AFA Catcher-Processor Sector Chinook and Chum Salmon Bycatch Incentive Plan and Agreement Annual Report 2024

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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 are 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.

50 CFR 679.21(f)(13) requires IPA entities to 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 Amendments 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 vessels to produce higher-value 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 2024, the 3-river index was determined to 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% 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% 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 2024.

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 (BAAs); 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.

In response to poor chum salmon runs in Western Alaska river systems, CP IPA participants voluntarily made further binding amendments prior to the 2022 B season. The amendments were specifically designed by participants to be more proactive in further reducing chum salmon bycatch. Three primary changes were made to increase chum salmon bycatch reduction incentives. (1) New BAAs may now be implemented on Monday for a Tuesday to Friday closure. (2) New restrictions limit all vessels from fishing in known areas of "extremely" high bycatch regardless of recent vessel performance. (3) A new chronic poor vessel bycatch performance ("outlier") provision now applies for chum salmon. IPA participants initiated these changes to achieve heightened responsiveness in curtailing any large spikes in chum bycatch. They reflect our understanding that chum salmon tend to move through the pollock grounds in larger numbers and more quickly than Chinook salmon, and are intended to more rapidly affect vessel behavior to lower overall bycatch of chum salmon.

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 volume 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, allowing the vessel to produce greater volumes of higher valued products each day.

The RHS accomplishes this in two steps. First, the fleet's investment in real-time data sharing and analysis makes it possible 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 BAAs). BAAs for chum are only identified during the B season, while BAAs 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 days or 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 for it to maintain unrestricted access to the fishing grounds (i.e. to avoid fishing prohibitions within BAAs), except when extremely high bycatch areas are identified for chum salmon. A provision that was added through the 2022 CP IPA Amendment package stipulates that if any ADFG statistical areas have a weekly chum bycatch rate greater than five chum per metric ton of pollock, these areas will be identified as "extremely" high chum bycatch avoidance areas, and all vessels will be required to avoid the area regardless of chum bycatch performance relative to the base rate. 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) BAAs 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/s3//2024-12/CP-IPA-Amended-2024.pdf.

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 all identified BAAs 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% of the base rate, then the vessel is prohibited again from fishing in any BAAs 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 2024). 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 Chinook bycatch 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 any BAAs 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 for Chinook in advance of the Amendment 110 requirement, and in 2022 for chum salmon. 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 or chum 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 A/B (Chinook) or two consecutive B seasons (chum), then the vessel is designated a poor performance vessel during the following season. All vessels designated as Chinook or chum poor performers are prohibited from fishing in any Chinook or chum BAAs, respectively, for the entire season. If the following season is a B season, then the Chinook poor performing 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 and chum 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. 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 respond by, for example, adopting Chinook BAAs east of 168 degrees West longitude while preserving BAAs 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 often 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. As a result, 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 more than a decade 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 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.

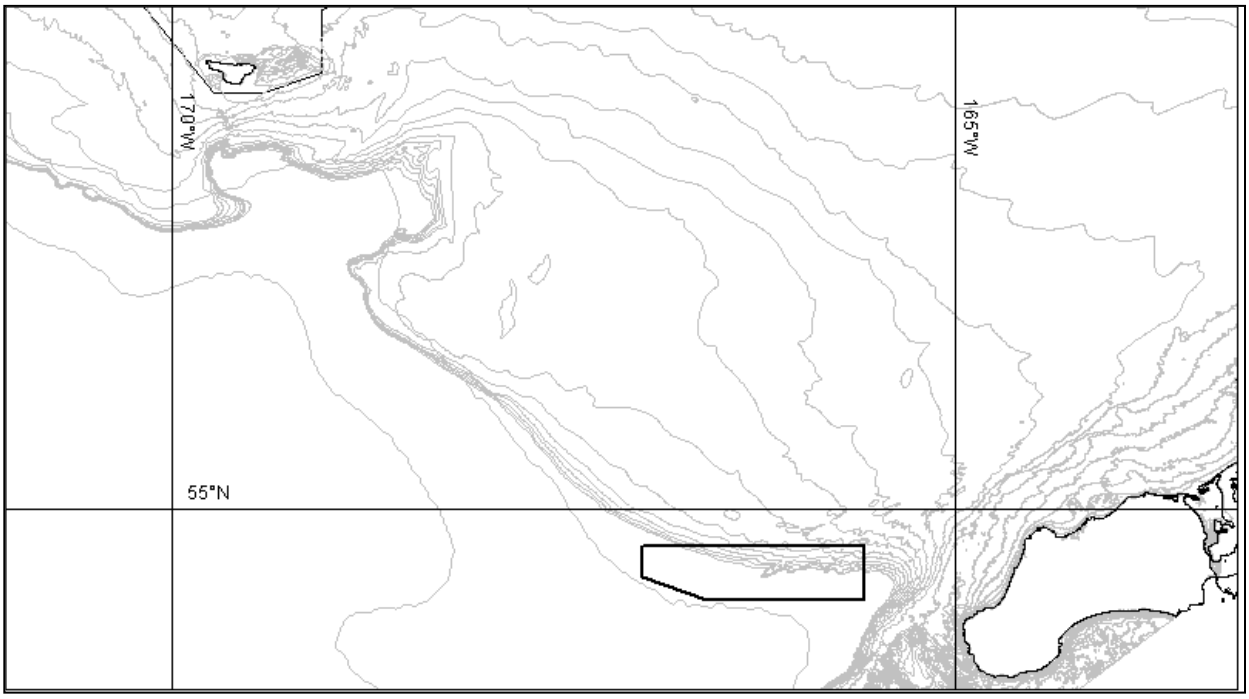

Figure 1. A season Chinook Conservation Area.

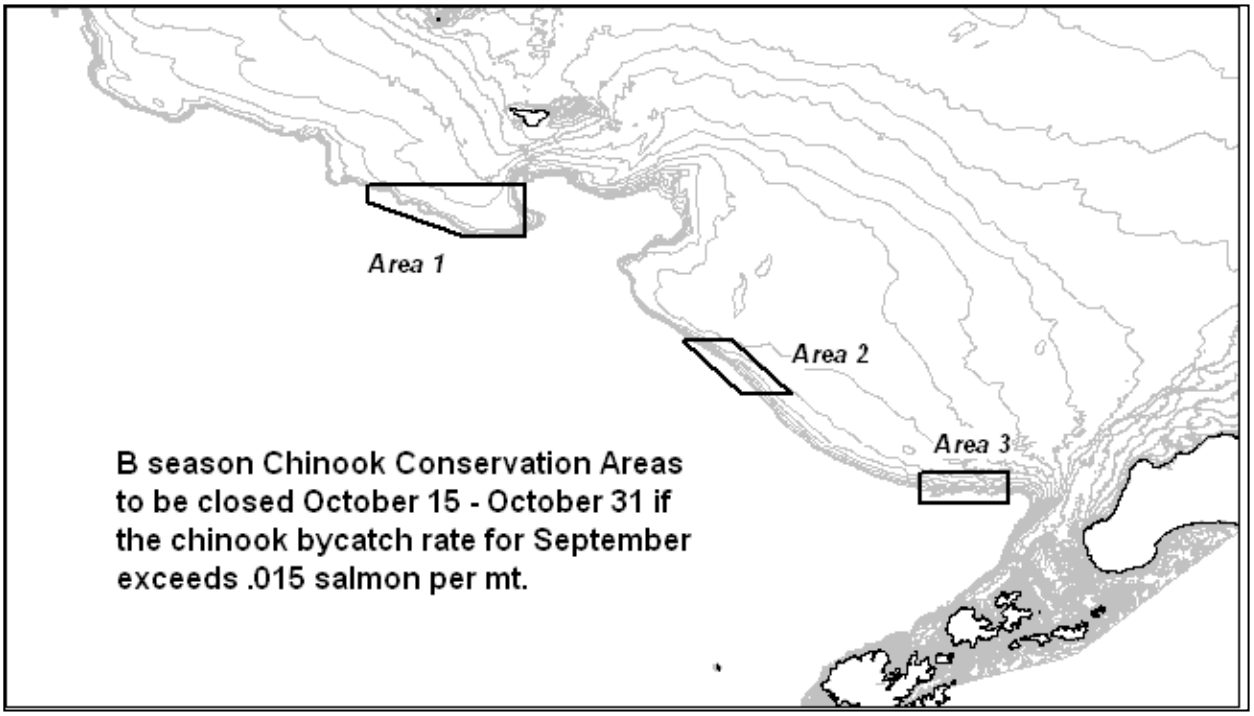

Figure 2. B season Chinook Conservation Areas.

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 three of seven consecutive years, then AFA vessels are held to the lower performance standard in perpetuity. The CP

IPA is therefore structured so that the absolute cap of 60,000 (45,000 in low-abundance years) is never allocated among companies and vessels (unless a majority of the CP Salmon Corporation vote to make such allocations). 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 Amendments 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 Amendments 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% 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 2024

Table 1 shows the CP IPA 2024 "day-one" allocations of pollock and Chinook salmon PSC by vessel for 2024 A and B seasons. Table 2 shows transfers of pollock and Chinook between CP IPA vessels in 2024. 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. Table 1 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. Normally pollock transfers between IPA vessels are made along with a pro-rata allocation of Chinook, however no transfers of Chinook between IPA vessels were necessary in 2024 due to Chinook bycatch rates by all vessels that were very low. Table 3 shows 2024 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, 2024, 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)
Alaska Ocean	31,513	1,407	38,516	0
American Dynasty	24,508	1,041	29,954	0
American Triumph	24,508	1,041	29,954	0
Arctic Fjord	21,872	922	22,866	0
Arctic Storm	16,582	689	24,134	0
Island Enterprise	16,740	750	20,459	0
Northern Eagle	24,508	1,041	29,954	0
Northern Hawk	19,312	879	23,604	0
Northern Jaeger	24,508	1,041	29,954	0
Ocean Peace	1,018	45	1,245	0
Ocean Rover	24,508	1,041	29,954	0
Seattle Enterprise	16,740	749	20,459	0
Starbound	16,740	750	20,459	0
Katie Ann	0	0	0	0
Northern Glacier	0	0	0	0
Total 2024 Allocation			584,572	11,395
Allocation Buffer			0	786

Table 2. Transfers of pollock and Chinook between CP IPA vessels in 2024.

Date	From vessel	To vessel	Amount (mt or N)	Sector	Species
5/24/24	Arctic Storm	Arctic Fjord	6	Coop	Pollock A
5/24/24	American Dynasty	American Triumph	77	Coop	Pollock A
5/24/24	American Dynasty	Northern Jaeger	35	Coop	Pollock A
5/24/24	American Triumph	Northern Eagle	90	Coop	Pollock A
5/24/24	Northern Jaeger	Ocean Rover	15	CDQ	Pollock A
5/24/24	Northern Eagle	Northern Jaeger	9	CDQ	Pollock A
5/24/24	Ocean Peace	Arctic Fjord	123	Coop	Pollock B
5/24/24	Ocean Peace	Northern Jaeger	196	Coop	Pollock B
5/24/24	Ocean Peace	Ocean Rover	197	Coop	Pollock B
5/24/24	Ocean Peace	Northern Eagle	196	Coop	Pollock B
5/24/24	Ocean Peace	Northern Hawk	34	Coop	Pollock B
5/24/24	Ocean Peace	Starbound	143	Coop	Pollock B
5/24/24	Ocean Peace	Island Enterprise	143	Coop	Pollock B
5/24/24	Ocean Peace	Alaska Ocean	212	Coop	Pollock B
8/24/24	Arctic Storm	Arctic Fjord	57	CDQ	Pollock B
8/24/24	Seattle Enterprise	Ocean Rover	1,016	CDQ	Pollock B
8/24/24	Starbound	Northern Jaeger	1,244	CDQ	Pollock B
8/24/24	Island Enterprise	American Dynasty	1,165	CDQ	Pollock B
8/26/24	Northern Hawk	Northern Eagle	2,462	CDQ	Pollock B
8/26/24	Northern Hawk	American Triumph	2,520	CDQ	Pollock B
9/3/24	Seattle Enterprise	Island Enterprise	7,244	Coop	Pollock B
9/3/24	Seattle Enterprise	Starbound	7,244	Coop	Pollock B

Table 3. CP IPA Pollock Catch and Chinook Bycatch Performance by Season and Vessel, 2024.

	A season			B season		
Vessel	Pollock (mt)	Chinook (n)	Rate (n/mt)	Pollock (mt)	Chinook (n)	Rate (n/mt)
Alaska Ocean	31,501	238	0.008	38,410	20	0.001
American Dynasty	22,674	368	0.016	27,933	59	0.002
American Triumph	23,900	298	0.012	29,365	47	0.002
Arctic Fjord	20,769	190	0.009	37,461	58	0.002
Arctic Storm	17,655	329	0.019	9,950	2	0.000
Island Enterprise	12,802	150	0.012	31,064	66	0.002
Northern Eagle	24,079	423	0.018	30,668	63	0.002
Northern Hawk	21,032	138	0.007	26,979	14	0.001
Northern Jaeger	23,593	305	0.013	29,255	24	0.001
Ocean Peace	1,012	5	0.005			
Ocean Rover	24,673	314	0.013	30,514	170	0.006
Seattle Enterprise	16,330	164	0.010			
Starbound	21,270	168	0.008	31,405	32	0.001
Northern Glacier	0	0		0	0	
Katie Ann	0	0		0	0	
Forum Star	0	0		0	0	
Neahkanie	0	0		0	0	
Sea Storm	0	0		0	0	
Muir Milach	0	0		0	0	
Totals	261,290	3,090	0.012	323,005	555	0.002

Grand Totals	Pollock A+B (mt)	Chinook A+B (n)	Rate A+B (n/mt)
	584,295	**3,645**	**0.006**

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 2020-2024 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 rates have been more than cut in half 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.

Table 4. Chinook Bycatch Rates (N/mt) in the CP Fleet for 2006-2010 and 2020-2024.

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	
2020	0.031	0.015	0.023	
2021	0.016	0.004	0.009	
2022	0.009	0.001	0.004	0.011
2023	0.021	0.001	0.010	
2024	0.012	0.002	0.006	

Figure 3 shows the range of vessel bycatch performance each year since 2005, 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 the variance of bycatch rates among vessels has been very small in the IPA years, even relative to previous years with similar average rates. Especially noteworthy in data from recent years is the lack of a tail on the left side of the distribution, suggesting vessels have maximized bycatch rate reductions. **Chinook bycatch rates among vessels display a much smaller range of values since 2011 than in previous years, providing clear evidence of the effectiveness of the vessel-level incentives.**

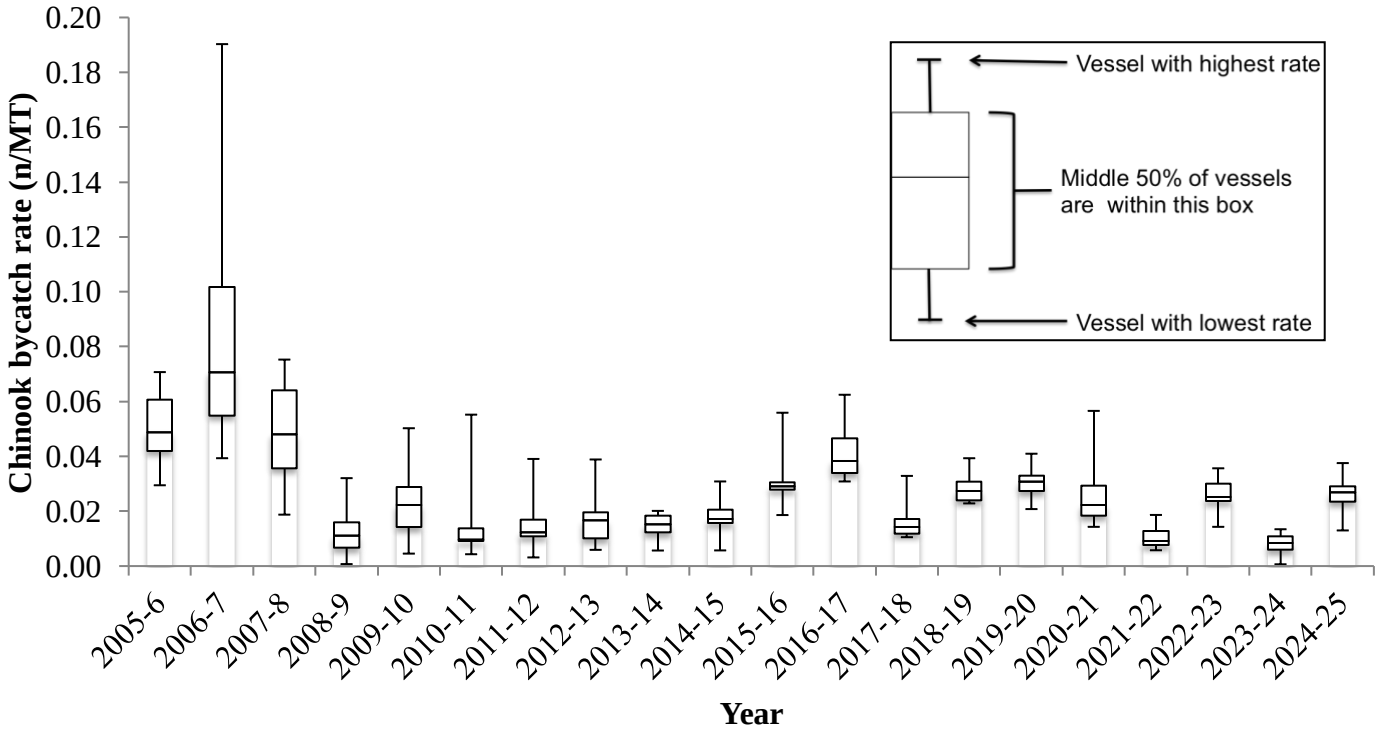

Figure 3. September-February *CP Vessel* Chinook Bycatch Rate Distribution by year 2005-2025.

Figure 4 shows the sector level Chinook bycatch rates both pre- and post-Amendment 91. What is obvious is that rates have been consistently very low since the implementation of Amendment 91 and sector level bycatch rates also remain very similar to each other, suggesting almost uniform vessel level accountability and behavior.

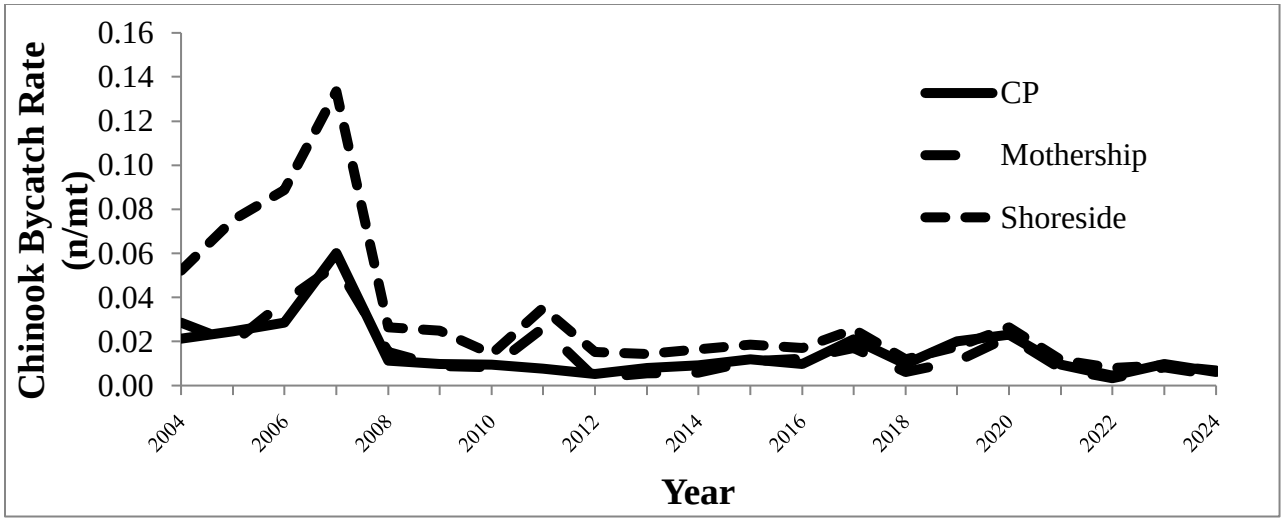

Figure 4. Pollock Sector Chinook Bycatch Rate Patterns by Year 2004-2024.

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 exhibiting vessel-level accountability for their Chinook bycatch. Figure 5 shows the distribution of vessel bycatch rates in the A season of 2010 (pre-Amendment 91), while Figure 6 shows the same distribution in the A season of 2024 (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 the stacking of vessels on the left side of the distribution shows that there is likely some effect of the vessel outlier provisions shifting the distribution to the left as vessels work to avoid being the outlier and compete for bycatch awards.

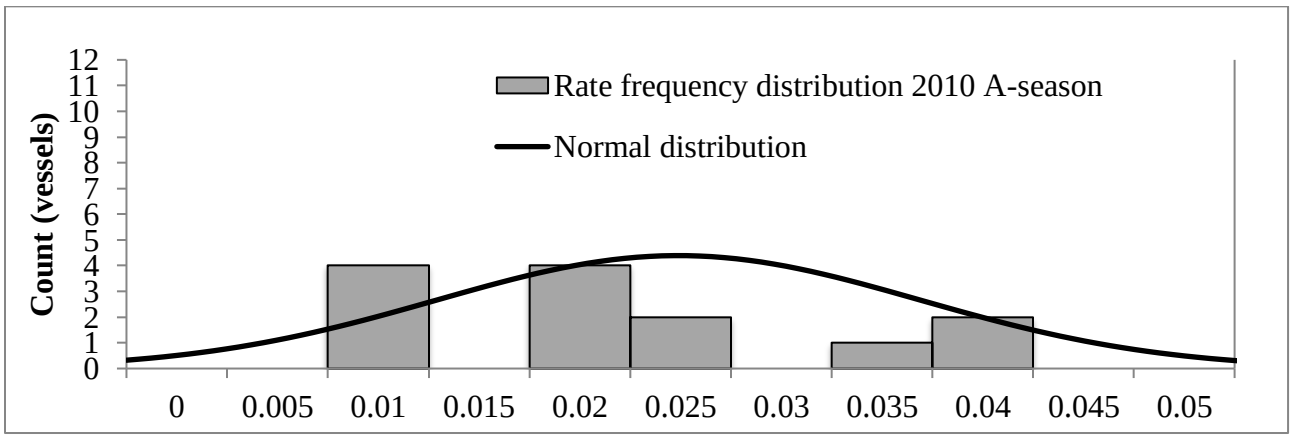

Figure 5. A season CP Vessel Chinook Bycatch Rate Distribution for 2010 with variance pre-Amendment 91 of 0.0014.

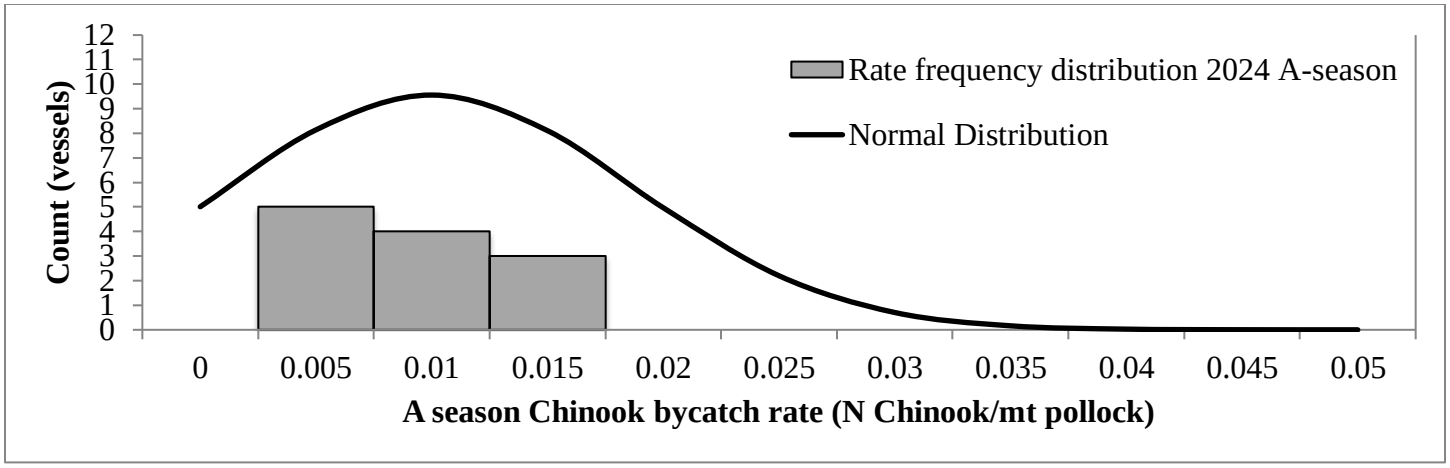

Figure 6. A season CP Vessel Chinook Bycatch Rate Distribution for 2024 with variance post-Amendment 91 of 0.0002.

The incentive to avoid chronic vessel poor Chinook bycatch performance first came into force during 2015, while the same incentive for chum was implemented in 2022. 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. The incentive to avoid chronic vessel poor chum bycatch performance is the same as Chinook except that it tracks performance only in the B season and only requires two consecutive seasons with a chum vessel bycatch rate greater than 1.5 standard deviations from the mean fleet chum bycatch rate before being excluded from all chum bycatch avoidance areas during the following season. Over the past ten seasons, nearly all vessels have been Chinook outliers in at least one season. Since the Chinook outlier provision was implemented, no vessel has been an outlier in three consecutive seasons. Two different vessels have been an outlier in two consecutive seasons.

Figure 7 below shows the relative Chinook performance of the fleet for the 2024 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 2024 A season, there was just one statistically poor performing vessel. During the 2024 B season there was also one vessel outlier, but different vessels in each season. The average bycatch rate during the A season was just 1.1 Chinook per 100 tons of pollock catch. The average bycatch rate in the B season was just 0.2 Chinook per 100 tons of pollock catch. The incentive to avoid chronic poor bycatch performance has proven effective since its implementation—with most vessels achieving Chinook bycatch rates within a very narrow distribution for both A and B seasons.

Figure 8 below shows the relative chum salmon performance of the fleet for the 2024 B season. During the 2024 B season, there was one statistically poor performing vessel and the vessel that was penalized in 2023 ended the 2024 season with the best chum salmon bycatch rate in the fleet, demonstrating that penalties were effective. The average bycatch rate in the B season was 2.3 chum per 100 tons of pollock catch. The incentive to avoid chronic poor bycatch performance is now in the third season of implementation, and effects have already been realized. This is because vessels have a strong incentive to change fishing behavior to avoid being an outlier in 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 salmon and pollock over time, the outlier provision should encourage a shift in the distribution of vessel bycatch performance to the left.

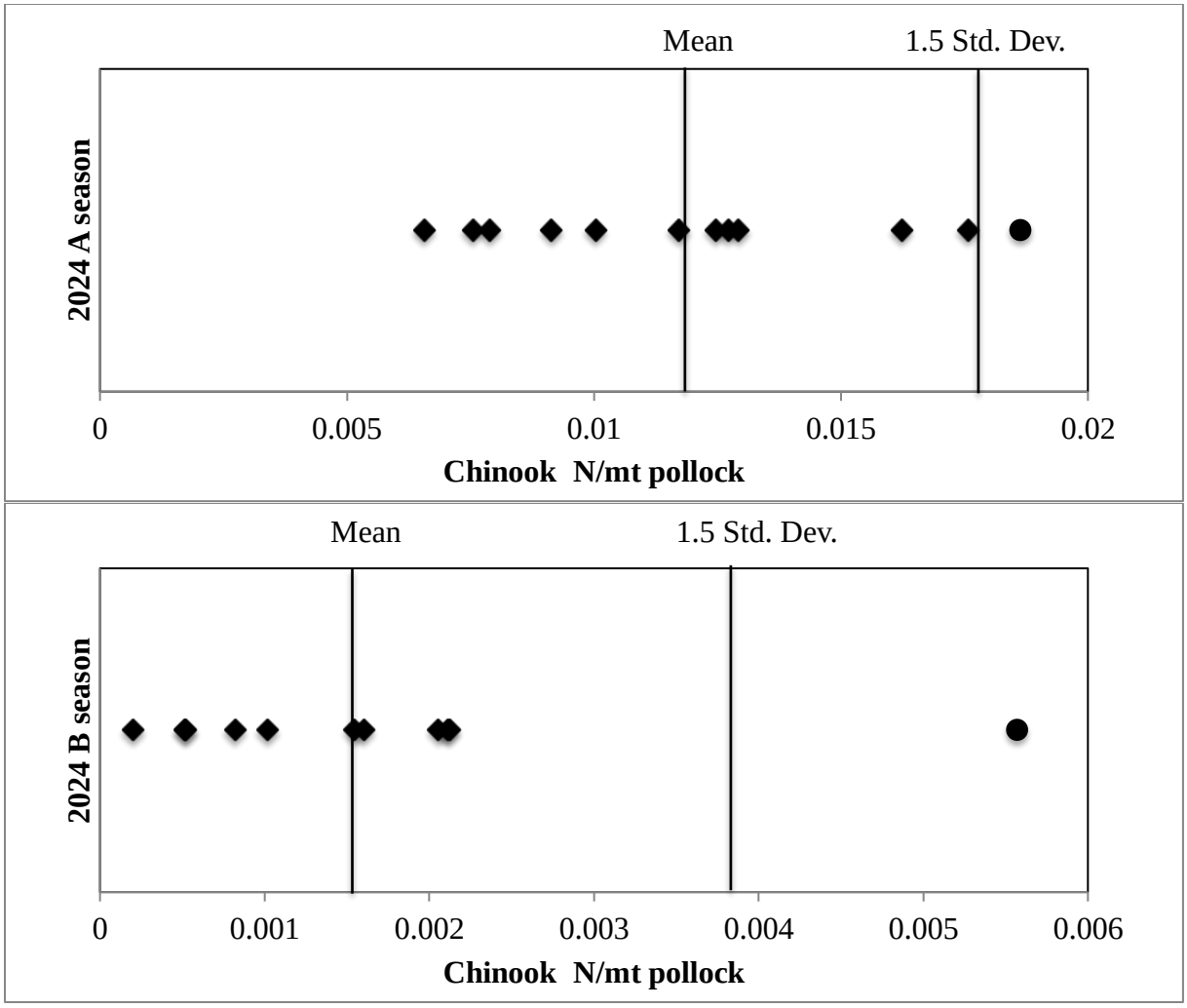

Figure 7. Fleetwide Chinook bycatch ratio distribution for 2024 fishing seasons. Circles denote outlier vessels.

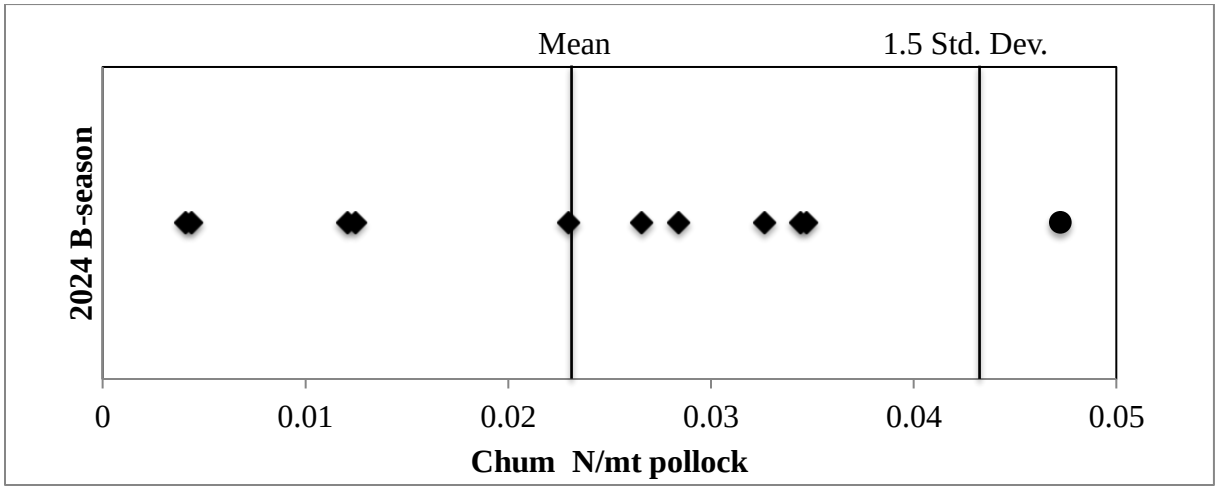

Figure 8. Fleetwide chum bycatch ratio distribution for the 2024 B season. Circles denote outlier vessel.

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 9 shows all CP trawl locations between 2008 and 2010 during the period where Chinook are most often present on the EBS shelf (September-February). The blue dots represent AFA CP trawl locations during 2008-2010 (pre-Amendment 91), and demonstrates that fishing effort was generally spread out over a larger area, and evidence of some fishing effort in areas that are currently closed or avoided altogether. The orange dots represent AFA CP haul locations for the September through February period for the years 2022-2024.

A close examination of the trawl locations in space and time, their bycatch rates, and the bycatch performance of all CP IPA vessels demonstrates 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, particularly in the A season. 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 – e.g., when schools of Chinook salmon move into a local area to feed.

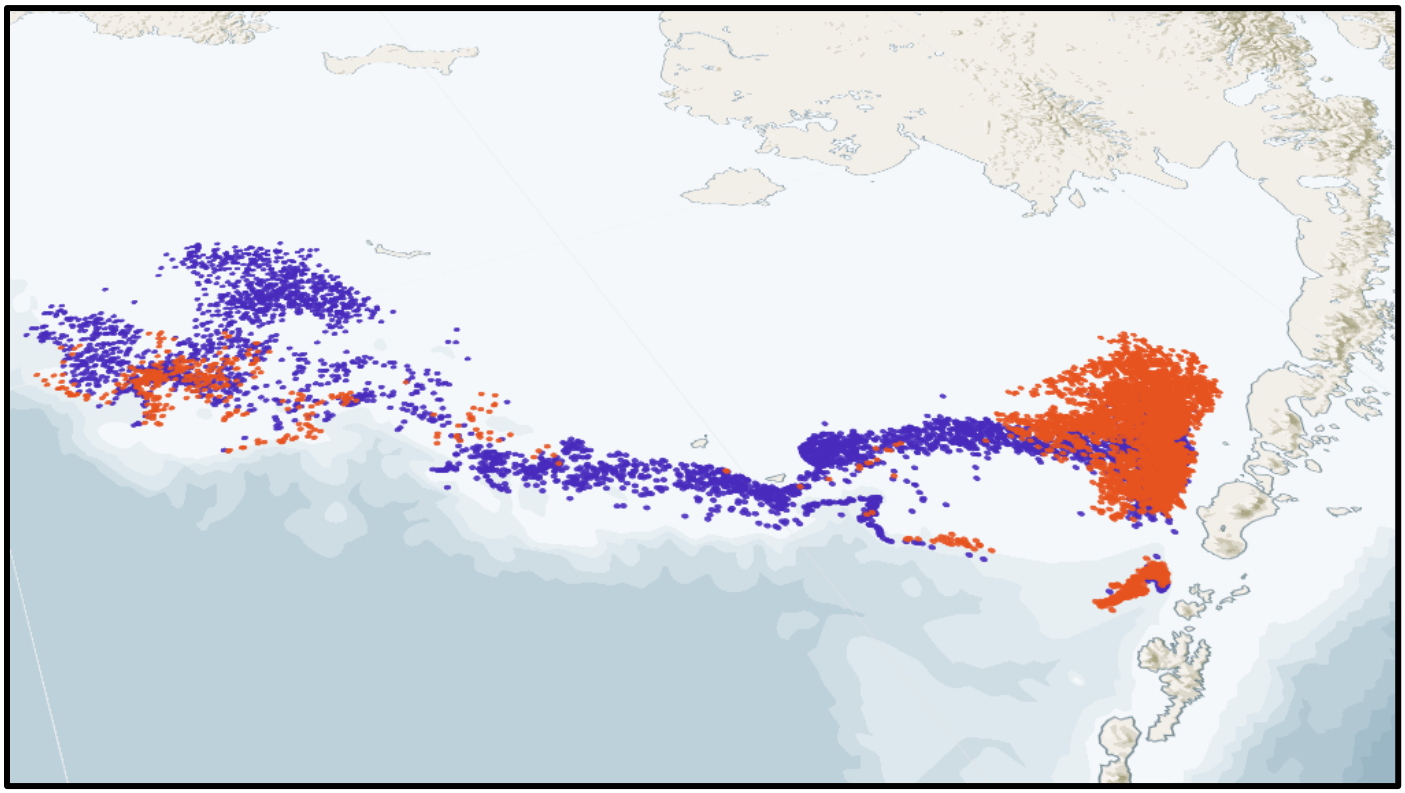

Figure 9. Pollock CP trawl locations between September 1st and February 28th for the years 2008-2010 (blue), 2022-2024 (orange).

As mentioned in the above paragraph, an important component of changing CP fishing behavior after 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 few years prior to Amendment 91 and the most recent years fishing effort, 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. Catcher-processor vessels were able to target pollock in the deeper off shelf waters outside Dutch Harbor in the A season of 2024 while maintaining Chinook bycatch rates significantly below the base rate of 0.035 Chinook per ton of pollock. This was considered an anomalous bycatch pattern and leads us to believe that Chinook distributions may be changing, or at a minimum are becoming less predictable.

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 10 plots AFA CP trawl locations during the winter months as a function of total Chinook catch. The darker areas indicate higher total Chinook catch per trawl, while the lighter areas indicate lower Chinook catch per trawl. In the pre-Amendment 91 period (top panel), it's clear that vessels remained in high Chinook bycatch areas and there was significantly more fishing in deeper off shelf areas. In the recent post-Amendment 91 period (lower panel) most of the fishing locations remain very shallow and there is a clear gradient of increased Chinook catch with depth. As noted above, vessels fished in the deep outside of Dutch Harbor for the first time in more than 10 years during the 2024 A season and were able to find clean pollock fishing to the west and north of the traditional high Chinook bycatch areas. It is also important to re-iterate that the fishery footprint has been significantly reduced in the recent years due to Chinook and other PSC species avoidance and the fleet has consolidated into smaller and smaller fishing areas.

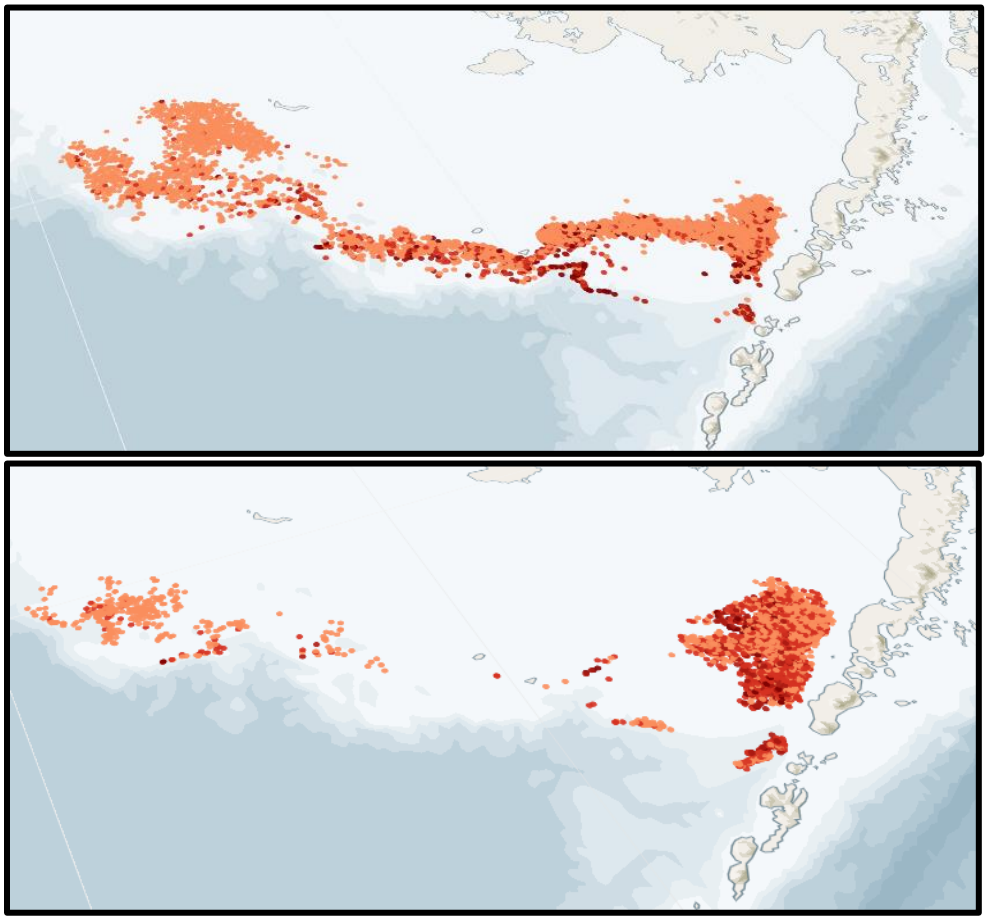

Figure 10. Pollock CP trawl locations as a function of total Chinook catch between September 1st and February 28th for the years 2008-2010 (top panel), 2022-2024 (lower panel). Color scales darkest (highest Chinook catch number per trawl) to lightest (lowest Chinook catch number per trawl).

Under the RHS program, two Chinook BAA (red) and two additional advisory Chinook BAA (yellow) were designated for the CP fleet during 2024 (Figure 11). 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 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 for it to become a bycatch avoidance area, so those areas where CPs avoided fishing entirely will not contain any BAA.

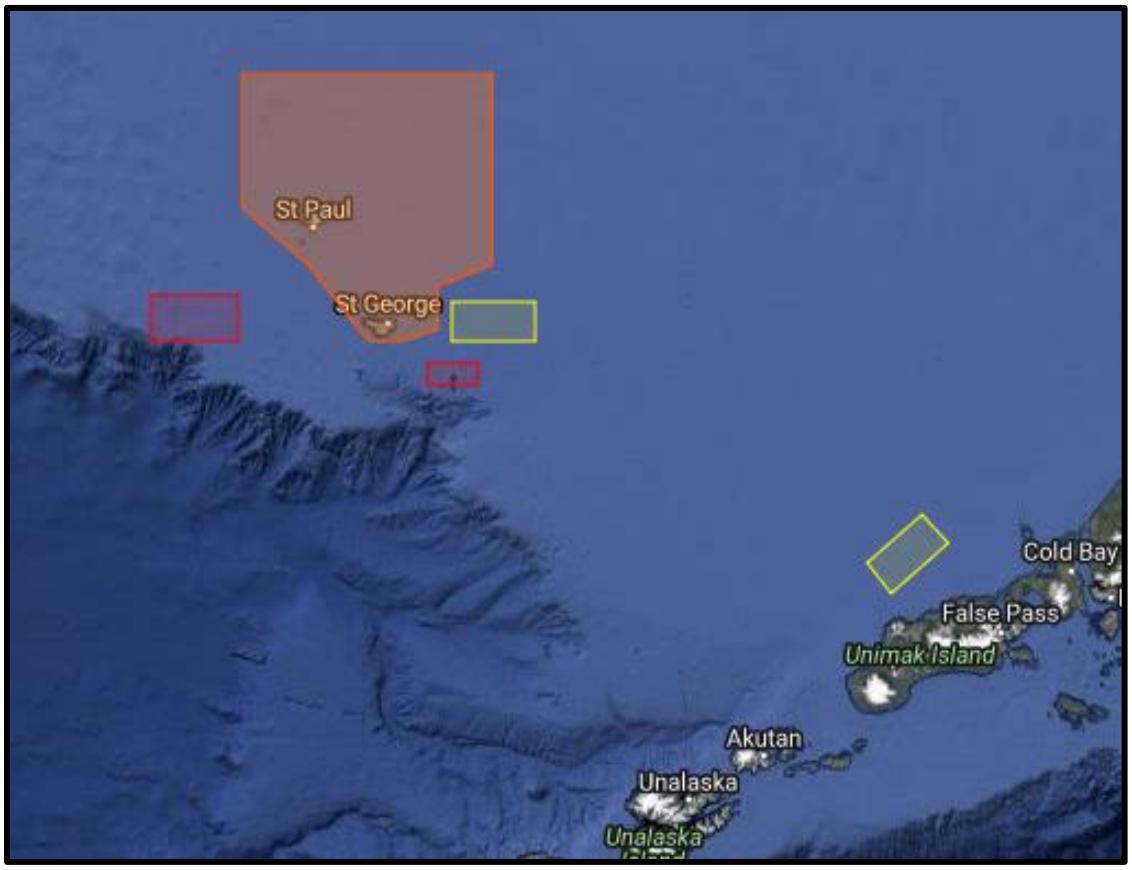

Figure 11. Chinook bycatch avoidance areas for the CP sector, 2024.

Table 5 shows the weeks of 2024 and the number of vessels excluded from designated bycatch avoidance areas for Chinook salmon during each week. There were two CP BAA for Chinook during two different fishing weeks during the 2024 A season and there were two unprecedented CP BAA Advisory Areas during the first few weeks of the B season prior to the IPA rules taking effect. During the first week of the A season as well as the advisory areas in the B season, the ADFG stat area bycatch rates for Chinook used in identifying BAA were a result of catcher vessel fishing activity and therefore almost no CP vessels were excluded. There were no vessels subject to an extended (2-week) fishing prohibition during 2024.

Table 5. Number of CP vessels excluded from designated Chinook bycatch avoidance areas during 2024.

Week	3/8	3/15	6/21
Number of CPs excluded from BAAs	0	3	1

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 western Alaska chum salmon abundance. In addition, the base-rate "floor" is lowest during June and July. Both 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 2024 B season. Most of the fishing effort by the CP fleet occurred west of 168 degrees West longitude during the 2024 B season.

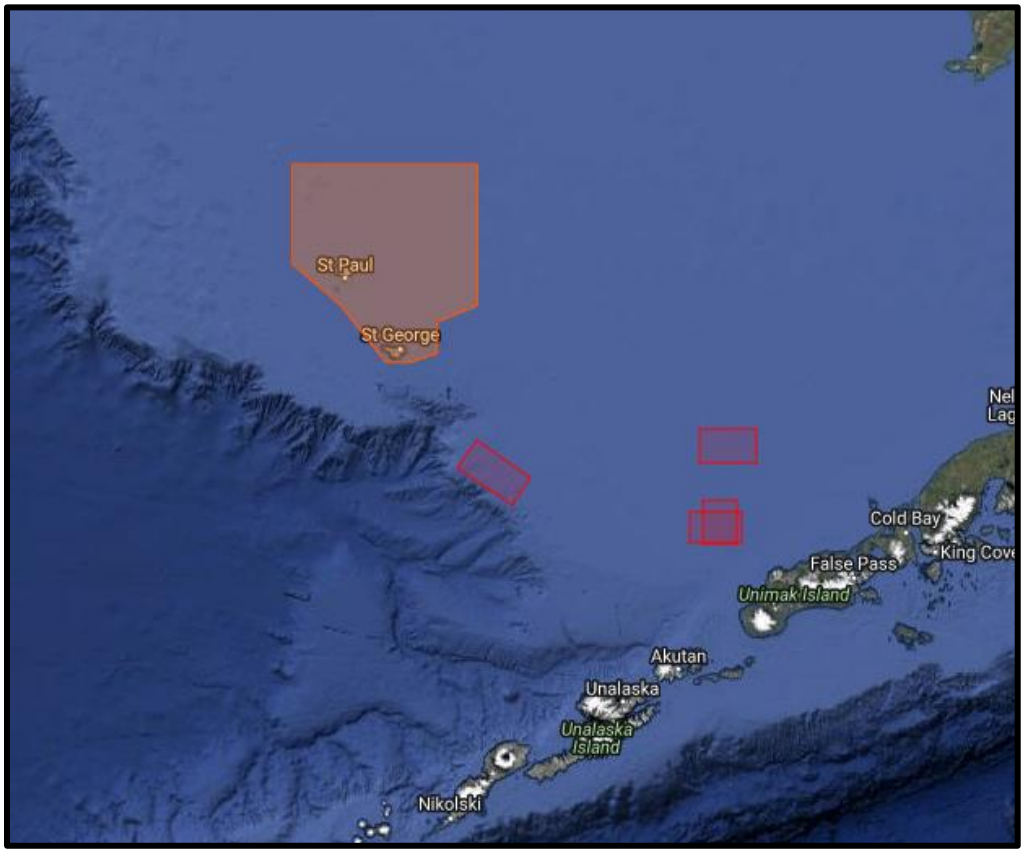

Figure 12. Chum bycatch avoidance areas for the CP sector, B season, 2024.

Table 6 shows the B season weeks of 2024 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 four total CP BAA for the B season spread across just 4 weeks of the fishing season, with a majority of BAA identified where CP vessel activity was absent in 2024. All CP BAA were identified based on the shoreside catch data, while the CP fleet fished predominantly to the northwest, hence why no CP vessels had bycatch rates high enough to be prohibited from fishing in the BAA. Chum salmon bycatch rates in the B season were very low for the CP fleet, therefore no "extremely" high chum bycatch avoidance areas were identified during 2024 (i.e.: ADFG statistical areas with a greater than five chum per metric ton of pollock weekly bycatch rate.) The Figure 12 above shows significantly more chum BAA identified in areas where western Alaska chum are known to be most prevalent. Preliminary genetics reports have estimated that the CP catch of Western Alaska origin chum salmon was just 147 fish while catch of Upper and Middle Yukon chum salmon was 166 fish in the 2024 B season.

Table 6. Number of CP vessels excluded from chum salmon designated bycatch avoidance areas during the 2024 B season.

Week	7/1	7/5	7/19	8/16
Number of CPs excluded from BAAs	0	0	0	0

Effects of New Chum Salmon Incentive Plan Amendments

There was one new chum salmon bycatch avoidance area identified on a Monday following new data from the weekend, despite the extremely low chum bycatch rates experienced in the 2024 B season.

Chum bycatch rates were low across all weeks of the 2024 B season therefore there were no ADFG Stat Area chum bycatch rates greater than five chum per metric ton of pollock.

Overall, there were just 7,957 chum caught by the CP fleet in 2024 B season, another significant reduction over both 2022 and 2023, while the spatial distribution of fishing again remained relatively constant across all years. The chum genetic stock identification for the catcher-processor identified that just 4% of chum salmon bycatch in 2024 from the CP fleet were bound for coastal Western Alaska. This is the lowest known percentage in the 2011-2024 time series. Average bottom temperature and cold pool extent in the Eastern Bering Sea exhibits a strong correlation to chum salmon catches in the pollock fishery and 2024 was again a relatively "normal" year in terms of sea ice extent and bottom temperatures across the Bering Sea shelf. The significant reduction in chum salmon catches can be attributed mostly to reduced distributional overlap with the pollock fishery due to unknown environmental factors and enhanced avoidance measures. Note that the rolling hot spot program caused minimal movement of the fleet in 2024 due to extremely low chum salmon encounters.

Chinook PSC Rates in October

No CP IPA vessels fished into the month of October in 2024 due to extremely good B season fishing conditions, therefore no September Chinook bycatch rate was calculated, and no Chinook Salmon Savings Area closures were necessary.

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.

At present, all 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 codend. It is unclear what direct effect these new technologies are having on overall salmon bycatch: no empirical studies have been conducted. At a minimum, the live feed camera can trigger a skipper's decision to abort the tow and haul back and move to a new fishing location due to salmon presence.

AFA CP vessels are participating in ongoing research through a NOAA Bycatch Reduction Engineering Proposal (BREP), which aims to further reduce salmon bycatch via deployment of an active release mechanism built into the trawl. During 2024, the Active Selection (ActSel) excluder device underwent further development, and more vessels are interested in field testing in 2025.

Current development of an excluder device focused on chum salmon is being explored through an Experimental Fishing Permit (EFP) application that we hope will receive approval prior to the 2025 B season. The principal investigators and collaborators have already convened a workshop to synthesize ideas that will undergo further development during an upcoming flume tank visit. One CP vessel is likely to be selected to participate in this EFP.