12. Pistol River Population

- Northern Coastal Stratum
- Dependent
- Recovery criteria: 20% of IP habitat must be occupied in years following spawning of brood years with high marine survival
- 93 mi^2
- 30 IP km (19 IP mi) (23% High)
- Dominant Land Uses are 'Timber Harvest' and 'Agriculture'
- Principal Stresses are 'Altered Sediment Supply', 'Lack of Floodplain and Channel Structure' and 'Degraded Riparian Forest Conditions'
- Principal Threats are 'Roads', 'Channelization/Diking', and 'Timber Harvest'

12.1 History of Habitat and Land Use

The relevant history of the Pistol River is described in the Pistol River Watershed Analysis (U.S Forest Service (USFS) 1998b) and the Pistol River Watershed Assessment (Maguire 2001e), which are the basis of this summary. Early settlers likely diminished the habitat capacity of the two lower river tributaries, which no longer have recognizable channels. Two ranches in the grassy meadows near the lower river have been in continuous grazing since that time.

Long time residents remember a river too cold to swim in most of the summer, before intensive timber harvest began in the 1950s (Maguire 2001e). The 1955 flood carried sediment that filled the lower river, which had previously been the site of major salmon spawning. Where the lower Pistol River had been a sequence of riffles and deep corner pools, it became a series of long riffles with small, shallow pools. Tributaries like Deep Creek were changed by repeated debris torrents after timber harvest, but local residents report prior use by 300 to 400 spawning salmon (Maguire 2001e). These same observers note that the river's flood flows rise and fall much more quickly than before timber harvest and that base flow conditions appear greatly reduced. The mouth of the river now opens later in the fall than it used to. Local residents used to breach the sand berm at the mouth of the Pistol River, but that is no longer allowed (Maguire 2001e).

Private industrial timber land ownership covers 30 percent of the basin and lies between the federally managed land in the upper basin and the ranchland in the lower valley.

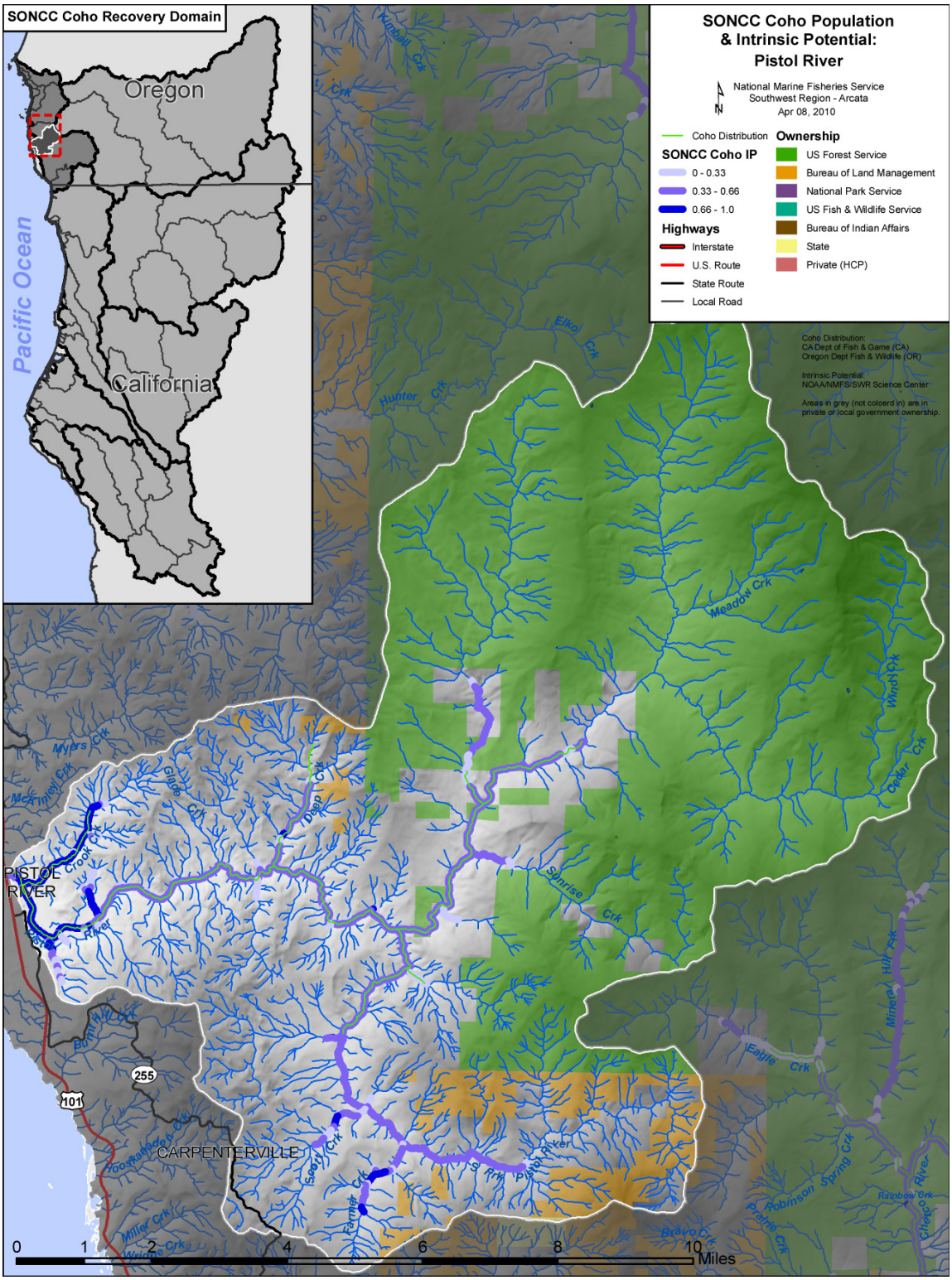

Figure 12-1. The geographic boundaries of the Pistol River coho salmon population. Figure shows modeled Intrinsic Potential of habitat (Williams et al. 2006), land ownership, coho salmon distribution (ODFW 2010a), and location within the Southern-Oregon/Northern California Coast Coho Salmon ESU and the Interior Rogue diversity stratum (Williams et al. 2006). Grey areas indicate private ownership.

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Since the Northwest Forest Plan (US Department of Agriculture (USDA) and US Department of the Interior (USDI) 1994) was adopted, there has been a very low level of timber harvest in the Pistol River basin on USFS and BLM lands. Streams in these upper tributaries have started to recover. Private industrial timber harvest is active in the western portion of the Pistol River basin, including much of the South Fork, where harvest rotations are 30 to 50 years.

The intensity of grazing in the lower Pistol River has undoubtedly decreased since a cheese factory located in the lower basin ceased operation in the 1960s, but fields still constrain the lower river channel and occupy its floodplain. Residential development has occurred in the lower Pistol River, but not to the same degree as other southwest Oregon streams like Hunter Creek and the lower Chetco River. Widespread restoration efforts over the last decade have met with mixed success (Swanson 2005).

12.2 Historic Fish Distribution and Abundance

The steep headwaters of the upper Pistol River prevent coho salmon access very far up major tributaries except in the South Fork (Maguire 2001e). Modeling by Williams et al.(2006) found high intrinsic potential (IP >0.66) habitat for coho salmon in the lower mainstem Pistol River, estuarine tributary Crook Creek and two unnamed tributaries of the lower river. Additionally, flat reaches in Deep Creek, and South Fork Pistol River tributaries, Farmer and Scott creeks, also have patches of high IP habitat (Table 12-1). The two unnamed tributaries of lower Pistol River are not found on U.S. Geological Survey (USGS) 1:24000 topographic map (USGS 1989) and no longer have recognizable stream channels when examined using aerial photos; therefore, they are not listed in Table 12-1. Pistol River had sufficient capacity before disturbance to provide possible refugia for smaller nearby populations and a modest source of colonists to adjacent smaller streams, such as Hunter Creek.

Table 12-1. Tributaries with instances of high IP reaches (IP > 0.66) (Williams et al. 2006).

Stream Name	Stream Name	Stream Name
Crook Creek	Farmer Creek	Pistol River Estuary
Deep Creek	Lower Pistol River	Scott Creek

12.3 Status of Pistol River Coho Salmon

Spatial Structure and Diversity

Much of the high IP coho salmon habitat in the lower mainstem Pistol River and its tributaries is presently unsuitable for coho salmon spawning or rearing. Some low gradient tributaries of the lower river are only partially degraded, but others have been completely lost. Although coho salmon population levels are low, spawning still occurs in the mainstem Pistol River up to the East Fork Pistol, in Crook Creek and Deep Creek, and in lower North Fork Pistol River, and in the lower South Fork Pistol River including its tributary Koontz and Davis Creek (Figure 12-1). The Oregon Department of Fish and Wildlife (ODFW) (2005a) conducted a total of 14 snorkel surveys at sites in the Pistol River basin from 2002 to 2004. They found juvenile coho salmon in 3 of 11 reaches (6 of 352 pools) sampled, all at very low levels of ≤0.001 coho/m2, including in

the lower South Fork and two mainstem Pistol River reaches upstream of the North Fork Pistol River. Pistol River coho salmon are still well distributed but persisting at low levels, which is likely diminishing genetic diversity.

Population Size and Productivity

Although ODFW (2005a) found coho salmon juveniles in each year of their surveys between 2002 and 2004, they were found only at extremely low levels. Coho salmon are only intermittently present in Crook Creek (Swanson 2005), a formerly productive tributary. Population estimates for 1998 to 2008 for south coast Oregon coho salmon were provided by ODFW (2009a). They estimated escapement in the Pistol River as 78 coho salmon in 1999, 155 in 2000, 118 in 2002, and zero in all the other years. The lack of consistent spawner returns within year classes and the absence of some year classes indicate very low productivity in the Pistol River. Because there is no information on ODFW survey effort, some qualification of these results is required. If surveys are only in lower river tributaries, then coho salmon that spawned in upper basin tributaries would not be counted. Similarly, in high flow years counts may be difficult or impossible. Consequently, the population may be somewhat larger than estimated and there may have been some coho salmon adults in years when the population estimate was zero.

Extinction Risk

Not applicable because the Pistol River is not an independent population.

Role in SONCC Coho Salmon ESU Viability

Although dependent populations such as the Pistol River are not viable on their own, they do increase connectivity by allowing dispersal among independent populations and provide areas of refugia for other populations, acting as a source of colonists in some cases. The Pistol River may have been a source of colonists to nearby dependent populations, such as Hunter Creek. Any restored habitat in Pistol River provides potential connectivity that assists metapopulation function in the SONCC ESU.

12.4 Plans and Assessments

State of Oregon

Oregon Plan for Salmon and Watersheds
http://www.oregon.gov/OPSW/about_us.shtml

The State of Oregon developed a conservation and recovery strategy for coho salmon in the SONCC and Oregon Coast ESUs (State of Oregon 1997). The Oregon Plan for coho salmon is a comprehensive plan that includes voluntary actions to address all of the threats currently facing coho salmon in these ESUs and involves all relevant state agencies. Reforms to fishery harvest and hatchery programs described in the Oregon Plan were implemented by ODFW in the late 1990s. Many habitat restoration projects have occurred across the landscape in headwater habitat, lowlands, and the estuary.

Report of the Oregon Expert Panel on Limiting Factors

ODFW (2008b) convened a panel of fisheries and watershed science experts as an initial step in their development of a recovery plan for Oregon's SONCC coho salmon populations. Deliberations of the expert panel provided ODFW with initial, strategic guidance on limiting factors and threats to recovery. Based on the input of panel members, ODFW (2008b) summarized the concerns for the Pistol River population as follows:

> Key concerns in the Pistol River were a loss of over-winter tributary habitat complexity and floodplain connectivity for juveniles, especially in the lowlands which are naturally very limited in these systems and have been impacted by past and current urban, rural residential, and forestry development and practices. High water temperatures for summer parr due to a loss of riparian function and channel straightening is also a key concern in these streams. The secondary concern was related to a loss of over-winter, lowland habitat complexity due to past and current agricultural practices.

Cumulative Effects of Southwest Oregon Coastal Land Use on Salmon Habitat

Oregon State University (OSU) Oak Creek Labs conducted a study funded by ODFW and the Oregon Department of Forestry (ODF) to determine relationships between forest harvest and Pacific salmon productivity (Frissell 1992). The study assessed basins along the Oregon coast extending from the Sixes River to the southern border during the period from 1986 to 1992.

Curry County Soil and Water Conservation District

Pistol River Package OWEB Grant #98-025 Monitoring Report

The Pistol River Package Monitoring Report (Swanson 2005) describes conditions in the Pistol River after numerous basin enhancements were carried out, including large wood placement, fish passage improvements, riparian fencing and planting, rock weirs, and bio-engineered bank stabilization structures.

South Coast Watershed Council (Pistol River Watershed Council)

Pistol River Watershed Assessment

This assessment (Maguire 2001e) summarizes conditions, historic changes and restoration needs in the Pistol River basin. Community concerns, salmonid habitat, limiting factors, and prospects for recovery of fisheries and watershed health are included.

Pistol River Action Plan

The Pistol River Action Plan (Massingill 2001e) is a companion to Maguire (2001e), and proposes specific targets for restoration.

United States Forest Service

Pistol River Watershed Analysis

The Pistol River Watershed Analysis was written by the USFS (1998b) in accordance with the Northwest Forest Plan (USDA and USDI 1994) and sets a course of restoration for their ownership in the Pistol River. Planned activities include road decommissioning, hardwood thinning and conifer planting in riparian zones and combating the spread of Port Orford root disease in the watershed.

12.5 Stresses

Table 12-2. Severity of stresses affecting each life stage of coho salmon in the Pistol River. Stress rank categories and assessment methods are described in Appendix B, and the data used to assess stresses for the initial threats assessment (described in Appendix B) is presented in Appendix H.

	Stresses (Limiting Factors)[2]	Egg	Fry	Juvenile[1]	Smolt	Adult	Overall Stress Rank
1	Altered Sediment Supply[1]	Very High	Very High	Very High[1]	High	High	Very High
2	Lack of Floodplain and Channel Structure[1]	High	Very High	Very High[1]	Very High	High	Very High
3	Degraded Riparian Forest Conditions[1]	-	Very High	Very High[1]	High	High	Very High
4	Impaired Water Quality[1]	Medium	High	Very High[1]	High	Low	Very High
5	Altered Hydrologic Function	High	High	High	High	-	High
6	Impaired Estuary/Mainstem Function	-	Low	High	High	Low	Medium
7	Barriers	-	Low	Low	Low	Low	Low
8	Adverse Hatchery-Related Effects	Low	Low	Low	Low	Low	Low
9	Adverse Fishery-Related Effects	-	-	-	-	Low	Low

[1]Key limiting factor(s) and limited life stage(s).
[2]Increased Disease/Predation/Competition is not considered a stress to this population.

Limiting Stresses, Life Stages, and Habitat

The upper South Fork Pistol River above Farmer Creek may provide coho salmon refugia because it has suitable gradient, cool water temperatures, and pools greater than 1 meter deep; however, there are no data documenting coho presence in that reach. Otherwise there are currently no functioning coho salmon refugia in the Pistol River or its tributaries. Crook Creek is too warm at its convergence with the mainstem to support coho salmon (Maguire 2001e) and Deep Creek has too much fine sediment (Swanson 2005).

The juvenile life stage is most limited and quality winter rearing habitat, as well as summer rearing habitat, is lacking as vital habitat for the population. Juvenile summer rearing habitat is impaired by an excess of fine sediment, which has filled in the mainstem, tributary channels, and the estuary, and contributes to high water temperature. Lack of floodplain and channel structure due to channelization and filling of the floodplain has eliminated much of the coho salmon

rearing habitat in the basin. Winter rearing habitat is often formed by instream large wood, but is also found in estuaries and floodplain wetlands. Degraded riparian conditions have eliminated the source of large wood recruitment and floodplain wetlands have been filled or disconnected from the river. Overall, these findings are consistent with those of the Oregon Expert Panel (Section 12.4) except that the expert panel did not consider excess sediment to be a concern.

Altered Sediment Supply

Sediment contribution from landslides and erosion occurs naturally in the Pistol River basin; however, roads, timber harvest, and bank erosion following removal of riparian vegetation have elevated fine sediment input. For example, debris torrents in 2003 covered large wood restoration projects with approximately 100,000 to 200,000 cubic yards of sediment in lower Deep Creek (Swanson 2005). Debris flows significant enough to alter channel structure occurred in the South Fork Pistol River and upper mainstem Pistol River in 1996 (Maguire 2001e). Excess fine sediment directly impacts coho salmon egg viability and can reduce food for fry, juveniles and smolts. Poor pool frequency and depth throughout the Pistol River basin (Maguire 2001e) is likely due to elevated levels of fine sediment partially filling pools, a lack of scour-forcing obstructions such as large wood, and in some reaches diminished scour due to channel widening.

Figure 12-2. Photo of Pistol River estuary. View is looking downstream from the Pistol River Road bridge. The large gravel bars occupy a formerly deep channel here, suggesting excess fine sediment.

Lack of Floodplain and Channel Structure

Long-time lower Pistol River residents described the transformation of the channel from one with well developed deep pools joined by short riffles to one dominated by riffles with few pools of limited depth (Maguire 2001e). High fine sediment load and bedload movement retards channel recovery and also creates adverse conditions for eggs because redds are scoured out or deposits smother eggs and prevent fry emergence.

Before disturbance, the Pistol River riparian zone was comprised of large conifers that lived hundreds of years and then fell into streams, forming pools and complex habitats with which coho salmon co-evolved. Large wood was swept from many mainstem and tributary channels in the 1955 and 1964 floods, which lead to a loss of habitat complexity. Current large wood recruitment is also low. Large wood surveys by ODWF show that all Pistol River reaches have poor levels of large wood (<1 key piece per 100m). USFS large wood surveys found very good levels of large wood in the upper East Fork Pistol River, North Fork Pistol River, and Sunrise Creek on USFS lands, but these streams are largely inaccessible to coho salmon.

Disconnection of the lower Pistol River and estuary from its floodplain and confinement of its channel (Figure 12-3) are major impediments to lower river recovery. Lower Crook Creek has high IP coho salmon habitat, but its lower reaches are channelized also.

ODFW and USFS habitat data indicate that in the mainstem Pistol River, pool frequencies are greater than 35 percent, which they rate as good. An upper East Fork Pistol River reach, lower Meadow Creek, and the South Fork tributary Koontz and Davis Creek all had poor ratings (<10 percent pools). Pool frequency is only fair (10 to 25 percent) in the lower North Fork, lower Sunrise Creek, Deep Creek, and South Fork tributaries including Scott Creek.

Pool depth of greater than one meter (3.3 ft.) is rated as good by ODFW, and on that basis the South Fork and mainstem Pistol River below the East Fork have good pool depth. However, the Pistol River formerly had pools that were up to 20 feet deep (Maguire 2001e).

Figure 12-3. Aerial photo of Pistol River showing confinement by a levee. The levee separates the active channel from adjacent farm and industrial gravel operation to the west (left). The levees also cut off the river from oxbows and meanders on the east bank (right), which would have formerly created ideal coho salmon rearing areas. Yellow arrows highlight pockets of residential development.

Degraded Riparian Forest Conditions

ODFW surveys found fewer than 75 conifers greater than 36” in diameter per 1000 ft. on the South Fork Pistol River, mainstem Pistol River downstream of the East Fork, Sunrise Creek, and Deep Creek. This low density of large trees in the riparian zone has led to poor bank structure, reduced shade, and reduced thermal and nutrient buffering. The riparian zone of the mainstem Pistol River is predominantly hardwood trees (Figure 12-4), with very few large conifers. Willow and alder are the most abundant species in the alluvial valleys, although cottonwoods were once a significant part of the riparian community (Maguire 2001e). High bedload transport in the lower Pistol River is likely causing high mortality of both conifers and alders, because these species die if their root systems are buried.

Figure 12-4. Photo of the lower mainstem Pistol River. The river has a willow and alder riparian zone. Note also excess sediment and lack of channel structure.

Impaired Water Quality

The mainstem Pistol River is 303(d) listed for impaired temperature and dissolved oxygen from the mouth upstream to RM 19.8, and the lower half mile of the South Fork is also listed as temperature impaired. Maguire (2001e) reported that the ODEQ maximum floating weekly maximum temperature (MWMT) threshold for impairment of 64 °F was exceeded at all stations measured, indicating lack of suitability for coho salmon rearing; however, there are a few additional stations/years in the ODEQ LASAR database (see Appendix B) with temperatures below the 64 °F threshold: Glade Creek at mouth, upper Farmer Creek, South Fork Pistol River at upper crossing, Deep Creek at mouth (2 of 8 years), and North Fork Pistol River near mouth (1 of 6 years). Figure 12-5 shows water temperatures for the Pistol River from 1995 to 2000 as reported by Maguire (2001e). The lower East Fork Pistol River and Deep Creek are almost cool enough to provide suitable coho salmon habitat. Lower reaches of the North Fork and the upper mainstem Pistol River are showing improvement (65 °F to 69 °F), but the South Fork is much too warm to support coho salmon (71.4 °F to 72.8 °F). Lower mainstem Pistol River temperatures are also too warm (71.8 °F -75 °F). The Pistol River warms 2 to 4 °F between the East Fork Pistol and South Fork Pistol (Maguire 2001e).

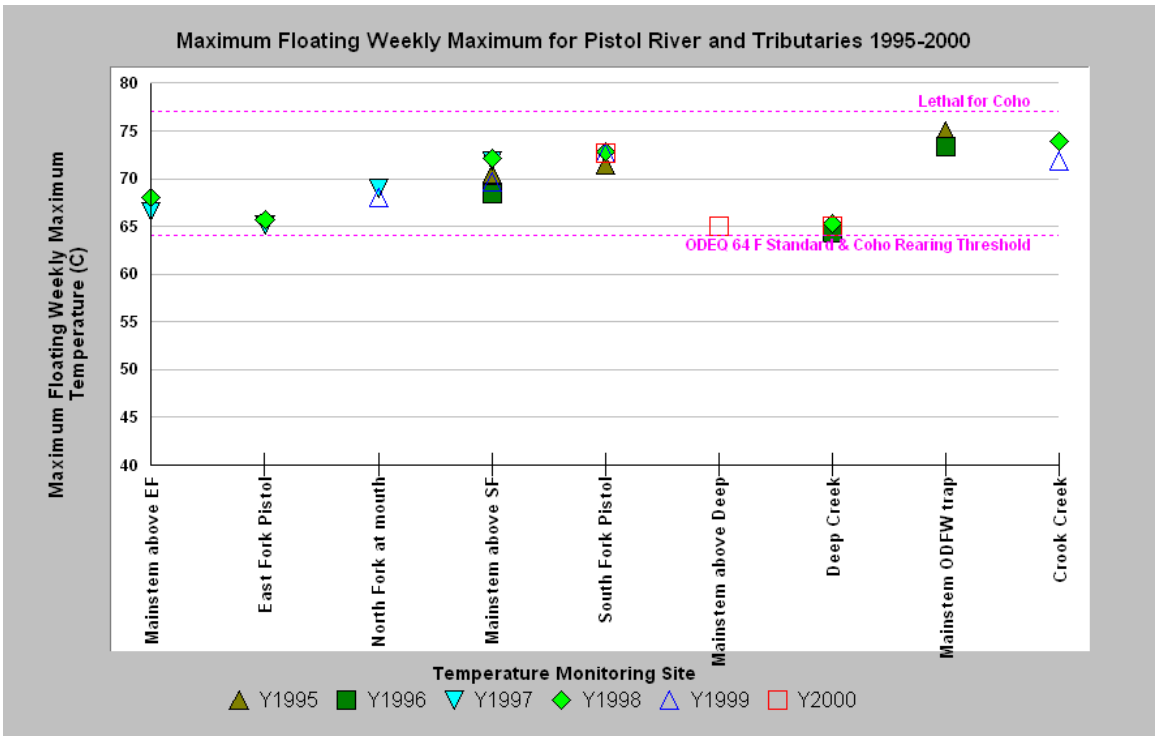

Figure 12-5. Maximum floating weekly maximum water temperatures for the Pistol River. Data includes tributaries and shows a pattern of exceeding coho salmon rearing requirements (McCullough 1999) and ODEQ standards (64 °F). The lethal temperature reference value of 77 °F is from Sullivan et al. (2000).

Water quality in the Pistol River is also compromised by low dissolved oxygen (DO) levels. The low DO levels are likely due to stagnation and to algal blooms, which are encouraged by excess nutrients and lack of shade. There are seasonal problems with elevated phosphorous, E. coli and biological oxygen demand (Maguire 2001e).

Altered Hydrologic Function

Changes in Pistol River basin hydrology have led to a substantial decrease in available habitat for coho salmon, resulting in a high level of stress across all life stages. The bedload build-up in the mainstem has buried the former stream channel, leaving wide gravel bars and a narrow ribbon of surface flow. Fine sediment over-supply also blocks surface and groundwater interactions by clogging interstitial spaces of stream gravels that are known to help maintain cool temperatures. This type of connection likely created cold water strata at depth in the deeper pools that were formerly common, even when surface waters were warm. Some Pistol River Watershed Council members believe that the summer base flows have also diminished (Maguire 2001e). Studies elsewhere in the Pacific Northwest indicate that converting forest stands of fewer large trees to ones with many small trees can decrease base flows for several decades (Murphy 1995).

The hydrology of the lower basin has been substantially altered through disconnection of the floodplain and channelization. High road densities in some Pistol River watersheds may also cause increased peak flows. These peak flows can scour eggs and flush fry, juveniles, and smolts from the river system.

Impaired Estuary/Mainstem Function

The Pistol River estuary retains little of its historic form or function and provides little opportunity for estuarine rearing. Studies elsewhere in Oregon found that estuarine tributaries and sloughs can be important habitat types for rearing coho salmon juveniles (Koehler and Miller 2003, Miller and Sadro 2003). The remnants of past estuarine habitat indicate the Pistol River estuary was formerly large with numerous tributaries, tidal channels, and likely tidal wetlands. The diking and filling for conversion to agricultural uses has completely eliminated these habitats. Lack of riparian vegetation in the estuary and the accretion of fine sediment have led to highly degraded water quality and habitat conditions. Long-time residents remember pools up to 20 feet deep, while ODFW 1991 habitat data indicated a mean pool depth of only 3.3 feet in the lowermost Pistol River reach (Maguire 2001e). Long time residents noted a decrease in estuarine use by smelt, which is likely due to a change in seasonality of the opening of the mouth. Crook Creek, the largest estuary tributary, loses surface flow during the summer for its last 500 feet (Swanson 2005), seasonally preventing fish use of this important rearing stream. Highway 101 bisects the estuary near the mouth of the river, constraining the estuary and preventing full tidal inundation upstream. The estuary to the west of Highway 101 encompasses a fair amount of sand and mudflat habitat that could be used for rearing, but it lacks complex habitat features such as large wood or deep pools. Reduced estuarine function poses a medium overall stress to Pistol River coho salmon.

Barriers

Although road densities in the Pistol River basin are high, which increases risk of passage problems, coho salmon still have access to most of the basin (Maguire 2001e). The dry reach at the mouth of Crook Creek (Swanson 2005) is a seasonal barrier to juveniles. A major passage problem into Deep Creek has been resolved by replacing a culvert with a bridge (Swanson 2005). Consequently, barriers represent a low stress.

Adverse Hatchery-Related Effects

The effects of hatchery fish on all life stages of coho salmon are described in Chapter 3. There are no operating hatcheries in the Pistol River population area. Hatchery-origin coho salmon may stray into Pistol River, but hatchery-origin adults may stray into the population area; however, the proportion of adults that are of hatchery origin is unknown. Adverse hatchery-related effects pose a low risk to all life stages, because less than five percent of adults are presumed to be of hatchery origin and there are no hatcheries in the basin (Appendix B).

Adverse Fishery-Related Effects

NMFS has determined that federally- and state-managed fisheries in Oregon are not likely to jeopardize the continued existence of the SONCC coho salmon ESU (Appendix B).

12.6 Threats

Table 12-3. Severity of threats affecting each life stage of coho salmon in the Pistol River. Threat rank categories and assessment methods are described in Appendix B, and the data used to assess threats for the initial threats assessment (described in Appendix B) is presented in Appendix H.

Threats[1]		Egg	Fry	Juvenile	Smolt	Adult	Overall Threat Rank
1	Roads	High	Very High	Very High	Very High	Very High	Very High
2	Channelization/Diking	Medium	Very High	Very High	Very High	Very High	Very High
3	Timber Harvest	Medium	Very High	Very High	Very High	Very High	Very High
4	Agricultural Practices	Low	Medium	High	High	High	High
5	Dams/Diversion	Low	Medium	Medium	Medium	Medium	Medium
6	Urban/Residential/Industrial	Low	Medium	Medium	Medium	Medium	Medium
7	High Intensity Fire	Low	Medium	Medium	Medium	Medium	Medium
8	Climate Change	Low	Low	Medium	Medium	Medium	Medium
9	Mining/Gravel Extraction	Low	Low	Low	Low	Low	Low
10	Road-Stream Crossing Barriers	-	Low	Low	Low	Low	Low
11	Hatcheries	Low	Low	Low	Low	Low	Low
12	Fishing and Collecting	-	-	-	-	Low	Low

[1]Invasive and Non-Native/Alien Species is not considered a threat to this population.

Roads

There are high road densities (2.5 to 3.0 mi./mi.^{2}) in the South Fork Pistol River and very high densities (>3.0 mi./mi.^{2}) in the Upper and Lower Pistol River. Road densities are medium (1.6-2.5 mi./mi.^{2}) in the East Fork Pistol River, North Fork Pistol River, and in mainstem watersheds between the East Fork and South Fork Pistol River. Additionally there is a high number of road stream crossings, streamside roads, and many road segments that cross steep unstable slopes or erodible soils. These conditions all pose a risk of elevated fine sediment yield. Road density estimates are conservative because they do not include skid roads, landings, or temporary roads. The main timber harvest haul road along the Pistol River has initiated large landslides (Maguire 2001e). A main haul road also follows the South Fork Pistol River.

Channelization/Diking

Channelization and diking have occurred in high IP coho salmon habitat in the lower tributaries, along the lower mainstem, and in the estuary. Crook Creek had ideal gradient and valley width for coho salmon, but the channel has been straightened and greatly reduced in complexity (Figure 12-6). The lower mainstem and estuary have been similarly channelized and disconnected from the flood plain and adjacent wetlands. Roads that follow the river or tributaries may cut them off from their floodplains as well.

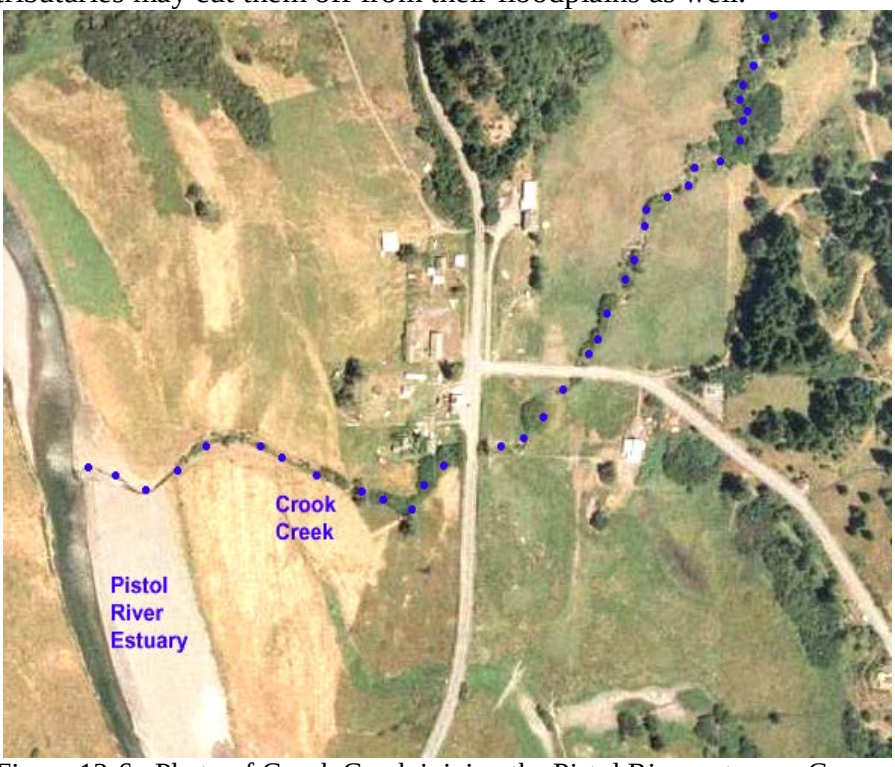

Figure 12-6. Photo of Crook Creek joining the Pistol River estuary. Convergence is at center left. The creek's channel is straightened and confined. It also lacks a functional riparian zone.

Timber Harvest

Private industrial timber lands occupy 30 percent of the landscape and coincide with watersheds that have low gradient streams, which were the best coho salmon habitat. Deep Creek is an example of where short timber harvest rotations are likely inhibiting channel and coho salmon recovery.

Studies of adjacent southwest Oregon basins found that "downstream, cumulative impacts of human activity are pervasive in southwest Oregon, wherever logging has occurred over an extensive portion of a drainage basin or has involved operations on steep, unstable slopes. The downstream effects of channel sedimentation and aggradation can severely damage streams even where buffer zones of riparian vegetation have been retained, and such effects persist more than 20-30 years after logging activities have ceased" (Frissell 1992).

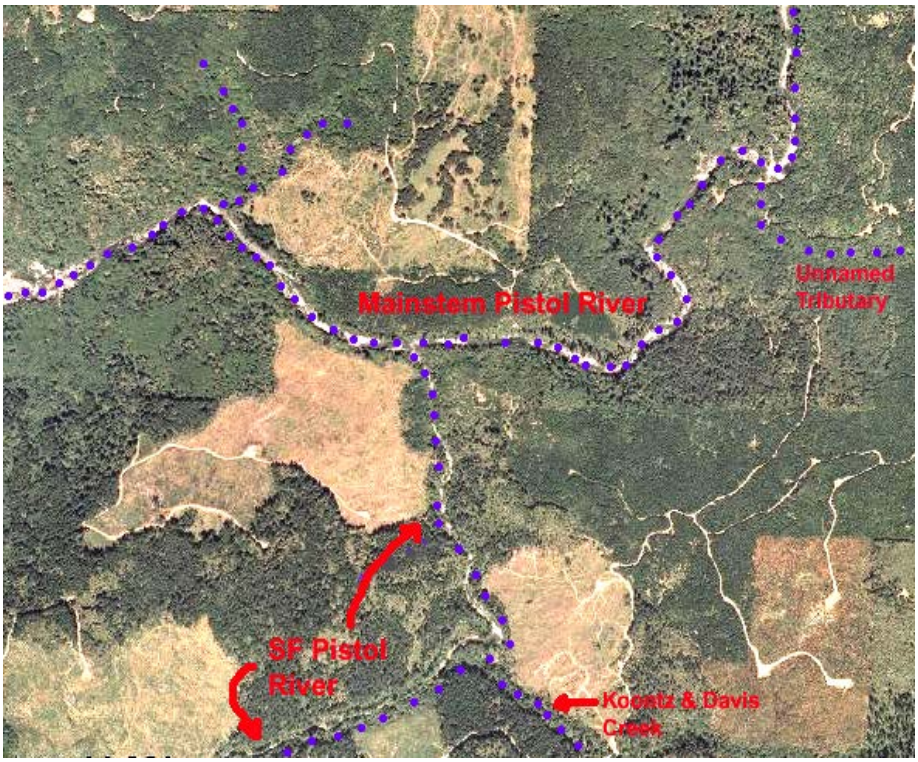

Figure 12-7. Photo of the mainstem Pistol River and the South Fork. Also shown is lower tributary Koontz and Davis Creek. Note extensive clear cuts and high road density.

Agricultural Practices

The same farms and ranches have operated in the lower river for well over 100 years and levels of grazing are likely not as high as they were in the past. Nonetheless, long term activities have led to the disconnection of the lower Pistol River and estuary from floodplains (Figure 12-3). Lower Pistol River tributaries have also been profoundly altered; two unnamed tributaries with high IP coho salmon habitat now have unrecognizable channels. Crook Creek has also been straightened and disconnected from its floodplain (Figure 12-6), but landowners have been trying to restore it (Swanson 2005). The negative effects of pesticides and herbicides on Pacific salmon species and aquatic ecosystem function are becoming more well documented regionally (National Marine Fisheries Service (NMFS) 2008, Laetz et al. 2009), but the extent of use of these chemicals by Pistol River farms and ranches is unknown.

Dams and Diversions

There are no known dams on the Pistol River. The Oregon Water Resources Department has a Pistol River instream water right of 15 cubic feet per second (cfs) (Maguire 2001e). The sum of the diversion water rights in the Pistol River basin is 1.5 cfs, primarily for agricultural use, but only 0.1 cfs of this is senior to the instream right (Maguire 2001e). The effects of water diversions on coho salmon in the Pistol River basin are not well understood. Crook Creek, an important coho tributary, loses surface flow at the downstream end of an agricultural area, but it is unknown if diversions contribute to that condition. A potentially significant contributor to the diminished apparent flow in the Pistol River is the aggradation of the stream bed, with more flow now sub-surface.

Urbanization/Residential/Industrial

Both commercial and residential development is occurring in the sensitive lower river and estuary. This area once held some of the most productive coho salmon habitats.

High Intensity Fire

The Pistol River is very near the coast and has moderate air temperatures and high rainfall. Consequently, it should have naturally low fire risk; however, hot (100 °F) 35 mph east winds occur seasonally, which can cause extreme seasonal fire risk (Maguire 2001e). Large areas of the Pistol River basin are presently covered by even-aged plantations and hardwoods that elevate fire risk. Sudden oak death syndrome is known to occur in the adjacent North Fork Chetco basin (Oregon Department of Agriculture (ODA) 2008) and could become a significant contributor to increased fire risk if it causes mortality of tanoaks in the Pistol River basin.

Climate Change

There is low risk of average temperature increase over the next 50 years (Appendix B). Modeled regional average temperature shows a moderate increase over the next 50 years (Appendix B). Average temperature could increase by up to 1o C in the summer and by a similar amount in the winter. The risk of sea level rise is also low (Appendix B, Thieler and Hammer-Klose 2000). Adults may be negatively impacted by climate-related ocean acidification, changes in ocean conditions, and prey availability (see Independent Science Advisory Board 2007, Feely et al. 2008, Portner and Knust 2007).

Mining/Gravel Extraction

Pistol River does not have geologic formations that bear gold and so was spared mining impacts that were experienced by interior basins of the Rogue River. Gravel mining can inhibit channel recovery by flattening the streams profile upstream and downstream from the point of extraction. The Sixes River company gravel permit for operation in the Pistol River has expired and there is no prospect of gravel mining activity in the near future (Wheeler 2009).

Road-Stream Crossing Barriers

Although there are many road-stream crossings on private industrial timber lands in the western Pistol River basin, many are well above the range of coho salmon. Maguire (2001e) and the ODFW (2008e) fish passage database do not indicate that road-stream crossing barriers are a significant problem for coho salmon distribution in the Pistol River basin.

Hatcheries

Hatcheries pose a low threat to all life stages of coho salmon in the Pistol River population area. The rationale for these ratings is described under the “Adverse Hatchery-Related Effects” stress

Fishing and Collecting

The directed recreational fishery for hatchery coho salmon in Oregon likely encounters more coho salmon than the Chinook-directed fisheries that account for much of the bycatch mortality

of SONCC coho salmon. This is because coho salmon are the targeted species in the directed recreational fishery. The exploitation rates associated with this freshwater fishery and all other fisheries managed by the State of Oregon were found to be low enough to avoid jeopardizing the existence of the ESU (NMFS 1999). The standard applied to make that determination was a jeopardy standard, not a species viability standard, because recovery objectives to achieve species viability had not been established for SONCC coho salmon at that time (NMFS 1999). As of April 2011, NMS has not authorized future collection of coho salmon for research purposes in the Pistol River.

12.7 Recovery Strategy

The most immediate need for habitat restoration and threat reduction in the Pistol River is in those areas currently occupied by coho salmon in mainstem Pistol River, Crook Creek, Deep Creek, North Fork Pistol River, South Fork Pistol River, and Koontz and Davis Creek. Unoccupied areas must also be restored to provide enough habitat for coho salmon recovery, and the places with the greatest chance of success are those with high IP habitat such as the lower mainstem Pistol River, the estuary, Crook Creek, Deep Creek, Scott Creek, and Farmer Creek.

The Pistol River population is considered dependent and therefore cannot be viable on its own; however, it is necessary to restore habitat within the basin so that it can support all life stages of coho salmon and provide connectivity between other populations in the ESU. The recovery criterion for this population is that 20% of IP habitat must be occupied in years following spawning of brood years with high marine survival.

The most important factor limiting recovery of coho salmon in the Pistol River is a deficiency in the amount of suitable rearing habitat for juveniles. The processes that create and maintain such habitat must be restored by increasing habitat complexity within the channel, re-establishing off-channel rearing areas, restoring riparian forests, and reducing threats to instream habitat.

Table 12-4 on the following page lists the recovery actions for the Pistol River population.

Table 12-4. Recovery action implementation schedule for the Pistol Riverpopulation.

Action ID	Strategy	Key LF	Objective	Action Description	Area	Priority
Step ID	***Step Description***					
SONCC-PisR.2.2.6	Floodplain and Channel Structure	Yes	Reconnect the channel to the floodplain	Construct off channel ponds, alcoves, backwater habitat, and old stream oxbows	Lower mainstem, estuary, and Crooks Creek	3
SONCC-PisR.2.2.6.1	*Identify potential sites to create refugia habitats. Prioritize sites and determine best means to create rearing habitat*					
SONCC-PisR.2.2.6.2	*Implement restoration projects that improve off channel habitats as guided by assessment results*					
SONCC-PisR.2.2.7	Floodplain and Channel Structure	Yes	Reconnect the channel to the floodplain	Increase beaver abundance	Population wide	3
SONCC-PisR.2.2.7.1	*Develop program to educate and provide incentives for landowners to keep beavers on their lands*					
SONCC-PisR.2.2.7.2	*Implement beaver program (may include reintroduction)*					
SONCC-PisR.7.1.1	Riparian	Yes	Improve wood recruitment, bank stability, shading, and food subsidies	Increase conifer riparian vegetation	Estuary, lower mainstem, upper South Fork, and Crook, Deep, Farmer and Scott creeks	3
SONCC-PisR.7.1.1.1	*Determine appropriate silvicultural prescription for benefits to coho salmon habitat*					
SONCC-PisR.7.1.1.2	*Thin, or release conifers, guided by prescription*					
SONCC-PisR.7.1.1.3	*Plant conifers, guided by prescription*					
SONCC-PisR.7.1.2	Riparian	Yes	Improve wood recruitment, bank stability, shading, and food subsidies	Improve long-range planning	Private land	BR
SONCC-PisR.7.1.2.1	*Review General Plan or City Ordinances to ensure coho salmon habitat needs are accounted for. Revise if necessary*					
SONCC-PisR.7.1.2.2	*Develop watershed-specific guidance for managing riparian vegetation. Consider larger riparian buffers in coho occupied habitat*					
SONCC-PisR.7.1.3	Riparian	Yes	Improve wood recruitment, bank stability, shading, and food subsidies	Improve timber harvest practices	Private timberland	BR
SONCC-PisR.7.1.3.1	*Revise Oregon Forest Practice Act Rules in consideration of IMST (1999) and NMFS (1998) recommendations*					

Action ID	Strategy	Key LF	Objective	Action Description	Area	Priority
Step ID		***Step Description***				
SONCC-PisR.8.1.4	Sediment	Yes	Reduce delivery of sediment to streams	Reduce road-stream hydrologic connection	Population wide; prioritize upper South Fork Pistol River and Crook, Deep, Farmer, and Scott creeks	3
SONCC-PisR.8.1.4.1		*Assess and prioritize road-stream connection, and identify appropriate treatment to meet objective*				
SONCC-PisR.8.1.4.2		*Decommission roads, guided by assessment*				
SONCC-PisR.8.1.4.3		*Upgrade roads, guided by assessment*				
SONCC-PisR.8.1.4.4		*Maintain roads, guided by assessment*				
SONCC-PisR.3.1.11	Hydrology	No	Improve flow timing or volume	Improve regulatory mechanisms	Population wide	BR
SONCC-PisR.3.1.11.1		*Establish a comprehensive statewide groundwater permit process*				
SONCC-PisR.3.1.12	Hydrology	No	Improve flow timing or volume	Educate stakeholders	Population wide	BR
SONCC-PisR.3.1.12.1		*Develop an educational program about water conservation programs and instream leasing programs*				
SONCC-PisR.27.2.13	Monitor	No	Track habitat condition	Track habitat indicators related to spawning, rearing, and migration	Population wide	3
SONCC-PisR.27.2.13.1		*Measure indicators for spawning and rearing habitat. Conduct a comprehensive survey*				
SONCC-PisR.27.2.13.2		*Measure indicators for spawning and rearing habitat once every 15 years, sub-sampling 10% of the original habitat surveyed*				
SONCC-PisR.27.1.14	Monitor	No	Track population abundance, spatial structure, productivity, or diversity	Estimate juvenile spatial distribution	Population wide	3
SONCC-PisR.27.1.14.1		*Conduct presence/absence surveys for juveniles (3 years on; 3 years off)*				
SONCC-PisR.27.2.15	Monitor	No	Track habitat condition	Track habitat indicators related to the stress 'Lack of Floodplain and Channel Structure'	All IP habitat	3
SONCC-PisR.27.2.15.1		*Measure the indicators, pool depth, pool frequency, D50, and LWD*				
SONCC-PisR.27.2.16	Monitor	No	Track habitat condition	Track habitat indicators related to the stress 'Altered Sediment Supply'	All IP habitat	3
SONCC-PisR.27.2.16.1		*Measure the indicators, % sand, % fines, V Star, silt/sand surface, turbidity, embeddedness*				

Action ID	Strategy	Key LF	Objective	Action Description	Area	Priority
Step ID	***Step Description***					
SONCC-PisR.27.1.17	Monitor	No	Track population abundance, spatial structure, productivity, or diversity	Refine methods for setting population types and targets	Population wide	3
SONCC-PisR.27.1.17.1	*Develop supplemental or alternate means to set population types and targets*					
SONCC-PisR.27.1.17.2	*If appropriate, modify population types and targets using revised methodology*					
SONCC-PisR.27.2.18	Monitor	No	Track habitat condition	Determine best indicators of estuarine condition	Estuary	3
SONCC-PisR.27.2.18.1	*Determine best indicators of estuarine condition*					
SONCC-PisR.5.1.10	Passage	No	Improve access	Remove barriers	Population wide	BR
SONCC-PisR.5.1.10.1	*Use ODFW and SCWC fish passage barrier database to 5.1 based on known coho use or data identifying suitable habitat conditions above barriers*					
SONCC-PisR.10.2.8	Water Quality	No	Reduce pollutants	Educate stakeholders	Lower mainstem, estuary, and Crooks Creek	BR
SONCC-PisR.10.2.8.1	*Develop an educational program that teaches landowners and businesses about avoiding pollution from septic systems, backyard pesticides, fuels, and nutrients.*					
SONCC-PisR.10.2.9	Water Quality	No	Reduce pollutants	Set standard	Population wide	3
SONCC-PisR.10.2.9.1	*Develop TMDLs for 303(d) listed water bodies*					