

# Ten Mile River



Location	• Mendocino County
Watershed Area	• 120.0 Square Miles
Potential Habitat	• 118.5 Stream Miles
Vegetation	• 75% Coniferous • 12% Riparian or Montane Forest
Erodability	• Moderate to High
Ownership Patterns	• 99% Private
Dominant Land Uses	• Timber
Housing Density	• Low
TMDL Pollutants	• Sediment and Temperature



South Fork Ten Mile River.  
Photo provided by KRIS Information System, and is used with permission.

## Ten Mile River Coho Salmon: Persistent – Low Abundance



### Recovery Goals

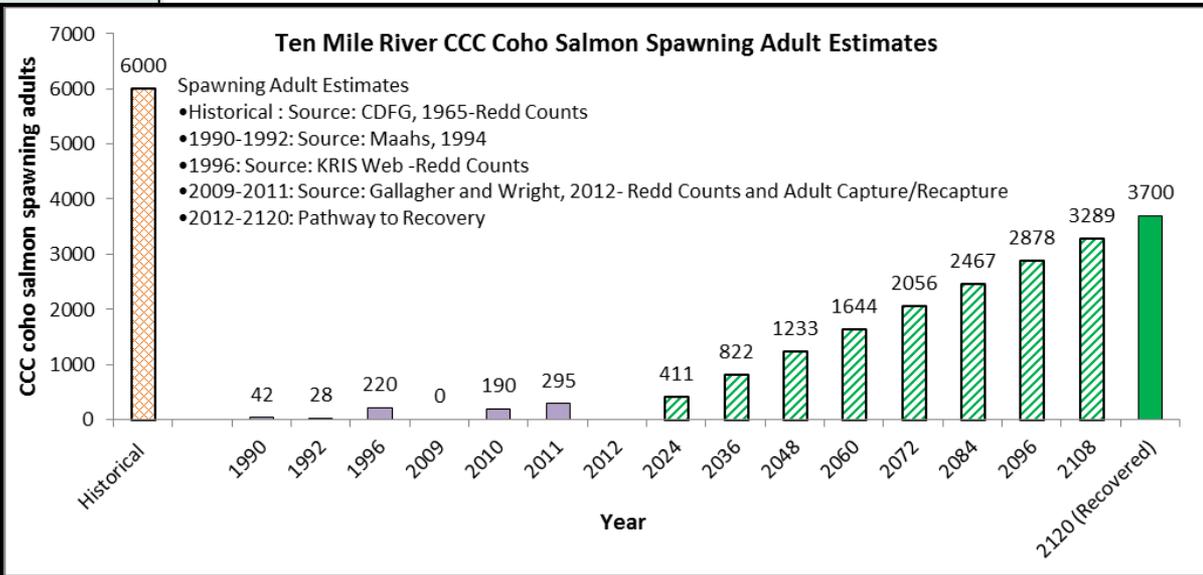
✓ Conduct periodic, standardized spawning surveys to estimate adult abundance in the watershed

**Ten Mile River Creek  
Adult Spawner Targets**

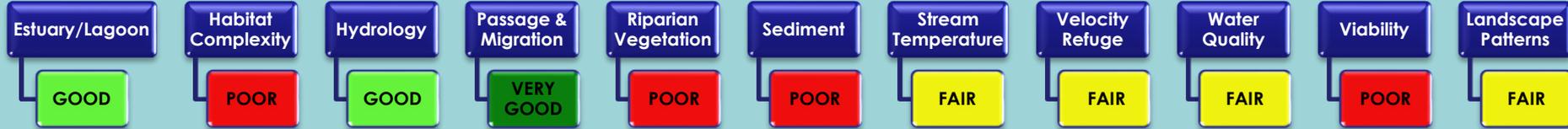
**Downlisting to Threatened  
1850**

**Recovery  
3700**

**STEELHEAD: YES**  
**CHINOOK SALMON: YES**



## Current Instream, Watershed and Population Conditions



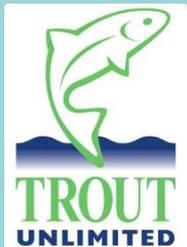
## Preventing Extinction & Improving Conditions

### Priority 1: Immediate Restoration Actions

- Promote restoration projects designed to create or restore alcove, backchannel, ephemeral tributary, or seasonal pond habitats
- Promote restoration projects designed to create or restore complex habitat features
- Retain, recruit and actively input large wood into stream

### Priority 2 & 3: Long-Term Restoration Actions

- Promote the re-vegetation of the native riparian plant community within inset floodplains and riparian corridors along the lower mainstem reaches
- Fully implement the Ten Mile River TMDL
- Establish a life cycle monitoring station in the Ten Mile River watershed

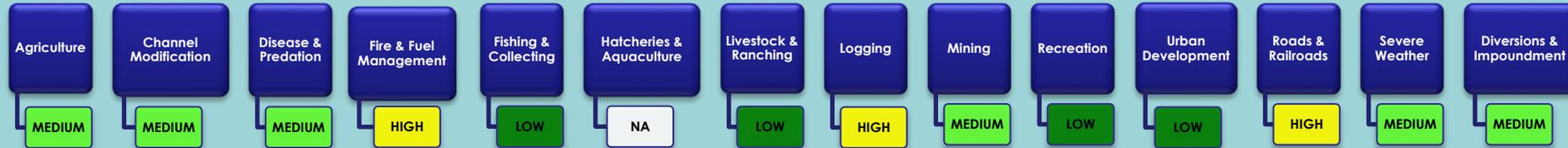


## Recovery Partners

Blencowe Forestry



## Future Threats



## Reducing Future Threats

### Priority 1: Immediate Threat Abatement Actions

- Minimize timber harvest on unstable slopes
- Discourage home building or other incompatible land use in areas identified as timber production zones
- Identify and hydrologically disconnect problematic legacy roads or landings within WLPZ's
- Design new roads to avoid unstable slopes, wetlands, floodplains and other areas of high habitat value
- Conduct annual inspections of all roads and correct conditions that are likely to deliver sediment to streams



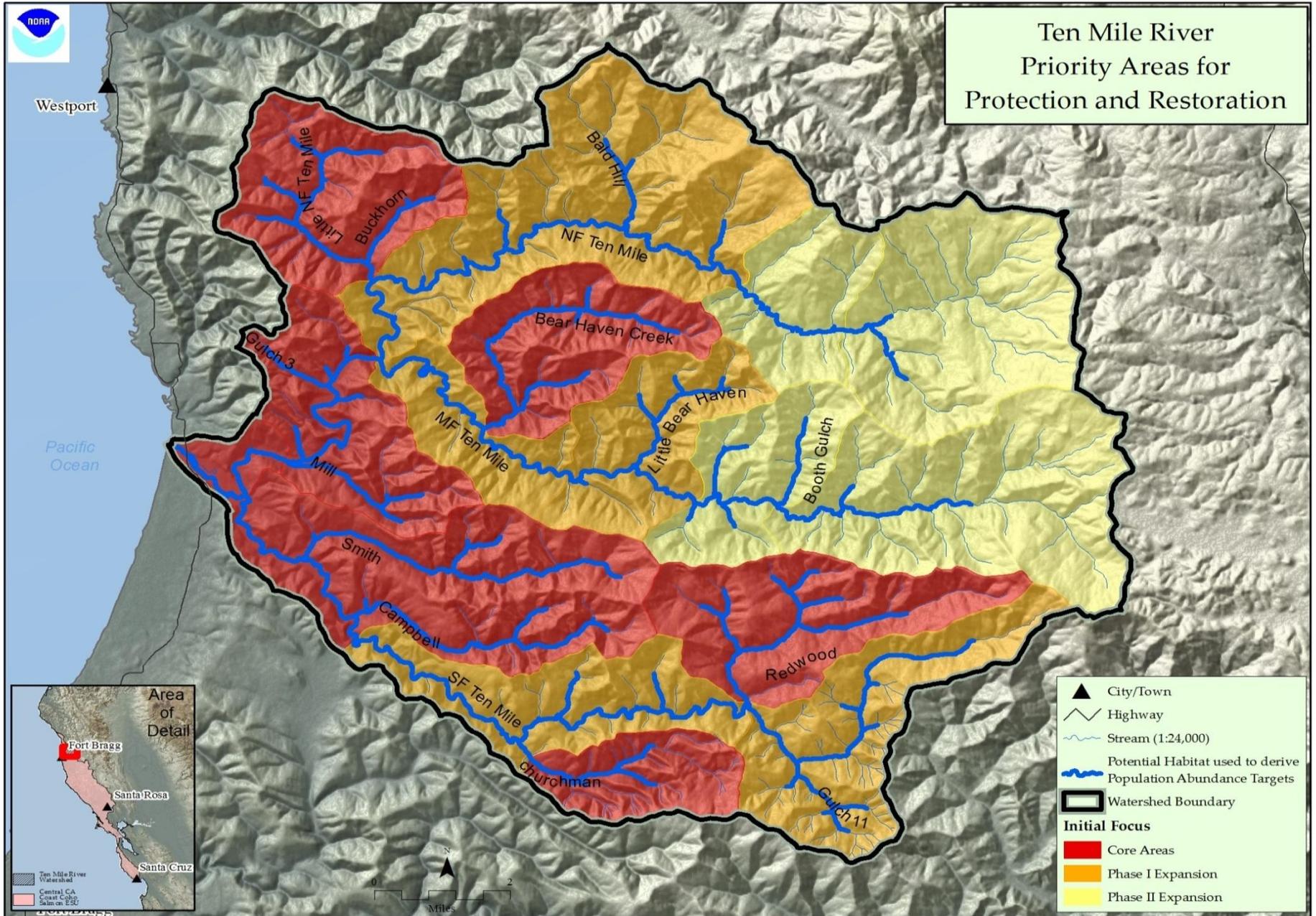
LWD on Ten Mile Creek  
Photo Courtesy: Campbell Timberland Management

### Priority 2 & 3: Long-Term Threat Abatement Actions

- Implement sediment reduction techniques in concert with prescribed fire or fire suppression techniques
- Avoid or minimize adverse impacts of timber harvest to off-channel habitats, floodplains, ponds, and oxbows
- Protect headwater channels with larger buffers and encourage tree retention to minimize sediment delivery
- Manage riparian areas for their site potential composition and structure
- Encourage wider riparian buffer zones in areas where stream are limiting
- Encourage low impact timber harvest techniques, and implementation of restoration projects as part of ongoing timber management practices

## Conservation Highlights

- The Nature Conservancy is working with landowners in the lower watershed to assess and improve floodplain connectivity
- Campbell Timberland Management, Trout Unlimited, CDFG, and Blencowe Forestry have collaborated to restore habitat complexity through placement of large woody debris structures and sediment remediation projects.
- Problem roads have been decommissioned, reducing sediment inputs to streams.



**Figure 1: Map of Ten Mile River**  
Ten Mile River

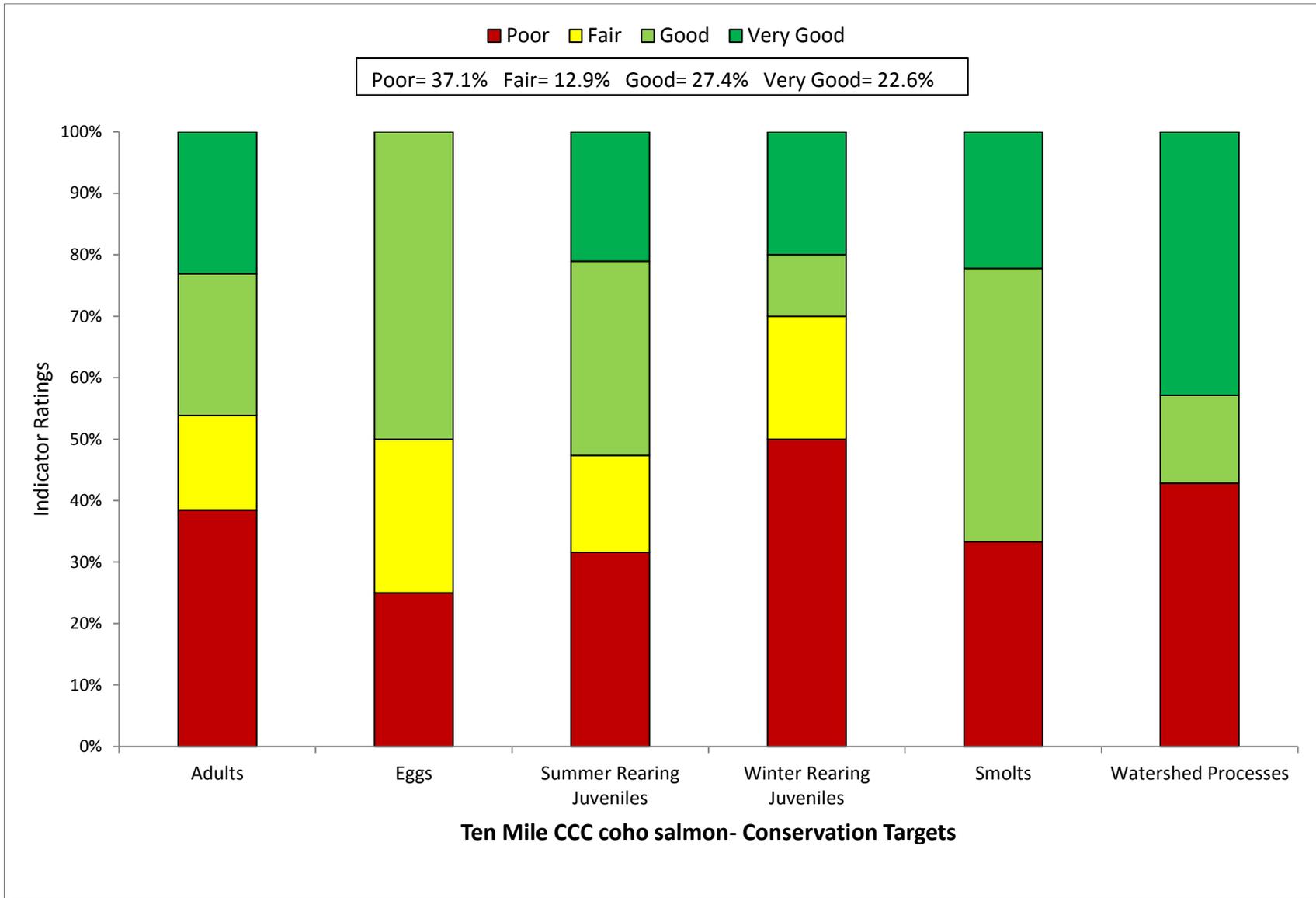


Figure 2: Viability Results by Lifestage

**Table 1: CAP Viability Results ~ Ten Mile River**

Target	Attribute	Indicator	Result	Rating	Method	Desired Criteria
Adults	Habitat Complexity	Large Wood Frequency (BFW 0-10 meters)	4 to 6 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)	0.45 LWD jams over 138403m.	Poor	NMFS Expert Estuary/Lagoon Panel	1.3 to 4 Key Pieces/100 meters
Adults	Habitat Complexity	Pool/Riffle/Flatwater Ratio	90% of streams 97% IP-km (>30% Pools; >20% Riffles)	Very Good	SEC Analysis/CDFG Data	75% to 90% of streams/ IP-Km (>30% Pools; >20% Riffles)
Adults	Habitat Complexity	Shelter Rating	10% stream 2% IP-km (>80 stream average)	Poor	SEC Analysis/CDFG Data	75% to 90% of streams/ IP-Km (>80 stream average)
Adults	Hydrology	Passage Flows	Risk Factor Score =50	Good	SEC Analysis/CDFG Data	NMFS Flow Protocol: Risk Factor Score 35-50
Adults	Passage/Migration	Passage at Mouth or Confluence	>90% of IP-km accessible	Very Good	SEC Analysis/CDFG Data	75% of IP-Km to 90% of IP-km
Adults	Passage/Migration	Physical Barriers	100% of IP-km accessible	Very Good	SEC Analysis/CDFG Data	75% of IP-Km to 90% of IP-km
Adults	Riparian Vegetation	Tree Diameter (North of SF Bay)	35% 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 Gravels	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	50-80% Response Reach Connectivity	Fair	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	<50% of streams/ IP-km maintains severity score of 3 or lower	Poor	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 =50	Good	SEC Analysis/CDFG Data	NMFS Flow Protocol: Risk Factor Score 35-50
Eggs	Hydrology	Redd Scour	Risk Factor Score =50	Good	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)	3% streams 0% IP-km (>50% stream average scores of 1 & 2)	Poor	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	Properly Functioning Condition	Good	NMFS Instream Flow Analysis	Properly Functioning Condition
Summer Rearing Juveniles	Habitat Complexity	Large Wood Frequency (Bankfull Width 0-10 meters)	4 to 6 Key Pieces/100m	Fair	NMFS Instream Flow Analysis	6 to 11 key pcs/100m
Summer Rearing Juveniles	Habitat Complexity	Large Wood Frequency (Bankfull Width 10-100 meters)	0.45 LWD Jans over 138403m	Poor	NMFS Instream Flow Analysis	1.3 to 4 Key Pieces/100 meters
Summer Rearing Juveniles	Habitat Complexity	Percent Primary Pools	14% streams 32% 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	90% streams 97% IP-km (>30% Pools; >20% Riffles)	Very Good	NMFS Instream Flow Analysis	75% to 90% of streams/ IP-Km (>30% Pools; >20% Riffles)
Summer Rearing Juveniles	Habitat Complexity	Shelter Rating	10% stream 2% 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 =50	Good	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	1 Diversion/23.9 km	Good	NMFS Watershed Characterization	0.01 - 1 Diversions/10 IP km
Summer Rearing Juveniles	Passage/Migration	Passage at Mouth or Confluence	>90% of IP-km accessible	Very Good	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	94% of streams/ IP-km (>85% average stream canopy)	Very 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)	35% 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)	3% streams 0% IP-km (>50% stream average scores of 1 & 2)	Poor	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)	50-74% IP km (<16 C MWMT)	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	50-74% of Historical Range	Fair	NMFS Watershed Characterization/CWHR	75-90% of Historical Range
Winter Rearing Juveniles	Habitat Complexity	Large Wood Frequency (Bankfull Width 0-10 meters)	4 to 6 Key Pieces/100m	Fair	NMFS Watershed Characterization/CWHR	6 to 11 key pcs/100m
Winter Rearing Juveniles	Habitat Complexity	Large Wood Frequency (Bankfull Width 10-100 meters)	0.45 LWD Jams over 138403m	Poor	NMFS Watershed Characterization/CWHR	1.3 to 4 Key Pieces/100 meters
Winter Rearing Juveniles	Habitat Complexity	Pool/Riffle/Flatwater Ratio	90% streams 97% IP-km (>30% Pools; >20% Riffles)	Very Good	NMFS Watershed Characterization/CWHR	75% to 90% of streams/ IP-Km (>30% Pools; >20% Riffles)
Winter Rearing Juveniles	Habitat Complexity	Shelter Rating	10% stream 2% IP-km (>80 stream average)	Poor	CDF Vegetation Maps/BPJ	75% to 90% of streams/ IP-Km (>80 stream average)
Winter Rearing Juveniles	Passage/Migration	Physical Barriers	100% of IP-km accessible	Very Good	Population Profile/BPJ	75% of IP-Km to 90% of IP-km
Winter Rearing Juveniles	Riparian Vegetation	Tree Diameter (North of SF Bay)	35% 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% of streams/ IP-Km (>50% stream average scores of 1 & 2)	Poor	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	No Acute or Chronic	Good	NMFS Watershed Characterization	No Acute or Chronic
Winter Rearing Juveniles	Water Quality	Turbidity	<50% of streams/ IP-km maintains severity score of 3 or lower	Poor	NMFS Watershed Characterization	75% to 90% of streams/ IP-Km maintains severity score of 3 or lower

Smolts	Estuary/Lagoon	Quality & Extent	Properly Functioning Condition	Good	SEC Analysis/CDFG Data	Properly Functioning Condition
Smolts	Habitat Complexity	Shelter Rating	10% stream 2% IP-km (>80 stream average)	Poor	Population Profile	75% to 90% of streams/ IP-Km (>80 stream average)
Smolts	Hydrology	Number, Condition and/or Magnitude of Diversions	1 Diversion/23.9 km	Good	Population Profile	0.01 - 1 Diversions/10 IP km
Smolts	Hydrology	Passage Flows	Risk Factor Score =42	Good	TRT Spence (2008)	NMFS Flow Protocol: Risk Factor Score 35-50
Smolts	Passage/Migration	Passage at Mouth or Confluence	>90% of IP-km accessible	Very Good	TRT Spence (2008)	75% of IP-Km to 90% of IP-km
Smolts	Smolification	Temperature	>90% IP-Km (>6 and <16 C)	Very 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	<50% of streams/ IP-km maintains severity score of 3 or lower	Poor	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	0.08% of Watershed in Impervious Surfaces	Very Good	SEC Analysis	3-6% of Watershed in Impervious Surfaces
Watershed Processes	Landscape Patterns	Agriculture	0% of Watershed in Agriculture	Very Good	EPA/RWQCB/NMFS Criteria	10-19% of Watershed in Agriculture
Watershed Processes	Landscape Patterns	Timber Harvest	42% of Watershed in Timber Harvest	Poor	Newcombe and Jensen 2003	25-15% of Watershed in Timber Harvest
Watershed Processes	Landscape Patterns	Urbanization	5% 1unit/20ac. 95%<1unit/160ac.	Very Good	EPA/RWQCB/NMFS Criteria	8-11% of watershed >1 unit/20 acres
Watershed Processes	Riparian Vegetation	Species Composition	51-74% Historical Species Composition	Good	Newcombe and Jensen 2003	51-74% Intact Historical Species Composition
Watershed Processes	Sediment Transport	Road Density	7.2 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 ~ Ten Mile 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	Low	Low	Medium	Medium	Low	Low	Medium
2	Channel Modification	Medium	Low	Medium	Low	Low	Low	Medium
3	Disease, Predation and Competition	Low	-	Medium	Low	Medium	Low	Medium
4	Fire, Fuel Management and Fire Suppression	Medium	Medium	Medium	High	Medium	Medium	High
5	Fishing and Collecting	Low	-	Low	-	Low	-	Low
6	Hatcheries and Aquaculture	-	-	-	-	-	-	-
7	Livestock Farming and Ranching	Low	Low	Medium	Low	Low	Low	Low
8	Logging and Wood Harvesting	Medium	Medium	Medium	High	Low	High	High
9	Mining	Low	Low	Medium	Medium	Low	Low	Medium
10	Recreational Areas and Activities	Low	Low	Medium	Low	Low	Low	Low
11	Residential and Commercial Development	Low	Low	Medium	Low	Low	Low	Low
12	Roads and Railroads	Medium	High	Medium	High	Low	High	High
13	Severe Weather Patterns	Medium	Medium	Medium	Medium	Medium	Medium	Medium
14	Water Diversion and Impoundments	Medium	Low	Medium	Low	Low	Low	Medium
Threat Status for Targets and Project		Medium	Medium	High	High	Medium	High	High

# Central CA Coast Coho Salmon ~ Ten Mile 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:** Improve the quality and extent of freshwater lagoon habitat

1.1.1.1. **Action Step:** Initiate estuary study to evaluate limiting factors in Ten Mile River estuary.

1.1.1.2. **Action Step:** Where feasible, remove structures and modify practices that degrade or reduce the historical estuarine extent or functions to benefit coho salmon and steelhead.

1.1.1.3. **Action Step:** Evaluate feasibility enhancing the estuary with physical habitat improvement. Implement project if feasible and if determined to result in benefits to salmonid survival.

### 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:** Increase and enhance velocity refuge

2.1.1.1. **Action Step:** Promote restoration projects designed to create or restore alcove, backchannel, ephemeral tributary, or seasonal pond habitats.

2.1.1.2. **Action Step:** Existing beaver habitat should be protected, and issues related to flooding resolved without the removal of beaver habitat (e.g. flow reduction devices, etc.)

### 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 LWD, primary pools and shelter ratings.

3.1.1.1. **Action Step:** Identify historical 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.

3.1.1.2. **Action Step:** Install properly sized large woody debris to appropriate viability table targets.

3.1.1.3. **Action Step:** Encourage coordination of LWD placement in streams as part of logging operations and road upgrades to maximize size, quality, and efficiency of effort (CDFG 2004).

3.1.1.4. **Action Step:** Encourage retention and recruitment of large woody debris for all historical CCC coho salmon streams to maintain and enhance current stream complexity, pool frequency, and depth. Consult a hydrologist and qualified fisheries biologist before removing wood from streams.

#### 4. Restoration- Hydrology

No species-specific actions were developed.

#### 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:** Reduce adverse impacts to watershed processes associated with road density

5.1.1.1. **Action Step:** Reduce road densities by 10 percent over the next 20 years, prioritizing high risk areas in historical habitats.

5.1.2. **Recovery Action:** Reduce adverse impacts to watershed processes associated with timber harvest

5.1.2.1. **Action Step:** Reduce the amount and rate of even aged management.

#### 6. Restoration- Passage

No species-specific actions were developed.

#### 7. Restoration- Pool Habitat

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

#### 8. Restoration- Riparian

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

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

8.1.1.1. **Action Step:** 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.

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

#### 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:** Reduce turbidity and suspended sediment

9.1.1.1. **Action Step:** Fully implement Ten Mile River TMDL.

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

9.1.1.3. **Action Step:** Where restricting winter access to unpaved roads is not feasible, encourage measures such as rocking to prevent sediment from reaching coho salmon streams (CDFG 2004).

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

- 9.1.2.1. **Action Step:** Locations for sediment catchment basins should be identified, developed and maintained, where appropriate.
- 9.1.2.2. **Action Step:** Stabilize the Miller Pond dam in Little North Fork Ten Mile to prevent catastrophic failure and massive sediment input into critical downstream spawning and rearing areas.

## **10. Restoration- Viability**

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

10.1.1. **Recovery Action:** Refine assessment methods to more accurately identify and measure key habitat attributes.

10.1.1.1. **Action Step:** Implement standardized assessment protocols (i.e., CDFG habitat assessment protocols) to ensure ESU-wide consistency.

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

10.1.2.1. **Action Step:** Establish a life cycle stations in the Ten Mile River watershed (Gallagher and Gallagher 2005). Consider placing a life cycle station on one key tributary (e.g., Little North Fork Ten Mile, Bear Haven, Campbell creeks) or, if possible, in each subwatershed (North Fork, Clark Fork, South Fork).

10.1.3. **Recovery Action:** Increase abundance

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

## **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:** Plant native vegetation to promote streamside shade where otherwise deficient (i.e., lower reaches of North Fork and South Fork).

11.1.2. **Recovery Action:** Reduce turbidity and suspended sediment

11.1.2.1. **Action Step:** Develop a Road Sediment Reduction Plan that prioritizes sites and outlines implementation and a timeline of necessary actions.

## *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**

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

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

15.1.1.1. **Action Step:** Implement sediment reduction techniques in concert with prescribed fire techniques to minimize sediment impacts to various coho salmon life stages.

15.1.1.2. **Action Step:** Immediately implement appropriate sediment control measures following completion of fire suppression while firefighters and equipment are on site.

15.1.1.3. **Action Step:** Reduce erosion from fire prevention or suppression activities by maintaining existing natural topography to the extent possible.

15.1.1.4. **Action Step:** Re-contour any new facility sites as soon as possible after site cleanup and fire.

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

15.1.2.1. **Action Step:** In the event of a wildfire, we recommend CalFire Resource Advisors inform the resource agencies for ESA consultation (or technical assistance) about the incident. The resource agencies can provide guidance regarding critical resources in the area that may be affected by firefighting actions.

15.1.3. **Recovery Action:** Prevent impairment to stream hydrology (impaired water flow)

15.1.3.1. **Action Step:** Draft water from lakes and reservoirs not occupied by listed salmonids when possible. In fish-bearing streams, excavate active channel areas outside of wetted width to create off-stream pools for water source. Require all water trucks/tenders be fitted with CDFG and NMFS approved fish screens when water is acquired at fish bearing streams. Put up a silt fence or other erosion controls around the water extraction locations. Avoid significantly lower stream flows during water drafting.

15.2. **Objective:** Address the inadequacies of regulatory mechanisms.

15.2.1. **Recovery Action:** Prevent impairment to water quality

15.2.1.1. **Action Step:** Disseminate NMFS' October 9, 2007, jeopardy biological opinion on the use of fire retardants and its impacts to salmonids, to local firefighting agencies and CalFire.

## **16. Threat- Fishing/Collecting**

No species-specific actions were developed.

## **17. Threat- Hatcheries**

No species-specific actions were developed.

## **18. Threat- Livestock**

No species-specific actions were developed.

## **19. Threat- Logging**

Ten Mile River

- 19.1. **Objective:** Address the present or threatened destruction, modification, or curtailment of the species habitat or range.
- 19.1.1. **Recovery Action:** Prevent impairment to floodplain connectivity (impaired quality & extent)
- 19.1.1.1. **Action Step:** Timber harvest planning should evaluate and avoid or minimize adverse impacts to off-channel habitats, floodplains, ponds, and oxbows.
- 19.1.2. **Recovery Action:** Prevent impairment to stream hydrology (impaired water flow)
- 19.1.2.1. **Action Step:** Evaluate road surface treatment options to halt or minimize impacts from water drafting and diversion
- 19.1.3. **Recovery Action:** Allow trees in riparian areas to age, die, and recruit into the stream naturally.
- 19.1.3.1. **Action Step:** Timber management should be designed to allow trees in riparian areas to age, die, and naturally recruit into the stream.
- 19.1.4. **Recovery Action:** Prevent impairment to instream substrate/food productivity (impaired gravel quality and quantity)
- 19.1.4.1. **Action Step:** Protect headwater channels with larger buffers to minimize sediment delivery downstream.
- 19.1.4.2. **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.
- 19.1.4.3. **Action Step:** For areas with high or very high erosion hazard, extend the monitoring period and upgrade road maintenance for timber operations.
- 19.1.4.4. **Action Step:** Minimize timber harvest on unstable slopes adjacent to Class 1 streams in the North Fork Ten Mile.
- 19.1.5. **Recovery Action:** Prevent adverse alterations to riparian species composition and structure
- 19.1.5.1. **Action Step:** Manage riparian areas for their site potential composition and structure.
- 19.1.5.2. **Action Step:** Encourage wider riparian buffer zones in areas where stream temperatures or riparian canopy are found limiting.
- 19.1.6. **Recovery Action:** Prevent increased landscape disturbance
- 19.1.6.1. **Action Step:** Encourage low impact timber harvest techniques such as full-suspension cable yarding ( to improve canopy cover; reduce sediment input, etc.).
- 19.1.7. **Recovery Action:** Prevent alterations to sediment transport (road condition/density, etc.)
- 19.1.7.1. **Action Step:** All roads, landings, and skid trails associated with timber operations should, to the maximum extent practicable, be hydrologically disconnected to prevent sediment runoff and delivery to streams.
- 19.1.7.2. **Action Step:** Avoid new road construction in riparian zones

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

19.2.1.2. **Action Step:** Forest landowners should consider pooling resources for a watershed-wide HCP or GCP that could provide for incidental take authorization and promote survival and recovery of coho salmon

19.2.1.3. **Action Step:** Until no-take rules are developed or the State has a secured HCP or GCP, assign NMFS staff to conduct THP reviews and provide no-take recommendations by using revised "Guidelines for NMFS staff when Reviewing Timber Operations: Avoiding Take and Harm of Salmon and Steelhead" (NMFS 2004) or "Short Term HCP Guidelines" (NMFS 1999).

19.2.1.4. **Action Step:** Encourage timber landowners to implement restoration projects as part of their ongoing timber management practices in Core area stream reaches where large woody material is deficient.

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

19.2.1.6. **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 watershed hydrology

23.1.1.1. **Action Step:** Size culverts to accommodate flashy, debris-laden flows and maintain trash racks to prevent culvert plugging and subsequent road failure.

23.1.1.2. **Action Step:** Stream crossings on THP parcels should be identified and mapped with the intention of replacement or removal if they cannot pass 100 year flow. Design should include fail safe measures to accommodate culvert overflow without causing massive road fill failures.

- 23.1.2. **Recovery Action:** Prevent impairment to instream substrate/food productivity (impaired gravel quality and quantity)
- 23.1.2.1. **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).
- 23.1.2.2. **Action Step:** Fully maintain all roads with inside ditches unless these roads have been properly decommissioned. All roads with inside ditches should be evaluated, and problems addressed, prior to the winter season.
- 23.1.2.3. **Action Step:** Conduct periodic training for road maintenance crews regarding modern sediment remediation techniques protective of salmonids.
- 23.1.2.4. **Action Step:** Install sediment traps for pretreatment, and a modified culvert system that can act as an efficient detention system.
- 23.1.2.5. **Action Step:** Install and maintain adequate energy dissipaters for culverts and other drainage pipe outlets where needed.
- 23.1.2.6. **Action Step:** Establish adequate spoils storage sites throughout the watershed so that material from landslides and road maintenance can be stored safely away from watercourses. Coordinate these efforts with all landowners in the watershed.
- 23.1.2.7. **Action Step:** Conduct road and sediment reduction assessments to identify sediment-related and runoff-related problems and determine level of hydrologic connectivity. The assessments should prioritize sites and outline implementation timelines of necessary actions.
- 23.1.2.8. **Action Step:** Decommission riparian road systems and/or upgrade roads (and skid trails on forestlands) that deliver sediment into adjacent watercourses (CDFG 2004).
- 23.1.2.9. **Action Step:** All harvest plans should identify problematic unused legacy roads or landings with WLPZ's and ensure these areas are hydrologically disconnected and revegetated with native species where practicable following completion of harvest activities.
- 23.1.3. **Recovery Action:** Prevent impairment to floodplain connectivity (impaired quality & extent)
- 23.1.3.1. **Action Step:** Design new roads to avoid unstable slopes, wetlands, floodplains and other areas of high habitat value.
- 23.1.4. **Recovery Action:** Prevent impairment to passage and migration
- 23.1.4.1. **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.

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

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

23.2.1.1. **Action Step:** Permitting and funding agencies (State, Federal, and local) should evaluate all authorized erosion control measures during the winter period.

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

23.2.2.1. **Action Step:** Avoid 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, protective of salmonids and their habitat, is created and implemented.

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

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

23.2.3.2. **Action Step:** Limit winter use of unsurfaced roads and recreational trails to decrease fine sediment loads.

23.2.3.3. **Action Step:** Licensed engineering geologists should review and approve grading on inner gorge slopes.

#### **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 passage and migration

24.1.1.1. **Action Step:** Pursue opportunities to acquire or lease water, or acquire water rights from willing sellers, for coho salmon recovery purposes. Develop incentives for water right holders to dedicate instream flows for the protection of coho salmon (CDFG 2004)(Water Code § 1707).

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

24.1.2.1. **Action Step:** Existing areas with floodplains or off channel habitats should be protected from future urban development of any kind.

24.1.2.2. **Action Step:** Promote restoration projects designed to create or restore alcove, backchannel, ephemeral tributary, or seasonal pond habitats.

24.1.3. **Recovery Action:** Reduce turbidity and suspended sediment

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

#### **25. Threat- Water Diversion/Impoundment**

No species-specific actions were developed.

**26. Threat- Watershed Process**

No species-specific actions were developed.

**Table 3: Implementation Schedule ~ Ten Mile 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		
TMR-CCC-1.1	Objective	Estuary	Address the present or threatened destruction, modification, or curtailment of the species habitat or range										
TMR-CCC-1.1.1	Recovery Action	Estuary	Improve the quality and extent of freshwater lagoon habitat										
TMR-CCC-1.1.1.1	Action Step	Estuary	Initiate estuary study to evaluate limiting factors in Ten Mile River estuary.	3	5	CDFG, RWQCB, The Nature Conservancy, Trout Unlimited	275.00					275	Estimate based on a three year study period and relative costs from other estuary studies. Development of a multi-disciplinary Technical Advisory Committee (TAC) to develop the scientific foundation for this study is recommended. The TAC should be familiar with other estuaries and estuary reaches within the Lost Coast Diversity Stratum as well as past and ongoing studies within the CCC ESU. Cost based on estuary use/residence timing at a cost of \$273,487.
TMR-CCC-1.1.1.2	Action Step	Estuary	Where feasible, remove structures and modify practices that degrade or reduce the historical estuarine extent or functions to benefit coho salmon and steelhead.	3		Private Landowners, The Nature Conservancy, Trout Unlimited						TBD	Ten Mile Estuary is relatively intact and likely has few structures that have significantly modified the historical tidal prism and feeding and transition habitat. Costs are difficult to determine until after an evaluation is conducted outlines the extent of the habitat impairment.
TMR-CCC-1.1.1.3	Action Step	Estuary	Evaluate feasibility enhancing the estuary with physical habitat improvement. Implement project if feasible and if determined to result in benefits to salmonid survival.	3	10	CDFG, Private Landowners, The Nature Conservancy	105.00	105.00				210	Targeting likely limiting factors such as over wintering and smolt transition habitats should be a high priority. Cost based on wetland restoration at a cost of \$206,493.
TMR-CCC-2.1	Objective	Floodplain Connectivity	Address the present or threatened destruction, modification, or curtailment of the species habitat or range										
TMR-CCC-2.1.1	Recovery Action	Floodplain Connectivity	Increase and enhance velocity refuge										
TMR-CCC-2.1.1.1	Action Step	Floodplain Connectivity	Promote restoration projects designed to create or restore alcove, backchannel, ephemeral tributary, or seasonal pond habitats.	1	5	CalFire, Campbell Timberland Management, CDFG, Private Landowners	300.00					300	These actions should initially target habitat in Core areas and the lower portions of the three mainstems (North Fork, Clark Fork, and South Fork). Cost based on treating 8.3 miles (assume 1 project/mile in 25% High IP) at a rate of \$36,046/mile.
TMR-CCC-2.1.1.2	Action Step	Floodplain Connectivity	Existing beaver habitat should be protected, and issues related to flooding resolved without the removal of beaver habitat (e.g. flow reduction devices, etc.)	3	100	CalFire, Campbell Timberland Management, CDFG, Private Landowners						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		
TMR-CCC-3.1	Objective	Habitat Complexity	Address the present or threatened destruction, modification, or curtailment of the species habitat or range										
TMR-CCC-3.1.1	Recovery Action	Habitat Complexity	Increase LWD, primary pools and shelter ratings.										
TMR-CCC-3.1.1.1	Action Step	Habitat Complexity	Identify historical 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.	1	5	Campbell Timberland Management, CDFG, Private Landowners, The Nature Conservancy	250.00					250	In addition to projects that increase large wood volumes in the three major subwatersheds and their tributaries attention should also be focused in the lower floodplain areas along the lower South Fork Ten Mile and areas below the Clark Fork/North Fork confluence. Projects designed to increase winter refuge habitat in these floodplain areas should be considered a high priority for salmonid habitat recovery. In the past few years, Campbell Timberland Management has conducted significant effort to improve instream habitat complexity for salmonids through the addition of large woody material. Initial efforts were focused on the South Fork Ten Mile, and today the majority of the South Fork mainstem has been enhanced with LWD. LWD recruitment efforts are now focused on the North Fork Ten Mile and Clark Fork Ten Mile. In 2010 and 2011, approximately 15 miles of mainstem North Fork were enhanced with LWD. Campbell Timberland has indicated that these efforts will continue into the near future. Cost based on treating 10 miles (assume 1 project/mile in 50% High IP) at a rate of \$25,000/mile. Additional features such as riparian vegetation and boulders will increase 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		
TMR-CCC-3.1.1.2	Action Step	Habitat Complexity	Install properly sized large woody debris to appropriate viability table targets.	1	10	Campbell Timberland Management, CDFG, Private Consultants, Private Landowners, The Nature Conservancy, Trout Unlimited							<p>Campbell Timberlands has implemented numerous LWD projects at relatively low cost due their use of non-anchored material. This is significantly less expensive than engineered approaches. Data from DFG habitat inventories indicate shelter ratings throughout the Ten Mile River watershed are poor within all sampled reaches and this is a limiting factor for the summer rearing and smolt lifestages. Poor LWD ratings were documented within the watershed, due largely to a lack of functional instream habitat according to shelter rating values. LWD was likely removed during past land management activities and well intentioned stream clearing practices. However, since these surveys were completed in the mid-1990's, extensive efforts to improve instream habitat conditions have been conducted in the mainstem portions of the South Fork, Clark Fork and North Fork using the Accelerated Recruitment approach. To date 18 miles (29 km) of the Ten Mile have been augmented with LWD and another 19 miles (30.5 km) are targeted in the near future by Campbell Timberland Management. While significant efforts have occurred, it is likely that instream habitat conditions overall (including some of the tributaries and properties not managed by CTM) are not at the viability targets for these attributes. Costs accounted for in "Identify Historical Habitat Lacking Complexity."</p> <p>To implement this recommendation, additional streamlining of the THP process for LWD input by regulatory agencies is necessary. This recommendation should be adopted as a reoccurring recommendation for all restoration projects by individuals, agencies, and organizations that fund restoration projects. In Ten Mile stream reaches where there is little immediate downstream infrastructure, properly sized trees could be felled into stream channels to create these structures. Coordinating instream large wood placement with future timber harvest activities in the watershed could result in substantial cost savings and serve as an opportunity for effective timber harvest plan mitigation. Costs may vary significantly due to stream access, varying paucity of large wood between sub-watersheds, and installation techniques. Ten Mile has been habitat typed</p>

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		
TMR-CCC-3.1.1.3	Action Step	Habitat Complexity	Encourage coordination of LWD placement in streams as part of logging operations and road upgrades to maximize size, quality, and efficiency of effort (CDFG 2004).	1	100	CalFire, Campbell Timberland Management, CDFG, Private Landowners, RCD, RWQCB						In-Kind	and thus the stream reaches lacking wood can be readily identified. Projects will occur as part of ongoing timber harvest actions and have lower overall costs, resulting in significant savings compared to restoration projects occurring without timber management equipment already nearby. Installing large woody material into a stream deficient in large wood should be considered a top restoration priority, particularly in Core and Priority 1 subwatersheds. Restoration during harvest activities provides a unique opportunity to access key areas that are relatively undisturbed in comparison to areas of the watershed with a large rural residential footprint. Cost accounted for in identify historical habitats lacking complexity.
TMR-CCC-3.1.1.4	Action Step	Habitat Complexity	Encourage retention and recruitment of large woody debris for all historical CCC coho salmon streams to maintain and enhance current stream complexity, pool frequency, and depth. Consult a hydrologist and qualified fisheries biologist before removing wood from streams.	1	100	CalFire, CDFG, Private Landowners, RWQCB, USACE						In-Kind	This recommendation should be considered standard practice.
TMR-CCC-5.1	Objective	Landscape Patterns	Address the present or threatened destruction, modification, or curtailment of the species habitat or range										
TMR-CCC-5.1.1	Recovery Action	Landscape Patterns	Reduce adverse impacts to watershed processes associated with road density										
TMR-CCC-5.1.1.1	Action Step	Landscape Patterns	Reduce road densities by 10 percent over the next 20 years, prioritizing high risk areas in historical habitats.	3	10	CalFire, Campbell Timberland Management, Private Landowners	660	660				1,320	Costs may be significant and benefits should be weighed against additional upland disturbance and overall costs. This recommendation is more feasible within Ten Mile watershed because a large portion of it is owned by one landowner. Indiscriminate road density reduction should be avoided so as not to preclude inhibiting future road realignments that could also effectively reduce sediment delivery. Cost based on decommissioning 110 miles of road network at a rate of \$12,000/mile.
TMR-CCC-5.1.2	Recovery Action	Landscape Patterns	Reduce adverse impacts to watershed processes associated with timber harvest										
TMR-CCC-5.1.2.1	Action Step	Landscape Patterns	Reduce the amount and rate of even aged management.	3	100	CalFire, Campbell Timberland Management, Private Landowners						In-Kind	This recommendation should be considered standard practice.

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
TMR-CCC-8.1	Objective	Riparian	Address the present or threatened destruction, modification, or curtailment of the species habitat or range										
TMR-CCC-8.1.1	Recovery Action	Riparian	Improve tree diameter										
TMR-CCC-8.1.1.1	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.	2	20	CalFire, Campbell Timberland Management, CDFG, Private Landowners	401.25	401.25	401.25	401.25		1,605	Most of these lands (inset floodplains and riparian corridors) are used for forest management and it is anticipated that most of this cost will be absorbed as part of on going forestry practices. Additional cost may be incurred in the lower watershed where other land management actions occur, including minimal farming and minimal grazing. Many of the areas historically used for agricultural purposes have been extensively cleared of all riparian vegetation. Targeting restoration in these areas may result in some lands no-longer being farmed for hay production, etc. Landowner outreach will likely be required in these areas. Cost based on treating 1 mile (assume 80 acres/mile in 5% High IP) at a rate of \$20,057/acre.
TMR-CCC-8.1.1.2	Action Step	Riparian	Conduct conifer release to promote growth of larger diameter trees where appropriate.	2	10	CalFire, Campbell Timberland Management, Private Landowners	171.00	171.00				342	Historical logging practices effectively removed all of the original conifer overstory (principally redwood and Douglas-fir) throughout the basin. As a result, no old-growth riparian stands remain within the watershed. Analysis of WHR size classes for Ten Mile watershed suggests that riparian stands are relatively well stock, albeit at a much younger age and generally in smaller size classes. Loss of the original forest changed the rate of recruitment and the quality of instream habitat forming features (e.g., old growth redwoods can persist instream for hundreds of years as LWLD, and due to their large size create significant habitat forming features). Tree recruitment into the stream channel is likely at a slower rate than under historical conditions, due, in part, to the much younger age of the extant riparian stands. Cost based on riparian thinning 3 miles (assume 80 acres/mile in 15% High IP) at a rate of \$1,422/acre. Cost is expected to be minimal because most of the watershed is subject to active timber management. Additional cost may be incurred in the lower watershed where other land management actions occur.

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		
TMR-CCC-9.1	Objective	Sediment	Address the present or threatened destruction, modification, or curtailment of the species habitat or range										
TMR-CCC-9.1.1	Recovery Action	Sediment	Reduce turbidity and suspended sediment										
TMR-CCC-9.1.1.1	Action Step	Sediment	Fully implement Ten Mile River TMDL.	2	20	CalFire, Campbell Timberland Management, Private Landowners, RWQCB						In-Kind	High levels of instream fine sediment and turbidity likely impair the egg, smolt, and winter rearing lifestages within many basins in Ten Mile River Watershed. Ten Mile River is considered impaired due to high instream sediment conditions (USEPA 2000). The source analysis in Ten Mile TMDL included an assessment of sediment sources historically and/or presently impacting water quality. Several management-related factors have contributed to the elevated sediment delivery rates throughout the watershed, primarily the high rate of timber harvest and associated road building. While overall rates have declined in the 67-year study period from 1933-1999, the USEPA (2000) determined that sediment generation from road surface erosion had increased. Current sediment delivery from all sources is estimated at 629 tons/mi <sup>2</sup> /yr., with about 50% of the total amount attributed to natural processes (i.e., background) and the rest management-related (USEPA 2000). Ten Mile River does not have time lines specified. Rapid implementation will result in greater cost, but it could result in significant benefits. The TMDL targets high priority areas for implementation that are similar to NMFS prioritization for coho protection. It is anticipated most cost will be included as part of upgrades associated with future timber harvest actions. Ten Mile River TMDL does not have time lines specified. Rapid implementation will result in greater cost, but it could result in significant benefits. The TMDL targets high priority areas for implementation that are similar to NMFS prioritization for coho protection. It is anticipated most cost will be included as part of upgrades associated with future timber harvest actions.

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		
TMR-CCC-9.1.1.2	Action Step	Sediment	Map unstable soils and use that information to guide land use decisions, road design, THPs, and other activities that can promote erosion.	2	10	CalFire, California Geological Survey, Campbell Timberland Management, Private Landowners, RWQCB	115.00	115.00				230	Identification of unstable areas will provide critical information for future THP planning and road construction and road decommissioning actions. Identification of high risk areas will provide important information for future road decommissioning grant funds by identifying areas for prioritization. Cost for erosion assessment estimated at \$12/acre (assume 25% of total watershed acres)
TMR-CCC-9.1.1.3	Action Step	Sediment	Where restricting winter access to unpaved roads is not feasible, encourage measures such as rocking to prevent sediment from reaching coho salmon streams (CDFG 2004).	2	100	CalFire, Campbell Timberland Management, Private Landowners, RWQCB						TBD	Minimal- difficult to estimate cost because assessments for the magnitude of the problem were not available. Additionally, many roads have been rocked - often through the timber harvest process - and these costs should be considered an ongoing operation expense.
TMR-CCC-9.1.2	Recovery Action	Sediment	Improve instream gravel quality										
TMR-CCC-9.1.2.1	Action Step	Sediment	Locations for sediment catchment basins should be identified, developed and maintained, where appropriate.	3	100	CalFire, Campbell Timberland Management, Private Landowners, RWQCB						TBD	Sediment basins must be maintained on a yearly basis. A limited number of areas may be suitable for sediment catchment basins, but where feasible, they should be used to retain or remove potentially chronic fine sediment sources that impact primary stream channels. Sties should be located on smaller tributaries or first order streams.
TMR-CCC-9.1.2.2	Action Step	Sediment	Stabilize the Miller Pond dam in Little North Fork Ten Mile to prevent catastrophic failure and massive sediment input into critical downstream spawning and rearing areas.	1	5	CDFG, Private Landowners, RWQCB						TBD	Little North Fork Ten Mile is one of the most important streams in Ten Mile River watershed. Cost cannot be determined until a plan is developed to stabilize the dam. Cost likely to be minimal since the structure will not need to be replaced.
TMR-CCC-10.1	Objective	Viability	Address the inadequacy of existing regulatory mechanisms										
TMR-CCC-10.1.1	Recovery Action	Viability	Refine assessment methods to more accurately identify and measure key habitat attributes.										
TMR-CCC-10.1.1.1	Action Step	Viability	Implement standardized assessment protocols (i.e., CDFG habitat assessment protocols) to ensure ESU-wide consistency.	3	60	Campbell Timberland Management, CDFG, Private Landowners, RWQCB						TBD	The watershed has been habitat typed and has had extensive instream monitoring occur in the past.
TMR-CCC-10.1.2	Recovery Action	Viability	Increase spawner density										

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		
TMR-CCC-10.1.2.1	Action Step	Viability	Establish a life cycle stations in the Ten Mile River watershed (Gallagher and Gallagher 2005). Consider placing a life cycle station on one key tributary (e.g., Little North Fork Ten Mile, Bear Haven, Campbell creeks) or, if possible, in each subwatershed (North Fork, Clark Fork, South Fork).	2	20	Campbell Timberland Management, CDFG, NMFS, NOAA RC, Private Landowners	235.00	235.00	235.00	235.00		940	Cost based on life cycle monitoring station at a cost of \$234,600. Initial cost may vary depending on infrastructure (permanent vs. annual) used for the monitoring efforts. Monitoring in the Ten Mile watershed should be closely coordinated and complementary with other ongoing monitoring efforts in the Lost Coast Diversity Stratum. Due to the costs associated with monitoring and the difficulty in funding current ongoing monitoring, the short term implementation of this recommendation will be problematic.
TMR-CCC-10.1.3	Recovery Action	Viability	Increase abundance										
TMR-CCC-10.1.3.1	Action Step	Viability	Re-establish a naturally reproducing run of coho salmon.	3	15	Campbell Timberland Management, CDFG, Private Landowners, RWQCB						In-Kind	
TMR-CCC-11.1	Objective	Water Quality	Address the present or threatened destruction, modification, or curtailment of the species habitat or range										
TMR-CCC-11.1.1	Recovery Action	Water Quality	Improve stream temperature conditions										
TMR-CCC-11.1.1.1	Action Step	Water Quality	Plant native vegetation to promote streamside shade where otherwise deficient (i.e., lower reaches of North Fork and South Fork).	2	20	CalFire, Campbell Timberland Management, Private Landowners, RWQCB							Costs may be higher in the lower watershed where significant areas of site 1 soils where extensive forests were removed. Historical logging practices effectively removed all of the original conifer overstory (principally redwood and Douglas-fir) throughout the basin. As a result, no old-growth riparian stands remain within the watershed. Conversion of the lower sections of the mainstem Ten Mile River from conifers to grassland for cattle grazing and agriculture has likely lowered riparian function and diversity adjacent to some of better rearing areas in the lower watershed. Reestablishing a functional riparian forest in these areas (provided landowners are willing) will likely require extensive oversight (watering, cattle exclusion) until the trees become established. Altered riparian conditions are common throughout Ten Mile River watershed, elevating summer water temperatures in some reaches and limiting LWD recruitment. Cost accounted for in RIPARIAN.

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		
TMR-CCC-11.1.2	Recovery Action	Water Quality	Reduce turbidity and suspended sediment										
TMR-CCC-11.1.2.1	Action Step	Water Quality	Develop a Road Sediment Reduction Plan that prioritizes sites and outlines implementation and a timeline of necessary actions.	2	5	CalFire, Campbell Timberland Management, Private Landowners, RWQCB						In-kind	
TMR-CCC-15.1	Objective	Fire/Fuel Management	Address the present or threatened destruction, modification, or curtailment of the species habitat or range										
TMR-CCC-15.1.1	Recovery Action	Fire/Fuel Management	Prevent impairment to instream substrate/food productivity (impaired gravel quality and quantity)										Past logging resulted in a conversion of the conifer-dominated overstory to an overstory dominated by hardwoods in many ridge top areas and in eastern portions of the watershed. The combination of younger conifer and hardwoods likely leaves these portions of Ten Mile watershed more vulnerable to wildfire than under historical conditions.
TMR-CCC-15.1.1.1	Action Step	Fire/Fuel Management	Implement sediment reduction techniques in concert with prescribed fire techniques to minimize sediment impacts to various coho salmon life stages.	2	100	CalFire, Campbell Timberland Management, Private Landowners						In-Kind	This recommendation should be considered a standard practice.
TMR-CCC-15.1.1.2	Action Step	Fire/Fuel Management	Immediately implement appropriate sediment control measures following completion of fire suppression while firefighters and equipment are on site.	2	100	CalFire, Campbell Timberland Management, Private Landowners						In-Kind	This recommendation will result in a net cost savings. This recommendation should be considered a standard practice and no additional financial costs are anticipated.
TMR-CCC-15.1.1.3	Action Step	Fire/Fuel Management	Reduce erosion from fire prevention or suppression activities by maintaining existing natural topography to the extent possible.	3	100	CalFire, Campbell Timberland Management, Private Landowners						In-Kind	Implementing erosion control measures when constructing firebreaks (if possible) or shortly thereafter will likely result in a net cost savings. It is much more financially efficient to implement these measures while the fire crews are present rather than months later after the fire is out.
TMR-CCC-15.1.1.4	Action Step	Fire/Fuel Management	Re-contour any new facility sites as soon as possible after site cleanup and fire.	3	100	CalFire, Campbell Timberland Management, Private Landowners						In-Kind	Standard business practice.

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
TMR-CCC-15.1.2	Recovery Action	Fire/Fuel Management	Prevent increased landscape disturbance										
TMR-CCC-15.1.2.1	Action Step	Fire/Fuel Management	In the event of a wildfire, we recommend CalFire Resource Advisors inform the resource agencies for ESA consultation (or technical assistance) about the incident. The resource agencies can provide guidance regarding critical resources in the area that may be affected by firefighting actions.	2	100	CalFire							Guidance could include informing CalFire in regards to the presence of sensitive biological resources in the watershed as well as recommendations regarding watersource locations (e.g., picking up water from areas other than Ten Mile River lagoon). Protocols, similar to those recommended here, are already in place between USFWS, NMFS, BLM, and USFS which could provide a template for CalFire.
TMR-CCC-15.1.3	Recovery Action	Fire/Fuel Management	Prevent impairment to stream hydrology (impaired water flow)										
TMR-CCC-15.1.3.1	Action Step	Fire/Fuel Management	Draft water from lakes and reservoirs not occupied by listed salmonids when possible. In fish-bearing streams, excavate active channel areas outside of wetted width to create off-stream pools for water source. Require all water trucks/tenders be fitted with CDFG and NMFS approved fish screens when water is acquired at fish bearing streams. Put up a silt fence or other erosion controls around the water extraction locations. Avoid significantly lower stream flows during water drafting.	3	100	CalFire							Do not pull water from the lagoon during fire unless absolutely necessary.
TMR-CCC-15.2	Objective	Fire/Fuel Management	Address the inadequacies of regulatory mechanisms.										
TMR-CCC-15.2.1	Recovery Action	Fire/Fuel Management	Prevent impairment to water quality										
TMR-CCC-15.2.1.1	Action Step	Fire/Fuel Management	Disseminate NMFS' October 9, 2007, jeopardy biological opinion on the use of fire retardants and its impacts to salmonids, to local firefighting agencies and CalFire.	2	2	CalFire						In-Kind	
TMR-CCC-19.1	Objective	Logging	Address the present or threatened destruction, modification, or curtailment of the species habitat or range.										
TMR-CCC-19.1.1	Recovery Action	Logging	Prevent impairment to floodplain connectivity (impaired quality & extent)										

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		
TMR-CCC-19.1.1.1	Action Step	Logging	Timber harvest planning should evaluate and avoid or minimize adverse impacts to off-channel habitats, floodplains, ponds, and oxbows.	2	100	CalFire, Campbell Timberland Management, Private Landowners						In-Kind	Timber harvest remains a threat to coho salmon habitat in Ten Mile River, but at diminished levels compared to historical practices. Timber harvest was listed as a threat for watershed processes due in large part to the high rate of harvest in many of the planning watersheds. Even with application of new California Forest Practice Rules this threat is anticipated to continue.
TMR-CCC-19.1.2	Recovery Action	Logging	Prevent impairment to stream hydrology (impaired water flow)										
TMR-CCC-19.1.2.1	Action Step	Logging	Evaluate road surface treatment options to halt or minimize impacts from water drafting and diversion	3	100	CalFire, Campbell Timberland Management, Private Landowners						In-Kind	Road surface treatment options will vary widely on road use and geology.
TMR-CCC-19.1.3	Recovery Action	Logging	Allow trees in riparian areas to age, die, and recruit into the stream naturally.										
TMR-CCC-19.1.3.1	Action Step	Logging	Timber management should be designed to allow trees in riparian areas to age, die, and naturally recruit into the stream.	3	100	CalFire, Campbell Timberland Management, Private Landowners						In-Kind	The current Forest Practice Rules require retention of a proportion of the largest diameter trees adjacent to water courses. This practice should continue and potential expansion of the number left for future recruitment should be considered.
TMR-CCC-19.1.4	Recovery Action	Logging	Prevent impairment to instream substrate/food productivity (impaired gravel quality and quantity)										
TMR-CCC-19.1.4.1	Action Step	Logging	Protect headwater channels with larger buffers to minimize sediment delivery downstream.	2	100	CalFire, Campbell Timberland Management, Private Landowners						In-Kind	This recommendation should be considered standard practice.
TMR-CCC-19.1.4.2	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.	2	100	CalFire, Campbell Timberland Management, Private Landowners						In-Kind	This recommendation should be considered standard practice.
TMR-CCC-19.1.4.3	Action Step	Logging	For areas with high or very high erosion hazard, extend the monitoring period and upgrade road maintenance for timber operations.	2	100	CalFire, Campbell Timberland Management, Private Landowners						In-Kind	This recommendation applies to all THPs located in the mixed lithology geomorphic units with steep slopes, and all sandstone geomorphic units (steep and gentle slopes).

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TMR-CCC-19.1.4.4	Action Step	Logging	Minimize timber harvest on unstable slopes adjacent to Class 1 streams in the North Fork Ten Mile.	1	30	CalFire, CDFG, RPFs, RWQCB						In-Kind	This recommendation should be considered standard practice.
TMR-CCC-19.1.5	Recovery Action	Logging	Prevent adverse alterations to riparian species composition and structure										
TMR-CCC-19.1.5.1	Action Step	Logging	Manage riparian areas for their site potential composition and structure.	2	100	CalFire, Campbell Timberland Management, Private Landowners						In-Kind	This recommendation should be considered standard practice.
TMR-CCC-19.1.5.2	Action Step	Logging	Encourage wider riparian buffer zones in areas where stream temperatures or riparian canopy are found limiting.	2	100	CalFire, Campbell Timberland Management, Private Landowners						In-Kind	This recommendation should be considered standard practice.
TMR-CCC-19.1.6	Recovery Action	Logging	Prevent increased landscape disturbance										
TMR-CCC-19.1.6.1	Action Step	Logging	Encourage low impact timber harvest techniques such as full-suspension cable yarding ( to improve canopy cover; reduce sediment input, etc.).	2	100	CalFire, Campbell Timberland Management, Private Landowners						In-Kind	This recommendation should be considered standard practice.
TMR-CCC-19.1.7	Recovery Action	Logging	Prevent alterations to sediment transport (road condition/density, etc.)										
TMR-CCC-19.1.7.1	Action Step	Logging	All roads, landings, and skid trails associated with timber operations should, to the maximum extent practicable, be hydrologically disconnected to prevent sediment runoff and delivery to streams.	2	100	CalFire, Campbell Timberland Management, Private Landowners						In-Kind	This recommendation should be considered standard practice.
TMR-CCC-19.1.7.2	Action Step	Logging	Avoid new road construction in riparian zones	2	100	CalFire, Campbell Timberland Management, Private Landowners						In-Kind	Old roads should not be reopened unless for proper decommissioning purposes. Particular care should be directed at new road construction or reconstruction adjacent to Class 1 streams with high IP value habitat.
TMR-CCC-19.2	Objective	Logging	Address the inadequacy of existing regulatory mechanisms										
TMR-CCC-19.2.1	Recovery Action	Logging	Prevent increased landscape disturbance										

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
TMR-CCC-19.2.1.1	Action Step	Logging	Establish greater oversight and post-harvest monitoring by the permitting agency for operations within Core, Phase I and Phase II CCC coho salmon areas.	3	20	CalFire, Campbell Timberland Management, Private Landowners						In-Kind	
TMR-CCC-19.2.1.2	Action Step	Logging	Forest landowners should consider pooling resources for a watershed-wide HCP or GCP that could provide for incidental take authorization and promote survival and recovery of coho salmon	3	20	CalFire, Campbell Timberland Management, Private Landowners						In-Kind	A watershed wide conservation effort could be used to help direct mitigation to areas where it would be most effective, rather than mitigation on a THP by THP basis. Pooling of resources could direct monitoring to areas where it would be most effective and minimize duplication of efforts. Other considerations could potentially covering timber harvest activities for multiple watersheds within Mendocino County. Cost is a rough estimate and may vary considerably depending on the number of species and activities covered. A multiple landowner HCP is preferable due to economy of scale and overall, similar land management actions across the watershed. The high cost of HCP development is considered a major impediment and disincentive for many landowners.
TMR-CCC-19.2.1.3	Action Step	Logging	Until no-take rules are developed or the State has a secured HCP or GCP, assign NMFS staff to conduct THP reviews and provide no-take recommendations by using revised "Guidelines for NMFS staff when Reviewing Timber Operations: Avoiding Take and Harm of Salmon and Steelhead" (NMFS 2004) or "Short Term HCP Guidelines" (NMFS 1999).	3		NMFS							The need for this action may change if the California Forest Practice Rules change and reach a no-take standard or the state receives incidental take authorization through the HCP process.
TMR-CCC-19.2.1.4	Action Step	Logging	Encourage timber landowners to implement restoration projects as part of their ongoing timber management practices in Core area stream reaches where large woody material is deficient.	2	100	CalFire, Campbell Timberland Management, Private Landowners							Installing large woody material into stream deficient in large wood should be considered a top restoration priority, particularly in Core and Priority 1 subwatersheds. Restoration during harvest activities provides a unique opportunity to access key areas that are relatively undisturbed in comparison to areas of the watershed with a large rural residential footprint.
TMR-CCC-19.2.1.5	Action Step	Logging	Discourage Mendocino County from rezoning forestlands to rural residential or other land uses (e.g., vineyards).	1	100	CalFire, Mendocino County, Private Landowners						0	

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TMR-CCC-19.2.1.6	Action Step	Logging	Discourage home building or other incompatible land use in areas identified as timber production zones (TPZ).	1	100	CalFire, Mendocino County, Private Landowners						0	Illegal marijuana cultivation may occur in some areas and have the potential to severely degrade juvenile rearing conditions by diverting water and introducing toxic quantities of fertilizers and pesticides into the stream environment. Increased anthropogenic interface with forested lands will likely lead to increases in these activities.
TMR-CCC-23.1	Objective	Roads/Railroads	Address the present or threatened destruction, modification, or curtailment of the species habitat or range										
TMR-CCC-23.1.1	Recovery Action	Roads/Railroads	Prevent impairment to watershed hydrology										
TMR-CCC-23.1.1.1	Action Step	Roads/Railroads	Size culverts to accommodate flashy, debris-laden flows and maintain trash racks to prevent culvert plugging and subsequent road failure.	2	5	CalFire, Campbell Timberland Management, Private Landowners	225.00					225	All new and replacement culverts should be sized to accommodate a 100 year flow event. Cost based on treating 1 stream crossing (assume minor 2 lane road) at a rate of \$223,051/unit.
TMR-CCC-23.1.1.2	Action Step	Roads/Railroads	Stream crossings on THP parcels should be identified and mapped with the intention of replacement or removal if they cannot pass 100 year flow. Design should include fail safe measures to accommodate culvert overflow without causing massive road fill failures.	3	30	CalFire, Campbell Timberland Management, Private Landowners						TBD	These will likely be replaced as part of future timber harvest plans in Ten Mile watershed.
TMR-CCC-23.1.2	Recovery Action	Roads/Railroads	Prevent impairment to instream substrate/food productivity (impaired gravel quality and quantity)										
TMR-CCC-23.1.2.1	Action Step	Roads/Railroads	Use available best management practices for road construction, maintenance, management and decommissioning (e.g. Weaver and Hagans, 1994; Sommarstrom et al., 2002; Oregon Department of Transportation, 1999).	2		CalFire, Campbell Timberland Management, Private Landowners						0	Legacy roads from past logging activity continue to impact Ten Mile watershed. Legacy roads from past logging activity continue to adversely impact habitat quality for salmonids in Ten Mile watershed. Road densities are high throughout the watershed and are estimated at 2.5 miles of road per square mile of watershed area, and at 3.7 miles per square mile of riparian area. Many of these roads were poorly situated and constructed, improperly maintained, and many have been abandoned and not properly decommissioned. Cost accounted for LANDSCAPE PATTERNS.

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							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
TMR-CCC-23.1.2.2	Action Step	Roads/Railroads	Fully maintain all roads with inside ditches unless these roads have been properly decommissioned. All roads with inside ditches should be evaluated, and problems addressed, prior to the winter season.	2	100	CalFire, Campbell Timberland Management, Private Landowners						In-Kind	Many roads in the watershed have inside ditches. Cost should be considered part of road maintenance costs.
TMR-CCC-23.1.2.3	Action Step	Roads/Railroads	Conduct periodic training for road maintenance crews regarding modern sediment remediation techniques protective of salmonids.	2	100	CalFire, Campbell Timberland Management, Private Landowners						In-Kind	Existing material can likely be used and tailored to private landowners and agencies with road maintenance staff. Roads are likely the largest contributor of sediment in the watershed, and sediment was rated as the most significant factor limiting salmonid production in the watershed. Outreach is critical to minimize the high rates of sediment input.
TMR-CCC-23.1.2.4	Action Step	Roads/Railroads	Install sediment traps for pretreatment, and a modified culvert system that can act as an efficient detention system.	3	100	CalFire, Campbell Timberland Management, Private Landowners						TBD	Sediment traps will require a significant maintenance commitment. Conduct inventory of culverts needing sediment traps.
TMR-CCC-23.1.2.5	Action Step	Roads/Railroads	Install and maintain adequate energy dissipaters for culverts and other drainage pipe outlets where needed.	3	20	CalFire, Campbell Timberland Management, Private Landowners						TBD	Particular care should be directed to ensuring water outfalls avoid unstable slopes. Conduct inventory of culverts needing energy dissipaters.
TMR-CCC-23.1.2.6	Action Step	Roads/Railroads	Establish adequate spoils storage sites throughout the watershed so that material from landslides and road maintenance can be stored safely away from watercourses. Coordinate these efforts with all landowners in the watershed.	2	5	CalFire, Campbell Timberland Management, Private Landowners						TBD	Assess the feasibility and extent of spoils storage site. Cost will be determined once an assessment is completed.

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TMR-CCC-23.1.2.7	Action Step	Roads/Railroads	Conduct road and sediment reduction assessments to identify sediment-related and runoff-related problems and determine level of hydrologic connectivity. The assessments should prioritize sites and outline implementation timelines of necessary actions.	2	10	CalFire, Campbell Timberland Management, Private Landowners	385.00	385.00				770	Active and abandoned logging roads and skid trails exist throughout the basin and likely contribute large volumes of sediment. Many logging roads have been upgraded to modern standards, but a lot of work remains before this sediment source is thoroughly minimized. An effective road program should include a component that closes and remediates unnecessary roads and skid trails in an effort to lower overall road density in the watershed. Road remediation for future timber harvest plans should be considered a top mitigation priority. The inventory should include all roads in the watershed, including abandoned roads. Many of these roads will likely not be addressed until timber harvest is resumed. The potential for sediment (both through chronic input and large episodic events) is likely to continue. Road rehabilitation from locations identified as high risk should not be based solely on timber harvesting schedules. Cost based on road assessment for 830 miles (assume 75% of road network) at a cost of \$927/mile.
TMR-CCC-23.1.2.8	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	10	CalFire, Campbell Timberland Management, Private Landowners, Trout Unlimited	306.00	306.00				612	Costs may vary widely depending on number of riparian roads and the magnitude of the problem associated with the roads. Additionally, many roads in Core watersheds have been addressed and hydrologically disconnected - often through the timber harvest process - and these costs should be considered an ongoing operation expense. Focus initial efforts (and/or continue ongoing efforts) in Little North Fork Ten Mile, Bear Haven (DFG 2004), Mill, Campbell, and Smith Creeks. Indiscriminate road density reduction should be avoided so as not to preclude inhibiting future road realignments that could also effectively reduce sediment delivery. Cost based on decommissioning 51 miles of riparian road network at a rate of \$12,000/mile. TU has partnered with CTM and Pacific Watershed Associates to upgrade 3.4 miles of inner gorge roads in Little North Fork which should be considered a major priority considering the importance of the coho salmon population in the Little North Fork.
TMR-CCC-23.1.2.9	Action Step	Roads/Railroads	All harvest plans should identify problematic unused legacy roads or landings with WLPZ's and ensure these areas are hydrologically disconnected and revegetated with native species where practicable following completion of harvest activities.	1	100	CalFire, Campbell Timberland Management, Private Landowners, RWQCB						In-Kind	

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TMR-CCC-23.1.3	Recovery Action	Roads/Railroads	Prevent impairment to floodplain connectivity (impaired quality & extent)										
TMR-CCC-23.1.3.1	Action Step	Roads/Railroads	Design new roads to avoid unstable slopes, wetlands, floodplains and other areas of high habitat value.	1	100	CalFire, Campbell Timberland Management, Private Landowners						In-Kind	This recommendation should be considered standard practice.
TMR-CCC-23.1.4	Recovery Action	Roads/Railroads	Prevent impairment to passage and migration										
TMR-CCC-23.1.4.1	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.	3	100	CalFire, Campbell Timberland Management, Private Landowners						In-Kind	Adopt NMFS (2001) Guidelines for Salmonid Passage at Stream Crossings.
TMR-CCC-23.2	Objective	Roads/Railroads	Address the inadequacy of existing regulatory mechanisms										
TMR-CCC-23.2.1	Recovery Action	Roads/Railroads	Address sediment and runoff sources from road networks and other actions that deliver sediment and runoff to stream channels.										
TMR-CCC-23.2.1.1	Action Step	Roads/Railroads	Permitting and funding agencies (State, Federal, and local) should evaluate all authorized erosion control measures during the winter period.	2	100	CalFire, CDFG, NRCS, RWQCB, USACE						In-Kind	This should be considered a standard business practice by regulatory agencies, however, due to staffing levels regulatory oversight is often inadequate.
TMR-CCC-23.2.2	Recovery Action	Roads/Railroads	Prevent impairment to floodplain connectivity (impaired quality & extent)										
TMR-CCC-23.2.2.1	Action Step	Roads/Railroads	Avoid 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, protective of salmonids and their habitat, is created and implemented.	1	10	CalFire, Campbell Timberland Management, Private Landowners						In-Kind	A well designed road management plan should result in overall cost savings due to lower maintenance costs.
TMR-CCC-23.2.3	Recovery Action	Roads/Railroads	Prevent impairment to instream substrate/food productivity (impaired gravel quality and quantity)										
TMR-CCC-23.2.3.1	Action Step	Roads/Railroads	Conduct annual inspections of all roads prior to winter. Correct conditions that are likely to deliver sediment to streams.	1	100	CalFire, Campbell Timberland Management, Private Landowners						0	This action is part of ongoing road maintenance and should be directed at the entire road network.

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							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
TMR-CCC-23.2.3.2	Action Step	Roads/Railroads	Limit winter use of unsurfaced roads and recreational trails to decrease fine sediment loads.	2	100	CalFire, Campbell Timberland Management, Private Landowners						0	Cost should be considered part of land owner road management plans.
TMR-CCC-23.2.3.3	Action Step	Roads/Railroads	Licensed engineering geologists should review and approve grading on inner gorge slopes.	3	100	CalFire, Campbell Timberland Management, Private Landowners						In-Kind	
TMR-CCC-24.1	Objective	Severe Weather Patterns	Address the present or threatened destruction, modification, or curtailment of the species habitat or range										
TMR-CCC-24.1.1	Recovery Action	Severe Weather Patterns	Prevent impairment to passage and migration										
TMR-CCC-24.1.1.1	Action Step	Severe Weather Patterns	Pursue opportunities to acquire or lease water, or acquire water rights from willing sellers, for coho salmon recovery purposes. Develop incentives for water right holders to dedicate instream flows for the protection of coho salmon (CDFG 2004)(Water Code § 1707).	3	20	CDFG, NOAA RC, Private Landowners, The Nature Conservancy, Trout Unlimited						TBD	Cost is unknown. The main benefit of this action is to improve flow conditions in the lower portion of the watershed where a few homes and limited agricultural use occurs.
TMR-CCC-24.1.2	Recovery Action	Severe Weather Patterns	Prevent impairment to floodplain connectivity (impaired quality & extent)										
TMR-CCC-24.1.2.1	Action Step	Severe Weather Patterns	Existing areas with floodplains or off channel habitats should be protected from future urban development of any kind.	2	100	Campbell Timberland Management, CDFG, Private Landowners						In-Kind	This recommendation should be considered standard practice.
TMR-CCC-24.1.2.2	Action Step	Severe Weather Patterns	Promote restoration projects designed to create or restore alcove, backchannel, ephemeral tributary, or seasonal pond habitats.	1	10	CalFire, Campbell Timberland Management, Private Landowners, RWQCB, The Nature Conservancy	90.50	90.50				181	Little infrastructure exists on the floodplains aside from numerous roads. Creation and restoration of offchannel habitat features could be used as a demonstration project and reference point for future actions in regards to costs, feasibility, biological effectiveness, and appropriate construction techniques. Areas in the lower reaches of the Ten Mile River should be designed with consideration of providing high flow refugia. Cost based on treating 5 miles (assume 81 project/mile in 25% High IP) at a rate of \$36,046/mile.
TMR-CCC-24.1.3	Recovery Action	Severe Weather Patterns	Reduce turbidity and suspended sediment										

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TMR-CCC-24.1.3.1	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	100	CalFire, RWQCB, State Parks						TBD	Extreme rainfall events could result in major input of sediment from upslope locations, particularly from legacy roads. The high road density in the watershed increases the likelihood of major sediment input during wet weather periods. Targeting high risk roads for closure and appropriate restoration actions will reduce the magnitude of this threat. Assess extent of high-risk shallow-seeded landslide areas and develop rehabilitation plan.