

# **2017 OCEAN SELECTIVE FISHERY SAMPLING REPORT**

SUBMITTED BY:

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE  
FISH MANAGEMENT PROGRAM  
600 CAPITOL WAY NORTH  
OLYMPIA, WASHINGTON 98501-1091

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## 1. INTRODUCTION

The Pacific Fishery Management Council (PFMC) adopted 2017 recreational and commercial troll fisheries for all salmon species in the area between Cape Falcon, Oregon and the U.S./Canada border. Recreational and commercial mark-selective fisheries (MSFs) for coho were included in all four Catch Record Card (CRC) areas of coastal Washington (Areas 1, 2, 3, and 4; **Fig 1**). Council-area fisheries were adopted based on assumptions regarding coho and Chinook abundance, distribution of stocks, Chinook age class distributions, coho mark rates, compliance with selective fishery regulations, and incidental mortality.

The PFMC adopted ocean coho MSFs in Marine Areas 1 through 4 for the nineteenth consecutive year, following state-tribal agreement during the North of Falcon process. No Chinook MSFs were recommended by the Salmon Advisory Subpanel nor adopted by the PFMC in 2017.

The Washington Department of Fish and Wildlife's (WDFW) Ocean Sampling Program (OSP) continued its intensive monitoring program in all ocean ports during the season to collect data to estimate key parameters characterizing the fishery and its impacts on unmarked salmon. Sampling activities included on-water observation, a Voluntary Trip Report (VTR) system, and dockside creel sampling. Among other parameters, sampling activities emphasized data collection needs for the estimation of: *i*) the mark rate of the targeted coho population, *ii*) the total number of coho harvested by mark-status, including an estimate of angler compliance rate with coho MSF regulations, *iii*) the total number of coho released (by mark-status), *iv*) the coded-wire tag (CWT) stock composition of landed coho, and *v*) the total mortality of marked and unmarked coho.

## 2. SEASON DESCRIPTION

### 2.1 Ocean Recreational All-Species Fisheries (Coho Mark-Selective)

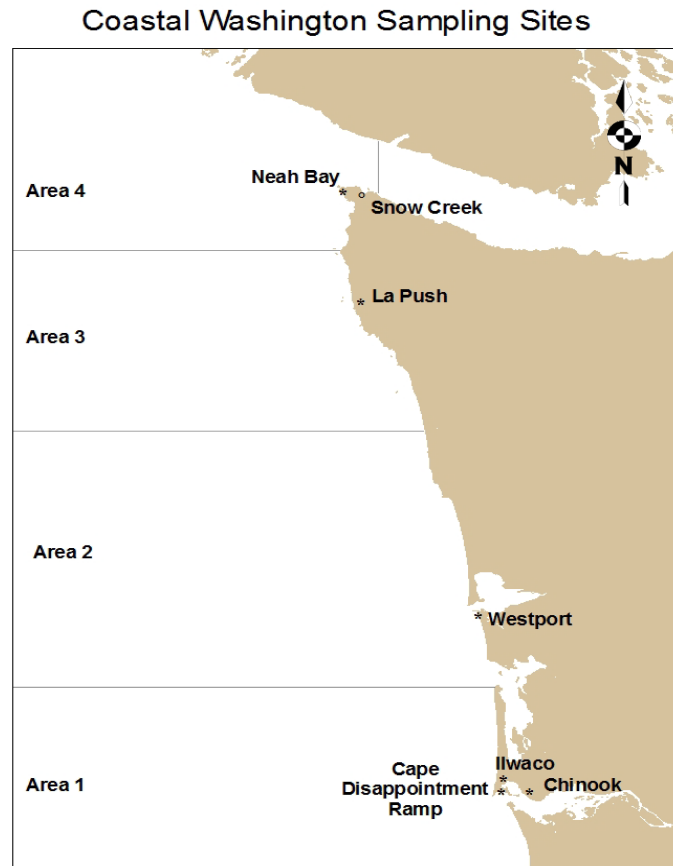
CRC Area 1: The ocean recreational fishery in CRC Area 1 was open for all salmon species seven days per week from June 24 through August 22. A daily bag limit of two salmon, one of which could be a Chinook, was in effect. All retained coho were required to have a healed adipose fin clip. The Columbia Control Zone was closed. A total of 60 fishing days were available in the area.

CRC Area 2: The ocean recreational fishery in CRC Area 2 was open for all salmon species seven days per week from July 1 through August 22. A daily bag limit of two salmon, one of which could be a Chinook, was in effect July 1 – July 21; the bag limit was modified in-season to two salmon from July 22 – August 22. All retained coho were required to have a healed adipose fin clip. A total of 53 fishing days were available in the area.

CRC Area 3: The ocean recreational fishery in CRC Area 3 was open for all salmon species seven days per week from June 24 through September 4. A daily bag limit of two salmon was in effect. All retained coho were required to have a healed adipose fin clip. A total of 73 fishing days were available in the area.

CRC Area 4: The ocean recreational fishery in CRC Area 4 was open for all salmon species seven days per week from June 24 through September 4. A daily bag limit of two salmon was in effect. All retained coho were required to have a healed adipose fin clip. A total of 73 fishing days were available in the area.

The all-species fishery operated under preseason quotas of 45,000 landed Chinook and 42,000 landed marked coho.



**Figure 1.** Map of coastal Washington showing the ocean catch record card areas (Areas 1 through 4) and major sampling sites.

## 2.2 Non-Treaty Commercial Troll Fisheries (Coho Mark-Selective)

The non-Treaty troll fishery was open in May and June for all salmon except coho from Cape Falcon, Oregon to the U.S.-Canada border. All sub-areas were open during this time for 61 days. The fishery reopened for all salmon species (except no chum retention north of Cape Alava, WA in August) on July 1 for 75 available fishing days in all areas between Cape Falcon, Oregon and the U.S.-Canada border. All retained coho were required to have a healed adipose fin clip. Specific open dates and regulations are available in the PFMC Review of 2017 Ocean Salmon Fisheries (<http://www.pcouncil.org/salmon/stock-assessment-and-fishery-evaluation-safe-documents/>).

### **3. METHODS**

WDFW's OSP implemented a comprehensive monitoring program in all ocean ports during the coho MSF seasons in Washington ocean CRC Areas 1-4. The OSP collected data to estimate key fishery parameters characterizing the ocean MSFs and associated impacts on unmarked salmon. Sampling activities included direct on-the-water observations of salmon encounters during charter ride-along trips, VTRs of completed trips provided by charter boat skippers and the angling public, dockside angler interviews (with catch sampling), and total boat counts via exit or entrance counts at each major coastal port.

#### **3.1 On-Board Observation**

WDFW samplers conducted direct on-water observation of salmon encounters aboard charter vessels during the recreational all-species coho MSF. For each hook-up, data collected included result of the hook-up (fish kept, released, or dropped off), species, mark status (marked or unmarked), and size class (legal or sublegal). These data were used to estimate the encounter rates of Chinook and coho by size class and mark group (legal-size and marked [LM], legal-size and unmarked [LU], sublegal-size and marked [SM], and sublegal-size and unmarked [SU]), as well as drop-offs.

Direct on-water observation of salmon encounters was primarily used in CRC Areas 1 and 2 where charter vessel salmon fishing trips are numerous. The VTR system (see Section 3.2 below) was also used to collect encounter data in these two areas.

In CRC Areas 3 and 4, where few charter vessels take salmon fishing trips, and those who do are very small, the VTR system was the primary method used to collect on-water encounter data; charter on-board observation was minimal in these areas.

#### **3.2 Voluntary Trip Reports**

Selective fishery encounter statistics were also acquired through VTRs that WDFW samplers distributed and collected from both charter boat skippers and the angling public in all ocean CRC Areas. The VTR form is designed to capture information identical to that collected by on-board observers. Anglers complete the information on the form as they fish, minimizing recall error.

Samplers distributed VTRs to private vessels on every sampled day in all sampled ports. Charter vessels agreeing to participate were given a binder with several forms to complete throughout the season. For private vessels, samplers approached anglers preparing to depart for fishing or after returning from fishing, explained the purpose of the VTR and how to complete it, and encouraged anglers to record all encounters while fishing and to return the form to a dockside sampler at the end of the fishing day. Anglers could also mail these forms to the WDFW Region 6 office postage-paid. Additionally, office staff contacted anglers by phone or mail who regularly complete VTRs prior to the season and provided blank VTRs.

#### **3.3 Dockside Sampling**

Dockside samplers were stationed in the four major landing ports for the ocean fisheries: Neah Bay, La Push, Westport, and Ilwaco (including the port of Chinook and the Columbia River North Jetty). The recreational fisheries in each port were sampled a minimum of 4 to 5 days per week, with weekend (Saturday, Sunday, and holidays) and weekday days (non-holiday Monday through Friday) stratified. Typically, all weekend days and 3 randomly-selected weekdays per week were sampled. Total fishery catch and effort estimates were generated by the OSP using three types of data obtained during dockside sampling: effort counts, interview data, and examination of catch. Each is described below.

### *Effort Counts*

On each sample day, a total recreational boat count was obtained either by counting boats exiting the port or entering the port. A minimum of 20% of the boats returning to the port within each boat type (charter and private) was sampled. An exit count (a count of boats leaving the port) typically began at 4:30AM and continued through the end of the sampling day (exact time was port-specific). An entrance count (a count of boats entering the port) usually began near 8:00AM and continued through dusk. Whether OSP samplers conducted exit or entrance counts varied based on specific considerations for each port. Regardless of the method used, this effort count, taken on every sampled day, provided the total counts of charter and private boats to which sample data were expanded.

### *Angler Interviews and Catch Sampling*

WDFW samplers stationed in coastal ports collected catch and effort information during dockside angler interviews from boats returning from fishing. Information collected during each sample included number of anglers, target species, area fished, landed catch by species, mark status of landed salmon, identification and recovery of (CWTs), and angler estimates of released salmon by species and mark status and of released groundfish by species. Additionally, dockside samplers collected DNA samples, lengths, and scale samples from landed Chinook as time allowed.

## **3.4 Estimating Catch and Effort**

### *3.4.i Estimated Stratum Totals (Primary Stage)*

Combined (total) catch estimates are typically stratified by weekend/holiday and weekday. In some strata, every day is sampled. In those strata the combined estimates are simply sums of the daily catches. In other strata, where some days are not sampled, the average catch per day over all sampled days is multiplied by the number of days in the stratum to estimate the total catch.

Let:

- $a$  = the marine catch area,
- $i$  = trip type,
- $t$  = Weekend/holiday or Weekday stratum,
- $N_t$  = the number of days in stratum  $t$ ,

- $T_t$  = collection of all days in stratum  $t$ ,  
 $n_t$  = the number of days sampled in stratum  $t$ ,  
 $S_t$  = collection of sampled days in stratum  $t$  (when  $S=T$ ,  $n=N$ ),  
 $Y_{taik}$  = estimated catch (or effort) on day  $k$  for stratum  $t$  in area  $a$  from trip type  $i$ ,  
 $C_{tai}$  = catch for stratum  $t$  in area  $a$  from trip type  $i$ ,

Then

$$\hat{C}_{tai} = N_t \frac{\sum_{k \in S_t} \hat{Y}_{taik}}{n_t}$$

with estimated variance (see Thompson 1992, p. 129):

$$\hat{V}(\hat{C}_{tai}) = \frac{N_t(N_t - n_t)}{n_t} \frac{\sum_{k \in S_t} (\hat{Y}_{taik} - \hat{Y}_{tai})^2}{n_t - 1} + \frac{N_t}{n_t} \sum_{k \in S_t} \hat{V}(\hat{Y}_{taik})$$

where

$$\hat{Y}_{tai} = \frac{\sum_{k \in S_t} \hat{Y}_{taik}}{n_t}.$$

For strata with all days sampled,  $n_t = N_t$ , and the catch and variance estimators reduce to:

$$\hat{C}_{tai} = \sum_{k \in T_t} \hat{Y}_{taik}$$

and

$$\hat{V}(\hat{C}_{tai}) = \sum_{k \in T_t} \hat{V}(\hat{Y}_{taik}).$$

### 3.4.ii Daily Catch and Effort Estimation (Secondary Stage)

Both catch and effort are post-stratified by trip-type and area fished. Effort in terms of boat-trips is simply the sampled number of boats for each trip-type and area expanded by the appropriate boat-type (charter or private) exit/entrance count. Effort in terms of angler-trips is calculated as the mean number of anglers per boat (indexed by trip-type and area) expanded by the counted total population of boats.



The total catch for a given species on a sampled day is the product of the population of boats and the estimated catch per boat, again post-stratified by trip-type and area fished. Key assumptions in the current estimation procedures are that:

- 1) All boats exiting/entering a port are included in the exit/entrance count
- 2) Exit/entrance counts are made without error
- 3) The approximate systematic sample of boats can be treated as a simple random sample
- 4) Anglers answer questions accurately and do not conceal fish

In the following discussion, subscripts referring to port and boat-type are suppressed. Let:

$M_t$  = total exit or entrance count for a given port on day  $t$  (assumed known without error),

$m_t$  = total boats sampled on day  $t$ ,

$m_{tai}$  = number of boats sampled of trip type  $i$  fishing in area  $a$  on day  $t$ ,

$a_{taij}$  = number of anglers on the  $j$ th boat from trip type  $i$  fishing in area  $a$  on day  $t$ ,

$y_{taij}$  = number of species specific fish caught on the  $j$ th boat from trip type  $i$  in area  $a$  on day  $t$ , and

$Y_{tai}$  = total catch of specific species caught from trip type  $i$  in area  $a$  on day  $t$ .

The estimate of the number of boat-trips of trip-type  $i$  and area  $a$  follows the procedure outlined in Lai et. al. (1991) where the proportion of boats in each category is estimated by:

$$\hat{p}_{tai} = \frac{m_{tai}}{m_t}$$

with estimated variance (see Cochran 1977, p. 52):

$$V(\hat{p}_{tai}) = \frac{\hat{p}_{tai} \cdot (1 - \hat{p}_{tai})}{(m_t - 1)} \cdot \left( \frac{M_t - m_t}{M_t} \right)$$

The estimated total boat-trips is then obtained by:

$$\hat{M}_{tai} = M_t \cdot \hat{p}_{tai}$$

with estimated variance:

$$\hat{V}(\hat{M}_{tai}) = M_t^2 \cdot \hat{V}(\hat{p}_{tai})$$

Effort expressed in terms of angler-trips is the product of the average anglers per boat-trip times the total number of boat-trips. The mean number of anglers per boat-trip (for trip-type  $i$  and fishing area  $a$ ) is estimated as:

$$\hat{a}_{tai} = \frac{\sum_j a_{taij}}{m_t}$$

with variance:

$$\hat{V}(\hat{a}_{tai}) = \frac{\sum_j (a_{taij} - \hat{a}_{tai})^2}{m_t(m_t - 1)} \cdot \left(\frac{M_t - m_t}{M_t}\right)$$

Thus the estimated total number of angler-trips is:

$$\hat{a}_{tai} = M_t \cdot \hat{a}_{tai}$$

with variance:

$$\hat{V}(\hat{a}_{tai}) = M_t^2 \cdot \hat{V}(\hat{a}_{tai})$$

The catch (or number released) for a specific species on sampled day  $t$  in area  $a$  from trip type  $i$  is similarly estimated by:

$$\hat{Y}_{tai} = \frac{\sum_j y_{taij}}{m_t} M_t$$

with estimated variance:

$$\hat{V}(\hat{Y}_{tai}) = \frac{\sum_j (y_{taij} - \hat{y}_{tai})^2}{m_t(m_t - 1)} M_t(M_t - m_t)$$

This estimate and its variance differs somewhat from that described in Lai et al. (1991) since the total count,  $M_t$  (assumed to be a known quantity), is used to expand the estimated CPUE (calculated over all sampled boats) rather than the estimated boat-trips by trip-type and area fished.

## **4. RESULTS IN THE ALL-SPECIES COHO MARK SELECTIVE RECREATIONAL FISHERY**

### **4.1 Dockside Sampling Results**

An estimated 70,021 angler trips (61,453 from Washington, 8,568 from Oregon) were completed by private and charter anglers during the 2017 coastwide all-species coho MSF. These anglers harvested a total of 21,945 Chinook coastwide (20,037 WA, 1,908 OR) and 42,657 coho (36,087 WA, 6,570 OR). **Table 1** shows effort and catch by month and area during the 2017 coho MSF.

WDFW dockside samplers interviewed an estimated 40% of all anglers fishing from WA coastwide during the coho MSF. A total of 38% of all Chinook and 42% of all coho harvested in WA were sampled; 1,007 CWTs were collected from sampled Chinook and 2,407 were collected from sampled coho in WA ports (**Table 2**).

### **4.2 On-water Observation and VTR Results**

**Tables 3 and 4** detail on-water data collected during on-board observation and from VTRs submitted by charter and private fishing vessels. OSP observer staff, combined with charter boat VTRs, provided on-water catch and encounter data from a total of 269 charter boat trips documenting a total of 713 legal sized Chinook, 373 sublegal sized Chinook, 4,475 legal sized coho, and 81 sublegal sized coho during the all-species coho MSF. Dockside samplers also collected 296 completed and useable VTRs from private vessels containing 391 legal sized Chinook encounters, 230 sublegal sized Chinook encounters, 1,442 legal sized coho encounters, and 56 sublegal sized coho encounters. Mark rates calculated from onboard observer and VTR data are shown in **Table 5** and compared to pre-season FRAM coho mark rate projections.

### **4.3 Overall Fishery Impacts**

#### *Estimated Total Coho Encounters and Mortalities*

FRAM pre-season projections of coho encounters (Washington and Oregon) in the 2017 ocean recreational all-species coho MSFs are compared with estimated encounters based on OSP data in **Table 6**. **Table 7** compares total coho mortality projected pre-season by FRAM (Washington and Oregon) with estimated coho mortality based on OSP data.

The overall impacts of the 2017 recreational coho MSF in ocean CRC Areas 1-4 are characterized in terms of grand-total estimates of coho encounters and mortalities and by using estimates specific to mark group (i.e., marked and unmarked). The method described in section 3.4 was used to generate total estimates of retained catch by mark group. To estimate coho salmon encounters and releases by mark group, we applied Conrad's (2012) alternative method for estimating coho encounters and release mortalities in ocean MSFs, which independently calculates charter and private vessel totals based on observer and VTR data. This method differs from that used prior to 2012.

Estimated marked and unmarked coho retention is calculated from dockside sampling data as described in Section 3.4; note that since catch estimates are stratified by week, monthly total

proportions of marked and unmarked estimated retained catch may vary slightly from monthly total proportions of marked and unmarked sampled coho. Encounters are calculated by boat type and CRC Area based on landed catch of legal sized marked coho, the proportion of observed encounters that were legal sized marked coho, and the proportion of observed encounters that were legal sized marked coho retained. Mortality was estimated for each mark group based on calculated encounters and the proportion of the legal sized coho of that mark status that were released multiplied by the PFMC ocean selective fishery mortality (*sfm*) rate of 14% (Conrad, 2012).

**Figure 2** compares the FRAM projected coho encounters and mortality by area with those estimated using OSP data in the all-species fishery. Observed estimates of both coho encounters and total mortality were lower than projected preseason in CRC Area 4, and higher than projected preseason in all Catch Areas (1-3) south of Cape Alava. This was caused primarily by an in-season transfer of coho (modeled to be impact-neutral on 2017 limiting stocks including Queets, Lower Columbia Natural (LCN), Skagit, and Stillaguamish coho) from the non-Treaty troll fishery quota to the recreational fishery quota. This increased the overall recreational coho quota and decreased the overall commercial coho quota relative to preseason models. The transferred fish were taken mainly in CRC Areas 1 and 2. Observed coho mark rates were also lower than anticipated preseason in the southern catch areas and full coho quotas were attained, resulting in greater than modeled encounters of unmarked coho.

### *Compliance*

**Table 8** reports rates of compliance with mark-selective fishery regulations observed by dockside samplers for the recreational fisheries by area and month. Coastwide, compliance with selective fishery regulations averaged 99%, similar to previous seasons.

### **4.4 DNA Data Collection**

A total of 1,117 DNA samples were collected from Chinook by Washington dockside samplers during the summer all-species recreational fishery. **Table 9** shows the numbers of samples collected by mark status and area.

**Table 1.** Estimates of total fishing effort and number of Chinook and coho retained during the 2017 all-species recreational fishery (coho MSF) between Cape Falcon, Oregon and the U.S.-Canada border.

	TOTAL ANGLER TRIPS					CHINOOK RETAINED					COHO RETAINED				
	June	July	Aug	Sept	TOTAL	June	July	Aug	Sept	TOTAL	June	July	Aug	Sept	TOTAL
Area 4	386	7,874	2,037	494	<b>10,791</b>	244	6,134	856	54	<b>7,287</b>	45	1,767	1,214	507	<b>3,533</b>
Area 3	82	465	1,005	348	<b>1,901</b>	7	209	229	37	<b>482</b>	13	159	1,155	423	<b>1,750</b>
Area 2	-	13,216	12,780	-	<b>25,997</b>	-	4,247	2,358	-	<b>6,605</b>	-	6,664	9,086	-	<b>15,750</b>
Area 1	388	8,532	13,844	-	<b>22,765</b>	319	2,191	3,153	-	<b>5,663</b>	30	5,724	9,301	-	<b>15,055</b>
<b>TOTAL WA</b>	<b>857</b>	<b>30,088</b>	<b>29,666</b>	<b>842</b>	<b>61,453</b>	<b>569</b>	<b>12,781</b>	<b>6,596</b>	<b>91</b>	<b>20,037</b>	<b>88</b>	<b>14,314</b>	<b>20,755</b>	<b>930</b>	<b>36,087</b>
OREGON (Area 1)	587	2,697	5,284	-	<b>8,568</b>	330	567	1,011	-	<b>1,908</b>	13	2,249	4,308	-	<b>6,570</b>
<b>TOTAL NOF</b>	<b>1,444</b>	<b>32,785</b>	<b>34,950</b>	<b>842</b>	<b>70,021</b>	<b>899</b>	<b>13,348</b>	<b>7,607</b>	<b>91</b>	<b>21,945</b>	<b>101</b>	<b>16,563</b>	<b>25,063</b>	<b>930</b>	<b>42,657</b>
WA Variance: <sup>1/</sup>					1,616,416					226,462					644,657
WA Standard Error:					1,271					476					803
WA CV (%):					2%					2%					2%
WA 95% CI:					58,961-63,945					19,104-20,970					34,513-37,660

<sup>1/</sup> Variance estimates are unavailable for Oregon statistics.

**Table 2.** WA dockside sampling statistics during the 2017 all-species recreational fishery (coho MSF) between Cape Falcon, Oregon and the U.S.-Canada border.

	Anglers Sampled	Sample Rate	Landed Chinook Sampled	Sample Rate	Landed Coho Sampled	Sample Rate	Chinook CWTs collected	Coho CWTs collected
Area 4	3,652	34%	2,279	31%	1,417	40%	270	184
Area 3	1,473	78%	367	76%	1,345	77%	43	145
Area 2	10,273	40%	2,339	35%	5,951	38%	254	902
Area 1	9,245	41%	2,667	47%	6,467	43%	440	1,176
<b>TOTAL WA</b>	<b>24,643</b>	<b>40%</b>	<b>7,652</b>	<b>38%</b>	<b>15,180</b>	<b>42%</b>	<b>1,007</b>	<b>2,407</b>

**Table 3.** On-board and VTR Chinook encounters by size class and mark status in the 2017 all-species recreational fishery (coho MSF) between Cape Falcon, Oregon and the U.S.-Canada border.

		Charter Boats (On-board observation/VTRs)						Private boats (VTRs)							
		Total Observer	LEGAL-SIZED			SUBLEGAL-SIZED			Total VTRs	LEGAL-SIZED			SUBLEGAL-SIZED		
		Trips/VTRs	Marked	Unmarked	Unknown	Marked	Unmarked	Unknown	Collected	Marked	Unmarked	Unknown	Marked	Unmarked	Unknown
<b>Area 4</b>	June	0	0	0	0	0	0	0	7	12	4	0	8	1	0
	July	4	22	18	0	5	8	0	26	48	22	0	39	28	4
	Aug	1	0	0	0	4	1	0	7	6	6	0	11	6	0
	Sept	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	<b>TOTAL</b>	<b>5</b>	<b>22</b>	<b>18</b>	<b>0</b>	<b>9</b>	<b>9</b>	<b>0</b>	<b>40</b>	<b>66</b>	<b>32</b>	<b>0</b>	<b>58</b>	<b>35</b>	<b>4</b>
<b>Area 3</b>	June	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	July	0	0	0	0	0	0	0	1	0	2	0	0	0	0
	Aug	0	0	0	0	0	0	0	6	0	1	0	2	3	0
	Sept	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	<b>TOTAL</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>7</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>2</b>	<b>3</b>	<b>0</b>
<b>Area 2</b>	June	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	July	106	248	121	0	169	60	0	82	74	32	0	27	27	3
	Aug	77	69	34	0	20	10	0	45	28	11	0	3	2	0
	Sept	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	<b>TOTAL</b>	<b>183</b>	<b>317</b>	<b>155</b>	<b>0</b>	<b>189</b>	<b>70</b>	<b>0</b>	<b>127</b>	<b>102</b>	<b>43</b>	<b>0</b>	<b>30</b>	<b>29</b>	<b>3</b>
<b>Area 1</b>	June	8	40	17	1	8	1	0	10	27	13	0	14	11	0
	July	43	59	24	0	36	25	0	63	41	17	0	13	15	1
	Aug	30	45	16	0	13	13	1	49	28	19	0	7	5	0
	Sept	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	<b>TOTAL</b>	<b>81</b>	<b>144</b>	<b>57</b>	<b>1</b>	<b>57</b>	<b>39</b>	<b>1</b>	<b>122</b>	<b>96</b>	<b>49</b>	<b>0</b>	<b>34</b>	<b>31</b>	<b>1</b>

**Table 4.** On-board and VTR coho encounters by size class and mark status in the 2017 all-species recreational fishery (coho MSF) between Cape Falcon, Oregon and the U.S.-Canada border.

		Charter Boats (On-board observation/VTRs)						Private boats (VTRs)							
		Total Observer Trips/VTRs	LEGAL-SIZED			SUBLEGAL-SIZED			Total VTRs Collected	LEGAL-SIZED			SUBLEGAL-SIZED		
			Marked	Unmarked	Unknown	Marked	Unmarked	Unknown		Marked	Unmarked	Unknown	Marked	Unmarked	Unknown
<b>Area 4</b>	June	0	0	0	0	0	0	0	7	1	2	0	0	0	0
	July	4	21	4	0	5	9	0	26	22	23	3	7	10	0
	Aug	1	13	12	0	0	0	0	7	13	8	0	2	0	0
	Sept	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	<b>TOTAL</b>	<b>5</b>	<b>34</b>	<b>16</b>	<b>0</b>	<b>5</b>	<b>9</b>	<b>0</b>	<b>40</b>	<b>36</b>	<b>33</b>	<b>3</b>	<b>9</b>	<b>10</b>	<b>0</b>
<b>Area 3</b>	June	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	July	0	0	0	0	0	0	0	1	3	0	0	0	0	0
	Aug	0	0	0	0	0	0	0	6	19	16	0	0	0	0
	Sept	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	<b>TOTAL</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>7</b>	<b>22</b>	<b>16</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Area 2</b>	June	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	July	106	876	812	0	14	8	0	82	170	143	0	5	11	0
	Aug	77	803	739	0	15	10	0	45	170	141	0	2	1	0
	Sept	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	<b>TOTAL</b>	<b>183</b>	<b>1,679</b>	<b>1,551</b>	<b>0</b>	<b>29</b>	<b>18</b>	<b>0</b>	<b>127</b>	<b>340</b>	<b>284</b>	<b>0</b>	<b>7</b>	<b>12</b>	<b>0</b>
<b>Area 1</b>	June	8	7	6	0	0	0	0	10	0	0	0	0	0	0
	July	43	389	288	0	7	3	0	63	196	183	0	7	5	0
	Aug	30	282	223	0	5	5	0	49	175	154	0	4	2	0
	Sept	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	<b>TOTAL</b>	<b>81</b>	<b>678</b>	<b>517</b>	<b>0</b>	<b>12</b>	<b>8</b>	<b>0</b>	<b>122</b>	<b>371</b>	<b>337</b>	<b>0</b>	<b>11</b>	<b>7</b>	<b>0</b>

**Table 5.** Estimated Chinook and coho mark rates during the 2017 all-species recreational fishery (coho MSF) by boat type and size class using onboard observer and VTR encounters.

		LEGAL-SIZED CHINOOK			SUBLEGAL-SIZED CHINOOK			LEGAL-SIZED COHO			FRAM Projected Coho
		Charter	Private	Combined	Charter	Private	Combined	Charter	Private	Combined	Mark Rate
<b>Area 4</b>	June	-	75%	75%	-	89%	89%	-	33%	33%	
	July	55%	69%	64%	38%	58%	55%	84%	49%	61%	
	August	-	50%	50%	80%	65%	68%	52%	62%	57%	
	September	-	-	-	-	-	-	-	-	-	
	<b>TOTAL</b>	<b>55%</b>	<b>67%</b>	<b>64%</b>	<b>50%</b>	<b>62%</b>	<b>60%</b>	<b>68%</b>	<b>52%</b>	<b>59%</b>	
<b>Area 3</b>	June	-	-	-	-	-	-	-	-	-	
	July	-	0%	0%	-	-	-	-	100%	100%	
	August	-	0%	0%	-	40%	40%	-	54%	54%	
	September	-	-	-	-	-	-	-	-	-	
	<b>TOTAL</b>	-	<b>0%</b>	<b>0%</b>	-	<b>40%</b>	<b>40%</b>	-	<b>58%</b>	<b>58%</b>	
<b>Area 2</b>	June	-	-	-	-	-	-	-	-	-	
	July	67%	70%	68%	74%	50%	69%	52%	54%	52%	
	August	67%	72%	68%	67%	60%	66%	52%	55%	53%	
	September	-	-	-	-	-	-	-	-	-	
	<b>TOTAL</b>	<b>67%</b>	<b>70%</b>	<b>68%</b>	<b>73%</b>	<b>51%</b>	<b>69%</b>	<b>52%</b>	<b>54%</b>	<b>52%</b>	
<b>Area 1</b>	June	70%	68%	69%	89%	56%	65%	54%	-	54%	
	July	71%	71%	71%	59%	46%	55%	57%	52%	55%	
	August	74%	60%	68%	50%	58%	53%	56%	53%	55%	
	September	-	-	-	-	-	-	-	-	-	
	<b>TOTAL</b>	<b>72%</b>	<b>66%</b>	<b>69%</b>	<b>59%</b>	<b>52%</b>	<b>57%</b>	<b>57%</b>	<b>52%</b>	<b>55%</b>	



**Table 6.** Comparison of modeled (FRAM model run #1731) and estimated total coho encounters in the 2017 ocean coho MSF.

Data Source	Area	Marked	Unmarked	Total Encounters	Landed Catch
FRAM	Area 4	4,548	4,219	8,767	4,370
	Area 3	1,139	866	2,005	1,090
	Area 2	16,278	10,082	26,360	15,540
	Area 1	22,077	9,909	31,986	21,000
	<b>TOTAL</b>	<b>44,042</b>	<b>25,076</b>	<b>69,118</b>	<b>42,000</b>
Estimated Actual Encounters	Area 4	3,865	3,309	7,174	3,533
	Area 3	1,814	2,125	3,939	1,750
	Area 2	16,038	13,981	30,019	15,750
	Area 1	21,959	19,258	41,217	21,625
	<b>TOTAL</b>	<b>43,675</b>	<b>38,673</b>	<b>82,348</b>	<b>42,657</b>
<b>Variance<sup>1/</sup>:</b>		1,237,509	965,654	4,386,844	644,657
<b>Standard Error:</b>		1,112	983	2,094	803
<b>CV (%):</b>		3%	3%	3%	2%
<b>95% CI:</b>		41,495-45,856	36,747-40,599	78,243-86,454	41,083-44,230

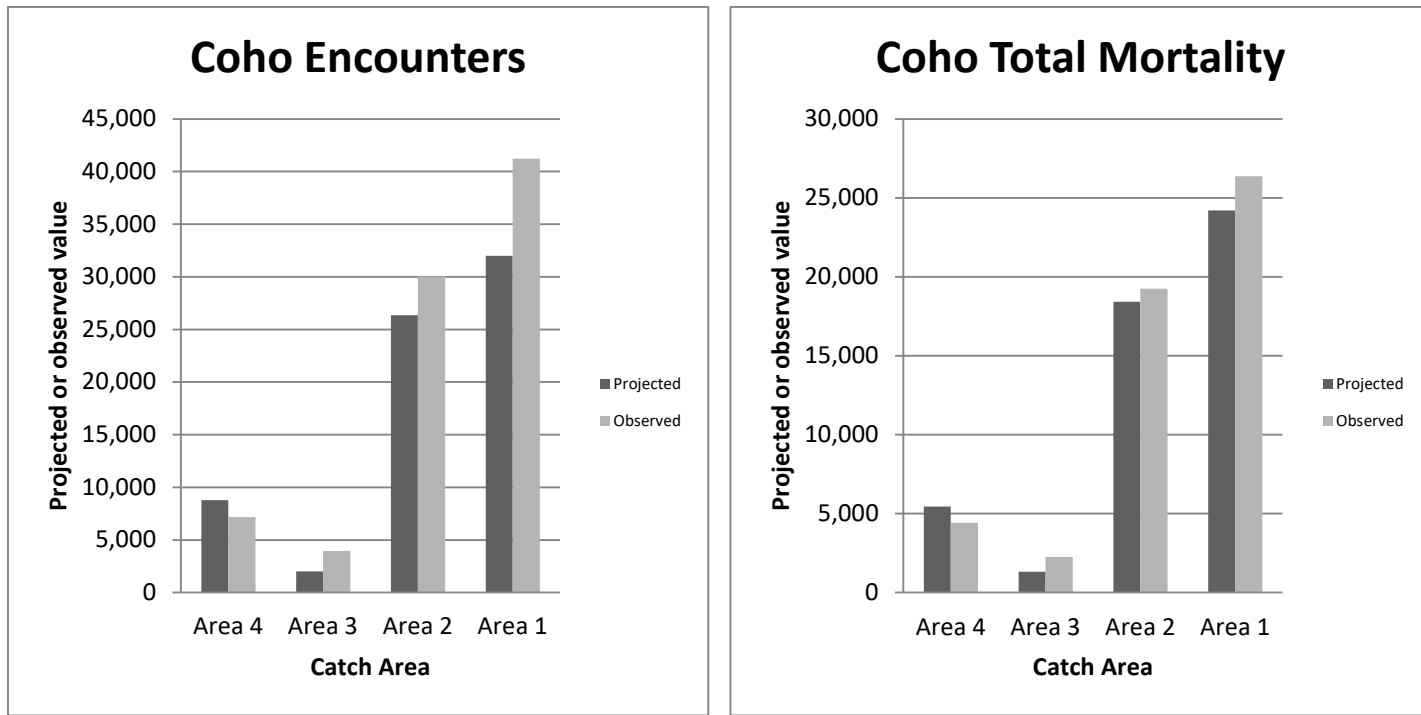
<sup>1/</sup> Variance estimates are unavailable for Oregon statistics.

**Table 7.** Comparison of modeled (FRAM model run #1731) and estimated total coho mortalities in the 2017 ocean coho MSF.

Data Source	Area	Release Mortality		Drop Off Mortality <sup>1/</sup>		Landed Catch		Total Mortality
		Marked	Unmarked	Marked	Unmarked	Marked	Unmarked	
FRAM	Area 4	38	593	228	217	4,284	86	5,446
	Area 3	10	122	57	45	1,073	17	1,324
	Area 2	137	1,417	816	517	15,333	207	18,427
	Area 1	186	1,398	1,107	508	20,796	204	24,199
	<b>TOTAL</b>	<b>371</b>	<b>3,530</b>	<b>2,208</b>	<b>1,287</b>	<b>41,486</b>	<b>514</b>	<b>49,396</b>
Estimated Actual Mortality	Area 4	64	446	193	165	3,405	148	4,422
	Area 3	10	297	91	106	1,744	6	2,253
	Area 2	47	1,957	802	699	15,701	49	19,255
	Area 1	60	2,696	1,098	963	21,527	28	26,372
	<b>TOTAL</b>	<b>182</b>	<b>5,396</b>	<b>2,184</b>	<b>1,934</b>	<b>42,377</b>	<b>231</b>	<b>52,303</b>
<b>Variance<sup>2/</sup>:</b>		602	29,313	3,094	2,414	637,128	773	-
<b>Standard Error:</b>		25	171	56	49	798	28	-
<b>CV (%):</b>		13%	3%	3%	3%	2%	12%	-
<b>95% CI:</b>		134-230	5,061-5,732	2,075-2,293	1,837-2,030	40,812-43,941	176-285	-

<sup>1/</sup> Estimated drop off mortality calculated as 5% of estimated encounters.

<sup>2/</sup> Variance estimates for landed catch are unavailable for Oregon



**Figure 2.** Comparison of modeled (FRAM model run #1731) and estimated total coho encounters and mortality in the 2017 ocean coho MSF.

**Table 8.** Compliance with coho selective fishery regulations observed during dockside sampling interviews in the 2017 ocean coho MSF between Cape Falcon, Oregon and the U.S.-Canada border.

		Total Coho Sampled	Marked Coho Sampled	Unmarked Coho Sampled	% Sampled Coho Marked
<b>Area 4</b>	June	40	39	1	97.5%
	July	585	568	17	97.1%
	August	629	597	32	94.9%
	September	163	163	0	100.0%
	<b>Total</b>	<b>1,417</b>	<b>1,367</b>	<b>50</b>	<b>96.5%</b>
<b>Area 3</b>	June	12	11	1	91.7%
	July	142	141	1	99.3%
	August	908	907	1	99.9%
	September	283	281	2	99.3%
	<b>Total</b>	<b>1,345</b>	<b>1,340</b>	<b>5</b>	<b>99.6%</b>
<b>Area 2</b>	June	-	-	-	-
	July	2,540	2,535	5	99.8%
	August	3,405	3,393	12	99.6%
	September	-	-	-	-
	<b>Total</b>	<b>5,945</b>	<b>5,928</b>	<b>17</b>	<b>99.7%</b>
<b>Area 1</b>	June	40	40	0	100.0%
	July	3,287	3,279	8	99.8%
	August	3,140	3,128	12	99.6%
	September	-	-	-	-
	<b>Total</b>	<b>6,467</b>	<b>6,447</b>	<b>20</b>	<b>99.7%</b>

**Table 9.** Number of Chinook DNA samples collected by dockside samplers from the 2017 ocean recreational all-species fishery by area, month, and mark status.

		Marked	Unmarked	Unknown	Total Number of DNA Samples
<b>Area 4</b>	June	9	4	2	15
	July	91	73	1	165
	Aug	49	33	0	82
	Sept	0	0	0	0
	<b>Total</b>	<b>149</b>	<b>110</b>	<b>3</b>	<b>262</b>
<b>Area 3</b>	June	0	0	0	0
	July	4	0	0	4
	Aug	3	4	0	7
	Sept	2	1	0	3
	<b>Total</b>	<b>9</b>	<b>5</b>	<b>0</b>	<b>14</b>
<b>Area 2</b>	June	-	-	-	0
	July	216	83	2	301
	Aug	120	55	0	175
	Sept	-	-	-	0
	<b>Total</b>	<b>336</b>	<b>138</b>	<b>2</b>	<b>476</b>
<b>Area 1</b>	June	22	12	0	34
	July	99	50	0	149
	Aug	110	72	0	182
	Sept	-	-	-	0
	<b>Total</b>	<b>231</b>	<b>134</b>	<b>0</b>	<b>365</b>

## 5. RESULTS IN THE ALL-SPECIES COHO MARK SELECTIVE NON-TREATY COMMERCIAL TROLL FISHERY

The non-Treaty commercial troll fishery harvested a total of 12,856 Chinook (11,961 WA, 895 OR) and 1,838 coho (1,368 WA, 470 OR) during the 2017 coastwide all-species coho MSF operating July 1 through September 19. Estimates of coho catch in the commercial troll fishery were lower than preseason projections. This was caused primarily by an in-season transfer of coho (modeled to be impact-neutral on 2017 limiting stocks including Queets, LCN, Skagit, and Stillaguamish coho) from the non-Treaty troll fishery quota to the recreational fishery quota. The transferred fish were harvested primarily in CRC Areas 1 and 2 in the recreational fishery. **Table 10** shows commercial troll catch by month and area.

WDFW dockside samplers examined a total of 33% of all Chinook and 34% of all coho harvested and landed in WA. CWT collections totaled 428 from Chinook and 60 from coho in Washington ports (**Table 11**).

**Table 10.** Total Chinook and coho retained during the 2017 all-species non-Treaty commercial troll fishery (coho mark-selective) between Cape Falcon, Oregon and the U.S.-Canada border.

	Chinook				Coho			
	July	August	September	TOTAL	July	August	September	TOTAL
Area 4	3,058	2,158	310	5,526	49	182	80	311
Area 3	308	1,275	356	1,939	34	228	140	402
Area 2	2,340	1,852	100	4,292	134	309	81	524
Area 1	74	21	109	204	14	50	67	131
<b>TOTAL WA</b>	<b>5,780</b>	<b>5,306</b>	<b>875</b>	<b>11,961</b>	<b>231</b>	<b>769</b>	<b>368</b>	<b>1,368</b>
OREGON (Area 1)	50	611	234	895	16	305	149	470
<b>TOTAL NOF</b>	<b>5,830</b>	<b>5,917</b>	<b>1,109</b>	<b>12,856</b>	<b>247</b>	<b>1,074</b>	<b>517</b>	<b>1,838</b>

**Table 11.** Chinook and coho sampled in WA during the 2017 all-species non-Treaty commercial troll fishery (coho mark-selective) between Cape Falcon, Oregon and the U.S.-Canada border.

	Chinook			Coho		
	Total Sampled	Sample Rate	CWTs Collected	Total Sampled	Sample Rate	CWTs Collected
Area 4	2,084	38%	226	105	34%	16
Area 3	986	51%	94	172	43%	20
Area 2	776	18%	94	128	24%	18
Area 1	56	27%	14	59	45%	6
<b>TOTAL WA</b>	<b>3,902</b>	<b>33%</b>	<b>428</b>	<b>464</b>	<b>34%</b>	<b>60</b>

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