmon PSC:

> *Changes in the pollock fishery resulting from Alternatives 2 through 5 are not expected to change typical levels of herring bycatch. Thus, the alternatives would likely not change the pollock fishery in a manner that would increase bycatch of herring to the extent that bycatch would impact abundance of these species.*

The conclusions in the analysis above are underscored by the fact that the herring PSC limits have only been reached twice in the last three decades. In 1992 the Herring Savings Area (HSA) closures were triggered; however, the herring PSC limit was mis-specified (too low) so the area closures were never put in place. In 2012, the winter HSA 3 was closed from October 2012 to March 2013 but neither of the summer area closures were triggered.

It is clear that the assumptions and conclusions reached in the Chinook salmon PSC analysis regarding the impacts on herring bycatch did not anticipate the increase in herring PSC due to high herring abundance seen in the 2020 pollock A season. During the 2020 pollock A season, vessels fishing east of St. George had to abandon the productive pollock fishing grounds altogether due to “lightning strike” encounters of herring PSC. The fleet moved west of the Pribilofs along the shelf break. Vessels explored deeper waters (out to 90 fathoms) but found unsustainable bycatch rates of Chinook salmon, which forced them back into the band of higher herring bycatch in waters less than approximately 60 fathoms. The higher rates of Chinook salmon have been seen in previous years, but in other years vessels could remain in shallower waters and not accumulate as much herring. Due to regulations implemented under Amendment 91 for the pollock fishery, Chinook salmon hard caps mean that encounters of Chinook salmon take priority over all other bycatch species; while avoiding Chinook salmon in the 2020 A season, pollock vessels accumulated herring due to abundance of herring on the grounds.

This resulted in the spatio-temporal Herring Savings Areas closing to directed pollock fishing. In particular, the winter herring savings area (closed September 1, 2020-March 1, 2021), in addition to closure of B-season Chinook Conservation Areas (October 15-November 1) was a severe restriction of the catcher processor sector B-season fishery footprint and severely limited the ability of the fleet to move away from high Chinook and chum salmon areas that occurred outside the existing closures.

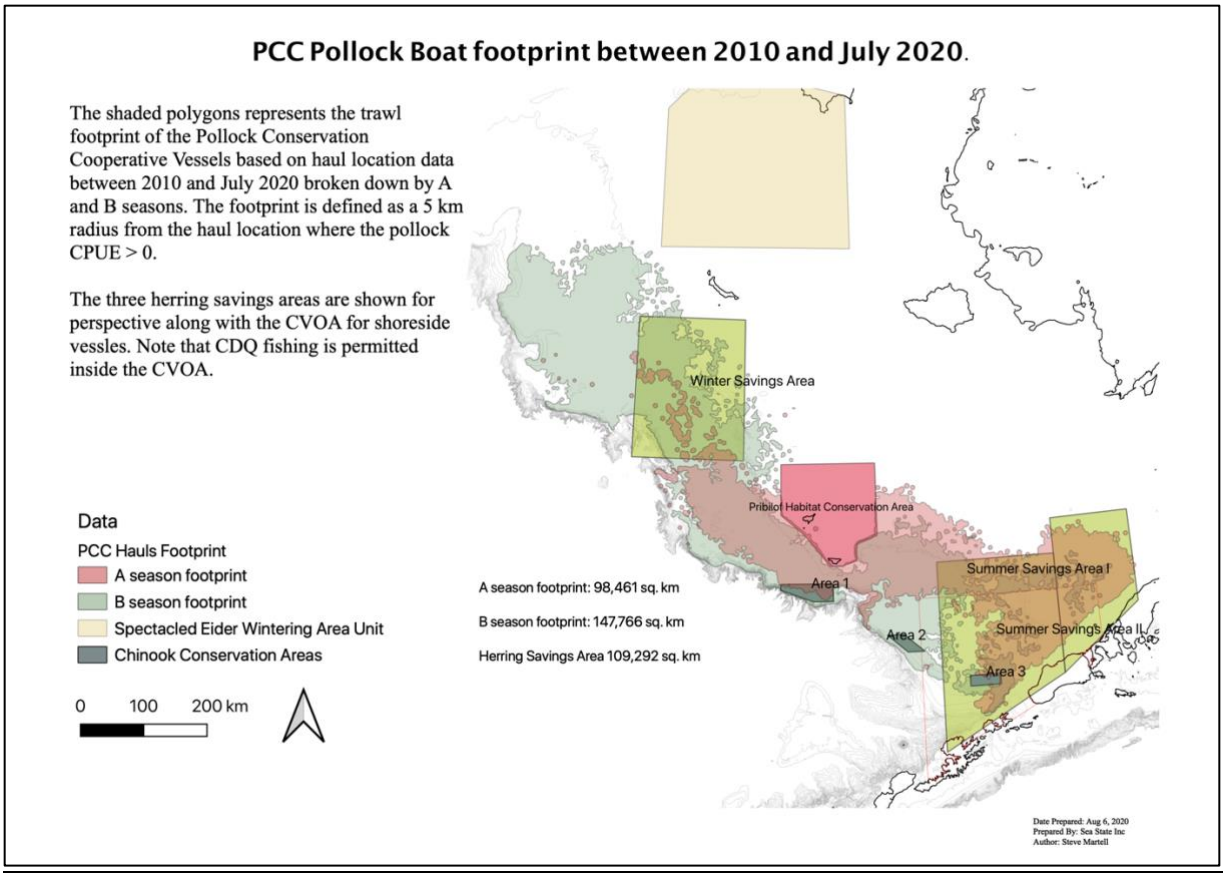

Figure 11. Catcher Processor Fleet fishing footprint (2010-2020) by season overlayed with closures from 2020.

Extemporaneous Events of 2020

The year 2020 was full of additional challenges not the least of which was the COVID-19 pandemic and resulting lost fishing time and increased operational costs. The B-season was made even more challenging by the myriad of bycatch circumstances noted above, leading to the closure of primary B-season fishing grounds the size of Maryland. In addition, the CP fleet encountered a Russian naval invasion of domestic fishing grounds.

On August 26, 2020, Russian naval vessels and aircraft involved in the Russian Exercise ‘Ocean Shield’ encountered pollock fishing vessels legally fishing within the US EEZ. The Russian vessels directed members of the CP fleet to depart the area due to safety concerns associated with a missile launch. While the Russian incursion did not have direct bycatch impacts, it is noteworthy because of the further restrictions on viable fishing grounds and additional lost fishing time.

Figure 12. Map of Hydropac Areas where US vessels were directed to depart active fishing grounds.

Ongoing Gear Research and Development

In accordance with the Amendment 110 regulations, the CP IPA requires all vessels use a salmon excluder device during trawls made during the A-season and the end of the B-season. During 2020, on board gear research and development were sidelined due to the COVID-19 pandemic.

At present, more than half of PCC vessels are utilizing a state-of-the-art live feed camera system, which provides images in real time of the composition of the catch entering the mouth of the net. AFA CP vessels are participating in ongoing research through a NOAA Bycatch Reduction Engineering Proposal (BREP) which aims to reduce salmon bycatch further, via an active release mechanism built into the trawl. That project remains ongoing, but sea trials and further development of some active excluder designs have been delayed due to the COVID-19 pandemic.