

GROUND FISH MANAGEMENT TEAM REPORT ON THE REINITIATION OF SECTION 7
CONSULTATION REGARDING THE PACIFIC FISHERY MANAGEMENT COUNCIL
GROUND FISH FISHERY MANAGEMENT PLAN

Salmon ITS: Mitigation Measures and Reserve Rule Analysis

In late 2017, the National Marine Fisheries Service (NMFS) released results of the section 7 re-consultation and the 2017 Salmon Incidental Take Statement (ITS) after the completion of the re-consultation on the continued implementation of the Groundfish Fishery Management Plan (FMP). The ITS included six reasonable and prudent measures¹ (RPMs) which require the Pacific Fishery Management Council (Council) and NMFS to take certain actions to address salmon bycatch in groundfish fisheries. These RPMs are non-discretionary and were developed based on the analysis in the biological opinion (BiOp) on the effects of the groundfish fishery on salmon. The RPMs included in this ITS are grouped by topic:

1. Monitoring;
2. Developing Measures to Keep Bycatch within Guidelines;
3. The Reserve;
4. New Times and Areas;
5. Identifying and Addressing High Bycatch Times/Areas/Conditions; and
6. Reporting and Evaluation.

The ITS provides terms and conditions (T&C) under each RPM that are also non-discretionary, and are required to implement each specific RPM. The Groundfish Management Team (GMT) considered the impacts analysis in the BiOp and the requirements of the RPMs in the ITS and provides the following information on process and options for Council consideration.

RPM 1: Monitoring

RPM 1 requires that “NMFS, in consultation with the Council, will review existing mechanisms for monitoring salmon bycatch in the groundfish fishery, and will develop mechanisms--if they do not already exist--that, a) provide timely inseason data regarding the amount and location of salmon bycatch by sector, and; b) provide timely inseason data regarding the geographic distribution of the at-sea whiting fleet.”

In order to accomplish this, the T&C for RPM 1 requires NMFS to monitor inseason bycatch for the trawl fisheries (T&C 1.a.i.); assess the quality of this data and ensure it is comparable or better to current collected information (T&C 1.a.ii.); monitor location of bycatch, collect coded wire tags (CWT) and other biological information (specifically genetic samples from all whiting, bottom

¹ The United States Fish and Wildlife Service (FWS) defines reasonable and prudent measures as an action that FWS or National Oceanic and Atmospheric Administration (NOAA) Fisheries believes necessary or appropriate to minimize the impacts (the amount or extent) of incidental take caused by an action that was subject to consultation.

trawl, and non-whiting midwater trawl fisheries; T&C 1.a.iii); and, track the distribution of fishing effort (T&C 1.a.iv).

The GMT evaluated the Council and NMFS' ability to track the amount, and location, of any salmon bycatch by the sectors (whiting and non-whiting) and sub-sector (at-sea, individual fishing quota (IFQ), recreational, etc.) defined in the ITS. In order to assess, on an ongoing basis, the inseason bycatch of salmon against the guidelines in the ITS and the likelihood of a sector, or sub-sector, exceeding the guideline, NMFS would need this information inseason and a method of projecting or accounting for catch. Table 1 below summarizes the timeliness and ability to project data inseason by sector and sub-sector.

Based on this evaluation, NMFS and the Council should be able to monitor salmon bycatch by species, area, and sector for the trawl fisheries on a weekly basis (T&C 1(a)(i)). Since the vast majority of historical bycatch has been from the trawl fisheries, the timely reporting of salmon bycatch in the trawl fishery should help ensure that inseason monitoring goals are met for all fisheries.

Table 1. Summary of Current Catch Reporting and Projection Methods for Salmon Bycatch.

Sector	Sub-Sector	Reporting Time	Location Information Available	Biological Information Available c/	Source	Model for Projection?
Whiting	At-Sea	24 hours	Yes- coordinates of haul	Sex, length/frequency, CWT, adipose fin presence, genetic data d/	NORPAC	Yes (bootstrap or bycatch ratio)
	Shoreside	~24 hours or less	Yes- IFQ catch area at the trip level within 24 hours. Logbooks available within ~ 1 week. Haul-level estimates of salmon catch available the following year.	Sex, length/frequency, CWT, adipose fin presence, genetic data d/.	Maximized retention, salmon landed on etix w/ no value	Yes (bycatch ratio)
	Tribal	Weekly, automatic notification if over 20 Chinook in a single tow	Within U&A boundaries	Length frequency, CWT, adipose fin presence	Tribes	No
Non-Whiting	Midwater/ Bottom trawl	~24 hours or less	Yes- IFQ catch area at the trip level within 24 hours. Logbooks available within ~ 1 week. Haul-level estimates of salmon catch available the following year.	Sex, length/frequency, CWT, adipose fin presence, genetic data.	EM vessels: Report salmon landed on etix w/no value. Observed vessels that sort at sea: Report to PacFIN within 24 hours.	Yes (bycatch ratio)
	WA, OR, CA recreational bottomfish during open salmon seasons	Impacts are accounted for in pre-season salmon modeling and do not have to be attributed to non-whiting thresholds. See Table 2-53 from BiOP/ITS.				

Sector	Sub-Sector	Reporting Time	Location Information Available	Biological Information Available c/	Source	Model for Projection?
	WA recreational bottomfish outside salmon season a/	One month lag	By marine catch area.	Retention prohibited	WDFW Not on RecFIN	Not available, but minor impacts
	OR rec. longleader (any month) and bottomfish outside salmon seasons a/	Preliminary 1 week lag, final 1 month lag	By broad grid of catch location.	Retention prohibited	ODFW Not on RecFIN	Not available, but minor impacts
	California rec. bottomfish outside salmon season b/	Currently, no existing reporting structure to analyze salmon bycatch rec data outside of salmon season, but minor impacts.				
	Non-Nearshore	Not available until fall of following year	Only for select observed hauls	Sex, length/frequency, CWT, adipose fin presence, genetic data.	WCGOP Salmon Report	Not available, but minor impacts
	Nearshore	Not available until fall of following year	Only for select observed hauls	Sex, length/frequency, CWT, adipose fin presence, genetic data.	WCGOP Salmon Report	Not available, but minor impacts

a/ From “bottomfish” trip types only based on following formula: Landed + Discarded x DMR (16% barbless, 30% barbed) + “drop-off” mortality for fish that shake hook before being caught (5% x landed)

b/ From “bottomfish” trip types only based on following formula: Landed + Discarded x DMR (59% J-hook) + 5% “drop-off” all catch

c/ Per T&C 1(a)(iii)(c), salmon taken as bycatch should be sampled for stock composition, coded wire tags, and other biological information including age, sex and size,. For all trawl fisheries, this includes taking genetic samples from the bycatch.

d/ Shoreside and At-sea Whiting take genetic samples from Chinook salmon only.

RPM 2: Developing Measures to Keep Bycatch within Guidelines

RPM 2 requires that “The Council and NMFS will review existing regulatory mechanisms for reducing salmon bycatch and will revise these mechanisms or develop and implement new mechanisms to ensure that, should inseason data show the annual coastwide bycatch will exceed 11,000 Chinook or 474 coho for the whiting sector or 5,500 Chinook or 560 coho for the non-whiting sector, NMFS and the PFMC will take timely and effective inseason action to avoid an exceedance of these bycatch thresholds.”

The T&Cs under RPM 2 require a range of responses from both the Council and NMFS. In our review and subsequent discussion, the GMT focused on T&C 2.a., which requires the Council to review existing mechanisms for avoiding or reducing bycatch inseason through the 2019-2020 biennial harvest specifications and management measures process. The GMT also provides some analysis on potential management measures that may be needed to keep sectors from exceeding their bycatch guidelines (T&C 2.b.). Specifically, the Council recommended that the GMT analyze the use of Bycatch Reduction Areas (BRAs) within the 2019-2020 biennial process for salmon bycatch reduction in the non-whiting mid-water trawl fishery. While preparing the analysis of BRAs, the GMT found some background information in the environmental assessment for the 2015 midwater clean-up rule on their development and historical use that seems pertinent to the Council’s request.

The 2009-2010 harvest specifications and management measures implemented bycatch limits for overfished species and BRAs for the whiting sector. However, these bycatch limits were removed from regulation with implementation of trawl rationalization. Since implementation of the trawl IFQ program, the authority to close the Pacific whiting sector of the Shorebased IFQ fishery through an automatic action has been removed, and the use of the BRAs has been modified such that they are now considered to be a type of groundfish conservation area (50 CFR 660.11). Like rockfish conservations areas, the BRAs are areas closed to fishing by particular gear types, bounded by lines approximating particular depth contours (50 CFR 660.11). Regulations at 50 CFR 660.55 (c)(3)(i) continue to allow BRAs to be implemented through automatic action, but they can also be implemented through routine inseason action. Because BRAs had not previously been considered for use as a mitigation tool for salmon bycatch, there is no analysis to support their use in this way.

Below, the GMT reviews by sector (whiting and non-whiting) the current mitigation measures available for avoiding or reducing salmon bycatch, whether these measures are adequate for addressing salmon bycatch concerns inseason, and the potential need for additional mitigation measures. The primary emphasis is geared toward Chinook salmon, although considerations for coho salmon are also presented below.

Whiting

The whiting fisheries have historically stayed below the 11,000 Chinook salmon bycatch threshold, as overages would have occurred only twice in the past 16 years (Table 2). Therefore, based on historical performance, there may be an infrequent need for inseason adoption of depth or area restrictions to stay within the whiting threshold. Furthermore, since 2002 (the start of the West Coast Groundfish Observer Program, WCGOP), the whiting fisheries have never exceeded the maximum of the combined salmon bycatch threshold (11,000 Chinook salmon) and the reserve

amount (3,500 Chinook salmon) established in the 2017 ITS. However, they did come close in 2014, with a total of 14,393 Chinook salmon taken by all whiting sub-sectors (Table 2).

Table 2. Bycatch of Chinook salmon (#) by year for the whiting fisheries in relation to the 11,000 Chinook threshold for the whiting sector.

Sector	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
At-sea	1,679	2,648	805	3,963	1,209	1,321	722	319	714	3,990	4,232	3,737	6,685	1,808	3,051	3,769
Shorebased	1,062	425	4,206	4,018	839	2,462	1,962	378	2,997	3,727	2,333	1,313	7,554	2,424	733	1,394
Tribal	1,018	3,439	3,740	3,985	1,940	2,404	697	2,147	678	906	17	1,025	154	1	200	577
Total	3,759	6,512	8,751	11,966	3,988	6,187	3,381	2,844	4,389	8,623	6,582	6,075	14,393	4,233	3,984	5,740
% 11k threshold	34%	59%	80%	109%	36%	56%	31%	26%	40%	78%	60%	55%	131%	38%	36%	52%

Currently, one mitigation measure is available in Federal regulations which specifically helps reduce and avoid Chinook salmon bycatch by the whiting sector, known as the Ocean Salmon Conservation Zone (OSCZ). The OSCZ consists of all waters shoreward of a boundary line approximating the 100 fathom (183 m) depth contour. When triggered, the OSCZ is closed to fishing for the whiting fleet. This closure is implemented coastwide through automatic action when NMFS projects the Pacific whiting fishery may take in excess of 11,000 Chinook salmon within a calendar year (50 CFR 660.131(c)(3)).

An additional automatic authority exists in regulation, which requires NMFS to implement area closures via BRAs through automatic action to respond to concerns over high bycatch of non-whiting groundfish in the whiting sector. These area closures are triggered automatically when NMFS projects that the Pacific whiting sector will exceed a non-whiting groundfish allocation before attaining its whiting allocation (§ 660.130(e)(6)). As described above, it may also be implemented as a routine action for vessels using midwater groundfish trawl gear during the Pacific whiting primary season (§ 660.60(c)(3)). BRAs are currently available in regulation at 75, 100, or 150 fathom depth contours, and close the area shoreward of that depth contour.

In November 2017, the Council recommended an analysis of the efficacy of the OSCZ and its use over the past several years. The Council also recommended that BRAs be analyzed for use in mitigating salmon bycatch thresholds in the ITS and that the analysis include the potential addition of a depth contour of 200 fathoms ([Agenda F.9., Preliminary Draft Council Motions, November 2017](#), [Agenda Item F.9.a, Supplemental GMT Report 4, November 2017](#)).

To gauge whether coastwide depth band closures could be effective in reducing Chinook salmon bycatch, the GMT analyzed historical Chinook salmon bycatch and fishing effort data for the non-tribal whiting sectors (at-sea and shoreside) by depth and area. Figure 1 shows the bycatch rate of Chinook salmon (number/mt whiting) and the effort by month and depth for the at-sea fleets (2011-2017) and the shoreside fleet (2011-2016). The actual bycatch amounts, bycatch rates, and effort information is included in the Appendix (Tables A1-A6 for at-sea, Tables A7-A10 for shoreside whiting, Tables A11-A12 for shoreside non-whiting mid-water).

This analysis considers effort in conjunction with bycatch rates, to ensure that the closure of an area would impact overall salmon bycatch. For example, closing an area with a high bycatch rate but low effort would likely not adequately curtail salmon bycatch coastwide. At the same time, preserving heavily fished depths with low or modest bycatch rates would be essential to minimize disruptions to the groundfish fishery sectors. In order to better visualize the bycatch rates and effort metrics simultaneously, Figure 1 synthesizes and displays the data from the separate tables in the Appendix and allows for comparisons both in relation to each other, as well as amongst sectors (at-sea vs shoreside).

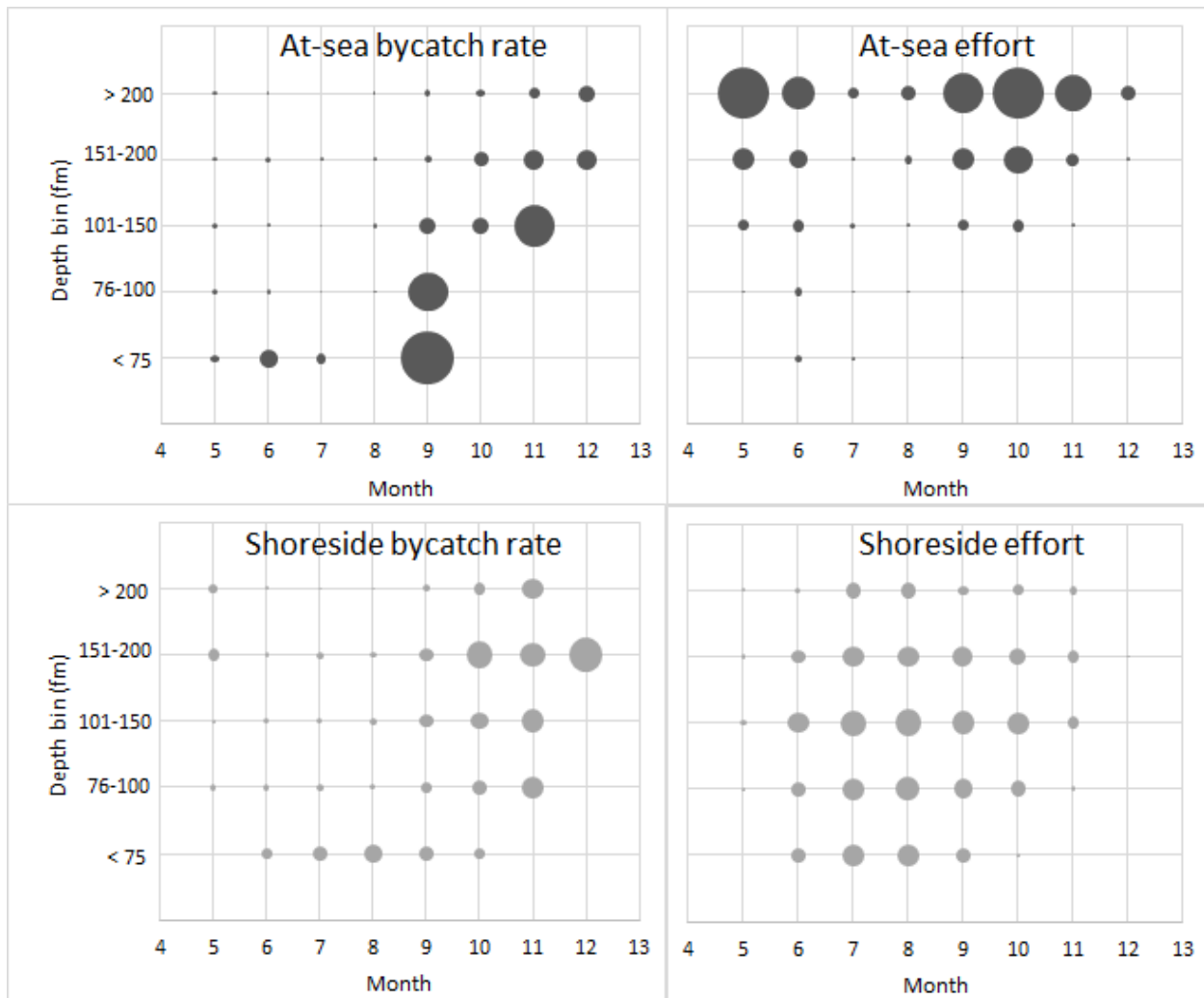


Figure 1. Relative bycatch rates (# Chinook salmon/ mt whiting) and effort (% of hauls) for the whiting fisheries by month and depth. A comparison of bycatch rates and effort amongst sectors is possible because both sectors use the same units and scale.

Figure 1 and all other figures in this section should be viewed with a few caveats in mind. First, depth for the at-sea sector reflects the average bottom depth of a haul in fathoms, which is ideal for evaluating depth closures, as they are based on bottom depth. In contrast, only depth of fishing is recorded for shoreside hauls, which can therefore lead to bias when evaluating depth restrictions based on bottom depth since they fish off the bottom. In other words, the bottom depths where shoreside fishing occurs are likely deeper than the fishing depths shown in Figure 1. Spatial analysis may be needed to determine if any correction for bias (e.g., adding x fathoms to account for depth off bottom) would be needed to fully evaluate impacts of depth restrictions.

A second caveat is that haul-level data is available at a finer scale for the at-sea sector compared to the shoreside sector. Landings and discards are sorted and recorded at the haul-level for the at-sea sector, while the shoreside sector does not sort at-sea while operating under maximized retention. Trip-level totals from fish tickets therefore must be used in conjunction with haul-level logbook estimates to approximate true haul-level landings (including salmon).

If the Council chose to develop BRAs for salmon mitigation, they could be implemented at any latitudinal break that exists in regulation. Therefore, the GMT also analyzed historical bycatch data by depth and latitude to determine if regional BRAs could be more effective than coastwide depth restrictions. The GMT used the same latitude breaks used in the annual salmon bycatch report produced by NMFS. The most recent version is available at [Agenda Item I.1.a, NMFS Report 2, March 2017](#). These particular latitude lines and regions were used as an example for preliminary analyses to promote Council and advisory body discussion. These regions are (Figure 2):

1. North of Cape Falcon (45° 46' N. lat.)
2. Cape Falcon (45° 46' N. lat.) to Cape Blanco (42° 50' N. lat.)
3. Cape Blanco (42° 50' N. lat. to 40° 10' N. lat.)
4. South of 40° 10' N. lat. (although 0 catch or effort in this area)

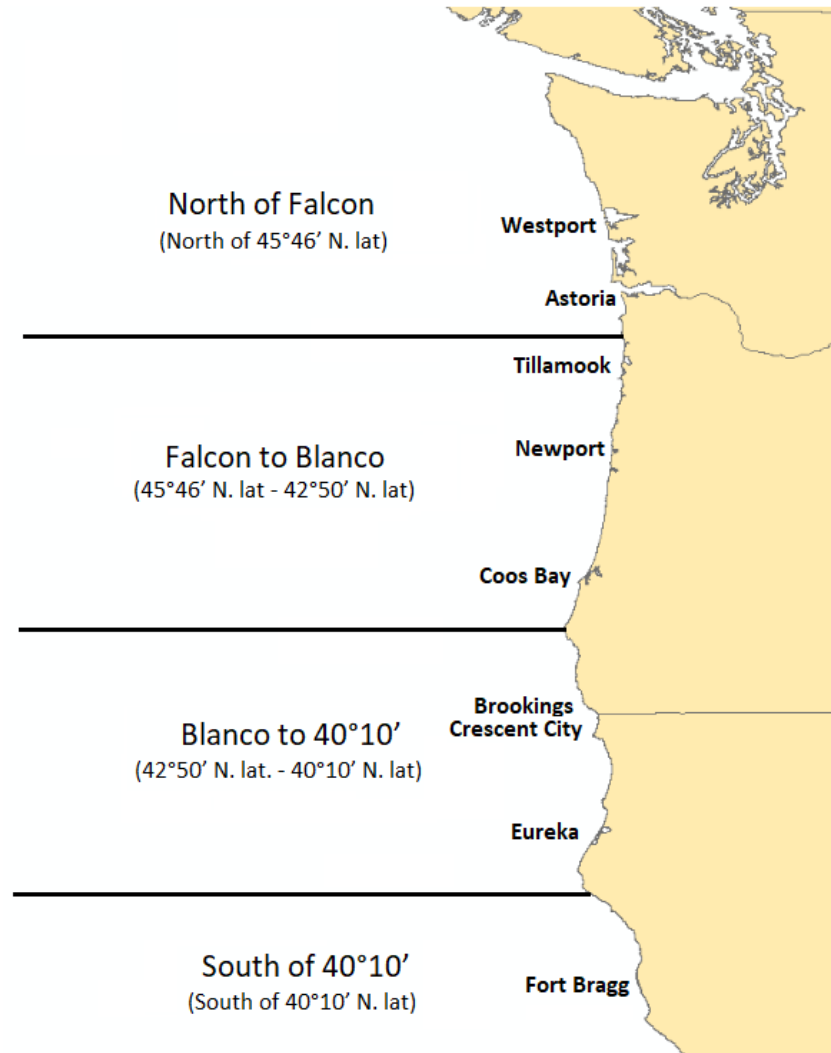


Figure 2. Latitudinal breaks used to define the four regions used in the analysis.

At-sea whiting

The OSCZ (< 100 fathoms) may not be an effective inseason measure to reduce at-sea Chinook salmon bycatch since only about one percent of effort between 2002 and 2017 occurred in those depths (Figure 1; Tables A-1 through A-6,) and it is only triggered once the threshold is projected to be or is exceeded. Because a majority of the effort and whiting catch occurs outside of 100 fathoms, the bycatch rate in this depth bin (0-100 fathoms) is generally higher than the deeper depth bins. Despite higher bycatch rates, the low amount of effort may result in limited actual reductions in salmon catch resulting from implementing the OSCZ. For perspective, in 2014, the OSCZ went into place on October 14. Historically, as shown in Table A-3, there have been zero hauls shallower than 100 fathoms in October- December. Therefore, implementing the OSCZ had no perceivable impact on salmon bycatch based on recent years' fishing behavior. If the OSCZ were to be implemented earlier in the year or if vessels were to fish for whiting shallower in the future, the effects of implementing this mitigation measure could be different. Those impacts would need to be assessed based on the inseason information for that fishing year, including the amount of potential additional whiting catch, the location of fishing effort, and the time of year.

The development of a BRA for use in salmon mitigation may provide some benefit to mitigating salmon bycatch in the whiting fisheries. A BRA closure of the areas shoreward of 200 fathoms could reduce salmon bycatch since it could shift about 25 percent of the effort from the shallower depth bins (0-200 fathoms) into the deepest depth bins (> 200 fathoms), which typically has at least two to three times lower bycatch rates than the shallower depths (Table A-2). Inseason assessment of the location of salmon bycatch and the amount of whiting still unharvested would need to be considered. Although hauls by the at-sea fleet in depths greater than 200 fathoms have shown low Chinook salmon bycatch rates (Table A1), the high effort in those same waters has resulted in the greatest amount of total Chinook salmon bycatch occurring in that depth bin.

Overall, the effectiveness of a depth restriction for the whiting fleet would be based on the sub-sector affected, time of year, and distribution of the whiting schools in a given year, and possibly salmon abundance (although [Agenda Item I.1.a, NMFS Report 1, March 2017](#) indicate abundance is not a driver to bycatch); therefore, the GMT focused on qualitative comparisons at this time. Curtailing salmon bycatch through depth restrictions alone may have limited effectiveness due to the patchy nature of bycatch; however, area restrictions may have an effect on the stocks of salmon expected to be contacted depending on the time of year and latitude of the closure.

While the bycatch and effort analyses used to evaluate depth restrictions (Figure 1 and Table A-1 through A-6 in Appendix) are shown for the at-sea sector as a whole for confidentiality purposes, the catcher-processor (CP) and mothership (MS) sectors are managed independently. Therefore, a BRA could be implemented on a sub-sector-specific basis for any of the non-tribal whiting sectors, including the at-sea sectors independent of each other, which could be more effective than a “one-size-fits-all” approach.

As noted above, a < 200 fathoms BRA could be the most effective for limiting at-sea bycatch, since it would shift the greatest amount of effort into the lowest bycatch depth bin (> 200 fathoms). However, a < 200 fathoms BRA may have more profound effects on the MS sector, since 41.6 percent of their hauls are shallower than 200 fathoms compared to 11.2 percent for the CP sector (Figure 3). If at-sea bycatch of Chinook salmon were disproportionately stemming from the CP sector, the adoption of a < 200 fathoms BRA for both at-sea sectors would potentially have a larger negative influence on the MS sector, with the CPs better equipped to shift effort to deeper depths. Based on past Groundfish Advisory Subpanel (GAP) feedback, the GMT understands that MS catcher vessels may lack the horsepower to fish deeper depths. It would therefore be helpful for the GAP to identify any depth restrictions that would result in de facto MS fishery closures.

The GMT stresses that the usefulness of implementing a BRA to lower bycatch of salmon would depend on the time of year. There is typically little at-sea effort in the summer months (July and August) when much of the fleets fish in Alaska. The level of activity in the surrounding months, when the highest bycatch rates occur in shallower depths, varies by year due to market price, fishing success in Alaska, and other factors. Additionally, one sector may fish later into the year than the other sector.

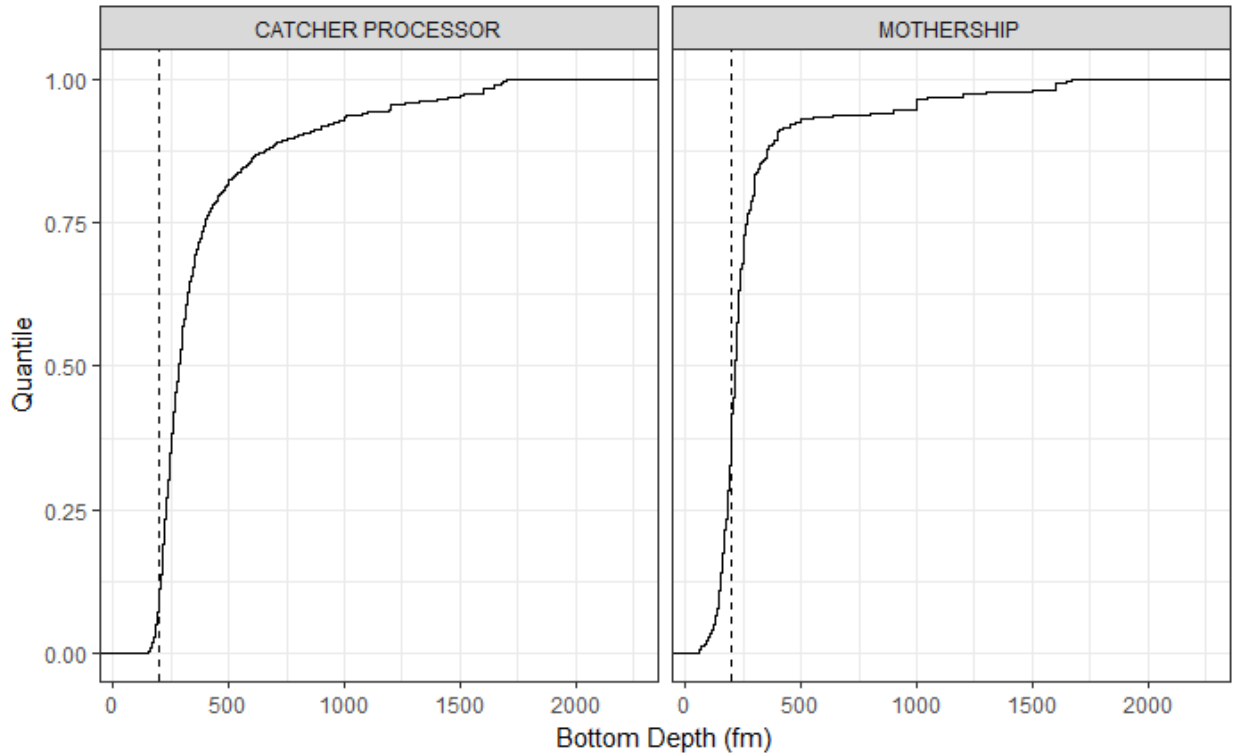


Figure 3. Distribution of average bottom depth (fm) of hauls by at-sea sector, 2011-2017. Dashed line represents 200 fathoms.

The fishing behavior of the at-sea sectors is driven by the location of whiting schools and constraining rockfish species allocations or set-asides. Therefore, while the location of the majority of recent effort has been concentrated between Cape Blanco and Cape Falcon, Table A-6 shows that between 2011 and 2017, there is significant intraannual and interannual variation. In recent years, the fleets have been limited by both Pacific ocean perch (POP) and darkblotched rockfish allocations. These constraints have led the sectors to fish more southerly, which has resulted in higher levels of Chinook bycatch (Figure 1-8 from the ITS). However, with the rebuilding of the POP and darkblotched rockfish stocks in 2017, higher annual catch limits (ACLs) in 2019-2020, and changes to set aside management, the sectors may fish more northerly. As shown in Figure 4, there are no discernable patterns of salmon bycatch rates in terms of area and depth. If the Council were to consider a BRA at a defined set of latitudes, it would likely need to be considered inseason to assess the location of high salmon bycatch rates.

In conclusion, the OSCZ (< 100 fathoms) may be too shallow to be effective for reducing at-sea salmon bycatch by measurable amounts and would depend on the time of implementation. As the threshold is likely to not be exceeded until later in the year (if at all), there is little to no impact expected (based on historical trends) as fishing does not occur in this depth bin after October. However, deeper BRAs (especially < 200 fathoms) could be effective to keep overall salmon numbers low for the at-sea sectors managed as a whole. The GMT again notes that sector-specific depth restrictions may be preferable given possible differences in the depths each sector can fish due to operational limitations (e.g., horsepower). The Council should consider this information when developing its range of alternatives (ROA) for whiting mitigation measures below.

Depth Bin	Area Bin	May	June	July	August	Sept.	Oct.	Nov.	Dec.
0-75	N of Cape Falcon								
	Cape Falcon to Cape Blanco								
	Cape Blanco to 40 10 N. lat.								
76-100	N of Cape Falcon								
	Cape Falcon to Cape Blanco								
	Cape Blanco to 40 10 N. lat.								
101-150	N of Cape Falcon								
	Cape Falcon to Cape Blanco								
	Cape Blanco to 40 10 N. lat.								
151-200	N of Cape Falcon								
	Cape Falcon to Cape Blanco								
	Cape Blanco to 40 10 N. lat.								
>200	N of Cape Falcon								
	Cape Falcon to Cape Blanco								
	Cape Blanco to 40 10 N. lat.								

The color gradient goes from dark green (lowest bycatch rate, including zero) to red (highest bycatch rate). Blank cells represent zero hauls in that bin.

No fishing effort south of 40°10' N. lat.

Figure 4. Heatmap of Chinook bycatch rates for the at-sea sectors by area, depth, and month, 2011-2017.

Shoreside whiting

The shoreside whiting sector is similar to the at-sea sub-sectors in that both have considerably higher bycatch rates of Chinook salmon in “fall” months (September - December) compared to “summer” months (May - August). For instance, the average bycatch rate (# Chinook salmon / mt whiting) for shoreside whiting during fall months is 3.8x higher than that of summer months (Table A-9). However, there are several large differences between at-sea and shoreside sub-sectors, which suggests that sub-sector specific mitigation measures may be more effective than implementing a depth or area restriction for the entire whiting sector.

As a reminder, all depths discussed in this section for shoreside represent fishing depth, and not bottom depth, upon which depth restrictions would be based. Therefore, the shoreside analyses presented below are likely biased shallow by the amount of fathoms they fish off the bottom. These biases could be rectified by further spatial analyses that link haul location to depth closure areas, which could help inform if depth restrictions would be effective for reducing salmon bycatch in the shoreside fisheries. However, note that precursory spatial analyses indicate their fishing locations based on haul coordinates have similar depth distributions as those based on fishing depth from Figure 1, which indicates that correction of the bias may not produce much for measurable results.

Another difference between at-sea and shoreside sub-sectors is that shoreside fishing occurs in shallower waters than in the at-sea sub-sectors. For instance, 92 percent of shoreside hauls occur shallower than 200 fathoms, compared to 24 percent by the at-sea sector (Table A-10 and Table A-3, respectively). The shoreside fishery is also more evenly distributed in effort across depth bins, and is centered around the 101-150 fathom depth bin, with a tailing off to the deeper and shallower depths.

Additionally, bycatch rates consistently decrease with depth for at-sea, but shoreside bycatch rates are homogeneous across depths (Figure 1). The highest bycatch rates (~0.05 Chinook per mt of whiting) occur in the shallowest depth bin (0-75 fathoms) and second deepest (151-200 fathoms) depth bins, with an intermediate bycatch rate in the most heavily fished 101-150 fathom depth bin.

The lack of a relationship between bycatch rates and depth may hinder the ability to use depth restrictions to reduce salmon bycatch in the shoreside fishery. In short, there would not be much difference in salmon bycatch if a depth closure shifted shoreside effort to deeper depths with similar bycatch rates. Implementing a BRA within a defined set of latitudes does not appear to be an effective means for reducing shoreside bycatch of Chinook either, since the bycatch rates appear similar by region (Figure 5). However, as with the at-sea sector, inseason data on the location of salmon bycatch and the amount of whiting allocation remaining would better inform how effective a BRA could be.

Depth (fm)	Area	May	June	Jul.	Aug.	Sept	Oct	Nov.	Dec.
0-75	1: N. Falcon	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	White	White
0-75	2: Falcon - Blanco	White	Orange	Yellow	Yellow	Yellow	Yellow	White	White
0-75	3: Blanco - 40.10	White	White	Green	Yellow	White	White	White	White
76-100	1: N. Falcon	Light Green	Light Green	Light Green	Light Green	Light Green	Yellow	Orange	White
76-100	2: Falcon - Blanco	White	Yellow	Yellow	Light Green	Yellow	Orange	Yellow	White
76-100	3: Blanco - 40.10	White	Green	Green	Yellow	White	White	White	White
101-150	1: N. Falcon	Green	Light Green	Light Green	Light Green	Light Green	Yellow	Orange	White
101-150	2: Falcon - Blanco	White	Yellow	Yellow	Yellow	Yellow	Orange	Orange	Red
101-150	3: Blanco - 40.10	White	Green	Green	Green	Green	White	White	White
151-200	1: N. Falcon	Yellow	Light Green	Light Green	Light Green	Light Green	Yellow	Orange	White
151-200	2: Falcon - Blanco	Green	Green	Yellow	Yellow	Yellow	Orange	Orange	Red
151-200	3: Blanco - 40.10	White	Yellow	Green	Yellow	Red	Yellow	Green	Green
>200	1: N. Falcon	Yellow	Light Green	Light Green	Light Green	Light Green	Light Green	Yellow	White
>200	2: Falcon - Blanco	Green	Green	Green	Green	Yellow	Yellow	Orange	White
>200	3: Blanco - 40.10	White	Green	Light Green	White	Green	Yellow	Green	Green

Figure 5. Heatmap of Chinook bycatch rates for the shoreside whiting sector by area, depth, and month, 2011-2016. The color gradient goes from dark green (lowest bycatch rate, including zero) to red (highest bycatch rate). White cells represent zero hauls in that bin. No fishing effort south of 40°10' N. lat.

Similar to at-sea, implementation of the OSCZ (< 100 fathoms) would not be expected to have much effect in the shoreside whiting sector since most effort already occurs beyond 100 fathoms later in the year, when the OSCZ would typically be implemented. More importantly, bycatch rates appear similar in depths shallower and deeper than 100 fathoms, which could simply shift effort out deeper without reduction in any salmon bycatch.

Also similar to at-sea, a < 200 fathoms BRA closure could be effective for reducing bycatch for shoreside whiting since it would shift effort into one of the lower bycatch rate bins (76-100 fathoms is the lowest). However, the expected reductions in salmon bycatch associated with a < 200 fathoms BRA closure would be less for shoreside than at-sea since the bycatch rate for shoreside does not decline as steeply with depth as for at-sea (Figure 1).

While a < 150 fathoms BRA may be effective for reducing bycatch for at-sea, it might not be as effective for shoreside, since effort could shift to the 151-200 fathom depth bin where the shoreside bycatch rates are generally the highest.

In conclusion, depth restrictions may not be an effective means to reduce bycatch of Chinook salmon in the shoreside whiting fisheries, since bycatch rates are similar by depth and region. The GMT is uncertain why bycatch rates are similar by depth for shoreside, but increase by depth for at-sea and would be interested to hear from the GAP and other industry members on this. As we mentioned above, the haul level data used in the analyses is more comprehensive for at-sea than shoreside (i.e., bottom depth instead of fishing depth, actual landings/discards for each haul instead of estimated landings). Note that the GMT could conduct further investigations into bycatch patterns for shoreside whiting that would resolve the fishing depth issue (i.e., by assigning hauls to depth bins or blocks based on coordinates). If desired, the Council should specify their preferred depth and area configurations.

Alternatives

Issue A: Whiting sector mitigation measures

The GMT proposes the following ROA as mitigation measures to address salmon take in the whiting sectors for Council consideration. These alternatives are not mutually exclusive and can be paired together. For example, the Council may choose to eliminate the OSCZ (Alternative 1) but develop BRAs for salmon mitigation through routine action (Alternative 2).

ROA for OSCZ:

No Action: Automatic Action once the whiting sectors (including tribal) are projected to or reach the threshold of 11,000 Chinook salmon

Alternative 1: Eliminate

ROA for BRAs:

No Action: Available at 75, 100, and 150 fathoms to minimize the incidental harvest of any protected or prohibited species taken in the groundfish fishery (this includes salmon)

Alternative 1: Maintain BRA lines at 75, 100, and 150 fathoms in regulation and add the 200 fm depth contour

Alternative 2: Maintain automatic action authority and revise regulations so that exceedance of the whiting salmon threshold of X would also trigger the automatic implementation of a BRA

For Alternative 1, the Council would have the ability to implement BRAs at either 75, 100, 150, or 200 fathoms coastwide, or at specific latitude bands, as a routine change through inseason action at a Council meeting and based on new information regarding salmon bycatch to date. If the Council were to select Alternative 2 for BRAs, the Council would need to provide guidance on the depth contours that would be available for mitigation against salmon bycatch. For example, under Alternative 2, a BRA would be triggered through automatic action once X number of Chinook salmon are taken in the whiting fisheries, with X being defined by the Council as the threshold of 11,000 Chinook salmon, or another lesser number that the Council chooses (e.g., 90 percent). The Council may also want to consider additional measures (e.g. hotspot closures) or implement rules to close the sector once a threshold is projected to be reached if the Reserve were to not be used (more detail below) outside the 2019-2020 biennial process.

Non-Whiting

The non-whiting sector for the ITS is comprised of the shorebased individual fishing quota non-whiting (i.e., bottom trawl, midwater trawl, and fixed gear or “gear switching”) fleets, nearshore, non-nearshore, and the two specified recreational fisheries from Table 1 (note that all tribal bycatch

is attributed to the whiting sector). Unlike in the whiting sector, there are currently no available management measures specifically for mitigating salmon bycatch in the non-whiting fisheries, and the timeliness and detail of inseason data needed to do so is not as readily available as for all non-whiting sub-sectors.

Non-whiting commercial fixed gear and select recreational fisheries

Currently, the nearshore and non-nearshore (limited entry fixed gear or open access vessels) sub-sectors, are only observed partially by WCGOP², and cannot be assessed inseason for bycatch. Recent bycatch levels have averaged around 54 Chinook salmon annually from 2011-2015 with a high of 124 Chinook salmon in 2013³. Therefore, when assessing total catch of salmon against the non-whiting threshold of 5,500 Chinook salmon, the Council may want to consider an approach that assumes a certain amount is taken by these fisheries and assess the trawl catch against the remaining amount. This value would not be in regulation, but rather would be an amount the Council could reference and consider for active inseason management of non-whiting trawl catch, either through routine or automatic action.

To improve estimates in fisheries with limited observer coverage, the Council could consider using the fixed gear logbook (with discards) that is to be developed as a part of the short tailed albatross ITS (T&C 2 of RPM 4; [Agenda Item F.7., Attachment 1, November 2017](#)) in the future. This logbook may provide information on salmon bycatch rates and location (depending on the format) as well as additional detail on location of fishing effort, which could be used to improve estimations of coastwide salmon bycatch in fisheries observed at less than 100 percent.

While recreational impacts from bottomfish fisheries during open salmon seasons are included in pre-season salmon modeling and therefore do not have to be attributed to the non-whiting threshold, impacts from other recreational groundfish fisheries must be counted against the non-whiting threshold (see Table 2-53 from the BiOp below). This includes the Oregon longleader fishery and the recreational bottomfish fisheries outside of salmon seasons. Note that conservative (high) Chinook impacts were analyzed in the BiOp for the Oregon longleader fishery⁴ (12 Chinook) and the California recreational skiff fishery outside the salmon season⁵ (18 Chinook) to provide more leeway in the BiOP. Impacts were not specified for the Washington and Oregon recreational groundfish fisheries outside salmon seasons, and were instead analyzed as part of the 250 Chinook buffer that also included uncertainty for commercial non-trawl fisheries. Chinook salmon impacts from the Oregon and Washington bottomfish fisheries outside the salmon seasons are expected to be negligible, since there are typically few bottomfish trips in Oregon during months closed to Chinook salmon (typically November through mid-March). Similarly, the Washington recreational groundfish fishery is closed from mid-October through mid-March resulting in very limited time when recreational groundfish season is open outside of salmon season.

² From 2012-2016, the following percentage of groundfish landings have been observed an average annually by WCGOP: Limited Entry Primary- 32 percent, Limited Entry DTL- 6 percent, OA DTL- 5 percent, and Nearshore- 7 percent (Somers, et al., 2016)

³ The maximum of 124 Chinook was the highest across all observed years, 2002-2015.

⁴ Oregon long-leader estimate was a conservative “assumed maximum” since it assumed 15 percent of the record high Oregon bottomfish trips (~100,000) would travel long distances offshore (25-40 miles) to the open shelf depths to fish the offshore long-leader fishery, which may be unlikely because they could instead fish close to port using traditional gear.

⁵ CA recreational skiff fishery estimate outside salmon season was conservative since was based on the 2012-2016 maximum that can be zero in some years. This estimate only includes private and rental boats surveyed at primary public-access sites accessible to the public, not CPFVs, private and rental boats surveyed at secondary public-access sites, or shoreline.

Table 2-53 from the Biological Opinion.

Section 2.0 Endangered Species Act: Biological Opinion and Incidental Take Statement

Table 2-53. Chinook and coho salmon mortality in ocean recreational groundfish fisheries and commercial groundfish non-trawl fisheries.

Non-trawl groundfish fishery	Species	
	Chinook salmon (number)	Coho salmon (number)
Commercial non-trawl ^{a/}	124	106
OR long-leader recreational ^{b/}	12	130
CA recreational skiff fishery ^{c/}	18	8
WA ocean bottomfish fishery ^{d/}	NA	NA
OR ocean bottomfish fishery ^{d/}	NA	NA
CA ocean bottomfish fishery ^{d/}	NA	NA
Buffer ^{e/}	250	250
Total	404	494

a/Maximum catch from 2002-2015; 100% discard mortality assumed; Table 5.

b/Bycatch rates were calculated from 2009-2011 long-leader EFPs

c/Ocean recreational groundfish fisheries outside of salmon season; 2012-2016.

Chinook salmon mortality ranged from 0 to 17.78 per year; Coho 0 to 5.7 per year

d/Salmon catch by WA, OR, and CA ocean recreational groundfish fisheries is already accounted for in salmon pre-season modeling. Not reported here.

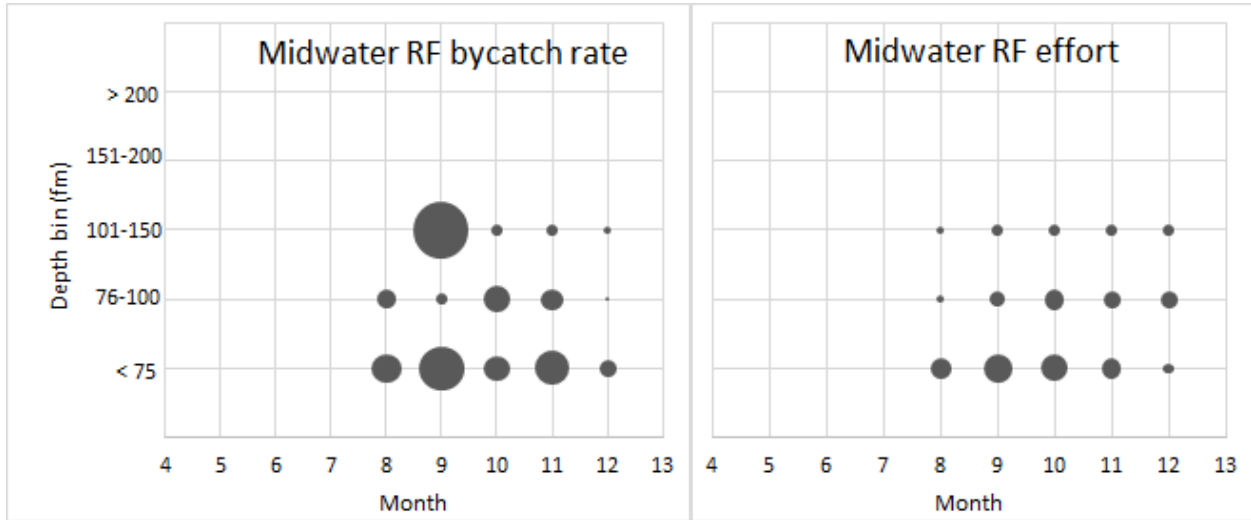
e/Buffer to account for OR and WA ocean recreational fisheries outside of the salmon season and uncertainty associated with commercial non-trawl estimates.

Non-whiting mid-water trawl

In November 2017, the Council recommended that BRAs, which are available as a routine inseason management measure at 660.60(c)(3) for the non-whiting mid-water fishery in response to their take of non-whiting groundfish, be analyzed for use as a response to salmon bycatch and an additional BRA at 200 fathoms be considered.

With increased access to rebuilt canary rockfish, 2017 was the first year with a substantive target fishery for midwater rockfish in recent history. In the development of the BiOp and the 2017-2018 biennial harvest specifications and management measures, analysts used 2011-2016 haul-level data to inform mid-water non-whiting actions. Although there is bycatch rate and effort data by depth for the non-whiting mid-water fishery from 2011-2016 (Table A-11 and A-12; Figure 6; Figure 7), there have been many significant recent changes in management of the fishery (e.g. drastically higher ACLs for canary and widow rockfishes) making it difficult to draw conclusions regarding the effectiveness of depth restrictions for reducing salmon bycatch going forward. This will likely be the same case even when haul level data becomes available for 2017, since so few salmon were caught in the trawl gear exempted fishing permit (EFP) and non-whiting mid-water fishery. Furthermore, there is insufficient data from 2011-2016 to investigate regional bycatch

patterns for non-whiting midwater vessels since there were few hauls (482), and nearly all (90 percent) were north of Cape Falcon.



2017 trips have not yet been processed to link depth and catch.
 Based on < 50% whiting threshold
 Excludes hauls with < 1 mt rockfish since unable to tell if these were “failed” whiting or rockfish hauls

Figure 6. Relative bycatch rates (# Chinook salmon/ mt rockfish) and effort (hauls) for the shoreside non-whiting mid-water fishery by month from 2011-2016 prior to increased midwater rockfish opportunity in 2017. There is insufficient data to show bycatch rate by area.

Depth bin	May	June	July	August	Sept.	Oct.	Nov.	Dec.
0-75	Yellow	Yellow	Yellow	Yellow	Red	Yellow	Orange	Yellow
76-100	White	Yellow	Green	Yellow	Light Green	Yellow	Yellow	Green
101-150	White	Yellow	White	Green	Red	Light Green	Yellow	Green
151-200	White	White	White	White	White	White	White	Green
>200	White	White	Green	Green	Green	White	White	Green

2017 trips have not yet been processed to link depth and catch.
 Bycatch rate based on Chinook # per mt of combined midwater rockfish
 Based on < 50% whiting threshold
 Excludes hauls with < 1 mt rockfish since unable to tell if these were “failed” whiting or rockfish hauls
 The color gradient goes from dark green (lowest bycatch rate, including zero) to red (highest bycatch rate). Blank cells represent zero hauls in that bin.

Figure 7. Relative bycatch rates (# Chinook salmon/ mt mid-water rockfish) for the shoreside non-whiting mid-water fishery by month from 2011-2016 before the increase in the midwater rockfish opportunity in 2017 (EFP and post-May 15th midwater).

The GMT notes the Chinook bycatch rate in 2017 was 43x lower than from 2011-2016 based on trip level data (haul level not finalized). The bycatch rate from the 2017-2018 trawl gear EFP and non-EFP non-whiting mid-water trips was 1 Chinook per 143 mt rockfish (42 chinook per 6,022 mt of widow, canary, and yellowtail rockfishes) in 2017 compared to 1 Chinook per 3.3 mt rockfish from 2011-2016 (1,412 Chinook per 4,702 mt rockfish). These stark differences in bycatch rates emphasize the GMT’s concern with attempting to draw conclusions using 2011-2016 haul level data.

While there is limited data currently to inform the effectiveness of BRAs for the midwater rockfish fishery, the Council could make them available in regulation during the 2019-2020 biennial process and then use inseason data to inform whether they would be useful in mitigating salmon bycatch inseason.

Non-whiting bottom trawl

While BRAs for the non-whiting mid-water trawl fishery are the only management measure currently being considered to address take of salmon by the non-whiting sector in the 2019-2020 biennium, the GMT would like to remind the Council that there is also potential for management measures for bottom trawl vessels to be developed within the essential fish habitat and rockfish conservation area (EFH/RCA) action item. In the Council's Preliminary Preferred Alternative (PPA) in November 2016, the Council recommended block areas closures be analyzed as a potential tool for mitigating salmon bycatch in the groundfish bottom trawl fishery. The Council is currently scheduled to take final action on the EFH/RCA item in April 2018. As a reminder, BRAs are currently designed to close shoreward of a specified fathom line between two latitude lines, while block area closures would be able to close between a set of latitude lines (e.g. North of Cape Falcon to the US-Canada border) and a set of fathom lines (e.g. 100 to 150 fathoms). The Council could consider modifying BRAs to be more like block area closures.

Non-whiting Alternatives

Issue B: Reference point for tracking non-whiting bycatch of salmon

For tracking salmon bycatch inseason, the GMT proposes the following ROA for Council consideration. These reference points would be used to assess catch of the trawl sub-sectors (groundfish bottom and non-whiting midwater) inseason; however, these would not be established in regulation unless used for an automatic action. These alternatives are based on the maximum historical bycatch amounts in the nearshore and non-nearshore fisheries as well as the maximum for the recreational fisheries not accounted for in pre-season salmon modeling. When new data becomes available, the Council could consider modifying the reference point.

Non-whiting trawl reference point alts. (minus deductions for fixed gear and rec.)

No Action: No reference point for tracking inseason

Alternative 1: 5,096 (5,550 threshold - 404 analyzed in the BiOp that includes: 124 for nearshore/non-nearshore (maximum bycatch) -18 maximum for CA recreational bottomfish fisheries outside salmon season - 12 assumed maximum OR longleader - 250 buffer for uncertainty for commercial non-trawl and OR/WA recreational bottomfish outside salmon seasons)

Issue C: Salmon mitigation measures for non-whiting mid-water trawl

The GMT proposes the following ROA for mitigation measures to address salmon take in the non-whiting mid-water trawl sub-sector for Council consideration. As a reminder, these alternatives could be considered in the 2019-2020 harvest specifications and management measures, or in another process, but must be evaluated and recommended within three years of the publication of the ITS.

No Action: Status Quo (BRAs available to minimize the incidental harvest of any protected or prohibited species taken in the groundfish fishery (including salmon))

Alternative 1: Make BRAs available at 200 fathoms for non-whiting mid-water trawl available in regulation for routine inseason action (Council recommends implementation to NMFS at a Council

meeting) for to minimize the incidental harvest of any protected or prohibited species taken in the groundfish fishery (this includes salmon)

Alternative 2: Make BRAs an automatic authority for non-whiting mid-water trawl and revise regulations so that exceedance of the non-whiting salmon threshold of X Chinook salmon would trigger the automatic implementation of a BRA

As with the at-sea sectors, if the Council were to choose Alternative 2 and make BRAs an automatic authority, the Council would need to consider the threshold or trigger that would result in a BRA being implemented. Automatic actions are non-discretionary and would need to include clear directions for the NMFS.

Developing a threshold or trigger that would prompt automatic BRA closures for non-whiting would be challenging since deductions would have to be made for all other non-whiting sectors. This includes commercial fixed gear and select recreational fisheries as discussed above plus another deduction for bottom trawl (noting all non-tribal is counted toward whiting). As seen in Table 3, bycatch from the bottom trawl fishery has been under 1,000 Chinook per year since 2005 but at highly variable levels (e.g., 67 in 2006 vs 984 in 2014).

Table 3. Annual bycatch of Chinook salmon from the bottom trawl fisheries.

2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
14,501	16,433	1,758	808	67	194	449	304	282	175	304	323	984	996	371

Coho Salmon

While the GMT’s primary focus was Chinook salmon, RPM 2 does state that the Council and NMFS will review and develop mechanisms to prevent exceeding the coho salmon thresholds of 474 coho salmon for the whiting sector and 560 coho for the non-whiting sector, which are the historical maximums. Note that the non-whiting threshold includes a mortality buffer of 250 coho salmon (see Table 2-56 of the BiOp) for uncertainty in estimates. Unlike the exceedance of the Chinook salmon thresholds and reserve, exceedance of the coho salmon guidelines alone will result in reconsultation.

The GMT notes that bycatch of coho salmon in the whiting fishery is characterized by extreme volatility, which makes it impractical to evaluate factors (e.g., depth) that affect bycatch and would also cause projection models to be so uncertain as to have little inseason management value (e.g., 200 +- 400 fish). The most effective mechanism for staying within the whiting sector coho salmon threshold could therefore be outreach to industry. The same is true for non-whiting, noting there is less risk of an overage since the threshold of 560 is based on the maximum (310) plus a buffer of 250. Bycatch would have to nearly double the historical maximum for the non-whiting threshold to be exceeded.

Table 4. Whiting sector bycatches of coho salmon by year in relation to 474 fish threshold.

Sector	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
At-sea	146	3	1	86	28	227	21	12	0	5	17	6	99	4	2	0
Shorebased	14	0	8	37	18	141	10	37	16	137	15	33	163	16	5	27
Tribal	23	193	207	344	3	107	21	57	5	27	0	91	0	0	1	6
Total	183	196	216	467	49	475	52	106	21	169	32	130	262	20	8	33
% 474 threshold	39%	41%	46%	99%	10%	100%	11%	22%	4%	36%	7%	27%	55%	4%	1%	7%

Table 5. Non-whiting commercial sector bycatches of coho salmon by year.

Sector	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Bottom Trawl	24	32	66	5	0	13	0	0	31	19	27	49	18	3
Midwater Rockfish	0	0	0	0	0	0	0	0	0	0	0	0	12	7
CS - Fixed Gear	0	0	0	0	0	0	0	0	0	0	0	0	15	0
Nearshore	0	0	45	0	0	12	42	71	42	63	16	19	69	29
Non-nearshore Fixed Gear	0	3	0	3	0	4	0	0	0	0	0	0	22	3
WA rec. bottomfish outside salmon season	0.6	2.1	22.2	11.7	10.5	50.8	1.5	33.1	17.2	29.6	26.4	21.5	22.6	21.0
OR rec. bottomfish outside salmon season	0.6	0.6	0.6	1.8	0.9	0.0	6.0	6.3	9.9	24.9	0.9	0.0	0.3	4.5
CA rec. bottomfish outside salmon season	--	--	--	--	--	--	--	--	--	--	0	0	0	0
Total a/	25.2	37.7	133.8	21.5	11.42	79.83	49.49	110.41	100.1 1	136.53	70.27	89.54	158.9 1	67.54
% of 560 threshold	5%	7%	24%	4%	2%	14%	9%	20%	18%	24%	13%	16%	28%	12%

a/ Does not include 130 for the assumed maximum for the Oregon longleader rec. fishery that was analyzed in the BiOp (Table 2-53)

RPM 3: The Reserve

RPM 3 requires NMFS and the Council to “develop and implement regulations regarding the Reserve and its use, ensuring that the Reserve will be available only to address unexpected high bycatch levels, and it will not be available as a matter of course to allow the sectors to exceed their bycatch guidelines” (RPM 3, p2-185). The ITS also provided three terms and conditions required to implement this RPM:

3. a. The Council and NMFS shall develop and implement initial regulations governing the Reserve of 3,500 Chinook salmon as part of the 2019-2020 biennial specifications and management measures. These regulations will be designed to, among other things, allow for inseason action to prevent any exceedance of a sector guideline plus the full amount of the Reserve and minimize the chance that the Reserve is used in three out of any consecutive five years.

3. b. NMFS shall monitor the use of the Reserve in 2019 and will provide a report to the Council during the process of developing the biennial specifications for 2021-2022. The report will summarize the use of the Reserve and recommending, if needed, changes to the regulations governing the Reserve.

3. c. If, at any time during the fishery, it is anticipated that the coastwide bycatch will exceed the annual Chinook salmon bycatch guideline of 11,000 for the whiting sector or 5,500 for the non-whiting sector, NMFS and the Council will take action to avoid an exceedance of either guideline. If either sector exceeds its guideline plus the Reserve, fisheries for that sector will close for the remainder of the year. If a sector exceeds its guideline plus the Reserve, but the other sector has not exceeded its guideline, only the sector that has exceeded its guideline plus the Reserve will be closed. If one sector has been closed for the remainder of the year under the above scenario, and the other sector reaches its guideline, all sectors would be closed for the remainder of the year. NMFS and the Council shall develop and implement regulations governing closure of the fishery sector(s) as described here as part of the biennial harvest specifications and management measures for 2019-2020.

In order to understand the requirements of RPM 3, the GMT focused on T&Cs 3a and 3c. T&C 3a specifically requires the Council and NMFS to develop inseason management practices governing the use of the reserve. T&C 3c provides specific criteria for when a sector (whiting or non-whiting), and potentially the entire groundfish fishery, would need to close automatically upon reaching or exceeding salmon bycatch guidelines provided in the ITS. Because T&C 3c requires the consideration of actions taken to address 3a, the GMT chose to look at how both T&Cs work together and then discussed each T&C individually below.

As the BiOp states throughout, the Reserve is not meant to be used as a matter of course. It is meant to be a “safety net to minimize disruption in the fishery where actions that were already taken to reduce bycatch were insufficient” (p1-25). The GMT took this to mean that the Reserve should not be partitioned out automatically if a sector were projected to or reached a threshold, but rather some consideration should be given to whether or not (1) depending on the timing in the

season, there could be a disruption to the sector by closing the sector if they reach their guideline, and (2) there were actions previously taken to address salmon take and the degree to which these actions were sufficient to reduce the rate of salmon bycatch for that sector.

Based on that information, the Council and NMFS could decide whether or not a sector could have access to the reserve during a routine inseason agenda item at a Council meeting. Note that if a sector were to exceed a threshold between Council meetings, and there was no previous discussion or direction at the prior meeting, the sector would be allowed to continue fishing as normal unless a mitigation measure was available in regulation (e.g. BRA). Figure 8 below provides a decision map illustrating this process.

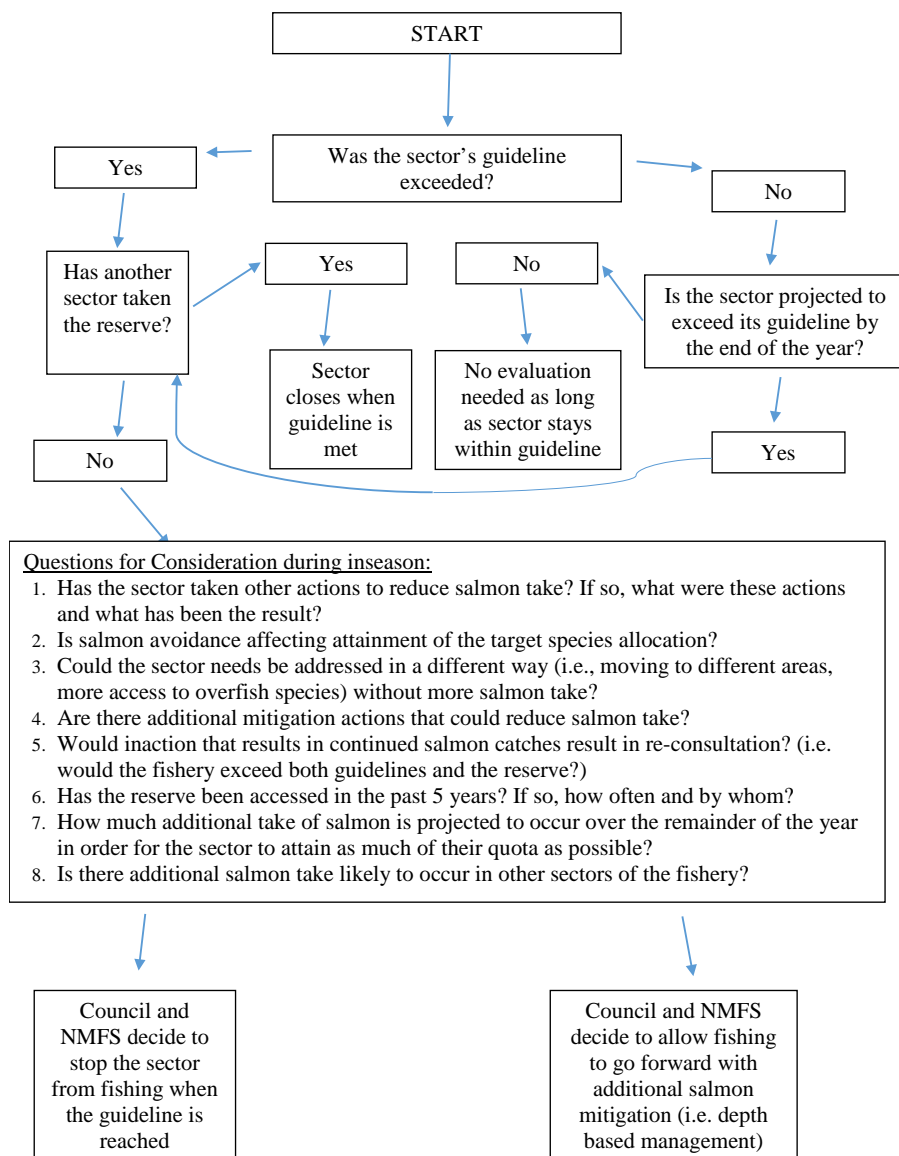


Figure 8. Decision map for address risks to sector salmon bycatch guidelines in the 2017 Salmon BiOp.

As Figure 8 shows, the only times when automatic action is required per the ITS are (1) if a sector exceeds or is projected to exceed their guideline plus the reserve, or (2) if one sector has already

taken their guideline plus the reserve and the other sector exceeds or is projected to exceed their guideline. Beyond those two instances, NMFS and the Council would have the ability at a Council meeting to discuss questions, such as those in the “questions for consideration” box, and make an informed decision based on the best available science to either allow fishing to continue or to close a sector when they exceed or are projected to exceed their guideline. As was mentioned under RPM 1, salmon take can be tracked inseason for the trawl fisheries, which are the most likely to take salmon. This inseason tracking ability may reduce the need for the automatic actions as we currently have in regulation (i.e. the OSCZ) or develop additional automatic actions. An adaptive management approach, like the one described here, allows industry and the Council to react to ongoing and projected salmon take, and then make an informed decision.

However, there is some risk with this approach. As mentioned above, there is the possibility that salmon take by one sector could exceed their guideline between Council meetings. The Council would therefore need to accept the risk of allowing a sector to access the reserve, without triggering any mitigation measures, until it was addressed at the following Council meeting. Table 6 illustrates the potential risk between Council meetings. This example focuses on the trawl fisheries (whiting, non-whiting bottom trawl, and non-whiting midwater trawl) which are the sub-sectors most likely to take salmon.

As can be seen from Table 6, there are periods during the year (shaded in grey) that the Council would not have the ability to react inseason at a Council meeting to a sector exceeding a salmon bycatch threshold. However, it is unlikely that the Council would need to address an issue with salmon bycatch until later in the year when all sectors (whiting and non-whiting) are fishing. As shown in Figure 1 and Figure 6, September, October, and November tend to have the highest salmon bycatch rates in the whiting and non-whiting, specifically midwater trawl, fisheries.

Table 6. Illustration of where and how the Council and NMFS would be able to respond to salmon bycatch by trawl fisheries. Cells shaded in light grey show where fishing takes place and there is no opportunity for the Council to react to bycatch of salmon.⁶

Time of Year	Whiting	Non-whiting Midwater Trawl	Non-whiting Bottom Trawl
January - March	Not fishing	Not fishing	Fishing
March CM	Not fishing	Not fishing	Fishing; Council will have data on salmon and could begin projecting bycatch of salmon for the year based off current bycatch rates; no inseason management measures currently available specifically for bottom trawl
April CM	Mid-April fishing begins in some parts	Mid-April fishing begins in some parts	Fishing; Council will have data on salmon and could begin projecting bycatch of salmon for the year based off current bycatch rates; no inseason management measures currently available specifically for bottom trawl
May	Mid-May all seasons and areas open to fishing	Mid-May all seasons and areas open to fishing	Fishing
June CM	Council will have data on salmon and could begin projecting bycatch of salmon for the year based off current bycatch rates; potential mitigation measures available inseason depending on Council action under RPM 2	Council will have data on salmon and could begin projecting bycatch of salmon for the year based off current bycatch rates; potential mitigation measures available inseason depending on Council action under RPM 2	Fishing; Council will have data on salmon and could begin projecting bycatch of salmon for the year based off current bycatch rates; no inseason management measures currently available specifically for bottom trawl

⁶ This table provides information on the normal course of fishing allowed under current regulations and does not reflect any exempted fishing which occurs under an exempted fishing permit.

Time of Year	Whiting	Non-whiting Midwater Trawl	Non-whiting Bottom Trawl
July - September	Fishing; automatic action authority potentially available depending on Council action under RPM2 and RPM3	Fishing; automatic action authority potentially available depending on Council action under RPM2 and RPM3	Fishing
September CM	Council will have data on salmon and could begin projecting bycatch of salmon for the year based off current bycatch rates; potential mitigation measures available inseason depending on Council action under RPM 2	Council will have data on salmon and could begin projecting bycatch of salmon for the year based off current bycatch rates; potential mitigation measures available inseason depending on Council action under RPM 2	Fishing; Council will have data on salmon and could begin projecting bycatch of salmon for the year based off current bycatch rates; no inseason management measures currently available specifically for bottom trawl
October	Fishing; automatic action authority potentially available depending on Council action under RPM2 and RPM3	Fishing; automatic action authority potentially available depending on Council action under RPM2 and RPM3	Fishing
November CM	Council will have data on salmon and could begin projecting bycatch of salmon for the year based off current bycatch rates; potential mitigation measures available inseason depending on Council action under RPM 2	Council will have data on salmon and could begin projecting bycatch of salmon for the year based off current bycatch rates; potential mitigation measures available inseason depending on Council action under RPM 2	Fishing; Council will have data on salmon and could begin projecting bycatch of salmon for the year based off current bycatch rates; no inseason management measures currently available specifically for bottom trawl
December	Fishing; automatic action authority potentially available depending on Council action under RPM2 and RPM3	Fishing; automatic action authority potentially available depending on Council action under RPM2 and RPM3	Fishing

T&C 3a requires the Council and NMFS develop initial regulations governing the Reserve, which allow for inseason action to prevent any exceedance of a sector guideline plus the Reserve. The GMT has provided an ROA for Council consideration within this report to mitigate salmon bycatch, and will comment on the selection of a PPA in April. As more mitigation measures are developed under RPM 2 and other Council actions (i.e. EFH/RCA), the “toolbox” of mitigation measures will grow.

T&C 3c requires the development of regulations, through the 2019-2020 biennial harvest specifications and management measures, for an automatic authority which closes a sector (whiting or non-whiting) when that sector exceeds its guideline plus the reserve, or when one sector has been closed under the prior scenario and the other sector reaches its guideline. Then, all sectors would be closed for the remainder of the year. With those authorities in place beginning in 2019, the Council could be sure there is a safety net to close the sectors during the times highlighted in light grey in Table 6, if the sector met the conditions of the automatic authority. Alternatives to implement the automatic authority were developed and are listed below for the Council’s consideration.

Alternatives

Issue 5: Automatic authorities for salmon bycatch thresholds and the Reserve

No Action: No automatic authorities around the salmon thresholds will be implemented in regulation

Alternative 1: Include two automatic authorities in regulations that would

- (1) close either sector (whiting or non-whiting) upon that sector having exceeded or being projected to exceed its salmon bycatch threshold and the reserve amount of 3,500, and
- (2) close a sector (whiting or non-whiting) when one sector has been closed after exceeding or being projected to exceed its salmon bycatch threshold and the reserve amount of 3,500, and the second sector exceeds or is projected to exceed its salmon bycatch threshold.

PFMC
02/12/18

Appendix A: Data summaries of salmon bycatch and effort

Table A- 1. Total At-Sea Chinook Catch (#s of fish) by month and depth, 2011-2017.

Depth Bin (fm)	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	% of Total Chinook
0-75	409			0	117	0	0	0	1.9%
76-100	4	28	4		163	0	0	0	0.7%
101-150	106	56	1	6	1,054	917	767	0	10.7%
151-200	228	229	2	27	885	4,803	2,117	172	31%
>200	1,366	279	2	25	1,928	5,418	4,767	1,401	55.7%

*Some cells are merged to maintain confidentiality

*No tribal data included

*Records without bottom depth filtered out

Table A- 2. At-Sea Bycatch Rate of Chinook (#/mt of whiting) by month and depth, 2011-2017.

Depth Bin (fm)	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
0-75	0.112			N/A	1.122	N/A	N/A	N/A
76-100	0.009	0.006	0.004		0.629	N/A	N/A	N/A
101-150	0.012	0.006	0.001	0.007	0.107	0.097	0.659	N/A
151-200	0.007	0.009	0.006	0.005	0.02	0.076	0.166	0.16
>200	0.006	0.003	0	0.002	0.014	0.029	0.053	0.109

*N/A means no effort occurred (see below)

*Some cells are merged to maintain confidentiality

*No tribal data included

*Records without bottom depth filtered out

Table A- 3. Number of Hauls in At-Sea Sector by month and depth, 2011-2017.

Depth Bin (fm)	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	% of Hauls
0-75	103			0	4	0	0	0	0.5%
76-100	9	91	27		6	0	0	0	0.7%
101-150	185	205	44	25	198	202	24	0	4.5%
151-200	690	530	14	113	770	1,214	251	18	18.2%
>200	4,237	1,704	182	361	2,422	3,911	2,000	289	76.2%

*Some cells are merged to maintain confidentiality

*No tribal data included

*Records without bottom depth filtered out

Table A- 4. Number of Chinook in At-Sea Sector by month and area, 2011-2017.

Area Bin	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	% of Chinook
N of Cape Falcon	926	182	18		267	26	296	347	7.6%
Cape Falcon to Cape Blanco	438	498	35	29	3,678	10,398	5,436	280	76.2%
Cape Blanco to 40° 10' N. lat.	343	291	2	11	202	714	1,919	946	16.2%

Table A- 5. Bycatch Rate in At-Sea Sector by month and area, 2011-2017.

Area Bin	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
N of Cape Falcon	0.008	0.004	0.002		0.011	0.005	0.016	0.077
Cape Falcon to Cape Blanco	0.007	0.009	0.008	0.003	0.024	0.048	0.097	0.048
Cape Blanco to 40° 10' N. lat.	0.004	0.012	0	0.007	0.02	0.02	0.065	0.264

Table A- 6. Number of Hauls in At-Sea Sector by month and area, 2011-2017.

Area Bin	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	% of Hauls
N of Cape Falcon	2,576	1,025	24	213	554	152	408	86	25.4%
Cape Falcon to Cape Blanco	1,175	1,105	143	241	2,653	4,460	1,209	136	56.1%
Cape Blanco to 40° 10' N. lat.	1,372	479	109	58	193	715	658	85	18.5%

Table A- 7. Total Shoreside Whiting Chinook Catch (#s of fish) by month and depth, 2011-2016.

Depth bin (fm)	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	% Chinook
0-75	c	302	1,145	1,885	566	41	---	---	24.0%
76-100	3	89	329	287	603	664	159	---	13.0%
101-150	10	168	250	407	1,222	2,071	939	c	30.9%
151-200	30	36	251	217	842	2,171	826	103	27.3%
>200	10	4	21	38	64	240	389	c	4.7%

c = data confidential due to less than 3 different vessels

Table A- 8. Total Shoreside Whiting Catch of Whiting by month and depth, 2011-2016.

Depth bin (fm)	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	% Hake
0-75	c	11,489	22,841	27,472	11,000	1,166	---	---	14.9%
76-100	366	11,570	26,578	38,484	28,234	16,426	1,438	---	24.8%
101-150	3,179	24,409	34,138	36,755	30,546	31,454	7,346	c	33.9%
151-200	953	7,947	19,372	20,972	19,515	13,481	6,174	389	17.9%
>200	592	1,145	10,757	13,055	5,120	7,606	3,669	c	8.5%

c = data confidential due to less than 3 different vessels

Table A- 9. Shoreside Bycatch Rate of Chinook (#/mt of whiting) by month and depth, 2011-2016. Grand mean is the properly weighted average bycatch rate for that depth bin (sum of total chinook / sum of total whiting).

Depth bin (fm)	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Grand mean
0-75	c	0.026	0.050	0.069	0.051	0.035	---	---	0.053
76-100	0.009	0.008	0.012	0.007	0.021	0.040	0.111	---	0.017
101-150	0.003	0.007	0.007	0.011	0.040	0.066	0.128	c	0.030
151-200	0.031	0.005	0.013	0.010	0.043	0.161	0.134	0.263	0.050
>200	0.017	0.003	0.002	0.003	0.012	0.032	0.106	c	0.018

c = data confidential due to less than 3 different vessels

Table A- 10. Shoreside whiting number of hauls by month and depth, 2011-2016.

Depth bin (fm)	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	% Hauls
0-75	c	228	521	485	193	24	---	---	15.0%
76-100	9	241	487	622	404	276	27	---	21.4%
101-150	46	492	694	738	535	512	143	c	32.7%
151-200	17	212	479	479	452	290	148	7	21.6%
>200	10	36	259	272	107	143	78	c	9.4%

c = confidential due to less than different 3 vessels

Table A- 11. Shoreside non-whiting number of hauls by month and depth, 2011-2016.

Depth bin (fm)	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Total
0-75	c	c	c	43	79	68	41	10	272
76-100		c	c	5	23	41	30	30	134
101-150		c		4	12	12	13	13	c
151-200								c	c
>200			c	c	c			c	6

c = data confidential due to less than 3 different vessels

Table A- 12. Shoreside non-whiting bycatch rates (# Chinook per mt widow, yellowtail, and canary rockfishes) by month and depth, 2011-2016. GMT strongly emphasizes that these bycatch rates may not be reflective of the future given the vast changes in the fishery that occurred in 2017.

Depth bin (fm)	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
0-75	c	c	c	0.303	0.693	0.218	0.400	0.104
76-100		c	c	0.141	0.047	0.224	0.157	0.006
101-150		c		0.000	1.062	0.041	0.056	0.014
151-200								c
>200			c	c	c			c

c = data confidential due to less than 3 different vessels

Insufficient data to split regionally (90 percent of hauls from north of Falcon).

Note 2017 hauls have not been processed yet, which is when fishery effort re-emerged