36. Scott River Population

Interior Klamath Stratum

Core, Functionally Independent Population

Moderate Extinction Risk

Population likely above depensation threshold

6,500 Spawners Required for ESU Viability

813.4 mi^2 watershed (37% Federal ownership)

250 IP-km (155 IP-mi) (78% High)

Dominant Land Uses are Agriculture, Ranching, and Forest Vegetation Management via Commercial Thinning and Fuels Treatment

Key Limiting Stresses are ‘Altered Hydrologic Function’ and ‘Degraded Riparian Forest Conditions’

Key Limiting Threats are ‘Agricultural Practices’ and ‘Dams/Diversions’

Highest Priority Recovery Actions

• Increase beaver abundance	• Remove, setback, or reconfigure levees and dikes
• Construct off channel-ponds, alcoves, backwater habitat, and old stream oxbows	• Increase instream flows
• Restore natural channel form and function	• Improve irrigation practices

36.1 History of Habitat and Land Use

Habitat for coho salmon within the Scott River basin has been altered by numerous human activities, affecting both instream conditions and adjacent riparian and upland slopes. Alterations to habitat and changes in land uses include previous removal of beaver, road construction, agricultural practices, river channelization, dams and diversions, timber harvest, mining/dredging, gravel extraction, high severity fires, and rural residential development. These anthropogenic impacts, combined with natural factors such as recurring floods (e.g., 1955, 1964, and 1997) erosive soil, and a warm and dry climate, have simplified, degraded, and fragmented migrating, spawning, and rearing habitat throughout the Scott River basin.

Agriculture and grazing have been, and continue to be the major land use in the Scott Valley, with commercial timber harvest and recreation in wilderness areas predominating in upland areas. Water diversions for agricultural practices, groundwater extraction, cattle grazing, residential/domestic water use, and flood control have diminished surface flows and greatly reduced or eliminated access to and use of historical coho salmon habitat in the Scott Valley (California Department of Fish and Game [CDFG] 2002b). In addition, livestock grazing persists in six Klamath National Forest grazing allotments in the Marble Mountains along the western boundary of the Scott River basin (U.S. Forest Service [USFS] 2006). Diminished allotment grazing and improved monitoring of grazing allotment condition and trend began in 2006, and is designed to detect changes in water quality (QVIR 2012) and to inform changes in grazing pressure, timing, and duration, as needed (NMFS 2010, NRST 2013).

Approximately one-third of the Scott Basin is managed by the US Forest Service or the Bureau of Land Management, particularly the upper elevations of the watersheds on the western perimeter of the Scott Basin (Westside drainages; Harter and Hines 2008). The loss of vegetative cover, bank erosion, and reduced stream flow has increased summer water temperatures throughout the watershed, decreasing the quantity and quality of rearing habitat, and limiting the fitness and survival of juveniles throughout the system. Additionally, decreases in habitat complexity through the loss of woody debris, instream cover, deep pools, accessible off channel habitat, and temperature-buffered water sources have contributed to reduced summer and winter rearing capacity for juvenile coho salmon (CDFG 2002).

Road construction and ground disturbance have adversely affected water quality and flows in the Scott River basin. The quantity and location of vegetation removal, surface grading, and ground compaction have modified drainage patterns and surface runoff throughout the basin. Such modification has also exacerbated surface erosion resulting in excess sediment delivery to coho salmon habitat (National Research Council [NRC] 2004). Land use activities involving vegetation removal have also led to mass wasting by reducing root soil binding strength and decreasing the extent of riparian buffers where sediment and polluted water can be intercepted before entering watercourses (USFS 2000d).

Following the floods of the 1930s, the US Army Corps of Engineers, at the request of Siskiyou County, removed the remaining vegetation through the middle of the Scott Valley, straightened portions of the Scott River channel, and built levees for flood control. Additional flood control levees were later built along lower Etna, Kidder and Moffett creeks (Mack 1958, Scott River Watershed Council [SRWC] 1997). Channelization of the mainstem Scott River has resulted in

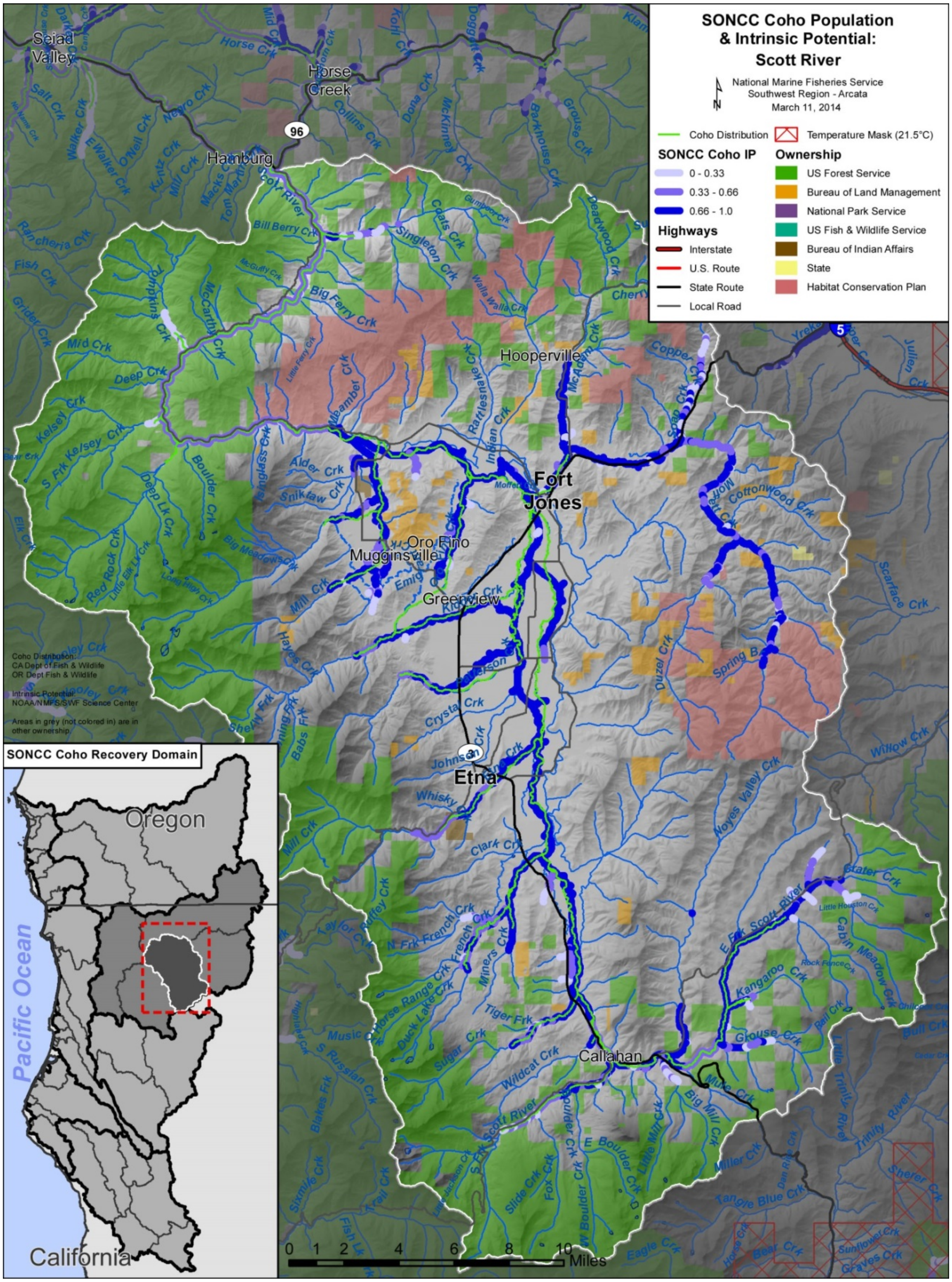

Figure 36-1. The geographic boundaries of the Scott River coho salmon population. Figure shows modeled Intrinsic Potential of habitat (Williams et al. 2006), land ownership, coho salmon distribution (CDFG 2012a), and location within the Southern-Oregon/Northern California Coast Coho Salmon ESU and the Interior Klamath River diversity stratum (Williams et al. 2006). Grey areas indicate private ownership.

channel simplification and incision, channel destabilization, and vegetation instability in areas immediately adjacent to and contained by these levees (SRWC 2005, Van Kirk and Naman 2008). Channelization has also exacerbated the accumulation of large volumes of coarse sediment in transitional reaches of tributaries to the Scott River, contributing to diminished surface flow, stream flow disconnection, barriers to fish passage, and increased need to tap groundwater resources.

Investigation of the relationship between groundwater and surface flow has been undertaken via a community groundwater study plan (Harter and Hines 2008), an integrated hydrologic model (Foglia et al. 2013), a groundwater conditions study (Popadopolous 2012), and a groundwater management and enhancement plan (Scott Valley Groundwater Advisory Committee 2012). These studies help document interactions between groundwater use and water availability in adjacent riparian habitat. Many beaver ponds, which historically provided important impoundments and diverse channel margin habitat attractive to coho salmon, were lost with the removal of beavers from the valley (SRWC 2005, CDFG 2009a). These changes in habitat have decreased the availability and extent of off-channel rearing habitat, altered the hydrology of the lower mainstem river, and caused changes in bedload movement and available spawning habitat throughout the channelized area (Mack 1958). This alteration of habitat, that accompanied the loss of beavers, has further decreased the fitness and survivability of coho salmon in the Scott River basin. Beaver reoccupation of portions of the mainstem Scott River, French Creek, Sugar Creek, and Shackleford/Mill creeks is occurring, and is expected to progressively expand and improve coho salmon rearing habitat (Pollock et al. 2012).

Mechanized timber harvest began in the 1950s, and overstory removal was the dominant regeneration harvest method (USFS 2006). From the 1960s to the 1980s, clear-cutting was common, and many plantations were established on KNF-managed lands in the Scott River basin. Timber harvest practices changed in the early 1990s with clear cutting practices giving way to selective cutting on KNF-managed land, using reduced impact timber harvesting methods. Legacy clear cut and plantation areas, along with lands affected by wildland fires, have created large stands of young, regeneration forests in upland portions of the Scott River basin (USFS 2000d). Road building, tree felling, skidding, and haul road use adversely affected water quality and peak/base flows in coho salmon habitat. Ground disturbance, compaction, and/or vegetation removal adjacent to streams during timber harvest modified drainage patterns and surface runoff, exacerbating surface erosion, creating a hydrologic connection to the stream network, and resulting in sediment delivery to coho salmon habitat downstream (Sommarstrom et al. 1990). Sediment source reduction projects were implemented during the 1990s and 2000s, treating significant sediment-generating road segments on both public and private lands.

Pervasive changes to the landscape began in 1850 with the discovery of gold, when many riparian areas along the Scott River and its tributaries were disturbed by gold mining of alluvial deposits using panning, sluicing, or dredging (i.e., placer mining). Dredge mining, using pressurized water later became common along many streams, and continued through the 1940s (USFS 2006). Large areas were stripped of vegetation and the remaining gravel deposits were hydraulically or mechanically worked to retrieve deposited gold. These activities left a legacy of unvegetated, heavily disturbed gravel deposits (e.g., tailings piles) mostly devoid of soil, and created permanent changes in floodplain and channel characteristics. Tailing piles are especially apparent along nearly five miles of the mainstem Scott River downstream from Callahan, and are common along many tributaries to the Scott River. Floating dredge operations occurring there from the mid-1930s through the early 1950s have reconfigured the entire Scott River valley, confining the active Scott River to one side of its historical floodplain. Many riparian areas in the Scott River basin were poorly vegetated and erodible (USFS 1997b) until livestock exclusion fencing and riparian restoration efforts began in the 1990s. Recent stream bank stabilization, bio-engineering efforts, riparian planting, and beaver habitat enhancement are all contributing to progressive improvement of riparian habitat conditions, in both quality and quantity (SRWC 2005, NCRWQCB 2009).

36.2 Historical Fish Distribution and Abundance

The Scott River basin has historically been an important native coho salmon river in the Interior Klamath River diversity stratum (Brown et al. 1994, Moyle et al. 2008, Garwood 2012). In 1851, George Gibbs noted that Native American health improved when salmon were present in interior areas of the Klamath Basin, including the Scott Valley area (Heizer 1972). In recent times, spawning and/or redds of coho salmon have been observed in the mainstem Scott River and its tributaries, including: East Fork Scott River, South Fork Scott River, Sugar Creek, French Creek, Miners Creek, Etna Creek, Kidder Creek, Patterson Creek, Shackleford Creek, Mill Creek, Canyon Creek, Kelsey Creek, Tompkins Creek, and Scott Bar Mill Creek (Soil Conservation Service 1972, CDFG 1974, Maurer 2005, Yokel 2007-2011, Calfish 2013). The IP model shows the highest values (IP > 0.66) throughout the Scott Valley and low gradient reaches of tributaries to the Scott River (Table 36-1.). Other Scott River tributaries that have high IP include Rail, Kangaroo, Grouse, Sniktaw, Emmigrant, Oro Fino, Cottonwood and Duzel creeks.

Table 36-1. Tributaries with high IP reaches (IP > 0.66); Williams et al. 2006.

Subarea	Stream Name	Subarea	Stream Name
Scott Valley	Shackleford Creek[1]	Scott Valley	Wildcat Creek
	Mill Creek[1]		Etna Creek[1]
	French Creek[1]		Boulder Creek[1]
	Miners Creek[1]		Kidder Creek[1]
	South Fork Scott River[1]		Noyes Valley Creek
	Sugar Creek[1]		Moffett Creek
	Wooliver Creek[1]	Scott Bar	Canyon Creek[1]
	Big Mill Creek[1]		Kelsey Creek[1]
	East Fork Scott River[1]		Mill Creek (near Scott Bar) [1]
	Patterson Creek[1]		Tompkins Creek[1]

[1] Denotes a "Key Stream" as identified in the State of California's Coho Recovery Strategy, and in which SONCC coho salmon have been observed since 2001.

Coho salmon abundance prior to the mid-20th century is available primarily via anecdotal accounts, with little numerical information. The California Department of Water Resources (CDWR 1965) estimated the Scott River's adult coho salmon population in the early 1960s to be 2,000. Lanse (1971) estimated that a total of 111 juvenile and zero adult coho salmon were harvested by anglers in a study of the mainstem Scott River from its mouth to the town of Callahan. Between 1982 and 1991, the California Department of Fish and Wildlife (formerly CDFG), operated a weir in the Scott River at river kilometer 2.6 (RM 1.6) near the confluence with the Klamath River to obtain fall-run Chinook salmon escapement estimates (Knechtle 2008). At this location, the counting weir was vulnerable to high flows that generally forced the removal of the weir before the conclusion of the coho salmon migration and spawning period (early November through January). However, early returning coho salmon were counted while the weir was operating (Table 36-2.).

Table 36-2. Number of adult coho salmon observed at the Scott River weir. Weir was operated by the CDFG Klamath River Project (Shasta Scott Recovery Team 2003).

Year	Dates of Operation	Jacks	Adults	Total*
1982	9/14 to 10/29	0	5	5
1983	9/14 to 11/03	1	21	22
1984	9/10 to 10/31	12	38	50
1985	9/03 to 11/12	0	1	1
1986	9/11 to 11/19	18	49	67
1987	9/25 to 11/18	12	248	260
1988	9/24 to 11/09	No coho salmon reported		
1989	9/08 to 10/22	1	7	8
1990	9/08 to 10/28	1	6	7
1991	9/10 to 11/05	0	3	3

*Total numbers of coho salmon observed should not be construed as escapement values as the weir was removed prior to the peak adult coho salmon migration.

Coho salmon juveniles were found regularly in several French Creek reaches as part of an annual September electrofishing monitoring effort by the French Creek Watershed Advisory Group (1992). Beginning in 1993, coho salmon juveniles were documented in French Creek for the first time, with 7 coho salmon found only in Miner's Creek and none in the other five reach sites. In 1996, 50 juvenile coho were estimated for three sites in the mainstem of French Creek but none in Miner's Creek. A total of 215 coho salmon juveniles were found in 1999, with 65% of these at the Miner's Creek site. In 2000, two juveniles were observed at one site, with 15 fish observed at two sites in 2001. In 2002, the 3-year population pattern emerged again but this time in record numbers, with 628 coho salmon juveniles identified at 5 sites (Maria 2002). Incidental observations indicate that French Creek coho salmon production may be increasing, though formal quantitative monitoring is not currently being conducted to confirm these observations.

Coho salmon spawning surveys were initiated in the Scott River watershed in the fall 2001/winter 2002 spawning year (Maurer 2002), yielding 173 live adult coho salmon observations. These spawning grounds surveys have been conducted yearly since then to provide annual estimates and distribution of returning adult SONCC coho salmon (Yokel 2011, Yokel 2013). In 2007, the CDFW installed a new resistance board weir and video counting flume in the Scott River at river kilometer 29.3 on public lands managed by the Klamath National Forest. Operation of this weir has improved the CDFW's ability to monitor adult coho salmon returns to the upper reaches of the Scott River. In addition, CDFW has increased efforts to document the number and distribution of adult coho salmon spawning in the mainstem and tributaries downstream of the video weir. These two efforts, along with spawning ground surveys conducted by the SRCD in the upper Scott River and tributary streams entering Scott Valley, have improved the accuracy of adult coho salmon population estimates in recent years. Data for 2013 indicate that at least 2,731 adult coho salmon returned to the Scott River upstream of the video weir (Figure 36-2; Knechtle 2014).

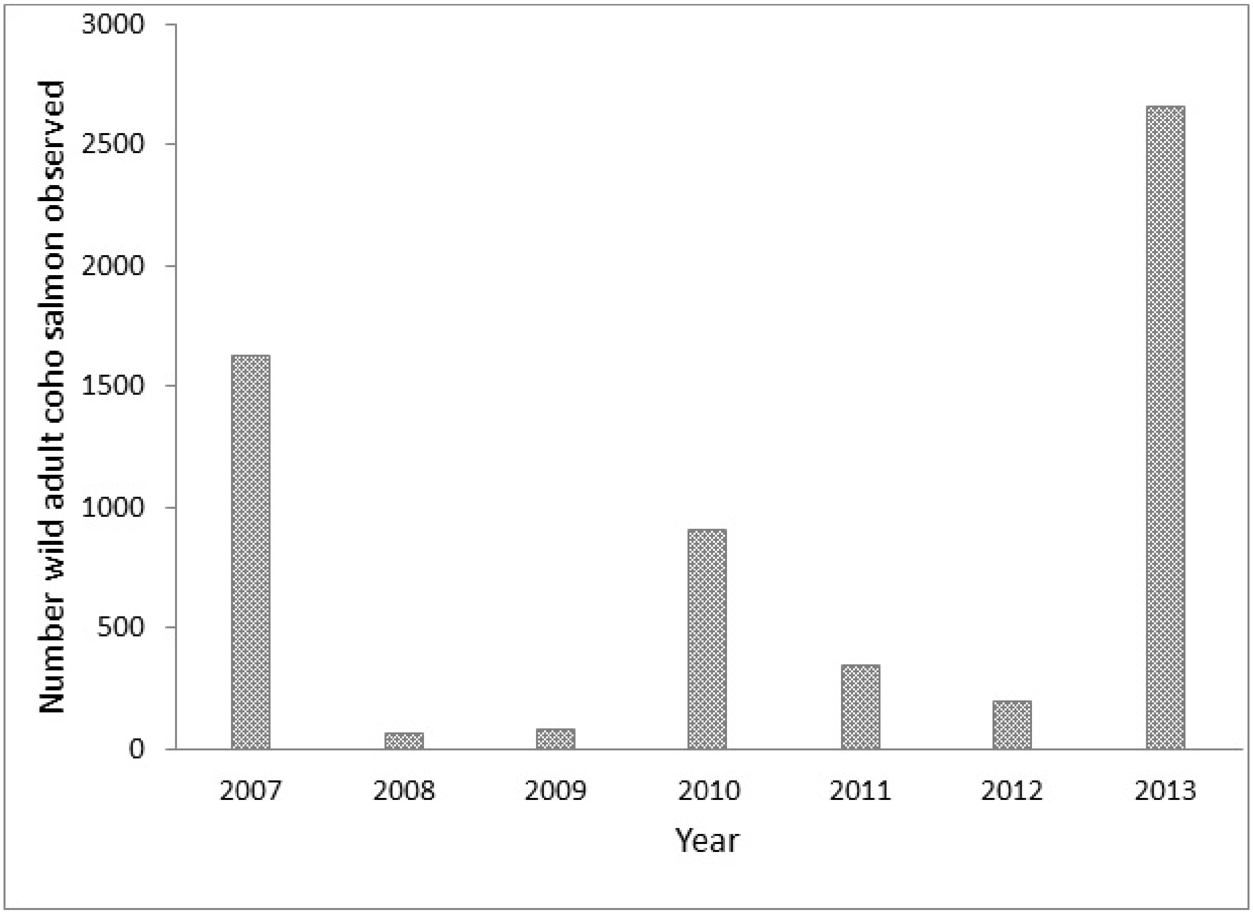

Figure 36-2. Adult escapement (ages 2 and 3) to the Scott River (video weir) (Knechtle and Chesney 2013, Knechtle 2014).

36.3 Status of Scott River Coho Salmon

Spatial Structure and Diversity

The diversity and complexity of the physical and environmental conditions found within the Scott River basin have contributed to the evolutionary legacy of coho salmon in the SONCC ESU, and contributed to this population being considered a Functionally Independent population (Williams et al. 2008). Juvenile fish have been found rearing in the mainstem Scott River, East Fork Scott River, South Fork Scott River, Shackleford Creek and its tributary Mill Creek, Etna Creek, French Creek and its tributary Miners Creek, Sugar Creek, Patterson Creek, Kidder Creek, Canyon Creek, Kelsey Creek, Tompkins Creek, and Mill Creek (near Scott Bar) (Shasta Scott Recovery Team 2003, Yokel 2006, CDFG 2008a, Calfish 2013). Adult coho salmon surveys of the Scott River and its tributaries have been occurring since 2001, and in French

Creek from 1992 to 2005 (CDFG 2006). This monitoring has documented the varying strength of the three coho salmon brood years in the above-mentioned portions of the Scott River basin, with the eleven most productive of these tributaries (East Fork Scott River, South Fork Scott River, Sugar Creek, French Creek, Miners Creek, Etna, Kidder Creek, Patterson Creek, Shackleford Creek, Mill Creek, and Canyon Creek) consistently sustaining rearing salmon juveniles in limited areas (Maurer 2006, Cramer Fish Sciences et al. 2010). Mill (Shackleford) Creek, for example, supports coho salmon every year, at densities that approach 20 redds/km. The other mentioned tributaries do not consistently sustain juvenile coho salmon, due to a lack of both available spawning and rearing habitat. Yokel (2006) notes that density of adult coho salmon spawning activity as well as the ability of juvenile salmon to emigrate or immigrate determine the extent of juvenile coho salmon presence in the Scott River basin. Physical stream characteristics play a significant role in constraining both the density of spawning activity and juvenile fish movement. The diversity of this population is, therefore, restricted by both available spawning and rearing habitat.

There have only been three confirmed observations of hatchery origin coho salmon recoveries in the Scott River. In 2009, one adult male coho salmon (39 cm fork length) with a right maxillary bone clip, indicating a fish released from Trinity River Hatchery, was sampled about 150 meters upstream from the confluence of the Scott River with the Klamath River (Knechtle and Chesney 2011). Two adult coho salmon of hatchery origin with a left maxillary clip (Iron Gate Hatchery origin) were observed passing through video counting flume during the 2012 season. Based on this information, CDFW estimated the portion of hatchery origin coho salmon in the Scott River was 0.81% (Knechtle and Chesney 2013). Although some exchange of genetic material from hatchery origin coho salmon is present within the Scott River either from straying of Iron Gate Hatchery origin coho salmon directly or secondarily through straying of natural origin Shasta River coho salmon, which does experience a high rate of straying from Iron Gate Hatchery, straying in the Scott River does not appear to be substantial and should not detract from its status as the most productive natural stock in the upper Klamath River basin (Garza 2012).

There are limited impacts from releases of coho salmon smolts from the Iron Gate Hatchery to the Scott River SONCC coho salmon population. These limited impacts include competition for freshwater habitat among juvenile coho salmon rearing and migration. Such habitat is expected to decrease in the future due to climate warming (Mote et al. 2003, Battin et al. 2007). Therefore, competition for limited thermal refugia areas will increase. Bartholow (2005) found a warming trend of 0.5 °C/decade in the Klamath River and a decrease in average length of river with temperatures below 15 °C (8.2 km/decade), underscoring the importance of thermal refugia areas. Hatchery releases are expected to remain constant during this period of diminished freshwater habitat availability. This will serve to increase detrimental impacts to naturally produced coho salmon from density-dependent mechanisms in the freshwater environment as climate warming continues. In this way, hatcheries will likely adversely impact the effective use of habitats by natural coho salmon in the future, if shared use of these habitats by natural and hatchery stocks exceed capacity limitations and food supplies.

Population Size and Productivity

NMFS determined at least 242 coho salmon must spawn in the Scott River each year to avoid such effects of extremely low population sizes. Adult spawning surveys and fish counting weir information that restarted in 2007 indicate adult spawning coho salmon number approaching 1,000 or more every third brood year (Figure 36-2), with abundance numbers ranging from 60 to 355 during other two brood years.

The number of smolts produced per returning adult (Table 36-3) provides a measure of freshwater survival in the Scott River Basin. When redd and juvenile abundance is below carrying capacity, the number of smolts produced per adult can be used to infer habitat condition, and trends between years, for coho salmon (Knechtle and Chesney 2013).

Table 36-3. Coho salmon adult and smolt point estimate and number of coho salmon smolts produced per adult for the Scott River (Knechtle and Chesney 2013).

Adult Return Year	Adult Estimate	Smolt Year	Smolt Point Estimate	Smolts produced per adult
2007	1622	2009	62207	38.35
2008	63	2010	1979	31.41
2009	81	2011	275	3.40
2010	927	2012	50315	54.28

Extinction Risk

The Scott River population is at moderate risk of extinction because the ratio of the three consecutive years of lowest abundance within the last twelve years to the amount of IP-km in a watershed is greater than one, but the ratio is less than the minimum required spawner density (both criteria described in Williams et al. 2008). NMFS' determination of population extinction risk is based on the viability criteria provided by Williams et al. 2008 (Table 3, p. 17). These viability criteria reflect population size and rate of decline. As Williams et al. (2008) provided no viability criteria for assessing moderate and high risk based on spatial structure and diversity, spatial structure and diversity were not considered in NMFS' determination of population extinction risk.

Role in SONCC Coho Salmon ESU Viability

The Scott River population is a core, Functionally Independent population within the Interior Klamath River diversity stratum; historically having had a high likelihood of persisting in isolation over 100-year time scales, and with population dynamics or extinction risk over a 100-year time period that are not substantially altered by exchanges of individuals with other populations (Williams et al. 2006). To contribute to stratum and ESU viability, the Scott River core population needs to have at least 6,500 spawners. Sufficient spawner densities are needed to maintain connectivity and diversity within the stratum and continue to represent critical components of the evolutionary legacy of the ESU. Besides its role in achieving demographic goals and objectives for recovery, as a core population, the Scott River population may serve as a source of spawner strays for nearby populations in the Klamath Basin.

36.4 Plans and Assessments

Siskiyou Resource Conservation District (RCD)

https://www.facebook.com/pages/Siskiyou-RCD/159947554025556

The Siskiyou RCD works to identify and address conservation and restoration needs through voluntary landowner and resource user participation, and by providing technical, financial, and educational leadership, primarily within the Scott River Basin. The Siskiyou RCD performs an extensive array of projects to protect the natural resources and the rural lifestyle of the Scott River watershed. RCD projects include agricultural and diversion improvement, barrier removal, riparian protection and enhancement, riparian bioengineering and planting, water conservation, fisheries and wildlife habitat improvement, water quality monitoring, and biological monitoring.

Siskiyou RCD Long Range Plan 2005-2009 (Siskiyou RCD 2005)

The Long Range Plan (Siskiyou RCD 2005) and its successor, are the guiding documents that set priorities for the Siskiyou RCD over a five-year period. The plans include the goals for programs and actions necessary to address identified objectives. Plans are subject to revision, when needed, to ensure that the RCD's programs are meeting the needs of its cooperators.

Scott River Watershed Council

Scott River Watershed Council Strategic Action Plan
http://scottriver.net/
https://www.facebook.com/ScottRiverWatershedCouncil

This watershed action plan sets priorities for future actions and practices to restore and manage Scott River basin resources, emphasizing salmonids. This plan builds on previous fall flows (SRWC 1999) and fish habitat & population studies (SRWC 1997), emphasizing restoration of native anadromous fish stocks. The action plan includes: analysis of current and historic conditions, identification of limiting factors, data and restoration needs (including type and location), prioritization of restoration project opportunities, and monitoring plans. A 2005 draft version of a limiting factor analysis of the Scott River coho salmon population was included as an appendix to the Strategic Action Plan. An update of the action plan began in 2011 and is still underway. Current work focuses on floodplain and wetlands habitat restoration to enhance rearing opportunities for salmonids.

Scott River Water Trust

Annual monitoring reports
www.scottwatertrust.org

Created in 2007, the Scott River Water Trust is the first water trust organization established in California. Its purpose is to supplement instream flows for coho salmon, Chinook salmon, and steelhead in critical habitat reaches of the Scott River and its tributaries, while providing financial compensation to agricultural water users. The Water Trust undertakes voluntary water leases with water users to forego irrigation water use in the summer and stockwater use in the fall. Assessments have identified the following streams where freshwater survival and growth of over-summering coho salmon and steelhead can provide the greatest benefit: French Creek, Shackleford Creek, Sugar Creek, Patterson Creek, South Fork, and East Fork. Each lease site is monitored to document the amount of water being leased, the instream flow, fish species presence, and water temperature. After irrigation season ends in late September, the fall season can create special flow needs if autumn rains arrive late and adult spawning salmonids need to reach good spawning gravels. To help improve upstream migration access, the Water Trust often leases stockwater rights in the mainstem Scott River. Spawning surveys then verify the upper extent where redds, carcasses, or live fish are located, which help inform water leasing priorities for the next year. Through 2013, the Water Trust has annually secured the following: 181 to 477 acre-feet of surface water leases, benefitting from 2.6 to 11.8 miles of stream habitat downstream; and fall leases of up to 1147 acre-feet.

Scott Valley Groundwater Advisory Committee

Voluntary Groundwater Management and Enhancement Plan

In 2013, the Siskiyou County Board of Supervisors approved the Voluntary Groundwater Management and Enhancement Plan (Scott Valley Groundwater Advisory Committee 2012). The purpose of the plan is to provide a voluntary, locally driven direction for the management and enhancement of the Scott Valley groundwater basin that is mutually beneficial for the community and environment. Specific objectives include:

1. Develop improved understanding of how groundwater and surface water behave.
2. Continue to maintain the long-term viability of the aquifer.
3. Reduce the conflict between groundwater use and other uses of water; scientifically validate the effect of groundwater use on salmon and steelhead use of the Scott River and its tributaries.
4. Improve public understanding of how agriculture uses wells and applies irrigation to local crops.
5. Identify non-agricultural water demands.
6. Identify groundwater use efficiency and enhancement projects and implement through grants, agencies and the community.

Scott River Watershed Coalition of Fire Safe Councils

The Mission of the Scott River Watershed Coalition of Fire Safe Councils is to promote collaboration in the Scott River Watershed to increase the likelihood of local community survival in the event of a catastrophic wildland fire. The coalition was formed in 2007 to marshal the resources of six volunteer fire safe councils operating in the Scott River watershed. The six fire safe councils are the French Creek Fire Safe Council, the Lower Scott River Fire Safe Council, the Quartz Valley Fire Safe Council, the Rattlesnake Creek Fire Safe Council, the Scott Bar Fire Safe Council and the Scott Valley Fire Safe Council.

http://www.californiaresourcecenter.org/viewpage.php?page_id=63

State of California

Recovery Strategy for California Coho Salmon
http://www.dfg.ca.gov/fish/Resources/Coho/SAL_CohoRecoveryRpt.asp

The Recovery Strategy for California Coho Salmon was adopted by the California Fish and Game Commission in February 2004. This report contains specific pilot program recovery recommendations for coho salmon in the Scott River Watershed that include: improved water management/water use efficiency, water augmentation, improved habitat management, protection, assessment and monitoring, and outreach and education. The recommendations developed by CDFW for the Scott River have been considered and incorporated into the recovery strategy and list of recovery actions for this population.

Total Maximum Daily Loads
http://www.waterboards.ca.gov/northcoast/water_issues/programs/tmdls/scott_river/

Clean Water Act Section 303(d) requires each state to develop a list of impaired waters where pollution controls are not sufficient to attain or maintain applicable water quality standards and a total maximum daily load (TMDL) for each pollutant of concern in each of the listed impaired waters. In December 2003, the USEPA published the final Total Maximum Daily Loads (TMDL) for temperature and sediment for the Scott River. On December 7, 2005, the North Coast Regional Water Quality Control Board adopted Resolution No. R1-2005-0113, amending the Water Quality Control Plan for the North Coast Region (Basin Plan) to include the Action Plan for the Scott River Watershed Sediment and Water Temperature Total Maximum Daily Loads. The TMDL and Action Plan set load allocations and assigned implementation responsibilities.

Long Range Plan for the Klamath River Basin Conservation Area Fishery Restoration Program
http://www.krisweb.com/biblio/gen_usfws_kierassoc_1991_lrp.pdf

In 1986, the Klamath River Basin Fishery Resources Restoration Act was enacted to help rebuild anadromous fish populations in the basin. The "Long Range Plan for the Klamath River Basin Conservation Area Fishery Restoration Program" was produced by the Klamath River Basin Fisheries Task Force (1991) with assistance from Kier Associates. This plan emphasized diversion improvement / barrier removal to provide fish passage, spawning survey assessments, watershed education, and communication.

U.S. Forest Service – Klamath National Forest

Watershed and Road Analyses by the Klamath National Forest
http://www.fs.usda.gov/detail/klamath/landmanagement/planning/?cid=STELPRDB5109804

The KNF completed the Callahan (USFS 1997b) and Lower Scott Watershed Analyses (USFS 2000d) that assess resource conditions in the uplands of the southern and northern boundaries of the Scott River basin. The KNF has also completed a Forest-wide Roads Analysis (USFS 2002) that provides recommendations for road maintenance, road closures, and road decommissioning projects to reduce road-related erosion on KNF-managed lands. Prioritized road storm proofing and decommissioning on KNF-managed lands in the Scott River watershed is ongoing.

The KNF, with partner Northern California Resource Center, completed a Forest-wide assessment of fish passage at road stream crossings during 2002-2004. Since then, the KNF has upgraded 9 crossings in the Scott River Watershed to allow for free passage of all aquatic organisms. Most of these crossings are just upstream of coho salmon CH and one is within CH on Scott Bar Mill Creek. The KNF will continue to pursue fish passage restoration projects where barriers to fish passage are identified.

The USFS has adopted a Watershed Condition Rating and Watershed Condition Framework (WCF) assessment and planning approach (USFS and BLM 2011) (http://www.fs.usda.gov/main/klamath/landmanagement/planning). The WCF is a comprehensive approach for proactively implementing integrated restoration within priority watersheds on national forests and grasslands. The WCF provides the Forest Service with an outcome-based performance measure for documenting improvement to watershed condition at forest, regional, and national scales. As part of the WCF, Sugar Creek was identified as a high priority 6th field sub-watershed for comprehensive restoration in the Klamath National Forest (USFS and BLM 2011). Currently the KNF is near completion of planning on the Sugar Creek Watershed Improvement Project and is in the process of selecting the next highest priority sub-watershed in the Scott Basin for comprehensive restoration.

Instream water right for fish and wildlife resources within the Klamath National Forest

The 1980 Scott River Decree includes an allocation for an instream flow right to the U.S. Forest Service at the USGS gauge downstream from Fort Jones, CA, to provide minimum subsistence-level fishery conditions including spawning, egg incubation, rearing, downstream migration, and summer survival of anadromous fish. To meet this purpose, the Scott River Decree provides for instream flows of 150 cubic feet per second (cfs) from April to June 15, 100 cfs from June 16 to June 30, 60 cfs from July 1 to July 15, 40 cfs from July 16 to July 31, 30 cfs in August and September, 40 cfs in October, and 200 cfs from November to March. These flows were anticipated to be provided in all years with an exception given for critically dry water years. However, since 1980, when the decree was finalized, the requirements for this water right have rarely been satisfied during the critical summer and fall seasons. In addition to the allotment described above, the U.S. Forest Service has an additional right to stream flow in the Scott River measured at the USGS gage downstream from Fort Jones for incremental fish flows and for recreational, scenic, and aesthetic purposes. The quantities described for this right are slightly greater than described above. These flow targets are routinely not met during the summer and fall, regardless of water year type.

French Creek Watershed Advisory Group

Created in 1990 as pilot study for the State Board of Forestry, the 12-member French Creek Watershed Advisory Group, comprising landowners and agencies, has worked cooperatively to reduce excessive granitic sediment delivery to French Creek to protect salmonid habitat. A granitic soil assessment identified roads as the major source of human-induced sedimentation (Sommarstrom et al. 1990). As a result, the French Creek Watershed Advisory Group developed and approved a Road Management Plan in 1992, followed by a Monitoring Plan and then a Fuel and Fire Management Plan. Road rehabilitation work on public and private roads has included outsloping and rocking sections of upslope roads that would have a high delivery rate of sediment to French Creek and its tributaries. Fine sediment levels in pools were assessed over time, indicating a decline in sediment from 31.6% in 1992 to 7.5% by 1994 (Power and Hilton 2003), and reaching 14.1% in 2012 (Farber and Nicolls 2012). Steelhead and coho salmon juvenile use at six survey reaches were electrofished annually to measure abundance and biomass from 1992-2005: coho numbers went from 0 to 628 in the surveyed reaches, with the discovery of one strong brood year class with two much weaker cohorts (CDFG 2006, Sommarstrom 2011).

Quartz Valley Indian Reservation

The Quartz Valley Indian Reservation (QVIR) undertakes resource assessment and monitoring in cooperative efforts to restore the Scott River basin (http://www.qvir.com), particularly in water quality monitoring. QVIR participates in coho salmon spawning surveys, and serves in an advisory capacity to the Scott River Watershed Council. QVIR is currently undertaking studies of the Shackleford/Mill Creek watershed.

36.5 Stresses

Table 36-4. Severity of stresses affecting each life stage of coho salmon in the Scott River. Stress rank categories, assessment methods, and data used to assess stresses are described in Appendix B.

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

[1] Key limiting stresses and limited life stage.

Key Limiting Stresses, Life Stages, and Habitat

The limiting stresses for the Scott River coho salmon population are the degraded riparian habitat conditions and altered hydrologic function that are occurring throughout the basin. These stresses are limiting the fitness and survival of juvenile coho salmon throughout the Scott River basin, by decreasing access to off-channel rearing habitat, creating stressful and lethal water quality conditions, decreasing water quantity and spawning habitat (Cramer Fish Sciences et al. 2010), and disconnecting floodplains and other off channel rearing habitat. The juvenile life stage is currently the limiting freshwater life stage for continued viability and success of the Scott River coho salmon population (CDFG 2004b, SRWC 2005).

Numerous water diversions, associated small diversion dams and interconnected groundwater extraction for agricultural purposes, and the diking of the mainstem Scott River have reduced summer and winter rearing habitat in the Scott River basin, limiting juvenile success. Although rearing habitat still exists in some of the key west-side tributaries, access to and from these areas is often hindered by dams and diversions, the existence of alluvial sills, the formation of thermal barriers at the confluence of tributaries and loss of surface flow connectivity between critical rearing pools in summer. Where passage is possible, juvenile fish can reach thermal refugia pools along both the mainstem Scott River and key west-side tributaries, where the water temperature can be several degrees cooler than in adjacent channels. A list of these known thermal refugia for rearing is in Table 36-5. These refugia areas occur in reaches with high IP and are vital to the continued existence and success of coho salmon in the Scott River. Expansion of these critical refugia habitats will aid in recovery.

Table 36-5. Potential refugia areas in the Scott River basin (Yokel 2006).

Subarea	Stream Name	Subarea	Stream Name
Scott Bar	Scott River from Boulder Creek to Tompkins Creek	Scott Valley	Shackleford/Mill Creek
Scott Valley	French Creek	Scott Bar	Canyon Creek
Scott Valley	Patterson Creek	Scott Bar	Kelsey Creek
Scott Valley	Kidder Creek	Scott Bar	Tompkins Creek
Scott Valley	South Fork & East Fork Scott River		

Excessive surface and groundwater extraction lowers the water table, often leading to the complete loss of riparian vegetation. Loss of riparian vegetation can lead to stream channelization and bank stabilization for flood protection. When high flows compromise channelization and stabilization efforts, the usual response is to further channelize and armor streambanks, aggravating riparian habitat loss. In contrast, any effort that serves to raise the groundwater table can help reverse the cycle of riparian habitat degradation.

Altered Hydrologic Function

Altered hydrologic function presents a very high stress for all life stages, with the exception of the egg stage (high) and the adult stage (medium). Water quantity and flow regime is poor in the southern portion of the Scott Valley from Etna Creek to about Noyes Valley Creek. The East Fork Scott River often becomes nearly dewatered during the summer, due to water diversions. Portions of the Scott Canyon area upstream from River Mile 15, in contrast, have fair water quantity (North Coast Regional Water Quality Control Board [NCRWQCB] 2005c). Numerous legal and some illegal water diversions occur throughout the basin, decreasing summer flows, increasing water temperature to lethal levels, and generally extending the period of surface flow disconnection on the valley floor.

Water rights on the Scott River have been fully adjudicated in the Superior Court of Siskiyou County through three separate decrees, the Shackleford Creek Decree (No. 13775) in 1950, the French Creek Decree (No. 14478) in 1958, and the Scott River Decree (No. 30662) in 1980. Of the three decrees, the Scott River Decree describes the water allocations for the vast majority of the watershed and unfortunately, there is no watermaster service for this large geographic area. As a result, there is no accounting of the actual timing or volumes of water diverted for the vast majority of the watershed. In addition, the Department of Water Resources terminated their watermaster service for the Shackleford and French Creek Decrees at the end of the 2011 irrigation season. A new Scott/Shasta Special Water Master District began operation in 2012. Since that time, quantification of surface water withdrawals has been inconsistent, particularly in the Shackleford watershed where several water right holders opted out of the new watermaster service, further reducing management and regulation of water diversions in Scott Valley.

Currently, valley-wide agricultural water diversions, groundwater extraction, and drought have all combined to cause premature surface flow disconnection along the mainstem Scott River. In addition, summer flows has continued to decrease significantly over time, further exacerbating detrimental effects on coho salmon in the basin. These conditions restrict or exclude available rearing habitat, elevate water temperature, decrease fitness and survival of over-summering juveniles, and sometimes result in juvenile fish strandings and death.

Degraded Riparian Forest Conditions

Degraded riparian forest conditions, caused by conversion of historic valley wetlands and riparian corridors to agricultural lands, pose a very high stress to all juvenile life stages and a medium stress to adults. Stream corridor shade is generally poor on the Scott Valley, due to both the loss of a functional floodplain and riparian community from agricultural encroachment, and solar exposure caused by the north-south orientation of the mainstem Scott River from Callahan downstream to Ft Jones, CA. Further downstream, the Scott Canyon area has fair to good shade cover, but spawning and rearing habitat is limited due to the steeper terrain. Dredge mining ended around 1950, but many riparian areas in the Scott River basin remain poorly vegetated, incised, and erodible up to the present day (USFS 1997b). This is especially apparent along the nearly five mile long “tailings pile reach” of the Scott River downstream from Callahan. Floating dredge operations there have reconfigured the upper reach of the valley in this area, confining the active Scott River channel to one side of its historic floodplain.

The clearing of extensive beaver-occupied wetlands and swamp forests, which once covered much of the Scott Valley, has resulted in relict valley riparian forests that are often devoid of canopy cover, or at best, dotted with willow, alder, and cottonwood clumps. This has reduced channel margin habitat and associated cover, which is favored by juvenile coho salmon, while increasing solar exposure and water temperature during the summer and early fall. Also, straightening, rocking, and confinement of channels on the valley floor has resulted in high intensity, bank-eroding flood events that have carried away remaining riparian vegetation and soil from riparian gallery forests, creating additional areas lacking riparian vegetation and further increasing water temperatures (CDFG 2004b, SRWC 2005). Stream bank stabilization, bio-engineering efforts, riparian planting, and beaver habitat enhancement (NCRWQCB 2009), occurring since the 1990s, are contributing to progressive improvement of riparian habitat conditions.

Impaired Water Quality

Water quality is a high to very high stress for all life stages, and is caused by the degraded riparian forest condition in the valley, extensive agricultural and grazing activities, and over allocated water withdrawal occurring throughout the basin. High water temperatures and increased nutrient and sediment loading have created poor water quality conditions in many side channel and off-channel rearing areas used by coho salmon. Water quality has been found to be good in perennial flowing tributaries, which allows juvenile coho salmon to rear as long as sufficient surface flows continue through the summer (French Creek Watershed Advisory Group 1992, Quigley et al. 2001, Sommarstrom 2001). However, water quality conditions are poor overall, being thermally stressful for juvenile fish throughout summer and much of the fall, especially in and adjacent to the mainstem Scott River (NCRWQCB 2004, Bowman 2010, QVIR 2011).

Benthic macroinvertebrate richness and Ephemeroptera/Plecoptera/Trichoptera taxa metrics range from fair to poor in Kelsey and Tompkins creeks, but are very good in much of lower Canyon Creek, upper French Creek, and the upper portions of tributaries to the Scott River (Chesney and Yokel 2003, 2006). Water temperatures in the summer are poor throughout the mainstem Scott River (QVIR 2011), Wildcat Creek, Patterson Creek, and lower French Creek, while water temperatures are generally fair (current indicator status 16.74 ^{o}C) in the upper reaches of other perennial tributaries. Water quality degrades continuously through the summer in the Scott River, and also in the terminal reaches of its tributaries. By July, lethal water temperatures of 80 °F (26.7 °C) routinely occur in the mainstem Scott, including portions of the Scott River Canyon (Chesney and Yokel 2003). Potential Hydrogen ion (pH) levels have been reported as poor near the mouth of the Scott River and fair where the lower Scott Valley enters the Scott River Canyon. Dissolved oxygen daily averages have been measured as progressively lowering from 11to 8 mg/L during the summer, reaching their lowest level during summer nights (QVIR 2011). All of these water quality impairments reduce juvenile opportunities for survival through the summer and decrease the viability of the population overall.

Impaired Estuary/Mainstem Function

This stress refers to the estuary and mainstem conditions in the Klamath River, since this population is part of a larger basin containing multiple populations. Degraded mainstem conditions in both the Scott River and the Klamath River create a low stress for fry, a high stress for juveniles, and a very high stress for smolts and adults. Mainstem conditions in the Scott River contribute to this stress because of reduced water quality, sedimentation, channel aggradation, and degraded habitat in mainstem reaches. Conditions in the Klamath River mainstem and estuary are important to this population since all salmon that originate from the Scott River migrate to and from the ocean through the mainstem Klamath River and the Klamath River estuary. This can be detrimental for juveniles when high concentrations of *C. shasta*, *P. minibicornis*, and other pathogenic diseases are occurring. Additionally, because of the long distance that this population must travel to and from the ocean, the time spent in the mainstem Klamath River may increase stress associated with mainstem conditions and residence time during late spring and summer when water quality conditions typically deteriorate.

The degraded conditions that exist throughout the Klamath Basin may mean that the estuary plays an enhanced role for all Klamath anadromous fish populations, by providing the opportunity for juvenile and smolt growth and refuge prior to entering the ocean (Wallace 1995). Juveniles, smolts, and adults transitioning through mainstem and estuarine habitat are stressed by the degraded conditions in these migratory zones, suffer from the lost opportunities for increased growth, and consequently experience a lower survival rate. The loss and degradation of estuarine and mainstem habitat is considered a high to very high stress for the population, with the most affected life stages being juveniles, smolts, and adults, due to degradation of rearing and migratory habitat. Although short and small compared to the large size of the watershed, the estuary does provide numerous habitat types and rearing habitat for juvenile coho salmon. The estuary, although relatively intact, suffers from poor water quality, elevated sedimentation and accretion, loss of habitat, and disconnection from tributary streams and the floodplain (Hiner

2006). Levees along the Lower Klamath and development on the floodplain have led to the loss and degradation of habitat in the estuary. More information about the Klamath River estuary can be found in the Lower Klamath population profile.

Lack of Floodplain and Channel Structure

The ongoing alteration of floodplain and channel structure from mining and other anthropogenic activities has reduced complex channel margin and pool habitat availability, disconnected the floodplain from the adjacent channel, and simplified instream habitat throughout the Scott River basin, creating a high stress for all life stages except for the egg stage (medium) and the juvenile stage (very high). In many locations, especially along the mainstem Scott River near Callahan, Oro Fino Creek and in lower Kidder Creek, large areas have been stripped of vegetation and the remaining gravel deposits have been hydraulically or mechanically worked to retrieve deposited gold and/or aggregate. These activities have left a legacy of unvegetated, heavily disturbed gravel deposits mostly devoid of soil and have caused disconnections between floodplains and instream channel habitats.

Coho salmon need channel margins, complex woody debris, undercut banks, beaver-influenced wetlands (Yokel 2006) and associated deep pools to rear in and for adults to rest in while migrating upstream. Monitoring data indicate that pool frequency is poor throughout the watershed, while pool depth varies from poor in Miners Creek to good or very good in French Creek. While it is encouraging that pool depth in some areas is good or very good, these areas may not always be accessible to rearing salmonids due to poor water quality conditions that create thermal barriers and physical barriers due to sediment deposition coupled with low flows. Compounding these issues is a lack of woody debris, both large and small, which is also an important component of rearing habitat, as it creates complex channel structure. Woody debris is lacking throughout the mainstem Scott River and its tributaries. Surveys assessing rearing habitat associated with complex woody debris confirm juvenile coho salmon presence around woody debris, and that such wood recruitment is lacking both in the Scott Valley and along tributary reaches above the valley (Yokel 2006).

Altered Sediment Supply

Altered sediment supply occurring in the Scott River imposes a medium stress to juvenile and smolt, high stress to adults, and a very high stress to the egg and fry coho salmon life history stages. The movement of fine sediment into streams can cause substrate embeddedness, preventing spawning and smothering eggs in redds. Additionally, excessive levels of fine sediment in pools and low gradient reaches of the Scott River and its tributaries also reduce the amount of rearing habitat available for juvenile coho salmon (USFS 2000d, NCRWQCB 2006a, CDFG 2009a, Cramer Fish Sciences et al. 2010). While unaltered background levels of sediment were around 10 percent volumetrically, monitoring in the French Creek watershed has shown large fluctuations in the percentages of fine sediment occurring in this watershed (Sommarstrom et al. 1990). Data from the early 1990s indicate a high of approximately 32 percent fine sediment occurring in French Creek in 1992, decreasing to approximately 7.5 percent by 1994 (Power and Hilton 2003), and then reaching a dynamic level of approximately 14 percent in 2012 (Farber and Nicolls 2012). More recent monitoring indicates that there is still a large percentage of fine sediment in the channel substrate in the upper portions of French

Creek, which is one of the two most productive spawning and rearing tributaries in the Scott River basin.

Excessive fine sediment loading was also found to cause poor substrate conditions in Miners (French/Miners) Creek, Sugar Creek and the lower mainstem of the Scott River. The largest causes of the altered sediment supply throughout the Scott River are the high density of unpaved and unmaintained roads and other compacted surfaces, unstable lands, and streamside degradation, which all mobilize excessive fine sediment into the mainstem Scott River and its tributaries. Large areas of erosive decomposed granite originating from slopes on the west side of the Scott Valley contribute to these high percentages of fine sediment in channel substrate. These unstable conditions are exacerbated by detrimental anthropogenic land uses occurring throughout the basin, which have resulted in aggradation and loss of summer surface flows in Westside streams, like Shackleford Creek (QVIR 2011). Fine sediment levels in lower Etna Creek are considered fair, although this decrease in fine sediment may be the effect of the sediment sampling location not being in a depositional reach, rather than a true reduction in sediment supply. Assessments of specific stream channels and riparian habitats have been undertaken along Etna Creek, to design effective watercourse and lake protection zones (Sommarstrom 2007, Farber and Whitaker 2010).

Adverse Hatchery-Related Effects

A small egg collecting station operated on Shackleford Creek from 1925 to 1940 (Leitritz 1970). No hatcheries or artificial propagation occur in the Scott River basin, but Iron Gate Hatchery is about 50 miles (80.5 km) upstream of the mouth of the Scott River, within the Klamath River basin. Juvenile fish often outmigrate from the Scott River into the Klamath River when they are still undersized, to escape rising water temperatures during the spring. These juvenile outmigrants encounter large numbers of released Iron Gate hatchery fish also utilizing cold water refugia along the mainstem Klamath River and experience competition for prey resources and exposure to disease. A limited survey of Scott River spawning grounds occurred in 2004, 2005, 2008, 2009, and 2010; in most years, no hatchery fish were observed (Quigley 2005, 2006, Walsh 2008, Franklin 2012, Yokel 2011, 2013). Adverse hatchery-related effects pose a medium risk to all life stages, due to the presence of Iron Gate Hatchery and Trinity River Hatchery in the Klamath basin (Appendix B)

Increased Disease/Predation/Competition

Increases in disease, predation, and competition present a high stress for juveniles and smolts, a medium stress for fry and adults, and a low stress for eggs,. This stress increases as coho salmon health is reduced by elevated water temperatures during the spring and summer. Warm water temperatures make fish more susceptible to diseases, and decrease fitness levels and the ability to fend off predators and competitors, including non-native piscivorous fish. Elevated mainstem temperatures force juvenile fish into the remaining cold water refugia (e.g., portions of the so-called "thermal reach" from the USGS Scott River gage to Townsend Gulch) where increased competition occurs for limited resources. If juvenile fish are forced into the Klamath River, they are exposed to disease and are vulnerable to other wildlife.

Juvenile fish are exposed to a variety of pathogens including *Ceratonova shasta,* which leads to ceratomyxosis, *Flavobacterium columnare* (columnaris), aeromonid bacteria *Nanophyetus salmonicola*, and the kidney myxosporean *Parvicapsula minibicornis* (Federal Energy Regulatory Commission 2007). Actinospore concentrations of both *C. shasta* and *P. minibicornis* in the mainstem Klamath River are often above the threshold necessary to induce infection and disease (Stocking et al. 2006, Nichols and True 2007) and have been shown to infect juveniles inhabiting the mainstem river in this area. By late spring and summer, both diseased hatchery and wild juveniles are seen dead or moribund in Klamath River screw traps.

Barriers

Barriers present a high stress for juvenile coho salmon, and a low stress for fry, smolt and adult life stages. Diversion dams, small impoundments, and road/stream crossings pose partial or complete barriers to high IP in the Scott River basin. Big Mill Creek, a tributary to the East Fork Scott River, has a complete fish passage barrier caused by down cutting at a road culvert outfall. The Big Mill Creek site can be corrected by returning Big Mill flow to its original channel, but this has been delayed until the landowner can be assured necessary access to private property across Big Mill Creek. Rail Creek, another tributary to the East Fork Scott River, poses a complete fish passage barrier and impoundment, caused by an irrigation pond levee. A project to provide fish passage at Rail Creek has been developed, but its implementation has been postponed while an analysis is done to determine if the 0.7 mile of upstream habitat to be regained justifies the project's expected cost. The Scott Valley Irrigation District's Youngs Dam has been outfitted with a fishway that needs correction to ensure fish passage in varying flow conditions. The City of Etna's municipal water diversion dam on Etna Creek effectively blocked fish passage into upper Etna Creek, but this dam was retrofitted with a volitional fishway in 2010. Work has been done recently to convert seasonal gravel push up dams to boulder weirs and the evaluation and upgrading of previously constructed boulder vortex weirs is ongoing. There are currently three known vortex weirs within SONCC coho salmon critical habitat in Shackleford and French creeks that require treatment to ensure complete fish passage.

Adverse Fishery- and Collection-Related Effects

Based on estimates of the fishing exploitation rate, as well as the status of the population relative to depensation and the status of NMFS approval for any scientific collection (Appendix B), these activities pose a medium stress to adults and a low stress to juveniles and smolts.

36.6 Threats

Table 36-6. Severity of threats affecting each life stage of coho salmon in the Scott River. Threat rank categories, assessment methods, and data used to assess threats are described in Appendix B.

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

[1] Key limiting threats and limited life stage.
[2] Invasive Non-Native/Alien Species is not considered a threat to this population

Key Limiting Threats

The two key limiting threats, those which most affect recovery of the population by influencing stresses, are agricultural practices and dams/diversions.

Agricultural Practices

Current agricultural practices are a very high threat to all life stages, and therefore have a very high overall threat. Sub-basins of the Scott Valley where pasture/hay and cultivated crops comprise more than 10 percent of the landscape include Clark Creek, lower Johnson Creek, lower Patterson Creek, lower Kidder Creek, Rattlesnake Creek, and lower Shackleford /Mill creeks. These sub-basins have become altered by the high percentage of agricultural land occurring within them. Grazing and other ranching activities are pervasive throughout the lower portions of the Scott Valley. Approximately 20 percent of all pastures/fields adjacent to stream channels have no exclusionary fencing or unmaintained fencing (Black 2011), which then contributes to increased bank erosion, degradation of riparian vegetation, and alteration of instream habitat characteristics.

Agriculture and related activities have been, and continue to be the major land use within the Scott Valley (Van Kirk and Naman 2008). Agricultural land use currently consists of approximately 29,000 acres of irrigated land with an estimated annual irrigation withdrawal of approximately 83,500 acre feet per year (Van Kirk and Naman 2008). There has been an increase in irrigation withdrawals in the Scott Valley of 115 percent between 1953 and the period 1988 to 2001, though the amount of irrigated farmland has not changed significantly (CDWR 2003). A progressive shift from irrigation of grain crops to alfalfa during this period did increase irrigation withdrawals (Harter and Hines 2008). Another important shift in the recent past was the change from flood to sprinkler irrigation, which increased efficiency and reduced return flows to the Scott River (Van Kirk and Naman 2008).

Currently, a large proportion (50 percent or more) of water used for irrigation comes from ground water (Van Kirk and Naman 2008). Because of the recognized interconnection between surface and groundwater (California State Water Resources Control Board 1980), quantification and modeling of groundwater dynamics has begun for the entire Scott Valley via a community groundwater study plan (Harter and Hines 2008, Foglia et al. 2013), which is documenting interactions between groundwater use and water availability in adjacent riparian habitat. In most years, low flows in the Scott River basin from June to November have become more pronounced with enhanced agricultural use of water (Van Kirk and Naman 2008), but with annual maximum groundwater levels remaining fairly constant (Harter and Hines 2008). Low surface flows, due in part to accumulation of less snow at lower elevations (Van Kirk and Naman 2008), result in elevated water temperature and loss of connectivity to side-channel and off-channel habitat areas.

During the summer, and especially during critically dry years, large portions of the mainstem Scott River become completely dry, leaving only isolated pools (SRWC 1997). Dry mainstem cuts off access to summer rearing habitat in many tributaries and high IP areas. In some years, many thousands of juvenile salmon and steelhead are stranded and killed in the Scott River basin (SRWC 1997) when stream flows go subsurface in the lower reaches of Etna, Patterson, Kidder (including Big Slough), and Shackleford Creeks each summer through early fall. This drying is believed to be a natural event (Siskiyou County Historical Society 1978), but it has become exacerbated by water withdrawal in the form of seasonal agricultural diversions, groundwater pumping, and by aggradation in low gradient tributary reaches. The end result is the dewatering of miles of instream habitat, lack of access to and from rearing habitat, and poor water quality, all of which yield stressful and sometimes lethal water temperatures for rearing coho salmon. Scott Valley eastside tributaries tend to flow only during high flow events (Mack 1958), but their confluences with the mainstem Scott River have high IP, which could provide enhanced over-summering habitat to juvenile fish with improved/enhanced wetland habitat along the Scott River channel via interconnected groundwater or hyporheic flow (Figure 36-1). Unless market factors bring about changes in cropping or amount of land in production, current agricultural activities and associated water use are expected to continue, and the associated stresses discussed above will continue to be a problem for the Scott River coho salmon population.

Dams/Diversions

Dams and diversions are a medium threat to the egg life stage, and a very high threat to fry, juvenile, smolt and adult life stages. Dams and diversions occur throughout the basin and are usually associated with agricultural practices and other ranching and grazing activities. Multiple water diversions currently hasten surface flow disconnection in the mainstem Scott River each summer, resulting in the reduction of available rearing habitat, increases in water temperatures, fish stranding, and death. Additionally, the impoundment of water behind dams and the diversion of stream flows affect juvenile and smolt life stages by decreasing instream flows, increasing water temperatures, blocking passage to and from vital rearing habitat, and causing stranding during peak diversion times. Although virtually all diversions within SONCC coho salmon habitat have been outfitted with fish exclusion screens, there is no consistent screen monitoring and maintenance to ensure that bypass flows around these screens is sufficient to sustain rearing juvenile coho salmon and their habitat downstream.

Van Kirk and Naman (2008) found that late summer baseflows in the Scott River were 60 percent lower (6.541 Mm^3 versus 10.96 Mm^3) in the recent past (1977 to 2005) than in the historic period (1942 to 1976). Climate change was found to be responsible for approximately 39 percent of this decline in late summer base flow. The minimum baseflow of 30 cfs during the summer months was determined necessary for the survival of salmon and steelhead stocks within the 1980 Scott River Adjudication. Gaging records at Fort Jones show summer discharge frequently falling below 30 cfs, and often fell below 10 cfs in critically dry water years. Flows failed to meet the USFS water right of 30 cfs in at least nine years since 1977 (QVIR 2011). At this level of discharge, the Scott River and portions of lower tributaries become a series of stagnant pools inhospitable to salmonids. Water diversions for agricultural practices, groundwater extraction, cattle grazing, residential/domestic water use, and flood control have diminished surface flows and greatly reduced or eliminated access to and use of historical coho salmon habitat in the Scott Valley. Agricultural surface water diversion continues to exacerbate channel drying and dewatering of the Scott River and its tributaries each spring/early summer. Juvenile salmonid strandings in isolated pools continues to occur. When coho salmon are stranded, they are often rescued and relocated to unoccupied cool water oversummering habitat.

Until diversion operations are remediated, demands are decreased, and dams are removed, this threat will continue to impact the Scott River coho salmon population. Work has begun in many areas of the watershed to begin to diminish the impacts from this threat. At Youngs Dam, efforts continue to improve/increase the range of flows at which the fishway, constructed in 2006, ensures consistent fish passage at the dam. Rail Creek, a tributary to the East Fork Scott River, has a complete fish passage barrier and impoundment caused by an irrigation pond levee. A project to provide fish passage at Rail Creek has been developed, but its implementation has been postponed while an analysis is done to determine if the 0.7 mile of upstream habitat to be regained justifies the project's expected cost. There are currently three known vortex weirs in French and Shackleford Creeks that require treatment to ensure complete fish passage. All Scott Valley agricultural water diversions within the known range of Chinook and coho salmon have been outfitted with fish exclusion screens. Approximately 15 diversion dams in tributaries to the Scott River continue to block salmonid passage. Priorities have been set to progressively address these remaining barriers through projects to both improve passage and properly screen all diversions within the range of anadromy.

Channelization/Diking

The channelization and diking of the Scott River mainstem and tributaries poses a very high threat to egg and fry life history stages, and a high threat to juvenile, smolt and adult life stages. Floodplain connectivity is poor (non-functional) in South Fork Scott River, Wildcat Creek, Sugar Creek, French/Miners Creeks, and Etna Creek watersheds, due to past hydrologic mining and conversion of beaver-occupied wetlands to drained agricultural lands. Floodplain connectivity is fair in the East Fork Scott River and the Scott River Canyon. In the 1930s, the US Army Corps of Engineers, at the request of Siskiyou County, removed the remaining vegetation through the middle of the valley and built levees for flood control (SRWC 1997), in turn altering the hydrology and morphology of the mainstem river and tributaries downstream. The construction and maintenance of levees disconnects floodplain habitat, alters the hydrograph throughout the system, decreases riparian vegetation success by lowering and disconnecting the water table, and increases flows during storm events. Since the construction of the first levees in the 1930s, much of the remaining mainstem Scott River has also been channelized in a continuing effort to control flood impacts and maximize acreage of agricultural lands adjacent to the river. This has destroyed low velocity margin and side channel habitat, making winter rearing habitat a significant limiting factor to juvenile coho salmon survival.

Climate Change

Climate change poses a medium threat to this population. The impacts of climate change in this region will have the greatest impact on the early fresh water life stages. Climate change will likely decrease summer base flow, reduce summer rearing habitat, and increase irrigation demand in the Scott River basin. The current climate is generally warm and modeled regional average temperature shows a large increase over the next 50 years (see Appendix B for modeling methods). Average temperature could increase by up to 2.7 °C in the summer and by 1.3 °C in the winter. Snowpack in upper elevations of the basin will decrease with changes in temperature and precipitation (California Natural Resources Agency 2009). The vulnerability of the Klamath estuary to sea level rise is low to moderate and therefore does not pose a significant threat to estuarine rearing habitat downstream. Juvenile rearing and migratory habitat in the Scott River and mainstem Klamath is most at risk to climate change. Overall, the range and degree of variability in temperature and precipitation is likely to increase in all populations. Also, all populations in the ESU will be negatively impacted by ocean acidification, rising sea surface temperatures and stratification, and loss of calcareous shell-forming species, which will affect prey availability (Independent Science Advisory Board 2007, Portner and Knust 2007, Feely et al. 2008).

Roads

Roads are a high threat across all life stages, and a significant overall threat for coho salmon in the Scott River population. Roads posing the highest threats to coho salmon are virtually all unpaved forest roads that, unless receiving a high level of use, receive minimal routine maintenance. High road density in watersheds concentrates and channelizes surface runoff, resulting in slope failures and landslides, which can mobilize sediment to stream channels, increase substrate embeddedness, smother eggs in redds, and fill in pools. Road density is high in the following tributary sub-basins, where high IP reaches predominate: South Fork Scott

River, upper East Fork Scott River, French/Miners creeks, Johnson Creek, Patterson Creek, Kidder Creek, Moffett Creek, McAdams Creek, Shackleford/Mill creeks, Boulder Creek, and Scott Bar Mill Creek. In the Scott River basin, human-related land sliding averages 36 tons/mi^2 per year, which significantly exceeds natural background land sliding in other neighboring watersheds (NCRWQCB 2006a). Road construction in upland areas has stabilized since the mid-1990s, providing opportunities to storm proof priority use roads and to decommission redundant roads. Currently, there are ongoing Klamath National Forest and private projects to upgrade, storm proof, and decommission roads in priority areas of the Scott River basin (USFS 2011a). While road related sediment issues remain a high threat across the basin, continuation and further funding of these efforts will likely decrease the magnitude of this threat in the future.

High Severity Fire

High severity fire, and the associated riparian forest habitat destruction and surface erosion to streams it causes is a high threat to both egg and fry and a medium threat to juvenile, smolt and adult life history stages. Because of past timber harvest practices, coupled with the fire-suppression efforts over the past century, understory forest fuel loads have become excessive. A wildland fire resulting from these excessive forest fuel loads occurred in the Scott River Canyon portion of the watershed in 1987 (USFS 2000d). Such fire mobilize sediment downslope to streams when they do occur, and can smother eggs in redds, decrease pool volume and habitat complexity, and create alluvial sills in tributary mouths (Maria 2002). High severity fire risk is expected to continue into the future, until current understory fuels reduction actions have strategically treated upland areas, and a more natural fire regime is reestablished throughout the basin.

Hatcheries

Hatcheries pose a medium threat to all life stages in the Scott River basin. The rationale for these ratings is described under the “Adverse Hatchery-Related Effects” stress.

Mining/Gravel Extraction

Mining activities and gravel extraction are a medium threat to all life stages. Effects from historic mining activities have created a legacy of impacts throughout the basin, with tailing piles and constrained active channels highlighting the altered structure of floodplains. Placer and hard rock mining continue today (USFS 2006), and are concentrated in the canyon reach of the mainstem Scott River. Currently, suction dredging is prohibited in California.

Current gravel extraction is incrementally removing a portion of historic tailings piles along the mainstem Scott River near Callahan, which may aid in the restoration of floodplain and channel connections and potentially restore a more natural hydrograph in areas downstream of the channelized reach (USFS 2006). Gravel extraction also has the potential to improve surface flow connection between the mainstem Scott River and tributaries that have been disconnected by alluvial sills, incised channels, and a lowered water table. This gravel can be relocated to nearby river reaches that currently require substrate enhancement for improved spawning habitat conditions (Cramer Fish Sciences et al. 2010).

Urban/Residential/Industrial Development

Urban/residential/industrial development is a medium threat to all life stages. The human population of the Scott Valley has grown from 2,900 in 1930 to nearly 8,000 in 2000 (SRWC 2005), which represents 1,800 acre feet of annual water use, at 200 gallons per person per day. In contrast, current irrigated agriculture/pasture annually uses approximately 81,070 acre feet of water for 29,000 acres (Van Kirk and Naman 2008). This agricultural usage is expected to continue without major change for the foreseeable future, due to the Scott Valley's relative isolation. The Scott Valley Area Plan and Environmental Impact Report (SRWC 2005) projected the Scott Valley population to reach 18,000 by 2010, but the actual population size at this time is less than half of this estimate. While human population growth is currently stable or even decreasing in the Scott Valley, establishment of center pivot irrigation systems using groundwater, and development of small ranches are increasing demand for water. Much of this demand is met through shallow groundwater wells, or through exercise of adjudicated in-stream diversions, which can markedly reduce stream flows during summer low-flow periods. Water use associated with rural residential development along tributaries to the Scott River may result in pronounced reductions in tributary summer surface flows. The number of domestic wells increased from 108 to 913 between 1970 and 2002, respectively (Shasta Scott Recovery Team 2003), and this growth in groundwater use is likely to continue into the future, representing a continued threat to the Scott River coho salmon population.

Timber Harvest

Timber harvest poses a medium threat to the Scott River population. High (25 to 35 percent of watershed harvested) and very high (>35 percent of watershed harvested) rates of timber harvest have occurred in the following tributary sub-basins: Noyes Valley Creek, Mule Creek, Wildcat Creek, French/Miners creeks, Etna Creek, Moffett Creek, McAdams Creek, and lower Scott River (upper Canyon Reach). These formerly high rates of timber harvest, though reduced since the mid-1990s, still contribute to the altered sediment supply, impaired water quality, degraded riparian forest conditions and impaired mainstem function stresses that are occurring in the Scott River basin. The steeper and erodible western and northwestern drainages of the basin had been extensively logged (USDA 2000) and then suffered a major fire prior to a December 1955 flood (Sommarstrom et al. 1990), when sediment and debris mobilized by the flood contributed to aggradation of alluvial fans at the foothill-valley floor interface for some of these tributary streams. These impacts have caused decreased pool volumes, poor water quality, disconnection of floodplain and off-channel habitat, and simplification of instream habitats. While Timber harvest activities continue in the Westside and Scott River Canyon areas, timber harvest has decreased in the last 15 years and upland riparian forest areas are in early stages of recovery. This recovery is expected to proceed as clear cutting is replaced by density-dependent thinning and understory fuels reduction, which are intended to reduce wildland fire risk and attendant sediment mobilization. Stormproofing and decommissioning of roads used for forest stand management and timber harvest have also stabilized road prisms and are reducing sediment mobilization downslope.

Road-stream Crossing Barriers

Road-related barriers are a low threat to all life history stages, with the exception of the egg stage which is not affected by such barriers. Available information in the Passage Assessment Database on the Calfish.org website and on the 5 Counties website indicate several road/stream crossings that require fish passage evaluation to determine necessary follow-up treatment (Table 36-7). The Hwy 3/Big Mill Creek road/stream crossing is a Caltrans facility located within SONCC coho salmon critical habitat, and is a high priority for treatment. Remediation of this barrier can be accomplished by returning Big Mill Creek flow to its original channel, but this has been delayed until the landowner can be assured necessary access to property across Big Mill Creek. There are currently no passage barriers within coho salmon critical habitat located on the U.S. Forest Service roads system in the Scott River basin.

Table 36-7. Road/stream crossing barriers in the Scott River basin.

IP priority	Stream Name	Road Name	Sub-basin	Miles of upstream habitat
1	Big Mill Creek	State Hwy 3	East Fork Scott River	1.5
1	Meamber Creek	Scott River Road	Lower Scott River	1.0
1	Sniktaw Creek	Big Meadows Road	Lower Scott River	2.0
1	Little Jackson Creek	Forest Service Road	South Fork Scott River	
1	West Boulder Creek	Forest Service Road	South Fork Scott River	
2	Kangaroo Creek	Forest Service Road	East Fork Scott River	
2	Tiger Fork	Forest Service Road	Sugar Creek	
2	Duzel Creek #1	Duzel Creek Road	Moffett	
2	Soap Creek	Hwy 3	Moffett Creek	

The number and kind of passage barriers associated with road-stream crossings on private land in the Scott River basin are unknown but potentially significant, given that many private roads cross high-IP reaches on the valley floor (e.g., lower Scott Bar Mill Creek-road crossing). Access to private land to inventory these crossings remains limited.

Fishing and Collecting

Based on estimates of the fishing exploitation rate, as well as the status of the population relative to depensation and the status of NMFS approval for any scientific collection (Appendix B), these activities pose a medium threat to adults and a low stress to juveniles and smolts.

36.7 Recovery Strategy

Sustained efforts to restore aquatic habitat condition and function have been occurring on the Scott Valley floor and in upland areas since the 1970s (USFS 2000d, SRWC 2005). Coho salmon in the Scott River basin, including the relatively productive 2010 brood year, are depressed in abundance, with a restricted distribution. Unless agricultural water use efficiency increases, water use is reduced, floodplain and channel structure is reestablished, and riparian habitat is restored, instream flows and riparian ecosystem functions are expected to remain in degraded condition. Fenced stream reaches on the Scott Valley floor and along its tributaries are in an early seral stage of recovery, although riparian canopy, large wood recruitment processes, and complex stream habitat will take decades to recover. Sediment loads resulting from agriculture-related channel alteration, degraded roads and compacted surfaces continue to impair salmon habitat. Residential development in the valley and lower tributary reaches of the watershed, many miles of untreated private roads, and ongoing stream channelization and straightening will continue to present a threat from sediment inputs into stream channels.

Recovery activities in the watershed should continue to be aimed towards increasing spatial distribution, productivity and abundance. Where possible, activities should occur watershed-wide, with a focus on those tributaries with consistent coho occupancy and high IP values. Recovery activities that enhance and extend surface flow connectivity to ensure sufficient instream flows should be given priority, along with efforts to increase summer and winter rearing habitat, and reduce lethal stream temperatures and fine sediment mobilization. Many of these activities are ongoing and are being undertaken by the Siskiyou RCD (NCRWQCB 2009) and Scott River Watershed Council, in coordination with the US Fish and Wildlife Service (Sommarstrom 2009), Natural Resources Conservation Service, California Department of Fish and Wildlife, and NMFS. The following recovery actions build upon these current, ongoing efforts. Specific goals for each stress are listed in the recovery actions that follow. These goals identify activities that are expected to reduce the stresses currently affecting the Scott River SONCC coho salmon population. The effects of fishing on this population's ability to meet its viability criteria should be evaluated.

Table 36-8 on the following page lists the recovery actions for the Scott River population.

Table 36-8. Recovery action implementation schedule for the Scott River population. Recovery actions for monitoring and research are listed in tables at the end of Chapter 5.

Action ID	Target	KLS/T	Strategy	Action Description	Area	Priority
Step ID	*Step Description*					
SONCC-ScoR.3.1.7	Hydrology	Yes	Improve flow timing or volume	Improve regulatory mechanisms	Population wide	1
SONCC-ScoR.3.1.7.1	*Identify and help reduce obstacles associated with voluntarily transferring water rights to instream flow through the CA Water Code Section 1707 process. Seek expanded use of CA Water Code Section 1707 transfers where appropriate*					
SONCC-ScoR.3.1.7.2	*Use groundwater modeling to identify areas of interconnected water and undertake improved water use management to increase flows and improve flow timing*					
SONCC-ScoR.1.2.46	Estuary	No	Improve estuarine habitat	Improve estuary condition	Klamath River Estuary	1
SONCC-ScoR.1.2.46.1	*Implement recovery actions for Lower Klamath River population that address the target "Estuary", including the creation/restoration of off-channel rearing habitat throughout the lower Klamath River*					
SONCC-ScoR.30.1.69	Disease, Predation, Competition	No	Reduce disease	Disrupt the disease cycle between salmon, myxospore, polychaetes, and actinospore stages.	Population wide	1
SONCC-ScoR.30.1.69.1	*Assess all means possible to disrupt disease cycle and develop a plan to do so*					
SONCC-ScoR.30.1.69.2	*Disrupt the disease cycle, guided by assessment results*					
SONCC-ScoR.10.1.14	Water Quality	No	Reduce water temperature, increase dissolved oxygen	Increase flow	Mouth of Shackleford/Mill crk system, Sugar Crk, South Fork Scott River, Patterson Crk, Upper Kidder Crk, Noyes Valley Crk, Meadow Gulch, candidate pond sites in McConnaughy Gulch, mtn catchments out of wilderness areas, and where coho benefit immediately	1
SONCC-ScoR.10.1.14.1	*Conduct flow studies at key sites in priority watersheds to determine necessary minimum instream flows that will ensure survival and recovery of all relevant coho salmon life stages*					
SONCC-ScoR.10.1.14.2	*Implement plan to increase minimum instream flows in priority watersheds, using flow study information to guide priority flow augmentation projects*					

Action ID	Target	KLS/T	Strategy	Action Description	Area	Priority
Step ID	*Step Description*					
SONCC-ScoR.10.1.15	Water Quality	No	Reduce water temperature, increase dissolved oxygen	Restore surface flow	Tributaries to mainstem Scott River, including Kidder Creek, Patterson Creek, Moffett Creek, all streams where coho salmon would benefit immediately	1
SONCC-ScoR.10.1.15.2	*Secure enhanced instream flows*					
SONCC-ScoR.3.1.5	Hydrology	Yes	Improve flow timing or volume	Improve irrigation practices	All areas where coho salmon would benefit immediately	2c
SONCC-ScoR.3.1.5.1	*Apply a variety of techniques (e.g., Farm Irrigation Rating Index Model) to make irrigation system water use efficiency comparisons, and implement water use efficiency improvements*					
SONCC-ScoR.3.1.5.2	*Evaluate irrigation water fees/pricing in the Scott Valley, and recommend revenue neutral changes that encourage water use efficiency and/or dedications to instream flows*					
SONCC-ScoR.3.1.5.3	*Line or pipe surface irrigation ditch systems to increase efficiency (e.g. ditch lining/piping techniques)*					
SONCC-ScoR.3.1.81	Hydrology	Yes	Improve flow timing or volume	Improve irrigation practices	Population wide	2d
SONCC-ScoR.3.1.81.1	*Apply a variety of techniques (e.g., Farm Irrigation Rating Index Model) to make irrigation system water use efficiency comparisons, and implement water use efficiency improvements*					
SONCC-ScoR.3.1.81.2	*Evaluate irrigation water fees/pricing in the Scott Valley, and recommend revenue neutral changes that encourage water use efficiency and/or dedications to instream flows*					
SONCC-ScoR.3.1.81.3	*Line or pipe surface irrigation ditch systems to increase efficiency (e.g. ditch lining/piping techniques)*					
SONCC-ScoR.3.1.1	Hydrology	Yes	Improve flow timing or volume	Increase instream flows	All streams where coho salmon would benefit immediately	2c
SONCC-ScoR.3.1.1.1	*Identify, map, and quantify all surface water diversions*					
SONCC-ScoR.3.1.1.2	*Secure dedicated unused water diversion rights and ensure use to increase instream flows*					
SONCC-ScoR.3.1.1.3	*Verify permitted water diversions and ensure water is allocated according to established water rights through watermaster program*					
SONCC-ScoR.3.1.3	Hydrology	Yes	Improve flow timing or volume	Increase instream flows	Population wide	2c
SONCC-ScoR.3.1.3.1	*Water master all irrigation water diversions, compliant with applicable water law*					
SONCC-ScoR.3.1.79	Hydrology	Yes	Improve flow timing or volume	Increase instream flows	Population wide	2d
SONCC-ScoR.3.1.79.1	*Identify, map, and quantify all surface water diversions*					
SONCC-ScoR.3.1.79.2	*Secure dedicated unused water diversion rights and ensure use to increase instream flows*					
SONCC-ScoR.3.1.79.3	*Verify permitted water diversions and ensure water is allocated according to established water rights through watermaster program*					

Action ID	Target	KLS/T	Strategy	Action Description	Area	Priority
Step ID	*Step Description*					
SONCC-ScoR.3.1.2	Hydrology	Yes	Improve flow timing or volume	Monitor flow for compliance	Population wide	2c
SONCC-ScoR.3.1.2.1	*Install flow measuring devices*					
SONCC-ScoR.3.1.2.2	*Maintain all flow measuring devices*					
SONCC-ScoR.3.1.2.3	*Install head gates and NMFS compliant fish exclusion screens on all water diversions in coho salmon habitat*					
SONCC-ScoR.3.1.42	Hydrology	Yes	Improve flow timing or volume	Secure and maintain sufficient instream flows	Population wide	2c
SONCC-ScoR.3.1.42.1	*Continue to identify priority reaches for improved flows beneficial to coho salmon, and those diversions and water rights that can provide significant instream flow benefits. Work with willing participants to develop and implement flow solutions (short-term or long-term).*					
SONCC-ScoR.3.1.42.2	*Support the collection and use of relevant hydrologic data to help guide and monitor instream flow actions. Support the continued water lease/dedication efforts of the Scott River Water Trust, to improve streamflow in priority habitat reaches through voluntary leases and dedications*					
SONCC-ScoR.3.2.10	Hydrology	Yes	Increase water storage	Increase water retention	All areas where coho salmon would benefit immediately	2c
SONCC-ScoR.3.2.10.1	*Develop water storage and recharge plans that help recharge groundwater, increase summer base flows, and extend surface connectivity in tributaries to Scott River*					
SONCC-ScoR.3.2.10.2	*Implement projects identified in water storage and recharge plan*					
SONCC-ScoR.3.2.10.3	*Maintain water storage structures*					
SONCC-ScoR.3.2.83	Hydrology	Yes	Increase water storage	Increase water retention	Population wide	2d
SONCC-ScoR.3.2.83.1	*Develop water storage and recharge plans that help recharge groundwater, increase summer base flows, and extend surface connectivity in tributaries to Scott River*					
SONCC-ScoR.3.2.83.2	*Implement projects identified in water storage and recharge plan*					
SONCC-ScoR.3.2.83.3	*Maintain water storage structures*					
SONCC-ScoR.3.1.65	Hydrology	No	Improve flow timing or volume	Increase instream flows	Population wide	2c
SONCC-ScoR.3.1.65.1	*Identify and cease unauthorized water diversions*					
SONCC-ScoR.3.1.67	Hydrology	No	Improve flow timing or volume	Increase instream flows	All streams where coho salmon would benefit immediately	2c
SONCC-ScoR.3.1.67.1	*Identify diversions in tributaries that have subsurface or low flow barrier conditions during the summer*					
SONCC-ScoR.3.1.67.2	*Reduce diversions using a combination of incentives and enforcement measures*					
SONCC-ScoR.3.1.82	Hydrology	No	Improve flow timing or volume	Increase instream flows	Population wide	2d
SONCC-ScoR.3.1.82.1	*Identify diversions in tributaries that have subsurface or low flow barrier conditions during the summer*					
SONCC-ScoR.3.1.82.2	*Reduce diversions using a combination of incentives and enforcement measures*					

Action ID	Target	KLS/T	Strategy	Action Description	Area	Priority
Step ID	*Step Description*					
SONCC-ScoR.3.1.68	Hydrology	No	Improve flow timing or volume	Provide adequate instream flow for coho salmon	Population wide	2c
SONCC-ScoR.3.1.68.1	*Conduct study to determine instream flow needs of coho salmon at all life stages.*					
SONCC-ScoR.3.1.68.2	*If coho salmon instream flow needs are not being met, develop plan to provide adequate flows. Plan may include water conservation incentives for landowners and re-assessment of water allocation.*					
SONCC-ScoR.3.1.68.3	*Implement coho salmon instream flow needs plan.*					
SONCC-ScoR.2.1.48	Floodplain and Channel Structure	No	Increase channel complexity	Improve regulatory mechanisms	Population wide	2c
SONCC-ScoR.2.1.48.1	*Improve protective regulations for beaver and develop guidelines for relocation that are practical for restoration groups*					
SONCC-ScoR.2.1.25	Floodplain and Channel Structure	No	Increase channel complexity	Increase LWD, boulders, or other instream structure	All areas where coho salmon would benefit immediately	2c
SONCC-ScoR.2.1.25.1	*Assess habitat to determine beneficial location and amount of instream structure needed*					
SONCC-ScoR.2.1.25.2	*Place instream structures, guided by assessment results*					
SONCC-ScoR.2.1.74	Floodplain and Channel Structure	No	Increase channel complexity	Increase LWD, boulders, or other instream structure	Population wide	2d
SONCC-ScoR.2.1.74.1	*Assess habitat to determine beneficial location and amount of instream structure needed*					
SONCC-ScoR.2.1.74.2	*Place instream structures, guided by assessment results*					
SONCC-ScoR.2.2.20	Floodplain and Channel Structure	No	Reconnect the channel to the floodplain	Construct off channel habitats, alcoves, backwater habitat, and old stream oxbows	All streams where coho salmon would benefit immediately	2c
SONCC-ScoR.2.2.20.1	*Identify potential sites to create refugia habitats. Prioritize sites and determine best means to create rearing habitat*					
SONCC-ScoR.2.2.20.2	*Implement restoration projects that improve off channel habitats to create refugia habitat, as guided by assessment results*					
SONCC-ScoR.2.2.75	Floodplain and Channel Structure	No	Reconnect the channel to the floodplain	Construct off channel habitats, alcoves, backwater habitat, and old stream oxbows	Population wide	2d
SONCC-ScoR.2.2.75.1	*Identify potential sites to create refugia habitats. Prioritize sites and determine best means to create rearing habitat*					
SONCC-ScoR.2.2.75.2	*Implement restoration projects that improve off channel habitats to create refugia habitat, as guided by assessment results*					
SONCC-ScoR.2.2.22	Floodplain and Channel Structure	No	Reconnect the channel to the floodplain	Increase beaver abundance	All streams where coho salmon would benefit immediately	2c
SONCC-ScoR.2.2.22.1	*Develop a beaver conservation plan that includes education and outreach, technical assistance for land owners, and methods for reintroduction and/or relocation of beaver as a last resort*					
SONCC-ScoR.2.2.22.2	*Implement education and technical assistance programs for landowners, guided by the plan*					
SONCC-ScoR.2.2.22.3	*Reintroduce or relocate beaver if appropriate, guided by the plan*					

Action ID	Target	KLS/T	Strategy	Action Description	Area	Priority
Step ID	*Step Description*					
SONCC-ScoR.2.2.77	Floodplain and Channel Structure	No	Reconnect the channel to the floodplain	Increase beaver abundance	Population wide	2d
SONCC-ScoR.2.2.77.1	*Develop a beaver conservation plan that includes education and outreach, technical assistance for land owners, and methods for reintroduction and/or relocation of beaver as a last resort*					
SONCC-ScoR.2.2.77.2	*Implement education and technical assistance programs for landowners, guided by the plan*					
SONCC-ScoR.2.2.77.3	*Reintroduce or relocate beaver if appropriate, guided by the plan*					
SONCC-ScoR.2.2.24	Floodplain and Channel Structure	No	Reconnect the channel to the floodplain	Remove, set back, or reconfigure levees and dikes	All areas where coho salmon would benefit immediately	2c
SONCC-ScoR.2.2.24.1	*Assess feasibility and develop a plan to remove or set back levees and dikes that includes restoring the natural channel form and floodplain connectivity once the levees and dikes have been removed or set back*					
SONCC-ScoR.2.2.24.2	*Remove or set back levees and dikes and restore channel form and floodplain connectivity, guided by the plan*					
SONCC-ScoR.2.2.78	Floodplain and Channel Structure	No	Reconnect the channel to the floodplain	Remove, set back, or reconfigure levees and dikes	Population wide	2d
SONCC-ScoR.2.2.78.1	*Assess feasibility and develop a plan to remove or set back levees and dikes that includes restoring the natural channel form and floodplain connectivity once the levees and dikes have been removed or set back*					
SONCC-ScoR.2.2.78.2	*Remove or set back levees and dikes and restore channel form and floodplain connectivity, guided by the plan*					
SONCC-ScoR.2.2.21	Floodplain and Channel Structure	No	Reconnect the channel to the floodplain	Restore natural channel form and function	Scott River including Westside Channel and Wolford Slough areas, and all streams where coho salmon would benefit immediately	2c
SONCC-ScoR.2.2.21.1	*Identify and prioritize mining reaches, developing a plan to restore the floodplain and channel by removing tailing piles and reconstructing the channel*					
SONCC-ScoR.2.2.21.2	*Remove tailing piles and reconstruct the channel, guided by the restoration plan*					
SONCC-ScoR.2.2.76	Floodplain and Channel Structure	No	Reconnect the channel to the floodplain	Restore natural channel form and function	Population wide	2d
SONCC-ScoR.2.2.76.1	*Identify and prioritize mining reaches, developing a plan to restore the floodplain and channel by removing tailing piles and reconstructing the channel*					
SONCC-ScoR.2.2.76.2	*Remove tailing piles and reconstruct the channel, guided by the restoration plan*					
SONCC-ScoR.30.1.70	Disease, Predation, Competition	No	Reduce disease	Conduct monitoring and research actions as described in the Klamath River Fish Disease Research Plan	Population wide	2c
SONCC-ScoR.30.1.70.1	*Develop monitoring plan and research actions as described in the Klamath River Fish Disease Research Plan*					
SONCC-ScoR.30.1.70.2	*Implement Klamath River Fish Disease Research Plan*					

Action ID	Target	KLS/T	Strategy	Action Description	Area	Priority
Step ID	*Step Description*					
SONCC-ScoR.26.1.66	Low Population Dynamics	No	Increase population abundance	Rescue and relocate stranded juveniles	Population wide	2d
SONCC-ScoR.26.1.66.1	*Survey coho-bearing tributaries and relocate juveniles stranded in drying pools*					
SONCC-ScoR.3.1.4	Hydrology	Yes	Improve flow timing or volume	Improve water management techniques	All areas where coho salmon would benefit immediately	3c
SONCC-ScoR.3.1.4.1	*Develop integrated water management plan and water budget, including identifying the relationship between groundwater and surface flow*					
SONCC-ScoR.3.1.4.2	*Improve water use efficiency through the investigation and implementation of alternative agricultural crops and practices (e.g., grass fed beef, winter wheat, alternative pasture crops)*					
SONCC-ScoR.3.1.4.3	*Upgrade and expand alternative stock watering systems to increase instream flows*					
SONCC-ScoR.3.1.4.4	*Develop and disseminate an on-farm water use efficiency monitoring system*					
SONCC-ScoR.3.1.4.5	*If current water use/management is determined to be inconsistent with coho salmon recovery, modify management accordingly*					
SONCC-ScoR.3.1.80	Hydrology	Yes	Improve flow timing or volume	Improve water management techniques	Population wide	3d
SONCC-ScoR.3.1.80.1	*Develop integrated water management plan and water budget, including identifying the relationship between groundwater and surface flow*					
SONCC-ScoR.3.1.80.2	*Improve water use efficiency through the investigation and implementation of alternative agricultural crops and practices (e.g., grass fed beef, winter wheat, alternative pasture crops)*					
SONCC-ScoR.3.1.80.3	*Upgrade and expand alternative stock watering systems to increase instream flows*					
SONCC-ScoR.3.1.80.4	*Develop and disseminate an on-farm water use efficiency monitoring system*					
SONCC-ScoR.3.1.80.5	*If current water use/management is determined to be inconsistent with coho salmon recovery, modify management accordingly*					
SONCC-ScoR.7.1.18	Riparian	Yes	Improve wood recruitment, bank stability, shading, and food subsidies	Improve grazing practices	Low gradient private lands, all areas where coho salmon would benefit immediately	3c
SONCC-ScoR.7.1.18.1	*Assess grazing impact on sediment delivery and riparian condition, identifying opportunities for improvement*					
SONCC-ScoR.7.1.18.2	*Develop grazing management plans to improve water quality and coho salmon habitat*					
SONCC-ScoR.7.1.18.3	*Plant vegetation to stabilize stream bank*					
SONCC-ScoR.7.1.18.4	*Maintain fencing or fence livestock out of riparian zones*					
SONCC-ScoR.7.1.18.5	*Manage livestock watering sources to reduce impacts to coho salmon*					
SONCC-ScoR.7.1.87	Riparian	Yes	Improve wood recruitment, bank stability, shading, and food subsidies	Improve grazing practices	Population wide	3d
SONCC-ScoR.7.1.87.1	*Assess grazing impact on sediment delivery and riparian condition, identifying opportunities for improvement*					
SONCC-ScoR.7.1.87.2	*Develop grazing management plans to improve water quality and coho salmon habitat*					
SONCC-ScoR.7.1.87.3	*Plant vegetation to stabilize stream bank*					
SONCC-ScoR.7.1.87.4	*Maintain fencing or fence livestock out of riparian zones*					
SONCC-ScoR.7.1.87.5	*Manage livestock watering sources to reduce impacts to coho salmon*					

Action ID	Target	KLS/T	Strategy	Action Description	Area	Priority
Step ID		*Step Description*				
SONCC-ScoR.5.1.12	Passage	No	Improve access	Provide artificial passage	French Creek, East Fork Scott River, mainstem Scott River upstream of Fay Lane, and all streams where coho salmon would benefit immediately	3c
SONCC-ScoR.5.1.12.1		*Identify and prioritize all barriers at diversions (rock weirs) and develop plan to provide short- and long-term passage*				
SONCC-ScoR.5.1.12.2		*Provide passage for all life stages, guided by plan*				
SONCC-ScoR.5.1.85	Passage	No	Improve access	Provide artificial passage	Population wide	3d
SONCC-ScoR.5.1.85.1		*Identify and prioritize all barriers at diversions (rock weirs) and develop plan to provide short- and long-term passage*				
SONCC-ScoR.5.1.85.2		*Provide passage for all life stages, guided by plan*				
SONCC-ScoR.5.1.13	Passage	No	Improve access	Reduce sediment barriers	All streams where coho salmon would benefit immediately	3c
SONCC-ScoR.5.1.13.1		*Inventory and prioritize barriers formed by alluvial deposits*				
SONCC-ScoR.5.1.13.2		*Using reach-based fluvial geomorphology information, remove alluvial deposits, construct low flow channels through alluvial reaches, or reduce stream gradient to provide fish passage for all life stages*				
SONCC-ScoR.5.1.86	Passage	No	Improve access	Reduce sediment barriers	Population wide	3d
SONCC-ScoR.5.1.86.1		*Inventory and prioritize barriers formed by alluvial deposits*				
SONCC-ScoR.5.1.86.2		*Using reach-based fluvial geomorphology information, remove alluvial deposits, construct low flow channels through alluvial reaches, or reduce stream gradient to provide fish passage for all life stages*				
SONCC-ScoR.5.1.11	Passage	No	Improve access	Remove structural barriers	Big Mill Creek, Rail Creek, Youngs Dam, improperly functioning diversion weirs, and all areas where coho salmon would benefit immediately	3c
SONCC-ScoR.5.1.11.1		*Assess barriers and prioritize for removal*				
SONCC-ScoR.5.1.11.2		*Remove all barriers guided by assessment results*				
SONCC-ScoR.5.1.84	Passage	No	Improve access	Remove structural barriers	Population wide	3d
SONCC-ScoR.5.1.84.1		*Assess barriers and prioritize for removal*				
SONCC-ScoR.5.1.84.2		*Remove all barriers guided by assessment results*				

Action ID	Target	KLS/T	Strategy	Action Description	Area	Priority
Step ID	*Step Description*					
SONCC-ScoR.7.1.58	Riparian	No	Improve wood recruitment, bank stability, shading, and food subsidies	Improve food availability	In watersheds that are natal habitat and/or provide thermal refugia, and all areas where coho salmon would benefit immediately	3c
SONCC-ScoR.7.1.58.1	*Assess need for salmonid carcass enhancement (with intestines and kidneys removed) to increase food for juvenile coho salmon, using excess hatchery*					
SONCC-ScoR.7.1.58.2	*Develop a plan for salmonid carcass enhancement to benefit rearing juvenile coho salmon, one that does not vector diseases*					
SONCC-ScoR.7.1.58.3	*Implement and monitor plan for salmonid carcass enhancement to benefit rearing juvenile coho salmon, and that does not vector diseases*					
SONCC-ScoR.7.1.88	Riparian	No	Improve wood recruitment, bank stability, shading, and food subsidies	Improve food availability	Population wide	3d
SONCC-ScoR.7.1.88.1	*Assess need for salmonid carcass enhancement (with intestines and kidneys removed) to increase food for juvenile coho salmon, using excess hatchery*					
SONCC-ScoR.7.1.88.2	*Develop a plan for salmonid carcass enhancement to benefit rearing juvenile coho salmon, one that does not vector diseases*					
SONCC-ScoR.7.1.88.3	*Implement and monitor plan for salmonid carcass enhancement to benefit rearing juvenile coho salmon, and that does not vector diseases*					
SONCC-ScoR.8.2.26	Sediment	No	Increase spawning gravel	Enhance spawning substrate	Sugar Creek, South Fork Scott River, Shackelford Creek, French Creek, Scott River, Patterson Creek, Etna Creek, Kidder Creek, and all streams where coho salmon would benefit immediately	3c
SONCC-ScoR.8.2.26.1	*Continue to develop a spawning substrate management plan that identifies quantity, quality, location, and timing of gravel supplements*					
SONCC-ScoR.8.2.26.2	*Supplement gravel, guided by the plan*					
SONCC-ScoR.8.2.90	Sediment	No	Increase spawning gravel	Enhance spawning substrate	Population wide	3d
SONCC-ScoR.8.2.90.1	*Continue to develop a spawning substrate management plan that identifies quantity, quality, location, and timing of gravel supplements*					
SONCC-ScoR.8.2.90.2	*Supplement gravel, guided by the plan*					
SONCC-ScoR.8.1.44	Sediment	No	Reduce delivery of sediment to streams	Reduce road-stream hydrologic connection	South Fork Scott River, upper East Fork Scott River, French/Miners, Johnson, Patterson, Kidder, Moffett , McAdams, Shackleford/Mill, Boulder, Scott Bar Mill creeks, and all areas where coho salmon would benefit immediately	3c
SONCC-ScoR.8.1.44.1	*Assess and prioritize road-stream connection, and identify appropriate treatments*					
SONCC-ScoR.8.1.44.2	*Decommission roads, guided by assessment*					
SONCC-ScoR.8.1.44.3	*Upgrade roads, guided by assessment*					
SONCC-ScoR.8.1.44.4	*Maintain roads, guided by assessment*					

Action ID	Target	KLS/T	Strategy	Action Description	Area	Priority
Step ID	*Step Description*					
SONCC-ScoR.8.1.89	Sediment	No	Reduce delivery of sediment to streams	Reduce road-stream hydrologic connection	Population wide	3d
SONCC-ScoR.8.1.89.1	*Assess and prioritize road-stream connection, and identify appropriate treatments*					
SONCC-ScoR.8.1.89.2	*Decommission roads, guided by assessment*					
SONCC-ScoR.8.1.89.3	*Upgrade roads, guided by assessment*					
SONCC-ScoR.8.1.89.4	*Maintain roads, guided by assessment*					
SONCC-ScoR.10.2.49	Water Quality	No	Reduce pollutants	Reduce pesticides	All areas where coho salmon would benefit immediately	3c
SONCC-ScoR.10.2.49.1	*Develop a pesticide management plan*					
SONCC-ScoR.10.2.49.2	*Implement pesticide management plan and technical assistance program*					
SONCC-ScoR.10.2.72	Water Quality	No	Reduce pollutants	Reduce pesticides	Population wide	3d
SONCC-ScoR.10.2.72.1	*Develop a pesticide management plan*					
SONCC-ScoR.10.2.72.2	*Implement pesticide management plan and technical assistance program*					
SONCC-ScoR.10.1.16	Water Quality	No	Reduce water temperature, increase dissolved oxygen	Reduce warm water inputs	All streams where coho salmon would benefit immediately	3c
SONCC-ScoR.10.1.16.1	*Develop a program that identifies, designs, and constructs projects that will reduce warm tailwater inputs*					
SONCC-ScoR.10.1.16.2	*Implement tailwater reduction program*					
SONCC-ScoR.10.1.71	Water Quality	No	Reduce water temperature, increase dissolved oxygen	Reduce warm water inputs	Population wide	3d
SONCC-ScoR.10.1.71.1	*Develop a program that identifies, designs, and constructs projects that will reduce warm tailwater inputs*					
SONCC-ScoR.10.1.71.2	*Implement tailwater reduction program*					
SONCC-ScoR.10.7.64	Water Quality	No	Restore nutrients	Add marine-derived nutrients to streams	All streams where coho salmon would benefit immediately	3c
SONCC-ScoR.10.7.64.1	*Develop a plan to supply appropriate amounts of marine-derived nutrients to streams (e.g. carcass placement, pellet dispersal)*					
SONCC-ScoR.10.7.64.2	*Supply marine-derived nutrients to streams guided by the plan*					
SONCC-ScoR.10.7.73	Water Quality	No	Restore nutrients	Add marine-derived nutrients to streams	Population wide	3d
SONCC-ScoR.10.7.73.1	*Develop a plan to supply appropriate amounts of marine-derived nutrients to streams (e.g. carcass placement, pellet dispersal)*					
SONCC-ScoR.10.7.73.2	*Supply marine-derived nutrients to streams guided by the plan*					

Action ID	Target	KLS/T	Strategy	Action Description	Area	Priority
Step ID		*Step Description*				
SONCC-ScoR.3.1.6	Hydrology	Yes	Improve flow timing or volume	Educate stakeholders	Population wide	3d
SONCC-ScoR.3.1.6.1	*Develop and implement an educational program addressing water conservation programs, instream leasing and water dedication programs, and improved connectivity at water diversions in tributaries to Scott River*					
SONCC-ScoR.3.1.6.2	*Create voluntary programs for Scott Valley agricultural water users to implement water conservation and instream transfer activities*					
SONCC-ScoR.3.1.8	Hydrology	Yes	Improve flow timing or volume	Improve regulatory mechanisms	Population wide	3d
SONCC-ScoR.3.1.8.1	*Establish a categorical exemption under CEQA for water leasing to increase instream flows*					
SONCC-ScoR.3.1.9	Hydrology	Yes	Improve flow timing or volume	Improve regulatory mechanisms	Population wide	3d
SONCC-ScoR.3.1.9.1	*Conduct a comprehensive inventory of current groundwater wells and well usage within Scott River Basin, completed by a surface-groundwater integrated model, that together can evaluate the relative merit of water management alternatives*					
SONCC-ScoR.3.1.9.2	*Establish a comprehensive groundwater permit process*					
SONCC-ScoR.7.1.43	Riparian	Yes	Improve wood recruitment, bank stability, shading, and food subsidies	Reestablish natural fire regime	Population wide, guided by assessment priorities (particularly USFS WCF 2011, in uplands on the Westside and in the Scott River Canyon)	3d
SONCC-ScoR.7.1.43.1	*Identify areas prone to high severity fire and develop a plan to reestablish a natural fire regime*					
SONCC-ScoR.7.1.43.2	*Carry out fuel reduction or modification projects such as thinning, prescribed burning, and piling, guided by the plan*					
SONCC-ScoR.7.1.59	Riparian	No	Improve wood recruitment, bank stability, shading, and food subsidies	Reestablish natural fire regime	Population wide guided by recent assessment priorities (USFS, WCF 2011)	3d
SONCC-ScoR.7.1.59.1	*Reduce stand densities in watersheds where stands are over dense, to create fire resilient landscapes*					
SONCC-ScoR.7.1.59.2	*Reduce the occurrence of high severity fire through strategic fuels treatments that allow future fires to be managed for multiple objectives*					
SONCC-ScoR.16.1.28	Fishing/Collecting	No	Manage fisheries consistent with recovery of SONCC coho salmon	Incorporate SONCC coho salmon VSP delisting criteria when formulating salmonid fishery management plans affecting SONCC coho salmon	SONCC recovery domain plus ocean; from shore to 200 miles off coasts of California and Oregon	3d
SONCC-ScoR.16.1.28.1	*Determine impacts of fisheries management on SONCC coho salmon in terms of VSP parameters*					
SONCC-ScoR.16.1.28.2	*Identify level of fishing impacts that does not limit attainment of population-specific viability criteria*					
SONCC-ScoR.16.1.61	Fishing/Collecting	No	Manage fisheries consistent with recovery of SONCC coho salmon	Incorporate SONCC coho salmon VSP delisting criteria when formulating salmonid fishery management plans affecting SONCC coho salmon	Tribal lands	3d
SONCC-ScoR.16.1.61.1	*Determine impacts of fisheries management on SONCC coho salmon in terms of VSP parameters*					
SONCC-ScoR.16.1.61.2	*Identify level of fishing impacts that does not limit attainment of population-specific viability criteria*					

Action ID	Target	KLS/T	Strategy	Action Description	Area	Priority
Step ID	*Step Description*					
SONCC-ScoR.16.1.62	Fishing/Collecting	No	Manage fisheries consistent with recovery of SONCC coho salmon	Incorporate SONCC coho salmon VSP delisting criteria when formulating salmonid fishery management plans affecting SONCC coho salmon	Tribal lands	3d
SONCC-ScoR.16.1.62.1	*Determine impacts of fisheries management on SONCC coho salmon in terms of VSP parameters*					
SONCC-ScoR.16.1.62.2	*Identify level of fishing impacts that does not limit attainment of population-specific viability criteria*					
SONCC-ScoR.16.1.29	Fishing/Collecting	No	Manage fisheries consistent with recovery of SONCC coho salmon	Reduce fishing impacts to levels that do not limit recovery	SONCC recovery domain plus ocean; from shore to 200 miles off coasts of California and Oregon	3d
SONCC-ScoR.16.1.29.1	*Determine actual fishing impacts*					
SONCC-ScoR.16.1.29.2	*If actual fishing impacts limit attainment of population-specific viability criteria, modify management so that fishing does not limit attainment of population-specific viability criteria*					
SONCC-ScoR.16.1.63	Fishing/Collecting	No	Manage fisheries consistent with recovery of SONCC coho salmon	Reduce fishing impacts to levels that do not limit recovery	Tribal lands	3d
SONCC-ScoR.16.1.63.1	*Determine actual fishing impacts*					
SONCC-ScoR.16.1.63.2	*If actual fishing impacts limit attainment of population-specific viability criteria, modify management so that fishing does not limit attainment of population-specific viability criteria*					
SONCC-ScoR.16.2.30	Fishing/Collecting	No	Manage scientific collection consistent with recovery of SONCC coho salmon	Incorporate SONCC coho salmon VSP delisting criteria when formulating scientific collection authorizations affecting SONCC coho salmon	SONCC recovery domain plus ocean; from shore to 200 miles off coasts of California and Oregon	3d
SONCC-ScoR.16.2.30.1	*Determine impacts of scientific collection on SONCC coho salmon in terms of VSP parameters*					
SONCC-ScoR.16.2.30.2	*Identify level of scientific collection impact that does not limit attainment of population-specific viability criteria*					
SONCC-ScoR.16.2.31	Fishing/Collecting	No	Manage scientific collection consistent with recovery of SONCC coho salmon	Reduce impacts of scientific collection to levels that do not limit recovery	SONCC recovery domain plus ocean; from shore to 200 miles off coasts of California and Oregon	3d
SONCC-ScoR.16.2.31.1	*Determine actual impacts of scientific collection*					
SONCC-ScoR.16.2.31.2	*If actual scientific collection impacts limit attainment of population-specific viability criteria, modify collection so that impacts do not limit attainment of population-specific viability criteria*					
SONCC-ScoR.10.2.17	Water Quality	No	Reduce pollutants	Set standard	Population wide	3d
SONCC-ScoR.10.2.17.1	*Continue implementation of TMDLs for water bodies listed under Clean Water Act Section 303(d)*					