Lower Interior Diversity Stratum

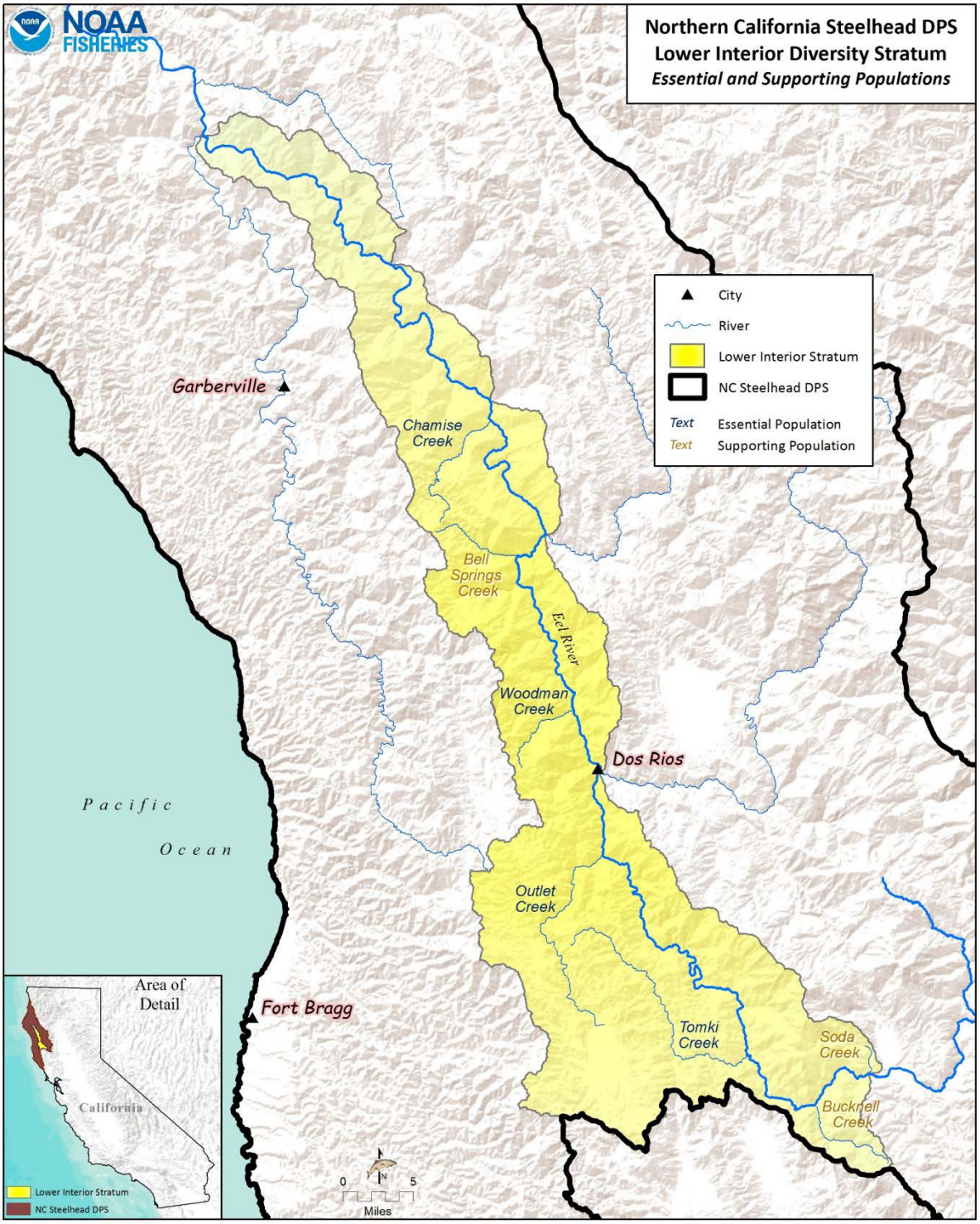
This stratum includes populations of winter steelhead that spawn in watersheds that drain lower elevation mountains in the Klamath Mountains ecoregion for which snowmelt contributes little to the annual hydrograph. Most of these watersheds lie south of the mainstem Eel River, but also include minor tributaries to the mainstem Eel River upstream of the confluence of the South Fork Eel River that drain smaller, somewhat lower watersheds lying on either side of the mainstem Eel River.

The populations that have been selected for recovery scenarios are listed in the table below and their profiles, maps, results, and recovery actions are in the pages following. Essential populations are listed by alphabetical order within the diversity stratum, followed by the Rapid Assessment of the Supporting populations:

- Chamise Creek
- Outlet Creek
- Tomki Creek
- Woodman Creek
- Lower Interior/North Mountain Interior Rapid Assessment
    - Bell Springs Creek
    - Bucknell Creek
    - Dobbyn Creek (North Mountain Interior)
    - Jewett Creek
    - Garcia Creek
    - Soda Creek

NC steelhead Lower Interior Diversity Stratum, Populations, Historical Status, Population's Role in Recovery, Current IP-km, and Spawner Density and Abundance Targets for Delisting.

Diversity Stratum	NC steelhead Populations	Historical Population Status	Population's Role In Recovery	Current Weighted IP-km	Spawner Density	Spawner Abundance
Lower Interior	Bell Springs Creek	I	Supporting	18.1	6-12	107-215
	Bucknell Creek	I	Supporting	9.0	6-12	52-106
	Chamise Creek	I	Essential	36.2	37.2	1,300
	Jewett Creek	I	Supporting	16.8	6-12	99-200
	Garcia Creek	D	Supporting	14.1	6-12	83-167
	Outlet Creek	I	Essential	189.2	20.0	3,800
	Soda Creek	D	Supporting	15.7	6-12	92-186
	Tomki Creek	I	Essential	90.8	29.6	2,700
	Woodman Creek	I	Essential	35.0	37.4	1,300
	Lower Interior Diversity Stratum Recovery Target					**9,100**



NC steelhead Lower Interior Diversity Stratum

Chamise Creek Population

NC Steelhead Winter-Run

- Role within DPS: Potentially Independent Population
- Diversity Stratum: Lower Interior
- Spawner Abundance Target: 1,300 adults
- Current Intrinsic Potential: 36.2 IP-km

For information regarding CC Chinook salmon and SONCC coho salmon for this watershed, please see the CC Chinook Salmon volume of this recovery plan and the SONCC coho salmon recovery plan (http://www.westcoast.fisheries.noaa.gov/).

Steelhead Abundance and Distribution

Adult and juvenile steelhead abundance is not well documented within the Chamise Creek watershed. Becker and Reining (2009) reference a 1983 CDFG report indicating that nine miles of stream within Chamise Creek are accessible to steelhead, although the report was careful to note the estimate represents stream miles "open to fish passage" and is not a "measure of availability or habitat quality". Like other Middle Eel River tributaries (*e.g.*, Woodman Creek), Chamise Creek likely supports a small population of steelhead at the present time (on the order of a few hundred fish), suggesting the current population is much smaller than the estimated historical size of 1,400 spawning adults identified by Spence *et al.* (2008).

Steelhead are well distributed throughout the Chamise Creek watershed and their distribution is generally limited only by natural channel conditions in the headwaters. Two passage impediments occur within the first mile above the confluence; the first is a boulder rough that is a partial barrier and the second is a waterfall that is passable during large winter flow events (CDFW PAD 2015).

History of Land Use

Like most Eel River tributaries, Chamise Creek was likely logged heavily during the early to mid-20th century. Other historical land uses may have included grazing and limited agricultural development. Currently, much of the lower watershed is privately owned, with some rural residential development occurring. The upper half of the watershed is a mix of private and Federally-owned (Bureau of Land Management, BLM) land. Chamise Creek is part of the larger Middle Eel River watershed, defined as the mainstem Eel River and associated tributaries between the South Fork Eel River confluence and the town of Dos Rios, California.

Current Resources and Land Management

Approximately 83 percent of the watershed is privately owned with the remainder managed by the BLM (16 percent) or the State of California (1 percent). No formal land management guidelines or rules currently govern activities or development within the Chamise Creek basin; the BLM land is managed by the Arcata Field Office under their Resource Management Plan.

Salmonid Viability and Watershed Conditions

The following habitat attributes were rated Poor through the CAP process: habitat complexity, water quality, riparian vegetation, viability, and sediment. Recovery strategies will typically focus on ameliorating these habitat attributes, although strategies that address other attributes may also be developed where their implementation is critical to restoring properly functioning habitat conditions within the watershed.

Current Conditions

The following discussion focuses on those conditions that rated Fair or Poor as a result of our CAP viability analysis. The Chamise Creek CAP Viability Table results are provided below. Recovery strategies will focus on improving these conditions.

Population and Habitat Conditions

Habitat Complexity: Large Wood and Shelter

Poor instream habitat complexity is suspected within the Chamise Creek watershed, based upon similar findings within adjacent Middle Eel River tributaries. Juvenile rearing success is likely compromised by poor instream shelter conditions and wood volume.

Hydrology: Baseflow and Passage Flows

The lower mainstem section of Chamise Creek suffers from low summer flow volume (Downie 2010), which likely limits juvenile steelhead rearing and survival within that section of the watershed. Although the causative factors are unclear at this time, the low-flow conditions may be a result of stream diversions and groundwater pumping by rural property owners, as well as high instream sediment volumes that force streamflows subsurface during summer months.

Sediment: Gravel Quality and Distribution of Spawning Gravels

High levels of instream fine sediment likely impair steelhead spawning and rearing success within Chamise Creek. The Middle Eel River watershed is considered impaired due to high instream sediment conditions (USEPA 2008), with past sediment loading within the system approximately 146% of the natural loading amount. The report does indicate that considerably

less natural and human-related sediment was produced since the 1970s, perhaps due to improvements in land management or favorable winter storm patterns (*i.e.,* reduced frequency of large, erosion-causing rainfall events).

Water Quality: Temperature

Summer water temperatures are likely limiting juvenile steelhead survival within the Chamise Creek watershed. The Middle Eel River TMDL (USEPA 2008) modeled changes to instream water temperatures resulting from differing riparian vegetation conditions to answer whether or not current practices and conditions are altering natural stream temperatures. Modeling results suggest that stream temperatures within much of Chamise Creek would be slightly cooler under historical riparian conditions versus those that exist currently. Furthermore, the modeling estimates that only 27% of modeled stream reaches exhibit maximum temperatures below 19°C at current shading levels, whereas that number would improve to 37% under the historical (*i.e.*, more natural) shading regime.

Viability: Density, Abundance, and Spatial Structure

The viability of the Chamise Creek steelhead population is likely depressed from historical measures (Rogers 2015). The cause of the suspected low juvenile abundance is difficult to pinpoint at this time, but may be related to high summer water temperatures, or poor egg to fry survival resulting from highly embedded spawning gravel.

Other Stresses

Improving canopy cover is a potential restoration action prescribed for many Middle Eel River tributaries (Becker and Reining 2009), and thus is a likely priority within Chamise Creek as well. The high density of riparian roads within the basin has likely impacted riparian function and structure by disrupting natural fluvial processes that create and maintain riparian habitat (*e.g.*, lateral channel migration, periodic floodplain inundation, *etc.*).

Threats

The following discussion focuses on those threats that were rated as High or Very High (see Chamise Creek CAP Results). Recovery strategies will likely focus on ameliorating threats rated as High; however, some strategies may address Medium and Low threats when the strategy is essential to recovery efforts. The figures and tables that display data used in this analysis are provided in Chamise Creek CAP Results.

Roads and Railroads

Overall road density within the Chamise Creek watershed is fairly low (1.6 road miles/square mile watershed area), with the highest road density found within the northwest section of the drainage. Of concern within the watershed is the high road density occurring within stream riparian corridors (1.3 mile/square mile). Riparian roads can more effectively deliver road sediment to the stream channel than upslope roads, and often confine the stream channel. As a result, riparian roads often preclude lateral channel migration, thus impairing natural fluvial and geomorphic processes responsible for creating and maintaining instream habitat features. Few road crossings completely block adult steelhead passage within the Chamise Creek watershed, although several do impede passage through the lower section of the mainstem creek at certain flow levels.

Residential and Commercial Development

Residential development, and its potential impact on instream flow and habitat quality, is a concern within the Chamise Creek watershed, given the suspected increase in subdivision activity and rural residential development within the basin (Downie 2010). Poorly planned and implemented residential development can increase hillside erosion, and reduce groundwater and instream flow levels.

Other Threats

No fish hatcheries operate within the Chamise Creek watershed, so hatchery-related effects are unlikely within the steelhead population. Similarly, invasive species are not known to be problematic within the basin, although pikeminnow inhabit portions of the Eel River and may reside within Chamise Creek, either permanently or seasonally. No dams or large water impoundments exist within the basin. The irrigation of illegal outdoor marijuana grows, using either surface flow or hydrologically connected groundwater, has likely impaired summer baseflow to some degree during the past several years (illegal marijuana cultivation has recently surged throughout much of the Eel River basin). Future residential development may also increase stream diversion and groundwater pumping within the watershed, and thus should be monitored carefully.

Limiting Stresses, Lifestages, and Habitats

Threat and stress analysis within the CAP workbook suggest summer rearing habitat is likely a limiting factor affecting steelhead abundance within the Chamise Creek watershed. Long stretches of the lower watershed go dry during late summer months, and high summer water temperatures likely limit juvenile steelhead survival within most wetted reaches.

General Recovery Strategy

Assess and Address Upslope Sediment Sources

The Chamise Creek TMDL identifies high sediment loads as limiting aquatic habitat within the watershed. A road and watershed assessment should be conducted to identify sources of sediment, and high priority sites should be restored and rehabilitated.

Perform Intensive Habitat Survey

As noted earlier, very little information exists regarding aquatic habitat conditions within Chamise Creek. Prior to any restoration actions, an intensive habitat survey should be conducted. An investigation into the suspected poor summer flow volume should be included in any habitat survey, and potential solutions that conserve summer baseflows (*e.g.,* winter storage programs) should be investigated and implemented, where feasible.

Rehabilitate Riparian Function and Composition

The composition of the Chamise Creek riparian corridor has likely shifted away from natural conditions, which has lessened available canopy coverage of streams and increased solar warming of the aquatic environment (USEPA 2008). Restoration efforts should re-establish a natural, native riparian corridor in stream reaches where canopy values are sub-optimal.

Literature Cited

Becker, G. S., and I. J. Reining. 2009. Steelhead/Rainbow Trout (*Oncorhynchus mykiss*): Resources of the Eel River Watershed, California. Prepared for the California State Coastal Conservancy. Cartography by D.A. Asbury. Center for Ecosystem Management and Restoration, Oakland, CA.

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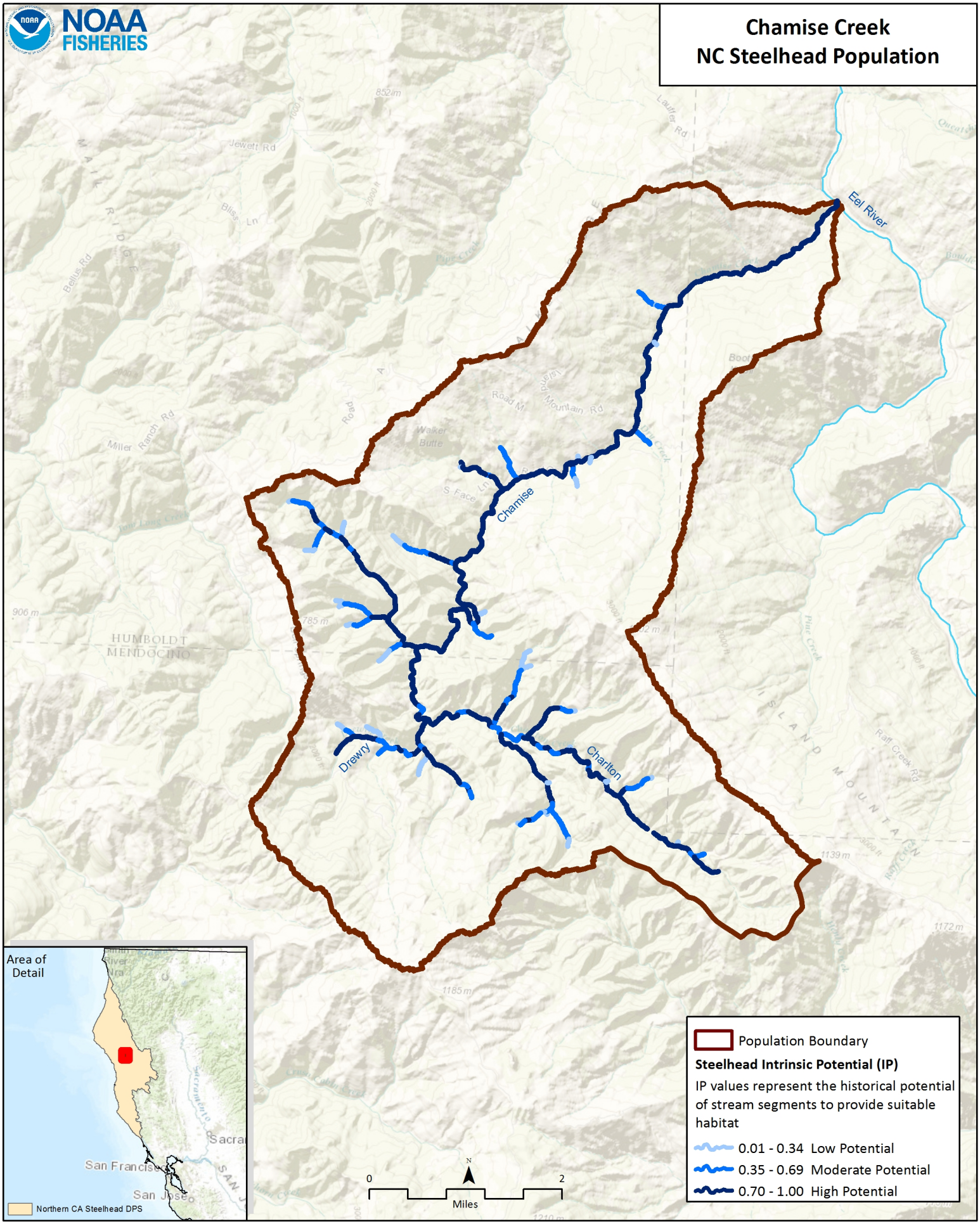
Spence, B. C., E. P. Bjorkstedt, J. C. Garza, J. J. Smith, D. G. Hankin, D. Fuller, W. E. Jones, R. Macedo, T. H. Williams, and E. Mora. 2008. A Framework for Assessing the Viability of Threatened and Endangered Salmon and Steelhead in the North-Central California

Coast Recovery Domain U.S. Department of Commerce, National Marine Fisheries Service, Southwest Fisheries Service Center, NOAA-TM-NMFS-SWFSC-423, Santa Cruz, CA.

USEPA (United States Envirionmental Protection Agency). 2008. Final Middle Main Eel River and Tributaries (from Dos Rios to the South Fork) Total Maximum Daily Loads for Temperature and Sediment. U.S. Environmental Protection Agency, Region IX. 53 pp.


NOAA FISHERIES
Chamise Creek
NC Steelhead Population
Eel River
Chamise
Drewry
Charlton
Area of Detail
Northern CA Steelhead DPS
0
2
Miles
N
Population Boundary
Steelhead Intrinsic Potential (IP)
IP values represent the historical potential of stream segments to provide suitable habitat
0.01 - 0.34 Low Potential
0.35 - 0.69 Moderate Potential
0.70 - 1.00 High Potential

#	Conservation Target	Category	Key Attribute	Indicator	Poor	Fair	Good	Very Good	Current Indicator Measurement	Current Rating
1	Adults	Condition	Habitat Complexity	Large Wood Frequency (BFW 0-10 meters)	<50% of streams/ IP-Km (>6 Key Pieces/100 meters)	50% to 74% of streams/ IP-Km (>6 Key Pieces/100 meters)	75% to 90% of streams/ IP-Km (>6 Key Pieces/100 meters)	>90% of streams/ IP-Km (>6 Key Pieces/100 meters)	50% to 74% of streams/ IP-km (>6 Key Pieces/100 meters)	Fair
			Habitat Complexity	Large Wood Frequency (BFW 10-100 meters)	<50% of streams/ IP-Km (>1.3 Key Pieces/100 meters)	50% to 74% of streams/ IP-Km (>1.3 Key Pieces/100 meters)	75% to 90% of streams/ IP-Km (>1.3 Key Pieces/100 meters)	>90% of streams/ IP-Km (>1.3 Key Pieces/100 meters)	N/A	
			Habitat Complexity	Pool/Riffle/Flatwater Ratio	<50% of streams/ IP-Km (>40% Pools; >20% Riffles)	50% to 74% of streams/ IP-Km (>40% Pools; >20% Riffles)	75% to 90% of streams/ IP-Km (>40% Pools; >20% Riffles)	>90% of streams/ IP-Km (>40% Pools; >20% Riffles)	50% to 74% of streams/ IP-km (>40% Pools; >20% Riffles)	Fair
			Habitat Complexity	Shelter Rating	<50% of streams/ IP-Km (>80 stream average)	50% to 74% of streams/ IP-Km (>80 stream average)	75% to 90% of streams/ IP-Km (>80 stream average)	>90% of streams/ IP-Km (>80 stream average)	<50% of streams/ IP-km (>80 stream average)	Poor
			Hydrology	Passage Flows	NMFS Flow Protocol: Risk Factor Score >75	NMFS Flow Protocol: Risk Factor Score 51-75	NMFS Flow Protocol: Risk Factor Score 35-50	NMFS Flow Protocol: Risk Factor Score <35	NMFS Flow Protocol: Risk Factor Score 58	Fair
			Passage/Migration	Passage at Mouth or Confluence	<50% of IP-Km or <16 IP-Km accessible*	50% of IP-Km to 74% of IP-km	75% of IP-Km to 90% of IP-km	>90% of IP-km	75% of IP-km to 90% of IP-km	Good
			Passage/Migration	Physical Barriers	<50% of IP-Km or <16 IP-Km accessible*	50% of IP-Km to 74% of IP-km	75% of IP-Km to 90% of IP-km	>90% of IP-km	>90% of IP-km	Very Good
			Riparian Vegetation	Tree Diameter (North of SF Bay)	≤39% Class 5 & 6 across IP-km	40 - 54% Class 5 & 6 across IP-km	55 - 69% Class 5 & 6 across IP-km	>69% Class 5 & 6 across IP-km	40 - 54% Class 5 & 6 across IP-km	Fair
			Riparian Vegetation	Tree Diameter (South of SF Bay)	≤69% Density rating "D" across IP-km	70-79% Density rating "D" across IP-km	≥80% Density rating "D" across IP-km	Not Defined		

			Sediment	Quantity & Distribution of Spawning Gravels	<50% of IP-Km or <16 IP-Km accessible*	50% of IP-Km to 74% of IP-km	75% of IP-Km to 90% of IP-km	>90% of IP-km	50% of IP-km to 74% of IP-km	Fair
			Velocity Refuge	Floodplain Connectivity	<50% Response Reach Connectivity	50-80% Response Reach Connectivity	>80% Response Reach Connectivity	Not Defined	50-80% Response Reach Connectivity	Fair
			Water Quality	Toxicity	Acute	Sublethal or Chronic	No Acute or Chronic	No Evidence of Toxins or Contaminants	No Acute or Chronic	Good
			Water Quality	Turbidity	<50% of streams/ IP-Km maintains severity score of 3 or lower	50% to 74% of streams/ IP-Km maintains severity score of 3 or lower	75% to 90% of streams/ IP-Km maintains severity score of 3 or lower	>90% of streams/ IP-Km maintains severity score of 3 or lower	<50% of streams/ IP-km maintains severity score of 3 or lower	Poor
		Size	Viability	Density	<1 Spawner per IP-km (Spence et al 2012)	>1 spawner per IP-km to < low risk spawner density per Spence et al (2012)	low risk spawner density per Spence et al (2012)		<1 Spawner per IP-km (Spence et al 2012)	Poor
2	Eggs	Condition	Hydrology	Flow Conditions (Instantaneous Condition)	NMFS Flow Protocol: Risk Factor Score >75	NMFS Flow Protocol: Risk Factor Score 51-75	NMFS Flow Protocol: Risk Factor Score 35-50	NMFS Flow Protocol: Risk Factor Score <35	NMFS Flow Protocol: Risk Factor Score 51-75	Fair
			Hydrology	Redd Scour	NMFS Flow Protocol: Risk Factor Score >75	NMFS Flow Protocol: Risk Factor Score 51-75	NMFS Flow Protocol: Risk Factor Score 35-50	NMFS Flow Protocol: Risk Factor Score <35	NMFS Flow Protocol: Risk Factor Score 51-75	Fair
			Sediment	Gravel Quality (Bulk)	>17% (0.85mm) and >30% (6.4mm)	15-17% (0.85mm) and <30% (6.4mm)	12-14% (0.85mm) and <30% (6.4mm)	<12% (0.85mm) and <30% (6.4mm)	15-17% (0.85mm) and <30% (6.4mm)	Fair
			Sediment	Gravel Quality (Embeddedness)	<50% of streams/ IP-Km (>50% stream average scores of 1 & 2)	50% to 74% of streams/ IP-Km (>50% stream average scores of 1 & 2)	75% to 90% of streams/ IP-Km (>50% stream average scores of 1 & 2)	>90% of streams/ IP-Km (>50% stream average scores of 1 & 2)	<50% of streams/ IP-km (>50% stream average scores of 1 & 2)	Poor

3	Summer Rearing Juveniles	Condition	Estuary/Lagoon	Quality & Extent	Impaired/non-functional	Impaired but functioning	Properly Functioning Condition		Impaired but functioning	Fair
			Habitat Complexity	Large Wood Frequency (Bankfull Width 0-10 meters)	<50% of streams/ IP-Km (>6 Key Pieces/100 meters)	50% to 74% of streams/ IP-Km (>6 Key Pieces/100 meters)	75% to 90% of streams/ IP-Km (>6 Key Pieces/100 meters)	>90% of streams/ IP-Km (>6 Key Pieces/100 meters)	50% to 74% of streams/ IP-km (>6 Key Pieces/100 meters)	Fair
			Habitat Complexity	Large Wood Frequency (Bankfull Width 10-100 meters)	<50% of streams/ IP-Km (>1.3 Key Pieces/100 meters)	50% to 74% of streams/ IP-Km (>1.3 Key Pieces/100 meters)	75% to 90% of streams/ IP-Km (>1.3 Key Pieces/100 meters)	>90% of streams/ IP-Km (>1.3 Key Pieces/100 meters)	N/A	
			Habitat Complexity	Percent Primary Pools	<50% of streams/ IP-Km (>40% average primary pool frequency)	50% to 74% of streams/ IP-Km (>40% average primary pool frequency)	75% to 89% of streams/ IP-Km (>40% average primary pool frequency)	>90% of streams/ IP-Km (>40% average primary pool frequency)	50% to 74% of streams/ IP-km (>40% average primary pool frequency)	Fair
			Habitat Complexity	Pool/Riffle/Flatwater Ratio	<50% of streams/ IP-Km (>40% Pools; >20% Riffles)	50% to 74% of streams/ IP-Km (>40% Pools; >20% Riffles)	75% to 90% of streams/ IP-Km (>40% Pools; >20% Riffles)	>90% of streams/ IP-Km (>40% Pools; >20% Riffles)	50% to 74% of streams/ IP-km (>40% Pools; >20% Riffles)	Fair
			Habitat Complexity	Shelter Rating	<50% of streams/ IP-Km (>80 stream average)	50% to 74% of streams/ IP-Km (>80 stream average)	75% to 90% of streams/ IP-Km (>80 stream average)	>90% of streams/ IP-Km (>80 stream average)	<50% of streams/ IP-km (>80 stream average)	Poor
			Hydrology	Flow Conditions (Baseflow)	NMFS Flow Protocol: Risk Factor Score >75	NMFS Flow Protocol: Risk Factor Score 51-75	NMFS Flow Protocol: Risk Factor Score 35-50	NMFS Flow Protocol: Risk Factor Score <35	NMFS Flow Protocol: Risk Factor Score 67	Fair
			Hydrology	Flow Conditions (Instantaneous Condition)	NMFS Flow Protocol: Risk Factor Score >75	NMFS Flow Protocol: Risk Factor Score 51-75	NMFS Flow Protocol: Risk Factor Score 35-50	NMFS Flow Protocol: Risk Factor Score <35	NMFS Flow Protocol: Risk Factor Score 58	Fair
			Hydrology	Number, Condition and/or Magnitude of Diversions	>5 Diversions/10 IP km	1.1 - 5 Diversions/10 IP km	0.01 - 1 Diversions/10 IP km	0 Diversions	0 Diversions	Very Good
			Passage/Migration	Passage at Mouth or Confluence	<50% of IP-Km or <16 IP-Km accessible*	50% of IP-Km to 74% of IP-km	75% of IP-Km to 90% of IP-km	>90% of IP-km	50% of IP-km to 74% of IP-km	Fair

			Passage/Migration	Physical Barriers	<50% of IP-Km or <16 IP-Km accessible*	50% of IP-Km to 74% of IP-km	75% of IP-Km to 90% of IP-km	>90% of IP-km	>90% of IP-km	Very Good
			Riparian Vegetation	Canopy Cover	<50% of streams/ IP-Km (>70% average stream canopy; >85% where coho IP overlaps)	50% to 74% of streams/ IP-Km (>70% average stream canopy; >85% where coho IP overlaps)	75% to 90% of streams/ IP-Km (>70% average stream canopy; >85% where coho IP overlaps)	>90% of streams/ IP-Km (>70% average stream canopy; >85% where coho IP overlaps)	<50% of streams/ IP-km (>70% average stream canopy; >85% where coho IP overlaps)	Poor
			Riparian Vegetation	Tree Diameter (North of SF Bay)	≤39% Class 5 & 6 across IP-km	40 - 54% Class 5 & 6 across IP-km	55 - 69% Class 5 & 6 across IP-km	>69% Class 5 & 6 across IP-km	40 - 54% Class 5 & 6 across IP-km	Fair
			Riparian Vegetation	Tree Diameter (South of SF Bay)	≤69% Density rating "D" across IP-km	70-79% Density rating "D" across IP-km	≥80% Density rating "D" across IP-km	Not Defined		
			Sediment (Food Productivity)	Gravel Quality (Embeddedness)	<50% of streams/ IP-Km (>50% stream average scores of 1 & 2)	50% to 74% of streams/ IP-Km (>50% stream average scores of 1 & 2)	75% to 90% of streams/ IP-Km (>50% stream average scores of 1 & 2)	>90% of streams/ IP-Km (>50% stream average scores of 1 & 2)	<50% of streams/ IP-km (>50% stream average scores of 1 & 2)	Poor
			Water Quality	Temperature (MWMT)	<50% IP km (<20 C MWMT; <16 C MWMT where coho IP overlaps)	50 to 74% IP km (<20 C MWMT; <16 C MWMT where coho IP overlaps)	75 to 89% IP km (<20 C MWMT; <16 C MWMT where coho IP overlaps)	>90% IP km (<20 C MWMT; <16 C MWMT where coho IP overlaps)	<50% IP-km (<20 C MWMT; <16 C MWMT where coho IP overlaps)	Poor
			Water Quality	Toxicity	Acute	Sublethal or Chronic	No Acute or Chronic	No Evidence of Toxins or Contaminants	No Acute or Chronic	Good
			Water Quality	Turbidity	<50% of streams/ IP-Km maintains severity score of 3 or lower	50% to 74% of streams/ IP-Km maintains severity score of 3 or lower	75% to 90% of streams/ IP-Km maintains severity score of 3 or lower	>90% of streams/ IP-Km maintains severity score of 3 or lower	50% to 74% of streams/ IP-km maintains severity score of 3 or lower	Fair
		Size	Viability	Density	<0.2 Fish/m^2	0.2 - 0.6 Fish/m^2	0.7 - 1.5 Fish/m^2	>1.5 Fish/m^2	<0.2 Fish/m^2	Poor
			Viability	Spatial Structure	<50% of Historical Range	50-74% of Historical Range	75-90% of Historical Range	>90% of Historical Range	>90% of Historical Range	Very Good

4	Winter Rearing Juveniles	Condition	Habitat Complexity	Large Wood Frequency (Bankfull Width 0-10 meters)	<50% of streams/ IP-Km (>6 Key Pieces/100 meters)	50% to 74% of streams/ IP-Km (>6 Key Pieces/100 meters)	75% to 90% of streams/ IP-Km (>6 Key Pieces/100 meters)	>90% of streams/ IP-Km (>6 Key Pieces/100 meters)	50% to 74% of streams/ IP-km (>6 Key Pieces/100 meters)	Fair
			Habitat Complexity	Large Wood Frequency (Bankfull Width 10-100 meters)	<50% of streams/ IP-Km (>1.3 Key Pieces/100 meters)	50% to 74% of streams/ IP-Km (>1.3 Key Pieces/100 meters)	75% to 90% of streams/ IP-Km (>1.3 Key Pieces/100 meters)	>90% of streams/ IP-Km (>1.3 Key Pieces/100 meters)	N/A	
			Habitat Complexity	Pool/Riffle/Flatwater Ratio	<50% of streams/ IP-Km (>40% Pools; >20% Riffles)	50% to 74% of streams/ IP-Km (>40% Pools; >20% Riffles)	75% to 90% of streams/ IP-Km (>40% Pools; >20% Riffles)	>90% of streams/ IP-Km (>40% Pools; >20% Riffles)	50% to 74% of streams/ IP-km (>40% Pools; >20% Riffles)	Fair
			Habitat Complexity	Shelter Rating	<50% of streams/ IP-Km (>80 stream average)	50% to 74% of streams/ IP-Km (>80 stream average)	75% to 90% of streams/ IP-Km (>80 stream average)	>90% of streams/ IP-Km (>80 stream average)		
			Passage/Migration	Physical Barriers	<50% of IP-Km or <16 IP-Km accessible*	50% of IP-Km to 74% of IP-km	75% of IP-Km to 90% of IP-km	>90% of IP-km	75% of IP-km to 90% of IP-km	Good
			Riparian Vegetation	Tree Diameter (North of SF Bay)	≤39% Class 5 & 6 across IP-km	40 - 54% Class 5 & 6 across IP-km	55 - 69% Class 5 & 6 across IP-km	>69% Class 5 & 6 across IP-km	40 - 54% Class 5 & 6 across IP-km	Fair
			Riparian Vegetation	Tree Diameter (South of SF Bay)	≤69% Density rating "D" across IP-km	70-79% Density rating "D" across IP-km	≥80% Density rating "D" across IP-km	Not Defined		
			Sediment (Food Productivity)	Gravel Quality (Embeddedness)	<50% of streams/ IP-Km (>50% stream average scores of 1 & 2)	50% to 74% of streams/ IP-Km (>50% stream average scores of 1 & 2)	75% to 90% of streams/ IP-Km (>50% stream average scores of 1 & 2)	>90% of streams/ IP-Km (>50% stream average scores of 1 & 2)	<50% of streams/ IP-km (>50% stream average scores of 1 & 2)	Poor
			Velocity Refuge	Floodplain Connectivity	<50% Response Reach Connectivity	50-80% Response Reach Connectivity	>80% Response Reach Connectivity	Not Defined	>80% Response Reach Connectivity	Good
			Water Quality	Toxicity	Acute	Sublethal or Chronic	No Acute or Chronic	No Evidence of Toxins or Contaminants	No Acute or Chronic	Good

			Water Quality	Turbidity	<50% of streams/ IP-Km maintains severity score of 3 or lower	50% to 74% of streams/ IP-Km maintains severity score of 3 or lower	75% to 90% of streams/ IP-Km maintains severity score of 3 or lower	>90% of streams/ IP-Km maintains severity score of 3 or lower		
5	Smolts	Condition	Estuary/Lagoon	Quality & Extent	Impaired/non-functional	Impaired but functioning	Properly Functioning Condition		Properly Functioning Condition	Good
			Habitat Complexity	Shelter Rating	<50% of streams/ IP-Km (>80 stream average)	50% to 74% of streams/ IP-Km (>80 stream average)	75% to 90% of streams/ IP-Km (>80 stream average)	>90% of streams/ IP-Km (>80 stream average)	<50% of streams/ IP-km (>80 stream average)	Poor
			Hydrology	Number, Condition and/or Magnitude of Diversions	>5 Diversions/10 IP km	1.1 - 5 Diversions/10 IP km	0.01 - 1 Diversions/10 IP km	0 Diversions	0 Diversions	Very Good
			Hydrology	Passage Flows	NMFS Flow Protocol: Risk Factor Score >75	NMFS Flow Protocol: Risk Factor Score 51-75	NMFS Flow Protocol: Risk Factor Score 35-50	NMFS Flow Protocol: Risk Factor Score <35	NMFS Flow Protocol: Risk Factor Score 58	Fair
			Passage/Migration	Passage at Mouth or Confluence	<50% of IP-Km or <16 IP-Km accessible*	50% of IP-Km to 74% of IP-km	75% of IP-Km to 90% of IP-km	>90% of IP-km	75% of IP-km to 90% of IP-km	Good
			Smoltification	Temperature	<50% IP-Km (>6 and <14 C)	50-74% IP-Km (>6 and <14 C)	75-90% IP-Km (>6 and <14 C)	>90% IP-Km (>6 and <14 C)	50-74% IP-km (>6 and <14 C)	Fair
			Water Quality	Toxicity	Acute	Sublethal or Chronic	No Acute or Chronic	No Evidence of Toxins or Contaminants	No Acute or Chronic	Good
			Water Quality	Turbidity	<50% of streams/ IP-Km maintains severity score of 3 or lower	50% to 74% of streams/ IP-Km maintains severity score of 3 or lower	75% to 90% of streams/ IP-Km maintains severity score of 3 or lower	>90% of streams/ IP-Km maintains severity score of 3 or lower	50% to 74% of streams/ IP-km maintains severity score of 3 or lower	Fair
		Size	Viability	Abundance	Smolt abundance which produces high risk spawner density per Spence (2008)	Smolt abundance which produces moderate risk spawner density per Spence (2008)	Smolt abundance to produce low risk spawner density per Spence (2008)		Smolt abundance which produces moderate risk spawner density per Spence (2008)	Fair

6	Watershed Processes	Landscape Context	Hydrology	Impervious Surfaces	>10% of Watershed in Impervious Surfaces	7-10% of Watershed in Impervious Surfaces	3-6% of Watershed in Impervious Surfaces	<3% of Watershed in Impervious Surfaces	0.05% of Watershed in Impervious Surfaces	Very Good
			Landscape Patterns	Agriculture	>30% of Watershed in Agriculture	20-30% of Watershed in Agriculture	10-19% of Watershed in Agriculture	<10% of Watershed in Agriculture	0% of Watershed in Agriculture	Very Good
			Landscape Patterns	Timber Harvest	>35% of Watershed in Timber Harvest	26-35% of Watershed in Timber Harvest	25-15% of Watershed in Timber Harvest	<15% of Watershed in Timber Harvest	1% of Watershed in Timber Harvest in last 15 years	Very Good
			Landscape Patterns	Urbanization	>20% of watershed >1 unit/20 acres	12-20% of watershed >1 unit/20 acres	8-11% of watershed >1 unit/20 acres	<8% of watershed >1 unit/20 acres	1% of watershed >1 unit/20 acres	Very Good
			Riparian Vegetation	Species Composition	<25% Intact Historical Species Composition	25-50% Intact Historical Species Composition	51-74% Intact Historical Species Composition	>75% Intact Historical Species Composition	25-50% Intact Historical Species Composition	Fair
			Sediment Transport	Road Density	>3 Miles/Square Mile	2.5 to 3 Miles/Square Mile	1.6 to 2.4 Miles/Square Mile	<1.6 Miles/Square Mile	1.6 Miles/Square Mile	Good
			Sediment Transport	Streamside Road Density (100 m)	>1 Miles/Square Mile	0.5 to 1 Miles/Square Mile	0.1 to 0.4 Miles/Square Mile	<0.1 Miles/Square Mile	1.3 Miles/Square Mile	Poor

Chamise Creek CAP Threat Results

	Threats Across Targets	Adults	Eggs	Summer Rearing Juveniles	Winter Rearing Juveniles	Smolts	Watershed Processes	Overall Threat Rank
	Project-specific-threats	1	2	3	4	5	6	
1	Agriculture	Low	Low	Medium	Low	Medium	Low	Medium
2	Channel Modification	Medium	Low	Medium	Low	Medium	Low	Medium
3	Disease, Predation and Competition	Medium		Medium	Low	Low	Low	Medium
4	Hatcheries and Aquaculture			Low	Low	Low	Low	Low
5	Fire, Fuel Management and Fire Suppression	Low	Low	Medium	Low	Low	Low	Low
6	Fishing and Collecting	Low		Low		Low	Low	Low
7	Livestock Farming and Ranching	Low	Low	Medium	Low	Low	Low	Low
8	Logging and Wood Harvesting	Low	Low	Medium	Low	Low	Low	Low
9	Mining	Low	Low	Medium	Low	Low	Low	Low
10	Recreational Areas and Activities	Low	Low	Medium	Low	Low	Low	Low
11	Residential and Commercial Development	Low	Medium	High	Medium	Low	Low	Medium
12	Roads and Railroads	Low	High	High	Medium	Medium	Medium	High
13	Severe Weather Patterns	Medium	Low	Medium	Medium	Medium	Low	Medium
14	Water Diversion and Impoundments	Medium	Low	High	Medium	Medium	Low	Medium
	Threat Status for Targets and Project	Medium	Medium	High	Medium	Medium	Medium	High

Chamise Creek, Northern California Steelhead (Lower Interior) Recovery Actions

Action ID	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partner	Costs ($K)						Comment
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25	Entire Duration	
ChC-NCSW-3.1	**Objective**	**Hydrology**	**Address the present or threatened destruction, modification or curtailment of the species habitat or range**										
ChC-NCSW-3.1.1	Recovery Action	Hydrology	Improve flow conditions										
ChC-NCSW-3.1.1.1	Action Step	Hydrology	Provide incentives to water rights holders and water uses to improve flows by offering incentives, deveoping a forbearance program, or similar measures.	2	20	NMFS						TBD	
ChC-NCSW-6.1	**Objective**	**Habitat Complexity**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
ChC-NCSW-6.1.1	Recovery Action	Habitat Complexity	Improve frequency of primary pools, LWD, and shelters										
ChC-NCSW-6.1.1.1	Action Step	Habitat Complexity	Improve summer rearing, winter rearing, and smolt survival by increasing instream channel complexity in potential rearing and migration reaches.	3	5	CDFW	232.00					232	Cost based on treating 8.9 miles (assume 1 project/mile in 50% high IP) at a rate of $26,000/mile.
ChC-NCSW-6.1.1.2	Action Step	Habitat Complexity	Utilize existing watershed analyses or habitat surveys, or conduct new analyses where needed, in order to prioritize restoration actions.	3	5		115.00					115	Cost based on fish/habitat restoration model at a rate of $114,861/project.
ChC-NCSW-6.1.1.3	Action Step	Habitat Complexity	Complete habitat surveys to document habitat quality and availability within the mainstem and tributaries.	1	10	CDFW, NMFS, Private Consultants						TBD	Cost is TBD at this time. If done through CDFW stream habitat survey program, the cost would likely be a part of CDFW personnel costs.
ChC-NCSW-6.1.1.4	Action Step	Habitat Complexity	Conduct outreach with private landowners in order to complete habitat surveys and establish restoration priorities on private lands.	2	5	CDFW, NMFS, NOAA RC, NRCS, Private Landowners, RCD						0	Cost will largely be covered through already existing personnel costs for CDFW and NMFS. Cost is considered In-Kind
ChC-NCSW-6.1.2	Recovery Action	Habitat Complexity	Increase large wood frequency										
ChC-NCSW-6.1.2.1	Action Step	Habitat Complexity	Encourage retention and recruitment of large woody debris to maintain current stream complexity, pool frequency, and depth.	3	50	CalFire, CDFW, Private Landowners						0	Cost is considered In-Kind
ChC-NCSW-6.1.2.2	Action Step	Habitat Complexity	Install or enhance existing LWD, boulders, and other instream features to increase habitat complexity and improve pool frequency and depth.	1	20	CDFW, NMFS, NOAA RC, NRCS, Private Landowners, RCD	58.00	58.00	58.00	58.00		232	Cost based on treating 8.9 miles (assume 1 project/mile in 50% high IP) at a rate of $26,000/mile. This action step should be coordinated with other similar action steps to reduce cost and redundancy.
ChC-NCSW-6.1.2.3	Action Step	Habitat Complexity	Encourage landowners to implement woody debris restoration projects as part of their ongoing operations in stream reaches where large woody debris is lacking.	2	10	CDFW, NMFS, NRCS, Private Landowners, RCD						0	Cost to encourage landowners expected to low and largely covered by CDFW and NMFS personnel costs. Cost is considered In-Kind
ChC-NCSW-7.1	**Objective**	**Riparian**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
ChC-NCSW-7.1.1	Recovery Action	Riparian	Improve canopy cover										
ChC-NCSW-7.1.1.1	Action Step	Riparian	Improve the structure and composition of riparian areas to provide shade, large woody debris input, nutrient input, bank stabilization, and other NC steelhead and CC Chinook salmon habitat needs.	3	25							0	Cost accounted for in other action steps.
ChC-NCSW-7.1.1.2	Action Step	Riparian	A comprehensive evaluation and monitoring program should be implemented to determine areas where poor riparian habitat is producing water temperatures that limit juvenile steelhead and Chinook salmon survival.	1	10	CDFW, NMFS, Private Landowners	37.00	37.00				74	Cost based on riparian restoration model at a rate of $73,792/project.

Chamise Creek, Northern California Steelhead (Lower Interior) Recovery Actions

Action ID	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partner	Costs ($K)						Comment
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25	Entire Duration	
ChC-NCSW-7.1.1.3	Action Step	Riparian	Work with CalFire and others through the timber harvest permitting process to protect existing riparian areas from timber harvest, rural residential, and grazing activities to maintain LWD supply and canopy recovery.	2	10	CalFire, CDFW, NMFS, Private Landowners						0	Action is considered In-Kind
ChC-NCSW-7.1.1.4	Action Step	Riparian	Fence riparian areas within the watershed from grazing by using fencing standards that allow other wildlife to access the stream.	1	5	CDFW, NMFS, NOAA RC, NRCS, Private Landowners, RCD						TBD	cost is TBD since size, scope and location of future fencing efforts are unknown. Cost estimate for livestock exclusion fencing is $3.63/ft.
ChC-NCSW-7.1.1.5	Action Step	Riparian	Assess riparian canopy and impacts of exotic vegetation (e.g., Arundo donax, ivy, etc.), prioritize and develop riparian habitat reclamation and enhancement programs (CDFG 2004).	1	20	CDFW, NMFS, NOAA RC, NRCS, Private Landowners, RCD	25.00	25.00	25.00	25.00		100	Approximate cost of performing assessment and developing reclamation and enhancement program.
ChC-NCSW-7.1.2	Recovery Action	Riparian	Improve tree diameter										
ChC-NCSW-7.1.2.1	Action Step	Riparian	Develop a Large Wood Recruitment Plan that assesses instream wood needs, and sites potentially responsive to wood recruitment or placement, and develop a riparian strategy to ensure long term natural recruitment of wood via large tree retention.	3	20	CDFW, NMFS, NOAA RC, NRCS, Private Landowners, RCD						TBD	Cost will vary with level of detail in the assessment and strategy development.
ChC-NCSW-7.1.2.2	Action Step	Riparian	Manage riparian areas for their site potential composition and structure.	1	100	CDFW, NMFS, NRCS, Private Landowners, RCD						0	Cost is considered In-Kind
ChC-NCSW-7.1.2.3	Action Step	Riparian	Conduct conifer release to promote growth of larger diameter trees where appropriate.	2	20	CDFW, NOAA RC, NRCS, Private Landowners, RCD						TBD	Cost based on the amount of conifer release that is needed
ChC-NCSW-8.1	**Objective**	**Sediment**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
ChC-NCSW-8.1.1	Recovery Action	Sediment	Improve instream gravel quality										
ChC-NCSW-8.1.1.1	Action Step	Sediment	Improve habitat conditions at multiple life stages by reducing sediment inputs to the stream at the watershed scale.	3	20	CalFire, CDFW, CalFire, CDFW, RCD, Priavate LandownersRCD, Priavate Landowners						TBD	Cost based on sediment sources and amount of sediment contributed from these sources. Methods to reduce sediment vary depending on type and locale.
ChC-NCSW-8.1.1.2	Action Step	Sediment	Re-establish natural sediment delivery processes and implement sediment reduction activities where necessary.	3	20							TBD	Cost based on identifying sediment sources. Erosion assessment and road inventory costs accounted for.
ChC-NCSW-8.1.1.3	Action Step	Sediment	Provide incentives to restore high priority sites as determined by watershed analysis, CDFW, or CalFire.	2	25	CDFW, Mendocino County, NMFS						0	Incentives likely to be provided by state, local and federal agencies, and the cost of developing these incentives is likely to be low. Cost is considered In-Kind
ChC-NCSW-8.1.1.4	Action Step	Sediment	Solicit cooperation from NRCS, RCDs, Farm Bureau, and others to devise incentive programs and incentive-based approaches to encourage and support landowners who conduct operations in a manner compatible with NC steelhead and CC Chinook salmon recovery priorities.	2	10	CDFW, Farm Bureau, NMFS, NRCS, Private Landowners, RCD						0	Cost is considered In-Kind
ChC-NCSW-10.1	**Objective**	**Water Quality**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										

Chamise Creek, Northern California Steelhead (Lower Interior) Recovery Actions

Action ID	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partner	Costs ($K)						Comment
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25	Entire Duration	
ChC-NCSW-10.1.1	Recovery Action	Water Quality	Improve stream temperature conditions										
ChC-NCSW-10.1.1.1	Action Step	Water Quality	Improve summer rearing survival by reducing instream temperatures in potential rearing reaches.	3	20							0	Cost accounted for in other action steps: HABITAT COMPLEXITY & RIPARIAN.
ChC-NCSW-10.1.1.2	Action Step	Water Quality	Monitor instream water temperatures to determine baseline conditions and judge the efficacy of restoration actions.	2	10	CDFW, NMFS, NRCS, Private Landowners, RCD	0.75	0.75				2	Cost based on installing a minimum of 3 stream temperature gauges at a rate of $500/gauge. Cost does not account for data management or maintenance.
ChC-NCSW-10.1.1.3	Action Step	Water Quality	Determine site-specific recommendations, including incentives, to remedy high temperatures and implement accordingly (CDFG 2004).	1	20	CDFW, NMFS, NRCS, Private Landowners, RCD						TBD	Cost is TBD since the number, location and scope of future projects is unknown at this time.
ChC-NCSW-11.1	**Objective**	**Viability**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
ChC-NCSW-11.1.1	Recovery Action	Viability	Increase density, abundance, spatial structure and diversity										
ChC-NCSW-11.1.1.1	Action Step	Viability	Conduct a comprehensive assessment of watershed processes (e.g., hydrology, geology, fluvial-geomorphology, water quality, and vegetation), instream habitat, and factors limiting Chinook salmon and steelhead production.	2	5	CDFW, NMFS, Private Consultants, Private Landowners	100.00					100	Estimated cost.
ChC-NCSW-11.1.1.2	Action Step	Viability	Develop and implement a monitoring program to evaluate the performance of recovery efforts.	3	20	CDFW, NMFS						0	Cost accounted for in Monitoring Chapter
ChC-NCSW-11.1.1.3	Action Step	Viability	Utilize CDFW approved implementation, effectiveness, and validation monitoring protocols when assessing efficacy of restoration efforts.	2	100	CDFW, NMFS, NRCS, Private Consultants, Private Landowners, RCD						0	Cost is expected to be low, and largely absorbed through future restoration funding. Cost is considered In-Kind
ChC-NCSW-11.1.1.4	Action Step	Viability	Evaluate feasibility of installing a lifecycle station in an appropriate location within the watershed. Implement action if found feasible.	2	10	CDFW, NMFS						0	Cost accounted for in Monitoring Chapter
ChC-NCSW-16.1	**Objective**	**Fishing/Collecting**	**Address the inadequacy of existing regulatory mechanisms**										
ChC-NCSW-16.1.1	Recovery Action	Fishing/Collecting	Prevent or minimize reduced density, abundance, and diversity based on the biological recovery criteria										
ChC-NCSW-16.1.1.1	Action Step	Fishing/Collecting	NMFS and CDFW will work to improve the California Freshwater Sport Fishing Regulations to minimize take of adult salmonids.	2	5	CDFW, NMFS						0	Cost is considered In-Kind
ChC-NCSW-16.1.1.2	Action Step	Fishing/Collecting	Work with CDFW to improve protection for salmonids by modifying California Code of Regulations Section 8.00 (a) (1-3) low flow restrictions for the Eel and Van Duzen rivers.	2	5	CDFW, NMFS						0	Cost is considered In-Kind
ChC-NCSW-22.1	**Objective**	**Residential/ Commercial Development**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
ChC-NCSW-22.1.1	Recovery Action	Residential/ Commercial Development	Prevent or minimize adverse alterations to riparian species composition and structure										
ChC-NCSW-22.1.1.1	Action Step	Residential/ Commercial Development	Promote re-vegetation of native riparian plant communities within inset floodplains and riparian corridors to ameliorate high instream water temperatures and provide a source of future large woody debris recruitment.	2	100	CDFW, NMFS, Private Landowners						0	Promoting regeneration is a low cost endeavor, undertaken mainly by already employed CDFW and NMFS staff. Cost is considered In-Kind

Chamise Creek, Northern California Steelhead (Lower Interior) Recovery Actions

Action ID	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partner	Costs ($K)						Comment
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25	Entire Duration	
ChC-NCSW-22.1.1.2	Action Step	Residential/ Commercial Development	Maintain intact and properly functioning riparian buffers to filter and prevent fine sediment input from entering streams and to provide shade.	3	50	CDFW, NMFS, Private Landowners						0	Cost is considered In-Kind
ChC-NCSW-22.1.1.3	Action Step	Residential/ Commercial Development	Work with agencies to minimize development within riparian zones and the 100-year flood prone zones.	1	100	NMFS, Mendocino County, Private Landowners						0	Cost is expected to be small and part of policy and land use management. Cost is considered In-Kind
ChC-NCSW-22.2	**Objective**	**Residential/ Commercial Development**	**Address the inadequacy of existing regulatory mechanisms**										
ChC-NCSW-22.2.1	Recovery Action	Residential/ Commercial Development	Prevent or minimize reduced density, abundance, and diversity based on the biological recovery criteria										
ChC-NCSW-22.2.1.1	Action Step	Residential/ Commercial Development	Improve education and awareness of agencies, landowners and the public regarding salmonid protection and habitat requirements.	3	20	NMFS, CDFW						0	Cost is considered In-Kind
ChC-NCSW-22.2.1.2	Action Step	Residential/ Commercial Development	Educate county and city public works departments, flood control districts, and planning departments, etc., on the critical importance of maintaining riparian vegetation, instream LWD, and LWD recruitment.	2	100	CDFW, NMFS, NRCS, Private Landowners, RCD						0	Cost of education likely to be low, and education will likely have to occur on a regular, recurring timeframe. Cost is considered In-Kind
ChC-NCSW-22.2.2	Recovery Action	Residential/ Commercial Development	Prevent or minimize impairment to water quality (increased turbidity, suspended sediment, and/or toxicity)										
ChC-NCSW-22.2.2.1	Action Step	Residential/ Commercial Development	Minimize the use of commercial and industrial products (e.g. pesticides) with high potential for contamination of local waterways.	2	100	Mendocino County, Private Landowners						0	Cost is considered In-Kind
ChC-NCSW-22.2.2.2	Action Step	Residential/ Commercial Development	Identify areas at increased risk of mass wasting and elevated fine sediment load, and decrease sediment from transportation projects and land management activities in those areas (CDFG 2004).	2	10	CDFW, NMFS, Private Landowners	11.50	11.50				23	Cost based on erosion assessment of 10% of total watershed acres at a rate of $12.62/acre.
ChC-NCSW-22.2.3	Recovery Action	Residential/ Commercial Development	Prevent or minimize impairment to riparian species composition and structure										
ChC-NCSW-22.2.3.1	Action Step	Residential/ Commercial Development	Develop policy and guidelines that address land conversion and attempt to minimize conversion-related impacts within the aquatic environment.	3	10	CDFW, Mendocino County, NMFS						0	Cost is considered In-Kind
ChC-NCSW-22.2.3.2	Action Step	Residential/ Commercial Development	Enforce existing building permit programs to minimize unpermitted construction.	2	100	Mendocino County						0	Cost may represent only a small increase above already in place enforcement efforts. Cost is considered In-Kind
ChC-NCSW-22.2.3.3	Action Step	Residential/ Commercial Development	Discourage Mendocino County from rezoning forestlands to rural residential or other land uses.	2	10	CDFW, Mendocino County, NMFS						0	Discouragement likely to be done primarily by CDFW and NMFS staff, and the cost is likely to be low. Cost is considered In-Kind
ChC-NCSW-22.2.3.4	Action Step	Residential/ Commercial Development	Purchase conservation easements from landowners that currently have grazing or agricultural operations within the watershed.	2	25	CDFW, NMFS, NRCS, Private Landowners, RCD						TBD	The cost of purchasing conservation easements is unknown at this time.
ChC-NCSW-22.2.3.5	Action Step	Residential/ Commercial Development	Institutionalize programs to purchase land/conservation easements to encourage the re-establishment and/or enhancement of natural riparian communities.	2	5	CDFW, Mendocino County, NMFS						0	Cost expected to be covered largely by local, state and federal personnel. Cost is considered In-Kind. Cost of purchasing consrevation easements is accounted for above.
ChC-NCSW-22.2.4	Recovery Action	Residential/ Commercial Development	Prevent or minimize increased landscape disturbance										
ChC-NCSW-22.2.4.1	Action Step	Residential/ Commercial Development	Minimize degradation of steelhead and Chinook salmon habitat through proper land-use zoning.	3	25	CalFire, CDFW, Mendocino County, NMFS						0	Cost is considered In-Kind

Chamise Creek, Northern California Steelhead (Lower Interior) Recovery Actions

Action ID	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partner	Costs ($K)						Comment
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25	Entire Duration	
ChC-NCSW-22.2.4.2	Action Step	Residential/ Commercial Development	Land use zoning should be appropriate to the site and be tolerant to anticipated conditions (e.g., frequent flooding, extreem low flow conditions (drought), sea level rise, etc.).	3	50	CalFire, Mendocino County, NMFS						0	Cost is considered In-Kind
ChC-NCSW-22.2.4.3	Action Step	Residential/ Commercial Development	Encourage Mendocino County to permit new developments that avoid unstable slopes, wetlands, areas of high habitat value, consider water supply and similarly constrained sites that occur adjacent to Chinook salmon and steelhead habitat.	2	10	Mendocino County, NMFS, CDFW						0	Cost is considered In-Kind
ChC-NCSW-22.2.4.4	Action Step	Residential/ Commercial Development	Encourage Mendocino County to develop and implement ordinances (e.g., Santa Cruz) to restrict subdivisions by requiring a minimum acreage limit for parcelization and in concert with limits on water supply and groundwater recharge areas.	2	10	CDFW, Mendocino County, NMFS						0	Encouragement likely to be done by NMFS and CDFW employees. Cost is considered In-Kind
ChC-NCSW-22.2.4.5	Action Step	Residential/ Commercial Development	Work with Mendocino County to develop more protective regulations in regard to exurban development (vineyard and rural residential).	3	10	CDFW, Mendocino County, NMFS						0	Cost is expected to be low, and largely covered by CDFW and NMFS staff. Cost is considered In-Kind
ChC-NCSW-23.1	**Objective**	**Roads/Railroads**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
ChC-NCSW-23.1.1	Recovery Action	Roads/Railroads	Prevent or minimize alterations to sediment transport (road condition/density, dams, etc.)										
ChC-NCSW-23.1.1.1	Action Step	Roads/Railroads	Develop a Riparian Road Sediment Reduction Plan that prioritizes sites and outlines implementation and a timeline of necessary actions.	1	20	CDFW, Mendocino County Department of Public Works, NMFS, Private Landowners	10.50	10.50	10.50	10.50		42	Cost based on road inventory for 43 miles of road at a rate of $957/mile.
ChC-NCSW-23.1.1.2	Action Step	Roads/Railroads	Implement riparian road upgrades at high priority sites.	2	25	CDFW, Mendocino County RCD, NMFS, NRCS, Private Landowners						TBD	Cannot make cost estimate at this time. Number of road miles to upgrade will be identified from road inventory.
ChC-NCSW-23.1.1.3	Action Step	Roads/Railroads	Work with the County of Mendocino DOT to upgrade existing high priority riparian road segments identified by the county.	1	10	County of Mendocino, CDFW, NMFS						TBD	Cannot make cost estimate at this time. Number of road miles to upgrade will be identified from road inventory.
ChC-NCSW-23.1.1.4	Action Step	Roads/Railroads	Work with private landowners to upgrade existing high priority riparian roads, or those identified in a sediment reduction plan.	2	10	CDFW, NMFS, Private Landowners						TBD	Cannot make cost estimate at this time. Number of road miles to upgrade will be identified from road inventory.

Outlet Creek Population

NC Steelhead Winter-Run

- Role within DPS or ESU: Potentially Independent Population
- Diversity Stratum: Lower Interior
- Spawner Abundance Target: 3,800 adults
- Current Intrinsic Potential: 188.8 IP-km

For information regarding CC Chinook salmon for this watershed, please see the CC Chinook Salmon volume of this recovery plan.

Steelhead Abundance and Distribution

The estimated historical population abundance of adult steelhead in Outlet Creek is approximately 2,300 spawners, whereas the current estimate made by fishery biologists working in this watershed is approximately 1,200 spawners (LeDoux-Bloom and Downie 2008).

CDFW has conducted juvenile steelhead distribution surveys for over 30 years in Outlet Creek that show 88 percent of the larger tributaries are inhabited by steelhead trout. When current steelhead distribution is compared to the potential historic habitat proposed by Spence *et al.*, (2012) the current distribution is less than 50 percent of the historic habitat that could been utilized by steelhead.

Limited outmigrant monitoring has occurred on Outlet Creek and its tributaries. CDFW conducted outmigrant trapping on one tributary (Willits Creek) during spring of 1999, 2000, and 2001, and reported extremely low trapping numbers for steelhead smolts (27, 10, and 38, respectively). Although extremely low, these trapping results should not be considered as valid abundance estimates due to the variable outmigration timing of steelhead smolts and the fact that the sampling represents just one stream in the watershed.

Areas of high quality habitat in this basin exist within Ryan Creek, Long Valley Creek, and Cherry Creek. Medium quality habitat exists in reaches of Outlet, Willits, Broaddus, and Baechtel creeks (LeDoux-Bloom and Downie, 2008).

History of Land Use

The first European settlers arrived in the Outlet Creek watershed in the early 1840s where five Pomo Villages already existed. Pomos were known to manage the land with the use of fire to

clear brush and vegetation in order to improve forage for deer and increase acorn yields. The first white settlers of the area were cattle ranchers, such as A.E. Sherwood and the Baechtels who drove cattle to the Willits Valley in the 1850s. Timber harvest began shortly after, when there were efforts to convert conifer forests to grazing land. The Northwest Railroad reached Willits in 1901, and the Skunk Line began operation in 1911. These rail lines were utilized to transport lumber to the bay area until the 1930s when large commercial timber operations decreased due to the great depression.

In the northern area of the Willits Valley a lake historically formed, creating a seasonal lake. The lake continues to form today, but is reduced in size due to agricultural activities first conducted around 1910 that drained and diked much of the lake bed. Over time streams were dredged and moved to accommodate the railroad, grazing, and potato farming (DWR 1965). By the end of the 1930s, most of the larger streams, such as Baechtel, Broaddus, Berry, and Davis creeks, had been channelized and levied for agriculture and transportation (LeDoux-Bloom and Downie, 2008).

An additional wave of destructive timber harvesting occurred during the post-World War II era. Tractor logging methods during this era harvested the remaining old growth fir in the basin and left the landscape susceptible to devastating erosion from the 1955 and 1964 winter storms. With the implementation of the Zberg-Nedjly Forest Practice act in 1973, timber harvest slowed, but low tree retention standards along riparian areas further degraded riparian habitat in the watershed.

Six dams have been constructed for water supply and recreation in the watershed. The City of Willits operates two of these dams, which are located on Davis Creek. Morris Dam (constructed in 1924) and Centennial Dam (1989) store a combined total of 1,359 acre-feet (LeDoux-Bloon and Downie, 2008). The Brooktrails Township Community Service also operates two dams, Lake Emily on Willits Creek and Lake Ada Rose, which is an off-channel reservoir. Lake Emily stores approximately 275 acre-feet and Lake Ada Rose stores 138 acre-feet. The largest impoundment is operated by the Boy Scouts of America, a reservoir impounding 800 acre-feet of water located on a tributary to Berry Creek. The smallest reservoir holds 45 acre-feet of water and is operated by Pine Mountain Mutual Water Company.

In the last 10 years there has been a dramatic increase in medical and commercial production of cannabis in the watershed. LeDoux-Bloom and Downie (2008) report juvenile salmonid stranding due to stream diversions from the large number of grow operations within the watershed. Other current land uses include some timber operations which provide limited employment, along with ranching and tourism. The largest town within the watershed is Willits, which acts a bedroom community to Ukiah due to less expensive housing costs. A proposed highway bypass project is

under construction that proposes to bypass the City of Willits on the east side in order to minimize traffic congestion related to Highway 101, which currently passes through the center of the city. As of July, 2015, the bypass is estimated at approximately 70% complete[1]

Current Resources and Land Management

The Outlet Creek watershed encompasses an area of 162 square miles and is predominantly in private ownership (91 percent) with grazing, timber, and rural residential as the major land uses. Public land makes up just 8 percent of the basin, with most existing in scattered BLM ownership. The human population in the watershed currently has only 12,580 people, the majority living in the City of Willits and the residential area of Brooktrails. The Willits Environmental Center and the Willits Watershed Group are the most active environmental groups in the watershed. These groups focus on environmental protection and watershed restoration within the Outlet Creek basin.

Salmonid Viability and Watershed Conditions

The following habitat indicators were rated Poor through the CAP process: LWD frequency, riparian tree diameter, and shelter rating, for all lifestages. Additional habitat indicators that were rated as Poor for juveniles were summer baseflow, primary pools, instantaneous flow condition, passage migration, physical barriers and stream temperature. Floodplain connectivity was rated Poor for winter rearing juveniles along with those indicators mentioned above. Gravel embeddedness was also unsuitable for the egg lifestage for most streams in the watershed. The only indicator for watershed processes that was rated as Poor through the CAP analysis was road density within riparian areas.

Recovery strategies will typically focus on ameliorating these habitat indicators, although strategies that address other indicators may also be developed where their implementation is critical to restoring properly functioning habitat conditions within the watershed. Indicators that rated as Fair through the CAP process, but are considered important within specific areas of the watershed include gravel quality for eggs, and urbanization with respect to watershed processes.

Current Conditions

The following discussion focuses on those conditions that rated Fair or Poor as a result of our CAP viability analysis. The Outlet Creek CAP Viability Table results are provided below. Recovery strategies will focus on improving these conditions.

[1] See https://willitsbypass.wordpress.com/ for more information.

Population and Habitat Conditions

Habitat Complexity: Large Wood and Shelter

Juvenile salmonids as well as adults require instream shelter for protection from predators, habitat partitioning from other fish, and providing areas of reduced velocity for energy conservation. Data from CDFW habitat inventories indicate shelter ratings throughout the Outlet Creek watershed are poor, with 8 of 9 sampled reaches rated as Poor. Poor to fair LWD volume was also documented within these drainages, due largely to a lack of functional riparian habitat and limited recruitment of large conifer and hardwoods species from adjacent upslope areas. Poor shelter ratings across the basin likely limit habitat availability for juvenile fish, and in turn juvenile fish survival, during the critical low-flow summer period and high-flow period in the winter.

Habitat Complexity: Percent Primary Pools and Pool/Riffle/Flatwater Ratios

The abundance of primary pools is poor in most tributary streams, but is good in Outlet Creek. Most sampled streams have a high percentage of flatwater or run habitat that is not preferred by rearing lifestages of salmonids due to the general lack of depth, complexity and velocity refuge. Low pool abundance in this basin likely limits the space available for juvenile fish attempting to maintain territory for feeding and protection from predators, and likely stems from increased sediment production (pool filling) and limited LWD recruitment caused by past land use practices. Therefore, we rated the conditions for this habitat attribute as Poor for both winter and summer rearing juvenile steelhead.

Hydrology: Baseflow and Passage Flows

Six dams and an unknown number of stream diversions impact summer baseflow conditions, impairing juvenile steelhead rearing throughout much of the Outlet Creek watershed. The cumulative effect from reduced summer baseflow below Centennial, Morris, and the Boy Scout reservoirs likely reduce summer flow to Outlet Creek.

The other large contributor to low summer baseflow is the dramatic increase in instream diversions from large illegal cannabis production and associated rural residential development, which has resulted in extremely low summer flow and dry reaches in many streams (LeDoux-Bloom and Downie 2006). Low summer baseflow across the basin appears to be limiting steelhead production in this watershed.

Passage/Migration: Mouth or Confluence and Physical Barriers

Many dry stream reaches that have been documented during habitat surveys in Outlet Creek also reduce the ability of juvenile steelhead to migrate to more suitable habitat. Stream diversions, poor reservoir management and road crossings impair passage conditions for juvenile steelhead. Impaired passage conditions likely lower steelhead survival by reducing the potential for juveniles to find suitable stream temperatures or more favorable habitats during the summer low flow period. There are also a number of passage barriers that impede upstream migration for adult steelhead (S. Harris, personal communication 2010). Improving passage conditions at culverts and road crossings instreams such as Ryan and Long Valley will improve adult migration into upstream spawning areas. Also, passage impediments need to be improved at two railroad crossings that exist on Haehl Creek.

Velocity Refuge: Floodplain Connectivity

Within the Outlet Creek watershed, streams that should have functional floodplains include low gradient reaches of Outlet, Mill, Broaddus, Haehl, Davis and Baechtel creeks. These stream reaches are associated with the low gradient inland valley that makes up the Little Lake Valley, which forms a lake on the northern end during the winter and spring. Historical agricultural activities have reduced floodplain connectivity by channelizing or relocating channels to facilitate land use on the valley floor. Losing floodplain connectivity limits low-velocity refuge habitat availability during the winter and spring months for juvenile salmon and steelhead.

Water Quality: Temperature

Summer water temperatures are likely limiting steelhead survival throughout many sections of the Outlet Creek watershed, primarily within or downstream of stream channels with poor riparian canopy cover. The few areas noted as exhibiting cool water temperatures include tributaries, such as Ryan Creek, Willits Creek, and Bloody Run Creek, which still retain a relatively good native hardwood and conifer riparian corridors. Most of the streams in the southern part of the watershed, such as the Outlet, Davis, Baechtel, and Broaddus creeks, currently have poor riparian habitat and marginal to unsuitable stream temperatures.

Other Current Conditions

Spawning habitat quality is poor in parts of the basin due to riparian road-related sediment delivery and is a condition in many streams, but was not rated overall as a Poor condition. Water quality impacts from cannabis production are also likely to occur. Mixing of fertilizers directly in streams that flow into salmonid habitat is a common practice that has been observed at many sites in Mendocino County, California.

Threats

The following discussion focuses on those threats that are rated as High or Very High (see Outlet Creek CAP Results). Recovery strategies will likely focus on ameliorating High rating threats; however, some strategies may address Medium and Low threats when the strategy is essential to recovery efforts. The figures and tables that display data used in this analysis are provided in Outlet Creek CAP Results.

Water Diversion and Impoundments

Threats from water diversions and impoundments in the Outlet Creek come from three moderately sized reservoirs and diversions associated with illegal cannabis production. Morris and Centennial dams operated by the City of Willits do not adhere to streamflow bypass requirements by CDFW, and as a result low summer flow in downstream areas limits steelhead production. The largest impoundment, the Boy Scout Dam (800 acre-feet), does not release adequate bypass flows, which will continue to impair summer flow for juvenile steelhead in Berry Creek and Outlet Creek. Lake Emily and Ada Rose are operated by the Brooktrails Township Community Services District (BTCSD). The BTCSD minimizes flow impacts by adhering to a release schedule that is set by CDFW. The larger reservoir, Lake Emily, is required to bypass flow for adult salmon and steelhead, and maintain natural flow releases downstream based on accurate and verifiable releases from a USGS gauging station that measures inflow to the reservoir.

Cannabis production is a serious and growing threat in this watershed. LeDoux-Bloom and Downie (2008) documented that diversion from large grows resulted in dry channels, stranded or dead juvenile salmonids, and reduced migration opportunities due to these impacts. These large grows can be legal (up to 99 plants) or illegal grows that require large stream diversions to supply plants during the summer growing season. This threat is likely to continue and become an increased source of stress on baseflow and water quality conditions for juvenile salmonids over the next decade.

Other Threats

Threats in the Outlet Creek basin that continue to stress salmonid habitat include roads, grazing, rural residential development, and timber harvesting. Erosion from poorly built and maintained riparian roads continues to reduce salmonid habitat suitability by delivering fine sediment to mainstem and tributary spawning and rearing reaches. Ongoing timber harvest and livestock grazing continue to degrade stream reaches through associated roads and riparian impacts. Rural residential development could become a High threat in the future; LeDoux-Bloom and Downie (2008) describe the large increase in human population across the watershed due to cannabis

production. We attempt to capture this threat in the water diversion section above, but other impacts from rural residential development, such as land clearing and road building, are likely to increase in the future.

Limiting Stresses, Lifestages, and Habitats

Threat and stress analysis within the CAP workbook suggest juvenile survival is likely limiting steelhead recovery in the Outlet Creek watershed. Low summer baseflows limit rearing areas across the basin. Impacts to baseflow during the summer from reservoir management and water diversions associated with cannabis cultivation and rural residential water use impact salmonid habitat suitability across the basin. Other habitat conditions that also limit juvenile salmonid production include poor floodplain connectivity and inadequate stream shelter and pool habitat. Although shade canopy is rated as Fair for surveyed reaches in the watershed, stream temperatures across much of the basin contribute to reduced juvenile habitat suitability. In addition there are tributaries across the basin that continue to be affected by high sediment yields that fill pools and reduce spawning habitat quality. Restoration actions should address these issues within specific sub basins to increase juvenile steelhead survival and carrying capacity in tributaries.

General Recovery Strategy

Minimum bypass flow requirements at Centennial, Morris, and Boy Scout reservoirs need to be implemented to improve summer habitat conditions below these facilities. Address water diversion and groundwater extraction causing reduced and disconnected flow conditions throughout the basin. Federal, state and local government representatives or community groups should work with landowners to implement creative solutions that minimize these effects. Solutions should examine conservation methods, water management planning, and water storage and recharge. In addition, improved coordination between NMFS, CDFW, and county law enforcement agencies must be implemented to reduce the number of illegal stream diversions within this basin.

Improve Canopy Cover and LWD Volume

Much of the Outlet Creek watershed would benefit from improved riparian composition and structure, which would increase stream shading, improve LWD recruitment, and increase instream shelter for juvenile fish. General practices to improve riparian condition include improving riparian areas protection (*e.g.*, increasing the number of riparian conservation easements), reducing development in riparian areas, and implementing riparian planting and livestock exclusion fencing.

Address Riparian Road Sediment Sources

Riparian roads associated with various land uses exist throughout the basin. Many of these roads need to be upgraded to reduce fine sediment delivery into streams. Problem roads and active erosion sites should be prioritized and addressed as part of a comprehensive sediment reduction plan at the subbasin level. Rural residential development and associated grading activities must be closely monitored and controlled by the County of Mendocino, or state agencies to minimize soil disturbance and sediment delivery to stream channels.

Increase Instream Shelter Ratings and Pool Volume

Shelter ratings are Low within many (90 percent) of the surveyed stream reaches of the Outlet Creek watershed. Due largely to an absence of LWD, quality pool habitat is absent and shelter components are comprised mainly of undercut banks and aquatic vegetation. Where applicable, restoration efforts should incorporate instream wood/boulder structures and/or large conifers (*i.e.*, fall trees) into degraded reaches to improve shelter and overall habitat complexity. Also, floodplain connectivity should be improved in low gradient stream reaches occurring in the Willits Valley and Outlet Creek.

Improve Passage at Migration Barriers

Addressing migration barriers caused by road and railroad crossings would improve habitat utilization for both spawning adults and rearing juveniles. There should be further assessments of a number of existing natural barriers, such as Cherry Creek, to determine the potential to provide passage above these barriers for additional habitat utilization by steelhead. Also, studies should be initiated to evaluate the potential for passage and rearing above the larger reservoirs, such as Lake Emily. Passage above these reservoirs may re-open many miles of habitat that was historically available to this population.

Literature Cited

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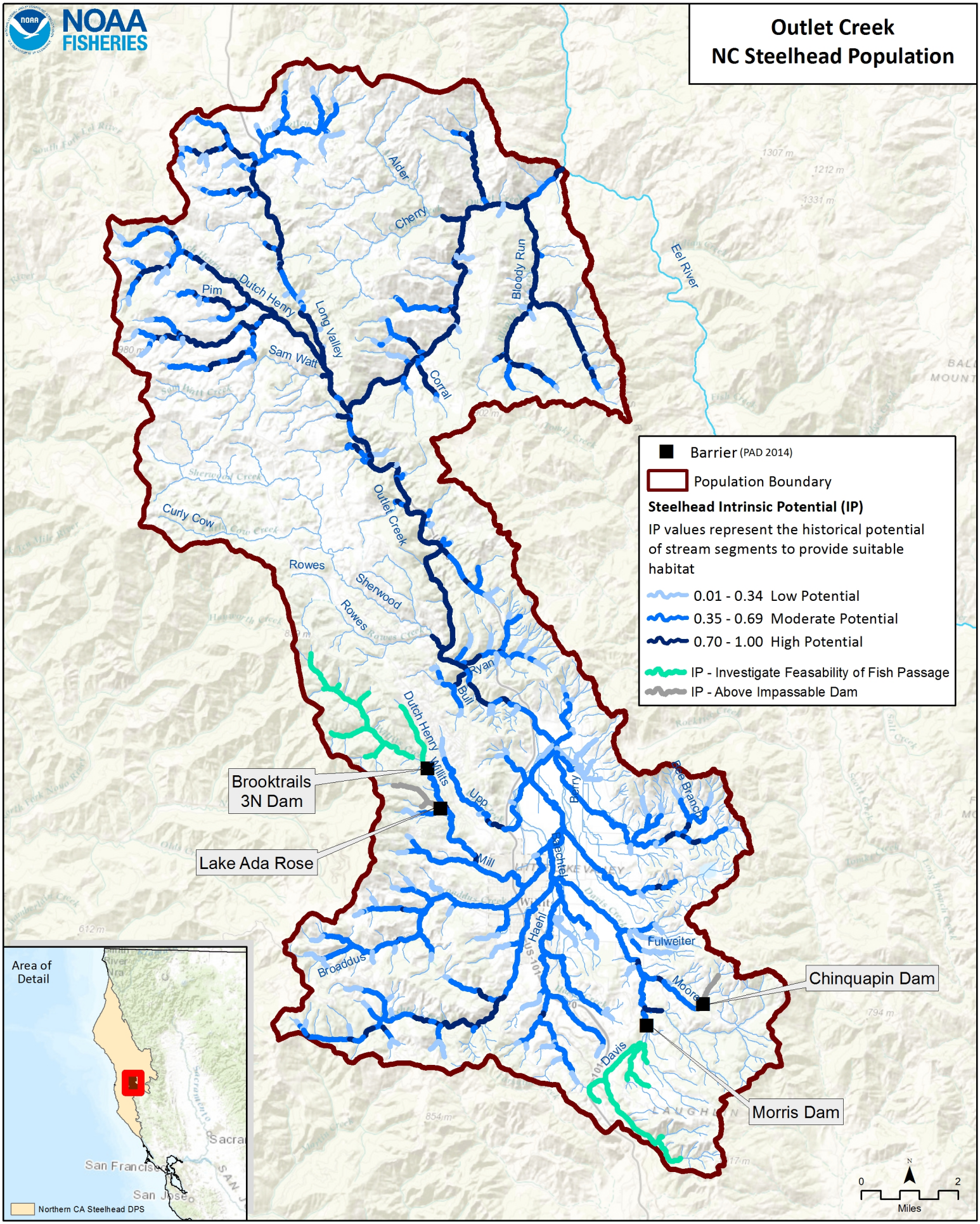
Spence, B. C., E. P. Bjorkstedt, S. Paddock, and L. Nanus. 2012. Updates to biological viability criteria for threatened steelhead populations in the North-Central California Coast Recovery Domain. National Marine Fisheries Service, Southwest Fisheries Science Center, Fisheries Ecology Division, Santa Cruz, CA.


NOAA FISHERIES
Outlet Creek
NC Steelhead Population
Barrier (PAD 2014)
Population Boundary
Steelhead Intrinsic Potential (IP)
IP values represent the historical potential of stream segments to provide suitable habitat
0.01 - 0.34 Low Potential
0.35 - 0.69 Moderate Potential
0.70 - 1.00 High Potential
IP - Investigate Feasability of Fish Passage
IP - Above Impassable Dam
Brooktrails 3N Dam
Lake Ada Rose
Chinquapin Dam
Morris Dam
Alder
Cherry
Bloody Run
Eel River
Pim
Dutch Henry
Long Valley
Sam Watt
Corral
Curly Cow
Outlet Creek
Rowes
Sherwood
Ryan
Bull
Willits
Upp
Mill
Haehl
Fulweiter
Broaddus
Moore
Davis
Area of Detail
Northern CA Steelhead DPS
San Francisco
San Jose
0
2
Miles

#	Conservation Target	Category	Key Attribute	Indicator	Poor	Fair	Good	Very Good	Current Indicator Measurement	Current Rating
1	Adults	Condition	Habitat Complexity	Large Wood Frequency (BFW 0-10 meters)	<50% of streams/ IP-Km (>6 Key Pieces/100 meters)	50% to 74% of streams/ IP-Km (>6 Key Pieces/100 meters)	75% to 90% of streams/ IP-Km (>6 Key Pieces/100 meters)	>90% of streams/ IP-Km (>6 Key Pieces/100 meters)	<50% of streams/ IP-km (>6 Key Pieces/100 meters)	Poor
			Habitat Complexity	Large Wood Frequency (BFW 10-100 meters)	<50% of streams/ IP-Km (>1.3 Key Pieces/100 meters)	50% to 74% of streams/ IP-Km (>1.3 Key Pieces/100 meters)	75% to 90% of streams/ IP-Km (>1.3 Key Pieces/100 meters)	>90% of streams/ IP-Km (>1.3 Key Pieces/100 meters)	<50% of streams/ IP-km (>1.3 Key Pieces/100 meters)	Poor
			Habitat Complexity	Pool/Riffle/Flatwater Ratio	<50% of streams/ IP-Km (>40% Pools; >20% Riffles)	50% to 74% of streams/ IP-Km (>40% Pools; >20% Riffles)	75% to 90% of streams/ IP-Km (>40% Pools; >20% Riffles)	>90% of streams/ IP-Km (>40% Pools; >20% Riffles)	50% to 74% of streams/ IP-km (>40% Pools; >20% Riffles)	Fair
			Habitat Complexity	Shelter Rating	<50% of streams/ IP-Km (>80 stream average)	50% to 74% of streams/ IP-Km (>80 stream average)	75% to 90% of streams/ IP-Km (>80 stream average)	>90% of streams/ IP-Km (>80 stream average)	<50% of streams/ IP-km (>80 stream average)	Poor
			Hydrology	Passage Flows	NMFS Flow Protocol: Risk Factor Score >75	NMFS Flow Protocol: Risk Factor Score 51-75	NMFS Flow Protocol: Risk Factor Score 35-50	NMFS Flow Protocol: Risk Factor Score <35	NMFS Flow Protocol: Risk Factor Score 51-75	Fair
			Passage/Migration	Passage at Mouth or Confluence	<50% of IP-Km or <16 IP-Km accessible*	50% of IP-Km to 74% of IP-km	75% of IP-Km to 90% of IP-km	>90% of IP-km	50% of IP-km to 74% of IP-km	Fair
			Passage/Migration	Physical Barriers	<50% of IP-Km or <16 IP-Km accessible*	50% of IP-Km to 74% of IP-km	75% of IP-Km to 90% of IP-km	>90% of IP-km	50% of IP-km to 74% of IP-km	Fair
			Riparian Vegetation	Tree Diameter (North of SF Bay)	≤39% Class 5 & 6 across IP-km	40 - 54% Class 5 & 6 across IP-km	55 - 69% Class 5 & 6 across IP-km	>69% Class 5 & 6 across IP-km	?39% Class 5 & 6 across IP-km	Poor
			Riparian Vegetation	Tree Diameter (South of SF Bay)	≤69% Density rating "D" across IP-km	70-79% Density rating "D" across IP-km	≥80% Density rating "D" across IP-km	Not Defined		

			Sediment	Quantity & Distribution of Spawning Gravels	<50% of IP-Km or <16 IP-Km accessible*	50% of IP-Km to 74% of IP-km	75% of IP-Km to 90% of IP-km	>90% of IP-km	75% of IP-km to 90% of IP-km	Good
			Velocity Refuge	Floodplain Connectivity	<50% Response Reach Connectivity	50-80% Response Reach Connectivity	>80% Response Reach Connectivity	Not Defined	<50% Response Reach Connectivity	Poor
			Water Quality	Toxicity	Acute	Sublethal or Chronic	No Acute or Chronic	No Evidence of Toxins or Contaminants	Sublethal or Chronic	Fair
			Water Quality	Turbidity	<50% of streams/ IP-Km maintains severity score of 3 or lower	50% to 74% of streams/ IP-Km maintains severity score of 3 or lower	75% to 90% of streams/ IP-Km maintains severity score of 3 or lower	>90% of streams/ IP-Km maintains severity score of 3 or lower	50% to 74% of streams/ IP-km maintains severity score of 3 or lower	Fair
		Size	Viability	Density	<1 Spawner per IP-km (Spence et al 2012)	>1 spawner per IP-km to < low risk spawner density per Spence et al (2012)	low risk spawner density per Spence et al (2012)		>1 spawner per IP-km to < low risk spawner density per Spence et al (2012)	Fair
2	Eggs	Condition	Hydrology	Flow Conditions (Instantaneous Condition)	NMFS Flow Protocol: Risk Factor Score >75	NMFS Flow Protocol: Risk Factor Score 51-75	NMFS Flow Protocol: Risk Factor Score 35-50	NMFS Flow Protocol: Risk Factor Score <35	NMFS Flow Protocol: Risk Factor Score 35-50	Good
			Hydrology	Redd Scour	NMFS Flow Protocol: Risk Factor Score >75	NMFS Flow Protocol: Risk Factor Score 51-75	NMFS Flow Protocol: Risk Factor Score 35-50	NMFS Flow Protocol: Risk Factor Score <35	NMFS Flow Protocol: Risk Factor Score 35-50	Good
			Sediment	Gravel Quality (Bulk)	>17% (0.85mm) and >30% (6.4mm)	15-17% (0.85mm) and <30% (6.4mm)	12-14% (0.85mm) and <30% (6.4mm)	<12% (0.85mm) and <30% (6.4mm)	15-17% (0.85mm) and <30% (6.4mm)	Fair
			Sediment	Gravel Quality (Embeddedness)	<50% of streams/ IP-Km (>50% stream average scores of 1 & 2)	50% to 74% of streams/ IP-Km (>50% stream average scores of 1 & 2)	75% to 90% of streams/ IP-Km (>50% stream average scores of 1 & 2)	>90% of streams/ IP-Km (>50% stream average scores of 1 & 2)	<50% of streams/ IP-km (>50% stream average scores of 1 & 2)	Poor

3	Summer Rearing Juveniles	Condition	Estuary/Lagoon	Quality & Extent	Impaired/non-functional	Impaired but functioning	Properly Functioning Condition	Unimpaired Condition	Impaired but functioning	Fair
			Habitat Complexity	Large Wood Frequency (Bankfull Width 0-10 meters)	<50% of streams/ IP-Km (>6 Key Pieces/100 meters)	50% to 74% of streams/ IP-Km (>6 Key Pieces/100 meters)	75% to 90% of streams/ IP-Km (>6 Key Pieces/100 meters)	>90% of streams/ IP-Km (>6 Key Pieces/100 meters)	<50% of streams/ IP-km (>6 Key Pieces/100 meters)	Poor
			Habitat Complexity	Large Wood Frequency (Bankfull Width 10-100 meters)	<50% of streams/ IP-Km (>1.3 Key Pieces/100 meters)	50% to 74% of streams/ IP-Km (>1.3 Key Pieces/100 meters)	75% to 90% of streams/ IP-Km (>1.3 Key Pieces/100 meters)	>90% of streams/ IP-Km (>1.3 Key Pieces/100 meters)	<50% of streams/ IP-km (>1.3 Key Pieces/100 meters)	Poor
			Habitat Complexity	Percent Primary Pools	<50% of streams/ IP-Km (>40% average primary pool frequency)	51% to 74% of streams/ IP-Km (>40% average primary pool frequency)	75% to 89% of streams/ IP-Km (>40% average primary pool frequency)	>90% of streams/ IP-Km (>40% average primary pool frequency)	<50% of streams/ IP-km (>40% average primary pool frequency)	Poor
			Habitat Complexity	Pool/Riffle/Flatwater Ratio	<50% of streams/ IP-Km (>40% Pools; >20% Riffles)	50% to 74% of streams/ IP-Km (>40% Pools; >20% Riffles)	75% to 90% of streams/ IP-Km (>40% Pools; >20% Riffles)	>90% of streams/ IP-Km (>40% Pools; >20% Riffles)	50% to 74% of streams/ IP-km (>40% Pools; >20% Riffles)	Fair
			Habitat Complexity	Shelter Rating	<50% of streams/ IP-Km (>80 stream average)	50% to 74% of streams/ IP-Km (>80 stream average)	75% to 90% of streams/ IP-Km (>80 stream average)	>90% of streams/ IP-Km (>80 stream average)	<50% of streams/ IP-km (>80 stream average)	Poor
			Hydrology	Flow Conditions (Baseflow)	NMFS Flow Protocol: Risk Factor Score >75	NMFS Flow Protocol: Risk Factor Score 51-75	NMFS Flow Protocol: Risk Factor Score 35-50	NMFS Flow Protocol: Risk Factor Score <35	NMFS Flow Protocol: Risk Factor Score >75	Poor
			Hydrology	Flow Conditions (Instantaneous Condition)	NMFS Flow Protocol: Risk Factor Score >75	NMFS Flow Protocol: Risk Factor Score 51-75	NMFS Flow Protocol: Risk Factor Score 35-50	NMFS Flow Protocol: Risk Factor Score <35	NMFS Flow Protocol: Risk Factor Score >75	Poor
			Hydrology	Number, Condition and/or Magnitude of Diversions	>5 Diversions/10 IP km	1.1 - 5 Diversions/10 IP km	0.01 - 1 Diversions/10 IP km	0 Diversions	>5 Diversions/10 IP-km	Poor
			Passage/Migration	Passage at Mouth or Confluence	<50% of IP-Km or <16 IP-Km accessible*	50% of IP-Km to 74% of IP-km	75% of IP-Km to 90% of IP-km	>90% of IP-km	50% of IP-km to 74% of IP-km	Fair

			Passage/Migration	Physical Barriers	<50% of IP-Km or <16 IP-Km accessible*	50% of IP-Km to 74% of IP-km	75% of IP-Km to 90% of IP-km	>90% of IP-km	<50% of IP-km or <16 IP-km accessible*	Poor
			Riparian Vegetation	Canopy Cover	<50% of streams/ IP-Km (>70% average stream canopy; >85% where coho IP overlaps)	50% to 74% of streams/ IP-Km (>70% average stream canopy; >85% where coho IP overlaps)	75% to 90% of streams/ IP-Km (>70% average stream canopy; >85% where coho IP overlaps)	>90% of streams/ IP-Km (>70% average stream canopy; >85% where coho IP overlaps)	50% to 74% of streams/ IP-km (>70% average stream canopy; >85% where coho IP overlaps)	Fair
			Riparian Vegetation	Tree Diameter (North of SF Bay)	≤39% Class 5 & 6 across IP-km	40 - 54% Class 5 & 6 across IP-km	55 - 69% Class 5 & 6 across IP-km	>69% Class 5 & 6 across IP-km	?39% Class 5 & 6 across IP-km	Poor
			Riparian Vegetation	Tree Diameter (South of SF Bay)	≤69% Density rating "D" across IP-km	70-79% Density rating "D" across IP-km	≥80% Density rating "D" across IP-km	Not Defined		
			Sediment (Food Productivity)	Gravel Quality (Embeddedness)	<50% of streams/ IP-Km (>50% stream average scores of 1 & 2)	50% to 74% of streams/ IP-Km (>50% stream average scores of 1 & 2)	75% to 90% of streams/ IP-Km (>50% stream average scores of 1 & 2)	>90% of streams/ IP-Km (>50% stream average scores of 1 & 2)	50% to 74% of streams/ IP-km (>50% stream average scores of 1 & 2)	Fair
			Water Quality	Temperature (MWMT)	<50% IP km (<20 C MWMT; <16 C MWMT where coho IP overlaps)	50 to 74% IP km (<20 C MWMT; <16 C MWMT where coho IP overlaps)	75 to 89% IP km (<20 C MWMT; <16 C MWMT where coho IP overlaps)	>90% IP km (<20 C MWMT; <16 C MWMT where coho IP overlaps)	<50% IP-km (<20 C MWMT; <16 C MWMT where coho IP overlaps)	Poor
			Water Quality	Toxicity	Acute	Sublethal or Chronic	No Acute or Chronic	No Evidence of Toxins or Contaminants	Sublethal or Chronic	Fair
			Water Quality	Turbidity	<50% of streams/ IP-Km maintains severity score of 3 or lower	50% to 74% of streams/ IP-Km maintains severity score of 3 or lower	75% to 90% of streams/ IP-Km maintains severity score of 3 or lower	>90% of streams/ IP-Km maintains severity score of 3 or lower	50% to 74% of streams/ IP-km maintains severity score of 3 or lower	Fair
		Size	Viability	Density	<0.2 Fish/m^2	0.2 - 0.6 Fish/m^2	0.7 - 1.5 Fish/m^2	>1.5 Fish/m^2	0.2 - 0.6 Fish/m^2	Fair
			Viability	Spatial Structure	<50% of Historical Range	50-74% of Historical Range	75-90% of Historical Range	>90% of Historical Range	50-74% of Historical Range	Fair

4	Winter Rearing Juveniles	Condition	Habitat Complexity	Large Wood Frequency (Bankfull Width 0-10 meters)	<50% of streams/ IP-Km (>6 Key Pieces/100 meters)	50% to 74% of streams/ IP-Km (>6 Key Pieces/100 meters)	75% to 90% of streams/ IP-Km (>6 Key Pieces/100 meters)	>90% of streams/ IP-Km (>6 Key Pieces/100 meters)	<50% of streams/ IP-km (>6 Key Pieces/100 meters)	Poor
			Habitat Complexity	Large Wood Frequency (Bankfull Width 10-100 meters)	<50% of streams/ IP-Km (>1.3 Key Pieces/100 meters)	50% to 74% of streams/ IP-Km (>1.3 Key Pieces/100 meters)	75% to 90% of streams/ IP-Km (>1.3 Key Pieces/100 meters)	>90% of streams/ IP-Km (>1.3 Key Pieces/100 meters)	<50% of streams/ IP-km (>1.3 Key Pieces/100 meters)	Poor
			Habitat Complexity	Pool/Riffle/Flatwater Ratio	<50% of streams/ IP-Km (>40% Pools; >20% Riffles)	50% to 74% of streams/ IP-Km (>40% Pools; >20% Riffles)	75% to 90% of streams/ IP-Km (>40% Pools; >20% Riffles)	>90% of streams/ IP-Km (>40% Pools; >20% Riffles)	50% to 74% of streams/ IP-km (>40% Pools; >20% Riffles)	Fair
			Habitat Complexity	Shelter Rating	<50% of streams/ IP-Km (>80 stream average)	50% to 74% of streams/ IP-Km (>80 stream average)	75% to 90% of streams/ IP-Km (>80 stream average)	>90% of streams/ IP-Km (>80 stream average)		
			Passage/Migration	Physical Barriers	<50% of IP-Km or <16 IP-Km accessible*	50% of IP-Km to 74% of IP-km	75% of IP-Km to 90% of IP-km	>90% of IP-km	50% of IP-km to 74% of IP-km	Fair
			Riparian Vegetation	Tree Diameter (North of SF Bay)	≤39% Class 5 & 6 across IP-km	40 - 54% Class 5 & 6 across IP-km	55 - 69% Class 5 & 6 across IP-km	>69% Class 5 & 6 across IP-km	?39% Class 5 & 6 across IP-km	Poor
			Riparian Vegetation	Tree Diameter (South of SF Bay)	≤69% Density rating "D" across IP-km	70-79% Density rating "D" across IP-km	≥80% Density rating "D" across IP-km	Not Defined		
			Sediment (Food Productivity)	Gravel Quality (Embeddedness)	<50% of streams/ IP-Km (>50% stream average scores of 1 & 2)	50% to 74% of streams/ IP-Km (>50% stream average scores of 1 & 2)	75% to 90% of streams/ IP-Km (>50% stream average scores of 1 & 2)	>90% of streams/ IP-Km (>50% stream average scores of 1 & 2)	50% to 74% of streams/ IP-km (>50% stream average scores of 1 & 2)	Fair
			Velocity Refuge	Floodplain Connectivity	<50% Response Reach Connectivity	50-80% Response Reach Connectivity	>80% Response Reach Connectivity	Not Defined	<50% Response Reach Connectivity	Poor
			Water Quality	Toxicity	Acute	Sublethal or Chronic	No Acute or Chronic	No Evidence of Toxins or Contaminants	Sublethal or Chronic	Fair

			Water Quality	Turbidity	<50% of streams/ IP-Km maintains severity score of 3 or lower	50% to 74% of streams/ IP-Km maintains severity score of 3 or lower	75% to 90% of streams/ IP-Km maintains severity score of 3 or lower	>90% of streams/ IP-Km maintains severity score of 3 or lower		
5	Smolts	Condition	Estuary/Lagoon	Quality & Extent	Impaired/non-functional	Impaired but functioning	Properly Functioning Condition	Unimpaired Condition	Properly Functioning Condition	Good
			Habitat Complexity	Shelter Rating	<50% of streams/ IP-Km (>80 stream average)	50% to 74% of streams/ IP-Km (>80 stream average)	75% to 90% of streams/ IP-Km (>80 stream average)	>90% of streams/ IP-Km (>80 stream average)	<50% of streams/ IP-km (>80 stream average)	Poor
			Hydrology	Number, Condition and/or Magnitude of Diversions	>5 Diversions/10 IP km	1.1 - 5 Diversions/10 IP km	0.01 - 1 Diversions/10 IP km	0 Diversions	1.1 - 5 Diversions/10 IP-km	Fair
			Hydrology	Passage Flows	NMFS Flow Protocol: Risk Factor Score >75	NMFS Flow Protocol: Risk Factor Score 51-75	NMFS Flow Protocol: Risk Factor Score 35-50	NMFS Flow Protocol: Risk Factor Score <35	NMFS Flow Protocol: Risk Factor Score 51-75	Fair
			Passage/Migration	Passage at Mouth or Confluence	<50% of IP-Km or <16 IP-Km accessible*	50% of IP-Km to 74% of IP-km	75% of IP-Km to 90% of IP-km	>90% of IP-km	75% of IP-km to 90% of IP-km	Good
			Smoltification	Temperature	<50% IP-Km (>6 and <14 C)	50-74% IP-Km (>6 and <14 C)	75-90% IP-Km (>6 and <14 C)	>90% IP-Km (>6 and <14 C)	50-74% IP-km (>6 and <14 C)	Fair
			Water Quality	Toxicity	Acute	Sublethal or Chronic	No Acute or Chronic	No Evidence of Toxins or Contaminants	Sublethal or Chronic	Fair
			Water Quality	Turbidity	<50% of streams/ IP-Km maintains severity score of 3 or lower	50% to 74% of streams/ IP-Km maintains severity score of 3 or lower	75% to 90% of streams/ IP-Km maintains severity score of 3 or lower	>90% of streams/ IP-Km maintains severity score of 3 or lower	50% to 74% of streams/ IP-km maintains severity score of 3 or lower	Fair
		Size	Viability	Abundance	Smolt abundance which produces high risk spawner density per Spence (2008)	Smolt abundance which produces moderate risk spawner density per Spence (2008)	Smolt abundance to produce low risk spawner density per Spence (2008)		23,400 - 470,000 = Smolt abundance which produces moderate risk spawner density per Spence (2008)	Fair

6	Watershed Processes	Landscape Context	Hydrology	Impervious Surfaces	>10% of Watershed in Impervious Surfaces	7-10% of Watershed in Impervious Surfaces	3-6% of Watershed in Impervious Surfaces	<3% of Watershed in Impervious Surfaces	<3% of Watershed in Impervious Surfaces	Very Good
			Landscape Patterns	Agriculture	>30% of Watershed in Agriculture	20-30% of Watershed in Agriculture	10-19% of Watershed in Agriculture	<10% of Watershed in Agriculture	20-30% of Watershed in Agriculture	Fair
			Landscape Patterns	Timber Harvest	>35% of Watershed in Timber Harvest	26-35% of Watershed in Timber Harvest	25-15% of Watershed in Timber Harvest	<15% of Watershed in Timber Harvest	25-15% of Watershed in Timber Harvest	Good
			Landscape Patterns	Urbanization	>20% of watershed >1 unit/20 acres	12-20% of watershed >1 unit/20 acres	8-11% of watershed >1 unit/20 acres	<8% of watershed >1 unit/20 acres	12-20% of watershed >1 unit/20 acres	Fair
			Riparian Vegetation	Species Composition	<25% Intact Historical Species Composition	25-50% Intact Historical Species Composition	51-74% Intact Historical Species Composition	>75% Intact Historical Species Composition	25-50% Intact Historical Species Composition	Fair
			Sediment Transport	Road Density	>3 Miles/Square Mile	2.5 to 3 Miles/Square Mile	1.6 to 2.4 Miles/Square Mile	<1.6 Miles/Square Mile	2.5 to 3 Miles/Square Mile	Fair
			Sediment Transport	Streamside Road Density (100 m)	>1 Miles/Square Mile	0.5 to 1 Miles/Square Mile	0.1 to 0.4 Miles/Square Mile	<0.1 Miles/Square Mile	>1 Miles/Square Mile	Poor

Outlet Creek CAP Viability Results

	Threats Across Targets	Adults	Eggs	Summer Rearing Juveniles	Winter Rearing Juveniles	Smolts	Watershed Processes	Overall Threat Rank
	Project-specific-threats	1	2	3	4	5	6	
1	Agriculture	Low	Low	Medium	Medium	Low	Medium	Medium
2	Channel Modification	Low	Low	Medium	High	Low	Low	Medium
3	Disease, Predation and Competition							
4	Hatcheries and Aquaculture							
5	Fire, Fuel Management and Fire Suppression		Low	Low	Low	Low	Low	Low
6	Fishing and Collecting	Low		Low				Low
7	Livestock Farming and Ranching	Low	Low	Medium	Medium	Low	Medium	Medium
8	Logging and Wood Harvesting	Low	Low	Medium	Medium	Low	Medium	Medium
9	Mining	Low	Low					Low
10	Recreational Areas and Activities							
11	Residential and Commercial Development	Low	Low	Medium	Medium	Low	Medium	Medium
12	Roads and Railroads	Low	Medium	Medium	Medium	Low	Medium	Medium
13	Severe Weather Patterns	Low	Low	High	Medium	Low	Medium	Medium
14	Water Diversion and Impoundments	Medium	Medium	Very High	High	Medium	High	High
	Threat Status for Targets and Project	Medium	Medium	High	High	Medium	High	High

Outlet Creek, Northern California Steelhead (Lower Interior) Recovery Actions

Action ID	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partner	Costs ($K)						Comment
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25	Entire Duration	
OC-NCSW-2.1	**Objective**	**Floodplain Connectivity**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
OC-NCSW-2.1.1	Recovery Action	Floodplain Connectivity	Rehabilitate and enhance floodplain connectivity										
OC-NCSW-2.1.1.1	Action Step	Floodplain Connectivity	Increase the frequency and functionality of floodplain habitats to improve over-winter survival.	2	10		223.50	223.50				447	Cost based on treating 12 miles (assume 1 project/mile in 25% high IP with 80 acres/mile) at a rate of $37,200/acre.
OC-NCSW-2.1.1.2	Action Step	Floodplain Connectivity	Create flood refuge habitat, such as hydrologically connected floodplains with riparian forest, removal of levees, and use streamway concept where appropriate.	2	20							0	Cost accounted for in above action step.
OC-NCSW-2.1.1.3	Action Step	Floodplain Connectivity	Work with landowners in the Willits Valley to restore floodplain connectivity within stream reaches of Outlet Creek, Davis Creek, lower Baechtel Creek and Haehl Creek are high priority for these actions.	1	20	Mendocino County RCD, NRCS, Private Landowners						0	Cost account for in above action step
OC-NCSW-3.1	**Objective**	**Hydrology**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
OC-NCSW-3.1.1	Recovery Action	Hydrology	Improve flow conditions										
OC-NCSW-3.1.1.1	Action Step	Hydrology	Improve bypass flows from existing reservoirs to maintain migratory passage for adult and juvenile steelhead, and to maintain good summer water quality.	1	10	CDFW, City of Willits, NMFS						0	Action is considered In-Kind
OC-NCSW-3.1.1.2	Action Step	Hydrology	Work with the City of Willits and the Boy Scouts of America to provide adequate bypass flow from Morris, and Centennial reservoirs, and the Boy Scout reservoir. Adequate bypass flows will maintain migratory passage for adult and juvenile steelhead, and maintain good summer water quality. Bypass flow requirements should follow those being implemented at Lake Emily by the Brook Trails Township Community Services District.	1	10	CDFW, City of Willits, NMFS						0	Action is considered In-Kind
OC-NCSW-3.1.2	Recovery Action	Hydrology	Improve flow conditions (baseflow condition)										
OC-NCSW-3.1.2.1	Action Step	Hydrology	Identify and work with the SWRCB to eliminate depletion of summer base flows from unauthorized water uses. Coordinated efforts by Federal and State, and County law enforcement agencies are required to remove illegal diversions from streams across the Outlet Creek watershed.	1	25	CDFW, COMMET, NMFS, SWRCB						0	Action is considered In-Kind
OC-NCSW-5.1	**Objective**	**Passage**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
OC-NCSW-5.1.1	Recovery Action	Passage	Modify or remove physical passage barriers										
OC-NCSW-5.1.1.1	Action Step	Passage	Evaluate and prioritize existing list of passage barriers documented by CDFW and identified in the Passage Assessment Database (PAD).	1	10							0	Action is considered In-Kind
OC-NCSW-5.1.1.2	Action Step	Passage	Develop and implement fish passage projects based on priority from list developed by CDFW (biologist Scott Harris).	1	10	CDFW, NMFS, Private Landowners						TBD	Estimate can not be made at this time.
OC-NCSW-5.1.1.3	Action Step	Passage	Evaluate the potential for adult passage natural barriers within the Outlet Creek basin. Streams such as Cherry Creek and Sherwood Creek are a high priority for evaluation and potential projects.	1	5	CDFW, NMFS, Private Landowners	4,930					4,930	Cost based on 5 known passage barriers assuming standard rate of passage estimated at $986,000/mile

Outlet Creek, Northern California Steelhead (Lower Interior) Recovery Actions

Action ID	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partner	Costs ($K)						Comment
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25	Entire Duration	
OC-NCSW-5.1.1.4	Action Step	Passage	Evaluate and prescribe appropriate volitional and/or non-volitional passage methodologies for the following long standing dams in the Outlet Creek watershed. Lake Emily PAD 718927 on Willits Creek, Centennial Dam PAD 719282, and Morris Dam PAD 718926 on Davis Creek.	2	25	CDFW, COMMET, NMFS, SWRCB						0	Action is considered In-Kind
OC-NCSW-5.1.1.5	Action Step	Passage	Evaluate, design, and implement appropriate fish passage at Moss Cove Creek Passage ID 707088.	1	5	CDFW, NMFS, Private Landowners	653					653	Cost based on treating double box culverts with a new fish ladder at a rate of $653,406/ladder.
6OC-NCSW-5.1.1.7	Action Step	Passage	Evaluate, design, and implement appropriate fish passage at unnamed tributary to Haehl Creek Passage ID 712894.	1	5	CDFW, NMFS, Private Landowners	654					654	Cost based on implementing a new fish ladder estimated at $$653,406/ladder.
OC-NCSW-5.1.1.7	Action Step	Passage	Evaluate, design, and implement appropriate fish passage on Long Valley Creek at Highway 101 at three sites (Passage ID 707090, 707091, and 707094).	1	5	CDFW, NMFS, Private Landowners	1,961					1,961	Cost based on installing 3 new fish ladders at an estimate of $653,406/ladder. Cost can vary depending on feasible alternatives.
OC-NCSW-5.1.1.8	Action Step	Passage	Evaluate, design, and implement appropriate fish passage at the culvert on an unnamed tributary Passage ID 730536.	2	5	CDFW, NMFS, Private Landowners	231.00					231	Cost based on replacing culvert at an estimated rate of $230,411.
OC-NCSW-5.1.1.9	Action Step	Passage	Evaluate, design, and implement appropriate fish passage at road crossing on Haehl Creek Passage ID 712822).	1	5	CDFW, NMFS, Private Landowners	231.00					231	Cost based on updating culvert at an estimate of $230,411.
OC-NCSW-5.1.1.10	Action Step	Passage	Evaluate, design, and implement appropriate fish passage at south and north fork of Fulweiter Creek on Eastside Road Passage ID 735068, and 705898).	1	5	CDFW, NMFS, Private Landowners	654					654	Cost based to replace culvert at an estimate $653,046.
OC-NCSW-5.1.1.11	Action Step	Passage	Evaluate, design, and implement appropriate fish passage at Moore Creek Passage ID 707894).	1	5	CDFW, NMFS, Private Landowners	65.00					65	Cost based on improving species migration pattern at a road crossing for a tributary at an estimate of $65,000/unit.
OC-NCSW-5.1.1.12	Action Step	Passage	Evaluate, design, and implement appropriate fish passage at a tributary to Davis Creek on Eastside Road Passage ID 705897.	1	5	CDFW, NMFS, Private Landowners	65.00					65	Cost based on improving species migration pattern at a road crossing for a tributary at an estimate of $65,000/unit.
OC-NCSW-5.1.1.13	Action Step	Passage	Evaluate, design, and implement appropriate fish passage at the Hamman Driveway on Ryan Creek Passage ID 712813.	2	5	CDFW, NMFS, Private Landowners	65.00					65	Cost based on improving species migration pattern at a road crossing for a tributary at an estimate of $65,000/unit.
OC-NCSW-5.1.1.14	Action Step	Passage	Evaluate, design, and implement appropriate fish passage at Ryan Creek on Ryan Creek Road Passage ID 705896.	2	10	CDFW, NMFS, Private Landowners	32.50	32.50				65	Cost based on improving species migration pattern at a road crossing for a tributary at an estimate of $65,000/unit.
OC-NCSW-5.1.1.15	Action Step	Passage	Evaluate, design, and implement appropriate fish passage at an unnamed tributary to Outlet Creek Passage ID 713155.	2	5	CDFW, NMFS, Private Landowners	65.00					65	Cost based on improving species migration pattern at a road crossing for a tributary at an estimate of $65,000/unit.
OC-NCSW-6.1	**Objective**	**Habitat Complexity**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
OC-NCSW-6.1.1	Recovery Action	Habitat Complexity	Improve frequency of primary pools, LWD, and shelters										
OC-NCSW-6.1.1.1	Action Step	Habitat Complexity	Improve frequency of large woody debris, root wads, and boulders to improve habitat complexity, and pools. Focus efforts in Baechtel, Broaddus, Bloody Run, Cherry, Davis, Long Valley, Ryan creeks.	1	15	CDFW, NMFS, NRCS, Private Landowners	500	500	500			1,500	Estimate based on 30 miles of LWD and boulder structures at 50K.
OC-NCSW-6.1.1.2	Action Step	Habitat Complexity	Implement a large woody debris supplementation program to increase stream complexity and gravel retention, and improve pool frequency and depth.	2	10	CDFW, NMFS, NRCS, Private Landowners	309.00	309.00				618	Cost based on treating 24 miles (assume 1 project/mile in 50% high IP) at a rate of $26,000/mile. Cost should be coordinated with above action step.
OC-NCSW-6.1.1.3	Action Step	Habitat Complexity	Encourage landowners to implement restoration projects as part of their ongoing operations in stream reaches where large woody debris is lacking.	2	25	CDFW, NMFS, NRCS, Private Landowners						0	Action is considered In-Kind
OC-NCSW-7.1	**Objective**	**Riparian**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										

Outlet Creek, Northern California Steelhead (Lower Interior) Recovery Actions

Action ID	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partner	Costs ($K)						Comment
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25	Entire Duration	
OC-NCSW-7.1.1	Recovery Action	Riparian	Improve canopy cover										
OC-NCSW-7.1.1.1	Action Step	Riparian	Improve the structure and composition of riparian areas to provide shade, large woody debris input, nutrient input, bank stabilization.	2	20	CDFW, Mendocino County RCD, NMFS, Private Landowners	298	298	298	298		1,193	Cost based on treating 2.4 miles (assume 1 project/mile in 5% high IP with 24 acres/mile) at a rate of $20,719/mile
OC-NCSW-7.1.1.2	Action Step	Riparian	Promote streamside conservation measures, including conservation easements, setbacks, and riparian buffers.	3	20	CDFW, Mendocino County RCD, NMFS, Private Landowners						TBD	No cost estimate can be made at this time. Cost based on fair market value, landowner participation, and amount of streamside conservation measures necessary to recovery species.
OC-NCSW-7.1.1.3	Action Step	Riparian	Restore and expand riparian buffers to increase riparian canopy cover.	2	30	CDFW, Mendocino County RCD, NMFS, Private Landowners						0	Action is standard practice, and is considered In-Kind
OC-NCSW-7.1.1.4	Action Step	Riparian	Prioritize and fence riparian areas from grazing (using fencing standards that allow other wildlife to access the stream). Focus efforts on stream reaches within Baechtel Creek, Broaddus Creek, Davis Creek, Haehl Creek, and Long Valley Creek.	2	10	CDFW, Mendocino County RCD, NRCS, Private Landowners	23.00	23.00				46	Cost based on riparian fencing 2.4 miles (assume 1 project/mile in 5% high IP) at a rate of $3.63/ft.
OC-NCSW-15.1	**Objective**	**Fire/Fuel Management**	**Address the inadequacies of regulatory mechanisms**										
OC-NCSW-15.1.1	Recovery Action	Fire/Fuel Management	Prevent or minimize increased landscape disturbance										
OC-NCSW-15.1.1.1	Action Step	Fire/Fuel Management	Work with CalFire to develop a fuels reduction plan for the Outlet Creek watershed that reduces impacts to listed salmonids and reduces potential for large stand replacing fires.	2	20	BLM, NMFS, USFS, CalFire						0	Action is considered In-Kind
OC-NCSW-15.1.1.2	Action Step	Fire/Fuel Management	Work with CalFire and private landowners to improve coordination and planning of fuels reductions projects to avoid adverse impacts to riparian or in stream habitats in rural residential areas of the Outlet Creek watershed.	3	20							0	Action is considered In-Kind
OC-NCSW-16.1	**Objective**	**Fishing/Collecting**	**Address the inadequacy of existing regulatory mechanisms**										
OC-NCSW-16.1.1	Recovery Action	Fishing/Collecting	Prevent or minimize reduced density, abundance, and diversity based on the biological recovery criteria										
OC-NCSW-16.1.1.1	Action Step	Fishing/Collecting	NMFS and CDFW will work to improve the California Freshwater Sport Fishing Regulations to minimize take of adult salmonids.	2	5	CDFW, NMFS						0	Action is considered In-Kind
OC-NCSW-16.1.1.2	Action Step	Fishing/Collecting	Work with CDFW to improve protection for salmonids by modifying the California Code of Regulations Section 8.00 (a) (1-3) low flow restrictions for the Eel and Van Duzen rivers.	2	5	CDFW, NMFS						0	Action is considered In-Kind
OC-NCSW-23.1	**Objective**	**Roads/Railroads**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
OC-NCSW-23.1.1	Recovery Action	Roads/Railroads	Prevent or minimize alterations to sediment transport (road condition/density, dams, etc.)										
OC-NCSW-23.1.1.1	Action Step	Roads/Railroads	Develop a Riparian Road Sediment Reduction Plan that prioritizes sites and outlines implementation and a timeline of necessary actions.	1	10	CDFW, Mendocino County Department of Public Works, NMFS, Private Landowners	192.00	192.00				384	Cost based on road inventory of 401 miles at a rate of $957/mile.

Outlet Creek, Northern California Steelhead (Lower Interior) Recovery Actions

Action ID	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partner	Costs ($K)						Comment
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25	Entire Duration	
OC-NCSW-23.1.1.2	Action Step	Roads/Railroads	Implement riparian road upgrades identified in the Sediment Reduction Plan at high priority sites. High priority sites include unpaved roads in Ryan, Bull, Outlet creeks and possibly along reaches of upper Cherry Creek, Broaddus Creek, and Alder Creek (unnamed tributary entering from the west).	2	10	CDFW, Mendocino County RCD, NMFS, NRCS, Private Landowners	125.00	125.00				250	Cost based on treating 12 miles of road (assume 25% high IP) at a rate of $21,000/mile.
OC-NCSW-23.1.1.3	Action Step	Roads/Railroads	Work with the County of Mendocino DOT to upgrade existing high priority riparian road segments identified in the Sediment Reduction Plan.	1	10	CDFW, County of Mendocino, NMFS	200.00	200.00				400	Estimate based on 20 miles at $20k
OC-NCSW-23.1.1.4	Action Step	Roads/Railroads	Work with private landowners to upgrade existing high priority riparian roads, or those identified in the Sediment Reduction Plan.		10	CDFW, NMFS, Private Landowners	200.00	200.00				400	Estimate based on 40 miles at $10k
OC-NCSW-24.1	**Objective**	**Severe Weather Patterns**	**Address other natural or manmade factors affecting the species continued existence**										
OC-NCSW-24.1.1	Recovery Action	Severe Weather Patterns	Prevent or minimize impairment to stream hydrology (impaired water flow)										
OC-NCSW-24.1.1.1	Action Step	Severe Weather Patterns	Maintain existing instream salmonid habitat by minimizing water use and diversion during drought periods.	3	25							0	Water conservation is considered standard practice, and action is considered In-Kind.
OC-NCSW-24.1.1.2	Action Step	Severe Weather Patterns	Work with rural residential water users within the Covelo area to implement water conservation, reclamation and water reuse measures.	2	20	County of Mendocino, NOAA RC, Private Landowners						0	Action is considered In-Kind
OC-NCSW-24.1.1.3	Action Step	Severe Weather Patterns	Work with land owners or public agencies to acquire water that would be utilized to minimize effects of droughts.	2	20	County of Mendocino, NMFS, NOAA RC, Private Landowners	250.00					250	Very rough estimate for acquiring water. We assume 100 acre feet is acquired at 500 dollars per acre foot which equals $50K. We assume 5 drought years over the next 20 years to arrive at 250K estimate.
OC-NCSW-25.1	**Objective**	**Water Diversion /Impoundment**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
OC-NCSW-25.1.1	Recovery Action	Water Diversion /Impoundment	Prevent or minimize impairment to stream hydrology (impaired water flow)										
OC-NCSW-25.1.1.1	Action Step	Water Diversion /Impoundment	Collaborate with landowners to minimize impacts on summer base flow from riparian water diversion activities.	2	25	NMFS, CDFW, Private Landowners, RCD						0	Action is considered In-Kind
OC-NCSW-25.1.1.2	Action Step	Water Diversion /Impoundment	Develop off channel water storage for grazing, cannabis, and rural residential users within the watershed to increase summer surface flow across the watershed.	1	20	CDFW, Private Landowners	125.00	125.00	125.00	125.00		500	Estimate a minimum of 100 participants at 5K.
OC-NCSW-25.2	**Objective**	**Water Diversion /Impoundment**	**Address the inadequacy of existing regulatory mechanisms**										
OC-NCSW-25.2.1	Recovery Action	Water Diversion /Impoundment	Prevent or minimize impairment to stream hydrology (impaired water flow)										
OC-NCSW-25.2.1.1	Action Step	Water Diversion /Impoundment	Restore surface flows during the summer period to improve survival of the summer rearing life stage.	2	25							TBD	Cost based on amount of summer base flow needed. Cost estimated at $150/acre ft./yr.
OC-NCSW-25.2.1.2	Action Step	Water Diversion /Impoundment	Identify and work with the SWRCB to eliminate depletion of summer base flows from unauthorized water uses. Coordinated efforts by Federal and State, and County law enforcement agencies are required to remove illegal diversions from streams across the watershed.	1	20	CDFW, COMMET, NMFS, SWRCB						0	Action is considered In-Kind

Outlet Creek, Northern California Steelhead (Lower Interior) Recovery Actions

Action ID	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partner	Costs ($K)						Comment
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25	Entire Duration	
OC-NCSW-25.2.1.3	Action Step	Water Diversion /Impoundment	Work with the City of Willits and the Boy Scouts of America to provide adequate bypass flow from Morris, and Centennial reservoirs, and the Boy Scout reservoir. Adequate bypass flows will maintain migratory passage for adult and juvenile steelhead, and maintain good summer water quality. Bypass flow requirements should follow those being implemented at Lake Emily by the Brook Trails Township Community Services District.	1	20	CDFW, City of Willits, NMFS						0	Action is considered In-Kind
OC-NCSW-25.2.1.4	Action Step	Water Diversion /Impoundment	Coordinate with County of Mendocino Marijuana Eradication Team to develop enforcement actions associated with illegal water diversions in the Outlet Creek watershed.	2	10	CDFW, COMMET, NMFS OLE						0	Action is considered In-Kind
OC-NCSW-25.2.1.5	Action Step	Water Diversion /Impoundment	Provide additional funding to the County of Mendocino Marijuana Eradication Team (COMMET) for removal of illegal cannabis operations that impact surface flow and water quality.	1	5	CDFW, COMMET, NMFS OLE	250.00					250	

Tomki Creek Population

NC Steelhead Winter-Run

- Role within DPS: Functionally Independent Population
- Diversity Stratum: Lower Interior
- Spawner Abundance Target: 2,700 adults
- Current Intrinsic Potential: 89.5 IP-km

For information regarding CC Chinook salmon for this watershed, please see the CC Chinook Salmon volume of this recovery plan.

Steelhead Abundance and Distribution

In 1965, the Department of Water Resources (DWR) estimated the run size of adult steelhead in Tomki Creek was approximately 3,000 to 4,000 spawners (DWR 1965).

Juvenile steelhead distribution information for Tomki Creek has been collected by CDFW during habitat typing surveys in the 1990s, and shows juvenile steelhead presence in most tributaries. There is a notable absence of juvenile steelhead rearing in the lower reaches of Tomki Creek, which have elevated stream temperatures. When current steelhead distribution is compared to the potential historic habitat proposed by Spence *et al.* (2012), approximately 50 to 75 percent of the potential historic steelhead habitat currently has juvenile presence. No current abundance estimates are available for adult or smolt steelhead for the Tomki Creek watershed.

Areas of high quality habitat in this basin exist within String Creek, reaches within Little Cave Creek, and tributary reaches of Wheelbarrow Creek. Medium quality habitat exists in stream reaches of Cave, Longbranch, and upper Tomki creeks (S. Harris, personal communication 2011).

History of Land Use

The first extensive land use occurred in the Tomki Creek watershed in the late 1930s with logging operations removing most of the merchantable timber by the early 1950s (MCRCD 1983). Most landowners cut timber at a short rotation, usually less than a 40 year rotation to maintain a tax exempt status with Mendocino County. Landowners also conducted extensive burning across the watershed in order to increase grazing acreage. Grazing since the late 1800s occurred within the Tomki Creek watershed, but little documentation of stocking numbers or accounts of overgrazing is available (MCRCD 1983).

Gravel extraction within Tomki Creek was conducted in the mid-1960s to supply material for road construction in the Willits subdivision of Brooktrails (R. Estabrook personal communication 2011). Approximately two miles of salmonid spawning area was mined in Tomki Creek to supply material for nearly 35 miles of road construction in the Brooktrails subdivision (Sagehorn, personal communication 1982, cited in MCRCD 1983).

In 1983, a pilot project in the Tomki Creek watershed was funded from Clean Water Act section 208 grant funding. The erosion and sediment control plan was developed to treat erosion sources in the watershed from past logging, grazing and road building. This pilot study reported that subbasins such as Cave, Wheelbarrow, and String creeks had high amounts of road associated erosion. Many of the roads within these subbasins are within riparian areas and are responsible for gully formation and other road related erosion (MCRCD 1983). Based on a system of prioritizing restoration actions within the watershed's 20 subbasins, the Mendocino Resource Conservation District (RCD) administered over $650,000 in grants to address high priority erosion sites.

Over the last 40 years land parcel size has decreased with parcel splits that have increased rural residential development. Associated roads and water diversions have increased with the increase in rural development. Over the last 10 years, Mendocino County has experienced a dramatic increase in population due to cannabis production, with watersheds such as Tomki Creek, a prime location for large production sites requiring water diversions for plantations and home use (P. Steiner, personal communication 2011).

Current Resources and Land Management

The Tomki Creek watershed encompasses an area of 40 square miles, and is predominately in private ownership (90 percent) with cannabis production, grazing, timber, and rural residential as the major land uses. Private ownership parcels within the watershed are varied, ranging from less than 10 acres to more than 5,000 acres. Public land makes up just 10 percent (4,020 acres) of the basin with most existing in scattered BLM ownership (MCRCD 1983).

Salmonid Viability and Watershed Conditions

The following habitat indicators were rated Poor through the CAP process: LWD frequency, riparian tree diameter, and shelter rating, primary pool frequency, and pool riffle ratio for all lifestages. Habitat indicators that were rated as Poor for juvenile steelhead were summer baseflow, riparian canopy cover, toxicity, and stream temperature. The indicators for watershed processes that were rated as Poor through the CAP analysis included road density within riparian areas, and land disturbance from urbanization (rural residential).

Recovery strategies will typically focus on ameliorating these habitat indicators, although strategies that address other indicators may also be developed where their implementation is critical to restoring properly functioning habitat conditions within the watershed. Indicators that rated as Fair through the CAP process, but are considered important within specific areas of the watershed include gravel quality for eggs, and riparian species composition with respect to watershed condition.

Current Conditions

The following discussion focuses on those conditions that were rated Fair or Poor as a result of our CAP viability analysis. The Tomki River CAP Viability Table results are provided below. Recovery strategies will focus on improving these conditions.

Population and Habitat Conditions

Habitat Complexity: Large Wood and Shelter

Instream shelter is required by juvenile salmonids as well as adult spawners for protection from predators, partitioning of habitat from other fish, and providing areas of reduced velocity for energy conservation. Data from CDFW habitat inventories indicate shelter ratings throughout the Tomki Creek watershed are Poor, with only 40 percent of the potential habitat meeting suitability targets for shelter. Poor to Fair LWD volume was also documented within these drainages, due largely to dysfunctional riparian corridors and poor recruitment of large conifer and hardwoods species from adjacent upslope areas. Poor shelter ratings across the basin likely limit available habitat for juvenile fish survival during critical low flows in the summer and during high flow events in the winter.

Habitat Complexity: Percent Primary Pools and Pool/Riffle/Flatwater Ratios

Primary pool habitat is lacking in most tributary streams habitat typed by CDFW in the late 1990s. Habitat Complexity, percent primary pools and pool/riffle/flatwater ratios have an overall rating of Poor for both winter and summer rearing juvenile steelhead. Most sampled streams have a high percentage of flatwater or run habitat that is generally unsuitable for rearing lifestages of salmonids due to lack of depth, complexity and velocity refuge. The lack of pools in this basin likely limits the space available for juvenile fish attempting to maintain territory for feeding and predator avoidance. Lack of pool habitats within this basin likely stems from high instream sediment concentrations (pool filling) and loss of LWD recruitment from past land use practices.

Hydrology: Baseflow and Passage Flows

Summer baseflow is expected to be reduced compared to coastal areas due to the warmer, drier interior physical setting of Tomki Creek. Summer flow likely limits juvenile fish survival by reducing available physical space for rearing juvenile steelhead. When surface diversions further depress naturally low water levels, streamflow can be a critical factor affecting steelhead survival during the summer. Stream reaches in the southern portion of the watershed are likely experiencing the highest level of impact at this time.

Water Quality: Temperature

High summer water temperatures are likely limiting steelhead survival throughout many sections of the Tomki Creek watershed, primarily within or downstream of stream channels with poor riparian canopy cover. The few areas noted as exhibiting cool water temperatures include three tributaries to Cave Creek, Scott Creek, and an unnamed tributary to Longbranch Creek that still retain relatively good native hardwood and conifer riparian corridors. Most of the streams in the watershed, such as the Tomki, Salmon, Cave, Longbranch, and Wheelbarrow creeks currently have unsuitable stream temperatures.

Other Current Conditions

Sediment Transport from roads conditions has a rating of Fair for the egg lifestage. Also, impacts from poaching on adult salmon and steelhead abundance need to be addressed. Poaching of spawning steelhead and salmon has persisted over many decades due to the isolated nature of the basin.

Threats

The following discussion focuses on those threats that were rated as High or Very High (see Tomki Creek CAP Results). Recovery strategies will likely focus on ameliorating High rating threats; however, some strategies may address medium and low threats when the strategy is essential to recovery efforts. The figures and tables that display data used in this analysis are provided in Tomkin Creek CAP Results.

Water Diversion and Impoundments

Cannabis production is a serious and growing threat in this watershed. Water diversion by large cannabis cultivators and associated rural residential water users is reducing summer baseflow. We base this conclusion on information from nearby basins such as Outlet Creek (LeDoux-Bloom and Downie 2008), and personal communications with biologists conducting field surveys in the Tomki Creek watershed (P. Steiner, personal communication 2011). Both legal (up to 99 plants) and larger illegal grows require large water diversions to supply plants during summer growing season. This threat is likely to continue and become an increased source of stress on summer

baseflow conditions for juvenile salmonids over the next decade. Subbasins that appear to be most impacted by these threats include the Cave, Scott, Salmon, and Longbranch areas in the southern portion of the watershed.

Other Threats

Threats in the Tomki Creek basin that continue to stress salmonid habitat include roads, livestock grazing, rural residential development, and timber harvesting. Riparian road densities associated with rural-residential development continue to reduce salmonid habitat suitability by delivering fine sediment to spawning and rearing reaches. Rural residential development will likely become a high threat in the future. We attempt to capture this threat in the water diversion section above, but other impacts from rural residential development, such as land clearing, water use, and road building, are likely to increase in the future.

Limiting Stresses, Lifestages, and Habitats

Threat and stress analysis within the CAP workbook suggests juvenile survival is likely limiting steelhead recovery in the Tomki Creek watershed. Reduced summer streamflows limit rearing area within stream reaches across the basin. Other habitat conditions that also limit juvenile salmonid production include inadequate stream shelter, pool habitat, and LWD-related structure or other roughness elements such as boulders. Also, shade canopies were rated as Poor for surveyed reaches in the watershed, and stream temperatures across much of the basin reduce juvenile habitat suitability.

General Recovery Strategy

Address Water Diversion and Groundwater Extraction

Reduced and disconnected flow conditions (*e.g.*, dry stream channels) resulting from water diversions and groundwater pumping are likely reducing juvenile steelhead survival in tributaries where rural residential development is concentrated. Federal, state, local government, or community based representatives should work with landowners to implement creative solutions that minimize these effects; solutions should examine conservation methods, water management planning, and water storage and recharge solutions. In addition, improved coordination between NMFS, CDFW and county law enforcement agencies must be occur to reduce the number of illegal stream diversions within this basin.

Improve Canopy Cover and LWD Volume

Much of the Tomki Creek watershed would benefit from improved riparian composition and structure, which would increase stream shading, improve LWD recruitment, increase instream

shelter for juvenile fish, and improve stream temperatures. General practices to improve riparian condition include protecting riparian areas (*e.g.*, increasing the number of riparian conservation easements), reducing riparian harvest, and implementing riparian planting and livestock exclusion fencing.

Address Riparian Road Sediment Sources

Riparian roads associated with various land uses exist throughout the basin. Many of these roads need to be upgraded to reduce fine sediment delivery into streams. Problem roads and active erosion sites should be prioritized and addressed as part of a comprehensive sediment reduction plan at the subbasin level. The highest priority road is Cave Creek Road, which has multiple stream crossings and sediment sources (Ross Taylor and Associates 2003). Rural residential development must be closely monitored and managed by the County of Mendocino in order to minimize soil disturbance and sediment delivery to stream channels.

Increase Instream Shelter Ratings and Pool Volume

Shelter ratings are unsuitable in all surveyed stream reaches of the Tomki Creek watershed. Due largely to an absence of LWD, quality pool habitat is scarce and shelter components are comprised mainly of undercut banks and aquatic vegetation. Where applicable, restoration efforts should incorporate instream wood/boulder structures and/or large conifers *(i.e.*, fall trees into creek) within degraded reaches to improve shelter and overall habitat complexity.

Improve Passage

Remediating barriers to migration caused by road crossings would improve habitat utilization for both spawning adults and rearing juveniles. Improving low water crossings on Cave Creek would improve passage and reduce sediment delivery into the stream channel.

Literature Cited

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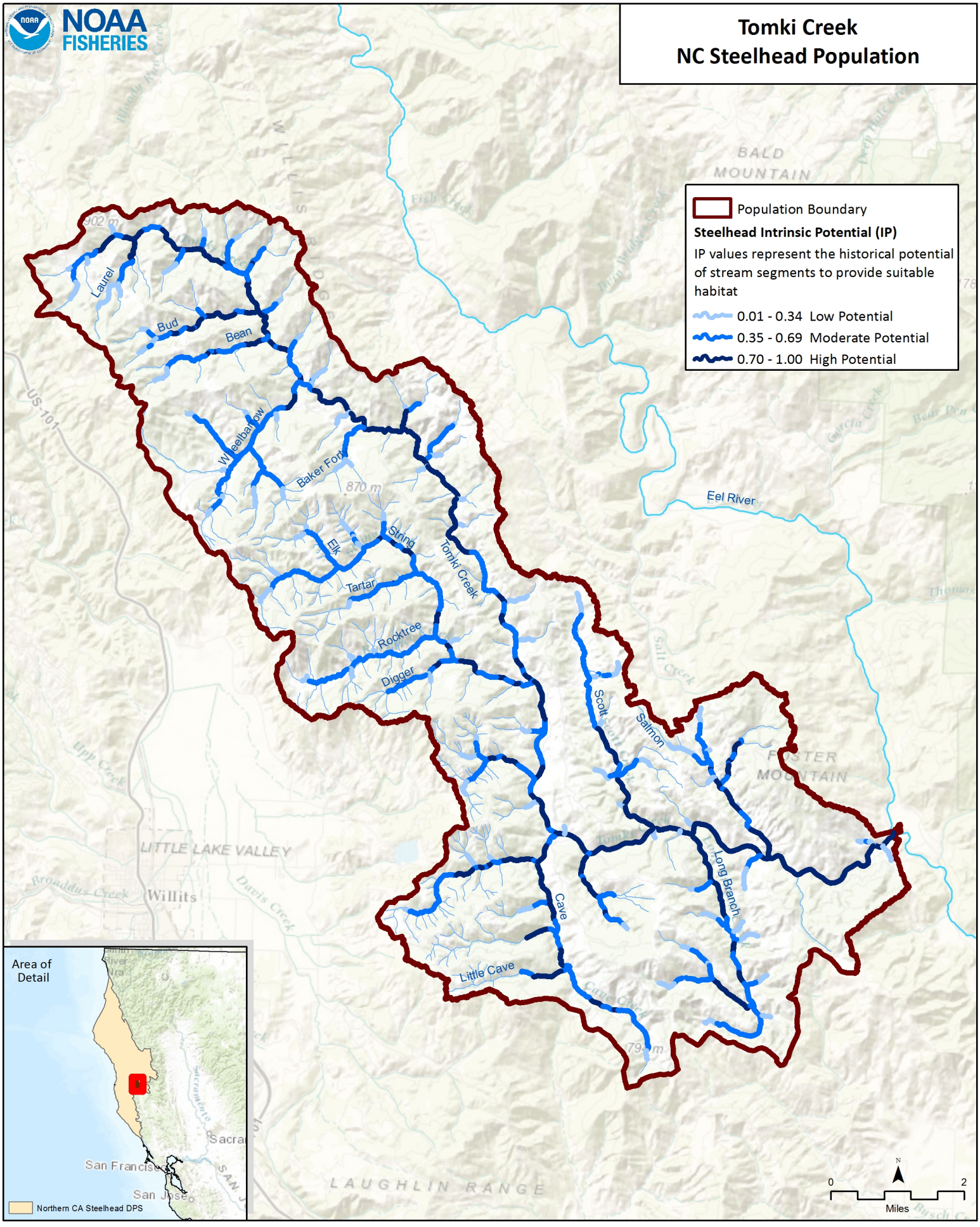
NOAA FISHERIES
Tomki Creek
NC Steelhead Population
Population Boundary
Steelhead Intrinsic Potential (IP)
IP values represent the historical potential of stream segments to provide suitable habitat
0.01 - 0.34 Low Potential
0.35 - 0.69 Moderate Potential
0.70 - 1.00 High Potential
Laurel
Bud
Bean
Wheelbarrow
Baker Fork
Elk
String
Tomki Creek
Tartar
Rocktree
Digger
Scott
Salmon
Cave
Long Branch
Little Cave
Eel River
BALD MOUNTAIN
FORSTER MOUNTAIN
LITTLE LAKE VALLEY
LAUGHLIN RANGE
Willits
US-101
Area of Detail
Northern CA Steelhead DPS
0
2
Miles
N

#	Conservation Target	Category	Key Attribute	Indicator	Poor	Fair	Good	Very Good	Current Indicator Measurement	Current Rating
1	Adults	Condition	Habitat Complexity	Large Wood Frequency (BFW 0-10 meters)	<50% of streams/ IP-Km (>6 Key Pieces/100 meters)	50% to 74% of streams/ IP-Km (>6 Key Pieces/100 meters)	75% to 90% of streams/ IP-Km (>6 Key Pieces/100 meters)	>90% of streams/ IP-Km (>6 Key Pieces/100 meters)	<50% of streams/ IP-km (>6 Key Pieces/100 meters)	Poor
			Habitat Complexity	Large Wood Frequency (BFW 10-100 meters)	<50% of streams/ IP-Km (>1.3 Key Pieces/100 meters)	50% to 74% of streams/ IP-Km (>1.3 Key Pieces/100 meters)	75% to 90% of streams/ IP-Km (>1.3 Key Pieces/100 meters)	>90% of streams/ IP-Km (>1.3 Key Pieces/100 meters)	<50% of streams/ IP-km (>1.3 Key Pieces/100 meters)	Poor
			Habitat Complexity	Pool/Riffle/Flatwater Ratio	<50% of streams/ IP-Km (>40% Pools; >20% Riffles)	50% to 74% of streams/ IP-Km (>40% Pools; >20% Riffles)	75% to 90% of streams/ IP-Km (>40% Pools; >20% Riffles)	>90% of streams/ IP-Km (>40% Pools; >20% Riffles)	64% streams/ 41% IP-km (>40% Pools; >20% Riffles)	Poor
			Habitat Complexity	Shelter Rating	<50% of streams/ IP-Km (>80 stream average)	50% to 74% of streams/ IP-Km (>80 stream average)	75% to 90% of streams/ IP-Km (>80 stream average)	>90% of streams/ IP-Km (>80 stream average)	0% of streams/ IP-km (>80 stream average)	Poor
			Hydrology	Passage Flows	NMFS Flow Protocol: Risk Factor Score >75	NMFS Flow Protocol: Risk Factor Score 51-75	NMFS Flow Protocol: Risk Factor Score 35-50	NMFS Flow Protocol: Risk Factor Score <35	NMFS Flow Protocol: Risk Factor Score 35-50	Good
			Passage/Migration	Passage at Mouth or Confluence	<50% of IP-Km or <16 IP-Km accessible*	50% of IP-Km to 74% of IP-km	75% of IP-Km to 90% of IP-km	>90% of IP-km	75% of IP-km to 90% of IP-km	Good
			Passage/Migration	Physical Barriers	<50% of IP-Km or <16 IP-Km accessible*	50% of IP-Km to 74% of IP-km	75% of IP-Km to 90% of IP-km	>90% of IP-km	100 of IP-km	Very Good
			Riparian Vegetation	Tree Diameter (North of SF Bay)	≤39% Class 5 & 6 across IP-km	40 - 54% Class 5 & 6 across IP-km	55 - 69% Class 5 & 6 across IP-km	>69% Class 5 & 6 across IP-km	?39% Class 5 & 6 across IP-km	Poor
			Riparian Vegetation	Tree Diameter (South of SF Bay)	≤69% Density rating "D" across IP-km	70-79% Density rating "D" across IP-km	≥80% Density rating "D" across IP-km	Not Defined		

			Sediment	Quantity & Distribution of Spawning Gravels	<50% of IP-Km or <16 IP-Km accessible*	50% of IP-Km to 74% of IP-km	75% of IP-Km to 90% of IP-km	>90% of IP-km	75% of IP-km to 90% of IP-km	Good
			Velocity Refuge	Floodplain Connectivity	<50% Response Reach Connectivity	50-80% Response Reach Connectivity	>80% Response Reach Connectivity	Not Defined	>80% Response Reach Connectivity	Good
			Water Quality	Toxicity	Acute	Sublethal or Chronic	No Acute or Chronic	No Evidence of Toxins or Contaminants	No Acute or Chronic	Good
			Water Quality	Turbidity	<50% of streams/ IP-Km maintains severity score of 3 or lower	50% to 74% of streams/ IP-Km maintains severity score of 3 or lower	75% to 90% of streams/ IP-Km maintains severity score of 3 or lower	>90% of streams/ IP-Km maintains severity score of 3 or lower	50% to 74% of streams/ IP-km maintains severity score of 3 or lower	Fair
		Size	Viability	Density	<1 Spawner per IP-km (Spence et al 2012)	>1 spawner per IP-km to < low risk spawner density per Spence et al (2012)	low risk spawner density per Spence et al (2012)		<1 Spawner per IP-km (Spence et al 2012)	Poor
2	Eggs	Condition	Hydrology	Flow Conditions (Instantaneous Condition)	NMFS Flow Protocol: Risk Factor Score >75	NMFS Flow Protocol: Risk Factor Score 51-75	NMFS Flow Protocol: Risk Factor Score 35-50	NMFS Flow Protocol: Risk Factor Score <35	NMFS Flow Protocol: Risk Factor Score 35-50	Good
			Hydrology	Redd Scour	NMFS Flow Protocol: Risk Factor Score >75	NMFS Flow Protocol: Risk Factor Score 51-75	NMFS Flow Protocol: Risk Factor Score 35-50	NMFS Flow Protocol: Risk Factor Score <35	NMFS Flow Protocol: Risk Factor Score 51-75	Fair
			Sediment	Gravel Quality (Bulk)	>17% (0.85mm) and >30% (6.4mm)	15-17% (0.85mm) and <30% (6.4mm)	12-14% (0.85mm) and <30% (6.4mm)	<12% (0.85mm) and <30% (6.4mm)	15-17% (0.85mm) and <30% (6.4mm)	Fair
			Sediment	Gravel Quality (Embeddedness)	<50% of streams/ IP-Km (>50% stream average scores of 1 & 2)	50% to 74% of streams/ IP-Km (>50% stream average scores of 1 & 2)	75% to 90% of streams/ IP-Km (>50% stream average scores of 1 & 2)	>90% of streams/ IP-Km (>50% stream average scores of 1 & 2)	43 % streams/ 64% IP-km (>50% stream average scores of 1 & 2)	Fair

3	Summer Rearing Juveniles	Condition	Estuary/Lagoon	Quality & Extent	Impaired/non-functional	Impaired but functioning	Properly Functioning Condition	Unimpaired Condition	Impaired but functioning	Fair
			Habitat Complexity	Large Wood Frequency (Bankfull Width 0-10 meters)	<50% of streams/ IP-Km (>6 Key Pieces/100 meters)	50% to 74% of streams/ IP-Km (>6 Key Pieces/100 meters)	75% to 90% of streams/ IP-Km (>6 Key Pieces/100 meters)	>90% of streams/ IP-Km (>6 Key Pieces/100 meters)	<50% of streams/ IP-km (>6 Key Pieces/100 meters)	Poor
			Habitat Complexity	Large Wood Frequency (Bankfull Width 10-100 meters)	<50% of streams/ IP-Km (>1.3 Key Pieces/100 meters)	50% to 74% of streams/ IP-Km (>1.3 Key Pieces/100 meters)	75% to 90% of streams/ IP-Km (>1.3 Key Pieces/100 meters)	>90% of streams/ IP-Km (>1.3 Key Pieces/100 meters)	<50% of streams/ IP-km (>1.3 Key Pieces/100 meters)	Poor
			Habitat Complexity	Percent Primary Pools	<50% of streams/ IP-Km (>40% average primary pool frequency)	50% to 74% of streams/ IP-Km (>40% average primary pool frequency)	75% to 89% of streams/ IP-Km (>40% average primary pool frequency)	>90% of streams/ IP-Km (>40% average primary pool frequency)	14% streams/ 64% IP-km (>40% average primary pool frequency)	Poor
			Habitat Complexity	Pool/Riffle/Flatwater Ratio	<50% of streams/ IP-Km (>40% Pools; >20% Riffles)	50% to 74% of streams/ IP-Km (>40% Pools; >20% Riffles)	75% to 90% of streams/ IP-Km (>40% Pools; >20% Riffles)	>90% of streams/ IP-Km (>40% Pools; >20% Riffles)	64% streams/ 41% IP-km (>40% Pools; >20% Riffles)	Poor
			Habitat Complexity	Shelter Rating	<50% of streams/ IP-Km (>80 stream average)	50% to 74% of streams/ IP-Km (>80 stream average)	75% to 90% of streams/ IP-Km (>80 stream average)	>90% of streams/ IP-Km (>80 stream average)	0% of streams/ IP-km (>80 stream average)	Poor
			Hydrology	Flow Conditions (Baseflow)	NMFS Flow Protocol: Risk Factor Score >75	NMFS Flow Protocol: Risk Factor Score 51-75	NMFS Flow Protocol: Risk Factor Score 35-50	NMFS Flow Protocol: Risk Factor Score <35	NMFS Flow Protocol: Risk Factor Score >75	Poor
			Hydrology	Flow Conditions (Instantaneous Condition)	NMFS Flow Protocol: Risk Factor Score >75	NMFS Flow Protocol: Risk Factor Score 51-75	NMFS Flow Protocol: Risk Factor Score 35-50	NMFS Flow Protocol: Risk Factor Score <35	NMFS Flow Protocol: Risk Factor Score 51-75	Fair
			Hydrology	Number, Condition and/or Magnitude of Diversions	>5 Diversions/10 IP km	1.1 - 5 Diversions/10 IP km	0.01 - 1 Diversions/10 IP km	0 Diversions	0.39 Diversions/10 IP-km	Fair
			Passage/Migration	Passage at Mouth or Confluence	<50% of IP-Km or <16 IP-Km accessible*	50% of IP-Km to 74% of IP-km	75% of IP-Km to 90% of IP-km	>90% of IP-km	50% of IP-km to 74% of IP-km	Fair

			Passage/Migration	Physical Barriers	<50% of IP-Km or <16 IP-Km accessible*	50% of IP-Km to 74% of IP-km	75% of IP-Km to 90% of IP-km	>90% of IP-km	100 of IP-km	Very Good
			Riparian Vegetation	Canopy Cover	<50% of streams/ IP-Km (>70% average stream canopy; >85% where coho IP overlaps)	50% to 74% of streams/ IP-Km (>70% average stream canopy; >85% where coho IP overlaps)	75% to 90% of streams/ IP-Km (>70% average stream canopy; >85% where coho IP overlaps)	>90% of streams/ IP-Km (>70% average stream canopy; >85% where coho IP overlaps)	50% of streams/ 14% IP-km (>70% average stream canopy; >85% where coho IP overlaps)	Poor
			Riparian Vegetation	Tree Diameter (North of SF Bay)	≤39% Class 5 & 6 across IP-km	40 - 54% Class 5 & 6 across IP-km	55 - 69% Class 5 & 6 across IP-km	>69% Class 5 & 6 across IP-km	?39% Class 5 & 6 across IP-km	Poor
			Riparian Vegetation	Tree Diameter (South of SF Bay)	≤69% Density rating "D" across IP-km	70-79% Density rating "D" across IP-km	≥80% Density rating "D" across IP-km	Not Defined		
			Sediment (Food Productivity)	Gravel Quality (Embeddedness)	<50% of streams/ IP-Km (>50% stream average scores of 1 & 2)	50% to 74% of streams/ IP-Km (>50% stream average scores of 1 & 2)	75% to 90% of streams/ IP-Km (>50% stream average scores of 1 & 2)	>90% of streams/ IP-Km (>50% stream average scores of 1 & 2)	43 % streams/ 64% IP-km (>50% stream average scores of 1 & 2)	Fair
			Water Quality	Temperature (MWMT)	<50% IP km (<20 C MWMT; <16 C MWMT where coho IP overlaps)	50 to 74% IP km (<20 C MWMT; <16 C MWMT where coho IP overlaps)	75 to 89% IP km (<20 C MWMT; <16 C MWMT where coho IP overlaps)	>90% IP km (<20 C MWMT; <16 C MWMT where coho IP overlaps)	<50% IP-km (<20 C MWMT; <16 C MWMT where coho IP overlaps)	Poor
			Water Quality	Toxicity	Acute	Sublethal or Chronic	No Acute or Chronic	No Evidence of Toxins or Contaminants	Sublethal or Chronic	Fair
			Water Quality	Turbidity	<50% of streams/ IP-Km maintains severity score of 3 or lower	50% to 74% of streams/ IP-Km maintains severity score of 3 or lower	75% to 90% of streams/ IP-Km maintains severity score of 3 or lower	>90% of streams/ IP-Km maintains severity score of 3 or lower	50% to 74% of streams/ IP-km maintains severity score of 3 or lower	Fair
		Size	Viability	Density	<0.2 Fish/m^2	0.2 - 0.6 Fish/m^2	0.7 - 1.5 Fish/m^2	>1.5 Fish/m^2	<0.2 Fish/m^2	Poor
			Viability	Spatial Structure	<50% of Historical Range	50-74% of Historical Range	75-90% of Historical Range	>90% of Historical Range	<50% of Historical Range	Poor

4	Winter Rearing Juveniles	Condition	Habitat Complexity	Large Wood Frequency (Bankfull Width 0-10 meters)	<50% of streams/ IP-Km (>6 Key Pieces/100 meters)	50% to 74% of streams/ IP-Km (>6 Key Pieces/100 meters)	75% to 90% of streams/ IP-Km (>6 Key Pieces/100 meters)	>90% of streams/ IP-Km (>6 Key Pieces/100 meters)	<50% of streams/ IP-km (>6 Key Pieces/100 meters)	Poor
			Habitat Complexity	Large Wood Frequency (Bankfull Width 10-100 meters)	<50% of streams/ IP-Km (>1.3 Key Pieces/100 meters)	50% to 74% of streams/ IP-Km (>1.3 Key Pieces/100 meters)	75% to 90% of streams/ IP-Km (>1.3 Key Pieces/100 meters)	>90% of streams/ IP-Km (>1.3 Key Pieces/100 meters)	<50% of streams/ IP-km (>1.3 Key Pieces/100 meters)	Poor
			Habitat Complexity	Pool/Riffle/Flatwater Ratio	<50% of streams/ IP-Km (>40% Pools; >20% Riffles)	50% to 74% of streams/ IP-Km (>40% Pools; >20% Riffles)	75% to 90% of streams/ IP-Km (>40% Pools; >20% Riffles)	>90% of streams/ IP-Km (>40% Pools; >20% Riffles)	64% streams/ 41% IP-km (>40% Pools; >20% Riffles)	Poor
			Habitat Complexity	Shelter Rating	<50% of streams/ IP-Km (>80 stream average)	50% to 74% of streams/ IP-Km (>80 stream average)	75% to 90% of streams/ IP-Km (>80 stream average)	>90% of streams/ IP-Km (>80 stream average)		
			Passage/Migration	Physical Barriers	<50% of IP-Km or <16 IP-Km accessible*	50% of IP-Km to 74% of IP-km	75% of IP-Km to 90% of IP-km	>90% of IP-km	100 of IP-km	Very Good
			Riparian Vegetation	Tree Diameter (North of SF Bay)	≤39% Class 5 & 6 across IP-km	40 - 54% Class 5 & 6 across IP-km	55 - 69% Class 5 & 6 across IP-km	>69% Class 5 & 6 across IP-km	?39% Class 5 & 6 across IP-km	Poor
			Riparian Vegetation	Tree Diameter (South of SF Bay)	≤69% Density rating "D" across IP-km	70-79% Density rating "D" across IP-km	≥80% Density rating "D" across IP-km	Not Defined		
			Sediment (Food Productivity)	Gravel Quality (Embeddedness)	<50% of streams/ IP-Km (>50% stream average scores of 1 & 2)	50% to 74% of streams/ IP-Km (>50% stream average scores of 1 & 2)	75% to 90% of streams/ IP-Km (>50% stream average scores of 1 & 2)	>90% of streams/ IP-Km (>50% stream average scores of 1 & 2)	43 % streams/ 64% IP-km (>50% stream average scores of 1 & 2)	Fair
			Velocity Refuge	Floodplain Connectivity	<50% Response Reach Connectivity	50-80% Response Reach Connectivity	>80% Response Reach Connectivity	Not Defined	50-80% Response Reach Connectivity	Fair
			Water Quality	Toxicity	Acute	Sublethal or Chronic	No Acute or Chronic	No Evidence of Toxins or Contaminants	No Acute or Chronic	Good

			Water Quality	Turbidity	<50% of streams/ IP-Km maintains severity score of 3 or lower	50% to 74% of streams/ IP-Km maintains severity score of 3 or lower	75% to 90% of streams/ IP-Km maintains severity score of 3 or lower	>90% of streams/ IP-Km maintains severity score of 3 or lower		
5	Smolts	Condition	Estuary/Lagoon	Quality & Extent	Impaired/non-functional	Impaired but functioning	Properly Functioning Condition	Unimpaired Condition	Impaired but functioning	Fair
			Habitat Complexity	Shelter Rating	<50% of streams/ IP-Km (>80 stream average)	50% to 74% of streams/ IP-Km (>80 stream average)	75% to 90% of streams/ IP-Km (>80 stream average)	>90% of streams/ IP-Km (>80 stream average)	0% of streams/ IP-km (>80 stream average)	Poor
			Hydrology	Number, Condition and/or Magnitude of Diversions	>5 Diversions/10 IP km	1.1 - 5 Diversions/10 IP km	0.01 - 1 Diversions/10 IP km	0 Diversions	1.1 - 5 Diversions/10 IP-km	Fair
			Hydrology	Passage Flows	NMFS Flow Protocol: Risk Factor Score >75	NMFS Flow Protocol: Risk Factor Score 51-75	NMFS Flow Protocol: Risk Factor Score 35-50	NMFS Flow Protocol: Risk Factor Score <35	NMFS Flow Protocol: Risk Factor Score 35-50	Good
			Passage/Migration	Passage at Mouth or Confluence	<50% of IP-Km or <16 IP-Km accessible*	50% of IP-Km to 74% of IP-km	75% of IP-Km to 90% of IP-km	>90% of IP-km	50% of IP-km to 74% of IP-km	Fair
			Smoltification	Temperature	<50% IP-Km (>6 and <14 C)	50-74% IP-Km (>6 and <14 C)	75-90% IP-Km (>6 and <14 C)	>90% IP-Km (>6 and <14 C)	50-74% IP-km (>6 and <14 C)	Fair
			Water Quality	Toxicity	Acute	Sublethal or Chronic	No Acute or Chronic	No Evidence of Toxins or Contaminants	No Acute or Chronic	Good
			Water Quality	Turbidity	<50% of streams/ IP-Km maintains severity score of 3 or lower	50% to 74% of streams/ IP-Km maintains severity score of 3 or lower	75% to 90% of streams/ IP-Km maintains severity score of 3 or lower	>90% of streams/ IP-Km maintains severity score of 3 or lower	50% to 74% of streams/ IP-km maintains severity score of 3 or lower	Fair
		Size	Viability	Abundance	Smolt abundance which produces high risk spawner density per Spence (2008)	Smolt abundance which produces moderate risk spawner density per Spence (2008)	Smolt abundance to produce low risk spawner density per Spence (2008)		<13,200 = Smolt abundance which produces high risk spawner density per Spence (2008)	Poor

6	Watershed Processes	Landscape Context	Hydrology	Impervious Surfaces	>10% of Watershed in Impervious Surfaces	7-10% of Watershed in Impervious Surfaces	3-6% of Watershed in Impervious Surfaces	<3% of Watershed in Impervious Surfaces	0.064% of Watershed in Impervious Surfaces	Very Good
			Landscape Patterns	Agriculture	>30% of Watershed in Agriculture	20-30% of Watershed in Agriculture	10-19% of Watershed in Agriculture	<10% of Watershed in Agriculture	0.001% of Watershed in Agriculture	Very Good
			Landscape Patterns	Timber Harvest	>35% of Watershed in Timber Harvest	26-35% of Watershed in Timber Harvest	25-15% of Watershed in Timber Harvest	<15% of Watershed in Timber Harvest	<15% of Watershed in Timber Harvest	Very Good
			Landscape Patterns	Urbanization	>20% of watershed >1 unit/20 acres	12-20% of watershed >1 unit/20 acres	8-11% of watershed >1 unit/20 acres	<8% of watershed >1 unit/20 acres	12-20% of watershed >1 unit/20 acres	Fair
			Riparian Vegetation	Species Composition	<25% Intact Historical Species Composition	25-50% Intact Historical Species Composition	51-74% Intact Historical Species Composition	>75% Intact Historical Species Composition	25-50% Intact Historical Species Composition	Fair
			Sediment Transport	Road Density	>3 Miles/Square Mile	2.5 to 3 Miles/Square Mile	1.6 to 2.4 Miles/Square Mile	<1.6 Miles/Square Mile	1.8 Miles/Square Mile	Good
			Sediment Transport	Streamside Road Density (100 m)	>1 Miles/Square Mile	0.5 to 1 Miles/Square Mile	0.1 to 0.4 Miles/Square Mile	<0.1 Miles/Square Mile	2.3 Miles/Square Mile	Poor

Tomki Creek CAP Threat Results

	Threats Across Targets	Adults	Eggs	Summer Rearing Juveniles	Winter Rearing Juveniles	Smolts	Watershed Processes	Overall Threat Rank
	Project-specific-threats	1	2	3	4	5	6	
1	Agriculture	Low		Medium		Low	Low	Low
2	Channel Modification							
3	Disease, Predation and Competition			Medium		Medium		Medium
4	Hatcheries and Aquaculture							
5	Fire, Fuel Management and Fire Suppression	Low	Low	Low	Low	Low	Low	Low
6	Fishing and Collecting	Medium				Low		Low
7	Livestock Farming and Ranching	Low	Low	Low	Low	Low	Medium	Low
8	Logging and Wood Harvesting	Low	Low	Medium	Low	Low	Medium	Medium
9	Mining							
10	Recreational Areas and Activities			Low				Low
11	Residential and Commercial Development	Medium	Medium	Medium	Low	Low	High	Medium
12	Roads and Railroads	Medium	Medium	Medium	Low	Low	Medium	Medium
13	Severe Weather Patterns	Low	Low	High	Low	Low	Medium	Medium
14	Water Diversion and Impoundments	Low	Low	Very High	Low	Low	Low	High
	Threat Status for Targets and Project	Medium	Medium	High	Low	Medium	Medium	High

Tomki Creek, Northern California Steelhead (Lower Interior) Recovery Actions

Action ID	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partner	Costs ($K)						Comment
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25	Entire Duration	
ToC-NCSW-5.1	**Objective**	**Passage**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
ToC-NCSW-5.1.1	Recovery Action	Passage	Modify or remove physical passage barriers										
ToC-NCSW-5.1.1.1	Action Step	Passage	Evaluate and prioritize existing list of passage barriers documented by CDFW.	2	10							0	This action largely relies on State and Federal regulatory staff. Action is considered In-Kind
ToC-NCSW-5.1.1.2	Action Step	Passage	Evaluate, design and implement fish passage for adult and juvenile salmonids at road crossings on Cave Creek.	2	10	CDFW, Mendocino County Department of Public Works, NOAA RC, Private Landowners	1000.00	1000.00				2,000	Cost based on providing passage improvements at 10 crossings on forested roads at a rate of $ 200,000/project.
ToC-NCSW-5.1.1.3	Action Step	Passage	Evaluate the potential for adult passage at natural barriers within the Tomki Creek basin. Streams such as Little Cave Creek, Salmon Creek and upper Tomki Creek are a high priority for evaluation.	2	20	CDFW, NMFS, Private Landowners						TBD	Cost based on the amount of natural barriers needing modification and feasible alternatives to apply.
ToC-NCSW-6.1	**Objective**	**Habitat Complexity**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
ToC-NCSW-6.1.1	Recovery Action	Habitat Complexity	Improve large wood frequency										
ToC-NCSW-6.1.1.1	Action Step	Habitat Complexity	Improve summer rearing, winter rearing, and smolt survival by increasing instream channel complexity in potential rearing and migration reaches.	2	10	CDFW, NMFS, Private Landowners	175.50	175.50				351	Cost based on treating 13.5 miles (assume 1 project/mile in 50% high IP) at a rate of $26,000/mile.
ToC-NCSW-6.1.1.2	Action Step	Habitat Complexity	Implement a large woody debris supplementation program to increase stream complexity and gravel retention, and improve pool frequency and depth.	3	30	CDFW, NMFS, Private Landowners						TBD	Cost will vary depending on type of methods and extent.
ToC-NCSW-6.1.1.3	Action Step	Habitat Complexity	Improve frequency of large woody debris, root wads, and boulders to improve habitat complexity, and pools. Focus efforts in tributaries that currently have suitable stream temperatures such as tributaries to Cave Creek, upper Tomki Creek, String Creek, and tributaries in the northern area of the watershed.	3		CDFW, NMFS, NRCS, Private Landowners						500	Estimate 10 miles of LWD and boulder structures at 50K.
ToC-NCSW-6.1.1.4	Action Step	Habitat Complexity	Encourage landowners to implement restoration projects as part of their ongoing operations in stream reaches where large woody debris is lacking.	3	25	CDFW, NMFS, NRCS, Private Landowners						0	Action is considered In-Kind
ToC-NCSW-7.1	**Objective**	**Riparian**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
ToC-NCSW-7.1.1	Recovery Action	Riparian	Improve canopy cover										
ToC-NCSW-7.1.1.1	Action Step	Riparian	Restore and expand riparian buffers to increase riparian canopy cover.	3	10	CDFW, NOAA RC, Private Landowners						0	Action is considered standard practice and is In-Kind
ToC-NCSW-7.1.1.2	Action Step	Riparian	Promote streamside conservation measures, including conservation easements, setbacks, and riparian buffers.	3	10	CDFW, Mendocino County RCD, NMFS, Private Landowners						0	Action is considered In-Kind
ToC-NCSW-7.1.1.3	Action Step	Riparian	Protect existing riparian areas from timber harvest, rural residential, and grazing activities to maintain LWD supply and canopy recovery.	1	60	CalFire, CDFW, Mendocino County, NMFS, Private Landowners, RWQCB						TBD	

Tomki Creek, Northern California Steelhead (Lower Interior) Recovery Actions

Action ID	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partner	Costs ($K)						Comment
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25	Entire Duration	
ToC-NCSW-7.1.1.4	Action Step	Riparian	Prioritize and plant riparian areas along Tomki creek and its tributaries. Based on CDFW habitat typing the following streams should be considered for riparian planting: Baker Forty Creek, Cave Creek, Little Cave Creek, Longbranch Creek, Tomki Creek, and Wheelbarrow Creek.	2	20	CDFW, Mendocino County RCD, NOAA RC, NRCS, Private Landowners	174	174	174	174		696	Cost based on treating 1.4 miles (assume 1 project/mile in 5% high IP with 24 acres/mile) at a rate of $20,719/acre.
ToC-NCSW-16.1	**Objective**	**Fishing/Collecting**	**Address the inadequacy of existing regulatory mechanisms**										
ToC-NCSW-16.1.1	Recovery Action	Fishing/Collecting	Prevent or minimize reduced density, abundance, and diversity based on the biological recovery criteria										
ToC-NCSW-16.1.1.1	Action Step	Fishing/Collecting	Reduce poaching of adult steelhead through outreach and coordinated enforcement.	2	20	CDFW, NMFS, County						0	Action is considered In-Kind
ToC-NCSW-16.1.1.2	Action Step	Fishing/Collecting	Provide additional funding for CDFW law enforcement to improve protection from poaching activities in the Tomki Creek watershed.	2	10	CDFW	150.00	150.00				300	Assumption of partial time of one warden assigned to this watershed. Over a ten-year period, viewpoints and actions of local poachers may be changed.
ToC-NCSW-16.1.1.3	Action Step	Fishing/Collecting	Work with CDFW to improve protection for salmonids by modifying California Code of Regulations Section 8.00 (a) (1-3) low flow restrictions for the Eel and Van Duzen rivers.	2	5	CDFW, NMFS						0	Action is considered In-Kind
ToC-NCSW-22.1	**Objective**	**Residential/ Commercial Development**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
ToC-NCSW-22.1.1	Recovery Action	Residential/ Commercial Development	Prevent or minimize increased landscape disturbance										
ToC-NCSW-22.1.1.1	Action Step	Residential/ Commercial Development	Work with agencies to minimize potential impacts to salmonid habitat from existing and future residential developed property.	3	25	CDFW, Mendocino County, NMFS						0	Action is considered In-Kind
ToC-NCSW-22.1.1.2	Action Step	Residential/ Commercial Development	Coordinate with local watershed groups to work with private property owners on projects to minimize sediment production, water use, and other activities that degrade aquatic habitat.	3	20	County of Mendocino, NOAA RC, Private Landowners, Public						0	Action is considered In-Kind
ToC-NCSW-22.1.1.3	Action Step	Residential/ Commercial Development	Work with Mendocino County Planning and building to minimize future development in the Tomki Creek watershed.	3	5	CDFW, Mendocino County, NMFS						0	Action is considered In-Kind
ToC-NCSW-22.1.1.4	Action Step	Residential/ Commercial Development	Efforts to minimize sediment production, and water diversion associated with existing rural residential land use should focus on the Scott, Salmon, Longbranch, and Cave Creek subbasins.	1	20	County of Mendocino, NOAA RC, Private Landowners, Public						0	Action is considered In-Kind
ToC-NCSW-23.1	**Objective**	**Roads/Railroads**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
ToC-NCSW-23.1.1	Recovery Action	Roads/Railroads	Prevent or minimize alterations to sediment transport (road condition/density, dams, etc.)										
ToC-NCSW-23.1.1.1	Action Step	Roads/Railroads	Develop a Riparian Road Sediment Reduction Plan that prioritizes sites and outlines implementation and a timeline of necessary actions.	1	10	CDFW, Mendocino County Department of Public Works, NMFS, Private Landowners	58.00	58.00				116	Cost based on road inventory of 121 miles at a rate of $957/mile.
ToC-NCSW-23.1.1.2	Action Step	Roads/Railroads	Based on the Sediment Reduction Plan, implement riparian road upgrades at high priority sites.	1	10	CDFW, Mendocino County RCD, NMFS, NRCS, Private Landowners						TBD	Can not make cost estimate at this time.

Tomki Creek, Northern California Steelhead (Lower Interior) Recovery Actions

Action ID	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partner	Costs ($K)						Comment
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25	Entire Duration	
ToC-NCSW-23.1.1.3	Action Step	Roads/Railroads	Work with the County of Mendocino DOT to upgrade existing high priority riparian road segments identified by the county. Focus on upgrades and crossings in Cave Creek along Tomki Road.	1	10	CDFW, County of Mendocino, NMFS	200	200				400	Estimate based on 20 miles at $20k
ToC-NCSW-23.1.1.4	Action Step	Roads/Railroads	Work with private landowners to upgrade existing high priority riparian roads (including private roads or driveways), or those identified in the Sediment Reduction Plan.	2	10	CDFW, NMFS, Private Landowners	400.00	400.00				800	Estimate based on 40 miles at $20k
ToC-NCSW-25.1	**Objective**	**Water Diversion/ Impoundment**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
ToC-NCSW-25.1.1	Recovery Action	Water Diversion/ Impoundment	Prevent or minimize impairment to stream hydrology (impaired water flow)										
ToC-NCSW-25.1.1.1	Action Step	Water Diversion/ Impoundment	Collaborate with landowners to minimize impacts on summer base flow from riparian water diversion activities.	2	25	NMFS, CDFW, Private Landowners						0	Action is considered In-Kind
ToC-NCSW-25.1.1.2	Action Step	Water Diversion/ Impoundment	Develop off channel water storage for grazing, cannabis, and rural residential users within the watershed to increase summer surface flow across the watershed.	1	20	CDFW, Private Landowners	125.00	125.00	125.00	125.00		500	Estimate a minimum of 100 participants at 5K.
ToC-NCSW-25.2	**Objective**	**Water Diversion/ Impoundment**	**Address the inadequacy of existing regulatory mechanisms**										
ToC-NCSW-25.2.1	Recovery Action	Water Diversion/ Impoundment	Prevent or minimize impairment to stream hydrology (impaired water flow)										
ToC-NCSW-25.2.1.1	Action Step	Water Diversion/ Impoundment	Minimize unauthorized water diversions with the use of coordinated law enforcement efforts.	2	10	NMFS, CDFW, County						0	Action is considered In-Kind
ToC-NCSW-25.2.1.2	Action Step	Water Diversion/ Impoundment	Coordinate with County of Mendocino Marijuana Eradication Team to develop enforcement actions associated with illegal water diversions in the Tomki Creek watershed.	2	10	CDFW, COMMET, NMFS OLE						0	Action is considered In-Kind
ToC-NCSW-25.2.1.3	Action Step	Water Diversion/ Impoundment	Provide additional funding to the County of Mendocino Marijuana Eradication Team (COMMET) for removal of illegal cannabis operations that impact surface flow and water quality.	1	5	CDFW, COMMET, NMFS OLE	250.00					250	

Woodman Creek Population

NC Steelhead Winter-Run

- Role within DPS: Potentially Independent Population
- Diversity Stratum: Lower Interior
- Spawner Abundance Target: 1,300 adults
- Current Intrinsic Potential: 35.0 IP-km

For information regarding CC Chinook salmon and SONCC coho salmon for this watershed, please see the CC Chinook Salmon volume of this recovery plan and the SONCC coho salmon recovery plan (http://www.westcoast.fisheries.noaa.gov/).

Steelhead Abundance and Distribution

Few records exist that inform historic steelhead abundance within Woodman Creek. A California Department of Fish and Wildlife (CDFW) stream inventory report from 1981 documents juvenile steelhead inhabiting Woodman Creek downstream of the White Rock Creek confluence, however, fish density was low and steelhead were "not abundant" (CDFG 1981). Later surveys in 1995 and 1998 confirmed widespread distribution of juvenile steelhead throughout the survey section of mainstem Woodman Creek and two small tributaries (CDFG 1995; 1998a; 1998b; 1998c). No adult or carcass surveys have been conducted within the watershed. Steelhead are distributed throughout much of the Woodman Creek watershed, although impassable road crossings preclude passage into the upper reaches of a few smaller tributaries (Becker and Reining 2009). White Rock Creek, the largest tributary within the watershed, contains approximately 5 miles of high quality rearing and spawning habitat (Becker and Reining 2009). The railroad crossing near the Woodman Creek / Eel River confluence is considered a passage impediment at most flows, likely impeding upstream passage of adult steelhead into the watershed.

History of Land Use

Little is known regarding historical land use within the Woodman Creek watershed. The area has both Federal and private land holdings, with much of the private land managed for rural development. Large areas within the headwater reaches of Woodman Creek and White Rock Creek are managed by the U.S. Bureau of Land Management. Although little logging has occurred within the basin in the past few decades (less than 0.03 percent during the past 14 years; NMFS GIS data), past logging intensity was much higher during the early and mid 20th century when much of the Eel River basin underwent heavy timber harvest. PWA (2005) indicates that much of the Woodman Creek watershed was heavily tractor-logged during the 1950s, prior to being subdivided in the 1960s for non-industrial timber harvest, recreation, livestock grazing and

rural residences. Currently, the majority of private land within the Woodman Creek watershed consists of large parcels that are slowly being developed as rural residential properties. This will likely lead to increased demand for a limited water supply.

Current Resources and Land Management

Approximately one-quarter of the Woodman Creek watershed is managed by the U.S. Bureau of Land Management (USBLM). The remaining watershed is privately owned.

Salmonid Viability and Watershed Conditions

The following habitat attributes were rated Poor through the CAP process: habitat complexity, fish passage, riparian vegetation, viability, and sediment. Recovery strategies will typically focus on ameliorating these habitat attributes, although strategies that address other attributes may also be developed where their implementation is critical to restoring properly functioning habitat conditions within the watershed.

Current Conditions

The following discussion focuses on those conditions that rated Fair or Poor as a result of our CAP viability analysis. The Woodman Creek CAP Viability Table results are provided below. Recovery strategies will focus on improving these conditions.

Population and Habit Conditions

Habitat Complexity: Large Wood and Shelter

Data from CDFW habitat inventories indicate shelter ratings throughout the Woodman Creek watershed are poor within all sampled reaches. Poor to Fair LWD ratings were also documented Habitat Complexity: large wood conditions have a rating of Poor for summer rearing juveniles, smolts and adults, due largely to a lack of functional riparian corridors and recruitment of large conifer species from adjacent upslope areas. The general lack of wood within Woodman Creek stream channels is likely a cause of the observed shelter deficiencies.

Riparian Vegetation: Composition, Cover & Tree Diameter

Although canopy cover within Woodman Creek is generally good throughout all CDFW surveyed reaches, few riparian trees are of a suitable size to recruit to the stream channel and function as high quality LWD. Approximately 17 percent of riparian trees within surveyed reaches of Woodman Creek were considered Class 5 and 6; any measurement below 40 percent is indicative of poor riparian tree size.

Sediment: Gravel Quality and Distribution of Spawning Gravels

High levels of instream fine sediment likely impair steelhead summer rearing success within Woodman Creek. All surveyed reaches exhibited poor gravel embeddedness scores, suggesting that elevated fine sediment is likely a problem throughout much of the basin. Sediment transport from upslope sources is also likely a problem within the basin, given the high density of unimproved roads within riparian areas.

Passage/Migration: Mouth on Confluence and Physical Barriers

Few passage barriers exist within the Woodman Creek basin, and those that do exist are typically poorly functioning road crossings located within the headwater reaches of smaller tributaries. However, several passage impediments occur within the lower mainstem of Woodman Creek, most importantly the engineered fish channel below the railroad crossing that precludes adult fish passage at some flow levels. Passage /Migration, physical barriers conditions have a rating of Poor.

Viability: Density, Abundance, and Spatial Structure

The viability of the Woodman Creek steelhead population is likely depressed from historical measures, as suggested by the low juvenile abundance witnessed during recent habitat surveys. The cause of the observed low juvenile abundance is unknown at this time, but may be related to poor adult passage into the watershed, or poor egg to fry survival resulting from highly embedded spawning gravel. Water temperature and flow volume do not appear to be limiting steelhead production within the basin.

Other Current Conditions

Watershed hydrology is generally unimpaired within Woodman Creek, with adequate summer discharge measured during CDFW habitat surveys in 1981, 1995 and 1998a. Likewise, summer stream temperatures are thought to adequately support successful steelhead rearing, with measured water temperatures usually between 60 and 70°F (CDFG 1998a). However, more recent data on seasonal stream flow patterns are needed to determine if the unimpaired conditions observed in the 1990's continue to persist on an annual basis.

Threats

The following discussion focuses on those threats that were rated as High or Very High (see in Woodman Creek CAP results). Recovery strategies will likely focus on ameliorating high rating threats; however, some strategies may address Medium and Low threats when the strategy is

essential to recovery efforts. The figures and tables that display data used in this analysis are provided in Woodman Creek CAP results.

Roads and Railroads

Overall road density within the Woodman Creek watershed is fairly low (1.8 road miles/square mile watershed area), with a higher road density found within the White Rock Creek drainage than the southern half of the watershed. Of concern within the watershed is the high road density occurring within stream riparian corridors (2.2 mile/square mile). Riparian roads can more effectively deliver road sediment to the stream channel than upslope roads due to their close proximity to aquatic environment. Furthermore, many of the riparian roads in Woodman Creek confine the stream channel and prevent lateral channel migration, thus impairing natural fluvial and geomorphic processes responsible for creating and maintaining instream habitat features.

Road and railroad stream crossings impair steelhead migration patterns within the Woodman Creek watershed. The engineered fish channel adjacent the railroad crossing at the Woodman Creek confluence likely impedes upstream adult steelhead passage at most flows. Some road crossings block access into the headwater reaches of some smaller tributary streams.

Other Threats

There are no fish hatcheries in operation within the Woodman Creek watershed, so hatchery-related effects are unlikely within the steelhead population. Similarly, invasive species are not known to be problematic within the basin. Land clearing and road building associated with rural residential development is a significant concern within the basin, primarily within the White Rock Creek subwatershed. No dams or water impoundments existed within the basin, and summer baseflows were apparently adequate during the most recent surveys (CDFG 1981, 1995, 1998a). However, based on observations in other areas of the Eel River Watershed, rural residential development and illegal marijuana growing are likely to expand in the Woodman Creek drainage, which would result in additional stream flow diversions or groundwater pumping. These additional stresses to Woodman Creek would reduce the quality and extent of habitat for steelhead during the dry season.

Limiting Stresses, Life Stages, and Habitats

Threat and stress analysis within the CAP workbook suggests adult migration and spawning success is likely a limiting factor affecting steelhead abundance within the Woodman Creek watershed. Adult passage into and through the Woodman Creek system is impaired at several locations, and high levels of in-channel silt documented by high embeddedness scores suggests

spawning gravel quality may be substandard. Restoration actions should target addressing these issues within high potential stream reaches.

General Recovery Strategy

Evaluate and Address Passage Impediment/Barriers

The railroad crossing at the mouth of Woodman Creek impedes adult steelhead passage. Other road crossings within the basin may impede or preclude upstream passage for both adult and juvenile fish. All potential passage barriers/impediments should be investigated, and high priority sites should be addressed.

Numerous landslides have been noted within the Woodman Creek basin, and many are actively delivering fine sediment directly to stream channels (CDFG 1981, 1995, 1998a). A sediment assessment for the basin has already been performed (PWA 2005); high priority sites identified within the report should be addressed as restoration opportunities arise.

Shelter ratings were low within all surveyed stream reaches of Woodman Creek. Due largely to an absence of LWD, available shelter components are comprised mainly of boulders and aquatic vegetation. Where applicable, restoration efforts should incorporate instream wood/boulder structures into degraded reaches to improve habitat complexity and shelter availability.

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California Department of Fish and Game. 1998c. Stream Inventory Report: Unnamed tributary #2 to Woodman Creek.

Pacific Watershed Associates. 2005. Woodman Creek Watershed Assessment and Restoration Planning Project, Prepared for the California Department of Fish and Game. Pacific Watershed Associates, Petaluma, CA.


NOAA FISHERIES
Woodman Creek
NC Steelhead Population
Eel River
Iron
Dunham Rd
Stivers Rd
White Rock
Woodman
Woodman Peak Rd
Area of Detail
Northern CA Steelhead DPS
San Francisco
San Jose
Sacra
Population Boundary
Steelhead Intrinsic Potential (IP)
IP values represent the historical potential of stream segments to provide suitable habitat
0.01 - 0.34 Low Potential
0.35 - 0.69 Moderate Potential
0.70 - 1.00 High Potential
0
1
Miles
N

#	Conservation Target	Category	Key Attribute	Indicator	Poor	Fair	Good	Very Good	Current Indicator Measurement	Current Rating
1	Adults	Condition	Habitat Complexity	Large Wood Frequency (BFW 0-10 meters)	<50% of streams/ IP-Km (>6 Key Pieces/100 meters)	50% to 74% of streams/ IP-Km (>6 Key Pieces/100 meters)	75% to 90% of streams/ IP-Km (>6 Key Pieces/100 meters)	>90% of streams/ IP-Km (>6 Key Pieces/100 meters)	<50% of streams/ IP-km (>6 Key Pieces/100 meters)	Poor
			Habitat Complexity	Large Wood Frequency (BFW 10-100 meters)	<50% of streams/ IP-Km (>1.3 Key Pieces/100 meters)	50% to 74% of streams/ IP-Km (>1.3 Key Pieces/100 meters)	75% to 90% of streams/ IP-Km (>1.3 Key Pieces/100 meters)	>90% of streams/ IP-Km (>1.3 Key Pieces/100 meters)	<50% of streams/ IP-Km (>1.3 Key Pieces/100 meters)	Poor
			Habitat Complexity	Pool/Riffle/Flatwater Ratio	<50% of streams/ IP-Km (>40% Pools; >20% Riffles)	50% to 74% of streams/ IP-Km (>40% Pools; >20% Riffles)	75% to 90% of streams/ IP-Km (>40% Pools; >20% Riffles)	>90% of streams/ IP-Km (>40% Pools; >20% Riffles)	100% of streams/IP-km (>40% Pools; >20% Riffles)	Very Good
			Habitat Complexity	Shelter Rating	<50% of streams/ IP-Km (>80 stream average)	50% to 74% of streams/ IP-Km (>80 stream average)	75% to 90% of streams/ IP-Km (>80 stream average)	>90% of streams/ IP-Km (>80 stream average)	0% of streams/IP-km (>80 stream average)	Poor
			Hydrology	Passage Flows	NMFS Flow Protocol: Risk Factor Score >75	NMFS Flow Protocol: Risk Factor Score 51-75	NMFS Flow Protocol: Risk Factor Score 35-50	NMFS Flow Protocol: Risk Factor Score <35	NMFS Flow Protocol: Risk Factor Score 58	Fair
			Passage/Migration	Passage at Mouth or Confluence	<50% of IP-Km or <16 IP-Km accessible*	50% of IP-Km to 74% of IP-km	75% of IP-Km to 90% of IP-km	>90% of IP-km	75% of IP-km to 90% of IP-km	Good
			Passage/Migration	Physical Barriers	<50% of IP-Km or <16 IP-Km accessible*	50% of IP-Km to 74% of IP-km	75% of IP-Km to 90% of IP-km	>90% of IP-km	<50% of IP-km or <16 IP-km accessible*	Poor
			Riparian Vegetation	Tree Diameter (North of SF Bay)	≤39% Class 5 & 6 across IP-km	40 - 54% Class 5 & 6 across IP-km	55 - 69% Class 5 & 6 across IP-km	>69% Class 5 & 6 across IP-km	17% Class 5 & 6 across IP-km	Poor
			Riparian Vegetation	Tree Diameter (South of SF Bay)	≤69% Density rating "D" across IP-km	70-79% Density rating "D" across IP-km	≥80% Density rating "D" across IP-km	Not Defined		

			Sediment	Quantity & Distribution of Spawning Gravels	<50% of IP-Km or <16 IP-Km accessible*	50% of IP-Km to 74% of IP-km	75% of IP-Km to 90% of IP-km	>90% of IP-km	<50% of IP-km or <16 IP-km accessible*	Poor
			Velocity Refuge	Floodplain Connectivity	<50% Response Reach Connectivity	50-80% Response Reach Connectivity	>80% Response Reach Connectivity	Not Defined	>80% Response Reach Connectivity	Good
			Water Quality	Toxicity	Acute	Sublethal or Chronic	No Acute or Chronic	No Evidence of Toxins or Contaminants	Sublethal or Chronic	Fair
			Water Quality	Turbidity	<50% of streams/ IP-Km maintains severity score of 3 or lower	50% to 74% of streams/ IP-Km maintains severity score of 3 or lower	75% to 90% of streams/ IP-Km maintains severity score of 3 or lower	>90% of streams/ IP-Km maintains severity score of 3 or lower	50% to 74% of streams/ IP-km maintains severity score of 3 or lower	Fair
		Size	Viability	Density	<1 Spawner per IP-km (Spence et al 2012)	>1 spawner per IP-km to < low risk spawner density per Spence et al (2012)	low risk spawner density per Spence et al (2012)		>1 spawner per IP-km to < low risk spawner density per Spence et al (2012)	Fair
2	Eggs	Condition	Hydrology	Flow Conditions (Instantaneous Condition)	NMFS Flow Protocol: Risk Factor Score >75	NMFS Flow Protocol: Risk Factor Score 51-75	NMFS Flow Protocol: Risk Factor Score 35-50	NMFS Flow Protocol: Risk Factor Score <35	NMFS Flow Protocol: Risk Factor Score 51-75	Fair
			Hydrology	Redd Scour	NMFS Flow Protocol: Risk Factor Score >75	NMFS Flow Protocol: Risk Factor Score 51-75	NMFS Flow Protocol: Risk Factor Score 35-50	NMFS Flow Protocol: Risk Factor Score <35	NMFS Flow Protocol: Risk Factor Score 51-75	Fair
			Sediment	Gravel Quality (Bulk)	>17% (0.85mm) and >30% (6.4mm)	15-17% (0.85mm) and <30% (6.4mm)	12-14% (0.85mm) and <30% (6.4mm)	<12% (0.85mm) and <30% (6.4mm)	15-17% (0.85mm) and <30% (6.4mm)	Fair
			Sediment	Gravel Quality (Embeddedness)	<50% of streams/ IP-Km (>50% stream average scores of 1 & 2)	50% to 74% of streams/ IP-Km (>50% stream average scores of 1 & 2)	75% to 90% of streams/ IP-Km (>50% stream average scores of 1 & 2)	>90% of streams/ IP-Km (>50% stream average scores of 1 & 2)	25% of streams/ 13% of IP-km (>50% stream average scores of 1 & 2)	Poor

3	Summer Rearing Juveniles	Condition	Estuary/Lagoon	Quality & Extent	Impaired/non-functional	Impaired but functioning	Properly Functioning Condition		Impaired/non-functional	Poor
			Habitat Complexity	Large Wood Frequency (Bankfull Width 0-10 meters)	<50% of streams/ IP-Km (>6 Key Pieces/100 meters)	50% to 74% of streams/ IP-Km (>6 Key Pieces/100 meters)	75% to 90% of streams/ IP-Km (>6 Key Pieces/100 meters)	>90% of streams/ IP-Km (>6 Key Pieces/100 meters)	<50% of streams/ IP-km (>6 Key Pieces/100 meters)	Poor
			Habitat Complexity	Large Wood Frequency (Bankfull Width 10-100 meters)	<50% of streams/ IP-Km (>1.3 Key Pieces/100 meters)	50% to 74% of streams/ IP-Km (>1.3 Key Pieces/100 meters)	75% to 90% of streams/ IP-Km (>1.3 Key Pieces/100 meters)	>90% of streams/ IP-Km (>1.3 Key Pieces/100 meters)	<50% of streams/ IP-Km (>1.3 Key Pieces/100 meters)	Poor
			Habitat Complexity	Percent Primary Pools	<50% of streams/ IP-Km (>40% average primary pool frequency)	50% to 74% of streams/ IP-Km (>40% average primary pool frequency)	75% to 89% of streams/ IP-Km (>40% average primary pool frequency)	>90% of streams/ IP-Km (>40% average primary pool frequency)	25% of streams/ 9% of IP-km (>40% average primary pool frequency)	Poor
			Habitat Complexity	Pool/Riffle/Flatwater Ratio	<50% of streams/ IP-Km (>40% Pools; >20% Riffles)	50% to 74% of streams/ IP-Km (>40% Pools; >20% Riffles)	75% to 90% of streams/ IP-Km (>40% Pools; >20% Riffles)	>90% of streams/ IP-Km (>40% Pools; >20% Riffles)	100% of streams/IP-km (>40% Pools; >20% Riffles)	Very Good
			Habitat Complexity	Shelter Rating	<50% of streams/ IP-Km (>80 stream average)	50% to 74% of streams/ IP-Km (>80 stream average)	75% to 90% of streams/ IP-Km (>80 stream average)	>90% of streams/ IP-Km (>80 stream average)	0% of streams/IP-km (>80 stream average)	Poor
			Hydrology	Flow Conditions (Baseflow)	NMFS Flow Protocol: Risk Factor Score >75	NMFS Flow Protocol: Risk Factor Score 51-75	NMFS Flow Protocol: Risk Factor Score 35-50	NMFS Flow Protocol: Risk Factor Score <35	NMFS Flow Protocol: Risk Factor Score 58	Fair
			Hydrology	Flow Conditions (Instantaneous Condition)	NMFS Flow Protocol: Risk Factor Score >75	NMFS Flow Protocol: Risk Factor Score 51-75	NMFS Flow Protocol: Risk Factor Score 35-50	NMFS Flow Protocol: Risk Factor Score <35	NMFS Flow Protocol: Risk Factor Score 58	Fair
			Hydrology	Number, Condition and/or Magnitude of Diversions	>5 Diversions/10 IP km	1.1 - 5 Diversions/10 IP km	0.01 - 1 Diversions/10 IP km	0 Diversions	0.01 - 1 Diversions/10 IP-km	Good
			Passage/Migration	Passage at Mouth or Confluence	<50% of IP-Km or <16 IP-Km accessible*	50% of IP-Km to 74% of IP-km	75% of IP-Km to 90% of IP-km	>90% of IP-km	75% of IP-km to 90% of IP-km	Good

			Passage/Migration	Physical Barriers	<50% of IP-Km or <16 IP-Km accessible*	50% of IP-Km to 74% of IP-km	75% of IP-Km to 90% of IP-km	>90% of IP-km	50% of IP-km to 74% of IP-km	Fair
			Riparian Vegetation	Canopy Cover	<50% of streams/ IP-Km (>70% average stream canopy; >85% where coho IP overlaps)	50% to 74% of streams/ IP-Km (>70% average stream canopy; >85% where coho IP overlaps)	75% to 90% of streams/ IP-Km (>70% average stream canopy; >85% where coho IP overlaps)	>90% of streams/ IP-Km (>70% average stream canopy; >85% where coho IP overlaps)	100% of streams/ IP-km (>70% average stream canopy; >85% where coho IP overlaps)	Very Good
			Riparian Vegetation	Tree Diameter (North of SF Bay)	≤39% Class 5 & 6 across IP-km	40 - 54% Class 5 & 6 across IP-km	55 - 69% Class 5 & 6 across IP-km	>69% Class 5 & 6 across IP-km	17% Class 5 & 6 across IP-km	Poor
			Riparian Vegetation	Tree Diameter (South of SF Bay)	≤69% Density rating "D" across IP-km	70-79% Density rating "D" across IP-km	≥80% Density rating "D" across IP-km	Not Defined		
			Sediment (Food Productivity)	Gravel Quality (Embeddedness)	<50% of streams/ IP-Km (>50% stream average scores of 1 & 2)	50% to 74% of streams/ IP-Km (>50% stream average scores of 1 & 2)	75% to 90% of streams/ IP-Km (>50% stream average scores of 1 & 2)	>90% of streams/ IP-Km (>50% stream average scores of 1 & 2)	25% of streams/ 13% of IP-km (>50% stream average scores of 1 & 2)	Poor
			Water Quality	Temperature (MWMT)	<50% IP km (<20 C MWMT; <16 C MWMT where coho IP overlaps)	50 to 74% IP km (<20 C MWMT; <16 C MWMT where coho IP overlaps)	75 to 89% IP km (<20 C MWMT; <16 C MWMT where coho IP overlaps)	>90% IP km (<20 C MWMT; <16 C MWMT where coho IP overlaps)	50 to 74% IP-km (<20 C MWMT; <16 C MWMT where coho IP overlaps)	Fair
			Water Quality	Toxicity	Acute	Sublethal or Chronic	No Acute or Chronic	No Evidence of Toxins or Contaminants	Sublethal or Chronic	Fair
			Water Quality	Turbidity	<50% of streams/ IP-Km maintains severity score of 3 or lower	50% to 74% of streams/ IP-Km maintains severity score of 3 or lower	75% to 90% of streams/ IP-Km maintains severity score of 3 or lower	>90% of streams/ IP-Km maintains severity score of 3 or lower	50% to 74% of streams/ IP-km maintains severity score of 3 or lower	Fair
		Size	Viability	Density	<0.2 Fish/m^2	0.2 - 0.6 Fish/m^2	0.7 - 1.5 Fish/m^2	>1.5 Fish/m^2	<0.2 Fish/m^2	Poor
			Viability	Spatial Structure	<50% of Historical Range	50-74% of Historical Range	75-90% of Historical Range	>90% of Historical Range	75-90% of Historical Range	Good

4	Winter Rearing Juveniles	Condition	Habitat Complexity	Large Wood Frequency (Bankfull Width 0-10 meters)	<50% of streams/ IP-Km (>6 Key Pieces/100 meters)	50% to 74% of streams/ IP-Km (>6 Key Pieces/100 meters)	75% to 90% of streams/ IP-Km (>6 Key Pieces/100 meters)	>90% of streams/ IP-Km (>6 Key Pieces/100 meters)	<50% of streams/ IP-km (>6 Key Pieces/100 meters)	Poor
			Habitat Complexity	Large Wood Frequency (Bankfull Width 10-100 meters)	<50% of streams/ IP-Km (>1.3 Key Pieces/100 meters)	50% to 74% of streams/ IP-Km (>1.3 Key Pieces/100 meters)	75% to 90% of streams/ IP-Km (>1.3 Key Pieces/100 meters)	>90% of streams/ IP-Km (>1.3 Key Pieces/100 meters)	<50% of streams/ IP-Km (>1.3 Key Pieces/100 meters)	Poor
			Habitat Complexity	Pool/Riffle/Flatwater Ratio	<50% of streams/ IP-Km (>40% Pools; >20% Riffles)	50% to 74% of streams/ IP-Km (>40% Pools; >20% Riffles)	75% to 90% of streams/ IP-Km (>40% Pools; >20% Riffles)	>90% of streams/ IP-Km (>40% Pools; >20% Riffles)	100% of streams/IP-km (>40% Pools; >20% Riffles)	Very Good
			Habitat Complexity	Shelter Rating	<50% of streams/ IP-Km (>80 stream average)	50% to 74% of streams/ IP-Km (>80 stream average)	75% to 90% of streams/ IP-Km (>80 stream average)	>90% of streams/ IP-Km (>80 stream average)		
			Passage/Migration	Physical Barriers	<50% of IP-Km or <16 IP-Km accessible*	50% of IP-Km to 74% of IP-km	75% of IP-Km to 90% of IP-km	>90% of IP-km	75% of IP-Km to 90% of IP-km	Good
			Riparian Vegetation	Tree Diameter (North of SF Bay)	≤39% Class 5 & 6 across IP-km	40 - 54% Class 5 & 6 across IP-km	55 - 69% Class 5 & 6 across IP-km	>69% Class 5 & 6 across IP-km	17% Class 5 & 6 across IP-km	Poor
			Riparian Vegetation	Tree Diameter (South of SF Bay)	≤69% Density rating "D" across IP-km	70-79% Density rating "D" across IP-km	≥80% Density rating "D" across IP-km	Not Defined		
			Sediment (Food Productivity)	Gravel Quality (Embeddedness)	<50% of streams/ IP-Km (>50% stream average scores of 1 & 2)	50% to 74% of streams/ IP-Km (>50% stream average scores of 1 & 2)	75% to 90% of streams/ IP-Km (>50% stream average scores of 1 & 2)	>90% of streams/ IP-Km (>50% stream average scores of 1 & 2)	25% of streams/ 13% of IP-km (>50% stream average scores of 1 & 2)	Poor
			Velocity Refuge	Floodplain Connectivity	<50% Response Reach Connectivity	50-80% Response Reach Connectivity	>80% Response Reach Connectivity	Not Defined	>80% Response Reach Connectivity	Good
			Water Quality	Toxicity	Acute	Sublethal or Chronic	No Acute or Chronic	No Evidence of Toxins or Contaminants	Sublethal or Chronic	Fair

			Water Quality	Turbidity	<50% of streams/ IP-Km maintains severity score of 3 or lower	50% to 74% of streams/ IP-Km maintains severity score of 3 or lower	75% to 90% of streams/ IP-Km maintains severity score of 3 or lower	>90% of streams/ IP-Km maintains severity score of 3 or lower		
5	Smolts	Condition	Estuary/Lagoon	Quality & Extent	Impaired/non-functional	Impaired but functioning	Properly Functioning Condition		Impaired/non-functional	Poor
			Habitat Complexity	Shelter Rating	<50% of streams/ IP-Km (>80 stream average)	50% to 74% of streams/ IP-Km (>80 stream average)	75% to 90% of streams/ IP-Km (>80 stream average)	>90% of streams/ IP-Km (>80 stream average)	0% of streams/IP-km (>80 stream average)	Poor
			Hydrology	Number, Condition and/or Magnitude of Diversions	>5 Diversions/10 IP km	1.1 - 5 Diversions/10 IP km	0.01 - 1 Diversions/10 IP km	0 Diversions	0.01 - 1 Diversions/10 IP-km	Good
			Hydrology	Passage Flows	NMFS Flow Protocol: Risk Factor Score >75	NMFS Flow Protocol: Risk Factor Score 51-75	NMFS Flow Protocol: Risk Factor Score 35-50	NMFS Flow Protocol: Risk Factor Score <35	NMFS Flow Protocol: Risk Factor Score 35-50	Good
			Passage/Migration	Passage at Mouth or Confluence	<50% of IP-Km or <16 IP-Km accessible*	50% of IP-Km to 74% of IP-km	75% of IP-Km to 90% of IP-km	>90% of IP-km	75% of IP-km to 90% of IP-km	Good
			Smoltification	Temperature	<50% IP-Km (>6 and <14 C)	50-74% IP-Km (>6 and <14 C)	75-90% IP-Km (>6 and <14 C)	>90% IP-Km (>6 and <14 C)	75-90% IP-km (>6 and <14 C)	Good
			Water Quality	Toxicity	Acute	Sublethal or Chronic	No Acute or Chronic	No Evidence of Toxins or Contaminants	Sublethal or Chronic	Fair
			Water Quality	Turbidity	<50% of streams/ IP-Km maintains severity score of 3 or lower	50% to 74% of streams/ IP-Km maintains severity score of 3 or lower	75% to 90% of streams/ IP-Km maintains severity score of 3 or lower	>90% of streams/ IP-Km maintains severity score of 3 or lower	50% to 74% of streams/ IP-km maintains severity score of 3 or lower	Fair
		Size	Viability	Abundance	Smolt abundance which produces high risk spawner density per Spence (2008)	Smolt abundance which produces moderate risk spawner density per Spence (2008)	Smolt abundance to produce low risk spawner density per Spence (2008)		Smolt abundance which produces high risk spawner density per Spence (2008)	Poor

6	Watershed Processes	Landscape Context	Hydrology	Impervious Surfaces	>10% of Watershed in Impervious Surfaces	7-10% of Watershed in Impervious Surfaces	3-6% of Watershed in Impervious Surfaces	<3% of Watershed in Impervious Surfaces	0.051% of Watershed in Impervious Surfaces	Very Good
			Landscape Patterns	Agriculture	>30% of Watershed in Agriculture	20-30% of Watershed in Agriculture	10-19% of Watershed in Agriculture	<10% of Watershed in Agriculture	0% of Watershed in Agriculture	Very Good
			Landscape Patterns	Timber Harvest	>35% of Watershed in Timber Harvest	26-35% of Watershed in Timber Harvest	25-15% of Watershed in Timber Harvest	<15% of Watershed in Timber Harvest	0.03% of Watershed in Timber Harvest	Very Good
			Landscape Patterns	Urbanization	>20% of watershed >1 unit/20 acres	12-20% of watershed >1 unit/20 acres	8-11% of watershed >1 unit/20 acres	<8% of watershed >1 unit/20 acres	0% of watershed >1 unit/20 acres	Very Good
			Riparian Vegetation	Species Composition	<25% Intact Historical Species Composition	25-50% Intact Historical Species Composition	51-74% Intact Historical Species Composition	>75% Intact Historical Species Composition	25-50% Intact Historical Species Composition	Fair
			Sediment Transport	Road Density	>3 Miles/Square Mile	2.5 to 3 Miles/Square Mile	1.6 to 2.4 Miles/Square Mile	<1.6 Miles/Square Mile	1.8 Miles/Square Mile	Good
			Sediment Transport	Streamside Road Density (100 m)	>1 Miles/Square Mile	0.5 to 1 Miles/Square Mile	0.1 to 0.4 Miles/Square Mile	<0.1 Miles/Square Mile	2.2 Miles/Square Mile	Poor

Woodman Creek CAP Threat Results

	Threats Across Targets	Adults	Eggs	Summer Rearing Juveniles	Winter Rearing Juveniles	Smolts	Watershed Processes	Overall Threat Rank
	Project-specific-threats	1	2	3	4	5	6	
1	Agriculture	Low	Low	Low	Low	Low	Low	Low
2	Channel Modification	Medium	Low	Medium	Medium	Medium	Low	Medium
3	Disease, Predation and Competition	Medium	Low	Low	Low	Medium	Low	Medium
4	Hatcheries and Aquaculture	Low		Low	Low	Low	Low	Low
5	Fire, Fuel Management and Fire Suppression	Low	Low	Low	Low	Low	Low	Low
6	Fishing and Collecting	Low		Low		Low		Low
7	Livestock Farming and Ranching	Low	Low	Medium	Low	Low		Low
8	Logging and Wood Harvesting	Low	Low	Low	Low	Low	Low	Low
9	Mining	Low	Low	Low	Low	Low	Low	Low
10	Recreational Areas and Activities	Low	Low	Low	Low	Low	Low	Low
11	Residential and Commercial Development	Medium	Low	Medium	Low	Medium	Low	Medium
12	Roads and Railroads	High	Medium	High	Medium	High	Medium	High
13	Severe Weather Patterns	Medium	Low	Medium	Medium	Medium	Low	Medium
14	Water Diversion and Impoundments	Medium	Low	Medium	Medium	Medium	Low	Medium
	Threat Status for Targets and Project	High	Medium	High	Medium	High	Medium	High

Woodman Creek, Northern California Steelhead (Lower Interior) Recovery Actions

Action ID	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partner	Costs ($K)						Comment
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25	Entire Duration	
WmC-NCSW-3.1	**Objective**	**Hydrology**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
WmC-NCSW-3.1.1	Recovery Action	Hydrology	Improve flow conditions										
WmC-NCSW-3.1.1.1	Action Step	Hydrology	Maintain or improve flow through a forbearance program or other incentives.	1	10	CDFW, NMFS, RWQCB						TBD	Although reports from the 1990's suggest there used to be adequate flows, this does not mean it is still the case. Woodman Creek is one of the few cooler water tributaries in the area. Preserving water to keep Woodman flowing is a top priority.
WmC-NCSW-5.1	**Objective**	**Passage**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
WmC-NCSW-5.1.1	Recovery Action	Passage	Modify or remove physical passage barriers										
WmC-NCSW-5.1.1.1	Action Step	Passage	Evaluate and prioritize existing list of passage barriers documented by CDFW.	2	10	CDFW, NOAA RC, RCD						0	Action is considered In-Kind
WmC-NCSW-5.1.1.2	Action Step	Passage	Develop and implement fish passage projects based on priority from list developed by CDFW (biologist Scott Harris).	2	10	CDFW, CDFW, NMFS, Private Landowners						TBD	Estimate can not be made at this time.
WmC-NCSW-5.1.1.3	Action Step	Passage	Investigate and improve passage at the railroad tressel near the confluence of Woodman Creek and the Eel River.	1	5	CDFW, NMFS	533					533	Highest priority action within watershed. Cost based on providing passage (assume partial barrier) at a rate of $532,706/project.
WmC-NCSW-6.1	**Objective**	**Habitat Complexity**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
WmC-NCSW-6.1.1	Recovery Action	Habitat Complexity	Improve frequency of primary pools, LWD, and shelter ratings										
WmC-NCSW-6.1.1.1	Action Step	Habitat Complexity	Utilize existing watershed analyses or habitat surveys, or conduct new analyses where needed, in order to prioritize restoration actions that improve instream habitat complexity.	2	20	CDFW, NMFS, RCD, Private Landowners						0	Action is considered In-Kind
WmC-NCSW-6.1.1.2	Action Step	Habitat Complexity	Complete habitat surveys to document habitat quality and availability within the watershed.	1	10	CDFW, NMFS						TBD	Cost is TBD at this time. If done through CDFW stream habitat survey program, the cost would likely be a part of CDFW personnel costs.
WmC-NCSW-6.1.1.3	Action Step	Habitat Complexity	Conduct outreach with private landowners in order to complete habitat surveys and establish restoration priorities on private lands.	2	5	CDFW, NMFS, NOAA RC, NRCS, Private Landowners, RCD						0	Cost will largely be covered through already existing personnel costs for CDFW and NMFS. Action is considered In-Kind
WmC-NCSW-6.1.2	Recovery Action	Habitat Complexity	Improve large wood frequency										
WmC-NCSW-6.1.2.1	Action Step	Habitat Complexity	Maintain current LWD, boulders, and other structure-providing features to maintain current stream complexity, pool frequency, and depth (CDFG 2004).	2	20	CDFW, NMFS, NRCS, Private Landowners, RCD						0	Maintenance of restoration structures is usually included within the grant contract, and is therefore a cost of the overall project. Action is considered In-Kind
WmC-NCSW-6.1.2.2	Action Step	Habitat Complexity	Install or enhance existing LWD, boulders, and other instream features to increase habitat complexity and improve pool frequency and depth.	1	10	CDFW, NMFS, NOAA RC, NRCS, Private Landowners, RCD	114.50	114.50				229	Cost based on treating 8.8 miles (assume 1 project/mile in 50% high IP) at a rate of $26,000/mile. This action step should be coordinate with above action steps to reduce cost and redundancy.
WmC-NCSW-6.1.2.3	Action Step	Habitat Complexity	Encourage landowners to implement woody debris restoration projects as part of their ongoing operations in stream reaches where large woody debris is lacking.	2	10	CDFW, NMFS, NRCS, Private Landowners, RCD						0	Cost to encourage landowners expected to low and largely covered by CDFW and NMFS personnel costs. Action is considered In-Kind

Woodman Creek, Northern California Steelhead (Lower Interior) Recovery Actions

Action ID	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partner	Costs ($K)						Comment
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25	Entire Duration	
WmC-NCSW-7.1	**Objective**	**Riparian**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
WmC-NCSW-7.1.1	Recovery Action	Riparian	Improve canopy cover										
WmC-NCSW-7.1.1.1	Action Step	Riparian	Restore and protect riparian vegetation to improve migration and summer/overwintering habitat for steelhead and Chinook salmon (CDFG 2004).	3	50	CDFW, NMFS, Private Landowners						0	Action is considered In-Kind
WmC-NCSW-7.1.1.2	Action Step	Riparian	A comprehensive evaluation and monitoring program should be implemented to determine areas where poor riparian habitat is producing water temperatures that limit juvenile steelhead and Chinook salmon survival.	1	10	CDFW, NMFS, Private Landowners	144.00	144.00				288	Cost based on riparian and wetland restoration model at a rate of $73,793 and $213,307/project.
WmC-NCSW-7.1.1.3	Action Step	Riparian	Promote streamside conservation measures, including conservation easements, setbacks, and riparian buffers (CDFG 2004).	2	100	CDFW, NMFS, NOAA RC, NRCS, Private Landowners, RCD						TBD	Cost is unknown at this time since the number, location and scope of future projects is not known.
WmC-NCSW-7.1.1.4	Action Step	Riparian	Fence riparian areas within the watershed from grazing by using fencing standards that allow other wildlife to access the stream.	1	5	CDFW, NMFS, NOAA RC, NRCS, Private Landowners, RCD	20.00					20	Cost based on treating 1 mile (assume 1 project/mile in 5% high IP) at a rate of $3.63/ft.
WmC-NCSW-7.1.1.5	Action Step	Riparian	Assess riparian canopy and impacts of exotic vegetation (e.g., Arundo donax, ivy, etc.), prioritize and develop riparian habitat reclamation and enhancement programs (CDFG 2004).	1	20	CDFW, NMFS, NOAA RC, NRCS, Private Consultants, RCD	25.00	25.00	25.00	25.00		100	Approximate cost of performing assessment and developing reclamation and enhancement program.
WmC-NCSW-7.1.2	Recovery Action	Riparian	Improve tree diameter										
WmC-NCSW-7.1.2.1	Action Step	Riparian	Develop a Large Wood Recruitment Plan that assesses instream wood needs, and sites potentially responsive to wood recruitment or placement, and develop a riparian strategy to ensure long term natural recruitment of wood via large tree retention.	3	10	CDFW, NMFS, Private Landowners, County						0	Action is considered In-Kind
WmC-NCSW-7.1.2.2	Action Step	Riparian	Manage riparian areas for their site potential composition and structure.	1	100	CDFW, NMFS, NRCS, Private Landowners, RCD						0	Action is considered In-Kind
WmC-NCSW-7.1.2.3	Action Step	Riparian	Conduct conifer release to promote growth of larger diameter trees where appropriate.	2	20	CDFW, NOAA RC, NRCS, Private Landowners, RCD						TBD	Cost based on amount of conifer to be released.
WmC-NCSW-8.1	**Objective**	**Sediment**	**Address the inadequacy of existing regulatory mechanisms**										
WmC-NCSW-8.1.1	Recovery Action	Sediment	Improve instream gravel quality										
WmC-NCSW-8.1.1.1	Action Step	Sediment	Solicit cooperation from NRCS, RCDs, Farm Bureau, and others to devise incentive programs and incentive-based approaches to encourage and support landowners who conduct operations in a manner compatible with NC steelhead and CC Chinook salmon recovery priorities.	2	20	CDFW, Farm Bureau, NMFS, NRCS, Private Landowners, RCD						0	Cost is expected to be low. Action is considered In-Kind

Woodman Creek, Northern California Steelhead (Lower Interior) Recovery Actions

Action ID	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partner	Costs ($K)						Comment
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25	Entire Duration	
WmC-NCSW-8.1.1.2	Action Step	Sediment	Provide incentives to restore high priority sites as determined by watershed analysis (e.g., Woodman Creek Watershed Assessment and Restoration Planning Project (PWA 2005)), CDFW, or CalFire.	1	10	CDFW, NMFS						0	Cost will be determined by the type of incentives offered, but is expected to be low. Currently, incentive programs exist and should be explored and expanded.
WmC-NCSW-11.1	**Objective**	**Viability**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
WmC-NCSW-11.1.1	Recovery Action	Viability	Increase density, abundance, spatial structure and diversity										
WmC-NCSW-11.1.1.1	Action Step	Viability	Conduct a comprehensive assessment of watershed processes (e.g., hydrology, geology, fluvial-geomorphology, water quality, and vegetation), instream habitat, and factors limiting Chinook salmon and steelhead production.	2	5	CDFW, NMFS, Private Landowners						0	Cost covered in Monitoring Chapter
WmC-NCSW-11.1.1.2	Action Step	Viability	Monitor population status for response to recovery actions.	3	10	CDFW, NMFS, Private Landowners						0	Cost covered in Monitoring Chapter
WmC-NCSW-11.1.1.3	Action Step	Viability	Utilize CDFW approved implementation, effectiveness, and validation monitoring protocols when assessing efficacy of restoration efforts.	2	100	CDFW, NMFS, NRCS, Private Consultants, Private Landowners, RCD						0	Cost is expected to be low, and largely absorbed through future restoration funding. Action is considered In-Kind
WmC-NCSW-16.1	**Objective**	**Fishing/Collecting**	**Address the inadequacy of existing regulatory mechanisms**										
WmC-NCSW-16.1.1	Recovery Action	Fishing/Collecting	Prevent or minimize reduced density, abundance, and diversity based on the biological recovery criteria										
WmC-NCSW-16.1.1.1	Action Step	Fishing/Collecting	NMFS and CDFW will work to improve the California Freshwater Sport Fishing Regulations to minimize take of adult salmonids.	2	5	CDFW, NMFS						0	Action is considered In-Kind
WmC-NCSW-16.1.1.2	Action Step	Fishing/Collecting	Work with CDFW to improve protection for salmonids by modifying California Code of Regulations Section 8.00 (a) (1-3) low flow restrictions for the Eel and Van Duzen rivers.	2	5	CDFW, NMFS						0	Action is considered In-Kind
WmC-NCSW-23.1	**Objective**	**Roads/Railroads**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
WmC-NCSW-23.1.1	Recovery Action	Roads/Railroads	Prevent or minimize alterations to sediment transport (road condition/density, dams, etc.)										
WmC-NCSW-23.1.1.1	Action Step	Roads/Railroads	Develop a Riparian Road Sediment Reduction Plan that prioritizes sites and outlines implementation and a timeline of necessary actions.	1	10	CDFW, Mendocino County Department of Public Works, NMFS, Private Landowners	21.50	21.50				43	Cost based on conducting a road inventory of 45 miles of road network at a rate of $957/mile.
WmC-NCSW-23.1.1.2	Action Step	Roads/Railroads	Implement riparian road upgrades at high priority sites identified in the sediment reduction plan.	3	15	CDFW, Mendocino County RCD, NMFS, NRCS, Private Landowners	79.33	79.33	79.33			238	Cost based on treating 11.3 miles of road (assume 25% of road network) at a rate of $21,000/mile.

NC Steelhead DPS Rapid Assessment Profile: Lower Interior/North Mountain Interior Diversity Strata Populations

Bell Springs

- Role within DPS: Potentially Independent Population
- Lower Interior Diversity Stratum
- Spawner Abundance Target: 107-215 adults
- Current Intrinsic Potential: 18.1 IP-km

Bucknell Creek

- Role within DPS: Dependent Population
- Lower Interior Diversity Stratum
- Spawner Abundance Target: 52-106 adults
- Current Intrinsic Potential: 9.0 IP-km

Dobbyn Creek

- Role within DPS: Potentially Independent Population
- North Mountain Interior Diversity Strata
- Spawner Abundance Target: 280-562 adults
- Current Intrinsic Potential: 47.0 IP-km

Garcia Creek

- Role within DPS: Dependent Population
- Lower Interior Diversity Stratum
- Spawner Abundance Target: 83-167 adults
- Current Intrinsic Potential: 14.1

Jewett Creek

- Role within DPS: Independent Population
- Lower Interior Diversity Stratum
- Spawner Abundance Target: 99-200 adults
- Current Intrinsic Potential: 16.8 IP-km

Soda Creek

- Role within DPS: Dependent Population

- Lower Interior Diversity Stratum
- Spawner Abundance Target: 92-186 adults
- Current Intrinsic Potential: 15.7 IP-km

For information regarding CC Chinook salmon for these watersheds, please see the CC Chinook Salmon volume of this recovery plan.

Steelhead Abundance and Distribution

These populations are all in larger tributaries to the mainstem Eel River that were included in the recovery plan to provide connectivity between populations along the mainstem Eel River from the South Fork Eel River Confluence to Scott Dam. Five tributaries, Bell Springs, Bucknell, Jewett, Garcia and Soda creeks, are part of the Lower Interior diversity stratum and Dobbyn Creek is within the North Mountain Interior Stratum. Dobbyn Creek enters the lower reach of mainstem Eel River in the northern area of the basin, north of Alderpoint. The Jewett Creek watershed is located approximately three miles upstream of the small town of Alderpoint in Humboldt County. Bell Springs Creek flows from the west and enters the Eel River directly across from the North Fork Eel River confluence. Garcia Creek is tributary to the Upper Middle Mainstem Eel River and flows south, entering the Eel River at about stream mile 147. Soda Creek and Bucknell Creek are located in the upper reach of the mainstem Eel River just downstream of Scott Dam and Lake Pillsbury.

Currently, steelhead are present in all of these tributaries but surveys have not been conducted since the late 1990s. Dobbyn Creek, the largest of these tributaries, has steelhead present throughout most of the watershed and was stocked heavily in the 1930s. Bell Springs Creek is similar with steelhead presence confirmed by CDFW biologists in 1996 (CEMR 2009). These CDFW surveys observed juvenile steelhead from the mouth of Bell Springs Creek upstream 3.4 miles where a series of falls is reported to limit anadromy. Bucknell and Soda creeks represent very important tributaries in the upper reach of the mainstem Eel River between the Van Arsdale Fish Station (VAFS) and Scott Dam. According to a stream survey conducted by CDFW in 1995, Bucknell Creek had about five juvenile steelhead per 100 feet of stream reach. Anadromous habitat in this tributary extends approximately 4.8 miles upstream to a series of waterfalls that limits anadromous passage. Two tributaries, Welch Creek and Panther Creek, meet to form Soda Creek which is the upper most tributary to the mainstem Eel River prior to Scott Dam which forms Lake Pillsbury. Currently, most of the Soda Creek reach, which is about three miles long, is dry or intermittent during the summer months. Juvenile steelhead are present in both Panther and Welch creeks, with Welch Creek providing cooler summer stream temperatures, but limited flow in some years (L. Morgan, personal communication 2013). Staff from USFS surveyed Garcia

Creek and its tributaries in 1973 and observed "salmonids" at low densities in the lower creek and becoming more common in the upper reaches. The creek contained three miles of stream accessible for anadromous spawning and rearing. A summary of the stream survey states, "Reproduction by salmonids seemed to be good for the past spawning season, but the general impression was that this stream is capable of supporting greater densities of these species" (USFS 1983). Electrofishing was conducted in a number of Eel River tributaries in 1981 as part of PG&E's Potter Valley Project Fisheries Study. Garcia Creek was sampled using electrofishing methods in August 1981 and 1982 and an estimate for juvenile steelhead in a 30 meter reach was 70 and 93, respectively (VTN 1982). Fish sampling was performed throughout the Eel River watershed in 1989 and 1990 as part of a four-year study conducted by researchers at UC Davis. During this sampling, O. mykiss was observed in Jewett Creek (Brown 1991).

History of Land Use, Land Management and Current Resources

Following WWII, mechanized logging was conducted in many areas of the watershed. Due to the near-absence of regulations, many areas were harvested with poor logging practices including road construction on steep hillsides. In the harvested areas, the watershed was then susceptible to massive erosion as the result of record rainfall and floods in 1955 and 1964 (US EPA 2005). The erosion resulted in increased sediment being deposited in stream channels, filling in most deep pools (Lisle 1982). Stream reaches became wide and shallow, with reduced riparian vegetation for stabilization or shade. According to US EPA (2005) most sediment production from 1940-2005 came from natural sources (68%), and roads are the cause of the human related sediment, accounting for 26% of sediment production. Following the 1964 flood, populations of anadromous fish did not recover, and recovery was made even more difficult by the illegal introduction and explosive population expansion of the predatory Sacramento pikeminnow in 1979 (Brown and Moyle 1997).

In parts of the mainstem Eel River basin grazing and residential development occurred over time that has further degraded stream reaches. Since the passage of Proposition 215, the Compassionate Use Act of 1996, many watersheds such as the Eel River have an increase in rural residential development associated with cannabis production. Rural residential development that occurred in the 1970s was known as the "back to the land" movement with individuals that did not want to conform to main stream society. These individuals spawned the early cannabis black market that has increased dramatically in northern California since 1996, with watersheds such as the Eel River becoming the epicenter of cannabis production in northern California (personal observation, T. Daugherty, NMFS, 2015).

Diversity Stratum Population and Habitat Conditions

Based on limited stream survey information, no habitat conditions rate as Poor for the mainstem Eel River tributaries described above. Fair and Poor conditions for these tributaries are associated with poor habitat conditions and reduced streamflow during the summer period that limits rearing capacity for the juvenile steelhead passage conditions at road crossings and natural boulder roughs reduce habitat availability in Dobbyn, Bell Springs, and Soda creeks. Recovery strategies will focus on improving these poor conditions as well as those needed to ensure population viability and functioning watershed processes.

Current impaired conditions result directly or indirectly from human activities, and are expected to continue until restored and/or the threat acting on the conditions is abated. The following discussion focuses on those conditions that rate as Poor or Fair for steelhead life history stages (see "Lower Interior Diversity Stratum and North Mountain Interior Stratum" Rapid Assessment Results). These were streamflows, passage and migration, pool frequency, LWD and shelter, gravel quality and quantity, abundance, and stream temperatures. Recovery strategies will focus on improving these conditions as well as those needed to ensure population viability and functioning watershed processes.

Estuary: Quality and Extent

The Eel River estuary was once a highly complex and extensive habitat area that played a vital role in the health and productivity of all Eel River salmonid populations. The Eel River estuary is severely impaired because of past diking and filling of tidal wetlands for agriculture and flood protection. CDFG (2010) estimates there has been a 90-percent reduction in the amount of historic wetland habitat in the estuary, and a similar reduction in the amount of water entering and leaving the estuary with the rise and fall of the tide. For more information regarding the Eel River estuary please see the Lower Mainstem Eel's Rapid Assessment and the Eel River Overview.

Hydrology: Baseflow and Passage Flows

Historic summer flow conditions within the hot interior areas of the Eel River system limit juvenile fish production in tributaries and the mainstem. Therefore, diversions that are occurring in these systems have an effect on quality and quantity of available habitat for juvenile fish during critical low flow periods.

Passage/Migration: Mouth or Confluence and Physical Barriers

Passage conditions in these tributaries are typically impacted by existing road crossings in smaller channels that could provide rearing opportunities for juvenile steelhead. Road culverts and in

some cases natural high-gradient boulder reaches limit the extent of anadromous use in these streams.

Habitat Complexity: Percent Primary Pools and Pool/Riffle/Flatwater Ratios

The lack of pools in tributary streams likely limits the space available for juvenile fish attempting to maintain territory for feeding and predator avoidance. Lack of pool habitats within this basin likely stems from high instream sediment concentrations (pool filling), reduced flow and loss of LWD recruitment from past land use practices.

Habitat Complexity: Large Wood and Shelter

Past timber harvesting of large conifers such as Douglas Fir and Pine has reduced recruitment of these species to stream channels. Unlike coastal redwoods, these species do not re-colonize or produce stump sprouts, making it difficult to re-grow riparian areas that mimic historic conditions. The majority of habitat complexity in these interior tributary streams is in the form of boulders and bedrock that forms the pool riffle sequences.

Sediment: Gravel Quality and Distribution of Spawning Gravels

Highly erodible soils in the Eel River system along with past land use practices have increased sediment delivery to stream channels. Natural sediment delivery rates are high across the watershed, with about a quarter of the current sediment delivery associated with human related activities. Fine sediment delivery from road systems causes elevated fine sediment levels that reduce egg survival in redds and impact food production for rearing fish.

Viability: Density, Abundance and Spatial Structure

Low numbers of adult steelhead returning to the mainstem Eel River at the VAFS suggests that spawning numbers in the tributaries are also relatively low. Typically the VAFS passes between 250-500 adult steelhead to the upper most reaches of the Eel River that includes Bucknell and Soda creeks.

Water Quality: Temperature

Stream temperatures are marginal for salmonid rearing in the warm interior area of the Eel River watershed. Data collected during 1996 in Dobbyn, and Panther creeks show maximum weekly temperatures (MWATs) of greater than 20°C, and in Bucknell Creek an MWAT of 19.4°C (Freidrichsen, 1998).

Threats

The following discussion focuses on those threats that rate as a primary or secondary concern (see "Lower Interior Diversity Stratum and North Mountain Interior Stratum" Rapid Assessment Results). Recovery strategies will focus on ameliorating primary threats; however, some strategies may address other threat categories when the strategy is essential to recovery efforts. The figures and tables that display data used in this analysis are provided in "Lower Interior Diversity Stratum and North Mountain Interior Stratum" Rapid Assessment Results.

Logging and Wood Harvesting

The potential for landslides is extremely high in across the Eel River watershed. The majority of the sediment delivered to stream channels was found to be from natural debris slides (68%) (US EPA 2005). Timber harvest is reported to contribute about 7 percent of the sediment in the Middle Mainstem Eel River; therefore, it was rated as Fair in its contribution to impairment of pool frequency. Reduction in riparian canopy from timber harvesting was also rated as Fair in altered riparian species, and reduced LWD and complexity.

Residential and Commercial Development

Rural residential development will likely become a High threat in the future. We attempt to capture this threat in the water diversion section above, but other impacts from rural residential development, such as land clearing, water uses, and road building, are likely to increase in the future.

Roads and Railroads

The road related sediment production in all four tributary watersheds is generated from both private roads and USFS roads on Soda and Bucknell creeks. EPA (2005) reports that roads generate an average of 80 tons/mile per year from road landslides, and 104 ton/mile per year from gullies and stream crossing failures across the Middle Mainstem Eel River watershed area. Riparian roads associated with multiple land uses are an increased concern due to their capacity to deliver fine sediment to spawning and rearing reaches. At low water road crossings on perennial streams there is a high potential for sediment delivery, which is elevated at crossing used in the winter months.

Severe Weather Patterns

Large flood events and drought are the greatest threat to this highly erosive watershed. Past flood events in 1995 and 1964 have had devastating effects to salmonid habitat by filling pools that are required in the summer for both adults and juvenile steelhead. Drought conditions can reduce migration potential for both winter and summer spawners and reduce suitability of

stream temperature in the spring and summer through reductions in snowpack and subsequent runoff.

Water Diversion and Impoundments

Cannabis production is a serious and growing threat in this watershed. Water diversion by large cannabis cultivators and associated rural residential water use is reducing summer baseflow. We base this conclusion on information from nearby basins such as Outlet Creek (LeDoux-Bloom and Downie 2008), and personal communications with biologists conducting field surveys in the Eel River watershed (P. Steiner personal communication 2011, L. Morgan personal communication 2012). Given the continued prohibition of cannabis production, this threat is likely to continue to increase on summer baseflow conditions for juvenile salmonids over the next decade. All of these tributaries, are known areas of cannabis production. Rural residential development associated with cannabis production also requires water diversion from groundwater, springs and stream surface flow that impacts summer rearing conditions for juvenile steelhead.

Fishing and Collecting

Given the remote conditions that exist for rural residents in living near these tributaries, it is a well-known fact that a certain level of poaching and illegal fishing occurs by residents. Steelhead are very susceptible to poaching with spears, nets, and large treble hooks when adult fish are spawning in small tributary streams (T. Daugherty, personal communication 2015).

Limiting Conditions, Lifestages, and Habitats

Given the natural hydrology of this interior portion of the Eel River watershed, we find that the conditions of summer flow hydrology is likely limiting steelhead production in these tributary streams. Stream diversions from rural residential and cannabis production are the greatest threats to these streams. Impaired fish passage at road crossings and high gradient reaches impacts steelhead distribution and habitat utilization in small headwater reaches. Fine sediment generated from rural roads contributes to habitat degradation by reducing food production and spawning success.

General Recovery Strategy

Our approach to recover steelhead in tributary streams in mainstem Eel River is to work closely with landowners to reduce water diversions during the summer low flow period and to improve rural road systems to reduce sediment production. Fish passage sites need to be evaluated and projects developed to improve habitat availability in high gradient tributary streams within these strata.

In general, recovery strategies focus on improving conditions and ameliorating conditions and threats discussed above, although strategies that address other indicators may also be developed where their implementation is critical to restoring properly functioning habitat conditions within the watershed. The general recovery strategies for the populations in this Stratum are discussed below with more detailed and site-specific recovery actions provided in "Lower Interior Diversity Stratum and North Mountain Interior Stratum" Rapid Assessment.

Address Water Diversion and Groundwater Extraction

Reduced and disconnected flow conditions (*e.g.*, dry stream channels) resulting from water diversions and groundwater pumping are likely reducing juvenile steelhead survival in tributaries where rural residential development is concentrated. Federal, state, local government, or community based representatives should work with landowners to implement creative solutions that minimize these effects; solutions should examine conservation methods, water management planning, and water storage and recharge solutions. In addition, improved coordination between NMFS, CDFW, State Water Resources Control Board (Division of Water Rights) and county law enforcement agencies must occur to reduce the number of illegal stream diversions in these tributaries.

Address Road Sediment Sources

Many roads need to be upgraded to reduce fine sediment delivery into streams. Problem roads and active erosion sites should be prioritized and addressed as part of a comprehensive sediment reduction plan at the subbasin level. Rural residential development must be closely monitored and managed by Lake and Mendocino counties to minimize soil disturbance and sediment delivery to stream channels.

Increase Instream Shelter Ratings and Pool Volume

Shelter ratings are unsuitable in all surveyed stream reaches of most tributaries in this watershed. Due largely to an absence of LWD, quality pool habitat is scarce and shelter components are comprised mainly of undercut banks and aquatic vegetation. Where applicable, restoration efforts should incorporate instream wood/boulder structures and/or large conifers (*i.e.*, fall trees into creek) within degraded reaches to improve shelter and overall habitat complexity.

Improve Passage

Remediating barriers to migration caused by road crossings would improve fish distribution/habitat availability for both spawning adults and rearing juveniles. Investigate improving passage on Bell Springs Creek at the series of waterfalls located 3.4 miles up from mouth. Also investigate passage improvement at the large slide on Panther Creek, a tributary to Soda Creek. Also, manmade barriers documented in the Fish Passage Assessment database

should be investigated to determine the potential to improve or restore passage to spawning and rearing to headwater reaches of this basin.

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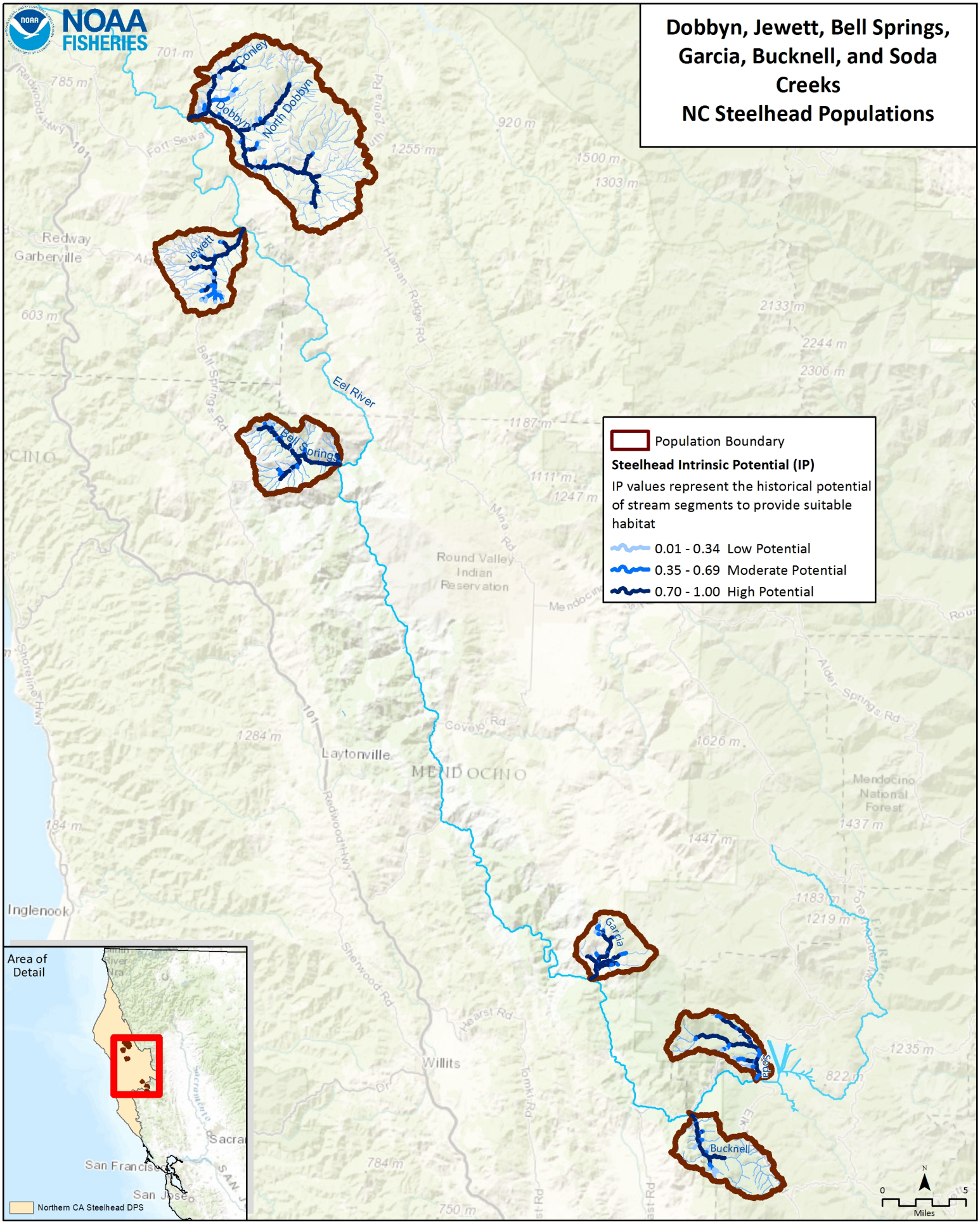
NOAA FISHERIES
Dobbyn, Jewett, Bell Springs, Garcia, Bucknell, and Soda Creeks
NC Steelhead Populations
Conley
Dobbyn
North Dobbyn
Jewett
Bell Springs
Garcia
Soda
Bucknell
Eel River
Redway
Garberville
Laytonville
Willits
Inglenook
Round Valley Indian Reservation
Mendocino National Forest
MENDOCINO
Population Boundary
Steelhead Intrinsic Potential (IP)
IP values represent the historical potential of stream segments to provide suitable habitat
0.01 - 0.34 Low Potential
0.35 - 0.69 Moderate Potential
0.70 - 1.00 High Potential
Area of Detail
Northern CA Steelhead DPS
San Francisco
San Jose
N
0
5
Miles

NC Steelhead DPS: Lower Interior and North Mountain Interior (Bell Springs/Bucknell/Dobbyn/Soda/Jewett/Garcia)						
Habitat & Population Condition Scores By Life Stage: **VG = Very Good** **G = Good** **F = Fair** **P = Poor**		**Steelhead Life History Stages**				
		Adults	**Eggs**	**Summer-Rearing Juveniles**	**Winter-Rearing Juveniles**	**Smolts**
Stresses: Key Attribute: Indicators	**Riparian Vegetation: Composition, Cover & Tree Diameter**			G	G	
	Estuary: Quality & Extent	P		P		P
	Velocity Refuge: Floodplain Connectivity	VG			VG	VG
	Hydrology: Redd Scour		G			
	Hydrology: Baseflow & Passage Flows	G	G	P		G
	Passage/Migration: Mouth or Confluence & Physical Barriers	F		G	F	VG
	Habitat Complexity: Percent Primary Pools & Pool/Riffle/Flatwater Ratios	G		F	G	
	Habitat Complexity: Large Wood & Shelter	G		F	F	F
	Sediment: Gravel Quality & Distribution of Spawning Gravels	G	F	G	G	
	Viability: Density, Abundance & Spatial Structure	F		F		F
	Water Quality: Temperature			F		G
	Water Quality: Turbidity & Toxicity	G		G	G	G

NC Steelhead DPS: Lower Interior and North Mountain Interior (Bell Springs/Bucknell/Dobbyn/Soda/Jewett/Garcia)													
Threat Scores **L: Low** **M: Medium** **H: High**		**Stresses**											
		Altered Riparian Species: Composition & Structure	Estuary: Impaired Quality & Extent	Floodplain Connectivity: Impaired Quality & Extent	Hydrology: Gravel Scouring Events	Hydrology: Impaired Water Flow	Impaired Passage & Migration	Instream Habitat Complexity: Altered Pool Complexity and/or Pool/Riffle Ratio	Instream Habitat Complexity: Reduced Large Wood and/or Shelter	Instream Substrate/Food Productivity: Impaired Gravel Quality & Quantity	Reduced Density, Abundance & Diversity	Water Quality: Impaired Instream Temperatures	Water Quality: Increased Turbidity or Toxicity
Threats - Sources of Stress	**Agriculture**	L	L	L	L		L	L	L	L		L	L
	Channel Modification	L	H	L	L	L	L	L	L	L		L	L
	Disease, Predation, and Competition	L	L	L			L	L	L		L	L	L
	Fire, Fuel Management, and Fire Suppression	L	L	L	L		L	L	L	L		L	L
	Livestock Farming and Ranching	L	L	L	L		L	L	L	L		L	L
	Logging and Wood Harvesting	L	M	L	L		L	M	M	L		L	L
	Mining	L	L	L	L		L	L	L	L		L	L
	Recreational Areas and Activities	L	L	L	L		L	L	L	L		L	L
	Residential and Commercial Development	L	M	L	L		L	L	L	L		L	L
	Roads and Railroads	L	L	L	L		M	L	L	M		L	L
	Severe Weather Patterns	L	L	L	L	H	L	L	L	L		M	L
	Water Diversions and Impoundments	L	M	L	L	H	M	L	L	L	L	M	L
	Fishing and Collecting										M		
	Hatcheries and Aquaculture										L	L	L

Bell Springs Creek, Northern California Steelhead (Lower Interior) Recovery Actions

Action ID	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partner	Costs ($K)						Comment
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25	Entire Duration	
BSprC-NCSW-3.1	**Objective**	**Hydrology**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
BSprC-NCSW-3.1.1	Recovery Action	Hydrology	Improve flow conditions										
BSprC-NCSW-3.1.1.1	Action Step	Hydrology	Develop cooperative projects with private landowners to conserve summer flows	2	10	CDFW, Mendocino County RCD, NOAA RC, Private Landowners						0	Action is considered In-Kind
BSprC-NCSW-3.1.1.2	Action Step	Hydrology	Develop critical flow values for consideration as a basis for minimum bypass flow requirements to support juvenile rearing habitat conditions during the dry season.	1	4	CDFW, NMFS, Private Landowners, SWRCB	50.00					50	Estimate based on 50K for each stream.
BSprC-NCSW-3.1.1.3	Action Step	Hydrology	Implement a summer water conservation program for rural residential water users that affect tributaries of the mainstem Eel River.	2	10	CDFW, NOAA RC, Private Landowners	50.00	50.00				100	
BSprC-NCSW-3.1.1.4	Action Step	Hydrology	Work with law enforcement to reduce or eliminate illegal water diversions.	2	5	CDFW Law Enforcement, NMFS OLE, SWRCB, USFS	100.00					100	Estimate based on 50 percent of time for two law enforcement officers each year.
BSprC-NCSW-5.1	**Objective**	**Passage**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
BSprC-NCSW-5.1.1	Recovery Action	Passage	Modify or remove physical barriers to passage										
BSprC-NCSW-5.1.1.1	Action Step	Passage	Evaluate and prioritize existing list of passage barriers documented by CDFW	2	5	CDFW, Mendocino County, Mendocino County RCD, NMFS, NOAA RC, Private Landowners						0	Action is considered In-Kind
BSprC-NCSW-5.1.1.2	Action Step	Passage	Identify high priority barriers and restore passage per NMFS' Guidelines for Salmonid Passage at Stream Crossings (NMFS 2001a).	2	5	CDFW, Mendocino County RCD, NOAA RC, NRCS, Private Landowners	225.00					225	Cost based on adult escapement and juvenile migration model at a rate of $36,379 and $188,264/project, respectively.
BSprC-NCSW-6.1	**Objective**	**Habitat Complexity**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
BSprC-NCSW-6.1.1	Recovery Action	Habitat Complexity	Improve frequency of primary pool, LWD, and shelters										
BSprC-NCSW-6.1.1.1	Action Step	Habitat Complexity	Work with agencies to assess habitat and determine beneficial locations lacking in habitat complexity and add instream structure.	2	5	CDFW, Mendocino County, Mendocino County RCD, NMFS						TBD	Costs vary with type and extent of actoins undertaken.
BSprC-NCSW-6.1.1.2	Action Step	Habitat Complexity	Implement actions to increase instream shelter, and velocity refuge.	2	10	CDFW, Mendocino County RCD, NOAA RC, NRCS, Private Landowners	63.00	63.00				126	Cost based on treating 4.8 miles (assume 1 project/mile in 50% high IP) at a rate of $26,000/mile.

Bell Springs Creek, Northern California Steelhead (Lower Interior) Recovery Actions

Action ID	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partner	Costs ($K)						Comment
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25	Entire Duration	
BSprC-NCSW-7.1	**Objective**	**Riparian**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
BSprC-NCSW-7.1.1	Recovery Action	Riparian	Improve canopy cover										
BSprC-NCSW-7.1.1.1	Action Step	Riparian	Promote streamside conservation measures, including conservation easements, setbacks, and riparian buffers (CDFG 2004)	2	10	CDFW, Mendocino County RCD, NMFS						0	Action is considered In-Kind
BSprC-NCSW-7.1.1.2	Action Step	Riparian	Work with CalFire and others through the timber harvest permitting process to protect existing riparian areas from timber harvest, rural residential, and grazing activities to maintain LWD supply and canopy recovery.	2	10	CalFire, CDFW, NMFS, Private Landowners						0	Action is considered In-Kind
BSprC-NCSW-16.1	**Objective**	**Fishing/Collecting**	**Address the inadequacy of existing regulatory mechanisms**										
BSprC-NCSW-16.1.1	Recovery Action	Fishing/Collecting	Prevent or minimize reduced density, abundance, and diversity based on the biological recovery criteria										
BSprC-NCSW-16.1.1.1	Action Step	Fishing/Collecting	NMFS and CDFW will work to improve the California Freshwater Sport Fishing Regulations to minimize take of adult salmonids.	2	5	CDFW, NMFS						0	Action is considered In-Kind
BSprC-NCSW-16.1.1.2	Action Step	Fishing/Collecting	Work with CDFW to improve protection for salmonids by modifying Californai Code of Regulations Section 8.00 (a) (1-3) low flow restrictions for the Eel and Van Duzen rivers.	2	5	CDFW, NMFS						0	Action is considered In-Kind
BSprC-NCSW-23.1	**Objective**	**Roads/Railroads**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
BSprC-NCSW-23.1.1	Recovery Action	Roads/Railroads	Prevent or minimize alterations to sediment transport (road condition/density, dams, etc.)										
BSprC-NCSW-23.1.1.1	Action Step	Roads/Railroads	Develop plan to decommission, upgrade or maintain roads.	2	10	Mendocino County Department of Public Works, Mendocino County RCD, NOAA RC, Private Landowners, RWQCB, USFS						TBD	Costs will vary depending on methods implemented and extent of rehabilitation.
BSprC-NCSW-24.1	**Objective**	**Severe Weather Patterns**	**Address other natural or manmade factors affecting the species continued existence**										
BSprC-NCSW-24.1.1	Recovery Action	Severe Weather Patterns	Prevent or minimize impairment to stream hydrology (impaired water flow)										
BSprC-NCSW-24.1.1.1	Action Step	Severe Weather Patterns	Agencies and landowners should develop contingencies for drought conditions in a manner compatible with NC steelhead summer flow needs	2	25	CDFW, NMFS, Private Landowners, SWRCB						0	Action is considered In-Kind
BSprC-NCSW-24.1.1.2	Action Step	Severe Weather Patterns	Work with landowners to bypass flow and conserve water during critical low flow periods.	2	25	CDFW, NOAA RC, Private Landowners, SWRCB						0	Action is considered In-Kind
BSprC-NCSW-25.1	**Objective**	**Water Diversion /Impoundment**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
BSprC-NCSW-25.1.1	Recovery Action	Water Diversion /Impoundment	Prevent or minimize impairment to stream hydrology (impaired water flow)										

Bell Springs Creek, Northern California Steelhead (Lower Interior) Recovery Actions

Action ID	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partner	Costs ($K)						Comment
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25	Entire Duration	
BSprC-NCSW-25.1.1.1	Action Step	Water Diversion /Impoundment	Establish a forbearance program, using water storage tanks for rural residential users to decrease diversion during periods of low flow.	2	10	NOAA RC, Private Landowners, SWRCB						TBD	Cost based on participation of landowners to decrease low-flow diversions. Cost for forbearance program estimated at $70,000/landowner.
BSprC-NCSW-25.2	**Objective**	**Water Diversion /Impoundment**	**Address the inadequacy of existing regulatory mechanisms**										
BSprC-NCSW-25.2.1	Recovery Action	Water Diversion /Impoundment	Prevent or minimize impairment to stream hydrology (impaired water flow)										
BSprC-NCSW-25.2.1.1	Action Step	Water Diversion /Impoundment	Identify and eliminate depletion of summer base flows from unauthorized water uses.	2	10	CDFW, Humboldt County, Mendocino County, NMFS OLE, SWRCB						0	Action is considered In-Kind
BSprC-NCSW-25.2.1.2	Action Step	Water Diversion /Impoundment	Work within existing federal, state and local regulations to minimize harm to steelhead from water diversion activities.	2	25	CDFW, Humboldt County, Mendocino County, NMFS OLE, SWRCB						0	Action is considered In-Kind

Bucknell Creek, Northern California Steelhead (Lower Interior) Recovery Actions

Action ID	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partner	Costs ($K)						Comment
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25	Entire Duration	
BC-NCSW-3.1	**Objective**	**Hydrology**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
BC-NCSW-3.1.1	Recovery Action	Hydrology	Improve flow conditions										
BC-NCSW-3.1.1.1	Action Step	Hydrology	Develop cooperative projects with private landowners to conserve summer flows	2	10	CDFW, Mendocino County RCD, NOAA RC, Private Landowners						0	Action is considered In-Kind
BC-NCSW-3.1.1.2	Action Step	Hydrology	Develop critical flow values for consideration as the basis for minimum bypass flow requirements to support juvenile rearing habitat conditions during the dry season.	1	4	CDFW, NMFS, Private Landowners, SWRCB	50.00					50	Estimate based on 50K for each stream.
BC-NCSW-3.1.1.3	Action Step	Hydrology	Implement a summer water conservation program for rural residential water users that affect tributaries of the mainstem Eel River.	2	10	CDFW, NOAA RC, Private Landowners	50.00	50.00				100	
BC-NCSW-3.1.1.4	Action Step	Hydrology	Work with law enforcement to reduce or eliminate illegal water diversions on Bucknell Creek.	2	5	CDFW Law Enforcement, NMFS OLE, SWRCB, USFS	100.00					100	Estimate based on 50 percent of time for two law enforcement officers each year.
BC-NCSW-5.1	**Objective**	**Passage**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
BC-NCSW-5.1.1	Recovery Action	Passage	Modify or remove physical barriers to passage										
BC-NCSW-5.1.1.1	Action Step	Passage	Evaluate and prioritize existing list of passage barriers documented by CDFW	2	5	CDFW, Mendocino County, Mendocino County RCD, NMFS, NOAA RC, Private Landowners						TBD	Costs vary with type and extent of actoins undertaken.
BC-NCSW-5.1.1.2	Action Step	Passage	Identify high priority barriers and restore passage per NMFS' Guidelines for Salmonid Passage at Stream Crossings (NMFS 2001a).	2	5	CDFW, Mendocino County RCD, NOAA RC, NRCS, Private Landowners	225.00					225	Cost based on adult escapement and juvenile migration model at a rate of $36,379 and $188,264/project, respectively.
BC-NCSW-6.1	**Objective**	**Habitat Complexity**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
BC-NCSW-6.1.1	Recovery Action	Habitat Complexity	Improve frequency of primary pool, LWD, and shelters										
BC-NCSW-6.1.1.1	Action Step	Habitat Complexity	Work with CalFire and others through the timber harvest permitting process to protect existing riparian areas from timber harvest, rural residential, and grazing activities to maintain LWD supply and canopy recovery.	2	5	CDFW, Mendocino County, Mendocino County RCD, NMFS, USFS						0	Action is considered In-Kind
BC-NCSW-6.1.1.2	Action Step	Habitat Complexity	Implement actions to increase instream shelter, and velocity refuge.	2	10	CDFW, Mendocino County RCD, NOAA RC, NRCS, Private Landowners, USFS	630	630				1,260	Cost based on treating 4.8 miles (assume 1 project/mile in 50% high IP) at a rate of $26,000/mile. However, after personal communication with Lee Morgan (USFS), cost were multiplied by 10.
BC-NCSW-7.1	**Objective**	**Riparian**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										

Bucknell Creek, Northern California Steelhead (Lower Interior) Recovery Actions

Action ID	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partner	Costs ($K)						Comment
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25	Entire Duration	
BC-NCSW-7.1.1	Recovery Action	Riparian	Improve canopy cover										
BC-NCSW-7.1.1.1	Action Step	Riparian	Promote streamside conservation measures, including conservation easements, setbacks, and riparian buffers (CDFG 2004)	2	10	CalFire, CDFW, Lake County, Mendocino County RCD, Mendocino Land Trust, NMFS, USFS						0	Action is considered In-Kind
BC-NCSW-7.1.1.2	Action Step	Riparian	Work with CalFire and others through the timber harvest permitting process to protect existing riparian areas from timber harvest, rural residential, and grazing activities to maintain LWD supply and canopy recovery.	2	10	CalFire, CDFW, NMFS, Private Landowners						0	Action is considered In-Kind
BC-NCSW-15.1	**Objective**	**Fire/Fuel Management**	**Address other natural or manmade factors affecting the species continued existence**										
BC-NCSW-15.1.1	Recovery Action	Fire/Fuel Management	Prevent or minimize impairment to water quality (increased turbidity, suspended sediment, and/or toxicity)										
BC-NCSW-15.1.1.1	Action Step	Fire/Fuel Management	Reduce fuel loading through mastication and prescribed burning in the Bucknell watershed.	2	2	CalFire, USFS	100.00					100	
BC-NCSW-16.1	**Objective**	**Fishing/Collecting**	**Address the inadequacy of existing regulatory mechanisms**										
BC-NCSW-16.1.1	Recovery Action	Fishing/Collecting	Prevent or minimize reduced density, abundance, and diversity based on the biological recovery criteria										
BC-NCSW-16.1.1.1	Action Step	Fishing/Collecting	NMFS and CDFW will work to improve the California Freshwater Sport Fishing Regulations to minimize take of adult salmonids.	2	5	CDFW, NMFS						0	Action is considered In-Kind
BC-NCSW-16.1.1.2	Action Step	Fishing/Collecting	Work with CDFW to improve protection for salmonids by modifying Californai Code of Regulations Section 8.00 (a) (1-3) low flow restrictions for the Eel and Van Duzen rivers.	2	5	CDFW, NMFS						0	Action is considered In-Kind
BC-NCSW-23.1	**Objective**	**Roads/Railroads**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
BC-NCSW-23.1.1	Recovery Action	Roads/Railroads	Prevent or minimize alterations to sediment transport (road condition/density, dams, etc.)										
BC-NCSW-23.1.1.1	Action Step	Roads/Railroads	Develop plan to decommission, upgrade or maintain roads. Specific road plans should be developed for roads in the Bucknell creek watershed.	2	10	Mendocino County Department of Public Works, Mendocino County RCD, NOAA RC, Private Landowners, RWQCB, USFS	50.00	50.00				100	Cost based on estimate for development of a plan.
BC-NCSW-23.1.1.2	Action Step	Roads/Railroads	Work with the USFS to minimize erosion from Off-Highway vehicle trail system.	2	10	NMFS, USFS						0	Action is considered In-Kind
BC-NCSW-24.1	**Objective**	**Severe Weather Patterns**	**Address other natural or manmade factors affecting the species continued existence**										
BC-NCSW-24.1.1	Recovery Action	Severe Weather Patterns	Prevent or minimize impairment to stream hydrology (impaired water flow)										
BC-NCSW-24.1.1.1	Action Step	Severe Weather Patterns	Agencies and landowners should develop contingencies for drought conditions in a manner compatible with NC steelhead summer flow needs	2	25	CDFW, NMFS, Private Landowners, SWRCB						0	Action is considered In-Kind
BC-NCSW-24.1.1.2	Action Step	Severe Weather Patterns	Work with landowners to bypass flow and conserve water during critical low flow periods.	2	25	CDFW, NOAA RC, Private Landowners, SWRCB						0	Action is considered In-Kind

Bucknell Creek, Northern California Steelhead (Lower Interior) Recovery Actions

Action ID	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partner	Costs ($K)						Comment
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25	Entire Duration	
BC-NCSW-25.1	**Objective**	**Water Diversion /Impoundment**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
BC-NCSW-25.1.1	Recovery Action	Water Diversion /Impoundment	Prevent or minimize impairment to stream hydrology (impaired water flow)										
BC-NCSW-25.1.1.1	Action Step	Water Diversion /Impoundment	Establish a forbearance program, using water storage tanks for rural residential users to decrease diversion during periods of low flow.	2	10	NOAA RC, Private Landowners, SWRCB						TBD	Cost based on participation of landowners to decrease low-flow diversions. Cost for forbearance program estimated at $70,000/landowner.
BC-NCSW-25.2	**Objective**	**Water Diversion /Impoundment**	**Address the inadequacy of existing regulatory mechanisms**										
BC-NCSW-25.2.1	Recovery Action	Water Diversion /Impoundment	Prevent or minimize impairment to stream hydrology (impaired water flow)										
BC-NCSW-25.2.1.1	Action Step	Water Diversion /Impoundment	Identify and eliminate depletion of summer base flows from unauthorized water uses.	2	10	CDFW, Humboldt County, Mendocino County, NMFS OLE, SWRCB						0	Action is considered In-Kind
BC-NCSW-25.2.1.2	Action Step	Water Diversion /Impoundment	Work within existing federal, state and local regulations to minimize harm to steelhead from water diversion activities.	2	25	CDFW, Humboldt County, Mendocino County, NMFS OLE, SWRCB						0	Action is considered In-Kind

Dobbyn Creek, Northern California Steelhead (North Mountain Interior) Recovery Actions

Action ID	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partner	Costs ($K)						Comment
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25	Entire Duration	
DobC-NCSW-3.1	**Objective**	**Hydrology**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
DobC-NCSW-3.1.1	Recovery Action	Hydrology	Improve flow conditions										
DobC-NCSW-3.1.1.1	Action Step	Hydrology	Develop cooperative projects with private landowners to conserve summer flows	2	10	CDFW, Mendocino County RCD, NOAA RC, Private Landowners						0	Action is considered In-Kind
DobC-NCSW-3.1.1.2	Action Step	Hydrology	Develop critical flow values that are the basis for minimum bypass flow requirements to support juvenile rearing habitat conditions during the dry season.	1	4	CDFW, NMFS, Private Landowners, SWRCB	50.00					50	Estimate based on 50K for each stream.
DobC-NCSW-3.1.1.3	Action Step	Hydrology	Implement a summer water conservation program for rural residential water users that affect tributaries of the mainstem Eel River.	2	10	CDFW, NOAA RC, Private Landowners	50.00	50.00				100	
DobC-NCSW-3.1.1.4	Action Step	Hydrology	Work with law enforcement to reduce or eliminate illegal water diversions.	2	5	CDFW Law Enforcement, NMFS OLE, SWRCB, USFS	100.00					100	Estimate based on 50 percent of time for two law enforcement officers each year.
DobC-NCSW-5.1	**Objective**	**Passage**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
DobC-NCSW-5.1.1	Recovery Action	Passage	Modify or remove physical barriers to passage										
DobC-NCSW-5.1.1.1	Action Step	Passage	Evaluate and prioritize existing list of passage barriers documented by CDFW	2	5	CDFW, Mendocino County, Mendocino County RCD, NMFS, NOAA RC, Private Landowners						0	Action is considered In-Kind
DobC-NCSW-5.1.1.2	Action Step	Passage	Identify high priority barriers and restore passage per NMFS' Guidelines for Salmonid Passage at Stream Crossings (NMFS 2001a).	2	5	CDFW, Mendocino County RCD, NOAA RC, NRCS, Private Landowners	225.00					225	Cost based on adult escapement and juvenile migration model at a rate of $36,379 and $188,264/project, respectively.
DobC-NCSW-5.1.1.3	Action Step	Passage	Evaluate the extent and quality of steelhead habitat on Mud Creek above Zenia Bluff Road (Dobbyn Creek watershed) and implement restoration of passage if sufficient habitat exists to justify removing the road barrier.	2	1	NOAA RC, Private Consultants, Private Landowners	0.12					0	Cost based on fish/habitat restoration model at a rate of $114,861/project.
DobC-NCSW-6.1	**Objective**	**Habitat Complexity**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
DobC-NCSW-6.1.1	Recovery Action	Habitat Complexity	Improve frequency of primary pool, LWD, and shelters										
DobC-NCSW-6.1.1.1	Action Step	Habitat Complexity	Assess habitat to determine beneficial locations and amount of instream structure needed based on the assessment.	2	5	CDFW, Mendocino County, Mendocino County RCD, NMFS						0	Action is considered In-Kind

Dobbyn Creek, Northern California Steelhead (North Mountain Interior) Recovery Actions

Action ID	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partner	Costs ($K)						Comment
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25	Entire Duration	
DobC-NCSW-6.1.1.2	Action Step	Habitat Complexity	Implement actions to increase instream shelter, and velocity refuge.	2	10	CDFW, Mendocino County RCD, NOAA RC, NRCS, Private Landowners	63.00	63.00				126	Cost based on treating 4.8 miles (assume 1 project/mile in 50% high IP) at a rate of $26,000/mile.
DobC-NCSW-7.1	**Objective**	**Riparian**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
DobC-NCSW-7.1.1	Recovery Action	Riparian	Improve canopy cover										
DobC-NCSW-7.1.1.1	Action Step	Riparian	Promote streamside conservation measures, including conservation easements, setbacks, and riparian buffers (CDFG 2004)	2	10	CDFW, Mendocino County RCD, NMFS						0	Action is considered In-Kind
DobC-NCSW-7.1.1.2	Action Step	Riparian	Protect existing riparian areas from timber harvest, rural residential, and grazing activities to maintain LWD supply and canopy recovery.	2	10	CalFire, CDFW, NMFS, Private Landowners						0	Action is considered In-Kind
DobC-NCSW-7.1.1.3	Action Step	Riparian	Identify and implement riparian enhancement projects where current canopy density and diversity are inadequate and site conditions are appropriate to: initiate tree planting and other vegetation management to encourage the development of a denser more extensive riparian canopy.	2	20	CDFW, NOAA RC, Private Landowners, RWQCB	0.58	0.58	0.58	0.58		2	Cost based on treating 1.4 miles (assume 1 project/mile in 15% high IP with 80 acres/mile) at a rate of $20,719/acre.
DobC-NCSW-23.1	**Objective**	**Roads/Railroads**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
DobC-NCSW-23.1.1	Recovery Action	Roads/Railroads	Prevent or minimize alterations to sediment transport (road condition/density, dams, etc.)										
DobC-NCSW-23.1.1.1	Action Step	Roads/Railroads	Develop plan to decommission, upgrade or maintain roads. Specific road plans should be developed for roads in the Dobbyn Creek watersheds.	2	10	Humboldt County Department of Public Works, NOAA RC, Private Landowners, RWQCB	250.00	250.00				500	Cost based on treating 50 miles at $ 10,000/mile
DobC-NCSW-24.1	**Objective**	**Severe Weather Patterns**	**Address other natural or manmade factors affecting the species continued existence**										
DobC-NCSW-24.1.1	Recovery Action	Severe Weather Patterns	Prevent or minimize impairment to stream hydrology (impaired water flow)										
DobC-NCSW-24.1.1.1	Action Step	Severe Weather Patterns	Agencies and landowners should develop contingencies for drought conditions in a manner compatible with NC steelhead summer flow needs	2	25	CDFW, NMFS, Private Landowners, SWRCB						0	Action is considered In-Kind
DobC-NCSW-24.1.1.2	Action Step	Severe Weather Patterns	Work with landowners to bypass flow and conserve water during critical low flow periods.	2	25	CDFW, NOAA RC, Private Landowners, SWRCB						0	Action is considered In-Kind
DobC-NCSW-25.1	**Objective**	**Water Diversion/ Impoundment**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
DobC-NCSW-25.1.1	Recovery Action	Water Diversion/ Impoundment	Prevent or minimize impairment to stream hydrology (impaired water flow)										

Dobbyn Creek, Northern California Steelhead (North Mountain Interior) Recovery Actions

Action ID	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partner	Costs ($K)						Comment
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25	Entire Duration	
DobC-NCSW-25.1.1.1	Action Step	Water Diversion/ Impoundment	Establish a forbearance program, using water storage tanks for rural residential users to decrease diversion during periods of low flow.	2	10	NOAA RC, Private Landowners, SWRCB						TBD	Cost based on participation of landowners to decrease low-flow diversions. Cost for forbearance program estimated at $70,000/landowner.
DobC-NCSW-25.2	**Objective**	**Water Diversion/ Impoundment**	**Address the inadequacy of existing regulatory mechanisms**										
DobC-NCSW-25.2.1	Recovery Action	Water Diversion/ Impoundment	Prevent or minimize impairment to stream hydrology (impaired water flow)										
DobC-NCSW-25.2.1.1	Action Step	Water Diversion/ Impoundment	Identify and eliminate depletion of summer base flows from unauthorized water uses.	2	10	CDFW, Humboldt County, Mendocino County, NMFS OLE, SWRCB						0	Action is considered In-Kind
DobC-NCSW-25.2.1.2	Action Step	Water Diversion/ Impoundment	Work within existing federal, state and local regulations to minimize harm to steelhead from water diversion activities.	2	25	CDFW, Humboldt County, Mendocino County, NMFS OLE, SWRCB						0	Action is considered In-Kind

Garcia Creek, Northern California Steelhead (Lower Interior) Threats and Associated Recovery Actions

Action ID	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partner	Costs ($K)						Comment
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25	Entire Duration	
GaC-NCSW-3.1	**Objective**	**Hydrology**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
GaC-NCSW-3.1.1	Recovery Action	Hydrology	Improve flow conditions										
GaC-NCSW-3.1.1.1	Action Step	Hydrology	Develop cooperative projects with private landowners to conserve summer flows	2	10	CDFW, Mendocino County RCD, NOAA RC, Private Landowners						0	Action is considered In-Kind
GaC-NCSW-3.1.1.2	Action Step	Hydrology	Develop critical flow values for consideration as the basis for minimum bypass flow requirements to support juvenile rearing habitat conditions during the summer and fall dry seasons.	1	4	CDFW, NMFS, Private Landowners, SWRCB	50.00					50	Estimate based on 50K for each stream.
GaC-NCSW-3.1.1.3	Action Step	Hydrology	Implement a summer water conservation program for rural residential water users that affect tributaries of the mainstem Eel River.	2	10	CDFW, NOAA RC, Private Landowners	50.00	50.00				100	
GaC-NCSW-3.1.1.4	Action Step	Hydrology	Work with law enforcement to reduce or eliminate illegal water diversions.	2	5	CDFW Law Enforcement, NMFS OLE, SWRCB, USFS	100.00					100	Estimate based on 50 percent of time for two law enforcement officers each year.
GaC-NCSW-5.1	**Objective**	**Passage**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
GaC-NCSW-5.1.1	Recovery Action	Passage	Modify or remove physical barriers to passage										
GaC-NCSW-5.1.1.1	Action Step	Passage	Evaluate and prioritize existing list of passage barriers documented by CDFW	2	5	CDFW, Mendocino County, Mendocino County RCD, NMFS, NOAA RC, Private Landowners						0	Action is considered In-Kind
GaC-NCSW-5.1.1.2	Action Step	Passage	Identify high priority barriers and restore passage per NMFS' Guidelines for Salmonid Passage at Stream Crossings (NMFS 2001a).	2	5	CDFW, Mendocino County RCD, NOAA RC, NRCS, Private Landowners	225.00					225	Cost based on adult escapement and juvenile migration model at a rate of $36,379 and $188,264/project, respectively.
GaC-NCSW-6.1	**Objective**	**Habitat Complexity**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
GaC-NCSW-6.1.1	Recovery Action	Habitat Complexity	Improve frequency of primary pool, LWD, and shelters										
GaC-NCSW-6.1.1.1	Action Step	Habitat Complexity	Work with agencies to assess habitat and determine beneficial locations lacking in habitat complexity and add instream structure.	2	5	CDFW, Mendocino County, Mendocino County RCD, NMFS						TBD	Costs vary with type and extent of actoins undertaken.
GaC-NCSW-6.1.1.2	Action Step	Habitat Complexity	Implement actions to increase instream shelter, and velocity refuge.	2	10	CDFW, Mendocino County RCD, NOAA RC, NRCS, Private Landowners	63.00	63.00				126	Cost based on treating 4.8 miles (assume 1 project/mile in 50% high IP) at a rate of $26,000/mile.

Garcia Creek, Northern California Steelhead (Lower Interior) Threats and Associated Recovery Actions

Action ID	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partner	Costs ($K)						Comment
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25	Entire Duration	
GaC-NCSW-7.1	**Objective**	**Riparian**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
GaC-NCSW-7.1.1	Recovery Action	Riparian	Improve canopy cover										
GaC-NCSW-7.1.1.1	Action Step	Riparian	Promote streamside conservation measures, including conservation easements, setbacks, and riparian buffers (CDFG 2004)	2	10	CDFW, Mendocino County RCD, NMFS						0	Action is considered In-Kind
GaC-NCSW-7.1.1.2	Action Step	Riparian	Work with CalFire and others through the timber harvest permitting process to protect existing riparian areas from timber harvest, rural residential, and grazing activities to maintain LWD supply and canopy recovery.	2	10	CalFire, CDFW, NMFS, Private Landowners						0	Action is considered In-Kind
GaC-NCSW-7.1.1.3	Action Step	Riparian	Promote streamside conservation measures, including conservation easements, setbacks, and riparian buffers (CDFG 2004).	2	10	CalFire, CDFW, Mendocino County, Mendocino County RCD, Mendocino Land Trust, NOAA RC, Private Landowners						0	Action is considered In-Kind
GaC-NCSW-16.1	**Objective**	**Fishing/Collecting**	**Address the inadequacy of existing regulatory mechanisms**										
GaC-NCSW-16.1.1	Recovery Action	Fishing/Collecting	Prevent or minimize reduced density, abundance, and diversity based on the biological recovery criteria										
GaC-NCSW-16.1.1.1	Action Step	Fishing/Collecting	NMFS and CDFW will work to improve the California Freshwater Sport Fishing Regulations to minimize take of adult salmonids.	2	5	CDFW, NMFS						0	Action is considered In-Kind
GaC-NCSW-16.1.1.2	Action Step	Fishing/Collecting	Work with CDFW to improve protection for salmonids by modifying the California code of Regulations Section 8.00 (a) (1-3) low flow restrictions for the Eel and Van Duzen rivers.	2	5	CDFW, NMFS						0	Action is considered In-Kind
GaC-NCSW-23.1	**Objective**	**Roads/Railroads**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
GaC-NCSW-23.1.1	Recovery Action	Roads/Railroads	Prevent or minimize alterations to sediment transport (road condition/density, dams, etc.)										
GaC-NCSW-23.1.1.1	Action Step	Roads/Railroads	Develop plan to decommission, upgrade or maintain roads.	2	10	Mendocino County Department of Public Works, Mendocino County RCD, NOAA RC, Private Landowners, RWQCB, USFS						TBD	Costs will vary depending on methods implemented and extent of rehabilitation.
GaC-NCSW-24.1	**Objective**	**Severe Weather Patterns**	**Address other natural or manmade factors affecting the species continued existence**										
GaC-NCSW-24.1.1	Recovery Action	Severe Weather Patterns	Prevent or minimize impairment to stream hydrology (impaired water flow)										
GaC-NCSW-24.1.1.1	Action Step	Severe Weather Patterns	Agencies and landowners should develop contingencies for drought conditions in a manner compatible with NC steelhead summer flow needs	2	25	CDFW, NMFS, Private Landowners, SWRCB						0	Action is considered In-Kind

Garcia Creek, Northern California Steelhead (Lower Interior) Threats and Associated Recovery Actions

Action ID	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partner	Costs ($K)						Comment
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25	Entire Duration	
GaC-NCSW-24.1.1.2	Action Step	Severe Weather Patterns	Work with landowners to bypass flow and conserve water during critical low flow periods.	2	25	CDFW, NOAA RC, Private Landowners, SWRCB						0	Action is considered In-Kind
GaC-NCSW-25.1	**Objective**	**Water Diversion /Impoundment**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
GaC-NCSW-25.1.1	Recovery Action	Water Diversion /Impoundment	Prevent or minimize impairment to stream hydrology (impaired water flow)										
GaC-NCSW-25.1.1.1	Action Step	Water Diversion /Impoundment	Establish a forbearance program, using water storage tanks for rural residential users to decrease diversion during periods of low flow.	2	10	NOAA RC, Private Landowners, SWRCB						TBD	Cost based on participation of landowners to decrease low-flow diversions. Cost for forbearance program estimated at $70,000/landowner.
GaC-NCSW-25.2	**Objective**	**Water Diversion /Impoundment**	**Address the inadequacy of existing regulatory mechanisms**										
GaC-NCSW-25.2.1	Recovery Action	Water Diversion /Impoundment	Prevent or minimize impairment to stream hydrology (impaired water flow)										
GaC-NCSW-25.2.1.1	Action Step	Water Diversion /Impoundment	Identify and eliminate depletion of summer base flows from unauthorized water uses.	2	10	CDFW, Humboldt County, Mendocino County, NMFS OLE, SWRCB						0	Action is considered In-Kind
GaC-NCSW-25.2.1.2	Action Step	Water Diversion /Impoundment	Work within existing federal, state and local regulations to minimize harm to steelhead from water diversion activities.	2	25	CDFW, Humboldt County, Mendocino County, NMFS OLE, SWRCB						0	Action is considered In-Kind

Jewett Creek, Northern California Steelhead (Lower Interior) Recovery Actions

Action ID	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partner	Costs ($K)						Comment
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25	Entire Duration	
JewC-NCSW-3.1	**Objective**	**Hydrology**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
JewC-NCSW-3.1.1	Recovery Action	Hydrology	Improve flow conditions										
JewC-NCSW-3.1.1.1	Action Step	Hydrology	Develop cooperative projects with private landowners to conserve summer flows	2	10	CDFW, Humboldt County RCD, NOAA RC, Private Landowners						0	Action is considered In-Kind
JewC-NCSW-3.1.1.2	Action Step	Hydrology	Develop critical flow values for consideration as the basis for minimum bypass flow requirements to support juvenile rearing habitat conditions during the summer and fall dry seasons.	1	4	CDFW, NMFS, Private Landowners, SWRCB	50.00					50	Estimate based on 50K for each stream.
JewC-NCSW-3.1.1.3	Action Step	Hydrology	Implement a summer water conservation program for rural residential water users that affect tributaries of the mainstem Eel River.	2	10	CDFW, NOAA RC, Private Landowners	50.00	50.00				100	
JewC-NCSW-3.1.1.4	Action Step	Hydrology	Work with law enforcement to reduce or eliminate illegal water diversions.	2	5	CDFW Law Enforcement, NMFS OLE, SWRCB, USFS	100.00					100	Estimate based on 50 percent of time for two law enforcement officers each year.
JewC-NCSW-5.1	**Objective**	**Passage**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
JewC-NCSW-5.1.1	Recovery Action	Passage	Modify or remove physical barriers to passage										
JewC-NCSW-5.1.1.1	Action Step	Passage	Evaluate and prioritize existing list of passage barriers documented by CDFW	2	5	CDFW, Humboldt County, Humboldt County RCD, NMFS, NOAA RC, Private Landowners						0	Action is considered In-Kind
JewC-NCSW-5.1.1.2	Action Step	Passage	Identify high priority barriers and restore passage per NMFS' Guidelines for Salmonid Passage at Stream Crossings (NMFS 2001a).	2	5	CDFW, Humboldt County RCD, NOAA RC, NRCS, Private Landowners	225.00					225	Cost based on adult escapement and juvenile migration model at a rate of $36,379 and $188,264/project, respectively.
JewC-NCSW-6.1	**Objective**	**Habitat Complexity**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
JewC-NCSW-6.1.1	Recovery Action	Habitat Complexity	Improve frequency of primary pool, LWD, and shelters										
JewC-NCSW-6.1.1.1	Action Step	Habitat Complexity	Work with agencies to assess habitat and determine beneficial locations lacking in habitat complexity and add instream structure.	2	5	CDFW, Mendocino County, Mendocino County RCD, NMFS						TBD	Costs vary with type and extent of actoins undertaken.
JewC-NCSW-6.1.1.2	Action Step	Habitat Complexity	Implement actions to increase instream shelter, and velocity refuge.	2	10	CDFW, Humboldt County RCD, NOAA RC, NRCS, Private Landowners	63.00	63.00				126	Cost based on treating 4.8 miles (assume 1 project/mile in 50% high IP) at a rate of $26,000/mile.

Jewett Creek, Northern California Steelhead (Lower Interior) Recovery Actions

Action ID	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partner	Costs ($K)						Comment
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25	Entire Duration	
JewC-NCSW-7.1	**Objective**	**Riparian**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
JewC-NCSW-7.1.1	Recovery Action	Riparian	Improve canopy cover										
JewC-NCSW-7.1.1.1	Action Step	Riparian	Promote streamside conservation measures, including conservation easements, setbacks, and riparian buffers (CDFG 2004)	2	10	CDFW, Humboldt County RCD, NMFS						0	Action is considered In-Kind
JewC-NCSW-7.1.1.2	Action Step	Riparian	Work with CalFire and others through the timber harvest permitting process to protect existing riparian areas from timber harvest, rural residential, and grazing activities to maintain LWD supply and canopy recovery.	2	10	CalFire, CDFW, NMFS, Private Landowners						0	Action is considered In-Kind
JewC-NCSW-16.1	**Objective**	**Fishing/Collecting**	**Address the inadequacy of existing regulatory mechanisms**										
JewC-NCSW-16.1.1	Recovery Action	Fishing/Collecting	Prevent or minimize reduced density, abundance, and diversity based on the biological recovery criteria										
JewC-NCSW-16.1.1.1	Action Step	Fishing/Collecting	NMFS and CDFW will work to improve the California Freshwater Sport Fishing Regulations to minimize take of adult salmonids.	2	5	CDFW, NMFS						0	Action is considered In-Kind
JewC-NCSW-16.1.1.2	Action Step	Fishing/Collecting	Work with CDFW to improve protection for salmonids by modifying the California Code of Regulations Section 8.00 (a) (1-3) low flow restrictions for the Eel and Van Duzen rivers.	2	5	CDFW, NMFS						0	Action is considered In-Kind
JewC-NCSW-23.1	**Objective**	**Roads/Railroads**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
JewC-NCSW-23.1.1	Recovery Action	Roads/Railroads	Prevent or minimize alterations to sediment transport (road condition/density, dams, etc.)										
JewC-NCSW-23.1.1.1	Action Step	Roads/Railroads	Develop plan to decommission, upgrade or maintain roads.	2	10	Humboldt County Department of Public Works, Humboldt County RCD, NOAA RC, Private Landowners, RWQCB, USFS						TBD	Costs will vary depending on methods implemented and extent of rehabilitation.
JewC-NCSW-24.1	**Objective**	**Severe Weather Patterns**	**Address other natural or manmade factors affecting the species continued existence**										
JewC-NCSW-24.1.1	Recovery Action	Severe Weather Patterns	Prevent or minimize impairment to stream hydrology (impaired water flow)										
JewC-NCSW-24.1.1.1	Action Step	Severe Weather Patterns	Agencies and landowners should develop contingencies for drought conditions in a manner compatible with NC steelhead summer flow needs	2	25	CDFW, NMFS, Private Landowners, SWRCB						0	Action is considered In-Kind
JewC-NCSW-24.1.1.2	Action Step	Severe Weather Patterns	Work with landowners to bypass flow and conserve water during critical low flow periods.	2	25	CDFW, NOAA RC, Private Landowners, SWRCB						0	Action is considered In-Kind
JewC-NCSW-25.1	**Objective**	**Water Diversion /Impoundment**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
JewC-NCSW-25.1.1	Recovery Action	Water Diversion /Impoundment	Prevent or minimize impairment to stream hydrology (impaired water flow)										

Jewett Creek, Northern California Steelhead (Lower Interior) Recovery Actions

Action ID	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partner	Costs ($K)						Comment
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25	Entire Duration	
JewC-NCSW-25.1.1.1	Action Step	Water Diversion /Impoundment	Establish a forbearance program, using water storage tanks for rural residential users to decrease diversion during periods of low flow.	2	10	NOAA RC, Private Landowners, SWRCB						TBD	Cost based on participation of landowners to decrease low-flow diversions. Cost for forbearance program estimated at $70,000/landowner.
JewC-NCSW-25.2	**Objective**	**Water Diversion /Impoundment**	**Address the inadequacy of existing regulatory mechanisms**										
JewC-NCSW-25.2.1	Recovery Action	Water Diversion /Impoundment	Prevent or minimize impairment to stream hydrology (impaired water flow)										
JewC-NCSW-25.2.1.1	Action Step	Water Diversion /Impoundment	Identify and eliminate depletion of summer base flows from unauthorized water uses.	2	10	CDFW, Humboldt County, Humboldt County, NMFS OLE, SWRCB						0	Action is considered In-Kind
JewC-NCSW-25.2.1.2	Action Step	Water Diversion /Impoundment	Work within existing federal, state and local regulations to minimize harm to steelhead from water diversion activities.	2	25	CDFW, Humboldt County, Humboldt County, NMFS OLE, SWRCB						0	Action is considered In-Kind

Soda Creek, Northern California Steelhead (Lower Interior) Recovery Actions

Action ID	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partner	Costs ($K)						Comment
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25	Entire Duration	
SodC-NCSW-3.1	**Objective**	**Hydrology**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
SodC-NCSW-3.1.1	Recovery Action	Hydrology	Improve flow conditions										
SodC-NCSW-3.1.1.1	Action Step	Hydrology	Develop cooperative projects with private landowners to conserve summer flows	2	20	CDFW, NMFS, Private Landowners						0	Action is considered In-Kind
SodC-NCSW-3.1.1.2	Action Step	Hydrology	Develop critical flow values for consideration as the basis for minimum bypass flow requirements to support juvenile rearing habitat conditions during the summer and fall dry seasons.	1	4	CDFW, NMFS, Private Landowners, SWRCB	50.00					50	Estimate based on 50K for each stream.
SodC-NCSW-3.1.1.3	Action Step	Hydrology	Implement a summer water conservation program for rural residential water users that affect tributaries of the main stem Eel River.	2	10	CDFW, NOAA RC, Private Landowners	50.00	50.00				100	
SodC-NCSW-3.1.1.4	Action Step	Hydrology	Investigate the potential for landowner to provide summer bypass flow to Welch Creek, a tributary to Soda Creek.	3	1	NMFS, USFS	0.07					0	Cost based on stream flow/precipitation model at a rate of $65,084/project.
SodC-NCSW-3.1.1.5	Action Step	Hydrology	Work with law enforcement to reduce or eliminate illegal water diversions.	2	5	CDFW Law Enforcement, NMFS OLE, SWRCB, USFS	100.00					100	Estimate based on 50 percent of time for two law enforcement officers each year.
SodC-NCSW-5.1	**Objective**	**Passage**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
SodC-NCSW-5.1.1	Recovery Action	Passage	Modify or remove physical passage barriers										
SodC-NCSW-5.1.1.1	Action Step	Passage	Evaluate and prioritize existing list of passage barriers documented by CDFW	2	5	CDFW						0	Action is considered In-Kind
SodC-NCSW-5.1.1.2	Action Step	Passage	Identify high priority barriers and restore passage per NMFS' Guidelines for Salmonid Passage at Stream Crossings (NMFS 2001a).	2	5	CDFW, Lake County, NOAA RC, NRCS, Private Landowners, RCD, USFS	300.00					300	Cost based on personal communication from Lee Morgan, USFS.
SodC-NCSW-6.1	**Objective**	**Habitat Complexity**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
SodC-NCSW-6.1.1	Recovery Action	Habitat Complexity	Improve frequency of primary pools, LWD, and shelters										
SodC-NCSW-6.1.1.1	Action Step	Habitat Complexity	Assess habitat to determine beneficial locations and amount of instream structure needed	3	5	CDFW, Lake County, RCD, USFS						TBD	
SodC-NCSW-6.1.1.2	Action Step	Habitat Complexity	Implement actions to increase instream shelter, and velocity refuge. Focus on stream reaches that provide summer rearing habitat in Soda and Welch creeks.	2	5	CDFW, Lake County, NOAA RC, NRCS, Private Landowners, RCD, USFS	300.00					300	Work should focus in Panther Creek; because Soda is mainly intermittent and Welch has very limited stream flow. Cost based on personal communication from Lee Morgan (USFS)
SodC-NCSW-7.1	**Objective**	**Riparian**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
SodC-NCSW-7.1.1	Recovery Action	Riparian	Improve riparian condition										

Soda Creek, Northern California Steelhead (Lower Interior) Recovery Actions

Action ID	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partner	Costs ($K)						Comment
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25	Entire Duration	
SodC-NCSW-7.1.1.1	Action Step	Riparian	Promote streamside conservation measures, including conservation easements, setbacks, and riparian buffers (CDFG 2004)	2	10	CalFire, CDFW, Lake County, Land Trusts, NOAA RC, Private Landowners, RCD						0	Action is considered In-Kind
SodC-NCSW-7.1.1.2	Action Step	Riparian	Work with CalFire and others through the timber harvest permitting process to protect existing riparian areas from timber harvest, rural residential, and grazing activities to maintain LWD supply and canopy recovery.	2	10	CalFire, CDFW, NMFS, Private Landowners						0	Action is considered In-Kind
SodC-NCSW-15.1	**Objective**	**Fire/Fuel Management**	**Address other natural or manmade factors affecting the species continued existence**										
SodC-NCSW-15.1.1	Recovery Action	Fire/Fuel Management	Prevent or minimize impairment to water quality (increased turbidity, suspended sediment, and/or toxicity)										
SodC-NCSW-15.1.1.1	Action Step	Fire/Fuel Management	Reduce fuel loading through mastication and prescribed burning in the Soda Creek watershed.	2	2	CalFire, USFS	150.00					150	
SodC-NCSW-16.1	**Objective**	**Fishing/Collecting**	**Address the inadequacy of existing regulatory mechanisms**										
SodC-NCSW-16.1.1	Recovery Action	Fishing/Collecting	Prevent or minimize reduced density, abundance, and diversity based on the biological recovery criteria										
SodC-NCSW-16.1.1.1	Action Step	Fishing/Collecting	NMFS and CDFW will work to improve the California Freshwater Sport Fishing Regulations to minimize take of adult salmonids.	2	5	CDFW, NMFS						0	Action is considered In-Kind
SodC-NCSW-16.1.1.2	Action Step	Fishing/Collecting	Work with CDFW to improve protection for salmonids by modifying the California Code of Regulations Section 8.00 (a) (1-3) low flow restrictions for the Eel and Van Duzen rivers.	2	5	CDFW, NMFS						0	Action is considered In-Kind
SodC-NCSW-23.1	**Objective**	**Roads/Railroads**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
SodC-NCSW-23.1.1	Recovery Action	Roads/Railroads	Prevent or minimize alterations to sediment transport (road condition/density, dams, etc.)										
SodC-NCSW-23.1.1.1	Action Step	Roads/Railroads	Develop a Riparian Road Sediment Reduction Plan that prioritizes sites and outlines implementation and a timeline of necessary actions.	1	20	CDFW, Lake County, NOAA RC, NMFS, RWQCB, Private Landowners	10.50	10.50	10.50	10.50		42	Cost based on road inventory for 43 miles of road at a rate of $957/mile.
SodC-NCSW-23.1.1.2	Action Step	Roads/Railroads	Develop plan to decommission or maintain roads.	2	10	Lake County, NOAA RC, Private Landowners, RCD, RWQCB, USFS	250.00	250.00				500	Cost based on road inventory of 24 miles of road. Cost for upgrading roads estimated at $21,000/mile and $12,000/mile for decommissioning. However cost was revised based on personal communication and the local knowledge of Lee Morgan (USFS)
SodC-NCSW-24.1	**Objective**	**Severe Weather Patterns**	**Address other natural or manmade factors affecting the species continued existence**										
SodC-NCSW-24.1.1	Recovery Action	Severe Weather Patterns	Prevent or minimize impairment to stream hydrology (impaired water flow)										
SodC-NCSW-24.1.1.1	Action Step	Severe Weather Patterns	Agencies and landowners should develop contingencies for drought conditions in a manner compatible with NC steelhead summer flow needs	2	25	CDFW, NMFS, Private Landowners, SWRCB						0	Action is considered In-Kind

Soda Creek, Northern California Steelhead (Lower Interior) Recovery Actions

Action ID	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partner	Costs ($K)						Comment
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25	Entire Duration	
SodC-NCSW-24.1.1.2	Action Step	Severe Weather Patterns	Work with landowners to bypass flow and conserve water during critical low flow periods.	2	25	CDFW, NOAA RC, Private Landowners, SWRCB						0	Action is considered In-Kind
SodC-NCSW-25.1	**Objective**	**Water Diversion/ Impoundment**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
SodC-NCSW-25.1.1	Recovery Action	Water Diversion/ Impoundment	Prevent or minimize impairment to stream hydrology (impaired water flow)										
SodC-NCSW-25.1.1.1	Action Step	Water Diversion/ Impoundment	Establish a forbearance program, using water storage tanks for rural residential users to decrease diversion during periods of low flow.	2	10	NOAA RC, Private Landowners, SWRCB						TBD	Cost based on participation of landowners to decrease low-flow diversions. Cost for forbearance program estimated at $70,000/landowner.
SodC-NCSW-25.2	**Objective**	**Water Diversion/ Impoundment**	**Address the inadequacy of existing regulatory mechanisms**										
SodC-NCSW-25.2.1	Recovery Action	Water Diversion/ Impoundment	Prevent or minimize impairment to stream hydrology (impaired water flow)										
SodC-NCSW-25.2.1.1	Action Step	Water Diversion/ Impoundment	Identify and eliminate depletion of summer base flows from unauthorized water uses.	2	10	CDFW, Humboldt County, Mendocino County, NMFS OLE, SWRCB						0	Action is considered In-Kind
SodC-NCSW-25.2.1.2	Action Step	Water Diversion/ Impoundment	Work within existing federal, state and local regulations to minimize harm to steelhead from water diversion activities.	2	25	CDFW, Humboldt County, Mendocino County, NMFS OLE, SWRCB						0	Action is considered In-Kind