

2021 OCEAN SELECTIVE FISHERY SAMPLING REPORT

SUBMITTED BY:

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TABLE OF CONTENTS

TABLE OF CONTENTS.....	1
LIST OF FIGURES	2
1. INTRODUCTION	3
2. SEASON DESCRIPTION.....	3
2.1 Ocean Recreational All-Species-Except-Coho Fisheries.....	4
2.2 Ocean Recreational All-Species Fisheries (Coho Mark-Selective).....	4
2.3 Non-Tribal Commercial Troll Fisheries (Coho Mark-Selective)	5
3. METHODS	6
3.1 On-Board Observation	6
3.2 Voluntary Trip Reports.....	6
3.3 Dockside Sampling.....	6
Effort Counts.....	7
Angler Interviews and Catch Sampling	7
3.4 Estimating Catch and Effort.....	7
3.4.i Estimated Stratum Totals (Primary Stage)	7
3.4.ii Daily Catch and Effort Estimation (Secondary Stage).....	8
4. RESULTS IN THE RECREATIONAL FISHERY	11
4.1 Dockside Sampling Results	11
4.2 On-water Observation and VTR Results	11
4.3 Overall Fishery Impacts.....	11
Estimated Total Coho Encounters and Mortalities	11
Compliance	12
4.4 DNA Data Collection.....	12
5. RESULTS IN THE ALL-SPECIES COHO MARK SELECTIVE NON-TRIBAL COMMERCIAL TROLL FISHERY	21
REFERENCES	22

LIST OF TABLES

Table 1. Estimates of total fishing effort and number of Chinook and coho retained during the 2021 recreational fishery between Cape Falcon, Oregon and the U.S.-Canada border. ^{1/}	13
Table 2. WA dockside sampling statistics during the 2021 recreational fishery between Cape Falcon, Oregon and the U.S.-Canada border.	13
Table 3. VTR Chinook encounters by boat type, size class and mark status in the 2021 recreational fishery between Cape Falcon, Oregon and the U.S.-Canada border. ^{1/}	14
Table 4. VTR coho encounters by boat type, size class and mark status in the 2021 recreational fishery between Cape Falcon, Oregon and the U.S.-Canada border. ^{1/}	15
Table 5. Estimated Chinook and coho mark rates during the 2021 recreational fishery between Cape Falcon, Oregon and the U.S.-Canada border by size class using VTR encounters. ^{1/}	16
Table 6. Comparison of modeled (FRAM model run #2140) and estimated total coho encounters in the 2021 ocean recreational fishery.	17

Table 7. Comparison of modeled (FRAM model run #2140) and estimated total coho mortalities in the 2021 ocean recreational fishery. 18

Table 8. Compliance with coho selective fishery regulations observed during dockside sampling interviews in the 2021 all-species recreational fishery (coho mark-selective) between Cape Falcon, Oregon and the U.S.-Canada border.^{1/} 20

Table 9. Total Chinook and coho retained during the 2021 all-species non-Tribal commercial troll fishery (coho mark-selective) between Cape Falcon, Oregon and the U.S.-Canada border. 21

Table 10. Chinook and coho sampled in WA during the 2021 all-species non-Tribal commercial troll fishery (coho mark-selective) between Cape Falcon, Oregon and the U.S.-Canada border. 21

LIST OF FIGURES

Figure 1. Map of coastal Washington showing the ocean catch record card areas (Areas 1 through 4) and major sampling sites. 5

Figure 2. Comparison of modeled (FRAM model run #2140) and estimated total coho encounters and mortality in the 2021 recreational fishery. 19

1. INTRODUCTION

Measures taken to limit the spread of COVID-19 were initiated before the planned openings of the 2020 ocean recreational and commercial troll salmon fisheries and remained in place during 2021 fisheries, as detailed throughout this report.

The Pacific Fishery Management Council (PFMC) adopted 2021 recreational and commercial troll fisheries for all salmon species 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 twenty-third consecutive year, following state-tribal agreement during the North of Falcon process. No Chinook MSFs were recommended by the Council's Salmon Advisory Subpanel nor adopted by the PFMC in 2021.

The Ocean Sampling Program (OSP) continued its intensive monitoring program in all accessible ocean ports and collaborated with the Puget Sound Sampling Unit (PSSU) in monitoring the port of Sekiu during the season to collect data to estimate key parameters characterizing the fishery and its impacts on unmarked salmon. All salmon fishery openings were monitored in 2021. Sampling activities included 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

The Makah Indian reservation, which includes the Washington ocean access port of Neah Bay, was closed to public access for the entirety of the 2021 ocean salmon fisheries, and the Quileute Indian reservation, which includes the Washington ocean access port of La Push, was closed to public access until July 12. Limited local commercial troll landings continued, but no recreational fishing originated from either port during the closures. The central and southern Washington coast ports of Westport and Ilwaco remained open to public access throughout the salmon fisheries. Consistent with 2020, to provide landing access to the commercial fleet on the northern Washington coast, the area between the Sekiu River and Port Angeles remained open to troll landing and delivery; this area includes the ports of Sekiu and Port Angeles. Most recreational salmon fishing access to the Neah Bay subarea originated from the port of Sekiu. No recreational salmon trips were recorded in the La Push subarea until the port of La Push reopened on July 12.

2.1 Ocean Recreational All-Species-Except-Coho Fisheries

CRC Area 1: The ocean recreational fishery in CRC Area 1 was open for all salmon species except coho seven days per week from June 19 through June 26. A daily bag limit of one salmon was in effect. The Columbia Control Zone was closed. This opening, 8 fishing days were available in the area.

CRC Area 2: The ocean recreational fishery in CRC Area 2 was open for all salmon species except coho seven days per week from June 19 through June 26. A daily bag limit of one salmon was in effect. This opening, 8 fishing days were available in the area.

CRC Area 3: The ocean recreational fishery in CRC Area 3 was open for all salmon species except coho seven days per week from June 19 through July 3. A daily bag limit of two salmon was in effect. This opening, 15 fishing days were available in the area.

CRC Area 4: The ocean recreational fishery in CRC Area 4 was open for all salmon species except coho seven days per week from June 19 through July 3. A daily bag limit of one salmon was in effect. This opening, 15 fishing days were available in the area.

2.2 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 27 through August 29. 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. This opening, 64 fishing days were available in the area.

CRC Area 2: The ocean recreational fishery in CRC Area 2 was open for all salmon species five days per week (Sunday through Thursday) from June 27 through August 5; the fishing week was modified in-season to seven days per week from August 6 through September 7. A daily bag limit of two salmon, one of which could be a Chinook, was in effect June 27 through August 20; the bag limit was modified in-season to two salmon from August 21 through September 7. All retained coho were required to have a healed adipose fin clip. The Grays Harbor Control Zone was closed beginning August 9. This opening, 63 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 July 4 through September 3. A daily bag limit of two salmon was in effect. All retained coho were required to have a healed adipose fin clip. This opening, 62 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 29 through September 15. A daily bag limit of two salmon was in effect July 4 through July 23; the bag limit was modified in-season to two salmon, only one of which could be a Chinook, from July 24 through September 15. All retained coho were required to have a healed adipose fin clip. This opening, 74 fishing days were available in the area.

The recreational salmon fishery operated under preseason quotas of 27,250 landed Chinook and 70,000 landed marked coho.

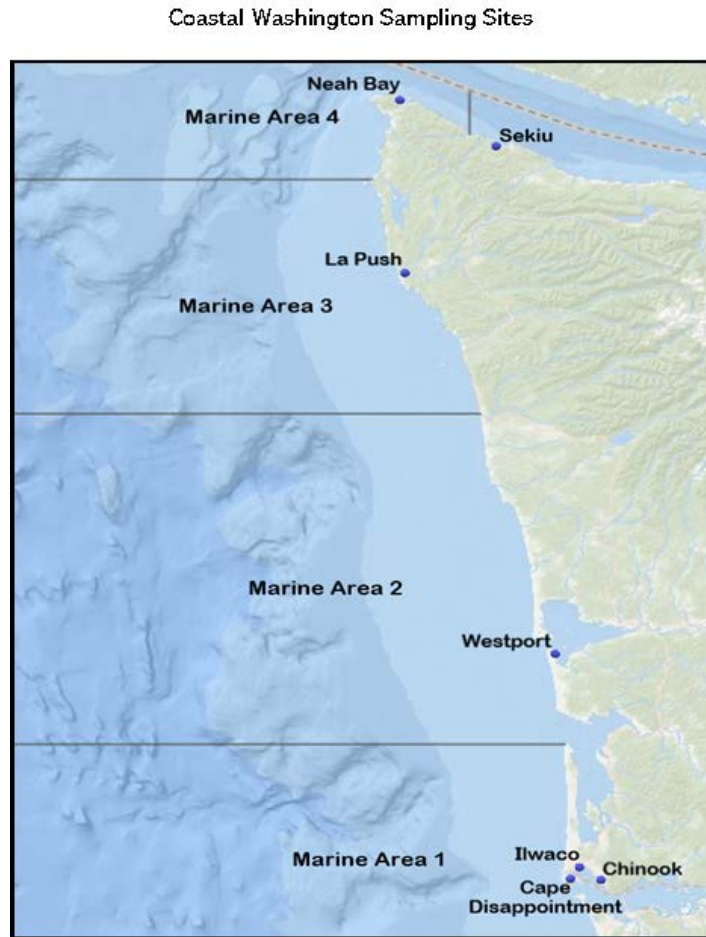


Figure 1. Map of coastal Washington showing the ocean catch record card areas (Areas 1 through 4) and major sampling sites.

2.3 Non-Tribal Commercial Troll Fisheries (Coho Mark-Selective)

The non-Tribal troll fishery was open May 1 through June 29 for all salmon except coho from Cape Falcon, Oregon, to the U.S.-Canada border. Ocean Areas 1 through 4 were open during this time for 60 days. The fishery reopened for all salmon species (except no chum retention north of Cape Alava, WA, in August) on July 1 in all areas between Cape Falcon, Oregon, and the U.S.-Canada border. The fishery closed as scheduled on September 30, allowing a total of 92 available fishing days. All retained coho were required to have a healed adipose fin clip. Specific open dates and regulations are available in the [PFMC Review of 2021 Ocean Salmon Fisheries](https://www.pcouncil.org/documents/2022/02/review-of-2021-ocean-salmon-fisheries.pdf) (<https://www.pcouncil.org/documents/2022/02/review-of-2021-ocean-salmon-fisheries.pdf>).

3. METHODS

In compliance with COVID-19 guidance from the Washington State Governor's Office, prescribed in 2020, the Washington Department of Fish and Wildlife (WDFW) enacted standard operating procedures to limit the spread of COVID-19. WDFW's COVID-19 operating procedures were adopted before 2020 ocean fisheries and continued to be followed by the Ocean Sampling Program (OSP) in 2021 but had minimal impact on fishery sampling. However, in 2021, as in 2020, on-water observation was unable to be conducted, and biodata collection was reduced.

WDFW's OSP implemented a comprehensive monitoring program in all accessible 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 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

Due to COVID-19 and WDFW's standard operating procedures enacted to limit the spread, direct on-water observation of salmon encounters aboard charter vessels was not conducted.

3.2 Voluntary Trip Reports

Selective fishery encounter statistics were acquired through VTRs that WDFW samplers distributed to and collected from 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 onboard 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 before the season and provided blank VTRs and binders.

3.3 Dockside Sampling

Dockside samplers were stationed in the major landing ports for the ocean fisheries that were accessible in 2021: Ilwaco (including the port of Chinook and the Cape Disappointment launch ramp), Westport, La Push, and Sekiu. The recreational fisheries in each accessible 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 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 by counting boats exiting or entering the port. A minimum of 20% of the boats returning to the port within each boat type (charter and private) were sampled. An exit count (a count of boats leaving the port) typically began at 4:00 AM 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.

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 differ 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 RECREATIONAL FISHERY

4.1 Dockside Sampling Results

Private and charter anglers completed an estimated 78,755 angler trips (65,870 from Washington, 12,885 from Oregon) during the 2021 coastwide recreational salmon fishery. These anglers harvested 17,814 Chinook coastwide (15,976 WA, 1,838 OR) and 64,177 coho (49,769 WA, 14,408 OR). **Table 1** shows effort and catch by month and area during the 2021 recreational fishery.

WDFW dockside samplers interviewed an estimated 40% of all anglers fishing from WA coastwide during the recreational salmon fishery. 41% of all Chinook and 42% of all coho harvested in WA were sampled; 667 CWTs were collected from sampled Chinook, and 3,146 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 from VTRs submitted by charter and private fishing vessels. Charter boat VTRs provided on-water catch and encounter data from a total of 90 charter boat trips documenting 341 legal-sized Chinook, 168 sub-legal sized Chinook, 2,465 legal sized coho, and 29 sublegal sized coho during the recreational fishery. Dockside samplers also collected 117 completed and useable VTRs from private vessels containing 126 legal sized Chinook encounters, 118 sublegal sized Chinook encounters, 793 legal sized coho encounters, and 33 sublegal sized coho encounters. Mark rates calculated from VTR data, where available, 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 2021 ocean recreational fishery are compared with estimated encounters based on Washington and Oregon sample data in **Table 6**. **Table 7** compares total coho mortality projected pre-season by FRAM (Washington and Oregon) with estimated coho mortality based on Washington and Oregon sample data.

The overall impacts of the 2021 recreational fishery in ocean CRC Areas 1-4 are characterized in terms of grand-total estimates of coho encounters and mortalities 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).

Observed estimates of total coho encounters and unmarked coho encounters were higher than projected preseason in all CRC areas; except area 4, where unmarked encounters and total encounters were below projections. Total mortality estimates were in-line with preseason projections in CRC areas 1 and 3, higher than projected in Area 2, and lower than projected in area 4. Estimated unmarked mortality was higher than projected preseason in all areas except Area 4. Estimated marked landed catch was lower than projected preseason in CRC areas 1 and 4; Area 2 estimated marked landed catch was above preseason projections and Area 4 was below projected. Estimated unmarked landed catch was higher than projected in all CRC areas except Area 4. Observed coho mark rates were lower than anticipated preseason in all CRC areas.

Figure 2 compares the FRAM projected coho encounters and mortality by area with those estimated using Washington and Oregon sample data in the all-species fishery.

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

No DNA samples were collected in 2021 due to COVID-19 related safety concerns. DNA collection resumed during 2022 fisheries.

Table 1. Estimates of total fishing effort and number of Chinook and coho retained during the 2021 recreational fishery between Cape Falcon, Oregon and the U.S.-Canada border.^{1/}

	TOTAL ANGLER TRIPS					CHINOOK RETAINED					COHO RETAINED				
	June	July	Aug	Sept	TOTAL	June	July	Aug	Sept	TOTAL	June	July	Aug	Sept	TOTAL
Area 4	1,939	6,668	1,775	516	10,899	633	3,542	215	28	4,417	4	1,144	1,027	442	2,618
Area 3	0	539	797	265	1,601	0	225	92	12	329	0	271	867	209	1,347
Area 2	1,752	9,577	9,599	3,987	24,915	920	3,929	1,792	413	7,054	17	2,448	11,412	6,787	20,665
Area 1	1,299	9,247	17,910	-	28,456	434	1,157	2,586	-	4,177	147	7,451	17,542	-	25,140
TOTAL WA	4,990	26,031	30,080	4,768	65,870	1,987	8,853	4,684	453	15,976	168	11,315	30,848	7,439	49,769
OREGON (Area 1)	336	4,676	7,873	-	12,885	62	349	1,427	-	1,838	112	4,656	9,640	-	14,408
TOTAL NOF	5,326	30,707	37,953	4,768	78,755	2,049	9,202	6,111	453	17,814	280	15,971	40,488	7,439	64,177
WA Variance ^{2/} :					2,035,622					175,742					1,843,730
WA Standard Error:					1,427					419					1,358
WA CV (%):					2%					3%					3%
WA 95% CI:					63,073-68,666					15,155-16,798					47,108-52,431

^{1/} Closed months are denoted by (-).

^{2/} Variance estimates are unavailable for Oregon.

Table 2. WA dockside sampling statistics during the 2021 recreational fishery between Cape Falcon, Oregon and the U.S.-Canada border.

	Anglers Sampled	Sample Rate	Landed		Landed		Chinook CWTs collected	Coho CWTs collected
			Chinook Sampled	Sample Rate	Coho Sampled	Sample Rate		
Area 4 ^{1/}	3,795	35%	1,426	32%	994	38%	79	36
Area 3	979	61%	195	59%	840	62%	18	79
Area 2	11,631	47%	3,412	48%	9,208	45%	405	1,359
Area 1	10,104	36%	1,513	36%	9,707	39%	165	1,672
TOTAL WA	26,509	40%	6,546	41%	20,749	42%	667	3,146

^{1/} Data for area 4 determined by area fished not port of landing. Landings and sampling primarily occurred in Sekiu.

Table 3. VTR Chinook encounters by boat type, size class and mark status in the 2021 recreational fishery between Cape Falcon, Oregon and the U.S.-Canada border.^{1/}

		Charter Boats (VTRs)							Private boats (VTRs)						
		Total	LEGAL-SIZED			SUBLEGAL-SIZED			Total VTRs	LEGAL-SIZED			SUBLEGAL-SIZED		
		Observer	Marked	Unmarked	Unknown	Marked	Unmarked	Unknown	Collected	Marked	Unmarked	Unknown	Marked	Unmarked	Unknown
Area 4	June	0	0	0	0	0	0	0	1	1	0	0	5	0	0
	July	1	7	2	0	4	0	0	2	1	1	0	6	3	0
	Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sept	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	1	7	2	0	4	0	0	3	2	1	0	11	3	0
Area 3	June	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	July	2	1	1	0	2	2	0	0	0	0	0	0	0	0
	Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sept	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	2	1	1	0	2	2	0	0	0	0	0	0	0	0
Area 2	June	9	40	17	0	12	11	0	12	14	9	0	7	10	2
	July	22	81	39	0	47	23	0	13	8	7	0	22	16	0
	Aug	25	40	35	0	17	11	0	20	7	6	0	6	5	0
	Sept	7	15	5	0	0	0	0	3	1	2	0	0	0	0
	TOTAL	63	176	96	0	76	45	0	48	30	24	0	35	31	2
Area 1	June	3	0	2	0	9	0	0	15	6	5	0	8	7	1
	July	17	28	18	0	8	20	0	27	22	16	0	7	7	0
	Aug	4	4	6	0	0	2	0	24	14	6	0	2	4	0
	Sept	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	TOTAL	24	32	26	0	17	22	0	66	42	27	0	17	18	1

^{1/} Closed months are denoted by (-).

Table 4. VTR coho encounters by boat type, size class and mark status in the 2021 recreational fishery between Cape Falcon, Oregon and the U.S.-Canada border.^{1/}

		Charter Boats (VTRs)							Private boats (VTRs)						
		Total	LEGAL-SIZED			SUBLEGAL-SIZED			Total VTRs	LEGAL-SIZED			SUBLEGAL-SIZED		
		Observer	Marked	Unmarked	Unknown	Marked	Unmarked	Unknown	Collected	Marked	Unmarked	Unknown	Marked	Unmarked	Unknown
Area 4	June	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	July	1	0	0	0	0	0	0	2	8	21	0	1	0	0
	Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sept	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	1	0	0	0	0	0	0	3	8	21	0	1	0	0
Area 3	June	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	July	2	0	2	0	0	0	0	0	0	0	0	0	0	0
	Aug	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Sept	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL	2	0	2	0	0	0	0	0	0	0	0	0	0	0
Area 2	June	0	4	4	0	2	3	0	12	0	2	0	4	1	0
	July	22	79	75	0	2	0	0	13	27	23	0	0	3	0
	Aug	25	530	716	0	8	2	0	20	119	113	5	2	3	0
	Sept	7	235	305	0	0	0	0	3	15	34	0	0	0	0
	TOTAL	54	848	1,100	0	12	5	0	48	161	172	5	6	7	0
Area 1	June	3	41	12	0	1	0	0	15	6	7	0	0	1	1
	July	17	213	177	0	0	11	0	27	100	64	0	1	4	0
	Aug	4	44	28	0	0	0	0	24	132	117	0	5	5	2
	Sept	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	TOTAL	24	298	217	0	1	11	0	66	238	188	0	6	10	3

^{1/} Closed months are denoted by (-).

Table 5. Estimated Chinook and coho mark rates during the 2021 recreational fishery between Cape Falcon, Oregon and the U.S.-Canada border by size class using VTR encounters.^{1/}

		LEGAL-SIZED CHINOOK			SUBLEGAL-SIZED CHINOOK			LEGAL-SIZED COHO			FRAM Projected Coho Mark Rate
		Charter	Private	Combined	Charter	Private	Combined	Charter	Private	Combined	
Area 4	June	NA	100%	100%	NA	100%	100%	NA	NA	NA	62%
	July	78%	50%	73%	100%	67%	77%	NA	28%	28%	
	August	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	September	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	TOTAL	78%	67%	75%	100%	79%	83%	NA	28%	28%	
Area 3	June	NA	NA	NA	NA	NA	NA	NA	NA	NA	67%
	July	50%	NA	50%	50%	NA	50%	0%	NA	0%	
	August	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	September	NA	NA	NA	NA	NA	NA	NA	NA	NA	
	TOTAL	50%	NA	50%	50%	NA	50%	0%	NA	0%	
Area 2	June	70%	61%	68%	52%	41%	48%	50%	0%	40%	72%
	July	68%	53%	66%	67%	58%	64%	51%	54%	52%	
	August	53%	54%	53%	61%	55%	59%	43%	51%	44%	
	September	75%	33%	70%	NA	NA	NA	44%	31%	42%	
	TOTAL	65%	56%	63%	63%	53%	59%	44%	48%	44%	
Area 1	June	0%	55%	46%	100%	53%	71%	77%	46%	71%	73%
	July	61%	58%	60%	29%	50%	36%	55%	61%	56%	
	August	40%	70%	60%	0%	33%	25%	61%	53%	55%	
	September	-	-	-	-	-	-	-	-	-	
	TOTAL	55%	61%	58%	44%	49%	46%	58%	56%	57%	

1/ Closed months are denoted by (-).

Table 6. Comparison of modeled (FRAM model run #2140) and estimated total coho encounters in the 2021 ocean recreational fishery.

Data Source	Area	Marked	Unmarked	Total Encounters	Landed Catch
FRAM	Area 4	6,001	3,669	9,670	5,729
	Area 3	1,501	729	2,230	1,430
	Area 2	21,514	8,437	29,951	20,440
	Area 1	44,644	16,599	61,243	42,400
	TOTAL	73,659	29,434	103,093	69,999
Estimated Actual Encounters	Area 4	2,610	2,139	4,749	2,618
	Area 3	1,324	1,853	3,176	1,347
	Area 2	21,443	25,025	46,468	20,665
	Area 1	40,039	31,218	71,257	39,548
	TOTAL	65,416	60,235	125,650	64,177
Variance^{1/}:		3,184,662	2,439,904	11,123,263	1,843,730
Standard Error:		1,785	1,562	3,335	1,358
CV (%):		3%	3%	3%	2%
95% CI:		61,918-68,913	57,173-63,296	119,113-132,187	61,516-66,839

1/ Variance estimates are unavailable for Oregon statistics.

Table 7. Comparison of modeled (FRAM model run #2140) and estimated total coho mortalities in the 2021 ocean recreational fishery.

Data Source	Area	Release Mortality		Drop Off Mortality ^{1/}		Landed Catch		Total Mortality
		Marked	Unmarked	Marked	Unmarked	Marked	Unmarked	
FRAM	Area 4	51	517	301	188	5,654	75	6,785
	Area 3	13	103	75	38	1,415	15	1,659
	Area 2	181	1,198	1,078	437	20,265	175	23,334
	Area 1	376	2,364	2,237	862	42,055	345	48,238
	TOTAL	620	4,182	3,691	1,524	69,389	610	80,016
Estimated Actual Mortality	Area 4	10	288	131	107	2,539	79	3,153
	Area 3	2	254	66	93	1,309	38	1,763
	Area 2	118	3,504	1,072	1,251	20,598	66	26,610
	Area 1	79	4,370	2,002	1,561	39,478	70	47,560
	TOTAL	209	8,416	3,271	3,012	63,924	254	79,085
Variance^{2/}:		2,709	100,156	7,962	6,100	340,932	1,210	-
Standard Error:		52	316	89	78	584	35	-
CV (%):		25%	4%	3%	3%	1%	14%	-
95% CI:		107-311	7,796-9,036	3,096-3,446	2,859-3,165	62,779-65,068	186-322	-

1/ Observed drop off mortality calculated as 5% of observed encounters.

2/ Variance estimates are unavailable for Oregon statistics.

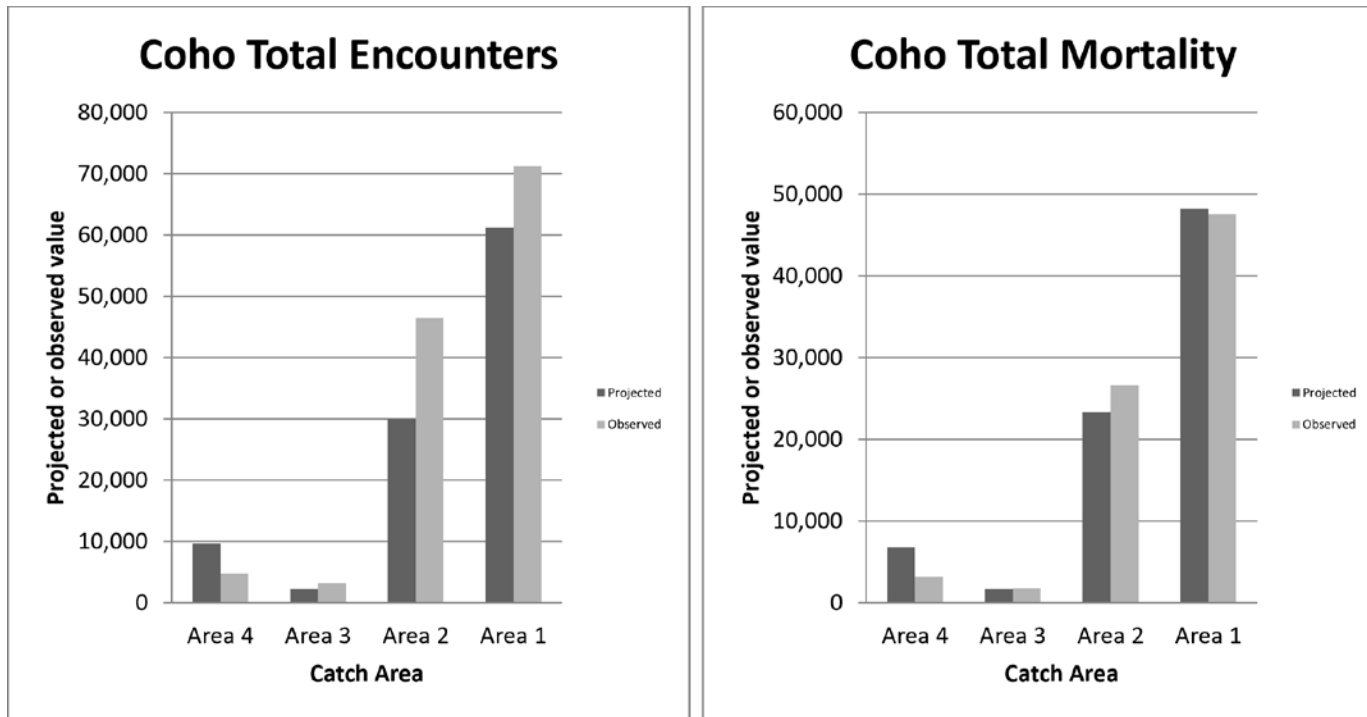


Figure 2. Comparison of modeled (FRAM model run #2140) and estimated total coho encounters and mortality in the 2021 recreational fishery.

Table 8. Compliance with coho selective fishery regulations observed during dockside sampling interviews in the 2021 all-species recreational fishery (coho mark-selective) between Cape Falcon, Oregon and the U.S.-Canada border.^{1/}

		Total Coho Sampled	Marked Coho Sampled	Unmarked Coho Sampled	% Sampled Coho Marked
Area 4 ^{2/}	June	1	1	0	100.0%
	July	352	333	19	94.6%
	August	446	438	8	98.2%
	September	151	149	2	98.7%
	Total	950	921	29	96.9%
Area 3	June	0	0	0	NA
	July	181	181	0	100.0%
	August	579	562	17	97.1%
	September	80	77	3	96.3%
	Total	840	820	20	97.6%
Area 2	June	27	26	1	96.3%
	July	1,136	1,133	3	99.7%
	August	5,722	5,701	21	99.6%
	September	2,323	2,321	2	99.9%
	Total	9,208	9,181	27	99.7%
Area 1	June	292	292	0	100.0%
	July	3,959	3,957	2	99.9%
	August	5,456	5,453	3	99.9%
	September	-	-	-	-
	Total	9,707	9,702	5	99.9%

1/ Closed months are denoted by (-).

2/ Data for area 4 determined by area fished not port of landing. Landings and sampling primarily occurred in Sekiu.

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

The non-Tribal commercial troll fishery harvested a total of 9,395 Chinook (9,240 WA, 155 OR) and 3,511 coho (3,370 WA, 141 OR) during the 2021 coastwide all-species coho MSF operating July 1 through September 30. Estimates of coho catch in the commercial troll fishery were below preseason projections. **Table 9** shows commercial troll catch by month and area.

WDFW dockside samplers examined a total of 42% of all Chinook and 37% of all coho harvested and landed in WA during the all-species coho MSF. CWT collections totaled 351 from Chinook and 155 from coho in Washington ports (**Table 10**).

Table 9. Total Chinook and coho retained during the 2021 all-species non-Tribal 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	212	75	33	320	7	10	50	67
Area 3	978	1,314	321	2,613	61	235	121	417
Area 2	4,357	1,751	154	6,262	483	826	1,454	2,763
Area 1	2	33	10	45	0	43	80	123
TOTAL WA	5,549	3,173	518	9,240	551	1,114	1,705	3,370
OREGON (Area 1)	126	24	5	155	75	25	41	141
TOTAL NOF	5,675	3,197	523	9,395	626	1,139	1,746	3,511

Table 10. Chinook and coho sampled in WA during the 2021 all-species non-Tribal 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	184	58%	16	55	82%	9
Area 3	1,376	53%	64	155	37%	15
Area 2	2,313	37%	267	993	36%	126
Area 1	21	47%	4	47	38%	5
TOTAL WA	3,894	42%	351	1,250	37%	155

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