THE OREGON PLAN for Salmon and Watersheds

Status of Oregon Stocks of Coho Salmon, 2004 through 2008

Report Number: OPSW-ODFW-2009-3

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CONTENTS

Page

FIGURES

TABLES

APPENDIX TABLES

SUMMARY

This report summarizes five years of monitoring status and trend in Oregon's naturally spawning coho salmon (*Oncorhynchus kisutch*) populations. The five coho run years reported are 2004 through 2008. Monitoring results include: abundance of naturally spawning coho; density of spawning coho; coho spawn timing; and proportion of hatchery (marked) coho in naturally spawning populations. These results are based on data from randomly selected spawning surveys, as well as other methods in areas without adequate random surveys. Results for coho standard spawning surveys, as well as 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 Population. There are three coho ESU's 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 Coasts (SONCC) Coho ESU. This report summarizes results for coho populations in the portion of each ESU that is within the State of Oregon.

In the Oregon portion of the LCR Coho ESU sufficient surveys were conducted to meet precision goals at the ESU level three out of the five sampling years. At the population complex scale, yearly precision goals were rarely met. Wild spawner abundance remained fairly stable over the five sampling years; hatchery abundance was more variable. Regional patterns in fish distribution, spawn timing, and hatchery proportion are apparent at both the stratum and population scale.

In the Oregon Coast ESU sufficient surveys were conducted to meet precision goals at the ESU level in all five sampling years, however at the population scale, precision goals were rarely met. Wild spawner abundance declined over the first four sampling years, but showed a significant increase in the fifth sampling year. The proportion of hatchery fish was generally low, but variable over the five sampling years. Only two populations, Salmon River and North Umpqua River, consistently had over 10% hatchery fish on the spawning grounds. Regional patterns in fish distribution, spawn timing, and hatchery proportion are apparent.

Inadequate funding and the need to update the GRTS sampling frame continue to hamper monitoring of the Oregon portion of the Southern Oregon/Northern California Coasts Coho ESU. In the Oregon portion of the ESU insufficient surveys were conducted to meet precision goals at the ESU level in any of the four years when GRTS surveys were done. However, estimates of wild coho spawners were obtained in all five years based on Huntley Park seining. Wild coho spawner abundance declined substantially over the five run years; but the proportion of hatchery coho spawning naturally was fairly low and stable. Regional patterns in fish distribution, spawn timing, and hatchery proportion are apparent.

INTRODUCTION

Conservation and management of coho salmon in Oregon requires monitoring status and trend for a variety of population criteria. This is true whether the populations are thriving or are 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 that are partially or entirely within the boundaries of the State of Oregon, and all three are currently listed as "Threatened" under the Federal Endangered Species Act (ESA). In addition, the LCR Coho ESU is listed as "Endangered" by the State of Oregon.

From 1950 through 2004 spawning surveys for coho salmon were conducted in standard index areas along the Oregon Coast to assess trends in the escapement to 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 data needed for management of Oregon's coho salmon populations. Both reviews identified areas of concern and made recommendations to improve monitoring of naturally spawning coho salmon in Oregon. In 1990 a stratified random sampling (SRS) program was initiated to address these recommendations and provide annual estimates of the abundance of naturally spawning Oregon Coastal Natural (OCN) coho. The OCN area covers Oregon coastal rivers from the mouth of the Columbia River south to Cape Blanco. The SRS methodology stratified coho spawning habitat into three categories, high, moderate, and low spawner density (Jacobs and Nickelson 1998). Spawning survey sites were then randomly selected from the high and moderate density categories. Sites were visited in the summer to confirm they contained coho spawning habitat. If habitat was identified sites were surveyed about weekly through the fall/winter coho spawning season to generate an area-under-the-curve (AUC) estimate of the number coho spawning at each site. The AUC estimate and the proportion of hatchery coho (from scale samples) were then used to generate estimates of the abundance and proportion of hatchery coho in naturally spawning coho populations by ODFW management district and basin groupings. This methodology was used for the 1990 through 1997 spawning seasons.

As part of the implementation of the Oregon Plan for Salmon and Watersheds (OPSW) in 1998, ODFW established an integrated monitoring program for Oregon coastal salmonids (Firman and Jacobs 2001). The program consists of three geographically extensive monitoring projects based on spatially balanced random site selection, and one project that intensively monitors specific sub-basins. The Life-Cycle Monitoring (LCM) project provides estimates of egg to smolt survival and smolt to adult survival at selected sites where trapping of migrating smolts and adults is possible (see: http://nrimp.dfw.state.or.us/crl/default.aspx?pn=SLCMP). The other three projects are based on the U.S. Environmental Protection Agency's Environmental Monitoring and Assessment Program (EMAP). These projects utilize the EMAP Generalized Random Tessellation Stratified (GRTS) sampling design to establish a shared set of random, spatially balanced sample points (Firman and Jacobs 2001, and Stevens 2002). The Aquatic Inventory Project (AIP) monitors status and trends in aquatic habitat (see: http://oregonstate.edu/dept/ODFW/freshwater/inventory/index.htm). The Western Oregon Rearing Project (WORP) conducts annual surveys to monitor juvenile salmonid abundance in Oregon streams (see: http://nrimp.dfw.state.or.us/crl/default.aspx?pn=WORP). The Oregon Adult Salmonid Inventory and Sampling Project (OASIS) conducts fall/winter surveys of

naturally spawning adult salmonids (see: http://oregonstate.edu/dept/ODFW/spawn/index.htm). Beginning in 1998 the GRTS design replaced the SRS method for 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. This methodology, with modifications, has been in use since those dates.

METHODS

Although the GRTS design for the OC and SONCC Coho ESUs was established in 1998 as a 27 year study, changes in management and technology, as well as the need for data at finer geographic scales, resulted in changes in the initial design (Table 1). The next three sub-sections describe some of the significant changes. The final two sub-sections give a brief description of field sampling protocols and data analysis methods.

Table 1. Design criteria used in selecting GRTS sampling points for coho spawning surveys. Sample Points = scale for precision targets; Coho Estimate = finest scale at which population estimates were made; MA = Monitoring Area (~Stratum); Popn = TRT coho population; Group = Basin or group of basins along the Oregon Coast as defined by ODFW; H, M, L = High, Medium, and Low quality habitat; Frame Scale is the scale of the GIS stream coverage used to select GRTS points; XX Frame = the last two digits of the year the frame was developed; H:W = Source of rearing origin determinations for sampled coho.

Run Year	Geographic Scale		Habitat Type (HT)	Frame Scale	Points by HT From			Coho H:W From
	Sample Points	Coho Estimate			98 Frame	05 Frame	07 Frame	
1998	MA	Group	M&H	1:100K	M&H			Scales
1999	MA	Group	M&H	1:100K	M&H			Fin Marks
2000	MA	Group	M&H	1:100K	M&H			Fin Marks
2001	MA	Group	M&H	1:100K	M&H			Fin Marks
2002	MA	Group	M&H	1:100K	M&H			Fin Marks
2003	MA	Group	M&H	1:100K	M&H			Fin Marks
2004	MA	Popn	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	Popn	Popn	All	1:24K			All	Fin Marks
2008	Popn	Popn	All	1:24K			All	Fin Marks

** = Sampled only Medium and High quality habitat, except in the Umpqua where all habitat was sampled.*

Rearing Origin

Through 1997 determining the rearing origin of naturally spawning coho was based on interpretation of growth patterns from scale samples. Starting with the 1995 brood year, Oregon hatchery coho smolts released in Lower Columbia and coastal basins were mass marked with an adipose fin clip. These fish returned as spawning adults in 1998, and determinations of rearing origin in that year were done by both scale samples and observations of adipose fin clips. While there were differences between the two methods for individual fish, estimates of the proportion

of hatchery fish in a basin were generally similar for the two methods (Jacobs et.al. 2000). Rearing origin determinations have been based on observations of adipose fin clips since 1998. However, due to releases of non mass marked hatchery coho above Bonneville Dam, interpretation of scale samples is still used for the Lower Gorge and Hood River populations in the LCR Coho ESU.

Geographic Scale

Initially the GRTS design continued the SRS method of selecting sampling points by Monitoring Area (MA), and only from spawning habitat in the high and moderate coho spawner density categories. The goal was to sample 120 sites for each of the four northern to mid-coast MAs (all within the OC Coho ESU), and 60 sites in the southernmost MA, in the SONCC Coho ESU (Jacobs et.al. 2000, 2001 and 2002). Coho spawner abundance estimates were then done at three hierarchical geographic scales; Oregon Coast, Monitoring Area, and Basin Group. The Basin Group scale is roughly equivalent to major coastal basins, but includes some lumping of smaller systems with the major basins, and divides the Umpqua and Rogue into sub-basins. As part of the ESA listing process, the NOAA Fisheries Technical Review Team (TRT) for each ESU reviewed and analyzed information on coho salmon, resulting in descriptions of the population structures for the three coho ESUs in Oregon (Figure 1). They organized each ESU into strata, and each stratum into independent, potentially independent, and dependent populations. For Oregon, this resulted in three strata with 8 populations in the LCR Coho ESU (Myers et.al. 2006); five strata with 21 independent or potentially independent populations and 35 dependent populations in the OC Coho ESU (Lawson et al. 2007); and two strata with 7 independent or potentially independent populations, 7 dependent populations and 2 ephemeral populations in the SONCC Coho ESU (Williams et al. 2006).

Implementation of the Native Fish Conservation Policy (NFCP) by ODFW included conducting an assessment of Oregon Coastal coho in 2005 (State of Oregon 2005) and development of the Oregon Coastal Coho Conservation Plan (OCCCP) in 2007 (State of Oregon 2007). Appendix 2 of the 2005 Coho Assessment describes the viability criteria and methods used by ODFW in the status assessment of the OC Coho ESU. Five criteria related to spawners (Spawner Abundance, Productivity, Persistence, Spawner Distribution, and Diversity) were used to assess the 21 independent or potentially independent coho populations, as identified by NMFS. Estimates of coho spawner abundance, by population, are needed for all five of these criteria. To accommodate this need the existing SRS and GRTS "Basin Group" estimates from 1990 through 2003 were converted to population estimates. Because the long-term standard surveys were done currently with the SRS and GRTS surveys from 1990 through 2004, a correlation between the two was used to estimate population scale coho abundances from 1958 through 1989 (see Part 1 and 2 of Appendix 2, State of Oregon 2005).

Given the need for estimates of coho spawner abundance by population, in 2006 we switched from selecting 120 sites per MA to selecting 30 sites, or enough sites to cover 30% of the coho spawning habitat (whichever is lower), in each of the independent or potentially independent coho populations. Dependent populations were grouped by stratum and sampled as a single population, again with a target of 30 sites or 30% of the habitat. The one exception is the Sutton Lake dependent population in the Lakes stratum of the OC Coho ESU. This is the

only dependent population for the lakes stratum, has about 6.5 miles of coho spawning habitat, and although included in the Lakes stratum is located within the boundaries of the Mid-Coast stratum. For these reasons it is included in the sampling of the Mid-Coast stratum dependents, rather than being the sole population in a Lakes stratum dependents sample. Finally, although the 2004 and 2005 sites were selected at the MA scale, the abundance of spawning coho was estimated at the population scale. Point selection and spawner abundance estimates in the OC Coho ESU have both occurred at the population scale since 2006.

The first four years of estimates (2002-2005) in the LCR Coho ESU were done at the scale of six population complexes. The eight LCR Coho ESU populations as defined by NMFS represent a refinement of the six LRC coho population complexes. Boundaries are the same for four populations/complexes (Clatskanie, Scappoose, Clackamas, and Sandy), with the Astoria Complex divided into the Youngs Bay and Big Creek populations, and the Bonneville Complex divided into the Lower Gorge and Hood River populations. Since 2006 LCR coho estimates have been done at the coho population scale and the 2002 through 2005 estimates were re-calculated at the population scale.

The SONCC coho frame sample points were recently reattributed from Basin Group to population scale. With this change we have re-calculated the SONCC Coho ESU estimates from 2002 through 2008 at the population scale. Further work is needed to convert the 1998 through 2001 estimates to the population scale. This will mostly involve error checking and importing data from old spreadsheet files into our current database files.

Sampling Frame

Utilizing Geographic Information System (GIS) software, an integrated frame of potential sampling sites (points) for the OC and SONCC Coho ESUs was established in 1998 (98 Frame). The GRTS points were established on a 1:100,000-scale digital line graph of streams at a density of approximately two points per mile of stream. Each point is attributed to one or more of three subsets which determine which projects (AIP, OASIS, and WORP) sample there. Each point is also assigned to one of 40 rotating panels. The rotating panel design is based on the three year life span of coho salmon and intended for a 27 year study duration. The 40 panels are assigned to 4 groups: 1 panel contains sites that are sampled every year; 3 panels have sites that are sampled every third year; 9 panels have sites that are sampled every 9 years; and 27 panels have sites that are sampled only once (Firman and Jacobs 2001, and Stevens 2002). The 98 Frame only attributed GRTS points in areas of assumed high and moderate coho spawner density as coho spawning survey (OASIS) sites. In 2002 a similar process was used to establish a GRTS sampling frame for the LCR Coho ESU. The LCR frame, unlike the OC and SONCC Coho ESU frames, included all GRTS points in coho spawning habitat as potential spawning survey sites without regard to assumed coho spawner density. However, it did not include the rotating panel design.

Conducting spawning surveys only in habitat assumed to be better for coho spawning in the OC and SONCC Coho ESUs, focused effort in areas most likely to have coho and was an attempt to obtain the most information on coho spawners given limited resources. However, this limited our ability to document overall distribution of spawning coho, document expansion of

coho into "marginal" habitats as abundance increased, or evaluate the actual density of coho spawners in the areas of assumed low density. To address these concerns a one-time addition to the 98 Frame was established in 2005 (05 Frame). This provided GRTS sample points in 1,999 miles of potential spawning habitat in areas assumed to have low coho spawner densities. However, the 05 Frame did not include a panel structure. Beginning in 2005, sample points were selected from the 98 Frame as usual, and then points were replaced (based on use order) by sample points selected from the 05 Frame. This process continued until the sample weight (miles of habitat in the frame/sample points selected) was the same for the 98 and 05 Frames. Due to time constraints we were only able to do this for the Umpqua stratum in 2005, but all the 2006 sample points for the OC Coho ESU were selected using this process.

The 05 Frame was a stop gap measure while a more permanent means was developed to sample the areas assumed to have low coho spawner density. A long-term solution needed to accomplish several goals. First, by 2006 we had completed 9 years of sampling under the rotating panel design. This meant that we had 9 years invested in the annual panel sites, three cycles of sampling for the three 3 year panels, and one cycle of sampling for the nine 9 year panels. Simply adding GRTS points in the low coho spawning density sites and then re-establishing all 40 panels could jeopardize this investment in time and effort, and compromise our trend detection abilities. Secondly, we wanted to transition from the 1:100,000-scale stream network that had been used to generate the 1998 sample to a 1:24,000-scale digital line graph of streams. This would improve our accuracy in determining survey lengths and locations, as well as identifying smaller streams that were not included in the coarser scale coverage. Finally, after 9 years of sampling by three projects we had identified a significant number of corrections, additions and deletions to our coho spawning habitat area. Staff from all three OPSW projects (AIP, OASIS, and WORP) developed a new 1:24,000-scale frame (07 Frame) and worked with staff from the Oregon State University (OSU) Statistics Department to establish a new draw of survey sites (07 Draw). In making the new draw we decided to maximize retention of sites that had been previously sampled and replace panels that had not yet been sampled (Stevens in prep). The 07 Draw has been used since 2007 (Table 1). This same effort is needed for the SONCC coho frame. However, it has not been done, and we are still using the 98 Frame for selecting coho spawning survey points in the SONCC Coho ESU.

Field Sampling

The assessment and establishment of new spawning surveys is done during a one time set-up visit between February and September. Once landowner permissions are obtained a surveyor visits the site to determine if there is coho spawning habitat present, and if there are any barriers to adult coho migration. If the site has habitat and is accessible to coho a new spawning ground survey is set-up that encompasses the GRTS point. Spawning surveys are generally about 1 mile in length, but actual boundaries are determined by site specific characteristics. Surveys are bound by significant landscape features including: beginning or ending of coho spawning habitat; confluences with other streams; and other long-term features such as, bridges, old roads, passable waterfalls, etc. Specific methods used in spawning survey set-ups can be found in the annual Spawning Survey Site Verification Procedures Manual in the Reports section of the OASIS project web page.

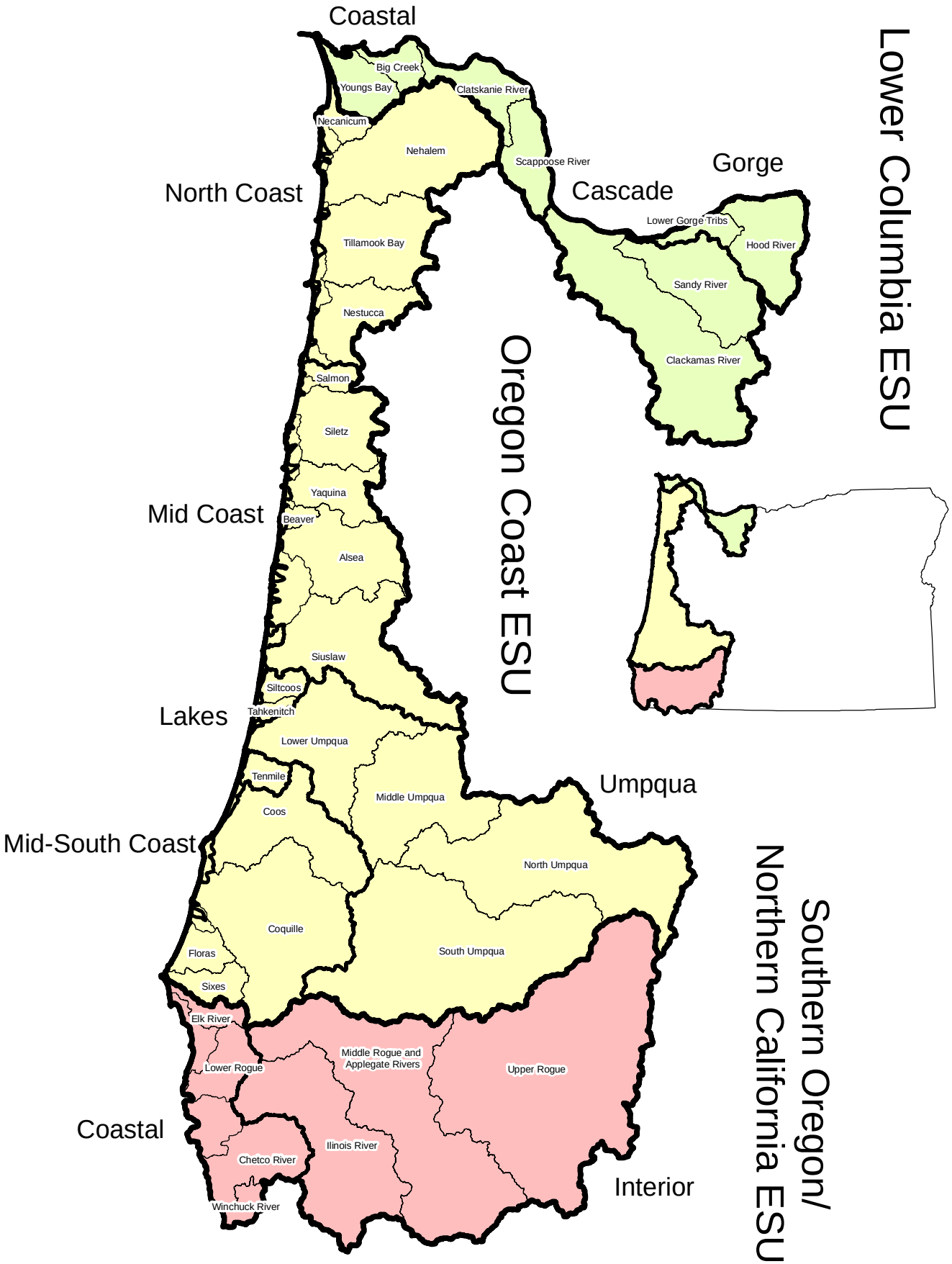

Figure 1. Coho monitoring study area showing the coho populations, strata and evoluntionarily significant units.

Coho spawning ground surveys are conducted approximately weekly from October through January each year. The goal is to get at least one valid survey (in which flow and visibility allow for counts of live fish, dead fish, and redds) before coho start spawning and two consecutive valid surveys with no live coho observed to end each site for the season. Although the goal is to do each survey every week, project 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. Once conditions allow, crews will continue to survey sites that have gone out of rotation and try to keep them in rotation for the remainder of the season. After the season is over, we evaluated all GRTS surveys to determine if they meet our protocols for inclusion in population estimates. The criteria we use do determine if each site is a successful GRTS survey (can be used in the population estimate) is based on minimizing the chance for an inaccurate AUC calculation. This could occur if the chance of a coho migrating to the site, spawning and dying in the period between survey visits is considered to high. Our standard method for determining whether we successfully surveyed a site for the year involves three steps. First we determine the critical period for each stratum, which is defined as the time period in which we saw 90% of the live coho in that stratum for that year. Next we calculate the number of days between valid surveys for each site for the year. Finally, we evaluate the "gaps" between survey dates to see if they meet our criteria for minimizing the chance of missing coho in our live counts. The standard criteria we use are; no gap of 16 of more days, and no more than one gap between 12 and 15 days during the critical period.

Crews conduct the surveys by walking up-stream and recording the number of live fish, dead fish and redds observed, as well as information on weather conditions, stream flow and viewing conditions (i.e. visibility - how well they can see the bottom of the steam). Surveyors record the species of live fish observed, and for coho, try to determine if the adipose fin has been clipped. All hatchery coho smolts released in Oregon coastal and lower Columbia streams are marked with either an adipose fin clip, a Coded Wire Tag (CWT), or both 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 forth coho carcass, and both a scale sample and snout are collected from every adipose fin clipped coho carcass. Finally, the tail is cut off of every sampled carcass to preclude repeat sampling on subsequent survey visits. Further details of our spawning survey methods can be found in the annual Coastal Salmon Spawning Survey Procedures Manual in the Reports section of the OASIS project web page.

Data Analysis

The AUC technique was used to estimate the total number of coho salmon adults spawning in a given stream segment over the course of the spawning season (Jacobs et al. 2002). Spawning coho were assumed to have an average spawning life of 11.3 days across the ESU and season (Beidler and Nickelson 1980, Perrin and Irvine 1990). Peak counts and the contribution of hatchery spawners were estimated as in Jacobs et al. (2002). Spawner density was calculated by population by year, as the total adult coho AUC / total length (miles) for all surveys. Abundance and timing calculations were not done for stream segments which did not meet criteria for a qualified survey. Qualifying surveys were defined as having no gaps between valid

survey dates of 16 of more days, and no more than one gap of 12 to 15 days during the period when 90% of the live coho were observed for the stratum.

Spawning escapement was estimated using the Horvitz-Thompson estimator (Diaz-Ramos et al. 1996). Variance estimates were calculated using the local mean variance estimator. Escapements were calculated for the ESU as a whole, each stratum, and each independent population or group of dependent populations (Jacobs et al. 2002). To determine the temporal distribution of spawners, each month was separated into 10 day periods (1^{st} to 10^{th}, 11 to 20^{th}, and 21^{st} to end of month). The number of adult coho observed was summed; by geographic scale, by year, and by 10 day period, and then normalized for effort by dividing the sum of live adults by the sum of miles surveyed during that year/scale/period. Occupancy for coho salmon spawners was defined as a peak count of at least 4 wild adult coho per mile of survey. The proportion of coho spawning habitat that was occupied was calculated as the percentage of qualified GRTS spawning survey sites that were occupied each year, and then averaged across years. This calculation was done at three geographic scales; ESU, stratum and population.

In some areas probabilistic (GRTS) surveys for spawners are not conducted, or we do not have adequate numbers of or long-term data from GRTS sites. In these areas, other sources of monitoring data are used to document the number of adult coho spawners. These include; dam counts, mark-recapture studies, and regressions of historic estimates to standard surveys. In the LCR Coho ESU there are five locations above which adult coho are allowed to pass, but no probabilistic coho spawning ground surveys are conducted. These include; two dams (River Mill and Powerdale dams), two hatchery weirs (Big Creek and Klaskanine Hatcheries), and one LCM site (Bonnie Falls). Counts of adult coho salmon passed are obtained for each location, and are added to the estimated abundance of coho spawners from locations where GRTS surveys are conducted. In the OC Coho ESU, we do conduct GRTS spawning ground surveys in all areas, but generally do not obtain access to adequate numbers of surveys in the three lakes populations to make estimates. Coho spawner abundances for the lakes populations are calculated using regressions of long-term standard surveys to historic mark-recapture studies and habitat measurements done in those locations (Jacobs et.al. 2002). We have only conducted GRTS surveys above Winchester Dam since the 2005 run year. Almost all of the coho spawning habitat for the North Umpqua coho population is located above Winchester Dam, and the count of coho past the dam is used to monitor abundance for this population. The Winchester Dam count is adjusted for coho collected and retained at the Rock Creek Hatchery, and for angler harvest in the North Umpqua River above Winchester Dam. The GRTS surveys in the North Umpqua are used to provide information on timing and distribution of coho on the spawning grounds. In the long-term, we will explore using the adjusted Winchester Dam count as part of a means of determining accuracy and potential calibration of the probabilistic estimates of coho spawners.

Implementation of a spatially-balanced probability sample for spawning coho in the SONCC Coho ESU has been hampered by funding, and the need to review the 98 Frame. The 98 Frame currently only includes about 30% of the potential coho spawning habitat in the SONCC Coho ESU, and does not have any sites within the Chetco, Winchuck or dependent populations (Figure 8). Due to budget cuts we did not conduct a statistical survey for spawning coho in the SONCC Coho ESU in 2005, and for 2006 through 2008 only sampled at half the rate

we did in prior years, 30 sites instead of our historic goal of 60 sites. Sampling at our current goal of 30 sites or 30% of the habitat in each coho population would require about 175 sites for the Oregon portion of the SONCC Coho ESU. Long-term monitoring of coho spawners in the SONCC Coho ESU currently relies on a mark-recapture calculation based on adipose fin clipped coho. Details of this method are described in Jacobs et.al. (2002). This method provides an estimate of adult coho escapement to the Rogue basin above Huntley Park, about river mile 8. These estimates were adjusted for coho collected and retained at the Cole Rivers Hatchery, and for angler harvest in the Rogue Basin above Huntley Park.

RESULTS

The following summarizes results of monitoring coho spawning escapements in Oregon basins of three coho salmon ESUs. These include results of statistical spawning ground surveys, and data from other sources where statistical 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 and constituent coho populations, and are our best estimate of results for each category. The individual components that comprise the results can be found in Appendices A, B, and C (by coho ESU). Ancillary data is presented in Appendix D.

Lower Columbia Evolutionarily Significant Unit

In 1999, naturally produced coho 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 Endangered Species Act (NMFS 2005). The Lower Columbia Coho ESU includes populations in both Oregon and Washington. This report summarizes monitoring of spawning escapement of the Oregon populations for the 2004 through 2008 spawning seasons. The Oregon portion of the Lower Columbia ESU is comprised of eight demographically independent coho populations (Meyers et al. 2006). This includes 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 passed wild fish can be used, are not surveyed, or expanded to for abundance estimates. Areas not sampled include the region; above Klaskanine Hatchery for the Youngs Bay population, above Big Creek Hatchery for the Big Creek population, above Bonnie Falls for the Scappoose population, above River Mill Dam for the Clackamas population, and above Powerdale Dam for the Hood population (see Figure 3). In 2006 Marmot Dam, on the Sandy River was removed. Through 2006, estimates of coho spawners in the Sandy population were a combination of GRTS estimates for the area below Marmot Dam, and the dam count plus any wild adult coho released above the dam by Sandy Hatchery staff. Coho spawning estimates for the Sandy population since 2007 have been based on GRTS surveys.

Effort

Spawning surveys were typically conducted from the beginning of October to the end of January, 2004–2008. An average of 90 sites was successfully surveyed each year across the

ESU. This comprised approximately 53% of the sites originally drawn, but this varied, ranging from 30% in 2006 to 62% in 2008 (Table 2). Issues such as landowner denials or site inaccessibility caused many surveys to be dropped. In 2006, only 52 sites were successfully surveyed (Table 2). Multiple gaps in survey effort due to high stream flow and poor visibility, were the primary cause of sites not meeting estimation criteria during that year. On average, 9% of the sites drawn each year are outside of coho spawning habitat. Although the number of sites successfully surveyed ("Target Response") was below our goal in all years, the 95% confidence interval for the entire ESU estimate was within the target level of precision of ± 30% for three out of the five sampling years (Table 2). At the population scale, the target level of precision was rarely reached, occurring only once for the Sandy population (2008) and twice for the Hood (2006 and 2007) population.

Table 2. Lower Columbia Coho ESU, GRTS spawning survey goals and results for number of sites surveyed and 95% C.I., 2004 through 2008 run years. Target Response sites are reaches within coho spawning habitat which were successfully surveyed.

Stratum	Population	Survey Goal	Target Response					95% CI as percent of point estimate (Goal is +/- 30%)				
			2004	2005	2006	2007	2008	2004	2005	2006	2007	2008
Coast	Youngs Bay	16	17	12	2	20	15	70.8%	79.3%	195.8%	68.8%	58.1%
	Big Creek	8	3	5	0	4	5	128.3%	79.1%	*NAS*	65.3%	86.3%
	Clatskanie	18	14	16	14	14	13	50.3%	80.0%	51.8%	36.6%	71.0%
	Scappoose	20	18	12	15	16	19	39.4%	45.2%	30.5%	82.8%	37.9%
Cascade	Clackamas	30	28	17	4	24	17	53.7%	50.4%	57.3%	55.1%	50.2%
	Sandy	30	21	15	12	26	27	64.8%	95.2%	137.3%	50.6%	26.6%
Gorge	Lower Gorge	2	1	2	3	4	3	*NAS*	67.1%	94.5%	107.2%	57.0%
	Hood	2	0	4	2	2	3	*NAS*	60.7%	16.4%	14.0%	138.3%
ESU Total		**126**	**102**	**83**	**52**	**110**	**102**	**28.2%**	**30.8%**	**43.7%**	**22.7%**	**25.5%**

NAS = Not adequately surveyed (either no surveys were selected in the population or < 2 surveys stayed in rotation).

Abundance

Wild coho spawner abundance was fairly stable over the five year period reported for the ESU. An average of approximately 5,500 (95% C.I. ± 600) wild adult coho was reported for the 5 year period (Table 3 and Figure 2). Of the three LCR strata, the populations in the Cascade stratum contributed the greatest proportion of wild spawners per year, ranging from 45% to 74% of the total ESU estimate. In contrast, the populations in the Gorge stratum contributed the fewest wild spawners per year, ranging from 2% to 32% of the total ESU estimate. Most populations in the ESU display a stable trend over the seven year period that monitoring has occurred. The Youngs Bay, Big Creek, Scappoose, and Lower Gorge populations maintain consistently low abundances with most years' estimates well under 500 wild adults. Wild spawners in the Hood population display a declining trend while the Clatskanie population shows slight increases in wild spawner abundances.

Hatchery coho abundance in natural spawning grounds across the ESU was more variable over the five year period reported and seemed to peak in 2006. Of the more than 12,000 estimated hatchery adult coho in the ESU that year, greater than 10,000 were estimated to have escaped to the Clackamas Basin. Excluding the 2006 estimate, average annual abundance is approximately 2,200 (95% C.I. ± 800) hatchery adult coho on natural spawning grounds. Overall, most populations show a declining trend in the proportion of adult hatchery coho spawners. The Clatskanie population is the only one that shows a slight increasing trend in proportion of hatchery spawners, although the 2008 estimate was zero. The proportion of hatchery coho spawning naturally in the Clackamas population has been highly variable between years, but shows no clear trend.

Table 3. Lower Columbia Coho ESU estimated abundance of adult coho spawning naturally by; ESU, stratum, and population for the 2004 through 2008 run years.

Geographic Scale		Spawning Year				
ESU/Stratum/Population		2004	2005	2006	2007	2008
Lower Columbia ESU	**Wild**	**5,630**	**4,820**	**6,422**	**5,785**	**4,987**
(Oregon Only)	**Hatchery**	**1,882**	**3,432**	**12,230**	**1,820**	**1,718**
	% Hat.	**25.1%**	**41.6%**	**65.6%**	**23.9%**	**25.6%**
Coast Stratum	**Wild**	**1,414**	**1,140**	**1,439**	**1,191**	**1,729**
	Hatchery	**1,218**	**373**	**479**	**773**	**89**
	% Hat.	**46.3%**	**24.7%**	**25.0%**	**39.4%**	**4.9%**
Youngs Bay	Wild	149	79	74	21	82
	Hatchery	886	242	394	14	23
	% Hat.	85.6%	75.4%	84.2%	40.0%	21.9%
Big Creek	Wild	112	219	225	212	360
	Hatchery	265	124	n.a.s.	216	66
	% Hat.	70.3%	36.2%		50.5%	15.5%
Clatskanie	Wild	398	494	421	583	995
	Hatchery	0	7	46	543	0
	% Hat.	0.0%	1.4%	9.9%	48.2%	0.0%
Scappoose	Wild	755	348	719	375	292
	Hatchery	67	0	39	0	0
	% Hat.	8.2%	0.0%	5.1%	0.0%	0.0%
Cascade Stratum	**Wild**	**4,087**	**2,157**	**4,387**	**4,295**	**2,971**
	Hatchery	**664**	**504**	**10,871**	**648**	**1,410**
	% Hat.	**14.0%**	**18.9%**	**71.2%**	**13.1%**	**32.2%**
Clackamas	Wild	2,874	1,301	3,464	3,608	1,694
	Hatchery	537	504	10,871	582	1,410
	% Hat.	15.7%	27.9%	75.8%	13.9%	45.4%
Sandy	Wild	1,213	856	923	687	1,277
	Hatchery	127	0	0	66	0
	% Hat.	9.5%	0.0%	0.0%	8.8%	0.0%
Gorge Stratum	**Wild**	**129**	**1,523**	**596**	**299**	**287**
	Hatchery	**n.a.s.**	**2,555**	**880**	**399**	**219**
	% Hat.		**62.7%**	**59.6%**	**57.2%**	**43.3%**
Lower Gorge Tribs.	Wild	n.a.s.	263	226	126	223
	Hatchery	n.a.s.	1,512	538	261	191
	% Hat.		85.2%	70.4%	67.4%	46.1%
Hood River	Wild	129	1,260	370	173	64
	Hatchery	n.a.s.	1,043	342	138	28
	% Hat.		45.3%	48.0%	44.4%	30.4%

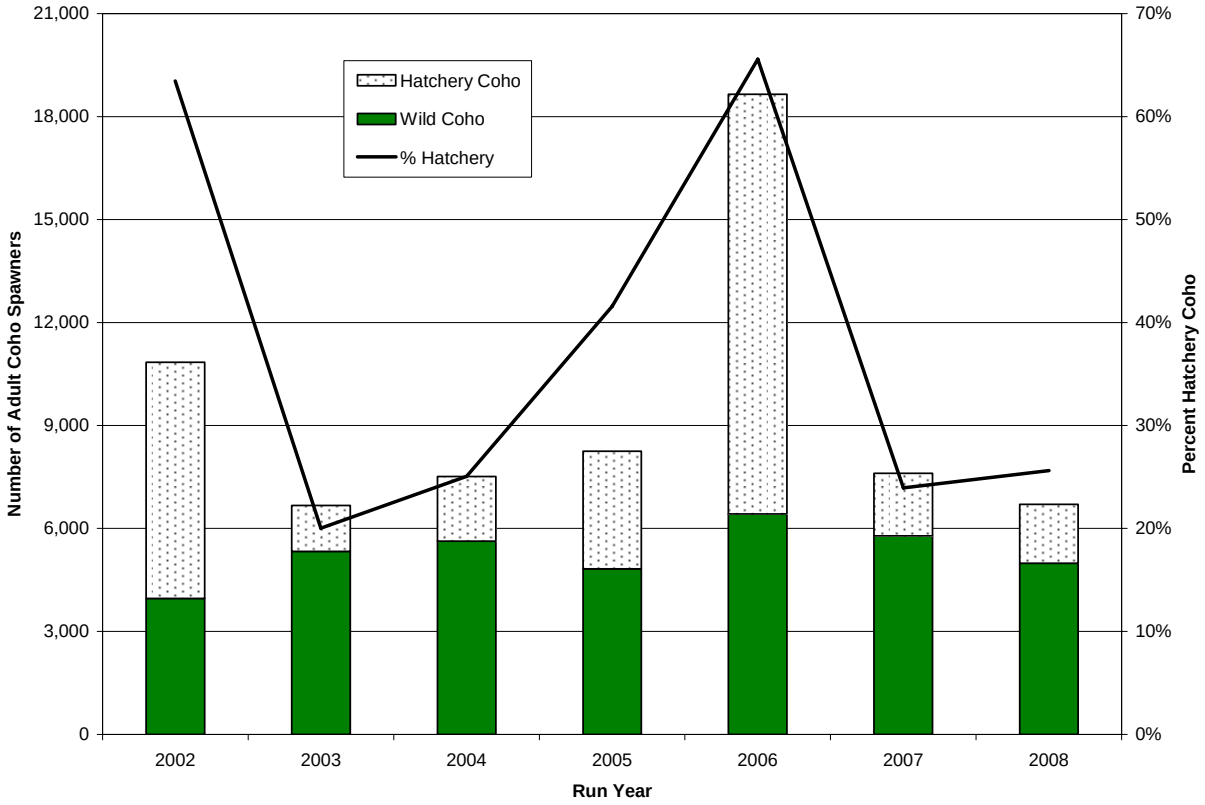

Figure 2. Lower Columbia Coho ESU estimated abundance of adult coho spawning naturally, by rearing origin for the 2002 through 2008 run years.

Distribution and Timing

Of the approximately 90 sites surveyed annually in the ESU, on average, 41% are occupied by wild adult coho (Table 4). This varies by population and ranges from approximately 8% in Youngs Bay to 95% of the sites surveyed in the Lower Gorge. Total adult coho densities are normally highest in the two gorge stratum populations (Figure 3A). Average coho density for both populations was > 150 adult coho per mile. The Youngs Bay, Scappoose, and Sandy populations consistently had the lowest densities in the ESU with averages less than 10 adult coho per mile.

For the 2004–2008 spawning years, peak counts typically occurred during the first week of November with an average of 4.8 adult coho per mile surveyed (Figure 4). Coho run timing varies considerably among populations. Populations located lower on the Columbia River such as Youngs Bay and Big Creek peak earlier than most up river populations. Live adults are typically not observed in most up river populations until after mid-October. The Clackamas population is an exception to this rule, live adults are typically observed during the first week of October. The Scappoose population also displays unique run timing with peak counts some times not occurring until mid-December.

Table 4. Lower Columbia Coho ESU average percentage of sites occupied by adult coho (Total & Wild) by population, stratum, and ESU for the 2004 through 2008 run years. An occupied site is one which has greater than or equal to four adult coho per mile on the peak count date.

ESU, Stratum, and TRT Population	Avg. No. Sites Surveyed	Total Adult Coho		Wild Adult Coho	
		Avg. No. Occupied	Avg. % Occupied	Avg. No. Occupied	Avg. % Occupied
Lower Columbia ESU (Oregon Only)	**90**	**45**	**50.9%**	**35**	**40.6%**
Coast Stratum	**47**	**23**	**50.7%**	**18**	**40.4%**
Youngs Bay	13	4	33.1%	1	8.4%
Big Creek	5	3	55.4%	1	10.0%
Clatskanie River	14	9	62.4%	8	58.1%
Scappoose Creek	16	9	54.6%	8	51.0%
Cascade Stratum	**38**	**17**	**44.6%**	**13**	**32.7%**
Clackamas River	18	9	57.9%	5	28.8%
Sandy River	20	8	37.3%	8	37.3%
Gorge Stratum	**5**	**4**	**93.3%**	**4**	**90.0%**
Lower Gorge Tribs	3	3	95.0%	3	95.0%
Hood River	3	3	91.7%	3	83.3%

Proportion Hatchery Fish

The average percentage of marked adult coho in the LCR Coho ESU remains relatively high compared to the other two Oregon coho ESU's. Average hatchery proportion ranged from 24% to 66% annually (Table 3). The Youngs Bay, Big Creek, lower Clackamas, and two gorge populations all average greater than 60% marked adult coho each year (Figure 3B). We do not conduct spawning surveys above the River Mill Dam on the Clackamas River; however, only unmarked coho are passed above the dam. The Scappoose and Sandy populations maintain the lowest levels of marked coho in the ESU with average annual proportions less than 3%. The Clatskanie population also maintains relatively low proportions of hatchery coho. The annual average is less than 12%, a number that would be considerably lower if it were not for Plympton Creek which receives a substantial number of hatchery strays from Big Creek.

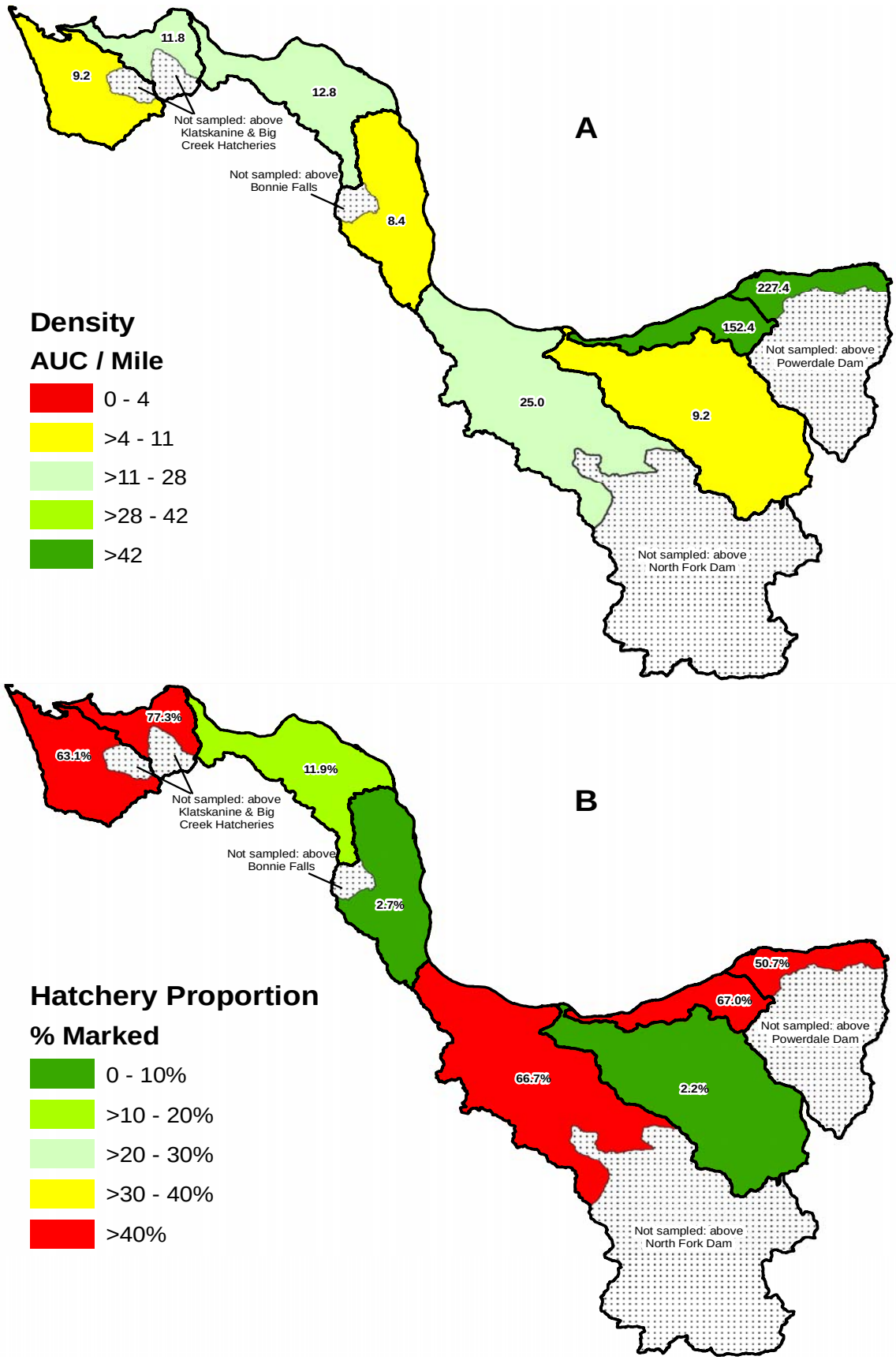

Figure 3. A) Average density (adult Coho AUC/Mile) in GRTS surveys by Lower Columbia Coho population, 2004 - 2008. B) Average percentage of marked adult Coho in GRTS surveys by Lower Columbia Coho population, 2004 - 2008. For further detail see appendix table D-4.

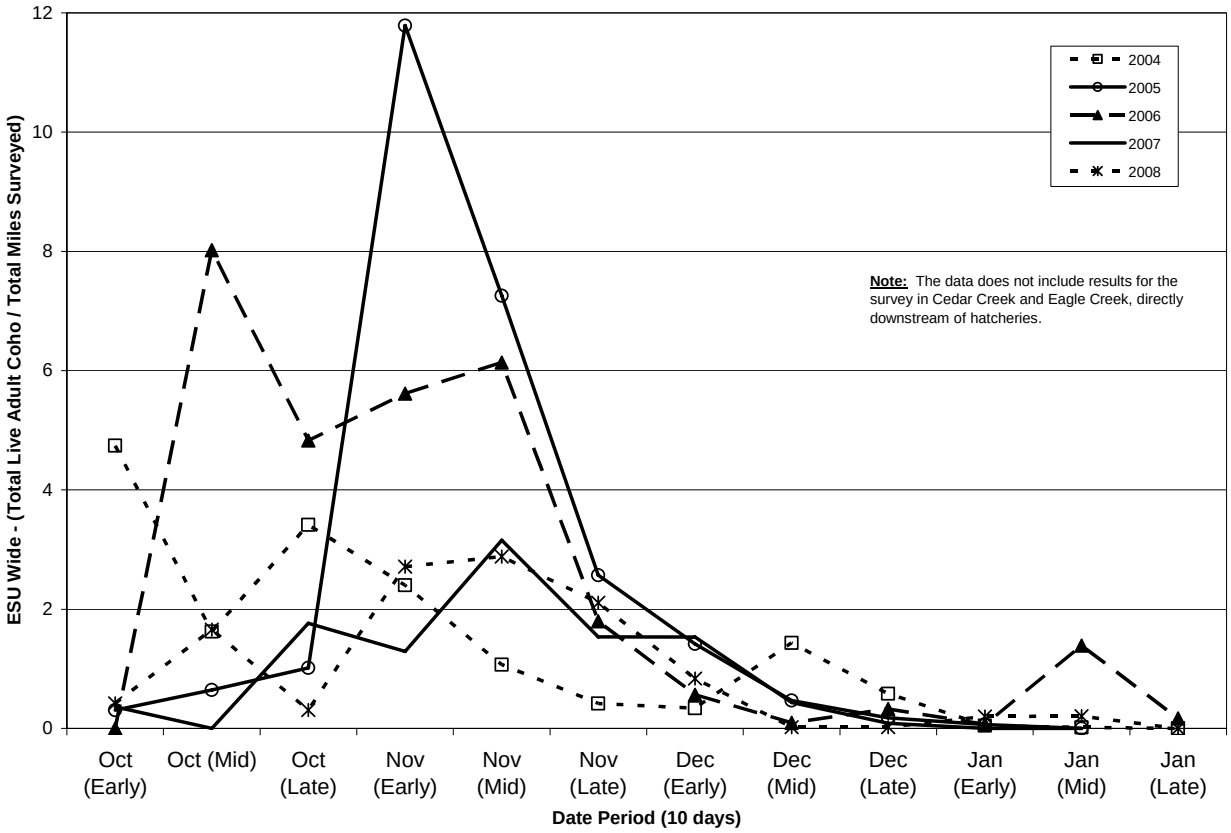

Figure 4. Run timing of live adult coho salmon observed on GRTS spawning ground surveys in the Lower Columbia Coho ESU, 2004 through 2008.

Oregon Coast Evolutionarily Significant Unit

In 2008, the Oregon Coast Coho ESU was listed as "threatened" under the federal Endangered Species Act (NMFS 2008). The OC Coho ESU is comprised of five strata, North Coast, Mid-Coast, Lakes, Umpqua, and Mid-South Coast with each stratum comprised of multiple populations, characterized as either 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 from three to six independent populations within each strata (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 of dependent populations. Four of the five strata are monitored using a spatially balanced random sample design (Stevens 2002). Those 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, probabilistic sampling in the OC Coho ESU began in 1998 in all areas except the North Umpqua population, where it began in 2005. From 1998 to 2004 monitoring of coho spawners in this population was based on Winchester Dam counts. For long-term consistency in the North Umpqua population, the GRTS estimates since 2005 are replaced with the Winchester Dam count in the final spawner abundance estimates.

Effort

Spawning surveys were typically conducted from the middle of October to the end of January, 2004–2008. An average of 316 sites was successfully surveyed each year across the ESU (Table 7). This comprised approximately 44% of the sites originally drawn. However, this varied, ranging from 27% in 2005 to 62% in 2004. Issues such as landowner denials or site inaccessibility for survey crews caused many surveys to be dropped before the season started. In addition, pre-season evaluations determined an average of 20% of the sites drawn each year did not actually include any coho spawning habitat or were not accessible to coho spawners. Finally, weather and stream conditions (high flows, turbidity, roads blocked by snow accumulation, etc) can prevent the crews from surveying sites for a portion(s) of the season. After the season we evaluate each GRTS survey against a set of project standards (see Data Analysis section of Methods) to determine if it was successfully surveyed for the year and can be included in the population estimate calculations. In-season weather and stream conditions were particularly challenging in 2005 and 2008. In 2005 post-season evaluation of surveys resulted in only 208 of over 400 GRTS sites actually surveyed meeting project standards for a successful survey. The over 50% of GRTS sites not meeting project standards in 2005, is much higher than the average of 22% for the 2004, 2006 and 2007 survey years. The 2008 season was even more challenging, and post-season evaluation of surveys resulted in only 142 of over 500 GRTS sites actually surveyed meeting project standards for a successful survey. This is a rate of over 70% of the sites not meeting project standards. Therefore, in 2008 the project standards were modified to no gaps between valid survey dates of *21* or more days, and no more than *two* gaps of 12 to 15 days during the period when 90% of the live coho were observed for the stratum. This resulted in nearly doubling, from 142 to 267, the number of GRTS sites that met project standards for inclusion in the population estimate calculations.

Although the number of sites successfully surveyed was below our goal in all years, the 95% confidence interval for the entire ESU estimate was within the target level of precision of ± 30% for all five years (Table 5). At the stratum scale we met our 95% CI goal in 10 of 20 cases over the five years, 2004 through 2008. We were much less successful at the population scale, meeting our 95% CI goal in only 12 of 84 cases in the 2004 through 2008 seasons (Table 5).

Abundance

Wild coho spawner abundance in the OC Coho ESU declined for the period between 2004 through 2007, with the most significant drop in 2007. Despite this four year decline, 2008 wild spawner abundance rebounded to become the highest reported in the five year period (Table 6 and Figure 5). In general, trends in the 5 strata, 21 independent and 3 groupings of dependent populations were consistent with the overall OC Coho ESU trend, declining to 2007 and then rebounding in 2008. However, there was more variability at the smaller geographic scales, and some indication of different year to year trends in specific areas. Wild coho spawning abundance decreased from 2004 to 2005 for the ESU as a whole and in most strata and populations, but increased in the Mid-Coast and Umpqua strata and most of their constituent populations (Table 6). A similar thing occurred between 2005 and 2006, decreasing abundance for the ESU as a whole, but increased wild coho spawning abundance in the North Coast, Lakes, and Mid-South Coast strata and constituent populations (Table 6).

Table 5. Oregon Coast Coho ESU, GRTS spawning survey goals and results for number of sites surveyed and 95% CI., 2004 through 2008 run years. Target Response sites are reaches within coho spawning habitat which were successfully surveyed.

Stratum	Population	Survey Goal	Target Response					95% CI as percent of point estimate (Goal is +/-30%)				
			2004	2005	2006	2007	2008	2004	2005	2006	2007	2008
North Coast	Necanicum	19	7	12	16	12	17	40.8%	50.6%	37.7%	48.7%	30.6%
	Nehalem	30	61	30	22	15	6	22.6%	29.2%	30.6%	53.8%	69.2%
	Tillamook	30	23	9	15	6	9	56.1%	58.4%	39.8%	54.5%	50.7%
	Nestucca	30	19	3	21	10	11	29.3%	98.4%	49.8%	80.2%	33.8%
	NC Depend.	21	2	4	8	11	15	196.1%	84.3%	63.5%	69.4%	57.9%
	Total	**130**	**112**	**58**	**82**	**54**	**58**	**17.1%**	**23.2%**	**21.1%**	**43.6%**	**47.3%**
Mid-Coast	Salmon	15	7	5	3	12	6	49.2%	121.3%	82.9%	54.6%	59.9%
	Siletz	30	17	5	21	24	13	42.1%	124.6%	86.9%	36.2%	43.6%
	Yaquina	30	10	4	29	23	15	67.8%	58.6%	43.4%	52.3%	27.8%
	Beaver	7	4	4	7	7	4	43.1%	70.5%	63.6%	53.5%	70.7%
	Alsea	30	24	6	12	17	22	29.4%	66.6%	47.8%	57.8%	25.8%
	Siuslaw	30	37	39	24	22	9	25.5%	39.2%	54.4%	34.3%	60.1%
	MC Depend.	30	8	6	11	11	14	132.0%	109.8%	93.6%	125.1%	99.9%
	Total	**172**	**107**	**69**	**107**	**116**	**83**	**28.5%**	**41.9%**	**28.6%**	**20.4%**	**21.8%**
Umpqua	L. Umpqua[a]	30	53	29	42	51	12	25.0%	34.4%	46.9%	33.3%	24.7%
	M. Umpqua	30	22	15	20	28	17	36.2%	79.0%	66.2%	63.8%	64.7%
	N. Umpqua	30	0	4	8	29	19	*NAS*	118.7%	85.2%	77.9%	84.9%
	S. Umpqua	30	39	18	11	24	11	43.1%	42.0%	60.8%	69.3%	60.6%
	Total	**120**	**114**	**66**	**81**	**132**	**59**	**21.9%**	**27.8%**	**33.0%**	**32.1%**	**36.6%**
Mid-South Coast	Coos	30	34	9	22	31	7	24.3%	53.8%	37.7%	28.4%	69.6%
	Coquille	30	45	3	7	6	11	23.3%	112.8%	61.1%	77.3%	60.6%
	Floras	13	4	0	6	5	10	86.9%	*NAS*	43.9%	30.6%	38.4%
	Sixes	12	0	0	0	1	8	*NAS*	*NAS*	*NAS*	*NAS*	62.3%
	MS Depend.	8	0	0	0	0	3	*NAS*	*NAS*	*NAS*	*NAS*	*NAS*
	Total	**93**	**83**	**12**	**35**	**43**	**39**	**18.9%**	**55.8%**	**43.8%**	**69.0%**	**47.5%**
ESU Total		**515**	**416**	**205**	**305**	**345**	**239**	**11.6%**	**21.0%**	**18.9%**	**23.4%**	**16.8%**

NAS = Not adequately surveyed (either no surveys were selected in the population or < 2 surveys stayed in rotation).
a = In years 2004, 2006 and 2007 the total number of surveys include an over sample of sites for the Smith River Calibration Study.

Table 6. Oregon Coast Coho ESU estimated abundance of adult coho spawning naturally by; ESU, stratum, and population for the 2004 through 2008 run years.

Geographic Scale ESU/Stratum/Population		Spawning Year 2004	2005	2006	2007	2008
Oregon Coast Coho ESU	**Wild**	**172,778**	**154,595**	**128,819**	**66,271**	**179,686**
	Hatchery	**10,680**	**11,667**	**12,814**	**5,863**	**3,299**
	% Hat.	**5.8%**	**7.0%**	**9.0%**	**8.1%**	**1.8%**
North Coast Stratum	**Wild**	**28,822**	**16,466**	**24,135**	**17,529**	**25,571**
	Hatchery	**1,131**	**43**	**1,389**	**597**	**206**
	% Hat.	**3.8%**	**0.3%**	**5.4%**	**3.3%**	**0.8%**
Necanicum River	Wild	2,198	1,218	750	431	1,055
	Hatchery	141	34	93	33	128
	% Hat.	6.0%	2.7%	11.0%	7.1%	10.8%
Nehalem River	Wild	18,736	10,451	11,614	14,033	17,205
	Hatchery	89	0	1,202	425	0
	% Hat.	0.5%	0.0%	9.4%	2.9%	0.0%
Tillamook Bay	Wild	2,532	1,995	8,774	2,295	4,828
	Hatchery	828	0	0	134	78
	% Hat.	24.6%	0.0%	0.0%	5.5%	1.6%
Nestucca River	Wild	4,695	686	1,876	394	1,844
	Hatchery	73	9	19	5	0
	% Hat.	1.5%	1.3%	1.0%	1.3%	0.0%
North Coast Dependents	Wild	661	2,116	1,121	376	639
	Hatchery	0	0	75	0	0
	% Hat.	0.0%	0.0%	6.3%	0.0%	0.0%
Mid-Coast Stratum	**Wild**	**42,070**	**51,407**	**21,224**	**12,270**	**68,138**
	Hatchery	**1,996**	**1,995**	**1,471**	**1,393**	**2,604**
	% Hat.	**4.5%**	**3.7%**	**6.5%**	**10.2%**	**3.7%**
Salmon River	Wild	1,642	79	513	59	652
	Hatchery	1,883	738	647	934	2,012
	% Hat.	53.4%	90.3%	55.8%	94.1%	75.5%
Siletz River	Wild	8,179	14,567	5,205	2,197	20,634
	Hatchery	0	667	118	219	0
	% Hat.	0.0%	4.4%	2.2%	9.1%	0.0%
Yaquina River	Wild	5,539	3,441	4,247	3,158	10,913
	Hatchery	113	172	59	197	0
	% Hat.	2.0%	4.8%	1.4%	5.9%	0.0%
Beaver Creek	Wild	4,569	2,264	1,950	611	1,218
	Hatchery	0	0	172	0	0
	% Hat.	0.0%	0.0%	8.1%	0.0%	0.0%
Alsea River	Wild	5,233	13,907	1,972	2,146	13,320
	Hatchery	0	0	0	0	122
	% Hat.	0.0%	0.0%	0.0%	0.0%	0.9%
Siuslaw River	Wild	8,729	16,907	5,869	3,552	17,491
	Hatchery	0	414	391	29	373
	% Hat.	0.0%	2.4%	6.2%	0.8%	2.1%
Mid Coast Dependents	Wild	8,179	242	1,468	547	3,910
	Hatchery	0	4	84	14	97
	% Hat.	0.0%	1.6%	5.4%	2.5%	2.4%

Table 6. Concluded.

Geographic Scale ESU/Stratum/Population		Spawning Year 2004	2005	2006	2007	2008
Lakes Stratum	**Wild**	**18,642**	**14,725**	**24,127**	**8,955**	**23,608**
	Hatchery	**45**	**0**	**251**	**0**	**0**
	% Hat.	**0.2%**	**0.0%**	**1.0%**	**0.0%**	**0.0%**
Siltcoos Lake	Wild	7,998	4,364	5,452	1,447	3,873
	Hatchery	27	0	21	0	0
	% Hat.	0.3%	0.0%	0.4%	0.0%	0.0%
Tahkenitch Lake	Wild	3,496	1,897	3,611	3,551	2,604
	Hatchery	0	0	107	0	0
	% Hat.	0.0%	0.0%	2.9%	0.0%	0.0%
Tenmile Lake	Wild	7,148	8,464	15,064	3,957	17,131
	Hatchery	18	0	123	0	0
	% Hat.	0.3%	0.0%	0.8%	0.0%	0.0%
Umpqua Stratum	**Wild**	**29,920**	**42,532**	**18,092**	**11,783**	**37,868**
	Hatchery	**7,287**	**9,364**	**9,585**	**3,860**	**462**
	% Hat.	**19.6%**	**18.0%**	**34.6%**	**24.7%**	**1.2%**
Lower Umpqua River	Wild	8,989	18,591	7,994	4,237	9,023
	Hatchery	64	423	1,484	424	309
	% Hat.	0.7%	2.2%	15.7%	9.1%	3.3%
Middle Umpqua River	Wild	6,375	7,608	4,852	1,587	4,472
	Hatchery	58	595	1,259	176	0
	% Hat.	0.9%	7.3%	20.6%	10.0%	0.0%
North Umpqua River	Wild	3,559	1,969	3,000	1,410	3,438
	Hatchery	6,753	8,346	6,692	2,578	153
	% Hat.	65.5%	80.9%	69.0%	64.6%	4.3%
South Umpqua River	Wild	10,997	14,364	2,246	4,549	20,935
	Hatchery	412	0	150	682	0
	% Hat.	3.6%	0.0%	6.3%	13.0%	0.0%
Mid-South Coast Stratum	**Wild**	**53,324**	**29,465**	**41,241**	**15,734**	**24,501**
	Hatchery	**221**	**265**	**118**	**13**	**27**
	% Hat.	**0.4%**	**0.9%**	**0.3%**	**0.1%**	**0.1%**
Coos River	Wild	23,337	17,048	11,266	1,329	14,881
	Hatchery	113	257	0	13	0
	% Hat.	0.5%	1.5%	0.0%	1.0%	0.0%
Coquille River	Wild	22,138	11,806	28,577	13,968	8,791
	Hatchery	44	0	0	0	0
	% Hat.	0.2%	0.0%	0.0%	0.0%	0.0%
Floras Creek	Wild	7,446	506	1,104	340	786
	Hatchery	0	0	110	0	17
	% Hat.	0.0%	0.0%	9.1%	0.0%	2.1%
Sixes River	Wild	403	105	294	97	43
	Hatchery	64	8	8	0	10
	% Hat.	13.7%	7.1%	2.6%	0.0%	18.9%
Mid-South Coast Dependents	Wild					0
	Hatchery					0
	% Hat.					

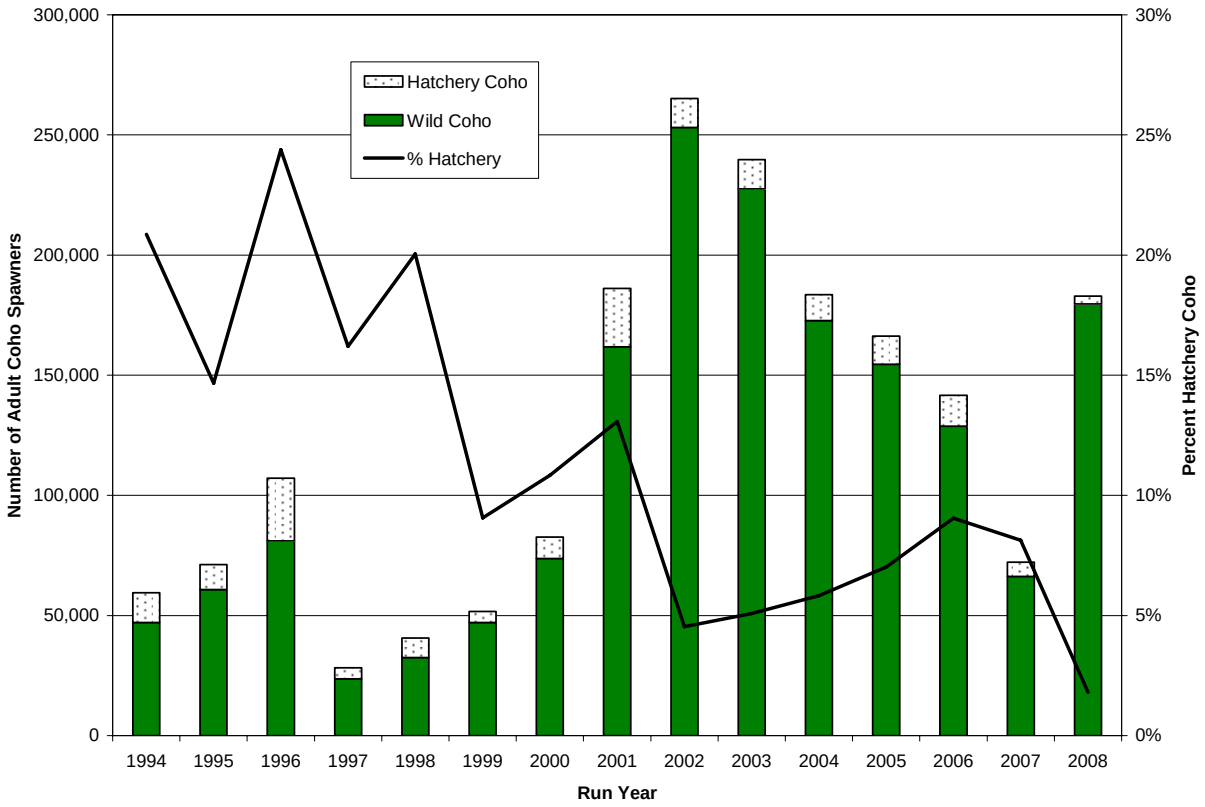

Figure 5. Oregon Coast Coho ESU estimated abundance of adult coho spawning naturally, by rearing origin for the 1994 through 2008 run years.

During the 2004 through 2008 run years, the Mid-Coast stratum averaged the greatest number of wild spawners in the ESU. However, this varied by year, with the Mid-Coast stratum highest in 2005and 2008, the Mid-South Coast stratum highest in 2004 and 2006, and the North Coast highest in 2007 (Table 6). In contrast, the Lakes stratum contributed the smallest proportion of wild spawners to the total ESU estimate overall and in each of the five years. The Lakes stratum has high coho spawner densities (Appendix Table D-4), but limited stream miles, so it produces a relatively small portion of the ESU total coho abundance (Table 6). Within each stratum, one or two populations consistently contributed the most to that stratum's overall estimated wild adult coho spawner abundance. In the North Coast stratum, the Nehalem River averaged 65%; Mid-Coast stratum, the Siuslaw and Siletz Rivers combined averaged 51%; Lakes stratum, Tenmile Lake averaged 55%; Umpqua stratum, the Lower Umpqua and South Umpqua River combined averaged 71%; and the Mid-South Coast stratum, the Coquille River averaged 55%.

Table 7. Oregon Coast Coho ESU average percentage of sites occupied by adult coho (Total & Wild) by population, stratum, and ESU for the 2004 through 2008 run years.

ESU, Stratum, and TRT Population	Avg. No. Sites Surveyed	Total Adult Coho		Wild Adult Coho	
		Avg. No. Occupied	Avg. % Occupied	Avg. No. Occupied	Avg. % Occupied
Oregon Coast ESU	**316**	**215**	**68.3%**	**207**	**65.9%**
North Coast Stratum	**73**	49	**65.9%**	**47**	**62.8%**
Necanicum River	13	9	75.3%	9	73.6%
Nehalem River	27	21	79.0%	21	79.0%
Tillamook Bay	12	8	65.7%	8	54.8%
Nestucca River	13	7	56.0%	6	38.7%
NC Dependents	8	3	46.0%	3	46.0%
Mid-Coast Stratum	**96**	**66**	**70.2%**	**63**	**66.8%**
Salmon River	7	6	85.8%	3	54.5%
Siletz River	16	11	71.2%	11	71.2%
Yaquina River	16	12	77.3%	12	77.3%
Beaver Creek	5	5	87.1%	5	87.1%
Alsea River	16	11	65.2%	11	65.2%
Siuslaw River	26	18	68.4%	18	68.4%
MC Dependents	10	4	37.1%	3	28.7%
Lakes Stratum	**14**	**12**	**75.0%**	**11**	**68.3%**
Siltcoos Lake	8	7	86.7%	6	66.7%
Tahkenitch Lake	3	3	76.7%	3	76.7%
Tenmile Lake	3	2	56.0%	2	56.0%
Umpqua Stratum	**90**	**57**	**63.1%**	**54**	**61.1%**
Lower Umpqua River	37	29	80.0%	29	79.0%
Middle Umpqua River	20	10	52.8%	10	49.6%
North Umpqua River	15	7	49.4%	6	46.0%
South Umpqua River	21	12	50.9%	11	50.1%
Mid-South Coast Stratum	**42**	**31**	**73.7%**	**31**	**73.7%**
Coos River	21	15	74.2%	15	74.2%
Coquille River	14	12	82.8%	12	82.8%
Floras Creek	6	5	87.5%	5	87.5%
Sixes River	5	1	6.3%	1	6.3%
MSC Dependents	3	0	0.0%	0	0.0%

Hatchery abundance across the ESU showed a slight increase between 2004 and 2006 with a noticeable decrease in 2007 and 2008 (Table 6). Of the five OC Coho ESU strata, the Umpqua stratum had the highest hatchery abundance, but exhibited the most dramatic decrease in hatchery abundance over the five year reporting period. Overall the proportion of hatchery coho remained less than 10% for the ESU for all five reporting years. The proportion of hatchery coho adults on the naturally spawning grounds was almost always below 10% for each stratum in each year (2004 to 2008), except for the Umpqua stratum (Table 6). Reductions in the North Umpqua hatchery coho program resulted in a sharp decline in the percent of hatchery fish in the Umpqua stratum and in the North Umpqua population starting with the 2008 run year.

Distribution and Timing

Of the approximately 316 sites surveyed annually in the OC Coho ESU, on average 66% are occupied by wild adult coho (Table 7). Averaged over the 2004 to 2008 run years, occupancy varied by population (excluding the dependent populations), ranging from approximately 6% in Sixes River to 88% of the sites surveyed in Floras Creek. Total adult coho densities were generally high across the ESU (Figure 6A). Coho density was calculated as the AUC estimate divided by the miles surveyed. The highest average coho densities were observed in the Lakes populations, with greater than 115 adult coho per mile. The lowest average coho densities were observed in the Sixes River population and Mid-South Coast dependent populations with less than 2 adult coho per mile. The Lakes, Mid-South and Mid-Coast strata generally had higher coho spawner densities that the North Coast and Umpqua strata.

Peak run timing of coho spawners ranged from early December (2005 and 2007 run years) to late December (2008 run year) in the OC Coho ESU (Figure 7). Averaged across the 2004 to 2008 spawning years, peak run timing occurred in late December with an average peak count of 7.0 total live adult coho observed per mile surveyed. Over the five year reporting period peak run timing fluctuated somewhat by year, but consistently occurred in December, and showed no trend across years.

Proportion Hatchery Fish

The OC Coho ESU naturally spawning coho abundance averaged 6.3% hatchery coho, and ranged from 1.8% to 9.0% for the 2004 through 2008 run years (Table 6). The majority of populations within the ESU averaged at or below 8% hatchery coho (Table 6 and Figure 6B). A few exceptions were the Tillamook Bay population which averaged 12.7%, Sixes River which averaged 18.2%, North Umpqua which averaged 39.3%, and Salmon River which averaged 73.7%. The continuing reduction in Oregon coastal hatchery coho production will further reduce the number of hatchery coho adults spawning naturally within the ESU. Hatchery coho releases have been eliminated in the North Umpqua and Salmon River populations. The last year with returning hatchery adult coho from smolts released in the North Umpqua population was 2007. The proportion of adult hatchery coho in the naturally spawning North Umpqua population went from an average of 70% for the 2004 through 2007 run years, to 4.3% in 2008. In Salmon River, 2008 is the last run year with adult hatchery coho from smolts released in the Salmon River. We would expect to see a similar reduction in 2009, from the current average of over 70% hatchery coho in the Salmon River naturally spawning population.

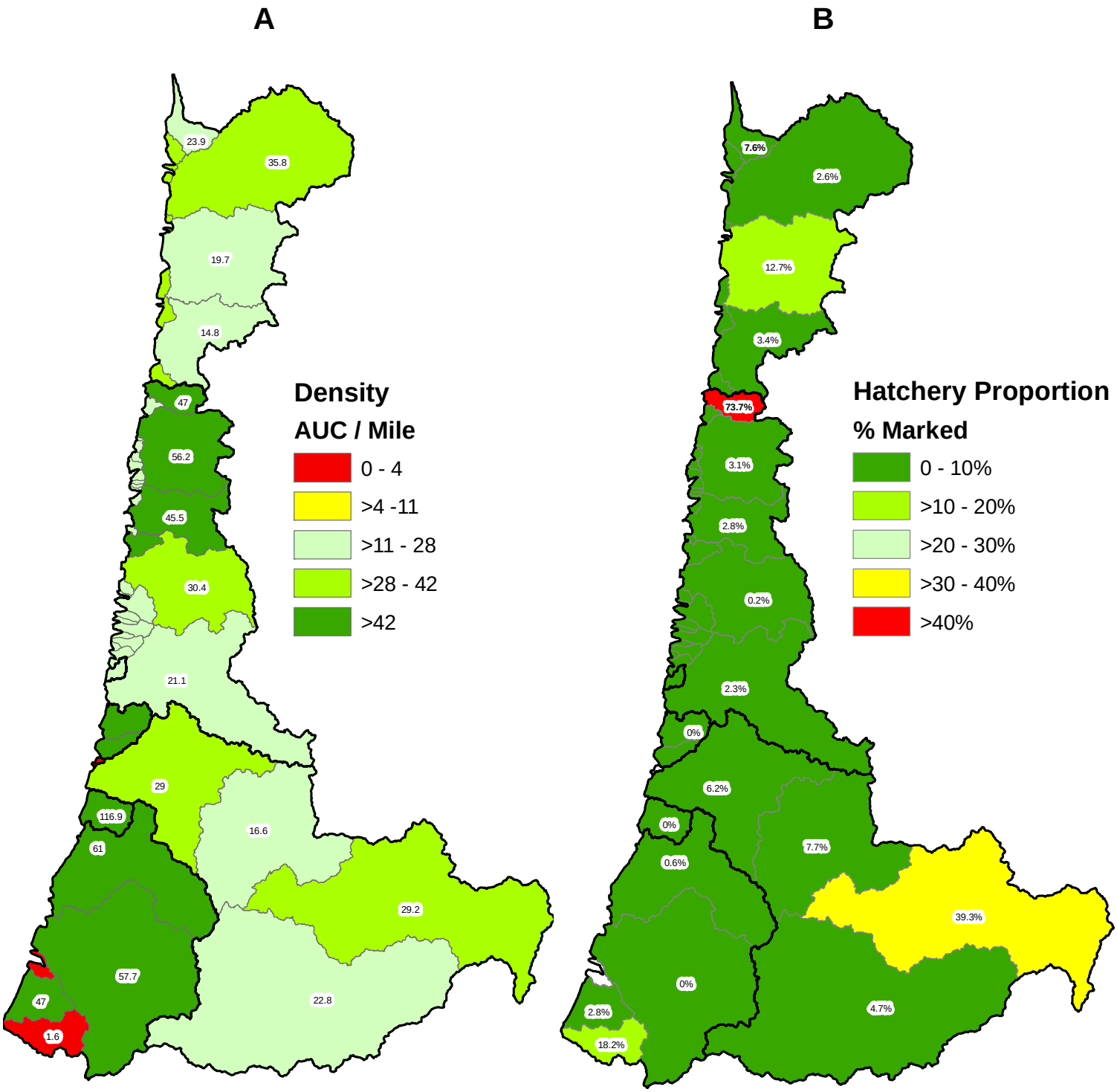

Figure 6. A) Average density (adult Coho AUC/Mile) in GRTS surveys by Oregon Coast Coho population, 2004 - 2008. B) Average percentage of marked adult Coho in GRTS surveys by Oregon Coast Coho population, 2004 - 2008. For further detail see appendix table D-4.

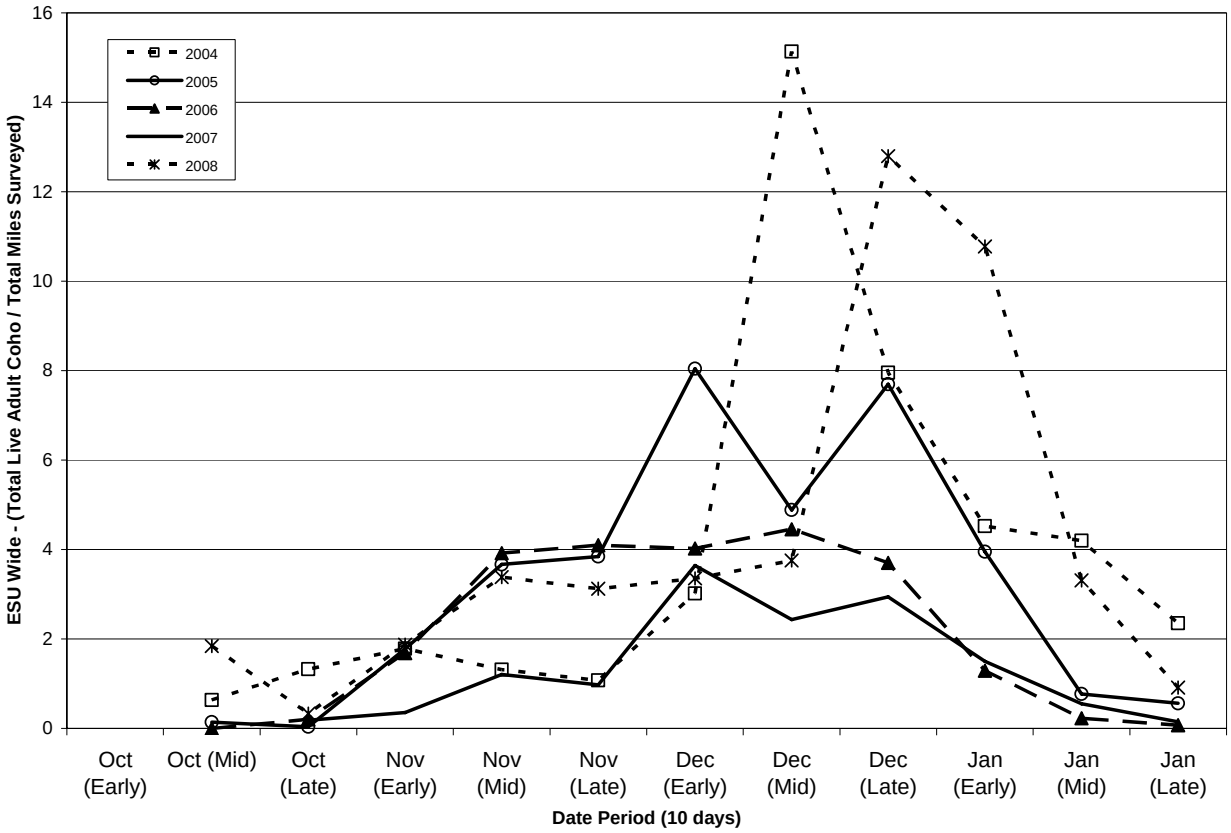

Figure 7. Run timing of live adult coho salmon observed on GRTS spawning ground surveys in the Oregon Coast Coho ESU, 2004 through 2008.

Southern Oregon/Northern California Coasts Evolutionarily Significant Unit

The Southern Oregon/Northern California Coasts Coho ESU includes coho populations in both Oregon and California. Naturally produced coho in the SONCC Coho ESU were listed as "threatened" in 1997 under the federal Endangered Species Act (NMFS 1997). This report covers spawning escapement monitoring of the Oregon populations in the SONCC Coho ESU, for the 2004 through 2008 spawning seasons. The NOAA Fisheries SONCC Coho TRT reviewed the historical coho population structure of this ESU and identified seven functionally or potentially independent, and nine dependent or ephemeral Oregon coho populations in this ESU (Williams et al. 2006). Geographically, these Oregon populations occupy the northern third of the SONCC Coho ESU, and based on an assessment of stream habitat intrinsic potential, represent about a third of the historic coho habitat potential for the ESU (Williams et.al. 2006).

Effort

Three methods are 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 is located at about river mile 126 on the Rogue River and is a complete barrier to adult salmonid migration, except through the fish ladder counting station. Counts of adult and jack coho salmon migrating past

Table 8. Southern Oregon/Northern California Coasts Coho ESU, GRTS spawning survey goals and results for number of sites surveyed and 95% CI., 2004 through 2008 run years. Target Response sites are reaches within coho spawning habitat which were successfully surveyed.

Stratum	Population	Survey Goal	Target Response					95% CI as percent of point estimate (Goal is +/-30%)				
			2004	2005[a]	2006	2007	2008	2004	2005[a]	2006	2007	2008
Coastal	Elk River	18	1		1	1	0	*NAS*		*NAS*	*NAS*	*NAS*
	L. Rogue R.	15	1		4	3	0	*NAS*		*NAS*	189.5%	*NAS*
	Chetco River[b]	26										
	Winchuck R.[b]	11										
	SC Depend.[b]	15										
Interior	Illinois River	30	9		3	4	3	60.1%		172.4%	61.4%	105.6%
	M. Rogue & Applegate R.	30	24		8	11	16	44.3%		126.6%	24.8%	63.4%
	U. Rogue R.	30	18		14	7	5	53.8%		55.9%	163.4%	163.1%
ESU Total		**175**	**53**		**30**	**26**	**24**	**32.1**%		**115.7**%	**31.4**%	**66.5**%

NAS = Not adequately surveyed (either no surveys were selected in the population or < 2 surveys stayed in rotation).
a = Did not sample
b = Areas are not in the sampling frame, no surveys conducted

Gold Ray Dam are not included in this report, but are available on the ODFW web page (http://www.dfw.state.or.us/fish/fish_counts/). Gold Ray dam counts include coho migrating to natural spawning grounds, and coho returning to Cole River Hatchery. Cole Rivers hatchery is located near the base of Lost Creek Dam (~ river mile 157 on the Rogue River), and releases approximately 200,000 coho smolts annually into the Rogue River adjacent to the hatchery.

Second, GRTS based coho spawning ground surveys have been conducted in the SONCC Coho ESU since 1998. However, as noted in the Methods Section, this effort still uses the 98 Frame which only samples coho spawning habitat in the high and moderate spawner density categories. This accounts for only 29% of the coho spawning habitat in Oregon populations of the SONCC Coho ESU, and does not include any coho spawning habitat in the Chetco River, Winchuck River and dependent populations of the ESU (Figure 8). The 98 Frame also only accounts for a small portion of the coho spawning habitat in the Elk River (20%) and in the four Rogue River coho populations (32%). Finally, there are large portions of the Illinois River and the Middle Rogue and Applegate River coho populations that are within the Rogue River Gorge or the Kalmiopsis Wilderness. These areas are too remote to logistically be able to conduct spawning ground surveys on a weekly basis, and are therefore excluded from the spawning survey sampling frame regardless of coho spawner density.

During the 1998 through 2004 run years we had three crews (1 in Gold Beach, 2 in the Upper Rogue) conducting coho spawning ground surveys in the SONCC Coho ESU, and they successfully surveyed 50 to 60 sites each year. Budget constraints forced the elimination of GRTS spawning ground surveys in the SONCC Coho ESU for the 2005 run year, and we were only able to fund 2 crews (1 in Gold Beach and 1 in the Upper Rogue) for the 2006 through 2008

run years. With this reduced effort we are only successfully surveying 25 to 30 sites a year (Table 8). If we were sampling all the coho spawning habitat using our target rate of 30 sites or 30% of the coho spawning habitat, we would need to survey about 175 sites a year in the Oregon populations of this ESU. The low level of sampling during the 2004 through 2008 run years did not meet our target for number of sites sampled in any year, and only meet our target for a 95% CI of +/- 30% of the point estimate in 1 of 17 cases (Table 8).

The final escapement monitoring method for the SONCC Coho ESU is a Peterson mark-recapture estimate of coho entering the Rogue River. Returning adult coho are sampled by seining at Huntley Park (river mile 8). The seining represents the re-capture, and provides the total coho sampled (C) and number of adipose fin clipped coho re-captured (R) for the mark-recapture equation. Adult coho returning to Cole River Hatchery are enumerated and also sampled for adipose fin clipped fish. The number of adipose fin clipped coho collected at Cole Rivers Hatchery is expanded by a constant (1.1) to account for catch and straying of coho between Huntley Park (river mile 8) and the hatchery (river mile 157). Fin-mark rates and the proportion of hatchery coho at Cole Rivers Hatchery that were fin-marked are used to estimate the hatchery and wild components of the coho run (Jacobs et.al. 2002). These estimates of the number of coho returning to the Rogue River above Huntley Park are then converted to estimates of the number of coho spawning naturally in the Rogue Basin. The number of hatchery and wild coho 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 on natural spawning grounds in the Rogue Basin (Table 9). Cole Rivers Hatchery data is obtained from the ODFW Hatchery Management Information System (HMIS). Estimates of freshwater harvest are based on return of angler harvest cards, and are generally not available until about 2 years after the end of each calendar year.

Table 9. Southern Oregon/Northern California Coasts Coho ESU estimated abundance of adult coho spawning naturally for the 2004 through 2008 run years. Rogue River Populations only.

	Coho	Spawning Year				
Data Component	Origin	2004	2005	2006	2007	2008
SONCC Coho ESU (Rogue Only)	**Wild**	**24,208**	**9,715**	**3,776**	**5,209**	**394**
	Hatchery	**1,230**	**479**	**325**	**83**	**31**
	% Hat.	**4.8%**	**4.7%**	**7.9%**	**1.6%**	**7.3%**
Huntley Park Est. [1]	Total	33,578	15,296	7,433	7,517	572
	Wild	24,486	9,957	3,937	5,242	414
	Hatchery	9,092	5,339	3,496	2,275	158
Freshwater Catch [2]	Total	509	320	237	209	*Not*
Excluding Rogue Bay	Wild	0	0	0	0	*Yet*
	Hatchery	509	320	237	209	*Available*
Cole Rivers Hatchery [3]	Total	7,631	4,782	3,095	2,016	147
	Wild	278	242	161	33	20
	Hatchery	7,353	4,540	2,934	1,983	127

1 = Huntley Park mark-recapture estimate of coho 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 for 2004 through 2008.

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

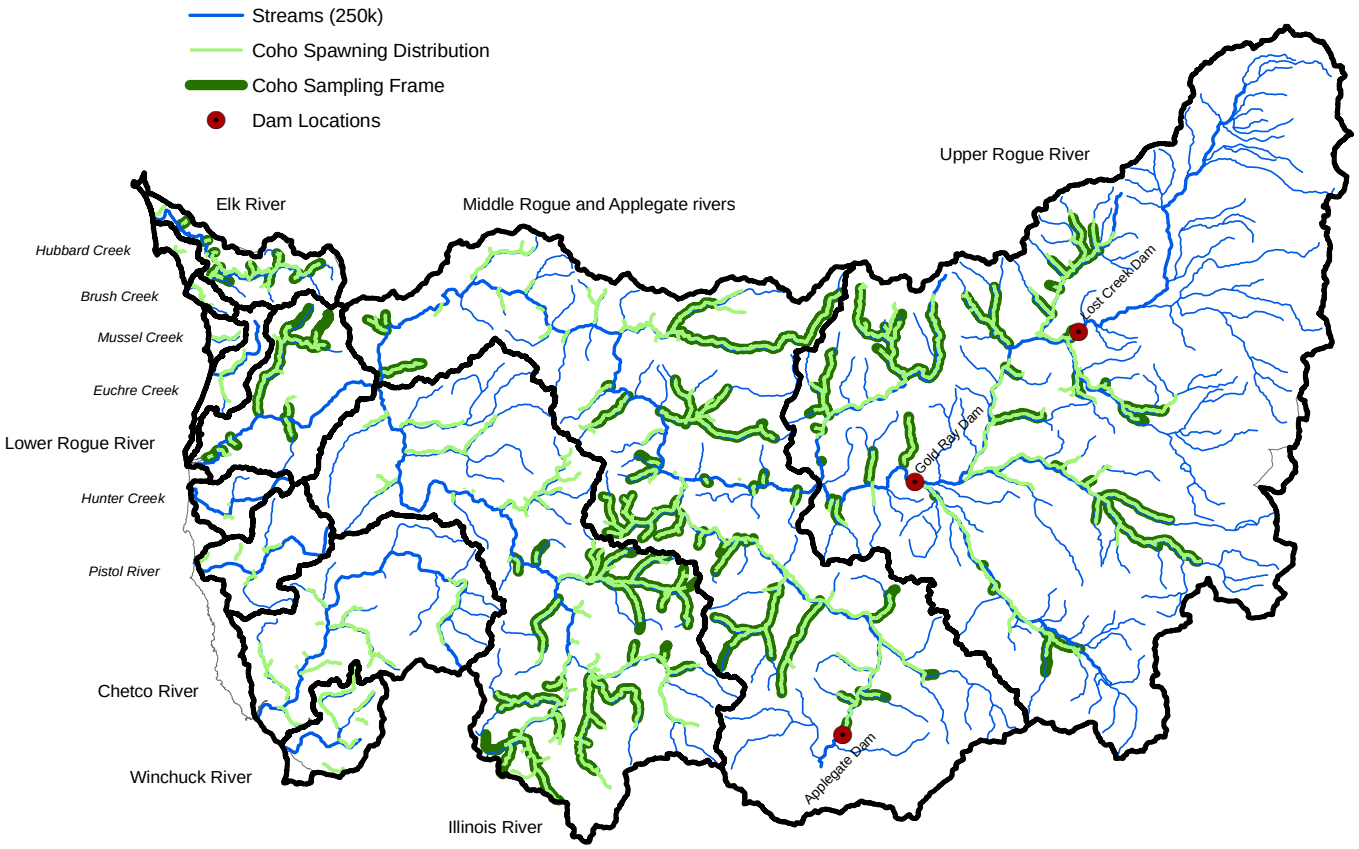

Figure 8. Distribution of coho salmon spawning habitat (as identified by ODFW) and the proportion included in the current GRTS sampling frame, for Oregon populations in the Southern Oregon/Northern California Coasts Coho ESU..

Abundance

Long-term monitoring of coho spawner abundance in Oregon populations of the SONCC Coho ESU is based on the Huntley Park estimates of coho in the Rogue Basin (Figure 9 and Table 9). Adult wild coho abundance in the SONCC Coho ESU generally increased from 1994 to a peak in 2004, and has declined since then to a very low escapement in 2008 (Figure 9). 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 5). However, the large increase in wild adult coho spawners in 2008 in the OC Coho ESU was not seen in the SONCC Coho ESU (Figures 5 and 9). The pattern in wild adult coho spawning abundance between 2004 and 2008 is very similar for the GRTS and Huntley Park estimates (Table 9 and Appendix Table C-1). The GRTS sampling frame only accounts for 32% of the coho spawning habitat in the Rogue Basin, but the GRTS estimate averaged 50.4% and 76.2% (wild and hatchery adult coho) of the Huntley

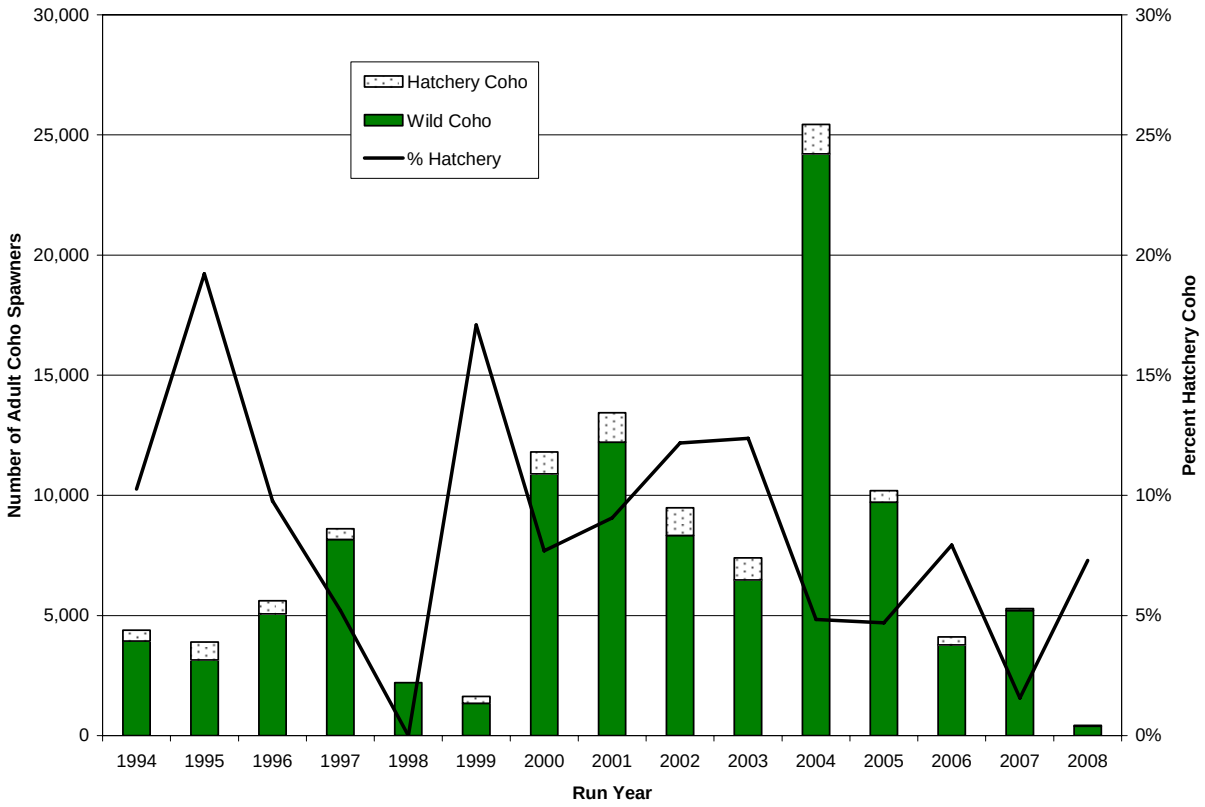

Figure 9. Southern Oregon/Northern California Coasts Coho ESU estimated abundance of adult coho spawning naturally, by rearing origin for the 1994 through 2008 run years. Abundance based on Huntley Seining mark-recapture method.

Park estimate for the 2004 through 2007 run years. The difference between the GRTS and Huntley Park estimates is likely the result of not including the low coho spawner density habitat in the 98 Frame for GRTS sampling sites. Rogue basin adult coho abundance in 2008 was very low for all three monitoring methods (Huntley Park, GRTS, and Gold Ray Dam count). However, unlike earlier years, estimates of wild adult coho spawning naturally based on GRTS surveys (1,205 see Appendix Table C-1) was higher than the Huntley Park estimate of 394 (Table 9). The Gold Ray Dam count of wild adult coho in 2008 was 1,283.

Distribution and Timing

Spatial distribution of coho spawners in the SONCC Coho ESU was compared across populations by average AUC/mile (Figure 10A), and within a population by percent of sampled sites that were occupied by coho spawners (Table 10). Only GRTS surveys that met project protocols for a successful survey were used in this analysis. The Illinois River coho population had the highest average density of total adult coho spawners (Figure 10A). Density of adult coho spawners in the Middle Rogue and Applegate River, and the Upper Rogue River coho populations were 6 to 9 coho/mile, while the Lower Rogue River and Elk River coho populations had very low average coho spawner densities (Figure 10A). Occupancy was calculated for both

all coho and wild coho only, and there were only small differences in the percentage of sites considered occupied between the two methods. Overall, only about 1/3 of the spawning survey sites in the SONCC Coho ESU were occupied (Table 10). Coho distribution in the Illinois River coho population was fairly good with an average of about 70% of sites occupied for the 2004 through 2008 run years. Although sample sizes are small, coho distribution in the Elk River, Lower Rouge and Upper Rogue populations was fairly limited, averaging 0% to 18% of sites occupied for the 2004 through 2008 run years (Table 10). We do not have any GRTS spawning surveys in the Chetco River, Winchuck River or SONCC dependent coho populations, so have no data on coho distribution in those areas.

Temporal distribution of coho spawners was only calculated at the ESU scale, and is based on observations of live adult coho in GRTS surveys, so includes both hatchery and wild coho. Peak run timing occurred from early December (2007 run year) to early January (2008 run year) in the SONCC Coho ESU (Figure 11). Run timing is influenced by a variety of environmental factors each year, but was actually fairly consistent in these years for the SONCC Coho ESU, with three of the four years being at or near their peak timing in mid December (Figure 11). This timing is very similar to that seen in the OC Coho ESU (Figure 7), but very different from that in the LCR Coho ESU which tends to have a much earlier coho run timing (Figure 4). Also of note, is the fairly broad timing of the 2004 and 2007 run years in comparison to the much narrower timing of the 2006 and 2008 run years (Figure 11). Abundance of coho spawners was substantially higher in 2004 and 2007, than in 2006 and 2008 (Table 9), which may have contributed to the broader run timing.

Table 10. Southern Oregon/Northern California Coasts Coho ESU average percentage of sites occupied by adult coho (Total & Wild) by population, stratum, and ESU for the 2004 through 2008 run years. -- = Data not available.

ESU, Stratum, and TRT Population	Avg. No. Sites Surveyed	Total Adult Coho		Wild Adult Coho	
		Avg. No. Occupied	Avg. % Occupied	Avg. No. Occupied	Avg. % Occupied
SONCC Coho ESU (Oregon Only)	**27**	**12**	**33.2%**	**12**	**31.0%**
Coastal Stratum	**4**	**0**	**0.0%**	**0**	**0.0%**
Elk River	1	0	0.0%	0	0.0%
Lower Rogue River	3	0	0.0%	0	0.0%
Chetco River	--	--	--	--	--
Winchuck River	--	--	--	--	--
SC Dependents	--	--	--	--	--
Interior Stratum	**31**	**15**	**45.5%**	**15**	**42.2%**
Illinois River	5	4	69.4%	4	69.4%
Middle Rogue & Applegate River	15	9	52.4%	8	47.0%
Upper Rogue River	11	3	21.0%	3	17.5%

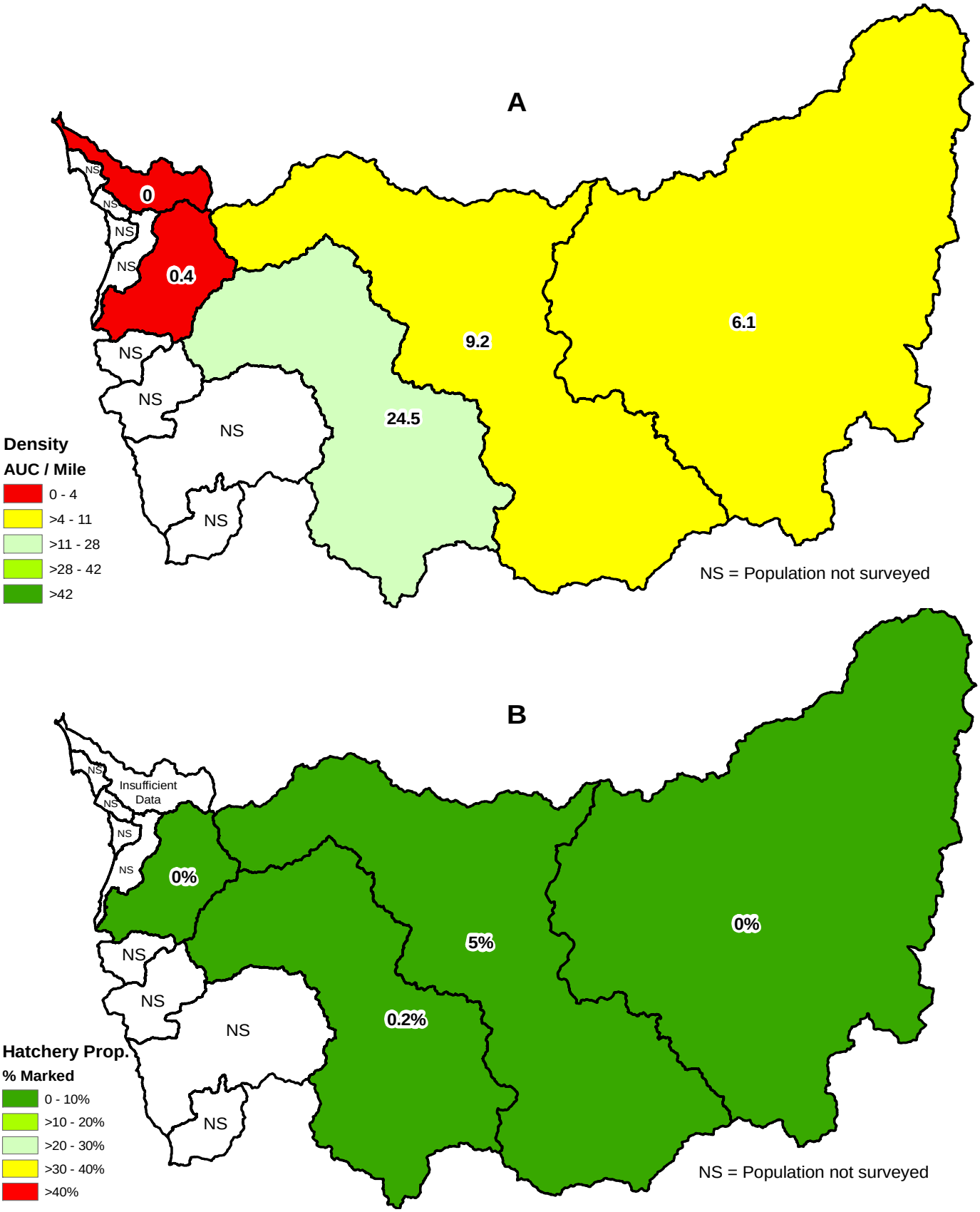

Figure 10. A) Average density (adult Coho AUC/Mile) in GRTS surveys by SONCC Coho populaiton, 2004 - 2008. B) Average percentage of marked adult Coho in GRTS surveys by SONCC Coho population, 2004 - 2008. For further detail see appendix table D-4.

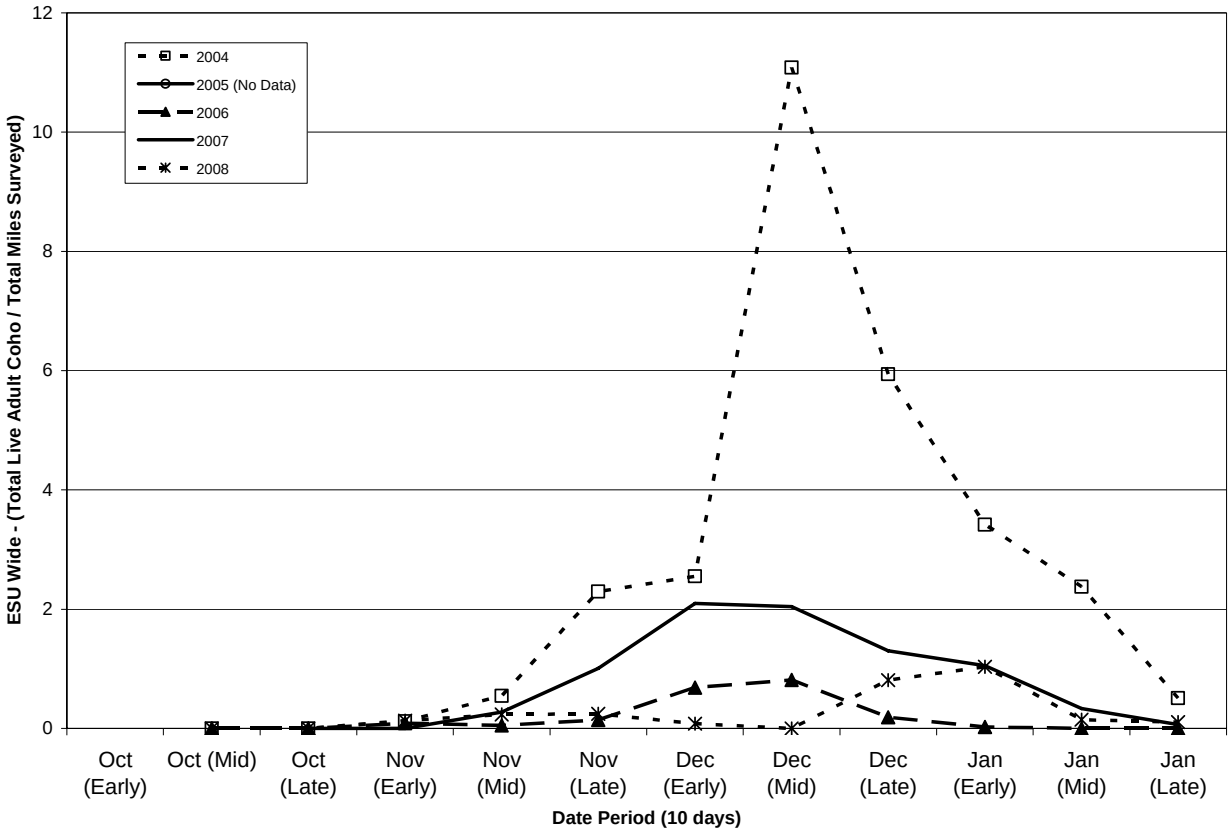

Figure 11. Run timing of live adult coho salmon observed on GRTS spawning ground surveys in the Southern Oregon/Northern California Coasts Coho ESU, 2004 through 2008.

Proportion Hatchery Fish

Hatchery fish averaged 5.3% of the naturally spawning coho in the SONCC Coho ESU, ranging from 1.6% to 7.9% for the 2004 through 2008 run years (Table 9). Estimated proportion of hatchery coho does differ between GRTS spawning ground surveys and Huntley Park seining, but both generally show similar results (Table 9 and Appendix Table C-1). Based on coho carcasses observed on GRTS surveys, the percentage of naturally spawning coho that were of hatchery origin averaged 5% or less in all of the SONCC Coho ESU populations for the 2004 through 2008 run years (Figure 10B). Percentage of hatchery coho in the Middle Rogue and Applegate River coho population was the highest of the four Rogue coho populations (Figure 10B). No overall pattern in the proportion of hatchery fish in the naturally spawning coho populations was observed for the SONCC Coho ESU overall or for any of the individual coho populations in the ESU for the 2004 through 2008 run years (Table 9 and Appendix Table C-1).

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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 years 2004 through 2008. 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.

ESU, Stratum, and TRT Population	Survey Effort Number of		Adult Coho Spawner Abundance			
			Total		Wild	
	Surveys	Miles	Estimate	95% CI	Estimate	95% CI
2004 Run Year						
Lower Columbia ESU	**101**	**89.7**	**4,287**	**1,208**	**2,532**	**663**
Coast Stratum						
Youngs Bay	17	15.2	1,014	718	128	91
Big Creek	3	3.0	265	340	0	0
Clatskanie River	14	11.5	398	200	398	200
Scappoose River	18	16.7	786	310	719	284
Cascade Stratum						
Clackamas River	28	25.5	1,496	804	959	516
Sandy River	21	17.9	327	212	327	212
Below Marmot	*3*	*3.1*	*131*	*256*	--	--
Above Marmot	*18*	*14.8*	*192*	*117*	*192*	*117*
Gorge Stratum						
Lower Gorge						
Hood River						
2005 Run Year						
Lower Columbia ESU	**83**	**76.0**	**6,347**	**1,954**	**2,914**	**957**
Coast Stratum						
Youngs Bay	12	9.9	319	253	77	61
Big Creek	5	5.1	163	129	39	31
Clatskanie River	16	13.9	501	401	494	396
Scappoose River	12	11.2	336	152	336	152
Cascade Stratum						
Clackamas River	17	19.1	583	294	79	40
Sandy River	15	12.0	392	373	392	373
Below Marmot	*2*	*1.1*	*0*	*0*	*0*	*0*
Above Marmot	*13*	*10.9*	*381*	*357*	*381*	*357*
Gorge Stratum						
Lower Gorge	2	1.1	1,775	1,191	263	176
Hood River	4	3.6	2,278	1,382	1,235	749

Table A-1. Concluded

ESU, Stratum, and TRT Population	Survey Effort Number of		Adult Coho Spawner Abundance			
			Total		Wild	
	Surveys	Miles	Estimate	95% CI	Estimate	95% CI
2006 Run Year						
Lower Columbia ESU	**53**	**47.5**	**16,546**	**7,233**	**2,637**	**665**
Coast Stratum						
Youngs Bay	2	1.3	457	895	--	--
Big Creek						
Clatskanie River	14	13.8	467	242	421	218
Scappoose River	15	13.4	728	222	689	210
Cascade Stratum						
Clackamas River	4	4.8	11,830	6,778	959	550
Sandy River	13	12.2	1,618	2,221	--	--
Below Marmot						
Above Marmot	*11*	*10.3*	*1,580*	*2,317*	--	--
Gorge Stratum						
Lower Gorge	3	1.2	764	722	226	214
Hood River	2	0.8	683	112	341	56
2007 Run Year						
Lower Columbia ESU	**111**	**101.1**	**3,931**	**894**	**1,989**	**537**
Coast Stratum						
Youngs Bay	20	17.9	16	11	--	--
Big Creek	4	3.7	216	141	0	0
Clatskanie River	14	14.4	1,126	412	583	213
Scappoose River	16	13.8	354	293	354	293
Cascade Stratum						
Clackamas River	25	25.0	821	452	239	132
Sandy River	26	23.5	753	381	687	348
Gorge Stratum						
Lower Gorge	4	1.8	387	415	126	135
Hood River	2	1.1	258	36	--	--
2008 Run Year						
Lower Columbia ESU	**104**	**91.9**	**11,492**	**1,419**	**3,910**	**918**
Coast Stratum						
Youngs Bay	15	11.3	86	50	63	37
Big Creek	5	4.3	197	170	131	113
Clatskanie River	13	12.9	995	706	995	706
Scappoose River	19	17.3	290	110	290	110
Cascade Stratum						
Clackamas River	17	14.1	2,269	1,139	859	431
Sandy River	27	27.8	1,277	340	1,277	340
Gorge Stratum						
Lower Gorge	3	1.5	414	236	223	127
Hood River	3	1.6	47	65	19	27

Table A-2. Number of unmarked adult coho passed upstream of counting stations, into areas without GRTS spawning grounds surveys. Oregon portion of the LCR Coho ESU, run years 2004 through 2008.

ESU, Stratum, and TRT Population	Counting Station	Spawning Year				
		2004	2005	2006	2007	2008
Lower Columbia ESU						
Coast Stratum						
Youngs Bay	Klaskanine Hatchery [a]	21	2	11	19	19
Big Creek	Big Creek Hatchery [a]	112	180	225	212	229
Scappoose River	Bonnie Falls Trap [a]	36	12	30	21	2
Cascade Stratum						
Clackamas River	N Fk Clackamas Dam [a]	1,915	1,222	2,505	3,369	835
Sandy River	Sandy Hatchery [a]	184	139	101	(80)	(57)
	Marmot Dam [a]	1,025	717	822	n.a.	n.a.
Gorge Stratum						
Hood River	Powerdale Dam [a]	129	25	29	53	45

a = Number of unmarked adult coho passed above otherwise impassable, listed counting station. Note: Sandy Hatchery count is number released above Marmot Dam site. Marmot Dam was removed in 2006, and these releases (in brackets) are now with in the GRTS sampled area. Thus, they are included in the spawning ground survey estimate area, and should not be add in.

n.a. = Not Applicable, Marmot dam was removed in 2006, so there are no longer any Marmot Dam counts.

APPENDIX B (OC COHO ESU)

Table B-1. Results of randomly selected spawning ground surveys for coho salmon in the OC Coho ESU, run years 2004 through 2008. 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.

ESU, Stratum, and TRT Population	Survey Effort Number of		Adult Coho Spawner Abundance			
			Total		Wild	
	Surveys	Miles	Estimate	95% CI	Estimate	95% CI
2004 Run Year						
Oregon Coast ESU	**417**	**387.6**	**153,994**	**17,864**	**150,176**	**17,664**
North Coast Stratum	**112**	**107.8**	29,954	**5,115**	**28,823**	**4,929**
Necanicum River	7	6.5	2,339	954	2,198	896
Nehalem River	61	61.5	18,825	4,251	18,736	4,231
Tillamook Bay	23	20.9	3,360	1,884	2,532	1,420
Nestucca River	19	17.5	4,768	1,399	4,695	1,378
NC Dependents	2	1.5	661	1,296	661	1,296
Mid-Coast Stratum	**107**	**101.4**	**44,067**	**12,543**	**42,071**	**12,425**
Salmon River	7	7.7	3,525	1,736	1,642	809
Siletz River	17	14.2	8,179	3,442	8,179	3,442
Yaquina River	10	9.3	5,652	3,830	5,539	3,753
Beaver Creek	4	4.6	4,569	1,970	4,569	1,970
Alsea River	24	22.3	5,233	1,541	5,233	1,541
Siuslaw River	37	35.8	8,729	2,222	8,729	2,222
MC Dependents	8	7.7	8,179	10,798	8,179	10,798
Umpqua Stratum	**115**	**103.3**	**26,895**	**5,894**	**26,360**	**5,732**
Lower Umpqua River	53	50.1	9,053	2,264	8,989	2,248
Middle Umpqua River	22	19.8	6,433	2,330	6,375	2,309
North Umpqua River						
South Umpqua River	40	33.5	11,409	4,918	10,997	4,740
Mid-South Coast Stratum	**83**	**75.0**	**53,078**	**10,045**	**52,922**	**10,024**
Coos River	34	30.8	23,450	5,692	23,337	5,664
Coquille River	45	41.4	22,182	5,160	22,138	5,150
Floras Creek	4	2.8	7,446	6,471	7,446	6,471
Sixes River						
MSC Dependents						

Table B-1. Continued.

ESU, Stratum, and TRT Population	Survey Effort Number of		Adult Coho Spawner Abundance			
			Total		Wild	
	Surveys	Miles	Estimate	95% CI	Estimate	95% CI
2005 Run Year						
Oregon Coast ESU	**205**	**176.2**	**146,870**	**30,909**	**140,053**	**29,563**
North Coast Stratum	**58**	**51.7**	**16,510**	**3,834**	**15,780**	**3,770**
Necanicum River	12	9.5	1,252	633	1,218	616
Nehalem River	30	29.8	10,451	3,048	10,451	3,048
Tillamook Bay	9	7.0	1,995	1,165	1,995	1,165
Nestucca River	3	1.5	695	684	--	--
NC Dependents	4	4.0	2,116	1,784	2,116	1,784
Mid-Coast Stratum	**69**	**59.5**	**53,401**	**22,366**	**51,164**	**21,581**
Salmon River	5	3.5	817	991	79	95
Siletz River	5	4.3	15,234	18,981	14,567	18,150
Yaquina River	4	3.4	3,613	2,119	3,441	2,018
Beaver Creek	4	3.9	2,264	1,597	2,264	1,597
Alsea River	6	5.4	13,907	9,257	13,907	9,257
Siuslaw River	39	33.8	17,321	6,796	16,907	6,633
MC Dependents	6	5.2	246	270	--	--
Umpqua Stratum	**66**	**54.8**	**47,847**	**13,286**	**44,255**	**11,518**
Lower Umpqua River	29	23.5	19,014	6,546	18,591	6,401
Middle Umpqua River	15	12.7	8,203	6,477	7,608	6,007
North Umpqua River	4	2.5	6,266	7,437	3,692	4,382
South Umpqua River	18	16.2	14,364	6,034	14,364	6,034
Mid-South Coast Stratum	**12**	**10.1**	**29,111**	**16,245**	**28,854**	**16,166**
Coos River	9	7.3	17,305	9,308	17,048	9,170
Coquille River	3	2.8	11,806	13,314	11,806	13,314
Floras Creek						
Sixes River						
MSC Dependents						

Table B-1. Continued.

ESU, Stratum, and TRT Population	Survey Effort Number of		Adult Coho Spawner Abundance			
			Total		Wild	
	Surveys	Miles	Estimate	95% CI	Estimate	95% CI
2006 Run Year						
Oregon Coast ESU	**307**	**260.2**	**112,772**	**21,319**	**103,551**	**20,427**
North Coast Stratum	**82**	**74.2**	**25,524**	**5,395**	**24,135**	**5,124**
Necanicum River	16	13.2	843	318	750	283
Nehalem River	22	19.7	12,816	3,918	11,614	3,551
Tillamook Bay	15	16.3	8,774	3,491	8,774	3,491
Nestucca River	21	18.3	1,895	944	1,876	934
NC Dependents	8	6.8	1,196	759	1,121	712
Mid-Coast Stratum	**107**	**85.0**	**22,695**	**6,497**	**21,223**	**6,207**
Salmon River	3	1.1	1,160	962	513	425
Siletz River	21	19.5	5,323	4,624	5,205	4,521
Yaquina River	29	22.1	4,306	1,869	4,247	1,843
Beaver Creek	7	5.3	2,122	1,349	1,950	1,240
Alsea River	12	9.0	1,972	942	1,972	942
Siuslaw River	24	19.9	6,260	3,405	5,869	3,193
MC Dependents	11	8.1	1,552	1,453	1,468	1,375
Umpqua Stratum	**82**	**68.9**	**23,496**	**7,764**	**17,247**	**5,442**
Lower Umpqua River	42	35.5	9,478	4,449	7,994	3,752
Middle Umpqua River	20	17.4	6,111	4,043	4,852	3,211
North Umpqua River	8	5.5	5,511	4,693	2,154	1,834
South Umpqua River	12	10.5	2,396	1,457	2,246	1,366
Mid-South Coast Stratum	**36**	**32.0**	**41,057**	**17,969**	**40,947**	**17,968**
Coos River	23	20.0	11,266	4,243	11,266	4,243
Coquille River	7	6.3	28,577	17,453	28,577	17,453
Floras Creek	6	5.7	1,214	533	1,104	484
Sixes River						
MSC Dependents						

Table B-1. Continued.

ESU, Stratum, and TRT Population	Survey Effort Number of		Adult Coho Spawner Abundance			
			Total		Wild	
	Surveys	Miles	Estimate	95% CI	Estimate	95% CI
2007 Run Year						
Oregon Coast ESU	**346**	**290.3**	**61,526**	**14,395**	**53,653**	**13,922**
North Coast Stratum	**54**	**41.9**	**18,126**	**7,902**	**14,840**	**7,555**
Necanicum River	12	10.3	464	226	431	210
Nehalem River	15	12.4	14,458	7,776	14,033	7,548
Tillamook Bay	6	3.8	2,429	1,324	--	--
Nestucca River	10	7.7	399	320	--	--
NC Dependents	11	7.6	376	261	376	261
Mid-Coast Stratum	**116**	**94.2**	**13,664**	**2,790**	**11,722**	**2,547**
Salmon River	12	10.0	993	542	59	32
Siletz River	24	18.3	2,416	875	2,197	795
Yaquina River	23	15.6	3,355	1,755	3,158	1,652
Beaver Creek	7	5.5	611	327	611	327
Alsea River	17	13.4	2,146	1,240	2,146	1,240
Siuslaw River	22	22.1	3,581	1,227	3,552	1,217
MC Dependents	11	9.2	561	702	--	--
Umpqua Stratum	**133**	**115.7**	**14,086**	**4,515**	**11,453**	**3,695**
Lower Umpqua River	51	43.0	4,661	1,552	4,237	1,411
Middle Umpqua River	28	25.6	1,763	1,125	1,587	1,012
North Umpqua River	29	25.6	2,431	1,894	1,081	842
South Umpqua River	25	21.5	5,231	3,623	4,549	3,150
Mid-South Coast Stratum	**43**	**38.5**	**15,650**	**10,799**	**15,638**	**10,799**
Coos River	31	30.0	1,342	381	1,329	378
Coquille River	6	5.2	13,968	10,791	13,968	10,791
Floras Creek	5	3.0	340	104	340	104
Sixes River						
MSC Dependents						

Table B-1. Concluded.

ESU, Stratum, and TRT Population	Survey Effort Number of		Adult Coho Spawner Abundance			
			Total		Wild	
	Surveys	Miles	Estimate	95% CI	Estimate	95% CI
2008 Run Year						
Oregon Coast ESU	**483**	**422.6**	**145,874**	**14,687**	**139,346**	**14,260**
North Coast Stratum	**125**	**108.8**	**28,473**	**5,994**	**27,677**	**5,919**
Necanicum River	21	17.6	1,208	322	1,105	294
Nehalem River	32	29.4	15,690	4,681	15,690	4,681
Tillamook Bay	30	27.2	5,536	1,741	4,897	1,540
Nestucca River	23	21.9	5,499	3,284	5,444	3,252
NC Dependents	19	12.7	540	301	540	301
Mid-Coast Stratum	**155**	**133.4**	**62,134**	**8,676**	**57,874**	**8,354**
Salmon River	12	11.2	3,853	1,464	784	298
Siletz River	28	26.3	15,256	5,067	14,519	4,823
Yaquina River	27	17.5	8,791	1,925	8,710	1,907
Beaver Creek	8	6.2	1,182	434	1,182	434
Alsea River	28	26.1	11,618	3,158	11,431	3,107
Siuslaw River	29	26.0	17,163	4,963	17,042	4,928
MC Dependents	23	20.0	4,270	2,992	4,204	2,946
Umpqua Stratum	**115**	**100.2**	**31,301**	**8,064**	**29,896**	**7,695**
Lower Umpqua River	27	21.4	13,235	5,359	12,267	4,967
Middle Umpqua River	30	26.6	4,731	2,476	4,594	2,404
North Umpqua River	32	29.0	1,027	763	1,027	763
South Umpqua River	26	23.3	12,307	5,440	12,007	5,308
Mid-South Coast Stratum	**88**	**80.3**	**23,967**	**6,282**	**23,900**	**6,269**
Coos River	30	28.7	13,353	5,105	13,312	5,090
Coquille River	29	24.9	9,874	3,649	9,874	3,649
Floras Creek	13	12.8	650	291	637	284
Sixes River	13	10.9	89	91	77	78
MSC Dependents	3	2.9	0	0	0	0

Table B-2. Comparison of wild adult coho 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 Spawner Abundance			
				Total		Wild	
		Surveys	Miles	Estimate	95% CI	Estimate	95% CI
2004 Run Year							
GRTS Surveys	**37**	**9**	**5.9**	**10,268**	**5,560**	**10,268**	**5,560**
Siltcoos	18	6	3.5	8,088	5,114	8,088	5,114
Tahkenitch	6	2	1.7	2,180	2,182	2,180	2,182
Tenmile	13						
Standard Surveys	**14**	**9**	**7.8**	**18,687**	--	**18,642**	--
Siltcoos	5	2	2.5	8,025	--	7,998	--
Tahkenitch	2	2	1.6	3,496	--	3,496	--
Tenmile	7	5	3.7	7,166	--	7,148	--
2005 Run Year							
GRTS Surveys	**37**	**3**		Only 1 survey in each population, so no estimates.			
Siltcoos	18	1					
Tahkenitch	6	1					
Tenmile	13	1					
Standard Surveys	**14**	**9**	**7.8**	**14,725**	--	**14,725**	--
Siltcoos	5	2	2.5	4,364	--	4,364	--
Tahkenitch	2	2	1.6	1,897	--	1,897	--
Tenmile	7	5	3.7	8,464	--	8,464	--
2006 Run Year							
GRTS Surveys	**37**	**8**	**6.6**	**4,088**	**3,675**	**4,088**	**3,675**
Siltcoos	18	5	2.9	3,352	3,675	3,352	3,675
Tahkenitch	6	2	2.5	736	--	736	--
Tenmile	13						
Standard Surveys	**14**	**6**	**5.1**	**24,378**	--	**24,127**	--
Siltcoos	5	2	2.5	5,473	--	5,452	--
Tahkenitch	2	2	1.6	3,718	--	3,611	--
Tenmile	7	2	1.0	15,187	--	15,064	--

Table B-2. Concluded.

ESU, Stratum & TRT Population	Survey Goal	Survey Effort Number of		Adult Coho Spawner Abundance			
				Total		Wild	
		Surveys	Miles	Estimate	95% CI	Estimate	95% CI
2007 Run Year							
GRTS Surveys	**37**	**20**	**16.7**	**4,940**	**1,879**	**4,940**	**1,879**
Siltcoos	18	10	5.8	1,472	490	1,472	490
Tahkenitch	6	5	5.3	2,202	1,406	2,202	1,406
Tenmile	13	5	5.6	1,266	1,145	1,266	1,145
Standard Surveys	**14**	**7**	**5.9**	**8,955**	--	**8,955**	--
Siltcoos	5	2	2.5	1,447	--	1,447	--
Tahkenitch	2	2	1.6	3,551	--	3,551	--
Tenmile	7	3	1.8	3,957	--	3,957	--
2008 Run Year							
GRTS Surveys	**37**	**28**	**22.9**	**14,780**	**4,427**	**14,780**	**4,427**
Siltcoos	18	16	12.6	6,317	2,902	6,317	2,902
Tahkenitch	6	6	4.6	1,511	713	1,511	713
Tenmile	13	6	5.7	6,952	3,266	6,952	3,266
Standard Surveys	**14**	**7**	**5.9**	**23,608**	--	**23,608**	--
Siltcoos	5	2	2.5	3,873	--	3,873	--
Tahkenitch	2	2	1.6	2,604	--	2,604	--
Tenmile	7	3	1.8	17,131	--	17,131	--

Table B-3. Estimates of adult coho run size in the North Umpqua River, derived through adjustment of Winchester Dam counts for adult coho retained by hatchery operations and harvest above Winchester Dam, 2004 through 2008.

Data Component	Coho Origin	Spawning Year				
		2004	2005	2006	2007	2008
North Umpqua Coho	**Wild**	**3,559**	**1,969**	**3,000**	**1,410**	**3,438**
	Hatchery	**6,753**	**8,346**	**6,692**	**2,578**	**153**
	% Hat.	**65.5%**	**80.9%**	**69.0%**	**64.6%**	**4.3%**
Winchester Dam [1]	Total	10,861	10,985	10,102	4,156	3,591
	Wild	3,705	2,113	3,062	1,410	3,438
	Hatchery	7,156	8,872	7,040	2,746	153
Freshwater Catch [2]	Total	403	474	348	168	
Above Winchester Dam	Wild	0	0	0	0	
	Hatchery	403	474	348	168	
Rock Creek Hatchery [3]	Total	146	196	62	0	0
	Wild	146	144	62	0	0
	Hatchery	0	52	0	0	0

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

2 = 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 only for 2004 through 2008.

3 = Number of adult coho collected (at Rock Creek and at Winchester Dam) and retained at Rock Creek Hatchery. These numbers do not include coho collected and released alive back into the wild.

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 years 2004 through 2008. 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	Survey Effort Number of		Adult Coho Spawner Abundance			
			Total		Wild	
TRT Population	Surveys	Miles	Estimate	95% CI	Estimate	95% CI
2004 Run Year						
South Coast	**53**	**48.7**	**9,335**	**2,993**	**9,112**	**2,944**
Elk River						
Lower Rogue River						
Illinois River	9	7.5	3,864	2,321	3,837	2,305
Middle Rogue and Applegate Rivers	24	21.3	2,891	1,282	2,695	1,195
Upper Rogue River	18	18.5	2,580	1,388	2,580	1,388
Note: Chetco River, Winchuck River, and Dependent populations are not included in the current sampling frame.						
2005 Run Year						
South Coast						
Note: Not sampled due to budget constraints.						
2006 Run Year						
South Coast	**30**	**28.8**	**1,561**	**1,806**	**1,351**	**1,786**
Elk River						
Lower Rogue River	4	3.5	0	0	--	--
Illinois River	3	2.7	1,031	1,777	1,031	1,777
Middle Rogue and Applegate Rivers	8	9.1	210	266	--	--
Upper Rogue River	14	13.1	319	179	319	179
Note: Chetco River, Winchuck River, and Dependent populations are not included in the current sampling frame.						
2007 Run Year						
South Coast	**26**	**23.8**	**4,568**	**1,435**	**4,047**	**1,386**
Elk River						
Lower Rogue River	3	1.9	19	36	--	--
Illinois River	4	3.8	2,117	1,301	2,117	1,301
Middle Rogue and Applegate Rivers	11	10.0	2,317	575	1,930	479
Upper Rogue River	7	6.9	116	189	--	--
Note: Chetco River, Winchuck River, and Dependent populations are not included in the current sampling frame.						
2008 Run Year						
South Coast	**24**	**20.7**	**1,276**	**848**	**1,205**	**839**
Elk River						
Lower Rogue River						
Illinois River	3	2.7	745	787	745	787
Middle Rogue and Applegate Rivers	16	12.7	459	291	459	291
Upper Rogue River	5	5.3	72	117	--	--
Note: Chetco River, Winchuck River, and Dependent populations are not included in the current sampling frame.						

Table C-2. Estimates of adult coho run size in the Rogue River derived through capture at the Huntley Park seine site and returns to Cole Rivers Hatchery, 1994 through 2008.

	Huntley Park Seine		Cole Rivers Hatchery		Adult Coho Run Size			
	Fin-marks	Total	Adult	Adult Fin-	Total		Wild	
Year	(R)	(C)	Returns	Marks (M)	Estimate	95% CI	Estimate	95% CI
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

APPENDIX D

Table D-1. Site status of GRTS samples in the Lower Columbia River Coho ESU, by TRT population by year (20xx). Target sites fell within coho 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 spawning habitat.

		Target Response					Target Non-response					Non-target				
Stratum	Population	04	05	06	07	08	04	05	06	07	08	04	05	06	07	08
Coast	Youngs Bay	17	12	2	20	15	0	1	17	3	5	4	4	5	5	3
	Big Creek	3	5	0	4	5	4	2	9	6	5	2	1	4	2	0
	Clatskanie	14	16	14	14	13	5	2	12	11	8	1	2	0	2	0
	Scappoose	18	12	15	16	19	4	4	9	9	7	2	5	2	1	3
Cascade	Clackamas	28	17	4	24	17	17	10	33	24	17	4	3	3	0	1
	Sandy	21	15	12	26	27	20	12	25	18	6	1	5	3	5	2
Gorge	Lower Gorge	1	2	3	4	3	0	2	0	3	3	0	0	0	0	0
	Hood	0	4	2	2	3	1	2	0	5	2	0	0	0	0	0
ESU Total		**102**	**83**	**52**	**110**	**102**	**51**	**35**	**105**	**79**	**53**	**14**	**20**	**17**	**15**	**9**

Table D-2. Site status of GRTS samples in the Southern Oregon/Northern California Coasts Coho ESU, by TRT population by year (20xx). Target sites fell within coho 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 spawning habitat.

		Target Response					Target Non-response					Non-target				
Stratum	Population	04	05	06	07	08	04	05	06	07	08	04	05	06	07	08
Coastal Sub-basins	Elk River	1		1	1	0	2	0	0	0	0	0	0	0	0	0
	L. Rogue R.	1		4	3	0	2	5	4	5	9	2	1	1	1	1
	Chetco River															
	Winchuck R.															
	SC Depend.															
	Total	**2**		**5**	**4**	**0**	**4**	**5**	**4**	**5**	**9**	**2**	**1**	**1**	**1**	**1**
Interior Sub-basins	Illinois River	9		3	4	3	8	24	15	16	9	5	0	4	1	3
	M. Rogue & Applegate R.	24		8	11	16	9	29	27	20	7	2	0	0	1	0
	U. Rogue R.	18		14	7	5	5	28	18	20	3	3	1	1	0	0
	Total	**51**		**25**	**22**	**24**	**22**	**81**	**60**	**56**	**19**	**10**	**1**	**5**	**2**	**3**
ESU Total		**53**		**30**	**26**	**24**	**26**	**86**	**64**	**61**	**28**	**12**	**2**	**6**	**3**	**4**

Table D-3. Site status of GRTS samples in the Oregon Coast Coho ESU, by TRT population by year (20xx). Target sites fell within coho 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 spawning habitat.

		Target Response					Target Non-response					Non-target				
Stratum	Population	04	05	06	07	08	04	05	06	07	08	04	05	06	07	08
North Coast	Necanicum	7	12	16	12	17	1	0	9	9	9	3	0	3	4	3
	Nehalem	61	30	22	15	6	10	31	8	19	29	10	19	13	6	5
	Tillamook	23	9	15	6	9	8	24	15	24	26	6	13	15	14	9
	Nestucca	19	3	21	10	11	2	14	17	22	21	3	5	5	8	6
	NC Depend.	2	4	8	11	15	2	3	6	8	7	3	0	8	9	9
	Total	**112**	**58**	**82**	**54**	**58**	**23**	**72**	**55**	**82**	**92**	**25**	**37**	**44**	**41**	**32**
Mid-Coast	Salmon	7	5	3	12	6	0	2	12	4	11	0	1	5	4	4
	Siletz	17	5	21	24	13	3	6	10	13	20	0	4	9	7	8
	Yaquina	10	4	29	23	15	2	6	8	9	20	3	4	3	8	7
	Beaver	4	4	7	7	4	0	1	2	0	5	0	2	3	5	5
	Alsea	24	6	12	17	22	5	14	21	17	12	4	5	10	10	7
	Siuslaw	37	39	24	22	9	11	11	9	16	26	20	18	9	2	4
	MC Depend.	8	6	11	11	14	2	7	15	16	16	1	4	14	13	16
	Total	**107**	**69**	**107**	**116**	**83**	**23**	**47**	**77**	**75**	**110**	**28**	**38**	**53**	**49**	**51**
Lakes	Siltcoos	6	1	5	10	16	1	4	11	9	9	5	3	9	5	11
	Tahkenitch	2	1	2	5	6	0	3	3	0	1	2	1	5	3	5
	Tenmile	1	1	1	5	6	5	10	8	11	20	4	3	14	2	4
	Total	**9**	**3**	**8**	**20**	**28**	**6**	**17**	**22**	**20**	**30**	**11**	**7**	**28**	**10**	**20**
Umpqua	L. Umpqua	53	29	42	51	12	9	40	15	6	23	11	13	3	4	2
	M. Umpqua	22	15	20	28	17	10	29	19	10	18	9	14	5	2	3
	N. Umpqua	0	4	8	29	19	0	14	30	10	17	0	2	3	1	1
	S. Umpqua	39	18	11	24	11	18	64	25	13	25	23	31	16	11	7
	Total	**114**	**66**	**81**	**132**	**59**	**37**	**147**	**89**	**39**	**83**	**43**	**60**	**27**	**18**	**13**
Mid-South Coast	Coos	34	9	22	31	7	9	30	13	5	28	12	16	9	4	2
	Coquille	45	3	7	6	11	27	65	29	33	35	26	27	10	1	4
	Floras	4	0	6	5	10	3	5	14	11	10	0	2	7	5	5
	Sixes	0	0	0	1	8	0	5	17	17	10	2	3	3	0	1
	MS Depend.	0	0	0	0	3	0	0	8	8	18	0	1	5	3	5
	Total	**83**	**12**	**35**	**43**	**39**	**39**	**105**	**81**	**74**	**101**	**40**	**49**	**34**	**13**	**17**
ESU Total		**425**	**208**	**313**	**365**	**267**	**128**	**404**	**324**	**290**	**416**	**147**	**191**	**186**	**131**	**133**

Table D-4. Adult coho density (AUC/mile) and marked proportion information by population in the Lower Columbia, Oregon Coast, and SONCC Coho ESU's during the 2004 through 2008 spawning years.

ESU	Stratum	Population	Total Surveys	Total Surveyed Length	Total Live Adults	Avg Density (AUC/Mile)	Min Density	Max Density	Total Carcasses	Avg % Marked	Min % Marked	Max % Marked
Lower Columbia	Coastal	Youngs Bay	66	55.7	487	9.2	0.6	18.4	107	63.1%	26.7%	100.0%
		Big Creek	17	16.0	188	11.8	6.5	20.2	36	77.3%	33.3%	100.0%
		Clatskanie River	71	66.6	861	12.8	6.4	23.2	101	11.9%	0.0%	48.3%
		Scappoose Creek	80	72.9	661	8.4	4.5	12.7	129	2.7%	0.0%	8.1%
	Cascade	Clackamas River	90	87.9	1,325	25.0	4.1	87.1	318	66.7%	34.3%	87.5%
		Sandy River	101	93.6	1,120	9.2	3.7	14.3	50	2.2%	0.0%	8.3%
	Gorge	Lower Gorge	12	5.8	837	152.4	78.5	280.6	78	67.0%	46.2%	85.2%
		Hood River	11	7.1	2,948	227.4	7.6	642.0	196	50.7%	45.8%	58.8%
Oregon Coast	North Coast	Necanicum River	64	52.9	1,123	23.9	10.7	47.5	197	7.6%	2.8%	11.1%
		Nehalem River	134	124.0	5,023	35.8	29.7	43.2	929	2.6%	0.0%	9.4%
		Tillamook Bay	62	54.4	1,246	19.7	9.9	44.4	114	12.7%	0.0%	37.5%
		Nestucca River	64	54.2	1,019	14.8	2.4	40.7	153	3.4%	0.0%	14.3%
		NC Dependents	40	30.1	724	32.2	9.1	65.0	58	1.3%	0.0%	6.3%
	Mid-Coast	Salmon River	33	25.7	1,450	47.0	21.3	83.4	248	73.7%	53.4%	93.9%
		Siletz River	80	67.0	3,027	56.2	12.1	106.3	288	3.1%	0.0%	9.1%
		Yaquina River	81	58.1	2,357	45.5	24.5	72.0	221	2.8%	0.0%	5.9%
		Beaver Creek	26	24.1	2,241	92.2	46.7	141.3	237	1.6%	0.0%	8.1%
		Alsea River	81	65.6	2,064	30.4	8.0	62.0	408	0.2%	0.0%	0.9%
		Siuslaw River	131	119.7	2,854	21.1	5.7	37.1	422	2.3%	0.0%	6.3%
		MC Dependents	50	42.8	1,162	24.9	2.1	87.7	146	1.6%	0.0%	5.4%
	Lakes	Siltcoos Lake	37	24.8	4,366	158.5	34.4	335.9	852	0.0%	0.0%	0.0%
		Tahkenitch Lake	15	14.1	2,164	141.5	94.3	189.0	678	0.0%	0.0%	0.0%
		Tenmile Lake	11	11.3	1,103	116.9	37.6	196.2	203	0.0%	0.0%	0.0%
	Mid-South Coast	Coos Bay	103	92.8	5,740	61.0	5.5	111.3	599	0.6%	0.0%	1.5%
		Coquille River	72	62.0	4,720	57.7	21.1	110.3	607	0.0%	0.0%	0.2%
		Floras Creek	25	20.3	838	47.0	9.5	120.0	175	2.8%	0.0%	9.1%
		Sixes River	8	6.6	8	1.6	1.6	1.6	6	18.2%	18.2%	18.2%
		MS Dependents	3	2.9	0	0.0	0.0	0.0	0	-	-	-
	Umpqua	Lower Umpqua	187	156.9	4,821	29.0	11.0	56.1	438	6.2%	0.7%	15.7%
		Middle Umpqua	102	89.6	1,431	16.6	4.6	26.0	215	7.7%	0.0%	20.6%
		North Umpqua	60	49.7	1,144	29.2	14.3	38.9	167	39.3%	0.0%	60.9%
		South Umpqua	103	89.9	2,108	22.8	7.3	34.8	455	4.7%	0.0%	13.6%

Table D-4. Concluded.

ESU	Stratum	Population	Total Surveys	Total Surveyed Length	Total Live Adults	Avg Density (AUC/Mile)	Min Density	Max Density	Total Carcasses	Avg % Marked	Min % Marked	Max % Marked
SONCC	Coastal	Elk River	2	2.2	0	0.0	0.0	0.0	0	-	-	-
		Lower Rogue River	9	7.5	2	0.4	0.0	0.7	0	0.0%	0.0%	0.0%
	Interior	Illinois River	19	16.7	629	24.5	11.2	48.9	199	0.2%	0.0%	0.6%
		Mid-Rog./Applegate	59	53.1	618	9.2	1.3	17.1	172	5.0%	0.0%	14.3%
		Upper Rogue River	44	43.7	403	6.1	0.6	21.0	85	0.0%	0.0%	0.0%