
TEN MILE RIVER

Ten Mile River

Independent Population
105.1 IP-Km of potential coho salmon habitat
Coho salmon, Chinook salmon, and steelhead present

The **Ten Mile River** drains approximately 120 square miles of western Mendocino County, and enters the Pacific Ocean about eight miles north of the town of Fort Bragg. The mouth of the river is semi-enclosed by a sandbar which forms a tidal estuary. About 75 percent of the Ten Mile River watershed is redwood coniferous forest and about 12 percent of the watershed area is either montane or riparian hardwood forest. The Ten Mile River watershed has moderate to high soil erodibility. The EPA listed the Ten Mile as having water quality impaired for sediment in 1998. The listing determined that sediment was impairing salmonids and identified non-point source silviculture as the probable cause. Since then, the EPA has established a TMDL for the watershed. Nearly the entire Ten Mile River watershed is in private ownership; only 18 acres are in public park land. The dominant land use within the Ten Mile River watershed is forestry. Timber harvest began about 1870. Second growth logging began in the 1960s and continues today. Most of the watershed's forest land is managed using about a 60 year average rotation age. Within the past 10 years, about 43 percent of the Ten Mile River watershed has been under a timber harvest plan. Housing development within the Ten Mile River watershed is low – about 120 housing units are present in the watershed.

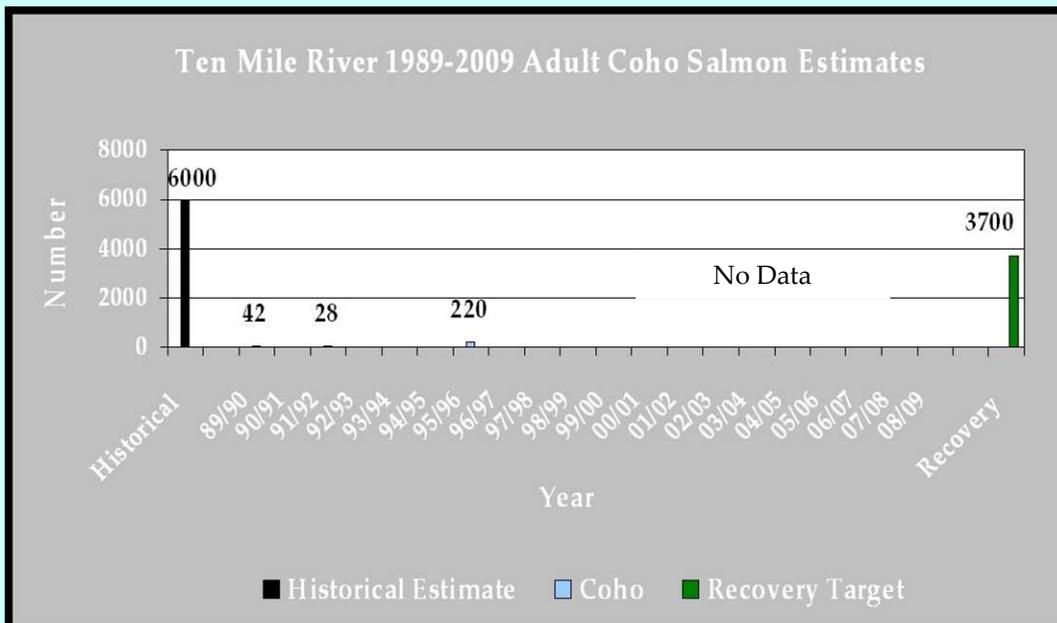


South Fork Ten Mile River.

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

The Watershed at a Glance

Spawning Quantity & Quality:	GOOD
Summer Water Temperatures:	POOR
Depth & Shelter of Pools:	POOR
Large Wood Frequency:	POOR
Riparian Canopy:	POOR
off channel/Floodplain Quality:	POOR to GOOD
Estuary Function:	GOOD



Increasing the survival of coho salmon

requires **protecting** all individuals from threats that are jeopardizing coho salmon. The highest ranked threats are:

- Logging and Wood Harvesting
- Roads and Railroads throughout the watershed

Preventing the extinction of coho salmon

means **restoring** many key habitat attributes within the Ten Mile River watershed that are in poor condition. The highest priorities for restoration are to:

- Improve pool complexity and increase number of pools
- Reduce summer stream temperature
- Increase large wood in streams and riparian tree size
- Increase the frequency of off channel habitat and floodplain connectivity
- Reduce the amount of roads throughout the watershed
- Reduce sources of sediment
- Improve gravel quality by reducing sediment inputs



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Ten Mile River
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Advancing recovery of coho

salmon in Ten Mile River requires these priority **recovery actions**:

- Promote restoration projects designed to create or restore alcove, backchannel, ephemeral tributary, or seasonal pond habitats. Restore floodplain connectivity to increase number and size of overwintering habitats.
- Encourage the development and implementation of large woody debris supplementation programs to increase stream complexity and gravel retention, and improve pool frequency and depth.
- Provide for watershed processes by promoting long term sustainable forestry practices that support coho salmon.
- Decommission riparian road systems and/or upgrade roads (and skid trails on forestlands) that deliver sediment to adjacent watercourses to decrease fine sediment.

. . . in these **core areas**: Little North Fork Ten Mile, Bear Haven Creek, Churchman Creek, Smith Creek, and Campbell Creek.

Conservation Highlights

- Campbell Timberland Management, Trout Unlimited, DFG, and Blencowe Forestry have collaborated on placement of large woody debris structures and sediment remediation projects.
- Problem roads have been decommissioned, reducing sediment inputs to streams.



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Immediate Needs

- ✓ Initiate a study of the estuary.
- ✓ Identify restoration actions to improve overwintering habitats.

Recovery Partners

NMFS
DFG
Campbell Timberland Management
Trout Unlimited
Blencowe Forestry
California Regional Water Quality Control Board



Westport

Ten Mile River Priority Areas for Protection and Restoration

IP values represent the historical potential of channel width, mean annual discharge and gradient to provide suitable habitats and support higher abundances of coho salmon

0.01 - 0.34 – Lower Likelihood
 0.35 - 0.69 - Moderate likelihood
 0.70 - 0.99 - High Likelihood

▲ City/Town

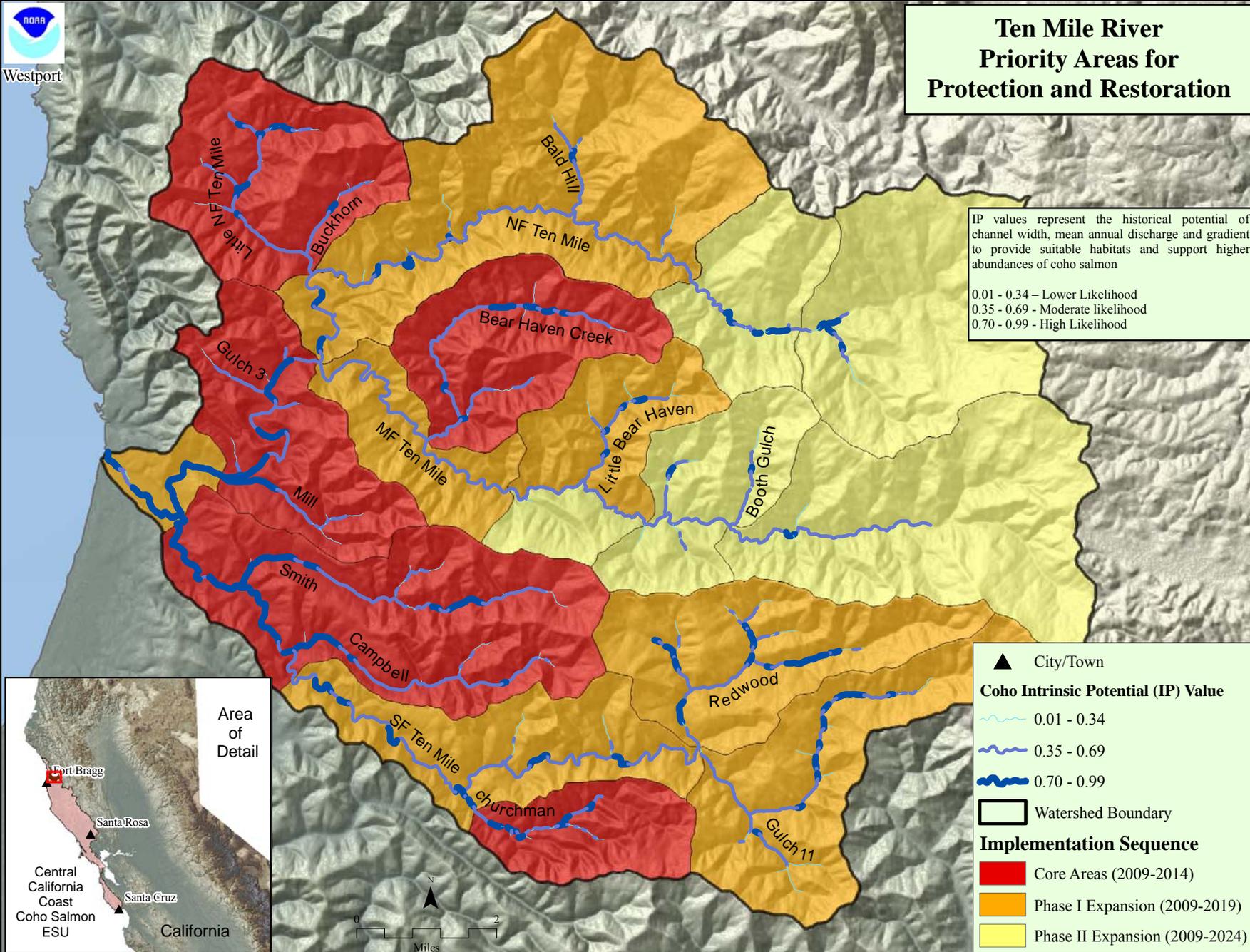
Coho Intrinsic Potential (IP) Value

0.01 - 0.34
 0.35 - 0.69
 0.70 - 0.99

□ Watershed Boundary

Implementation Sequence

Core Areas (2009-2014)
 Phase I Expansion (2009-2019)
 Phase II Expansion (2009-2024)



**CCC Coho Salmon
Ten Mile River
CAP Viability Table Results**

Analyst	Source	Result	Rating	Target	Habitat Attribute	Indicator	Poor	Fair	Good	Very Good
Flow Panel	Decision Matrix	50	Good	Spawning Adults	Hydrology	Passage Flows	>75 (score)	51-75	35-50	<35
SEC	PSMFC Database	100%	Very Good	Spawning Adults	Passage	Physical Barriers	<50% of IP-km	50-70% of IP-km	70-90% of IP-km	>90% of IP-km
NCWAP	Decision Matrix	30-60 days	Fair	Spawning Adults	Passage	Passage at Mouth	<30 days	30-60 days	60-90 days	>90 days
SEC	CDFG HAB 8	5000-9600 m ²	Good	Spawning Adults	Sediment	Amount of Gravel*	<500 m ²	500-5000 m ²	5000-9600 m ²	>9600 m ²
NMFS	Best Prof. judgment	5-10%	Fair	Spawning Adults	Viability	Freshwater Harvest	>10% of pop.	5-10%	<5%	
Flow Panel	Decision Matrix	50	Good	Eggs	Hydrology	Instantaneous Condition	>75 (score)	51-75	35-50	<35
Flow Panel	Decision Matrix	50	Good	Eggs	Hydrology	Redd Scour	>75 (score)	51-75	35-50	<35
SEC	Many Sources	NA	Poor	Eggs	Sediment	Gravel Quality	>17% 0.85mm and or >30% 6.3mm	15-17% 0.85	12-14% 0.85mm and or <30% 6.3mm	<12% 0.85
SEC	CDFG HAB 8	12%	Poor	Eggs	Sediment	Gravel Quality (Embeddedness)	<25% of scores 1s&2s	25-50% of scores 1s&2s	>50% of scores 1s&2s	
Flow Panel	Decision Matrix	50	Good	Summer Rearing	Hydrology	Baseflow	>75 (score)	51-75	35-50	<35
SEC	CDFG HAB 8	44	Poor	Summer Rearing	Pool Habitat	Shelter Rating	<60 avg. rating	60-80	80-100	>100
SEC	CDFG HAB 8	16%	Poor	Summer Rearing	Pool Habitat	Primary Pools	<30% pools by length	30-40%	40-50%	>50%
SEC/NMFS	Many Sources	NA	Poor	Summer Rearing	Water Quality	Temperature	>30% of IP > 17 C MWMT	Does not meet Good or Very Good	30-60% of IP < 15C MWMT	>60% of IP < 15C MWMT
SEC	CDFG HAB 8	44	Poor	Winter Rearing	Floodplain	Complex Habitat**	<50% Connected	50-80% connected	>80% connected	
NMFS	NCWAP	Good	Good	Smolts	Estuary	Estuary				
Flow Panel	Decision Matrix	42	Good	Smolts	Hydrology	Passage Flows	>75 (score)	51-75	35-50	<35
SEC	SWRCB	0.57/10 IP-km	Good	Smolts	Passage	# of Diversions**	>5 / 10 IP km	1.1-5	0.01-1	0
SEC	CDFG HAB 8	44	Poor	Multiple Life Stages	Pool Habitat	Shelter Rating	<60 avg. rating	60-80	80-100	>100
NMFS	Best Prof. judgment	>80%	Good	Multiple Life Stages	Floodplain	Floodplain Connectivity	<50%	50-80%	>80%	not defined
NMFS	CDF CWHR	39%	Good	Multiple Life Stages	Hydrology	Stand Age			>40 years old	
SEC	NLCDB	0.16%	Good	Multiple Life Stages	Hydrology	Impervious Surfaces	>12.01% of WS by area	7.01-12%	3.01-7%	0-3%
SEC	FMMP	5%	Very Good	Multiple Life Stages	Land disturbance	Agriculture	>30% of WS by area	10-30%	0.1-10%	<0.1%
NMFS	CDF THP Dataset	42%	Poor	Multiple Life Stages	Land disturbance	Timber Harvest	>35% of WS by area	25 - 35%	10 - 25%	<10%
SEC	Best Prof. judgment	NA	Fair	Multiple Life Stages	Pool Habitat	LWD Freq. (BFW 0-10)	<4key pcs/100m	4-6/100m	6-11/100m	>11/100m
SEC	Many Sources	0.429	Poor	Multiple Life Stages	Pool Habitat	LWD Freq. (BFW 10-100)	<1/100m	1-1.3/100m	1.3-4/100m	>4/100m
NMFS	CDF CWHR	>50%	Good	Multiple Life Stages	Riparian Veg.	Species Composition	<25%	25-50%	>50%	Historical Conditions
NMFS	CDF CWHR	35%	Poor	Multiple Life Stages	Riparian Veg.	DBH	<39% Class 5 and 6	40-54%	55-69%	>69%
SEC	CDFG HAB 8	60-70%	Fair	Multiple Life Stages	Riparian Veg.	Canopy Cover	<45 % avg. over IP-km	75-85%	85-95%	>95%
NMFS	CDF THP Dataset	7.2 mi/sq.mi.	Poor	Multiple Life Stages	Sediment Transport	Road Density	>3 miles/sq. mile	3 to 2.5	2.5 to 1.6	<1.6
NMFS	CDF THP Dataset	6.2 mi/sq.mi.	Poor	Multiple Life Stages	Sediment Transport	Road density 100	>1 miles/sq. mile	1-0.5	0.5-0.1	<0.1
NMFS	Many Sources	Good	Good	Multiple Life Stages	Water Quality	Toxicity	Acute	Sublethal or Chronic	No Acute or Chronic	No evidence of toxins or Contaminants
NMFS	Best Prof. judgment	<1 per IP-km	Poor	Spawning Adults	Viability	Adult Density	<1 per IP-km	1-20 per IP-km	20-40 per IP-km	>40 per IP-km
NMFS	Best Prof. judgment	<0.2 fish/m ²	Poor	Summer Rearing	Viability	Juvenile Density	<0.2 fish/m ²	0.2-0.5 fish/m ²	0.5-1.0 fish/m ²	>1.0 fish/m ²
NMFS	Best Prof. judgment	20-34%	Fair	Summer Rearing	Viability	Juvenile Distribution	<20% IP-km occupied	20-34%	35-50%	>50%

See Appendix C for a full description of the analysis methods for the Viability Table Reports

* = watershed specific numbers

** = Ratings defined by the distribution of results

Ten Mile River Threats Across Targets		Spawning Adults	Eggs	Summer Rearing Juveniles	Winter Rearing Juveniles	Smolts	Multiple Life Stages			Overall Threat Rank
Project-specific threats		1	2	3	4	5	6	7	8	
1	Roads and Railroads	Medium	High	High	High	Medium	Very High			Very High
2	Logging and Wood Harvesting	Medium	Medium	High	High	Medium	Very High			High
3	Droughts	Medium	Medium	Medium	Medium	High	Medium			High
4	Climate Change	Medium	Medium	Medium	Medium	Medium	Medium			Medium
5	Fire and Fuel Management	Medium	Medium	Medium	Medium	Medium	Medium			Medium
6	Mining	Medium	Medium	Medium	Medium	Medium	Medium			Medium
7	Agricultural Practices	Medium	Low	Medium	Medium	Medium	Medium			Medium
8	Channel Modification	Medium	Low	Medium	Medium	Medium	Medium			Medium
9	Livestock Farming and Ranching	Medium	Low	Medium	Medium	Medium	Medium			Medium
10	Recreational Areas and Activities	Medium	Low	Medium	Medium	Medium	Medium			Medium
11	Residential and Commercial Development	Medium	Low	Medium	Medium	Medium	Medium			Medium
12	Storms and Flooding	Low	Medium	Medium	Medium	Medium	Medium			Medium
13	Water Diversion and Impoundment	Medium	Low	Medium	Medium	Medium	Medium			Medium
14	Disease, Predation, and Competition	Medium	-	Medium	-	Medium	-			Medium
15	Fishing and Collecting	Medium	-	Low	Low	Low	-			Low
16	Hatcheries and Aquaculture	Low	-	Low	Low	Low	Low			Low
Threat Status for Targets and Project		High	High	High	High	High	Very High	-	-	Very High

Ten Mile River (Lost Coast-Navarro Point) Threats and Associated Recovery Actions

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY1	FY2	FY3	FY4	FY5		
TMR-A-1.1	Objective	Estuary	Restore and enhance estuary habitat in the watershed.										
TMR-A-1.1.1	Recovery Action	Estuary	Develop Estuary Protection and Enhancement Guidelines to maintain estuary function and provide information for estuary restoration.	2	60	California Coastal Conservancy, CDFG, NMFS, RWQCB, UC Extension, USFWS						TBD	Existing authorities of permitting agencies facilitate implementation at minimal costs.
TMR-A-1.1.1.1	Action Step	Estuary	Initiate estuary study to evaluate limiting factors in the Ten Mile River estuary.	3	5	California Coastal Conservancy, CDFG, NMFS, RWQCB, USACE	18.00	18.00	18.00	18.00	18.00	90	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.
TMR-A-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 salmon and steelhead.	3	10	Private Landowners						0	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. Cost cannot be determined until after an evaluation is conducted that outlines the extent of the habitat loss.
TMR-A-2.1	Objective	Floodplain	Improve over-winter survival by increasing the frequency and functionality of off-channel habitats.										
TMR-A-2.1.1	Recovery Action	Floodplain	Create flood refuge habitat, such as hydrologically connected floodplains with riparian forest, or remove or setback levees, and use streamway concept where appropriate.										
TMR-A-2.1.1.1	Action Step	Floodplain	Delineate reaches possessing both potential winter rearing habitat and floodplain areas.	3	5	CalFire, Campbell Timberland Management, Private Landowners	8.00	8.00	8.00	8.00	8.00	40	This may be a GIS exercise with ground truthing. Available information exists from past habitat typing that may streamline this analysis and further reduce the overall cost.
TMR-A-2.1.1.2	Action Step	Floodplain	Target habitat restoration and enhancement that will function between winter base flow and flood stage.	2	60	CalFire, California Coastal Conservancy, Campbell Timberland Management, CDFG							Costs depend on level of technical assistance required and types of projects proposed. Many salmon recovery efforts and management programs are currently ongoing. It is possible that there could be additional salmon restoration costs identified based on recovery needs of the species; however, at this time there is not sufficient information to estimate those potential costs or identify the actions under which they might fall.
TMR-A-2.1.2	Recovery Action	Floodplain	Promote restoration projects designed to create or restore alcove, backchannel, ephemeral tributary, or seasonal pond habitats.	1	60	CalFire, California Coastal Conservancy, Campbell Timberland Management, CDFG, Private Landowners						TBD	Costs to promote and support restoration efforts depend on the level of technical assistance provided and the types of projects proposed.
TMR-A-4.1	Objective	Land Disturbance	Reduce percentage of watershed area subject to timber harvest over a ten year period. (See also strategies for reducing the threat of Logging and Wood Harvesting below).										
TMR-A-4.1.1	Recovery Action	Land Disturbance	Encourage a watershed-wide HCP for all or multiple landowners within a watershed to pool resources as a means to facilitate long-term survival and recovery for coho salmon and their habitat.	3	30	Campbell Timberland Management, CDFG, Private Landowners, RWQCB, USFWS	26.67	26.67	26.67	26.67	26.67	800	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-A-6.1	Objective	Pool Habitat	Improve summer rearing, winter rearing, and smolt survival by increasing instream channel complexity in potential rearing and migration reaches. Additionally, improve egg survival by reducing redd scour in streams characterized by high bedload mobility.										

Ten Mile River (Lost Coast-Navarro Point) Threats and Associated Recovery Actions

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY1	FY2	FY3	FY4	FY5		
TMR-A-6.1.1	Recovery Action	Pool Habitat	Encourage the development and implementation of large woody debris supplementation programs to increase stream complexity and gravel retention, and improve pool frequency and depth (DFG 2004).	1	10	California Coastal Conservancy, Campbell Timberland Management, CDFG, NMFS, NOAA RC, Private Landowners	70.00	70.00	70.00	70.00	70.00	700	Costs may vary significantly due to access, varying paucity of large wood between sub-watersheds, and installation techniques. The Ten Mile has been habitat typed and thus the stream reaches lacking wood can be readily identified. Permitting should be streamlined because of programmatic biological opinions for these types of actions; however, more effort on the part of regulatory agencies is needed. Many key areas in Ten Mile have been targeted for LWD enhancement, and total costs may be significantly less than projected. Campbell Timberlands has implemented numerous LWD projects at relatively low cost due their use of non-anchored material. This is significantly less expensive than engineer approaches.
TMR-A-6.1.2	Recovery Action	Pool Habitat	Encourage landowners to implement restoration projects as part of their ongoing operations in stream reaches where large woody debris is lacking.	1	60	CalFire, Campbell Timberland Management, CDFG, Private Landowners, RCD, RWQCB						0	Costs may vary significantly due to stream access, varying paucity of large wood between sub-watersheds, and installation techniques. The Ten Mile has been habitat typed and thus the stream reaches lacking wood can be readily identified. It is assumed that most projects will occur as part of ongoing timber harvest actions and that overall cost should be less than those restoration projects occurring absent timber management equipment already nearby. To implement this recommendation, additional streamlining of the THP process for LWD input by regulatory agencies is necessary.
TMR-A-6.1.3	Recovery Action	Pool Habitat	Encourage retention and recruitment of large woody debris for all historic 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.										
TMR-A-6.1.3.1	Action Step	Pool Habitat	Develop a Large Wood Recruitment Plan that assesses instream wood needs, and sites potentially responsive to wood recruitment or placement, and develop a riparian strategy to ensure long term natural recruitment of wood via large tree retention.	1	5	CalFire, California Coastal Conservancy, Campbell Timberland Management, CDFG, NMFS, NOAA RC, NRCS, RWQCB, UC Extension, USACE	5.00	5.00	5.00	5.00	5.00	25	Cost of the plan should be relatively inexpensive in the Ten Mile River Watershed due to the large amount of instream habitat typing data and THP data currently available. The plan should review areas with high IP-km scores as high priority areas for immediate enhancement and restoration.
TMR-A-7.1	Objective	Riparian Vegetation	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.										
TMR-A-7.1.1	Recovery Action	Riparian Vegetation	Promote streamside conservation measures, including conservation easements, setbacks, and riparian buffers (DFG 2004).										
TMR-A-7.1.1.1	Action Step	Riparian Vegetation	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	60	CalFire, California Coastal Conservancy, Campbell Timberland Management, CDFG, NMFS, NOAA RC, Private Landowners						TBD	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 some farming and minimal grazing. Many of the areas 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. Extensive landowner outreach will likely be required in these areas.

Ten Mile River (Lost Coast-Navarro Point) Threats and Associated Recovery Actions

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY1	FY2	FY3	FY4	FY5		
TMR-A-8.1	Objective	Sediment	Improve habitat conditions at multiple life stages by reducing sediment inputs to the stream at the watershed scale.										
TMR-A-8.1.1	Recovery Action	Sediment	Re-establish natural sediment delivery processes by assessing sediment delivery sources at the sub-watershed scale and prioritizing sediment reduction activities.										
TMR-A-8.1.1.1	Action Step	Sediment	Develop a Road Sediment Reduction Plan that prioritizes sites and outlines implementation and a timeline of necessary actions. Begin with a road survey focused on inner gorge roads followed by roads in other settings.	2	5	CalFire, Campbell Timberland Management, Private Landowners, RWQCB, USEPA						TBD	A road sediment reduction plan should tier off recommendations in the Ten Mile River TMDL.
TMR-A-8.1.1.2	Action Step	Sediment	Identify areas at increased risk of mass wasting and elevated fine sediment load, and decrease sediment from transportation projects and land management activities in those areas (DFG 2004).	2	5	CalFire, Campbell Timberland Management, Private Landowners							Cost is likely minimal because these sites are likely already identified and cataloged by CalFire and private landowners in existing GIS databases from ongoing timber harvest plans.
TMR-A-8.1.2	Recovery Action	Sediment	Address sediment and runoff sources from road networks and other actions that deliver sediment and runoff to stream channels.										
TMR-A-8.1.2.1	Action Step	Sediment	Restoration projects that upgrade or decommission high risk roads in Core areas should be considered an extremely high priority for funding (e.g., PCSRF).	2	5	CalFire, Campbell Timberland Management, Private Landowners	600	600	600	600	600	3,000	TBD- difficult to estimate cost because assessments for the magnitude of the problem were not available. Additionally, many roads in Core watersheds have been addressed - often through the timber harvest process - and these costs should be considered an ongoing operation expense.
TMR-A-8.1.2.2	Action Step	Sediment	All roads alongside inner gorge areas or in potentially unstable headwall areas should be removed, if feasible.	2	30	CalFire, Campbell Timberland Management, Private Landowners							TBD- difficult to estimate cost because assessments for the magnitude of the problem were not available. Additionally, many inner gorge roads have been addressed - often through the timber harvest process - and these costs should be considered an ongoing operation expense.
TMR-A-8.1.2.3	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 (DFG 2004).	2	60	CalFire, Campbell Timberland Management, Private Landowners, RWQCB							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-A-8.1.3	Recovery Action	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	6.00	6.00	6.00	6.00	6.00	30	
TMR-A-9.1	Objective	Viability	Develop and implement a monitoring program to evaluate the performance of recovery efforts.										
TMR-A-9.1.1	Recovery Action	Viability	Measure or estimate the condition of key habitat attributes across the watershed. Prioritize Core tributaries first, followed by Phase I and Phase II areas as appropriate.										
TMR-A-9.1.1.1	Action Step	Viability	Implement standardized assessment protocols (i.e., DFG 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-A-9.1.2	Recovery Action	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	100	100	100	100	100	2,000	Monitoring costs may vary considerably depending on the number of subwatersheds surveyed. Average annual cost is anticipated to range between \$80,000 and \$120,000. An average of \$100,000 per year was calculated for this action. 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.

Ten Mile River (Lost Coast-Navarro Point) Threats and Associated Recovery Actions

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY1	FY2	FY3	FY4	FY5		
TMR-A-10.1	Objective	Water Quality	Improve summer rearing survival by reducing instream temperatures in potential rearing reaches. See also strategies for restoring and enhancing riparian vegetation.										
TMR-A-10.1.1	Recovery Action	Water Quality	Implement actions to maintain and restore water temperatures to meet habitat requirements for CCC coho salmon in specific streams (DFG 2004).										
TMR-A-10.1.1.1	Action Step	Water Quality	Implement education programs and modify policies and procedures to improve riparian corridor protection, maintain channel integrity, implement alternatives to hard bank protection, and retain large woody debris.	3	20	CalFire, Campbell Timberland Management, Private Landowners, RWQCB						TBD	TBD - Additional cost related to recovery are expected to be minimal. The cost will likely vary significantly depending on types of programs proposed and policies proposed for modification. In the Ten Mile River watershed acceptance of programs by landowners is likely higher for LWD retention and maintenance of channel integrity than in other more urban watersheds and therefore, the costs may be less here than in other areas.
TMR-A-10.1.1.2	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	60	CalFire, Campbell Timberland Management, Private Landowners, RWQCB						TBD	Cost will vary depending on land owner participation. Costs may be higher in the lower watershed where significant areas of site 1 soils where extensive forests were removed for agricultural purposes. Reestablishing a functional riparian forest in these areas (provided landowners are willing) will likely require extensive oversight until the trees become established.
TMR-A-10.1.1.3	Action Step	Water Quality	Increase LWD frequency in mainstem reaches of Ten Mile River.	1	10	CalFire, Campbell Timberland Management, CDFG, NOAA RC, Private Landowners							See Pools strategies for cost estimates. Overall costs in Ten Mile likely moderate due to close road proximity along most of the three major forks in the Ten Mile. In the Ten Mile River watershed acceptance of programs by landowners is likely higher for LWD retention and maintenance of channel integrity than in other more urban watersheds and therefore, the costs may be less here than in other areas.
TMR-A-15.1	Objective	Droughts	Work with land owners or public agencies to acquire water that would be utilized to minimize effects of droughts.										
TMR-A-15.1.1	Recovery Action	Droughts	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 (DFG 2004)(Water Code § 1707).	3	60	CDFG, NOAA RC, Private Landowners						TBD	Cost is unknown. The main benefit of this action is to improve flow conditions in the lower portion of the watershed where the majority of home owners and agricultural use occurs.
TMR-A-15.2	Objective	Droughts	All local and state planning and development should consider, and provide contingencies for, droughts in a manner compatible with CCC coho salmon recovery needs.										
TMR-A-15.2.1	Recovery Action	Droughts	Identify and work with water users to minimize depletion of summer base flows from unauthorized water uses.	2	10	Campbell Timberland Management, CDFG, NMFS OLE, SWRCB						TBD	Costs depend on extent of unauthorized use and receptivity of water users.
TMR-A-15.2.2	Recovery Action	Droughts	Implement water conservation strategies that provide for drought contingencies without relying on interception of surface flows or groundwater depletion.										
TMR-A-15.2.2.1	Action Step	Droughts	Develop and implement critical flow levels for stream reaches impacted by water diversions.	3	60	CDFG, NMFS, Private Landowners, SWRCB	1.67	1.67	1.67	1.67	1.67	100	Relatively few diversions occur in the watershed. Studies should be focused at the impact of diversions in the lower portion of the watershed where the majority of diversions are believed to occur.
TMR-A-15.2.2.2	Action Step	Droughts	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.	3	60	CDFG, NMFS, Private Landowners, SWRCB						0	This action is contingent on the above action. If predicted flows are below a level considered critical to maintain viable rearing habitat for salmonids, measures to reduce water consumption should be initiated in the watershed through conservation programs.
TMR-A-20.1	Objective	Logging and Wood Harvesting	Maintain and expand California's working forestlands and forestlands held by the State, and prevent future conversion of forestlands to agriculture or other land uses.										

Ten Mile River (Lost Coast-Navarro Point) Threats and Associated Recovery Actions

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY1	FY2	FY3	FY4	FY5		
TMR-A-20.1.1	Recovery Action	Logging and Wood Harvesting	Coordinate with the agencies that authorize conversions to minimize conversions in key watersheds and discourage forestland conversions.										
TMR-A-20.1.1.1	Action Step	Logging and Wood Harvesting	Discourage Counties from rezoning forestlands to rural residential or other land uses (e.g., vineyards).	1	5	CalFire, California Coastal Conservancy, Mendocino County, NMFS, Private Landowners, USEPA, USFWS						0	
TMR-A-20.1.1.2	Action Step	Logging and Wood Harvesting	Discourage home building or other incompatible land use in areas identified as timber production zones (TPZ).	1	60	Mendocino County						0	
TMR-A-20.2	Objective	Logging and Wood Harvesting	Encourage landowners to implement restoration projects as part of their ongoing practices in priority stream reaches, particularly where large woody debris is found lacking.	1	60	CalFire, CDFG, NMFS, RWQCB						0	This recommendation is contingent on regulatory agencies developing a streamlined process to facilitate enhancement projects through the THP process.
TMR-A-20.3	Objective	Logging and Wood Harvesting	Provide for properly functioning watershed processes (e.g., cycles of wood, water and sediment) by promoting long term sustainable forestry practices that support coho salmon habitats.										
TMR-A-20.3.1	Recovery Action	Logging and Wood Harvesting	Address sediment and runoff sources from road networks and other actions that deliver sediment and runoff to stream channels.										
TMR-A-20.3.1.1	Action Step	Logging and Wood Harvesting	Extend the monitoring period and upgrade THP road maintenance after harvest.	2	20	Board of Forestry, CalFire, Campbell Timberland Management, CDFG						TBD	Extension of monitoring period is expected to have minimal costs, however, remediation of identified issue may incur greater costs.
TMR-A-20.3.1.2	Action Step	Logging and Wood Harvesting	New THPs should identify problematic legacy roads within WLPZ's, decommission them, and revegetate the area with appropriate native species.	2	60	CalFire, Campbell Timberland Management, Private Landowners						TBD	Most of these cost will likely be associated with planned or ongoing harvest plans.
TMR-A-20.3.1.3	Action Step	Logging and Wood Harvesting	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, Campbell Timberland Management, Private Landowners							This cost is expected to be minimal because the main land management action is timber harvest and the mapping will occur as part of the THP process.
TMR-A-20.3.1.4	Action Step	Logging and Wood Harvesting	Encourage tree retention on the axis of headwall swales. Any deviations should be reviewed and receive written approval by a licensed engineering geologist.	2	60	CalFire, Campbell Timberland Management, Private Landowners							Cost is expected to be minimal.
TMR-A-20.3.2	Recovery Action	Logging and Wood Harvesting	Manage riparian areas for their site potential composition and structure.										
TMR-A-20.3.2.1	Action Step	Logging and Wood Harvesting	Conduct conifer release to promote growth of larger diameter trees where appropriate.	2	60	CalFire, Campbell Timberland Management, Private Landowners						0	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.
TMR-A-20.3.2.2	Action Step	Logging and Wood Harvesting	Conserve and manage forestlands for older forest stages.	2	60	CalFire, Campbell Timberland Management, Private Landowners							TBD- the cost of this action may be minimal depending on the harvest philosophy of the landowner.
TMR-A-20.4	Objective	Logging and Wood Harvesting	Ensure current populations of CCC coho salmon are protected from harm or take and protect all historical habitats from further habitat degradation.										
TMR-A-20.4.1	Recovery Action	Logging and Wood Harvesting	Provide information to the appropriate regulatory bodies regarding the status of CCC coho salmon, priority watershed processes needing consideration, and recommendations that provide no take or incidental take assurances.	1	10	CalFire, CDFG, NMFS	4.00	4.00	4.00	4.00	4.00	40	The recovery plan should serve as the appropriate vehicle to deliver this information.

Ten Mile River (Lost Coast-Navarro Point) Threats and Associated Recovery Actions

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY1	FY2	FY3	FY4	FY5		
TMR-A-20.4.2	Recovery Action	Logging and Wood Harvesting	Establish greater oversight and post-harvest monitoring by the permitting agency of operations within Core, Phase I and Phase II CCC coho salmon areas.										
TMR-A-20.4.2.1	Action Step	Logging and Wood Harvesting	Assign NMFS staff to conduct THP reviews of the highest priority areas using revised "Guidelines for NMFS Staff when Reviewing Timber Operations: Avoiding Take and Harm of Salmon and Steelhead" (NMFS 2004).	2	10	NMFS	70.00	70.00	70.00	70.00	70.00	700	This action will likely require funding for at least one full time NMFS position for the Lost Coast Diversity Stratum. The need for this action may change if Forest Practices Rules change and achieve a no-take standard.
TMR-A-24.1	Objective	Roads and Railroads	Conduct outreach and education regarding the adverse effects of roads, and the types of best management practices protective of salmonids.										
TMR-A-24.1.1	Recovery Action	Roads and Railroads	Continue education of County road engineers and maintenance staff regarding watershed processes and the adverse effects of improper road construction and maintenance on salmonids and their habitats.	3	10	CalFire, Campbell Timberland Management, FishNet 4C, Mendocino County Department of Public Works, Private Landowners						0	Cost is a rough estimate prorated for the Ten Mile River watershed. Existing programs and templates already exist for this recommendation and are currently implemented by most operators and road engineers in the watershed.
TMR-A-24.2	Objective	Roads and Railroads	Reduce road densities by 10 percent over the next 10 years, prioritizing high risk areas in historical habitats or Core CCC coho salmon watersheds.										
TMR-A-24.2.1	Recovery Action	Roads and Railroads	Decommission riparian road systems and/or upgrade roads (and skid trails on forestlands) that deliver sediment into adjacent watercourses (DFG 2004).	1	15	CalFire, California Coastal Conservancy, Campbell Timberland Management, CDFG, NOAA RC, NRCS, Private Landowners, RCD, RWQCB						TBD	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.
TMR-A-24.2.2	Recovery Action	Roads and Railroads	Assess and redesign transportation network to minimize road density and maximize transportation efficiency.	2	20	CalFire, Campbell Timberland Management, Mendocino County Department of Public Works, NOAA RC, Private Landowners, RWQCB						TBD	Costs associated with assessment and redesign cannot be determined at this time. Costs may be significant and should be weighed against additional upland disturbance and overall costs. This recommendation is more feasible within the Ten Mile watershed because a large portion of the watershed is owned by one landowner.
TMR-A-24.3	Objective	Roads and Railroads	Conduct actions that hydrologically disconnect roads in Core areas within ten years (from 2010). Move into Phase I followed by Phase II watersheds as soon as practicable.										
TMR-A-24.3.1	Recovery Action	Roads and Railroads	Address sediment and runoff sources from road networks and other actions that deliver sediment and runoff to stream channels.										
TMR-A-24.3.1.1	Action Step	Roads and Railroads	Fully implement the Ten Mile River TMDL.	2	40							TBD	The 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 (Lost Coast-Navarro Point) Threats and Associated Recovery Actions

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY1	FY2	FY3	FY4	FY5		
TMR-A-24.3.1.2	Action Step	Roads and Railroads	Licensed engineering geologists should review and approve grading on inner gorge slopes.	1	60	CalFire, California Department of Mines and Geology, Campbell Timberland Management, Private Landowners						TBD	Costs likely to be incurred as part of timber harvest operations. However, in some circumstances this may be a stand alone cost.
TMR-A-24.3.1.3	Action Step	Roads and Railroads	Establish adequate spoils storage sites throughout the watershed so that material from landslides and road maintenance can be stored safely away from coho streams. Coordinate these efforts with all landowners in the watershed, and with County road maintenance staff as appropriate.	2	60	CalFire, Campbell Timberland Management, CDFG, Mendocino County Department of Public Works, Private Landowners						0	These areas are likely already established. Efforts should be made to coordinate storage with all landowners in the basin to minimize costs and impacts.
TMR-A-24.3.1.4	Action Step	Roads and 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.	1	60	CalFire, Campbell Timberland Management						0	Many roads in the watershed have inside ditches. Cost should be considered part of road maintenance costs.
TMR-A-24.3.2	Recovery Action	Roads and Railroads	Limit winter use of unsurfaced roads and recreational trails by unauthorized and impacting uses to decrease fine sediment loads.										
TMR-A-24.3.2.1	Action Step	Roads and Railroads	Conduct annual inspections of all roads prior to winter. Correct conditions that are likely to deliver sediment to streams. Hydrologically disconnect roads.	1	60	CalFire, Campbell Timberland Management, Mendocino County Department of Public Works, Private Landowners						0	This action is part of ongoing road maintenance and should be directed at the entire road network.
TMR-A-24.3.3	Recovery Action	Roads and Railroads	Use available best management practices for road construction, maintenance, management and decommissioning (e.g. Hagans & Weaver, 1994; Sommarstrom, 2002; Oregon Department of Transportation, 1999).	1	60	CalFire, Campbell Timberland Management, Private Landowners						TBD	
TMR-A-24.3.4	Recovery Action	Roads and 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.										
TMR-A-24.3.4.1	Action Step	Roads and 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	60	CalFire, California Department of Mines and Geology, Campbell Timberland Management, Private Landowners						TBD	Costs will vary depending on number of actual crossings not meeting passage criteria. Many roads in the watershed have been upgraded recently. This recommendation is generally implemented as part of the THP process
TMR-A-24.4	Objective	Roads and Railroads	Reduce sediment sources from road networks, maintenance activities, and other actions that deliver sediment to stream channels through improved, or new, laws and policies, and/or enforcement of existing laws and policies.										
TMR-A-24.4.1	Recovery Action	Roads and 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	20	Board of Forestry, Campbell Timberland Management, CDFG, Mendocino County						0	
TMR-A-24.4.2	Recovery Action	Roads and Railroads	Improve CalFire enforcement of THP erosion control measures.	1	60	CalFire						0	CalFire can implement this action immediately at minimal cost.