Usal Creek

Location	•Mendocino County
Watershed Area	• 24.5 Square Miles
Potential Habitat	•10.9 Stream Miles
Vegetation	•70% Coniferous •20% Riparian or Montane Forest
Erodability	•High
Ownership Patterns	•98% Private; 2% Public
Dominant Land Uses	•Timber
Housing Density	•Very low
TMDL Pollutants	•None

Usal Creek
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Usal Creek Coho Salmon: Nearly Extirpated

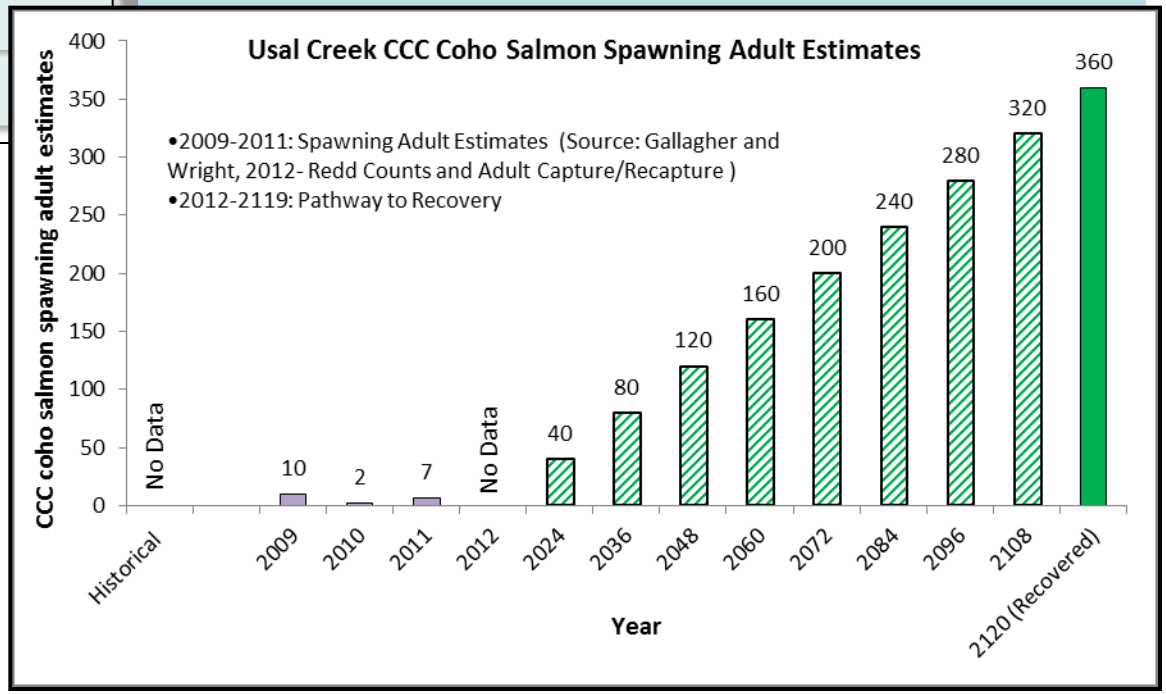
Recovery Goals

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

Usal Creek
Adult Spawner Targets

Downlisting to Threatened
180

Recovery
360



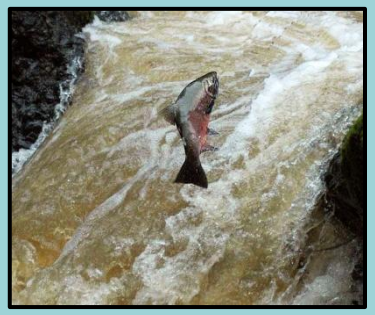
STEELHEAD: YES
CHINOOK SALMON: NO

Usal Creek

Potential Habitat: 10.9 miles
Recovery Target: 360 Spawning Adult Coho Salmon

Current Instream, Watershed and Population Conditions

Estuary/Lagoon	Habitat Complexity	Hydrology	Passage & Migration	Riparian Vegetation	Sediment	Stream Temperature	Velocity Refuge	Water Quality	Viability	Landscape Patterns
POOR	POOR	GOOD	FAIR	FAIR	POOR	GOOD	GOOD	GOOD	POOR	GOOD



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
- Install large woody material, boulders, and other instream features to increase habitat complexity and improve pool frequency and depth

Priority 2 & 3: Long-Term Restoration Actions

- Install LWD structures in the estuary, and consider sediment removal from lower mainstem and the estuary
- Conduct conifer release by thinning hardwoods, and replant floodplain with native overstory vegetation
- Encourage landowners to implement restoration projects as part of ongoing operations
- Improve passage conditions through the aggraded estuary, mainstem, and lower reaches

Recovery Partners

Photo courtesy from left to right: Josh Fuller, NMFS, Campbell Timberland, Paola Bouley, SPAWN, Campbell Timberland and Morgan Bond, SWFSC

Usal Creek

Potential Habitat: 10.9 miles
Recovery Target: 360 Spawning Adult Coho Salmon

Future Threats

Agriculture	Channel Modification	Disease & Predation	Fire & Fuel Management	Fishing & Collecting	Hatcheries & Aquaculture	Livestock & Ranching	Logging	Mining	Recreation	Urban Development	Roads & Railroads	Severe Weather	Diversions & Impoundment
NA	MEDIUM	MEDIUM	MEDIUM	MEDIUM	NA	NA	MEDIUM	LOW	LOW	NA	HIGH	HIGH	MEDIUM

Reducing Future Threats

Priority 1: Immediate Threat Abatement Actions

- Design new roads to avoid unstable slopes, wetlands, floodplains and other areas of high habitat value
- Protect existing areas with floodplains or off channel habitats from future development

Priority 2 & 3: Long-Term Threat Abatement Actions

- Size culverts to accommodate flashy, debris-laden flows and maintain trash racks to prevent culvert plugging and subsequent road failure
- Use available best management practices for road construction, maintenance, management and decommissioning
- Encourage County of Mendocino to winterize and maintain the Usal County road
- Establish adequate spoils storage sites throughout the watershed
- Replace the existing county bridge in the Sinkyone State Parks Campground

Usal Creek (left) Soldier Creek confluence. *Photo provided by Redwood Forest Foundation, Inc., and is used with permission. All rights reserved.*

Conservation Highlights

- To improve aquatic habitat Campbell Timberland Management and Redwood Forest Foundation have collaborated on sediment remediation projects.

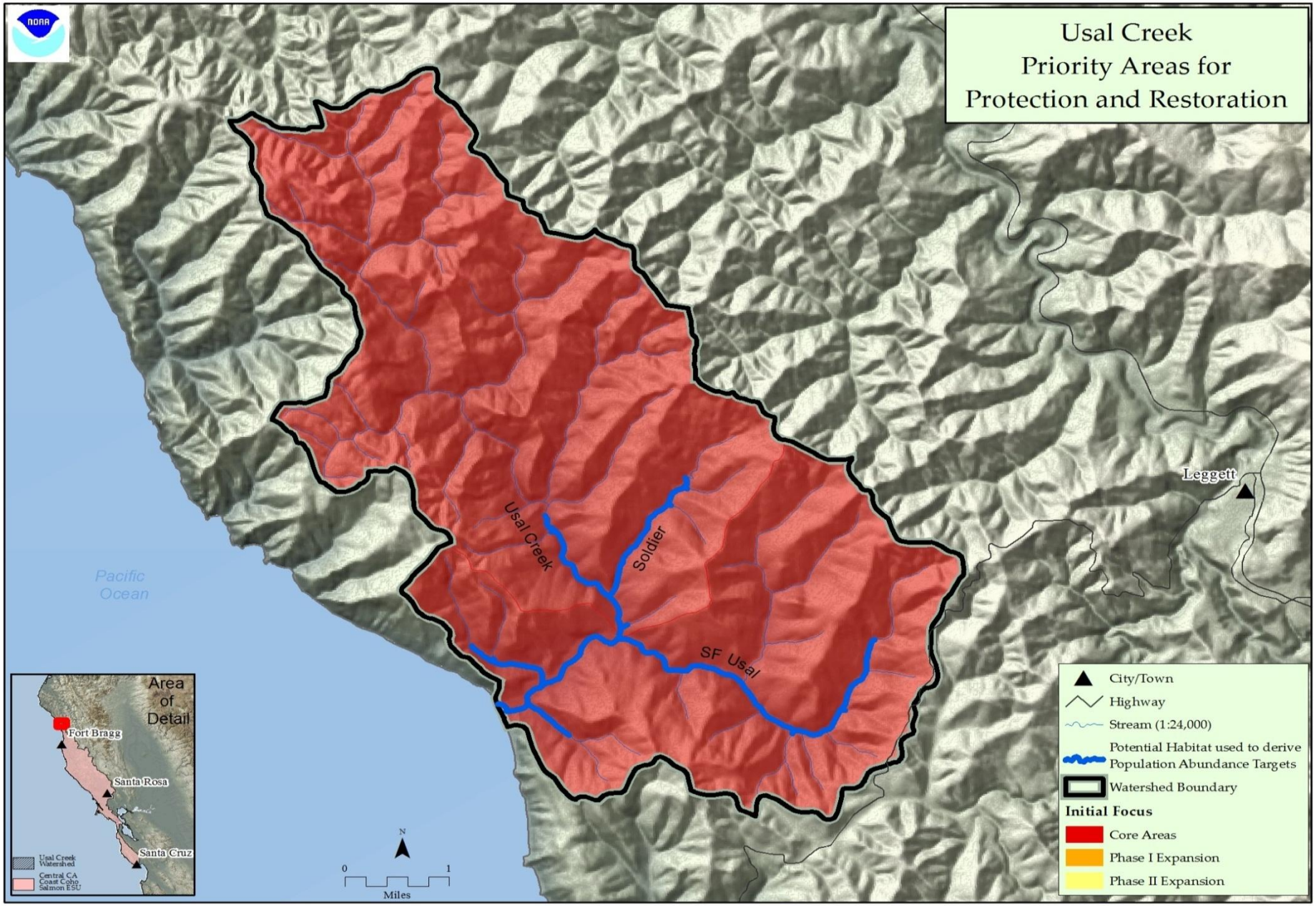


Figure 1: Map of Usal Creek

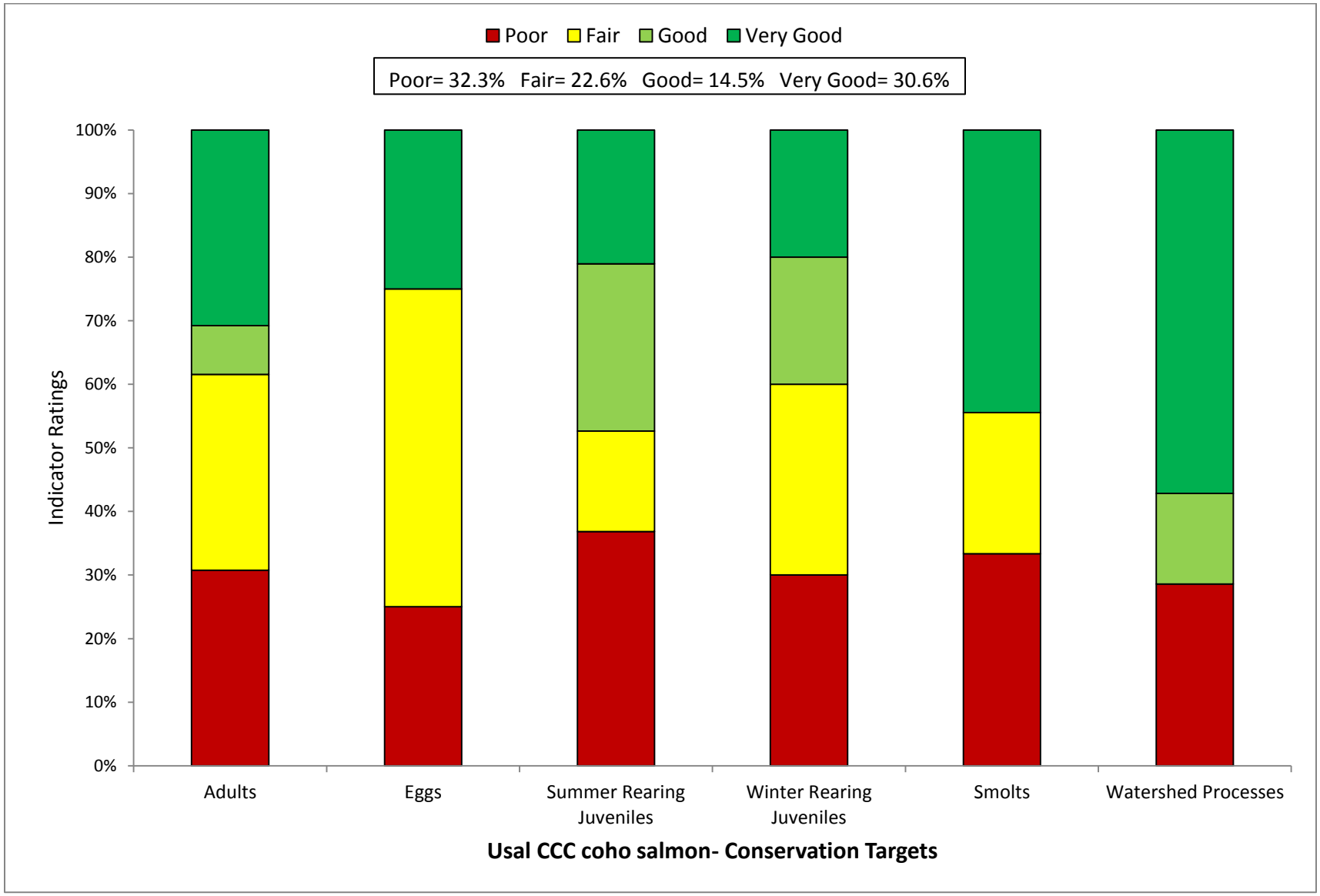


Figure 2: Viability Results by Lifestage

Table 1: CAP Viability Results ~ Usal Creek

Target	Attribute	Indicator	Result	Rating	Method	Desired Criteria
Adults	Habitat Complexity	Large Wood Frequency (BFW 0-10 meters)	**<4 Key Pieces/100m**	Poor	NMFS Expert Estuary/Lagoon Panel	6 to 11 key pcs/100m
Adults	Habitat Complexity	Large Wood Frequency (BFW 10-100 meters)	**<1 Key Pieces/100m**	Poor	NMFS Expert Estuary/Lagoon Panel	1.3 to 4 Key Pieces/100 meters
Adults	Habitat Complexity	Pool/Riffle/Flatwater Ratio	**80% streams 49% IP-km**	Fair	SEC Analysis/CDFG Data	75% to 90% of streams/ IP-Km (>30% Pools; >20% Riffles)
Adults	Habitat Complexity	Shelter Rating	**30% by stream 12% by 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 Factore Score = <35**	Very Good	SEC Analysis/CDFG Data	NMFS Flow Protocol: Risk Factor Score 35-50
Adults	Passage/Migration	Passage at Mouth or Confluence	**50% of IP-km to 74% of IP-km accessible**	Fair	SEC Analysis/CDFG Data	75% of IP-Km to 90% of IP-km
Adults	Passage/Migration	Physical Barriers	**100% of IP-km accessible**	Very Good	SEC Analysis/CDFG Data	75% of IP-Km to 90% of IP-km
Adults	Riparian Vegetation	Tree Diameter (North of SF Bay)	**40% Class 5 & 6 across IP-km**	Fair	SEC Analysis/CDFG Data	55 - 69% Class 5 & 6 across IP-km
Adults	Riparian Vegetation	Tree Diameter (South of SF Bay)	**NA**	0	SEC Analysis/CDFG Data	≥80% Density rating "D" across IP-km
Adults	Sediment	Quantity & Distribution of Spawning Gravels	**>90% of IP-km accessible**	Very Good	SEC Analysis/CDFG Data	75% of IP-Km to 90% of IP-km
Adults	Velocity Refuge	Floodplain Connectivity	**>80% Response Reach Connectivity**	Good	SEC Analysis/CDFG Data	>80% Response Reach Connectivity
Adults	Water Quality	Toxicity	**No evidence of toxins or contaminants**	Very Good	SEC Analysis/CDFG Data	No Acute or Chronic
Adults	Water Quality	Turbidity	**50% to 74% of streams/ IP-km maintains severity score of 3 or lower**	Fair	SEC Analysis/CDFG Data	75% to 90% of streams/ IP-Km maintains severity score of 3 or lower
Adults	Viability	Density	**<1 spawner per IP-km**	Poor	SEC Analysis/CDFG Data	low risk spawner density per Spence (2008)
Eggs	Hydrology	Flow Conditions (Instantaneous Condition)	**Risk Factor Score = <35**	Very Good	SEC Analysis/CDFG Data	NMFS Flow Protocol: Risk Factor Score 35-50
Eggs	Hydrology	Redd Scour	**Risk Factor Score =51-75**	Fair	SEC Analysis/CDFG Data	NMFS Flow Protocol: Risk Factor Score 35-50

Eggs	Sediment	Gravel Quality (Bulk)	**>17% (0.85mm) and >30% (6.4mm)**	Poor	NMFS Instream Flow Analysis	12-14% (0.85mm) and <30% (6.4mm)
Eggs	Sediment	Gravel Quality (Embeddedness)	**70% streams 75% IP-km (>50% stream average scores of 1 & 2)**	Fair	NMFS Instream Flow Analysis	75% to 90% of streams/ IP-Km (>50% stream average scores of 1 & 2)
Summer Rearing Juveniles	Estuary/Lagoon	Quality & Extent	**Impaired and not functioning**	Poor	NMFS Instream Flow Analysis	Properly Functioning Condition
Summer Rearing Juveniles	Habitat Complexity	Large Wood Frequency (Bankfull Width 0-10 meters)	**<4 Key Pieces/100m**	Poor	NMFS Instream Flow Analysis	6 to 11 key pcs/100m
Summer Rearing Juveniles	Habitat Complexity	Large Wood Frequency (Bankfull Width 10-100 meters)	**<1 Key Pieces/100m**	Poor	NMFS Instream Flow Analysis	1.3 to 4 Key Pieces/100 meters
Summer Rearing Juveniles	Habitat Complexity	Percent Primary Pools	**30% stream 10% 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	**80% streams 49% IP-km (>30% Pools; >20% Riffles)**	Fair	NMFS Instream Flow Analysis	75% to 90% of streams/ IP-Km (>30% Pools; >20% Riffles)
Summer Rearing Juveniles	Habitat Complexity	Shelter Rating	**30% by stream 12% by IP (>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 =35-50**	Good	NMFS Instream Flow Analysis	NMFS Flow Protocol: Risk Factor Score 35-50
Summer Rearing Juveniles	Hydrology	Flow Conditions (Instantaneous Condition)	**Risk Factor Score = 41.6**	Good	NMFS Watershed Characterization	NMFS Flow Protocol: Risk Factor Score 35-50
Summer Rearing Juveniles	Hydrology	Number, Condition and/or Magnitude of Diversions	**0 Diversions**	Very Good	NMFS Watershed Characterization	0.01 - 1 Diversions/10 IP km
Summer Rearing Juveniles	Passage/Migration	Passage at Mouth or Confluence	**75% of IP-km to 90% of IP-km accessible**	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	**>90% 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)	**40% Class 5 & 6 across IP-km**	Fair	Population Profile/BPJ	55 - 69% Class 5 & 6 across IP-km
Summer Rearing Juveniles	Riparian Vegetation	Tree Diameter (South of SF Bay)	**NA**	0	SEC or PAD/CDFG Data	≥80% Density rating "D" across IP-km
Summer Rearing Juveniles	Sediment (Food Productivity)	Gravel Quality (Embeddedness)	**70% streams 75% IP-km (>50% stream average scores of 1 & 2)**	Fair	SEC or PAD/CDFG Data	75% to 90% of streams/ IP-Km (>50% stream average scores of 1 & 2)

Summer Rearing Juveniles	Water Quality	Temperature (MWMT)	**75 to 89% IP-km (<16 C MWMT)**	Good	Population Profile/BPJ	75 to 89% IP km (<16 C MWMT)
Summer Rearing Juveniles	Water Quality	Toxicity	**No evidence of toxins or contaminants**	Very 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% of Historical Range**	Poor	NMFS Watershed Characterization/CWHR	75-90% of Historical Range
Winter Rearing Juveniles	Habitat Complexity	Large Wood Frequency (Bankfull Width 0-10 meters)	**<4 Key Pieces/100m**	Poor	NMFS Watershed Characterization/CWHR	6 to 11 key pcs/100m
Winter Rearing Juveniles	Habitat Complexity	Large Wood Frequency (Bankfull Width 10-100 meters)	**<1 Key Pieces/100m**	Poor	NMFS Watershed Characterization/CWHR	1.3 to 4 Key Pieces/100 meters
Winter Rearing Juveniles	Habitat Complexity	Pool/Riffle/Flatwater Ratio	**80% by streams 49% by IP-km (>30% Pools; >20% Riffles)**	Good	NMFS Watershed Characterization/CWHR	75% to 90% of streams/ IP-Km (>30% Pools; >20% Riffles)
Winter Rearing Juveniles	Habitat Complexity	Shelter Rating	**30% by stream 12% by IP-km (>80 stream average)**	Poor	CDF Vegetation Maps/BPJ	75% to 90% of streams/ IP-Km (>80 stream average)
Winter Rearing Juveniles	Passage/Migration	Physical Barriers	**100% of IP-km accessible**	Very Good	Population Profile/BPJ	75% of IP-Km to 90% of IP-km
Winter Rearing Juveniles	Riparian Vegetation	Tree Diameter (North of SF Bay)	**40% Class 5 & 6 across IP-km**	Fair	Population Profile/BPJ	55 - 69% Class 5 & 6 across IP-km
Winter Rearing Juveniles	Riparian Vegetation	Tree Diameter (South of SF Bay)	**NA**	0	SEC Analysis/CDFG Data	≥80% Density rating "D" across IP-km
Winter Rearing Juveniles	Sediment (Food Productivity)	Gravel Quality (Embeddedness)	**70 by streams 75 by IP-km (>50% stream average scores of 1 & 2)**	Fair	SEC Analysis/CDFG Data	75% to 90% of streams/ IP-Km (>50% stream average scores of 1 & 2)
Winter Rearing Juveniles	Velocity Refuge	Floodplain Connectivity	**>80% Response Reach Connectivity**	Good	SEC Analysis/CDFG Data	>80% Response Reach Connectivity
Winter Rearing Juveniles	Water Quality	Toxicity	**No evidence of toxins or contaminants**	Very Good	NMFS Watershed Characterization	No Acute or Chronic
Winter Rearing Juveniles	Water Quality	Turbidity	**50 to 74% of streams/ IP-Km maintains severity score of 3 or lower**	Fair	NMFS Watershed Characterization	75% to 90% of streams/ IP-Km maintains severity score of 3 or lower

Smolts	Estuary/Lagoon	Quality & Extent	**Impaired but functioning**	Fair	SEC Analysis/CDFG Data	Properly Functioning Condition
Smolts	Habitat Complexity	Shelter Rating	**30% by stream 12% by IP-km (>80 stream average)**	Poor	Population Profile	75% to 90% of streams/ IP-Km (>80 stream average)
Smolts	Hydrology	Number, Condition and/or Magnitude of Diversions	**0 diversions**	Very Good	Population Profile	0.01 - 1 Diversions/10 IP km
Smolts	Hydrology	Passage Flows	**Risk Factor Score = <35**	Very Good	TRT Spence (2008)	NMFS Flow Protocol: Risk Factor Score 35-50
Smolts	Passage/Migration	Passage at Mouth or Confluence	**<50% of IP-km accessible**	Poor	TRT Spence (2008)	75% of IP-Km to 90% of IP-km
Smolts	Smoltification	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 evidence of toxins or contaminants**	Very Good	TRT Spence (2008)	No Acute or Chronic
Smolts	Water Quality	Turbidity	**50 to 74% of streams/ IP-Km maintains severity score of 3 or lower**	Fair	EPA/RWQCB/NMFS Criteria	75% to 90% of streams/ IP-Km maintains severity score of 3 or lower
Smolts	Viability	Abundance	**Abundance leading to high risk spawner density = 0**	Poor	Newcombe and Jensen 2003	Smolt abundance to produce low risk spawner density per Spence (2008)
Watershed Processes	Hydrology	Impervious Surfaces	**0.117% 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	**18% of Watershed in Timber Harvest in last 15 years**	Good	Newcombe and Jensen 2003	25-15% of Watershed in Timber Harvest
Watershed Processes	Landscape Patterns	Urbanization	**0% of watershed >1 unit/20 acres**	Very Good	EPA/RWQCB/NMFS Criteria	8-11% of watershed >1 unit/20 acres
Watershed Processes	Riparian Vegetation	Species Composition	**>75% Historical Species Composition**	Very Good	Newcombe and Jensen 2003	51-74% Intact Historical Species Composition
Watershed Processes	Sediment Transport	Road Density	**3.5 Miles/Square Mile**	Poor	EPA/RWQCB/NMFS Criteria	1.6 to 2.4 Miles/Square Mile
Watershed Processes	Sediment Transport	Streamside Road Density (100 m)	**4.3 Miles/Square Mile**	Poor	Newcombe and Jensen 2003	0.1 to 0.4 Miles/Square Mile

Table 2: CAP Threats Results ~ Usal Creek

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

Central CA Coast Coho Salmon ~ Usal Creek

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:** Identify key locations and install LWD structures targeting increased pool depth and shelter within the estuary.

1.1.1.2. **Action Step:** Evaluate and implement as appropriate, sediment removal from Usal lower mainstem and estuary. Sediment could be used as a rock source of the numerous unpaved roads in the watershed as well as for the Usal County Road.

1.1.2. **Recovery Action:** Improve the quality of each estuarine habitat zone

1.1.2.1. **Action Step:** Conduct conifer release by thinning hardwoods in lower reaches of South and North Fork Usal Creek. Conifers could serve as a source for future large woody debris recruitment into the estuary and aid in cooler water temperatures flowing into estuary.

1.1.2.2. **Action Step:** Initiate riparian planting of conifers within the riparian zones that are currently dominated by hardwoods and floodplain areas that are absent of conifers.

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

1.2.1. **Recovery Action:** Reduce frequency of artificial breaching events

1.2.1.1. **Action Step:** Post durable and attractive interpretive signage at the beach to discourage casual breaching of the lagoon sandbar.

1.2.1.2. **Action Step:** Post warning signs and provide financial rewards to individuals who identify persons who illegally breach the sandbar to Usal lagoon.

1.2.1.3. **Action Step:** Implement patrols by citizens groups, State Parks staff and law enforcement to ensure the sandbar is not illegally breached.

2. Restoration- Floodplain Connectivity

2.1. **Objective:** Improve over-winter survival by increasing the frequency and functionality of off-channel habitats.

2.1.1. **Recovery Action:** Create flood refuge habitat, such as hydrologically connected floodplains with riparian forest.

2.1.1.1. **Action Step:** Delineate reaches possessing both potential winter rearing habitat and floodplain areas.

2.1.1.2. **Action Step:** Target habitat restoration and enhancement that will function between winter baseflow and flood stage.

2.1.1.3. **Action Step:** Promote restoration projects designed to create or restore alcoves, backchannels, ephemeral tributaries, or seasonal pond habitats.

2.1.1.4. **Action Step:** Replant floodplain with native overstory vegetation.

3. Restoration- Habitat Complexity

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

3.1.1. **Recovery Action:** Increase large wood frequency and shelter rating

3.1.1.1. **Action Step:** Install Large woody material, boulders, and other instream features to increase habitat complexity and improve pool frequency and depth.

3.1.1.2. **Action Step:** Mechanically recruit alder from floodplain surfaces into the stream channel.

3.1.1.3. **Action Step:** Identify historical CCC coho salmon habitats lacking in channel complexity, and promote restoration projects designed to create or restore complex habitat features that provide for localized pool scour, velocity refuge, and cover.

3.1.1.4. **Action Step:** Incorporate large woody material into stream bank protection projects, where appropriate. Do not use aqua logs (cylindrical concrete rip rap).

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

3.1.1.6. **Action Step:** Encourage retention and recruitment of large woody material for all historical anadromous salmonid rearing habitats in Usal Creek. Consult a hydrologist and qualified fisheries biologist before removing wood from streams.

3.1.1.7. **Action Step:** If log jams are modified for fish passage, retain LWD for instream enhancement projects that address poor shelter rating for juveniles and smolts.

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

3.1.2. **Recovery Action:** Increase frequency of primary pools

3.1.2.1. **Action Step:** Excavate sediment and build up channel bars.

4. Restoration- Hydrology

No species-specific actions were developed.

5. Restoration- Landscape Patterns

No species-specific actions were developed.

6. Restoration- Passage

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

6.1.1. **Recovery Action:** Rehabilitate and enhance passage into tributaries (aggradation/degradation)

6.1.1.1. **Action Step:** Evaluate smolt (and juvenile rearing) outmigration constraints, particularly during drought year low flow conditions, through the aggraded estuary, mainstem Usal, and lower reaches of N Fk. Usal.

6.1.1.2. **Action Step:** Install instream structures such as boulders, boulder clusters, LWD, and other appropriate materials to increase scour and maintain the wetted channel at appropriate depths during the outmigration season..

7. Restoration- Pool Habitat

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

8. Restoration- Riparian

No species-specific actions were developed.

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:** Re-establish natural sediment delivery processes by assessing sediment delivery sources at the sub-watershed scale and prioritizing sediment reduction activities.

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.

10. Restoration- Viability

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

10.1.1. **Recovery Action:** Increase abundance

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

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

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

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

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

10.2.2.1. **Action Step:** Conduct periodic, standardized spawning surveys to estimate adult abundance in the watershed. Surveys should include all three cohorts.

10.2.2.2. **Action Step:** Implement a monitoring program to evaluate the performance of recovery efforts.

11. Restoration- Water Quality

No species-specific actions were developed.

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 sedimentation 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 fire fighters 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, CalFire Resource Advisors should contact 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, ponds, storage tanks, 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 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

No species-specific actions were developed.

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:** Encourage County of Mendocino winterize the Usal County road using modern techniques to ensure sediment from roads does not enter North Fork Usal Creek.

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

23.1.2.5. **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.

23.1.2.6. **Action Step:** Establish adequate spoils storage sites throughout the watershed so that material from landslides and road maintenance can be stored safely away from coho streams. Coordinate these efforts with all landowners in the watershed, CalTrans, and county road maintenance staff as appropriate.

23.1.2.7. **Action Step:** Install and maintain adequate energy dissipaters for culverts and other drainage pipe outlets where needed.

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:** Replace the existing bridge on Usal County Road located in the Sinkyone State Parks Campground.

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

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

23.1.5.1. **Action Step:** Discourage or eliminate unwanted vegetation and promote desirable (native) vegetation.

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

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

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

23.2.3.4. **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 the estuary (impaired quality and extent)

24.1.1.1. **Action Step:** Monitor and evaluate existing subtidal resources and habitat types to track impacts of sea level rise to subtidal habitats that occur within and adjacent to selected tidal wetland restoration projects (California State Coastal Conservancy et al. 2010).

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

24.1.2.1. **Action Step:** CDFG, SWRCB, RWQCB, CalFire, Caltrans, and other agencies and landowners, in cooperation with NMFS, should evaluate the rate and volume of water drafting for dust control in streams or tributaries and where appropriate, minimize water withdrawals that could impact coho salmon.

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

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

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

24.1.4.1. **Action Step:** Patterns of water runoff, including surface and subsurface drainage, should match, to the greatest extent possible, the natural hydrologic pattern for the watershed in timing, quantity, and quality.

24.1.4.2. **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 ~ Usal Creek

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs ($K)						Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25	Entire Duration	
UsC-CCC-1.1	**Objective**	**Estuary**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
UsC-CCC-1.1.1	Recovery Action	Estuary	Improve the quality and extent of freshwater lagoon habitat										
UsC-CCC-1.1.1.1	Action Step	Estuary	Identify key locations and install LWD structures targeting increased pool depth and shelter within the estuary.	2	10	CDFG, State Parks	275.00	275.00				550	Efforts should be directed at facilitating channel scour as well as providing summer refugia for rearing juvenile salmonids in the estuary and the lower mainstem. Available information obtained from historical photographs does not provide a clear image of the estuary's historical size and extent. Inferences, based on removal of old growth conifers from the floodplain and current rates of sediment input from the upper watershed, suggest historically the estuary may have provided more suitable rearing habitat for salmonids than under current conditions. Due to the importance estuaries play in the survival of salmonids, further assessment of the potential to enhance and restore estuarine quality and extent should be conducted. An immediate program of LWD supplementation to enhance habitat complexity will likely be necessary due to the long period of time it will likely take for LWD to naturally recruit from existing riparian zones. Cost based on treating 2 acres (assume 25% of estuarine habitat) at a rate of $272,120/acre.
UsC-CCC-1.1.1.2	Action Step	Estuary	Evaluate and implement as appropriate, sediment removal from Usal lower mainstem and estuary. Sediment could be used as a rock source of the numerous unpaved roads in the watershed as well as for the Usal County Road.	2	5	CA Coastal Commission, CDFG, Mendocino County Department of Public Works, RFFI, State Parks	30.00					30	The historical potential of Usal estuary is unknown; however, it is believed to be highly compromised due to aggradation from past land-management practices in the upper portion of the watershed. Due to the importance of estuaries for juvenile rearing (Bond et al. 2008), a thorough evaluation of the intrinsic potential of the estuary to provide necessary attributes for salmonid survival should occur to evaluate whether conditions could be improved. Excess sediment could be used as a rock source for the numerous unpaved roads in the watershed and for Usal County Road. The rock would likely need to be crushed, once removed from the estuary in order to provide an adequate road base. Cost cannot be accurately determined without assessing the volume of sediment to be removed on an annual basis. Assume flat rate of $60,000/ mile for 0.5 miles.

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs ($K)						Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25	Entire Duration	
UsC-CCC-1.1.2	Recovery Action	Estuary	Improve the quality of each estuarine habitat zone										
UsC-CCC-1.1.2.1	Action Step	Estuary	Conduct conifer release by thinning hardwoods in lower reaches of South and North Fork Usal Creek. Conifers could serve as a source for future large woody debris recruitment into the estuary and aid in cooler water temperatures flowing into estuary.	2	5	RFFI	1.50					2	Cost would be almost completely for personnel. Little permitting costs anticipated. The lower reaches have a heavy alder overstory component that slows the growth of understory conifers and ultimately impedes the rate of future conifer recruitment to the wetted channel. Cost based on riparian thinning for 1 mile (assume 320 acres/mile in 25% High IP) at a rate of $1,422/mile.
UsC-CCC-1.1.2.2	Action Step	Estuary	Initiate riparian planting of conifers within the riparian zones that are currently dominated by hardwoods and floodplain areas that are absent of conifers.	2	5	Campbell Timberland Management, CDFG, State Parks							Initial efforts should focus on the alder dominated riparian areas along the mainstem and lower North and South Forks of Usal Creek. Historical photographs of the Usal floodplain indicate the presence of old growth conifers. Replanting the floodplain would likely facilitate LWD recruitment in the distant future. Cost accounted for in FLOODPLAIN CONNECTIVITY.
UsC-CCC-1.2	**Objective**	**Estuary**	**Address the inadequacy of existing regulatory mechanisms**										
UsC-CCC-1.2.1	Recovery Action	Estuary	Reduce frequency of artificial breaching events										
UsC-CCC-1.2.1.1	Action Step	Estuary	Post durable and attractive interpretive signage at the beach to discourage casual breaching of the lagoon sandbar.	3	10	State Parks	1.50	1.50				3	Additional educational signage along the estuary should be included with this recommendation. Signage should explain estuarine function and its benefits to endangered species and water quality of a properly functioning estuary. Cost of signs can vary widely depending on materials. Average cost estimated to be $1,000/sign. Assume minimum of 3 signs located at key points along the estuary.
UsC-CCC-1.2.1.2	Action Step	Estuary	Post warning signs and provide financial rewards to individuals who identify persons who illegally breach the sandbar to Usal lagoon.	3	10	CDFG Law Enforcement, NMFS OLE, State Parks							Unauthorized breeching reported during smolt season. Cost for signs could be accounted for in post durable attractive signs.
UsC-CCC-1.2.1.3	Action Step	Estuary	Implement patrols by citizens groups, State Parks staff and law enforcement to ensure the sandbar is not illegally breached.	3	100	State Parks						In-Kind	Rough cost estimate for the 100 year period. Close coordination by all parties would likely comprise the majority of the costs.
UsC-CCC-2.1	**Objective**	**Floodplain Connectivity**	**Improve over-winter survival by increasing the frequency and functionality of off-channel habitats.**										

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs ($K)						Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25	Entire Duration	
UsC-CCC-2.1.1	Recovery Action	Floodplain Connectivity	Create flood refuge habitat, such as hydrologically connected floodplains with riparian forest.										
UsC-CCC-2.1.1.1	Action Step	Floodplain Connectivity	Delineate reaches possessing both potential winter rearing habitat and floodplain areas.	2	2	CDFG, RFFI, State Parks	20.00					20	Assessments have already been conducted but additional site specific field checks and mapping are likely needed.
UsC-CCC-2.1.1.2	Action Step	Floodplain Connectivity	Target habitat restoration and enhancement that will function between winter baseflow and flood stage.	3	20	CDFG, NOAA RC, RFFI, State Parks						TBD	Difficult to estimate cost until an evaluation of habitat enhancement opportunities are conducted.
UsC-CCC-2.1.1.3	Action Step	Floodplain Connectivity	Promote restoration projects designed to create or restore alcoves, backchannels, ephemeral tributaries, or seasonal pond habitats.	1	5	CDFG, RFFI, State Parks	45.00					45	Areas with perennial flow and high IP-km scores should be targeted first for this measure. Little infrastructure exists on the floodplain. Creation and restoration of off-channel 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 Usal should be designed with consideration of providing high flow refugia. Cost based on treating 1.25 miles (assume 1 project/mile in 25% High IP) at a rate of $36,046/mile.
UsC-CCC-2.1.1.4	Action Step	Floodplain Connectivity	Replant floodplain with native overstory vegetation.	2	20	CDFG, RFFI, State Parks	503	503	503	503		2,010	Cost based on treating 1.25 miles (assume 80 acres/mile) at a rate of $20,057/acre.
UsC-CCC-3.1	**Objective**	**Habitat Complexity**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
UsC-CCC-3.1.1	Recovery Action	Habitat Complexity	Increase large wood frequency and shelter rating										

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs ($K)						Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25	Entire Duration	
UsC-CCC-3.1.1.1	Action Step	Habitat Complexity	Install Large woody material, boulders, and other instream features to increase habitat complexity and improve pool frequency and depth.	1	5	CDFG, NMFS, Private Consultants, RFFI, State Parks	37.50					38	Usal Creek has approx. 5 km of High IP habitat. Data from CDFG habitat inventories indicate shelter ratings throughout the Usal Creek watershed are poor within all sampled reaches. Poor LWD ratings were documented within the watershed, due largely to a lack of functional instream habitat. Large portions of this functional instream structure were likely removed due to past land management and well-intentioned stream clearing practices. Initial efforts should be directed at the lower reaches where significant aggradation limits summer rearing habitat. Significant cost savings (and ecological benefits) would likely be realized if unsecured woody material (sized at 1.5 to 2 times bankfull) is used. Costs can be reduced by using onsite materials and coordinating efforts and equipment associated with other land management actions. Unsecured LWD input is practical in Usal Creek because almost no downstream infrastructure is present other than the County bridge which is recommended in this plan for upgrades. Large woody material should be targeted to reach density and volume outlined in the Viability table in this document. These actions will 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. Cost based on treating 1.5 miles (assume 1 project/mile in 50% High IP) at a rate of $25,000/mile.
UsC-CCC-3.1.1.2	Action Step	Habitat Complexity	Mechanically recruit alder from floodplain surfaces into the stream channel.	2	5	, CDFG, RFFI, State Parks	15.00					15	Recruit alders at least 20 feet away from the stream banks to maintain bank integrity. Rather than felling trees by chainsaw, pull over with winches and place root balls in the channel. Recruit at a rate of one tree per channel width in the lower portions of North Fork and South Fork Usal and appropriate locations on the mainstem. This action should occur within the context of a larger overall large wood (conifer) enhancement effort throughout the watershed.
UsC-CCC-3.1.1.3	Action Step	Habitat Complexity	Identify historical CCC coho salmon habitats lacking in channel complexity, and promote restoration projects designed to create or restore complex habitat features that provide for localized pool scour, velocity refuge, and cover.	2	15	CDFG, NMFS, Private Consultants, RFFI, State Parks							Increasing channel confinement should be a priority in the lower portion of Usal Creek. A confined channel would more efficiently sort and process bed material and thus, facilitate development of resilient pool riffle structure.

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs ($K)						Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25	Entire Duration	
UsC-CCC-3.1.1.4	Action Step	Habitat Complexity	Incorporate large woody material into stream bank protection projects, where appropriate. Do not use aqua logs (cylindrical concrete rip rap).	3	100	CDFG, NMFS, Private Consultants, RFFI, State Parks							Little bank hardening is anticipated to be needed in Usal watershed. This recommendation should be a standard practice.
UsC-CCC-3.1.1.5	Action Step	Habitat Complexity	Encourage landowners to implement restoration projects as part of their ongoing operations in stream reaches where large woody debris is lacking.	2	100	CDFG, Private Landowners						In-Kind	This recommendation should be adopted as a reoccurring recommendation for all timber harvest plans.
UsC-CCC-3.1.1.6	Action Step	Habitat Complexity	Encourage retention and recruitment of large woody material for all historical anadromous salmonid rearing habitats in Usal Creek. Consult a hydrologist and qualified fisheries biologist before removing wood from streams.	2	100	CDFG, NMFS, Private Landowners, State Parks						In-Kind	Manipulation of Large Woody Material should not occur until evaluated by a hydrologist and/or qualified biologist familiar with Lost Coast streams.
UsC-CCC-3.1.1.7	Action Step	Habitat Complexity	If log jams are modified for fish passage, retain LWD for instream enhancement projects that address poor shelter rating for juveniles and smolts.	3	100	CDFG, RFFI, RWQCB, State Parks						In-Kind	Retention of wood could result in cost savings for future restoration projects. Significant oversight and evaluation should occur prior to removal of any large wood structure.
UsC-CCC-3.1.1.8	Action Step	Habitat Complexity	Conduct conifer release to promote growth of larger diameter trees where appropriate.	2	100	RFFI, State Parks						TBD	Conifer release must take a comprehensive approach and should only be initiated in stream reaches with adequate canopy cover and where increases in instream temperatures are unlikely. Conifer release will ultimately promote the natural recruitment of large wood into the tributaries and mainstem areas. Cost could be minimal if incorporated into ongoing timber harvest plans. The forest is in a period of recovery from past intensive harvest practices and the overstory has changed from a heavily dominated redwood overstory to a forest with young redwood and a significant hardwood and Douglas-fir overstory component. Conifer release will ultimately restore riparian processes by providing a source for future large wood recruitment into watercourses. Some cost for conifer release accounted for in ESTUARY recovery actions.
UsC-CCC-3.1.2	Recovery Action	Habitat Complexity	Increase frequency of primary pools										

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs ($K)						Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25	Entire Duration	
UsC-CCC-3.1.2.1	Action Step	Habitat Complexity	Excavate sediment and build up channel bars.	2	10	CDFG, RFFI, State Parks, USACE	37.50	37.50				75	Using an excavator/backhoe, remove sediment from incipient pools or adjacent to incipient bars, and place the sediment on incipient bars. Grade the placed sediment to contoured form and attach to banks, mimicking alternate bars in general shapes. Bars should confine the active channel approximately 50% in width. This rough design estimate should be refined by results from field survey and hydraulic model analysis. Place LWD and available coarse sediment on bar surfaces to increase resistance to erosion.
UsC-CCC-6.1	**Objective**	**Passage**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
UsC-CCC-6.1.1	Recovery Action	Passage	Rehabilitate and enhance passage into tributaries (aggradation/degradation)										
UsC-CCC-6.1.1.1	Action Step	Passage	Evaluate smolt (and juvenile rearing) outmigration constraints, particularly during drought year low flow conditions, through the aggraded estuary, mainstem Usal, and lower reaches of N Fk. Usal.	2	10	RFFI, State Parks	292.50	292.50				585	Evaluation should consider flow conditions and impacts to smolt outmigration under extreme drought conditions through the month of June. Cost for conducting study to determine adequate summer low flows needed to support rearing juveniles. Cost for stream flow model accounted for in SEVERE WEATHER PATTERNS. Cost for annual smolt outmigration surveys estimated at $58,404/year.
UsC-CCC-6.1.1.2	Action Step	Passage	Install instream structures such as boulders, boulder clusters, LWD, and other appropriate materials to increase scour and maintain the wetted channel at appropriate depths during the outmigration season..	1	5	CDFG, NMFS, RFFI, State Parks	120.00					120	Install instream structures such as boulders, boulder clusters, LWD, and other appropriate materials to increase scour and maintain the wetted channel at appropriate depths during the outmigration season. Install instream structures such as boulders, boulder clusters, LWD, and other appropriate materials to increase scour and maintain the wetted channel at appropriate depths during the outmigration season. Install instream structures such as boulders, boulder clusters, LWD, and other appropriate materials to increase scour and maintain the wetted channel at appropriate depths during the outmigration season.
UsC-CCC-9.1	**Objective**	**Sediment**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range.**										

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs ($K)						Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25	Entire Duration	
UsC-CCC-9.1.1	Recovery Action	Sediment	Reduce turbidity and suspended sediment										
UsC-CCC-9.1.1.1	Action Step	Sediment	Re-establish natural sediment delivery processes by assessing sediment delivery sources at the sub-watershed scale and prioritizing sediment reduction activities.	3	100	Mendocino County Department of Public Works, RFFI, State Parks						In-Kind	The original forest of Usal Creek was almost completely removed. The removal occurred relatively recently compared to many of the other watersheds in coastal Mendocino County (largely between the late 1950s and early 1980s). The mechanized removal practices left an extensive and inadequately maintained road network that continues to contribute sediment to Usal Creek watercourses. The alteration of sediment transport will likely continue to affect multiple salmonid life stages in the watershed. The December 2006, Soldier Creek landslide will likely continue to contribute sediment into the lower watershed, and the transport of this sediment into the ocean will likely take many years under current conditions.
UsC-CCC-9.1.2	Recovery Action	Sediment	Improve instream gravel quality										
UsC-CCC-9.1.2.1	Action Step	Sediment	Locations for sediment catchment basins should be identified, developed and maintained, where appropriate.		30							TBD	Cost for this recovery action cannot be determined at this time. Assessment of feasibility and need for catchment basins will determine the extent of costs.
UsC-CCC-10.1	**Objective**	**Viability**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
UsC-CCC-10.1.1	Recovery Action	Viability	Increase abundance										

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs ($K)						Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25	Entire Duration	
UsC-CCC-10.1.1.1	Action Step	Viability	Work with existing permittees to rescue juvenile coho salmon that are under an imminent risk of stranding and mortality and relocate to suitable habitat when deemed appropriate by NMFS and CDFG.	3	100	CDFG, NMFS, Private Consultants, RFFI, State Parks						In-Kind	The earliest known quantitative information on salmonids in Usal Creek was obtained from a report on fish rescue efforts initiated by DFG in 1940 (Brown et al. 1994). Available information from fish rescue efforts in 1945 (Shapovalov 1949) were directed at saving juveniles in response to stream dewatering during the late-summer/early-fall low flow period. In 1945 a total of 25,821 juvenile steelhead and 61,133 juvenile coho were rescued from mainstem Usal Creek and possibly the estuary (a maximum distance of only 1.7 miles). The lower section of Usal is highly aggraded and dries during the summer low flow period. If coho numbers successful rebound in Usal it is likely that juvenile fish will become stranded in the lower reach. An evaluation of the potential benefits of rescue should be considered and if implemented, suitable areas should be identified within the watershed.
UsC-CCC-10.2	**Objective**	**Viability**	**Address the inadequacy of existing regulatory mechanisms.**										
UsC-CCC-10.2.1	Recovery Action	Viability	Increase spatial structure and diversity										
UsC-CCC-10.2.1.1	Action Step	Viability	Implement standardized assessment protocols (i.e., CDFG habitat assessment protocols) to ensure ESU-wide consistency.	2	100	CDFG, NMFS, Private Consultants, RFFI, State Parks						In-Kind	
UsC-CCC-10.2.2	Recovery Action	Viability	Increase spawner density										
UsC-CCC-10.2.2.1	Action Step	Viability	Conduct periodic, standardized spawning surveys to estimate adult abundance in the watershed. Surveys should include all three cohorts.	2	21	CDFG, NMFS, Private Consultants, RFFI, State Parks	83.33	83.33	83.33	83.33	16.67	350	Monitoring adult abundance in Usal Creek is not as high a priority as in other watersheds in the Lost Coast Diversity Stratum due to the watersheds designation as "Dependent" and the existing monitoring currently occurring in the stratum. Periodic monitoring should have sufficient funding to document size of all three cohorts and should occur concurrently with smolt monitoring to the maximum extent possible. Cost based on $1000/IP km for 5 km of High IP.
UsC-CCC-10.2.2.2	Action Step	Viability	Implement a monitoring program to evaluate the performance of recovery efforts.	3	10	CDFG, NMFS, Private Consultants, RFFI, State Parks	56.00	56.00				112	Cost based on fish/habitat restoration effectiveness monitoring at a cost of $111,192.

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs ($K)						Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25	Entire Duration	
UsC-CCC-15.1	**Objective**	**Fire/Fuel Management**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
UsC-CCC-15.1.1	Recovery Action	Fire/Fuel Management	Prevent impairment to instream substrate/food productivity (impaired gravel quality and quantity)										
UsC-CCC-15.1.1.1	Action Step	Fire/Fuel Management	Implement sedimentation reduction techniques in concert with prescribed fire techniques to minimize sediment impacts to various coho salmon life stages.	2	100	CalFire, RFFI							This recommendation should be considered a standard practice.
UsC-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, RFFI							This recommendation will result in a net cost savings. This recommendation should be considered a standard practice and no additional financial costs are anticipated.
UsC-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, RFFI							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.
UsC-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, RFFI							Standard business practice.
UsC-CCC-15.1.2	Recovery Action	Fire/Fuel Management	Prevent increased landscape disturbance										
UsC-CCC-15.1.2.1	Action Step	Fire/Fuel Management	In the event of a wildfire, CalFire Resource Advisors should contact 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 fire fighting actions.	2	100	CalFire						In-Kind	Guidance could include informing CalFire in regards to the presence of sensitive biological resources in the watershed as well as recommendations regarding watersource locations. Protocols, similar to those recommended here, are already in place between USFWS, NMFS, BLM, and USFS which could provide a template for CalFire.
UsC-CCC-15.1.3	Recovery Action	Fire/Fuel Management	Prevent impairment to stream hydrology (impaired water flow)										

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs ($K)						Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25	Entire Duration	
UsC-CCC-15.1.3.1	Action Step	Fire/Fuel Management	Draft water from lakes, ponds, storage tanks, 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 draft water from the lagoon during fire unless absolutely necessary.
UsC-CCC-15.2	**Objective**	**Fire/Fuel Management**	**Address the inadequacies of regulatory mechanisms.**										
UsC-CCC-15.2.1	Recovery Action	Fire/Fuel Management	Prevent impairment to water quality										
UsC-CCC-15.2.1.1	Action Step	Fire/Fuel Management	Disseminate NMFS' October 9, 2007, jeopardy biological opinion on the use of fire retardants to local firefighting agencies and CalFire.	2	2	CalFire						In-Kind	
UsC-CCC-23.1	**Objective**	**Roads/Railroads**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										
UsC-CCC-23.1.1	Recovery Action	Roads/Railroads	Prevent impairment to watershed hydrology										
UsC-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	10	Mendocino County Department of Public Works, RFFI, State Parks	385.00	385.00				770	All new and replacement culverts should be sized to accommodate a 100 year flow event. Cost based on upgrading 3 stream crossing (assume minor 2 lane rural road) at a rate $254,065/unit.
UsC-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, RFFI							These will likely be replaced as part of future timber harvest plans in Usal watershed.
UsC-CCC-23.1.2	Recovery Action	Roads/Railroads	Prevent impairment to instream substrate/food productivity (impaired gravel quality and quantity)										

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs ($K)						Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25	Entire Duration	
UsC-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	100	Mendocino County Department of Public Works, RFFI, State Parks						In-Kind	Legacy roads from past logging activity continue to impact the Usal watershed. Road densities are high throughout the watershed and are estimated at 3.5 miles of road per square mile overall and at 4.5 miles per square mile in riparian areas. Many of these roads were poorly situated and constructed, not properly maintained, and many have been abandoned. Cost associated with future implementation of THPs.
UsC-CCC-23.1.2.2	Action Step	Roads/Railroads	Encourage County of Mendocino winterize the Usal County road using modern techniques to ensure sediment from roads does not enter North Fork Usal Creek.	2	100	CDFG, Mendocino County Department of Public Works, RFFI						In-Kind	The Usal County Road should be properly winterized every year to ensure sediment from this dirt road does not enter Usal Creek or other anadromous streams in the area. Road closure during the winter period should be implemented if necessary to ensure integrity of road winterization efforts.
UsC-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	Mendocino County Department of Public Works, RFFI, State Parks						In-Kind	This should be an ongoing program (approximately every three years), particularly for County road maintenance staff regarding sediment remediation on the Usal County Road. 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.
UsC-CCC-23.1.2.4	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	20	Campbell Timberland Management, Mendocino County Department of Public Works, RFFI, State Parks	90.00	90.00	90.00	90.00		360	However, a longer duration is associated with the action due to the large road and skid trail network and low rate of timber harvest. North Fork Usal's mainline riparian road should be considered one of the top decommission priorities. Cost based on treating 30 miles of road (assume reduce road density to 2.0mi/mi square) at a rate of $12,000/mile.

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs ($K)						Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25	Entire Duration	
UsC-CCC-23.1.2.5	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	Mendocino County Department of Public Works, RFFI, State Parks	39.50	39.50				79	Active and abandoned logging roads and skid trials 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 significant sediment source is thoroughly addressed. Of particular note, the Usal County Road is poorly maintained by Mendocino County and is believed to contribute significant volumes of sediment into the North Fork. To the maximum extent practicable, problem roads and active erosion sites, such as the campground near Hotel Gulch on State Parks Property, should be prioritized and addressed as part of a comprehensive sediment reduction plan for the entire Usal basin. The program should include a component that closes and remediates unnecessary roads and skid trails and moves campsites away from watercourses 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 and, based on the low rate of projected harvest in the watershed, the potential for sediment (both through chronic input and large episodic events) is high. Road rehabilitation from locations identified as high risk should not be based solely on timber harvesting schedules. Cost based on assessment of 68 miles (assume 75% of total road network) at a rate of $1,150/mile.
UsC-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 coho streams. Coordinate these efforts with all landowners in the watershed, CalTrans, and county road maintenance staff as appropriate.	2	5	Mendocino County Department of Public Works, RFFI, State Parks						TBD	An assessment of adequate spoils storage sites needs to be completed before determining costs.
UsC-CCC-23.1.2.7	Action Step	Roads/Railroads	Install and maintain adequate energy dissipaters for culverts and other drainage pipe outlets where needed.	3	20	Mendocino County Department of Public Works, RFFI, State Parks						TBD	Particular care should be directed to ensuring water outfalls avoid unstable slopes. Number of energy dissipaters will be identified from road assessment.
UsC-CCC-23.1.3	Recovery Action	Roads/Railroads	Prevent impairment to floodplain connectivity (impaired quality & extent)										

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UsC-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	Mendocino County Department of Public Works, RFFI, State Parks						In-Kind	
UsC-CCC-23.1.4	Recovery Action	Roads/Railroads	Prevent impairment to passage and migration										
UsC-CCC-23.1.4.1	Action Step	Roads/Railroads	Replace the existing bridge on Usal County Road located in the Sinkyone State Parks Campground.	2	5	Mendocino County, State Parks	250.00					250	Due to stream bed aggradation the current bridge likely cannot pass a 100 year flow event in Usal Creek. Protection of this inadequate crossing in a major concern that may preclude necessary instream LWD enhancement above the bridge. Since the road receives light use a replacement bridge could be constructed on railcars which would result in a significant cost savings over other types of bridges. Cost based on upgrading crossing with bottomless/open arch crossing at a rate of $248,141/unit
UsC-CCC-23.1.4.2	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	Mendocino County Department of Public Works, RFFI, State Parks						In-Kind	Adopt NMFS (2001) Guidelines for Salmonid Passage at Stream Crossings.
UsC-CCC-23.1.5	Recovery Action	Roads/Railroads	Prevent adverse alterations to riparian species composition and structure										
UsC-CCC-23.1.5.1	Action Step	Roads/Railroads	Discourage or eliminate unwanted vegetation and promote desirable (native) vegetation.	3	100	Mendocino County Department of Public Works, RFFI, State Parks						In-Kind	Many abandoned roads and active roadside areas have extensive infestations of pampas grass.
UsC-CCC-23.2	**Objective**	**Roads/Railroads**	**Address the inadequacy of existing regulatory mechanisms**										
UsC-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.										
UsC-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.

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							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25	Entire Duration	
UsC-CCC-23.2.2	Recovery Action	Roads/Railroads	Prevent impairment to floodplain connectivity (impaired quality & extent)										
UsC-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	Mendocino County Department of Public Works, RFFI, State Parks						In-Kind	Preservation of remaining migration zones are a high priority due to their importance for various salmonid life stages. Protection of these areas will potentially help facilitate future restoration actions.
UsC-CCC-23.2.3	Recovery Action	Roads/Railroads	Prevent impairment to instream substrate/food productivity (impaired gravel quality and quantity)										
UsC-CCC-23.2.3.1	Action Step	Roads/Railroads	Reduce road densities by 10 percent over the next 20 years, prioritizing high risk areas in historical habitats.	2	20	Mendocino County Department of Public Works, RFFI, State Parks							This is a feasible recommendation for the Usal watershed due to the large number of abandoned and poorly maintained roads. Many of these roads are historical logging roads and skid trails that are no longer used. Decommissioning should evaluate potential impacts and benefits in terms of sediment mobilization between leaving road in current conditions and reopening for decommissioning purposes. Cost accounted for in address the present or threatened destruction of habitat.
UsC-CCC-23.2.3.2	Action Step	Roads/Railroads	Conduct annual inspections of all roads prior to winter. Correct conditions that are likely to deliver sediment to streams.	2	100	Mendocino County Department of Public Works, RFFI, State Parks						In-Kind	Costs should be considered part of ongoing road maintenance.
UsC-CCC-23.2.3.3	Action Step	Roads/Railroads	Limit winter use of unsurfaced roads and recreational trails to decrease fine sediment loads.	2	100	Mendocino County Department of Public Works, RFFI, State Parks						In-Kind	Cost should be considered part of land owner road management plans.
UsC-CCC-23.2.3.4	Action Step	Roads/Railroads	Licensed engineering geologists should review and approve grading on inner gorge slopes.	3	100	Mendocino County Department of Public Works, RFFI, State Parks						In-Kind	
UsC-CCC-24.1	**Objective**	**Severe Weather Patterns**	**Address the present or threatened destruction, modification, or curtailment of the species habitat or range**										

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs ($K)						Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25	Entire Duration	
UsC-CCC-24.1.1	Recovery Action	Severe Weather Patterns	Prevent impairment to the estuary (impaired quality and extent)										
UsC-CCC-24.1.1.1	Action Step	Severe Weather Patterns	Monitor and evaluate existing subtidal resources and habitat types to track impacts of sea level rise to subtidal habitats that occur within and adjacent to selected tidal wetland restoration projects (California State Coastal Conservancy et al. 2010).	3	10	FEMA, Mendocino County, State Parks, USACE	120.00	120.00				240	Cost based on monitoring estuary use, residence timing at a rate of $273,217.
UsC-CCC-24.1.2	Recovery Action	Severe Weather Patterns	Prevent impairment to passage and migration										
UsC-CCC-24.1.2.1	Action Step	Severe Weather Patterns	CDFG, SWRCB, RWQCB, CalFire, Caltrans, and other agencies and landowners, in cooperation with NMFS, should evaluate the rate and volume of water drafting for dust control in streams or tributaries and where appropriate, minimize water withdrawals that could impact coho salmon.	3	10	CalFire, CalTrans, CDFG, NMFS, RFFI, RWQCB, SWRCB	31.50	31.50				63	These agencies should consider existing regulations or other mechanisms when evaluating alternatives to water as a dust palliative (including EPA-certified compounds) that are consistent with maintaining or improving water quality. Cost for stream flow model estimated at $63,005/project.
UsC-CCC-24.1.3	Recovery Action	Severe Weather Patterns	Prevent impairment to floodplain connectivity (impaired quality & extent)										
UsC-CCC-24.1.3.1	Action Step	Severe Weather Patterns	Existing areas with floodplains or off channel habitats should be protected from future urban development of any kind.	1	100	CDFG, RFFI, State Parks						In-Kind	Protecting these areas from impacts of development may be costly due to concerns of reverse condemnation, etc.
UsC-CCC-24.1.4	Recovery Action	Severe Weather Patterns	Reduce turbidity and suspended sediment										
UsC-CCC-24.1.4.1	Action Step	Severe Weather Patterns	Patterns of water runoff, including surface and subsurface drainage, should match, to the greatest extent possible, the natural hydrologic pattern for the watershed in timing, quantity, and quality.	2	100	CalFire, RFFI, RWQCB, State Parks						In-Kind	Usal Creek watershed exhibits a Mediterranean-type climate, with an average rainfall between 45 and 75 inches that falls predominantly between the months of October and April. Although winter and spring seasons can be relatively wet (especially within higher elevations), the summer and fall can be warm; however, the maritime influence results in many days of prolonged fog which can moderate seasonal temperatures within the lower basin. Severe weather patterns, coupled with the existing road network, may exacerbate and accelerate future sediment delivery and land sliding.

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							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25	Entire Duration	
UsC-CCC-24.1.4.2	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, RFFI, RWQCB, State Parks						TBD	Assess and prioritize high-risk shallow-seeded landslide and develop plan to rehabilitate.