Pacific Whiting Conservation Cooperative (PWCC)
Response to Council Request Letter: July 18, 2023
September 2023 PFMC Meeting

I. Council's Request

On July 18, 2023 the members of PWCC received a letter from the Council requesting additional information on spring fishery and fall whiting fishing plans. This briefing document is intended to respond to the request that "*the PWCC and WMC [Whiting Mothership Cooperative] provide information at the September Council meeting regarding each cooperative's plans for managing salmon bycatch and the groundfish species managed with "set-asides" through the fall*." The Council request noted that catch of Chinook salmon and groundfish "*are of concern to the Council. The Council therefore requests written information from your cooperatives to better understand what occurred this past spring and your plans going forward to avoid and minimize bycatch this fall.*" The first portion of this briefing provides an overview of our spring fishery followed by a summary of our proposed fall fishing plans.

The focus of our review is bycatch of Chinook salmon and rockfish (particularly dark blotched rockfish). These two species were highlighted as bycatch species of particular concern during Council discussions in June. As part of fall fishing plan review, we describe how our fall management measures are intended to avoid and minimize bycatch of Chinook salmon and rockfish species managed under set-asides.

II. Chinook Salmon and Rockfish Bycatch in the Spring PWCC Fishery

Historically, Chinook salmon bycatch rates in the catcher-processor (CP) sector (i.e., PWCC members), and other whiting sectors, are relatively low in the spring. Chinook salmon bycatch rates for the CP sector were at unprecedentedly high levels this year. On average, the Chinook salmon bycatch rates in the CP sector are the same as the Chinook salmon rates observed in the other at-sea sector based on data from 2017 – 2022 -- a period that represents current management of whiting, and recent conditions affecting Chinook salmon abundance (Table 1).

Table 1: At-sea average (2017 – 2022) and current (2023) Chinook salmon bycatch rates by season and annually.

Sector	Spring Season		Fall Season	Annual
	Average Chinook Salmon bycatch rate No./mt whiting (2017-2022)	Current Chinook Salmon bycatch rate No./mt whiting (2023)	Average Chinook Salmon bycatch rate No./mt whiting (2017-2022)	Average Chinook Salmon bycatch rate No./mt whiting (2017-2022)
CP	0.0049	0.0537	0.0362	0.0228
Mothership	0.0053	0.0350	0.0431	0.0230

Similarly, since the Council implemented set-aside provisions both the CP and mothership sectors have been successful in maintaining catch below the set-aside limits. Table 2 shows that since 2021, when set-aside amounts stabilized, the at-sea sectors have generally stayed below the set-asides amounts.

Table 2. At-sea rockfish and sablefish set-aside amounts and percent attainment, 2019-2023.

Year	2019		2020		2021		2022		2023	
Species	Set-Aside	% Attained	Set-Aside	% Attained	Set-Aside	% Attained	Set-Aside	% Attained	Set-Aside	% Attained
Sablefish	50.0	**142.5%**	50.0	30.4%	100.0	57.7%	100.0	**304.6%**	100.0	56.8%
Canary RF	46.0	11.0%	46.0	2.0%	36.0	16.3%	36.0	16.1%	36.0	55.2%
Drkbltch RF	36.3	**210.6%**	38.7	**102.6%**	76.4	53.7%	76.4	91.7%	76.4	**102.1%**
POP	404.5	35.1%	394.0	1.2%	300.0	17.4%	300.0	7.6%	300.0	24.5%
Widow RF	611.0	32.6%	578.0	15.4%	476.0	24.3%	476.0	39.1%	476.0	41.6%
Yllwtl RF	300.0	**105.9%**	300.0	55.6%	300.0	26.8%	300.0	9.2%	320.0	83.2%

On an annual basis, set-aside bycatch performance across the two at-sea fleets has varied, with each sector having higher rates of bycatch for different species in different years (Table 3).

Table 3. Sector specific bycatch rate for sablefish and rockfish set-aside species, 2019-2023 in kg bycatch/mt whiting. (Highest rates shown in bold).

Year	2019		2020		2021		2022		2023	
Species	CP Rate	MS Rate	CP Rate	MS Rate	CP Rate	MS Rate	CP Rate	MS Rate	CP Rate	MS Rate
Sablefish	**0.4575**	0.3436	0.0584	**0.2288**	**0.4862**	0.2040	0.8815	**3.2677**	**1.1114**	0.8695
Canary RF	0.0149	**0.0629**	0.0039	**0.0132**	0.0302	**0.0771**	0.0251	**0.0441**	**0.4859**	0.0304
Drkbltch RF	0.3916	**0.5884**	**0.3120**	0.1322	**0.3302**	0.1910	**0.4540**	0.2157	**1.7534**	0.5554
POP	0.8124	**0.9035**	**0.0401**	0.0100	**0.4738**	0.0842	**0.1473**	0.0700	**1.6865**	0.4153
Widow RF	0.7972	**2.0219**	**0.6278**	0.5122	**0.9280**	0.5393	0.8283	**1.3797**	**4.4774**	1.3344
Yllwtl RF	1.4091	**2.9238**	0.6869	**2.3817**	0.0335	**2.1910**	0.0279	**0.4062**	**5.8938**	2.1388

The Chinook salmon bycatch rate observed in the CP sector this spring (0.054 No./mt whiting) was approximately 11-times higher than the average Chinook salmon spring bycatch rates (0.005 No/mt whiting) observed over the past 6-year period (2017 – 2022), and greater than the bycatch rates observed in other whiting sectors this spring. Similarly, rockfish bycatch (particularly dark blotched rockfish) was consistently higher than what had been observed in past spring fisheries.

The unprecedented high bycatch rates raise two key questions.

- Did the CP fleet fish in different areas than it has historically?
- Did the CP fleet fish at different times than it has historically?

To answer those questions, we reviewed our 2023 catch data from Sea State and compared those catch records to our historic patterns of fishing.

Areas Fished – Based on our review of the available data, the geographic distribution of the CP sector was similar to past years. Our fleet did not observe specific geographic regions where Chinook salmon bycatch rates were reliably and consistently higher relative to other fishing areas in the spring season. More specifically, areas where high Chinook bycatch was encountered in one tow could also be an area with low Chinook bycatch encounters in other tows (See heat map in Figure 1).

Bycatch rates for Chinook vary by the time and depth when the net is deployed. In general, for the CP sector, Chinook bycatch rates are higher when gear is deployed at night between 2100 and 0300 hours and in waters shallower than 180 fathoms (Figure 1). During the 2023 spring fishery, CP vessels were unable to find reliable and consistent amounts of whiting at greater depths (i.e., greater than 180 fathoms). Compared to recent years, a larger proportion of whiting was observed at shallower depths.

Because the CP fleet was unable to find whiting consistently in deeper waters, more catch occurred in shallower waters and Chinook salmon bycatch rates increased. Based on the higher rate and cumulative catch of Chinook, PWCC voluntarily closed three areas to fishing in late May (see Section IV).

For dark blotched rockfish, the CP fleet observed a pattern of smaller but consistent amounts of dark blotched throughout the season. This pattern persisted across geographic locations, depths and times (Figures 2 and 3). This observation is consistent with what we heard from vessel crew; dark blotched rockfish were present throughout the fishery regardless of fishing area, time, or depth. This relatively low level, persistent catch of dark blotched rockfish differed from encounters with other rockfish species.

The length composition data of dark blotched rockfish bycatch in 2023 (Figure 4) is indicative of a strong 2013 cohort which was observed in the most recent stock assessment. It appears the whiting fishery is observing this large 2013 cohort. As this cohort matures, the weight of individual rockfish would be expected to increase. This may result in an increased biomass of rockfish taken as bycatch as these fish continue to grow.

For other rockfish species, specifically canary, Pacific ocean perch, widow, and yellowtail rockfish we observed lightning strike events that contributed to the higher levels of bycatch for some of these species (Figure 2). We anticipate that the bycatch rates for many of these species will decrease in the fall consistent with past patterns of bycatch encounters in the fall. Specifically, there is a well-established pattern of substantial decreases in canary and yellowtail rockfish in the fall consistent with changes in the species distribution. If bycatch rates for a species are higher than anticipated, our fall fishing plan includes provisions for implementing move along rules and hot spot closures (See Section IV for more detail).

Times Fished – The fishery opened on May 1, a revision from the previous regulatory opening of May 15. Two CPs began fishing on May 5. Other vessels slowly began to enter the fishery from May 8 through May 15. Table 4 shows that Chinook salmon and dark blotched rockfish rates were similar from May 1 -14, and from May 15 through the end of the spring season.

Table 4. Spring season whiting, Chinook salmon, and dark blotched rockfish catch and bycatch rates in 2023; from May 1 – May 14, and post May 15.

	Spring Season Catch (mt or No.)		**Spring Bycatch rate** (mt bycatch/mt whiting or No./mt whiting)	
Species	May 1-14	May 15 – End of Spring Season	May 1-14	May 15 – End of Spring Season
Pacific Whiting	8,056 mt	32,040 mt	N/A	
Dark Blotched Rockfish	11.37 mt	58.92 mt	0.0014 mt/mt whiting	0.0018 mt/mt whiting
Chinook salmon (No.)	387	1,768	0.048 Chinook/mt whiting	0.055 Chinook/mt whiting

III. Description of Spring Fishery

Based on previous performance in the spring fishery, initial observations of high Chinook bycatch events were considered to be anomalous "lightning strikes" and not representative of a pattern of substantially increased Chinook salmon bycatch. Retrospectively, it is clear that there was greater abundance of Chinook on the fishing grounds than observed previous years. A higher number of lightning strike events occurred in 2023 compared to previous years.

Our vessels operated under a Salmon Mitigation Plan (SMP). The SMP requires members to: provide data and immediately communicate high bycatch events to Sea State, other member vessels, and the cooperative manager; use salmon excluders; and move when high Chinook salmon is encountered. Vessels moved extensively during the spring season in an effort to avoid Chinook salmon. For example, several vessels moved from Southern Oregon to Northern Washington to search for cleaner fishing. In some cases, vessels responded to higher Chinook salmon bycatch by increasing the depth of fishing in the area (i.e., moving into canyons and deeper waters) in an effort to avoid Chinook salmon. The movement protocols PWCC vessels operate under consistent with our SMP were not sufficient to address the level of Chinook salmon bycatch observed. Movement between areas did not consistently result in lower bycatch; some vessels moved from areas of high bycatch to a different area with high bycatch. This was particularly pronounced during the middle to end of May when there were particularly high tides and a full moon.

After several days fishing less productive areas, the CPs would shift back to the areas where whiting production was better, encounter several days of relatively good fishing, and then experience a surge in salmon bycatch when juvenile salmon shifted back into the productive whiting grounds.

On May 25, after repeated efforts to move and find fishing grounds with lower Chinook bycatch rates, PWCC voluntarily closed three large areas in southern Oregon that comprised higher Chinook salmon bycatch rates (Figure 5). These closure areas were designed in-season to respond to the unprecedentedly high Chinook salmon bycatch and were based on analysis of at-sea bycatch rates provided by Sea State. These closed areas included the best whiting fishing and the areas of highest Chinook salmon bycatch. When these areas closed, fishing shifted to areas of lower whiting production and higher occurrence of rockfish, most notably off Washington. Fishing off Washington resulted in slightly lower Chinook bycatch, but the fleet encountered much higher canary bycatch.

After the closure areas were in place for seven days, PWCC and Sea State analyzed catch data and on June 1 modified the provisions that applied to the most northern of the three closed areas (see Figure 5). Fishing was allowed in this area under mandatory constraints including limiting night fishing, limitations on the number of CPs in the area, and requirements that vessels had to cease fishing if Chinook salmon bycatch exceeded restrictive bycatch limits. PWCC also established provisions that would close the entire area based on cumulative Chinook salmon catch in the area. Three vessels entered the area and began fishing under these provisions. After several days of good production and relatively low bycatch, salmon moved into the area and bycatch increased. The closure provisions were triggered and the area was then closed again on June 4. Shortly after this closure, the fleet ceased operating due to the high levels of bycatch and low whiting CPUE in areas outside of the closure areas.

During the spring fishing season, there were several incidents where vessels redeployed gear after sets where high Chinook salmon was observed. During CP operations, it is often not possible to reliably observe Chinook salmon on deck when the codend is opened and catch moves into the holding tank. Gear is typically redeployed while catch is in the holding tank. Chinook salmon bycatch is monitored and sampled by observers during factory operations. Sampling all catch from a tow can take multiple hours and in some cases, the wheelhouse may not have observer sampling data until after gear has been set. In cases where Chinook salmon can be observed, deck crew notify the wheelhouse immediately. Our fall management measures seek to improve our ability to detect high Chinook salmon rates by implementing test tow requirements when moving into a new area or reentering an area previous subject to closures.

IV. Measures for the Fall Season

Based on the fishery patterns observed this spring and previous fall fishing seasons, the fleet will implement several measures in an effort to minimize bycatch of Chinook salmon and rockfish species.

We assume that minimizing Chinook salmon bycatch continues to be the Council's top priority. The enhanced fall fishing measures are designed to minimize potential encounters with Chinook salmon while balancing the need to minimize rockfish bycatch by moving the fleet based on bycatch areas, depths, and times. Throughout the fall fishery we intend to ensure that we are in close contact with fishery managers and other fishery participants to adapt to conditions on the fishing grounds.

1. Night Fishing Limitations

- Prior to September 1, no fishing shallower than 180 fathoms at night (2100 – 0300 gear deploy time) to limit potential Chinook salmon encounters. Historically, the CP sector fishes most of its tows at depths greater than 180 fathoms at night, but this provision requires deeper fishing to further limit potential Chinook salmon encounters. This management measure comes from an analysis of Chinook salmon encounter rates by time and depth. Although there is not always a consistent pattern of higher Chinook bycatch at night, based on a review of the 2023 spring fishery, gear deployment times during these windows and at depths shallower than 180 fathoms were correlated with higher Chinook salmon bycatch rates. Our analysis indicates that Chinook salmon bycatch rates are substantially lower at depths greater than 180 fathoms. An analysis of Chinook salmon rates by gear deployment time indicates that the periods of highest Chinook salmon bycatch occur when gear was deployed between 2100 and 0300 at shallower depths (less than 180 fathoms). (See Figure 1).

- After September 1, no fishing shallower than 100 fathoms at night (2100 – 0300 gear deploy time) to limit potential Chinook salmon encounters. This provision recognizes that after September 1 encounter rates of Chinook salmon are lower at shallower depths. Based on a review of CP catch data, limiting shallower fishing at night tends to be correlated with lower rockfish bycatch as well.

The 2023 catch and effort data indicate that bycatch rates for Chinook salmon are highest during night fishing operations in shallow water. Bycatch rates for dark blotched rockfish are nearly equivalent during day or night operations. The anticipated effect of vessels shifting from shallow to deeper waters

at night to avoid Chinook is lower whiting catch and potentially higher dark blotched rockfish bycatch as vessels have to tow longer to harvest the same amount of whiting.

Our management measures are designed to address this tradeoff by establishing test tow requirements and dark blotched rate-based management. Balancing these species-specific measures will be expected to increase operational costs and extend fishing time. This could increase the potential of fishing later in the fall. Our fleet will seek to balance the Chinook salmon and dark blotched rockfish catch to minimize overall bycatch, with a focus on minimizing Chinook salmon bycatch particularly later in the fall season when bycatch rates tend to increase.

2. Test Tows

When CP vessels move to a new location or arrive on the fishing grounds vessels will be required to make a test tow to evaluate fishing conditions. A test tow is defined as a tow of 30 minutes of fishing time or less, or catch of not more than 20 mt. Vessel operators will be required to evaluate the test tow and bycatch data before redeploying gear. Test tows will be required for any fishing activity where no other vessels are operating in the area (i.e. where no catch data/fishing condition information exists). The initial test will inform the vessel whether it is safe to make a full tow, or whether the vessel should move to a new location.

3. Move Along Provisions

The CP fleet will implement move along provisions for Chinook salmon and rockfish species subject to a set-aside management to relocate fishing effort to areas where vessels can reasonably expect to achieve a lower bycatch rate.

These measures will apply to individual CP vessels. In addition, the bycatch rate will be determined based on the daily bycatch rate established for that vessel. This approach recognizes that catch and bycatch for a CP is best managed on a vessel-specific basis and best measured based on the daily observer reports that compile data from several tows during a day.

- **Chinook Salmon**, a CP vessel must relocate their fishing effort if the vessel's daily average bycatch rate exceeds 150% of the base rate.
- **Set-Aside Rockfish Species**, a CP vessel must relocate their fishing effort if the vessel's daily average bycatch rate exceeds 150% of the base rate.
- **Base rate is defined as the rate at which the CP sector must fish at to harvest the remainder of the whiting allocation while not exceeding the CP sectors pro-rata share of the remaining at-sea set aside.**

If a movement is required, information identifying the trigger type (outlined above), the bycatch species and the location and depth of the bycatch event(s) will be sent to all other CP and mothership vessels and Sea State notifying them that a move has been made.

4. Hot Spot Management

During the fall fishery the CP sector will also implement "rolling hot spot" closure authority for Sea State. The CP fleet regularly deploys closure areas in other fisheries through coordination with Sea State. This authority provides Sea State authority to coordinate with PWCC members to establish closures or advisory areas in response to high Chinook and rockfish bycatch. Hot spot closures would

remain in effect for a 5-day period. This time period balances the need to limit Chinook bycatch with the fact that whiting and Chinook are highly mobile species -- areas that were once areas of high bycatch can become low bycatch areas in a very short period of time.

5. Mothership Closure Area Requirements

Before fishing in areas defined as mothership closure areas, CP vessels would be required to conduct a test tow (i.e., a tow of 30 minutes or less of fishing time or not more than 20 mt of catch). This provision would allow fishing only if test tows indicate that the area can be fished with limited impact on rockfish and salmon.

6. Dark Blotched Base Rate

Recognizing that the CP sector's spring 2023 catch of dark blotched rockfish has exceeded the at-sea set aside, minimizing further rockfish catch is a priority for the CP fleet. In order for rate-based move along rules to properly function an amount of dark blotched rockfish must be established to calculate move along rules and inform Sea State's hot spot reporting. The CP sector estimates that in conjunction with the tools outlined above, establishing a base rate of 0.449 kg rockfish/mt whiting the CP sector will have an opportunity to harvest its remaining allocation.

If the CP sector is able to fully harvest its allocations, this would result in approximately 40 mt of additional dark blotched rockfish at the proposed rate. If the CP fleet can maintain rates below this level or does not fully harvest its allocation due to poor fishing conditions, operational limitations, or bycatch constraints, then total bycatch of dark blotched rockfish would be lower.

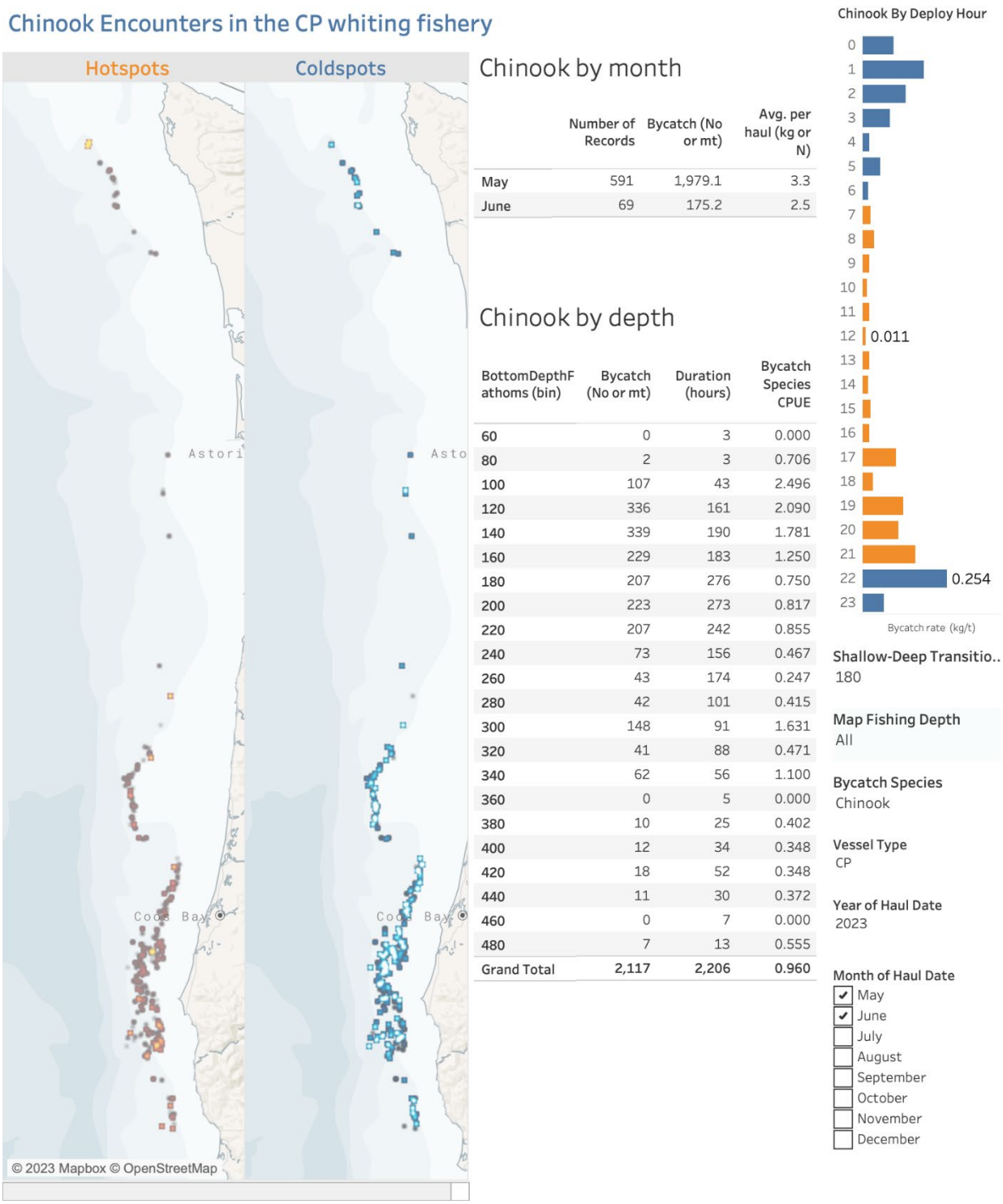

Figure 1. Distribution of Chinook bycatch rates in the whiting Catcher Processor sector for spring of 2023. The map on the left shows the distribution of tows for the CP sector for the months of May-June and the color density reflects the bycatch hotspots with red to orange colors and the density of tows with low Chinook salmon bycatch. The tables reflect the monthly bycatch rates, distribution of bycatch by depth and the bycatch rates by the hour of the day the net is deployed.

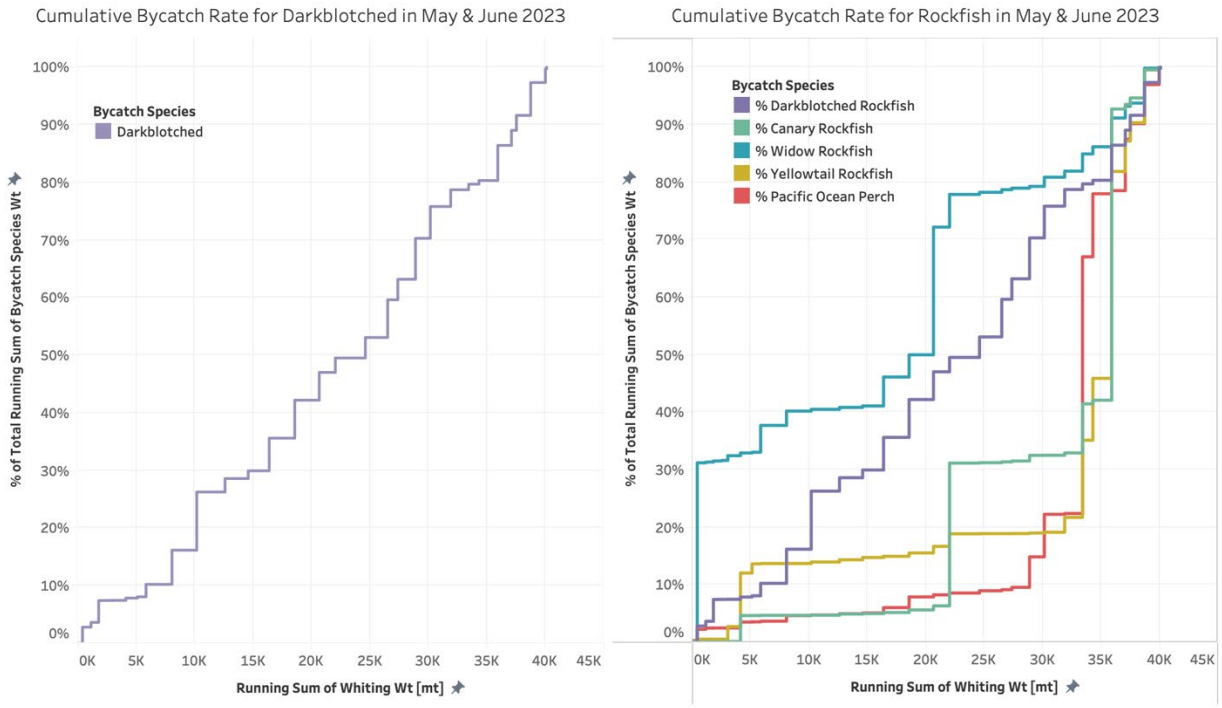

Figure 2. Cumulative rockfish bycatch proportions versus the cumulative whiting catch by fishing date (May-June, 2023) in the CP whiting sector. Each step along each species line corresponds to a day of fishing and the vertical increase reflects the daily bycatch amount, and the horizontal step reflects the daily whiting amount caught. A "lightning-strike" pattern is associated with an infrequent large vertical increase. A more "chronic" pattern is associated with frequent small vertical increases; for example, the dark blotched rockfish isolated in the left panel is an example of a chronic bycatch pattern.

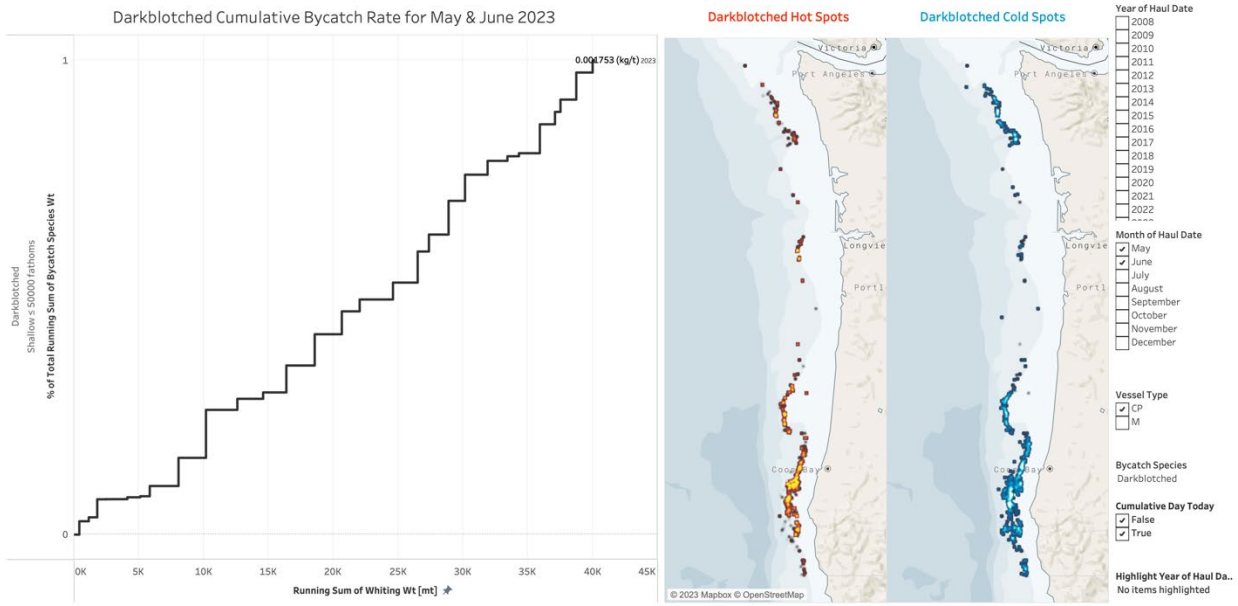

Figure 1. The left panel shows the cumulative catch of dark blotched rockfish versus the cumulative catch of Pacific whiting for the CP sector. The heat maps on the right reflect the spatial distribution of bycatch rates of dark blotched rockfish hot spots and cold spots in the months of May and June in 2023.

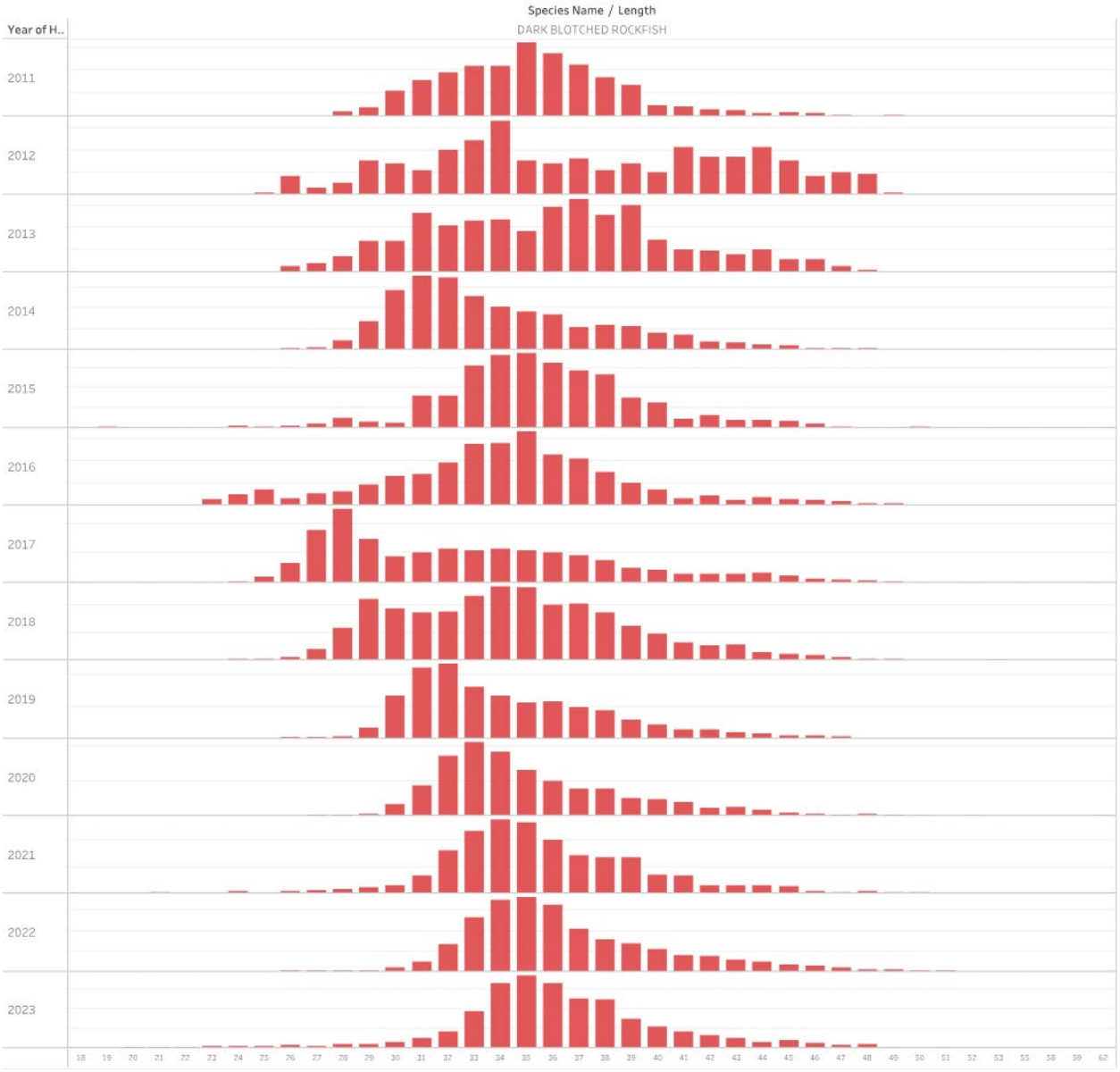

Figure 4. Length frequencies of dark blotched rockfish sampled in the CP whiting fishery. Note that the 2023 data only include samples from the spring fishery (May-June, 2023). The strong 2013-year class for dark blotched rockfish can be seen recruiting to the offshore whiting fishery in 2016 and continuing grow from a mode of 25 cm to a mode of 35 cm in the spring of 2023.

Bycatch avoidance areas effective 5/25/2023 16:00 to 6/1/2023 16:00

1	Chinook Salmon	Advisory Only	44° 19' N	125° 00' W
			44° 19' N	124° 52' W
			43° 51' N	124° 52' W
			43° 51' N	125° 00' W
			44° 19' N	125° 00' W
3	Chinook Salmon		43° 28' N	124° 47' W
			43° 28' N	124° 36' W
			43° 04' N	124° 42' W
			43° 04' N	124° 51' W
			43° 28' N	124° 47' W
4	Chinook Salmon		42° 16' N	124° 41' W
			42° 16' N	124° 37' W
			42° 02' N	124° 35' W
			41° 48' N	124° 29' W
			41° 48' N	124° 33' W
			42° 02' N	124° 39' W
			42° 16' N	124° 41' W
5	Chinook Salmon		42° 46' N	124° 58' W
			42° 46' N	124° 42' W
			42° 20' N	124° 42' W
			42° 20' N	124° 58' W
			42° 46' N	124° 58' W

Map of bycatch avoidance areas

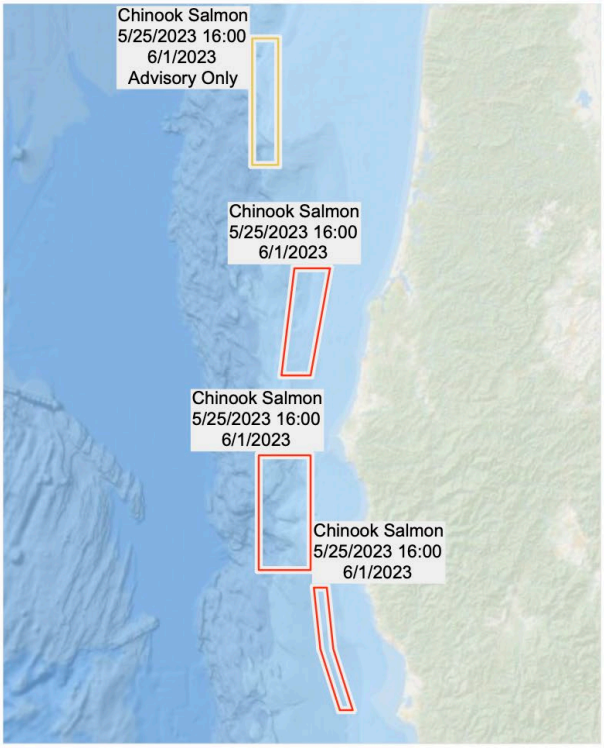

Figure 5. PWCC Chinook salmon closure areas implemented on 5/25/2023 through 06/01/2023 and subsequently extended through 06/08/2023. Limited fishing in the northern most closure areas after 06/01/2023 (test tows required and night fishing limitations and maximum Chinook salmon bycatch provisions applied). Closure areas were determined using Chinook bycatch rate data and VMS information from all offshore sector vessels (CPs and Motherships catcher vessels).