

Garcia River



Location	• Mendocino County
Watershed Area	• 114.0 Square Miles
Potential Habitat	• 103.7 Stream Miles
Vegetation	• 66% Coniferous, 18% Montane Hardwood
Erodability	• Moderate to High
Ownership Patterns	• 99% Private
Dominant Land Uses	• Timber, Agriculture
Housing Density	• Moderate
TMDL Pollutants	• Sediment, Temperature



Garcia River. Photo provided by KRIS Information System, and is used with permission

Garcia River Coho Salmon: Persistent – Low Abundance

Recovery Goals

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

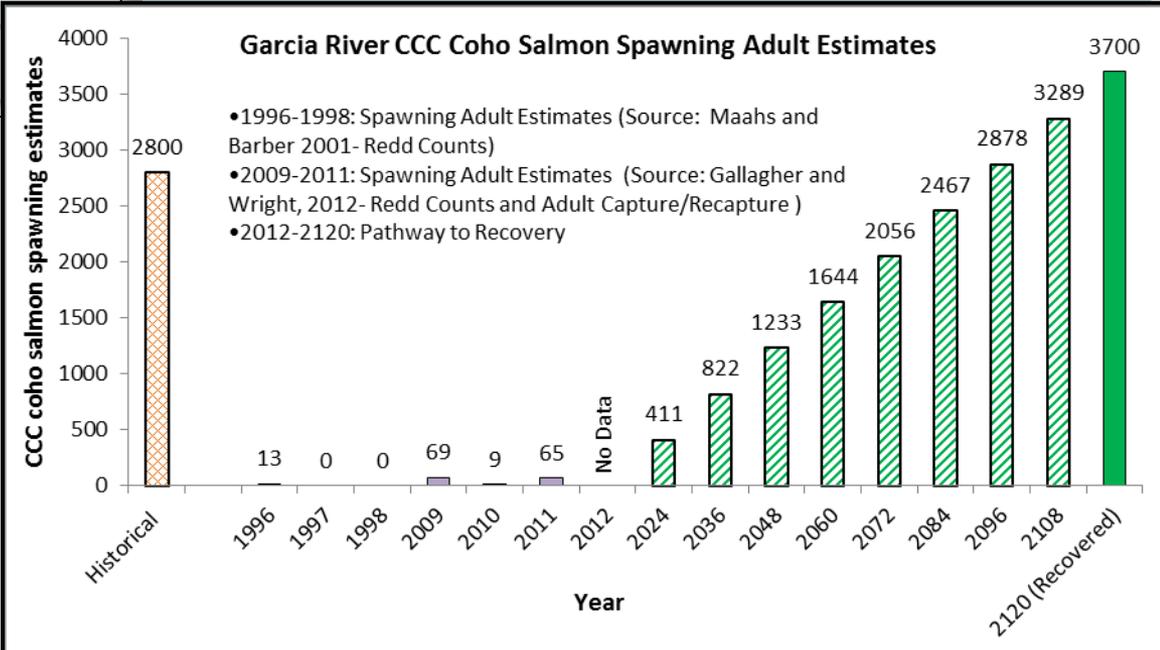


**Garcia Creek
Adult Spawner Targets**

**Downlisting to Threatened
1,850**

**Recovery
3,700**

**STEELHEAD: YES
CHINOOK SALMON: YES**



Current Instream, Watershed and Population Conditions



Preventing Extinction & Improving Conditions

Priority 1: Immediate Restoration Actions

- Rehabilitate winter rearing floodplain habitat
- Install and maintain stream gauges in coldwater tributaries
- Complete remediation of erosion control sites
- Decommission or upgrade roads
- Encourage riparian planting
- Maintain, install and enhance LWD and other complex habitat features

Priority 2 & 3: Long-Term Restoration Actions

- Investigate possible realignment of the lower estuary channel
- Continue rehabilitation of the estuary and tidal sloughs
- Enhance back water and off channel habitats
- Upgrade water rights information system
- Promote off channel storage
- Continue implementation of the Garcia River TMDL and associated sediment reduction efforts
- Investigate the genetic diversity of coho salmon in the Garcia River



Recovery Partners

AmeriCorps, Mendocino Fish and Wildlife Advisory Board, The Conservation Fund, Salmonid Restoration Federation Field School



Future Threats



Reducing Future Threats

Priority 1: Immediate Threat Abatement Actions

- Discourage timberland conversions
- Extend the monitoring period and upgrade road maintenance after harvest in highly erosive areas
- Upgrade forest practices
- Discourage incompatible land use in TPZs
- Limit winter use of unsurfaced roads and recreational trails
- Ensure new or replacement bridges are free span

Priority 2 & 3: Long-Term Threat Abatement Actions

- Implement water conservation strategies for drought contingencies
- Work with local tribal officials to stop gill netting
- Ensure forest management supports optimal levels of LWD recruitment
- Reduce road density by 10 percent over the next 10 years
- Identify and remediate stream crossings that cannot pass the 100 year flow
- Establish flow related adult and smolt migration thresholds prior to authorizing future water diversions
- Monitor and enforce existing water resource regulations
- Identify strategic locations to install LWD features within spawning and rearing areas



Installing LWD in Garcia River Photo provided by KRIS Information System, and is used with permission

Conservation Highlights

- The Conservation Fund (TCF) and The Nature Conservancy (TNC) purchased ~ 24,000 acres of the Garcia River watershed, and will manage the property for sustainable forestry.
- Trout Unlimited (TU), MRC, TCF, Mendocino County Fish and Wildlife Advisory Board, and TNC have undertaken various stream restoration actions.
- Established Salmonid Restoration Federation Field School

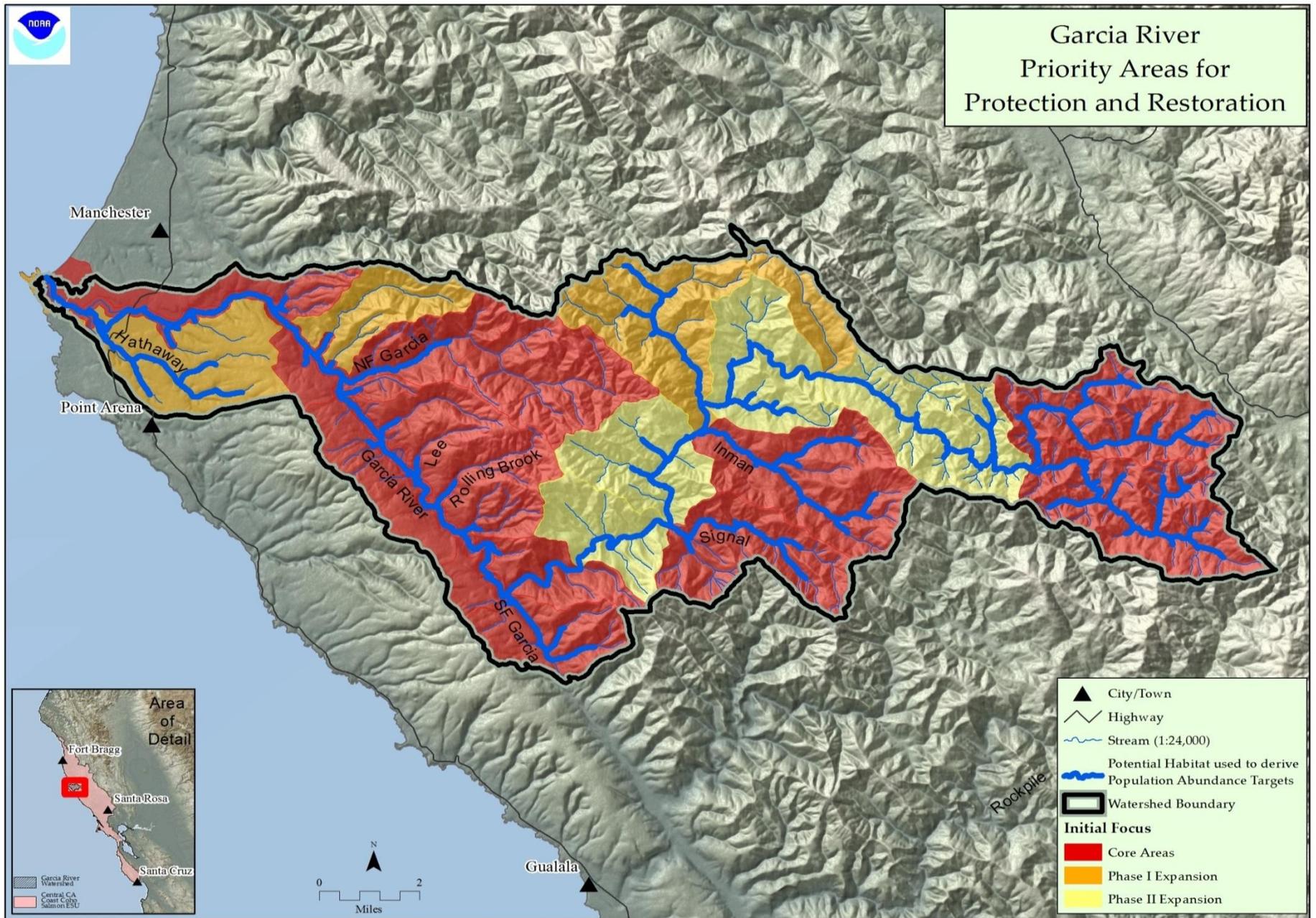


Figure 1: Map of Garcia River

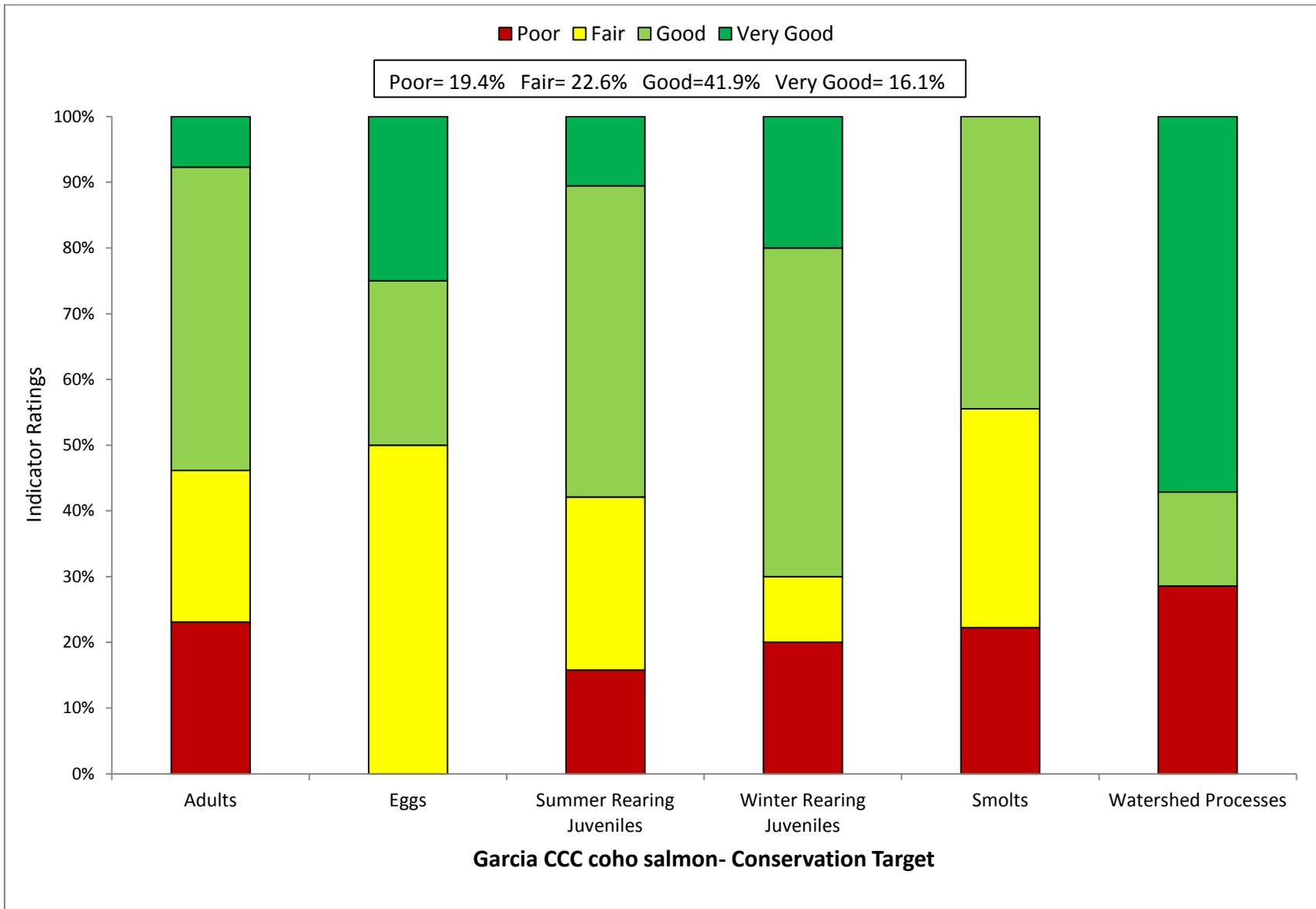


Figure 2: Viability Results by Lifestage

Table 1: CAP Viability Results ~ Garcia River

Target	Attribute	Indicator	Result	Rating	Method	Desired Criteria
Adults	Habitat Complexity	Large Wood Frequency (BFW 0-10 meters)	7.39 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)	0.48 Key Pieces/ 100m	Poor	NMFS Expert Estuary/Lagoon Panel	1.3 to 4 Key Pieces/100 meters
Adults	Habitat Complexity	Pool/Riffle/Flatwater Ratio	55% streams 79% IP-km (>30% Pools; >20% Riffles)	Good	SEC Analysis/CDFG Data	75% to 90% of streams/ IP-Km (>30% Pools; >20% Riffles)
Adults	Habitat Complexity	Shelter Rating	18% streams 6% 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 =50	Good	SEC Analysis/CDFG Data	NMFS Flow Protocol: Risk Factor Score 35-50
Adults	Passage/Migration	Passage at Mouth or Confluence	50% of IP-km to 74% of IP-km accessible	Fair	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)	39% 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)	NA	0	SEC Analysis/CDFG Data	≥80% Density rating "D" across IP-km
Adults	Sediment	Quantity & Distribution of Spawning Gravels	50% of IP-km to 74% of IP-km accessible	Fair	SEC Analysis/CDFG Data	75% of IP-Km to 90% of IP-km
Adults	Velocity Refuge	Floodplain Connectivity	>80% Response Reach Connectivity	Good	SEC Analysis/CDFG Data	>80% Response Reach Connectivity
Adults	Water Quality	Toxicity	No Acute or Chronic	Good	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 =35-50	Good	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)	15-17% (0.85mm) and <30% (6.4mm)	Fair	NMFS Instream Flow Analysis	12-14% (0.85mm) and <30% (6.4mm)
Eggs	Sediment	Gravel Quality (Embeddedness)	91% streams 97% IP-km (>50% stream average scores of 1 & 2)	Very Good	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)	7.39 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)	0.48 Key Pieces/ 100m	Poor	NMFS Instream Flow Analysis	1.3 to 4 Key Pieces/100 meters
Summer Rearing Juveniles	Habitat Complexity	Percent Primary Pools	64% streams 82% IP-km (>49% of pools are primary pools)	Good	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	55% streams 77% IP-km (>30% Pools; >20% Riffles)	Good	NMFS Instream Flow Analysis	75% to 90% of streams/ IP-Km (>30% Pools; >20% Riffles)
Summer Rearing Juveniles	Habitat Complexity	Shelter Rating	18% streams 8% 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 =58	Fair	NMFS Instream Flow Analysis	NMFS Flow Protocol Risk Factor Score 35-50
Summer Rearing Juveniles	Hydrology	Flow Conditions (Instantaneous Condition)	Risk Factor Score =50	Good	NMFS Watershed Characterization	NMFS Flow Protocol Risk Factor Score 35-50
Summer Rearing Juveniles	Hydrology	Number, Condition and/or Magnitude of Diversions	.06 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	91% streams 56% IP-km with average canopy >85%	Good	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)	39% 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)	NA	0	SEC or PAD/CDFG Data	≥80% Density rating "D" across IP-km
Summer Rearing Juveniles	Sediment (Food Productivity)	Gravel Quality (Embeddedness)	91 % streams 98% IP-km (>50% stream average scores of 1 & 2)	Very Good	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 (MWMT)	50 to 74% IP km (<20 C MWMT; <16 C MWMT where coho IP overlaps)	Fair	Population Profile/BPJ	75 to 89% IP km (<16 C MWMT)
Summer Rearing Juveniles	Water Quality	Toxicity	No Acute or Chronic	Good	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)	7.39 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)	0.48 Key Pieces/ 100m	Poor	NMFS Watershed Characterization/CWHR	1.3 to 4 Key Pieces/100 meters
Winter Rearing Juveniles	Habitat Complexity	Pool/Riffle/Flatwater Ratio	55% streams 79% IP-km (>30% Pools; >20% Riffles)	Good	NMFS Watershed Characterization/CWHR	75% to 90% of streams/ IP-Km (>30% Pools; >20% Riffles)
Winter Rearing Juveniles	Habitat Complexity	Shelter Rating	18% streams 6% 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)	39% 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)	NA	0	SEC Analysis/CDFG Data	≥80% Density rating "D" across IP-km
Winter Rearing Juveniles	Sediment (Food Productivity)	Gravel Quality (Embeddedness)	91 % streams 98% IP-km (>50% stream average scores of 1 & 2)	Very Good	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	>80% Response Reach Connectivity	Good	SEC Analysis/CDFG Data	>80% Response Reach Connectivity
Winter Rearing Juveniles	Water Quality	Toxicity	No Acute or Chronic	Good	NMFS Watershed Characterization	No Acute or Chronic
Winter Rearing Juveniles	Water Quality	Turbidity	75% to 90% of streams/ IP-km maintains severity score of 3 or lower	Good	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	Properly Functioning Condition
Smolts	Habitat Complexity	Shelter Rating	18% streams 6% 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	1.58 Diversions/10 IP-km	Fair	Population Profile	0.01 - 1 Diversions/10 IP km
Smolts	Hydrology	Passage Flows	Risk Factor Score =50	Good	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	75-90% IP-km (>6 and <14 C)	Good	TRT Spence (2008)	75-90% IP-Km (>6 and <16 C)
Smolts	Water Quality	Toxicity	No Acute or Chronic	Good	TRT Spence (2008)	No Acute or Chronic
Smolts	Water Quality	Turbidity	75% to 90% of streams/ IP-Km maintains severity score of 3 or lower	Good	EPA/RWQCB/NMFS Criteria	75% to 90% of streams/ IP-Km maintains severity score of 3 or lower
Smolts	Viability	Abundance	Abundance leading to high risk spawner density = 0	Poor	Newcombe and Jensen 2003	Smolt abundance to produce low risk spawner density per Spence (2008)
Watershed Processes	Hydrology	Impervious Surfaces	0.147 of Watershed in Impervious Surfaces	Very Good	SEC Analysis	3-6% of Watershed in Impervious Surfaces
Watershed Processes	Landscape Patterns	Agriculture	1.134 of Watershed in Agriculture	Very Good	EPA/RWQCB/NMFS Criteria	10-19% of Watershed in Agriculture
Watershed Processes	Landscape Patterns	Timber Harvest	15% of Watershed in Timber Harvest	Good	Newcombe and Jensen 2003	25-15% of Watershed in Timber Harvest
Watershed Processes	Landscape Patterns	Urbanization	1% 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	80% Historical Species Composition	Very Good	Newcombe and Jensen 2003	51-74% Intact Historical Species Composition
Watershed Processes	Sediment Transport	Road Density	5.9 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)	6.2 Miles/Square Mile	Poor	Newcombe and Jensen 2003	0.1 to 0.4 Miles/Square Mile

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

Central CA Coast Coho Salmon ~ Garcia 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:** Rehabilitate natural river mouth dynamics
 - 1.1.1.1. **Action Step:** Investigate and determine if the river/estuary mouth dynamics have changed from historical conditions and patterns. Evaluate passage conditions relative to adult salmonid run timing.
 - 1.1.1.2. **Action Step:** If determined necessary, develop and implement strategies that address adverse passage conditions for adult salmonids caused by altered river mouth dynamics.
 - 1.1.2. **Recovery Action:** Rehabilitate inner estuarine hydrodynamics
 - 1.1.2.1. **Action Step:** Investigate the possibility of re-aligning the lower estuary channel from Minor Hole to the mouth in efforts to increase estuary depth and improve tidal wetlands.
 - 1.1.2.2. **Action Step:** If determined beneficial to estuary health and function, develop and implement a lower estuary channel re-alignment project.
 - 1.1.3. **Recovery Action:** Increase the physical extent of estuarine habitat
 - 1.1.3.1. **Action Step:** Investigate the extent of sedimentation within the estuary associated watershed legacy impacts (logging). Evaluate sediment transport within the estuary and determine if the estuary is "filling" with sediment or "flushing" sediment (recovering).
 - 1.1.3.2. **Action Step:** Investigate and determine the current vs. historical extent of the Garcia estuary. Include tracts of salt and freshwater marshes, sloughs, tidal channels, etc.
 - 1.1.3.3. **Action Step:** Evaluate, design, and implement strategies to enhance habitat conditions within Hathaway Creek and near its confluence with the Garcia River main stem. Consider thinning vegetation within lower Hathaway to increase hydrologic circulation. Optimize winter rearing habitat/refuge while considering upstream migration to upper Hathaway Creek if determined desirable.
 - 1.1.3.4. **Action Step:** Evaluate, design, and implement rehabilitation projects targeting tidal sloughs and off-channel habitats impaired by cattle located within the historical extent of the Garcia River estuary.
 - 1.1.3.5. **Action Step:** Continue estuary rehabilitation efforts (public acquisition and easements, Bell 2003).
 - 1.1.4. **Recovery Action:** Increase and enhance estuarine habitat complexity features
 - 1.1.4.1. **Action Step:** Increase the percentage of area containing high value habitat complexity elements and features (SAV, LWD, boulders, marshes, vegetation, pools > 2 meters).

- 1.1.4.2. **Action Step:** Identify key locations to install LWD structures targeting increased pool depth and habitat conditions within the Garcia estuary.
- 1.1.4.3. **Action Step:** Continue working with landowner and rehabilitating riparian conditions within the Garcia estuary.
- 1.1.5. **Recovery Action:** Improve estuarine freshwater inflow
 - 1.1.5.1. **Action Step:** Install a stream gauge immediately upstream of the estuary to monitor inflow conditions during the dry season.
 - 1.1.5.2. **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).
 - 1.1.5.3. **Action Step:** Identify and implement a minimum freshwater inflow threshold to ensure optimal estuary health and function for rearing salmonids.
- 1.1.6. **Recovery Action:** Improve estuarine water quality
 - 1.1.6.1. **Action Step:** Install continuous water quality monitoring stations throughout the Garcia estuary.
 - 1.1.6.2. **Action Step:** Identify and implement strategies to address point pollutant sources causing impairment to estuarine water quality conditions.
- 1.1.7. **Recovery Action:** Enhance macro-invertebrate abundance and taxa richness
 - 1.1.7.1. **Action Step:** Investigate and identify prey items/availability for rearing salmonids and the associated water quality conditions they reside.

2. [Restoration- Floodplain Connectivity](#)

- 2.1. **Objective:** Address the present or threatened destruction, modification or curtailment of the species habitat or range
 - 2.1.1. **Recovery Action:** Rehabilitate and enhance floodplain connectivity
 - 2.1.1.1. **Action Step:** Conduct a Lower Garcia River off-channel low gradient habitat assessment targeting juvenile coho salmon rearing requirements (biological performance criteria, i.e. reduced velocity targets relative to juvenile coho). Identify potential off-channel rehabilitation sites.
 - 2.1.1.2. **Action Step:** Work with landowners and encourage rehabilitation activities within the lower Hathaway Creek area in efforts to enhance backwater/off-channel and floodplain habitat for winter rearing salmonids.
 - 2.1.1.3. **Action Step:** Identify, design, and implement rehabilitation projects that target winter rearing floodplain habitat within the lower reaches of the Garcia River.

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 spawning and rearing areas to the extent that a minimum of six key LWD pieces exists every 100 meters in 0-10 meters BFW streams.
- 3.1.1.2. **Action Step:** Identify and install key LWD pieces in Rolling Brook to the extent that LWD frequency is optimized.
- 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:** Target Signal Creek, North Fork Garcia, Rolling Brook, lower Mill Creek, Pardaloe, Blue Waterhole, Lanmour, and upper Mill Creek sub-basins as high priorities for LWD placement and rehabilitation work.
- 3.1.2.3. **Action Step:** Evaluate and implement strategies to rehabilitate LWD frequency and natural recruitment within the Garcia River main stem.
- 3.1.2.4. **Action Step:** Identify strategic locations to install key LWD features in the SF Garcia mainstem to the extent that habitat complexity is optimized.
- 3.1.2.5. **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).
- 3.1.3. **Recovery Action:** Increase primary pools frequency
- 3.1.3.1. **Action Step:** Increase the number of primary pools to the extent that more than 40% of summer rearing pools meet primary pool criteria (>2.5 feet deep in 1st and 2nd order streams; >3 feet in third order or larger streams.)
- 3.1.3.2. **Action Step:** Evaluate, develop, and implement strategies to increase primary pool frequency in high priority reaches within the following tributaries: Fleming Creek, Little SF Garcia, Signal Creek (and tribs).
- 3.1.3.3. **Action Step:** Maintain, install, and/or enhance LWD, boulders, and other channel forming features to improve pool frequency and depth. Use information from MRC Garcia Watershed Analysis, CDFG HAB-8, and TNC data to determine high priority reaches lacking adequate pool frequency and complexity relative to juvenile coho rearing requirements.
- 3.1.4. **Recovery Action:** Improve shelter
- 3.1.4.1. **Action Step:** Increase the number of pools that have a minimum shelter rating of 80 (See NMFS/CDFG criteria).

3.1.4.2. **Action Step:** Evaluate, identify, and improve shelter ratings in pools within the mainstem Garcia River and the following tributaries: Blue Waterhole, Fleming Creek, Graphite Creek, Inman Creek, Little SF Garcia, NF Garcia, and Signal Creek (and tribs).

3.1.5. **Recovery Action:** Improve pool:riffle:flatwater ratio

3.1.5.1. **Action Step:** Increase the frequencies of riffles in 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:** Map all water diversions (including illegal and legal) and upgrade the existing water rights information system so that water allocations can be readily quantified by watershed.

4.1.1.2. **Action Step:** Monitor, identify problems, and prioritize needed changes to permitted water diversions on known or potential summer rearing coho streams.

4.1.1.3. **Action Step:** Install and maintain stream gauges within the following tributaries that provide coldwater to the Garcia River mainstem: Hathaway, North Fork, Rolling Brook, Mill Creek (lower Garcia River), South Fork, Signal, Mill Creek (upper Garcia River).

4.1.1.4. **Action Step:** Identify strategic locations to install off-channel storage facilities to reduce impacts associated with water diversions (e.g. storage tanks for rural residential users).

4.1.1.5. **Action Step:** CDFG, SWRCB, RWQCB, CalFire, Caltrans, and other agencies and landowners, in cooperation with NMFS, should evaluate the rate and volume of water drafting for dust control in streams or tributaries and where appropriate, minimize water withdrawals that could impact coho salmon. These agencies should consider existing regulations or other mechanisms when evaluating alternatives to water as a dust palliative (including EPA-certified compounds) that are consistent with maintaining or improving water quality (CDFG 2004).

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 Garcia River watershed as a Salmonid Preserve.

5.1.1.2. **Action Step:** Should large tracts of forestlands within the Garcia 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.

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

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 strategies to address potential impairment to passage due to vegetation encroachment or "choking" in Hathaway Creek. Ensure that winter rearing refuge for juvenile salmonids is optimize. Investigate habitat quality in upper Hathaway Creek.
 - 6.1.1.2. **Action Step:** Evaluate, design, and implement appropriate fish passage at Bridge at Highway 1 on Hathaway Creek (Gasker Slough) (See CALFISH: PAD_ID 716762; Passage ID 26883).
 - 6.1.1.3. **Action Step:** Evaluate, design, and implement appropriate fish passage at private road crossing on Mill Creek (See CALFISH: PAD_ID 713213; Passage ID 16601).
 - 6.1.1.4. **Action Step:** Evaluate, design, and implement appropriate fish passage at Fish Rock Road on Mill Creek (See CALFISH: PAD_ID 705892; Passage ID 7210)
 - 6.1.1.5. **Action Step:** Evaluate, design, and implement appropriate fish passage at Fish Rock Road on Mill Creek (See CALFISH: PAD_ID 705893; Passage ID 7211).
 - 6.1.1.6. **Action Step:** Evaluate, design, and implement appropriate fish passage at private road crossing on Mill Creek (See CALFISH: PAD_ID 713212; Passage ID 16600).
 - 6.1.1.7. **Action Step:** Evaluate, design, and implement appropriate fish passage at private road crossing on Mill Creek (See CALFISH: PAD_ID 713213; Passage ID 16601).
 - 6.1.1.8. **Action Step:** Evaluate, design, and implement appropriate fish passage at Fish Rock Road on Sled Creek (See CALFISH: PAD_ID 713211; Passage ID 16599)
 - 6.1.1.9. **Action Step:** Evaluate, design, and implement appropriate fish passage at private road crossing on Hathaway Creek (See CALFISH: PAD_ID 716763; Passage ID 26884).
 - 6.1.1.10. **Action Step:** Evaluate, design, and implement appropriate fish passage at culvert at mouth on SF Garcia River (See CALFISH: PAD_ID 712859; Passage ID 16063).
 - 6.1.1.11. **Action Step:** Evaluate, design, and implement appropriate fish passage at culvert on Flemming Creek (See CALFISH: PAD_ID 723443; Passage ID 9525)
 - 6.1.1.12. **Action Step:** Evaluate, design, and implement appropriate fish passage at unnamed tributary to SF Garcia River (See CALFISH: PAD_ID 723441; Passage ID 9523).
 - 6.1.1.13. **Action Step:** Evaluate, design, and implement appropriate fish passage at culvert on unnamed tributary to main stem Garcia River (See CALFISH: PAD_ID 723440; Passage ID 9522).
 - 6.1.1.14. **Action Step:** Evaluate, design, and implement appropriate fish passage at identified logjams throughout the Garcia watershed (only if necessary).

- 6.1.1.15. **Action Step:** Identify and prioritize all logjams that are complete or partial barriers and indicate passage impairment to specific life stage (Bell 2006, as cited by KrisWeb 2011).
- 6.1.1.16. **Action Step:** Ensure that all logjams are carefully modified and that all LWD remains in the active stream channel (Monschke and Caldon 1992).

7. Restoration- Pool Habitat

No species-specific actions were developed.

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 canopy cover

- 8.1.1.1. **Action Step:** Increase the average stream canopy cover within all current and potential salmonid spawning and rearing reaches to a minimum of 80%.
- 8.1.1.2. **Action Step:** Plant and protect riparian vegetation, including redwood, on the lower 7 mile reach (Eureka Hill Road Bridge and Windy Hollow Road) or where necessary to provide the following: shade and lower water temperatures, cover, protection for fish, bank protection from erosion, and large organic debris in the future for habitat (Bell 2003).
- 8.1.1.3. **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 within the Blue Waterhole sub-basin.
- 8.1.1.4. **Action Step:** Retain all existing native riparian vegetation where stream cover is provided.

- 8.1.2. **Recovery Action:** Improve tree diameter

- 8.1.2.1. **Action Step:** Increase tree diameter to a minimum of 80% CWHR density rating "D" across all current and potential spawning and juvenile rearing areas.
- 8.1.2.2. **Action Step:** Conduct conifer release to promote growth of larger diameter trees where appropriate.
- 8.1.2.3. **Action Step:** Develop a Large Wood Recruitment Plan that assesses instream wood needs, and sites potentially responsive to wood recruitment or placement, and develop a riparian strategy to ensure long term natural recruitment of wood via large tree retention.
- 8.1.2.4. **Action Step:** Promote streamside conservation measures, including conservation easements, setbacks, and riparian buffers (CDFG 2004). Focus on partnerships with railroad and timber industry, as well as large private landowners.

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 and expand instream gravel quantity

- 9.1.1.1. **Action Step:** Increase the percentage of gravel quality embeddedness to values of 1s and 2s (See NMFS Conservation Action Planning Attribute Table Report) in all current and potential juvenile salmonid summer and seasonal (fall/winter/spring) rearing areas.
- 9.1.1.2. **Action Step:** Identify and implement strategies to treat landslides and old features such as stream side landings (Bell 2003).
- 9.1.1.3. **Action Step:** Complete the remaining 25% of erosion control sites identified in the South Fork Garcia River by the Trout Unlimited North Coast Coho Project.
- 9.1.1.4. **Action Step:** Treat high and medium priority sites that are identified in the MRC Garcia River Watershed Analysis, Garcia River Forest Integrated Resource Management Plan and other credible landowner assessments.
- 9.1.1.5. **Action Step:** Acquire funding for assessment and implementation of sediment reduction measures associated with the 2008 Jacks Fire which occurred in the North Fork Garcia River subbasin.
- 9.1.1.6. **Action Step:** Continue the implementation of the Garcia River TMDL and associated sediment reduction efforts.
- 9.1.1.7. **Action Step:** Develop and implement bank erosion prevention and riparian planting in Pardaloe Creek (Monschke and Caldon 1992).

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 Garcia coho salmon population.
- 10.1.1.3. **Action Step:** Investigate the population dynamics and viability status of coho salmon in the Garcia River watershed.
- 10.1.1.4. **Action Step:** Determine if the coho salmon population within the Garcia 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 Garcia 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:** Conduct a comprehensive assessment of watershed processes (e.g., hydrology, geology, fluvial-geomorphology, water quality, and vegetation), instream habitat, and factors limiting coho salmon production (CDFG 2004). Use the watershed assessment template developed in portions of the watershed in Mendocino Redwood Company ownership, and apply to the rest of the Garcia River watershed.

10.1.2.2. **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.

10.1.3. **Recovery Action:** Increase abundance

10.1.3.1. **Action Step:** Re-establish a naturally reproducing run of coho salmon in appropriate subwatersheds.

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:** Work with TNC and Stillwater Sciences to develop a "Basin Temp" model to aid in efforts to reduce stream temperatures between Signal and the Pardaloe/Mill creeks confluence.

11.1.1.2. **Action Step:** Work with landowners to plant riparian zones of Blue Waterhole, Inman Creek, and Pardaloe Creek with the goal of reducing instream water temperatures of the Garcia River main stem during the dry season.

11.1.1.3. **Action Step:** Identify and 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

No species-specific actions were developed.

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.

16.1.1.2. **Action Step:** Reduce poaching of adult coho salmon by increasing law enforcement.

16.1.1.3. **Action Step:** Promote CalTip to discourage poaching (CDFG 2004).

16.2. **Objective:** Address other natural or manmade factors affecting the species' continued existence

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

16.2.1.1. **Action Step:** Investigate and work with local tribal officials in efforts to stop gill-netting in the Garcia River watershed.

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 impairment to estuary quality and extent

18.1.1.1. **Action Step:** Work with BLM to ensure that future cattle leasing agreements do not reduce potential rehabilitation of high value summer and winter juvenile salmonid rearing habitat within the lower Garcia River and estuary.

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 water quality (instream water temperature)

19.1.1.1. **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.

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

19.1.2.1. **Action Step:** Ensure future forest management allows for optimal levels of natural LWD recruitment of larger older trees into stream channels

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

19.1.3.1. **Action Step:** Develop and implement low impact timber and wood harvest techniques (e.g., full-suspension cable yarding) in efforts to reduce turbidity impacts in streams. Example: Parker Ranch in the Ten Mile River Basin (Bell 2003).

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

19.1.3.3. **Action Step:** New THPs should identify problematic legacy roads within WLPZ's, decommission them, and revegetate the area with appropriate native species.

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

19.1.4.1. **Action Step:** Areas adjacent to currently owned State parks or forestlands supporting Core, Phase I and Phase II priority areas should be considered for purchase (if feasible within the next 5 years).

19.1.4.2. **Action Step:** Should large tracts of forestlands within the Garcia 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.

19.1.4.3. **Action Step:** Continue the activities of the North Coast Watershed Assessment /Coastal Watershed Program.

19.1.4.4. **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:** Discourage Counties from rezoning forestlands to rural residential or other land uses (e.g., vineyards).

19.2.1.2. **Action Step:** Work with the California Board of Forestry to design and implement a program of BMPs for logging areas that meets the approval of NMFS and CDFG.

19.2.1.3. **Action Step:** Conduct an assessment of the mechanisms driving forestland conversion and develop strategies to protect forestlands.

19.2.1.4. **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.

19.2.1.5. **Action Step:** Develop a framework similar to Washington State that establishes a scientific framework for monitoring the effectiveness of practices in meeting watershed process goals and a decision-making process that is adaptive to the new information.

19.2.1.6. **Action Step:** Provide information to BOF regarding CCC coho salmon priorities and recommend upgrading relevant forest practices.

19.2.1.7. **Action Step:** Discourage home building or other incompatible land use in areas identified as timber production zones (TPZ).

19.2.1.8. **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).

- 19.2.1.9. **Action Step:** Develop a California Forest Practice monitoring protocol to determine whether specific practices are effectively meeting intended objectives and are providing for the protection of CCC coho salmon.

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:** Reduce road densities by 10 percent over the next 10 years, prioritizing high risk areas in historical habitats or Core CCC coho salmon watersheds.

23.1.1.2. **Action Step:** Map and identify stream crossings with the intention of replacement or removal if they cannot pass the 100 year flow. Designs should include fail safe measures to accommodate culvert overflow without causing massive road fill failures.

23.1.1.3. **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).

23.1.1.4. **Action Step:** Restoration projects that upgrade or decommission high risk roads in Core areas should be considered an extremely high priority for funding (e.g., PCSRF). Where no Core areas are designated, apply this action to Phase I areas.

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

23.1.1.6. **Action Step:** Limit winter use of unsurfaced roads and recreational trails by unauthorized and impacting uses to decrease fine sediment loads.

23.1.2. **Recovery Action:** Prevent alterations to sediment transport (road condition/density, dams, etc.)

23.1.2.1. **Action Step:** Develop a private road database using standardized methods. The methods should document all road features, apply erosion rates, and compile information into a GIS database.

23.1.2.2. **Action Step:** Develop a Salmon Certification Program for road maintenance staff.

23.1.2.3. **Action Step:** All new crossings and upgrades to existing crossings (bridges, culverts, fills, and other crossings) should accommodate 100-year flood flows and associated bedload and debris.

23.1.2.4. **Action Step:** Evaluate existing and future stream crossings that impair natural geomorphic processes. Replace or retrofit crossings to achieve more natural conditions that meet sediment transport goals.

23.1.2.5. **Action Step:** Conduct annual inspections of all roads prior to winter. Correct conditions that are likely to deliver sediment to streams. Hydrologically disconnect roads.

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

23.1.3.1. **Action Step:** Bridges associated with new roads or replacement bridges (including railroad bridges) should be free span or constructed with the minimum number of bents feasible in order to minimize drift accumulation and facilitate fish passage.

23.1.3.2. **Action Step:** Ensure that all future road or bridge repairs at stream crossing provide unimpaired fish passage for all salmonid life stages.

24. Threat- Severe Weather Patterns

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

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

24.1.1.1. **Action Step:** Implement water conservation strategies that provide for drought contingencies without relying on interception of surface flows or groundwater depletion.

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 water supply demands can be met without impacting flow either directly or indirectly through groundwater withdrawals and aquifer depletion.

25.1.1.2. **Action Step:** Provide incentives to water rights holders willing to convert some or all of their water right 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 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).

25.1.4. **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:** 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.

25.2.1.2. **Action Step:** Encourage compliance with the most recent update of NMFS' Water Diversion Guidelines.

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

25.2.1.4. **Action Step:** Upgrade the existing water rights information system so that water allocations can be readily quantified by watershed.

25.2.1.5. **Action Step:** Improve compliance with existing water resource regulations via monitoring and enforcement.

25.2.1.6. **Action Step:** Support the SWRCB in regulating groundwater.

25.2.1.7. **Action Step:** Request that SWRCB review and/or modify water use based on the needs of coho salmon and authorized diverters (CDFG 2004).

26. Threat- Watershed Process

No species-specific actions were developed.

Table 3: Implementation Schedule ~ Garcia 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		
GR-CCC-1.1	Objective	Estuary	Address the present or threatened destruction, modification or curtailment of the species habitat or range										
GR-CCC-1.1.1	Recovery Action	Estuary	Rehabilitate natural river mouth dynamics										
GR-CCC-1.1.1.1	Action Step	Estuary	Investigate and determine if the river/estuary mouth dynamics have changed from historical conditions and patterns. Evaluate passage conditions relative to adult salmonid run timing.	3	10	BLM, CDFG, NMFS HCD, NMFS PRD, NOAA RC, NRCS, Private Landowners, RCD, RWQCB	137.00	137.00				274	Cost for estuary use is estimated at \$273,217/project.
GR-CCC-1.1.1.2	Action Step	Estuary	If determined necessary, develop and implement strategies that address adverse passage conditions for adult salmonids caused by altered river mouth dynamics.	3	20	CDFG, Friends of the Garcia River, NMFS HCD, NMFS PRD, NOAA RC, NRCS, RCD, RWQCB, The Nature Conservancy						TBD	
GR-CCC-1.1.2	Recovery Action	Estuary	Rehabilitate inner estuarine hydrodynamics										
GR-CCC-1.1.2.1	Action Step	Estuary	Investigate the possibility of re-aligning the lower estuary channel from Minor Hole to the mouth in efforts to increase estuary depth and improve tidal wetlands.	2	10	CDFG, Friends of the Garcia River, NMFS HCD, NMFS PRD, NOAA RC, NRCS, RCD, RWQCB, The Nature Conservancy						TBD	Cost accounted for above.
GR-CCC-1.1.2.2	Action Step	Estuary	If determined beneficial to estuary health and function, develop and implement a lower estuary channel re-alignment project.	2	10	CDFG, Friends of the Garcia River, NMFS HCD, NMFS PRD, NOAA RC, NRCS, RCD, RWQCB, The Nature Conservancy						TBD	
GR-CCC-1.1.3	Recovery Action	Estuary	Increase the physical extent of estuarine 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		
GR-CCC-1.1.3.1	Action Step	Estuary	Investigate the extent of sedimentation within the estuary associated watershed legacy impacts (logging). Evaluate sediment transport within the estuary and determine if the estuary is "filling" with sediment or "flushing" sediment (recovering).	2	10	CDFG, Friends of the Garcia River, NMFS HCD, NMFS PRD, NOAA RC, NRCS, RCD, RWQCB, The Nature Conservancy	111.50	111.50				223	Cost for sediment assessment is estimated at \$12.22/acre
GR-CCC-1.1.3.2	Action Step	Estuary	Investigate and determine the current vs. historical extent of the Garcia estuary. Include tracts of salt and freshwater marshes, sloughs, tidal channels, etc.	2	10	BLM, CDFG, Friends of the Garcia River, NMFS HCD, NMFS PRD, NOAA RC, NRCS, Private Landowners, RCD, RWQCB, The Nature Conservancy						TBD	Cost accounted for in above action steps.
GR-CCC-1.1.3.3	Action Step	Estuary	Evaluate, design, and implement strategies to enhance habitat conditions within Hathaway Creek and near its confluence with the Garcia River main stem. Consider thinning vegetation within lower Hathaway to increase hydrologic circulation. Optimize winter rearing habitat/refuge while considering upstream migration to upper Hathaway Creek if determined desirable.	2	10	BLM, CDFG, Friends of the Garcia River, NMFS HCD, NMFS PRD, NOAA RC, NRCS, Private Landowners, RCD, RWQCB, The Nature Conservancy	25.00	25.00				50	Cost based on treating 1 mile of stream (assume 1 project/mile) at a rate of \$25,000/mile.
GR-CCC-1.1.3.4	Action Step	Estuary	Evaluate, design, and implement rehabilitation projects targeting tidal sloughs and off-channel habitats impaired by cattle located within the historical extent of the Garcia River estuary.	2	5	BLM, CDFG, NMFS HCD, NMFS PRD, NOAA RC, Private Landowners, RCD, RWQCB, The Nature Conservancy	273.00					273	Cost based on treating 10 acres (assume 10% of estuarine habitat) at a rate of \$272,120/acre.
GR-CCC-1.1.3.5	Action Step	Estuary	Continue estuary rehabilitation efforts (public acquisition and easements, Bell 2003).	2	10-May	BLM, CDFG, Friends of the Garcia River, NMFS HCD, NMFS PRD, NOAA RC, NRCS, Private Landowners, RCD, RWQCB, The Nature Conservancy						TBD	
GR-CCC-1.1.4	Recovery Action	Estuary	Increase and enhance estuarine habitat complexity features										

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		
GR-CCC-1.1.4.1	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	10	BLM, CDFG, Friends of the Garcia River, NMFS HCD, NMFS PRD, NOAA RC, Private Landowners, RCD, RWQCB, The Nature Conservancy						TBD	Cost likely accounted for in other action steps.
GR-CCC-1.1.4.2	Action Step	Estuary	Identify key locations to install LWD structures targeting increased pool depth and habitat conditions within the Garcia estuary.	2	10	BLM, CDFG, Friends of the Garcia River, NMFS HCD, NMFS PRD, NOAA RC							Cost accounted for in other action steps.
GR-CCC-1.1.4.3	Action Step	Estuary	Continue working with landowner and rehabilitating riparian conditions within the Garcia estuary.	2	50	BLM, CDFG, Friends of the Garcia River, NMFS HCD, NMFS PRD, NOAA RC, NRCS, Private Landowners, RCD, RWQCB, The Nature Conservancy						In-Kind	
GR-CCC-1.1.5	Recovery Action	Estuary	Improve estuarine freshwater inflow										
GR-CCC-1.1.5.1	Action Step	Estuary	Install a stream gauge immediately upstream of the estuary to monitor inflow conditions during the dry season.	2		CDFG, Friends of the Garcia River, NMFS HCD, NMFS PRD, NOAA RC, NRCS, RCD, RWQCB, SWRCB, The Nature Conservancy						1,000	Cost for stream flow gauges estimated at \$1000/gauge. Cost estimate does not account for maintenance or data management.
GR-CCC-1.1.5.2	Action Step	Estuary	Investigate the hydrodynamics of freshwater inflow and estuary water quality conditions relative to juvenile salmonid estuarine summer rearing (osmoregulating and non-osmoregulating).	2	10	CDFG, Friends of the Garcia River, NMFS HCD, NMFS PRD, NOAA RC, NRCS, RCD, RWQCB, The Nature Conservancy						TBD	Cost accounted for in estuary use/residence timing monitoring.

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		
GR-CCC-1.1.5.3	Action Step	Estuary	Identify and implement a minimum freshwater inflow threshold to ensure optimal estuary health and function for rearing salmonids.	2	10	CDFG, Friends of the Garcia River, NMFS HCD, NMFS PRD, NRCS, RCD, RWQCB, SWRCB, The Nature Conservancy	32.00	32.00				64	Cost for stream flow modeling estimated at \$63,005/project.
GR-CCC-1.1.6	Recovery Action	Estuary	Improve estuarine water quality										
GR-CCC-1.1.6.1	Action Step	Estuary	Install continuous water quality monitoring stations throughout the Garcia estuary.	2	5	CDFG, Friends of the Garcia River, NMFS HCD, NMFS PRD, NOAA RC, NRCS, Private Landowners, RCD, RWQCB, The Nature Conservancy	35.00					35	Cost for continuous water quality monitoring stations estimated at \$5,000/station with a total of 7 gauges. Cost does not account for maintenance and data management.
GR-CCC-1.1.6.2	Action Step	Estuary	Identify and implement strategies to address point pollutant sources causing impairment to estuarine water quality conditions.	2	20	BLM, CDFG, Friends of the Garcia River, NMFS HCD, NMFS PRD, NRCS, Private Landowners, RCD, The Nature Conservancy							Cost accounted for in other action steps.
GR-CCC-1.1.7	Recovery Action	Estuary	Enhance macro-invertebrate abundance and taxa richness										
GR-CCC-1.1.7.1	Action Step	Estuary	Investigate and identify prey items/availability for rearing salmonids and the associated water quality conditions they reside.	3	15	CDFG, Friends of the Garcia River, NMFS HCD, NMFS PRD, NOAA RC, NRCS, Private Consultants, RCD, RWQCB, The Nature Conservancy							Cost accounted for other action steps.
GR-CCC-2.1	Objective	Floodplain Connectivity	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		
GR-CCC-2.1.1	Recovery Action	Floodplain Connectivity	Rehabilitate and enhance floodplain connectivity										
GR-CCC-2.1.1.1	Action Step	Floodplain Connectivity	Conduct a Lower Garcia River off-channel low gradient habitat assessment targeting juvenile coho salmon rearing requirements (biological performance criteria, i.e. reduced velocity targets relative to juvenile coho). Identify potential off-channel rehabilitation sites.	2	5	BLM, CDFG, NMFS HCD, NMFS PRD, NOAA RC, NRCS, RCD, RWQCB, The Nature Conservancy	207.00					207	Cost for wetland restoration assessment estimated at \$206,493/project.
GR-CCC-2.1.1.2	Action Step	Floodplain Connectivity	Work with landowners and encourage rehabilitation activities within the lower Hathaway Creek area in efforts to enhance backwater/off-channel and floodplain habitat for winter rearing salmonids.	2	100	BLM, CDFG, Friends of the Garcia River, NMFS HCD, NMFS PRD, NOAA RC, NRCS, Private Landowners, RCD, RWQCB, The Nature Conservancy						In-Kind	
GR-CCC-2.1.1.3	Action Step	Floodplain Connectivity	Identify, design, and implement rehabilitation projects that target winter rearing floodplain habitat within the lower reaches of the Garcia River.	2	5	CDFG, Mendocino Redwood Company, The Nature Conservancy	235.00					235	Cost based on treating 7 miles (assume 1 project/mile in 25% High IP) at a rate of \$36,046/mile.
GR-CCC-3.1	Objective	Habitat Complexity	Address the present or threatened destruction, modification or curtailment of the species habitat or range										
GR-CCC-3.1.1	Recovery Action	Habitat Complexity	Increase large wood frequency (BFW 0-10 meters)										
GR-CCC-3.1.1.1	Action Step	Habitat Complexity	Increase wood frequency in spawning and rearing areas to the extent that a minimum of six key LWD pieces exists every 100 meters in 0-10 meters BFW streams.	2	10	CDFG, Conservation Fund, Friends of the Garcia River, Mendocino Redwood Company, NMFS HCD, NMFS PRD, NOAA RC, NRCS, Private Landowners, RCD, RWQCB, The Nature Conservancy	125.00	125.00				250	Cost based on treating 10 miles of stream at a rate of \$25,000/mile. If ELJ projects implemented, cost could be \$1,011,200.

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		
GR-CCC-3.1.1.2	Action Step	Habitat Complexity	Identify and install key LWD pieces in Rolling Brook to the extent that LWD frequency is optimized.	3	10	CDFG, NMFS HCD, NMFS PRD, NRCS, Private Landowners, RCD, RWQCB, The Nature Conservancy							Cost accounted for in increase wood frequency in spawning in rearing habitat.
GR-CCC-3.1.2	Recovery Action	Habitat Complexity	Increase large wood frequency (BFW 10-100 meters)										
GR-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	Board of Forestry, CalFire, CDFG, Conservation Fund, Friends of the Gualala River Watershed, Mendocino Redwood Company, NMFS HCD, NMFS PRD, NOAA RC, Private Landowners, Public, RCD, RWQCB, The Nature Conservancy	162.50	162.50				325	Cost based on treating 13 miles of stream at a rate of \$25,000/mile. Cost to treat 13 miles of stream with ELJ would be \$1,34,560.
GR-CCC-3.1.2.2	Action Step	Habitat Complexity	Target Signal Creek, North Fork Garcia, Rolling Brook, lower Mill Creek, Pardaloe, Blue Waterhole, Lanmour, and upper Mill Creek sub-basins as high priorities for LWD placement and rehabilitation work.	2	20	CDFG, Conservation Fund, Friends of the Garcia River, Mendocino Redwood Company, NMFS HCD, NMFS PRD, NOAA RC, Private Landowners, RCD, RWQCB, The Nature Conservancy							Cost accounted for in increase wood frequency in seasonal 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		
GR-CCC-3.1.2.3	Action Step	Habitat Complexity	Evaluate and implement strategies to rehabilitate LWD frequency and natural recruitment within the Garcia River main stem.	2	20	CDFG, Conservation Fund, Friends of the Garcia River, NMFS HCD, NMFS PRD, NOAA RC, Private Landowners, Public, RCD, RWQCB, The Nature Conservancy	18.00	18.00	18.00	18.00		72	Cost based on riparian restoration validation monitoring estimated at \$71,426/project.
GR-CCC-3.1.2.4	Action Step	Habitat Complexity	Identify strategic locations to install key LWD features in the SF Garcia mainstem to the extent that habitat complexity is optimized.	2	20	CDFG, Conservation Fund, Friends of the Garcia River, Mendocino Redwood Company, NMFS HCD, NMFS PRD, NOAA RC, NRCS, Private Landowners, Public, Railroad, RWQCB, The Nature Conservancy							Cost accounted for in increase wood frequency in seasonal habitat.
GR-CCC-3.1.2.5	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	100	CalFire, CDFG, Private Landowners						In-Kind	Cost will vary depending on number of projects.
GR-CCC-3.1.3	Recovery Action	Habitat Complexity	Increase primary pools frequency										
GR-CCC-3.1.3.1	Action Step	Habitat Complexity	Increase the number of primary pools to the extent that more than 40% of summer rearing pools meet primary pool criteria (>2.5 feet deep in 1st and 2nd order streams; >3 feet in third order or larger streams.)	2	10	CDFG, Conservation Fund, Mendocino Redwood Company, NMFS HCD, NMFS PRD, NOAA RC, NRCS, RCD, RWQCB, The Nature Conservancy	162.50	162.50				325	Cost based on treating 13 miles (50% of High IP) at a rate of \$25,000/mile. This may be combined with increasing LWD, reducing overall cost.

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		
GR-CCC-3.1.3.2	Action Step	Habitat Complexity	Evaluate, develop, and implement strategies to increase primary pool frequency in high priority reaches within the following tributaries: Fleming Creek, Little SF Garcia, Signal Creek (and tribs).	2	20	CDFG, Mendocino Redwood Company, NMFS HCD, NMFS PRD, NOAA RC, NRCS, Private Landowners, Public, RCD, RWQCB, The Nature Conservancy							Cost accounted for in increase the number of primary pools.
GR-CCC-3.1.3.3	Action Step	Habitat Complexity	Maintain, install, and/or enhance LWD, boulders, and other channel forming features to improve pool frequency and depth. Use information from MRC Garcia Watershed Analysis, CDFG HAB-8, and TNC data to determine high priority reaches lacking adequate pool frequency and complexity relative to juvenile coho rearing requirements.	2	10	CDFG, NOAA RC, Private Landowners, RCD	125.00	125.00				250	Cost estimate for 10 LWD loading projects at \$25,000 in four core area subbasins.
GR-CCC-3.1.4	Recovery Action	Habitat Complexity	Improve shelter										
GR-CCC-3.1.4.1	Action Step	Habitat Complexity	Increase the number of pools that have a minimum shelter rating of 80 (See NMFS/CDFG criteria).	2	10	CDFG, Conservation Fund, Friends of the Garcia River, Mendocino Redwood Company, NMFS HCD, NMFS PRD, NOAA RC, NRCS, Private Landowners, Public, RCD, The Nature Conservancy							Cost are likely associated with other recovery action such as increase LWD and increasing primary pools.
GR-CCC-3.1.4.2	Action Step	Habitat Complexity	Evaluate, identify, and improve shelter ratings in pools within the mainstem Garcia River and the following tributaries: Blue Waterhole, Fleming Creek, Graphite Creek, Inman Creek, Little SF Garcia, NF Garcia, and Signal Creek (and tribs).	2	10	CDFG, Conservation Fund, Friends of the Garcia River, Mendocino Redwood Company, NMFS HCD, NMFS PRD, NOAA RC, NRCS, RCD, RWQCB, The Nature Conservancy	162.50	162.50				325	Cost based on treating 13 miles (50% of High IP), assuming this recovery action is separate from increase large wood and primary pools, 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		
GR-CCC-3.1.5	Recovery Action	Habitat Complexity	Improve pool:riffle:flatwater ratio										
GR-CCC-3.1.5.1	Action Step	Habitat Complexity	Increase the frequencies of riffles in 75% of the streams within the watershed	2	30								Cost accounted for in above action steps (i.e. increase primary pool frequency and LWD).
GR-CCC-4.1	Objective	Hydrology	Address the present or threatened destruction, modification or curtailment of the species habitat or range										
GR-CCC-4.1.1	Recovery Action	Hydrology	Improve flow conditions (baseflow conditions)										
GR-CCC-4.1.1.1	Action Step	Hydrology	Map all water diversions (including illegal and legal) and upgrade the existing water rights information system so that water allocations can be readily quantified by watershed.	2	60	CDFG, CDFG Law Enforcement, NMFS, NMFS OLE, Private Landowners, SWRCB, The Nature Conservancy						TBD	Costs may be minimal due to the low number of diverters in this basin.
GR-CCC-4.1.1.2	Action Step	Hydrology	Monitor, identify problems, and prioritize needed changes to permitted water diversions on known or potential summer rearing coho streams.	2	10	BLM, CDFG, NMFS, Private Landowners, SWRCB							Cost likely accounted for in stream flow model.
GR-CCC-4.1.1.3	Action Step	Hydrology	Install and maintain stream gauges within the following tributaries that provide coldwater to the Garcia River mainstem: Hathaway, North Fork, Rolling Brook, Mill Creek (lower Garcia River), South Fork, Signal, Mill Creek (upper Garcia River).	2	10	CDFG, NMFS, Private Landowners, SWRCB, The Nature Conservancy	3.50	3.50				7	Cost for 7 stream flow gauges estimated at \$1000/gauge. Cost does not account for maintenance or data management.
GR-CCC-4.1.1.4	Action Step	Hydrology	Identify strategic locations to install off-channel storage facilities to reduce impacts associated with water diversions (e.g. storage tanks for rural residential users).	2	30	CDFG, NMFS, NRCS, Private Landowners, RCD, SWRCB						TBD	Cost are difficult to determine because based on landowner participation and extent of off-channel storage facilities needed.
GR-CCC-4.1.1.5	Action Step	Hydrology	CDFG, SWRCB, RWQCB, CalFire, Caltrans, and other agencies and landowners, in cooperation with NMFS, should evaluate the rate and volume of water drafting for dust control in streams or tributaries and where appropriate, minimize water withdrawals that could impact coho salmon. These agencies should consider existing regulations or other mechanisms when evaluating alternatives to water as a dust palliative (including EPA-certified compounds) that are consistent with maintaining or improving water quality (CDFG 2004).	2	60	CalFire, CalTrans, CDFG, Mendocino County Department of Public Works, Private Landowners, RWQCB						In-Kind	Most diversions in the Garcia for dust control are for timber management actions. Most of these diversion have a 1600 agreement with the Department of Fish and Game and are likely incorporated into existing operations.

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		
GR-CCC-5.1	Objective	Landscape Patterns	Address the present or threatened destruction, modification, or curtailment of the species habitat or range										
GR-CCC-5.1.1	Recovery Action	Landscape Patterns	Prevent increased landscape disturbance										
GR-CCC-5.1.1.1	Action Step	Landscape Patterns	Consider developing and/or identifying Salmonid Preserves. Consider the Garcia River watershed as a Salmonid Preserve.	2	100	CDFG, Conservation Fund, NMFS HCD, NMFS PRD, NOAA RC, Private Landowners, State Parks, The Nature Conservancy, Trout Unlimited						In-Kind	
GR-CCC-5.1.1.2	Action Step	Landscape Patterns	Should large tracts of forestlands within the Garcia 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	100	CDFG, Conservation Fund, NMFS HCD, NMFS PRD, NOAA RC, Private Landowners, State Parks, The Nature Conservancy, Trout Unlimited						TBD	Cost are difficult to determine because of fair market value and land use turnover.
GR-CCC-5.1.1.3	Action Step	Landscape Patterns	Discourage counties from rezoning forestlands to rural residential or other land uses (e.g., vineyards).	2	100	CDFG, Mendocino County, NMFS HCD, NMFS PRD, Sonoma County						In-Kind	
GR-CCC-6.1	Objective	Passage	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		
GR-CCC-6.1.1	Recovery Action	Passage	Modify or remove physical passage barriers	3	10-May	BLM, CDFG, Conservation Fund, Friends of the Garcia River, Mendocino Redwood Company, NMFS, NMFS HCD, NMFS PRD, NOAA RC, NRCS, Private Landowners, Public, Railroad, RCD, RWQCB, The Nature Conservancy							
GR-CCC-6.1.1.1	Action Step	Passage	Evaluate, design, and implement strategies to address potential impairment to passage due to vegetation encroachment or "choking" in Hathaway Creek. Ensure that winter rearing refuge for juvenile salmonids is optimize. Investigate habitat quality in upper Hathaway Creek.	2	5	BLM, CDFG, Friends of the Garcia River, NMFS HCD, NMFS PRD, NOAA RC, NRCS, Private Landowners, RCD, RWQCB, The Nature Conservancy	52.00					52	Cost based on treating 8 acres at a rate of \$6,400/acre.
GR-CCC-6.1.1.2	Action Step	Passage	Evaluate, design, and implement appropriate fish passage at Bridge at Highway 1 on Hathaway Creek (Gasker Slough) (See CALFISH: PAD_ID 716762; Passage ID 26883).	3	5	CalTrans, CDFG, NMFS, USACE	370.00					370	Cost based on treating passage for major 2 lane road at a rate of \$367,732/unit.
GR-CCC-6.1.1.3	Action Step	Passage	Evaluate, design, and implement appropriate fish passage at private road crossing on Mill Creek (See CALFISH: PAD_ID 713213; Passage ID 16601).	3	5	CDFG, Mendocino County, NMFS, NOAA RC, USACE	260.00					260	Cost based on treating minor 2 lane road at a rate of \$254,065/unit.
GR-CCC-6.1.1.4	Action Step	Passage	Evaluate, design, and implement appropriate fish passage at Fish Rock Road on Mill Creek (See CALFISH: PAD_ID 705892; Passage ID 7210)	3	5	CDFG, Mendocino County, NMFS, NOAA RC, Private Landowners, USACE	660					660	Cost based on providing passage for a small waterway at a rate of \$653,406/unit.
GR-CCC-6.1.1.5	Action Step	Passage	Evaluate, design, and implement appropriate fish passage at Fish Rock Road on Mill Creek (See CALFISH: PAD_ID 705893; Passage ID 7211).	3	5	CDFG, Mendocino County, NMFS, USACE	660					660	Cost based on providing passage for a small waterway at a rate of \$653,406/unit.

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		
GR-CCC-6.1.1.6	Action Step	Passage	Evaluate, design, and implement appropriate fish passage at private road crossing on Mill Creek (See CALFISH: PAD_ID 713212; Passage ID 16600).	3	5	CDFG, Mendocino County, NMFS, Private Landowners, USACE	260.00					260	Cost based on treating a minor 2 lane road at a rate of \$254,065/unit.
GR-CCC-6.1.1.7	Action Step	Passage	Evaluate, design, and implement appropriate fish passage at private road crossing on Mill Creek (See CALFISH: PAD_ID 713213; Passage ID 16601).	3	5	CDFG, Mendocino County, NMFS, Private Landowners, USACE	260.00					260	Cost based on treating a minor 2 lane road at a rate of \$254,065/unit.
GR-CCC-6.1.1.8	Action Step	Passage	Evaluate, design, and implement appropriate fish passage at Fish Rock Road on Sled Creek (See CALFISH: PAD_ID 713211; Passage ID 16599)	3	5	CDFG, Mendocino County, USACE	660					660	Cost based on providing passage on a small waterway at a rate of \$653,406/unit.
GR-CCC-6.1.1.9	Action Step	Passage	Evaluate, design, and implement appropriate fish passage at private road crossing on Hathaway Creek (See CALFISH: PAD_ID 716763; Passage ID 26884).	3	5	CDFG, Mendocino County, NMFS, Private Landowners, USACE	260.00					260	Cost based on treating minor 2 lane road at a rate of \$254,065/unit.
GR-CCC-6.1.1.10	Action Step	Passage	Evaluate, design, and implement appropriate fish passage at culvert at mouth on SF Garcia River (See CALFISH: PAD_ID 712859; Passage ID 16063).	3	5	CalTrans, CDFG, Mendocino County, NMFS, NOAA RC, USACE	470.00					470	Cost based on treating major 2 lane road at a rate of \$468,022/unit.
GR-CCC-6.1.1.11	Action Step	Passage	Evaluate, design, and implement appropriate fish passage at culvert on Flemming Creek (See CALFISH: PAD_ID 723443; Passage ID 9525)	3	5	CDFG, Mendocino County, NMFS, Private Landowners, USACE	255.00					255	Cost based on treating minor 2 lane road at a rate of \$254,065/unit.
GR-CCC-6.1.1.12	Action Step	Passage	Evaluate, design, and implement appropriate fish passage at unnamed tributary to SF Garcia River (See CALFISH: PAD_ID 723441; Passage ID 9523).	3	5	CDFG, Mendocino County, NMFS, Private Landowners, USACE	255.00					255	Cost base on treating minor 2 lane road at a rate of \$254,065/unit.
GR-CCC-6.1.1.13	Action Step	Passage	Evaluate, design, and implement appropriate fish passage at culvert on unnamed tributary to main stem Garcia River (See CALFISH: PAD_ID 723440; Passage ID 9522).	3	5	CDFG, Mendocino County, Private Landowners, USACE	255.00					255	Cost based on treating minor 2 lane road at a rate of \$254,065/unit.

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		
GR-CCC-6.1.1.14	Action Step	Passage	Evaluate, design, and implement appropriate fish passage at identified logjams throughout the Garcia watershed (only if necessary).	3	20	CDFG, Mendocino County, Mendocino County Fish and Wildlife Advisory Board, Mendocino Redwood Company, NMFS, Private Landowners, USACE						In-Kind	Cost are anticipated to be minimal.
GR-CCC-6.1.1.15	Action Step	Passage	Identify and prioritize all logjams that are complete or partial barriers and indicate passage impairment to specific life stage (Bell 2006, as cited by KrisWeb 2011).	3	20							In-Kind	
GR-CCC-6.1.1.16	Action Step	Passage	Ensure that all logjams are carefully modified and that all LWD remains in the active stream channel (Monschke and Caldon 1992).	3	30							In-Kind	
GR-CCC-8.1	Objective	Riparian	Address the present or threatened destruction, modification, or curtailment of the species habitat or range										
GR-CCC-8.1.1	Recovery Action	Riparian	Improve canopy cover										
GR-CCC-8.1.1.1	Action Step	Riparian	Increase the average stream canopy cover within all current and potential salmonid spawning and rearing reaches to a minimum of 80%.	2	20	Board of Forestry, CalFire, Conservation Fund, Mendocino Redwood Company, NMFS HCD, NMFS PRD, RWQCB, The Nature Conservancy	803	803	803	803		3,210	Cost based on treating 2 miles (assume 80 acres/mile in 5% High IP) at a rate of \$20,057/acre.
GR-CCC-8.1.1.2	Action Step	Riparian	Plant and protect riparian vegetation, including redwood, on the lower 7 mile reach (Eureka Hill Road Bridge and Windy Hollow Road) or where necessary to provide the following: shade and lower water temperatures, cover, protection for fish, bank protection from erosion, and large organic debris in the future for habitat (Bell 2003).	2	10-May	Board of Forestry, CalFire, CDFG, NMFS HCD, NMFS PRD, NOAA RC, NRCS, Private Landowners, RCD, RWQCB, The Nature Conservancy							Cost accounted for in increase average stream canopy.

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		
GR-CCC-8.1.1.3	Action Step	Riparian	Identify and implement riparian enhancement projects where current canopy density and diversity are inadequate and site conditions are appropriate to: initiate tree planting, thinning, and other vegetation management to encourage the development of a denser more extensive riparian canopy within the Blue Waterhole sub-basin.	2	20	Board of Forestry, CalFire, Conservation Fund, Mendocino Redwood Company, NMFS HCD, NMFS PRD, RWQCB, The Nature Conservancy							Cost accounted for in increase average stream canopy.
GR-CCC-8.1.1.4	Action Step	Riparian	Retain all existing native riparian vegetation where stream cover is provided.	2	20	Board of Forestry, CalFire, CDFG, Conservation Fund, NMFS HCD, NMFS PRD, RWQCB, The Nature Conservancy						In-Kind	
GR-CCC-8.1.2	Recovery Action	Riparian	Improve tree diameter										
GR-CCC-8.1.2.1	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, Conservation Fund, NMFS HCD, NMFS PRD, RWQCB, The Nature Conservancy							Cost accounted for in increase canopy cover.
GR-CCC-8.1.2.2	Action Step	Riparian	Conduct conifer release to promote growth of larger diameter trees where appropriate.	2	10	Board of Forestry, CDFG, Conservation Fund, NMFS HCD, NMFS PRD, Private Landowners, RCD, RWQCB, The Nature Conservancy	227.50	227.50				455	Cost based on treating 4 miles (assume 80 acres/mile in 15% High IP) at a rate of \$1,422/acre.
GR-CCC-8.1.2.3	Action Step	Riparian	Develop a Large Wood Recruitment Plan that assesses instream wood needs, and sites potentially responsive to wood recruitment or placement, and develop a riparian strategy to ensure long term natural recruitment of wood via large tree retention.	3	2		80.00					80	Cost based on \$20K in each Core area subbasin over a two year period.

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		
GR-CCC-8.1.2.4	Action Step	Riparian	Promote streamside conservation measures, including conservation easements, setbacks, and riparian buffers (CDFG 2004). Focus on partnerships with railroad and timber industry, as well as large private landowners.	3	20	CA Coastal Commission, California Coastal Conservancy, CDFG, Mendocino County, NMFS, NRCS, Private Landowners, RCD, Redwood Forest Foundation						TBD	Costs can not be determined without additional information on the potential projects within this basin.
GR-CCC-9.1	Objective	Sediment	Address the present or threatened destruction, modification, or curtailment of the species habitat or range										
GR-CCC-9.1.1	Recovery Action	Sediment	Improve and expand instream gravel quantity										
GR-CCC-9.1.1.1	Action Step	Sediment	Increase the percentage of gravel quality embeddedness to values of 1s and 2s (See NMFS Conservation Action Planning Attribute Table Report) in all current and potential juvenile salmonid summer and seasonal (fall/winter/spring) rearing areas.	2	20	CDFG, Conservation Fund, Friends of the Garcia River, NMFS HCD, NMFS PRD, NOAA RC, RWQCB, The Nature Conservancy						TBD	A habitat survey assessment needs to be conducted to determine extent of embeddedness. Cost for habitat survey estimated at \$353/IP km. Assume survey High IP, cost estimated at \$15,000. This action step could be incorporated in other monitoring and assessment actions.
GR-CCC-9.1.1.2	Action Step	Sediment	Identify and implement strategies to treat landslides and old features such as stream side landings (Bell 2003).	3	10	CDFG, Conservation Fund, Friends of the Garcia River, NMFS HCD, NMFS PRD, NOAA RC, Private Landowners, RWQCB, The Nature Conservancy							Cost should be accounted for in ESTUARY.
GR-CCC-9.1.1.3	Action Step	Sediment	Complete the remaining 25% of erosion control sites identified in the South Fork Garcia River by the Trout Unlimited North Coast Coho Project.	1	5	Mendocino Redwood Company, Trout Unlimited						TBD	Need cost estimates from project proponents.
GR-CCC-9.1.1.4	Action Step	Sediment	Treat high and medium priority sites that are identified in the MRC Garcia River Watershed Analysis, Garcia River Forest Integrated Resource Management Plan and other credible landowner assessments.	1	10	CDFG, NOAA RC, Private Consultants, Private Landowners, SWRCB	500	500				1,000	Based on \$1 million estimate for Garcia river forest sites.

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		
GR-CCC-9.1.1.5	Action Step	Sediment	Acquire funding for assessment and implementation of sediment reduction measures associated with the 2008 Jacks Fire which occurred in the North Fork Garcia River subbasin.	2	2	CalFire, NRCS, Private Landowners, RCD	200					200	Rough estimate for erosion control in affected area.
GR-CCC-9.1.1.6	Action Step	Sediment	Continue the implementation of the Garcia River TMDL and associated sediment reduction efforts.	1	20	Board of Forestry, CalFire, CDFG, NMFS HCD, NMFS PRD, NOAA RC, RWQCB, The Nature Conservancy							
GR-CCC-9.1.1.7	Action Step	Sediment	Develop and implement bank erosion prevention and riparian planting in Pardaloe Creek (Monschke and Caldon 1992).	2	10	CDFG, Conservation Fund, NMFS HCD, NMFS PRD, NOAA RC, RCD, RWQCB, The Nature Conservancy	11.50	11.50				23	Cost based on treating 0.5 mile of bank at a rate of \$25,000/mile for bank erosion and \$20,057/mile for riparian planting.
GR-CCC-10.1	Objective	Viability	Address other natural or manmade factors affecting the species continued existence										
GR-CCC-10.1.1	Recovery Action	Viability	Increase spawner density										
GR-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	10	CDFG, NMFS HCD, NMFS PRD, NOAA RC, NOAA SWFSC, RWQCB, The Nature Conservancy						TBD	
GR-CCC-10.1.1.2	Action Step	Viability	Determine the biological or DPS significance of the Garcia coho salmon population.	1	5	NMFS HCD, NMFS PRD, NOAA RC, NOAA SWFSC						TBD	
GR-CCC-10.1.1.3	Action Step	Viability	Investigate the population dynamics and viability status of coho salmon in the Garcia River watershed.	1	5	CDFG, Conservation Fund, NMFS HCD, NMFS PRD, NOAA RC, NOAA SWFSC, RWQCB, The Nature Conservancy						TBD	

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		
GR-CCC-10.1.1.4	Action Step	Viability	Determine if the coho salmon population within the Garcia River watershed is at a short-term or immediate risk of extinction.	1	5	CDFG, Conservation Fund, NMFS HCD, NMFS PRD, NOAA SWFSC, RWQCB, The Nature Conservancy						TBD	
GR-CCC-10.1.1.5	Action Step	Viability	Identify population viability goals and the expectations of a conservation hatchery/supplementation/augmentation program.	1	5	CDFG, NMFS HCD, NMFS PRD, NOAA SWFSC, RWQCB, The Nature Conservancy						TBD	
GR-CCC-10.1.1.6	Action Step	Viability	Investigate the genetic diversity of coho salmon in the Garcia River.	1	5	NMFS HCD, NMFS PRD, NOAA RC, NOAA SWFSC						TBD	
GR-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	10	CDFG, NMFS HCD, NMFS PRD, NOAA RC, NOAA SWFSC, RWQCB, The Nature Conservancy						TBD	
GR-CCC-10.1.2	Recovery Action	Viability	Increase spatial structure and diversity										
GR-CCC-10.1.2.1	Action Step	Viability	Conduct a comprehensive assessment of watershed processes (e.g., hydrology, geology, fluvial-geomorphology, water quality, and vegetation), instream habitat, and factors limiting coho salmon production (CDFG 2004). Use the watershed assessment template developed in portions of the watershed in Mendocino Redwood Company ownership, and apply to the rest of the Garcia River watershed.	2	10	CDFG, Conservation Fund, Mendocino Redwood Company, NMFS, NRCS, Private Consultants, Private Landowners, RCD, RWQCB, The Nature Conservancy							Cost of comprehensive assessment accounted for in fish/habitat monitoring and habitat survey monitoring.
GR-CCC-10.1.2.2	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	375.00	375.00				750	Annual cost for spawner ground surveys for N. Central Coast diversity stratum estimated at \$16,650 and smolt outmigration at \$58,404.

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		
GR-CCC-10.1.3	Recovery Action	Viability	Increase abundance										
GR-CCC-10.1.3.1	Action Step	Viability	Re-establish a naturally reproducing run of coho salmon in appropriate subwatersheds.	1	10							TBD	
GR-CCC-11.1	Objective	Water Quality	Address the present or threatened destruction, modification, or curtailment of the species habitat or range										
GR-CCC-11.1.1	Recovery Action	Water Quality	Improve stream temperature conditions										
GR-CCC-11.1.1.1	Action Step	Water Quality	Work with TNC and Stillwater Sciences to develop a "Basin Temp" model to aid in efforts to reduce stream temperatures between Signal and the Pardaloe/Mill creeks confluence.	2	10	CDFG, Conservation Fund, NMFS HCD, NMFS PRD, NOAA RC, Private Landowners, RCD, RWQCB, The Nature Conservancy							Cost accounted for in development of stream flow model.
GR-CCC-11.1.1.2	Action Step	Water Quality	Work with landowners to plant riparian zones of Blue Waterhole, Inman Creek, and Pardaloe Creek with the goal of reducing instream water temperatures of the Garcia River main stem during the dry season.	2	10	CDFG, NOAA RC, Private Landowners						TBD	Cost will depend on the length of reaches identified for planting.
GR-CCC-11.1.1.3	Action Step	Water Quality	Identify and Implement actions to maintain and restore water temperatures to meet habitat requirements for CCC coho salmon in specific streams (CDFG 2004).	2									See Riparian section above.
GR-CCC-16.1	Objective	Fishing/Collecting	Address the inadequacy of existing regulatory mechanisms										
GR-CCC-16.1.1	Recovery Action	Fishing/Collecting	Prevent reduced density, abundance, and diversity										
GR-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	30	CDFG, NMFS PRD							In-Kind
GR-CCC-16.1.1.2	Action Step	Fishing/Collecting	Reduce poaching of adult coho salmon by increasing law enforcement.	1	100								
GR-CCC-16.1.1.3	Action Step	Fishing/Collecting	Promote CalTip to discourage poaching (CDFG 2004).	2	100								

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		
GR-CCC-16.2	Objective	Fishing/Collecting	Address other natural or manmade factors affecting the species' continued existence										
GR-CCC-16.2.1	Recovery Action	Fishing/Collecting	Prevent reduced density, abundance, and diversity										
GR-CCC-16.2.1.1	Action Step	Fishing/Collecting	Investigate and work with local tribal officials in efforts to stop gill-netting in the Garcia River watershed.	1	30	CDFG, CDFG Law Enforcement, NMFS OLE, NMFS PRD						In-Kind	
GR-CCC-18.1	Objective	Livestock	Address the present or threatened destruction, modification or curtailment of the species habitat or range										
GR-CCC-18.1.1	Recovery Action	Livestock	Prevent impairment to estuary quality and extent										
GR-CCC-18.1.1.1	Action Step	Livestock	Work with BLM to ensure that future cattle leasing agreements do not reduce potential rehabilitation of high value summer and winter juvenile salmonid rearing habitat within the lower Garcia River and estuary.	2	20	BLM, CDFG, NMFS HCD, NMFS PRD, NOAA RC						In-Kind	
GR-CCC-19.1	Objective	Logging	Address the present or threatened destruction, modification, or curtailment of the species habitat or range.										
GR-CCC-19.1.1	Recovery Action	Logging	Prevent impairment to water quality (instream water temperature)										
GR-CCC-19.1.1.1	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	50	Board of Forestry, CalFire, CDFG, Conservation Fund, Mendocino Redwood Company, NMFS HCD, NMFS PRD, NOAA RC, Private Landowners, RWQCB, The Nature Conservancy						In-Kind	
GR-CCC-19.1.2	Recovery Action	Logging	Prevent impairment to instream habitat complexity (reduced large wood and/or shelter)										

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		
GR-CCC-19.1.2.1	Action Step	Logging	Ensure future forest management allows for optimal levels of natural LWD recruitment of larger older trees into stream channels	2	100	CDFG, Conservation Fund, Mendocino Redwood Company, NMFS, RWQCB, The Nature Conservancy						In-Kind	
GR-CCC-19.1.3	Recovery Action	Logging	Prevent impairment to instream substrate/food productivity (gravel quality and quantity)										
GR-CCC-19.1.3.1	Action Step	Logging	Develop and implement low impact timber and wood harvest techniques (e.g., full-suspension cable yarding) in efforts to reduce turbidity impacts in streams. Example: Parker Ranch in the Ten Mile River Basin (Bell 2003).	2	100	Board of Forestry, CDFG, Conservation Fund, Mendocino Redwood Company, Private Landowners, RWQCB, The Nature Conservancy						In-Kind	This recommendation should be considered standard practice.
GR-CCC-19.1.3.2	Action Step	Logging	Extend the monitoring period and upgrade THP road maintenance after harvest.	2	60	CalFire						In-Kind	
GR-CCC-19.1.3.3	Action Step	Logging	New THPs should identify problematic legacy roads within WLPZ's, decommission them, and revegetate the area with appropriate native species.	2	20	CalFire, Mendocino Redwood Company, NOAA RC, Private Landowners						TBD	Cost will vary with THP development near streams with legacy roads.
GR-CCC-19.1.4	Recovery Action	Logging	Prevent increased landscape disturbance										
GR-CCC-19.1.4.1	Action Step	Logging	Areas adjacent to currently owned State parks or 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, Private Landowners, Redwood Forest Foundation, The Nature Conservancy, Trout Unlimited						TBD	Cost estimates are difficult to determine as this action step is driven by current market value and rate of turnover.
GR-CCC-19.1.4.2	Action Step	Logging	Should large tracts of forestlands within the Garcia 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, NMFS, Redwood Forest Foundation, RWQCB, The Nature Conservancy						TBD	

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		
GR-CCC-19.1.4.3	Action Step	Logging	Continue the activities of the North Coast Watershed Assessment /Coastal Watershed Program.	2	20	CDFG, NMFS, Private Landowners						TBD	NCWP/Coastal Watershed Program needs to implement assessment in the Garcia River basin.
GR-CCC-19.1.4.4	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	20	Board of Forestry, CalFire, CDFG, NMFS, RWQCB						In-Kind	
GR-CCC-19.2	Objective	Logging	Address the inadequacy of existing regulatory mechanisms										
GR-CCC-19.2.1	Recovery Action	Logging	Prevent increased landscape disturbance										
GR-CCC-19.2.1.1	Action Step	Logging	Discourage Counties from rezoning forestlands to rural residential or other land uses (e.g., vineyards).	1	20	Board of Forestry, CA Coastal Commission, CDFG, NMFS						In-Kind	Cost expected to be minimal to improve coordination with Mendocino County.
GR-CCC-19.2.1.2	Action Step	Logging	Work with the California Board of Forestry to design and implement a program of BMPs for logging areas that meets the approval of NMFS and CDFG.	3	20	Board of Forestry, CDFG, NMFS, RWQCB						In-Kind	
GR-CCC-19.2.1.3	Action Step	Logging	Conduct an assessment of the mechanisms driving forestland conversion and develop strategies to protect forestlands.	3	10	Board of Forestry, Mendocino County, NMFS PRD						TBD	
GR-CCC-19.2.1.4	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.	2	20	Board of Forestry, CDFG, NMFS	25.00	25.00	25.00	25.00		100	Assumes data for the Garcia River portion of the database can be maintained for \$5k per year.
GR-CCC-19.2.1.5	Action Step	Logging	Develop a framework similar to Washington State that establishes a scientific framework for monitoring the effectiveness of practices in meeting watershed process goals and a decision-making process that is adaptive to the new information.	1	30	Board of Forestry, CalFire, CDFG, Conservation Fund, Mendocino Redwood Company, NMFS, Private Landowners						In-Kind	
GR-CCC-19.2.1.6	Action Step	Logging	Provide information to BOF regarding CCC coho salmon priorities and recommend upgrading relevant forest practices.	1	2	CDFG, NMFS						In-Kind	This is underway.

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							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
GR-CCC-19.2.1.7	Action Step	Logging	Discourage home building or other incompatible land use in areas identified as timber production zones (TPZ).	1	100	CA Coastal Commission, CDFG, Mendocino County, NMFS						In-Kind	Need to determine the number of regulatory staff to control rural development in Mendocino County.
GR-CCC-19.2.1.8	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		Board of Forestry, CalFire, CDFG, NMFS						In-Kind	
GR-CCC-19.2.1.9	Action Step	Logging	Develop a California Forest Practice monitoring protocol to determine whether specific practices are effectively meeting intended objectives and are providing for the protection of CCC coho salmon.	3	20	Board of Forestry, CalFire, NMFS HCD, NMFS PRD, NRCS, RCD, RWQCB, The Nature Conservancy						In-Kind	
GR-CCC-23.1	Objective	Roads/Railroads	Address the present or threatened destruction, modification, or curtailment of the species habitat or range										
GR-CCC-23.1.1	Recovery Action	Roads/Railroads	Prevent impairment to instream substrate/food productivity (gravel quality and quantity)										
GR-CCC-23.1.1.1	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.	2	10	Board of Forestry, CalFire, Mendocino County, NMFS HCD, NMFS PRD, NOAA RC, RWQCB	495.00	495.00				990	Cost based on treating 82 miles of road network at a rate of \$12,000/mile.
GR-CCC-23.1.1.2	Action Step	Roads/Railroads	Map and identify stream crossings with the intention of replacement or removal if they cannot pass the 100 year flow. Designs should include fail safe measures to accommodate culvert overflow without causing massive road fill failures.	2	20	CDFG, Mendocino County Department of Public Works, NOAA RC, NRCS, Private Landowners, RCD							Number of culverts and specific details to upgrade are needed to estimate cost.
GR-CCC-23.1.1.3	Action Step	Roads/Railroads	Use available best management practices for road construction, maintenance, management and decommissioning (e.g. Weaver and Hagens, 1994; Sommarstrom et al., 2002; Oregon Department of Transportation, 1999).	2	10	CalFire, CDFG, Mendocino County Department of Public Works, NRCS, Private Landowners						In-Kind	Ten year duration to accommodate changes in BMPs.

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		
GR-CCC-23.1.1.4	Action Step	Roads/Railroads	Restoration projects that upgrade or decommission high risk roads in Core areas should be considered an extremely high priority for funding (e.g., PCSRF). Where no Core areas are designated, apply this action to Phase I areas.	1	20	CDFG, NOAA RC, NRCS							Costs minimal to prioritize projects.
GR-CCC-23.1.1.5	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	20	CalFire, CDFG, NOAA RC, NRCS, Private Landowners, RCD	19.00	19.00	19.00	19.00		76	Cost based on decommissioning 6.2 miles of riparian roads at a rate of \$12,000/mile. Cost may be less than other basins due to TMDLs in place since 1997.
GR-CCC-23.1.1.6	Action Step	Roads/Railroads	Limit winter use of unsurfaced roads and recreational trails by unauthorized and impacting uses to decrease fine sediment loads.	2	20	CalFire, CDFG, NOAA RC, NRCS, Private Landowners, RCD						In-Kind	Costs are related to maintenance and enforcement of gates and other closure techniques.
GR-CCC-23.1.2	Recovery Action	Roads/Railroads	Prevent alterations to sediment transport (road condition/density, dams, etc.)										
GR-CCC-23.1.2.1	Action Step	Roads/Railroads	Develop a private road database using standardized methods. The methods should document all road features, apply erosion rates, and compile information into a GIS database.	3	5	CalFire, Mendocino County Department of Public Works, NMFS, Private Consultants, Private Landowners	50.00					50	Cost estimate for entire basin.
GR-CCC-23.1.2.2	Action Step	Roads/Railroads	Develop a Salmon Certification Program for road maintenance staff.	2	10	CDFG, Mendocino County, NOAA RC, NRCS, Private Landowners						In-Kind	Cost estimate for Garcia watershed only.
GR-CCC-23.1.2.3	Action Step	Roads/Railroads	All new crossings and upgrades to existing crossings (bridges, culverts, fills, and other crossings) should accommodate 100-year flood flows and associated bedload and debris.	3	20	Mendocino County, NMFS HCD, NMFS PRD, NRCS, Private Landowners, RCD						In-Kind	

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		
GR-CCC-23.1.2.4	Action Step	Roads/Railroads	Evaluate existing and future stream crossings that impair natural geomorphic processes. Replace or retrofit crossings to achieve more natural conditions that meet sediment transport goals.	3	10	Board of Forestry, CalFire, CDFG, Friends of the Garcia River, Mendocino Redwood Company, NMFS HCD, NMFS PRD, NOAA RC, NRCS, RCD, RWQCB	335.00	335.00				670	Cost based on replacing 3 stream crossings at a rate of \$223,051/unit.
GR-CCC-23.1.2.5	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	CalFire, CalTrans, CDFG, NMFS, NRCS, Private Landowners	250.00					250	Based on approximately \$50k to do inspections for a five year period.
GR-CCC-23.1.3	Recovery Action	Roads/Railroads	Prevent impairment to passage and migration										
GR-CCC-23.1.3.1	Action Step	Roads/Railroads	Bridges associated with new roads or replacement bridges (including railroad bridges) should be free span or constructed with the minimum number of bents feasible in order to minimize drift accumulation and facilitate fish passage.	2	100	CalTrans, Mendocino County Department of Public Works						In-Kind	
GR-CCC-23.1.3.2	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	Mendocino County						In-Kind	
GR-CCC-24.1	Objective	Severe Weather Patterns	Address the present or threatened destruction, modification, or curtailment of the species habitat or range										
GR-CCC-24.1.1	Recovery Action	Severe Weather Patterns	Prevent impairment to stream hydrology (stream flow)										
GR-CCC-24.1.1.1	Action Step	Severe Weather Patterns	Implement water conservation strategies that provide for drought contingencies without relying on interception of surface flows or groundwater depletion.	2	20	CDFG, CDFG Law Enforcement, NMFS HCD, NMFS OLE, NMFS PRD, RWQCB, SWRCB							Costs addressed in Hydrology section.
GR-CCC-25.1	Objective	Water Diversion/Impoundment	Address the present or threatened destruction, modification or curtailment of the species habitat or range										
GR-CCC-25.1.1	Recovery Action	Water Diversion/Impoundment	Prevent impairment to stream hydrology (stream flow)										

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		
GR-CCC-25.1.1.1	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.	2	20	CDFG, NMFS HCD, NMFS PRD, SWRCB						TBD	Stream flow model should identify flow levels for coho salmon.
GR-CCC-25.1.1.2	Action Step	Water Diversion/Impoundment	Provide incentives to water rights holders willing to convert some or all of their water right to instream use via petition change of use and §1707 (CDFG 2004).	2	20	CDFG, NOAA RC, Private Landowners, SWRCB						TBD	Cost will vary with the number of water rights holders willing to participate.
GR-CCC-25.1.2	Recovery Action	Water Diversion/Impoundment	Prevent impairment to passage and migration										
GR-CCC-25.1.2.1	Action Step	Water Diversion/Impoundment	Establish flow related adult and smolt migration thresholds prior to authorizing future water diversions.	2	20	CDFG, CDFG Law Enforcement, NMFS HCD, NMFS OLE, NMFS PRD, SWRCB						TBD	
GR-CCC-25.1.3	Recovery Action	Water Diversion/Impoundment	Prevent impairment to the estuary (quality and extent)										
GR-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).	2	20	CDFG, CDFG Law Enforcement, NMFS HCD, NMFS OLE, NMFS PRD, SWRCB						In-Kind	
GR-CCC-25.1.4	Recovery Action	Water Diversion/Impoundment	Prevent impairment to water quality (instream temperature)										
GR-CCC-25.1.4.1	Action Step	Water Diversion/Impoundment	Ensure future water diversions do not impair instream water temperatures during the dry season.	2	50							In-Kind	
GR-CCC-25.2	Objective	Water Diversion/Impoundment	Address the inadequacy of existing regulatory mechanisms										
GR-CCC-25.2.1	Recovery Action	Water Diversion/Impoundment	Prevent impairment to stream hydrology (stream flow)										
GR-CCC-25.2.1.1	Action Step	Water Diversion/Impoundment	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	10	CDFG, CDFG Law Enforcement, NMFS HCD, NMFS OLE, NMFS PRD, SWRCB						In-Kind	
GR-CCC-25.2.1.2	Action Step	Water Diversion/Impoundment	Encourage compliance with the most recent update of NMFS' Water Diversion Guidelines.	2	100	CDFG, NMFS, NRCS, SWRCB						In-Kind	

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							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
GR-CCC-25.2.1.3	Action Step	Water Diversion/Impoundment	Ensure all water diversions and impoundments are compliant with AB2121 or other appropriate protective measures.	2	50	CDFG, NMFS HCD, NMFS PRD, SWRCB						In-Kind	
GR-CCC-25.2.1.4	Action Step	Water Diversion/Impoundment	Upgrade the existing water rights information system so that water allocations can be readily quantified by watershed.	3	30	SWRCB						In-Kind	
GR-CCC-25.2.1.5	Action Step	Water Diversion/Impoundment	Improve compliance with existing water resource regulations via monitoring and enforcement.	2	20	CDFG, CDFG Law Enforcement, NMFS HCD, NMFS OLE, NMFS PRD, SWRCB						In-Kind	
GR-CCC-25.2.1.6	Action Step	Water Diversion/Impoundment	Support the SWRCB in regulating groundwater.	3	20	CDFG, NMFS, RWQCB						In-Kind	
GR-CCC-25.2.1.7	Action Step	Water Diversion/Impoundment	Request that SWRCB review and/or modify water use based on the needs of coho salmon and authorized diverters (CDFG 2004).	2	20	CDFG, NMFS, SWRCB						In-Kind	