

Pescadero Creek



Location	• San Mateo County
Watershed Area	• 81.0 Square Miles
Potential Habitat	• 54.9 Stream Miles
Vegetation	• 66% Coniferous, 22% Shrubland, 8% Grassland
Erodability	• Moderate to High
Ownership Patterns	• 77% Private; 23% Public
Dominant Land Uses	• Rural Residential, Timber, Agricultural
Housing Density	• Low to Moderate
TMDL Pollutants	• Sediment



Pescadero Creek
Photo by Joel Casagrande

Pescadero Creek Coho Salmon: Nearly Extirpated



Recovery Goals

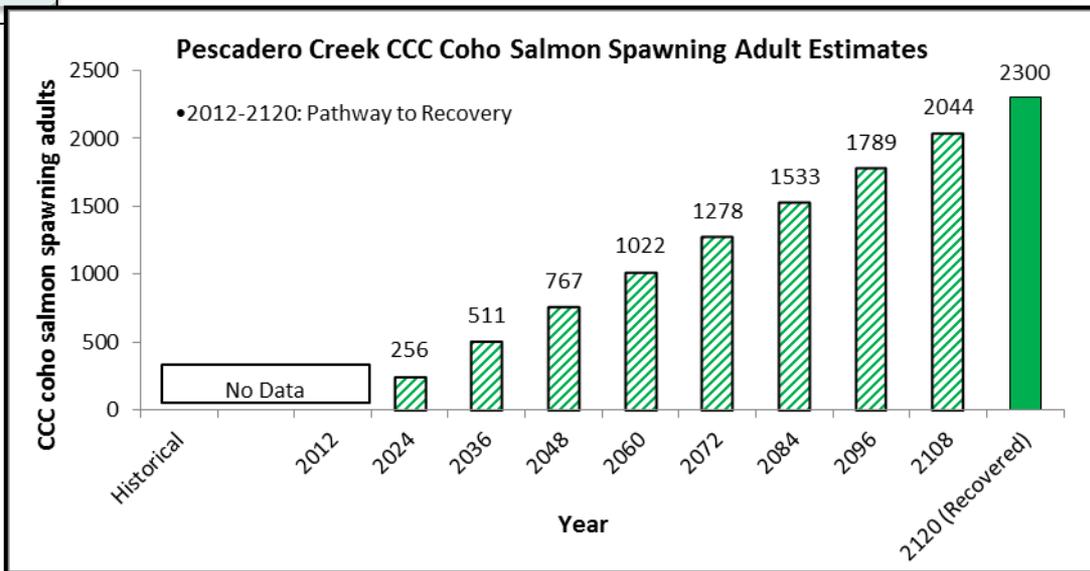
- ✓ Implement a monitoring program to evaluate the performance of recovery efforts

**Pescadero Creek
Adult Spawner Targets**

**Downlisting to Threatened
1,150**

**Recovery
2,300**

**STEELHEAD: YES
CHINOOK SALMON: NO**



Current Instream, Watershed and Population Conditions



Preventing Extinction & Improving Conditions

Priority 1: Immediate Restoration Actions

- Promote restoration projects designed to create or restore alcove, backwater channel, ephemeral tributary, or seasonal habitats
- Design new development to allow streams to meander in historical patterns
- Maintain, install and enhance LWD and other complex habitat features
- Provide incentives to water rights holders willing to convert some or all of their water right to instream use
- Avoid new development, or road construction within floodplains, riparian areas, unstable soils or other sensitive areas
- Re-establish a naturally reproducing run of coho salmon in appropriate subwatersheds

Priority 2 & 3: Long-Term Restoration Actions

- Implement restoration actions to benefit listed salmonids in the estuary
- Prevent illegal or casual breaching of the sandbar to the Pescadero Creek lagoon
- Promote off-channel storage and irrigation efficiency measures to reduce impacts of water diversion
- Initiate education programs and outreach
- Establish and/or maintain continuous native riparian buffers
- Establish release imprinting stations where smolts could be held a minimum of two weeks prior to release



Recovery Partners

San Mateo RCD



Future Threats



Reducing Future Threats

Priority 1: Immediate Threat Abatement Actions

- Discourage forest-to-vineyard land or rural residential conversions
- Protect channel migration zones and their riparian areas by designing new roads and development to allow streams to meander in historical patterns
- Ensure all water diversions in the watershed are in compliance with all applicable laws and policies
- Existing areas with floodplains or off channel habitats should be protected from future development

Priority 2 & 3: Long-Term Threat Abatement Actions

- Protect headwater channels with larger buffers to minimize sediment delivery downstream
- Encourage wider riparian buffer zones in areas where stream temperatures or riparian canopy are limiting
- All roads, landings, and skid trails associated with timber operations should, to the maximum extent practicable, be hydrologically disconnected from the stream



Pescadero Creek
Photo by San Mateo County PW Dept

Conservation Highlights

- There are actions underway, which includes a multidisciplinary task force, to address yearly fish kills that appear to result in significant mortality rates of federally listed CCC steelhead in the estuary.

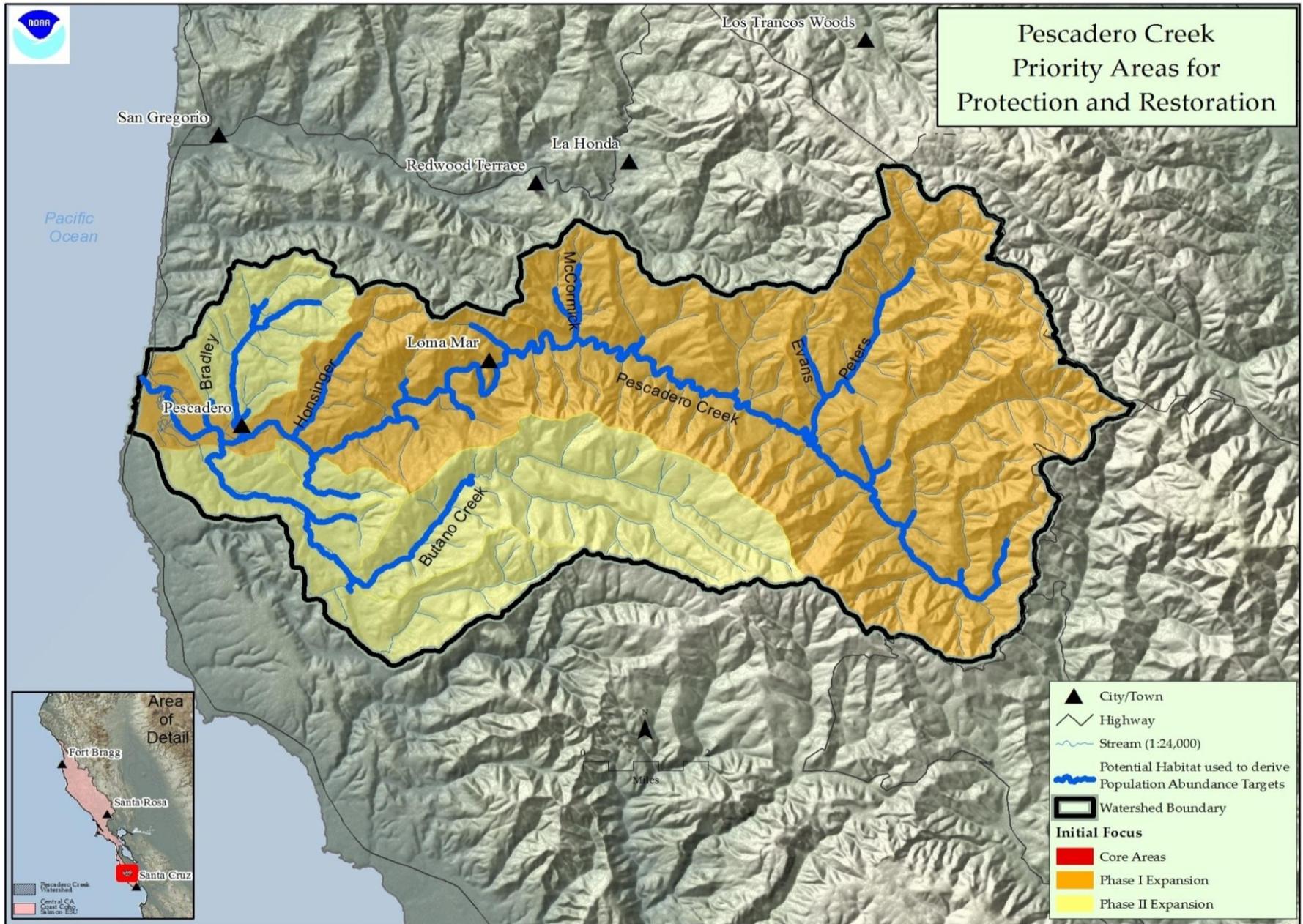


Figure 1: Pescadero Creek Map

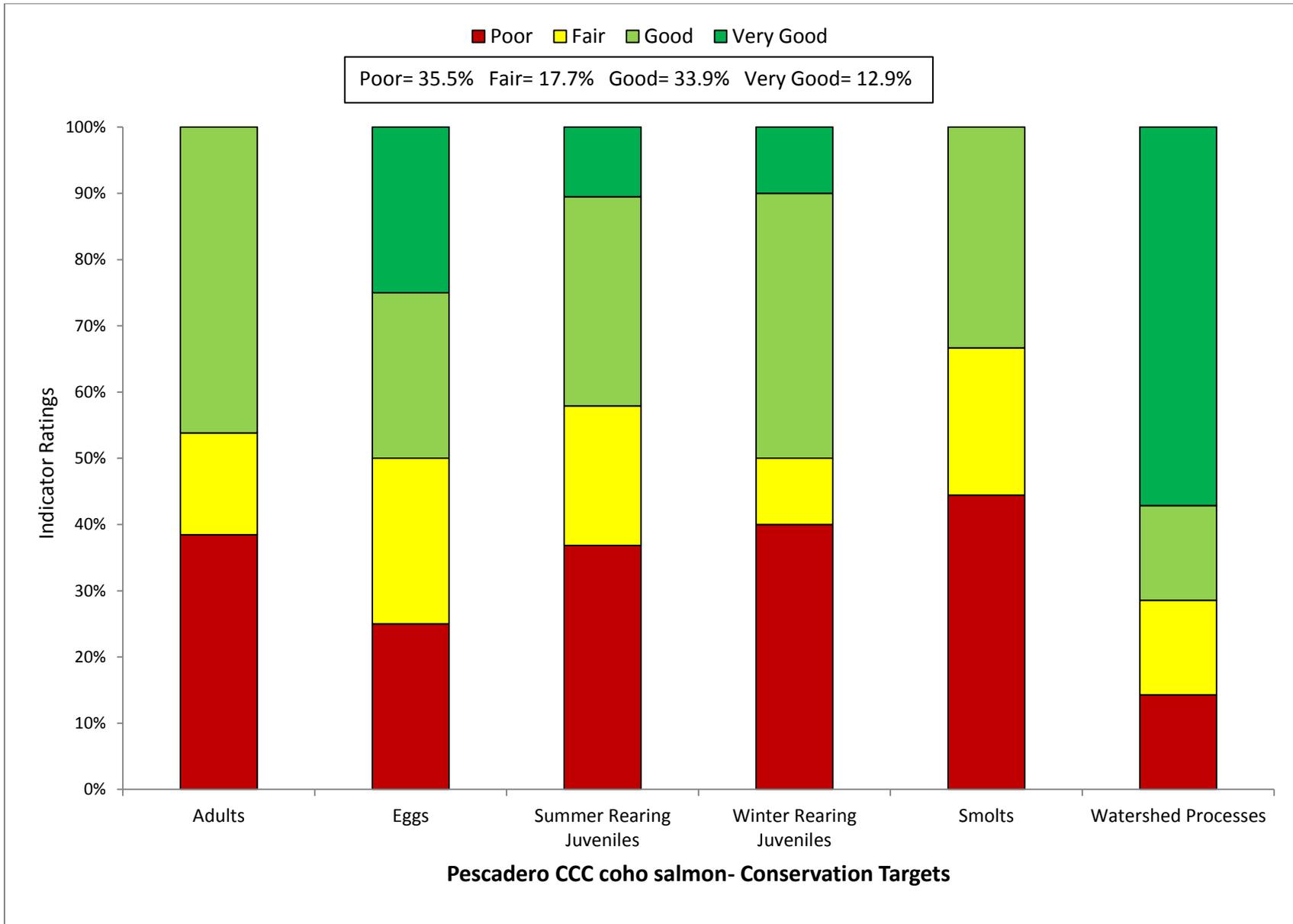


Figure 2: Viability Results by Lifestage

Table 1: CAP Viability Results ~ Pescadero 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 98% IP (>30% Pools; >20% Riffles)	Good	SEC Analysis/CDFG Data	75% to 90% of streams/ IP-Km (>30% Pools; >20% Riffles)
Adults	Habitat Complexity	Shelter Rating	20% streams 2% IP-km (>80 stream average)	Poor	SEC Analysis/CDFG Data	75% to 90% of streams/ IP-Km (>80 stream average)
Adults	Hydrology	Passage Flows	Risk Factor Score =67	Fair	SEC Analysis/CDFG Data	NMFS Flow Protocol Risk Factor Score 35-50
Adults	Passage/Migration	Passage at Mouth or Confluence	75% of IP-km to 90% of IP-km accessible	Good	SEC Analysis/CDFG Data	75% of IP-Km to 90% of IP-km
Adults	Passage/Migration	Physical Barriers	89% of IP-km accessible	Good	SEC Analysis/CDFG Data	75% of IP-Km to 90% of IP-km
Adults	Riparian Vegetation	Tree Diameter (North of SF Bay)	NA	0	SEC Analysis/CDFG Data	55 - 69% Class 5 & 6 across IP-km
Adults	Riparian Vegetation	Tree Diameter (South of SF Bay)	≥80% Density rating "D" across IP-km	Good	SEC Analysis/CDFG Data	≥80% Density rating "D" across IP-km
Adults	Sediment	Quantity & Distribution of Spawning Gravels	50% of IP-km to 74% of IP-km accessible	Fair	SEC Analysis/CDFG Data	75% of IP-Km to 90% of IP-km
Adults	Velocity Refuge	Floodplain Connectivity	>80% Response Reach Connectivity	Good	SEC Analysis/CDFG Data	>80% Response Reach Connectivity
Adults	Water Quality	Toxicity	No Acute or Chronic	Good	SEC Analysis/CDFG Data	No Acute or Chronic
Adults	Water Quality	Turbidity	<50% of streams/ IP-km maintains severity score of 3 or lower	Poor	SEC Analysis/CDFG Data	75% to 90% of streams/ IP-Km maintains severity score of 3 or lower
Adults	Viability	Density	<1 spawner per IP-km	Poor	SEC Analysis/CDFG Data	low risk spawner density per Spence (2008)
Eggs	Hydrology	Flow Conditions (Instantaneous Condition)	Risk Factor Score =42	Good	SEC Analysis/CDFG Data	NMFS Flow Protocol Risk Factor Score 35-50
Eggs	Hydrology	Redd Scour	Risk Factor Score =75	Fair	SEC Analysis/CDFG Data	NMFS Flow Protocol Risk Factor Score 35-50

Eggs	Sediment	Gravel Quality (Bulk)	>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)	100% streams 100% IP (>50% stream average scores of 1 & 2)	Very Good	NMFS Instream Flow Analysis	75% to 90% of streams/ IP-Km (>50% stream average scores of 1 & 2)
Summer Rearing Juveniles	Estuary/Lagoon	Quality & Extent	Impaired and non-functional	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	0% of streams/ 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 98% IP (>30% Pools; >20% Riffles)	Good	NMFS Instream Flow Analysis	75% to 90% of streams/ IP-Km (>30% Pools; >20% Riffles)
Summer Rearing Juveniles	Habitat Complexity	Shelter Rating	20% streams; 2% IP-km (>80 stream average)	Poor	NMFS Instream Flow Analysis	75% to 90% of streams/ IP-Km (>80 stream average)
Summer Rearing Juveniles	Hydrology	Flow Conditions (Baseflow)	Risk Factor Score =75	Fair	NMFS Instream Flow Analysis	NMFS Flow Protocol Risk Factor Score 35-50
Summer Rearing Juveniles	Hydrology	Flow Conditions (Instantaneous Condition)	Risk Factor Score =35-50	Good	NMFS Watershed Characterization	NMFS Flow Protocol Risk Factor Score 35-50
Summer Rearing Juveniles	Hydrology	Number, Condition and/or Magnitude of Diversions	9.05 Diversions/10 IP-km	Poor	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	78.3% of IP-km accessible	Good	Population Profile/BPJ	75% of IP-Km to 90% of IP-km
Summer Rearing Juveniles	Riparian Vegetation	Canopy Cover	50% to 74% of streams/ IP-km (>85% average stream canopy)	Fair	SEC or PAD/CDFG Data	75% to 90% of streams/ IP-Km (>85% average stream canopy)
Summer Rearing Juveniles	Riparian Vegetation	Tree Diameter (North of SF Bay)	NA	0	Population Profile/BPJ	55 - 69% Class 5 & 6 across IP-km
Summer Rearing Juveniles	Riparian Vegetation	Tree Diameter (South of SF Bay)	≥80% Density rating "D" across IP-km	Good	SEC or PAD/CDFG Data	≥80% Density rating "D" across IP-km
Summer Rearing Juveniles	Sediment (Food Productivity)	Gravel Quality (Embeddedness)	100% streams 100% IP (>50% stream average scores of 1 & 2)	Very Good	SEC or PAD/CDFG Data	75% to 90% of streams/ IP-Km (>50% stream average scores of 1 & 2)

Summer Rearing Juveniles	Water Quality	Temperature (MWT)	50 to 74% IP-km (<16 C MWT)	Fair	Population Profile/BPJ	75 to 89% IP km (<16 C MWT)
Summer Rearing Juveniles	Water Quality	Toxicity	Sublethal or Chronic	Fair	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	>90% of Historical Range	Very Good	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% streams 98% IP (>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	20% streams; 2 IP-km (>80 stream average)	Poor	CDF Vegetation Maps/BPJ	75% to 90% of streams/ IP-Km (>80 stream average)
Winter Rearing Juveniles	Passage/Migration	Physical Barriers	78.3 of IP-km accessible	Good	Population Profile/BPJ	75% of IP-Km to 90% of IP-km
Winter Rearing Juveniles	Riparian Vegetation	Tree Diameter (North of SF Bay)	NA	0	Population Profile/BPJ	55 - 69% Class 5 & 6 across IP-km
Winter Rearing Juveniles	Riparian Vegetation	Tree Diameter (South of SF Bay)	≥80% Density rating "D" across IP-km	Good	SEC Analysis/CDFG Data	≥80% Density rating "D" across IP-km
Winter Rearing Juveniles	Sediment (Food Productivity)	Gravel Quality (Embeddedness)	100% streams 100% IP (>50% stream average scores of 1 & 2)	Very Good	SEC Analysis/CDFG Data	75% to 90% of streams/ IP-Km (>50% stream average scores of 1 & 2)
Winter Rearing Juveniles	Velocity Refuge	Floodplain Connectivity	50-80% Response Reach Connectivity	Fair	SEC Analysis/CDFG Data	>80% Response Reach Connectivity
Winter Rearing Juveniles	Water Quality	Toxicity	No Acute or Chronic	Good	NMFS Watershed Characterization	No Acute or Chronic
Winter Rearing Juveniles	Water Quality	Turbidity	<50% of streams/ IP-km maintains severity score of 3 or lower	Poor	NMFS Watershed Characterization	75% to 90% of streams/ IP-Km maintains severity score of 3 or lower

Smolts	Estuary/Lagoon	Quality & Extent	impaired but functional	Fair	SEC Analysis/CDFG Data	Properly Functioning Condition
Smolts	Habitat Complexity	Shelter Rating	20% streams; 2 IP-km (>80 stream average)	Poor	Population Profile	75% to 90% of streams/ IP-Km (>80 stream average)
Smolts	Hydrology	Number, Condition and/or Magnitude of Diversions	9.05 Diversions/10 IP-km	Poor	Population Profile	0.01 - 1 Diversions/10 IP km
Smolts	Hydrology	Passage Flows	Risk Factor Scores =75	Fair	TRT Spence (2008)	NMFS Flow Protocol Risk Factor Score 35-50
Smolts	Passage/Migration	Passage at Mouth or Confluence	75% of IP-km to 90% of IP-km accessible	Good	TRT Spence (2008)	75% of IP-Km to 90% of IP-km
Smolts	Smolification	Temperature	75-90% IP-Km (>6 and <16 C)	Good	TRT Spence (2008)	75-90% IP-Km (>6 and <16 C)
Smolts	Water Quality	Toxicity	No Acute or Chronic	Good	TRT Spence (2008)	No Acute or Chronic
Smolts	Water Quality	Turbidity	<50% of streams/ IP-km maintains severity score of 3 or lower	Poor	EPA/RWQCB/NMFS Criteria	75% to 90% of streams/ IP-Km maintains severity score of 3 or lower
Smolts	Viability	Abundance	Abundance leading to high risk spawner density =0	Poor	Newcombe and Jensen 2003	Smolt abundance to produce low risk spawner density per Spence (2008)
Watershed Processes	Hydrology	Impervious Surfaces	0.246% of Watershed in Impervious Surfaces	Very Good	SEC Analysis	3-6% of Watershed in Impervious Surfaces
Watershed Processes	Landscape Patterns	Agriculture	1.47% of Watershed in Agriculture	Very Good	EPA/RWQCB/NMFS Criteria	10-19% of Watershed in Agriculture
Watershed Processes	Landscape Patterns	Timber Harvest	11% of Watershed in Timber Harvest	Very Good	Newcombe and Jensen 2003	25-15% of Watershed in Timber Harvest
Watershed Processes	Landscape Patterns	Urbanization	3% 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	51-74% Intact Historical Species Composition	Good	Newcombe and Jensen 2003	51-74% Intact Historical Species Composition
Watershed Processes	Sediment Transport	Road Density	3 Miles/Square Mile	Fair	EPA/RWQCB/NMFS Criteria	1.6 to 2.4 Miles/Square Mile
Watershed Processes	Sediment Transport	Streamside Road Density (100 m)	3.3 Miles/Square Mile	Poor	Newcombe and Jensen 2003	0.1 to 0.4 Miles/Square Mile

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

Central CA Coast Coho Salmon ~ Pescadero 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:** Increase the extent of estuarine habitat
 - 1.1.1.1. **Action Step:** Assess the benefits of altering to existing dikes and levees which currently reduce shoreline complexity and natural function
 - 1.1.2. **Recovery Action:** Rehabilitate inner estuarine hydrodynamics
 - 1.1.2.1. **Action Step:** Encourage USFWS to reinitiate consultation for biological opinion with State Parks regarding the estuary restoration project.
 - 1.1.2.2. **Action Step:** Evaluate all floodgates located within the tidal portion of Pescadero Creek and determine the feasibility of re-claiming historic tidal slough habitat.
 - 1.1.3. **Recovery Action:** Rehabilitate natural river mouth dynamics
 - 1.1.3.1. **Action Step:** Restore the timing of sandbar closure so that it closes in June / July (as it did prior to reconstruction of the Highway 1 bridge) so as to provide adequate time for de-stratification and conversion to freshwater.
 - 1.1.4. **Recovery Action:** Improve the quality and extent of freshwater lagoon habitat
 - 1.1.4.1. **Action Step:** Implement restoration actions that benefit listed salmonids and other special status species in the estuary. Requirements and goals will vary by species.
 - 1.1.5. **Recovery Action:** Reduce extent of estuarine shoreline development
 - 1.1.5.1. **Action Step:** Evaluate existing conservation easements in the Estuary to ensure they are in conformance with original terms and conditions of the easement.
 - 1.1.5.2. **Action Step:** Construction of new buildings and associated infrastructure should only occur above the historical estuary tidal prism.
 - 1.1.6. **Recovery Action:** Reduce frequency of artificial breaching events
 - 1.1.6.1. **Action Step:** Implement patrols by citizens groups, State Parks, and law enforcement to ensure the sandbar is not illegally breached.
 - 1.1.6.2. **Action Step:** Post and provide financial rewards to individuals who identify persons who illegally breach the sandbar to the Pescadero Creek lagoon.
 - 1.1.6.3. **Action Step:** Post durable and attractive interpretive signage at the beach to discourage casual breaching of the lagoon sandbar.

2. Restoration- Floodplain Connectivity

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

2.1.1. **Recovery Action:** Rehabilitate and enhance floodplain connectivity

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

2.1.1.2. **Action Step:** Design new development to allow streams to meander in historical patterns, Protecting riparian zones and their floodplains or channel migration zones averts the need for bank erosion control in most situations.

3. Restoration- Habitat Complexity

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

3.1.1. **Recovery Action:** Increase large wood frequency

3.1.1.1. **Action Step:** Encourage retention of large woody material for all historical 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.

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

3.1.1.3. **Action Step:** Educate landowners, land managers, and County staff regarding the importance of Large Woody Material to coho salmon survival and recovery, and watershed processes.

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

3.1.1.5. **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.

3.1.1.6. **Action Step:** Incorporate large woody debris (preferably large diameter redwood trees) into stream bank protection projects, where appropriate.

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

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

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

3.2.1.1. **Action Step:** Fund a watershed coordinator position.

4. Restoration- Hydrology

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

4.1.1. **Recovery Action:** Improve flow conditions

- 4.1.1.1. **Action Step:** Provide incentives to water rights holders willing to convert some or all of their water right to instream use via petition change of use and §1707 (CDFG 2004).
- 4.1.1.2. **Action Step:** Promote off-channel storage to reduce impacts of water diversion (e.g. storage tanks for rural residential users).
- 4.1.1.3. **Action Step:** Develop more efficient and coordinated use of water resources to provide increased supply, restore groundwater levels, and increase dry weather baseflows through conjunctive management, use of reclaimed wastewater, and increased storage or utilization of excess winter stream flows.
- 4.1.1.4. **Action Step:** Promote irrigation efficiency projects for agricultural practices.
- 4.1.2. **Recovery Action:** Reduce the number, conditions, and/or magnitude of diversions
 - 4.1.2.1. **Action Step:** Provide incentives to water rights holders willing to convert some or all of their water right to instream use via petition change of use and §1707.
 - 4.1.2.2. **Action Step:** Establish a comprehensive stream flow evaluation program to determine instream flow needs for coho salmon.

5. [Restoration- Landscape Patterns](#)

- 5.1. **Objective:** Address the present or threatened destruction, modification, or curtailment of the species habitat or range
 - 5.1.1. **Recovery Action:** Reduce adverse impacts to watershed processes associated with streamside road density (< 100 meters)
 - 5.1.1.1. **Action Step:** Avoid new development, or road construction within floodplains, riparian areas, unstable soils or other sensitive areas
 - 5.1.1.2. **Action Step:** Conserve open space in contiguous landscapes, protect floodplain areas and riparian corridors, and develop conservation easements

6. [Restoration- Passage](#)

No species-specific actions were developed.

7. [Restoration- Pool Habitat](#)

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

8. [Restoration- Riparian](#)

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:** Promote the re-vegetation of the native riparian plant community within inset floodplains and riparian corridors.

9.1.1.2. **Action Step:** Encourage San Mateo to develop property easement acquisition funds and acquire grant monies to purchase eroding private properties in riparian corridors or properties subject to frequent flooding through a buyout program.

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

9.1.2.1. **Action Step:** Locations for sediment catchment basins should be identified, developed and maintained, where appropriate.

9.1.2.2. **Action Step:** Establish and/or maintain continuous native riparian buffers.

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

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

9.1.2.5. **Action Step:** Disperse discharge from new or upgraded commercial and residential areas into a spatially distributed network rather than a few point discharges, which can result in locally severe erosion and disruption of riparian vegetation and instream habitat.

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.

10.1.1.2. **Action Step:** Re-establish a naturally reproducing run of coho salmon in appropriate subwatersheds. Prioritize Core and Phase 1 watersheds.

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

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

10.2.1.1. **Action Step:** Implement a monitoring program to evaluate the performance of recovery efforts. Phase 1 areas should have the highest priority for a site-based assessment; adapt the strategies for restoration and threat abatement to address site-based issues identified by the watershed assessments.

10.2.1.2. **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.

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

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

10.3.1.1. **Action Step:** Establish release imprinting stations, and other smolt release streams, so that smolts can be held for a minimum two week period prior to release. The holding period should allow for imprinting to occur on the parent release stream, increasing the potential for returns as adults which spawn naturally.

11. Restoration- Water Quality

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

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

11.1.1.1. **Action Step:** Disperse discharge from new or upgraded commercial and residential areas into a spatially distributed network rather than a few point discharges, which can result in locally severe erosion and disruption of riparian vegetation and instream habitat.

11.1.1.2. **Action Step:** 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.

11.1.1.3. **Action Step:** Encourage San Mateo County to establish wider riparian buffers in residential and urban areas.

11.1.1.4. **Action Step:** Implement Best Management Practices such as those in the Fish Friendly Farming program (California Land Stewardship Institute), or other cooperative conservation programs.

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

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

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

14.1.1.1. **Action Step:** Improve conditions for salmonids by decreasing the adverse effects of exotic vegetation within the stream and riparian corridor.

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 firefighters and equipment are on site.
- 15.1.1.3. **Action Step:** Reduce erosion from fire prevention or suppression activities by maintaining existing natural topography to the extent possible.
- 15.1.1.4. **Action Step:** Re-contour any new facility sites as soon as possible after site cleanup and fire.
- 15.1.1.5. **Action Step:** Encourage CalFire to provide plan to all non-County fire fighters when providing firefighting assistance in the Pescadero Creek watershed (and all other watersheds in the County).
- 15.1.2. **Recovery Action:** Prevent increased landscape disturbance
- 15.1.2.1. **Action Step:** Work with County planners to define future impacts of proposed urban and infrastructure development on fire suppression and fuel load buildup.
- 15.1.2.2. **Action Step:** In the event of a wildfire, we recommend CalFire Resource Advisors contact the resource agencies for ESA consultation (or technical assistance) regarding 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, 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.
- 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](#)

- 16.1. **Objective:** Address the inadequacy of existing regulatory mechanisms
- 16.1.1. **Recovery Action:** Prevent reduced density, abundance, and diversity
- 16.1.1.1. **Action Step:** Prohibit offshore fishing until January 15 (or until sandbar opens naturally) within one mile of the river mouth.
- 16.1.1.2. **Action Step:** Work with CDFG to monitor the river mouth until river flows naturally breach the sandbar.

- 16.1.1.3. **Action Step:** Work with CDFG to modify Section 8.00 (b) (1) low flow minimum flow closure for Pescadero Creek.
- 16.1.1.4. **Action Step:** Install/construct permanent signs at all major public access points along Pescadero Creek that clearly identify differences in body morphology of all potentially present adult salmonids with color photos (e.g., caudal fin spotting, caudal fork shape, coloration of lower jaw, peduncle width, etc.).
- 16.1.1.5. **Action Step:** Increase oversight on anglers fishing in Pescadero to evaluate compliance with fishing regulations.

17. Threat- Hatcheries

No species-specific actions were developed.

18. Threat- Livestock

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

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

18.1.1.1. **Action Step:** Reduce the adverse effects of grazing and ranching to water quality in the Bradley Creek subwatershed.

18.1.1.2. **Action Step:** Establish and implement a conservative residual dry matter (RDM) target per acre that ensures area is not overgrazed with 1000 lbs RDM (residual dry matter)/acre left at end of grazing season. Remove cattle from pasture before soils dry out.

18.1.1.3. **Action Step:** To minimize gully initiation, grazing should be kept at relatively low intensities on the steeper slopes in this area.

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

18.1.2.1. **Action Step:** Locate water sources away from riparian areas.

18.1.2.2. **Action Step:** Aid landowners willing to fence off riparian areas in choosing alternatives water source sites (preferably ones that are hydrologically disconnected from stream flows).

19. Threat- Logging

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

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

19.1.1.1. **Action Step:** Timber harvest planning should evaluate and avoid or minimize adverse impacts to offchannel habitats, floodplains, ponds, and oxbows.

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

19.1.2.1. **Action Step:** Evaluate road surface treatment options to halt or minimize impacts from water drafting and diversion

19.1.3. **Recovery Action:** Prevent impairment to habitat complexity

19.1.3.1. **Action Step:** Timber management should be designed to allow trees in riparian areas to age, die, and naturally recruit into the stream.

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

19.1.4.1. **Action Step:** Protect headwater channels with larger buffers to minimize sediment delivery downstream.

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

19.1.4.3. **Action Step:** For areas with high or very high erosion hazard, extend the monitoring period and upgrade road maintenance for timber operations.

19.1.5. **Recovery Action:** Prevent impairment to water quality (impaired instream temperature)

19.1.5.1. **Action Step:** Encourage wider riparian buffer zones in areas where stream temperatures or riparian canopy are found limiting.

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

19.1.6.1. **Action Step:** Encourage low impact timber harvest techniques such as full-suspension cable yarding (to improve canopy cover; reduce sediment input, etc.).

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

19.1.7.1. **Action Step:** All roads, landings, and skid trails associated with timber operations should, to the maximum extent practicable, be hydrologically disconnected to prevent sediment runoff and delivery to streams.

19.1.7.2. **Action Step:** Avoid road construction in riparian zones

19.1.7.3. **Action Step:** All harvest plans should identify problematic unused legacy roads or landings with WLPZ's and ensure these areas are hydrologically disconnected and revegetated with native species where practicable following completion of harvest activities.

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

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

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

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

19.2.1.3. **Action Step:** Until no-take rules are developed or the State has a secured HCP or GCP, assign NMFS staff to conduct THP reviews and provide no-take recommendations by using

revised "Guidelines for NMFS staff when Reviewing Timber Operations: Avoiding Take and Harm of Salmon and Steelhead" (NMFS draft, 2004) or "Short Term HCP Guidelines" (NMFS 1999).

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

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

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

19.2.2. **Recovery Action:** Prevent impairment to water quality (impaired instream temperature)

19.2.2.1. **Action Step:** Increase buffer widths on Class II streams.

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:** Assess and redesign transportation network to minimize road density and maximize transportation efficiency.

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

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

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

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:** Conduct road and sediment reduction assessments to identify sediment-related and runoff-related problems and determine level of hydrologic connectivity.
- 23.1.2.3. **Action Step:** Reduce erosion from mainline timber harvest roads.
- 23.1.2.4. **Action Step:** Evaluate stream crossings for their potential to impair natural geomorphic processes. Replace or retrofit crossings to achieve more natural conditions that meet sediment transport goals.
- 23.1.2.5. **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.
- 23.1.2.6. **Action Step:** Evaluate and remove roadside berms that lead to increased runoff velocities and result in increased sediment discharge.
- 23.1.2.7. **Action Step:** Install and maintain adequate energy dissipaters for culverts and other drainage pipe outlets where needed.
- 23.1.2.8. **Action Step:** Conduct outreach and education regarding the adverse effects of roads, and the types of best management practices protective of salmonids.
- 23.1.2.9. **Action Step:** Develop a road upgrade fund to supplement FEMA emergency repair funding so problem roads could be upgraded to reduce sediment loading and improve road reliability. The Counties should seek amendment of FEMA policies to allow improvements that prevent erosion and failure, particularly in watersheds with endangered salmonid habitat.
- 23.1.2.10. **Action Step:** Encourage County to continue to implement the San Mateo County Road Maintenance Manual

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

- 23.1.3.1. **Action Step:** Identify high priority barriers and restore passage per NMFS' Guidelines for Salmonid Passage at Stream Crossings (NMFS 2001a).

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

- 23.1.4.1. **Action Step:** Encourage adoption and implementation of a plan similar to the County of Santa Cruz's Integrated Vegetation Management Plan for Roads Near Perennial Waters (URS Corporation 2008) regarding roadside maintenance activities. This plan was developed to 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:** Encourage San Mateo County to increase enforcement of existing County regulations regarding grading, riparian and building violations, and sediment release from county roads.
- 23.2.2. **Recovery Action:** Prevent impairment to floodplain connectivity (impaired quality & extent)
- 23.2.2.1. **Action Step:** Protect channel migration zones and their riparian areas by designing new roads to allow streams to meander in historical patterns.
- 23.2.2.2. **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 is created and implemented.
- 23.2.3. **Recovery Action:** Prevent impairment to instream substrate/food productivity (impaired gravel quality and quantity)
- 23.2.3.1. **Action Step:** Conduct annual inspections of all roads prior to winter. Correct conditions that are likely to deliver sediment to streams.
- 23.2.3.2. **Action Step:** For all rural (unpaved) and seasonal dirt roads apply (at a minimum) the road standards outlined in the California Forest Practice Rules.
- 23.2.3.3. **Action Step:** Limit winter use of unsurfaced roads and recreational trails by unauthorized and impacting uses 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:** Design projects to include subtidal habitats and natural bioengineering techniques that buffer wave action and increase sediment deposition to minimize shoreline and wetland erosion (California State Coastal Conservancy et al. 2010).
- 24.1.1.2. **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).
- 24.1.1.3. **Action Step:** Evaluate living shoreline and associated techniques as a way to benefit habitats while providing desired shoreline stabilization needs for future shoreline restoration or shoreline protection structures (California State Coastal Conservancy et al. 2010). Implement where feasible. See California State Coastal Conservancy et al. (2010) for habitat types to consider for inclusion, recommended monitoring, and potentially suitable locations for implementation.

- 24.1.2. **Recovery Action:** Prevent impairment to stream hydrology (impaired water flow)
- 24.1.2.1. **Action Step:** Ensure all diversions in the watershed are in compliance with all applicable laws and policies.
- 24.1.3. **Recovery Action:** Prevent impairment to water quality
- 24.1.3.1. **Action Step:** Ensure tolerable water temperatures are maintained during drought periods.
- 24.1.3.2. **Action Step:** Implement performance standards in Stormwater Management Plans.
- 24.1.4. **Recovery Action:** Prevent impairment to passage and migration
- 24.1.4.1. **Action Step:** Work with CDFG, County of San Mateo, and knowledgeable biologists to develop emergency rules and adopt implementation agreements regarding contingency efforts during drought conditions.
- 24.1.4.2. **Action Step:** Increase enforcement patrols by CDFG and NMFS OLE in sensitive spawning and rearing areas.
- 24.1.4.3. **Action Step:** CDFG, SWRCB, RWQCB, CalFire, Caltrans, and other agencies and landowners, in cooperation with NMFS, should evaluate the rate and volume of water drafting for dust control in streams or tributaries and where appropriate, minimize water withdrawals that could impact coho salmon. These agencies should consider existing regulations or other mechanisms when evaluating alternatives to water as a dust palliative (including EPA-certified compounds) that are consistent with maintaining or improving water quality (CDFG 2004).
- 24.1.4.4. **Action Step:** Evaluate performance of all existing fish ladders to pass migrating fish during drought conditions.
- 24.1.5. **Recovery Action:** Prevent impairment to floodplain connectivity (impaired quality & extent)
- 24.1.5.1. **Action Step:** Existing areas with floodplains or off channel habitats should be protected from future urban development of any kind.
- 24.1.5.2. **Action Step:** Flood control projects or other modifications facilitating new development (as opposed to protecting existing infrastructure) should be avoided.
- 24.1.5.3. **Action Step:** Adopt a policy of “managed retreat” (removal of problematic infrastructure and replacement with native vegetation or flood tolerant land uses) for areas highly susceptible to, or previously damaged from, flooding.
- 24.1.6. **Recovery Action:** Reduce turbidity and suspended sediment
- 24.1.6.1. **Action Step:** Develop Bank Stabilization and Floodplain Guidelines for use by private and public entities specific to geological constraints in San Mateo County.
- 24.1.6.2. **Action Step:** Protect high-risk shallow-seeded landslide areas and surfaces prone to erosion from being mobilized by intense storm events.
- 24.1.6.3. **Action Step:** Establish targeted polices, requirements and assistance for sandy soils areas.

25. Threat- Water Diversion/Impoundment

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

25.1.1. **Recovery Action:** Prevent impairment to the estuary (impaired quality and extent)

25.1.1.1. **Action Step:** Ensure current and future water diversions (surface and groundwater) do not further impair estuary water quality conditions for rearing juvenile salmonids.

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

25.1.2.1. **Action Step:** Ensure water supply demands can be met without impacting flow either directly or indirectly through groundwater withdrawals and aquifer depletion.

25.1.2.2. **Action Step:** Establish a comprehensive stream flow evaluation program to determine instream flow needs for salmonids throughout the watershed.

25.1.2.3. **Action Step:** Monitor, identify problems, and prioritize needed changes to water diversion on current or potential coho streams that go dry in some years (CDFG 2004).

25.1.2.4. **Action Step:** Promote passive diversion devices designed to allow diversion of water only when minimum streamflow requirements are met or exceeded (CDFG 2004).

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

25.1.3.1. **Action Step:** Ensure current and future water diversions (surface or groundwater) do not impair migration patterns for listed salmonids in Pescadero Creek.

25.1.3.2. **Action Step:** Adequately screen water diversions to prevent juvenile salmonid mortalities.

25.1.4. **Recovery Action:** Prevent impairment to water quality (impaired instream temperature)

25.1.4.1. **Action Step:** Ensure water diversions do not impair water temperatures in Pescadero Creek.

25.1.4.2. **Action Step:** Request the SWRCB conduct interagency consultation with the California Department of Fish and Game, and seek technical assistance from NMFS on the issuance of water rights permits.

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

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

25.2.1.1. **Action Step:** Evaluate and monitor 1600 program compliance related to all water diversions (CDFG 2004).

25.2.1.2. **Action Step:** Identify and work with the SWRCB to eliminate depletion of summer base flows from unauthorized water uses. Coordinated efforts by Federal and State, and County law enforcement agencies to remove illegal diversions from streams.

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

25.2.1.4. **Action Step:** Promote conjunctive use of water with water projects whenever possible to maintain or restore salmonid habitat.

26. Threat- Watershed Process

No species-specific actions were developed.

Table 3: Implementation Schedule ~ Pescadero Creek

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
PeC-CCC-1.1	Objective	Estuary	Address the present or threatened destruction, modification, or curtailment of the species habitat or range										
PeC-CCC-1.1.1	Recovery Action	Estuary	Increase the extent of estuarine habitat										
PeC-CCC-1.1.1.1	Action Step	Estuary	Assess the benefits of altering to existing dikes and levees which currently reduce shoreline complexity and natural function	3	10	CDFG, Farm Bureau, NMFS, San Mateo County, State Parks, USFWS	1,100	1,100				2,200	Issues regarding the estuary have been contentious for many years. Resolving these issues and implementing effective restoration actions is considered essential due to the relative importance of estuaries on the Central Coast for salmonid rearing. Removing, reconfiguring, or breaching levees would likely help initiate restoration of natural estuarine functions. The 320 acre Pescadero marsh/estuary/lagoon has been reduced in size following European arrival; nonetheless, it is relatively intact in areal extent when compared to many other major estuaries in the Santa Cruz Mountains diversity stratum (e.g., San Lorenzo River, Aptos and Soquel creeks). While the Pescadero estuary was extensively converted for agricultural purposes, it also has relatively little permanent infrastructure (hard-scape) within the historical tidal prism (which increases the feasibility of large scale restoration efforts). However, the estuary/lagoon is significantly impaired due to a variety of anthropogenic alterations which affect the overall hydrology and water chemistry. NMFS (2008) estimated floodplain and tributary reconnection could range in cost from \$8,721 to \$81,395 per acre. Costs in Pescadero Marsh would likely be at the higher edge of that estimate range. If side channel restoration is proposed NMFS (2008) estimated cost could range between \$34,884 and \$290,698 per acre. Diking, channelization, reclamation, and excessive sedimentation have dramatically altered the size and character of Pescadero Marsh over the past 150 years. Between 1900 and 1960 the size of the delta/open water area of the marsh decreased by over 50%, primarily due to reclamation of marshland for agriculture. CEMAR (2010) discussed a number of potential restoration actions that could include (1) lowering the right bank levee of Pescadero Creek at the upper end of the Marsh, (2) Raising or repairing the low levee along the channel adjacent to North Marsh that leads to North Pond, and (3) Remove some or all of the remaining levees between Butano Creek and Butano Marsh. Cost based on treating 8 acres assume 5% of current estuarine extent) at a rate of \$272,120/acre.

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
PeC-CCC-1.1.2	Recovery Action	Estuary	Rehabilitate inner estuarine hydrodynamics										<p>Project per the biological opinion's project description was not implemented as described. As such, reinitiation of consultation pursuant to section 7 of ESA may be necessary. In 1993, California Department of Parks and Recreation implemented restoration actions "Pescadero Marsh Natural Preserve Hydrological Enhancement Plan (Williams 1990)" to both increase as well as isolate hydrologic connectivity between areas within the estuary/lagoon/marsh complex. The stated goals were to protect habitat for sensitive species, provide flood control, and reduce sediment within the estuary/lagoon/marsh. In the southern portion of the Marsh, restoration actions included widening the lower portion of Butano creek and removing portions of levees across various areas in the Marsh. In the northern portion of the Marsh, restoration actions included widening and excavating a channel connecting Pescadero Creek with North Pond, excavating a channel, and building a levee with eight gated-culverts crossed the channel in close proximity to its confluence with Pescadero Creek. The gated culverts were to be manually closed when the sandbar formed to facilitate freshwater conversion. The purpose of these culverts was to enhance and protect rearing habitat for steelhead (rapid freshwater conversion provides improved water quality conditions) as well as to provide habitat for other sensitive species (California red legged frog, San Francisco garter snake, tidewater goby, and Western pond turtle). Additionally, a "low elevation levee" was built separating North Pond and North Marsh for the purpose of isolating North Marsh from tidal influence to protect and enhance sensitive species (California red legged frog, San Francisco garter snake, and tidewater goby) habitat. Unfortunately, Pescadero Marsh Natural Preserve Hydrological Enhancement Plan (Williams 1990) was not implemented according to the intended hydrological and biological goals: the low elevation levee was constructed too low and the culverts quickly rusted and became inoperable (Smith and Reis 1997). In 1995, the sandbar began forming substantially later in the year and this continues to present day (Smith and Reis 1997; Smith 2009). Currently, there is not enough time to fully convert the water column to a freshwater lagoon and the water quality is impaired. Tidewater now over-tops the "low elevation</p>

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
PeC-CCC-1.1.2.1	Action Step	Estuary	Encourage USFWS to reinitiate consultation for biological opinion with State Parks regarding the estuary restoration project.	3	3	State Parks, USACE, USFWS						In-Kind	levee" which has changed the designed freshwater habitat for sensitive species (other than steelhead) to unsuitable saltwater conditions. Smith (1990) documented that steelhead juveniles grew very rapidly in Pescadero lagoon prior to implementation of the two aforementioned projects in the 1990s. The benefits of the lagoon are compromised when conditions, as described above, occur. The impaired condition of the lagoon is one of the most significant limiting factors to the steelhead population in the Pescadero Creek watershed and could limit coho salmon when populations are re-established in the watershed.
PeC-CCC-1.1.2.2	Action Step	Estuary	Evaluate all floodgates located within the tidal portion of Pescadero Creek and determine the feasibility of re-claiming historic tidal slough habitat.	2	3	State Parks, USFWS							Cost accounted for increase the extent of estuarine habitat.
PeC-CCC-1.1.3	Recovery Action	Estuary	Rehabilitate natural river mouth dynamics										
													Changes to the steelhead population and water quality were documented following replacement of Highway One Bridge in 1991 and implementation of the Pescadero Marsh Natural Preserve Hydrological Enhancement Plan in 1993. Since construction of these project the system no longer converts to a seasonal freshwater lagoon because the sandbar forms two to three months later than it did prior to the 1993 (in the early fall rather than in the late spring / early summer). Early closure is believed necessary to prevent fish kills and maximize lagoon productivity. Three years of experimentation should be adequate to ascertain whether this action produces favorable results in regard to frequent fish kills that many believe adversely affect the steelhead population rearing in the closed lagoon. If this experiment results in desired results it should be incorporated into ongoing Pescadero operations by State Parks during most water years. This action has a potential to produce significant benefits to rearing coho salmon by precluding fish kills and maximizing water quality benefits. Permitting requirements should be closely coordinated between all responsible agencies by a well-

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
PeC-CCC-1.1.3.1	Action Step	Estuary	Restore the timing of sandbar closure so that it closes in June / July (as it did prior to reconstruction of the Highway 1 bridge) so as to provide adequate time for de-stratification and conversion to freshwater.	3	3	CA Coastal Commission, CalTrans, CDFG, NMFS, Public, RWQCB, State Parks, USACE, USFWS	48.00					48	qualified and experienced permitting lead with a track record of success on challenging projects. CCC steelhead are directly impacted by these conditions; CCC coho salmon are likely absent from the watershed and not currently impacted. However, these conditions could impact coho salmon to some degree if a run is successfully re-established in Pescadero Creek. Cost based on treating 8 acres (assume 5% of total estuarine habitat) at a rate of \$6,000/acre. Cost can be vary widely depending on various experimental approaches to sandbar closure.
PeC-CCC-1.1.4	Recovery Action	Estuary	Improve the quality and extent of freshwater lagoon habitat										
PeC-CCC-1.1.4.1	Action Step	Estuary	Implement restoration actions that benefit listed salmonids and other special status species in the estuary. Requirements and goals will vary by species.	2	10	CalTrans, CDFG, Farm Bureau, NMFS, Private Landowners, RWQCB, San Mateo County, State Parks, USACE, USFWS							Efforts should be guided by appropriate protection and enhancement guidelines. Restoration should include immediate actions as well as long term actions to address systemic problems in the estuary. Short term actions could include measures from CEMAR's Dec. 9, 2010, and Smith and Reis (1997) list of potential restoration actions. All actions should include a monitoring component so the impacts of the actions are well understood by all parties interested in the Pescadero Marsh. CEMAR (2010) discussed a number of potential restoration actions that could include (1) lowering the right bank levee of Pescadero Creek at the upper end of the Marsh, (2) Raising or repairing the low levee along the channel adjacent to North Marsh that leads to North Pond, and (3) Remove some or all of the remaining levees between Butano Creek and Butano Marsh. Other options are likely also viable and should be explored. Cost accounted for in other recovery actions.
PeC-CCC-1.1.5	Recovery Action	Estuary	Reduce extent of estuarine shoreline development										
PeC-CCC-1.1.5.1	Action Step	Estuary	Evaluate existing conservation easements in the Estuary to ensure they are in conformance with original terms and conditions of the easement.	3	5	Private Landowners						In-Kind	This cost should be minimal and should be considered a standard business practice by the entity that has granted conservation easements for private properties in the estuary.

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
PeC-CCC-1.1.5.2	Action Step	Estuary	Construction of new buildings and associated infrastructure should only occur above the historical estuary tidal prism.	2	100	CalTrans, FEMA, San Mateo County, State Parks, USACE						In-Kind	New infrastructure should be constructed above the historical tidal prism. Although a large portion of the tidal prism has been reclaimed for agriculture it is conceivable some of these farmed areas could be restored and provide important water quality and ecological benefits to the estuary. Development of permanent infrastructure in these areas usually precludes future ecologically beneficial restoration and typically results in additional chronic degradation due to flood prevention measures, and other similar actions, into the future.
PeC-CCC-1.1.6	Recovery Action	Estuary	Reduce frequency of artificial breaching events										
PeC-CCC-1.1.6.1	Action Step	Estuary	Implement patrols by citizens groups, State Parks, and law enforcement to ensure the sandbar is not illegally breached.	2	100	CDFG Law Enforcement, NMFS OLE, Pescadero Municipal Advisory Council, Public, 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. Other methods should also be evaluated such as installation of cameras that provide real time oversight. Cost of recovery action are expected to be minimal due to volunteer patrols.
PeC-CCC-1.1.6.2	Action Step	Estuary	Post and provide financial rewards to individuals who identify persons who illegally breach the sandbar to the Pescadero Creek lagoon.	2	100	CDFG Law Enforcement, NMFS OLE, State Parks						TBD	Financial rewards may act as a deterrent to those involved in the unauthorized breaching of the lagoon. The lagoon has a long history of illegal breaches and to date no one has been successfully prosecuted for this activity. Breaching is believed to result in significant adverse impacts to steelhead rearing (and coho salmon if present) in the lagoon. Breaching has historically coincided with the start of the December steelhead fishing season in Pescadero Creek.
PeC-CCC-1.1.6.3	Action Step	Estuary	Post durable and attractive interpretive signage at the beach to discourage casual breaching of the lagoon sandbar.	2	10	CDFG, State Parks	1.50	1.50				3	Cost of signage varies widely depending on materials and information. Assume standard rate of \$1,000/sign.
PeC-CCC-2.1	Objective	Floodplain Connectivity	Address the present or threatened destruction, modification or curtailment of the species habitat or range										
PeC-CCC-2.1.1	Recovery Action	Floodplain Connectivity	Rehabilitate and enhance floodplain connectivity										
PeC-CCC-2.1.1.1	Action Step	Floodplain Connectivity	Promote restoration projects designed to create or restore alcove, backchannel, ephemeral tributary, or seasonal pond habitats.	1	20	CDFG, NMFS, NRCS, San Mateo County, San Mateo RCD, State Parks						TBD	The number of projects will vary depending on landowner participation and acceptance.

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
PeC-CCC-2.1.1.2	Action Step	Floodplain Connectivity	Design new development to allow streams to meander in historical patterns, Protecting riparian zones and their floodplains or channel migration zones averts the need for bank erosion control in most situations.	1	100	CDFG, FEMA, RWQCB, San Mateo County, USACE						In-Kind	This recommendation should be considered standard practice.
PeC-CCC-3.1	Objective	Habitat Complexity	Address the present or threatened destruction, modification, or curtailment of the species habitat or range										
PeC-CCC-3.1.1	Recovery Action	Habitat Complexity	Increase large wood frequency										
PeC-CCC-3.1.1.1	Action Step	Habitat Complexity	Encourage retention of large woody material for all historical coho salmon streams to maintain and enhance current stream complexity, pool frequency, and depth. Consult a hydrologist and qualified fisheries biologist before removing wood from streams.	1	100	Big Creek Lumber Co., CalFire, CalTrans, CDFG, FEMA, NMFS, NRCS, Pescadero Municipal Advisory Council, POST, Private Landowners, Red Tree, RWQCB, San Mateo County, San Mateo RCD, USACE						In-Kind	This recommendation should be adopted as a reoccurring recommendation for all restoration projects by individuals, agencies, and organizations funding restoration projects. Manipulation of LWD should not occur until evaluated by the County of San Mateo Planning staff and hydrologist and/or qualified biologist familiar with Central Coast streams. LWD target could likely be achieved in a relatively short time period of existing if naturally recruited large wood was left intact by landowners. Cost savings would be significant. Currently a significant amount of large woody material is removed without proper authorization in the Pescadero Creek. Poor LWD ratings were documented for most of the 23 sample reaches evaluated by ESA et al. (2004) within the watershed. ESA et al. (2004) noted a high proportion of recently recruited LWD and low proportion of decayed wood in the channel compared to a similar inventory on the Garcia River in Mendocino County, California. The small proportion of decayed pieces in the Pescadero-Butano water is indicative of instream wood removal. ESA et al. (2004) also noted that over half the conifer recruitment observed in their 23 sample reaches occurred in just two reaches located in Portola Redwoods State Park, suggesting the relatively mature forest stands in the park generate a high proportion of LWD recruited to the channels, and an inherently higher degree of protection of these attributes likely occurs due to government ownership. The paucity of LWD in areas outside the park likely is the major contributor to the lower shelter values estimated in the watershed (an average rating of 20 out of a possible total of shelter rating of 300).

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
PeC-CCC-3.1.1.2	Action Step	Habitat Complexity	Install properly sized large woody debris to appropriate viability table targets.	1	20	CalFire, IWRP, Mid Peninsula Open Space District, Private Landowners, Red Tree, San Mateo County, San Mateo RCD	96.25	96.25	96.25	96.25		385	Estimates in the State Coho Plan indicate that LWD placement costs about \$20,000 per stream mile; costs rise as the width of the water bodies increase and as the size of the material to be placed in channels grows. Currently, the Pescadero watershed lacks a LWD inventory but available information indicates LWD is lacking. Assuming universal landowner approval and permission, the cost to install LWD in the 44.1 IP-km (27mi) = \$384,750. Cost based on treating 13.5 miles (assume 1 project per mile in 50% High IP) at a rate of \$28,500 We believe this cost would be significantly more in the Pescadero watershed due to concerns regarding LWD stability and flooding that would require more engineering. If ELJ used, cost would be \$1,556,236. Additionally, the LWD targets proposed in this plan likely exceed those estimated in the State Plan resulting in increased costs. Coordinating instream large wood placement with future timber harvest activities in the watershed could result in substantial cost savings and serve as an opportunity for effective timber harvest plan mitigation.
PeC-CCC-3.1.1.3	Action Step	Habitat Complexity	Educate landowners, land managers, and County staff regarding the importance of Large Woody Material to coho salmon survival and recovery, and watershed processes.	1	2	CalTrans, CDFG, FEMA, FishNet 4C, NMFS, San Mateo County, San Mateo RCD, State Parks						In-Kind	Program should initially be directed at landowners along important stream reaches where large wood removal has been identified as an ongoing concern by the resource agencies and the County of San Mateo. Cost estimate may expand if large wood removal continues to occur at current levels following completion of the program. The recommendation is based on ongoing efforts throughout the ten year period. Education effort would include workshops, mailings, fliers, signage, and focused presentations. Costs could be somewhat minimized through the use of existing materials already created nearby from the RCD of Santa Cruz County and County of Santa Cruz.
PeC-CCC-3.1.1.4	Action Step	Habitat Complexity	Identify historical habitats lacking in channel complexity, and promote restoration projects designed to create or restore complex habitat features that provide for localized pool scour, velocity refuge, and cover.	1	5	CalTrans, CDFG, IWRP, NMFS, Private Landowners, RWQCB, San Mateo RCD, State Parks, USACE	127.00					127	A comprehensive LWD inventory has not been conducted in Pescadero, however ESA (2004) did conduct reach level sampling in a discrete number of units and documented a paucity of LWD. A review of CDFG habitat typing information confirms the overall lack of wood formed structure. LWD installation should not wait until the completion of an inventory effort but should occur simultaneously. An appropriate approach would be beginning restoration actions in stream reaches with high IP values for both CCC coho and steelhead. Cost based on fish/habitat restoration at a rate of \$126,758/project

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
PeC-CCC-3.1.1.5	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.	2	100	CalTrans, CDFG, FEMA, NMFS, Private Landowners, San Mateo County, San Mateo RCD, USACE						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.
PeC-CCC-3.1.1.6	Action Step	Habitat Complexity	Incorporate large woody debris (preferably large diameter redwood trees) into stream bank protection projects, where appropriate.	3	100	CalTrans, CDFG, FEMA, NMFS, Private Landowners, San Mateo County, San Mateo RCD, USACE						In-Kind	Costs should be minimal because the bank protection action would likely occur anyway. This recommendation would be implemented only when an existing problem has been identified and is in needed of protection.
PeC-CCC-3.1.1.7	Action Step	Habitat Complexity	Conduct conifer release to promote growth of larger diameter trees where appropriate.	3	20	Big Creek Lumber Co., CalFire, POST, Private Landowners, Red Tree, State Parks	130.00	130.00	130.00	130.00		520	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 or insignificant to downstream reaches. Conifer release will ultimately promote the natural recruitment of large wood into the tributaries and mainstem areas. Cost based on treating 4 miles (assume 80 acres/mile in 15% High IP) at a rate of \$1,622/acre.
PeC-CCC-3.2	Objective	Habitat Complexity	Address other natural or manmade factors affecting the species' continued existence										
PeC-CCC-3.2.1	Recovery Action	Habitat Complexity	Improve frequency of primary pools, LWD, and shelter ratings.										

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
PeC-CCC-3.2.1.1	Action Step	Habitat Complexity	Fund a watershed coordinator position.	1	10	Big Creek Lumber Co., CalFire, California Coastal Conservancy, California Geological Survey, CalTrans, CDFG, IWRP, Mid Peninsula Open Space District, NOAA RC, NRCS, Pescadero Municipal Advisory Council, POST, Private Landowners, RPFs, RWQCB, San Mateo County, San Mateo RCD, State Parks, SWRCB, USFWS	325.00	325.00				650	A watershed coordinator is necessary in Pescadero Creek watershed due to 1) the large number of small landowners adjacent to important watercourses and, 2) multiple governmental jurisdictions that often work in a limited and uncoordinated fashion in regard to restoration activities. A coordinator should be able to work with various stakeholders to facilitate rapid implementation of high priority restoration and habitat enhancement projects. A watershed coordinator should have a thorough understanding of social and environmental constraints and opportunities in the Pescadero Creek watershed. A qualified coordinator will be well versed in various State, County, and Federal permitting requirements and local issues and concerns with the various constituencies.
PeC-CCC-4.1	Objective	Hydrology	Address the present or threatened destruction, modification or curtailment of the species habitat or range										
PeC-CCC-4.1.1	Recovery Action	Hydrology	Improve flow conditions										
PeC-CCC-4.1.1.1	Action Step	Hydrology	Provide incentives to water rights holders willing to convert some or all of their water right to instream use via petition change of use and §1707 (CDFG 2004).	1	20	CDFG, IWRP, POST, Private Landowners, SWRCB						TBD	The price at which water is sold on environmental water markets is determined by negotiations between landowners and purchasing entities. The aggregate fiscal cost of water acquisition will depend on the quantity of water acquired and whether water rights will be permanently transferred or purchased for single periods of time. Initial efforts should be directed at water diversions in the Butano watershed.
PeC-CCC-4.1.1.2	Action Step	Hydrology	Promote off-channel storage to reduce impacts of water diversion (e.g. storage tanks for rural residential users).	2	100	CDFG, Farm Bureau, IWRP, NOAA RC, NRCS, POST, Private Landowners, San Mateo County, San Mateo RCD, State Parks, SWRCB, Trout Unlimited						TBD	Water augmentation costs were estimated in regards to the Shasta-Scott Pilot Program (CDFG 2004). These results indicated potentially significant costs. Off channel storage cost will vary depending on landowner participation, regulatory agency participation, and permitting requirements.

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
PeC-CCC-4.1.1.3	Action Step	Hydrology	Develop more efficient and coordinated use of water resources to provide increased supply, restore groundwater levels, and increase dry weather baseflows through conjunctive management, use of reclaimed wastewater, and increased storage or utilization of excess winter stream flows.	2	100	CDFG, IWRP, NRCS, POST, San Mateo RCD, SWRCB						TBD	Costs will vary depending on landowner participation.
PeC-CCC-4.1.1.4	Action Step	Hydrology	Promote irrigation efficiency projects for agricultural practices.	2	20	Farm Bureau, Laguna Foundation, NRCS, POST, San Mateo RCD							Initial focus should be directed towards agricultural practices in the Butano sub-watershed.
PeC-CCC-4.1.2	Recovery Action	Hydrology	Reduce the number, conditions, and/or magnitude of diversions										
PeC-CCC-4.1.2.1	Action Step	Hydrology	Provide incentives to water rights holders willing to convert some or all of their water right to instream use via petition change of use and §1707.	1	10	CDFG, Farm Bureau, San Mateo County						TBD	Significant oversight by regulatory agencies may be required to ensure successful program implementation. Implementation and outreach is anticipated to occur over the entire 100 year recovery horizon due to the large number of diversions in the watershed. Cost are estimated for first ten years assuming successful implementation of two projects per year. Costs are estimated at \$70000 per landowner per year. Costs will vary depending on the size of the diversion and participation of diverters.
PeC-CCC-4.1.2.2	Action Step	Hydrology	Establish a comprehensive stream flow evaluation program to determine instream flow needs for coho salmon	2	10		36.00	36.00				72	Cost for stream flow monitoring estimated at \$72,000/project.
PeC-CCC-5.1	Objective	Landscape Patterns	Address the present or threatened destruction, modification, or curtailment of the species habitat or range										
PeC-CCC-5.1.1	Recovery Action	Landscape Patterns	Reduce adverse impacts to watershed processes associated with streamside road density (< 100 meters)										
PeC-CCC-5.1.1.1	Action Step	Landscape Patterns	Avoid new development, or road construction within floodplains, riparian areas, unstable soils or other sensitive areas	1	100	CalFire, California Geological Survey, CDFG, RWQCB, San Mateo County, USACE						In-Kind	This recommendation should be considered standard practice.
PeC-CCC-5.1.1.2	Action Step	Landscape Patterns	Conserve open space in contiguous landscapes, protect floodplain areas and riparian corridors, and develop conservation easements	1	100	Private Landowners, San Mateo County, State Parks						In-Kind	

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
PeC-CCC-9.1	Objective	Sediment	Address the present or threatened destruction, modification, or curtailment of the species habitat or range										
PeC-CCC-9.1.1	Recovery Action	Sediment	Reduce turbidity and suspended sediment										
PeC-CCC-9.1.1.1	Action Step	Sediment	Promote the re-vegetation of the native riparian plant community within inset floodplains and riparian corridors.	3	20	CalTrans, Farm Bureau, Pescadero Municipal Advisory Council, Private Landowners, RWQCB, San Mateo County, San Mateo RCD						TBD	Re-vegetation would also facilitate amelioration of instream temperatures and would provide a source for future LWD recruitment. This recommendation will likely be received with some resistance by some landowners. Costs will vary depending on landowner participation and existing landuse.
PeC-CCC-9.1.1.2	Action Step	Sediment	Encourage San Mateo to develop property easement acquisition funds and acquire grant monies to purchase eroding private properties in riparian corridors or properties subject to frequent flooding through a buyout program.	3	100	Pescadero Municipal Advisory Council, Private Landowners, San Mateo County						TBD	High priority areas include locations adjacent to the Pescadero Marsh, areas within the historical tidal prism of the marsh that are candidates for restoration, and location in sandstone and/or steep mixed lithology geology. Other important areas include tributaries that maintain good quality or easily restored, and currently occupied habitats.
PeC-CCC-9.1.2	Recovery Action	Sediment	Improve instream gravel quality										
PeC-CCC-9.1.2.1	Action Step	Sediment	Locations for sediment catchment basins should be identified, developed and maintained, where appropriate.	3	100	CalTrans, NRCS, RWQCB, San Mateo County, State Parks						TBD	Sediment basins must be maintained on a yearly basis. A limited number of areas may be suitable for sediment catchment basins, but where feasible, they should be used to retain and remove potentially chronic fine sediment sources that impact primary stream channels. Sties should be located on smaller tributaries or first order streams.
PeC-CCC-9.1.2.2	Action Step	Sediment	Establish and/or maintain continuous native riparian buffers.	2	100	CalFire, CalTrans, NRCS, POST, RWQCB, San Mateo County, State Parks						In-Kind	In a study on the San Lorenzo River in Santa Cruz County, Balance Hydrologics found stream reaches with a total of 1.5 to 2 bankfull widths (on both banks) of healthy native riparian vegetation offer the best instream habitat and have the most stable banks (Balance Hydrologics Inc. 1998). These riparian width recommendations are also appropriate for Pescadero and would facilitate return of watershed processes to properly functioning conditions.
PeC-CCC-9.1.2.3	Action Step	Sediment	Work with landowners to assess the effectiveness of erosion control measures throughout the winter period.	3	100	Farm Bureau, NRCS, Private Landowners, RWQCB, San Mateo County, San Mateo RCD, State Parks						In-Kind	

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
PeC-CCC-9.1.2.4	Action Step	Sediment	Permitting agencies (State, Federal, and local) should evaluate all authorized erosion control measures during the winter period.	3	100	CalFire, CDFG, FEMA, NMFS PRD, NRCS, RWQCB, San Mateo County, San Mateo RCD, USACE, USFWS						In-Kind	Inspections should be considered a standard business practice by all regulatory agencies and this action should not be considered as an additional cost.
PeC-CCC-9.1.2.5	Action Step	Sediment	Disperse discharge from new or upgraded commercial and residential areas into a spatially distributed network rather than a few point discharges, which can result in locally severe erosion and disruption of riparian vegetation and instream habitat.	3	100	CalFire, CalTrans, NRCS, Private Landowners, San Mateo County, San Mateo RCD, USACE						In-Kind	Cost are likely minimal if incorporated into general management plan for commercial and residential areas.
PeC-CCC-10.1	Objective	Viability	Address the present or threatened destruction, modification, or curtailment of the species habitat or range										
PeC-CCC-10.1.1	Recovery Action	Viability	Increase abundance										
PeC-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, NOAA SWFSC, Private Consultants, Private Landowners, State Parks						In-Kind	
PeC-CCC-10.1.1.2	Action Step	Viability	Re-establish a naturally reproducing run of coho salmon in appropriate subwatersheds. Prioritize Core and Phase 1 watersheds.	1	10	CDFG, NOAA SWFSC, Private Consultants, Private Landowners, State Parks						TBD	Re-introduction should only occur in subwatersheds where instream habitat conditions are suitable for all coho salmon lifestages. Conditions evaluated should include summer flow conditions, cover, winter refugia, pools depths, instream temperature, and gravel quality. Cost cannot be determined until priority locations are identified and numbers of coho salmon needed to reseed those areas are established.
PeC-CCC-10.2	Objective	Viability	Address the inadequacy of existing regulatory mechanisms										
PeC-CCC-10.2.1	Recovery Action	Viability	Refine assessment methods to more accurately identify and measure key habitat attributes.										
PeC-CCC-10.2.1.1	Action Step	Viability	Implement a monitoring program to evaluate the performance of recovery efforts. Phase 1 areas should have the highest priority for a site-based assessment; adapt the strategies for restoration and threat abatement to address site-based issues identified by the watershed assessments.	2	15	CDFG, NOAA SWFSC, Private Consultants, Private Landowners, State Parks	42.33	42.33	42.33			127	Cost for fish/habitat restoration are \$126,758.

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
PeC-CCC-10.2.1.2	Action Step	Viability	Implement standardized assessment protocols (i.e., CDFG habitat assessment protocols) to ensure ESU-wide consistency.	3	100	CDFG, NOAA SWFSC, Private Consultants, Private Landowners, State Parks						In-Kind	While standard methods are available, outreach will be required to encourage all landowners to utilize them. Costs for outreach and education are difficult to determine due to an unknown number of participants, staff turnover, etc. Costs for a statewide outreach and education program were estimated at \$60K (CDFG 2004). Costs for a watershed specific program would likely be a fraction of that.
PeC-CCC-10.2.2	Recovery Action	Viability	Increase spawner density										
PeC-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.	3	20	CDFG, NOAA SWFSC, Private Consultants, Private Landowners, State Parks	28.00	28.00	28.00	28.00		112	Standardized surveys should not occur until a small sustained run of CCC coho salmon is re-established in the watershed. Other monitoring efforts are occurring in the Santa Cruz Mtns Diversity Stratum and therefore, Pescadero ranks lower in overall priority in the immediate future. However, it will ultimately be important to begin assessing the overall adult run size in Pescadero due to its designation as an Independent watershed for both coho and steelhead. Redd monitoring using (GTRS sampling design) may be less expensive than establishing life cycle station to count migrating adults and smolts. All assessments should use standardized methods. Methods should be consistent across the ESU or at a minimum the Santa Cruz Mtns Diversity Stratum. Cost for spawner surveys are estimated at \$56,470/year.
PeC-CCC-10.3	Objective	Viability	Address other natural or manmade factors affecting the species' continued existence										
PeC-CCC-10.3.1	Recovery Action	Viability	Increase spawner density										
PeC-CCC-10.3.1.1	Action Step	Viability	Establish release imprinting stations, and other smolt release streams, so that smolts can be held for a minimum two week period prior to release. The holding period should allow for imprinting to occur on the parent release stream, increasing the potential for returns as adults which spawn naturally.	2	10	CDFG, NOAA SWFSC, Private Consultants, Private Landowners, State Parks							Imprinting stations will increase the likelihood of adults returning and re-establish a run in targeted sub basins. A total of three to five imprinting station may be needed in various tributaries of Pescadero Creek. Stations should continue until a run is verifiably re-established. Suitable locations should be carefully evaluated for their potential to support a viable run.
PeC-CCC-11.1	Objective	Water Quality	Address the present or threatened destruction, modification, or curtailment of the species habitat or range										

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
PeC-CCC-11.1.1	Recovery Action	Water Quality	Reduce turbidity and suspended sediment										Water quality is impaired from land use practices in the watershed. Many landuse practices degrade water quality and coho salmon survival, principally through the input of fine sediment which results in increased turbidity, which smothers spawning gravels, reduces food production, and fills in rearing habitats. Sources of sediment input include roads and road maintenance, agriculture, residential development, and logging.
PeC-CCC-11.1.1.1	Action Step	Water Quality	Disperse discharge from new or upgraded commercial and residential areas into a spatially distributed network rather than a few point discharges, which can result in locally severe erosion and disruption of riparian vegetation and instream habitat.	2	100	CalFire, CalTrans, Private Landowners, RWQCB, San Mateo County, USACE, USEPA						TBD	Cost to upgrade stormwater discharge points cannot be determined at this time, but it may be significant. Turbidity data (NHI, 2010) indicated elevated levels during the winter and spring following seasonal rainfall events. Elevated turbidity levels could injure gills, reduce feeding efficiency and adversely affect growth. Increased rates of turbidity and temperature are likely the result of land and water management practices in the watershed. Winter rearing juveniles are the primary life-stage affected by high turbidity levels.
PeC-CCC-11.1.1.2	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	10	CalFire, San Mateo County						In-Kind	
PeC-CCC-11.1.1.3	Action Step	Water Quality	Encourage San Mateo County to establish wider riparian buffers in residential and urban areas.	2	10	CDFG, NMFS, Private Landowners, San Mateo County							This will likely be a sensitive issue for many landowners with property located next to riparian areas. This recommendation should be applied to all new development projects.
PeC-CCC-11.1.1.4	Action Step	Water Quality	Implement Best Management Practices such as those in the Fish Friendly Farming program (California Land Stewardship Institute), or other cooperative conservation programs.	3	100	Farm Bureau, NMFS, Private Landowners, San Mateo County, San Mateo RCD						In-Kind	Note that these programs and take minimization measures and are not a no take standard. The San Mateo Farm Bureau is working with landowners to voluntarily address sources of sediment contribution and the Sotoyome RCD program could be combined with this ongoing effort.
PeC-CCC-14.1	Objective	Disease/Predation/Competition	Address the present or threatened destruction, modification, or curtailment of the species habitat or range.										
PeC-CCC-14.1.1	Recovery Action	Disease/Predation/Competition	Prevent adverse alterations to riparian species composition and structure										
PeC-CCC-14.1.1.1	Action Step	Disease/Predation/Competition	Improve conditions for salmonids by decreasing the adverse effects of exotic vegetation within the stream and riparian corridor.	3	20	Private Landowners, San Mateo RCD	1,525	1,525	1,525	1,525		6,100	Cost based on treating 2 miles (assume 80 acres/mile in 5% High IP) at a rate of \$37,574/acre.

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
PeC-CCC-15.1	Objective	Fire/Fuel Management	Address the present or threatened destruction, modification, or curtailment of the species habitat or range										
PeC-CCC-15.1.1	Recovery Action	Fire/Fuel Management	Prevent impairment to instream substrate/food productivity (impaired gravel quality and quantity)										
PeC-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						In-Kind	This recommendation should be considered a standard practice.
PeC-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, San Mateo County, San Mateo RCD						In-Kind	This recommendation will result in a net cost savings. This recommendation should be considered a standard practice and no additional financial costs are anticipated.
PeC-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, San Mateo County, San Mateo RCD						In-Kind	Implementing erosion control measures when constructing firebreaks (if possible) or shortly thereafter will likely result in a net cost savings. It is much more financially efficient to implement these measures while the fire crews are present rather than months later after the fire is out. Some areas in the Pescadero watershed have high fire hazard rating according to CalFire data. A major fire, particularly if located in areas with a high erosion hazard rating, could substantially increase fine sediment input and further compromise the rate of large wood recruitment in stream channels. Furthermore, if existing riparian areas were lost to fire, higher stream temperatures, which are already above optimal condition along the mainstem, would likely result.
PeC-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						In-Kind	Standard business practice.
PeC-CCC-15.1.1.5	Action Step	Fire/Fuel Management	Encourage CalFire to provide plan to all non-County fire fighters when providing firefighting assistance in the Pescadero Creek watershed (and all other watersheds in the County).	2	100	CalFire, San Mateo County, San Mateo RCD						In-Kind	Cost of providing the plan is minimal.
PeC-CCC-15.1.2	Recovery Action	Fire/Fuel Management	Prevent increased landscape disturbance										
PeC-CCC-15.1.2.1	Action Step	Fire/Fuel Management	Work with County planners to define future impacts of proposed urban and infrastructure development on fire suppression and fuel load buildup.	2	10	CalFire, San Mateo County, San Mateo RCD						In-Kind	

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
PeC-CCC-15.1.2.2	Action Step	Fire/Fuel Management	In the event of a wildfire, we recommend CalFire Resource Advisors contact the resource agencies for ESA consultation (or technical assistance) regarding the incident. The resource agencies can provide guidance regarding critical resources in the area that may be affected by firefighting actions.	2	100	CalFire, San Mateo County, San Mateo RCD						In-Kind	Guidance could include informing CalFire in regards to the presence of sensitive biological resources in the watershed as well as recommendations regarding water source locations (e.g., drafting water from areas other than Pescadero lagoon). Protocols, similar to those recommended here, are already in place between USFWS, NMFS, BLM, and USFS which could provide a template for CalFire.
PeC-CCC-15.1.3	Recovery Action	Fire/Fuel Management	Prevent impairment to stream hydrology (impaired water flow)										
PeC-CCC-15.1.3.1	Action Step	Fire/Fuel Management	Draft water from lakes, ponds, 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.	3	100	CalFire							Require all water truck/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. Attempt to avoid significantly lowering stream flows during water drafting.
PeC-CCC-15.2	Objective	Fire/Fuel Management	Address the inadequacies of regulatory mechanisms										
PeC-CCC-15.2.1	Recovery Action	Fire/Fuel Management	Prevent impairment to water quality										
PeC-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						0	
PeC-CCC-16.1	Objective	Fishing/Collecting	Address the inadequacy of existing regulatory mechanisms										
PeC-CCC-16.1.1	Recovery Action	Fishing/Collecting	Prevent reduced density, abundance, and diversity										
PeC-CCC-16.1.1.1	Action Step	Fishing/Collecting	Prohibit offshore fishing until January 15 (or until sandbar opens naturally) within one mile of the river mouth.	3	10	CDFG, NMFS							
PeC-CCC-16.1.1.2	Action Step	Fishing/Collecting	Work with CDFG to monitor the river mouth until river flows naturally breach the sandbar.	2	100	CalTrans, CDFG, Public, State Parks							If river mouth has been artificially breached without appropriate authorization, prohibitions on offshore should continue until appropriate flows occur.

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
PeC-CCC-16.1.1.3	Action Step	Fishing/Collecting	Work with CDFG to modify Section 8.00 (b) (1) low flow minimum flow closure for Pescadero Creek.	2	3	CDFG, NMFS						In-Kind	Low flow closures are needed for the Pescadero Creek based on flow conditions in from a nearby watershed in the Santa Cruz Mountains. Additionally, due to later recent runs of CCC coho salmon in the stream south of the Golden Gate, the date of opening season should be pushed back to later in the fishing season (currently fishing season starts on December 15) to at least January 15. Consideration should be given to pushing the entire fishing season back so that the total number of angling days in not reduced significantly.
PeC-CCC-16.1.1.4	Action Step	Fishing/Collecting	Install/construct permanent signs at all major public access points along Pescadero Creek that clearly identify differences in body morphology of all potentially present adult salmonids with color photos (e.g., caudal fin spotting, caudal fork shape, coloration of lower jaw, peduncle width, etc.).	1	10	CDFG, Pescadero Municipal Advisory Council, Private Landowners, San Mateo County, San Mateo RCD	7.50	7.50				15	Cost for signs varies widely depending on materials and content of signs. Cost based on \$500/sign. Assume a minimum of 30.
PeC-CCC-16.1.1.5	Action Step	Fishing/Collecting	Increase oversight on anglers fishing in Pescadero to evaluate compliance with fishing regulations.	2	10	CDFG, CDFG Law Enforcement, NMFS OLE							
PeC-CCC-18.1	Objective	Livestock	Address the present or threatened destruction, modification, or curtailment of the species habitat or range										
PeC-CCC-18.1.1	Recovery Action	Livestock	Prevent impairment to instream substrate/food productivity (impaired gravel quality and quantity)										
PeC-CCC-18.1.1.1	Action Step	Livestock	Reduce the adverse effects of grazing and ranching to water quality in the Bradley Creek subwatershed.	3	30	Farm Bureau, Private Landowners, San Mateo RCD						TBD	Cost cannot be determined due to variability of landowner participation and extent of impacts.
PeC-CCC-18.1.1.2	Action Step	Livestock	Establish and implement a conservative residual dry matter (RDM) target per acre that ensures area is not overgrazed with 1000 lbs. RDM (residual dry matter)/acre left at end of grazing season. Remove cattle from pasture before soils dry out.	3	15	CDFG, NRCS, Private Landowners						In-Kind	This recommendation should be considered standard practice.
PeC-CCC-18.1.1.3	Action Step	Livestock	To minimize gully initiation, grazing should be kept at relatively low intensities on the steeper slopes in this area.	3	100	Farm Bureau, NRCS, Private Landowners, RVQCB, San Mateo RCD						In-Kind	The lower Pescadero is vulnerable to gully initiation. Establishing conservative targets would reduce the total number of AUM but would also reduce restoration costs to address gullies.

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
PeC-CCC-18.1.2	Recovery Action	Livestock	Prevent adverse alterations to riparian species composition and structure										
PeC-CCC-18.1.2.1	Action Step	Livestock	Locate water sources away from riparian areas.	3	100	Farm Bureau, NRCS, Private Landowners, San Mateo RCD						TBD	CDFG estimated water control structures at \$15,000 each. The cost of moving a water source for grazing cattle is likely much lower. However, costs cannot be estimated because landowner participation is unknown and site specific conditions are currently unknown.
PeC-CCC-18.1.2.2	Action Step	Livestock	Aid landowners willing to fence off riparian areas in choosing alternatives water source sites (preferably ones that are hydrologically disconnected from stream flows).	2	100	Farm Bureau, Private Landowners, San Mateo RCD						TBD	CDFG 2004 estimates fencing costs in 2002 dollars at \$4 per LF. Costs may be higher in the Pescadero watershed. Total costs are unknown and may vary depending on landowner participation and total amount of habitat fenced.
PeC-CCC-19.1	Objective	Logging	Address the present or threatened destruction, modification or curtailment of the species habitat or range										
PeC-CCC-19.1.1	Recovery Action	Logging	Prevent impairment to floodplain connectivity (impaired quality & extent)										
PeC-CCC-19.1.1.1	Action Step	Logging	Timber harvest planning should evaluate and avoid or minimize adverse impacts to offchannel habitats, floodplains, ponds, and oxbows.	2	100	CalFire, CDFG, Private Landowners, San Mateo County						In-Kind	This recommendation should be considered standard practice.
PeC-CCC-19.1.2	Recovery Action	Logging	Prevent impairment to stream hydrology (impaired water flow)										
PeC-CCC-19.1.2.1	Action Step	Logging	Evaluate road surface treatment options to halt or minimize impacts from water drafting and diversion	3	100	CalFire, CDFG, Private Landowners, San Mateo County						TBD	Cost for this recommendation will be determined by feasibility of road surface treatment and extent of miles of road to be treated.
PeC-CCC-19.1.3	Recovery Action	Logging	Prevent impairment to habitat complexity										
PeC-CCC-19.1.3.1	Action Step	Logging	Timber management should be designed to allow trees in riparian areas to age, die, and naturally recruit into the stream.	3	100	CalFire, CDFG, Private Landowners, San Mateo County						In-Kind	The current Forest Practice Rules require retention of a proportion of the largest diameter trees adjacent to water courses. This practice should continue and potential expansion of the number left for future recruitment should be considered.
PeC-CCC-19.1.4	Recovery Action	Logging	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)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
PeC-CCC-19.1.4.1	Action Step	Logging	Protect headwater channels with larger buffers to minimize sediment delivery downstream.	2	100	CalFire, CDFG, Private Landowners, San Mateo County						In-Kind	This recommendation should be considered standard practice.
PeC-CCC-19.1.4.2	Action Step	Logging	Encourage tree retention on the axis of headwall swales. Any deviations should be reviewed and receive written approval by a licensed engineering geologist.	2	100	CalFire, CDFG, Private Landowners, San Mateo County						In-Kind	Cost is expected to be minimal
PeC-CCC-19.1.4.3	Action Step	Logging	For areas with high or very high erosion hazard, extend the monitoring period and upgrade road maintenance for timber operations.	2	100	CalFire, CDFG, Private Landowners, San Mateo County						In-Kind	This action should be considered a high priority within the Butano watershed. This recommendation applies to all THPs located in the mixed lithology geomorphic units with steep slopes, and all sandstone geomorphic units (steep and gentle slopes).
PeC-CCC-19.1.5	Recovery Action	Logging	Prevent impairment to water quality (impaired instream temperature)										
PeC-CCC-19.1.5.1	Action Step	Logging	Encourage wider riparian buffer zones in areas where stream temperatures or riparian canopy are found limiting.	2	100	CalFire, CDFG, Private Landowners, San Mateo County						in-Kind	
PeC-CCC-19.1.6	Recovery Action	Logging	Prevent increased landscape disturbance										
PeC-CCC-19.1.6.1	Action Step	Logging	Encourage low impact timber harvest techniques such as full-suspension cable yarding (to improve canopy cover; reduce sediment input, etc.).	3	100	CalFire, CDFG, Private Landowners, San Mateo County						In-Kind	
PeC-CCC-19.1.7	Recovery Action	Logging	Prevent alterations to sediment transport (road condition/density, etc.)										
PeC-CCC-19.1.7.1	Action Step	Logging	All roads, landings, and skid trails associated with timber operations should, to the maximum extent practicable, be hydrologically disconnected to prevent sediment runoff and delivery to streams.	2	100	CalFire, CDFG, Private Landowners, San Mateo County						In-Kind	
PeC-CCC-19.1.7.2	Action Step	Logging	Avoid road construction in riparian zones	2								In-Kind	Old roads should not be reopened unless for proper decommissioning purposes. Particular care should be directed at new road construction or reconstruction within the Butano watershed.

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
PeC-CCC-19.1.7.3	Action Step	Logging	All harvest plans should identify problematic unused legacy roads or landings with WLPZ's and ensure these areas are hydrologically disconnected and revegetated with native species where practicable following completion of harvest activities.	3	100	CalFire, CDFG, Private Landowners, San Mateo County						TBD	Cost for this recommendation depend on extent and feasibility of decommissioning legacy roads and landings.
PeC-CCC-19.2	Objective	Logging	Address the inadequacy of existing regulatory mechanisms										
PeC-CCC-19.2.1	Recovery Action	Logging	Prevent increased landscape disturbance										
PeC-CCC-19.2.1.1	Action Step	Logging	Establish greater oversight and post-harvest monitoring by the permitting agency for operations within Core, Phase I and Phase II CCC coho salmon areas.	3	20	CalFire, CDFG, Private Landowners, RWQCB						In-Kind	
PeC-CCC-19.2.1.2	Action Step	Logging	Forest landowners should consider pooling resources for a watershed-wide HCP or GCP that could provide for incidental take authorization and promote survival and recovery of coho salmon	3	20	Big Creek Lumber Co., Private Landowners, Red Tree						In-Kind	A watershed wide conservation effort could be used to help direct mitigation to areas where it would be most effective, rather than mitigation on a THP by THP basis. Pooling of resources could direct monitoring to areas where it would be most effective and minimize duplication of efforts. Other considerations could potentially covering timber harvest activities for multiple watersheds within San Mateo County.
PeC-CCC-19.2.1.3	Action Step	Logging	Until no-take rules are developed or the State has a secured HCP or GCP, assign NMFS staff to conduct THP reviews and provide no-take recommendations by using revised "Guidelines for NMFS staff when Reviewing Timber Operations: Avoiding Take and Harm of Salmon and Steelhead" (NMFS draft, 2004) or "Short Term HCP Guidelines" (NMFS 1999).	3	10	NMFS						In-Kind	The need for this action may change if the California Forest Practice Rules change and reach a no-take standard or the state receives incidental take authorization through the HCP process.
PeC-CCC-19.2.1.4	Action Step	Logging	Encourage timber landowners to implement restoration projects as part of their ongoing timber management practices in stream reaches where large woody material is deficient.	2	100	Big Creek Lumber Co., CalFire, CDFG, Private Landowners, Red Tree, Redwood Empire						In-Kind	Installing large woody material into stream deficient in large wood should be considered a top restoration priority, particularly in Core and Priority 1 subwatersheds. Restoration during harvest activities provides a unique opportunity to access key areas that are relatively undisturbed in comparison to areas of the watershed with a large rural residential footprint.
PeC-CCC-19.2.1.5	Action Step	Logging	Discourage San Mateo County from rezoning forestlands to rural residential or other land uses (e.g., vineyards).	1	100	CDFG, NMFS, San Mateo County						In-Kind	Maintaining forestlands as functional forests is a key strategy for returning the watershed to properly functioning conditions.
PeC-CCC-19.2.1.6	Action Step	Logging	Discourage home building or other incompatible land use in areas identified as timber production zones (TPZ).	1	100	CDFG, NMFS, San Mateo County						In-Kind	Cost should be minimal and long-term savings due to reduced watershed impacts should be significant.

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
PeC-CCC-19.2.2	Recovery Action	Logging	Prevent impairment to water quality (impaired instream temperature)										
PeC-CCC-19.2.2.1	Action Step	Logging	Increase buffer widths on Class II streams.	2	10	Board of Forestry, CalFire, Private Landowners, RPFs, RWQCB							Increasing buffer width (to be consistent with CFPR standards throughout the rest of the CCC ESU) to a 30 foot no-harvest buffer will ensure water temperatures are protected to downstream reaches critical for coho salmon rearing.
PeC-CCC-23.1	Objective	Roads/Railroads	Address the present or threatened destruction, modification, or curtailment of the species habitat or range										
PeC-CCC-23.1.1	Recovery Action	Roads/Railroads	Prevent impairment to watershed hydrology										
PeC-CCC-23.1.1.1	Action Step	Roads/Railroads	Assess and redesign transportation network to minimize road density and maximize transportation efficiency.	3	20	CalFire, CalTrans, Private Landowners, San Mateo County	0.05	0.05	0.05	0.05		0	This recommendation should be initially targeted at seasonal and unsurfaced roads in areas with erodible geology and/or near high risk landslides. Cost based on road inventory assessment at a rate of \$1066/mile for 160 miles (assume 75% of road network)..
PeC-CCC-23.1.1.2	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	100	CalFire, CalTrans, Private Landowners, San Mateo County	127.50	127.50	127.50	127.50	127.50	2,550	Replacement of culverts/bridges and upgrading to NMFS standards will result in increased cost for materials and construction but will likely result in structures that can withstand large storm events better than many existing structures. This recommendation should be considered standard practice. Cost based on upgrading 10 road crossing (assume minor 2 lane road and 25% of total crossings upgraded) at a rate of \$254,278/unit.
PeC-CCC-23.1.1.3	Action Step	Roads/Railroads	Develop a private road database using standardized methods. The methods should document all road features, apply erosion rates, and compile information into a GIS database.	2	10	CalFire, CalTrans, Private Landowners, San Mateo County						TBD	Many road associations are inadequately funded. A road improvement fund for the Pescadero could address sources of chronic and episodic sediment input by improving drainage features and reducing hydrologic connectivity. This action encourages implementation of many existing policies. Cost accounted in part in other recovery actions. Setting up database is likely minimal cost once road inventory is completed.

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
PeC-CCC-23.1.1.4	Action Step	Roads/Railroads	Reduce road densities by 10 percent over the next 20 years, prioritizing high risk areas in historical habitats.	3	20	CalFire, CalTrans, Private Landowners, San Mateo County	17.50	17.50	17.50	17.50		70	Initial roads targeted will likely be unsurfaced seasonal roads where ongoing maintenance does not comport with modern standards. Targeted areas should include sub watersheds with high erosion potential (e.g., lower portion of the Pescadero watershed). Roads that receive frequent use by the public will be very difficult to decommission; roads in more remote areas, particularly those historically used for timber harvest or in public ownership will likely be much easier to target for decommissioning. Roads located in steep sandstone geology or nearstream sandstone geology should receive the highest priority for decommissioning. Indiscriminate road density reduction should be avoided so as not to preclude inhibiting future road realignments that could also effectively reduce sediment delivery. Cost based on decommissioning 5 miles of road network at a rate of \$13,680/mile.
PeC-CCC-23.1.2	Recovery Action	Roads/Railroads	Prevent impairment to instream substrate/food productivity (impaired gravel quality and quantity)										
PeC-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	CalFire, CalTrans, Mid Peninsula Open Space District, POST, Private Landowners, San Mateo County						In-Kind	ESA et al. (2004) noted that while construction and maintenance practices are steadily improving, there are many miles of unused and/or abandoned secondary roads on both public and private lands that have not been properly upgraded or decommissioned commensurate with the decrease in management intensity in the basin. Many of these roads may be poorly designed with regard to drainage (ESA et al. 2004). Even though chronic fine sediment production decreases as the roads become vegetated, roads can deteriorate with age, becoming more susceptible to many forms of erosion, including culvert plugging and subsequent stream crossing failure, stream diversion and gullyng, as well as failure of both road and landing fills (ESA et al. 2004). On many forest and ranch roads located on both public and private lands, periodic maintenance occurs in the absence of an attempt to address chronic, localized erosion problems. In these circumstances, grading of poorly drained roads and repair of failed fills and stream crossing can continue sediment delivery.
PeC-CCC-23.1.2.2	Action Step	Roads/Railroads	Conduct road and sediment reduction assessments to identify sediment-related and runoff-related problems and determine level of hydrologic connectivity.	3	10	CalFire, CalTrans, Mid Peninsula Open Space District, POST, Private Landowners, San Mateo County	91.00	91.00				182	Some road assessment have already been conducted in the watershed. Initial assessment efforts should target Core and Priority 1 sub watersheds. Existing assessments should be used when possible. Cost for road inventory accounted for in above action steps. Cost for erosion assessment estimated at \$14.03/mile.

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
PeC-CCC-23.1.2.3	Action Step	Roads/Railroads	Reduce erosion from mainline timber harvest roads.	2	20	CalFire, CDFG, RWQCB, San Mateo County						In-Kind	Road densities are high throughout the watershed, estimated at 2.7 miles of road per square mile of watershed area, and at 3.2 miles per square mile of riparian area. Many of these roads are poorly situated and constructed, and improperly maintained. Roads were ranked as accounting for the largest percentage of total sediment delivery in the watershed from 1983-2002 by ESA et al. (2004). The total road-related sediment delivery rate during this time period was estimated at 50,379 yards ³ per year, which is more than twice the combined sediment delivery of all other land use in the watershed. Cost accounted for in other recovery actions and will incorporate measures to reduce road densities.
PeC-CCC-23.1.2.4	Action Step	Roads/Railroads	Evaluate stream crossings for their potential to impair natural geomorphic processes. Replace or retrofit crossings to achieve more natural conditions that meet sediment transport goals.	3	20	CalFire, CalTrans, NRCS, Private Landowners, San Mateo County						TBD	Partial barriers are present in the Pescadero watershed. According to CDFG 2004 cost estimates can range from 150K to 800K depending on location and type of barrier. Some modified barriers in Santa Cruz County have cost more than these estimates. Costs associated with barrier modification must be carefully balanced against other restoration activities that are less popular socially, but may yield greater beneficial affects to various lifestyles. If bridges are not feasible, replacement culverts on fish bearing streams must have a natural bottom. Cost accounted for road inventory assessment.
PeC-CCC-23.1.2.5	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.	3	5	CalFire, CalTrans, RWQCB, San Mateo County, State Parks						TBD	Inadequate storage of sediment has been an ongoing issue in Pescadero watershed. The paucity of locations for temporary storage of landslide material is a significant constraint. Sites should be identified within the duration specified and this action should be continued in perpetuity. Future efforts may require incentives to increase landowner participation. Cost estimates cannot be determine until the feasibility and quantity of adequate spoils storage site is completed.
PeC-CCC-23.1.2.6	Action Step	Roads/Railroads	Evaluate and remove roadside berms that lead to increased runoff velocities and result in increased sediment discharge.	3	20	CalFire, CalTrans, Private Landowners, San Mateo County						TBD	Roadside berms can result in concentrated water and sediment runoff. These features are often created to serve as a quasi safety device (in lieu of crash barriers or guard rails).
PeC-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	CalFire, CalTrans, Private Landowners, San Mateo County, State Parks						0	Cost for type and quantity of energy dissipaters will be determined from road inventory assessment. However, this should be considered a standard business practice and minimal costs are anticipated.

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
PeC-CCC-23.1.2.8	Action Step	Roads/Railroads	Conduct outreach and education regarding the adverse effects of roads, and the types of best management practices protective of salmonids.	2	100	CalFire, IWRP, NRCS, Private Landowners, State Parks						In-Kind	This should be an ongoing program. Existing material can likely be used and tailored to private landowners and agencies with road maintenance staff.
PeC-CCC-23.1.2.9	Action Step	Roads/Railroads	Develop a road upgrade fund to supplement FEMA emergency repair funding so problem roads could be upgraded to reduce sediment loading and improve road reliability. The Counties should seek amendment of FEMA policies to allow improvements that prevent erosion and failure, particularly in watersheds with endangered salmonid habitat.	3	20	CalTrans, FEMA, San Mateo County, State Parks						TBD	Costs are difficult to accurately determine but it may result in a long term cost savings. San Mateo County should seek amendments to FEMA policies to facilitate improvements that prevent erosion and failure, particularly for watersheds targeted in this and the CCC coho salmon recovery plan.
PeC-CCC-23.1.2.10	Action Step	Roads/Railroads	Encourage County to continue to implement the San Mateo County Road Maintenance Manual	2	100	San Mateo County							
PeC-CCC-23.1.3	Recovery Action	Roads/Railroads	Prevent impairment to passage and migration										
PeC-CCC-23.1.3.1	Action Step	Roads/Railroads	Identify high priority barriers and restore passage per NMFS' Guidelines for Salmonid Passage at Stream Crossings (NMFS 2001a).	3	20	CalTrans, IWRP, Private Landowners, San Mateo County, San Mateo RCD	8,750	8,750	8,750	8,750		35,000	Few partial barriers are present in the Pescadero Watershed. According to CDFG 2004 cost estimates can range from 150K to 800K depending on location and type of barrier. Some modified barriers in Santa Cruz Mountains Diversity Stratum have cost more than these estimates. Costs associate with barrier modification must be carefully balanced against other restoration activities that are less popular socially, but may yield greater beneficial affects to various lifestages. Cost based on treating 7 impassable barriers at a rate of \$500,560/barrier.
PeC-CCC-23.1.4	Recovery Action	Roads/Railroads	Prevent adverse alterations to riparian species composition and structure										
PeC-CCC-23.1.4.1	Action Step	Roads/Railroads	Encourage adoption and implementation of a plan similar to the County of Santa Cruz's Integrated Vegetation Management Plan for Roads Near Perennial Waters (URS Corporation 2008) regarding roadside maintenance activities. This plan was developed to discourage or eliminate unwanted vegetation and promote desirable (native) vegetation.	2	100	CalFire, CalTrans, FEMA, IWRP, NRCS, San Mateo County, San Mateo RCD, USACE						In-Kind	
PeC-CCC-23.2	Objective	Roads/Railroads	Address the inadequacy of existing regulatory mechanisms										
PeC-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.										

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
PeC-CCC-23.2.1.1	Action Step	Roads/Railroads	Encourage San Mateo County to increase enforcement of existing County regulations regarding grading, riparian and building violations, and sediment release from county roads.	2	5	San Mateo County							The periodic grading and leveling of unsurfaced roads continuously exposes erodible material both on the road surface and along the road shoulders. This loose, unconsolidated material is frequently mobilized during winter storms where it enters the water column. Additionally, paved and unpaved roads parallel many of the waterways within Pescadero Creek and impinge on channel migration. Many of these roads have areas that fail recurrently at the same unstable locations which contribute to ongoing sedimentation as well as bank hardening. Roads located in areas dominated by sandy soils are some of the largest contributors to degrade streambed conditions in the watershed.
PeC-CCC-23.2.2	Recovery Action	Roads/Railroads	Prevent impairment to floodplain connectivity (impaired quality & extent)										
PeC-CCC-23.2.2.1	Action Step	Roads/Railroads	Protect channel migration zones and their riparian areas by designing new roads to allow streams to meander in historical patterns.	1	100	CalFire, CDFG, FEMA, IWRP, NMFS, NRCS, Private Landowners, RPFs, RWQCB, San Mateo County, USACE, USFWS							Preservation of remaining migration zones are a high priority due to their importance for various salmonid lifestages. Protection of these areas will potentially help facilitate future restoration actions.
PeC-CCC-23.2.2.2	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 is created and implemented.	2	5	CalFire, CalTrans, Mid Peninsula Open Space District, POST, San Mateo County, State Parks							A well designed road management plan should result in overall cost savings due to lower maintenance costs. Particular emphasis should be directed at avoiding new road construction within the historical tidal prism of the Pescadero Marsh in order to avoid precluding future restoration actions and areas of high IP value.
PeC-CCC-23.2.3	Recovery Action	Roads/Railroads	Prevent impairment to instream substrate/food productivity (impaired gravel quality and quantity)										
PeC-CCC-23.2.3.1	Action Step	Roads/Railroads	Conduct annual inspections of all roads prior to winter. Correct conditions that are likely to deliver sediment to streams.	2	100	CalFire, CalTrans, CDFG, Mid Peninsula Open Space District, NMFS, NRCS, POST, Private Landowners, RPFs, RWQCB, San Mateo County, USACE						In-Kind	Standard business practice; however, implementation may be difficult in the watershed due to the large number of small landowners and varying degree of financial resources. County of San Mateo evaluated roads and trails and likely have a good idea of priority locations that should be addressed on an annual basis. Rural roads should receive the majority of the attention vs. mainline roads in the watershed.

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
PeC-CCC-23.2.3.2	Action Step	Roads/Railroads	For all rural (unpaved) and seasonal dirt roads apply (at a minimum) the road standards outlined in the California Forest Practice Rules.	2	100	CalFire, RPFs, RWQCB, San Mateo County, USACE							This should be considered the minimum standard for dirt roads in the watershed.
PeC-CCC-23.2.3.3	Action Step	Roads/Railroads	Limit winter use of unsurfaced roads and recreational trails by unauthorized and impacting uses to decrease fine sediment loads.	2	100	CalFire, NRCS, Public, RPFs, San Mateo County, USACE						0	Cost should be considered part of land owner road management plans.
PeC-CCC-23.2.3.4	Action Step	Roads/Railroads	Licensed engineering geologists should review and approve grading on inner gorge slopes.	3	100	CalFire, CalTrans, RWQCB							
PeC-CCC-24.1	Objective	Severe Weather Patterns	Address the present or threatened destruction, modification, or curtailment of the species habitat or range										
PeC-CCC-24.1.1	Recovery Action	Severe Weather Patterns	Prevent impairment to the estuary (impaired quality and extent)										
PeC-CCC-24.1.1.1	Action Step	Severe Weather Patterns	Design projects to include subtidal habitats and natural bioengineering techniques that buffer wave action and increase sediment deposition to minimize shoreline and wetland erosion (California State Coastal Conservancy et al. 2010).	3	100	FEMA, State Parks, USACE							Cost accounted for in ESTUARY.
PeC-CCC-24.1.1.2	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	100	FEMA, State Parks, USACE							Cost accounted for in ESTUARY.
PeC-CCC-24.1.1.3	Action Step	Severe Weather Patterns	Evaluate living shoreline and associated techniques as a way to benefit habitats while providing desired shoreline stabilization needs for future shoreline restoration or shoreline protection structures (California State Coastal Conservancy et al. 2010). Implement where feasible. See California State Coastal Conservancy et al. (2010) for habitat types to consider for inclusion, recommended monitoring, and potentially suitable locations for implementation.	3	100	FEMA, State Parks, USACE							Cost accounted for in ESUARY.
PeC-CCC-24.1.2	Recovery Action	Severe Weather Patterns	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	
PeC-CCC-24.1.2.1	Action Step	Severe Weather Patterns	Ensure all diversions in the watershed are in compliance with all applicable laws and policies.	1	5	Private Landowners, SWRCB						In-Kind	The SWRCB should conduct periodic sweeps of diversions in Pescadero Creek to ensure they are in compliance with annual reporting requirements and that annual water usage is accurately reported.
PeC-CCC-24.1.3	Recovery Action	Severe Weather Patterns	Prevent impairment to water quality										
PeC-CCC-24.1.3.1	Action Step	Severe Weather Patterns	Ensure tolerable water temperatures are maintained during drought periods.	2	5	Private Landowners, RWQCB, SWRCB	5.00					5	Water temperatures during drought will be directly affected by ongoing surface water diversions in Pescadero Creek and its tributaries. Concerted efforts should be made to address these diversions during drought periods to minimize predictable adverse impacts to stream temperatures. Cost based on stream temperature monitoring (assume minimum of 10 sites) at a cost of \$500/unit. Cost estimate does not account for maintenance or data management.
PeC-CCC-24.1.3.2	Action Step	Severe Weather Patterns	Implement performance standards in Stormwater Management Plans.	3	30	Private Landowners, RWQCB, SWRCB						In-Kind	This recommendation should be considered standard practice.
PeC-CCC-24.1.4	Recovery Action	Severe Weather Patterns	Prevent impairment to passage and migration										
PeC-CCC-24.1.4.1	Action Step	Severe Weather Patterns	Work with CDFG, County of San Mateo, and knowledgeable biologists to develop emergency rules and adopt implementation agreements regarding contingency efforts during drought conditions.	3	10	CDFG, NMFS, Private Consultants, Private Landowners, SWRCB						In-Kind	
PeC-CCC-24.1.4.2	Action Step	Severe Weather Patterns	Increase enforcement patrols by CDFG and NMFS OLE in sensitive spawning and rearing areas.	3	2	CDFG Law Enforcement, NMFS OLE							Costs are anticipated to be absorbed into ongoing activities.
PeC-CCC-24.1.4.3	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. These agencies should consider existing regulations or other mechanisms when evaluating alternatives to water as a dust palliative (including EPA-certified compounds) that are consistent with maintaining or improving water quality (CDFG 2004).	3	10	CalFire, CalTrans, CDFG, NMFS, RWQCB, SWRCB						In-Kind	
PeC-CCC-24.1.4.4	Action Step	Severe Weather Patterns	Evaluate performance of all existing fish ladders to pass migrating fish during drought conditions.	2	5	CalTrans, CDFG, NOAA RC, San Mateo County	41.00					41	Evaluation should include an evaluation of existing maintenance requirements and development of landowner agreements where appropriate. Escapement monitoring cost are \$40,541/project.

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							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
PeC-CCC-24.1.5	Recovery Action	Severe Weather Patterns	Prevent impairment to floodplain connectivity (impaired quality & extent)										
PeC-CCC-24.1.5.1	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	CalTrans, FEMA, Public, San Mateo County, USACE						TBD	Protecting these areas from impacts of development may be costly due to concerns of reverse condemnation, etc. However, avoiding development in areas prone to flooding will reduce the frequency of "emergency" conditions and adverse consequences to watershed processes associated with flood-fight efforts.
PeC-CCC-24.1.5.2	Action Step	Severe Weather Patterns	Flood control projects or other modifications facilitating new development (as opposed to protecting existing infrastructure) should be avoided.	1	100	CalTrans, FEMA, Public, San Mateo County, USACE							Not building flood control projects will not incur expenses. Particular attention should be directed at ensuring substantial future infrastructure is not placed within the historical tidal prism of the estuary.
PeC-CCC-24.1.5.3	Action Step	Severe Weather Patterns	Adopt a policy of "managed retreat" (removal of problematic infrastructure and replacement with native vegetation or flood tolerant land uses) for areas highly susceptible to, or previously damaged from, flooding.	2	100	FEMA, San Mateo County						In-Kind	This recommendation should be considered standard practice.
PeC-CCC-24.1.6	Recovery Action	Severe Weather Patterns	Reduce turbidity and suspended sediment										
PeC-CCC-24.1.6.1	Action Step	Severe Weather Patterns	Develop Bank Stabilization and Floodplain Guidelines for use by private and public entities specific to geological constraints in San Mateo County.	2	5	CDFG, NMFS HCD, San Mateo County						In-Kind	Cost will likely consist of existing staff time. It is presumed that existing protocols could be tailor to general San Mateo County constraints. Costs may be higher if new guidelines are developed that do not rely on protocols from past studies.
PeC-CCC-24.1.6.2	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	CalTrans, County of San Mateo, FEMA, Public, USACE						TBD	Particular attention should be directed in the lower portion of the watershed including Butano Creek. A sediment assessment for high-risk shallow seeded landside areas is needed to determine extent of erosion potential and protective measures.
PeC-CCC-24.1.6.3	Action Step	Severe Weather Patterns	Establish targeted polices, requirements and assistance for sandy soils areas.	2	10	CalTrans, County of San Mateo, FEMA, Public, USACE							Extreme flood events such as those that occurred in 1955 could result in major input of sediment from upslope locations. Much of the lower watershed is comprised of highly erodible geology which would likely impact spawning and rearing habitats when sediment enters the stream channel. Improvements in land use practices will likely lower sediment yield rates following future flooding events.
PeC-CCC-25.1	Objective	Water Diversion/Impoundment	Address the present or threatened destruction, modification or curtailment of the species habitat or range										
PeC-CCC-25.1.1	Recovery Action	Water Diversion/Impoundment	Prevent impairment to the estuary (impaired quality and extent)										

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
PeC-CCC-25.1.1.1	Action Step	Water Diversion/Impoundment	Ensure current and future water diversions (surface and groundwater) do not further impair estuary water quality conditions for rearing juvenile salmonids.	1	100	CDFG, County of San Mateo, State Parks, SWRCB						In-Kind	Aquatic conditions in Pescadero Creek are adversely affected by water diversions -- the watershed has been designated as a Fully Appropriated Stream by the California State Water Resources Control Board. Water diversions adversely impact the summer life stage by reducing flows and available habitat for rearing and feeding in the riverine areas as well as the estuary. Water diversions also extend the duration necessary for conversion to a freshwater lagoon during the summer. Work would entail SWRCB reviewing all existing water diversions and contacting diverters who are not in compliance with existing permits and licenses. It is likely that some diverters will require more time and interaction on the part of the SWRCB to come into compliance. Initial focus should be directed at diversions in the Butano watershed.
PeC-CCC-25.1.2	Recovery Action	Water Diversion/Impoundment	Prevent impairment to stream hydrology (impaired water flow)										
PeC-CCC-25.1.2.1	Action Step	Water Diversion/Impoundment	Ensure water supply demands can be met without impacting flow either directly or indirectly through groundwater withdrawals and aquifer depletion.	1	10	CDFG, County of San Mateo, POST, State Parks, SWRCB	36.00	36.00				72	Cost for evaluating stream flow model are estimated at \$71,825.
PeC-CCC-25.1.2.2	Action Step	Water Diversion/Impoundment	Establish a comprehensive stream flow evaluation program to determine instream flow needs for salmonids throughout the watershed.	2	10	CDFG, County of San Mateo, NMFS, POST, Private Landowners, San Mateo RCD, SWRCB						TBD	Site specific studies should be conducted to ensure adequate instream flow targets are established for all life stages. Studies should include determining critical flow levels for stream reaches impacted by diversions, both future and current diversions. Critical flow values would include minimum bypass flow requirements for upstream adult migration during winter months and rearing habitat conditions in the summer and fall months. Additionally, exceedence probability curves to predict late summer flow conditions would also be needed. The greatest numbers of water diversions are located in the lower watershed and in Butano Creek. Diversion in Butano Creek and its tributaries, coupled with degraded instream habitat conditions, likely contribute to significant degradation of juvenile rearing opportunities during the summer period. Cost accounted for ensure water supply demands can be met (see above).

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs (\$K)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
PeC-CCC-25.1.2.3	Action Step	Water Diversion/Impoundment	Monitor, identify problems, and prioritize needed changes to water diversion on current or potential coho streams that go dry in some years (CDFG 2004).	2	10	CDFG, County of San Mateo, Farm Bureau, NMFS, Private Landowners, San Mateo RCD, SWRCB						TBD	Water diversions reduce the quantity of water in the wetted stream channel, which increases diurnal temperature fluctuations and reduces available rearing habitat. Efforts to address diversions could include increased oversight by the SWRCB for permitted diversions and enforcement of applicable laws for unpermitted diversions. Initial focus to minimize the adverse effects of diversions should be focused in the Butano watershed. Completion of stream flow model will determine adequate conservation measures to insure adequate surface flows for coho.
PeC-CCC-25.1.2.4	Action Step	Water Diversion/Impoundment	Promote passive diversion devices designed to allow diversion of water only when minimum streamflow requirements are met or exceeded (CDFG 2004).	3	30	CDFG, County of San Mateo, Farm Bureau, NMFS, Private Landowners, San Mateo RCD, SWRCB						In-Kind	In impacted areas, this recommendation should be a high priority. Cost will vary widely depending on willingness of water diverters to modify water diversions. Costs may be significant depending on site conditions and number of devices installed.
PeC-CCC-25.1.3	Recovery Action	Water Diversion/Impoundment	Prevent impairment to passage and migration										
PeC-CCC-25.1.3.1	Action Step	Water Diversion/Impoundment	Ensure current and future water diversions (surface or groundwater) do not impair migration patterns for listed salmonids in Pescadero Creek.	2	100	CDFG, County of San Mateo, NMFS, POST, Private Landowners, SWRCB						In-Kind	
PeC-CCC-25.1.3.2	Action Step	Water Diversion/Impoundment	Adequately screen water diversions to prevent juvenile salmonid mortalities.	3	100	CDFG, NMFS, POST, Private Landowners, SWRCB						In-Kind	This recommendation should be considered standard practice.
PeC-CCC-25.1.4	Recovery Action	Water Diversion/Impoundment	Prevent impairment to water quality (impaired instream temperature)										
PeC-CCC-25.1.4.1	Action Step	Water Diversion/Impoundment	Ensure water diversions do not impair water temperatures in Pescadero Creek.	2	100	CDFG, County of San Mateo, NMFS, POST, Private Landowners, SWRCB							As part of future 1600 agreement, CDFG should require installation of temperature thermographs upstream and downstream of the diversion. These results should be reviewed on a yearly basis by the SWRCB and CDFG. Cost accounted for in SEVERE WEATHER PATTERNS.
PeC-CCC-25.1.4.2	Action Step	Water Diversion/Impoundment	Request the SWRCB conduct interagency consultation with the California Department of Fish and Game, and seek technical assistance from NMFS on the issuance of water rights permits.	2	100	CDFG, NMFS, SWRCB						TBD	
PeC-CCC-25.2	Objective	Water Diversion/Impoundment	Address the inadequacy of existing regulatory mechanisms.										
PeC-CCC-25.2.1	Recovery Action	Water Diversion/Impoundment	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)					Entire Duration	Comments
							FY 1-5	FY 6-10	FY 11-15	FY 16-20	FY 21-25		
PeC-CCC-25.2.1.1	Action Step	Water Diversion/Impoundment	Evaluate and monitor 1600 program compliance related to all water diversions (CDFG 2004).	2	5	CDFG, POST, SWRCB	8.00					8	Cost is based on a one year pilot study. The study would evaluate rates of compliance and overall impact of currently permitted diversion to coho salmon and steelhead survival and recovery. This should be adopted as a standard practice by CDFG. However, full implementation may be limited due to a lack of staffing. In this circumstance, other alternatives should be evaluated.
PeC-CCC-25.2.1.2	Action Step	Water Diversion/Impoundment	Identify and work with the SWRCB to eliminate depletion of summer base flows from unauthorized water uses. Coordinated efforts by Federal and State, and County law enforcement agencies to remove illegal diversions from streams.	1	100	SWRCB							The greatest numbers of water diversions are located in the lower watershed and in Butano Creek. Diversion in Butano Creek and its tributaries, coupled with degraded instream habitat conditions, likely contribute to significant degradation of juvenile rearing opportunities during the summer period.
PeC-CCC-25.2.1.3	Action Step	Water Diversion/Impoundment	Support SWRCB in regulating the use of streamside wells and groundwater.	2	100	CDFG, County of San Mateo, NMFS, State Parks, SWRCB, USFWS						0	
PeC-CCC-25.2.1.4	Action Step	Water Diversion/Impoundment	Promote conjunctive use of water with water projects whenever possible to maintain or restore salmonid habitat.	2	100	California Coastal Conservancy, CDFG, County of San Mateo, Farm Bureau, NRCS, POST, Private Landowners, San Mateo RCD, SWRCB, Trout Unlimited							Costs will vary significantly depending on landowner cooperation, infrastructure constraints, and types of infrastructure necessary to meet landowner needs. Due to the predicted levels of flow impairment in the watershed it is likely that significant infrastructure and coordination will be required to meet minimum flow requirements for steelhead viability and therefore, costs will be significant.