

Gualala River



Location	• Mendocino County
Watershed Area	• 298.0 Square Miles
Potential Habitat	• 266.6 Stream Miles
Vegetation	• 52% Coniferous, 31% Montane Hardwood, 16% Grassland
Erodability	• Low (29%) to High (71%)
Ownership Patterns	• 99% Private
Dominant Land Uses	• Timber, Agriculture, Gravel Mining
Housing Density	• Moderate
TMDL Pollutants	• Sediment, Temperature



Gualala River estuary.
Photo by Bob Coey, NMFS.

Gualala River Coho Salmon: Persistent – Low Abundance

Recovery Goals

- ✓ Conduct monitoring to track population response to recovery action implementation

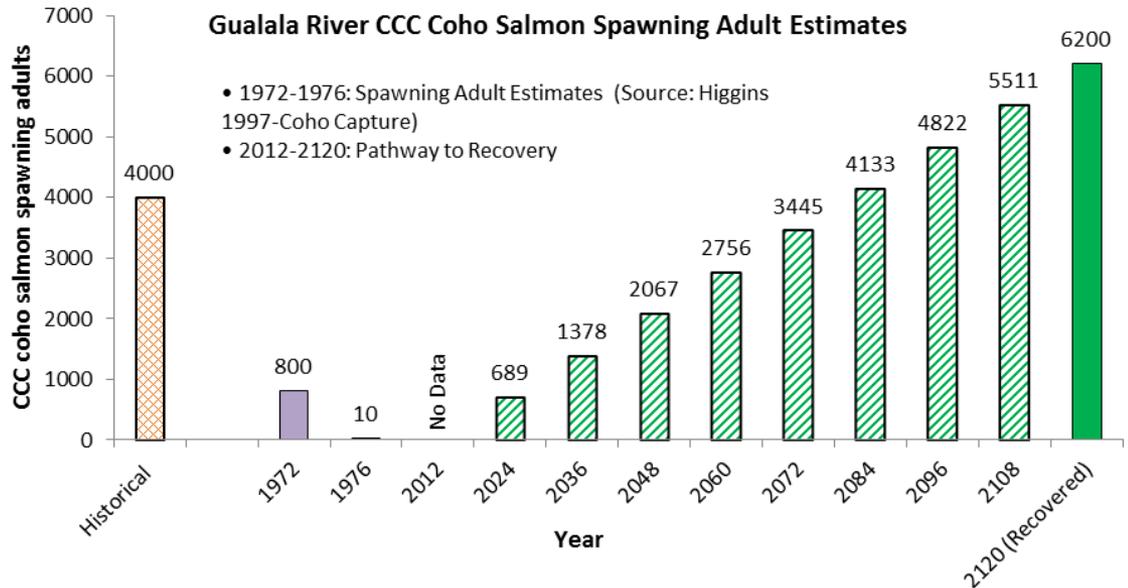


**Gualala River
Adult Spawner Targets**

**Downlisting to Threatened
3,100**

**Recovery
6,200**

**STEELHEAD: YES
CHINOOK SALMON: NO**



Current Instream, Watershed and Population Conditions



Preventing Extinction & Improving Conditions

Priority 1: Immediate Restoration Actions

- Treat high priority slides and landings
- Develop critical flow values that are the basis for minimum bypass flow requirements to support summer rearing

Priority 2 & 3: Long-Term Restoration Actions

- Monitor water quality in the Gualala estuary during the summer months
- Investigate the hydrodynamics of freshwater inflow and estuary water quality conditions
- Monitor, identify problems, and prioritize needed changes to permitted water diversions
- Upgrade water rights information system and promote off channel storage
- Increase frequency of LWD and other complex habitat structures in seasonal habitat and migratory reaches
- Improve passage conditions

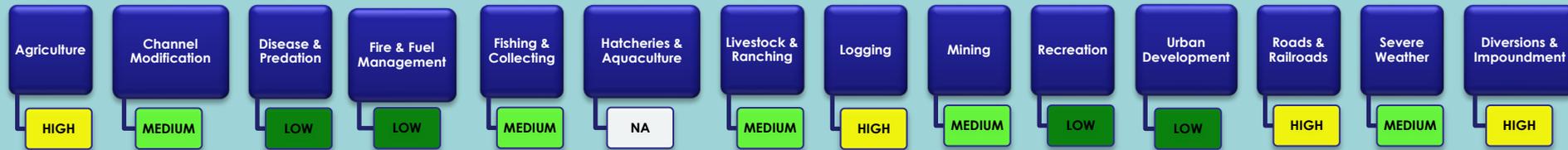


Recovery Partners

Gualala River Watershed Council, Gualala Redwood Company



Future Threats



Reducing Future Threats

Priority 1: Immediate Threat Abatement Actions

- Discourage forest-to-vineyard land conversions
- Decommission or upgrade roads
- Reduce road density by 10 percent of the next 10 years
- Ensure current and future water diversions do not impair summer rearing



Wide and shallow riffle in the Gualala River
Photo provided by KRIS Information System,
and is used with permission

Priority 2 & 3: Long-Term Threat Abatement Actions

- Maintain functional riparian stream buffers that provide desirable stream canopy cover adjacent to agricultural land
- Identify and eliminate depletion of summer base flows
- Evaluate and avoid impacts to off channel habitat in timber harvest
- Retain the largest trees in all riparian zones (including intermittent and ephemeral streams) for bank stability and long-term wood recruitment
- Conserve and manage forestlands for older forest stages
- Conduct inspections and correct conditions of all roads prior to winter
- Ensure all future road or bridge repairs at stream crossings provide unimpaired fish passage for all salmonid life stages

Conservation Highlights

- The Gualala River Watershed Council (GRWC) has worked with landowners to conduct sediment reduction projects that have prevented more than 15,000 dump truck loads of sediment from polluting streams.
- GRWC has installed 70 stream temperature monitoring stations throughout the watershed. They conduct annual surveys of fish and aquatic and riparian habitat, and completed the first scientific study of the Gualala River Estuary.
- Gualala Redwood Company has installed many instream LWD structures on the North Fork Gualala River

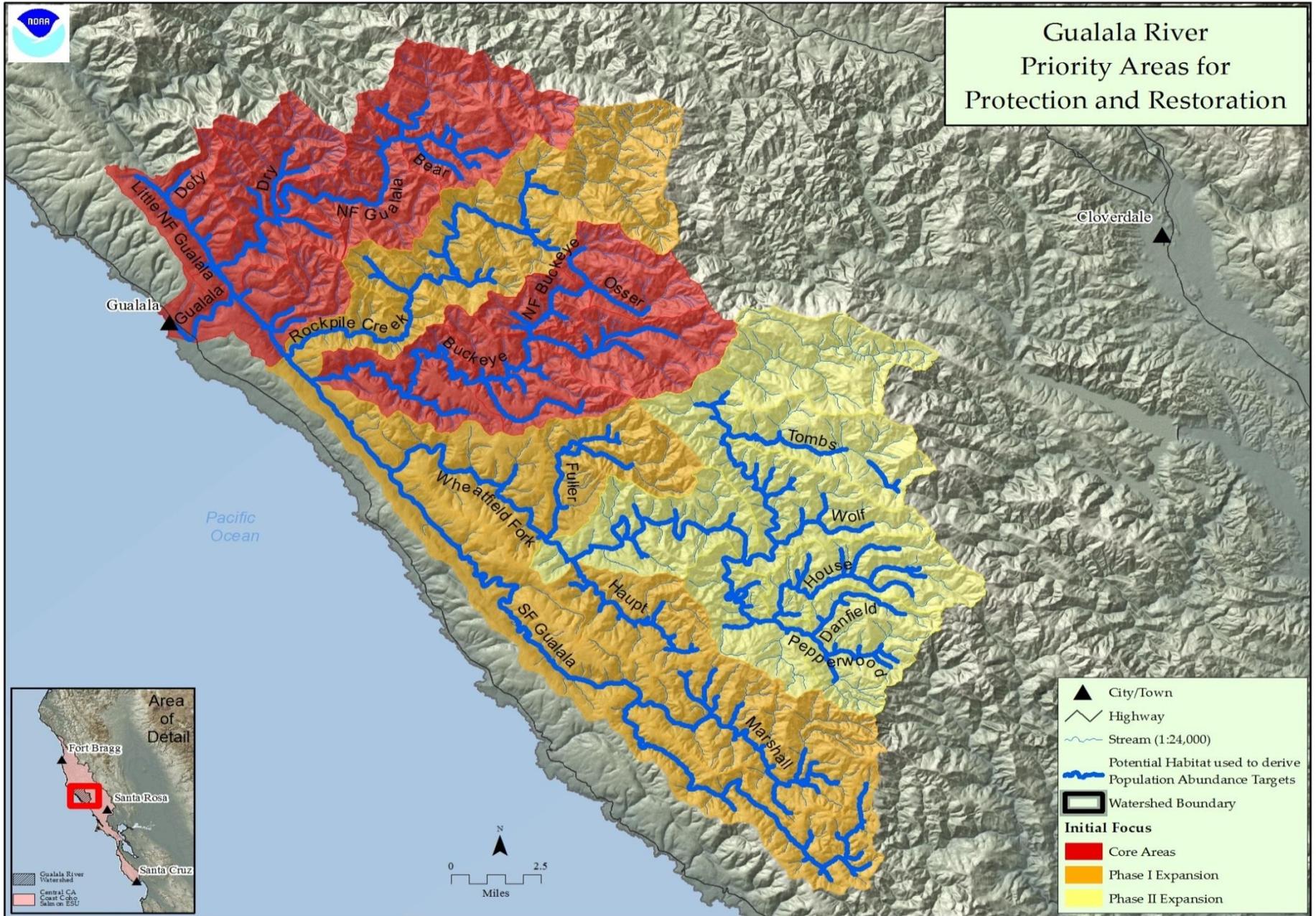


Figure 1: Map of Gualala River
Gualala River

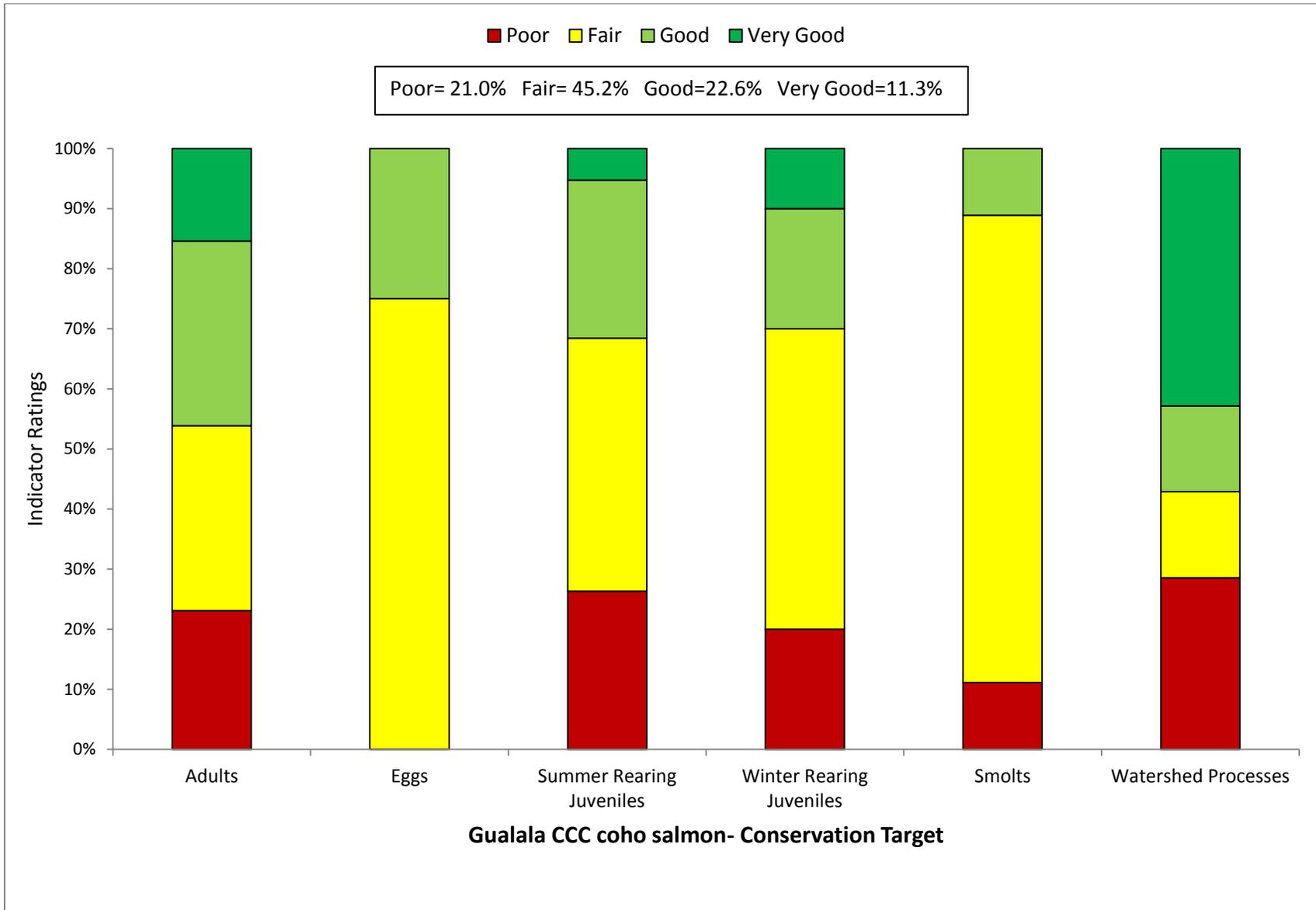


Figure 2: Viability Results by Lifestage

Table 1: CAP Viability Results ~ Gualala River

Target	Attribute	Indicator	Result	Rating	Method	Desired Criteria
Adults	Habitat Complexity	Large Wood Frequency (BFW 0-10 meters)	9.25 Key Pieces/100m	Good	NMFS Expert Estuary/Lagoon Panel	6 to 11 key pcs/100m
Adults	Habitat Complexity	Large Wood Frequency (BFW 10-100 meters)	2.15 Key Pieces/100m	Good	NMFS Expert Estuary/Lagoon Panel	1.3 to 4 Key Pieces/100 meters
Adults	Habitat Complexity	Pool/Riffle/Flatwater Ratio	48% streams 37% IP-km (>30% Pools; >20% Riffles)	Poor	SEC Analysis/CDFG Data	75% to 90% of streams/ IP-Km (>30% Pools; >20% Riffles)
Adults	Habitat Complexity	Shelter Rating	8% streams 2% IP-km (>80 stream average)	Poor	SEC Analysis/CDFG Data	75% to 90% of streams/ IP-Km (>80 stream average)
Adults	Hydrology	Passage Flows	Risk Factor Score =58	Fair	SEC Analysis/CDFG Data	NMFS Flow Protocol: Risk Factor Score 35-50
Adults	Passage/Migration	Passage at Mouth or Confluence	75% of IP-km to 90% of IP-km accessible	Good	SEC Analysis/CDFG Data	75% of IP-Km to 90% of IP-km
Adults	Passage/Migration	Physical Barriers	100% of IP-km accessible	Very Good	SEC Analysis/CDFG Data	75% of IP-Km to 90% of IP-km
Adults	Riparian Vegetation	Tree Diameter (North of SF Bay)	40 - 54% Class 5 & 6 across IP-km	Fair	SEC Analysis/CDFG Data	55 - 69% Class 5 & 6 across IP-km
Adults	Riparian Vegetation	Tree Diameter (South of SF Bay)	0	0	SEC Analysis/CDFG Data	≥80% Density rating "D" across IP-km
Adults	Sediment	Quantity & Distribution of Spawning Gravels	>90% of IP-km accessible	Very Good	SEC Analysis/CDFG Data	75% of IP-Km to 90% of IP-km
Adults	Velocity Refuge	Floodplain Connectivity	50-80% Response Reach Connectivity	Fair	SEC Analysis/CDFG Data	>80% Response Reach Connectivity
Adults	Water Quality	Toxicity	Sublethal or Chronic	Fair	SEC Analysis/CDFG Data	No Acute or Chronic
Adults	Water Quality	Turbidity	75% to 90% of streams/ IP-km maintains severity score of 3 or lower	Good	SEC Analysis/CDFG Data	75% to 90% of streams/ IP-Km maintains severity score of 3 or lower
Adults	Viability	Density	<1 spawner per IP-km	Poor	SEC Analysis/CDFG Data	low risk spawner density per Spence (2008)
Eggs	Hydrology	Flow Conditions (Instantaneous Condition)	Risk Factor Score =67	Fair	SEC Analysis/CDFG Data	NMFS Flow Protocol: Risk Factor Score 35-50
Eggs	Hydrology	Redd Scour	Risk Factor Score =75	Fair	SEC Analysis/CDFG Data	NMFS Flow Protocol: Risk Factor Score 35-50

Eggs	Sediment	Gravel Quality (Bulk)	12-14% (0.85mm) and <30% (6.4mm)	Good	NMFS Instream Flow Analysis	12-14% (0.85mm) and <30% (6.4mm)
Eggs	Sediment	Gravel Quality (Embeddedness)	66% streams 69% IP-km (>50% stream average scores of 1 & 2)	Fair	NMFS Instream Flow Analysis	75% to 90% of streams/ IP-Km (>50% stream average scores of 1 & 2)
Summer Rearing Juveniles	Estuary/Lagoon	Quality & Extent	Impaired but functioning	Fair	NMFS Instream Flow Analysis	Properly Functioning Condition
Summer Rearing Juveniles	Habitat Complexity	Large Wood Frequency (Bankfull Width 0-10 meters)	9.25 Key Pieces/100m	Good	NMFS Instream Flow Analysis	6 to 11 key pcs/100m
Summer Rearing Juveniles	Habitat Complexity	Large Wood Frequency (Bankfull Width 10-100 meters)	2.15 Key Pieces/100m	Good	NMFS Instream Flow Analysis	1.3 to 4 Key Pieces/100 meters
Summer Rearing Juveniles	Habitat Complexity	Percent Primary Pools	24% streams 29% IP-km (>49% of pools are primary pools)	Poor	NMFS Instream Flow Analysis	75% to 89% of streams/ IP-Km (>49% of pools are primary pools)
Summer Rearing Juveniles	Habitat Complexity	Pool/Riffle/Flatwater Ratio	45% streams 33% IP-km (>30% Pools; >20% Riffles)	Poor	NMFS Instream Flow Analysis	75% to 90% of streams/ IP-Km (>30% Pools; >20% Riffles)
Summer Rearing Juveniles	Habitat Complexity	Shelter Rating	8% streams 3% IP-km (>80 stream average)	Poor	NMFS Instream Flow Analysis	75% to 90% of streams/ IP-Km (>80 stream average)
Summer Rearing Juveniles	Hydrology	Flow Conditions (Baseflow)	Risk Factor Score =75	Poor	NMFS Instream Flow Analysis	NMFS Flow Protocol: Risk Factor Score 35-50
Summer Rearing Juveniles	Hydrology	Flow Conditions (Instantaneous Condition)	Risk Factor Score = 51-75	Fair	NMFS Watershed Characterization	NMFS Flow Protocol: Risk Factor Score 35-50
Summer Rearing Juveniles	Hydrology	Number, Condition and/or Magnitude of Diversions	0.15 Diversions/10 IP-km	Good	NMFS Watershed Characterization	0.01 - 1 Diversions/10 IP km
Summer Rearing Juveniles	Passage/Migration	Passage at Mouth or Confluence	50% of IP-km to 74% of IP-km accessible	Fair	NMFS Watershed Characterization	75% of IP-Km to 90% of IP-km
Summer Rearing Juveniles	Passage/Migration	Physical Barriers	100% of IP-km accessible	Very Good	Population Profile/BPJ	75% of IP-Km to 90% of IP-km
Summer Rearing Juveniles	Riparian Vegetation	Canopy Cover	50% streams 14% IP-km (>85% average stream canopy)	Fair	SEC or PAD/CDFG Data	75% to 90% of streams/ IP-Km (>85% average stream canopy)
Summer Rearing Juveniles	Riparian Vegetation	Tree Diameter (North of SF Bay)	40 - 54% Class 5 & 6 across IP-km	Fair	Population Profile/BPJ	55 - 69% Class 5 & 6 across IP-km
Summer Rearing Juveniles	Riparian Vegetation	Tree Diameter (South of SF Bay)	0	0	SEC or PAD/CDFG Data	≥80% Density rating "D" across IP-km
Summer Rearing Juveniles	Sediment (Food Productivity)	Gravel Quality (Embeddedness)	63% streams 70% IP-km (>50% stream average scores of 1 & 2)	Fair	SEC or PAD/CDFG Data	75% to 90% of streams/ IP-Km (>50% stream average scores of 1 & 2)

Summer Rearing Juveniles	Water Quality	Temperature (MWMPT)	50 to 74% IP-km (<20 C MWMPT; <16 C MWMPT where coho IP overlaps)	Fair	Population Profile/BPJ	75 to 89% IP km (<16 C MWMPT)
Summer Rearing Juveniles	Water Quality	Toxicity	Sublethal or Chronic	Fair	NMFS Watershed Characterization/CWHR	No Acute or Chronic
Summer Rearing Juveniles	Water Quality	Turbidity	75% to 90% of streams/ IP-km maintains severity score of 3 or lower	Good	NMFS Watershed Characterization/CWHR	75% to 90% of streams/ IP-Km maintains severity score of 3 or lower
Summer Rearing Juveniles	Viability	Density	<0.2 fish/meter^2	Poor	SEC Analysis/CDFG Data	0.5 - 1.0 fish/meter^2
Summer Rearing Juveniles	Viability	Spatial Structure	75-90% of Historical Range	Good	NMFS Watershed Characterization/CWHR	75-90% of Historical Range
Winter Rearing Juveniles	Habitat Complexity	Large Wood Frequency (Bankfull Width 0-10 meters)	9.25 Key Pieces/100m	Good	NMFS Watershed Characterization/CWHR	6 to 11 key pcs/100m
Winter Rearing Juveniles	Habitat Complexity	Large Wood Frequency (Bankfull Width 10-100 meters)	2.15 Key Pieces/100m	Good	NMFS Watershed Characterization/CWHR	1.3 to 4 Key Pieces/100 meters
Winter Rearing Juveniles	Habitat Complexity	Pool/Riffle/Flatwater Ratio	48% streams 37% IP-km (>30% Pools; >20% Riffles)	Poor	NMFS Watershed Characterization/CWHR	75% to 90% of streams/ IP-Km (>30% Pools; >20% Riffles)
Winter Rearing Juveniles	Habitat Complexity	Shelter Rating	8% streams 2% IP-km (>80 stream average)	Poor	CDF Vegetation Maps/BPJ	75% to 90% of streams/ IP-Km (>80 stream average)
Winter Rearing Juveniles	Passage/Migration	Physical Barriers	100% of IP-km accessible	Very Good	Population Profile/BPJ	75% of IP-Km to 90% of IP-km
Winter Rearing Juveniles	Riparian Vegetation	Tree Diameter (North of SF Bay)	40 - 54% Class 5 & 6 across IP-km	Fair	Population Profile/BPJ	55 - 69% Class 5 & 6 across IP-km
Winter Rearing Juveniles	Riparian Vegetation	Tree Diameter (South of SF Bay)	0	0	SEC Analysis/CDFG Data	≥80% Density rating "D" across IP-km
Winter Rearing Juveniles	Sediment (Food Productivity)	Gravel Quality (Embeddedness)	63% streams 70% IP-km (>50% stream average scores of 1 & 2)	Fair	SEC Analysis/CDFG Data	75% to 90% of streams/ IP-Km (>50% stream average scores of 1 & 2)
Winter Rearing Juveniles	Velocity Refuge	Floodplain Connectivity	50-80% Response Reach Connectivity	Fair	SEC Analysis/CDFG Data	>80% Response Reach Connectivity
Winter Rearing Juveniles	Water Quality	Toxicity	Sublethal or Chronic	Fair	NMFS Watershed Characterization	No Acute or Chronic
Winter Rearing Juveniles	Water Quality	Turbidity	50% to 74% of streams/ IP-km maintains severity score of 3 or lower	Fair	NMFS Watershed Characterization	75% to 90% of streams/ IP-Km maintains severity score of 3 or lower

Smolts	Estuary/Lagoon	Quality & Extent	Impaired but functioning	Fair	SEC Analysis/CDFG Data	Property Functioning Condition
Smolts	Habitat Complexity	Shelter Rating	8% streams 2% IP-km (>80 stream average)	Poor	Population Profile	75% to 90% of streams/ IP-Km (>80 stream average)
Smolts	Hydrology	Number, Condition and/or Magnitude of Diversions	0.24 Diversions/10 IP-km	Good	Population Profile	0.01 - 1 Diversions/10 IP km
Smolts	Hydrology	Passage Flows	Risk Factor Score =51-75	Fair	TRT Spence (2008)	NMFS Flow Protocol: Risk Factor Score 35-50
Smolts	Passage/Migration	Passage at Mouth or Confluence	50% of IP-km to 74% of IP-km accessible	Fair	TRT Spence (2008)	75% of IP-Km to 90% of IP-km
Smolts	Smoltification	Temperature	50-74% IP-km (>6 and <14 C)	Fair	TRT Spence (2008)	75-90% IP-Km (>6 and <16 C)
Smolts	Water Quality	Toxicity	Sublethal or Chronic	Fair	TRT Spence (2008)	No Acute or Chronic
Smolts	Water Quality	Turbidity	50% to 74% of streams/ IP-km maintains severity score of 3 or lower	Fair	EPA/RWQCB/NMFS Criteria	75% to 90% of streams/ IP-Km maintains severity score of 3 or lower
Smolts	Viability	Abundance	Smolt abundance which produces moderate risk spawner density	Fair	Newcombe and Jensen 2003	Smolt abundance to produce low risk spawner density per Spence (2008)
Watershed Processes	Hydrology	Impervious Surfaces	0.101% of Watershed in Impervious Surfaces	Very Good	SEC Analysis	3-6% of Watershed in Impervious Surfaces
Watershed Processes	Landscape Patterns	Agriculture	0.548% of Watershed in Agriculture	Very Good	EPA/RWQCB/NMFS Criteria	10-19% of Watershed in Agriculture
Watershed Processes	Landscape Patterns	Timber Harvest	26-35% of Watershed in Timber Harvest	Fair	Newcombe and Jensen 2003	25-15% of Watershed in Timber Harvest
Watershed Processes	Landscape Patterns	Urbanization	2% of watershed >1 unit/20 acres	Very Good	EPA/RWQCB/NMFS Criteria	8-11% of watershed >1 unit/20 acres
Watershed Processes	Riparian Vegetation	Species Composition	51-74% Historical Species Composition	Good	Newcombe and Jensen 2003	51-74% Intact Historical Species Composition
Watershed Processes	Sediment Transport	Road Density	4.8 Miles/Square Mile	Poor	EPA/RWQCB/NMFS Criteria	1.6 to 2.4 Miles/Square Mile
Watershed Processes	Sediment Transport	Streamside Road Density (100 m)	4.1 Miles/Square Mile	Poor	Newcombe and Jensen 2003	0.1 to 0.4 Miles/Square Mile

Table 2: CAP Threats Results ~ Gualala River

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	Medium	Medium	High	Medium	Medium	Medium	High
2	Channel Modification	Medium	Low	Medium	Low	Low	Low	Medium
3	Disease, Predation and Competition	Low	-	Medium	Low	Low	Low	Low
4	Fire, Fuel Management and Fire Suppression	Low	Low	Medium	Low	Low	Low	Low
5	Fishing and Collecting	High	-	Low	-	Medium	-	Medium
6	Hatcheries and Aquaculture	-	-	-	-	-	-	-
7	Livestock Farming and Ranching	Medium	Low	Medium	Low	Medium	Low	Medium
8	Logging and Wood Harvesting	Medium	High	High	High	High	High	High
9	Mining	Medium	Low	Medium	Medium	Medium	Medium	Medium
10	Recreational Areas and Activities	Low	Low	Medium	Low	Low	Low	Low
11	Residential and Commercial Development	Low	Low	Medium	Low	Low	Low	Low
12	Roads and Railroads	Medium	High	Medium	High	Medium	High	High
13	Severe Weather Patterns	Medium	Medium	Medium	Low	Medium	Low	Medium
14	Water Diversion and Impoundments	Medium	Medium	High	Medium	High	Medium	High
Threat Status for Targets and Project		High	High	High	High	High	High	High

Central CA Coast Coho Salmon ~ Gualala River

ACTIONS FOR RESTORING HABITATS

1. Restoration- Estuary

1.1. **Objective:** Address the present or threatened destruction, modification or curtailment of the species habitat or range

1.1.1. **Recovery Action:** Increase the physical extent of estuarine habitat

1.1.1.1. **Action Step:** Investigate the extent of sedimentation within the estuary/lagoon associated with watershed legacy impacts (logging). Evaluate sediment transport within the estuary and determine if the estuary is "filling" with sediment or "flushing" sediment (recovering).

1.1.1.2. **Action Step:** Identify past mechanical fill sites (inside of Mill Bend (?)) and develop strategies targeting the re-establishment of wetland marsh habitat (if feasible).

1.1.1.3. **Action Step:** Develop and implement rehabilitation projects designed to increase the physical extent of high quality habitat for rearing juvenile salmonids within the Gualala River estuary.

1.1.2. **Recovery Action:** Increase and enhance estuarine habitat complexity features

1.1.2.1. **Action Step:** Increase the percentage of area containing high value habitat complexity elements and features (SAV, LWD, boulders, marshes, vegetation, pools > 2 meters).

1.1.2.2. **Action Step:** Identify strategic locations to install LWD structures designed to increased pool depth and habitat conditions within the Gualala River estuary.

1.1.3. **Recovery Action:** Improve the quality of freshwater lagoon habitat

1.1.3.1. **Action Step:** Install continuous water quality monitoring stations in the Gualala estuary during the summer months. Monitor at a minimum temperature, dissolved oxygen, and salinity.

1.1.4. **Recovery Action:** Improve freshwater inflow

1.1.4.1. **Action Step:** Install a stream gauge immediately upstream of the estuary/lagoon to monitor inflow conditions during the dry season.

1.1.4.2. **Action Step:** Investigate the hydrodynamics of freshwater inflow and estuary water quality conditions relative to juvenile salmonid estuarine summer rearing (osmo-regulating and non-osmoregulating).

1.1.4.3. **Action Step:** Identify and implement minimum freshwater inflow thresholds to ensure optimal estuary health and function.

2. Restoration- Floodplain Connectivity

No species-specific actions were developed.

3. Restoration- Habitat Complexity

3.1. **Objective:** Address the present or threatened destruction, modification, or curtailment of the species habitat or range.

- 3.1.1. **Recovery Action:** Increase large wood frequency (BFW 0-10 meters)
 - 3.1.1.1. **Action Step:** Increase wood frequency in salmonid spawning and rearing areas to the extent that a minimum of 6 key LWD pieces exists every 100 meters in 0-10 meter BFW streams.
 - 3.1.1.2. **Action Step:** Design and install LWD structures in McKenzie and Wild Hog creeks, and the SF sub-basin to the extent that optimal LWD frequency is achieved at strategic locations.
- 3.1.2. **Recovery Action:** Increase large wood frequency (BFW 10-100 meters)
 - 3.1.2.1. **Action Step:** Increase wood frequency in seasonal habitat and migratory reaches to the extent that a minimum of 1.3 to 4 key LWD pieces exists every 100 meters in 10-100 meter BFW streams.
 - 3.1.2.2. **Action Step:** Design and implement a SF Gualala mainstem migration project. Focus should include a higher frequency of significantly large wood structures to enhance staging pool development.
 - 3.1.2.3. **Action Step:** Evaluate, design, and implement salmonid habitat improvement structures as appropriate to the stream channel type and hydrologic conditions within the Rockpile Sub-basin
 - 3.1.2.4. **Action Step:** Evaluate, design, and implement salmonid habitat improvement structures as appropriate to the stream channel type and hydrologic conditions within the Buckeye Sub-basin.
- 3.1.3. **Recovery Action:** Improve pool shelter rating
 - 3.1.3.1. **Action Step:** Evaluate, design, and implement strategies to improve shelter pools ratings within the Rockpile and Buckeye sub-basins and the following tributaries: Boyd, Buckeye, Camper, Carson, Danfield, Doty, Dry, Franchini, Fuller, Grasshopper, Groshong Gulch, House, Little NF GR, Log Cabin, Marshall, McGann, McKenzie, NF Fuller, Lower NF GR, Palmer Canyon, Pepperwood, Rockpile, SF Fuller, Sullivan, Tombs, Wheatfield Fork, and Wild Hog creeks.
- 3.1.4. **Recovery Action:** Increase primary pools frequency
 - 3.1.4.1. **Action Step:** Evaluate, develop, and implement strategies to increase primary pool frequency in high priority reaches within the following tributaries: Boyd, Doty, Dry, Fuller, Little NF GR, Log Cabin, Marshall, McGann, McKenzie, Palmer, Robinson, Tombs, and West Fork Fuller.
 - 3.1.4.2. **Action Step:** Identify historic CCC coho salmon habitats lacking in channel complexity and implement restoration projects designed to create or restore complex habitat features that provide for localized pool scour, velocity refuge, and cover. Prioritize Core areas first followed by Phase I areas.
 - 3.1.4.3. **Action Step:** Encourage coordination of LWD placement in streams as part of logging operations and road upgrades to maximize size, quality, and efficiency of effort (CDFG 2004).
 - 3.1.4.4. **Action Step:** Encourage landowners to implement restoration projects as part of their ongoing operations in stream reaches where large woody debris is lacking.

3.1.4.5. **Action Step:** Maintain current LWD, boulders, and other structure-providing features to maintain current stream complexity, pool frequency, and depth (CDFG 2004).

3.1.5. **Recovery Action:** Improve pool/riffle/flatwater ratios (hydraulic diversity)

3.1.5.1. **Action Step:** Increase the frequencies to 75% of the streams within the watershed

4. Restoration- Hydrology

4.1. **Objective:** Address the present or threatened destruction, modification or curtailment of the species habitat or range

4.1.1. **Recovery Action:** Improve flow conditions (baseflow conditions)

4.1.1.1. **Action Step:** Continue to work with the North Gualala Water Company on water right Permit 14853. Ensure that the Site-specific Study Plan prepared for the NGWC by Stillwater Sciences (11 October 2011) is completed within the next 3-yrs. Implement recommendations within the next 5-years. Ensure salmonid life history requirements targeted in the proposal are evaluate under a range of water year types (dry - wet). Evaluate potential impacts to dry season estuary water quality conditions associated with Permit 14853.

4.1.1.2. **Action Step:** Map all water diversions and upgrade the existing water rights information system so that water allocations can be readily quantified by watershed.

4.1.1.3. **Action Step:** Monitor, identify problems, and prioritize needed changes to permitted water diversions on current or potential coho salmon streams.

4.1.1.4. **Action Step:** Install and maintain a gauging station immediately upstream of the estuary to monitor freshwater inflow during the dry season.

4.1.1.5. **Action Step:** Develop critical flow values that are the basis for minimum bypass flow requirements to support juvenile rearing habitat conditions during the dry season. Focus on core coho salmon areas initially.

4.1.1.6. **Action Step:** Install and maintain a stream gauge at an appropriate location near the base of Rockpile Creek.

4.1.1.7. **Action Step:** Install and maintain a stream gauge at an appropriate location near the base of Buckeye Creek.

4.1.1.8. **Action Step:** Install and maintain a stream gauge at an appropriate location immediately downstream of the SF Gualala and Wheatfield Fork confluence.

4.1.1.9. **Action Step:** Evaluate and implement off-channel storage facilities to reduce impacts of water diversion (storage tanks for rural residential users). Focus efforts in the NF Gualala and Wheatfield sub-watersheds.

5. Restoration- Landscape Patterns

5.1. **Objective:** Address the present or threatened destruction, modification, or curtailment of the species habitat or range

5.1.1. **Recovery Action:** Prevent increased landscape disturbance

- 5.1.1.1. **Action Step:** Consider developing and/or identifying Salmonid Preserves. Consider the Gualala River watershed as a Salmonid Preserve.
- 5.1.1.2. **Action Step:** Should large tracts of forestlands within the Gualala River watershed become available for purchase, the State of California and/or the Federal Government should consider purchasing the area as a Demonstration Forest, State Park, or Salmonid Preserve.

5.2. **Objective:** Address the inadequacy of existing regulatory mechanisms

5.2.1. **Recovery Action:** Prevent increased landscape disturbance

5.2.1.1. **Action Step:** Discourage counties from rezoning forestlands to rural residential or other land uses (e.g., vineyards).

5.2.1.2. **Action Step:** Discourage any forestland to agricultural and/or rural/urban development.

6. Restoration- Passage

6.1. **Objective:** Address the present or threatened destruction, modification or curtailment of the species habitat or range

6.1.1. **Recovery Action:** Modify or remove physical passage barriers

6.1.1.1. **Action Step:** Evaluate, design, and implement appropriate fish passage at South Beach Road Crossing on Fuller Creek (Wheatfield Fork sub-basin; See CALFISH: PAD_ID 736904; Passage ID 13268)

6.1.1.2. **Action Step:** Evaluate, design, and implement appropriate fish passage designs in Palmer Canyon and McKenzie creeks (Wheatfield Fork sub-basin; Klamt et al. 2003).

7. Restoration- Pool Habitat

No species-specific actions were developed. See Habitat Complexity.

8. Restoration- Riparian

8.1. **Objective:** Address the present or threatened destruction, modification, or curtailment of the species habitat or range

8.1.1. **Recovery Action:** Improve tree diameter

8.1.1.1. **Action Step:** Increase tree diameter to a minimum of 80% CWHR density rating "D" across all current and potential spawning and juvenile rearing areas.

8.1.1.2. **Action Step:** Prioritize large tree retention along the SF Gualala River.

8.1.1.3. **Action Step:** Conduct conifer release to promote growth of larger diameter trees where appropriate.

8.1.2. **Recovery Action:** Improve canopy cover

8.1.2.1. **Action Step:** Increase the average stream canopy cover within potential spawning and rearing reaches to a minimum of 80%.

- 8.1.2.2. **Action Step:** Evaluate buffers width and/or timber harvest in terms of light penetration and potential changes to micro-climate conditions along the SF Gualala River.
- 8.1.2.3. **Action Step:** Identify and implement riparian enhancement projects where current canopy density and diversity are inadequate and site conditions are appropriate to: initiate tree planting, thinning, and other vegetation management to encourage the development of a denser more extensive riparian canopy in the following reaches and tributaries of the NF Gualala sub-basin: upper reaches of Dry Creek, Robinson Creek, the central and higher reaches of the mainstem, and the lower reaches of Bear and Stewart Creeks (Klamt et al. 2003).
- 8.1.2.4. **Action Step:** Identify and implement riparian enhancement projects where current canopy density and diversity are inadequate and site conditions are appropriate to: initiate tree planting, thinning, and other vegetation management to encourage the development of a denser more extensive riparian canopy in the following reaches and tributaries of the Rockpile sub-basin: mainstem Rockpile Creek, Red Rock Creek, and Horsetheif (Klamt et al. 2003).
- 8.1.2.5. **Action Step:** Identify and implement riparian enhancement projects where current canopy density and diversity are inadequate and site conditions are appropriate to: initiate tree planting, thinning, and other vegetation management to encourage the development of a denser more extensive riparian canopy in the following reaches and tributaries of the Buckeye sub-basin: upper reaches of Buckeye Creek, Franchini, Grasshopper, and Soda Springs creeks (Klamt et al. 2003).

9. Restoration- Sediment

- 9.1. **Objective:** Address the present or threatened destruction, modification, or curtailment of the species habitat or range
 - 9.1.1. **Recovery Action:** Improve instream gravel quality
 - 9.1.1.1. **Action Step:** Treat high priority slides and landings identified in credible landowner assessments.
 - 9.1.1.2. **Action Step:** Continue efforts such as erosion proofing, improvements, and decommissioning, through the Rockpile sub-basin to reduce sediment delivery to central Rockpile Creeks and Rockpile tributaries.

10. Restoration- Viability

- 10.1. **Objective:** Address other natural or manmade factors affecting the species continued existence
 - 10.1.1. **Recovery Action:** Increase spawner density
 - 10.1.1.1. **Action Step:** Determine if there is a need for a conservation hatchery/supplementation/augmentation program. Assess the following prior to supplementation (Action Steps 2-7):
 - 10.1.1.2. **Action Step:** Determine the biological or DPS significance of the Gualala coho salmon population.
 - 10.1.1.3. **Action Step:** Investigate the population dynamics and viability status of coho salmon in the Gualala River watershed.

- 10.1.1.4. **Action Step:** Determine if the coho salmon population within the Gualala River watershed is at a short-term or immediate risk of extinction.
- 10.1.1.5. **Action Step:** Identify population viability goals and the expectations of a conservation hatchery/supplementation/augmentation program.
- 10.1.1.6. **Action Step:** Investigate the genetic diversity of coho salmon in the Gualala River.
- 10.1.1.7. **Action Step:** If determine necessary, identify a source population (in or out of basin stock) that could be used to start a population augmentation/supplementation/ broodstock program.
- 10.1.2. **Recovery Action:** Increase spatial structure and diversity
 - 10.1.2.1. **Action Step:** Continue and expand upon biological monitoring activities to determine salmonid population and productivity trends at the watershed and sub-watershed scales. Information regarding spawner escapement and smolt production are the highest priorities.

11. Restoration- Water Quality

- 11.1. **Objective:** Address the present or threatened destruction, modification, or curtailment of the species habitat or range
 - 11.1.1. **Recovery Action:** Improve stream temperature conditions
 - 11.1.1.1. **Action Step:** Expand continuous temperature monitoring efforts into the upper sub-basins and tributaries that provide summer rearing for salmonids. Investigate canopy composition and monitoring air temperature to examine the relationship between canopy, temperature, and other micro-climate effects on water temperature (Klamt et al. 2003).
 - 11.1.1.2. **Action Step:** Evaluate the current adequacy of buffer zones in recently logged areas and ensure stream temperatures have not increased due to these activities.
 - 11.1.1.3. **Action Step:** Implement actions to maintain and restore water temperatures to meet habitat requirements for CCC coho salmon in specific streams (CDFG 2004).

THREAT ABATEMENT ACTIONS

12. Threat- Agricultural Practices

- 12.1. **Objective:** Address the present or threatened destruction, modification or curtailment of the species habitat or range
 - 12.1.1. **Recovery Action:** Prevent impairment to instream habitat complexity (altered pool complexity and/or pool riffle ratio)
 - 12.1.1.1. **Action Step:** Discourage forest-to-vineyard land conversions or other agricultural activities that may impact natural stream channel morphology.
 - 12.1.2. **Recovery Action:** Prevent impairment to instream substrate/food productivity (gravel quality and quantity)

12.1.2.1. **Action Step:** Address sources from agricultural activities that deliver sediment and runoff to stream channels.

12.1.2.2. **Action Step:** Work with vineyard owners to assess the effectiveness of erosion control measures throughout the winter period.

12.1.2.3. **Action Step:** Encourage and assist the NRCS and RCD to increase the number of landowners participating in sediment reduction planning and implementation.

12.1.2.4. **Action Step:** Establish appropriately sized and properly functioning riparian buffers adjacent to watercourses that have a potential to deliver sediment to spawning and rearing habitat.

12.1.3. **Recovery Action:** Prevent impairment to water quality (instream water temperature)

12.1.3.1. **Action Step:** Maintain functional riparian stream buffers that provide desirable stream canopy cover adjacent to agricultural land activities.

12.1.4. **Recovery Action:** Prevent impairment to watershed hydrology

12.1.4.1. **Action Step:** Promote off-channel storage facilities (e.g. winter diversion ponds) in efforts to reduce in-stream flow impacts associated with agricultural water use.

12.1.5. **Recovery Action:** Prevent increased landscape disturbance

12.1.5.1. **Action Step:** Work within the agricultural community to educate landowners and enhance practices that provide for functional watershed processes.

12.1.5.2. **Action Step:** Improve education and awareness to agencies, landowners, and the general public regarding salmonid recovery and habitat requirements.

12.2. **Objective:** Address the inadequacy of existing regulatory mechanisms

12.2.1. **Recovery Action:** Prevent increased landscape disturbance

12.2.1.1. **Action Step:** Coordinate with regulatory agencies authorizing/permitting forestland-to-agriculture conversions to ensure consistency with salmonid recovery goals.

12.2.1.2. **Action Step:** Streamline permit processing where landowners are conducting actions aligned with recovery priorities.

12.2.1.3. **Action Step:** Technical support to counties by NMFS staff should be conducted to encourage county general plan updates that include measures to conserve and protect salmonids and their habitats.

12.2.2. **Recovery Action:** Prevent impairment to watershed hydrology

12.2.2.1. **Action Step:** Identify and eliminate depletion of summer base flows from unauthorized water users.

12.2.2.2. **Action Step:** Develop legislation to fund county planning for environmentally sound agricultural growth and water supply.

13. [Threat- Channel Modification](#)

No species-specific actions were developed.

14. [Threat- Disease/Predation/Competition](#)

No species-specific actions were developed.

15. [Threat- Fire/Fuel Management](#)

No species-specific actions were developed.

16. [Threat- Fishing/Collecting](#)

16.1. **Objective:** Address the inadequacy of existing regulatory mechanisms

16.1.1. **Recovery Action:** Prevent reduced density, abundance, and diversity

16.1.1.1. **Action Step:** Work with CDFG to modify Section 8.00(b)(1) low flow minimum flow closure for Mendocino, Sonoma, and Marin counties. Discontinue using the Russian River at Guerneville gauging station for angling closures and use the Navarro River USGS gauging station (11468000) which better reflects hydrologic conditions in smaller unregulated coastal Sonoma/Mendocino streams.

17. [Threat- Hatcheries](#)

No species-specific actions were developed.

18. [Threat- Livestock](#)

18.1. **Objective:** Address the present or threatened destruction, modification or curtailment of the species habitat or range

18.1.1. **Recovery Action:** Prevent adverse alterations to riparian species composition and structure

18.1.1.1. **Action Step:** Reduce livestock and feral pig access to the riparian zone to encourage bank stabilization and re-vegetation of riparian areas within the following sub-basins: Gualala Main stem/ SF Garcia, Wheatfield Fork, Rockpile (Klamt et al. 2003).

19. [Threat- Logging](#)

19.1. **Objective:** Address the present or threatened destruction, modification or curtailment of the species habitat or range

19.1.1. **Recovery Action:** Prevent impairment to floodplain connectivity (quality & extent)

19.1.1.1. **Action Step:** Timber harvest planning should evaluate and avoid impacts to off channel habitat, floodplains, ponds, and oxbows.

19.1.2. **Recovery Action:** Prevent impairment to instream habitat complexity (reduced large wood and/or shelter)

19.1.2.1. **Action Step:** Encourage coordination of LWD placement projects in streams (as necessary) as part of logging operations.

19.1.2.2. **Action Step:** Retain the largest trees in all riparian zones (including intermittent and ephemeral streams) for bank stability and long-term wood recruitment.

- 19.1.3. **Recovery Action:** Prevent impairment to instream substrate/food productivity (gravel quality and quantity)
- 19.1.3.1. **Action Step:** Encourage all permanent and year-round access roads beyond the THP parcel be surfaced after harvest completion with base rock and road gravel, asphalt, or chipseal, as appropriate.
 - 19.1.3.2. **Action Step:** Map unstable soils and use that information to guide land use decisions, road design, THPs, and other activities that can promote erosion.
 - 19.1.3.3. **Action Step:** Establish equipment limitation zones on headwater streams and swales.
 - 19.1.3.4. **Action Step:** Decommissioning legacy roads, upgrading road networks, and other rehabilitation work targeting reductions in fine sediment inputs to stream networks.
- 19.1.4. **Recovery Action:** Prevent impairment to water quality (instream water temperature)
- 19.1.4.1. **Action Step:** Encourage wider riparian buffer zones in areas where stream temperatures or riparian canopy are found limiting.
 - 19.1.4.2. **Action Step:** Protect current riparian zones in all summer salmonid rearing areas to the extent that they are able to mature, provide, and maintain a minimum of 80% canopy cover.
- 19.1.5. **Recovery Action:** Prevent adverse alterations to riparian species composition and structure
- 19.1.5.1. **Action Step:** Conserve and manage forestlands for older forest stages.
 - 19.1.5.2. **Action Step:** Manage riparian areas for their site potential composition and structure.
- 19.1.6. **Recovery Action:** Prevent increased landscape disturbance
- 19.1.6.1. **Action Step:** Consider the development of a Watershed Database (similar to the CDFG Northern Spotted Owl database) for salmonids that provides watershed data and information in a consistent fashion to all foresters for consideration in their harvest plans.
 - 19.1.6.2. **Action Step:** Acquire key large tracts of forestlands identified as a priority by Federal, State, local government, and non-governmental organizations
 - 19.1.6.3. **Action Step:** Provide for properly functioning watershed processes (e.g., cycles of wood, water and sediment) by promoting long term sustainable forestry practices that support coho salmon habitats.
 - 19.1.6.4. **Action Step:** Should large tracts of forestlands within the Gualala River watershed identified as a Core or Phase I in this recovery plan become available for purchase, the State of California or other entities should consider purchasing the area as a Demonstration Forest or State Park.
 - 19.1.6.5. **Action Step:** Forestlands supporting Core, Phase I and Phase II priority areas should be considered for purchase (if feasible within the next 5 years).
 - 19.1.6.6. **Action Step:** Discourage home building or other incompatible land use in areas identified as timber production zones (TPZ).

19.1.6.7. **Action Step:** Maintain and expand California's working forestlands and forestlands held by the State, and prevent future conversion of forestlands to agriculture or other land uses.

19.2. **Objective:** Address the inadequacy of existing regulatory mechanisms

19.2.1. **Recovery Action:** Prevent increased landscape disturbance

19.2.1.1. **Action Step:** Work with Sonoma county planning staff to minimize rezoning forestlands to rural residential or other land uses (e.g., vineyards).

19.2.1.2. **Action Step:** Coordinate with regulatory agencies to minimize conversions in key watersheds and discourage forestland conversions.

19.2.1.3. **Action Step:** Establish greater oversight and post-harvest monitoring by the permitting agency for operations within Core, Phase I and Phase II CCC coho salmon areas.

19.2.1.4. **Action Step:** Assign NMFS staff to conduct THP reviews of the highest priority areas using revised "Guidelines for NMFS Staff when Reviewing Timber Operations: Avoiding Take and Harm of Salmon and Steelhead" (NMFS 2004).

19.2.1.5. **Action Step:** Require tree retention on the axis of headwall swales. Any deviations should be reviewed and receive written approval by a licensed engineering geologist.

19.2.1.6. **Action Step:** Extend the monitoring period and upgrade THP road maintenance after harvest.

19.2.1.7. **Action Step:** Investigate opportunities to programmatically permit the forest certification program to authorize incidental take for landowners through Section 10(a)(1)(B).

20. Threat- Mining

No species-specific actions were developed.

21. Threat- Recreation

No species-specific actions were developed.

22. Threat- Residential/Commercial Development

No species-specific actions were developed.

23. Threat- Roads/Railroads

23.1. **Objective:** Address the present or threatened destruction, modification, or curtailment of the species habitat or range

23.1.1. **Recovery Action:** Prevent impairment to instream substrate/food productivity (gravel quality and quantity)

23.1.1.1. **Action Step:** Decommission riparian road systems and/or upgrade roads (and skid trails on forestlands) that deliver sediment into adjacent watercourses (CDFG 2004).

23.1.1.2. **Action Step:** Use available best management practices for road construction, maintenance, management and decommissioning (e.g. Weaver and Hagans, 1994; Sommarstrom et al., 2002; Oregon Department of Transportation, 1999).

- 23.1.1.3. **Action Step:** Conduct road and sediment reduction assessments to identify sediment-related and runoff-related problems and determine level of hydrologic connectivity.
- 23.1.1.4. **Action Step:** Conduct annual inspections of all roads prior to winter. Correct conditions that are likely to deliver sediment to streams. Hydrologically disconnect roads.
- 23.1.1.5. **Action Step:** Encourage, when necessary and appropriate, restricted access to unpaved roads in winter to reduce road degradation and sediment release. Where restricted access is not feasible, encourage measures such as rocking to prevent sediment from reaching streams with coho salmon (CDFG 2004).
- 23.1.1.6. **Action Step:** Evaluate, develop, and implement strategies to address decommissioning old roads, maintaining existing roads, and constructing new roads in the following Gualala mainstem/ SF Gualala Subbasin tributaries: McKenzie Creek, Marchall Creek, Palmer Canyon Creek, Wild Hog Creek, South Fork, and Marshall Creek.
- 23.1.1.7. **Action Step:** Evaluate, develop, and implement strategies to address decommissioning old roads, maintaining existing roads, and constructing new roads in the following Wheatfield Fork sub-basin tributary reaches: Lower reaches of Haupt and Tabacco Creeks; Lower to middle reaches of Tombs, Wolf, and Elk creeks, and unnamed trib to the mainstem Wheatfield Fork upstream from Tombs Creek, to Elk Creek, and flanked by Bear and Gibson ridges; larger watercourses to the lower reaches of House Creek; middle to higher reaches of House, Pepperwood, Danfield, and Cedar creeks (Klamt et al. 2003).
- 23.1.1.8. **Action Step:** Evaluate, develop, and implement strategies to address decommissioning old roads, maintaining existing roads, and constructing new roads in the following North Fork sub-basin tributaries: Stewart, Dry, Upper Billings, upper Robinson, Doty, Log Cabin creeks, and McGann Gulch (Klamt et al. 2003).
- 23.1.1.9. **Action Step:** Use appropriately sized culverts in steep terrain to accommodate flashy, debris-laden flows and maintain trash racks to prevent culvert plugging and subsequent road failure in the Buckeye sub-basin (GRWA 2003).
- 23.1.2. **Recovery Action:** Prevent impairment to passage and migration
- 23.1.2.1. **Action Step:** Prevent future barriers on newly constructed roads utilizing NMFS Guidelines for Salmonid Passage at Stream Crossings (NMFS 2001a)
- 23.1.2.2. **Action Step:** Ensure that all future road or bridge repairs at stream crossing provide unimpaired fish passage for all salmonid life stages.
- 23.1.3. **Recovery Action:** Prevent impairment to water quality (increased turbidity, suspended sediment, and/or toxicity)
- 23.1.3.1. **Action Step:** Design new roads that avoid riparian areas and are hydrologically disconnected from the stream network.
- 23.1.4. **Recovery Action:** Prevent increased landscape disturbance

- 23.1.4.1. **Action Step:** Reduce road densities by 10 percent over the next 10 years, prioritizing high risk areas in historical habitats or Core CCC coho salmon watersheds.
- 23.1.4.2. **Action Step:** Develop a Road Sediment Reduction Plan that prioritizes sites and outlines implementation and a timeline of necessary actions.
- 23.1.4.3. **Action Step:** Conduct outreach and education regarding the adverse effects of roads, and the types of best management practices protective of salmonids.
- 23.1.4.4. **Action Step:** Develop a Salmon Certification Program for road maintenance staff.

24. Threat- Severe Weather Patterns

24.1. **Objective:** Address the inadequacy of existing regulatory mechanisms

24.1.1. **Recovery Action:** Prevent impairment to stream hydrology (stream flow)

- 24.1.1.1. **Action Step:** Use the emergency drought operations center (EDOC) or other similar group to oversee implementation of water conservation measures and alternatives.
- 24.1.1.2. **Action Step:** Work with CDFG, Counties, other agencies, and knowledgeable biologists to develop emergency rules and adopt implementation agreements.
- 24.1.1.3. **Action Step:** Impose mandatory conservation measures to maintain instream flow needs of CCC coho salmon.

25. Threat- Water Diversion/Impoundment

25.1. **Objective:** Address the present or threatened destruction, modification or curtailment of the species habitat or range

25.1.1. **Recovery Action:** Prevent impairment to stream hydrology (stream flow)

- 25.1.1.1. **Action Step:** Ensure that current and future water diversions (surface or groundwater) do not impair water quality conditions in summer rearing reaches.
- 25.1.1.2. **Action Step:** Ensure water supply demands can be met without impacting flow either directly or indirectly through groundwater withdrawals and aquifer depletion.
- 25.1.1.3. **Action Step:** Provide incentives to water rights holders willing to convert some or all of their water rights to instream use via petition change of use and §1707 (CDFG 2004).

25.1.2. **Recovery Action:** Prevent impairment to passage and migration

- 25.1.2.1. **Action Step:** Establish flow related adult and smolt migration thresholds for prior to authorizing future water diversions.

25.1.3. **Recovery Action:** Prevent impairment to the estuary (quality and extent)

- 25.1.3.1. **Action Step:** Discourage the development of any surface water diversions in the watershed that independently or cumulatively have significant impact on reducing inflow to the estuary during spring/summer/fall months (ECORP and Kamman Hydrology & Engineering 2005).

25.1.3.2. **Action Step:** Develop and implement Estuary Inflow Protection and Enhancement Guidelines to maintain estuary function and provide information for estuary restoration.

25.1.4. **Recovery Action:** Prevent impairment to water quality (instream temperature)

25.1.4.1. **Action Step:** Ensure future water diversions do not impair instream water temperatures during the dry season.

25.2. **Objective:** Address the inadequacy of existing regulatory mechanisms

25.2.1. **Recovery Action:** Prevent impairment to stream hydrology (stream flow)

25.2.1.1. **Action Step:** Ensure all water diversions and impoundments are compliant with AB2121 or other appropriate protective measures.

25.2.1.2. **Action Step:** 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 to remove illegal diversions from streams.

25.2.1.3. **Action Step:** Improve coordination between agencies and others to address season of diversion, off-stream reservoirs, bypass flows protective of coho salmon and their habitats, and avoidance of adverse impacts caused by water diversion (CDFG 2004).

26. [Threat- Watershed Process](#)

No species-specific actions were developed.

Table 3: Implementation Schedule ~ Gualala River

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
GuaR-CCC-1.1	Objective	Estuary	Address the present or threatened destruction, modification or curtailment of the species habitat or range										
GuaR-CCC-1.1.1	Recovery Action	Estuary	Increase the physical extent of estuarine habitat										
GuaR-CCC-1.1.1.1	Action Step	Estuary	Investigate the extent of sedimentation within the estuary/lagoon associated with watershed legacy impacts (logging). Evaluate sediment transport within the estuary and determine if the estuary is "filling" with sediment or "flushing" sediment (recovering).	3	10	CDFG, NMFS HCD, NOAA RC, NRCS, RCD, RWQCB	117.00	117.00				234	Cost based on sediment assessment estimated at \$12.22/acre. Assume 10% of total watershed acres.
GuaR-CCC-1.1.1.2	Action Step	Estuary	Identify past mechanical fill sites (inside of Mill Bend (?)) and develop strategies targeting the re-establishment of wetland marsh habitat (if feasible).	3	10	CDFG, NMFS HCD, NMFS PRD, NOAA RC, NRCS, RCD						TBD	Cost accounted for in other action steps. Feasibility of re-establishing wetland marsh habitat should be identified in estuary monitoring.
GuaR-CCC-1.1.1.3	Action Step	Estuary	Develop and implement rehabilitation projects designed to increase the physical extent of high quality habitat for rearing juvenile salmonids within the Gualala River estuary.	3	10	CDFG, Gualala Watershed Council, NMFS HCD, NMFS PRD, NOAA RC, NRCS, Private Landowners	680	680				1,360	Cost based on treating 5 acres (assume 5% of total estuarine habitat) at a rate of \$272,120/acre.
GuaR-CCC-1.1.2	Recovery Action	Estuary	Increase and enhance estuarine habitat complexity features										
GuaR-CCC-1.1.2.1	Action Step	Estuary	Increase the percentage of area containing high value habitat complexity elements and features (SAV, LWD, boulders, marshes, vegetation, pools > 2 meters).	2								101,000	Cost based on stream complexity recovery action at \$101,120/mile from estuary mouth to Highway 1 bridge.
GuaR-CCC-1.1.2.2	Action Step	Estuary	Identify strategic locations to install LWD structures designed to increased pool depth and habitat conditions within the Gualala River estuary.	2	10								Costs associated with installation of LWD would be encompassed by increasing the percentage of area high value habitat.
GuaR-CCC-1.1.3	Recovery Action	Estuary	Improve the quality of freshwater lagoon habitat										

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
GuaR-CCC-1.1.3.1	Action Step	Estuary	Install continuous water quality monitoring stations in the Gualala estuary during the summer months. Monitor at a minimum temperature, dissolved oxygen, and salinity.	2	5	CDFG, Gualala Watershed Council, NMFS HCD, NMFS PRD, NOAA RC, North Gualala Water Company, NRCS, Private Landowners, RCD, RWQCB	15.00					15	Cost based on continuous monitoring gauges estimated at \$5,000/unit. Assume a minimum of 3 for lagoon. Cost does not account for maintenance or data management.
GuaR-CCC-1.1.4	Recovery Action	Estuary	Improve freshwater inflow										
GuaR-CCC-1.1.4.1	Action Step	Estuary	Install a stream gauge immediately upstream of the estuary/lagoon to monitor inflow conditions during the dry season.	2	5	CDFG, Gualala Watershed Council, NMFS HCD, NMFS PRD, NOAA RC, North Gualala Water Company, NRCS, Private Landowners, Public, RWQCB	1.00					1	Cost based on stream gauges estimated at \$1,000/gauge. Cost does not account for maintenance or data management.
GuaR-CCC-1.1.4.2	Action Step	Estuary	Investigate the hydrodynamics of freshwater inflow and estuary water quality conditions relative to juvenile salmonid estuarine summer rearing (osmo-regulating and non-osmoregulating).	2	10	CDFG, Friends of the Gualala River Watershed, Gualala Watershed Council, NMFS HCD, NMFS PRD, NOAA RC, North Gualala Water Company, NRCS, Private Consultants, Private Landowners, RCD, RWQCB, SWRCB	136.61	136.61				273	Cost based estuary use estimated at \$273,217/project.

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
GuaR-CCC-1.1.4.3	Action Step	Estuary	Identify and implement minimum freshwater inflow thresholds to ensure optimal estuary health and function.	2	5	CDFG, Gualala Watershed Council, NMFS HCD, NMFS PRD, NOAA RC, North Gualala Water Company, NRCS, Private Consultants, RWQCB, SWRCB	63.01					63	Cost based on stream flow model estimated at \$63,005/project.
GuaR-CCC-3.1	Objective	Habitat Complexity	Address the present or threatened destruction, modification, or curtailment of the species habitat or range.										
GuaR-CCC-3.1.1	Recovery Action	Habitat Complexity	Increase large wood frequency (BFW 0-10 meters)										
GuaR-CCC-3.1.1.1	Action Step	Habitat Complexity	Increase wood frequency in salmonid spawning and rearing areas to the extent that a minimum of 6 key LWD pieces exists every 100 meters in 0-10 meter BFW streams.	2	10	Board of Forestry, CalFire, CDFG, Friends of the Gualala River Watershed, Gualala Redwood Company, Gualala Watershed Council, NMFS HCD, NMFS PRD, NOAA RC, North Gualala Water Company, NRCS, Private Landowners, Public, RCD	350.00	350.00				700	Cost based on treating 28 miles (assume 1 project/mile in 50% High IP) at a rate of \$25,000/mile.

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
GuaR-CCC-3.1.1.2	Action Step	Habitat Complexity	Design and install LWD structures in McKenzie and Wild Hog creeks, and the SF sub-basin to the extent that optimal LWD frequency is achieved at strategic locations.	2	20	Board of Forestry, CalFire, CDFG, Friends of the Gualala River Watershed, Gualala Redwood Company, Gualala Watershed Council, NMFS HCD, NMFS PRD, NOAA RC, North Gualala Water Company, NRCS, Private Landowners, Public, RWQCB							Cost accounted for in above.
GuaR-CCC-3.1.2	Recovery Action	Habitat Complexity	Increase large wood frequency (BFW 10-100 meters)										
GuaR-CCC-3.1.2.1	Action Step	Habitat Complexity	Increase wood frequency in seasonal habitat and migratory reaches to the extent that a minimum of 1.3 to 4 key LWD pieces exists every 100 meters in 10-100 meter BFW streams.	2	10	CDFG, Friends of the Gualala River Watershed, Gualala Redwood Company, Gualala Watershed Council, NMFS HCD, NMFS PRD, NOAA RC, NRCS, Private Landowners, Public, RCD, RWQCB	125.00	125.00				250	Cost based on treating 10 miles (assume 1 project/mile in 50% High IP) at a rate of \$25,000/mile.

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
GuaR-CCC-3.1.2.2	Action Step	Habitat Complexity	Design and implement a SF Gualala mainstem migration project. Focus should include a higher frequency of significantly large wood structures to enhance staging pool development.	2		CDFG, Gualala Redwood Company, Gualala Watershed Council, NMFS HCD, NMFS PRD, NOAA RC, NRCS, Private Landowners, Public, RCD							
GuaR-CCC-3.1.2.3	Action Step	Habitat Complexity	Evaluate, design, and implement salmonid habitat improvement structures as appropriate to the stream channel type and hydrologic conditions within the Rockpile Sub-basin	2		Conservation Fund, Friends of the Gualala River Watershed, Gualala Redwood Company, Gualala Watershed Council, NMFS HCD, NMFS PRD, NOAA RC, North Gualala Water Company, NRCS, Private Landowners, Public, RCD, The Nature Conservancy							
GuaR-CCC-3.1.2.4	Action Step	Habitat Complexity	Evaluate, design, and implement salmonid habitat improvement structures as appropriate to the stream channel type and hydrologic conditions within the Buckeye Sub-basin.	2		CDFG, Friends of the Gualala River Watershed, Gualala Redwood Company, Gualala Watershed Council, NMFS HCD, NMFS PRD, NOAA RC, Private Landowners, Public, RCD, RWQCB							
GuaR-CCC-3.1.3	Recovery Action	Habitat Complexity	Improve pool shelter rating										

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
GuaR-CCC-3.1.3.1	Action Step	Habitat Complexity	Evaluate, design, and implement strategies to improve shelter pools ratings within the Rockpile and Buckeye sub-basins and the following tributaries: Boyd, Buckeye, Camper, Carson, Danfield, Doty, Dry, Franchini, Fuller, Grasshopper, Groshong Gulch, House, Little NF GR, Log Cabin, Marshall, McGann, McKenzie, NF Fuller, Lower NF GR, Palmer Canyon, Pepperwood, Rockpile, SF Fuller, Sullivan, Tombs, Wheatfield Fork, and Wild Hog creeks.	2	20	CDFG, Conservation Fund, Friends of the Gualala River Watershed, Gualala Redwood Company, Gualala Watershed Council, NMFS HCD, NMFS PRD, NOAA RC, NRCS, Private Landowners, Public, RCD, The Nature Conservancy	175.00	175.00	175.00	175.00		700	Cost based on treating 28 miles (assume 1 project/mile in 50% High IP) at a rate of \$25,000/mile. This action step should be in concert with increasing LWD frequency and therefore cost could be lower.
GuaR-CCC-3.1.4	Recovery Action	Habitat Complexity	Increase primary pools frequency										
GuaR-CCC-3.1.4.1	Action Step	Habitat Complexity	Evaluate, develop, and implement strategies to increase primary pool frequency in high priority reaches within the following tributaries: Boyd, Doty, Dry, Fuller, Little NF GR, Log Cabin, Marshall, McGann, McKenzie, Palmer, Robinson, Tombs, and West Fork Fuller.	2	20	CDFG, Friends of the Gualala River Watershed, Gualala Redwood Company, Gualala Watershed Council, NMFS HCD, NMFS PRD, NOAA RC, NRCS, Private Landowners, Public, RCD							Cost accounted for in other action steps.
GuaR-CCC-3.1.4.2	Action Step	Habitat Complexity	Identify historic CCC coho salmon habitats lacking in channel complexity and implement restoration projects designed to create or restore complex habitat features that provide for localized pool scour, velocity refuge, and cover. Prioritize Core areas first followed by Phase I areas.	2	20	CDFG, NOAA RC, Private Landowners						TBD	Continue current restoration projects in progress.
GuaR-CCC-3.1.4.3	Action Step	Habitat Complexity	Encourage coordination of LWD placement in streams as part of logging operations and road upgrades to maximize size, quality, and efficiency of effort (CDFG 2004).	2	20	CalFire, CDFG, NOAA RC, Private Landowners						In-Kind	Cost to coordinate projects is expected to be low.

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
GuaR-CCC-3.1.4.4	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.	2	60	CDFG, NOAA RC, Private Landowners						In-Kind	Minimal cost expected.
GuaR-CCC-3.1.4.5	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	60	CDFG, NMFS, NRCS, Private Landowners						In-Kind	Cost to maintain LWD is expected to be minimal.
GuaR-CCC-3.1.5	Recovery Action	Habitat Complexity	Improve pool/riffle/flatwater ratios (hydraulic diversity)										
GuaR-CCC-3.1.5.1	Action Step	Habitat Complexity	Increase the frequencies to 75% of the streams within the watershed	2	20							TBD	Cost should be accounted for in increase LWD frequency and primary pools.
GuaR-CCC-4.1	Objective	Hydrology	Address the present or threatened destruction, modification or curtailment of the species habitat or range										
GuaR-CCC-4.1.1	Recovery Action	Hydrology	Improve flow conditions (baseflow conditions)										
GuaR-CCC-4.1.1.1	Action Step	Hydrology	Continue to work with the North Gualala Water Company on water right Permit 14853. Ensure that the Site-specific Study Plan prepared for the NGWC by Stillwater Sciences (11 October 2011) is completed within the next 3-yrs. Implement recommendations within the next 5-years. Ensure salmonid life history requirements targeted in the proposal are evaluate under a range of water year types (dry - wet). Evaluate potential impacts to dry season estuary water quality conditions associated with Permit 14853.	2	20	CDFG, CDFG Law Enforcement, Gualala Watershed Council, NMFS HCD, NMFS OLE, NMFS PRD, North Gualala Water Company, SWRCB						In-Kind	
GuaR-CCC-4.1.1.2	Action Step	Hydrology	Map all water diversions and upgrade the existing water rights information system so that water allocations can be readily quantified by watershed.	2	60	CDFG, NMFS, North Gualala Water Company, Private Landowners, Sea Ranch, SWRCB						TBD	Costs may be minimal due to the low number of diverters in this basin.

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
GuaR-CCC-4.1.1.3	Action Step	Hydrology	Monitor, identify problems, and prioritize needed changes to permitted water diversions on current or potential coho salmon streams.	2	10	BLM, CDFG, NMFS, North Gualala Water Company, Private Landowners, Sea Ranch, SWRCB						TBD	Problems should be identified through mapping diversion and developing stream flow model.
GuaR-CCC-4.1.1.4	Action Step	Hydrology	Install and maintain a gauging station immediately upstream of the estuary to monitor freshwater inflow during the dry season.	2	10	CDFG, NMFS, USGS	0.50	0.50				1	Provide consistent funding for the North Fork Gualala River and possible funding for the Wheatfield Forks of the Gualala River. Cost of installing stream gage is \$1000/unit. Cost does not account for maintenance or data management.
GuaR-CCC-4.1.1.5	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. Focus on core coho salmon areas initially.	1	5	CDFG, Gualala Watershed Council, NMFS HCD, NMFS PRD, NOAA RC, North Gualala Water Company, NRCS, Private Landowners, RCD, RWQCB, Sea Ranch, SWRCB							Cost accounted for in stream flow model.
GuaR-CCC-4.1.1.6	Action Step	Hydrology	Install and maintain a stream gauge at an appropriate location near the base of Rockpile Creek.	3	10	CDFG, Gualala Watershed Council, NMFS HCD, NMFS PRD, NOAA RC, NRCS, Private Landowners, RWQCB, SWRCB	0.50	0.50				1	Cost based on stream gauge estimated at \$1,000/gauge. Cost does not account for maintenance or data management.
GuaR-CCC-4.1.1.7	Action Step	Hydrology	Install and maintain a stream gauge at an appropriate location near the base of Buckeye Creek.	3	indefinitely	CDFG, NMFS HCD, NMFS PRD, NRCS, Private Landowners, RCD, SWRCB							

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
GuaR-CCC-4.1.1.8	Action Step	Hydrology	Install and maintain a stream gauge at an appropriate location immediately downstream of the SF Gualala and Wheatfield Fork confluence.	3	10	CDFG, Gualala Watershed Council, NMFS HCD, NMFS PRD, NRCS, Private Landowners, RCD, Sea Ranch, SWRCB	0.50	0.50				1	Cost based on stream flow gauge estimated at \$1,000/gauge. Cost does not account for maintenance or data management.
GuaR-CCC-4.1.1.9	Action Step	Hydrology	Evaluate and implement off-channel storage facilities to reduce impacts of water diversion (storage tanks for rural residential users). Focus efforts in the NF Gualala and Wheatfield sub-watersheds.	2	20	CDFG, Gualala Watershed Council, NMFS HCD, NMFS PRD, North Gualala Water Company, NRCS, SWRCB						TBD	Cost difficult to estimated because of participation of landowners and feasibility of off-channel storage facilities.
GuaR-CCC-5.1	Objective	Landscape Patterns	Address the present or threatened destruction, modification, or curtailment of the species habitat or range										
GuaR-CCC-5.1.1	Recovery Action	Landscape Patterns	Prevent increased landscape disturbance										
GuaR-CCC-5.1.1.1	Action Step	Landscape Patterns	Consider developing and/or identifying Salmonid Preserves. Consider the Gualala River watershed as a Salmonid Preserve.	2	100	CDFG, NMFS, NMFS HCD, NMFS PRD, NOAA RC							
GuaR-CCC-5.1.1.2	Action Step	Landscape Patterns	Should large tracts of forestlands within the Gualala River watershed become available for purchase, the State of California and/or the Federal Government should consider purchasing the area as a Demonstration Forest, State Park, or Salmonid Preserve.	2	50	CDFG, Gualala Redwood Company, NMFS HCD, NMFS PRD, NOAA RC						TBD	Cost difficult to estimate because of fair market value and land use turnover.
GuaR-CCC-5.2	Objective	Landscape Patterns	Address the inadequacy of existing regulatory mechanisms										
GuaR-CCC-5.2.1	Recovery Action	Landscape Patterns	Prevent increased landscape disturbance										

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
GuaR-CCC-5.2.1.1	Action Step	Landscape Patterns	Discourage counties from rezoning forestlands to rural residential or other land uses (e.g., vineyards).	1	100	Board of Forestry, CalFire, CDFG, Gualala Redwood Company, Gualala Watershed Council, NMFS HCD, NMFS PRD, North Gualala Water Company, NRCS, RCD, Sea Ranch, Sonoma County, SWRCB						In-Kind	
GuaR-CCC-5.2.1.2	Action Step	Landscape Patterns	Discourage any forestland to agricultural and/or rural/urban development.	1	100	Board of Forestry, CalFire, CDFG, Gualala Redwood Company, Gualala Watershed Council, NMFS, NMFS HCD, NMFS PRD, North Gualala Water Company, NRCS, Private Landowners, Public, RCD, Sea Ranch, Sonoma County, SWRCB						In-Kind	
GuaR-CCC-6.1	Objective	Passage	Address the present or threatened destruction, modification or curtailment of the species habitat or range										
GuaR-CCC-6.1.1	Recovery Action	Passage	Modify or remove physical passage barriers										

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
GuaR-CCC-6.1.1.1	Action Step	Passage	Evaluate, design, and implement appropriate fish passage at South Beach Road Crossing on Fuller Creek (Wheatfield Fork sub-basin; See CALFISH: PAD_ID 736904; Passage ID 13268)	2	10	CDFG, Friends of the Gualala River Watershed, Gualala Watershed Council, NMFS, NMFS HCD, NMFS PRD, NOAA RC, NRCS, RCD	31.50	31.50				63	Cost based on stream crossing at \$63,000/unit.
GuaR-CCC-6.1.1.2	Action Step	Passage	Evaluate, design, and implement appropriate fish passage designs in Palmer Canyon and McKenzie creeks (Wheatfield Fork sub-basin; Klamt et al. 2003).	2	10	CDFG, Friends of the Gualala River Watershed, Gualala Watershed Council, NMFS HCD, NMFS PRD, NOAA RC, NRCS, RCD	950	950				1,900	Cost based on implementing two fish passage facilities at a rate of \$961,000/unit.
GuaR-CCC-8.1	Objective	Riparian	Address the present or threatened destruction, modification, or curtailment of the species habitat or range										
GuaR-CCC-8.1.1	Recovery Action	Riparian	Improve tree diameter										
GuaR-CCC-8.1.1.1	Action Step	Riparian	Increase tree diameter to a minimum of 80% CWHR density rating "D" across all current and potential spawning and juvenile rearing areas.	2	20	Board of Forestry, CalFire, CDFG, Conservation Fund, Gualala Redwood Company, NMFS HCD, NMFS PRD, The Nature Conservancy	1,205	1,205	1,205	1,205		4,820	Cost based on treating 3 miles (assume 80 acres/mile in 5% High IP) at a rate of \$20,057/acre.

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
GuaR-CCC-8.1.1.2	Action Step	Riparian	Prioritize large tree retention along the SF Gualala River.	2	50	Board of Forestry, CalFire, CDFG, Gualala Redwood Company, NMFS HCD, NMFS PRD						In-Kind	
GuaR-CCC-8.1.1.3	Action Step	Riparian	Conduct conifer release to promote growth of larger diameter trees where appropriate.	2	10	Board of Forestry, CalFire, CDFG, Gualala Redwood Company, NMFS HCD, NMFS PRD, NRCS, RCD	550	550				1,100	Cost based on treating 9 miles (assume 80 acres/mile in 15% High IP) at a rate of \$1,422/acre.
GuaR-CCC-8.1.2	Recovery Action	Riparian	Improve canopy cover										
GuaR-CCC-8.1.2.1	Action Step	Riparian	Increase the average stream canopy cover within potential spawning and rearing reaches to a minimum of 80%.	2	20	Board of Forestry, CalFire, CDFG, Friends of the Gualala River Watershed, Gualala Redwood Company, Gualala Watershed Council, NMFS HCD, NMFS PRD, NOAA RC, NRCS, The Nature Conservancy	1,205	1,205	1,205	1,205		4,820	Cost based on treating 3 miles (assume 80 acres/mile in 5% High IP) at a rate of \$20,057/acre. This action step should be in concert with increasing tree diameter to a minimum of 80% CVHR.

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
GuaR-CCC-8.1.2.2	Action Step	Riparian	Evaluate buffers width and/or timber harvest in terms of light penetration and potential changes to micro-climate conditions along the SF Gualala River.	2	50	Board of Forestry, CalFire, CDFG, Friends of the Gualala River Watershed, Gualala Redwood Company, Gualala Watershed Council, NMFS HCD, NMFS PRD						In-Kind	
GuaR-CCC-8.1.2.3	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, thinning, and other vegetation management to encourage the development of a denser more extensive riparian canopy in the following reaches and tributaries of the NF Gualala sub-basin: upper reaches of Dry Creek, Robinson Creek, the central and higher reaches of the mainstem, and the lower reaches of Bear and Stewart Creeks (Klamt et al. 2003).	2	20	Board of Forestry, CalFire, CDFG, Friends of the Gualala River Watershed, Gualala Redwood Company, Gualala Watershed Council, NMFS HCD, NMFS PRD, NOAA RC, NRCS, Private Landowners, RCD						TBD	Cost likely accounted for in above action steps.

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
GuaR-CCC-8.1.2.4	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, thinning, and other vegetation management to encourage the development of a denser more extensive riparian canopy in the following reaches and tributaries of the Rockpile sub-basin: mainstem Rockpile Creek, Red Rock Creek, and Horsetheif (Klamt et al. 2003).	2	20	Board of Forestry, CalFire, CDFG, Conservation Fund, Friends of the Gualala River Watershed, Gualala Redwood Company, Gualala Watershed Council, NMFS HCD, NMFS PRD, NOAA RC, NRCS, Private Landowners, RCD, The Nature Conservancy						TBD	Cost likely accounted for in above action steps.
GuaR-CCC-8.1.2.5	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, thinning, and other vegetation management to encourage the development of a denser more extensive riparian canopy in the following reaches and tributaries of the Buckeye sub-basin: upper reaches of Buckeye Creek, Franchini, Grasshopper, and Soda Springs creeks (Klamt et al. 2003).	2	20	Board of Forestry, CalFire, CDFG, Friends of the Gualala River Watershed, Gualala Redwood Company, Gualala Watershed Council, NMFS HCD, NMFS PRD, NOAA RC, NRCS, Private Landowners, RCD						TBD	Cost likely accounted for in above action steps.
GuaR-CCC-9.1	Objective	Sediment	Address the present or threatened destruction, modification, or curtailment of the species habitat or range										
GuaR-CCC-9.1.1	Recovery Action	Sediment	Improve instream gravel quality										

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
GuaR-CCC-9.1.1.1	Action Step	Sediment	Treat high priority slides and landings identified in credible landowner assessments.	1	20	CDFG, NOAA RC, Private Landowners						TBD	Site specific information needed for a accurate cost estimate.
GuaR-CCC-9.1.1.2	Action Step	Sediment	Continue efforts such as erosion proofing, improvements, and decommissioning, through the Rockpile sub-basin to reduce sediment delivery to central Rockpile Creeks and Rockpile tributaries.	2	10	Board of Forestry, CalFire, CDFG, Friends of the Gualala River Watershed, Gualala Redwood Company, Gualala Watershed Council, NMFS HCD, NMFS PRD, NOAA RC, NRCS, RCD	30.00	30.00				60	Cost based on decommissioning 5 miles of road network at a rate of \$12,000/mile.
GuaR-CCC-10.1	Objective	Viability	Address other natural or manmade factors affecting the species continued existence										
GuaR-CCC-10.1.1	Recovery Action	Viability	Increase spawner density										
GuaR-CCC-10.1.1.1	Action Step	Viability	Determine if there is a need for a conservation hatchery/supplementation/augmentation program. Assess the following prior to supplementation (Action Steps 2-7):	1	12	CDFG, NMFS HCD, NMFS PRD, NOAA RC, NOAA SWFSC						In-Kind	This recommendation will determine cost for action steps below
GuaR-CCC-10.1.1.2	Action Step	Viability	Determine the biological or DPS significance of the Gualala coho salmon population.	1	20	CDFG, NMFS, NMFS HCD, NMFS PRD, NOAA RC, NOAA SWFSC						In-Kind	
GuaR-CCC-10.1.1.3	Action Step	Viability	Investigate the population dynamics and viability status of coho salmon in the Gualala River watershed.	1	10	CDFG, NMFS HCD, NMFS PRD, NOAA RC, NOAA SWFSC	65.00	65.00				130	Cost based on abundance and distribution monitoring estimated at \$129,391/project.

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
GuaR-CCC-10.1.1.4	Action Step	Viability	Determine if the coho salmon population within the Gualala River watershed is at a short-term or immediate risk of extinction.	1	20	CDFG, NMFS HCD, NMFS PRD, NOAA RC, NOAA SWFSC						In-Kind	
GuaR-CCC-10.1.1.5	Action Step	Viability	Identify population viability goals and the expectations of a conservation hatchery/supplementation/augmentation program.	1	20	CDFG, NMFS HCD, NMFS PRD, NOAA RC, NOAA SWFSC						In-Kind	
GuaR-CCC-10.1.1.6	Action Step	Viability	Investigate the genetic diversity of coho salmon in the Gualala River.	1	20	CDFG, NMFS HCD, NMFS PRD, NOAA RC, NOAA SWFSC						In-Kind	
GuaR-CCC-10.1.1.7	Action Step	Viability	If determine necessary, identify a source population (in or out of basin stock) that could be used to start a population augmentation/supplementation/broodstock program.	1	20	CDFG, NMFS HCD, NMFS PRD, NOAA RC, NOAA SWFSC						In-Kind	
GuaR-CCC-10.1.2	Recovery Action	Viability	Increase spatial structure and diversity										
GuaR-CCC-10.1.2.1	Action Step	Viability	Continue and expand upon biological monitoring activities to determine salmonid population and productivity trends at the watershed and sub-watershed scales. Information regarding spawner escapement and smolt production are the highest priorities.	2	10	CDFG, NMFS, Private Landowners, RCD	115.00	115.00				230	Cost based on annual spawner ground estimated at \$64,040/year and smolt outmigration surveys \$50,030/year for Central Coastal diversity stratum.
GuaR-CCC-11.1	Objective	Water Quality	Address the present or threatened destruction, modification, or curtailment of the species habitat or range										
GuaR-CCC-11.1.1	Recovery Action	Water Quality	Improve stream temperature conditions										

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)						Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25	Entire Duration	
GuaR-CCC-11.1.1.1	Action Step	Water Quality	Expand continuous temperature monitoring efforts into the upper sub-basins and tributaries that provide summer rearing for salmonids. Investigate canopy composition and monitoring air temperature to examine the relationship between canopy, temperature, and other micro-climate effects on water temperature (Klamt et al. 2003).	2		CDFG, Friends of the Gualala River Watershed, Gualala Redwood Company, Gualala Watershed Council, NMFS HCD, NMFS PRD, NOAA RC							
GuaR-CCC-11.1.1.2	Action Step	Water Quality	Evaluate the current adequacy of buffer zones in recently logged areas and ensure stream temperatures have not increased due to these activities.	2		Board of Forestry, CalFire, CDFG, Friends of the Gualala River Watershed, Gualala Redwood Company, Gualala Watershed Council, NMFS HCD, NMFS PRD, Private Landowners, RCD							
GuaR-CCC-11.1.1.3	Action Step	Water Quality	Implement actions to maintain and restore water temperatures to meet habitat requirements for CCC coho salmon in specific streams (CDFG 2004).	2		CDFG, Friends of the Gualala River Watershed, Gualala Redwood Company, Gualala Watershed Council, NMFS HCD, NMFS PRD, NRCS, Private Landowners							
GuaR-CCC-12.1	Objective	Agricultural Practices	Address the present or threatened destruction, modification or curtailment of the species habitat or range										
GuaR-CCC-12.1.1	Recovery Action	Agricultural Practices	Prevent impairment to instream habitat complexity (altered pool complexity and/or pool riffle ratio)										

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
GuaR-CCC-12.1.1.1	Action Step	Agricultural Practices	Discourage forest-to-vineyard land conversions or other agricultural activities that may impact natural stream channel morphology.	1	30	Board of Forestry, CalFire, CDFG, NMFS, Sonoma County						In-Kind	This action is considered part of doing business with regulatory agencies and stakeholders.
GuaR-CCC-12.1.2	Recovery Action	Agricultural Practices	Prevent impairment to instream substrate/food productivity (gravel quality and quantity)										
GuaR-CCC-12.1.2.1	Action Step	Agricultural Practices	Address sources from agricultural activities that deliver sediment and runoff to stream channels.	3		CA Coastal Commission, CDFG, DWR, NOAA RC, NRCS, Private Landowners, RCD							
GuaR-CCC-12.1.2.2	Action Step	Agricultural Practices	Work with vineyard owners to assess the effectiveness of erosion control measures throughout the winter period.	3	5	CalFire, CDFG, NMFS, RWQCB, Sonoma County	50.00					50	Cost estimate for field work by agency or other staff.
GuaR-CCC-12.1.2.3	Action Step	Agricultural Practices	Encourage and assist the NRCS and RCD to increase the number of landowners participating in sediment reduction planning and implementation.	3		CDFG, NMFS, NOAA RC, Private Landowners							
GuaR-CCC-12.1.2.4	Action Step	Agricultural Practices	Establish appropriately sized and properly functioning riparian buffers adjacent to watercourses that have a potential to deliver sediment to spawning and rearing habitat.	3		NRCS, Private Landowners, RCD							
GuaR-CCC-12.1.3	Recovery Action	Agricultural Practices	Prevent impairment to water quality (instream water temperature)										
GuaR-CCC-12.1.3.1	Action Step	Agricultural Practices	Maintain functional riparian stream buffers that provide desirable stream canopy cover adjacent to agricultural land activities.	2	20	FishNet 4C, NOAA RC, Private Landowners, Sonoma County						TBD	Additional information needed on the size and scope of projects in order to estimate cost.
GuaR-CCC-12.1.4	Recovery Action	Agricultural Practices	Prevent impairment to watershed hydrology										

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
GuaR-CCC-12.1.4.1	Action Step	Agricultural Practices	Promote off-channel storage facilities (e.g. winter diversion ponds) in efforts to reduce in-stream flow impacts associated with agricultural water use.	2	10	CalFire, CDFG, NMFS, NMFS OLE, Private Landowners, Sonoma County, SWRCB						TBD	Low cost to promote. Implementation likely 1-2 million based on recent Russian River costs to develop off-channel storage.
GuaR-CCC-12.1.5	Recovery Action	Agricultural Practices	Prevent increased landscape disturbance										
GuaR-CCC-12.1.5.1	Action Step	Agricultural Practices	Work within the agricultural community to educate landowners and enhance practices that provide for functional watershed processes.	3	20	Farm Bureau, FishNet 4C, Private Landowners, Sonoma County						0	Relatively low cost is expected to work with agricultural community.
GuaR-CCC-12.1.5.2	Action Step	Agricultural Practices	Improve education and awareness to agencies, landowners, and the general public regarding salmonid recovery and habitat requirements.	3		NMFS, NOAA RC, NRCS, Private Landowners, Public, RCD							
GuaR-CCC-12.2	Objective	Agricultural Practices	Address the inadequacy of existing regulatory mechanisms										
GuaR-CCC-12.2.1	Recovery Action	Agricultural Practices	Prevent increased landscape disturbance										
GuaR-CCC-12.2.1.1	Action Step	Agricultural Practices	Coordinate with regulatory agencies authorizing/permitting forestland-to-agriculture conversions to ensure consistency with salmonid recovery goals.	1		CalFire, CDFG, NMFS HCD, NMFS PRD, Sonoma County							
GuaR-CCC-12.2.1.2	Action Step	Agricultural Practices	Streamline permit processing where landowners are conducting actions aligned with recovery priorities.	2		CDFG, NMFS HCD, NMFS PRD, NOAA RC, Private Landowners, RCD							

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
GuaR-CCC-12.2.1.3	Action Step	Agricultural Practices	Technical support to counties by NMFS staff should be conducted to encourage county general plan updates that include measures to conserve and protect salmonids and their habitats.	3		NMFS HCD, NMFS PRD, NOAA RC, NRCS, Private Landowners, Public Works, RCD, Sonoma County							
GuaR-CCC-12.2.2	Recovery Action	Agricultural Practices	Prevent impairment to watershed hydrology										
GuaR-CCC-12.2.2.1	Action Step	Agricultural Practices	Identify and eliminate depletion of summer base flows from unauthorized water users.	2	20	CDFG, NMFS HCD, NMFS OLE, NMFS PRD, NOAA RC, North Gualala Water Company, SWRCB						TBD	Development of stream flow model will identify summer base flow levels.
GuaR-CCC-12.2.2.2	Action Step	Agricultural Practices	Develop legislation to fund county planning for environmentally sound agricultural growth and water supply.	2	30	CDFG, NMFS HCD, NMFS PRD, Sonoma County, SWRCB						In-Kind	
GuaR-CCC-16.1	Objective	Fishing/Collecting	Address the inadequacy of existing regulatory mechanisms										
GuaR-CCC-16.1.1	Recovery Action	Fishing/Collecting	Prevent reduced density, abundance, and diversity										
GuaR-CCC-16.1.1.1	Action Step	Fishing/Collecting	Work with CDFG to modify Section 8.00(b)(1) low flow minimum flow closure for Mendocino, Sonoma, and Marin counties. Discontinue using the Russian River at Guerneville gauging station for angling closures and use the Navarro River USGS gauging station (11468000) which better reflects hydrologic conditions in smaller unregulated coastal Sonoma/Mendocino streams.	2	100	CDFG, NMFS						In-Kind	
GuaR-CCC-18.1	Objective	Livestock	Address the present or threatened destruction, modification or curtailment of the species habitat or range										

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
GuaR-CCC-18.1.1	Recovery Action	Livestock	Prevent adverse alterations to riparian species composition and structure										
GuaR-CCC-18.1.1.1	Action Step	Livestock	Reduce livestock and feral pig access to the riparian zone to encourage bank stabilization and re-vegetation of riparian areas within the following sub-basins: Gualala Main stem/ SF Garcia, Wheatfield Fork, Rockpile (Klamt et al. 2003).	3		CDFG, Friends of the Gualala River Watershed, Gualala Watershed Council, NMFS HCD, NMFS PRD, NOAA RC, NRCS, RCD							
GuaR-CCC-19.1	Objective	Logging	Address the present or threatened destruction, modification or curtailment of the species habitat or range										
GuaR-CCC-19.1.1	Recovery Action	Logging	Prevent impairment to floodplain connectivity (quality & extent)										
GuaR-CCC-19.1.1.1	Action Step	Logging	Timber harvest planning should evaluate and avoid impacts to off channel habitat, floodplains, ponds, and oxbows.	2	50	Board of Forestry, CalFire, CDFG, Gualala Redwood Company, NMFS HCD, NMFS PRD, NRCS, RCD						In-Kind	
GuaR-CCC-19.1.2	Recovery Action	Logging	Prevent impairment to instream habitat complexity (reduced large wood and/or shelter)										
GuaR-CCC-19.1.2.1	Action Step	Logging	Encourage coordination of LWD placement projects in streams (as necessary) as part of logging operations.	3	30	Board of Forestry, CalFire, CDFG, Gualala Redwood Company, NMFS HCD, NMFS PRD, NOAA RC, RCD						In-Kind	This recommendation should be considered standard practice.

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
GuaR-CCC-19.1.2.2	Action Step	Logging	Retain the largest trees in all riparian zones (including intermittent and ephemeral streams) for bank stability and long-term wood recruitment.	2	100	Board of Forestry, CalFire, Gualala Redwood Company, NMFS HCD, NMFS PRD, NRCS, RCD						In-Kind	
GuaR-CCC-19.1.3	Recovery Action	Logging	Prevent impairment to instream substrate/food productivity (gravel quality and quantity)										
GuaR-CCC-19.1.3.1	Action Step	Logging	Encourage all permanent and year-round access roads beyond the THP parcel be surfaced after harvest completion with base rock and road gravel, asphalt, or chipseal, as appropriate.	3	60	CalFire, Private Landowners						TBD	See Roads section.
GuaR-CCC-19.1.3.2	Action Step	Logging	Map unstable soils and use that information to guide land use decisions, road design, THPs, and other activities that can promote erosion.	3	20	CalFire, California Geological Survey, Private Consultants, Private Landowners, RWQCB						TBD	Cost expected to be low because much of this mapping has been completed.
GuaR-CCC-19.1.3.3	Action Step	Logging	Establish equipment limitation zones on headwater streams and swales.	3	50	Board of Forestry, CalFire, CDFG, NMFS HCD, NMFS PRD, NRCS, RCD						In-Kind	

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Comments	
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		Entire Duration
GuaR-CCC-19.1.3.4	Action Step	Logging	Decommissioning legacy roads, upgrading road networks, and other rehabilitation work targeting reductions in fine sediment inputs to stream networks.	2	20	Board of Forestry, CalFire, CDFG, Conservation Fund, Friends of the Gualala River Watershed, Gualala Redwood Company, Gualala Watershed Council, NMFS HCD, NMFS PRD, NOAA RC, Private Landowners, RCD	137.50	137.50	137.50	137.50		550	Cost to decommission 40 miles (assume 10% of road network) at a rate of \$12,000/mile.
GuaR-CCC-19.1.4	Recovery Action	Logging	Prevent impairment to water quality (instream water temperature)										
GuaR-CCC-19.1.4.1	Action Step	Logging	Encourage wider riparian buffer zones in areas where stream temperatures or riparian canopy are found limiting.	2	30	Board of Forestry, CalFire, Friends of the Gualala River Watershed, Gualala Redwood Company, Gualala Watershed Council, NMFS HCD, NMFS PRD, NOAA RC, NRCS, RCD						In-Kind	
GuaR-CCC-19.1.4.2	Action Step	Logging	Protect current riparian zones in all summer salmonid rearing areas to the extent that they are able to mature, provide, and maintain a minimum of 80% canopy cover.	2	100	Board of Forestry, CalFire, CDFG, Gualala Redwood Company, NMFS HCD, NMFS PRD, Private Landowners, RCD						In-Kind	
GuaR-CCC-19.1.5	Recovery Action	Logging	Prevent adverse alterations to riparian species composition and structure										

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
GuaR-CCC-19.1.5.1	Action Step	Logging	Conserve and manage forestlands for older forest stages.	2	100	Board of Forestry, CalFire, CDFG, Gualala Redwood Company, NMFS HCD, NMFS PRD						In-Kind	
GuaR-CCC-19.1.5.2	Action Step	Logging	Manage riparian areas for their site potential composition and structure.	2	60	Board of Forestry, CalFire, CDFG, NMFS						TBD	Cost of reducing timber available in riparian areas needs to be calculated for estimating cost of this action.
GuaR-CCC-19.1.6	Recovery Action	Logging	Prevent increased landscape disturbance										
GuaR-CCC-19.1.6.1	Action Step	Logging	Consider the development of a Watershed Database (similar to the CDFG Northern Spotted Owl database) for salmonids that provides watershed data and information in a consistent fashion to all foresters for consideration in their harvest plans.	3	20	Board of Forestry, CDFG, NMFS HCD, NMFS PRD						TBD	
GuaR-CCC-19.1.6.2	Action Step	Logging	Acquire key large tracts of forestlands identified as a priority by Federal, State, local government, and non-governmental organizations	2	30	CDFG, NMFS, NMFS HCD, NMFS PRD, NOAA RC						TBD	Cost are difficult to estimate because of fair market value and rate of turnover.
GuaR-CCC-19.1.6.3	Action Step	Logging	Provide for properly functioning watershed processes (e.g., cycles of wood, water and sediment) by promoting long term sustainable forestry practices that support coho salmon habitats.	2	100	Board of Forestry, CalFire, CDFG, NMFS HCD, NMFS PRD, RWQCB						In-Kind	
GuaR-CCC-19.1.6.4	Action Step	Logging	Should large tracts of forestlands within the Gualala River watershed identified as a Core or Phase I in this recovery plan become available for purchase, the State of California or other entities should consider purchasing the area as a Demonstration Forest or State Park.	2	20	BLM, CalFire, California Coastal Conservancy, CDFG, Conservation Fund, NMFS, Private Landowners, Sonoma County, State Parks, The Nature Conservancy						TBD	Not able to estimate cost at this time.

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
GuaR-CCC-19.1.6.5	Action Step	Logging	Forestlands supporting Core, Phase I and Phase II priority areas should be considered for purchase (if feasible within the next 5 years).	2	50	CDFG, NMFS HCD, NMFS PRD, NOAA RC							
GuaR-CCC-19.1.6.6	Action Step	Logging	Discourage home building or other incompatible land use in areas identified as timber production zones (TPZ).	3	60	CalFire, CDFG, NMFS, Private Landowners, Sonoma County						TBD	Costs may be low if conducted with existing federal, state and county staff.
GuaR-CCC-19.1.6.7	Action Step	Logging	Maintain and expand California's working forestlands and forestlands held by the State, and prevent future conversion of forestlands to agriculture or other land uses.	2	50	Board of Forestry, CalFire, CDFG, NMFS						In-Kind	
GuaR-CCC-19.2	Objective	Logging	Address the inadequacy of existing regulatory mechanisms										
GuaR-CCC-19.2.1	Recovery Action	Logging	Prevent increased landscape disturbance										
GuaR-CCC-19.2.1.1	Action Step	Logging	Work with Sonoma county planning staff to minimize rezoning forestlands to rural residential or other land uses (e.g., vineyards).	1	60	CalFire, NMFS HCD, Sonoma County						0	Cost low if conducted with current regulatory and County staff.
GuaR-CCC-19.2.1.2	Action Step	Logging	Coordinate with regulatory agencies to minimize conversions in key watersheds and discourage forestland conversions.	1		Board of Forestry, CalFire, CDFG, NMFS HCD, NMFS PRD							
GuaR-CCC-19.2.1.3	Action Step	Logging	Establish greater oversight and post-harvest monitoring by the permitting agency for operations within Core, Phase I and Phase II CCC coho salmon areas.	2		Board of Forestry, CalFire, CDFG, NMFS HCD, NMFS PRD, RWQCB							
GuaR-CCC-19.2.1.4	Action Step	Logging	Assign NMFS staff to conduct THP reviews of the highest priority areas using revised "Guidelines for NMFS Staff when Reviewing Timber Operations: Avoiding Take and Harm of Salmon and Steelhead" (NMFS 2004).	1	10	CalFire, NMFS							The recovery action is considered in-kind and part of conducting business.

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
GuaR-CCC-19.2.1.5	Action Step	Logging	Require tree retention on the axis of headwall swales. Any deviations should be reviewed and receive written approval by a licensed engineering geologist.	2	60	CalFire, California Geological Survey, CDFG, NMFS PRD, Private Consultants, Private Landowners, RWQCB						TBD	Cost can not be determined without information on the number of acres and cost of merchantable timber retention.
GuaR-CCC-19.2.1.6	Action Step	Logging	Extend the monitoring period and upgrade THP road maintenance after harvest.	2	10	CalFire, CDFG, NMFS PRD, Private Landowners, RWQCB							
GuaR-CCC-19.2.1.7	Action Step	Logging	Investigate opportunities to programmatically permit the forest certification program to authorize incidental take for landowners through Section 10(a)(1)(B).	3		Board of Forestry, CalFire, CDFG, NMFS PRD							
GuaR-CCC-23.1	Objective	Roads/Railroads	Address the present or threatened destruction, modification, or curtailment of the species habitat or range										
GuaR-CCC-23.1.1	Recovery Action	Roads/Railroads	Prevent impairment to instream substrate/food productivity (gravel quality and quantity)										
GuaR-CCC-23.1.1.1	Action Step	Roads/Railroads	Decommission riparian road systems and/or upgrade roads (and skid trails on forestlands) that deliver sediment into adjacent watercourses (CDFG 2004).	1	10	CDFG, NOAA RC, Private Landowners, RCD, Sonoma County	300.00	300.00				600	Based on remaining number of miles of roads that have not been upgraded (500 miles) in Core and Phase I recovery areas. Cost to decommission roads based on \$12,000/mile for 500 miles. If roads were upgraded, costs would be \$21,000/mile for an estimated total of \$1,050,000.
GuaR-CCC-23.1.1.2	Action Step	Roads/Railroads	Use available best management practices for road construction, maintenance, management and decommissioning (e.g. Weaver and Hagans, 1994; Sommarstrom et al., 2002; Oregon Department of Transportation, 1999).	1	60	Private Landowners, RCD, Sonoma County						TBD	Cost of maintaining upgraded roads will depend on severity of previous winter.

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
GuaR-CCC-23.1.1.3	Action Step	Roads/Railroads	Conduct road and sediment reduction assessments to identify sediment-related and runoff-related problems and determine level of hydrologic connectivity.	2	5	NRCS, Private Consultants, Private Landowners, RCD						TBD	Cost expected to be low because most areas have been surveyed.
GuaR-CCC-23.1.1.4	Action Step	Roads/Railroads	Conduct annual inspections of all roads prior to winter. Correct conditions that are likely to deliver sediment to streams. Hydrologically disconnect roads.	2	5	CDFG, Private Consultants, Private Landowners, RWQCB						TBD	Five years may be sufficient to determine problem segments that would be stormproofed.
GuaR-CCC-23.1.1.5	Action Step	Roads/Railroads	Encourage, when necessary and appropriate, restricted access to unpaved roads in winter to reduce road degradation and sediment release. Where restricted access is not feasible, encourage measures such as rock to prevent sediment from reaching streams with coho salmon (CDFG 2004).	2	20	Private Landowners						TBD	Twenty years is suggested to institutionalize these practices.
GuaR-CCC-23.1.1.6	Action Step	Roads/Railroads	Evaluate, develop, and implement strategies to address decommissioning old roads, maintaining existing roads, and constructing new roads in the following Gualala mainstem/ SF Gualala Subbasin tributaries: McKenzie Creek, Marchall Creek, Palmer Canyon Creek, Wild Hog Creek, South Fork, and Marshall Creek.	2	20	CDFG, Gualala Redwood Company, NMFS HCD, NMFS PRD, NOAA RC, NRCS, Private Landowners, RCD, RWQCB						TBD	Cost likely accounted for in other action steps.
GuaR-CCC-23.1.1.7	Action Step	Roads/Railroads	Evaluate, develop, and implement strategies to address decommissioning old roads, maintaining existing roads, and constructing new roads in the following Wheatfield Fork sub-basin tributary reaches: Lower reaches of Haupt and Tabacco Creeks; Lower to middle reaches of Tombs, Wolf, and Elk creeks, and unnamed trib to the mainstem Wheatfield Fork upstream from Tombs Creek, to Elk Creek, and flanked by Bear and Gibson ridges; larger watercourses to the lower reaches of House Creek; middle to higher reaches of House, Pepperwood, Danfield, and Cedar creeks (Klamt et al. 2003).	2	20	CDFG, NMFS HCD, NMFS PRD, NOAA RC, NRCS, RCD, RWQCB						TBD	Cost likely accounted for in other action steps.

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							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
GuaR-CCC-23.1.1.8	Action Step	Roads/Railroads	Evaluate, develop, and implement strategies to address decommissioning old roads, maintaining existing roads, and constructing new roads in the following North Fork sub-basin tributaries: Stewart, Dry, Upper Billings, upper Robinson, Doty, Log Cabin creeks, and McGann Gulch (Klamt et al. 2003).	2	20	CDFG, Friends of the Gualala River Watershed, Gualala Watershed Council, NMFS HCD, NMFS PRD, NOAA RC, NRCS, RCD, RWQCB						TBD	Cost likely accounted for in other action steps.
GuaR-CCC-23.1.1.9	Action Step	Roads/Railroads	Use appropriately sized culverts in steep terrain to accommodate flashy, debris-laden flows and maintain trash racks to prevent culvert plugging and subsequent road failure in the Buckeye sub-basin (GRWA 2003).	2	50	CDFG, Friends of the Gualala River Watershed, Gualala Watershed Council, NMFS HCD, NMFS PRD, NOAA RC, NRCS, RCD, RWQCB						In-Kind	This recommendation should be considered standard practice.
GuaR-CCC-23.1.2	Recovery Action	Roads/Railroads	Prevent impairment to passage and migration										
GuaR-CCC-23.1.2.1	Action Step	Roads/Railroads	Prevent future barriers on newly constructed roads utilizing NMFS Guidelines for Salmonid Passage at Stream Crossings (NMFS 2001a)	2	20	CDFG, NMFS HCD, NMFS PRD, NOAA RC, NRCS, Private Landowners, RCD, RWQCB						In-Kind	
GuaR-CCC-23.1.2.2	Action Step	Roads/Railroads	Ensure that all future road or bridge repairs at stream crossing provide unimpaired fish passage for all salmonid life stages.	2	20	CDFG, NMFS HCD, NMFS PRD, NOAA RC, NRCS, RCD, RWQCB						In-Kind	
GuaR-CCC-23.1.3	Recovery Action	Roads/Railroads	Prevent impairment to water quality (increased turbidity, suspended sediment, and/or toxicity)										
GuaR-CCC-23.1.3.1	Action Step	Roads/Railroads	Design new roads that avoid riparian areas and are hydrologically disconnected from the stream network.	2	60	Private Consultants, Private Landowners, Sonoma County						In-Kind	This recommendation should be considered standard practice.

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
GuaR-CCC-23.1.4	Recovery Action	Roads/Railroads	Prevent increased landscape disturbance										
GuaR-CCC-23.1.4.1	Action Step	Roads/Railroads	Reduce road densities by 10 percent over the next 10 years, prioritizing high risk areas in historical habitats or Core CCC coho salmon watersheds.	1	10	FishNet 4C, Private Landowners, RCD	1,100	1,100				2,200	Cost based on decommissioning 176 miles of road at a cost of \$12,000/mile. Recovery action related to prevent impairment to instream substrate by decommissioning riparian roads.
GuaR-CCC-23.1.4.2	Action Step	Roads/Railroads	Develop a Road Sediment Reduction Plan that prioritizes sites and outlines implementation and a timeline of necessary actions.	3	5	Board of Forestry, CDFG, NMFS HCD, NMFS PRD, NRCS, RCD, RWQCB							
GuaR-CCC-23.1.4.3	Action Step	Roads/Railroads	Conduct outreach and education regarding the adverse effects of roads, and the types of best management practices protective of salmonids.	3	30	Board of Forestry, CDFG, NMFS HCD, NMFS PRD, NOAA RC, NRCS, RCD, RWQCB							In-Kind
GuaR-CCC-23.1.4.4	Action Step	Roads/Railroads	Develop a Salmon Certification Program for road maintenance staff.	2	10								In-Kind
GuaR-CCC-24.1	Objective	Severe Weather Patterns	Address the inadequacy of existing regulatory mechanisms										
GuaR-CCC-24.1.1	Recovery Action	Severe Weather Patterns	Prevent impairment to stream hydrology (stream flow)										
GuaR-CCC-24.1.1.1	Action Step	Severe Weather Patterns	Use the emergency drought operations center (EDOC) or other similar group to oversee implementation of water conservation measures and alternatives.	2	60	CDFG, CDFG Law Enforcement, NMFS OLE, North Gualala Water Company, Private Landowners, Public, Sea Ranch, Sonoma County							TBD Need additional analysis to estimate cost which will vary with drought frequency.

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
GuaR-CCC-24.1.1.2	Action Step	Severe Weather Patterns	Work with CDFG, Counties, other agencies, and knowledgeable biologists to develop emergency rules and adopt implementation agreements.	2	10	CDFG, NMFS HCD, North Gualala Water Company, Sea Ranch, Sonoma County Water Agency, SWRCB						0	Cost expected to be low if conducted by existing agency staff.
GuaR-CCC-24.1.1.3	Action Step	Severe Weather Patterns	Impose mandatory conservation measures to maintain instream flow needs of CCC coho salmon.	3	10	CDFG, NMFS						0	Prioritizing existing funding mechanisms is not expected to add additional cost to the process.
GuaR-CCC-25.1	Objective	Water Diversion/Impoundment	Address the present or threatened destruction, modification or curtailment of the species habitat or range										
GuaR-CCC-25.1.1	Recovery Action	Water Diversion/Impoundment	Prevent impairment to stream hydrology (stream flow)										
GuaR-CCC-25.1.1.1	Action Step	Water Diversion/Impoundment	Ensure that current and future water diversions (surface or groundwater) do not impair water quality conditions in summer rearing reaches.	1		CDFG, CDFG Law Enforcement, Friends of the Gualala River Watershed, Gualala Watershed Council, NMFS HCD, NMFS OLE, NMFS PRD, NOAA RC, SWRCB							
GuaR-CCC-25.1.1.2	Action Step	Water Diversion/Impoundment	Ensure water supply demands can be met without impacting flow either directly or indirectly through groundwater withdrawals and aquifer depletion.	1		CDFG, CDFG Law Enforcement, NMFS HCD, NMFS PRD, SWRCB							
GuaR-CCC-25.1.1.3	Action Step	Water Diversion/Impoundment	Provide incentives to water rights holders willing to convert some or all of their water rights to instream use via petition change of use and §1707 (CDFG 2004).	2		CDFG, NMFS HCD, NMFS PRD, SWRCB							

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
GuaR-CCC-25.1.2	Recovery Action	Water Diversion/Impoundment	Prevent impairment to passage and migration										
GuaR-CCC-25.1.2.1	Action Step	Water Diversion/Impoundment	Establish flow related adult and smolt migration thresholds for prior to authorizing future water diversions.	1	5	CDFG, NMFS HCD, NMFS PRD, North Gualala Water Company, SWRCB							
GuaR-CCC-25.1.3	Recovery Action	Water Diversion/Impoundment	Prevent impairment to the estuary (quality and extent)										
GuaR-CCC-25.1.3.1	Action Step	Water Diversion/Impoundment	Discourage the development of any surface water diversions in the watershed that independently or cumulatively have significant impact on reducing inflow to the estuary during spring/summer/fall months (ECORP and Kamman Hydrology & Engineering 2005).	1	5	CDFG, Gualala Watershed Council, NMFS HCD, NMFS PRD, North Gualala Water Company, SWRCB							
GuaR-CCC-25.1.3.2	Action Step	Water Diversion/Impoundment	Develop and implement Estuary Inflow Protection and Enhancement Guidelines to maintain estuary function and provide information for estuary restoration.	1		CDFG, NMFS HCD, NMFS PRD, SWRCB							
GuaR-CCC-25.1.4	Recovery Action	Water Diversion/Impoundment	Prevent impairment to water quality (instream temperature)										
GuaR-CCC-25.1.4.1	Action Step	Water Diversion/Impoundment	Ensure future water diversions do not impair instream water temperatures during the dry season.	1		CDFG, Gualala Watershed Council, NMFS HCD, NMFS PRD, North Gualala Water Company, NRCS, RCD, Sea Ranch, SWRCB							
GuaR-CCC-25.2	Objective	Water Diversion/Impoundment	Address the inadequacy of existing regulatory mechanisms										

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
GuaR-CCC-25.2.1	Recovery Action	Water Diversion/Impoundment	Prevent impairment to stream hydrology (stream flow)										
GuaR-CCC-25.2.1.1	Action Step	Water Diversion/Impoundment	Ensure all water diversions and impoundments are compliant with AB2121 or other appropriate protective measures.	1		CDFG, CDFG Law Enforcement, NMFS HCD, NMFS OLE, NMFS PRD, SWRCB							
GuaR-CCC-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 to remove illegal diversions from streams.	1		CDFG, CDFG Law Enforcement, NMFS HCD, NMFS OLE, NMFS PRD, SWRCB							
GuaR-CCC-25.2.1.3	Action Step	Water Diversion/Impoundment	Improve coordination between agencies and others to address season of diversion, off-stream reservoirs, bypass flows protective of coho salmon and their habitats, and avoidance of adverse impacts caused by water diversion (CDFG 2004).	2		CDFG, CDFG Law Enforcement, NMFS HCD, NMFS OLE, NMFS PRD, SWRCB							