THE OREGON PLAN for Salmon and Watersheds

Status of Oregon Stocks of Coho Salmon, 2014

Report Number: OPSW-ODFW-2015-3

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Monitoring Report No. OPSW-ODFW-2015-3
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SUMMARY

This report summarizes the results of status and trend monitoring for Oregon's naturally spawning coho salmon, *Oncorhynchus kisutch,* through the 2014 run year (October 2014 through February 2015). Monitoring results include:

1. Abundance of naturally spawning coho salmon
2. Density (fish/mile) of naturally spawning coho salmon
3. Coho salmon spawn timing and distribution
4. Proportion of hatchery (marked) coho salmon in naturally spawning populations

Results in this report are based on data from randomly selected spawning surveys and other methods used in areas without adequate random surveys. Results for coho salmon standard spawning 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://oregonstate.edu/dept/ODFW/spawn/index.htm).

Monitoring occurs at three hierarchical spatial scales, as defined by the National Marine Fisheries Service (NMFS): Evolutionarily Significant Unit (ESU); stratum; and coho salmon population. There are three coho salmon ESUs located entirely or partially within the State of Oregon: the Lower Columbia River (LCR) Coho ESU; the Oregon Coast (OC) Coho ESU; and the Southern Oregon/Northern California Coast (SONCC) Coho ESU. This report summarizes results for coho salmon populations in the portion of each ESU within the State of Oregon.

In the Oregon portion of the LCR Coho ESU sufficient surveys were conducted in 2014 to meet precision goals for the ESU, two of three strata, and two of the six sampled populations. The 2014 wild coho salmon spawner abundance was well above the previous 12 year average at almost all spatial scales, and in several was the highest on record for this period. The proportion of hatchery coho salmon on LCR Coho ESU natural spawning grounds in 2014 was lower than the previous 12 year record low observed in 2013, and about a third of the previous 12 year average. At the stratum and population scales, the proportion of hatchery coho salmon on the natural spawning grounds was more variable. Regional patterns in fish distribution, spawn timing, and hatchery proportion are apparent at both the stratum and population scales. Overall, coho salmon spawner run timing in 2014 was similar in duration and peak timing to previous years, but high density spawning activity continued over a longer duration than normal, ending in mid-December rather than the typical late November.

In the OC Coho ESU survey effort for the 2014 season was reduced by approximately 50% in all populations except in the Salmon River population, and random surveys were completely eliminated in the Lakes strata. However, even with this reduced effort, sufficient surveys were conducted to meet the precision goal for the ESU, three of four strata, but only 2 of 21 populations (Salmon River and Alsea). Wild spawner abundance in 2014 was the highest for the OC Coho ESU since random surveys were implemented in 1990. The proportion of hatchery fish was less than 1% for the ESU. All naturally spawning coho salmon populations, except in the Mid Coast Dependent and South Umpqua populations, contained greater than 95% wild fish. Distribution and density of wild coho salmon spawners increased in 2014 in comparison to 2013.

The percentage of surveyed sites that were occupied across the ESU increased from 66% to 86%, and 19 of the 21 populations had higher wild fish per mile densities in 2014 than in 2013. Coho salmon spawner run timing in 2014 was earlier than the long-term average; peak spawning occurred in early-December instead of the normal mid to late December.

Inadequate funding and the need to update the sampling frame continue to hamper the monitoring of the Oregon portion of the SONCC Coho ESU. In 2014 no Generalized Random Tessellation Stratified (GRTS) surveys were conducted in the Oregon portion of this ESU. Monitoring of wild coho salmon spawners was based on the Huntley Park seining estimate. Wild coho salmon spawner abundance decreased substantially in 2014 compared to the prior year, and was about a third of the 1994 through 2013 average. The proportion of hatchery coho salmon spawning naturally in 2014 was higher than the previous six years, but below the 20 year average. Without GRTS surveys, fish distribution and spawn timing were not evaluated in 2014.

INTRODUCTION

Conservation and management of coho salmon, *Oncorhynchus kisutch,* in Oregon requires monitoring status and trend for a variety of population criteria. This is true if the populations are thriving or depressed. Collecting data during both conditions is valuable in the assessment and interpretation of current and historic population status. There are three coho salmon ESUs located entirely or partially within Oregon: the LCR Coho ESU (populations in Washington and Oregon); the OC Coho ESU (all populations in Oregon); and the SONCC Coho ESU (populations in Oregon and California). All three ESUs are currently listed as "Threatened" under the Federal Endangered Species Act (ESA). In addition, the LCR Coho ESU is listed as "Endangered" under the State of Oregon ESA.

Since the early 1950's spawning surveys for coho salmon were conducted in standard index areas along the Oregon coast to assess escapement trends on natural spawning grounds (Jacobs et.al. 2002). Beidler and Nickelson (1980) and Ganio et.al. (1986) reviewed the adequacy of this method to provide the level of monitoring needed for management of Oregon's coho salmon populations. Both reviews identified areas of concern and made recommendations to improve the monitoring of naturally spawning coho salmon in Oregon. In 1990, a stratified random sampling program was initiated to address these recommendations and provide annual estimates of the abundance of naturally spawning Oregon Coastal Natural (OCN) coho salmon. The OCN area covers Oregon coastal rivers from the mouth of the Columbia River south to Cape Blanco. Methods and results for this methodology are described in Jacobs and Nickelson (1998). This methodology was used for the 1990 through 1997 spawning seasons.

In 1998 ODFW established an integrated monitoring program for Oregon coastal salmonids as part of the implementation of the Oregon Plan for Salmon and Watersheds (OPSW) (Firman and Jacobs 2001). The program consists of three geographically extensive monitoring projects based on spatially balanced random site selection, as well as one project that intensively monitor specific sub-basins. The three geographically extensive projects are based on the U.S. Environmental Protection Agency's, Environmental Monitoring and Assessment Program. These projects incorporate a GRTS sampling design to establish a shared set of random, spatially balanced sample points (Firman and Jacobs 2001, and Stevens 2002). Beginning in 1998 the

GRTS design replaced the stratified random sampling method for the selection of spawning ground surveys in the OC Coho ESU. The GRTS design was also implemented in the SONCC Coho ESU in 1998 and expanded to include the LCR Coho ESU in 2002. With some modifications, this methodology has been in use since those dates.

METHODS

Boundaries and population structures of the Oregon coho salmon ESUs, as defined by the NMFS Technical Recovery Teams (TRT), are presented in Figure 1. Although, the OPSW adult coho salmon monitoring design for the OC and SONCC Coho ESUs was established in 1998 as a 27-year study, changes in technology and salmon management, as well as the need for data at finer geographic scales, resulted in alterations to the initial design (Table 1). Significant changes in methods are discussed in Lewis et.al. (2009). In 2014, survey effort in the OC ESU was reduced by approximately 50%, resulting in a change in the survey site selection method. Instead of 30 sites or 30% of the spawning habitat per population, the goal was 60 sites per monitoring area (MA), distributed equitably across populations. The following two sub-sections give a brief description of field sampling protocols and data analysis methods.

Field Sampling

The assessment and establishment of new spawning surveys is completed during an initial set-up visit between February and September. Once landowner permissions are obtained, a surveyor visits the site to determine if it contains coho salmon spawning habitat, and if there are any barriers to adult coho salmon migration. If the site has habitat and is accessible, a new spawning ground survey is established that encompasses the GRTS point. Spawning surveys are generally one mile in length, but actual boundaries are determined by the site's specific characteristics. Surveys are bound by significant landscape features including: beginning or ending of coho salmon spawning habitat; confluences with other streams; and other long-term features such as, bridges, roads, waterfalls, etc. Specific methods used in spawning survey set-ups can be found in the annual site verification procedures manual on the Oregon Adult Salmonid Inventory and Sampling (OASIS) project web page.

Table 1. Design criteria used to select GRTS sampling points for coho salmon spawning surveys. Sample points = scale for precision targets; Estimate = finest scale for population estimates; MA = monitoring area (~Stratum); Popn = TRT population; Group = basin or group of basins; H, M, L = High, Medium, and Low quality habitats; Frame scale = scale of stream coverage used to select GRTS points; *XX* Frame = last two digits of the year the frame was developed; H:W = data source for rearing origin (Hatchery vs. Wild) determinations.

Run year	Geographic scale		Habitat type (HT)	Frame scale	Points by Habitat Type from			H:W
	Sample points	Estimate			98 Frame	05 Frame	Current Frame**	
1998	MA	Group	M&H	1:100K	M&H			Scales
1999–04	MA	Group	M&H	1:100K	M&H			Fin Marks
2005	MA	Popn	M&H*	1:100K	M&H	L (Ump.)		Fin Marks
2006	Popn	Popn	All	1:100K	M&H	L (All)		Fin Marks
2007-14	Popn	Popn	All	1:24K			All	Fin Marks

** = Sampled only Medium and High quality habitat, except in the Umpqua where all habitat was sampled.*
*** = Major frame revision in 2007 with a frame refinement in 2013.*

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

Coho salmon spawning ground surveys are conducted weekly from October through January, or longer as needed. The goal is to obtain at least one valid survey (in which flow and visibility allow for counts of live fish, dead fish, and redds) before coho salmon start spawning and two consecutive valid surveys with no live coho salmon observed to conclude each site for the season. Although the goal is to conduct a weekly survey, current protocols allow for up to 11 days between valid survey visits. Surveys that go more than 11 days between valid visits are considered to be out of rotation. When conditions permit, crews continue survey sites that have gone out of rotation and try to maintain their rotation throughout the remainder of the season.

Surveys are conducted by walking up-stream and recording the number of live and dead fish, redds observed, and categorical information on weather, visibility, and stream flow. Surveyors record the species of live fish observed and try to determine if the adipose fin has been clipped (Ad Clip) on coho salmon. Hatchery coho salmon smolts released in Oregon streams are marked with an Ad Clip and a subset of these are marked with a coded wire tag prior to release. For carcasses, surveyors record species, gender, Mid Eye to Posterior Scale (MEPS) length, and any fin clips, marks, or tags. A scale sample is collected from every tenth coho salmon carcass, and both a scale sample and snout are collected from every Ad Clip carcass to recover the coded wire tag, if present. There are a few exceptions to the scale sampling protocol; the first exception is in the lakes system in the OC Coho ESU (Siltcoos, Tahkenitch, and Tenmile) where a scale sample is collected from every twenty-fifth coho salmon carcass. The second exception is in the LC Coho ESU, specifically in the Sandy, Lower Gorge and Hood populations where scale samples are collected from every coho salmon carcass. Because coho spawners in these populations could be from hatchery smolts released without an Ad Clip mark, scale samples are used to determine rearing origin. Finally, the tail is cut off of every sampled carcass to preclude repeat sampling on subsequent survey visits. Further details on the spawning survey methods can be found in the annual spawning survey procedures manual on the OASIS project web page.

Data Analysis

The trapezoidal Area-Under-the-Curve (AUC) technique is used to estimate the number of coho salmon adults spawning in a given stream segment throughout the spawning season (Jacobs et al. 2002). Adult coho salmon are defined as fish measuring over 430 mm MEPS. Spawning coho salmon are assumed to have an average spawning life of 11.3 days across the ESU and season (Beidler and Nickelson 1980, Perrin and Irvine 1990). Live coho salmon observations are adjusted for the estimated bias associated with visual counts by surveyors (Solazzi 1984). Peak counts and the contribution of hatchery spawners are estimated as in Jacobs et al. (2002). Spawner density is calculated for each population, as the total adult coho salmon AUC / total length (miles) for all surveys. Abundance and timing calculations are only done with GRTS surveys which meet criteria for a qualified survey. Post season, all GRTS surveys are evaluated to determine if they meet the criteria to qualify for inclusion in population estimates. The criteria to determine if a site is a qualified survey are based on minimizing the possibility for an inaccurate AUC calculation. This could occur if the chance of a coho salmon migrating to the site, spawning and dying in the period between survey visits is considered too high. The standard method for determining whether a site was successfully surveyed for the year involves three steps. First, the critical period is determined for each stratum. Critical period is defined as the time interval in which 90% of the live coho salmon were seen in a stratum for the year. Second, the number of days between valid surveys is calculated for each site for the year. Finally, the

"gaps" between survey dates are evaluated to determine if they meet the criteria for minimizing the chance of missing coho salmon in the live counts. The standard criteria used are: no gap of 16 or more days, and no more than one gap between 12 and 15 days during the critical period. However, an unusually low number of surveys meeting the standard inclusion criteria resulted in an inadequate sample size for calculating abundance estimates for five OC populations and one LC population (OC: Beaver Creek, Floras Creek, Sixes River, Middle Umpqua, North Umpqua, LC: Sandy River). In 2014, relaxed criteria, allowing larger survey gaps were used for those six populations. Larger allowable gaps for the relaxed criteria increase the likelihood of missing live fish, a potential negative bias in the estimate. Determining to implement the relaxed criteria for a population was based on an unsuccessful survey rate greater than one and a half times the ESU average. The relaxed criteria used for the OC populations were: no gap of 18 or more days, and no more than two gaps between 12 and 17 days during the critical period. For the Sandy River population, the relaxed criteria still produced an inadequate sample so an even more relaxed criterion was used: no gap of 19 or more days, and no more than two gaps between 12 and 18 days during the critical period. For two of the five OC populations (Floras Creek and North Umpqua) no level of relaxing the criteria improved the survey inclusion rate.

Coho salmon spawning escapement is estimated using the Horvitz-Thompson estimator (Diaz-Ramos et al. 1996). Variance estimates are calculated using the local mean variance estimator. Escapements are calculated for the ESU as a whole, each stratum, and each independent population or group of dependent populations (Jacobs et al. 2002). Temporal distribution of spawners is based on monthly 10-day periods (1st to 10th, 11th to 20th, and 21st to end of month). The number of adult coho salmon observed is summed by geographic scale, year, and 10-day period, and then normalized for effort by dividing the sum of live adults by the corresponding sum of miles surveyed. Occupancy is defined as a peak of at least four adult coho salmon per mile. Occupancy of coho salmon spawning habitat is calculated as the percentage of qualified GRTS spawning surveys that are occupied each year. This calculation is done at three geographic scales: ESU, stratum, and population. Three additional metrics are used to evaluate the distribution of fish within each population. The metrics are calculated for total coho salmon in populations with at least 10 qualified GRTS spawning surveys for the year. Presence is calculated as the percentage of qualified GRTS spawning surveys with at least one coho salmon observed. Area-Over-the-Curve (AOC) and minimum proportion of sites comprising 80% of the population abundance ($P_{80\%}$) are calculated from cumulative abundance curves of sites ranked from highest to lowest abundance (Walters and Cahoon 1985, Peacock and Holt 2012).

The proportion of hatchery origin spawners (pHOS) is normally calculated at the population, rather than site scale to maximize the likelihood of reaching our minimum sample size goal of 10 fish with known Ad Clip status. Ad Clip status is most reliably determined from carcasses, but is recorded for live fish when possible. If Ad Clip status is available for at least 10 carcasses then pHOS is calculated from the carcass data, if not, the live fish data is included. A single pHOS value for all sites in a population precludes evaluation of the spatial distribution of coho salmon by rearing origin. Therefore, pHOS values were calculated for each GRTS site at the finest of four geographic scales which met the minimum sample size goal of 10 fish with known Ad Clip status. The four spatial scales are; GRTS site, 6^{th} field hydrologic unit code (HUC), 5^{th} field HUC, and TRT population. Distribution metrics (AOC, $P_{80\%}$, and Presence)

were calculated separately for hatchery and wild coho salmon in populations with at least 50% GRTS site and at least 90% finer than population scale pHOS values.

In some areas, GRTS surveys for coho salmon spawners are not conducted, the number of qualified surveys is not adequate, or there is no long-term data from GRTS surveys. In these areas, 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. There are currently 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). In these five locations, counts of adult coho salmon passed up-stream are obtained and added to the estimated abundance of coho salmon spawners for areas where GRTS surveys are conducted. In the OC Coho ESU, GRTS spawning ground surveys are conducted in most areas, except for the North Umpqua River above Winchester Dam. For the 2014 run year, Winchester Dam counts, and results of GRTS surveys below the dam, were used to document the number of adult coho salmon spawners in the North Umpqua. 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. Random (GRTS) coho salmon spawning surveys above Winchester Dam were conducted from 2005 to 2011 run years. These surveys provided information on the timing and distribution of coho salmon on the spawning grounds. In 2014 funding limitations prevented GRTS surveys from being conducted in the three coastal lake populations. Coho salmon spawner abundances for the lake populations are calculated using regressions of long-term standard surveys to historic mark-recapture studies and habitat measurements for those locations (Jacobs et.al. 2002). In years with an adequate number of GRTS surveys in the lakes populations, a GRTS based estimate is also calculated. Comparison of the GRTS estimates of coho salmon spawners to other estimates for the same area and year will be used to evaluate the accuracy and potential calibration of GRTS based survey estimates.

Implementation of a GRTS based sample for spawning coho salmon in the SONCC Coho ESU has been hampered by funding and a need to review the sample frame. Issues and limitations of the current frame for the SONCC Coho ESU are reviewed in Lewis et.al. (2009). No GRTS coho salmon spawning surveys were conducted in 2014, which is the seventh year since 1998 that budget constraints have precluded GRTS surveys for coho salmon spawners in this ESU. In addition, during the 2006 through 2008 season's budget constraints resulted in GRTS sampling at half the rate of previous years. Long-term monitoring of coho salmon spawners in the SONCC Coho ESU currently relies on a mark-recapture calculation 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.

RESULTS

Results of monitoring coho salmon spawning escapements in Oregon basins are summarized by the three coho salmon ESUs. Results include data from GRTS spawning ground surveys and data from other sources where GRTS surveys are not conducted. Results are

reported in four categories: Effort, Abundance, Distribution and Timing, and Proportion Hatchery Fish. 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.

Weather and stream flow patterns across the monitoring area for the 2014 season were variable. Temperatures and precipitation were generally normal between October and December; however January was drier than normal. As a result of these weather patterns, stream flows were normal throughout the majority of the spawning season. In the Lower Columbia, North and Mid-Coasts there were six distinct stream flow peaks occurring at even intervals from late October through the end of January, with the largest peak occurring in late December. In the Mid-South Coast the pattern was similar, but additional smaller freshets occurred in November. This pattern was generally conducive to conducting salmon spawning ground surveys in all areas, and resulted in a generally good success rates for keeping surveys in rotation.

Lower Columbia River Evolutionarily Significant Unit

In 1999, naturally produced coho salmon in the lower Columbia River basin were listed as "endangered" by the State of Oregon, and in 2005 were listed as "threatened" under the federal ESA (NMFS 2005). The LCR Coho ESU includes populations in both Oregon and Washington. The Oregon portion of the LCR Coho ESU is comprised of eight coho salmon populations (Meyers et al. 2006). They include all naturally spawning populations in Columbia River tributaries (excluding areas above Willamette Falls) downstream of and including the Hood River (Figure 1). Spawning habitat above dams, ladders, or hatcheries (where counts of fish are available) are not surveyed or expanded to for GRTS abundance estimates. These include: above Klaskanine Hatchery (Youngs Bay population), above Big Creek Hatchery (Big Creek population), above Sandy Hatchery (Sandy population), above Bonnie Falls (Scappoose population), above River Mill Dam (Clackamas population), and above Powerdale Dam (Hood River population) (Figure 3). Marmot Dam on the Sandy River was removed in 2007 and Powerdale Dam on the Hood River in 2010. Through 2006, estimates for the Sandy population were a combination of GRTS estimates for the area below Marmot Dam and the dam count, plus any wild fish released above Marmot Dam by Sandy Hatchery staff. Coho salmon spawning estimates for the Sandy population since 2007 have been based on GRTS surveys, plus any wild fish released in Cedar Creek above Sandy Hatchery. Logistic and budget issues currently preclude conducting GRTS surveys in the Hood River above the old Powerdale Dam site. Starting with the 2010 season wild coho salmon estimates for the Hood River population will not include an estimate of coho salmon spawning in the Hood River above the old Powerdale Dam site. Between 2002 and 2009 these fish accounted for about half of the Hood River population wild coho salmon spawner abundance. Beginning in 2013, random coho surveys were not conducted in the Big Creek and Youngs Bay populations due to budget constraints.

Effort

Spawning surveys were generally conducted from the beginning of October 2014 to the end of January 2015. The number of spawning surveys successfully conducted during the 2014 season was 73% of the goal for the ESU and ranged from 50% to 150% by population (Table 2). This is the ninth year of selecting points at the population scale, and the number of successful

surveys in 2014 was slightly less than the average over this period. The 92 sites successfully surveyed in 2014 comprised approximately 64% of the sites originally drawn, compared to an average of 61% for the previous six years. Some sites were not surveyed in 2014 due to access denials and site inaccessibility. In addition, some sites were surveyed but due to long gaps (≥16 days) or multiple gaps of 12–15 days between survey dates, did not meet the estimation criteria. On average, 7% of the sites drawn each year in the LCR Coho ESU are outside of coho salmon spawning habitat (non-target). In 2014, 4% of the sites drawn were non-target (Table D-1). The number of sites successfully surveyed met the goal in only two of the six populations being monitored in the Lower Columbia this year. The precision target (95% confidence less than ± 30% of the estimate) was met at the ESU level, and in only two of six population estimates, with the best population scale performance being in the Lower Gorge (Table 2).

Table 2. Lower Columbia River Coho ESU, GRTS spawning survey goals and results for number of surveys and 95% C.I., 2014 run year. Target response sites are reaches within coho salmon spawning habitat which were successfully surveyed.

			Target response				95% CI as percent of point estimate (goal is +/- 30%)			
				2009 to 2013				2009 to 2013		
Stratum	Population	Goal	2014	Avg.	Min.	Max.	2014	Avg.	Min.	Max.
Coast	Youngs Bay	0	0	14	0	22	n.a.	91%	41%	125%
	Big Creek	0	0	6	0	10	n.a.	66%	36%	107%
	Clatskanie	18	22	19	13	28	24%	34%	27%	42%
	Scappoose	20	16	18	15	24	54%	52%	43%	58%
	Total	**38**	**38**	**56**	**39**	**75**	**n.a.**	**28%**	**21%**	**32%**
Cascade	Clackamas	30	29	19	16	27	33%	39%	31%	45%
	Sandy	30	21	26	23	28	54%	55%	31%	78%
	Total	**60**	**50**	**45**	**40**	**50**	**34%**	**36%**	**26%**	**58%**
Gorge	Lower Gorge	2	3	2	1	4	9%.	96%	75%	128%
	Hood	2	1	4	2	6	n.a.	66%	23%	93%
	Total	**4**	**4**	**6**	**4**	**8**	**n.a.**	**65%**	**64%**	**66%**
ESU Total		**102**	**92**	**107**	**87**	**133**	**23%**	**22%**	**16%**	**29%**

n.a. = Not available (either no surveys were selected in the population or < 2 surveys stayed in rotation).

Abundance

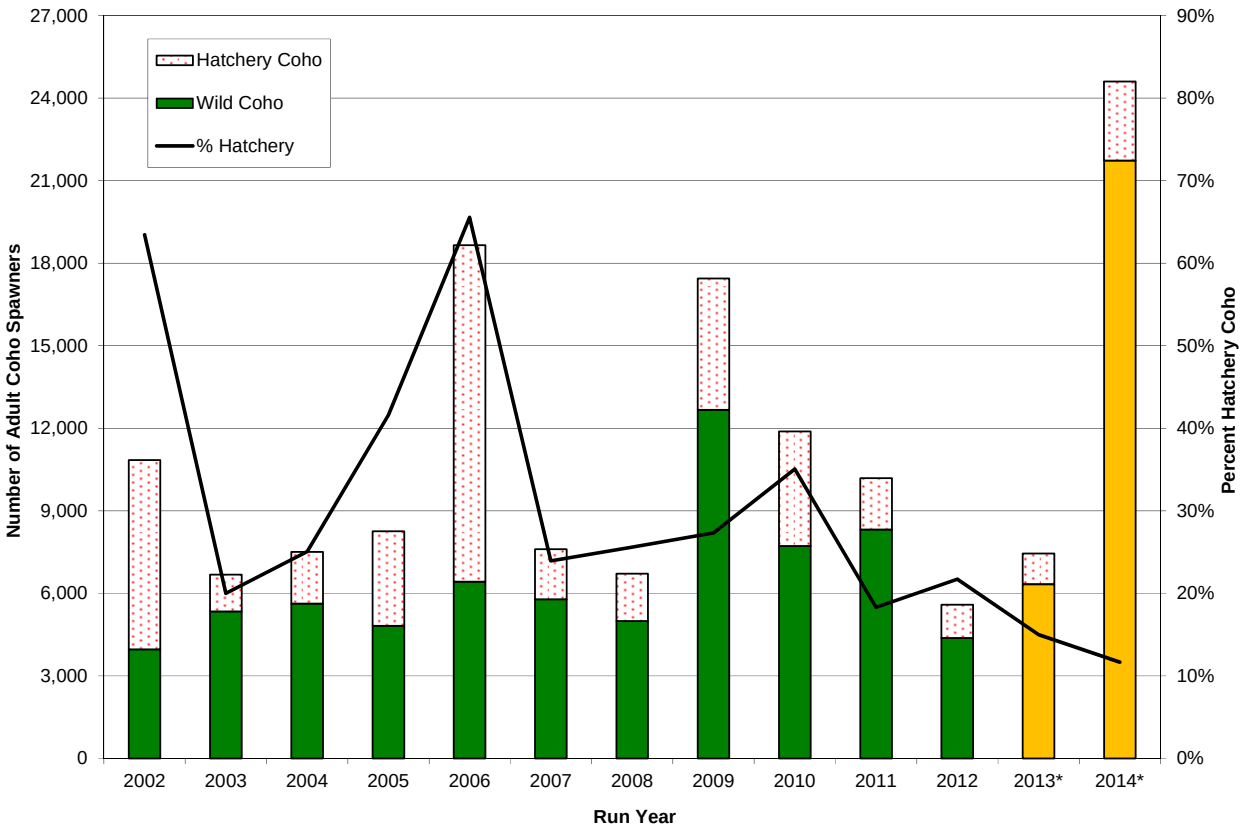
Wild coho salmon spawner abundance in 2014 was the highest on record since monitoring began in 2002 (Figure 2 and Table 3). This is particularly notable since the Big Creek and Youngs River populations typically contribute about 7% of the ESU's total wild abundance, but were not monitored in 2013 or 2014. Results by population were generally high, but with some variation, with four populations being well above average, and two near or below average (Table 3). Wild coho estimates in the Sandy (495% of average), Clackamas (374% of average),

and the Clatskanie (426% of average) populations were the highest since monitoring began (Appendix Table A-3). In contrast, 2014 wild coho abundance in the Hood River population was similar to the lowest observed from 2002-2013 (Appendix Table A-3). The highest abundance of wild coho in the LCR ESU was the 10,670 fish estimated in the Clackamas population; a number approaching double the 2002-2013 average for the ESU. (Table 3).

Table 3. Lower Columbia River Coho ESU estimated abundance of adult coho salmon spawning naturally by ESU, stratum, and population in the 2014 run year compared to the previous 12 years.

Geographic scale ESU/Stratum/Population		Spawning year			
			2002 to 2013		
		2014	Avg.	Min.	Max.
Lower Columbia River ESU (Oregon Only)	**Wild**	**21,729 ***	**6,365**	**3,963**	**12,674**
	Hatchery	**2,873 ***	**3,536**	**1,117**	**12,230**
	% Hat.	**11.7% ***	**31.9%**	**15.0%**	**65.6%**
Coast Stratum	**Wild**	**n.a.**	**1,777**	**1,115**	**3,916**
	Hatchery	**n.a.**	**920**	**89**	**3,497**
	% Hat.	**n.a.**	**30.9%**	**4.9%**	**75.8%**
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	3,126	734	104	1,609
	Hatchery	421	121	0	543
	% Hat.	11.9%	15.7%	0.0%	54.6%
Scappoose	Wild	1,587	629	210	1,960
	Hatchery	0	12	0	67
	% Hat.	0.0%	1.9%	0.0%	9.9%
Cascade Stratum	**Wild**	**16,612**	**4,051**	**2,157**	**9,475**
	Hatchery	**1,943**	**1,997**	**139**	**10,871**
	% Hat.	**10.5%**	**25.4%**	**3.5%**	**71.2%**
Clackamas	Wild	10,670	2,850	1,301	7,982
	Hatchery	1,774	1,876	50	10,871
	% Hat.	14.3%	29.2%	1.5%	75.8%
Sandy	Wild	5,942	1,201	382	3,494
	Hatchery	169	132	0	515
	% Hat.	2.8%	11.0%	0.0%	57.4%
Gorge Stratum	**Wild**	**404**	**566**	**41**	**1,525**
	Hatchery	**509**	**810**	**192**	**2,555**
	% Hat.	**55.8%**	**51.8%**	**26.5%**	**72.9%**
Lower Gorge Tribs.	Wild	362	303	96	920
	Hatchery	377	321	9	1,512
	% Hat.	51.0%	43.8%	5.6%	85.2%
Hood River	Wild	42	314	41	1,262
	Hatchery	132	488	0	1,298
	% Hat.	75.9%	50.3%	0.0%	85.3%

** = Does not include data for the Youngs Bay and Big Creek Populations. These populations were not sampled, 2013 through 2014 run years.*



** The estimates for 2013 and 2014 do not include Big Creek and Youngs Bay populations, and are therefore incomplete. These two populations combined account for an average of 12% of the total estimate for the ESU (about 7% of the wild, and 21% of the hatchery components).*

Figure 2. Lower Columbia River Coho ESU estimated abundance of adult coho salmon spawning naturally by rearing origin for the 2002 through 2014 run years.

Abundance of naturally spawning hatchery coho in 2014 was about 80% of the 2002 to 2013 average for the LCR Coho ESU, with most populations being close to average (Table 3). The 421 hatchery fish estimated to spawn naturally in the Clatskanie population was one exception to this pattern, being over three times higher than the average, and the second highest on record. The majority of hatchery-origin fish observed spawning in the Clatskanie population were located in Plympton Creek, and as a result the pHOS of about 12% in this population is likely to be biased somewhat upward when compared to actual spawning introgression. The Sandy coho population also had a slightly above average number of hatchery fish, but due to a relatively large wild coho estimate, pHOS was below average. The Scappoose population has now had eight consecutive years with an estimate of zero hatchery coho spawners.

The LCR Coho ESU and most of the Oregon populations have displayed year to year variability in abundance, but no strong indication of trend over the 12 years of monitoring (Figure 2; Appendix Table A-3). Abundance in five of the six monitored populations in 2014 is higher than the previous year, with the Hood River population being below the previous year and 12 year average. Prior to 2012 there was some indication of an increasing trend over the previous four years in the Clatskanie population, but 2012 and 2013 returns had regressed to lower levels. The 2014 estimate of 3,126 wild spawners is nearly twice the previous record, and may indicate

that the increasing trend in this area continues (Appendix Table A-3). Patterns in abundance trends for the other five populations are less clear.

Distribution and Timing

Approximately 77% of the valid sites surveyed in 2014 were occupied, well above the previous five year average (Table 4). Occupancy rates by population in 2014 were similar, with all six populations being higher than the 5 year average. In 2014, 76% of occupied sites in the LC Coho ESU had confirmed wild coho salmon present, which is the highest on record for this monitoring effort, and substantially higher than the previous 5 year average of 46% (Table 4).

Coho salmon densities (AUC/mile) in 2014 were highest in the Lower Gorge population and lowest in the Clackamas and Scappoose (Figure 3A). Compared to the previous 5 year average, coho salmon spawner density in 2014 was substantially higher in all but the Hood River population (Appendix Table D-4). Due to sample size issues, coho salmon distribution metrics within a population were only evaluated for 4 of the 6 monitored populations (Table 5). Coho salmon were most evenly distributed in the Clatskanie population while the Sandy River population had the patchiest spatial distribution (Table 5). Distribution by rearing origin was calculated for the Clatskanie, Clackamas and Sandy River populations (Table 5). In all cases the wild fish distribution was similar to the total fish distribution, but hatchery fish distribution was more irregular. One example of this is the Clatskanie River population, where, 1 of the 23 sites contained approximately 80% of the hatchery fish, but only 10% of the wild fish (Figure 4).

Table 4. Lower Columbia River Coho ESU adult coho salmon occupancy (total & wild) by population, stratum, and ESU for the 2014 run year and previous 5 year average (2009–13). Occupancy is defined as a peak of at least 4 adult coho salmon per mile of survey. Occupied sites with at least one documented wild coho salmon are considered wild occupied. N.A = Not available, since the population was not surveyed in this year.

ESU, Stratum, and TRT Population	2014 No. sites surveyed	5 yr avg. No. sites surveyed	Total coho salmon		Wild coho salmon	
			2014 % Occupied	5 yr avg. % Occupied	2014 % Occupied	5 yr avg. % Occupied
Lower Columbia R. ESU	**92**	**107**	**77%**	**53%**	**76%**	**46%**
Coast Stratum	**38**	**56**	**87%**	**58%**	**84%**	**49%**
Youngs Bay	0	14	n.a.	37%	n.a.	16%
Big Creek	0	6	n.a.	73%	n.a.	53%
Clatskanie River	22	19	100%	79%	95%	72%
Scappoose Creek	16	18	69%	45%	69%	44%
Cascade Stratum	**50**	**44**	**68%**	**45%**	**68%**	**40%**
Clackamas River	29	18	76%	49%	76%	44%
Sandy River	21	26	57%	43%	57%	36%
Gorge Stratum	**4**	**6**	**100%**	**74%**	**100%**	**66%**
Lower Gorge tribs.	3	2	100%	88%	100%	78%
Hood River	1	4	100%	63%	100%	58%

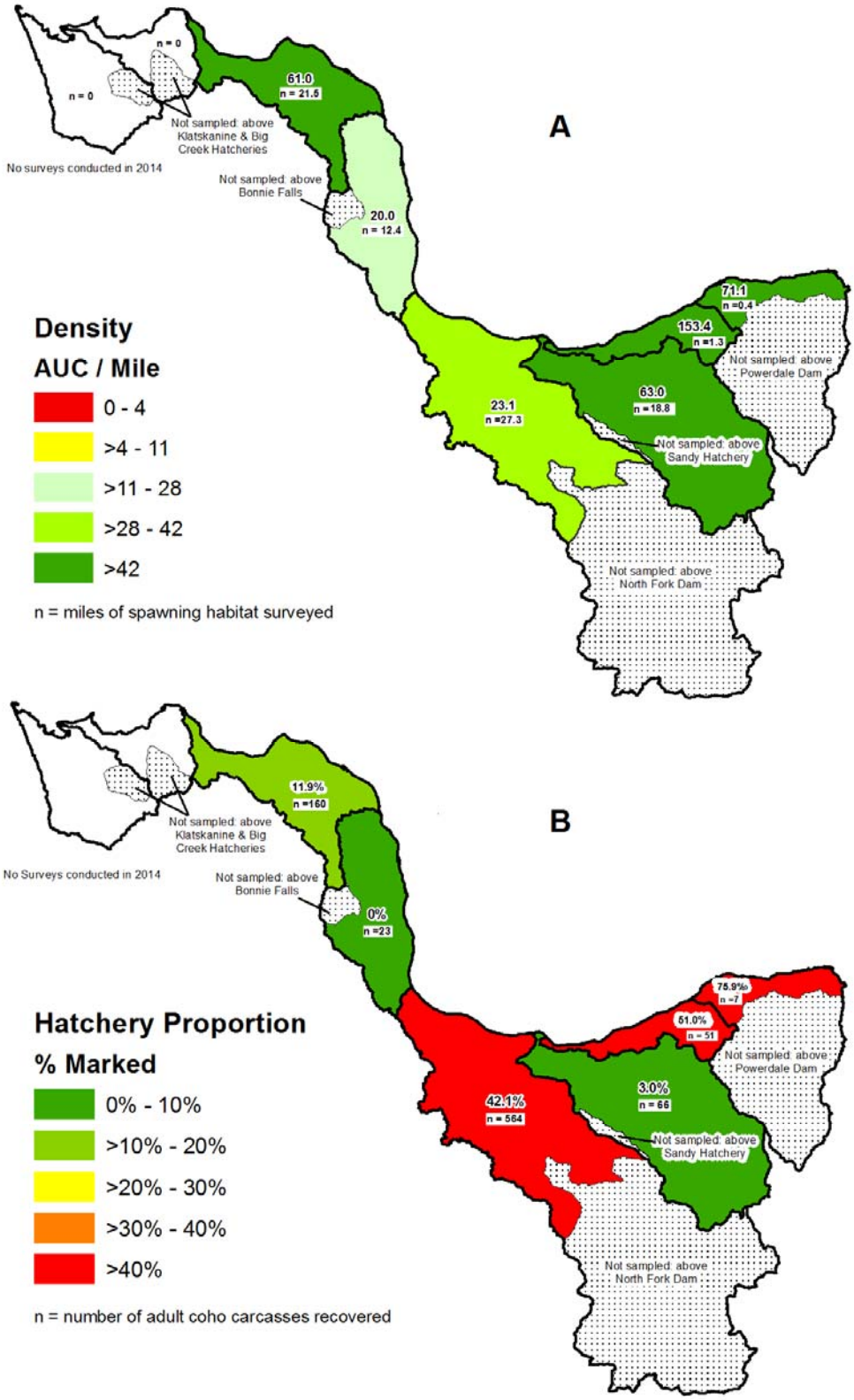


Figure 3. A) Coho salmon density in GRTS surveys by lower Columbia River TRT population, 2014. B) Percentage of marked adult coho salmon in GRTS surveys by lower Columbia River TRT population, 2014.

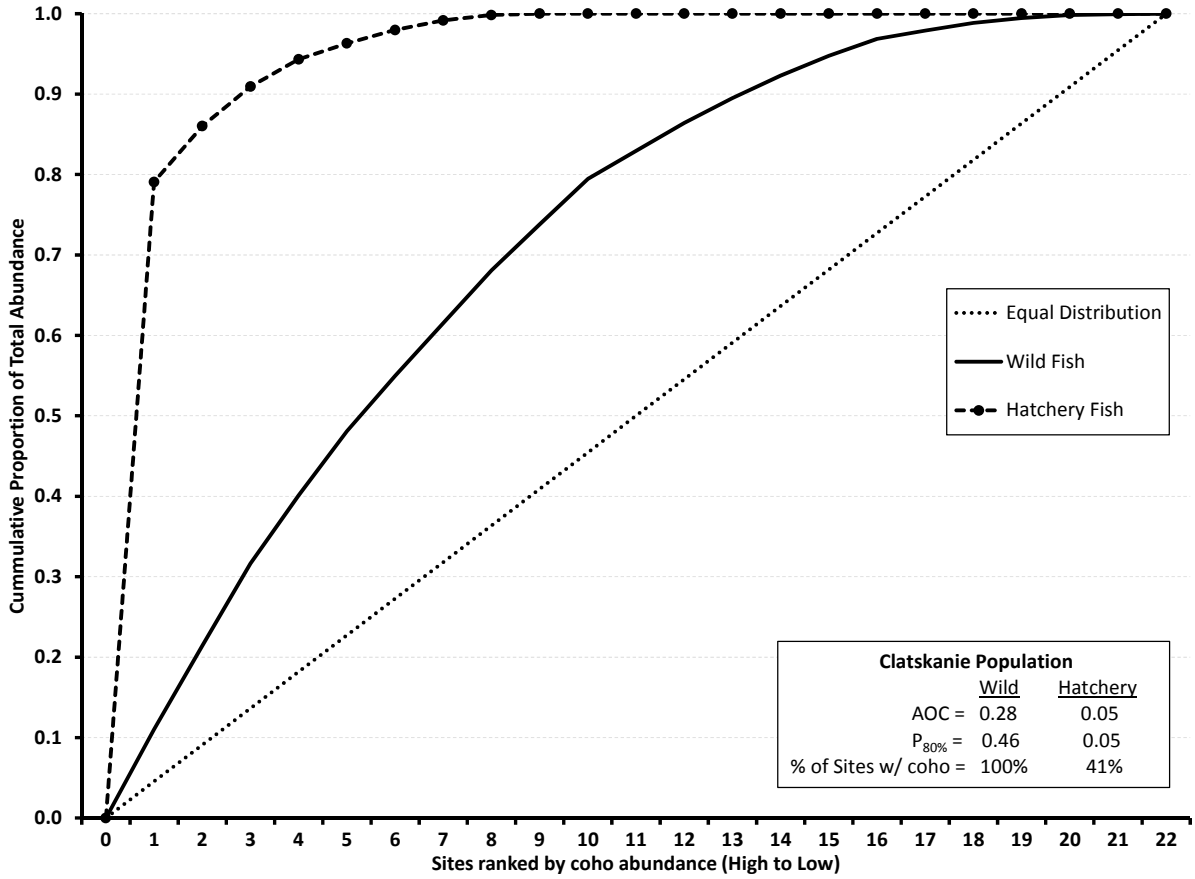


Figure 4. Cumulative frequency distribution of coho salmon in the Clatskanie population, 2014 run year.

Table 5. Distribution metrics for Lower Columbia River Coho ESU populations, 2014 run year. Total fish metrics were calculated for populations with at least 10 sites, hatchery and wild metrics were calculated for populations with adequate site specific pHOS data. Populations with uniform distribution would have AOC = 0.5, $P_{80\%}$ = 0.8, and % sites with fish = 100%.

Lower Columbia populations	# of Sites	Total coho salmon			Wild coho salmon			Hatchery coho salmon		
		AOC	$P_{80\%}$	% sites with fish	AOC	$P_{80\%}$	% sites with fish	AOC	$P_{80\%}$	% sites with fish
Youngs Bay	--	--	--	--	--	--	--	--	--	--
Big Creek	--	--	--	--	--	--	--	--	--	--
Clatskanie River	22	0.31	0.50	100%	0.28	0.46	100%	0.05	0.05	41%
Scappoose Creek	16	0.18	0.31	75%	--	--	--	--	--	--
Clackamas River	29	0.20	0.34	79%	0.28	0.45	88%	0.07	0.09	55%
Sandy River	21	0.14	0.23	57%	0.13	0.22	57%	0.04	0.06	43%
Lower Gorge tribs.	3	--	--	--	--	--	--	--	--	--
Hood River	1	--	--	--	--	--	--	--	--	--

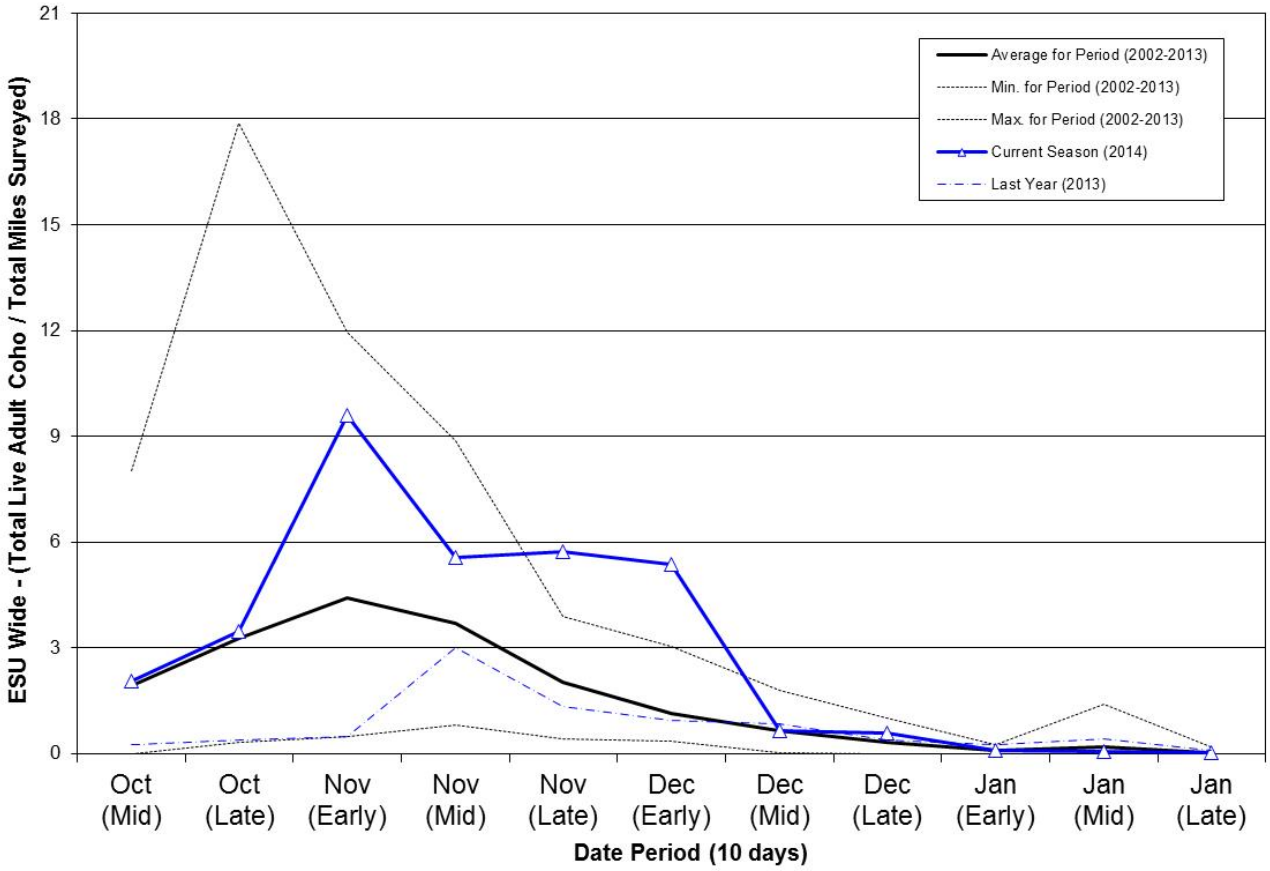


Figure 5. Run timing of live adult coho salmon in 2014 on GRTS spawning ground surveys in the Lower Columbia River Coho ESU.

For the 2002 through 2013spawning years, peak counts of live coho salmon in the LCR Coho ESU typically occurred during the first 10 days of November with an average of 5 adult coho salmon per mile surveyed, and very few live coho salmon seen after early December (Figure 5). Run timing in 2014 was delayed slightly when compared to the 12 year average timing for the ESU, with the peak in early-November at 9.6 adult coho salmon per mile surveyed. Timing in the LCR Coho ESU is much earlier than in the OC Coho ESU, which typically peaks in mid to late December (Figure 10). Fish per mile in 2014 was near normal for the late October time periods, but densities during late-November through early December were the highest on-record (2002-2013) (Figure 5). Stream flow patterns in 2014 were amenable to both fish access to spawning grounds and survey methods, with significant freshets on a regular schedule beginning in late September and continuing through the remainder of the season. These freshets allowed fish access to most streams within the ESA, and were generally conducive to survey methods.

Proportion Hatchery Fish

In 2014, pHOS in the LCR Coho ESU was the lowest on record (11.7%) for the period 2002 through 2014 (Table 3). It should be noted that monitoring in 2013 and 2014 differed from

that of previous years in that, due to budget cuts, surveys were not conducted in two populations that usually have high hatchery influence (Big Creek and Youngs Bay). These two populations typically contribute approximately 21% of all hatchery origin coho spawning in the LCR ESU, and assuming their combined 2014 contribution is equal to the previous 11 year average, the pHOS for the LCR Coho ESU would be 13.6% which is would still be the lower pHOS in the 13 years of monitoring. Four of the six successfully monitored LCR populations had pHOS values below the previous 12 year average. The populations having pHOS values above their averages are the Lower Gorge and Hood River (Table 3). In the Clackamas River, a large run of 8,230 wild coho were passed above a complex of dams and into habitat not monitored by this project. Combining these dam counts with spawning survey estimates results in a pHOS of 14.3%, as compared to the pHOS of 42.1% shown for the lower basin. According to protocols, the pHOS in five of six of these basins was based on carcass recoveries since there were more than ten recoveries in each population (Table D-4). In the Hood River population only 7 carcasses were recovered, and as a result live observations were used. In the Clatskanie population, all the recoveries of hatchery coho carcasses in 2014 occurred in Plympton Creek, which is a stream located on the northern margin of the population in relatively close proximity to the Big Creek Hatchery.

The LCR Coho ESU 2014 pHOS of 11.7% is high compared to the other Oregon coho salmon ESUs, where pHOS was 0.8% for the OC Coho ESU (Table 7) and 4.6% for the SONCC Coho ESU (Table 11). The Clatskanie, Clackamas, Lower Gorge and Hood River populations all had greater than 10% hatchery adult coho salmon in the naturally spawning populations (Table 3 and Figure 3B). The pHOS rates observed in 2014 are consistent with results for the previous coho generation (3 years) for the LCR Coho ESU and four of six sampled populations. The 2014 pHOS rate in the Clackamas population was nearly double the previous 3 year average (14.3% versus 7.1% average), and in the Sandy population was less than half the 3 year average (2.8% versus 7.6% average). Once again the Scappoose population had the lowest pHOS rate in the ESU with no hatchery origin coho observed in 2014 (Table 3 and Figure 3B).

Oregon Coast Evolutionarily Significant Unit

In 2008, the Oregon Coast Coho ESU was listed as “threatened” under the federal ESA (NMFS 2008). The OC Coho ESU is comprised of five strata: North Coast, Mid-Coast, Lakes, Umpqua, and Mid-South Coast. Each stratum is composed of populations characterized as independent or dependent based on their historical structure, potential for persistence, and degree of isolation from neighboring populations (Lawson et al. 2007, Wainwright et al. 2008). There are anywhere from three to six independent populations within each stratum (Figure 1), and spawning escapement estimates are made for each independent population. Dependent populations are grouped together by stratum, and spawning escapement estimates are made for each stratum aggregate. Four of the five strata are monitored using a spatially balanced random sample design (Stevens 2002). These four strata are the North Coast, Mid-Coast, Umpqua, and Mid-South Coast. Abundance estimates for the Lakes stratum are made by expanding counts in standard index reaches (Jacobs et.al. 2002). Finally, GRTS sampling in the OC Coho ESU began in 1998 in all areas except the North Umpqua population, where GRTS sampling began in 2005 and ended in 2011. Monitoring of coho salmon spawners in this population is predominately

based on Winchester Dam counts. For long-term consistency, the Winchester Dam count is used as the North Umpqua population spawner abundance estimate.

Effort

The 2014 spawning season is the eighth year using the updated sample frame (Table 1), which includes sampling all potential coho salmon spawning habitat based on a 1:24,000-scale digital line graph of streams. The sample frame was refined in 2013, with the most significant change in the Floras population. A total of 229 sites were successfully surveyed in 2014, which is well below the average of the previous five years (Table 6). Sampling effort was reduced substantially in 2014 due to budget constraints, with a 2014 sampling goal of 255 sites versus 527 sites in 2013. The 229 sites successfully surveyed in 2014 were 90% of the goal (Table 6), and 9 of 21 populations were at or above the sites goal. Only the North Umpqua, Floras Creek, and Sixes River populations were substantially below the sample site goal. Those populations had a number of sites not meet criteria for inclusion in the population estimate.

Spawning surveys were generally conducted from mid-October 2014 to the end of January 2015. The 229 sites successfully surveyed in 2014 are 52% of the sites originally drawn, which is similar the previous five year average of 50%. Some sites were not surveyed in 2014 due to access denials and site inaccessibility. In addition some sites were surveyed, but due to not meeting the standard or relaxed criteria, these sites could not be used in the abundance estimate. Since implementing use of the 1:24 k frame in 2007, on average 17.3% of the sites drawn each year in the OC Coho ESU are outside of coho salmon spawning habitat (non-target). In 2014, 9.8% of the sites drawn were non-target (Appendix Table D-3). Periodically crews identify areas that contain spawning habitat and are accessible to coho salmon, but are not within the sampling frame. These target sites that are outside the frame are noted for future exploration and addition to the frame when it is updated. In 2013 the frame was refined, typically frame updates occur about every 5 to 10 years, and until that time no adjustment is made to the coho salmon abundance estimate for the target areas outside the sampling frame. Adjusting for non-target sites inside the frame, but not for target sites outside the frame will result in a negative bias in the coho salmon abundance estimate.

Despite the adequate survey conditions in 2014, only 9 of 26 spatial sampling scales (21 populations, 4 strata, 1 ESU) met the goal for number of surveys (Table 6). Results for meeting the precision goal of a 95% CI no more than +/- 30% of the point estimate were much lower than the results for number of surveys. In 2014 the precision goal was achieved for the ESU, three of four strata, and 2 of 21 populations (Table 6). This is comparable to previous years when on average the precision goal was met for 7 of 30 spatial sampling scales.

Abundance

Wild coho salmon spawner abundance in the OC Coho ESU increased substantially in 2014 to the highest level recorded during the previous 24 years (Figure 6 and Table 7). In 2014 all five strata were substantially above the 24 year average abundance (Table 7). Results for individual populations were higher in 2014, with 22 of the 24 populations above average, with only 2 populations at or below 75% of the average (Floras Creek and Mid-South Dependents).

Table 6. Oregon Coast Coho ESU, GRTS spawning survey goals, responses, and estimate precision by population, 2014 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%)			
				2009 to 2013				2009 to 2013		
			2014	Avg.	Min.	Max.	2014	Avg.	Min.	Max.
North Coast	Necanicum	9	11	18	15	21	41%	54%	20%	95%
	Nehalem	14	13	26	13	34	38%	36%	25%	51%
	Tillamook	14	14	24	19	31	36%	57%	37%	78%
	Nestucca	14	12	21	12	31	49%	52%	38%	64%
	NC Depend.	10	9	18	15	21	89%	51%	39%	71%
	Total	**61**	**59**	**108**	**81**	**131**	**22%**	**26%**	**20%**	**39%**
Mid-Coast	Salmon	15*	17	11	7	16	23%	58%	27%	122%
	Siletz	11	12	24	21	29	47%	30%	24%	36%
	Yaquina	11	10	25	21	28	55%	39%	34%	52%
	Beaver	3	5	6	2	8	45%	49%	14%	100%
	Alsea	11	11	29	26	32	29%	26%	22%	33%
	Siuslaw	11	12	28	24	36	34%	29%	21%	33%
	MC Depend.	11	11	18	15	20	43%	57%	38%	93%
	Total	**73**	**78**	**142**	**130**	**158**	**19%**	**15%**	**14%**	**17%**
Lakes	Siltcoos	0	0	15	8	21	n.a.	49%	39%	64%
	Tahkenitch	0	0	5	2	7	n.a.	71%	40%	122%
	Tenmile	0	0	14	10	18	n.a.	35%	29%	48%
	Total	**0**	**0**	**34**	**22**	**44**	**n.a.**	**31%**	**24%**	**49%**
Umpqua	L. Umpqua	19	18	27	25	30	31%	31%	28%	34%
	M. Umpqua	19	15	23	14	28	50%	48%	29%	64%
	N. Umpqua	4	1	17	1	36	n.a.	65%	30%	83%
	S. Umpqua	19	17	27	22	30	37%	56%	40%	69%
	Total	**61**	**51**	**94**	**71**	**116**	**22%**	**33%**	**24%**	**43%**
Mid-South Coast	Coos	17	18	29	23	35	50%	36%	23%	50%
	Coquille	17	15	27	16	34	53%	36%	25%	43%
	Floras	15	1	10	6	18	n.a.	45%	25%	60%
	Sixes	7	4	10	1	19	85%	65%	25%	91%
	MS Depend.	4	3	3	1	5	195%	103%	86%	124%
	Total	**60**	**41**	**79**	**58**	**109**	**37%**	**24%**	**17%**	**33%**
ESU Total		**255**	**229**	**456**	**405**	**522**	**13%**	**12%**	**10%**	**15%**

n.a. = Not available (either no surveys were selected in the population or < 2 surveys stayed in rotation).

Table 7. Oregon Coast Coho ESU estimated abundance of adult coho salmon spawning naturally by ESU, stratum, and population for the 2014 run year compared to the previous 24 years.

Geographic scale ESU/Stratum/Population	Coho salmon origin	Spawning year			
			1990 to 2013		
		2014	Avg.	Min.	Max.
Oregon Coast Coho ESU	**Wild**	**359,624**	**125,638**	**21,139**	**356,243**
	Hatchery	**2,777**	**10,090**	**984**	**26,128**
	% Hat.	**0.8%**	**11.7%**	**0.8%**	**31.4%**
North Coast Stratum	**Wild**	**67,370**	**20,017**	**1,524**	**58,096**
	Hatchery	**1,433**	**2,247**	**0**	**15,563**
	% Hat.	**2.1%**	**20.9%**	**0.0%**	**79.0%**
Necanicum River	Wild	5,727	1,282	97	4,832
	Hatchery	98	130	0	501
	% Hat.	1.7%	17.8%	0.0%	40.1%
Nehalem River	Wild	30,577	10,765	527	32,517
	Hatchery	764	1,722	0	14,014
	% Hat.	2.4%	23.0%	0.0%	87.7%
Tillamook Bay	Wild	20,090	4,774	80	19,250
	Hatchery	460	331	0	1,498
	% Hat.	2.2%	18.8%	0.0%	68.9%
Nestucca River	Wild	6,369	2,720	160	16,698
	Hatchery	0	59	0	274
	% Hat.	0.0%	6.5%	0.0%	15.3%
North Coast Dependents	Wild	4,607	476	0	2,116
	Hatchery	111	12	0	75
	% Hat.	2.4%	0.9%	0.0%	6.3%
Mid-Coast Stratum	**Wild**	**121,894**	**34,184**	**2,444**	**119,099**
	Hatchery	**216**	**2,268**	**0**	**9,633**
	% Hat.	**0.2%**	**15.0%**	**0.0%**	**50.1%**
Salmon River	Wild	3,680	484	5	3,636
	Hatchery	27	689	0	2,621
	% Hat.	0.7%	65.6%	0.0%	97.6%
Siletz River	Wild	19,496	6,163	207	33,094
	Hatchery	71	291	0	962
	% Hat.	0.4%	18.2%	0.0%	58.4%
Yaquina River	Wild	25,582	5,705	317	23,800
	Hatchery	0	195	0	1,526
	% Hat.	0.0%	7.9%	0.0%	25.0%
Beaver Creek	Wild	6,564	1,698	90	5,552
	Hatchery	0	55	0	405
	% Hat.	0.0%	4.1%	0.0%	23.8%
Alsea River	Wild	25,786	6,086	108	28,337
	Hatchery	0	364	0	2,214
	% Hat.	0.0%	17.6%	0.0%	93.8%
Siuslaw River	Wild	38,896	12,465	501	55,445
	Hatchery	0	664	0	4,136
	% Hat.	0.0%	11.7%	0.0%	37.6%
Mid Coast Dependents	Wild	1,890	1,583	51	8,179
	Hatchery	118	25	0	97
	% Hat.	5.9%	1.4%	0.0%	5.4%

Table 7. Continued

Geographic scale ESU/Stratum/Population	Coho salmon origin	Spawning year			
			1990 to 2013		
		2014	Avg.	Min.	Max.
Lakes Stratum	**Wild**	**22,010**	**14,808**	**1,973**	**38,744**
	Hatchery	**0**	**59**	**0**	**251**
	% Hat.	**0.0%**	**0.5%**	**0.0%**	**2.2%**
Siltcoos Lake	Wild	7,178	4,069	385	7,998
	Hatchery	0	27	0	124
	% Hat.	0.0%	1.0%	0.0%	8.7%
Tahkenitch Lake	Wild	3,691	2,980	317	10,681
	Hatchery	0	15	0	107
	% Hat.	0.0%	0.5%	0.0%	3.1%
Tenmile Lake	Wild	11,141	7,759	1,271	20,385
	Hatchery	0	17	0	123
	% Hat.	0.0%	0.3%	0.0%	3.4%
Umpqua Stratum	**Wild**	**66,272**	**27,107**	**3,334**	**94,655**
	Hatchery	**1,127**	**5,000**	**434**	**17,758**
	% Hat.	**1.7%**	**19.8%**	**1.1%**	**36.0%**
Lower Umpqua River	Wild	36,942	8,881	1,257	19,245
	Hatchery	0	291	0	1,484
	% Hat.	0.0%	3.6%	0.0%	15.7%
Middle Umpqua River	Wild	13,939	6,173	563	19,962
	Hatchery	0	244	0	1,259
	% Hat.	0.0%	4.9%	0.0%	20.6%
North Umpqua River	Wild	3,979	2,621	355	9,397
	Hatchery	105	3,579	125	14,094
	% Hat.	2.6%	54.9%	2.5%	84.3%
South Umpqua River	Wild	11,412	9,433	435	49,958
	Hatchery	1,022	886	0	7,040
	% Hat.	8.2%	13.1%	0.0%	57.2%
Mid-South Coast Stratum	**Wild**	**82,078**	**29,522**	**4,890**	**76,318**
	Hatchery	**1**	**515**	**1**	**2,766**
	% Hat.	**0.0%**	**2.5%**	**0.0%**	**23.8%**
Coos River	Wild	38,880	13,714	1,112	33,595
	Hatchery	0	230	0	1,387
	% Hat.	0.0%	2.6%	0.0%	36.4%
Coquille River	Wild	41,660	13,207	2,033	55,667
	Hatchery	0	201	0	1,832
	% Hat.	0.0%	2.1%	0.0%	15.4%
Floras Creek	Wild	1,022	2,864	340	11,329
	Hatchery	0	76	0	400
	% Hat.	0.0%	4.6%	0.0%	22.8%
Sixes River	Wild	410	178	34	567
	Hatchery	0	20	0	182
	% Hat.	0.0%	9.6%	0.0%	65.7%
Mid-South Coast Dependents	Wild	106	142	0	484
	Hatchery	1	2	0	9
	% Hat.	0.9%	1.3%	0.0%	4.6%

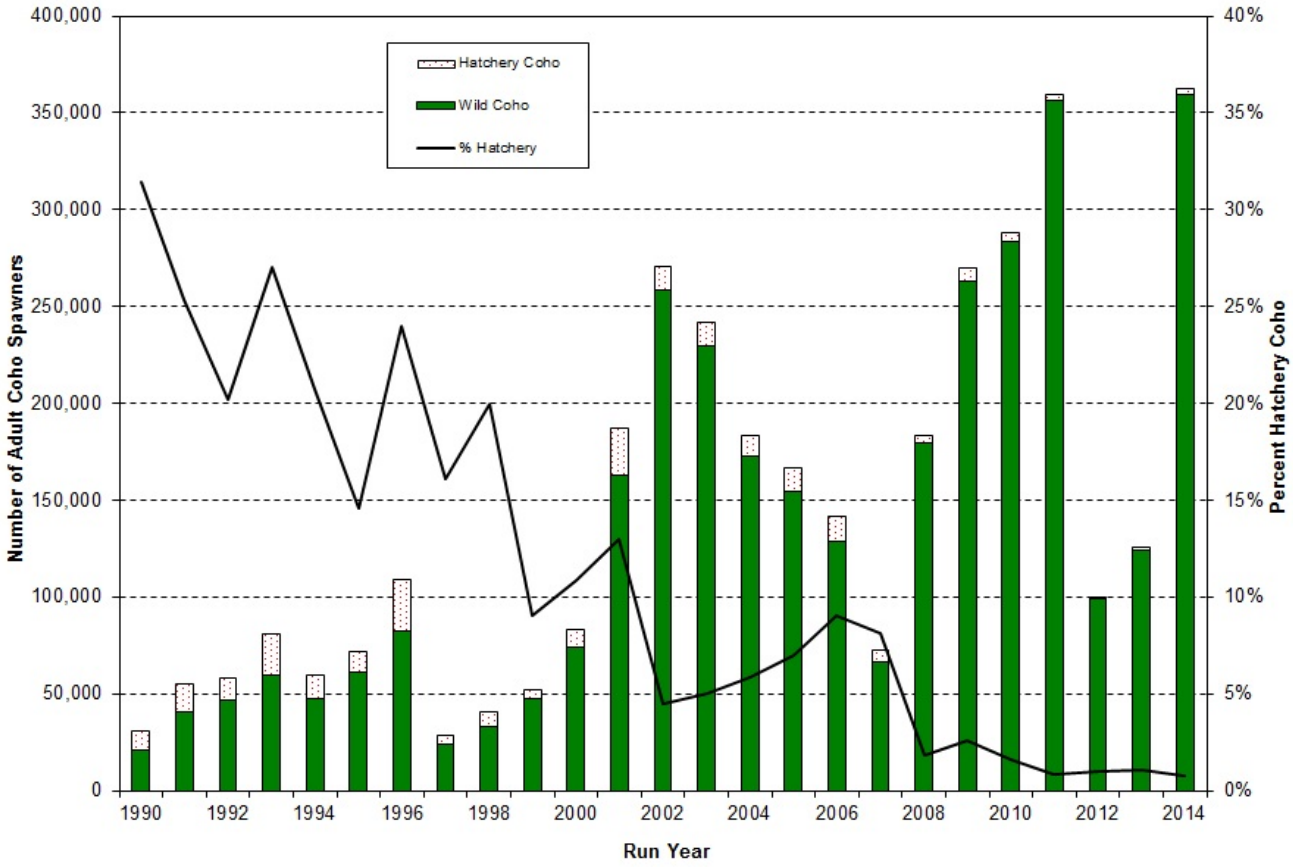


Figure 6. Oregon Coast Coho ESU estimated abundance of adult coho salmon spawning naturally by rearing origin for the 1990 through 2014 run years.

Wild coho spawner abundance increased in 2014 compared to 2013, and the distribution of spawners between populations was slightly more equitable (Appendix Table B-4). In both years the Coquille had the highest wild coho abundance, accounting for 19% in 2013 but only 12% in 2014 of the ESU total abundance. In both years the five populations with the highest wild coho abundance accounted for over 50% of the ESU total abundance. However, in 2013 the five populations were in the southern half of the ESU (Alsea to Coquille), but in 2014 had a broader geographic range (Nehalem to Coquille) and accounted for 52% versus 54% in 2013 of the ESU total abundance. Another way to track the distribution of wild coho salmon spawners across the OC Coho ESU is in the number of populations with over 20,000 wild adult coho salmon spawners. The lowest OC Coho ESU total wild coho salmon spawning abundance observed during the 25 years of this monitoring was 21,139 in 1990. In 2011, the prior peak abundance year, 5 of 24 populations had over 20,000 wild adult coho salmon spawners. Whereas, in 2014 there were 8 of 24 populations with over 20,000 wild adult coho salmon spawners, and a ninth populations was only 504 fish short of 20,000 wild adult coho salmon spawners.

The Oregon Coast Coho Conservation Plan (OCCCP) established six measureable criteria for the assessment of conservation status of the 21 independent populations in the OC Coho ESU (ODFW 2007). Metrics for two of the criteria are based on wild adult coho salmon spawner

abundance. Although the OCCCP assesses the criteria over a multi-year time frame, the annual abundance estimates can be compared to the threshold value for each metric. Criterion 1 (Adult Abundance) establishes escapement goals for each population based on the annual marine survival category (ODFW 2007, Appendix 2 Table 2). The marine survival category for 2014 was "Medium" (PFMC 2014) and 2 of 21 independent populations (Salmon and Beaver) met the OCCCP escapement goal. Criterion 5 (Diversity) is based on maintaining at least 97.5% of a population's heterozygosity over a 100 year period. The threshold value for the metric is a harmonic mean of at least 1,200 wild adult coho spawners over a modeled 100 year population abundance projection. Although the 2014 estimated abundances are not a direct evaluation of the OCCCP Criterion 5 metric, 19 of the 21 independent populations exceeded the threshold value (Table 7).

Abundance of hatchery adult coho salmon on natural spawning grounds in the OC Coho ESU in 2014 was slightly more than double the number from 2013. However, it is still the third lowest value observed in the now 25 year period (Table 7). Abundance of hatchery fish in 2014 was less than the long-term average in all 5 strata and in 20 of the 24 populations (Table 7). During the 2014 spawning season almost 3,400 coho salmon carcasses were sampled on GRTS surveys that met criteria for use in abundance estimates. This sample included a total of 24 hatchery carcasses, spread across 8 populations (Appendix Table D-4). Small sample sizes can complicate detection of hatchery fish, especially if the number of hatchery fish is low. In the 13 populations where no hatchery coho salmon carcasses were observed the number of coho salmon carcasses sampled, by population, ranged from 2 to 486 and averaged 160 (Appendix Table D-4). During 2014, only 6 of the 24 OC Coho ESU populations had an estimated abundance of greater than 100 hatchery coho salmon on natural spawning grounds (Table 7).

Distribution and Timing

In 2014, 86% of the 229 sites surveyed in the OC Coho ESU were occupied by adult coho salmon (Table 8). Occupancy in 2014 was higher than the 5 year average rate for the OC Coho ESU overall, 4 of 4 sampled strata, and 20 of 21 sampled populations. The proportion of surveys in 2014 that were occupied and contained wild fish ranged from 33% for the Mid-South Coast dependent populations to 100% in eight populations (Table 8). Occupancy rates are typically lowest in the Umpqua stratum and highest in the Lakes stratum (Table 8). While 2014 occupancy rates were above average, the largest increase from the five year averages were in the North Coast and Umpqua strata. The North Umpqua was excluded from the occupancy rate determination since there was only one site evaluated, and the Lakes strata was excluded due to no random sites conducted in 2014. The Mid-Coast stratum had the least change between the 5 year average and 2014 wild coho salmon occupancy rate (Table 8).

Adult coho salmon density in 2014 was relatively high across the ESU (Figure 7). Coho salmon density was calculated as the AUC estimate divided by the miles surveyed. The highest coho salmon density in 2014 was observed in the Beaver Creek population at about 503 adult coho salmon per mile (Figure 7; Appendix Table D-4). In 2014 there were eight populations with coho salmon densities over 100 fish per mile. The lowest 2014 adult coho salmon densities were in 2 populations with less than 5 adult coho salmon per mile (Figure 7; Appendix Table D-4).

Table 8. Oregon Coast Coho ESU adult coho salmon occupancy (total & wild) by population, stratum, and ESU; 2014 run year and previous 5 year average (2009–13). Occupancy is defined as a peak of at least 4 adult coho salmon per mile of survey. Occupied sites with at least one documented wild coho salmon are considered wild occupied.

ESU, Stratum, and TRT Population	2014 No. sites surveyed	5 yr avg. No. sites surveyed	Total coho salmon		Wild coho salmon	
			2014 % Occupied	5 yr avg. % Occupied	2014 % Occupied	5 yr avg. % Occupied
Oregon Coast ESU	**229**	**456**	**86.0%**	**74.4%**	**85.2%**	**70.9%**
North Coast Stratum	**59**	**108**	**88.1%**	**69.8%**	**84.7%**	**64.8%**
Necanicum River	11	18	100.0%	76.1%	100.0%	74.0%
Nehalem River	13	26	92.3%	68.4%	92.3%	65.4%
Tillamook Bay	14	24	92.9%	77.6%	85.7%	68.7%
Nestucca River	12	21	83.3%	66.9%	75.0%	62.0%
NC Dependents	9	18	66.7%	55.0%	66.7%	51.1%
Mid-Coast Stratum	**78**	**142**	**89.7%**	**83.1%**	**89.7%**	**80.3%**
Salmon River	17	11	88.2%	73.7%	88.2%	67.9%
Siletz River	12	24	100.0%	90.3%	100.0%	89.5%
Yaquina River	10	25	100.0%	87.3%	100.0%	85.0%
Beaver Creek	5	6	100.0%	100.0%	100.0%	100.0%
Alsea River	11	29	100.0%	93.8%	100.0%	91.8%
Siuslaw River	12	28	75.0%	84.2%	75.0%	80.3%
MC Dependents	11	18	72.7%	48.6%	72.7%	44.1%
Lakes Stratum	**0**	**34**	**0**	**88.3%**	**0**	**87.3%**
Siltcoos Lake	0	15	0	83.4%	0	83.4%
Tahkenitch Lake	0	5	0	97.1%	0	97.1%
Tenmile Lake	0	14	0	90.7%	0	88.2%
Umpqua Stratum	**51**	**94**	**80.4%**	**63.4%**	**80.4%**	**59.8%**
Lower Umpqua River	18	27	83.3%	79.7%	83.3%	75.8%
Mid. Umpqua River	15	23	73.3%	63.4%	73.3%	60.3%
North Umpqua River	1	17	100.0%	48.2%	100.0%	43.4%
South Umpqua River	17	27	82.4%	60.4%	82.4%	58.2%
Mid-South Stratum	**41**	**79**	**82.9%**	**74.7%**	**82.9%**	**71.9%**
Coos River	18	29	100.0%	78.4%	100.0%	74.3%
Coquille River	15	27	80.0%	79.2%	80.0%	77.8%
Floras Creek	1	10	100.0%	88.9%	100.0%	86.7%
Sixes River	4	10	50.0%	32.8%	50.0%	28.8%
MSC Dependents	3	3	33.3%	32.0%	33.3%	32.0%

Due to sample size issues, coho salmon distribution within a population was evaluated for only 15 of the 24 populations (Table 9). In 2014 the Alsea River population had the most even and Coquille River population had the patchiest spatial distribution (Table 9). The percent of GRTS sites in a population with live coho observed (AUC > 0) averaged 92%, and ranged from 80% in two populations to 100% in six populations (Table 9).

Table 9. Distribution metrics for Oregon Coast Coho ESU populations, 2014 run year. Total fish metrics were calculated for populations with at least 10 sites, hatchery and wild metrics were calculated for populations with adequate site specific pHOS data. Populations with uniform distribution would have AOC = 0.5, $P_{80\%}$ = 0.8, and % sites with fish = 100%.

		Total coho salmon			Wild coho salmon			Hatchery coho salmon		
Oregon Coast populations	# of Sites	AOC	$P_{80\%}$	% sites with fish	AOC	$P_{80\%}$	% sites with fish	AOC	$P_{80\%}$	% sites with fish
Necanicum River	11	0.30	0.47	100%	0.29	0.47	100%	0.10	0.16	27%
Nehalem River	13	0.29	0.50	92%	0.30	0.51	92%	0.07	0.12	23%
Tillamook Bay	14	0.26	0.45	93%	0.27	0.45	93%	0.10	0.17	43%
Nestucca River	12	0.23	0.38	83%	--	--	--	--	--	--
NC Dependent	9	n.a.	n.a.	n.a.	--	--	--	--	--	--
Salmon River	17	0.24	0.38	100%	0.24	0.38	100%	0.07	0.10	29%
Siletz River	12	0.27	0.46	100%	0.27	0.46	100%	0.04	0.08	8%
Yaquina River	10	0.28	0.53	100%	--	--	--	--	--	--
Beaver Creek	5	n.a.	n.a.	n.a.	--	--	--	--	--	--
Alsea River	11	0.34	0.59	100%	--	--	--	--	--	--
Siuslaw River	12	0.31	0.52	92%	0.31	0.52	92%	0.04	0.08	8%
MC Dependent	11	0.27	0.46	91%	0.26	0.46	91%	0.10	0.17	27%
Siltcoos Lake	0	n.a.	n.a.	n.a.	--	--	--	--	--	--
Tahkenitch Lake	0	n.a.	n.a.	n.a.	--	--	--	--	--	--
Tenmile Lake	0	n.a.	n.a.	n.a.	--	--	--	--	--	--
Lower Umpqua R.	18	0.27	0.45	89%	--	--	--	--	--	--
Middle Umpqua R.	15	0.21	0.35	80%	--	--	--	--	--	--
North Umpqua R.	1	n.a.	n.a.	n.a.	--	--	--	--	--	--
South Umpqua R.	17	0.25	0.43	82%	0.24	0.42	82%	0.14	0.25	47%
Coos River	18	0.24	0.43	100%	--	--	--	--	--	--
Coquille River	15	0.17	0.26	80%	--	--	--	--	--	--
Floras Creek	1	n.a.	n.a.	n.a.	--	--	--	--	--	--
Sixes River	4	n.a.	n.a.	n.a.	--	--	--	--	--	--
MSC Dependent	3	n.a.	n.a.	n.a.	--	--	--	--	--	--

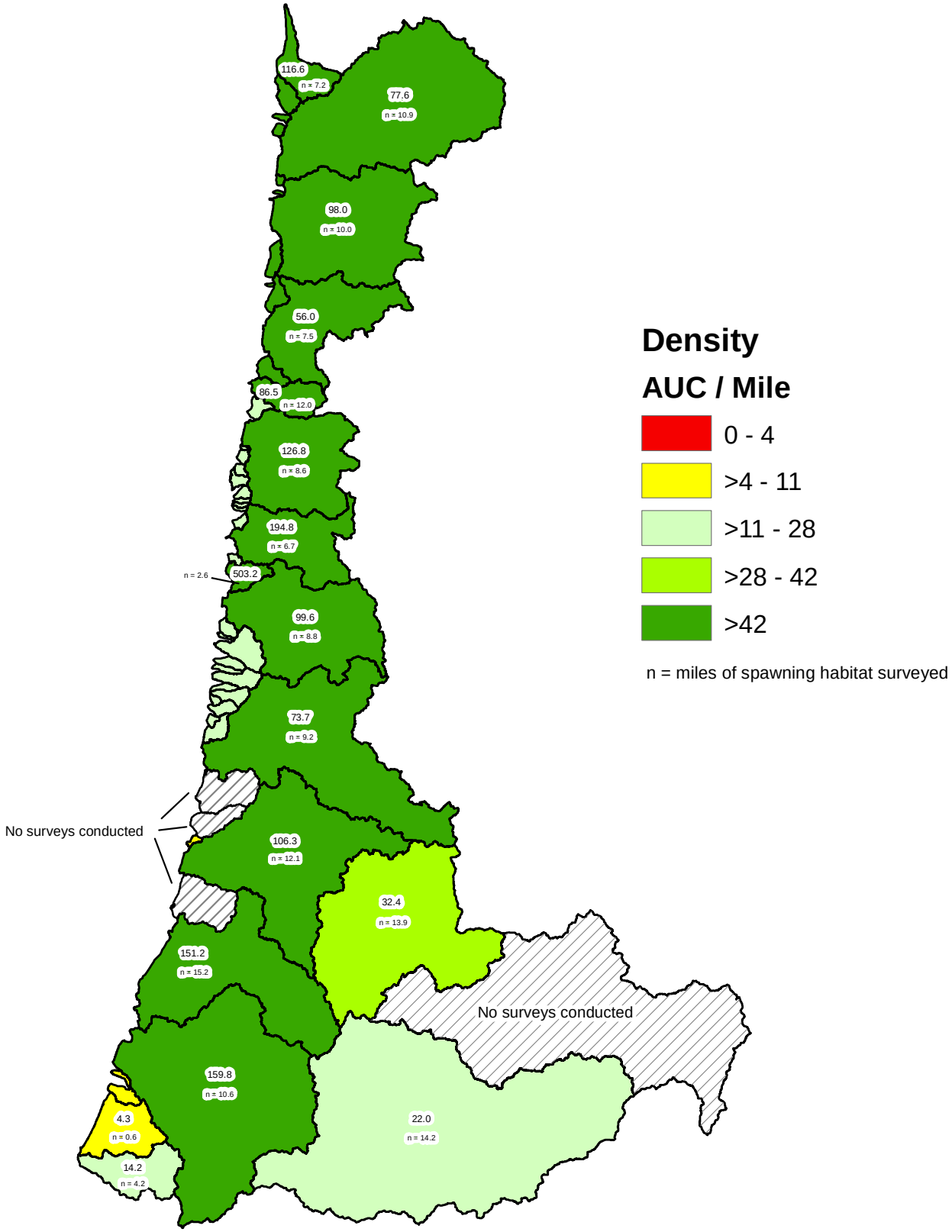


Figure 7. Coho salmon density (AUC/mile) in GRTS surveys by Oregon Coast TRT population, 2014. Functionally independent and potentially independent populations are labeled. For further detail see Appendix Table D-4.

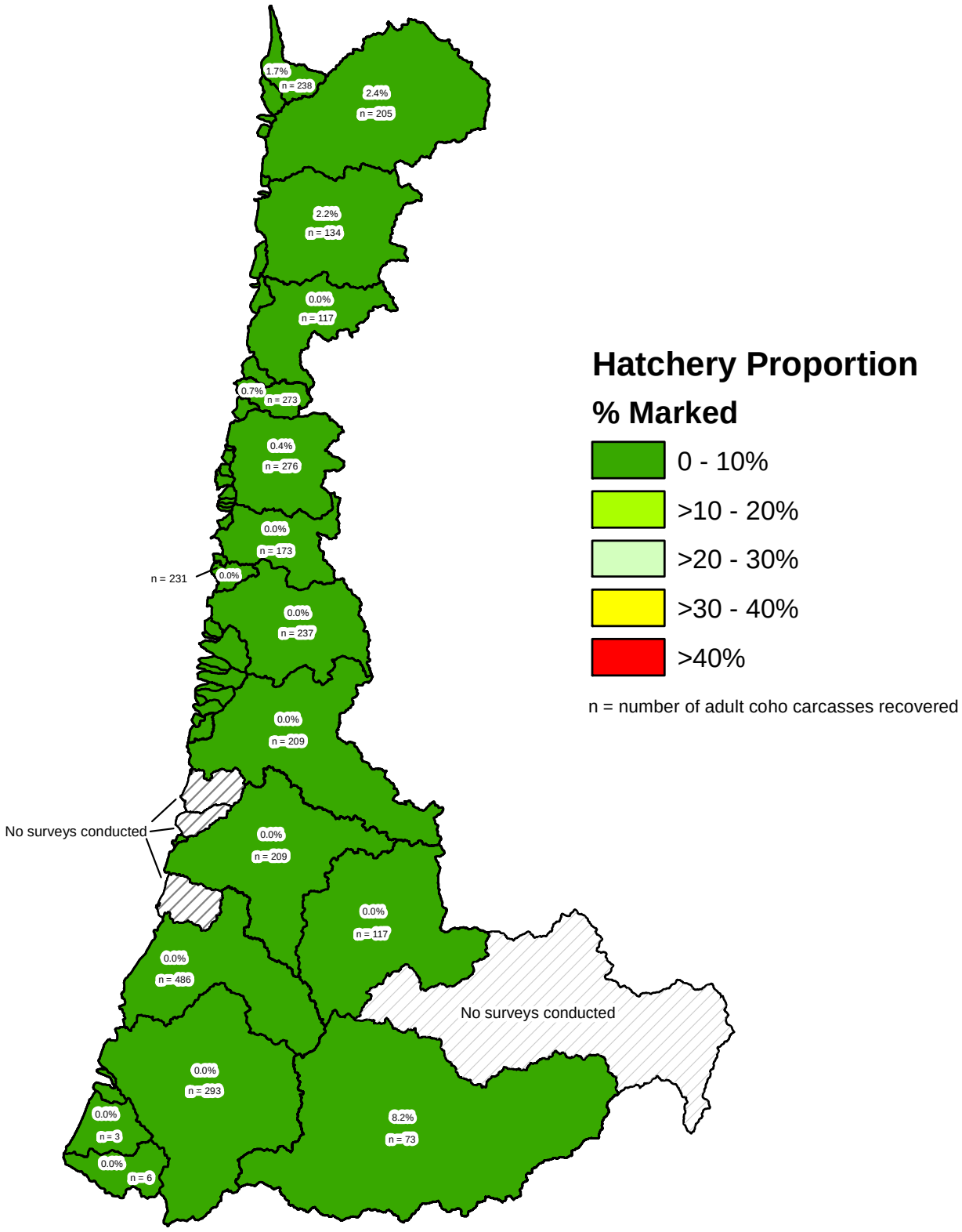


Figure 8. Percentage of marked adult coho salmon in GRTS surveys by Oregon Coast TRT population, 2014. Functionally independent and potentially independent populations are labeled. For further detail see Appendix Table D-4.

Inadequate samples for determining pHOS at spatial scales smaller than the TRT population limited the analysis of distribution by rearing origin. Only eights populations met the criteria for calculating distribution by rearing origin (at least 50% GRTS site and at least 90% finer than population scale pHOS values). In the Salmon River population, 3 of 17 sites accounted for 94% of hatchery coho salmon in 2014, whereas, it required 10 of 17 sites to account for 93% of the wild coho spawners (Figure 9).

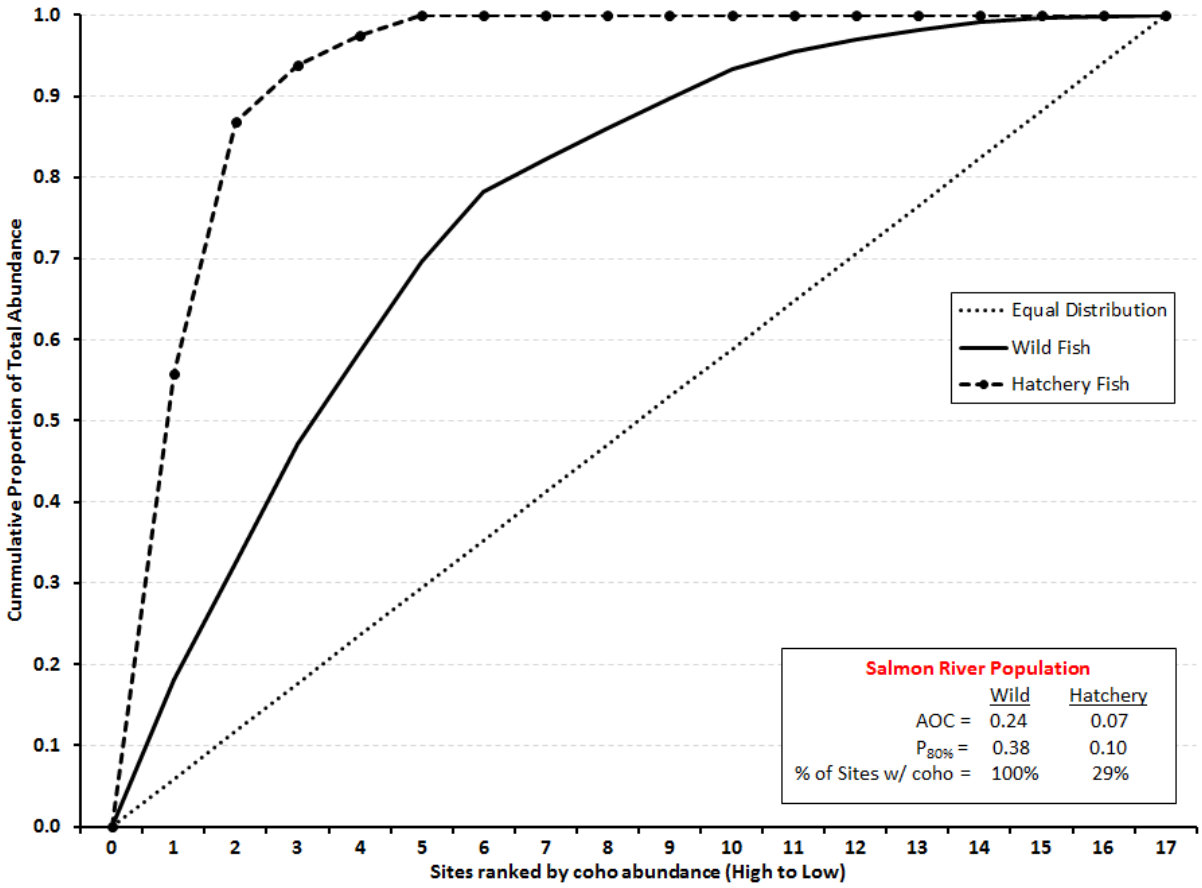


Figure 9. Cumulative frequency distribution of coho salmon in the Salmon River population, 2014 run year.

Peak run timing of coho salmon spawners typically occurs in mid to late December in the OC Coho ESU. Run timing in 2014 was earlier than average with a peak in early December (Figure 10). The above average stream flow between mid-October and early November likely contributed to the slightly earlier than normal run timing. Even though run timing was earlier than the average, the peak was still well above average (Figure 10). On average, about 90% of the live coho salmon seen on OC Coho ESU spawning surveys are seen between mid-November and late January (Figure 10). This is both a longer period and later in the season than for the LCR Coho ESU, where 90% were seen from mid-October to early December (Figure 5).

Proportion Hatchery Fish

The OC Coho ESU naturally spawning coho salmon abundance averaged 11.7% hatchery coho salmon and ranged from 0.8% to 31.4% for the 1990 through 2013 run years (Table 7). In 2014 the proportion of hatchery fish on OC Coho ESU natural spawning grounds was 0.8%, and all five strata and all 24 populations met the Native Fish Conservation Policy (OAR 635-007-0502) interim criteria of at least 90% naturally produced spawners (Table 7 and Figure 8). A total of 268,326 hatchery coho salmon smolts were released in the OC Coho ESU in 2013 (adult returns in 2014). The releases occurred in only 4 of the 24 populations (Nehalem, Tillamook, Mid-Coast Dependent and South Umpqua) and represent about five percent of the 5 million hatchery coho salmon smolts released annually in the OC Coho ESU in the early 1990's (Lewis 2000). In 2014, the four OC Coho ESU populations with hatchery coho smolt releases in 2013 had pHOS rates ranging from 2.2% in the Tillamook to 8.2% in the South Umpqua (Table 7). The reduction in Oregon coastal hatchery coho salmon releases has reduced the number of hatchery coho salmon adults spawning naturally and thus pHOS rate, within the ESU. Only two populations without hatchery coho smolt releases in 2013 had 2014 pHOS rates greater than 2.0%, and both are adjacent to populations with hatchery releases. The North Umpqua had a 2.6% pHOS and the North Coast Dependents a 2.4% pHOS rate in 2014 (Table 7).

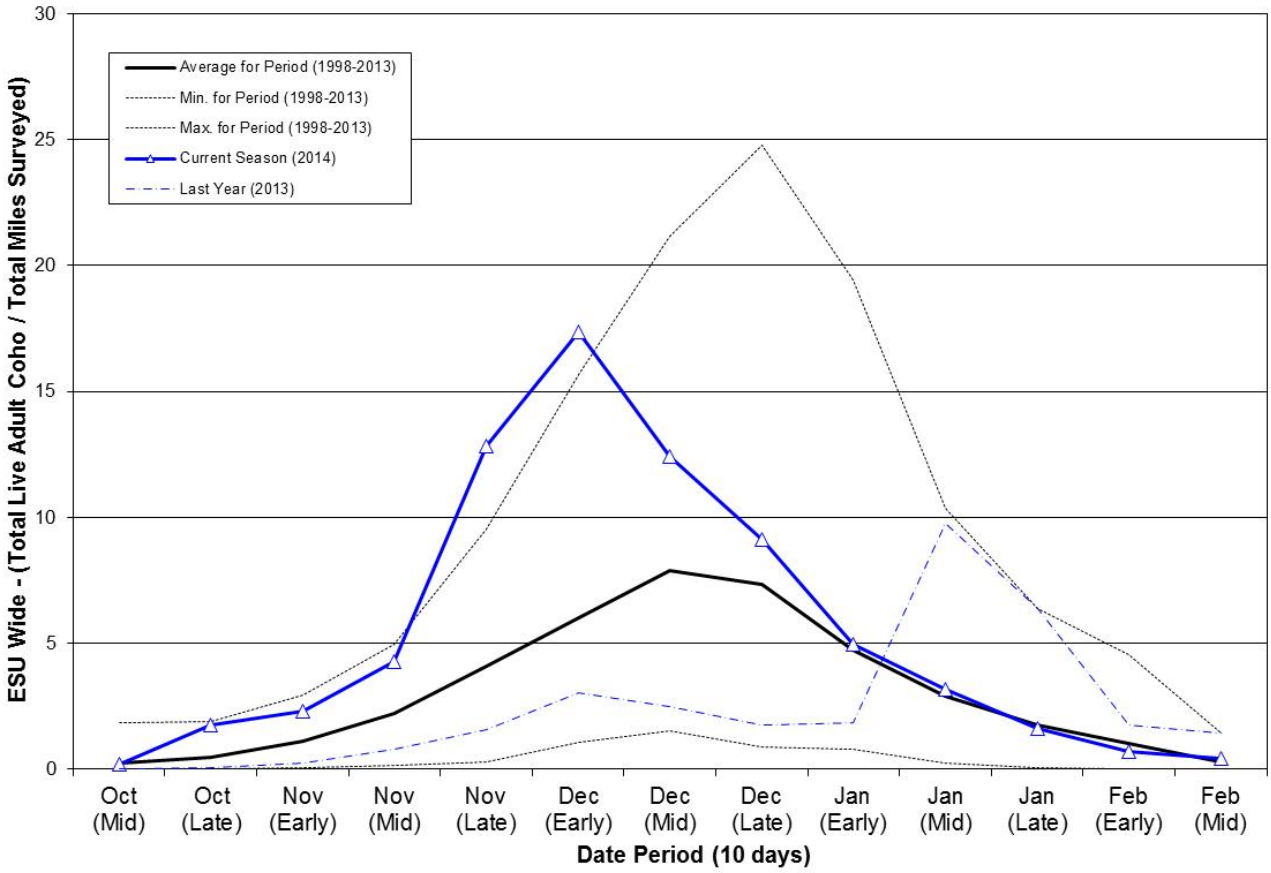


Figure 10. Run timing of live adult coho salmon in 2014 on GRTS spawning ground surveys in the Oregon Coast Coho ESU.

Southern Oregon/Northern California Coasts Evolutionarily Significant Unit

The Southern Oregon/Northern California Coasts Coho ESU includes coho salmon populations in Oregon and California. Naturally produced coho salmon in the SONCC Coho ESU were listed as "threatened" in 1997 under the federal ESA (NMFS 1997). This report covers spawning escapement monitoring of the Oregon populations in the SONCC Coho ESU, for the 2014 spawning season. The TRT for the SONCC Coho ESU reviewed the historical coho salmon population structure of this ESU and identified seven functionally or potentially independent and nine dependent or ephemeral Oregon coho salmon populations (Figure 1). Geographically, these Oregon populations occupy the northern third of the ESU and, based on an assessment of stream habitat intrinsic potential, represent a similar proportion of the historic coho salmon habitat potential for the ESU (Williams et.al. 2006).

Table 10. Southern Oregon/Northern California Coast Coho ESU, GRTS spawning survey goals, responses, and estimate precision by population, 2014 run year. Target response sites are reaches within coho salmon spawning habitat which were successfully surveyed.

			Target response				95% CI as percent of point estimate (goal is +/- 30%)			
				2006 to 2008 [a]				2006 to 2008 [a]		
Stratum	Population	Goal	2014[a]	Avg.	Min.	Max.	2014[a]	Avg.	Min.	Max.
Coastal	Elk	18	--	1	0	1	--	n.a.	n.a.	n.a.
	L. Rogue	15	--	2	0	4	--	189%	189%	189%
	Chetco [b]	26	--	--	--	--	--	--	--	--
	Winchuck [b]	11	--	--	--	--	--	--	--	--
	SC Depend. [b]	15	--	--	--	--	--	--	--	--
	Total	**85**		**3**	**0**	**5**	**--**	**n.a.**	**n.a.**	**n.a.**
Interior	Illinois	30	--	3	3	4	--	113%	61%	172%
	M. Rogue & Applegate	30	--	12	8	16	--	72%	25%	127%
	U. Rogue	30	--	9	5	14	--	127%	56%	163%
	Total	**90**	**--**	**24**	**22**	**25**	**--**	**n.a.**	**n.a.**	**n.a.**
ESU Total		**175**	--	**27**	**24**	**30**	--	**71%**	**31%**	**116%**

n.a. = Not available.
a = No random (GRTS) surveys were conducted in the SONCC Coho ESU for run years 2009 through 2014.
b = The 98 and 07 GRTS sampling frames did not include any coho salmon spawning habitat in these populations.

Effort

Three methods have been used to monitor the abundance of adult coho salmon returning to fresh water in the Oregon portion of the SONCC Coho ESU. First, Gold Ray Dam was located at about river mile 126 on the Rogue River and was a complete barrier to adult salmonid migration, except through the fish ladder counting station. Gold Ray Dam was removed in 2010 and is no longer a source of monitoring data for salmon runs. Counts of adult and jack coho

salmon migrating past Gold Ray Dam are not included in this report, but are available on a web page (http://www.dfw.state.or.us/fish/local_fisheries/rogue_river/goldray/index.asp). Gold Ray Dam counts include coho salmon migrating to natural spawning grounds and coho salmon returning to Cole M. Rivers Hatchery. The hatchery is located near the base of Lost Creek Dam (~ river mile 157 on the Rogue River) and releases approximately 150,000 coho salmon smolts annually into the Rogue River adjacent to the hatchery.

Table 11. Southern Oregon/Northern California Coasts Coho ESU estimated abundance of adult coho salmon spawning naturally in the 2014 run year compared to the previous 20 years. Rogue River Populations only.

	Coho salmon	Spawning year			
			1994 to 2013		
Data component	origin	2014	Avg.	Min.	Max.
SONCC Coho ESU (Rogue Only)	**Wild**	**2,409**	**6,559**	**394**	**24,231**
	Hatchery	**117**	**451**	**0**	**1,230**
	% Hat.	**4.6%**	**6.0%**	**0.0%**	**19.2%**
Huntley Park Est. [1]	Total	3,238	12,312	572	33,601
	Wild	2,409	6,680	414	24,509
	Hatchery	829	5,631	158	14,013
Freshwater Catch [2]	Total	*NA*	332	67	862
Excluding Rogue Bay	Wild	0	0	0	0
	Hatchery	*NA*	332	67	862
Cole Rivers Hatchery [3]	Total	712	4,972	147	12,298
	Wild	0	121	0	370
	Hatchery	712	4,851	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: http://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.
NA = Data not available at time of print

Second, GRTS based coho salmon spawning ground surveys were conducted in the SONCC Coho ESU from 1998 to 2008. This effort used the 98 Frame (Table 1) which only samples coho salmon spawning habitat in the high and moderate spawner density categories. This accounts for only 29% of the coho salmon spawning habitat in Oregon populations of the SONCC Coho ESU and does not include any coho salmon spawning habitat in the Chetco River, Winchuck River, and dependent populations of the ESU (Figure 11). The 98 Frame also only accounts for a small portion of the coho salmon spawning habitat in the Elk River (20%) and in the four Rogue River coho salmon populations (32%). Finally, there are large portions of the Illinois River and the Middle Rogue and Applegate River coho salmon populations that are within the Rogue River Gorge or the Kalmiopsis Wilderness. These areas are too remote to efficiently be able to conduct spawning ground surveys on a weekly basis. Therefore, they are

excluded from the spawning survey sampling frame. Due to budget constraints no GRTS surveys were conducted in the SONCC Coho ESU in 2005, and 2009 through 2014 (Table 10).

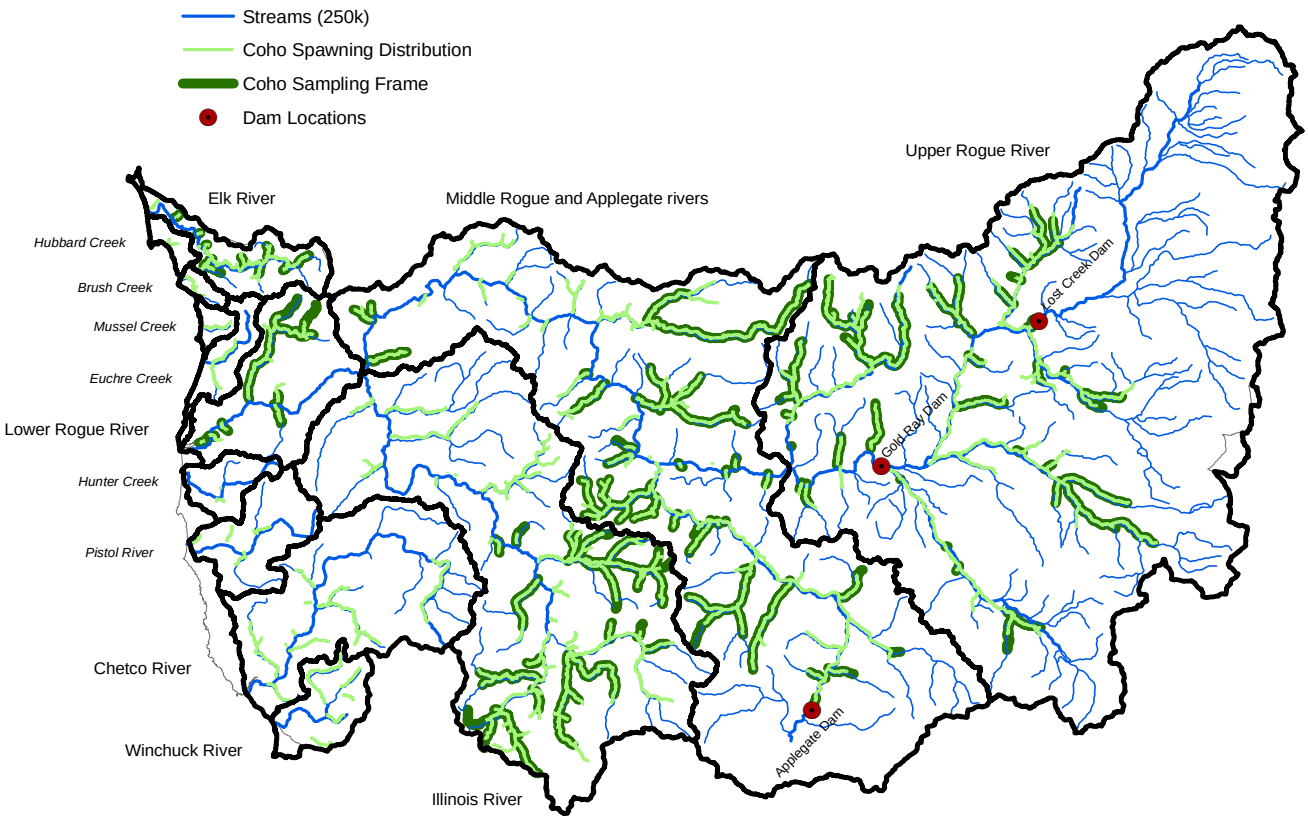


Figure 11. Distribution of coho salmon spawning habitat and the portion included in the current GRTS sampling frame for Oregon populations in the Southern Oregon/Northern California Coasts Coho ESU.

The final escapement monitoring method for the SONCC Coho ESU is a mark-recapture estimate of coho salmon entering the Rogue River. Returning adult coho salmon are sampled by seining at Huntley Park (river mile 8). The seining represents the re-capture, and provides the total coho salmon sampled (*C*) and number of Ad Clip coho salmon re-captured (*R*) for the mark-recapture equation. Adult coho salmon returning to Cole Rivers Hatchery are enumerated and also sampled for Ad Clip fish. The number of Ad Clip coho salmon collected at Cole Rivers Hatchery is expanded by a constant (1.1) to account for catch and straying of coho salmon between Huntley Park (river mile 8) and the hatchery (river mile 157). Fin-mark rates and the proportion of hatchery coho salmon at Cole Rivers Hatchery that were fin-marked are used to estimate the hatchery and wild components of the coho salmon run (Jacobs et.al. 2002). These estimates of the number of coho salmon returning to the Rogue River above Huntley Park are

then converted to estimates of the number of coho salmon spawning naturally in the Rogue. The number of hatchery and wild coho salmon retained at Cole Rivers Hatchery, and the number harvested in Rogue Basin fisheries (excluding catch in the bay) are subtracted from the Huntley Park estimate to produce an estimate of the abundance of coho salmon on natural spawning grounds in the Rogue Basin (Table 11). Cole Rivers Hatchery data is obtained from the ODFW Hatchery Management Information System. Estimates of freshwater harvest are based on return of angler harvest cards. These are generally not available until a year after the calendar year.

Abundance

Long-term monitoring of coho salmon spawner abundance in Oregon populations of the SONCC Coho ESU is based on the Huntley Park estimates of coho salmon in the Rogue Basin (Figure 12 and Table 11). Adult wild coho salmon abundance in the SONCC Coho ESU generally increased from 1994 to a peak in 2004 and then declined to a very low escapement in 2008 (Figure 12). This is similar to the pattern for the OC Coho ESU, which generally increased from 1994 to a peak in 2002 and then declined to the 2007 run year (Figure 6). Wild adult coho salmon spawner abundance in the SONCC Coho ESU increased steadily since the very low abundance in 2008 through 2013, and then in 2014 there was a significant decrease in abundance.

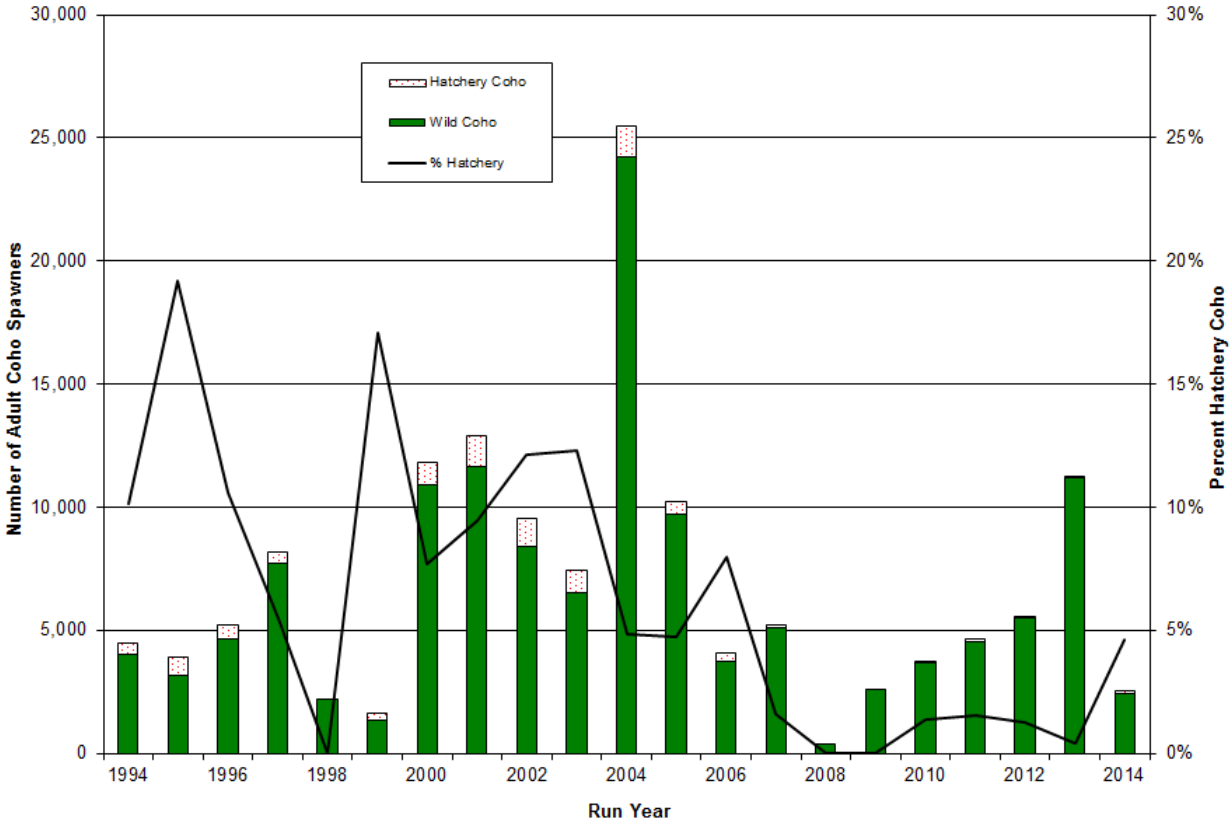


Figure 12. Southern Oregon/Northern California Coasts Coho ESU estimated abundance of adult coho salmon spawning naturally by rearing origin for the 1994 through 2014 run years. Abundance based on Huntley seining mark-recapture method.

Distribution and Timing

Huntley Park seining in the Rogue Basin provides long-term abundance data, but not spatial and temporal distribution information for coho salmon spawners. The GRTS spawning survey project can provide this information. However, no GRTS spawning grounds surveys for coho salmon were conducted in the SONCC Coho ESU in 2014. Results for previous years GRTS coho salmon spawning ground surveys in the SONCC Coho ESU are reported in Lewis et.al. (2009).

Proportion Hatchery Fish

Hatchery fish accounted for 4.6% of the naturally spawning coho salmon in the Rogue Basin in 2014 (Table 11). This is below the long-term average of 6.0% pHOS for the Rogue River naturally spawning coho salmon population. Hatchery coho salmon spawning naturally is calculated by starting with the estimated number of hatchery coho salmon passing Huntley Park (river mile 8), and then subtracting hatchery coho salmon collected upriver of Huntley Park (harvest based on angler harvest card data, and returns to Cole Rivers Hatchery). Since no GRTS spawning ground surveys were conducted in 2014 there is no direct measurement of naturally spawning hatchery coho salmon to compare to this estimate. In years with both estimates of pHOS in the Rogue naturally spawning coho salmon population, the two methods produced comparable results (Lewis et.al. 2009).

ACKNOWLEDGEMENTS

We would like to thank the many field biologists and project staff who prepare for the season and conduct the surveys each year. Without their tireless efforts, hard work, and diligence this report would not be possible. We would also like to thank the ODFW staff who conduct the Huntley Park seining and who count and sample fish at hatcheries, dams, and fish traps for their hard work and dedication that provides such valuable data for this work. We are very grateful to staff at the Oregon State University statistics department and the Corvallis U.S. Environmental Protection Agency for their help with sampling design and statistical analysis.

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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 2014. 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	**92**	**81.6**	**15,723**	**3,550**	**12,851**	**3,218**
Coast Stratum	**38**	**33.9**	**5,024**	**1,157**	**4,603**	**1,086**
Youngs Bay	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Big Creek	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
Clatskanie River	22	21.5	3,547	846	3,126	745
Scappoose River	16	12.4	1,477	790	1,477	790
Cascade Stratum	**50**	**46.0**	**9,786**	**3,355**	**7,844**	**3,029**
Clackamas River	21	18.0	2,605	850	2,245	733
Eagle Creek (Clackamas)	8	9.3	1,609	1,171	195	142
Sandy River	21	18.8	5,572	3,027	5,403	2,936
Gorge Stratum	**4**	**1.7**	**913**	**67**	**404**	**33**
Lower Gorge	3	1.3	739	67	362	33
Hood River	1	0.4	174	n.a.	42	n.a.

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 2014.

ESU, Stratum, and TRT Population	Counting station	Spawning year			
			2002 to 2013		
		2014	Avg.	Min.	Max.
Lower Columbia River ESU					
Coast Stratum					
Youngs Bay	Klaskanine Hatchery	57	22	2	68
Big Creek	Big Creek Hatchery	606	219	46	487
Scappoose River	Bonnie Falls Trap	110	50	2	136
Cascade Stratum					
Clackamas River	N Fk Clackamas Dam	8,230	2,096	835	5,461
Sandy River	Sandy Hatchery [a]	539	155	57	234
	Marmot Dam	n.a.	809	310	1,173
Gorge Stratum					
Hood River	Powerdale Dam	n.a.	52	27	126

a = Sandy Hatchery count through 2009 is number released above Marmot Dam, which was removed in 2006. Beginning in 2010, Sandy Hatchery releases the fish 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 2014. n.a. = not available.

Return Year	Youngs Bay	Big Creek	Clatskanie	Scappoose	Clackamas	Sandy	Lower Gorge	Hood River
2002	411	98	104	502	1,981	382	338	147
2003	113	435	563	336	2,507	1,348	n.a.	41
2004	149	112	398	755	2,874	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	21	212	583	375	3,608	687	126	170
2008	82	360	995	292	1,694	1,277	223	69
2009	26	792	1,070	778	7,982	1,493	468	65
2010	68	279	1,609	1,960	1,757	901	920	223
2011	161	160	1,506	298	2,254	3,494	216	232
2012	129	409	619	210	1,580	1,165	96	169
2013	n.a.	n.a.	443	979	3,202	667	152	889
2014	n.a.	n.a.	3,126	1,587	10,670	5,942	362	42

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 2014. 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	**229**	**172.9**	**335,231**	**42,728**	**332,453**	**42,559**
North Coast Stratum	**59**	**40.6**	**68,803**	**15,189**	**67,370**	**14,846**
Necanicum River	11	7.2	5,825	2,387	5,727	2,347
Nehalem River	13	10.9	31,341	11,935	30,577	11,643
Tillamook Bay	14	10.0	20,550	7,428	20,090	7,262
Nestucca River	12	7.5	6,369	3,148	6,369	3,148
NC Dependents	9	5.0	4,718	4,184	4,607	4,085
Mid-Coast Stratum	**78**	**57.8**	**122,056**	**22,732**	**121,840**	**22,716**
Salmon River	17	12.0	3,707	867	3,680	861
Siletz River	12	8.6	19,567	9,174	19,496	9,140
Yaquina River	10	6.7	25,582	13,965	25,582	13,965
Beaver Creek	5	2.6	6,564	2,927	6,564	2,927
Alsea River	11	8.8	25,733	7,388	25,733	7,388
Siuslaw River	12	9.2	38,896	13,149	38,896	13,149
MC Dependents	11	9.9	2,008	867	1,890	816
Umpqua Stratum	**51**	**41.3**	**63,315**	**14,183**	**62,293**	**14,065**
Lower Umpqua River	18	12.1	36,942	11,465	36,942	11,465
Middle Umpqua River	15	13.9	13,939	6,976	13,939	6,976
North Umpqua River	1	1.1				
South Umpqua River	17	14.2	12,434	4,588	11,412	4,211
Mid-South Coast Stratum	**41**	**33.3**	**81,057**	**29,615**	**80,951**	**29,615**
Coos River	18	15.2	38,880	19,615	38,880	19,615
Coquille River	15	10.6	41,660	22,185	41,660	22,185
Floras Creek	1	0.6				
Sixes River	4	4.2	410	348	410	348
MSC Dependents	3	2.6	107	209		

Table B-2. Comparison of 2014 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**	**8**	**6.6**	**22,010**		**22,010**	
Siltcoos	5	2	2.5	7,178		7,178	
Tahkenitch	2	2	1.6	3,691		3,691	
Tenmile	7	4	2.5	11,141		11,141	

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, 2014 compared to the previous 5 years.

Data component	Coho salmon origin	Spawning year			
			2009 to 2013		
		2014	Avg.	Min.	Max.
North Umpqua Coho salmon	**Wild**	3,979	5,809	2,774	9,397
	Hatchery	105	500	153	638
	% Hat.	2.6%	9.9%	2.5%	18.2%
GRTS Estimate below Winchester Dam [1]	Total	298	29	21	37
	Wild	298	29	21	37
	Hatchery	0	0	0	0
Winchester Dam [2]	Total	3,786	6,384	3,359	10,127
	Wild	3,681	5,841	2,737	9,462
	Hatchery	105	543	169	669
Freshwater Catch [3] Above Winchester Dam	Total	0	40	5	115
	Wild	0	0	0	0
	Hatchery	0	40	5	115
Rock Creek Hatchery [4]	Total	0	46	0	96
	Wild	0	43	0	86
	Hatchery	0	3	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 (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 2014. 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	0	0	0	0	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	242	1,468	547	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	7,283
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	101

Table B-4. Concluded.

Stratum and Population	2012	2013	2014
North Coast			
Necanicum River	902	798	5,727
Nehalem River	2,963	4,539	30,577
Tillamook Bay	1,686	4,402	20,090
Nestucca River	1,751	946	6,369
NC Dependents	218	271	4,607
Mid-Coast			
Salmon River	297	1,165	3,680
Siletz River	4,495	7,660	19,496
Yaquina River	6,268	3,553	25,582
Beaver Creek	1,878	2,015	6,564
Alsea River	8,470	9,283	25,786
Siuslaw River	11,946	14,118	38,896
MC Dependents	492	1,929	1,890
Umpqua			
Lower Umpqua River	3,731	7,792	36,942
Middle Umpqua River	2,447	4,272	13,939
North Umpqua River	3,134	2,774	3,979
South Umpqua River	11,636	12,178	11,412
Lakes			
Siltcoos	3,945	3,797	7,178
Tahkenitch	5,675	3,413	3,691
Tenmile	9,302	6,449	11,141
Mid-South Coast			
Coos River	9,414	6,884	38,880
Coquille River	5,911	23,637	41,660
Floras Creek	2,502	1,936	1,022
Sixes River	34	567	410
MSC Dependents	48	33	106

APPENDIX C (SONCC COHO ESU)

Table C-1. Results of randomly selected spawning ground surveys for coho salmon in the Oregon portion of the SONCC Coho ESU, run year 2014. Estimates derived using GRTS protocol and are adjusted for visual observation bias. Estimates of wild spawners derived through application of carcass fin-mark observations. Missing values for populations indicate inadequate samples for determining total and/or wild abundance.

Monitoring area TRT Population	Survey effort number of		Adult coho salmon spawner abundance			
			Total		Wild	
	Surveys	Miles	Estimate	95% CI	Estimate	95% CI
South Coast *Note: Not sampled due to budget constraints.*						

Table C-2. Estimates of adult coho salmon run size in the Rogue River derived from Huntley Park seining and returns to Cole Rivers Hatchery, 1990 through 2014.

	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	3	56	452	103	1,625	1,536	1,243	1,343
1991	11	106	2,209	277	2,729	1,455	471	604
1992	4	86	1,338	168	3,236	2,754	2,037	2,185
1993	2	34	756	104	1,342	1,452	768	1,099
1994	92	174	6,590	5,564	11,518	1,602	4,305	980
1995	139	211	8,714	7,757	12,923	1,248	3,359	636
1996	205	375	7,921	6,940	13,936	1,280	5,241	785
1997	245	501	8,001	7,571	16,997	1,517	8,213	1,054
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	423	1,041	12,759	9,837	26,596	1,950	12,579	1,341
2002	345	752	11,599	8,831	21,143	1,638	8,403	1,033
2003	170	450	6,656	4,842	14,050	1,659	6,754	1,150
2004	260	1,264	8,289	6,297	33,578	3,629	24,486	3,099
2005	146	519	4,876	3,930	15,296	2,094	9,957	1,690
2006	174	457	3,188	2,581	7,433	866	3,937	630
2007	86	343	2,085	1,727	7,517	1,365	5,242	1,140
2008	19	107	148	95	572	226	414	192
2009	12	80	503	449	3,084	1,536	2,566	1,401
2010	13	143	730	337	3,826	1,904	3,073	1,706
2011	24	147	1,086	778	5,073	1,813	3,917	1,593
2012	36	201	1,322	1,142	6,863	1,999	5,440	1,779
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

APPENDIX D

Table D-1. Site status of 2014 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 2009 to 2013.

		Target response				Target non-response				Non-target			
Stratum	Population	2014	Avg.	Min	Max	2014	Avg.	Min	Max	2014	Avg.	Min	Max
Coast	Youngs Bay	0	14	0	22	0	4	0	8	0	6	6	7
	Big Creek	0	6	0	10	0	4	1	9	0	2	0	2
	Clatskanie	22	19	13	28	0	7	2	13	2	1	0	2
	Scappoose	16	18	15	24	16	12	10	14	1	1	0	3
	Total	**38**	**56**	**39**	**75**	**16**	**25**	**14**	**35**	**3**	**8**	**2**	**11**
Cascade	Clackamas	29	18	16	27	11	19	11	23	0	0	0	2
	Sandy	21	26	23	28	17	11	6	16	1	2	1	4
	Total	**50**	**44**	**40**	**50**	**28**	**30**	**24**	**36**	**1**	**3**	**1**	**4**
Gorge	Lower Gorge	3	2	1	4	2	2	0	4	0	0	0	0
	Hood	1	4	2	6	0	1	0	2	1	1	0	2
	Total	**4**	**6**	**4**	**8**	**2**	**3**	**0**	**4**	**1**	**1**	**0**	**2**
ESU Total		**92**	**107**	**87**	**133**	**46**	**58**	**49**	**75**	**5**	**12**	**7**	**15**

Table D-2. Site status of 2014 GRTS samples in the Southern Oregon/Northern California Coasts Coho ESU by TRT population. Target and Response categories as defined in Table D-1. Average is for 2006 to 2008.

		Target response				Target non-response				Non-target			
Stratum	Population	2014	Avg.	Min	Max	2014	Avg.	Min	Max	2014	Avg.	Min	Max
Coastal Sub-basins	Elk River	0	1	0	1	0	0	0	0	0	0	0	0
	L. Rogue R.	0	2	0	4	0	6	4	9	0	1	1	1
	Chetco River	0	0	0	0	0	0	0	0	0	0	0	0
	Winchuck R.	0	0	0	0	0	0	0	0	0	0	0	0
	SC Depend.	0	0	0	0	0	0	0	0	0	0	0	0
	Total	**0**	**3**	**0**	**5**	**0**	**6**	**4**	**9**	**0**	**1**	**1**	**1**
Interior Sub-basins	Illinois River	0	3	3	4	0	13	9	16	0	3	1	4
	M. Rogue & Applegate R.	0	12	8	16	0	18	7	27	0	0	0	1
	U. Rogue R.	0	9	5	14	0	14	3	20	0	0	0	1
	Total	**0**	**24**	**22**	**25**	**0**	**45**	**19**	**60**	**0**	**3**	**2**	**5**
ESU Total		**0**	**27**	**24**	**30**	**0**	**51**	**28**	**64**	**0**	**4**	**3**	**6**

Table D-3. Site status of 2014 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 2009 to 2013.

		Target response				Target non-response				Non-target			
Stratum	Population	2014	Avg.	Min	Max	2014	Avg.	Min	Max	2014	Avg.	Min	Max
North Coast	Necanicum	11	18	15	21	1	7	5	11	2	5	3	8
	Nehalem	13	26	13	34	1	12	3	23	4	5	3	7
	Tillamook	14	24	19	31	10	13	9	20	0	13	6	20
	Nestucca	12	21	12	31	9	17	8	30	4	10	8	12
	NC Depend.	9	18	15	21	2	4	2	8	4	15	12	17
	Total	**59**	**108**	**81**	**131**	**23**	**54**	**34**	**72**	**14**	**48**	**42**	**57**
Mid-Coast	Salmon	17	11	7	16	13	13	8	22	1	5	2	7
	Siletz	12	24	21	29	3	13	3	20	12	10	7	12
	Yaquina	10	25	21	28	8	13	6	21	1	12	12	13
	Beaver	5	6	2	8	3	5	2	8	0	5	2	8
	Alsea	11	29	26	32	5	10	6	13	2	10	7	14
	Siuslaw	12	28	24	36	3	12	7	15	2	3	0	6
	MC Depend.	11	18	15	20	6	16	12	21	1	20	16	25
	Total	**78**	**142**	**130**	**158**	**41**	**81**	**66**	**103**	**19**	**66**	**59**	**77**
Lakes	Siltcoos	0	15	8	21	0	12	8	21	0	12	10	16
	Tahkenitch	0	5	2	7	0	2	0	6	0	5	1	8
	Tenmile	0	14	10	18	0	11	5	14	0	5	2	7
	Total	**0**	**34**	**22**	**44**	**0**	**25**	**20**	**40**	**0**	**23**	**18**	**27**
Umpqua	L. Umpqua	18	27	25	30	7	16	12	22	1	2	1	2
	M. Umpqua	15	23	14	28	11	19	8	29	1	4	2	6
	N. Umpqua	1	17	1	36	9	10	2	27	0	2	0	4
	S. Umpqua	17	27	22	30	16	14	8	23	1	11	8	13
	Total	**51**	**94**	**71**	**116**	**43**	**60**	**33**	**78**	**3**	**18**	**12**	**21**
Mid-South Coast	Coos	18	29	23	35	3	12	6	22	2	6	5	7
	Coquille	15	27	16	34	11	21	17	33	0	3	0	6
	Floras	1	10	6	18	24	15	6	19	1	4	3	6
	Sixes	4	10	1	19	11	10	6	18	0	1	0	2
	MS Depend.	3	3	1	5	12	14	11	18	4	7	5	9
	Total	**41**	**79**	**58**	**109**	**61**	**73**	**55**	**94**	**7**	**21**	**16**	**26**
ESU Total		**229**	**456**	**405**	**522**	**168**	**292**	**247**	**350**	**43**	**176**	**161**	**196**

Table D-4. 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 2014 spawning year.

ESU	Stratum	Population	Total valid surveys	Total live adults	Live adults w/ known mark	Total carcasses	Marked carcasses	2014 Density	2009-13 Avg. Density	2014 % Marked	2009-13 Avg. % Marked
Lower Columbia River	Coastal	Youngs Bay	0	n.a.	n.a.	n.a.	n.a.	n.a.	5.4	n.a.	71.3%
		Big Creek	0	n.a.	n.a.	n.a.	n.a.	n.a.	18.8	n.a.	73.4%
		Clatskanie River	22	1,583	1,051	160	19	61.0	20.0	11.9%	14.8%
		Scappoose Creek	16	290	168	23	0	20.0	11.7	0.0%	0.0%
	Cascade	Clackamas River	29	978	550	564	350	23.1	11.9	41.2%	44.0%
		Sandy River	21	1,128	262	66	2	63.0	17.4	3.0%	10.7%
	Gorge	Lower Gorge	3	235	134	51	3	153.4	99.2	51.9%	30.5%
		Hood River	1	41	30	7	5	71.1	231.6	75.9%	48.3%
Oregon Coast	North Coast	Necanicum River	11	1,028	482	238	4	116.6	48.9	1.7%	0.6%
		Nehalem River	13	1,043	655	205	5	77.6	27.8	2.4%	2.1%
		Tillamook Bay	14	1,127	527	134	3	98.0	48.6	2.2%	2.1%
		Nestucca River	12	429	214	117	0	56.0	25.4	0.0%	1.6%
		NC Dependents	9	679	243	85	2	121.0	30.6	2.4%	0.5%
	Mid-Coast	Salmon River	17	1,192	682	273	2	86.5	32.0	0.7%	0.8%
		Siletz River	12	1,232	1,200	276	1	126.8	86.4	0.4%	0.9%
		Yaquina River	10	1,410	1,396	173	0	194.8	79.3	0.0%	0.9%
		Beaver Creek	5	1,353	1,200	231	0	503.2	160.5	0.0%	0.0%
		Alsea River	11	1,049	957	237	0	99.6	51.9	0.0%	0.2%
		Siuslaw River	12	748	605	209	0	73.7	33.8	0.0%	1.1%
		MC Dependents	11	146	104	17	1	13.6	16.5	5.9%	0.4%
	Lakes	Siltcoos Lake	0	n.a.	n.a.	n.a.	n.a.	n.a.	186.4	n.a.	0.1%
		Tahkenitch Lake	0	n.a.	n.a.	n.a.	n.a.	n.a.	349.6	n.a.	0.1%
		Tenmile Lake	0	n.a.	n.a.	n.a.	n.a.	n.a.	198.4	n.a.	0.2%
	Mid-South Coast	Coos Bay	18	2,368	1,147	486	0	151.2	71.8	0.0%	0.3%
		Coquille River	15	1,600	1,281	293	0	159.8	71.5	0.0%	0.5%
		Floras Creek	1	2	0	3	0	4.3	169.4	0.0%	0.0%
		Sixes River	4	51	13	6	0	14.2	9.0	0.0%	1.9%
		MS Dependents	3	8	6	2	0	4.0	8.2	0.0%	1.4%
	Umpqua	Lower Umpqua	18	1,488	963	209	0	106.3	36.8	0.0%	0.9%
		Middle Umpqua	15	540	340	117	0	32.4	34.9	0.0%	0.1%
		North Umpqua	1	22	18	2	0	15.9	17.0	0.0%	2.8%
		South Umpqua	17	343	263	73	6	22.0	39.1	8.2%	4.0%

n.a. = not available due to; not sampled, or no known mark status adults observed.