THE OREGON PLAN for Salmon and Watersheds

Western Oregon Adult Coho Salmon,
2019 Spawning Survey Data Report

Report Number: OPSW-ODFW-2020-3

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May 2020

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Funds contributed in part by:

Sport Fish and Wildlife Restoration Program administered by the U.S. Fish and Wildlife Service; Pacific Salmon Treaty and Pacific Coast Salmon Recovery Fund administered by the National Marine Fisheries Service; and State of Oregon (General and Lottery Funds).

Citation: Sounhein, B., M. Lewis and M. Weeber. 2020. Western Oregon adult Coho Salmon, 2019 spawning survey data report. Monitoring Program Report Number OPSW-ODFW-2020-3, Oregon Department of Fish and Wildlife, Salem, Oregon.

SUMMARY

This report provides a summary of results from Coho Salmon spawning ground surveys conducted in Lower Columbia (Oregon side only) and Oregon Coast basins during the 2019 spawning season. For a discussion of the history, goals and methods of this long-term monitoring effort see prior reports (e.g. Sounhein et al. 2017). Results in this report are based on data from randomly selected spawning ground surveys as well as alternative methods in areas without random sampling. Results for Coho Salmon standard spawning ground surveys and spawning surveys for other species are covered in data summaries and reports posted on an Oregon Department of Fish and Wildlife (ODFW) web page (see: http://odfw.forestry.oregonstate.edu/spawn/index.htm).

Wild adult Coho spawner abundance in 2019 was lower than average, at 87% of the 17-year average in the Lower Columbia River (LCR) Evolutionary Significant Unit (ESU), 76% of the 29-year average in the Oregon Coast (OC) Coho ESU, and 34% of the 25-year average in the Southern Oregon/Northern California Coast (SONCC) Coho ESU. In the Oregon portion of the LCR Coho ESU sufficient surveys were conducted to meet the precision goal for the ESU, but not for any of the strata or populations. In the OC Coho ESU sufficient surveys were conducted to meet the precision goal for the ESU, 2 of 4 strata, and 2 of 21 populations. Coho spawning surveys were not conducted in the Southern Oregon/Northern California Coast (SONCC) Coho ESU. Monitoring of wild Coho Salmon spawners in the SONCC Coho ESU is based on the Huntley Park seining estimate and those results are provided below.

INTRODUCTION AND METHODS

Monitoring of Western Oregon adult Coho Salmon occurs at three hierarchical spatial scales: Evolutionary Significant Unit; stratum; and population. There are three Coho Salmon ESUs located entirely or partially within the State of Oregon: the Lower Columbia River Coho ESU; the Oregon Coast Coho ESU; and the Southern Oregon/Northern California Coast Coho ESU. Boundaries and population structures of the Oregon Coho Salmon ESUs are presented in Figure 1. This report summarizes results for Coho Salmon populations in the portion of each ESU within Oregon.

A brief history of sampling designs is available in prior years ODFW status reports (e.g. Sounhein et al. 2017). Field methods for establishing and conducting salmon spawning ground surveys are described in ODFW procedures manuals (ODFW 2019a, ODFW 2019b). The trapezoidal Area-Under-the-Curve (AUC) technique is used to estimate the number of adult Coho Salmon spawning in each stream segment throughout the spawning season (Jacobs et al. 2002). Prior years status reports provide a more detailed description of how spawner estimates are derived (Jacobs et al 2002, Lewis et al. 2009), the criteria used for determining if sites are included in the estimate (Lewis et al. 2009, Sounhein et al 2015), methods for determining the proportion of hatchery origin spawners (pHOS) in naturally spawning populations (Lewis et al. 2009, Lewis et al. 2011), and the analysis methods for other metrics included in this report (Lewis et al. 2009, Lewis et al 2012).

In areas where surveys are not conducted, other sources of monitoring data are used to document the number of adult Coho Salmon spawners. These include dam counts, mark-recapture estimates, and regressions of standard survey data to abundance estimates. Typically, there are five such locations in the LCR Coho ESU including: one dam (River Mill on the Clackamas River), three hatchery weirs (Big Creek, Klaskanine, and Sandy hatcheries), and one OPSW life-cycle monitoring site (Bonnie Falls Trap). In these locations, counts of adult Coho Salmon passed up-stream are added to the estimated abundance of Coho Salmon spawners below the facilities. However, in 2019 operations at the Bonnie Falls trap were discontinued due to budget cuts. The decision to cease operations at Bonnie Falls came too late to allow for inclusion of the area above the falls in the 2019 spawning survey effort. A regression of annual counts at Bonnie Falls and corresponding spawning survey estimates of adult coho for the rest of the Scappoose population was used to estimate the 2019 Bonnie Falls count.

In the OC Coho ESU, random spawning ground surveys are conducted in most areas, except for the North Umpqua River above Winchester Dam and above the Alsea Hatchery weir. Winchester Dam counts and results of surveys below the dam, are used to document the number of adult Coho Salmon spawners in the North Umpqua population. The Winchester Dam count is adjusted for Coho Salmon collected and retained at Rock Creek Hatchery, and for angler harvest of Coho Salmon in the North Umpqua River above Winchester Dam. The count of Coho Salmon passed above the Alsea Hatchery weir is added to the spawning survey estimate for the Alsea population. Coho Salmon spawner abundances for the Lakes stratum are calculated using regressions of long-term standard surveys to historic mark-recapture studies and habitat measurements for those locations (Jacobs et.al. 2002).

Long-term monitoring of Coho Salmon spawners in the SONCC Coho ESU currently relies on a mark-recapture effort, based on adipose fin-clipped Coho Salmon. Details of this method are described in Jacobs et.al. (2002); the method provides an estimate of adult Coho Salmon escapement to the Rogue basin above Huntley Park (river mile 8). These estimates are adjusted for Coho Salmon collected and retained at Cole Rivers Hatchery, as well as angler harvest in the Rogue basin above Huntley Park.

In addition to the surveys used in the abundance estimates, “calibration” surveys are conducted in the Mill Creek, Yaquina and Mill Creek, Siletz sub-basins to test the accuracy of survey-based AUC estimates. The purpose of these survey is to compare known passage or mark-recapture estimates, with survey-based AUC estimates using a Generalized Random Tessellation Stratified (GRTS) survey site selection methodology.

RESULTS

Results include data from random spawning ground surveys and data from other sources where random surveys are not conducted. Results are presented in Bullets, Tables and Figures. Results are summarized by Coho Salmon ESU, in four categories: Survey Effort, Spawner Abundance, Distribution and Timing, and Hatchery Proportion. Spatially, results are reported by ESU, stratum, and constituent Coho Salmon populations. The individual components that

comprise the results can be found in Appendices A, B, and C (by Coho Salmon ESU). Ancillary data is presented in Appendix D.

Stream flow levels were generally very low (less than 50% of average) during the middle of the 2019 season, with essentially no significant flow events between late October and late December. Flow patterns and levels were more typical in the early (September through mid-October) and late (January on) parts of the season. Temperatures were generally slightly below normal into November, then transitioning to slightly above normal through January. Precipitation was also generally low for most of the season, particularly in November. This pattern reversed at the end of the season, with monthly precipitation totals for January 2020 at about 170% and 150% of normal in the LCR and OC Coho ESUs respectively. These weather patterns were generally conducive to conducting spawning ground surveys. In 2019, the unsuccessful survey rate was less than the previous 10-year average, plus one standard deviation (2019 = 29.1%, Avg. + 1SD = 24.1%). Thus, the standard inclusion criteria were employed to determine which sites were used in abundance estimates in all areas except the Mid-Coast stratum. Application of the first step (75% critical period criterion) provided adequate surveys for estimates in the Mid-Coast stratum and its seven populations. Generally low adult coho carcass recoveries in 2019 resulted in small samples sizes for determining pHOS. Thus, standard criteria were used in only 16 of 24 populations in the OC Coho ESU, and 3 of 8 populations or sub-populations in the LC Coho ESU (Appendix Table D-3).

Survey Effort

Lower Columbia River Coho ESU

- Survey effort was similar to recent years (Table 1).
- Percent of sites successfully surveyed was below the prior 5-year average (Table D-1).
- Surveys were not conducted in 2019 in two populations (Youngs Bay and Big Creek).
- Survey conditions were generally amenable to project protocols, and relatively few surveys had to be excluded from the abundance estimates (No AUC rate in Table D-4).

Oregon Coast Coho ESU

- Survey effort was somewhat higher than recent years (Table 4).
- Percent of sites successfully surveyed was higher than the 5-year average (Table D-2).
- All populations were surveyed.
- Survey conditions were generally amenable to project protocols, and relatively few surveys had to be excluded from the abundance estimates (No AUC rate in Table D-4).

Southern Oregon/Northern California Coast Coho ESU

- No random survey effort in 2019.

Spawner Abundance

Lower Columbia River Coho ESU

- Total wild adult coho spawner abundance in 2019 (6,003) was 87% of the previous 17-year average (6,866 wild adults, Table 3 and Figure 2). These abundance estimates (17-year average and 2019) do not include the Youngs Bay and Big Creek populations, which have not been samples since 2012.
- Compared to long-term averages the 2019 spawner abundance estimates by population were more variable, with no clear geographic pattern. One population was slightly above average (Clackamas – 116%), one well below average (Clatskanie – 18%), and the remaining four ranging from 57% to 85% of their prior 17-year average (Table 3).
- The 2019 wild adult Coho spawners abundance estimates set no new record lows or highs for the 17-year period of monitoring (2002 through 2019).

Oregon Coast Coho ESU

- Total wild adult coho spawner abundance in 2019 (95,138) was 76% of the previous 29-year average (125,637 wild adults, Table 6 and Figure 5).
- Wild adult coho spawner abundance in 2019 was below average in 20 of 24 populations (Table 6). Three of the four populations with above average abundance in 2019 were in the North Coast stratum.
- Abundance in the North Coast stratum was slightly above average (109%). Abundance in the Mid-Coast and Lakes strata was furthest from average (56% and 54%, Table 6).

Southern Oregon/Northern California Coast Coho ESU

- Total wild adult coho spawner abundance in 2019 (2,121) was 34% of the previous 25-year average (6,265 wild adults, Table 7 and Figure 9).

Calibration Sites

- In 2019 the AUC estimates averaged 76% of the dam count or mark recapture abundance at the two calibration sites, similar to the 5-year (2014-2018) average of 79% (Table 8).

Distribution and Timing

Lower Columbia River Coho ESU

- Similar to last year, there were no strong peaks in spawn timing in 2019, with relatively flat curves during the normal peak period (Figure 4).
- The proportion of sites occupied by coho in 2019 was below the prior 5-year average in all populations, except the Lower Gorge population (Table 2).
- Total coho and wild coho site occupancy results were very similar (Table 2). Wild occupancy for the ESU in 2019 was 82% of the prior 5-year average (Table 2).

Oregon Coast Coho ESU

- Spawn timing in 2019 was similar to the long term average, but with a slightly later peak (Late December) versus the typical Mid-December peak (Figure 8).
- Total coho and wild coho site occupancy results were very similar (Table 5). Wild coho site occupancy in 2019 was below average in 11 of 20 populations. Occupancy was generally higher in the North Coast and Mid-Coast strata (Table 5).

Southern Oregon/Northern California Coast Coho ESU

- No distribution or timing data is available. There has been no random spawning survey effort for coho in this ESU since the 2008 spawning season.

Hatchery Proportion

Lower Columbia River Coho ESU

- Sample sizes for pHOS estimation at the population scale were sufficient in most areas.
- The 2019 proportion of hatchery coho on spawning grounds in the ESU was 5.4%, well below the 17-year average of 24.9% (Table 3). However, the 2019 results do not include two populations, Youngs Bay and Big Creek, which typically contribute a large portion of hatchery spawners to the ESU total.
- The Scappoose and Sandy populations both had the lowest pHOS in 2019 (0%), while the highest occurred in the Clatskanie (40.2%), see Table 3.

Oregon Coast Coho ESU

- Sample sizes for pHOS estimation at the population scale were sufficient in most areas.
- The 2019 proportion of hatchery coho on spawning grounds in the ESU was 0.9%, well below the 29-year average of 9.8% (Table 6).
- At the population and strata scale, pHOS was below the 29-year average in all cases, except for Siltcoos Lake and the Lakes Stratum. Only two populations had a pHOS higher than 5% in 2019, the North and South Umpqua (Table 6).
- In the OC ESU, pHOS has generally been decreasing over time, and has consistently been below 5% since 2008 (Figure 5).

Southern Oregon/Northern California Coast Coho ESU

- The 2019 proportion of hatchery fish on spawning grounds in the ESU was 5.0%, similar to the 25-year average of 5.2% (Table 7).

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Table 1. Lower Columbia River Coho ESU, GRTS spawning survey goals and results for number of surveys and 95% C.I., 2019 run year. Target response sites are reaches within Coho Salmon spawning habitat which were successfully surveyed.

Stratum	Population	Goal	Target response				95% CI as percent of point estimate (goal is +/- 30%)			
				2014 to 2018				2014 to 2018		
			2019	Avg.	Min.	Max.	2019	Avg.	Min.	Max.
Coast	Youngs Bay	0	0	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
	Big Creek	0	0	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
	Clatskanie	18	22	20	12	23	45%	41%	21%	74%
	Scappoose	20	14	15	13	18	50%	65%	46%	103%
	Total	**38**	**36**	**35**	**27**	**40**	**32%**	**41%**	**24%**	**72%**
Cascade	Clackamas	30	23	26	18	30	72%	73%	33%	110%
	Sandy	30	34	29	21	35	37%	48%	40%	54%
	Total	**60**	**57**	**55**	**49**	**61**	**31%**	**38%**	**33%**	**42%**
Gorge	Lower Gorge	2	2	3	0	6	119%	69%	9%	99%
	Hood	2	5	2	0	3	83%	64%	0%	191%
	Total	**4**	**7**	**4**	**0**	**8**	**70%**	**53%**	**1%**	**88%**
ESU Total		**102**	**100**	**94**	**85**	**101**	**23%**	**28%**	**23%**	**34%**

n.a. = Not available (no surveys were selected in the population, less than 2 surveys stayed in rotation, or the abundance estimate was 0).

Table 2. Lower Columbia River Coho ESU adult Coho Salmon occupancy (total & wild) by population, stratum, and ESU for the 2019 run year and previous 5-year average (2014–18). Occupancy = a peak of 4 or more adult Coho Salmon per mile. Wild Occupied = occupied sites with at least one wild Coho Salmon. N.A = Not available, population was not monitored.

ESU, Stratum, and TRT Population	2019 No. sites surveyed	5 yr. avg. No. sites surveyed	Total Coho Salmon		Wild Coho Salmon	
			2019 % Occupied	5 yr. avg. % Occupied	2019 % Occupied	5 yr. avg. % Occupied
Lower Columbia R. ESU	**100**	**98**	**33%**	**42%**	**33%**	**40%**
Coast Stratum	**36**	**36**	**28%**	**47%**	**28%**	**45%**
Youngs Bay	0	0	n.a	n.a	n.a	n.a
Big Creek	0	0	n.a	n.a	n.a	n.a
Clatskanie River	22	20	23%	53%	23%	50%
Scappoose Creek	14	15	36%	42%	36%	40%
Cascade Stratum	**57**	**58**	**32%**	**36%**	**32%**	**35%**
Clackamas River	23	29	22%	28%	22%	28%
Sandy River	34	29	38%	42%	38%	40%
Gorge Stratum	**7**	**4**	**71%**	**78%**	**71%**	**70%**
Lower Gorge tribs.	2	3	100%	79%	100%	63%
Hood River	5	2	60%	83%	60%	83%

Table 3. Lower Columbia River Coho ESU estimated abundance of adult Coho Salmon spawning naturally by ESU, stratum, and population in the 2019 run year compared to the previous 17 years.

Geographic scale ESU/Stratum/Population		Spawning year			
			2002 to 2018		
		2019	Avg.	Min.	Max.
Lower Columbia River ESU (Oregon Only)	**Wild**	**6,003 ***	**6,866 ***	**2,988 ***	**21,849 ***
	Hatchery	**345 ***	**2,224 ***	**285 ***	**11,836 ***
	% Hat.	**5.4% ***	**21.8% ***	**6.5% ***	**65.9% ***
Coast Stratum *	**Wild**	**n.a.**	**1,836**	**1,140**	**3,993**
	Hatchery	**n.a.**	**838**	**89**	**3,420**
	% Hat.	**n.a.**	**27.8%**	**4.9%**	**74.4%**
Youngs Bay *	Wild	n.a.	119	21	411
	Hatchery	n.a.	510	14	2,506
	% Hat.	n.a.	67.7%	21.9%	92.1%
Big Creek *	Wild	n.a.	300	98	792
	Hatchery	n.a.	317	66	936
	% Hat.	n.a.	46.0%	15.5%	89.8%
Clatskanie	Wild	146	833	25	3,246
	Hatchery	98	43	0	151
	% Hat.	40.2%	9.7%	0.0%	67.9%
Scappoose	Wild	384	670	178	1,960
	Hatchery	0	11	0	67
	% Hat.	0.0%	1.7%	0.0%	9.9%
Cascade Stratum	**Wild**	**5,096**	**4,923**	**2,157**	**16,612**
	Hatchery	**196**	**1,632**	**139**	**10,871**
	% Hat.	**3.7%**	**20.7%**	**3.5%**	**71.2%**
Clackamas	Wild	4,044	3,473	1,301	10,670
	Hatchery	196	1,531	50	10,871
	% Hat.	4.6%	23.9%	1.5%	75.8%
Sandy	Wild	1,052	1,450	382	5,942
	Hatchery	0	107	0	515
	% Hat.	0.0%	8.7%	0.0%	57.4%
Gorge Stratum	**Wild**	**377**	**467**	**34**	**1,525**
	Hatchery	**51**	**653**	**25**	**2,555**
	% Hat.	**11.9%**	**49.1%**	**23.1%**	**72.9%**
Lower Gorge Tribs.	Wild	184	274	16	920
	Hatchery	8	261	9	1,512
	% Hat.	4.2%	40.7%	6.2%	85.2%
Hood River	Wild	193	228	4	1,262
	Hatchery	43	393	0	1,298
	% Hat.	18.2%	54.0%	0.0%	85.3%

** = Does not include data for the Youngs Bay and Big Creek Populations. These populations were not sampled, 2013 through 2019 run years.*

Table 4. Oregon Coast Coho ESU, GRTS spawning survey goals, responses, and estimate precision by population, 2019 run year. Target response sites are reaches within Coho Salmon spawning habitat which were successfully surveyed.

Stratum	Population	Goal	Target response				95% CI as percent of point estimate (goal is +/- 30%)			
				2014 to 2018				2014 to 2018		
			2019	Avg.	Min.	Max.	2019	Avg.	Min.	Max.
North Coast	Necanicum	13	16	16	11	18	22%	38%	24%	50%
	Nehalem	20	24	18	13	23	43%	43%	37%	49%
	Tillamook	20	23	20	14	25	54%	50%	36%	56%
	Nestucca	20	21	15	9	23	53%	51%	42%	73%
	NC Depend.	7	7	7	6	9	86%	93%	79%	104%
	Total	**80**	**91**	**76**	**59**	**92**	**28%**	**26%**	**22%**	**31%**
Mid-Coast	Salmon	9	12	11	7	17	82%	59%	23%	92%
	Siletz	20	22	19	12	26	48%	42%	35%	47%
	Yaquina	20	17	18	10	22	35%	45%	36%	55%
	Beaver	3	3	4	3	5	130%	51%	24%	64%
	Alsea	20	20	18	11	24	38%	28%	26%	33%
	Siuslaw	20	22	17	12	23	42%	37%	28%	52%
	MC Depend.	8	8	8	6	11	85%	74%	43%	103%
	Total	**100**	**104**	**95**	**78**	**114**	**20%**	**18%**	**16%**	**22%**
Lakes	Siltcoos	0	0	0	0	0	n.a.	n.a.	n.a.	n.a.
	Tahkenitch	0	0	0	0	0	n.a.	n.a.	n.a.	n.a.
	Tenmile	0	0	0	0	0	n.a.	n.a.	n.a.	n.a.
	Total	**0**	**0**	**0**	**0**	**0**	**n.a.**	**n.a.**	**n.a.**	**n.a.**
Umpqua	L. Umpqua	20	17	17	15	20	50%	48%	24%	78%
	M. Umpqua	20	14	13	6	15	60%	68%	50%	80%
	N. Umpqua	3	1	1	0	3	n.a.	n.a.	n.a.	n.a.
	S. Umpqua	20	16	16	9	20	85%	64%	37%	92%
	Total	**63**	**48**	**48**	**30**	**55**	**37%**	**39%**	**22%**	**62%**
Mid-South Coast	Coos	20	20	20	18	22	56%	49%	29%	69%
	Coquille	20	22	19	15	24	42%	47%	33%	57%
	Floras	17	21	9	1	22	21%	56%	43%	72%
	Sixes	8	15	6	3	12	41%	70%	40%	101%
	MS Depend	3	1	3	0	6	n.a.	179%	163%	195%
	Total	**68**	**79**	**57**	**41**	**72**	**34%**	**31%**	**26%**	**37%**
ESU Total		**311**	**322**	**276**	**229**	**318**	**16%**	**15%**	**13%**	**18%**

n.a. = Not available (no surveys were selected in the population, less than 2 surveys stayed in rotation, or the abundance estimate was 0).

Table 5. Oregon Coast Coho ESU adult Coho Salmon occupancy (total & wild) by population, stratum, and ESU for the 2019 run year and previous 5-year average (2014–18). Occupancy = a peak of 4 or more adult Coho Salmon per mile. Wild Occupied = occupied sites with at least one wild Coho Salmon.

ESU, Stratum, and TRT Population	2019 No. sites surveyed	5 yr. avg. No. sites surveyed	Total Coho Salmon		Wild Coho Salmon	
			2019 % Occupied	5 yr. avg. % Occupied	2019 % Occupied	5 yr. avg. % Occupied
Oregon Coast ESU	**322**	**276**	**61.5%**	**66.2%**	**61.2%**	**64.2%**
North Coast Stratum	**91**	**76**	**69.2%**	**65.5%**	**68.1%**	**62.9%**
Necanicum River	16	16	81.3%	74.4%	75.0%	71.0%
Nehalem River	24	18	58.3%	67.5%	58.3%	67.5%
Tillamook Bay	23	20	60.9%	62.3%	60.9%	59.1%
Nestucca River	21	15	90.5%	68.4%	90.5%	64.2%
NC Dependents	7	7	42.9%	49.1%	42.9%	45.7%
Mid-Coast Stratum	**104**	**95**	**60.6%**	**76.7%**	**60.6%**	**75.3%**
Salmon River	12	11	33.3%	55.0%	33.3%	52.7%
Siletz River	22	19	81.8%	84.8%	81.8%	84.8%
Yaquina River	17	18	88.2%	81.8%	88.2%	80.7%
Beaver Creek	3	4	66.7%	100.0%	66.7%	93.3%
Alsea River	20	18	65.0%	89.4%	65.0%	89.4%
Siuslaw River	22	17	45.5%	73.4%	45.5%	71.1%
MC Dependents	8	8	12.5%	36.5%	12.5%	31.1%
Lakes Stratum	**0**	**0**	**n.a.**	**n.a.**	**n.a.**	**n.a.**
Siltcoos Lake	0	0	n.a.	n.a.	n.a.	n.a.
Tahkenitch Lake	0	0	n.a.	n.a.	n.a.	n.a.
Tenmile Lake	0	0	n.a.	n.a.	n.a.	n.a.
Umpqua Stratum	**48**	**48**	**45.8%**	**52.6%**	**45.8%**	**50.9%**
Lower Umpqua River	17	17	70.6%	70.4%	70.6%	68.3%
Mid. Umpqua River	14	13	42.9%	41.9%	42.9%	41.9%
North Umpqua River	1	1	n.a.	n.a.	n.a.	n.a.
South Umpqua River	16	16	25.0%	41.8%	25.0%	38.5%
Mid-South Stratum	**79**	**57**	**63.3%**	**60.4%**	**63.3%**	**58.0%**
Coos River	20	20	85.0%	69.1%	85.0%	67.0%
Coquille River	22	19	77.3%	65.5%	77.3%	64.5%
Floras Creek	21	9	52.4%	73.2%	52.4%	68.1%
Sixes River	15	6	33.3%	37.5%	33.3%	27.5%
MSC Dependents	1	3	0.0%	8.3%	0.0%	8.3%

Table 6. Oregon Coast Coho ESU estimated abundance of adult Coho Salmon spawning naturally by ESU, stratum, and population for the 2019 run year compared to the previous 29 years.

Geographic scale ESU/Stratum/Population	Coho salmon origin	Spawning year			
			1990 to 2018		
		2019	Avg.	Min.	Max.
Oregon Coast Coho ESU	**Wild**	**95,138**	**125,637**	**21,139**	**359,692**
	Hatchery	**848**	**8,525**	**386**	**26,128**
	% Hat.	**0.9%**	**9.8%**	**0.6%**	**31.4%**
North Coast Stratum	**Wild**	**22,260**	**20,511**	**1,524**	**67,370**
	Hatchery	**0**	**1,920**	**0**	**15,563**
	% Hat.	**0.0%**	**17.4%**	**0.0%**	**79.0%**
Necanicum River	Wild	698	1,352	97	5,727
	Hatchery	0	112	0	501
	% Hat.	0.0%	14.9%	0.0%	40.1%
Nehalem River	Wild	12,383	10,663	527	32,517
	Hatchery	0	1,461	0	14,014
	% Hat.	0.0%	19.3%	0.0%	87.7%
Tillamook Bay	Wild	3,961	5,106	80	20,090
	Hatchery	0	290	0	1,498
	% Hat.	0.0%	15.7%	0.0%	68.9%
Nestucca River	Wild	4,602	2,781	160	16,698
	Hatchery	0	49	0	274
	% Hat.	0.0%	5.4%	0.0%	15.3%
North Coast Dependents	Wild	616	608	0	4,607
	Hatchery	0	16	0	111
	% Hat.	0.0%	0.9%	0.0%	6.3%
Mid-Coast Stratum	**Wild**	**20,075**	**35,739**	**2,444**	**121,963**
	Hatchery	**4**	**1,894**	**0**	**9,633**
	% Hat.	**0.0%**	**12.5%**	**0.0%**	**50.1%**
Salmon River	Wild	215	594	5	3,680
	Hatchery	0	576	0	2,621
	% Hat.	0.0%	54.8%	0.0%	97.6%
Siletz River	Wild	4,509	6,273	207	33,094
	Hatchery	0	244	0	962
	% Hat.	0.0%	15.1%	0.0%	58.4%
Yaquina River	Wild	3,452	6,062	317	25,582
	Hatchery	0	164	0	1,526
	% Hat.	0.0%	6.7%	0.0%	25.0%
Beaver Creek	Wild	814	1,773	90	6,564
	Hatchery	0	46	0	405
	% Hat.	0.0%	3.4%	0.0%	23.8%
Alsea River	Wild	4,915	6,723	108	28,337
	Hatchery	0	301	0	2,214
	% Hat.	0.0%	14.6%	0.0%	93.8%
Siuslaw River	Wild	5,881	12,804	501	55,445
	Hatchery	0	549	0	4,136
	% Hat.	0.0%	9.6%	0.0%	37.6%
Mid Coast Dependents	Wild	289	1,510	51	8,179
	Hatchery	4	27	0	118
	% Hat.	1.4%	1.5%	0.0%	5.9%

Table 6. Continued

Geographic scale ESU/Stratum/Population	Coho salmon origin	Spawning year			
			1990 to 2018		
		2019	Avg.	Min.	Max.
Lakes Stratum	**Wild**	**7,433**	**13,730**	**1,302**	**38,744**
	Hatchery	**44**	**49**	**0**	**251**
	% Hat.	**0.6%**	**0.5%**	**0.0%**	**2.2%**
Siltcoos Lake	Wild	1,065	3,855	385	7,998
	Hatchery	44	22	0	124
	% Hat.	4.0%	0.8%	0.0%	8.7%
Tahkenitch Lake	Wild	1,405	2,741	269	10,681
	Hatchery	0	12	0	107
	% Hat.	0.0%	0.5%	0.0%	3.1%
Tenmile Lake	Wild	4,963	7,134	318	20,385
	Hatchery	0	14	0	123
	% Hat.	0.0%	0.2%	0.0%	3.4%
Umpqua Stratum	**Wild**	**19,158**	**26,837**	**3,334**	**94,655**
	Hatchery	**607**	**4,237**	**257**	**17,758**
	% Hat.	**3.1%**	**17.0%**	**1.1%**	**36.0%**
Lower Umpqua River	Wild	9,152	9,764	1,257	36,942
	Hatchery	0	242	0	1,484
	% Hat.	0.0%	3.0%	0.0%	15.7%
Middle Umpqua River	Wild	3,104	5,902	563	19,962
	Hatchery	0	202	0	1,259
	% Hat.	0.0%	4.1%	0.0%	20.6%
North Umpqua River	Wild	3,302	2,596	355	9,397
	Hatchery	407	2,984	50	14,094
	% Hat.	11.0%	46.4%	1.2%	84.3%
South Umpqua River	Wild	3,600	8,574	435	49,958
	Hatchery	200	809	0	7,040
	% Hat.	5.3%	13.0%	0.0%	57.2%
Mid-South Coast Stratum	**Wild**	**26,212**	**28,821**	**4,890**	**82,077**
	Hatchery	**193**	**426**	**0**	**2,766**
	% Hat.	**0.7%**	**2.1%**	**0.0%**	**23.8%**
Coos River	Wild	13,289	13,299	1,112	38,880
	Hatchery	193	191	0	1,387
	% Hat.	1.4%	2.1%	0.0%	36.4%
Coquille River	Wild	11,841	13,166	2,033	55,667
	Hatchery	0	166	0	1,832
	% Hat.	0.0%	1.7%	0.0%	15.4%
Floras Creek	Wild	904	2,486	340	11,329
	Hatchery	0	61	0	400
	% Hat.	0.0%	3.7%	0.0%	22.8%
Sixes River	Wild	155	179	34	567
	Hatchery	0	16	0	182
	% Hat.	0.0%	7.9%	0.0%	65.7%
Mid-South Coast Dependents	Wild	23	88	0	484
	Hatchery	0	1	0	9
	% Hat.	0.0%	0.9%	0.0%	4.6%

Table 7. Southern Oregon/Northern California Coasts Coho ESU estimated abundance of adult Coho Salmon spawning naturally in the 2019 run year compared to the previous 25 years. Rogue River Populations only. NA = Data not available at time of print.

Data component	Coho salmon origin	Spawning year			
			1994 to 2018		
		2019	Avg.	Min.	Max.
SONCC Coho ESU (Rogue Only)	**Wild**	**2,121**	**6,265**	**394**	**24,231**
	Hatchery	**112**	**367**	**0**	**1,230**
	% Hat.	**5.0%**	**5.2%**	**0.0%**	**19.2%**
Huntley Park Est. [1]	Total	2,351	11,067	572	33,601
	Wild	2,156	6,367	414	24,509
	Hatchery	195	4,669	158	14,013
Freshwater Catch [2] Excluding Rogue Bay	Total	*NA*	298	67	862
	Wild	0	0	0	0
	Hatchery	*NA*	298	67	862
Cole Rivers Hatchery [3]	Total	118	4,144	147	12,298
	Wild	35	103	0	370
	Hatchery	83	4,041	127	11,937

1 = Huntley Park mark-recapture estimate of Coho Salmon freshwater escapement to the Rogue Basin above Huntley Park (~ River Mile 8). This includes returns to Cole Rivers Hatchery, natural spawning grounds, freshwater harvest and mortality between Huntley and upriver areas.

2 = Estimated freshwater harvest of Coho Salmon in the Rouge basin (excluding the Rogue River Bay), based on Angler Harvest Cards (see: https://www.dfw.state.or.us/resources/fishing/sportcatch.asp). Selective harvest of only marked Coho Salmon since 2004.

3 = Number of adult Coho Salmon collected and retained at Cole Rivers Hatchery. These numbers do not include Coho Salmon collected and released alive back into the wild.

Table 8. Comparison of two independent coho abundance estimates at each of two life-cycle monitoring sites in the Oregon Coast Coho ESU. Estimate based on AUC protocol compared to a Mark–Recapture estimate (Mill Cr., Siletz R.) or a Dam Count (Mill Cr., Yaquina R.).

Spawning Year	Mill Creek (Siletz R.)			Mill Creek (Yaquina R.)		
	M-R Est.	AUC Est.	AUC/M-R	Dam Count	AUC Est.	AUC/Dam
2014	1,844	1,642	89%	1,471	1,677	114%
2015	316	196	62%	275	142	52%
2016	451	440	98%	760	607	80%
2017	518	471	91%	405	211	52%
2018	363	276	76%	382	298	78%
2019	674	611	91%	473	291	62%
Mean	**694**	**606**	**84%**	**628**	**538**	**73%**

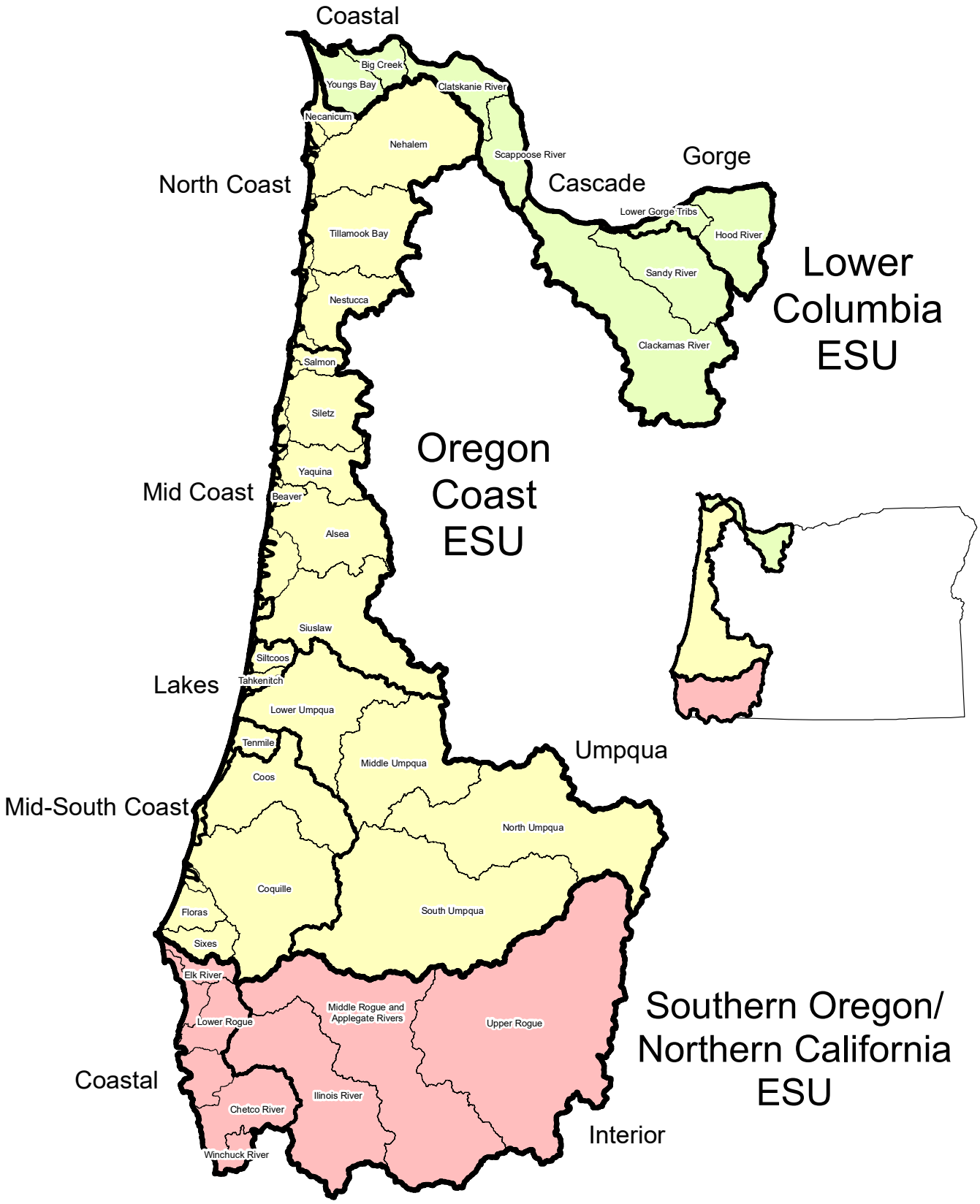
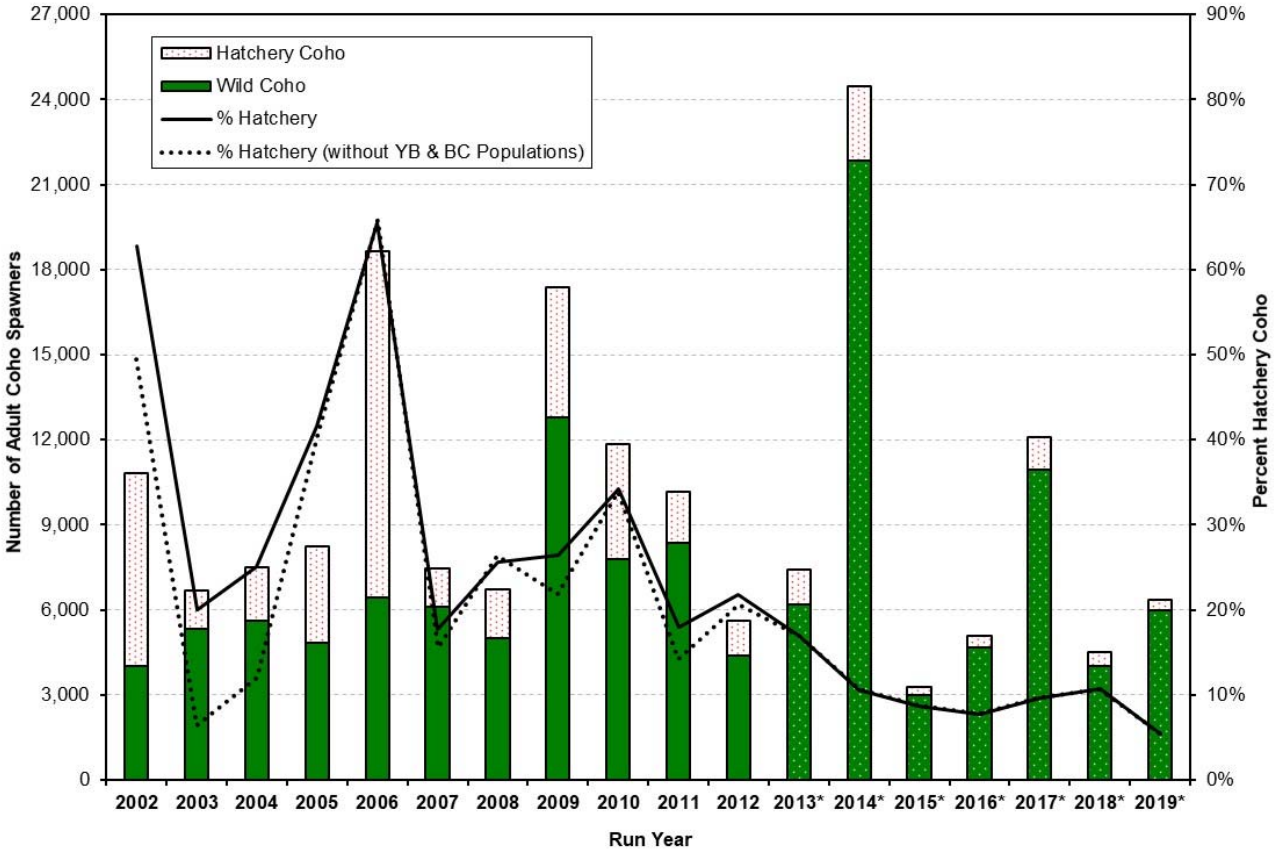


Figure 1. Coho salmon monitoring study area showing the populations, strata, and evoluntionarily significant units.



** Estimates for 2013 to 2019 do not include Big Creek (BC) and, Youngs Bay (YB) populations, and are therefore incomplete. These populations combined account for an average of 12% of the total estimate for the ESU (about 7% of the wild, and 27% of the hatchery components). Note: The Hood River and Lower Gorge populations were not sampled in 2017 due to safety concerns from wild fires.*

Figure 2. Lower Columbia River Coho ESU estimated abundance of adult Coho Salmon spawning naturally by rearing origin for the 2002 through 2019 run years.

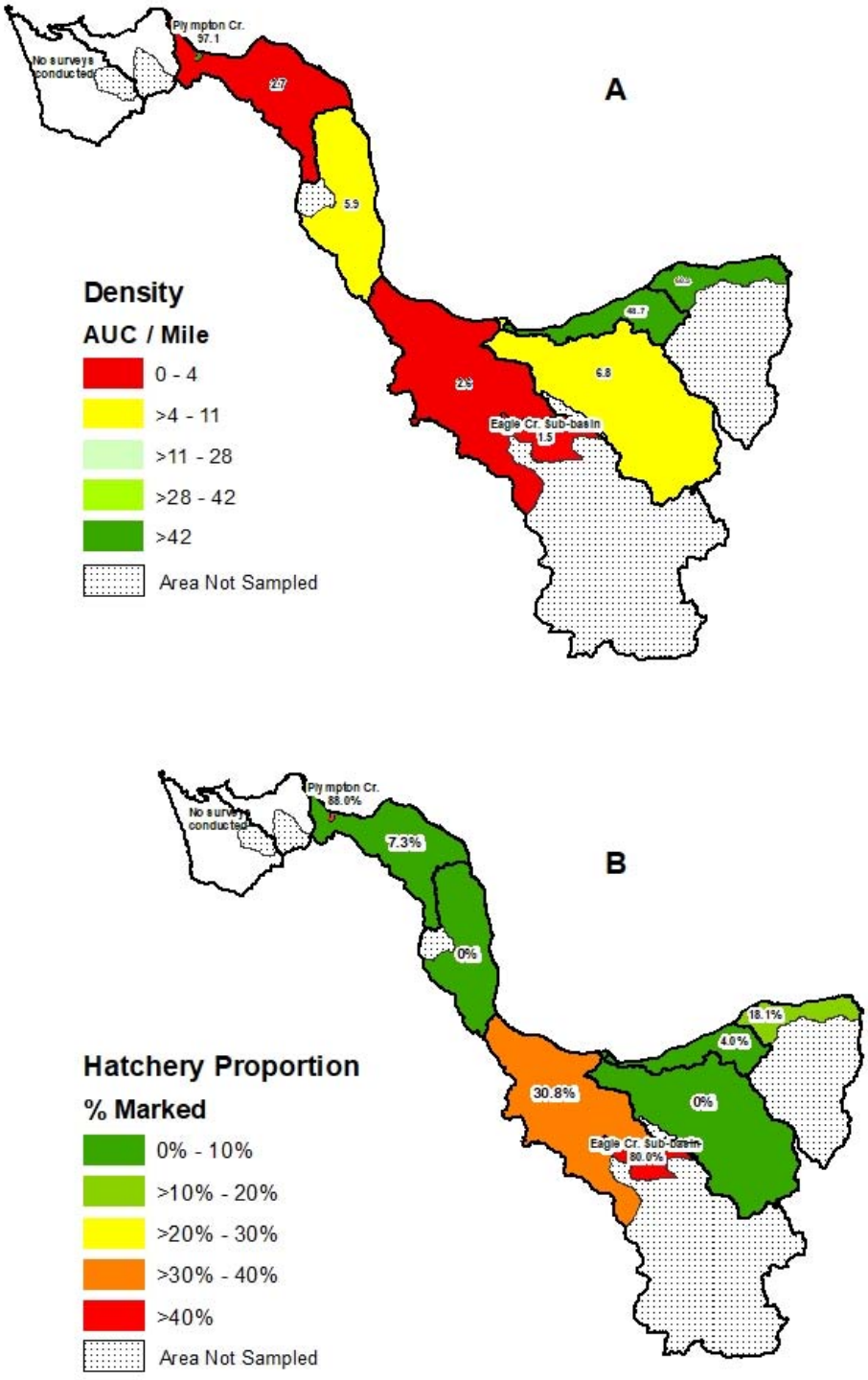


Figure 3. A) Coho salmon density (AUC/mile) in GRTS surveys by lower Columbia River TRT population, 2019. B) Percentage of marked adult coho salmon in GRTS surveys by lower Columbia River TRT population, 2019.

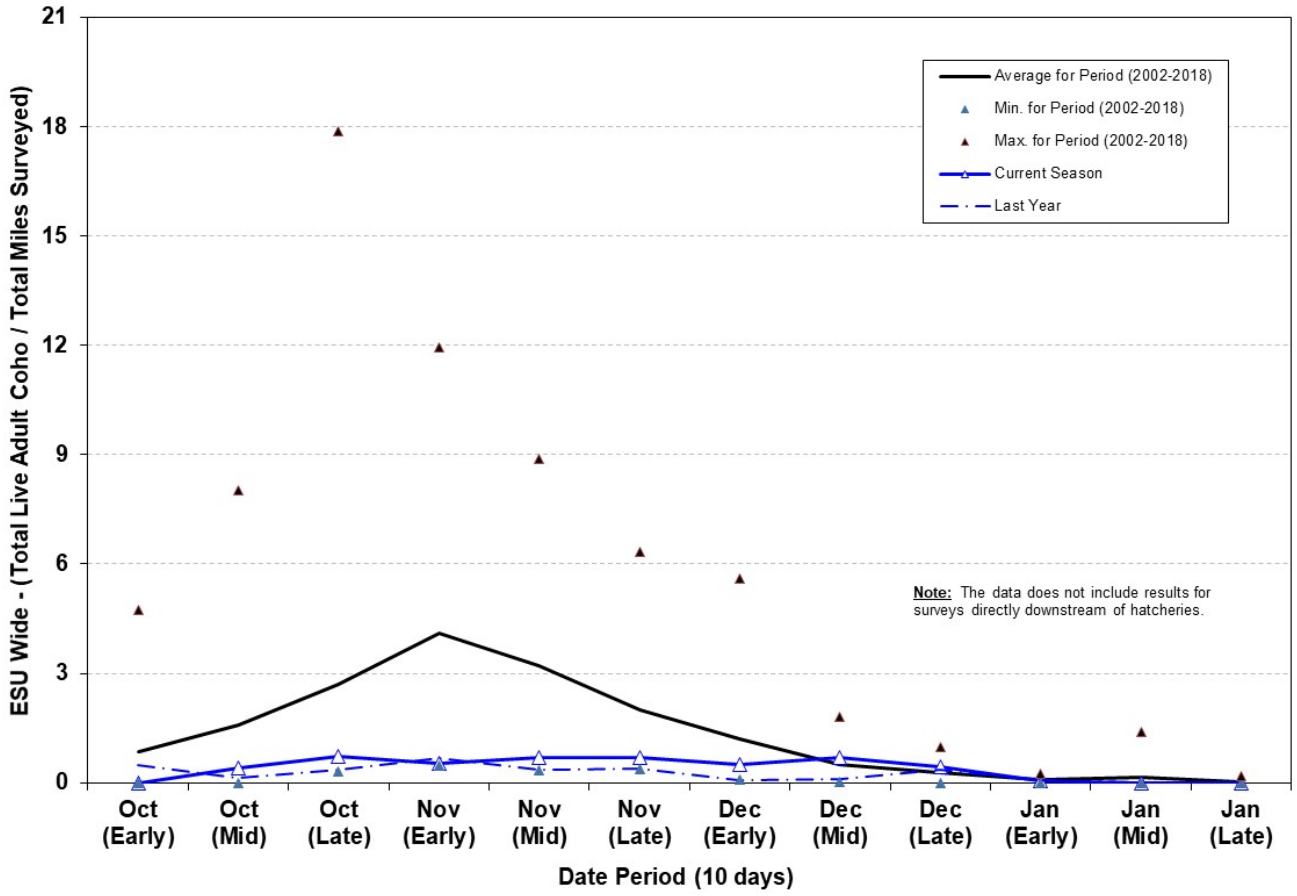


Figure 4. Spawn timing of live adult Coho Salmon in 2019 on GRTS spawning ground surveys in the Lower Columbia River Coho ESU.

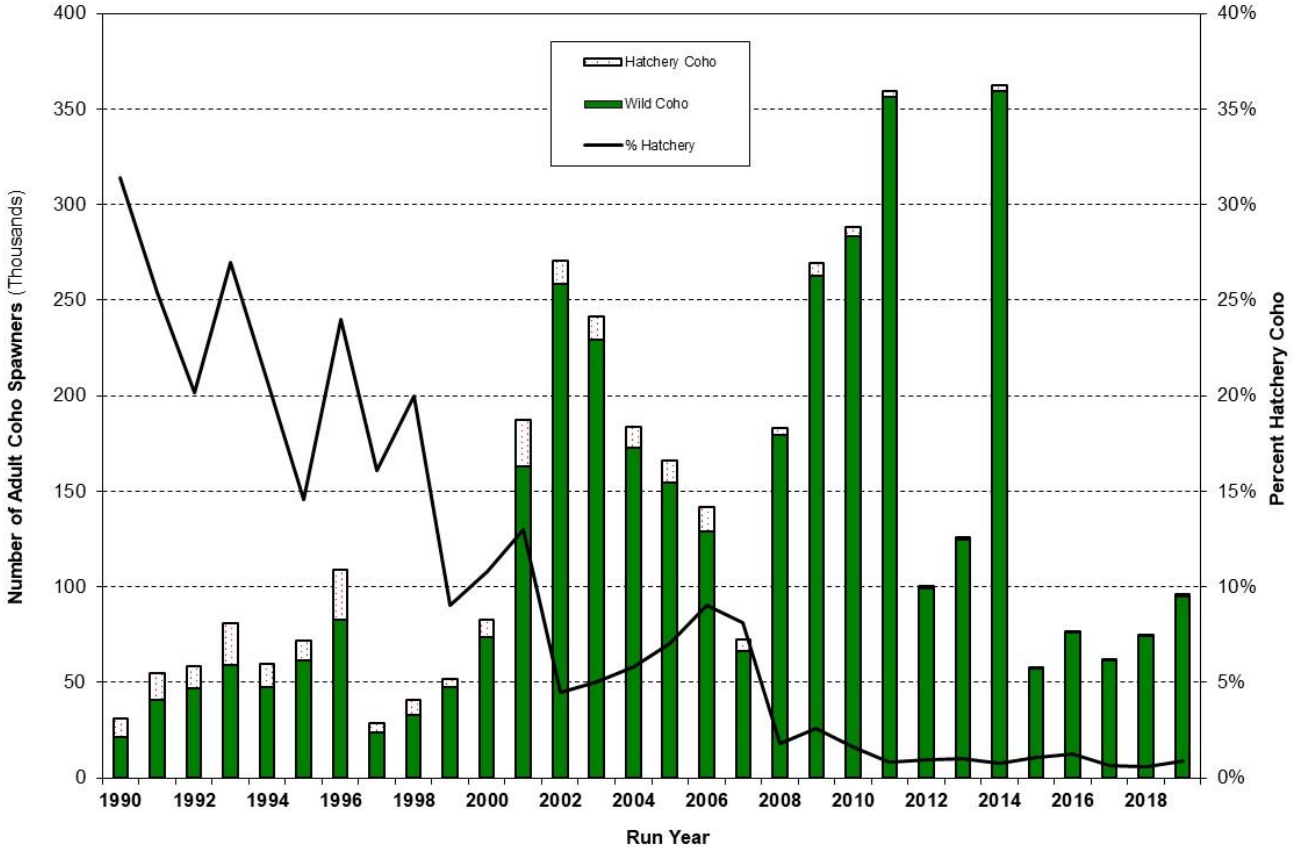


Figure 5. Oregon Coast Coho ESU estimated abundance of adult Coho Salmon spawning naturally by rearing origin for the 1990 through 2019 run years.

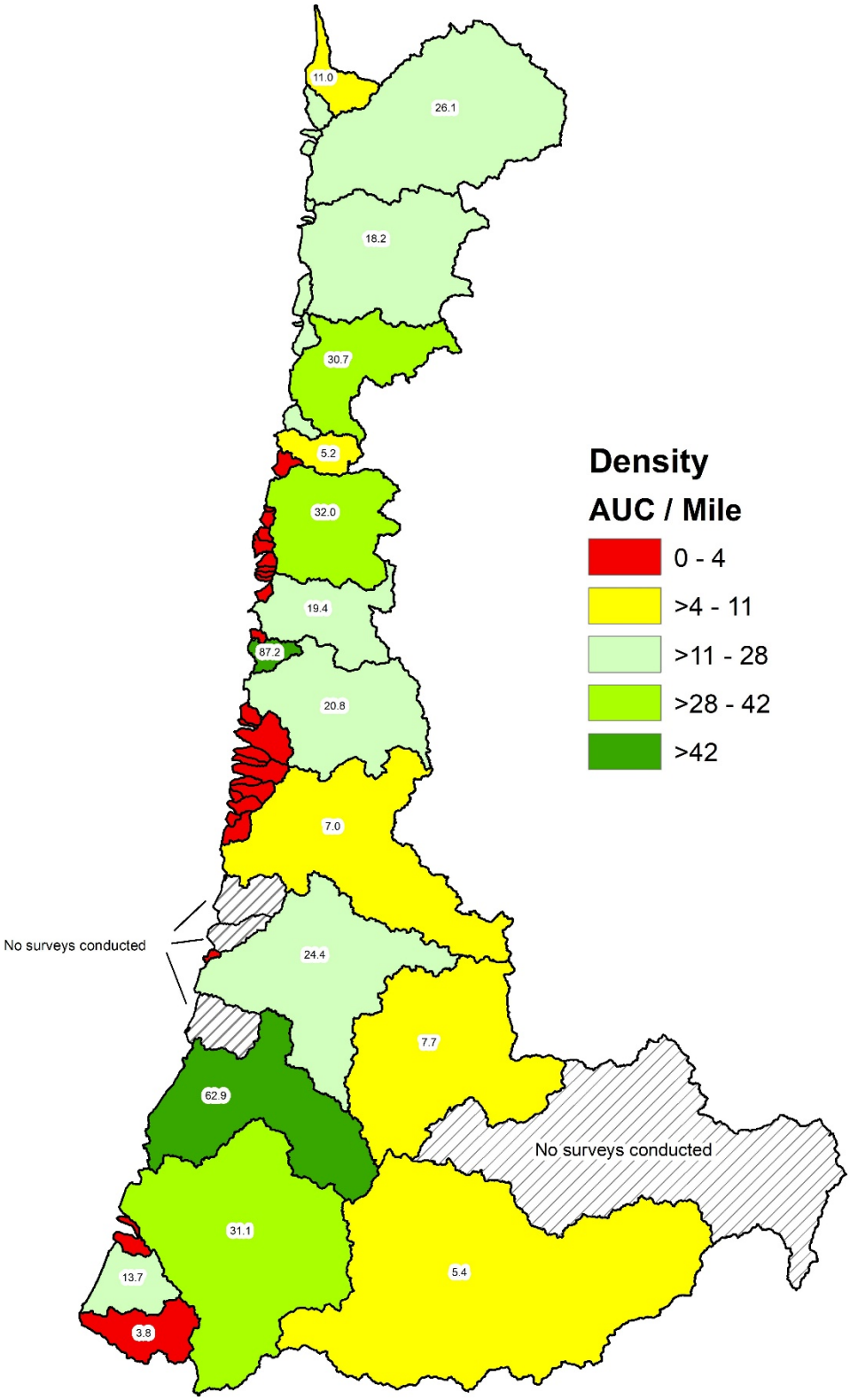


Figure 6. Coho salmon density (AUC/mile) in GRTS surveys by Oregon Coast TRT population, 2019. Functionally independent and potentially independent populations are labeled.

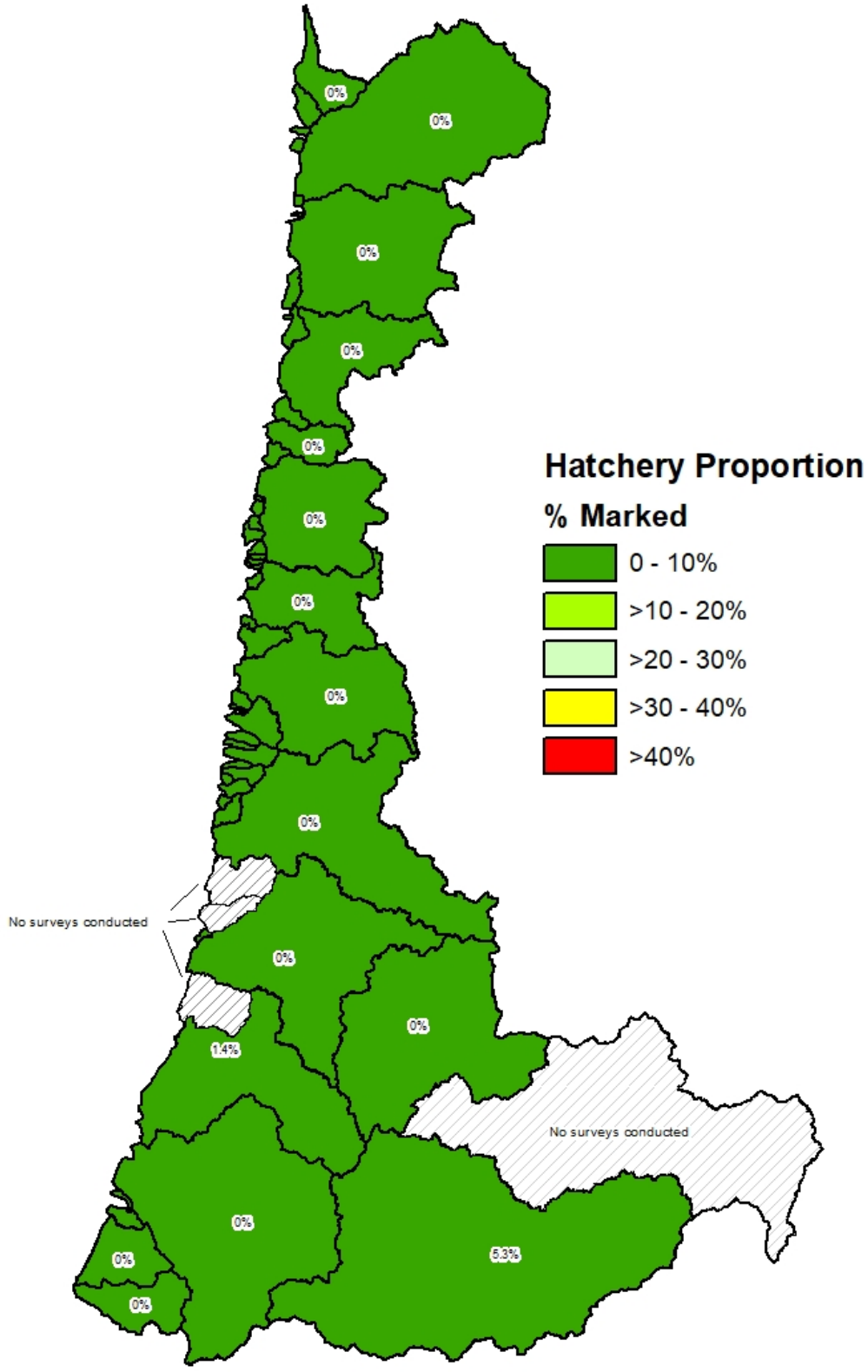


Figure 7. Percentage of marked adult coho salmon in GRTS surveys by Oregon Coast TRT population, 2019. Functionally independent and potentially independent populations are labeled.

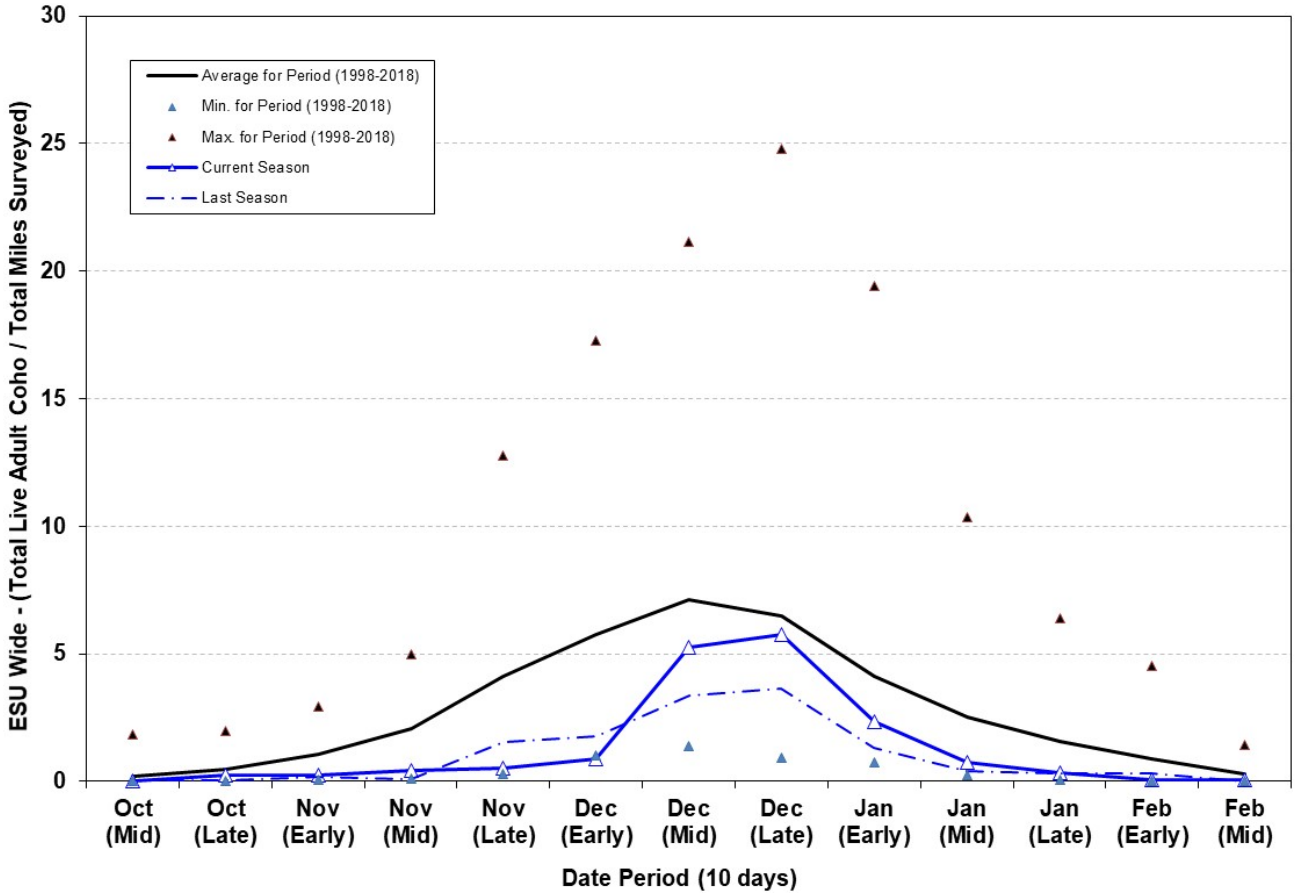


Figure 8. Spawn timing of live adult Coho Salmon in 2019 on GRTS spawning ground surveys in the Oregon Coast Coho ESU.

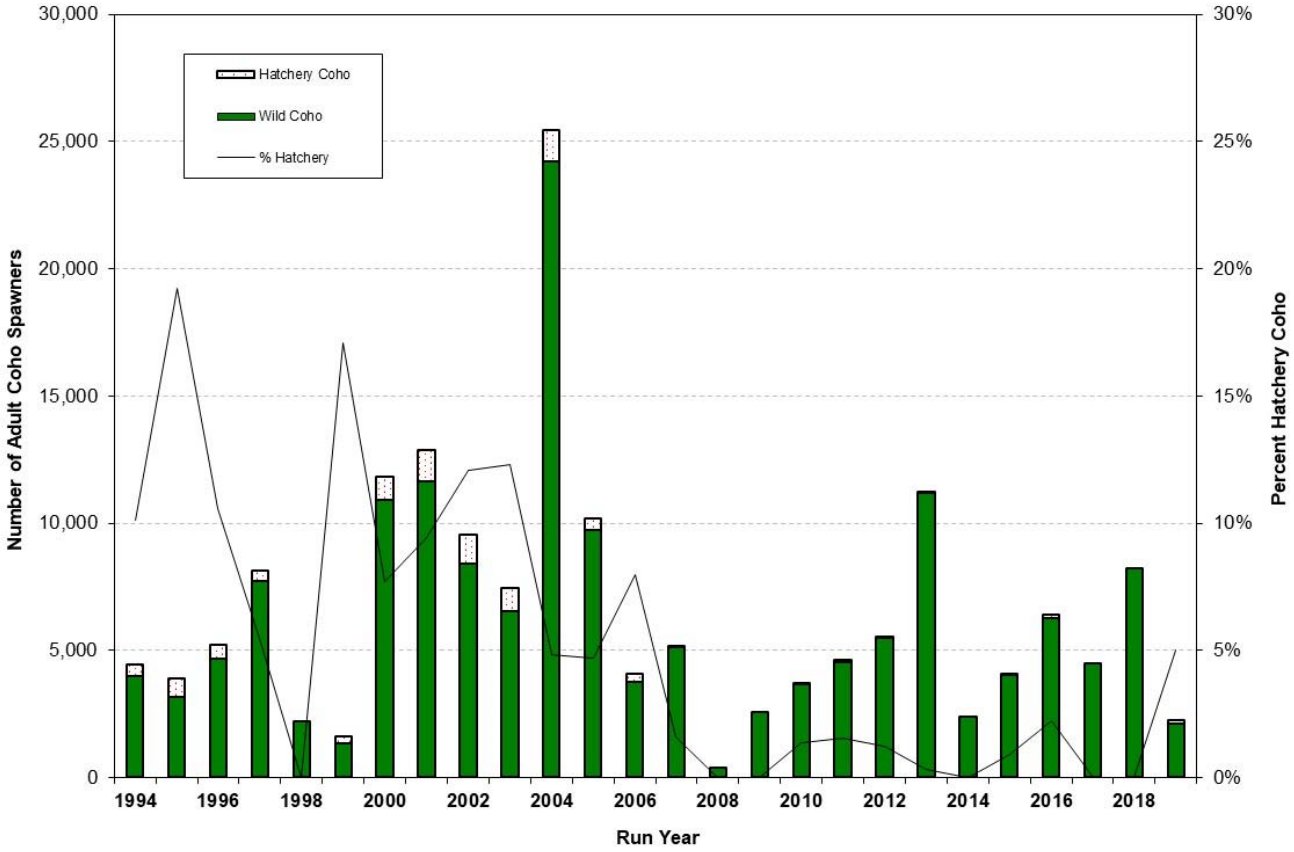


Figure 9. Southern Oregon/Northern California Coasts Coho ESU estimated abundance of adult Coho Salmon spawning naturally by rearing origin for the 1994 through 2019 run years. Abundance based on Huntley seining mark-recapture method.

APPENDIX A (LCR COHO ESU)

Table A-1. Results of randomly selected spawning ground surveys for Coho Salmon in the Oregon portion of the LCR Coho ESU, run year 2019. Estimates derived using GRTS protocol. Estimates of wild spawners derived through application of fin-mark observations. Missing values for populations indicate inadequate samples for determining total and/or wild abundance.

ESU, Stratum, and TRT Population	Survey effort number of		Adult Coho Salmon spawner abundance			
			Total		Wild	
	Surveys	Miles	Estimate	*95% CI*	Estimate	*95% CI*
Lower Columbia River ESU	**100**	**88.3**	**2,182**	***507***	**1,837**	***448***
Coast Stratum	**36**	**31.5**	**595**	***188***	**497**	***187***
Youngs Bay	0					
Big Creek	0					
Clatskanie River (ex. Plympton)	21	20.5	145	*65*	134	*60*
Plympton Cr. (Clatskanie R.)	1	1.0	99	*0*	12	*0*
Scappoose River	14	9.9	351	*177*	351	*177*
Cascade Stratum	**57**	**51.5**	**1,159**	***362***	**963**	***303***
Clackamas River (ex. Eagle Cr.)	15	13.0	363	*238*	252	*164*
Eagle Creek (Clackamas R.)	8	9.7	106	*101*	21	*20*
Sandy River	34	28.9	690	*253*	690	*253*
Gorge Stratum	**7**	**5.3**	**428**	***301***	**377**	***272***
Lower Gorge	2	0.9	192	*229*	184	*220*
Hood River	5	4.4	236	*195*	193	*160*

Table A-2. Number of unmarked adult Coho Salmon passed upstream of counting stations into areas without GRTS spawning surveys. Oregon portion of the LCR Coho ESU, run year 2019.

ESU, Stratum, and TRT Population	Counting station	Spawning year			
			2002 to 2018		
		2019	Avg.	Min.	Max.
Lower Columbia River ESU					
Coast Stratum					
Youngs Bay	Klaskanine Hatchery	17	23	2	68
Big Creek	Big Creek Hatchery	441	225	46	606
Scappoose River	Bonnie Falls Trap	33 [a]	48	2	136
Cascade Stratum					
Clackamas River	N Fk Clackamas Dam	3,771	2,715	835	8,230
Sandy River	Sandy Hatchery [a]	362	168	36	539
	Marmot Dam	n.a.	809	310	1,173
Gorge Stratum					
Hood River	Powerdale Dam	n.a.	52	27	126

a = Regression estimate based on 17 years of concurrent trap counts and GRTS survey abundance estimates.
b = Sandy Hatchery count through 2009 is number released above Marmot Dam, which was removed in 2006. Beginning in 2010, Sandy Hatchery switched the release site for these fish to above the hatchery weir on Cedar Creek.
n.a. = Not Applicable. Marmot dam was removed in 2006 and Powerdale Dam was removed in 2010, so there are no longer any dam counts.

Table A-3. Annual abundance estimates of naturally spawning wild adult Coho Salmon in the Oregon portion of the LCR Coho ESU, run years 2002 through 2019. n.a. = not available.

Return Year	Youngs Bay	Big Creek	Clatskanie*	Scappoose	Clackamas*	Sandy	Lower Gorge	Hood River
2002	411	98	167	500	1,985	382	338	147
2003	113	435	563	336	2,495	1,348	n.a.	41
2004	149	111	398	755	2,733	1,213	n.a.	126
2005	79	219	494	348	1,301	856	263	1,262
2006	74	225	421	719	3,464	923	226	373
2007	25	212	927	375	3,438	687	126	170
2008	82	360	995	294	1,800	1,277	223	69
2009	28	792	1,195	778	8,642	1,493	468	65
2010	68	279	1,686	1,960	4,009	901	920	223
2011	161	160	1,546	297	2,253	3,494	216	232
2012	129	409	619	210	1,663	1,165	96	169
2013	n.a.	n.a.	611	979	4,012	667	151	561
2014	n.a.	n.a.	3,246	1,587	10,672	5,942	362	42
2015	n.a.	n.a.	240	487	1,784	443	30	4
2016	n.a.	n.a.	464	1,200	1,628	939	395	57
2017	n.a.	n.a.	566	387	7,598	2,384	n.a.	n.a.
2018	n.a.	n.a.	25	178	3,159	537	16	107
2019	n.a.	n.a.	146	384	4,044	1,052	184	193

** = Stratified abundance estimation. Plympton Creek estimated separately from the rest of the Clatskanie population and Eagle Creek estimated separately from the rest of the Clackamas population.*

APPENDIX B (OC COHO ESU)

Table B-1. Results of randomly selected spawning ground surveys for Coho Salmon in the OC Coho ESU, run year 2019. Estimates derived using GRTS protocol. Estimates of wild spawners derived through application of fin-mark observations. Missing values for populations indicate inadequate samples for determining total and/or wild abundance.

ESU, Stratum, and TRT Population	Survey effort number of		Adult Coho Salmon spawner abundance			
			Total		Wild	
	Surveys	Miles	Estimate	*95% CI*	Estimate	*95% CI*
Oregon Coast ESU	**322**	**249.1**	**84,711**	***13,182***	**84,026**	***13,077***
North Coast Stratum	**91**	**73.0**	**22,260**	***6,298***	**22,260**	***6,298***
Necanicum River	16	11.9	698	*151*	698	*151*
Nehalem River	24	19.9	12,383	*5,363*	12,383	*5,363*
Tillamook Bay	23	19.5	3,961	*2,158*	3,961	*2,158*
Nestucca River	21	17.7	4,602	*2,437*	4,602	*2,437*
NC Dependents	7	4.1	616	*532*	616	*532*
Mid-Coast Stratum	**104**	**73.3**	**20,015**	***4,090***	**19,722**	***4,082***
Salmon River	12	6.9	215	*176*	215	*176*
Siletz River	22	17.3	4,509	*2,167*	4,509	*2,167*
Yaquina River	17	8.4	3,452	*1,220*	3,452	*1,220*
Beaver Creek	3	1.8	814	*1,057*	814	*1,057*
Alsea River	20	14.8	4,850	*1,828*	4,850	*1,828*
Siuslaw River	22	16.3	5,881	*2,447*	5,881	*2,447*
MC Dependents	8	7.8	293	*250*		
Umpqua Stratum	**48**	**34.2**	**16,055**	***5,893***	**15,855**	***5,802***
Lower Umpqua River	17	12.1	9,152	*4,566*	9,152	*4,566*
Middle Umpqua River	14	10.4	3,104	*1,857*	3,104	*1,857*
North Umpqua River	1	0.7	0			
South Umpqua River	16	10.9	3,800	*3,230*	3,600	*3,060*
Mid-South Coast Stratum	**79**	**68.6**	**26,382**	***9,091***	**26,189**	***9,001***
Coos River	20	18.3	13,482	*7,602*	13,289	*7,493*
Coquille River	22	18.2	11,841	*4,982*	11,841	*4,982*
Floras Creek	21	16.7	904	*189*	904	*189*
Sixes River	15	14.3	155	*63*	155	*63*
MSC Dependents	1	1.2	23			

Table B-2. Comparison of 2019 run year wild adult Coho Salmon spawners in the Oregon Coastal Lakes populations based on GRTS surveys and calibrated standard surveys.

ESU, Stratum, & TRT Population	Survey goal	Survey effort number of		Adult Coho Salmon spawner abundance			
				Total		Wild	
		Surveys	Miles	Estimate	*95% CI*	Estimate	*95% CI*
GRTS Surveys							
Lakes Strata	**--**	--	--	--	--	--	--
Siltcoos	--	--	--	--	--	--	--
Tahkenitch	--	--	--	--	--	--	--
Tenmile	--	--	--	--	--	--	--
Standard Surveys							
Lakes Strata	**14**	**9**	**8.7**	**7,477**		**7,433**	
Siltcoos	5	2	2.5	1,109		1,065	
Tahkenitch	2	2	1.6	1,405		1,405	
Tenmile	7	5	4.6	4,963		4,963	

Table B-3. Estimates of adult Coho Salmon run size in the North Umpqua River derived through adjustment of Winchester Dam count. Dam count adjusted for adult Coho Salmon retained by hatchery operations and harvest above Winchester Dam, 2019 compared to the previous 5 years.

Data component	Coho salmon origin	Spawning year			
			2014 to 2018		
		2019	Avg.	Min.	Max.
North Umpqua Coho Salmon	**Wild**	**3,302**	**2,571**	**1,148**	**3,979**
	Hatchery	**407**	**132**	**50**	**206**
	% Hat.	**11.0%**	**5.7%**	**1.2%**	**9.7%**
GRTS Estimate below Winchester Dam [1]	Total	0	60	0	298
	Wild	0	60	0	298
	Hatchery	0	0	0	0
Winchester Dam [2]	Total	3,709	2,675	1,252	3,786
	Wild	3,302	2,511	1,148	3,681
	Hatchery	407	164	104	216
Freshwater Catch [3] Above Winchester Dam	Total	n.a.	30	6	60
	Wild	n.a.	0	0	0
	Hatchery	n.a.	30	6	60
Rock Creek Hatchery [4]	Total	0	2	0	10
	Wild	0	0	0	0
	Hatchery	0	2	0	10

1 = Estimate of adult Coho Salmon observed in GRTS surveys below Winchester Dam (Sutherlin Creek and tributaries).

2 = Counts of adult Coho Salmon by mark type (marked =hatchery, unmarked = wild) at Winchester Dam on the North Umpqua River.

3 = Estimated freshwater harvest of Coho Salmon in the North Umpqua basin above Winchester Dam based on Angler Harvest Cards (see: http://www.dfw.state.or.us/resources/fishing/sportcatch.asp). Selective harvest of mark Coho Salmon began in 2004.

4 = Number of adult Coho Salmon collected from the North Umpqua population (at Rock Creek and at Winchester Dam) and retained at Rock Creek Hatchery. These numbers do not include Coho Salmon collected and released alive back into the wild.

Table B-4. Annual abundance estimates of naturally spawning wild adult Coho Salmon in the Oregon Coast Coho ESU, run years 1990 through 2019. n.a. = not available. *Numbers in italics are partial estimates of spawners in dependent populations*.

Stratum and Population	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
North Coast											
Necanicum River	126	752	133	512	269	181	416	97	575	351	359
Nehalem River	1,158	6,837	1,392	3,049	2,844	1,700	527	1,187	1,206	3,555	14,462
Tillamook Bay	80	1,577	176	571	1,105	341	733	437	358	1,831	2,178
Nestucca River	160	618	604	340	266	1,537	440	230	202	2,357	1,219
NC Dependents	*0*	*444*	*24*	*41*	*77*	*108*	*275*	*61*	*0*	*47*	*0*
Mid-Coast											
Salmon River	19	5	11	13	91	105	82	16	86	14	179
Siletz River	228	410	2,386	207	621	314	395	298	316	1,209	3,387
Yaquina River	318	317	528	458	2,040	4,723	4,578	419	510	2,563	637
Beaver Creek	90	484	618	275	675	308	1,296	497	401	1,511	1,464
Alsea River	775	1,011	6,273	694	828	441	1,060	601	108	1,341	3,363
Siuslaw River	2,269	2,808	3,554	4,600	3,159	6,161	7,234	501	1,020	2,980	6,532
MC Dependents	*487*	*51*	*1,037*	*467*	*317*	*348*	*1,364*	*112*	*173*	*150*	*91*
Umpqua											
Lower Umpqua River	1,678	3,123	1,797	7,877	2,762	10,854	7,985	1,257	4,552	2,623	5,781
Middle Umpqua River	1,222	4,546	5,275	2,947	2,162	3,250	5,086	563	1,257	1,748	4,555
North Umpqua River	355	1,301	1,579	906	899	1,293	1,069	577	765	1,194	1,677
South Umpqua River	2,934	2,233	435	3,723	1,081	4,715	7,040	937	3,177	3,011	2,581
Lakes											
Siltcoos	1,578	2,868	385	3,569	1,302	4,415	4,707	2,653	3,122	2,756	3,835
Tahkenitch	1,085	1,215	317	954	1,056	1,577	1,627	1,842	2,817	3,664	634
Tenmile	1,687	3,033	1,271	5,544	3,354	5,092	7,092	4,092	5,169	6,123	8,278
Mid-South Coast											
Coos River	2,243	2,426	16,722	14,932	14,500	10,302	12,128	1,112	2,985	4,818	4,704
Coquille River	2,589	4,782	2,033	7,291	5,119	2,034	15,814	5,720	2,412	2,667	6,253
Floras Creek	n.a	n.a	n.a.	n.a.	2,653	1,351	1,519	482	879	670	1,477
Sixes River	58	35	92	253	238	77	194	143	558	56	136
MSC Dependents	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Table B-4. Continued.

Stratum and Population	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
North Coast											
Necanicum River	4,832	2,047	2,377	2,198	1,218	750	431	1,055	3,827	4,445	2,120
Nehalem River	21,928	17,164	32,517	18,736	10,451	11,614	14,033	17,205	21,753	32,215	15,322
Tillamook Bay	1,944	13,334	13,008	2,532	1,995	8,774	2,295	4,828	16,251	14,890	19,250
Nestucca River	4,164	16,698	10,194	4,695	686	1,876	394	1,844	4,252	1,947	7,857
NC Dependents	*71*	*16*	*0*	661	2,116	1,121	376	639	2,052	1,473	1,341
Mid-Coast											
Salmon River	225	543	42	1,642	79	513	59	652	753	1,382	3,636
Siletz River	1,595	2,129	8,038	8,179	14,567	5,205	2,197	20,634	24,070	6,283	33,094
Yaquina River	3,589	23,800	16,484	5,539	3,441	4,247	3,158	10,913	11,182	8,589	19,074
Beaver Creek	1,832	3,217	5,552	4,569	2,264	1,950	611	1,218	3,575	2,072	2,389
Alsea River	3,228	9,073	10,281	5,233	13,907	1,972	2,146	13,320	14,638	9,688	28,337
Siuslaw River	10,606	55,445	29,003	8,729	16,907	5,869	3,552	17,491	30,607	25,983	28,082
MC Dependents	*816*	*5,308*	*1,852*	8,179	246	1,468	546	3,910	1,610	2,548	4,487
Umpqua											
Lower Umpqua River	11,639	18,881	16,494	8,989	18,591	7,994	4,237	9,023	19,245	17,516	18,715
Middle Umpqua River	8,940	10,738	11,090	6,375	7,608	4,852	1,587	4,472	15,075	18,123	19,962
North Umpqua River	2,634	3,368	2,862	3,559	1,969	3,000	1,410	3,438	7,720	9,397	6,020
South Umpqua River	11,871	10,517	4,337	10,997	14,364	2,246	4,549	20,935	15,944	24,983	49,958
Lakes											
Siltcoos	5,104	4,636	6,628	7,998	4,364	5,452	1,447	3,873	5,197	7,678	6,354
Tahkenitch	3,510	3,480	3,188	3,496	1,897	3,611	3,551	2,604	2,977	10,681	6,644
Tenmile	10,990	13,861	6,260	7,148	8,464	15,064	3,957	17,131	9,175	20,385	7,284
Mid-South Coast											
Coos River	33,595	33,120	25,761	23,337	17,048	11,266	1,329	14,881	26,979	27,658	10,999
Coquille River	13,833	7,676	22,403	22,138	11,806	28,577	13,968	8,791	22,286	23,564	55,667
Floras Creek	5,664	3,272	952	7,446	506	1,104	340	786	3,203	11,329	9,217
Sixes River	95	95	86	403	105	294	97	43	176	92	334
MSC Dependents	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	0	188	484	100

Table B-4. Concluded.

Stratum and Population	2012	2013	2014	2015	2016	2017	2018	2019
North Coast								
Necanicum River	902	798	5,727	847	936	529	393	698
Nehalem River	2,963	4,539	30,577	3,079	7,549	5,486	4,190	12,383
Tillamook Bay	1,686	4,402	20,090	1,345	7,102	2,927	2,035	3,961
Nestucca River	1,751	946	6,369	1,029	2,412	4,495	1,072	4,602
NC Dependents	218	271	4,607	440	699	206	262	616
Mid-Coast								
Salmon River	297	1,165	3,680	332	1,054	450	103	215
Siletz River	4,495	7,660	19,496	2,216	3,015	5,202	4,064	4,509
Yaquina River	6,268	3,553	25,582	2,400	3,730	2,491	4,672	3,452
Beaver Creek	1,878	2,015	6,564	332	1,709	1,553	494	814
Alsea River	8,470	9,283	25,855	6,185	7,375	4,377	5,112	4,915
Siuslaw River	11,946	14,118	38,896	10,352	9,141	7,129	6,635	5,881
MC Dependents	492	1,929	1,890	856	464	1,646	958	289
Umpqua								
Lower Umpqua River	3,731	7,792	36,942	3,725	4,422	10,848	14,080	9,152
Middle Umpqua River	2,447	4,272	13,939	2,245	1,159	1,788	3,888	3,104
North Umpqua River	3,134	2,774	3,979	3,012	1,148	1,772	2,481	3,302
South Umpqua River	11,636	12,178	11,412	5,878	765	1,084	3,125	3,600
Lakes								
Siltcoos	3,945	3,797	7,178	1,558	2,421	715	2,256	1,065
Tahkenitch	5,675	3,413	3,691	1,085	1,249	269	1,678	1,405
Tenmile	9,302	6,449	11,141	2,086	4,374	318	2,770	4,963
Mid-South Coast								
Coos River	9,414	6,884	38,880	3,030	4,624	2,689	7,292	13,289
Coquille River	5,911	23,637	41,660	3,357	9,494	4,641	5,688	11,841
Floras Creek	2,502	1,936	1,022	1,585	942	693	628	904
Sixes River	34	567	410	168	120	69	174	155
MSC Dependents	48	32	105	0	0	0	10	23

APPENDIX C (SONCC COHO ESU)

Table C-1. Estimates of adult Coho Salmon run size in the Rogue River derived from Huntley Park seining and returns to Cole Rivers Hatchery, 1990 through 2019.

	Huntley Park seine		Cole Rivers Hatchery		Adult Coho Salmon run size			
	Fin-marks	Total	Adult	Adult fin-	Total		Wild	
Year	(*R*)	(*C*)	returns	marks (*M*)	Estimate	95% CI	Estimate	95% CI
1990	1	58	452	103	3,363	4,581	3,109	4,404
1991	11	106	2,209	277	2,729	1,455	471	604
1992	4	91	1,338	168	3,422	2,917	2,224	2,352
1993	3	34	756	106	1,033	953	383	580
1994	91	173	6,590	5,564	11,577	1,624	4,364	997
1995	139	211	8,714	7,757	12,923	1,248	3,359	636
1996	204	362	7,921	6,940	13,520	1,221	4,824	729
1997	213	424	8,001	7,571	16,541	1,562	7,760	1,070
1998	79	165	2,921	2,387	5,451	860	2,257	553
1999	108	163	4,381	3,742	6,194	673	1,389	319
2000	194	505	9,224	7,389	21,094	2,321	10,978	1,675
2001	352	848	12,759	9,837	26,028	2,075	12,015	1,410
2002	323	706	11,599	8,831	21,199	1,699	8,460	1,073
2003	169	449	6,656	4,842	14,101	1,672	6,805	1,162
2004	259	1,260	8,289	6,297	33,601	3,639	24,509	3,108
2005	146	519	4,876	3,930	15,296	2,094	9,957	1,690
2006	175	458	3,188	2,581	7,407	859	3,911	624
2007	87	345	2,085	1,713	7,411	1,337	5,136	1,113
2008	19	107	148	95	572	226	414	192
2009	12	80	503	449	3,084	1,536	2,566	1,401
2010	13	142	730	393	4,423	2,201	3,671	2,005
2011	25	172	1,086	778	5,702	2,020	4,545	1,804
2012	36	202	1,322	1,142	6,897	2,010	5,474	1,790
2013	17	154	1,911	1,394	13,209	5,737	11,210	5,285
2014	19	91	784	639	3,238	1,255	2,409	1,083
2015	16	65	1,540	1,332	5,692	2,331	4,072	1,972
2016	6	51	1,248	917	7,503	5,171	6,302	4,739
2017	22	147	836	764	5,412	2,033	4,526	1,859
2018	9	354	326	219	8,591	5,249	8,266	5,149
2019	5	163	208	77	2,351	1,846	2,156	1,768

APPENDIX D

Table D-1. Site status of 2019 GRTS samples in the Lower Columbia River Coho ESU by TRT population. Target sites fell within Coho Salmon spawning habitat; response sites were successfully surveyed, and non-response sites were not surveyed because of issues such as lack of landowner permission, site inaccessibility, or gaps in survey effort usually from stream turbidity. Non-target sites are outside of Coho Salmon spawning habitat. Average is for 2014 to 2018.

		Target response				Target non-response				Non-target			
Stratum	Population	2019	Avg.	Min	Max	2019	Avg.	Min	Max	2019	Avg.	Min	Max
Coast	Youngs Bay	0	0	0	0	0	0	0	0	0	0	0	0
	Big Creek	0	0	0	0	0	0	0	0	0	0	0	0
	Clatskanie	21	19	11	22	9	7	0	16	1	2	1	3
	Plympton *	1	1	1	2	0	0	0	0	0	0	0	0
	Scappoose	14	15	13	18	16	18	10	23	0	1	0	2
	Total	**36**	**35**	**27**	**40**	**25**	**24**	**15**	**39**	**1**	**2**	**1**	**3**
Cascade	Clackamas	15	22	15	30	28	15	11	19	0	0	0	1
	Eagle Cr *	8	7	3	9	5	3	0	5	0	0	0	0
	Sandy	34	29	21	35	14	15	14	17	1	1	1	2
	Total	**57**	**58**	**49**	**64**	**47**	**33**	**27**	**40**	**1**	**2**	**1**	**3**
Gorge	Lower Gorge	2	3	0	6	3	4	2	6	1	0	0	1
	Hood	5	2	0	3	1	3	0	5	1	1	0	2
	Total	**7**	**4**	**0**	**8**	**4**	**6**	**2**	**11**	**2**	**1**	**0**	**2**
ESU Total		**100**	**98**	**85**	**105**	**76**	**59**	**46**	**86**	**4**	**5**	**2**	**8**

** = Stratified abundance estimation. Plympton Creek estimated separately from the rest of the Clatskanie population and Eagle Creek estimated separately from the rest of the Clackamas population.*

Table D-2. Site status of 2019 GRTS samples in the Oregon Coast Coho ESU by TRT population. Target sites fell within Coho Salmon spawning habitat; response sites were successfully surveyed and non-response sites were not surveyed because of issues such as lack of landowner permission, site inaccessibility, or gaps in survey effort usually from stream turbidity. Non-target sites are outside of Coho Salmon spawning habitat. Average is for 2014 to 2018.

		Target response				Target non-response				Non-target			
Stratum	Population	2019	Avg.	Min	Max	2019	Avg.	Min	Max	2019	Avg.	Min	Max
North Coast	Necanicum	16	16	11	18	8	5	1	11	1	1	0	2
	Nehalem	24	18	13	23	5	7	1	10	2	5	2	8
	Tillamook	23	20	14	25	3	7	3	10	1	3	0	5
	Nestucca	21	15	9	23	7	11	4	18	4	6	4	9
	NC Depend.	7	7	6	9	1	1	1	2	3	3	3	4
	Total	**91**	**76**	**59**	**92**	**24**	**30**	**22**	**49**	**11**	**17**	**12**	**24**
Mid-Coast	Salmon	12	11	7	17	9	12	8	14	1	0	0	1
	Siletz	22	19	12	26	4	5	1	12	6	6	3	9
	Yaquina	17	18	10	22	7	6	3	9	5	4	1	6
	Beaver	3	4	3	5	1	1	0	3	1	1	0	1
	Alsea	20	18	11	24	10	7	3	10	1	1	1	2
	Siuslaw	22	17	12	23	7	8	3	14	2	3	2	4
	MC Depend.	8	8	6	11	2	3	2	6	0	0	0	1
	Total	**104**	**95**	**78**	**114**	**40**	**42**	**28**	**54**	**16**	**14**	**9**	**20**
Lakes	Siltcoos	0	0	0	0	0	0	0	0	0	0	0	0
	Tahkenitch	0	0	0	0	0	0	0	0	0	0	0	0
	Tenmile	0	0	0	0	0	0	0	0	0	0	0	0
	Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Umpqua	L. Umpqua	17	17	15	20	10	9	7	12	3	1	0	2
	M. Umpqua	14	13	6	15	17	15	11	22	3	2	1	4
	N. Umpqua	1	1	0	3	4	6	4	9	1	0	0	1
	S. Umpqua	16	16	9	20	12	13	8	17	5	2	1	3
	Total	**48**	**48**	**30**	**55**	**43**	**43**	**33**	**54**	**12**	**5**	**3**	**8**
Mid-South Coast	Coos	20	20	18	22	6	5	2	7	2	2	1	4
	Coquille	22	19	15	24	13	15	10	20	2	2	0	3
	Floras	21	9	1	22	8	21	11	27	2	2	1	4
	Sixes	15	6	3	12	5	10	2	16	1	0	0	1
	MS Depend.	1	3	0	6	18	9	4	18	4	5	2	7
	Total	**79**	**57**	**41**	**72**	**50**	**59**	**48**	**69**	**11**	**11**	**5**	**18**
ESU Total		**322**	**276**	**229**	**318**	**157**	**174**	**155**	**221**	**50**	**48**	**33**	**63**

Table D-3. Adult Coho Salmon counts, density (AUC/mile), and marked proportion information for valid GRTS surveys by population in the Lower Columbia River and Oregon Coast Coho ESUs during the 2019 spawning year. Averages in *italics* do not include data for all years.

Location **ESU** / ***Stratum*** / Population	Total Surveys	Survey Miles	Sample of marks * dead (live)	2019 Density	2014-18 Avg. Density	2019 % Marked	2014-18 Avg. % Marked
Lower Columbia River ESU							
Coastal Stratum							
Youngs Bay	0	--	--	--	--	--	--
Big Creek	0	--	--	--	--	--	--
Clatskanie River [a]	21	20.5	3 (57)	2.7	16.0	7.3%	18.2%
Plympton Creek	1	1.0	9 (122)	97.1	35.2	88.0%	74.5%
Scappoose Creek	14	9.9	8 (63)	5.9	10.6	0.0%	1.2%
Cascade Stratum							
Clackamas River [a]	15	13.0	4 (34)	2.6	5.9	30.8%	13.9%
Eagle Creek	8	9.7	10	1.5	15.5	80.0%	75.0%
Sandy River	34	29.8	25	6.8	18.8	0.0%	4.3%
Gorge Stratum							
Lower Gorge	2	0.9	9 (56)	48.8	*64.7*	4.0%	*22.4%*
Hood River	5	4.8	20	60.5	*38.9*	18.1%	*58.2%*
Oregon Coast ESU							
North Coast Stratum							
Necanicum River	16	11.9	4 (67)	11.0	31.3	0.0%	1.3%
Nehalem River	24	19.9	45	26.1	23.6	0.0%	1.2%
Tillamook Bay	23	19.5	10	18.2	32.1	0.0%	0.7%
Nestucca River	21	17.7	38	30.7	23.1	0.0%	0.0%
NC Dependents	7	4.1	3 (29)	13.6	31.7	0.0%	0.5%
Mid-Coast Stratum							
Salmon River	12	6.9	8 (35)	5.2	24.9	0.0%	3.4%
Siletz River	22	17.3	14	32.0	45.7	0.0%	0.1%
Yaquina River	17	8.4	41	19.4	55.6	0.0%	0.7%
Beaver Creek	3	1.9	20	87.2	173.3	0.0%	0.1%
Alsea River	20	14.8	24	20.8	37.9	0.0%	0.0%
Siuslaw River	22	16.3	13	7.0	24.3	0.0%	0.0%
MC Dependents	8	7.8	0 (6)	1.4	6.8	0.0%	1.8%
Lakes Stratum							
Siltcoos Lake	0	--	--	--	--	--	--
Tahkenitch Lake	0	--	--	--	--	--	--
Tenmile Lake	0	--	--	--	--	--	--
Mid-South Coast Str.							
Coos Bay	20	18.3	70	62.9	45.9	1.4%	0.0%
Coquille River	22	18.2	15	31.2	47.8	0.0%	0.0%
Floras Creek	21	16.7	24	13.7	11.5	0.0%	0.0%
Sixes River	15	14.3	4 (40)	3.8	6.4	0.0%	0.0%
MS Dependents	1	1.1	1 (0)	0.0	0.9	0.0%	*0.9%*
Umpqua Stratum							
Lower Umpqua	17	12.2	36	24.4	41.3	0.0%	0.2%
Middle Umpqua	14	10.4	7 (62)	7.7	10.6	0.0%	0.0%
North Umpqua	1	0.7	0 (0)	0.0	3.2		*4.5%*
South Umpqua	16	11.0	19	5.4	8.7	5.3%	12.8%

a = Stratified sampling. Results for population excluding the sub-area listed below.
* = Used carcass (i.e. dead) sample only if greater than 10, otherwise use both live and dead sample.

Table D-4. Percent of selected GRTS sites classified "Target Non-Response" in three main categories. No AUC - Site surveyed, but didn't meet inclusion criteria for estimates. Denied - Sites not surveyed, lacked access permission. Inaccessible - Sites not surveyed, safety concerns or time required (greater than 3 hours). Average, minimum and maximum are for the period 2008 through 2018.

			No AUC				Denied				Inaccessible			
ESU	Strata	Population	2019	**Avg.**	Min.	Max.	2019	**Avg.**	Min.	Max.	2019	**Avg.**	Min.	Max.
LCR	Coastal	Youngs Bay	n.a.	8.2%	0.0%	24.1%	n.a.	3.2%	0.0%	8.7%	n.a.	1.7%	0.0%	8.7%
LCR	Coastal	Big Creek	n.a.	22.0%	0.0%	37.5%	n.a.	3.3%	0.0%	8.3%	n.a.	0.0%	0.0%	0.0%
LCR	Coastal	Clatskanie River	3.1%	16.5%	0.0%	42.3%	21.9%	4.9%	0.0%	16.1%	0.0%	1.4%	0.0%	4.5%
LCR	Coastal	Scappoose Creek	0.0%	9.4%	3.4%	13.8%	44.4%	21.9%	10.3%	45.2%	0.0%	1.0%	0.0%	5.7%
LCR	Cascade	Clackamas River	4.5%	22.2%	9.5%	37.8%	21.3%	11.4%	2.9%	25.6%	0.0%	1.5%	0.0%	7.5%
LCR	Cascade	Sandy River	3.4%	8.2%	0.0%	28.2%	8.6%	2.8%	0.0%	11.5%	10.3%	10.6%	4.8%	21.4%
LCR	Gorge	Lower Gorge	0.0%	3.0%	0.0%	33.3%	0.0%	0.0%	0.0%	0.0%	16.7%	9.1%	0.0%	100.0%
LCR	Gorge	Hood River	0.0%	0.0%	0.0%	0.0%	0.0%	3.8%	0.0%	16.7%	0.0%	13.4%	0.0%	100.0%
OC	N Coast	Necanicum River	4.0%	5.8%	0.0%	25.8%	12.0%	3.2%	0.0%	10.3%	16.0%	8.0%	0.0%	19.2%
OC	N Coast	Nehalem River	0.0%	21.5%	0.0%	66.7%	3.2%	1.2%	0.0%	5.1%	3.2%	3.5%	0.0%	8.3%
OC	N Coast	Tillamook Bay	0.0%	12.5%	0.0%	47.7%	3.7%	6.1%	2.0%	13.3%	3.7%	6.2%	0.0%	15.6%
OC	N Coast	Nestucca River	3.1%	19.3%	2.9%	41.9%	6.3%	6.9%	2.1%	12.5%	6.3%	6.3%	0.0%	17.1%
OC	N Coast	NC Dependents	0.0%	3.6%	0.0%	15.4%	9.1%	6.9%	2.6%	13.3%	0.0%	0.8%	0.0%	3.2%
OC	Mid-Coast	Salmon River	18.2%	21.8%	0.0%	47.6%	0.0%	6.5%	0.0%	11.5%	18.2%	17.5%	0.0%	31.0%
OC	Mid-Coast	Siletz River	0.0%	12.2%	0.0%	36.6%	2.3%	0.8%	0.0%	4.9%	2.3%	4.9%	2.1%	9.1%
OC	Mid-Coast	Yaquina River	10.3%	11.6%	0.0%	26.8%	10.3%	10.6%	6.5%	18.0%	3.4%	2.8%	0.0%	10.5%
OC	Mid-Coast	Beaver Creek	20.0%	11.9%	0.0%	35.7%	0.0%	4.9%	0.0%	16.7%	0.0%	0.0%	0.0%	0.0%
OC	Mid-Coast	Alsea River	6.3%	6.8%	0.0%	15.0%	25.0%	13.9%	8.5%	23.5%	0.0%	1.5%	0.0%	6.9%
OC	Mid-Coast	Siuslaw River	9.7%	15.3%	0.0%	51.3%	3.2%	7.1%	2.4%	13.3%	6.5%	5.6%	3.2%	9.5%
OC	Mid-Coast	MC Dependents	0.0%	11.8%	0.0%	21.8%	20.0%	12.6%	3.6%	22.2%	0.0%	2.1%	0.0%	6.1%
OC	Lakes	Siltcoos Lake	n.a.	3.8%	0.0%	20.0%	n.a.	19.2%	11.1%	36.4%	n.a.	6.5%	3.0%	11.1%
OC	Lakes	Tahkenitch Lake	n.a.	6.3%	0.0%	30.8%	n.a.	5.5%	0.0%	15.4%	n.a.	0.0%	0.0%	0.0%
OC	Lakes	Tenmile Lake	n.a.	3.3%	0.0%	13.3%	n.a.	28.9%	18.2%	43.3%	n.a.	7.7%	2.6%	15.2%
OC	Mid-S Coast	Coos Bay	0.0%	12.3%	0.0%	62.2%	7.1%	10.1%	4.7%	16.1%	3.6%	2.0%	0.0%	6.7%
OC	Mid-S Coast	Coquille River	0.0%	10.5%	0.0%	36.7%	21.6%	22.3%	14.8%	28.3%	5.4%	8.4%	1.9%	15.0%
OC	Mid-S Coast	Floras Creek	9.7%	24.2%	0.0%	51.9%	9.7%	26.2%	17.2%	31.3%	6.5%	5.5%	2.9%	11.8%
OC	Mid-S Coast	Sixes River	0.0%	28.6%	0.0%	63.2%	19.0%	15.2%	5.0%	26.3%	4.8%	7.2%	0.0%	11.8%
OC	Mid-S Coast	MS Dependents	0.0%	4.5%	0.0%	13.0%	78.3%	51.0%	35.0%	65.4%	0.0%	0.8%	0.0%	4.5%
OC	Umpqua	Lower Umpqua	3.3%	14.6%	3.6%	40.5%	6.7%	7.9%	2.4%	14.3%	13.3%	10.4%	7.1%	14.8%
OC	Umpqua	Middle Umpqua	11.8%	22.0%	7.7%	41.4%	26.5%	17.0%	7.7%	25.9%	11.8%	1.9%	0.0%	10.3%
OC	Umpqua	North Umpqua	33.3%	27.2%	0.0%	80.0%	33.3%	14.5%	0.0%	40.0%	0.0%	2.8%	0.0%	12.2%
OC	Umpqua	South Umpqua	6.1%	12.8%	0.0%	39.3%	24.2%	15.7%	8.5%	25.8%	6.1%	5.4%	0.0%	9.1%