

Navarro River



Location	• Mendocino County
Watershed Area	• 315.0 Square Miles
Potential Habitat	• 220.4 Stream Miles
Vegetation	• 50% Coniferous, 26% Montane Hardwood, and 15% Grassland
Erodability	• Moderate to High
Ownership Patterns	• 98% Private, 2% Public
Dominant Land Uses	• Timber, Agriculture
Housing Density	• Low to Moderate
TMDL Pollutants	• Sediment, Temperature



Navarro River estuary
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Navarro River Coho Salmon: Persistent – Low Abundance

Recovery Goals

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

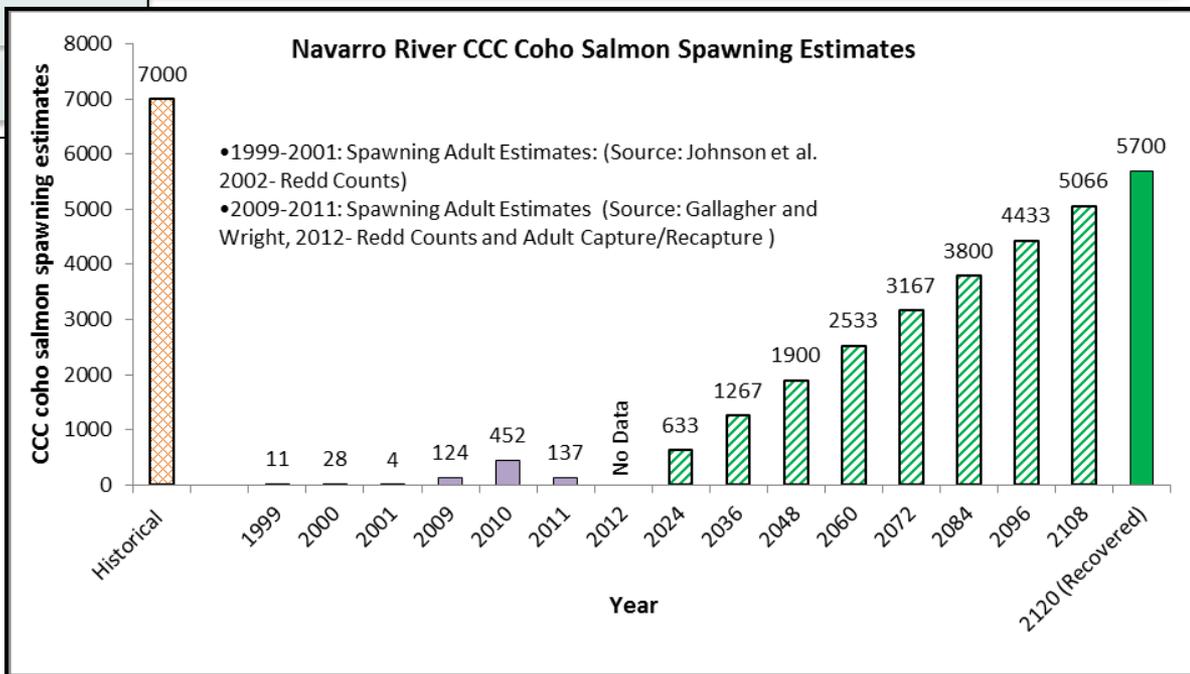


**Navarro Creek
Adult Spawner Targets**

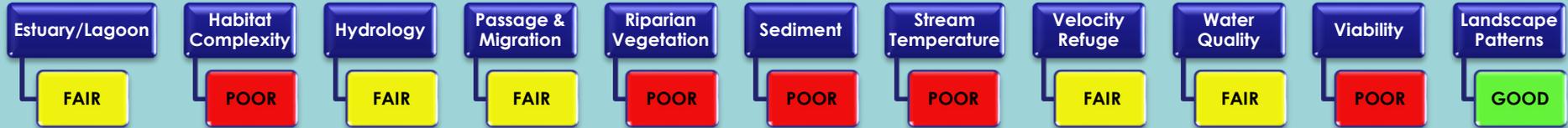
**Downlisting to Threatened
2,850**

**Recovery
5,700**

**STEELHEAD: YES
CHINOOK SALMON: YES**



Current Instream, Watershed and Population Conditions



Preventing Extinction & Improving Conditions

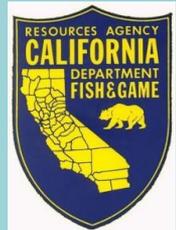
Priority 1: Immediate Restoration Actions

- Modify road crossings to provide access to historical habitats
- Maintain, install and enhance LWD and other complex habitat features
- Eliminate depletion of summer flows
- Develop BMP's (such as off-channel storage) for landowners conducting water diversion actions
- Address high and medium priority sediment delivery sites

Priority 2 & 3: Long-Term Restoration Actions

- Fence riparian areas from grazing
- Continue removal of *Arundo* located in the upper reaches of Rancheria Creek

Recovery Partners



Future Threats



Reducing Future Threats

Priority 1: Immediate Threat Abatement Actions

- Promote off-channel storage to reduce impacts of water diversion during the spring and summer
- Establish a moratorium on conversion of open space, rangeland, or TPZ to vineyards or other agricultural uses
- Increase size of Navarro River Redwoods State Park if acquisition opportunities arise
- New THPs should identify and decommission problematic legacy roads within WLPZ's
- For all rural (unpaved) and seasonal dirt roads apply best management practices for road construction maintenance management and decommissioning
- Conduct annual inspections of all roads prior to winter and correct poor conditions

Priority 2 & 3: Long-Term Threat Abatement Actions

- Prevent impairment to instream substrate/food productivity (impaired gravel quality and quantity)
- Develop a road sediment seduction Plan for agricultural lands
- Map unstable soils and use information to guide land use decisions, road design, THPs, and other activities that can promote erosion
- Allow trees in riparian areas to age, die, and recruit into the stream naturally
- Encourage timber landowners to implement restoration projects as part of their timber management practices
- Implement water conservation programs
- Protect high-risk shallow-seeded landslide areas and surfaces prone to erosion from being mobilized by intense storm events



Culvert that was removed on John Smith Creek
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Conservation Highlights

- MRC has worked with TU and NMFS to improve coho salmon habitat, by replacing large culverts at John Smith Creek and conducting road upgrades.
- Mendocino County RCD and NRCS continue to work with private landowners to conduct road upgrade and sediment reduction projects throughout the watershed. Also, these agencies work with landowners to conduct stream improvement projects, such as riparian planting, and bank protection projects.

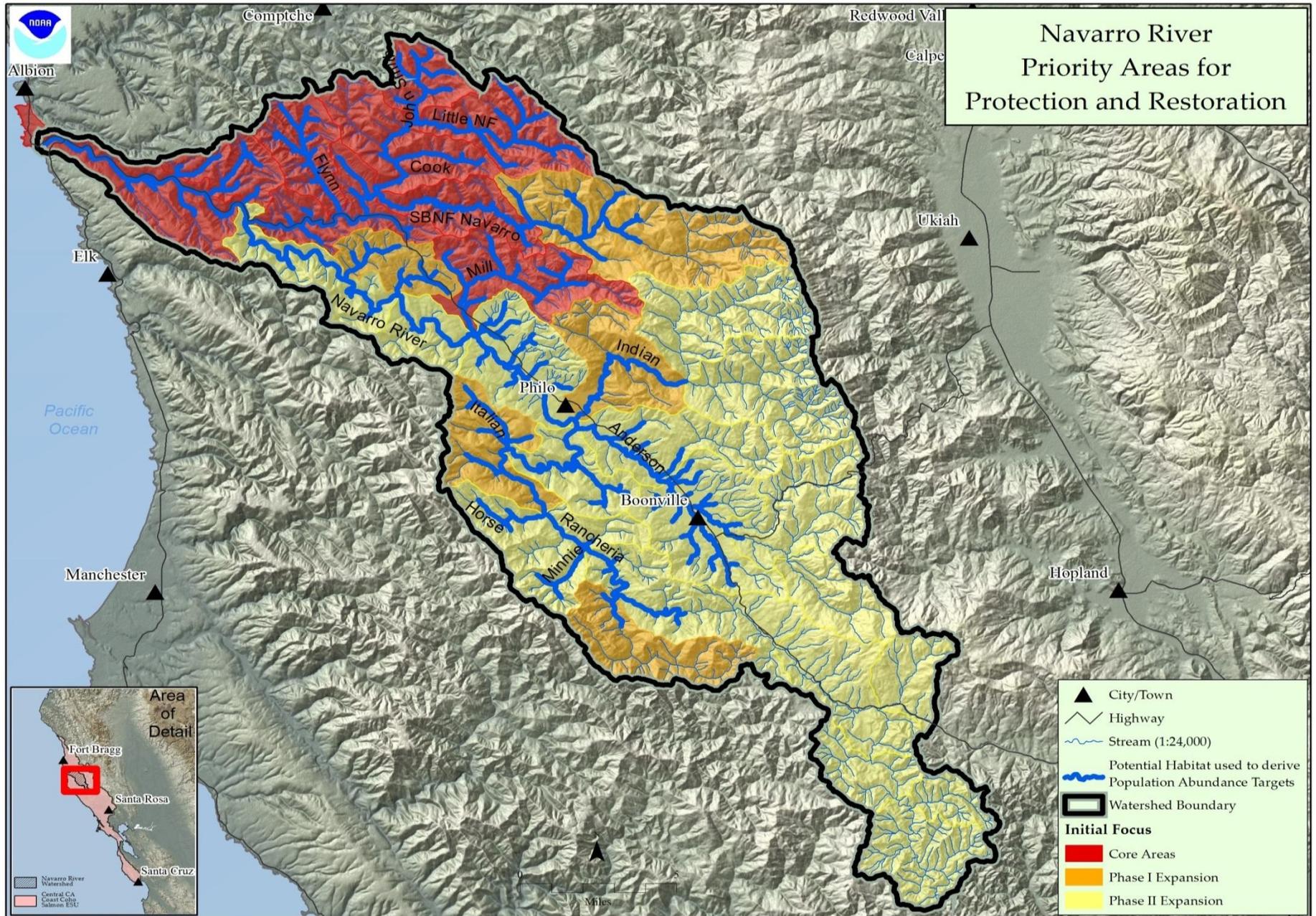


Figure 1: Map of Navarro River
Navarro River

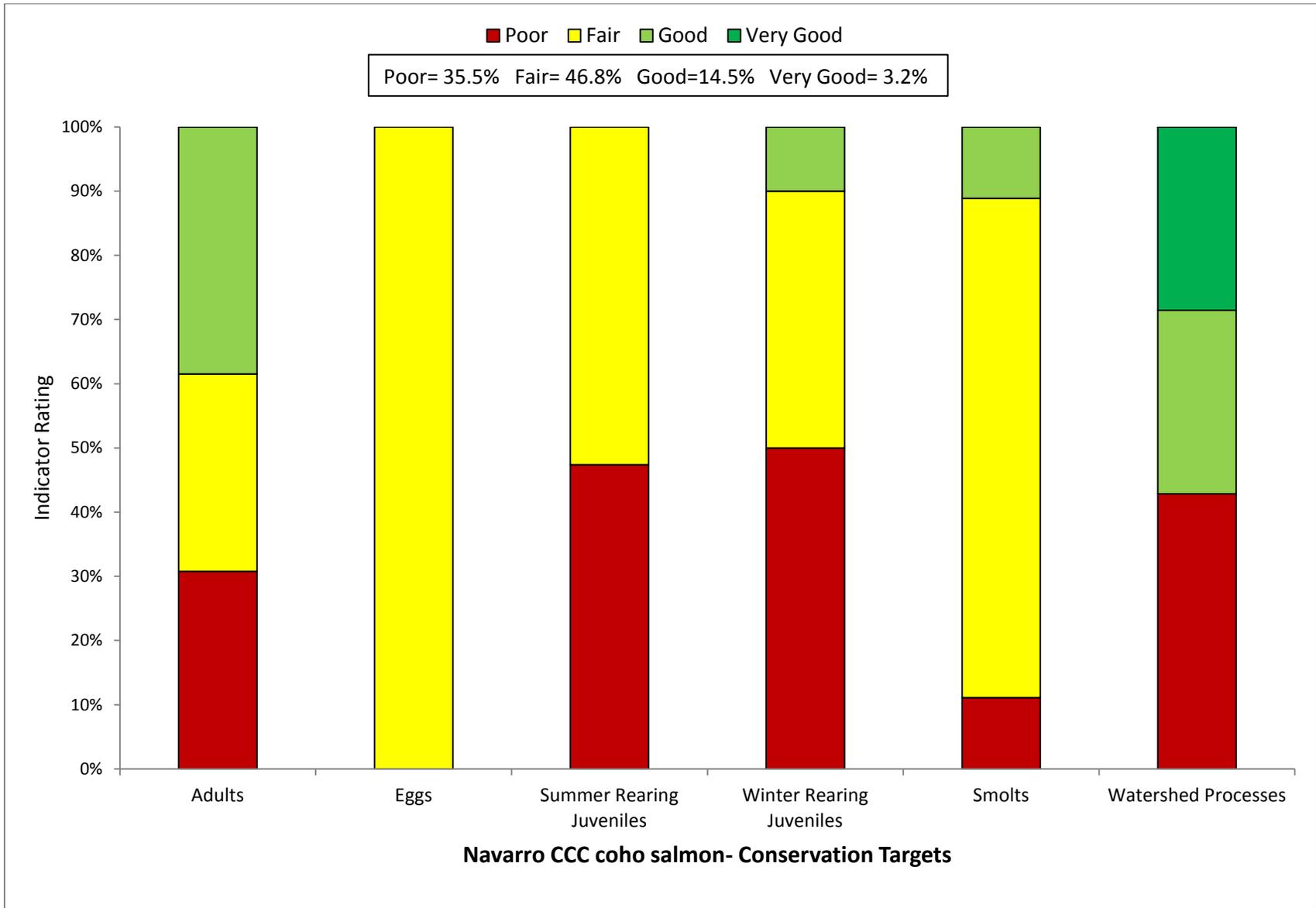


Figure 2: Viability Results by Lifestage

Table 1: CAP Viability Results ~ Navarro River

Target	Attribute	Indicator	Result	Rating	Method	Desired Criteria
Adults	Habitat Complexity	Large Wood Frequency (BFW 0-10 meters)	4.44 Key Pieces/100m	Fair	NMFS Expert Estuary/Lagoon Panel	6 to 11 key pcs/100m
Adults	Habitat Complexity	Large Wood Frequency (BFW 10-100 meters)	0.91 Key Pieces/100 meters)	Poor	NMFS Expert Estuary/Lagoon Panel	1.3 to 4 Key Pieces/100 meters
Adults	Habitat Complexity	Pool/Riffle/Flatwater Ratio	53 % of streams/ IP-km (>30% Pools; >20% Riffles)	Fair	SEC Analysis/CDFG Data	75% to 90% of streams/ IP-Km (>30% Pools; >20% Riffles)
Adults	Habitat Complexity	Shelter Rating	17 % of streams/ 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 =51-75	Fair	SEC Analysis/CDFG Data	NMFS Flow Protocol: Risk Factor Score 35-50
Adults	Passage/Migration	Passage at Mouth or Confluence	75% of IP-km to 90% of IP-km accessible	Good	SEC Analysis/CDFG Data	75% of IP-Km to 90% of IP-km
Adults	Passage/Migration	Physical Barriers	88% of IP-km accessible	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	Poor	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 Graves	75% of IP-km to 90% of IP-km accessible	Good	SEC Analysis/CDFG Data	75% of IP-Km to 90% of IP-km
Adults	Velocity Refuge	Floodplain Connectivity	>80% Response Reach Connectivity	Good	SEC Analysis/CDFG Data	>80% Response Reach Connectivity
Adults	Water Quality	Toxicity	Sublethal or Chronic	Fair	SEC Analysis/CDFG Data	No Acute or Chronic
Adults	Water Quality	Turbidity	75% to 90% of streams/ IP-km maintains severity score of 3 or lower	Good	SEC Analysis/CDFG Data	75% to 90% of streams/ IP-Km maintains severity score of 3 or lower
Adults	Viability	Density	<1 spawner per IP-km	Poor	SEC Analysis/CDFG Data	low risk spawner density per Spence (2008)
Eggs	Hydrology	Flow Conditions (Instantaneous Condition)	Risk Factor Score =51-75	Fair	SEC Analysis/CDFG Data	NMFS Flow Protocol: Risk Factor Score 35-50
Eggs	Hydrology	Redd Scour	Risk Factor Score =51-75	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)	57% streams; 56% IP-km (>50% stream average scores of 1 & 2)	Fair	NMFS Instream Flow Analysis	75% to 90% of streams/ IP-Km (>50% stream average scores of 1 & 2)
Summer Rearing Juveniles	Estuary/Lagoon	Quality & Extent	Impaired but functioning	Fair	NMFS Instream Flow Analysis	Properly Functioning Condition
Summer Rearing Juveniles	Habitat Complexity	Large Wood Frequency (Bankfull Width 0-10 meters)	<4 Key Pieces/100m	Poor	NMFS Instream Flow Analysis	6 to 11 key pcs/100m
Summer Rearing Juveniles	Habitat Complexity	Large Wood Frequency (Bankfull Width 10-100 meters)	<1 Key Pieces/100m	Poor	NMFS Instream Flow Analysis	1.3 to 4 Key Pieces/100 meters
Summer Rearing Juveniles	Habitat Complexity	Percent Primary Pools	8% streams; 14% IP-km (>49% of pools are primary pools)	Poor	NMFS Instream Flow Analysis	75% to 89% of streams/ IP-Km (>49% of pools are primary pools)
Summer Rearing Juveniles	Habitat Complexity	Pool/Riffle/Flatwater Ratio	<50% of streams/ IP-km (>30% Pools; >20% Riffles)	Poor	NMFS Instream Flow Analysis	75% to 90% of streams/ IP-Km (>30% Pools; >20% Riffles)
Summer Rearing Juveniles	Habitat Complexity	Shelter Rating	22% of streams/ 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 =51-75	Fair	NMFS Instream Flow Analysis	NMFS Flow Protocol: Risk Factor Score 35-50
Summer Rearing Juveniles	Hydrology	Flow Conditions (Instantaneous Condition)	Risk Factor Score =51-75	Fair	NMFS Watershed Characterization	NMFS Flow Protocol: Risk Factor Score 35-50
Summer Rearing Juveniles	Hydrology	Number, Condition and/or Magnitude of Diversions	1.59 Diversions/10 IP km	Fair	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	50% of IP-km to 74% of IP-km accessible	Fair	Population Profile/BPJ	75% of IP-Km to 90% of IP-km
Summer Rearing Juveniles	Riparian Vegetation	Canopy Cover	50% to 74% of streams/ IP-km (>70% average stream canopy; >85% where coho IP overlaps)	Fair	SEC or PAD/CDFG Data	75% to 90% of streams/ IP-Km (>85% average stream canopy)
Summer Rearing Juveniles	Riparian Vegetation	Tree Diameter (North of SF Bay)	≤39% Class 5 & 6 across IP-km	Poor	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)	50% to 74% of streams/ IP-km (>50% stream average scores of 1 & 2)	Fair	SEC or PAD/CDFG Data	75% to 90% of streams/ IP-Km (>50% stream average scores of 1 & 2)

Summer Rearing Juveniles	Water Quality	Temperature (MWMt)	<50% IP km (<20 C MWMt; <16 C MWMt where coho IP overlaps)	Poor	Population Profile/BPJ	75 to 89% IP km (<16 C MWMt)
Summer Rearing Juveniles	Water Quality	Toxicity	Sublethal or Chronic	Fair	NMFS Watershed Characterization/CWHR	No Acute or Chronic
Summer Rearing Juveniles	Water Quality	Turbidity	50% to 74% of streams/ IP-km maintains severity score of 3 or lower	Fair	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	<50% of Historical Range	Poor	NMFS Watershed Characterization/CWHR	75-90% of Historical Range
Winter Rearing Juveniles	Habitat Complexity	Large Wood Frequency (Bankfull Width 0-10 meters)	<4 Key Pieces/100m	Poor	NMFS Watershed Characterization/CWHR	6 to 11 key pcs/100m
Winter Rearing Juveniles	Habitat Complexity	Large Wood Frequency (Bankfull Width 10-100 meters)	<1 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	21% of streams/ IP-km (>30% Pools; >20% Riffles)	Poor	NMFS Watershed Characterization/CWHR	75% to 90% of streams/ IP-Km (>30% Pools; >20% Riffles)
Winter Rearing Juveniles	Habitat Complexity	Shelter Rating	16% of streams/ 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	50% of IP-km to 74% of IP-km accessible	Fair	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	Poor	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)	50% to 74% of streams/ IP-km (>50% stream average scores of 1 & 2)	Fair	SEC Analysis/CDFG Data	75% to 90% of streams/ IP-Km (>50% stream average scores of 1 & 2)
Winter Rearing Juveniles	Velocity Refuge	Floodplain Connectivity	50-80% Response Reach Connectivity	Fair	SEC Analysis/CDFG Data	>80% Response Reach Connectivity
Winter Rearing Juveniles	Water Quality	Toxicity	Sublethal or Chronic	Fair	NMFS Watershed Characterization	No Acute or Chronic
Winter Rearing Juveniles	Water Quality	Turbidity	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	50% to 74% of streams/ IP-km (>80 stream average)	Fair	Population Profile	75% to 90% of streams/ IP-Km (>80 stream average)
Smolts	Hydrology	Number, Condition and/or Magnitude of Diversions	3.11 Diversions/10 IP-km	Fair	Population Profile	0.01 - 1 Diversions/10 IP km
Smolts	Hydrology	Passage Flows	Risk Factor Score =51-75	Fair	TRT Spence (2008)	NMFS Flow Protocol: Risk Factor Score 35-50
Smolts	Passage/Migration	Passage at Mouth or Confluence	75% of IP-km to 90% of IP-km accessible	Good	TRT Spence (2008)	75% of IP-Km to 90% of IP-km
Smolts	Smoltification	Temperature	50-74% IP-km (>6 and <16 C)	Fair	TRT Spence (2008)	75-90% IP-Km (>6 and <16 C)
Smolts	Water Quality	Toxicity	Sublethal or Chronic	Fair	TRT Spence (2008)	No Acute or Chronic
Smolts	Water Quality	Turbidity	50% to 74% of streams/ IP-km maintains severity score of 3 or lower	Fair	EPA/RWQCB/NMFS Criteria	75% to 90% of streams/ IP-Km maintains severity score of 3 or lower
Smolts	Viability	Abundance	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	0.165% of Watershed in Impervious Surfaces	Very Good	SEC Analysis	3-6% of Watershed in Impervious Surfaces
Watershed Processes	Landscape Patterns	Agriculture	1.51% of Watershed in Agriculture	Very Good	EPA/RWQCB/NMFS Criteria	10-19% of Watershed in Agriculture
Watershed Processes	Landscape Patterns	Timber Harvest	25-15% of Watershed in Timber Harvest	Good	Newcombe and Jensen 2003	25-15% of Watershed in Timber Harvest
Watershed Processes	Landscape Patterns	Urbanization	8-11% of watershed >1 unit/20 acres	Good	EPA/RWQCB/NMFS Criteria	8-11% of watershed >1 unit/20 acres
Watershed Processes	Riparian Vegetation	Species Composition	<25% Historical Species Composition	Poor	Newcombe and Jensen 2003	51-74% Intact Historical Species Composition
Watershed Processes	Sediment Transport	Road Density	>3 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)	>1 Miles/Square Mile	Poor	Newcombe and Jensen 2003	0.1 to 0.4 Miles/Square Mile

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

Cental CA Coast Coho Salmon ~ Navarro River

ACTIONS FOR RESTORING HABITATS

1. Restoration- Estuary

No species-specific actions were developed.

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:** Delineate reaches possessing both potential winter rearing habitat and floodplain areas, and develop restoration action plans.

2.1.1.2. **Action Step:** Evaluate Highway 128 and associated crossings with focus on the segment from the North Fork Navarro Bridge to Barton Gulch. Many crossing may need to be modified to provide access to historical floodplain habitats.

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

3.1.1.1. **Action Step:** Install or enhance existing LWD, boulders, and other instream features to increase habitat complexity and improve pool frequency and depth (CDFG 2004). Focus on tributaries of Flynn Creek, North Fork Navarro, South Branch Navarro, and Mill Creek.

3.1.1.2. **Action Step:** Encourage landowners to implement restoration projects as part of their ongoing operations in stream reaches where large woody debris is lacking.

3.1.1.3. **Action Step:** Maintain current LWD, boulders, and other structure providing features to maintain current stream complexity, pool frequency, and depth (CDFG 2004). Maintain large debris accumulations along Highway 128 on the North Fork Navarro.

3.1.2. **Recovery Action:** Improve frequency of primary pools, and shelter ratings.

3.1.2.1. **Action Step:** Identify historic CCC coho salmon habitats lacking in channel complexity, and promote restoration projects designed to create or restore complex habitat features that provide for localized pool scour, velocity refuge, and cover. Prioritize Core areas first followed by Phase I areas.

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

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

4. Restoration- Hydrology

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

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

- 4.1.1.1. **Action Step:** Assess and map water diversions (CDFG 2004). Focus initial efforts in Core and Phase I watersheds. Expand efforts to Phase II watersheds upon completion of Core and Phase I evaluation.
- 4.1.1.2. **Action Step:** Promote off-channel storage to reduce impacts of water diversion (e.g. storage tanks for rural residential users).
- 4.1.1.3. **Action Step:** Require streamflow gauging devices to determine the level of impairment to natural flow. Focus initial efforts on Mill Creek, Flynn Creek, and North Fork Navarro.
- 4.1.1.4. **Action Step:** Identify and eliminate depletion of summer base flows from unauthorized water uses. Focus efforts along Rancheria Creek, Mill Creek, and tributaries along the mainstem Navarro River above the North Fork. Tributaries such as Floodgate Creek and Perry Gulch and other small tributaries need water use evaluated.
- 4.1.1.5. **Action Step:** Work with SWRCB and landowners to purchase water rights that would improve and protect over summer survival of juveniles by re-establishing summer baseflows (from July 1 to October 1) in rearing reaches that are currently or have potential to be impacted by water use.
- 4.1.1.6. **Action Step:** Provide incentives to water rights holders willing to convert some or all of their water rights to instream use via petition change of use and §1707 (CDFG 2004).
- 4.1.1.7. **Action Step:** Support a water conservation program for rural residential water users within the Navarro River watershed.
- 4.1.2. **Recovery Action:** Improve passage flows
 - 4.1.2.1. **Action Step:** Develop BMP's (such as off-channel storage) for landowners conducting water diversion actions.
 - 4.1.2.2. **Action Step:** Encourage compliance with the most recent update of NMFS' Water Diversion Guidelines.

5. [Restoration- Landscape Patterns](#)

No species-specific actions were developed.

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:** Restore passage in high priority areas of the Navarro watershed as identified by the Mendocino RCD, MRC, the County of Mendocino, Caltrans (HWY 128), and existing fish passage databases.

7. [Restoration- Pool Habitat](#)

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

8. [Restoration- Riparian](#)

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

8.1.1. **Recovery Action:** Improve canopy cover and species composition

8.1.1.1. **Action Step:** Fence riparian areas from grazing (using fencing standards that allow other wildlife to access the stream). Focus efforts along Anderson Creek and its tributaries, and affected areas of the Indian and Rancheria creek watersheds.

8.1.1.2. **Action Step:** Promote streamside conservation measures, including conservation easements, setbacks, and riparian buffers (CDFG 2004). Work cooperatively with land trusts, and Mendocino RCD to establish conservation easements, setbacks, and riparian buffers on industrial timberland, agricultural, and rangeland within Core and Phase 1 subbasins.

8.1.1.3. **Action Step:** Continue removal of Arundo located in the upper reaches of Rancheria Creek to stop infestation of downstream areas.

8.1.1.4. **Action Step:** Improve riparian and instream conditions in rearing habitats by establishing riparian protection zones that extend the distance of a site potential tree height from the outer edge of a channel.

8.1.1.5. **Action Step:** Promote the re-vegetation of the native riparian plant community within inset floodplains and riparian corridors to ameliorate instream temperature and provide a source of future large woody debris recruitment.

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

8.1.2.1. **Action Step:** Increase tree diameter within 55% of watershed to achieve optimal riparian forest conditions (55 - 69% Class 5 & 6 tree)

8.1.2.2. **Action Step:** Improve the structure and composition of riparian areas to provide shade, large woody debris input, nutrient input, bank stabilization, and other CCC coho salmon needs.

9. Restoration- Sediment

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

9.1.1. **Recovery Action:** Improve instream gravel quality

9.1.1.1. **Action Step:** Address high and medium priority sediment delivery sites as identified by the Mendocino RCD, Mendocino Redwoods Company, or other credible assessments.

10. Restoration- Viability

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

10.1.1. **Recovery Action:** Increase spawner density

10.1.1.1. **Action Step:** Implement action steps from Fishing/Collecting threats

10.1.2. **Recovery Action:** Increase abundance

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

10.1.3. **Recovery Action:** Increase spatial structure and diversity

10.1.3.1. **Action Step:** Continue to rescue juvenile coho salmon with existing permittees that are under an imminent risk of stranding and mortality and relocate to suitable habitat when deemed appropriate by NMFS and CDFG

11. Restoration- Water Quality

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

11.1.1. **Recovery Action:** Improve stream temperature conditions

11.1.1.1. **Action Step:** Work with local RCD and NRCS representatives to determine stream reaches appropriate for riparian planting projects.

11.1.1.2. **Action Step:** Implement actions from Riparian action steps section.

THREAT ABATEMENT ACTIONS

12. Threat- Agricultural Practices

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

12.1.1. **Recovery Action:** Address the inadequacy of existing regulatory mechanisms

12.1.1.1. **Action Step:** Coordinate with the agencies to minimize conversion of range and forestland in Core and Phase 1 watersheds.

12.1.1.2. **Action Step:** Promote off-channel storage to reduce impacts of water diversion during the spring and summer (e.g. diversion during winter high flow).

12.1.1.3. **Action Step:** The State and Mendocino County should impose a moratorium on conversion of open space, rangeland, or TPZ to vineyards or other agricultural uses that impact salmonids until a grading ordinance and land conversion ordinance are in place.

12.1.1.4. **Action Step:** Investigate the potential to provide bypass flow from agricultural storage during critical low flow period of August through October.

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

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

12.2.1.1. **Action Step:** Develop a Road Sediment Reduction Plan for agricultural lands that prioritizes problem sites and outlines implementation and a timeline of necessary actions.

12.2.1.2. **Action Step:** Address sediment and runoff sources from road networks and other actions that deliver sediment and runoff to stream channels.

12.2.1.3. **Action Step:** Work with landowners to assess the effectiveness of erosion control measures throughout the winter period.

12.2.1.4. **Action Step:** Continue implementation of the NRCS/RCD coordinated permit program for fishery restoration practices.

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:** NMFS and CDFG will work to improve the California Freshwater Sport Fishing Regulations to minimize take of adult salmonids.

16.1.1.2. **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 and replace with the Navarro River USGS gauging station (11468000) to reflect hydrologic conditions for coastal streams.

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

17. Threat- Hatcheries

No species-specific actions were developed.

18. Threat- Livestock

No species-specific actions were developed.

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 increased landscape disturbance

19.1.1.1. **Action Step:** Should large tracts of forestlands within any watershed identified as a priority in this recovery plan become available for purchase, the Federal Government, State of California, or other entities should consider purchasing the area as a conservation area.

19.1.1.2. **Action Step:** Increase size of Navarro River Redwoods State Park if opportunities arise. At the minimum purchase or develop conservation easement on lower tributaries and associated riparian areas, including important coho salmon tributaries such as Flynn Creek.

19.1.1.3. **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).

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

19.1.2.1. **Action Step:** Encourage all permanent and year-round access roads beyond the THP parcel be surfaced after harvest completion with base rock and road gravel, asphalt, or chipseal, as appropriate.

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

19.1.2.3. **Action Step:** Map unstable soils and use that information to guide land use decisions, road design, THPs, and other activities that can promote erosion.

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

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

19.1.3.1. **Action Step:** Explore acquisition or conservation easements from willing land-owners.

19.1.3.2. **Action Step:** Allow trees in riparian areas to age, die, and recruit into the stream naturally.

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:** Assign NMFS staff to conduct THP reviews in Navarro River watershed Core areas.

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

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

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 (impaired gravel quality and quantity)

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

23.1.1.2. **Action Step:** For all rural (unpaved) and seasonal dirt roads apply best management practices for road construction maintenance management and decommissioning (e.g. Weaver and Hagans, 1994; Sommarstrom et al., 2002; Oregon Department of Transportation, 1999).

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

23.1.1.4. **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).

23.1.1.5. **Action Step:** Establish a moratorium on new road construction within floodplains, riparian areas, unstable soils or other sensitive areas until a watershed specific and/or agency/company specific road management plan is created and implemented.

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

24. [Threat- Severe Weather Patterns](#)

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

24.1.1. **Recovery Action:** Prevent impairment to hydrology

24.1.1.1. **Action Step:** If predicted flows are below a level considered critical to maintain viable rearing habitat for salmonids, measures to reduce water consumption should be initiated by municipal water suppliers and other users in the watershed through conservation programs.

24.1.1.2. **Action Step:** Critical flow values should include minimum bypass flow requirements to support upstream adult migration during winter months and juvenile rearing in the summer and fall months.

24.1.1.3. **Action Step:** Encourage SWRCB to bring illegal water diverters and out-of-compliance diverters into compliance with State law.

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

24.1.2.1. **Action Step:** Protect high-risk shallow-seeded landslide areas and surfaces prone to erosion from being mobilized by intense storm events.

- 24.1.2.2. **Action Step:** New development in all historic CCC coho salmon watersheds should meet a zero net increase in storm-water runoff, changes in duration, or magnitude of peak flow.
- 24.1.2.3. **Action Step:** Coordinate with county planners to eliminate or reduce new construction of permanent infrastructure that will adversely affect watershed processes, particularly within the 100-year flood prone zones in all historic CCC coho salmon watersheds.
- 24.1.2.4. **Action Step:** Develop Bank Stabilization and Floodplain Guidelines for use by private and public entities.

25. Threat- Water Diversion/Impoundment

25.1. **Objective:** Abate the threat contribution to HYDROLOGY.

25.1.1. **Recovery Action:** Address the inadequacy of existing regulatory mechanisms

25.1.1.1. **Action Step:** Support SWRCB in regulating the use of streamside wells and groundwater.

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

25.1.1.3. **Action Step:** Work with CDFG during the 1600 permit process to re-establish natural flow regimes to improve adult migration to spawning habitats and smolt outmigration. Develop bypass flow plans for ponds and reservoirs to reduce the potential for impacts to fall flows that may inhibit adult coho passage.

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

25.2.1. **Recovery Action:** Improve flow conditions (instantaneous conditions)

25.2.1.1. **Action Step:** Work with SWRCB and landowners to restore and maintain the natural hydrograph between March 1 and May 15 to minimize impacts to coho fry due to stranding by implementing alternative frost protection strategies.

26. Threat- Watershed Process

No species-specific actions were developed.

Table 3: Implementation Schedule ~ Navarro 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		
NaR-CCC-2.1	Objective	Floodplain Connectivity	Address the present or threatened destruction, modification or curtailment of the species habitat or range.										
NaR-CCC-2.1.1	Recovery Action	Floodplain Connectivity	Rehabilitate and enhance floodplain connectivity										
NaR-CCC-2.1.1.1	Action Step	Floodplain Connectivity	Delineate reaches possessing both potential winter rearing habitat and floodplain areas, and develop restoration action plans.	3	5	CDFG, Private Consultants, Private Landowners	253.00					253	Cost based on treating 7 miles of High IP (assume 1 project per mile in 25% high IP) at a rate of \$36,046/mile.
NaR-CCC-2.1.1.2	Action Step	Floodplain Connectivity	Evaluate Highway 128 and associated crossings with focus on the segment from the North Fork Navarro Bridge to Barton Gulch. Many crossing may need to be modified to provide access to historical floodplain habitats.	1	1	CalTrans, CDFG, NOAA RC	1,587					1,587	Cost to evaluate existing passage database and plan restoration of culvert crossings on Hwy128. Cost to treat 8 crossings at a rate of \$198,400/crossing would total \$1,587,200. Costs should be lower if minor modifications are needed at each crossing.
NaR-CCC-3.1	Objective	Habitat Complexity	Address the present or threatened destruction, modification or curtailment of the species habitat or range										
NaR-CCC-3.1.1	Recovery Action	Habitat Complexity	Increase large wood frequency										
NaR-CCC-3.1.1.1	Action Step	Habitat Complexity	Install or enhance existing LWD, boulders, and other instream features to increase habitat complexity and improve pool frequency and depth (CDFG 2004). Focus on tributaries of Flynn Creek, North Fork Navarro, South Branch Navarro, and Mill Creek.	1	10	CDFG, NOAA RC, NRCS, Private Landowners	625	625				1,250	Cost based on treating 50 miles at a rate of \$25,000/mile. Based on an estimate of 50 miles in the next 10 years at 20k for Core and Phase 1 areas.
NaR-CCC-3.1.1.2	Action Step	Habitat Complexity	Encourage landowners to implement restoration projects as part of their ongoing operations in stream reaches where large woody debris is lacking.	3	20							In-Kind	
NaR-CCC-3.1.1.3	Action Step	Habitat Complexity	Maintain current LWD, boulders, and other structure providing features to maintain current stream complexity, pool frequency, and depth (CDFG 2004). Maintain large debris accumulations along Highway 128 on the North Fork Navarro.	2	50							In-Kind	
NaR-CCC-3.1.2	Recovery Action	Habitat Complexity	Improve frequency of primary pools, and shelter ratings.										

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		
NaR-CCC-3.1.2.1	Action Step	Habitat Complexity	Identify historic CCC coho salmon habitats lacking in channel complexity, and promote restoration projects designed to create or restore complex habitat features that provide for localized pool scour, velocity refuge, and cover. Prioritize Core areas first followed by Phase I areas.	2	10	Campbell Timberland Management, CDFG, Private Landowners	56.00	56.00				112	These data would be most effective if combined into a central repository and restoration projects were prioritized according to highest restoration priority. Cost for fish/habitat monitoring is estimated at \$111,192/project.
NaR-CCC-3.1.3	Recovery Action	Habitat Complexity	Improve pool/riffle/flatwater ratios (hydraulic diversity)										
NaR-CCC-3.1.3.1	Action Step	Habitat Complexity	Increase the frequencies to 75% of the streams within the watershed	2	20	Campbell Timberland Management, CDFG, NMFS, NOAA RC, Private Landowners						TBD	Cost should be accounted for in increase LWD frequency and primary pools.
NaR-CCC-4.1	Objective	Hydrology	Address the inadequacy of existing regulatory mechanisms										
NaR-CCC-4.1.1	Recovery Action	Hydrology	Improve flow conditions (baseflow conditions)										
NaR-CCC-4.1.1.1	Action Step	Hydrology	Assess and map water diversions (CDFG 2004). Focus initial efforts in Core and Phase I watersheds. Expand efforts to Phase II watersheds upon completion of Core and Phase I evaluation.	2	5	Private Consultants, Private Landowners, SWRCB						TBD	Estimate based on landowner cooperation to assess diversion sites.
NaR-CCC-4.1.1.2	Action Step	Hydrology	Promote off-channel storage to reduce impacts of water diversion (e.g. storage tanks for rural residential users).	2	20	CDFG, Mendocino County, NMFS, NOAA RC, Private Consultants, Private Landowners, SWRCB						In-Kind	
NaR-CCC-4.1.1.3	Action Step	Hydrology	Require streamflow gauging devices to determine the level of impairment to natural flow. Focus initial efforts on Mill Creek, Flynn Creek, and North Fork Navarro.	3	5	Private Landowners, SWRCB, USGS	3.00					3	Cost for stream flow gauges estimated at \$1,000/gauge. Cost does not account for maintenance or data management.
NaR-CCC-4.1.1.4	Action Step	Hydrology	Identify and eliminate depletion of summer base flows from unauthorized water uses. Focus efforts along Rancheria Creek, Mill Creek, and tributaries along the mainstem Navarro River above the North Fork. Tributaries such as Floodgate Creek and Perry Gulch and other small tributaries need water use evaluated.	1	5	CDFG, CDFG Law Enforcement, NMFS OLE, SWRCB	63.00					63	Cost for stream flow model estimated at \$63,005/project.

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
NaR-CCC-4.1.1.5	Action Step	Hydrology	Work with SWRCB and landowners to purchase water rights that would improve and protect over summer survival of juveniles by re-establishing summer baseflows (from July 1 to October 1) in rearing reaches that are currently or have potential to be impacted by water use.	1	20	CDFG, FishNet 4C, NOAA RC, Private Landowners, SWRCB						TBD	Costs for acquisition of water rights and developing alternatives will need to be developed. Cost of water is reported to average 500 dollars or more per acre foot (Sunding and Zwane 2004).
NaR-CCC-4.1.1.6	Action Step	Hydrology	Provide incentives to water rights holders willing to convert some or all of their water rights to instream use via petition change of use and §1707 (CDFG 2004).	1	20	CDFG, FishNet 4C, NOAA RC, Private Landowners, RCD, SWRCB						TBD	Number of water rights holders willing to participate is unknown at this time.
NaR-CCC-4.1.1.7	Action Step	Hydrology	Support a water conservation program for rural residential water users within the Navarro River watershed.	3	50							In-Kind	
NaR-CCC-4.1.2	Recovery Action	Hydrology	Improve passage flows										
NaR-CCC-4.1.2.1	Action Step	Hydrology	Develop BMP's (such as off-channel storage) for landowners conducting water diversion actions.	1	20	NMFS HCD, NRCS, Private Landowners, SWRCB						TBD	Total cost for basin will need additional analysis. Cost per landowner is estimated to be 10-50k.
NaR-CCC-4.1.2.2	Action Step	Hydrology	Encourage compliance with the most recent update of NMFS' Water Diversion Guidelines.	2	10	CDFG, NMFS, Private Landowners, SWRCB						In-Kind	
NaR-CCC-6.1	Objective	Passage	Address the present or threatened destruction, modification or curtailment of the species habitat or range										
NaR-CCC-6.1.1	Recovery Action	Passage	Modify or remove physical passage barriers										
NaR-CCC-6.1.1.1	Action Step	Passage	Restore passage in high priority areas of the Navarro watershed as identified by the Mendocino RCD, MRC, the County of Mendocino, Caltrans (HWY 128), and existing fish passage databases.	1	10		800	800				1,600	Cost based on treating 8 barriers in high IP at a rate of \$198,400/barrier. Cost may be less depending on updated database.
NaR-CCC-8.1	Objective	Riparian	Address the present or threatened destruction, modification or curtailment of the species habitat or range										
NaR-CCC-8.1.1	Recovery Action	Riparian	Improve canopy cover and species composition										

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		
NaR-CCC-8.1.1.1	Action Step	Riparian	Fence riparian areas from grazing (using fencing standards that allow other wildlife to access the stream). Focus efforts along Anderson Creek and its tributaries, and affected areas of the Indian and Rancheria creek watersheds.	2	10	CDFG, NOAA RC, Private Landowners, RCD	47.00	47.00				94	Cost based on treating 5 miles at a rate of \$18,760/mile.
NaR-CCC-8.1.1.2	Action Step	Riparian	Promote streamside conservation measures, including conservation easements, setbacks, and riparian buffers (CDFG 2004). Work cooperatively with land trusts, and Mendocino RCD to establish conservation easements, setbacks, and riparian buffers on industrial timberland, agricultural, and rangeland within Core and Phase 1 subbasins.	3	20	CA Coastal Commission, California Coastal Conservancy, CDFG, NOAA RC, NRCS, Private Landowners, State Parks							
NaR-CCC-8.1.1.3	Action Step	Riparian	Continue removal of Arundo located in the upper reaches of Rancheria Creek to stop infestation of downstream areas.	2	10	CDFG, NOAA RC, Private Landowners, RCD	97.00	97.00				194	Cost based on treating 5 acres at a rate of \$38,690/acre.
NaR-CCC-8.1.1.4	Action Step	Riparian	Improve riparian and instream conditions in rearing habitats by establishing riparian protection zones that extend the distance of a site potential tree height from the outer edge of a channel.			CalFire, Mendocino County, Mendocino Redwood Company, NRCS, Private Landowners, RCD							
NaR-CCC-8.1.1.5	Action Step	Riparian	Promote the re-vegetation of the native riparian plant community within inset floodplains and riparian corridors to ameliorate instream temperature and provide a source of future large woody debris recruitment.	3	20							In-Kind	
NaR-CCC-8.1.2	Recovery Action	Riparian	Improve tree diameter										
NaR-CCC-8.1.2.1	Action Step	Riparian	Increase tree diameter within 55% of watershed to achieve optimal riparian forest conditions (55 - 69% Class 5 & 6 tree)	2	30	CDFG, NMFS, NOAA RC, RCD						TBD	Cost likely accounted for in above action steps.
NaR-CCC-8.1.2.2	Action Step	Riparian	Improve the structure and composition of riparian areas to provide shade, large woody debris input, nutrient input, bank stabilization, and other CCC coho salmon needs.	2	20	CDFG, NMFS, NOAA RC, Private Landowners, RCD						TBD	Cost accounted for in above action steps.
NaR-CCC-9.1	Objective	Sediment	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		
NaR-CCC-9.1.1	Recovery Action	Sediment	Improve instream gravel quality										
NaR-CCC-9.1.1.1	Action Step	Sediment	Address high and medium priority sediment delivery sites as identified by the Mendocino RCD, Mendocino Redwoods Company, or other credible assessments.	1	20	CDFG, Mendocino Redwood Company, Private Landowners, RCD						TBD	More information is needed for large projects such as large slides and landings.
NaR-CCC-10.1	Objective	Viability	Address the inadequacy of existing regulatory mechanisms										
NaR-CCC-10.1.1	Recovery Action	Viability	Increase spawner density										
NaR-CCC-10.1.1.1	Action Step	Viability	Implement action steps from Fishing/Collecting threats										
NaR-CCC-10.1.2	Recovery Action	Viability	Increase abundance										
NaR-CCC-10.1.2.1	Action Step	Viability	Re-establish a naturally reproducing run of coho salmon in appropriate subwatersheds.	1	10							TBD	
NaR-CCC-10.1.3	Recovery Action	Viability	Increase spatial structure and diversity										
NaR-CCC-10.1.3.1	Action Step	Viability	Continue to rescue juvenile coho salmon with existing permittees that are under an imminent risk of stranding and mortality and relocate to suitable habitat when deemed appropriate by NMFS and CDFG	2	10	CDFG, NMFS, NOAA RC						In-Kind	Inter-agency coordination will continue as part of doing business to rescue juvenile coho salmon until habitat conditions are restored to prevent imminent risk of stranding and mortality.
NaR-CCC-11.1	Objective	Water Quality	Address the present or threatened destruction, modification, or curtailment of the species range or habitat										
NaR-CCC-11.1.1	Recovery Action	Water Quality	Improve stream temperature conditions										
NaR-CCC-11.1.1.1	Action Step	Water Quality	Work with local RCD and NRCS representatives to determine stream reaches appropriate for riparian planting projects.	2	30							In-Kind	
NaR-CCC-11.1.1.2	Action Step	Water Quality	Implement actions from Riparian action steps section.										
NaR-CCC-12.1	Objective	Agricultural Practices	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		
NaR-CCC-12.1.1	Recovery Action	Agricultural Practices	Address the inadequacy of existing regulatory mechanisms										
NaR-CCC-12.1.1.1	Action Step	Agricultural Practices	Coordinate with the agencies to minimize conversion of range and forestland in Core and Phase 1 watersheds.	2	50							In-Kind	
NaR-CCC-12.1.1.2	Action Step	Agricultural Practices	Promote off-channel storage to reduce impacts of water diversion during the spring and summer (e.g. diversion during winter high flow).	1	10	CDFG, NMFS HCD, Private Landowners, SWRCB						TBD	Cost of implementing is unknown at this time. An analysis focusing on the amount of off-channel storage to provide improved spring and summer flows needs to be conducted prior to implementing. Participating landowners and water users could initiate prior to analysis being completed.
NaR-CCC-12.1.1.3	Action Step	Agricultural Practices	The State and Mendocino County should impose a moratorium on conversion of open space, rangeland, or TPZ to vineyards or other agricultural uses that impact salmonids until a grading ordinance and land conversion ordinance are in place.	1	60	Farm Bureau, Private Consultants, Private Landowners						In-Kind	Cost to minimize or halt future agricultural development are considered cost of doing business.
NaR-CCC-12.1.1.4	Action Step	Agricultural Practices	Investigate the potential to provide bypass flow from agricultural storage during critical low flow period of August through October.	2	20							TBD	
NaR-CCC-12.2	Objective	Agricultural Practices	Address the present or threatened destruction, modification or curtailment of the species habitat or range										
NaR-CCC-12.2.1	Recovery Action	Agricultural Practices	Prevent impairment to instream substrate/food productivity (impaired gravel quality and quantity).	2	40	CDFG, Farm Bureau, NMFS HCD, Private Landowners						TBD	Cost of implementing BMPs to agriculture producers is not known at this time. The cost BMPs for reducing sediment production, riparian protection, and water use will need to be determined.
NaR-CCC-12.2.1.1	Action Step	Agricultural Practices	Develop a Road Sediment Reduction Plan for agricultural lands that prioritizes problem sites and outlines implementation and a timeline of necessary actions.	2	10	Private Consultants, Private Landowners						TBD	
NaR-CCC-12.2.1.2	Action Step	Agricultural Practices	Address sediment and runoff sources from road networks and other actions that deliver sediment and runoff to stream channels.	2	10	Board of Forestry, CDFG, Farm Bureau, NMFS, Private Landowners	394.00	394.00				788	Cost base on road inventory of 550 miles (assume 25% of road network) estimated at \$927/mile and sediment assessment (assume 10% of road network) estimated at \$1,385/mile.
NaR-CCC-12.2.1.3	Action Step	Agricultural Practices	Work with landowners to assess the effectiveness of erosion control measures throughout the winter period.	2	10	Farm Bureau, NMFS, Private Consultants, Private Landowners							Cost accounted for in above action step.

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			
NaR-CCC-12.2.1.4	Action Step	Agricultural Practices	Continue implementation of the NRCS/RCD coordinated permit program for fishery restoration practices.	2	30							In-Kind		
NaR-CCC-16.1	Objective	Fishing/Collecting	Address the inadequacy of existing regulatory mechanisms											
NaR-CCC-16.1.1	Recovery Action	Fishing/Collecting	Prevent reduced density, abundance, and diversity											
NaR-CCC-16.1.1.1	Action Step	Fishing/Collecting	NMFS and CDFG will work to improve the California Freshwater Sport Fishing Regulations to minimize take of adult salmonids.	2	30	CDFG, NMFS, Public							In-Kind	
NaR-CCC-16.1.1.2	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 and replace with the Navarro River USGS gauging station (11468000) to reflect hydrologic conditions for coastal streams.	2	20								In-Kind	
NaR-CCC-16.1.1.3	Action Step	Fishing/Collecting	Reduce poaching of adult coho salmon by increasing law enforcement.	2	20								TBD	Cost are difficult to determine because of availability of increased law enforcement.
NaR-CCC-19.1	Objective	Logging	Address the present or threatened destruction, modification or curtailment of the species habitat or range	3	60	California Coastal Conservancy, Private Landowners, State Parks							TBD	Cost would be millions for purchase and operation of additional land held by the State or other entity.
NaR-CCC-19.1.1	Recovery Action	Logging	Prevent increased landscape disturbance											
NaR-CCC-19.1.1.1	Action Step	Logging	Should large tracts of forestlands within any watershed identified as a priority in this recovery plan become available for purchase, the Federal Government, State of California, or other entities should consider purchasing the area as a conservation area.	3		BLM, CDFG, Redwood Forest Foundation							TBD	Will vary with specific tract and current market value.
NaR-CCC-19.1.1.2	Action Step	Logging	Increase size of Navarro River Redwoods State Park if opportunities arise. At the minimum purchase or develop conservation easement on lower tributaries and associated riparian areas, including important coho salmon tributaries such as Flynn Creek.	1	20	Mendocino Redwood Company, Private Landowners, State Parks							TBD	Cost to acquire parcels cannot be determined due to fluctuations in market value and rate of turnover.

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		
NaR-CCC-19.1.1.3	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).	3	30							TBD	
NaR-CCC-19.1.2	Recovery Action	Logging	Prevent impairment to instream substrate/food productivity (impaired gravel quality and quantity)										
NaR-CCC-19.1.2.1	Action Step	Logging	Encourage all permanent and year-round access roads beyond the THP parcel be surfaced after harvest completion with base rock and road gravel, asphalt, or chipseal, as appropriate.	1	60	CalFire, CDFG, NMFS, Private Landowners, RWQCB						TBD	See roads and sediment actions.
NaR-CCC-19.1.2.2	Action Step	Logging	New THPs should identify problematic legacy roads within WLPZ's, decommission them, and revegetate the area with appropriate native species.	1	40	CalFire, CDFG, NRCS, Private Landowners						TBD	Cost are estimated in sediment reduction actions and roads actions.
NaR-CCC-19.1.2.3	Action Step	Logging	Map unstable soils and use that information to guide land use decisions, road design, THPs, and other activities that can promote erosion.	2	60	CalFire, CDFG, Private Consultants, Private Landowners, RWQCB						In-Kind	These action occur now in CA THP process, therefore cost is expected to be minimal.
NaR-CCC-19.1.2.4	Action Step	Logging	Encourage tree retention on the axis of headwall swales. Any deviations should be reviewed and receive written approval by a licensed engineering geologist.	3	60	Private Landowners						In-Kind	Additional cost of retaining trees is not know at this time. Landowners need to estimate timber volumes that would be lost.
NaR-CCC-19.1.3	Recovery Action	Logging	Prevent adverse alterations to riparian species composition and structure										
NaR-CCC-19.1.3.1	Action Step	Logging	Explore acquisition or conservation easements from willing land-owners.	3	20	Private Consultants, Private Landowners						TBD	Cost difficult to determine because of fair market value and rate of turnover.
NaR-CCC-19.1.3.2	Action Step	Logging	Allow trees in riparian areas to age, die, and recruit into the stream naturally.	2	60	Board of Forestry, CalFire, Mendocino County, Mendocino Redwood Company, Private Landowners							
NaR-CCC-19.2	Objective	Logging	Address the inadequacy of existing regulatory mechanisms										

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
NaR-CCC-19.2.1	Recovery Action	Logging	Prevent increased landscape disturbance										
NaR-CCC-19.2.1.1	Action Step	Logging	Assign NMFS staff to conduct THP reviews in Navarro River watershed Core areas.	2	50							In-Kind	
NaR-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.	1	3	CalFire, NMFS, NMFS OLE, Private Landowners, RWQCB						In-Kind	
NaR-CCC-19.2.1.3	Action Step	Logging	Discourage Counties from rezoning forestlands to rural residential or other land uses (e.g., vineyards).	1	20	CDFG, Mendocino County, NMFS PRD, RWQCB, State Parks						In-Kind	
NaR-CCC-19.2.1.4	Action Step	Logging	Discourage home building or other incompatible land use in areas identified as timber production zones (TPZ).	1	60	CalFire, Mendocino County, NMFS, Private Landowners						In-Kind	
NaR-CCC-23.1	Objective	Roads/Railroads	Address the present or threatened destruction, modification, or curtailment of the species habitat or range										
NaR-CCC-23.1.1	Recovery Action	Roads/Railroads	Prevent impairment to instream substrate/food productivity (impaired gravel quality and quantity)										
NaR-CCC-23.1.1.1	Action Step	Roads/Railroads	Restoration projects that upgrade or decommission high risk roads in Core areas should be considered a high priority for funding (e.g., PCSRF). Where no Core areas are designated, apply this action to Phase I areas.	1	10	CDFG, Mendocino County, Mendocino Redwood Company, NOAA RC, Private Landowners	630	630				1,260	Cost based on decommissioning 105 miles of riparian road network at a rate of \$12,000/mile. If roads were upgraded only, cost would equal \$2,205,000
NaR-CCC-23.1.1.2	Action Step	Roads/Railroads	For all rural (unpaved) and seasonal dirt roads apply best management practices for road construction maintenance management and decommissioning (e.g. Weaver and Hagans, 1994; Sommarstrom et al., 2002; Oregon Department of Transportation, 1999).	1	10	CDFG, Mendocino County Department of Public Works, Mendocino Redwood Company, NOAA RC, NRCS, Private Landowners, Public, RCD	2,100	2,100				4,200	Cost based on treating 200 miles of road at a rate of \$21,000/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		
NaR-CCC-23.1.1.3	Action Step	Roads/Railroads	Conduct annual inspections of all roads prior to winter. Correct conditions that are likely to deliver sediment to streams.	1	5	CDFG, NOAA RC, Private Landowners, RCD						TBD	Cost accounted for in road and sediment assessment.
NaR-CCC-23.1.1.4	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	20							In-Kind	
NaR-CCC-23.1.1.5	Action Step	Roads/Railroads	Establish a moratorium on new road construction within floodplains, riparian areas, unstable soils or other sensitive areas until a watershed specific and/or agency/company specific road management plan is created and implemented.	2	30							In-Kind	
NaR-CCC-23.1.1.6	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).	2	30								Cost accounted for in restoration projects that upgrade or decommission riparian roads.
NaR-CCC-24.1	Objective	Severe Weather Patterns	Address the inadequacy of existing regulatory mechanisms	1		CalFire, California Geological Survey, CalTrans, CDFG, Mendocino Redwood Company, NRCS, Private Landowners, Public, RCD, RWQCB							
NaR-CCC-24.1.1	Recovery Action	Severe Weather Patterns	Prevent impairment to hydrology										
NaR-CCC-24.1.1.1	Action Step	Severe Weather Patterns	If predicted flows are below a level considered critical to maintain viable rearing habitat for salmonids, measures to reduce water consumption should be initiated by municipal water suppliers and other users in the watershed through conservation programs.	2	60	Mendocino County, NOAA RC, Private Landowners, Public, SWRCB						TBD	An analysis of critical flow levels is needed to determine amount of water to determine extent of reduced in water consumption
NaR-CCC-24.1.1.2	Action Step	Severe Weather Patterns	Critical flow values should include minimum bypass flow requirements to support upstream adult migration during winter months and juvenile rearing in the summer and fall months.	2	60	CDFG, NMFS, NMFS OLE, Private Landowners, SWRCB						TBD	Cost of providing bypass flow can not be estimated without further analysis.

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		
NaR-CCC-24.1.1.3	Action Step	Severe Weather Patterns	Encourage SWRCB to bring illegal water diverters and out-of-compliance diverters into compliance with State law.	2	20	NOAA RC, Private Landowners, USACE						In-Kind	
NaR-CCC-24.1.2	Recovery Action	Severe Weather Patterns	Prevent impairment to instream substrate/food productivity (impaired gravel quality and quantity)	3	20	CDFG, Mendocino County, NMFS, RWQCB						TBD	Additional analysis needed to determine cost of modifying regulations at various levels.
NaR-CCC-24.1.2.1	Action Step	Severe Weather Patterns	Protect high-risk shallow-seeded landslide areas and surfaces prone to erosion from being mobilized by intense storm events.	2	60	Board of Forestry, CalFire, CDFG, Mendocino County, Private Landowners						TBD	Cost of protecting high risk areas is unknown at this time.
NaR-CCC-24.1.2.2	Action Step	Severe Weather Patterns	New development in all historic CCC coho salmon watersheds should meet a zero net increase in storm-water runoff, changes in duration, or magnitude of peak flow.	2	60							In-Kind	
NaR-CCC-24.1.2.3	Action Step	Severe Weather Patterns	Coordinate with county planners to eliminate or reduce new construction of permanent infrastructure that will adversely affect watershed processes, particularly within the 100-year flood prone zones in all historic CCC coho salmon watersheds.	2	50							In-Kind	
NaR-CCC-24.1.2.4	Action Step	Severe Weather Patterns	Develop Bank Stabilization and Floodplain Guidelines for use by private and public entities.	2	50							In-Kind	
NaR-CCC-25.1	Objective	Water Diversion/Impoundment	Abate the threat contribution to HYDROLOGY.										
NaR-CCC-25.1.1	Recovery Action	Water Diversion/Impoundment	Address the inadequacy of existing regulatory mechanisms										
NaR-CCC-25.1.1.1	Action Step	Water Diversion/Impoundment	Support SWRCB in regulating the use of streamside wells and groundwater.	2	20							In-Kind	
NaR-CCC-25.1.1.2	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							In-Kind	

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							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
NaR-CCC-25.1.1.3	Action Step	Water Diversion/Impoundment	Work with CDFG during the 1600 permit process to re-establish natural flow regimes to improve adult migration to spawning habitats and smolt outmigration. Develop bypass flow plans for ponds and reservoirs to reduce the potential for impacts to fall flows that may inhibit adult coho passage.	2	30							In-Kind	
NaR-CCC-25.2	Objective	Water Diversion/Impoundment	Address the inadequacy of existing regulatory mechanisms.										
NaR-CCC-25.2.1	Recovery Action	Water Diversion/Impoundment	Improve flow conditions (instantaneous conditions)										
NaR-CCC-25.2.1.1	Action Step	Water Diversion/Impoundment	Work with SWRCB and landowners to restore and maintain the natural hydrograph between March 1 and May 15 to minimize impacts to coho fry due to stranding by implementing alternative frost protection strategies.	2	10							In-Kind	