36. Scott River Population

- Interior Klamath Stratum
- Core, Functionally Independent Population
- High Extinction Risk
- 8,800 Spawners Required for ESU Viability
- 813.4 mi^2
- 441 IP km (274 mi) (71% High)
- Dominant Land Uses are Agriculture and Ranching
- Principal Stresses are 'Altered Hydrologic Function' and 'Degraded Riparian Forest Conditions'
- Principal Threats are 'Agricultural Practices' and 'Dams/Diversions'

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 intensity 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 on the Scott and Shasta Valley floors, 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 Westside grazing allotments in the Marble Mountains along the western boundary of the Scott River basin (U.S. Forest Service (USFS) 2006). Improved monitoring of grazing allotment condition and trend began in 2006, and is designed to inform changes in grazing pressure, timing, and duration, as needed.

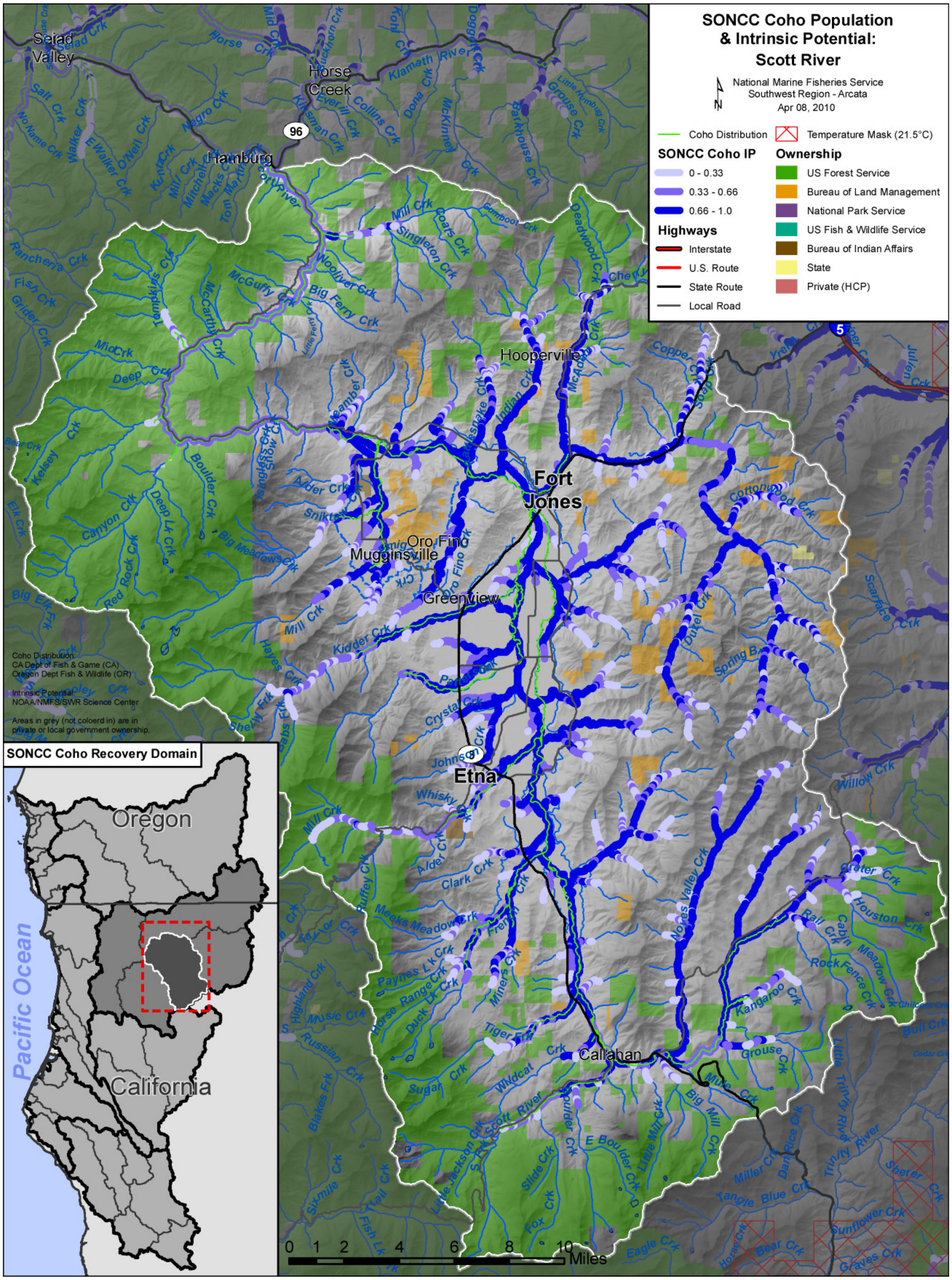

Figure 36-1. The geographic boundaries of the Scott River coho salmon population. Figure shows modeled Intrinsic Potential of habitat (Williams et al. 2006), land ownership, coho salmon distribution (CDFG 2009a), and location within the Southern-Oregon/Northern California Coast Coho Salmon ESU and the Northern Coastal diversity stratum (Williams et al. 2006). Grey areas indicate private ownership.

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 2002b).

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. 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 (Scott River Watershed Council (SRWC) 1997, Mack 1958). Such channelization of the mainstem Scott River has resulted in channel simplification and incision, channel destabilization, and vegetation instability in areas immediately adjacent to and contained by these levees (Van Kirk and Naman 2008, SRWC 2005a). Investigation of the relationship between groundwater and surface flow has been undertaken via a community groundwater study plan (Harter *et al*. 2008), which will 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. 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. 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 Scott Valley is occurring slowly, and is expected to progressively expand and improve coho salmon rearing habitat.

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 1990’s 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 2002). 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. 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. Tailings piles are especially apparent along nearly five miles of the mainstem Scott River downstream from Callahan. Floating dredge operations occurring there from the mid-1930s through the early 1950s have reconfigured the entire valley floor, confining the active Scott River channel to one side of its historical floodplain. Many riparian areas in the Scott River basin remain poorly vegetated and erodible up to the present day (USFS 1997b).

36.2 Historical Fish Distribution and Abundance

The Scott River basin has historically been an important native coho salmon river in the Klamath River diversity stratum (Brown et al. 1994). 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 (Quigley 2007, Calfish.org). The IP data show 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 values include Rail, Kangaroo, Grouse, Sniktaw, Emmigrant, Oro Fino, Cottonwood and Duzel creeks.

Table 36-1. Tributaries with instances of 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.

The Department of Water Resources (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 Game (CDFG) operated a weir in the Scott River near the confluence with the Klamath River to obtain fall-run Chinook salmon escapement estimates. The weir was removed each year before the conclusion of the coho salmon migration and spawning period (early November to early January), but early returning coho salmon were counted while the weir was operating (Table 36-2).

Table 36-2. Year, dates of operation and counts of coho salmon observed at the Scott River weir. Weir was operated by the CDFG Klamath River Project (Shasta Scott Recovery Team (SSRT) 2003).

Year	**Dates of Operation**	**Jacks**	**Adults**	**Total***
1982	9/14 to 10/29	0	5	5
1983	9/14 to 11/3	1	21	22
1984	9/10 to 10/31	12	38	50
1985	9/3 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 11/9	No coho salmon reported		
1989	9/8 to 10/22	1	7	8
1990	9/8 to 10/28	1	6	7
1991	9/10 to 11/5	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 spawning surveys were initiated in the Scott River watershed in the fall 2001/winter 2002 spawning year (Maurer 2002), and have been conducted yearly since then to provide annual estimates of returning adult SONCC coho salmon (Siskiyou Resource Conservation District (SRCD) website). Installation of a video weir by CDFG on the Scott River in 2007 has allowed for better estimation of returning adult coho salmon to the Scott River. Figure 36-2 and shows recent adult return data, reported by CDFG.

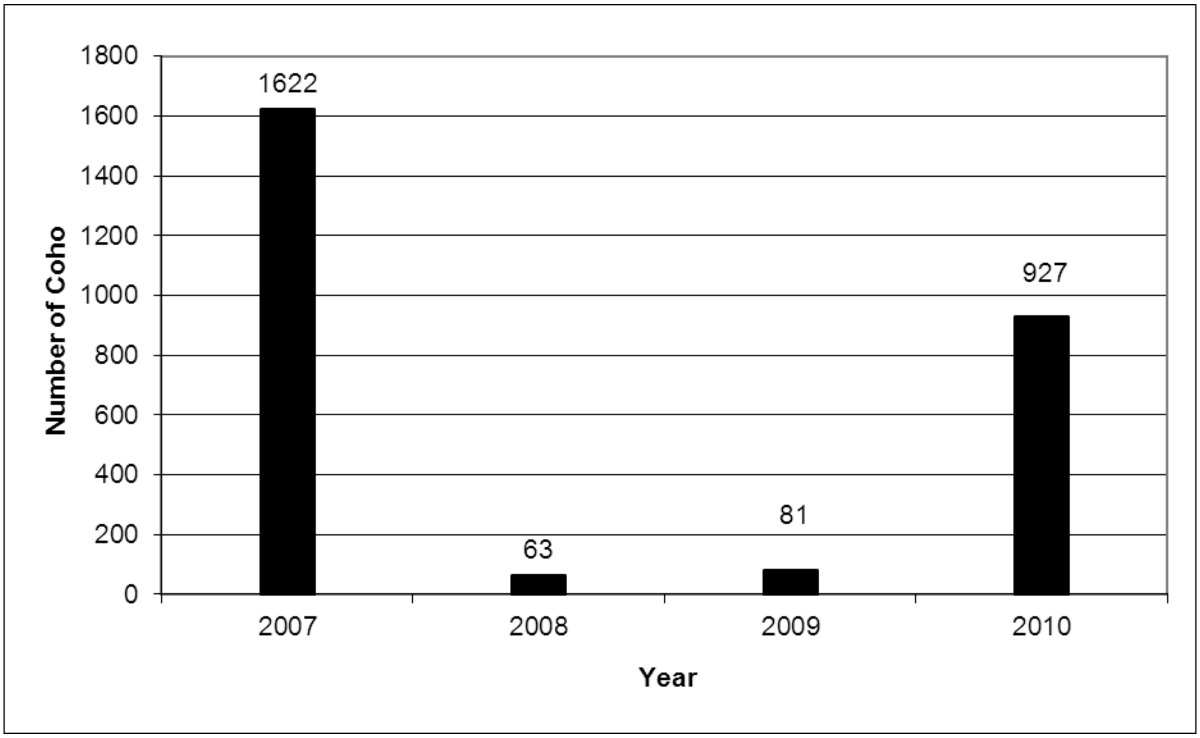

Figure 36-2. Video weir estimates of adult coho salmon. The Scott River population estimates for 2007 to 2010. (Data from M. Knechtle, CDFG.)

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) (SSRT 2003, Yokel 2006, CDFG 2008a). Routine fish 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 and coho salmon presence in 11 tributaries, with the six most productive of these tributaries consistently sustaining rearing salmon juveniles in limited areas. The other five tributaries do not consistently sustain juvenile coho salmon, indicating that the diversity of this population is restricted by available rearing habitat.

Population Size and Productivity

Williams et al. (2008) determined at least 441 coho salmon must spawn in the Scott River each year to avoid such effects of extremely low population sizes. Continuing 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 80 during other two brood years.

Table 36-3 shows coho salmon yearling outmigrant point estimates, adult coho salmon abundance estimates, the ratio of outmigrant yearlings to adult returns, and the percent of yearling outmigrants that successfully returned to the Scott River Basin, for brood years 2004 to 2008.

Table 36-3. Yearling coho salmon outmigrant abundance. Adult coho salmon abundance estimates, ratio of outmigrant yearlings to adult returns, and proportion of outmigrant yearlings returned as adults, by Scott River brood years, 2004-2008 (Knechtle and Chesney 2011).

Brood Year	Yearling Year	Yearling Point Estimate	Adult Year	Adult Estimate	Yearlings to Adult	Percent Yearling Survival
2004	2006	75097	2007	1622	46.30	2.16
2005	2007	3931	2008	62	63.40	1.58
2006	2008	941	2009	81	11.62	8.61
2007	2009	62207	2010	927	67.11	1.49
2008	2010	2174	2011	37 /2	58.94 /2	1.74 /1

/1 Average percent yearling survival from brood years 2004, 2005 and 2007.
/2 Projected adult estimate and yearling to adult ratio based on yearling point estimate of 62,207 and average percent yearling survival from brood years 2004, 2005 and 2007.

Extinction Risk

Williams et al. (2008) determined that at least 20 coho salmon per-IP km of habitat are needed (8,800 total spawners) to approximate the historical distribution of Scott River coho salmon and habitat. The Scott River coho salmon population is currently low and unstable, typically less than the 441 spawners that are necessary to avoid the effects of low population sizes. Additionally, data shows that only one out of three brood years has abundance numbers over 100 individuals, making the chances of extinction even higher if a catastrophic event, such as a flood, impacts the stronger brood year. Recurring past flooding could be responsible for the current weakness of the other two brood years. Juvenile fish numbers are reduced by stranding as summer flows recede and rearing habitat disappears, constraining both diversity and spatial structure. Based on the criteria set forth by Williams et al. (2008) the Scott River population is at high risk of extinction. This conclusion is based on the small population size of the natural population (below the low risk spawner threshold), and continuing low and static productivity of all three brood years. Therefore, all four population viability parameters are impaired.

Role in SONCC Coho Salmon ESU Viability

The Scott River population is considered to be a “functionally Independent” population within the Interior Klamath diversity stratum, meaning that it was sufficiently large to be historically viable in isolation and historically had demographics and extinction risk that were minimally influenced by immigrants from adjacent populations (Bjorkstedt et al. 2005, Williams et al.

2006). The Scott River is also a core population, due to its location in the most eastern part of the ESU, its delayed interior basin run timing, its large run size compared to other SONCC coho salmon populations (Brown et al. 1994), and its unique life history traits. As a core population, the recovery target for the Scott River population is for it to be viable, and to have a low risk of extinction according to population viability criteria. Sufficient spawner densities and spatial structure/distribution are needed to maintain connectivity and diversity within the stratum, and will need to be confirmed by future monitoring if the Scott River population is to sustain its historical contribution to the viability of the ESU.

36.4 Plans and Assessments

Siskiyou Resource Conservation District (RCD)

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, water conservation, fisheries and wildlife habitat improvement, water quality monitoring, and biological monitoring.

Scott River Watershed Council

Scott River Watershed Council Strategic Action Plan
http://www.scottriver.org/planning-analysis-2/

This 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 (Scott River Watershed Council (SRWC) 1999) and Fish Habitat & population (SRWC 1997) studies, 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 (LFA) of the Scott River coho salmon population was included as an appendix to the Strategic Action Plan, and an update of this LFA began in 2011.

Scott River Water Trust

The Scott River Water Trust was established in 2006, and continues its efforts to improve stream flow in priority fish habitat reaches of the Scott River and its tributaries. This is accomplished through voluntary water leases and instream dedications of water with agricultural water users in the Scott Valley.

Scott River Fire Safe Councils

Northern California Resource Center (NCRC)

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 CDFG for the Scott River have been considered and incorporated into the recovery strategy and list of recovery actions for this population. Recent CDFG efforts to institute a programmatic watershed-wide permitting program with take coverage for agricultural water users in the Scott Basin has been terminated by Superior Court decision, having deemed the program insufficient to ensure CESA and CEQA protections.

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

Federal regulations require that a total maximum daily load (TMDL) be established for 303(d) listed water bodies for each pollutant of concern. In December 2003, the EPA 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. The Regional Water Board is required to develop measures which will result in implementation of the TMDLs.

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 1987, Congress adopted the “Klamath Act” (Public Law 99-552) which authorized a 20-year long Klamath River Basin Conservation Area Restoration Program 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 Kier Associates for the Task Force in 1991. 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

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 stormproofing and decommissioning on KNF-managed lands in the Scott River watershed is ongoing. Completion of the KNF's Watershed Condition Framework in 2011 resulted in the selection of the Sugar Creek 6th field watershed for focused restoration activity in the Scott Basin during the next five years.

Sufficiency Assessment: Forest Service and Bureau of Land Management Programs in Support of SONCC Coho Salmon Recovery (USFS and BLM 2011)

The USFS has adopted a Watershed Condition Framework assessment and planning approach (USFS and BLM 2011). The Watershed Condition Framework (WCF) is a comprehensive approach for proactively implementing integrated restoration on 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 subwatersheds in the Klamath National Forest (USFS and BLM 2011).

French Creek Watershed Advisory Group

Created in 1990 as pilot study for the State Board of Forestry, the 12-member French Creek WAG comprising landowners and agencies has worked cooperatively to reduce excessive granitic sediment mobilization to French Creek. The WAG developed and approved a Road Management Plan in 1992, then a Monitoring Plan and 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 the French Creek and its tributaries.

36.5 Stresses

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

	Stresses (Limiting Factors)	Egg	Fry	Juvenile[1]	Smolt	Adult	Overall Stress Rank
1	Altered Hydrologic Function[1]	Very 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	Very High	Very High	Very High
5	Lack of Floodplain and Channel Structure	Low	High	Very High	High	High	Very High
6	Altered Sediment Supply	Very High	Very High	Medium	Medium	High	High
7	Adverse Hatchery-Related Effects	Medium	Medium	Medium	Medium	Medium	Medium
8	Increased Disease/Predation/Competition	Low	Low	Low	Medium	Medium	Low
9	Barriers	-	Low	Medium	Low	Low	Low
10	Adverse Fishery Related Effects	-	-	-	-	Low	Low

[1] Key limiting factor(s) and limited life stage(s).

Limiting Stresses, Life Stages, and Habitat

The limiting stresses for the Scott River coho salmon population are the degraded riparian habitat conditions, altered hydrologic function, lack of floodplain and channel structures and the impaired water quality that is occurring throughout the system. 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, and disconnecting floodplains and other off channel rearing habitat. The juvenile life stage is currently the limiting life stage for continued viability and success of the Scott River coho salmon population (CDFG 2004b, SRWC 2005b).

Numerous water diversions, associated small diversion dams and interconnected groundwater extraction for agricultural purposes, and the diking and leveeing 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 tributaries, access to and from these areas is hindered by dams and diversions, the existence of alluvial sills, and the formation of thermal barriers at the confluence of tributaries and stagnant, disconnected pools in summer. Where passage is possible, juvenile fish can reach thermal refugial pools and tributaries where the water temperature is several degrees cooler than in adjacent channels. A list of these known thermal refugia for rearing is in Table 36-5 (Yokel 2006). These refugial areas occur in reaches with high IP values and are vital to the continued existence and success of coho salmon in the Scott River.

Table 36-5. Potential refugial areas within the geographic boundaries of the Scott River population.

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		

Altered Hydrologic Function

Altered hydrologic function presents a very high stress for all life history stages, with the exception of the adult stage, which is moderately affected by this stress. Water quantity and flow regime is poor in the southern portion of the Scott Valley from Etna Creek around to Noyes Valley Creek. The East Fork Scott River often becomes nearly dewatered during the summer, due to water diversion. 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) 2004). Numerous legal and some illegal water diversions and withdrawals 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. Termination of Department of Water Resources watermaster service at the end of 2011 will cause interruption in consistent water master service associated with the three water decrees in the basin, until a new Scott/Shasta Special Water Master District begins operation. This may result in unquantified surface and groundwater withdrawals in many areas. Gauging and observational data indicate, and the 1980 Scott River Decree requires that a minimum flow of at least 30 cfs must be achieved at the River Mile 21 USGS gage to provide both surface connectivity in the mainstem Scott River from the Canyon area up into the Scott Valley floor (Sommarstrom 2010) and sufficient flows for salmonids. Surface flows of approximately 40 cfs must be achieved to ensure volitional migration of salmonids throughout the Scott Valley floor (Pisano 2010). Currently, valley-wide agricultural water withdrawals and diversions, groundwater extraction, and drought have all combined to cause premature surface flow disconnection along the mainstem Scott River. In addition, summer discharge 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 floor 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 floor, due to both the crowding of agricultural fields up against the bank of the Scott River, and insolation 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 entire valley floor, 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 2005a).

Impaired Water Quality

Water quality is a high to very high stress for all life history stages and is caused by the degraded riparian forest condition, extensive agricultural and grazing activities, and over allocated water withdrawal occurring throughout the basin. High water temperatures, increased nutrient and sediment loading, and pollution inputs from grazing cattle have created poor water quality conditions in many side channel and off-channel rearing areas used by coho salmon. Although water quality has been found to be good in some tributaries, water quality conditions are poor overall and are stressful for juvenile fish throughout summer and much of the fall (NCRWQCB 2004, Bowman 2010).

Benthic macroinvertebrate richness and Ephemeroptera/Plecoptera/Tricoptera taxa metrics range from fair to poor in Kelsey and Tompkins creeks, but are very good in much of lower Canyon Creek and upper French Creek. Water temperatures in the summer are poor throughout the mainstem Scott River, 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 ^{o}F (26.7 ^{o}C) routinely occur in the mainstem, including portions of the Scott River Canyon (Chesney and Yokel 2003). 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 has been measured as poor in both the Scott River Canyon reach and near the mouth of the Scott River. All of these water quality impairments reduce juvenile 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 increases stresses associated with mainstem conditions and residence time.

The degraded conditions that exist throughout the Klamath basin today 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 the estuary is short and small compared to the large size of the watershed, it 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. 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. 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 and associated deep pools to rear in and for adults to rest in while migrating upstream. Monitoring data indicates 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 due to sediment deposition coupled with low flows that create physical barriers. 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 debris recruitment is lacking both in the Scott Valley and along tributary reaches above the valley floor (Yokel 2006).

Altered Sediment Supply

Altered sediment supply occurring in the Scott River imposes a medium stress to juvenile, smolt, and adult coho salmon, 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. 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. Data from the early 1990s indicate a high of 32 percent fine sediment occurring in French Creek at one time, then subsiding to a healthy sustained level of less than10 percent, with a temporary increase to 17 percent occurring following the 1997 flood (Power 2001, Sommarstrom et al. 1990). 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. 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.

Adverse Hatchery-Related Effects

The effects of hatchery fish on all life stages of coho salmon are described in Chapter 3. 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 spring water temperatures. 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, Siskiyou RCD, CDFG). 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 medium stress for smolt and adult life history stages, and a low stress for egg, fry, and juvenile life history stages. This stress increases as anadromous fish 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 *Ceratomyxa 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 medium stress for juvenile coho salmon, and a low stress for fry, smolt and adult life history stages. Diversion dams, small impoundments, and road/stream crossings pose partial or complete barriers to high IP habitat in the following Scott River basin locations. 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. Passage at the first of these weirs in French Creek is to be upgraded in 2012.

Adverse Fishery-Related Effects

NMFS has determined that federally-managed fisheries in California are not likely to jeopardize the continued existence of the SONCC coho salmon ESU (Appendix B). The effects of fisheries managed by the state of California and tribal governments on the continued existence of the SONCC coho salmon ESU have not been formally evaluated by NMFS (Appendix B).

36.6 Threats

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

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

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

Agricultural Practices

Agricultural practices are a very high threat to all life history stages, and therefore have a very high overall threat ranking. Subbasins of the Scott Valley floor 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 subbasins 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. Where exclusionary fencing has not been installed and maintained, approximately 20 percent of all pastures/fields adjacent to stream channels (Black 2011), these activities still contribute 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 and Shasta Valleys (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, which was accompanied by an 89 percent increase in irrigated land area. 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). Having a recognized area of interconnected surface and groundwater (Scott River Decree 1980), has quantification and modeling of groundwater dynamics has begun via a community groundwater study plan (Harter et al. 2008), which is documenting interactions between groundwater use and water availability in adjacent riparian habitat. In most years, low flows occurring in the Scott River Basin from June to November have become more pronounced with enhanced agricultural use of water (Van Kirk and Naman 2008). Low surface flows 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 periods, large portions of the mainstem Scott River become completely dry (SRWC 1997), cutting 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 documented 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. Scott Valley eastside tributaries tend to be ephemeral (Mack 1958), but their lower reaches have high IP which could provide enhanced over-summering habitat to juvenile fish, with improved hydrologic connection to the Scott River channel (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 egg and fry life history stages, and a very high threat to juvenile, smolt and adult life history 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 affects 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 critical 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 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 Decree. Gaging records at Fort Jones show that it is common for discharge to fall below this level, and often below 10 cfs in drier water years. At this level of discharge, the Scott River exists as a series of stagnant pools of water 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.

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 are underway to determine how to improve/increase the range of flows at which the fishway, constructed in 2006, will ensure 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 within SONCC coho salmon critical habitat in French and Shackleford Creeks that require treatment to ensure complete fish passage. Passage at one of these French Creek weirs is to be upgraded in 2012. All Scott Valley agricultural water diversions within the known range of Chinook and coho salmon have been outfitted with fish exclusion screens. Approximately15 irrigation diversion dams in tributaries to the Scott River continue to block steelhead 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.

Timber Harvest

Timber harvest is a very high threat to egg and fry life history stages, and a high threat to juvenile, smolt and adult life history stages. 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 subbasins: Noyes Valley Creek, Mule Creek, Wildcat Creek, French/Miners creeks, Etna Creek, Moffett Creek, McAdams Creek, and lower Scott River (upper Canyon Reach). These 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 Kidder Creek drainage had been extensively logged and suffered a major fire prior to a 1955 flood, when sediment and debris washed from the watershed by the flood contributed to an alluvial fan at its confluence with the Scott River. The creek flows underground through this fan for much of the year. These impacts have caused decreased pool volumes, poor water quality, disconnection of floodplain and off channel habitat, and simplification of instream habitats. Timber harvest activities have decreased in the last 15 years and upland riparian forest areas are in early stages of recovery. This recovery is expected to proceed slowly as clear cutting diminishes in favor of density-dependent thinning and understory fuels reduction, which are intended to reduce wildland fire risk and attendant sediment mobilization.

Climate Change

Climate change poses a high threat to this population. The impacts of climate change in this region will have the greatest impact on juveniles, smolts, and adults. 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. Increasing temperatures and changes in the amount and timing of precipitation and snowmelt will impact water quality and hydrologic function in the summer and winter. 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, loss of calcareous shell-forming species, which will affect prey availability (Independent Science Advisory Board 2007, Feely et al. 2008, Portner and Knust 2007).

Roads

Roads are a high threat across all life history stages, and a significant overall threat for coho salmon in the Scott River population. These roads 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 streams, cause substrate embeddedness, smother eggs in redds, and fill in pools. Road density is high in the following tributary subbasins, 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/mi2/yr, which significantly exceeds natural background land sliding in other neighboring watersheds (NCRWQCB 2005c). 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 2011c). 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 Intensity Fire

High intensity 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 intensity 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 history stages. Effects from historic mining activities have created a legacy of impacts throughout the basin, with tailings 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. A five-year moratorium on suction dredging permitting became law in California in July 2011. In response, high banking practices are becoming more common. Current gravel extraction is incrementally removing a portion of historic tailings piles along the mainstem Scott River near Callahan, may aid in the restoration of floodplain and channel connections, and 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.

Urban/Residential/Industrial Development

Urban/residential/industrial development is a medium threat to all life history stages. The human population of the Scott Valley has grown from 2,900 in 1930 to nearly 8,000 in 2000 (SRWC 2005a), which represents 1,800 acre feet of annual water use, at 200 gallons per person per day. In contrast, current irrigated agriculture/pasture uses approximately 81,070 acre feet of annual water diversion/withdrawal for 29,000 acres (Van Kirk and Naman 2008). This 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 2005a) 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 drilled wells increased from 108 to 913 between 1970 and 2002 (SSRT 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.

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. List of road/stream crossing barriers, Scott River basin

IP priority	Stream Name	Road Name	Subbasin	Miles of 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

California-managed fisheries for species other than coho salmon occur in estuaries, freshwater, and nearshore marine areas. In addition, tribal salmonid fisheries have the potential to cause injury and death to coho salmon in the Klamath/Trinity basin. The effects of the fisheries managed by the State of California and the Yurok and Hoopa Tribes, on the continued existence of the SONCC coho salmon ESU have not been formally evaluated by NMFS. NMFS has authorized future collection of coho salmon for research purposes in the Scott River. NMFS has determined these collections are not likely to jeopardize the continued existence of the SONCC coho salmon ESU

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 2005a). Coho salmon in the Scott River basin, including the relatively productive 2010 brood year, are severely 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 state 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 be aimed at continuing to increase spatial distribution, productivity and abundance. Where possible, activities should occur watershed-wide, with a focus on those tributaries with 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. Specific goals for each stressor 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.

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.

Action ID	Strategy	Key LF	Objective	Action Description	Area	Priority
Step ID	*Step Description*					
SONCC-ScoR.2.2.20	Floodplain and Channel Structure	Yes	Reconnect the channel to the floodplain	Construct off channel ponds, alcoves, backwater habitat, and old stream oxbows	Population wide	2
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 as guided by assessment results*					
SONCC-ScoR.2.2.21	Floodplain and Channel Structure	Yes	Reconnect the channel to the floodplain	Restore natural channel form and function	Scott River including Westside Channel and Wolford Slough areas	2
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.2.2.22	Floodplain and Channel Structure	Yes	Reconnect the channel to the floodplain	Increase beaver abundance	Population wide	3
SONCC-ScoR.2.2.22.1	*Develop program to educate and provide incentives for landowners to keep beavers on their lands*					
SONCC-ScoR.2.2.22.2	*Implement beaver program (may include reintroduction)*					
SONCC-ScoR.2.2.24	Floodplain and Channel Structure	Yes	Reconnect the channel to the floodplain	Remove, set back, or reconfigure levees and dikes	Population wide	2
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 have been removed*					
SONCC-ScoR.2.2.24.2	*Remove levees and restore channel form and floodplain connectivity*					
SONCC-ScoR.2.1.25	Floodplain and Channel Structure	Yes	Increase channel complexity	Increase LWD, boulders, or other instream structure	Population wide	2
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.3.1.1	Hydrology	Yes	Improve flow timing or volume	Increase instream flows	Population wide	2
SONCC-ScoR.3.1.1.1	*Identify, map, and quantify all surface water diversions*					

Action ID	Strategy	Key LF	Objective	Action Description	Area	Priority
Step ID	*Step Description*					
SONCC-ScoR.3.1.1.2	*Secure dedicated unused water diversion rights*					
SONCC-ScoR.3.1.1.3	*Verify permitted water diversions and bring water mastering allocations into compliance with CA state water law, including place of use restrictions*					
SONCC-ScoR.3.1.2	Hydrology	Yes	Improve flow timing or volume	Monitor flow for compliance	Population wide	2
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 NOAA Fisheries compliant fish exclusion screens on all water diversions in coho salmon habitat*					
SONCC-ScoR.3.1.3	Hydrology	Yes	Improve flow timing or volume	Manage flow	Population wide	3
SONCC-ScoR.3.1.3.1	*Water master all irrigation water diversions*					
SONCC-ScoR.3.1.3.2	*Implement water mastering allocations compliant with applicable water law*					
SONCC-ScoR.3.1.4	Hydrology	Yes	Improve flow timing or volume	Improve water management techniques	Population wide	3
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.3.1.5	Hydrology	Yes	Improve flow timing or volume	Improve irrigation practices	Population wide	BR
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 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, and do QA/QC to improve ditch lining/piping techniques*					
SONCC-ScoR.3.1.6	Hydrology	Yes	Improve flow timing or volume	Educate stakeholders	Population wide	3
SONCC-ScoR.3.1.6.1	*Develop an educational program addressing water conservation programs, instream leasing and water dedication programs, and water diversion/screen connectivity in tributaries to Scott River*					
SONCC-ScoR.3.1.7	Hydrology	Yes	Improve flow timing or volume	Improve regulatory mechanisms	Population wide	3
SONCC-ScoR.3.1.7.1	*Prioritize and provide incentives for use of CA Water Code Section 1707*					

Action ID	Strategy	Key LF	Objective	Action Description	Area	Priority
Step ID	*Step Description*					
SONCC-ScoR.3.1.8	Hydrology	Yes	Improve flow timing or volume	Improve regulatory mechanisms	Population wide	3
SONCC-ScoR.3.1.8.1	*Establish a categorical exemption under CEQA for water leasing*					
SONCC-ScoR.3.1.9	Hydrology	Yes	Improve flow timing or volume	Improve regulatory mechanisms	Population wide	3
SONCC-ScoR.3.1.9.1	*Establish a comprehensive statewide groundwater permit process*					
SONCC-ScoR.3.2.10	Hydrology	Yes	Increase water storage	Increase water retention	Population wide	2
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.3.1.42	Hydrology	Yes	Improve flow timing or volume	Secure and maintain sufficient instream flows	Population wide	2
SONCC-ScoR.3.1.42.1	*Assess water diversions, prioritize, and treat areas in need of increased flows to complement the life history requirements of coho salmon*					
SONCC-ScoR.3.1.42.2	*Use real time flow, precipitation, snowpack, groundwater, and climate information to guide Water Trust work to augment surface flows at priority locations for coho, via water leases and dedications*					
SONCC-ScoR.7.1.18	Riparian	Yes	Improve wood recruitment, bank stability, shading, and food subsidies	Improve grazing practices	Low gradient private lands	BR
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 meet objectives*					
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	*Remove instream livestock watering sources*					
SONCC-ScoR.7.1.19	Riparian	Yes	Improve wood recruitment, bank stability, shading, and food subsidies	Improve timber harvest practices	Population wide	2
SONCC-ScoR.7.1.19.1	*Amend California Forest Practice Rules to include regulations which describe the specific analysis, protective measures, and procedure required by timber owners and CalFire to demonstrate timber operations described in timber harvest plans meet the requirements specified in 14 CCR 898.2(d) prior to approval by the Director (similar to a Spotted Owl Resource Plan).*					

Action ID	Strategy	Key LF	Objective	Action Description	Area	Priority
Step ID	*Step Description*					
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)	3
SONCC-ScoR.7.1.43.1	*Identify areas prone to high intensity 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.10.1.14	Water Quality	Yes	Reduce water temperature, increase disssolved oxygen	Increase flow	Population wide, especially mouth of Shackleford/Mill, mouth of Sugar, South Fork Scott River, Patterson, Upper Kidder,Noyes Valley, Meadow Gulch, candidate pond sites in McConnaughy Gulch, mountain catchments outside of wilderness areas	2
SONCC-ScoR.10.1.14.1	*Develop a plan to increase minimum instream flows, using flow rate information to guide priority flow augmentation sites*					
SONCC-ScoR.10.1.15	Water Quality	Yes	Reduce water temperature, increase disssolved oxygen	Restore surface flow	Tributaries to mainstem Scott River, including Kidder Creek, Patterson Creek, Moffett Creek, etc.	2
SONCC-ScoR.10.1.15.1	*Develop plan to restore/enhance connectivity of surface flow between tributaries and mainstem Scott River*					
SONCC-ScoR.10.1.15.2	*Secure enhanced instream flows, especially in dry/critically dry water years*					
SONCC-ScoR.10.1.16	Water Quality	Yes	Reduce water temperature, increase disssolved oxygen	Reduce warm water inputs	Population wide	3
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.10.2.17	Water Quality	Yes	Reduce pollutants	Set standard	Population wide	3
SONCC-ScoR.10.2.17.1	*Continue implementation of TMDLs for 303(d) listed water bodies*					
SONCC-ScoR.1.2.46	Estuary	No	Improve estuarine habitat	Improve estuary condition	Klamath River Estuary	3

Action ID	Strategy	Key LF	Objective	Action Description	Area	Priority
Step ID	***Step Description***					
SONCC-ScoR.1.2.46.1	*Implement recovery actions to address strategy "Estuary" for Lower Klamath River population*					
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	3
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 fishing impacts expected to be consistent with recovery*					
SONCC-ScoR.16.1.29	Fishing/Collecting	No	Manage fisheries consistent with recovery of SONCC coho salmon	Limit fishing impacts to levels consistent with recovery	SONCC recovery domain plus ocean; from shore to 200 miles off coasts of California and Oregon	2
SONCC-ScoR.16.1.29.1	*Determine actual fishing impacts*					
SONCC-ScoR.16.1.29.2	*If actual fishing impacts exceed levels consistent with recovery, modify management so that levels are consistent with recovery*					
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	3
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 scientific collection impacts expected to be consistent with recovery*					
SONCC-ScoR.16.2.31	Fishing/Collecting	No	Manage scientific collection consistent with recovery of SONCC coho salmon	Limit impacts of scientific collection to levels consistent with recovery	SONCC recovery domain plus ocean; from shore to 200 miles off coasts of California and Oregon	3
SONCC-ScoR.16.2.31.1	*Determine actual impacts of scientific collection*					
SONCC-ScoR.16.2.31.2	*If actual scientific collection impacts exceed levels consistent with recovery, modify collection so that impacts are consistent with recovery*					
SONCC-ScoR.27.1.32	Monitor	No	Track population abundance, spatial structure, productivity, or diversity	Evaluate impacts to coho salmon from specific restoration project types	Population wide	BR
SONCC-ScoR.27.1.32.1	*Develop a monitoring program that evaluates impacts to coho salmon from tailing pile removal, rock weir installation, and floodplain restoration projects*					
SONCC-ScoR.27.1.32.2	*Implement monitoring program, guided by the plan*					

Action ID	Strategy	Key LF	Objective	Action Description	Area	Priority
Step ID	*Step Description*					
SONCC-ScoR.27.1.33	Monitor	No	Track population abundance, spatial structure, productivity, or diversity	Estimate abundance	Population wide	3
SONCC-ScoR.27.1.33.1	*Perform annual spawning surveys*					
SONCC-ScoR.27.1.34	Monitor	No	Track population abundance, spatial structure, productivity, or diversity	Track life history diversity	Population wide	3
SONCC-ScoR.27.1.34.1	*Describe annual variation in migration timing, age structure, habitat occupied, and behavior*					
SONCC-ScoR.27.1.34.2	*Develop comprehensive PIT tagging and retrieval project that assesses habitat use and survival*					
SONCC-ScoR.27.1.35	Monitor	No	Track population abundance, spatial structure, productivity, or diversity	Track indicators related to the stress 'Fishing and Collecting'	Population wide	2
SONCC-ScoR.27.1.35.1	*Annually estimate the commercial and recreational fisheries bycatch and mortality rate for wild SONCC coho salmon.*					
SONCC-ScoR.27.2.36	Monitor	No	Track habitat condition	Track habitat indicators related to spawning, rearing, and migration	Population wide	3
SONCC-ScoR.27.2.36.1	*Measure indicators for spawning and rearing habitat. Conduct a comprehensive survey*					
SONCC-ScoR.27.2.36.2	*Measure indicators for spawning and rearing habitat once every 10 years, sub-sampling 10% of the original habitat surveyed*					
SONCC-ScoR.27.2.37	Monitor	No	Track habitat condition	Track habitat indicators related to the stress 'Lack of Floodplain and Channel Structure'	All IP habitat	3
SONCC-ScoR.27.2.37.1	*Measure the indicators, pool depth, pool frequency, D50, and LWD*					
SONCC-ScoR.27.2.38	Monitor	No	Track habitat condition	Track habitat indicators related to the stress 'Degraded Riparian Forest Condition'	All IP habitat	3
SONCC-ScoR.27.2.38.1	*Measure the indicators, canopy cover, canopy type, and riparian condition*					
SONCC-ScoR.27.2.39	Monitor	No	Track habitat condition	Track habitat indicators related to the stress 'Altered Sediment Supply'	All IP habitat	3
SONCC-ScoR.27.2.39.1	*Measure the indicators, % sand, % fines, V Star, silt/sand surface, turbidity, embeddedness*					

Action ID	Strategy	Key LF	Objective	Action Description	Area	Priority
Step ID	*Step Description*					
SONCC-ScoR.27.2.40	Monitor	No	Track habitat condition	Track habitat indicators related to the stress 'Impaired Water Quality'	All IP habitat	3
SONCC-ScoR.27.2.40.1	*Measure the indicators, pH, D.O., temperature, and aquatic insects*					
SONCC-ScoR.27.2.41	Monitor	No	Track habitat condition	Track habitat indicators related to the stress 'Impaired Hydrologic Function'	All IP habitat	3
SONCC-ScoR.27.2.41.1	*Annually measure the hydrograph and identify instream flow needs*					
SONCC-ScoR.27.1.45	Monitor	No	Track population abundance, spatial structure, productivity, or diversity	Estimate juvenile spatial distribution	Population wide	3
SONCC-ScoR.27.1.45.1	*Conduct presence/absence surveys for juveniles (3 years on; 3 years off)*					
SONCC-ScoR.27.1.47	Monitor	No	Track population abundance, spatial structure, productivity, or diversity	Refine methods for setting population types and targets	Population wide	3
SONCC-ScoR.27.1.47.1	*Develop supplemental or alternate means to set population types and targets*					
SONCC-ScoR.27.1.47.2	*If appropriate, modify population types and targets using revised methodology*					
SONCC-ScoR.5.1.11	Passage	No	Improve access	Remove structural barriers	Population wide, including Big Mill Creek, Rail Creek, Youngs Dam, and improperly functioning diversion weirs	BR
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.5.1.12	Passage	No	Improve access	Provide artificial passage	French Creek, East Fork Scott River, mainstem Scott River upstream of Fay Lane, etc.	3
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.5.1.13	Passage	No	Improve access	Reduce sediment barriers	Population wide	3

Action ID	Strategy	Key LF	Objective	Action Description	Area	Priority
Step ID	*Step Description*					
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.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, etc.	3
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.8.1.44	Sediment	No	Reduce delivery of sediment to streams	Reduce road-stream hydrologic connection	South Fork Scott River, upper East Fork Scott River, French/Miners creeks, Johnson Creek, Patterson Creek, Kidder Creek, Moffett Creek, McAdams Creek, Shackleford/Mill creeks, Boulder Creek, Scott Bar Mill Creek, etc.	3
SONCC-ScoR.8.1.44.1	*Assess and prioritize road-stream connection, and identify appropriate treatment to meet objective*					
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*					