LAGUNITAS RIVER

Lagunitas Creek

Independent Population
70.3 Km of Potential Habitat
Coho salmon, steelhead, and Chinook salmon present

Lagunitas Creek drains approximately 109 square miles of western Marin County, and empties into Tomales Bay. The Lagunitas Creek watershed is about 35 percent grasslands, 28 percent montane or riparian hardwood forest, and about 22 percent is redwood coniferous forest. The upper portions of the Nicasio Creek subwatershed are dominated by grassland habitats while the main stem of Lagunitas Creek, San Geronimo Creek, and Olema Creek, are dominated by forested habitats. The Lagunitas Creek watershed has moderate erodibility after considering slope, precipitation, and the susceptibility of failure of underlying geology. Forty-eight percent of the Lagunitas Creek watershed is in private ownership. Local water district lands, national parks and open space make up the remaining area of the watershed. Land uses within the watershed include municipal water supply reservoirs, agriculture, rural residential development, and recreation. Housing development within the Lagunitas Creek watershed is low to moderate, approximately 2600 housing units are present in the watershed. There are 21 dams within the watershed that impede or block salmon migration, and numerous partial barriers to salmon migration caused by road crossings, and diversions. Impassable barriers block salmonids from more than 50 percent of the watershed, more than any other of the 28 focus watersheds identified in this recovery plan.

Lagunitas Creek
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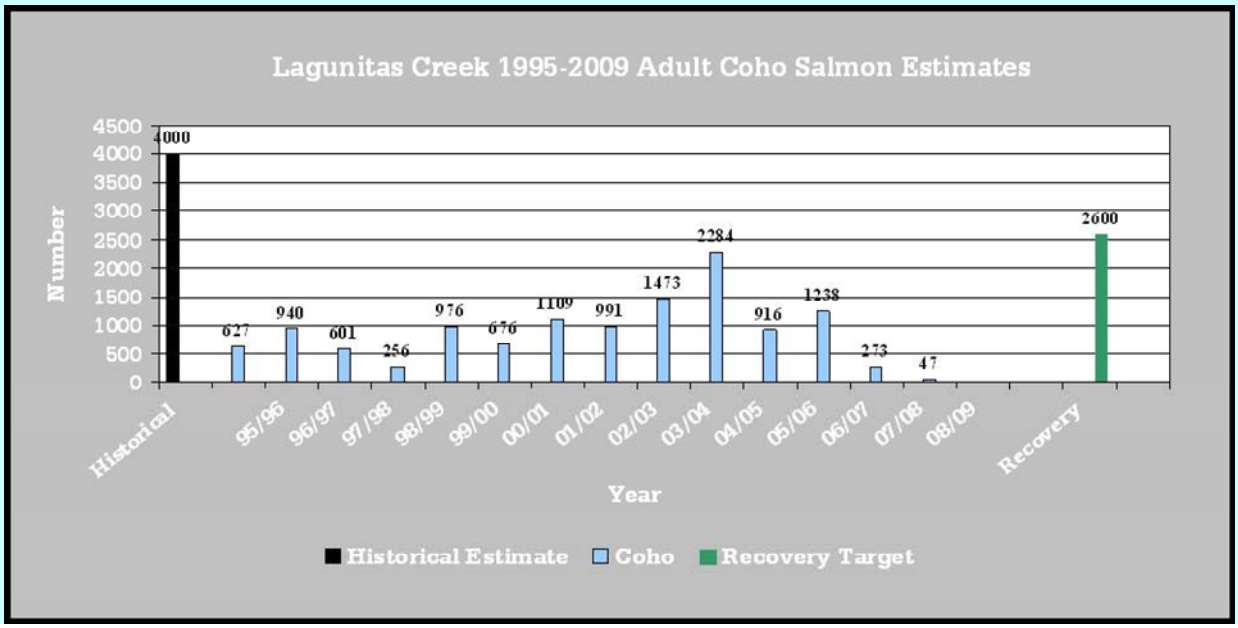
The Watershed at a Glance

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



Lagunitas Creek

Recovery Target: 2,600 Adult Coho Salmon

Increasing the survival of coho salmon

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

- Droughts
- Residential and Commercial Development
- Climate Change
- Roads and Railroads
- Agricultural Practices
- Water Diversion and Impoundments
- Channel Modification

Preventing the extinction of coho salmon

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

- Increase spawning habitat
- Remove barriers
- Improve pool habitat
- Increase and improve off channel habitat types
- Increase the amount of large wood in streams
- Improve riparian shading to cool streams
- Decrease the number of roads near the stream and reduce impacts from remaining roads

Peters Dam located on Lagunitas Creek
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Advancing recovery of coho

salmon in Lagunitas Creek requires these priority **recovery actions:**

- Increase the frequency and functionality of off channel habitats.
- Promote, via technical assistance and/or regulatory action, the reduction of water use affecting the natural hydrograph, development of alternative water sources, and implementation of diversion regimes protective of the natural hydrograph.
- Maintain and restore hydrologic function, protect riparian and floodplain areas, and minimize adverse effects to water quality and instream rearing habitats resulting from commercial and urban development.
- Create passage to currently inaccessible spawning and rearing habitats above major dams.

. . . in these **core areas:** San Geronimo Creek, Olema Creek, Cheda Creek and lower Lagunitas Creek floodplain and estuarine areas.

Conservation Highlights

- Extensive monitoring activities are conducted in Lagunitas by Marin Municipal Water District, SPAWN, and the National Park Service. Lagunitas has one of the most robust data sets for CCC coho salmon.
- The County of Marin and the NPS have remediated several passage barriers in the Lagunitas Creek watershed.
- SPAWN is also involved in sediment remediation activities.

Monitoring in Lagunitas Creek
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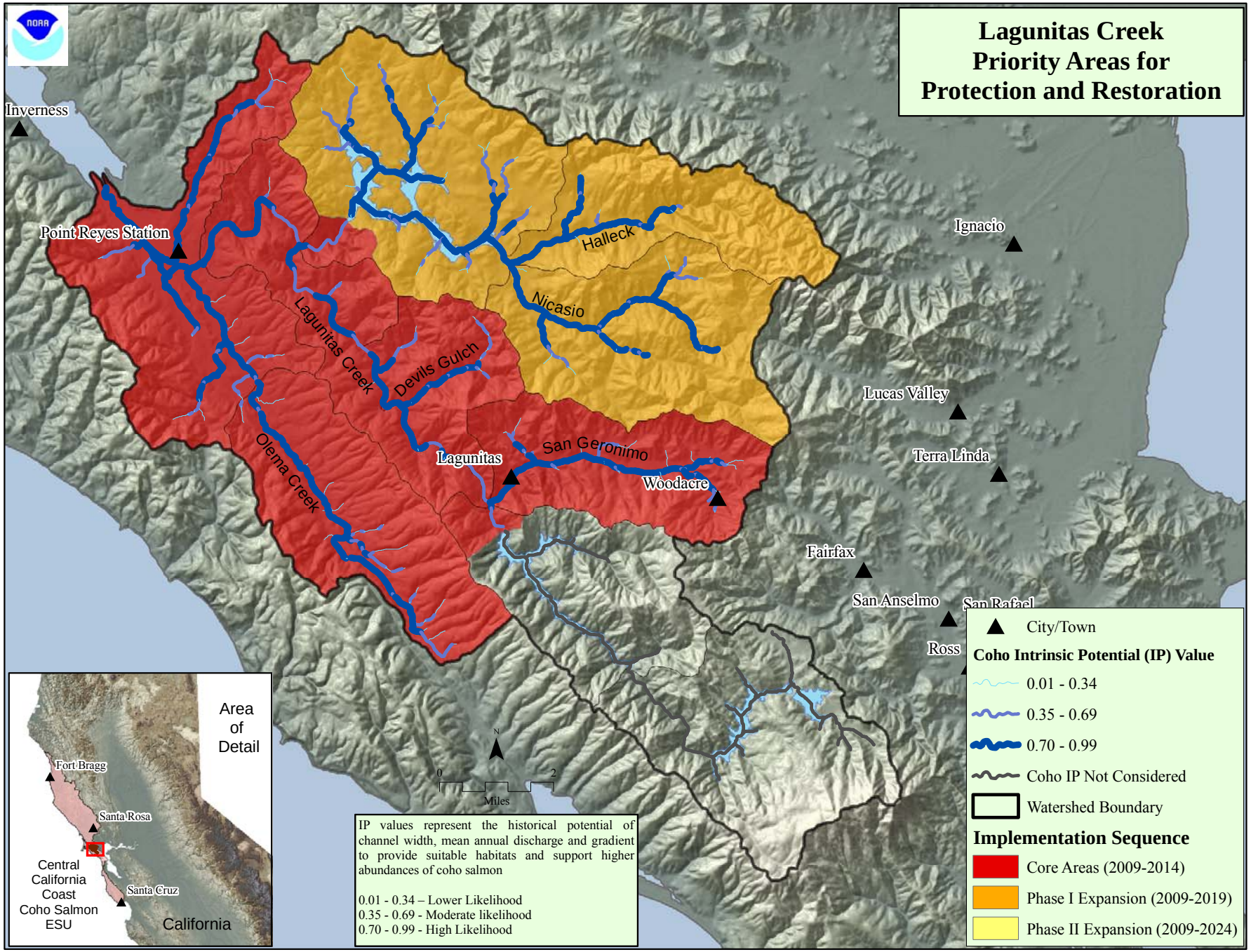
Immediate Needs

√ Continue monitoring
√ Life cycle monitoring: Lagunitas/Olema
√ Expand monitoring to estuary and Tomales Bay

Recovery Partners

Tomales Bay Watershed Council
MMWD
SPAWN
NPS
County of Marin
California State Parks


Lagunitas Creek
Priority Areas for
Protection and Restoration
Inverness
Point Reyes Station
Ignacio
Halleck
Nicasio
Lagunitas Creek
Devils Gulch
Lucas Valley
Terra Linda
Olema Creek
Lagunitas
San Geronimo
Woodacre
Fairfax
San Anselmo
San Rafael
Ross
City/Town
Coho Intrinsic Potential (IP) Value
0.01 - 0.34
0.35 - 0.69
0.70 - 0.99
Coho IP Not Considered
Watershed Boundary
Implementation Sequence
Core Areas (2009-2014)
Phase I Expansion (2009-2019)
Phase II Expansion (2009-2024)
N
0
2
Miles
IP values represent the historical potential of channel width, mean annual discharge and gradient to provide suitable habitats and support higher abundances of coho salmon
0.01 - 0.34 – Lower Likelihood
0.35 - 0.69 - Moderate likelihood
0.70 - 0.99 - High Likelihood
Area of Detail
Fort Bragg
Santa Rosa
Central California Coast Coho Salmon ESU
Santa Cruz
California

CCC Coho Salmon

Lagunitas Creek

CAP Viability Table Results

Analyst	Source	Result	Rating	Target	Habitat Attribute	Indicator	Poor	Fair	Good	Very Good
Flow Panel	Decision Matrix	33	Very Good	Spawning Adults	Hydrology	Passage Flows	>75 (score)	51-75	35-50	<35
SEC	PSMFC Database	32%	Poor	Spawning Adults	Passage	Physical Barriers	<50% of IP-km	50-70% of IP-km	70-90% of IP-km	>90% of IP-km
NCWAP	Decision Matrix	>90 days	Very Good	Spawning Adults	Passage	Passage at Mouth	<30 days	30-60 days	60-90 days	>90 days
SEC	CDFG HAB 8	303 m^2	Poor	Spawning Adults	Sediment	Amount of Gravel*	<600 m^2	600-6100 m^2	6100-11700 m^2	>11700 m^2
NMFS	Best Prof. judgment	<5%	Good	Spawning Adults	Viability	Freshwater Harvest	>10% of pop.	5-10%	<5%	
Flow Panel	Decision Matrix	50	Good	Eggs	Hydrology	Instantaneous Condition	>75 (score)	51-75	35-50	<35
Flow Panel	Decision Matrix	50	Good	Eggs	Hydrology	Redd Scour	>75 (score)	51-75	35-50	<35
SEC	Many Sources	NA	Good	Eggs	Sediment	Gravel Quality	>17% 0.85mm and or >30% 6.3mm	15-17% 0.85	12-14% 0.85mm and or <30% 6.3mm	<12% 0.85
SEC	CDFG HAB 8		NA	Eggs	Sediment	Gravel Quality (Embeddedness)	<25% of scores 1s&2s	25-50% of scores 1s&2s	>50% of scores 1s&2s	
Flow Panel	Decision Matrix	50	Good	Summer Rearing	Hydrology	Baseflow	>75 (score)	51-75	35-50	<35
SEC	CDFG HAB 8	17.05	Poor	Summer Rearing	Pool Habitat	Shelter Rating	<60 avg. rating	60-80	80-100	>100
SEC	CDFG HAB 8	4%	Good	Summer Rearing	Pool Habitat	Primary Pools	<30% pools by length	30-40%	40-50%	>50%
SEC/NMFS	Many Sources	NA	Poor	Summer Rearing	Water Quality	Temperature	>30% of IP > 17 C MWMT	Does not meet Good or Very Good	30-60% of IP < 15C MWMT	>60% of IP < 15C MWMT
SEC	CDFG HAB 8	0.03%	Poor	Winter Rearing	Floodplain	Complex Habitat**	<50% Connected	50-80% connected	>80% connected	
NMFS	NCWAP	Fair	Fair	Smolts	Estuary	Estuary				
Flow Panel	Decision Matrix	33	Very Good	Smolts	Hydrology	Passage Flows	>75 (score)	51-75	35-50	<35
SEC	SWRCB	2.7/10 IP-km	Fair	Smolts	Passage	# of Diversions**	>5 / 10 IP km	1.1-5	0.01-1	0
SEC	CDFG HAB 8	17.05	Poor	Multiple Life Stages	Pool Habitat	Shelter Rating	<60 avg. rating	60-80	80-100	>100
NMFS	Best Prof. judgment	<50%	Poor	Multiple Life Stages	Floodplain	Floodplain Connectivity	<50%	50-80%	>80%	not defined
NMFS	CDF CWHR		Good	Multiple Life Stages	Hydrology	Stand Age			>40 years old	
SEC	NLCDB	0.42%	Good	Multiple Life Stages	Hydrology	Impervious Surfaces	>12.01% of WS by area	7.01-12%	3.01-7%	0-3%
SEC	FMMP	12.48%	Fair	Multiple Life Stages	Land disturbance	Agriculture	>30% of WS by area	10-30%	0.1-10%	<0.1%
NMFS	CDF THP Dataset	10 - 25%	Good	Multiple Life Stages	Land disturbance	Timber Harvest	>35% of WS by area	25 - 35%	10 - 25%	<10%
SEC	Many Sources	2.6	Poor	Multiple Life Stages	Pool Habitat	LWD Freq. (BFW 0-10)	<4key pcs/100m	4-6/100m	6-11/100m	>11/100m
SEC	Best Prof. judgment	NA	Fair	Multiple Life Stages	Pool Habitat	LWD Freq. (BFW 10-100)	<1/100m	1-1.3/100m	1.3-4/100m	>4/100m
NMFS	CDF CWHR	>50%	Good	Multiple Life Stages	Riparian Veg.	Species Composition	<25%	25-50%	>50%	Historical Conditions
NMFS	CDF CWHR	51%	Fair	Multiple Life Stages	Riparian Veg.	DBH	<39% Class 5 and 6	40-54%	55-69%	>69%
SEC	CDFG HAB 8	83%	Fair	Multiple Life Stages	Riparian Veg.	Canopy Cover	<75 % avg. over IP-km	75-85%	85-95%	>95%
NMFS	CDF THP Dataset	2.2 mi/sq.mi.	Good	Multiple Life Stages	Sediment Transport	Road Density	>3 miles/sq. mile	3 to 2.5	2.5 to 1.6	<1.6
NMFS	CDF THP Dataset	2.9 mi/sq.mi.	Poor	Multiple Life Stages	Sediment Transport	Road density 100	>1 miles/sq. mile	1-0.5	0.5-0.1	<0.1
NMFS	Many Sources	Good	Good	Multiple Life Stages	Water Quality	Toxicity	Acute	Sublethal or Chronic	No Acute or Chronic	No evidence of toxins or Contaminants
NMFS	Best Prof. judgment	20-40 per IP-km	Good	Spawning Adults	Viability	Adult Density	<1 per IP-km	1-20 per IP-km	20-40 per IP-km	>40 per IP-km
NMFS	Best Prof. judgment	< 0.2 fish/m^2	Poor	Summer Rearing	Viability	Juvenile Density	< 0.2 fish/m^2	0.2-0.5 fish/m^2	0.5-1.0 fish/m^2	>1.0 fish/m^2
NMFS	Best Prof. judgment	35-50%	Good	Summer Rearing	Viability	Juvenile Distribution	<20% IP-km occupied	20-34%	35-50%	>50%

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

* = watershed specific numbers

** = Ratings defined by the distribution of results

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

Lagunitas Creek (Coastal) Threats and Associated Recovery Actions

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs ($K)						Comments
							FY1	FY2	FY3	FY4	FY5	Entire Duration	
LaC-A-2.1	Objective	Floodplain	Permanently protect riparian and floodplain habitat.										
LaC-A-2.1.1	Recovery Action	Floodplain	Support the acquisition of the San Geronimo Golf Course to support fish passage and increase channel complexity and access to off channel habitat in the San Geronimo Corps area.	1	10	CDFG, NMFS, NOAA RC, SPAWN, USFWS	800	800	800	800	800	8,000	There is local support for the acquisition, and the property is currently on the market. Acquisition and restoration may be the single most important action to be taken in this watershed for recovery of the coho salmon population.
LaC-A-2.1.2	Recovery Action	Floodplain	Evaluate undeveloped and developed floodplain property for potential function and acquisition potential.	2	3	MMWD, NPS, SPAWN	1.67	1.67	1.67			5	Costs of evaluation coincide with other proposed evaluation actions, and are expected to be minimal.
LaC-A-2.1.2.1	Action Step	Floodplain	Work with the San Geronimo Golf Course to restore the floodplain, riparian, and in stream habitats.	2	2	CA Coastal Commission, California Coastal Conservancy, CDFG, NMFS, NOAA RC, Private Landowners, SPAWN						TBD	
LaC-A-2.1.3	Recovery Action	Floodplain	Evaluate potential of modification to the Olema Ranch Campground to accommodate improved floodplain function on Olema Creek.	2	3	NPS, Private Landowners, State Parks	0.67	0.67	0.67			2	Most costs would be associated with implementation, and costs of evaluation are expected to be minimal.
LaC-A-2.1.4	Recovery Action	Floodplain	Evaluate potential acquisition of easements to protect floodplain function on lower Lagunitas Creek.	2	5	NPS, Private Landowners	0.40	0.40	0.40	0.40	0.40	2	Costs of evaluation coincide with other proposed evaluation actions, and are expected to be minimal.
LaC-A-2.2	Objective	Floodplain	Allow and support the formation of inset floodplains in the Lower Lagunitas watershed.										
LaC-A-2.2.1	Recovery Action	Floodplain	Create flood refuge habitat, such as hydrologically connected floodplains with riparian forest, or remove or setback levees, and use streamway concept where appropriate.	1	60	Marin County, Marin RCD, MMWD, NPS, State Parks	1,667	1,667	1,667	1,667	1,667	100,000	Addresses multiple poor habitat attributes and results in long term benefits by addressing the underlying threats.
LaC-A-2.2.1.1	Action Step	Floodplain	Implement Marin County Flood Zone activities for the improvement of coho salmon habitat	2	-1	Marin County, MMWD						0	Implementation of existing program activities are unlikely to increase costs associated with recovery.
LaC-A-2.3	Objective	Floodplain	Improve over-winter survival by increasing the frequency and functionality of off-channel habitats.										
LaC-A-2.3.1	Recovery Action	Floodplain	Delineate reaches possessing both potential winter rearing habitat and floodplain areas.	3	5	Marin County, MMWD, NPS, State Parks	8.00	8.00	8.00	8.00	8.00	40	This is a GIS exercise with ground truthing, and costs are expected to be fairly low.
LaC-A-2.3.2	Recovery Action	Floodplain	Promote restoration projects designed to create or restore alcove, backchannel, ephemeral tributary, or seasonal pond habitats.	2	60	CDFG, Marin County, MMWD, NMFS, NPS, State Parks						TBD	Costs to promote and support restoration efforts (e.g. technical assistance) depend on level of technical assistance provided and the types of projects proposed.
LaC-A-2.3.2.1	Action Step	Floodplain	Where existing infrastructure exists within historical floodplains or offchannel habitats, and where restoration is found feasible, encourage willing landowners to restore these areas through conservation easements, etc.	3	25							TBD	Conservation easements can be a powerful tool for conservation. Associated costs per acre can be highly variable. Costs for timberlands ranged from $54 to $279 per acre (DFG 2004). Costs in Marin County are likely much higher and cannot be accurately determined at this time.
LaC-A-2.3.3	Recovery Action	Floodplain	Target habitat restoration and enhancement projects that will function between winter base flow and flood stage.	2	60	Marin County, MMWD, NMFS, NPS, State Parks						TBD	Costs depend on level of technical assistance required and types of projects proposed. Many salmon recovery efforts and management programs are currently ongoing by a variety of agencies and stakeholders. It is possible that there could be additional salmon restoration costs identified; however, at this time we do not have sufficient information to estimate those potential costs.
LaC-A-2.4	Objective	Floodplain	Improve connectivity of floodplain habitat on tributaries, mainstem and estuarine habitat.										
LaC-A-2.4.1	Recovery Action	Floodplain	Evaluate existing road and transportation networks and identify measures to reduce interaction of transportation infrastructure on tributary, mainstem and estuarine floodplain process.	3	5	Marin County, MMWD, NPS, State Parks	4.00	4.00	4.00	4.00	4.00	20	Costs to evaluate and identify measures are expected to be minimal. Most costs would be associated with implementation rather than with preliminary analysis.
LaC-A-2.4.2	Recovery Action	Floodplain	Evaluate potential habitat benefitting multiple species and lifestages	2	5	CDFG, MMWD, NPS, SPAWN, State Parks	2.00	2.00	2.00	2.00	2.00	10	Extensive work on habitat evaluation has been conducted. Additional costs to evaluate remaining habitat expected to be minimal.

Lagunitas Creek (Coastal) Threats and Associated Recovery Actions

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs ($K)						Comments
							FY1	FY2	FY3	FY4	FY5	Entire Duration	
LaC-A-3.1	Objective	Hydrology	Improve survival at all life stages by restoring the historical spatial and temporal pattern of surface flows throughout spawning, rearing, and migration areas.										
LaC-A-3.1.1	Recovery Action	Hydrology	Manage reservoirs and dam releases to maintain suitable rearing temperatures and migratory flows in downstream habitats (e.g., pulse flow programs for adult upstream migration and smolt outmigration).	2	60	CDFG, MMWD, NMFS						TBD	
LaC-A-3.1.1.1	Action Step	Hydrology	Continue to assess the release of water from Soulejule Reservoir to develop the optimum flow release for coho salmon (DFG 2004).	2	20	Marin County, Marin RCD, MMWD, NMFS PRD, SWRCB						0	Assessment is ongoing, additional costs are expected to be minimal.
LaC-A-3.1.2	Recovery Action	Hydrology	Manage riparian areas for their site potential composition and structure.	3	60	Marin County, MMWD, Tomalis Bay Watershed Council						TBD	
LaC-A-3.1.3	Recovery Action	Hydrology	Patterns of water runoff, including surface and subsurface drainage, should match, to the greatest extent possible, the natural hydrologic pattern for the watershed in timing, quantity, and quality.										
LaC-A-3.1.3.1	Action Step	Hydrology	Promote, via technical assistance and/or regulatory action, the reduction of water use affecting the natural hydrograph, development of alternative water sources, and implementation of diversion regimes protective of the natural hydrograph.	2	60	CDFG, Gold Ridge RCD, Marin County, Marin RCD, MMWD, NMFS						TBD	Technical assistance is ongoing.
LaC-A-3.1.3.2	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 (DFG 2004).	2	10	DWR, Marin County, NMFS, SWRCB						TBD	
LaC-A-5.1	Objective	Passage	Improve access of spawning adults and juveniles to blocked IP kilometers.										
LaC-A-5.1.1	Recovery Action	Passage	Remove all barriers remaining in the Lagunitas Watershed.										
LaC-A-5.1.1.1	Action Step	Passage	Restore fish passage at Roy's Pools to facilitate unimpeded passage for all life stages into the San Geronimo Core Area.	1	3	SPAWN	267	267	267			800	This action would provide access to the San Geronimo Valley Core area for all lifestages.
LaC-A-5.1.1.2	Action Step	Passage	Remove all barriers in the Woodacre, Arroyo, Larsen and Montezuma subwatersheds, tributaries in the San Geronimo core area and remove all barriers in the remaining San Geronimo tributaries and the San Geronimo mainstem portion of the core area.	1	5	Marin County, SPAWN, Trout Unlimited	200	200	200	200	200	1,000	This action would provide access to the most productive subwatershed in this system. Many barriers have been addressed, however some continue to limit access to habitat.
LaC-A-5.1.1.3	Action Step	Passage	Removal all remaining Core area barriers in the Cheda, Devil's Gulch and Olema subwatersheds.	1	10	Marin County, MMWD, NPS, State Parks	500	500	500	500	500	5,000	This is an important Core area that supports extant populations.
LaC-A-5.1.1.4	Action Step	Passage	Remove all barriers remaining in the Lagunitas Watershed.	1	20	Marin County, Marin RCD, MMWD, NPS, State Parks	500	500	500	500	500	10,000	This action addresses access to Phase I&II expansion areas.
LaC-A-5.1.2	Recovery Action	Passage	Evaluate feasibility, develop solutions, and implement fish passage over Seeger Dan (Nicasio).										
LaC-A-5.1.2.1	Action Step	Passage	Provide passage over Seeger Dam (Nicasio).	3	30	CDFG, Marin County, NMFS OLE						TBD	Cannot determine at this time. Cost will depend on method of passage.
LaC-A-6.1	Objective	Pool Habitat	Improve summer rearing, winter rearing, and smolt survival by increasing instream channel complexity in potential rearing and migration reaches. Additionally, improve egg survival by reducing redd scour in streams characterized by high bedload mobility.										
LaC-A-6.1.1	Recovery Action	Pool Habitat	Develop a Large Wood Recruitment Plan that assesses instream wood needs, and sites potentially responsive to wood recruitment or placement, and develop a riparian strategy to ensure long term natural recruitment of wood via large tree retention.										

Lagunitas Creek (Coastal) Threats and Associated Recovery Actions

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs ($K)						Comments
							FY1	FY2	FY3	FY4	FY5	Entire Duration	
LaC-A-6.1.1.1	Action Step	Pool Habitat	Expand on the efforts of the Regional Water Quality Control Board and Marin Municipal Water District efforts retain LWD.	2	10	MMWD, RWQCB, SPAWN, Trout Unlimited						0	Cost to maintain LWD is expected to be minimal.
LaC-A-6.1.2	Recovery Action	Pool Habitat	Evaluate, develop solutions and implement immediate needs to address problems resulting from channelization.										
LaC-A-6.1.2.1	Action Step	Pool Habitat	Hold restoration workshops to specifically focus on restoration techniques that promote winter rearing juvenile habitat complexity in the Tocaloma reach of the lower Lagunitas mainstem. In addition, focus on restoration techniques that specifically address declining pool frequency and shelter ratings for summer rearing juveniles.	3	9	Marin County, Marin RCD, NOAA RC, SPAWN	10.00	10.00	10.00	10.00	10.00	90	Plan for three workshops over 9 years, each costing approximately 30k.
LaC-A-6.1.3	Recovery Action	Pool Habitat	Identify areas with low large wood recruitment potential and prioritize for restoration.	2	5	MMWD, NPS, SPAWN	4.00	4.00	4.00	4.00	4.00	20	Expect four surveys (one per sub basin) to identify areas with low LWD at approximately $5,000 each.
LaC-A-6.1.4	Recovery Action	Pool Habitat	Identify historic CCC coho salmon habitats lacking in channel complexity, and promote restoration projects designed to create or restore complex habitat features that provide for localized pool scour, velocity refuge, and cover. Prioritize Core areas first followed by Phase I areas.										
LaC-A-6.1.4.1	Action Step	Pool Habitat	Analyze whether summertime low-flow pools (perceived to be a limiting factor) are filling up with fine sediment from San Geronimo Creek between flow events that have enough power to scour the pools. This could be examined by surveying selected pools in detail several times a year (long enough to cover several potential scour and fill events), as was conducted in 1981.	2	5	MMWD, NPS, SPAWN	5.00	5.00	5.00	5.00	5.00	25	Five years of data is expected to be adequate to determine rates of sedimentation.
LaC-A-6.1.4.2	Action Step	Pool Habitat	In the San Geronimo Creek sub-watershed, continue public outreach and education for private landowners, residents, commercial, public utility and county workers regarding best management practices to control erosion, protect riparian vegetation, retain LWD, and minimize disturbance to coho salmon from domestic animals.	3	5	Marin County, SPAWN	1.00	1.00	1.00	1.00	1.00	5	Continue ongoing efforts.
LaC-A-6.1.5	Recovery Action	Pool Habitat	Install LWD, boulders, and other instream features to increase habitat complexity and improve pool frequency and depth (DFG 2004).										
LaC-A-6.1.5.1	Action Step	Pool Habitat	Implement LWD projects to address concerns in the 2003 assessment of LWD. The data collected in 2003 provide some insights into the habitat improvements that still need to be made. Resurvey these reaches to compare current conditions to those in 2003.	1	5	CDFG, Marin County, Marin RCD, MMWD, NOAA RC, SPAWN, Trout Unlimited	2,240	2,240	2,240	2,240	2,240	11,200	Cost estimate based on DFG 2004, at approximately 20k per mile.
LaC-A-6.1.5.2	Action Step	Pool Habitat	Install structures with multiple logs and root balls because they are more effective than structures with only one log. The eight top-ranked structures each had between two and four logs.	1	10	CDFG, Marin County, MMWD, NPS, SPAWN	70.00	70.00	70.00	70.00	70.00	700	Estimate 35 structures (1 per 2km), at 20k per structure. Structures already been place in some subwatersheds.
LaC-A-6.1.5.3	Action Step	Pool Habitat	Implement LWD projects with the following four goals or targeted woody debris functions: 1. Retard downstream migration of medium to large gravel and cobble: at incipient riffles and at existing riffles that are too coarse or are lacking sufficient quantities of desirable gravel; 2. Increase pool volume via local scour from flow obstruction; 3. Increase high flow refuge habitat by creating eddies and slower moving water behind obstructions; and 4. Increase summer escape cover habitat by increasing the complexity of the underwater environment and increasing the percentage of the pool that is shaded by cover on or just above the surface of the water.	2	10	Marin RCD, MMWD, NPS, RWQCB, SPAWN, Trout Unlimited						0	Costs covered in LWD structures action (35 structures at 20k each).

Lagunitas Creek (Coastal) Threats and Associated Recovery Actions

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs ($K)						Comments
							FY1	FY2	FY3	FY4	FY5	Entire Duration	
LaC-A-6.1.5.4	Action Step	Pool Habitat	Conduct outreach and education efforts. Prepare and distribute LWD Brochure to visitors at Samuel P. Taylor State Park. Develop Public displays. Set up Press coverage. Conduct annual outreach to local community groups. Integrate descriptions of the plan into information disseminated by MMWD, including an annual flyer to MMWD customers. Support community-based watershed restoration efforts. Make copies of reports available to the public.	3	10	MMWD, SPAWN, State Parks	5.00	5.00	5.00	5.00	5.00	50	Expect cost to be approximately 5K per year.
LaC-A-6.1.6	Recovery Action	Pool Habitat	Maintain current LWD, boulders, and other structure-providing features to maintain current stream complexity, pool frequency, and depth (DFG 2004).	2	5	Marin County, MMWD						0	Action is to stop removal of LWD and other habitat elements, so costs are expected to be minimal, and cost savings may occur.
LaC-A-6.1.7	Recovery Action	Pool Habitat	Remove logs and debris from streams only as a "last resort" (i.e., failure to remove them will certainly cause the loss of an essential facility) after consultation with a hydrologist and/or qualified fisheries biologist.	3	60	Marin County, Marin RCD, MMWD, NPS, SPAWN, State Parks						TBD	Costs depend on level of technical assistance provided and the types of projects proposed.
LaC-A-6.1.8	Recovery Action	Pool Habitat	Focus efforts to restore channel complexity in the Tocaloma reach of the Lagunitas mainstem to improve smolt survival.	1	10	MMWD, NPS						0	Costs are expected to be included in implementation of LWD placements actions.
LaC-A-7.1	Objective	Riparian Vegetation	Improve the structure and composition of riparian areas to provide shade, large woody debris input, nutrient input, bank stabilization, and other CCC coho salmon needs.										
LaC-A-7.1.1	Recovery Action	Riparian Vegetation	Prioritize and fence riparian areas from grazing (using fencing standards that allow other wildlife to access the stream).										
LaC-A-7.1.1.1	Action Step	Riparian Vegetation	Continue riparian protection and sediment control projects with a focus on working with landowners to manage livestock to protect riparian areas, and to implement erosion control projects on State and Federal park and private lands (e.g., Devil's Gulch).	1	10	Marin County, Marin RCD, MMWD, NPS, SPAWN, State Parks						TBD	Livestock damage has severe effects in the Olema Core area, but is less of an issue in the other areas of the watershed.
LaC-A-8.1	Objective	Sediment	Improve habitat conditions at multiple life stages by reducing sediment inputs to the stream at the watershed scale.										
LaC-A-8.1.1	Recovery Action	Sediment	Identify and modify road maintenance activities that generate fine sediment to decrease fine sediment loads (DFG 2004).	3	10	Marin County, NPS, State Parks	15.00	15.00	15.00	15.00	15.00	150	Some work has already been done to reduce sediments from roads. Estimate 25 miles or roads may require treatment, at approximately $6,000 per mile (DFG 2004).
LaC-A-8.1.2	Recovery Action	Sediment	Identify areas at increased risk of mass wasting and elevated fine sediment load, and decrease sediment from transportation projects and land management activities in those areas (DFG 2004).	3	5	Marin County, Marin RCD, MMWD, NPS, SPAWN, State Parks	4.00	4.00	4.00	4.00	4.00	20	Implementation requires mainly staff time, technical assistance by GIS analysis, so costs expected to be minimal.
LaC-A-8.1.3	Recovery Action	Sediment	Limit winter use of unsurfaced roads and recreational trails by unauthorized and impacting uses to decrease fine sediment loads.	3	60	CDFG, Marin County, NPS, State Parks						0	NMFS recommends the Fishnet 4C Best Management Practices. Costs are expected to be minimal if BMPs are followed.
LaC-A-8.1.4	Recovery Action	Sediment	For all rural (unpaved) and seasonal dirt roads apply (at a minimum) the road standards outlined in the California Forest Practice Rules.	2	5	Marin County, NPS, State Parks						0	Costs are expected to be minimal due to existing management plans.
LaC-A-8.1.5	Recovery Action	Sediment	Fully implement practices consistent with the SFRWQCB sediment TMDL.	2	10	Marin County, NPS, RWQCB, State Parks						0	Implementation of the TMDL is mandated by the Clean Water Act, and additional costs associated with recovery are not expected.
LaC-A-8.1.6	Recovery Action	Sediment	Decommission riparian road systems and/or upgrade roads (and skid trails on forestlands) that deliver sediment into adjacent watercourses (DFG 2004).	3	10	Marin County, NPS, State Parks						TBD	Decommissioning and rerouting road and trails can be expensive, however, costs cannot be determined due to an unknown number of miles of roads that may be targeted.
LaC-A-8.1.7	Recovery Action	Sediment	Address sediment and runoff sources from road networks and other actions that deliver sediment and runoff to stream channels.										

Lagunitas Creek (Coastal) Threats and Associated Recovery Actions

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs ($K)						Comments
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LaC-CCC-8.1.7.3	Action Step	Sediment	Examine whether fine sediment from San Geronimo Creek is negatively impacting the overall habitat by collecting data that serves as an "indicator" of overall habitat health. Indictors include physical indicators such as the amount of fine material in riffles or biological indicators such as the collection of aquatic insects (which live in the streambed).	3	5	SPAWN, USEPA	10.00	10.00	10.00	10.00	10.00	50	Estimate monitoring costs of approximately 10K per year.
LaC-CCC-8.1.7.4	Action Step	Sediment	Analyze whether the amount of fine sediment in the riffles is high enough to jeopardize juvenile salmonid survival. Subsurface samples in the riffles should be collected, analyzed, and compared to a large body of research that has quantified how much fine sediment is detrimental to salmonid survival. Alternatively, inexpensive monitors that directly sample inter-gravel dissolved oxygen should be installed.	3	5	MMWD, NPS, SPAWN, State Parks, USEPA	15.00	15.00	15.00	15.00	15.00	75	Cost estimate is 15K/year in addition to monitoring in San Geronimo Creek.
LaC-CCC-8.1.7.5	Action Step	Sediment	Assess and implement private road upgrades to reduce excessive fine sediment loading to San Geronimo Creek.	1	5	CDFG, NOAA RC, RWQCB, SPAWN						TBD	Spawn is currently organizing landowner groups in subwatersheds of San Geronimo Creek to develop road upgrade strategies. Roads are currently in poor condition and a significant source of sediment.
LaC-CCC-8.1.8	Recovery Action	Sediment	Work with landowners to assess the effectiveness of erosion control measures throughout the winter period.	3	30	Marin RCD, Private Landowners, RWQCB						TBD	Costs cannot be determined due to an unknown number of landowners, and undetermined assessment methods.
LaC-CCC-9.1	Objective	Viability	Develop and implement a monitoring program to evaluate the performance of recovery efforts.										
LaC-CCC-9.1.1	Recovery Action	Viability	Measure or estimate response of key habitat attributes to recovery efforts across the watershed.										
LaC-CCC-9.1.1.1	Action Step	Viability	Develop standardized watershed assessments within sub-watersheds to define limiting factors specific to those areas. Encourage all major landowners to develop similar assessment methods.	1	20	CDFG, Marin RCD, MMWD, NMFS, RWQCB, SPAWN, State Parks						TBD	Need additional info for methods to be used and landowners participating to develop cost estimate.
LaC-CCC-9.1.1.2	Action Step	Viability	To better understand changes in sedimentation, monitoring in the basin should include: longitudinal profiles, cross-sections, V*, LWD volume and distribution, and embeddedness.	2	30	CDFG, Marin County, MMWD, NPS, SPAWN, State Parks						TBD	Cost cannot be determined at this time. Specific information on the number of sample reaches and methods will determine cost.
LaC-CCC-9.1.2	Recovery Action	Viability	Monitor population status for response to recovery actions.										
LaC-CCC-9.1.2.1	Action Step	Viability	Monitor population response in off-channel habitats compared to instream habitat, similar to work conducted by Environmental Science Associates et al. (2004).	1	60	CDFG, MMWD, NMFS, NPS, Private Consultants, State Parks						TBD	Cost for monitoring program are estimated at 160K (DFG 2004). This monitoring would follow off-channel habitat improvements and cannot be estimated at this time.
LaC-CCC-9.2	Objective	Viability	Develop the watershed as a lifecycle monitoring location. Standardize monitoring efforts to assess population level response in this area of the Coastal Diversity Stratum.										
LaC-CCC-9.2.1	Recovery Action	Viability	Operation of the Lagunitas life cycle station should continue (Gallagher and Gallagher 2005).		10	CDFG, Marin County, MMWD, NMFS, NPS, SPAWN, State Parks	75.00	75.00	75.00	75.00	75.00	750	Includes juvenile surveys, smolt outmigration, and adult carcass surveys at 75k per year for 10 years.
LaC-CCC-9.2.2	Recovery Action	Viability	Annually monitor juvenile and adult coho salmon to assess success of the implemented augmentation/intervention strategy (eg. number of adult returns, spawning success, juvenile survival etc.) to determine if there is an increase in abundance of natural production of coho salmon in this population.	1	12	CDFG, MMWD, NMFS, SPAWN	0.83	0.83	0.83	0.83	0.83	10	
LaC-CCC-9.3	Objective	Viability	Recover a naturally reproducing run of coho salmon in appropriate subwatersheds.										
LaC-CCC-9.3.1	Recovery Action	Viability	Supplement the existing population, while minimizing departure from the genetic profile that historically existed in the population.										
LaC-CCC-9.3.1.1	Action Step	Viability	Annually capture or retain (during rescue efforts) - adequate numbers of fish from streams in Marin Countiy for purposes of broodstock	1	10	CDFG, MMWD, NMFS, NPS, SPAWN							existing operations

Lagunitas Creek (Coastal) Threats and Associated Recovery Actions

Recovery Strategy Number	Level	Targeted Attribute or Threat	Action Description	Priority Number	Action Duration (Years)	Recovery Partners	Costs ($K)						Comments
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LaC-CCC-9.3.1.2	Action Step	Viability	Utilize captured fish in a within-basin program for an immediate short term augmentation strategy at established facility(s), for release as adults, to avoid near term extinction (within 6 years).	1	6	CDFG, MMWD, NMFS, NPS, USACE						TBD	Costs estimated for these activities are not high and are being absorbed through the implementation of other programs and existing staff resources.
LaC-CCC-9.3.1.3	Action Step	Viability	Pursue longer term intervention strategies through establishing a river specific facility if populations do not rebound within six years, to avoid extinction and ensure long-term genetic diversity within the population.	2	12	CDFG, MMWD, NMFS, NPS, USACE						TBD	Cost cannot be determined at this time. More specific methods in development will determine cost.
LaC-CCC-9.3.2	Recovery Action	Viability	Re-establish extinct populations within the ESU, while minimizing departure from the genetic profile that historically existed in the population.										
LaC-CCC-9.3.2.1	Action Step	Viability	Annually capture or retain (during rescue efforts) - adequate numbers of fish from streams in Marin Countiy for purposes of broodstock	1	10	CDFG, MMWD, NMFS, NPS							existing operations
LaC-CCC-9.3.2.2	Action Step	Viability	Utilize these surplus fish in out-of-basin programs to increase genetic variability in the Russian River Program as well as for adult re-introduction efforts in barren Marin and Sonoma County streams (eg.Walker and Salmon Creeks)	1	10	CDFG, MMWD, NMFS, NPS, USACE						TBD	Costs estimated for these activities are not high and are being absorbed through the implementation of other programs and existing staff resources.
LaC-CCC-9.3.3	Recovery Action	Viability	Continue to work with existing permitees 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	1	10	CDFG, MMWD, NMFS, NPS, SPAWN, State Parks							Existing operations
LaC-CCC-10.1	Objective	Water Quality	Improve summer rearing survival by reducing instream temperatures in potential rearing reaches. See also strategies for restoring and enhancing riparian vegetation.										
LaC-CCC-10.1.1	Recovery Action	Water Quality	Determine site-specific recommendations, including incentives, to remedy high temperatures and implement accordingly (DFG 2004) .	3	5	Marin County, MMWD, NPS, State Parks							Existing programs could be copied for implementation, so costs are expected to be minimal.
LaC-CCC-10.1.1.1	Action Step	Water Quality	Focus on restoration efforts that deal with riparian canopy, shelter ratings and any other impaired key habitat attribute indicator that relates specifically to instream temperature.	3	5	Marin County, MMWD, NPS, State Parks							Existing programs could be copied for implementation, so costs are expected to be minimal.
LaC-CCC-10.2	Objective	Water Quality	Fully implement practices consistent with the SFRWQCB pathogen and sediment TMDLs.	2	10	Marin County, MMWD, NPS, RWQCB, State Parks						0	Implementation of the TMDL is mandated by the Clean Water Act, and additional costs associated with recovery are not expected.
LaC-CCC-11.1	Objective	Agricultural Practices	Address sources from agricultural actions that deliver sediment and runoff to stream channels.										
LaC-CCC-11.1.1	Recovery Action	Agricultural Practices	Assist in the development and support implementation of sediment TMDL to assure water quality conditions for coho salmon are improved and fine sediment loads are decreased to baseline conditions.		5							0	Costs are expected to be minimal, however technical assistance from several agencies will be needed.
LaC-CCC-12.1	Objective	Channel Modification	Improve education and awareness of agencies, landowners and the public regarding salmonid protection and habitat requirements.										
LaC-CCC-12.1.1	Recovery Action	Channel Modification	Develop a Salmon Certification Program for road maintenance staff.	3	5	Marin County, MMWD, NPS, State Parks						0	Existing programs could be copied for implementation, so costs are expected to be minimal.
LaC-CCC-12.2	Objective	Channel Modification	Restore or minimize impacts to watershed processes (e.g., riparian, sediment transport, hydrology and estuary function).										
LaC-CCC-12.2.1	Recovery Action	Channel Modification	Agencies should develop large woody debris retention programs and move away from the practice of removing instream large woody debris under high flow “emergencies”.	2	5	Marin County, Marin RCD, MMWD, NPS, SPAWN, State Parks						0	Costs are expected to be minimal and leaving LWD in place may actually save costs.
LaC-CCC-12.2.2	Recovery Action	Channel Modification	Eliminate the use of gabion baskets and undersized rock within the bankfull channel.	2	60	Marin County, MMWD, NPS, State Parks, USACE						0	Gabion baskets are more expensive than most bioengineered solutions, so implementation may actually save costs.
LaC-CCC-12.2.3	Recovery Action	Channel Modification	Conduct restoration activities that restore channels, floodplains and meadows to extend the duration of the summer flow and provide refuge from high winter flows.	2	30	CDFG, Marin County, Marin RCD, MMWD, NPS, SPAWN, State Parks							Costs cannot be determined due to unknown types and sizes of restoration activities.

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LaC-A-12.3.1.1	Action Step	Channel Modification	Encourage counties to develop a Sensitive Habitat Ordinance similar to that in place for the County of Santa Cruz.	3	60	Marin County, MMWD, NPS, State Parks						TBD	Costs cannot be determined at this time, however since the Santa Cruz ordinance could serve as a template, and costs are expected to be minimal.
LaC-A-12.3.2	Recovery Action	Channel Modification	Develop Bank Stabilization and Floodplain Guidelines for use by private and public entities.										
LaC-A-12.3.2.1	Action Step	Channel Modification	Develop a mitigation policy that requires in-kind replacement of removed large woody debris at a 3:1 ratio.	1	40	CDFG, Marin County, Marin RCD, MMWD, NMFS, NPS, RWQCB, SPAWN, State Parks, USACE, USEPA							Costs cannot be determined at this time, however the net result is expected to be that project proponents leave woody debris in place, which could save costs.
LaC-A-12.3.3	Recovery Action	Channel Modification	Counties and municipalities should 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.	3	60	Marin County, MMWD, NPS, State Parks						0	Costs associated with policy development are expected to be minimal.
LaC-A-12.3.4	Recovery Action	Channel Modification	Promote streamside conservation measures, including conservation easements, setbacks, and riparian buffers (DFG 2004).										
LaC-A-12.3.4.1	Action Step	Channel Modification	Flood control projects or other modifications facilitating new development (as opposed to protecting existing infrastructure) should be avoided.	3	60	Marin County, USACE						0	Implementation is expected to save costs for developers and land owners in the long run.
LaC-A-12.4	Objective	Channel Modification	Evaluate design alternatives to riprap bank repairs. Where riprap is necessary, evaluate integration of other habitat-forming features – including large woody debris to ensure improved habitat at the restoration site.	2	30	Marin County, Marin RCD, MMWD, SPAWN						TBD	Many design alternatives exist, however they may depend on available resources (e.g. root wads or other bioengineered solutions), and costs cannot be determined at this time.
LaC-A-12.5	Objective	Channel Modification	Evaluate channel crossings, culverts and headcuts to determine effective measures to ensure stable conditions and improved habitat features.	2	5	Marin County, MMWD, NOAA RC, SPAWN						0	This should be a standard business practice, and additional costs are not expected.
LaC-A-15.1	Objective	Droughts	Work with land owners or public agencies to acquire water that would be utilized to minimize effects of droughts.										
LaC-A-15.1.1	Recovery Action	Droughts	Pursue opportunities to acquire or lease water, or acquire water rights from willing sellers, for coho salmon recovery purposes. Develop incentives for water right holders to dedicate instream flows for the protection of coho salmon (DFG 2004)(Water Code § 1707).	2	10	CDFG, MMWD, NPS, RWQCB, State Parks						0	Costs are expected to be minimal as some of these efforts will be part of existing programs, however some technical assistance may be necessary from a variety of agencies.
LaC-A-15.1.2	Recovery Action	Droughts	Dedicate appropriative water rights to instream flow in Olema Creek watershed (NPS is currently evaluating opportunities in this watershed).	2	7	NPS, RWQCB						0	No costs specific to recovery are associated with this effort.
LaC-A-15.2	Objective	Droughts	Minimize water use and seek alternatives during droughts.										
LaC-A-15.2.1	Recovery Action	Droughts	Evaluate and assess impacts of local groundwater withdrawals in San Geronimo Creek watershed.	3	20	Marin RCD, MMWD, Private Landowners, RWQCB, SPAWN						TBD	Assessment costs depend on participation and methods utilized, and cannot be determined at this time.
LaC-A-15.3	Objective	Droughts	All local and state planning and development should consider, and provide contingencies for, droughts in a manner compatible with CCC coho salmon recovery needs.										
LaC-A-15.3.1	Recovery Action	Droughts	Implement water conservation strategies that provide for drought contingencies without relying on interception of surface flows or groundwater depletion.										
LaC-A-15.3.1.1	Action Step	Droughts	Manage reservoirs and dam releases to maintain suitable rearing temperatures and migratory flows in downstream habitats (e.g., pulse flow programs for adult upstream migration and smolt outmigration).	3	20	CDFG, Marin County, NMFS, Private Landowners, SPAWN						TBD	Costs associated with operations are expected to be minimal, however structural modifications to facilitate appropriate operations may be costly. Costs cannot be determined until specific structural modifications are developed.
LaC-A-15.3.1.2	Action Step	Droughts	Identify and work with water users to minimize depletion of summer base flows from unauthorized water uses.	3	20	Marin County, Marin RCD, NPS, Private Landowners, SPAWN, State Parks						TBD	Costs cannot be determined due to an unknown number of unauthorized users, and unknown level of enforcement that would be required.

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LaC-A-15.3.1.3	Action Step	Droughts	Evaluate and implement rainfall capture from impervious surfaces for irrigation use to protect water quality and reduce water demand in summer.	3	10	CDFG, Marin County, Marin RCD, MMWD, NPS, SPAWN, State Parks						TBD	Costs cannot be determined due to an unknown number of participants and types of modifications required for implementation.
LaC-A-19.1	Objective	Livestock Farming and Ranching	Promote grazing and ranching practices that protect and restore CCC coho salmon habitats.										
LaC-A-19.1.1	Recovery Action	Livestock Farming and Ranching	Support grazing practices that minimize impacts to riparian and instream habitat: livestock exclusion, rotational grazing, etc.										
LaC-A-19.1.1.1	Action Step	Livestock Farming and Ranching	Provide funding assistance to landowners willing to fence riparian and other sensitive areas (areas prone to erosion) to exclude cattle and sheep. Calf/cow operations should take priority for riparian fencing programs over steer operations.	2	20	CDFG, Marin RCD, NOAA RC						TBD	Costs depend on methods and extent of fencing installed.
LaC-A-19.1.1.2	Action Step	Livestock Farming and Ranching	Increase the use of water storage and catchment systems that collect rainwater in the winter for use during the dry summer and fall seasons.	2	10	Marin RCD, NPS, Private Landowners, State Parks						TBD	Costs for required infrastructure (e.g. mobile water trailers, tanks, etc.) will be the responsibility of individual landowners or supporting agencies, but cannot be determined at this time.
LaC-A-23.1	Objective	Residential and Commercial Development	Improve education and awareness of agencies, landowners and the public regarding salmonid protection and habitat requirements.										
LaC-A-23.1.1	Recovery Action	Residential and Commercial Development	Educate county and city public works departments, flood control districts, and planning departments, etc., on the critical importance of maintaining riparian vegetation, instream LWD, and LWD recruitment.										
LaC-A-23.1.1.1	Action Step	Residential and Commercial Development	Encourage FishNet 4C to facilitate instream and riparian restoration and management workshops with a specific focus on problems and opportunities in the Lagunitas Watershed.	2c	5	CDFG, FishNet 4C, Marin County, MMWD, NMFS, NPS, SPAWN, State Parks	30.00	30.00	30.00	30.00	30.00	150	Estimate costs of conducting workshops at approximately $30K per workshop, and annual workshops over 5 years would be ideal.
LaC-A-23.2	Objective	Residential and Commercial Development	Improve stream maintenance practices to protect instream complexity, hydrologic processes and riparian functions.										
LaC-A-23.2.1	Recovery Action	Residential and Commercial Development	Counties and municipalities should 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	10	Marin County, NPS, State Parks						0	Costs associated with development of a policy is expected to be minimal.
LaC-A-23.2.2	Recovery Action	Residential and Commercial Development	Maintain current LWD, boulders, and other structure-providing features to maintain current stream complexity, pool frequency, and depth (DFG 2004).	2	5	CDFG, Marin County, Marin RCD, MMWD, NPS, State Parks						0	Action is to stop removal of LWD and other habitat elements, so costs are expected to be minimal, and cost savings may occur.
LaC-A-23.2.3	Recovery Action	Residential and Commercial Development	Maintain intact and properly functioning riparian buffers to filter and prevent fine sediment input from entering streams.	2	60	Marin RCD, MMWD, NPS, Private Landowners, State Parks						TBD	It is possible that there could be additional salmon restoration costs identified based on recovery needs of the species; however, at this time NMFS does not have sufficient information to estimate those potential costs.
LaC-A-23.2.4	Recovery Action	Residential and Commercial Development	Promote the re-vegetation of the native riparian plant community within inset floodplains and riparian corridors to ameliorate instream temperature and provide a source of future large woody debris recruitment.	3	60	CDFG, Marin RCD, NPS, Private Landowners, State Parks						TBD	Costs depend on level of technical assistance provided and the types of projects proposed.
LaC-A-23.2.5	Recovery Action	Residential and Commercial Development	Assess efficacy and necessity of ongoing stream maintenance practices and evaluate, avoid, minimize and/or mitigate their impacts to rearing and migrating CCC coho salmon.	3	10	Marin County, MMWD, NPS, State Parks						TBD	Costs may vary with methods and extent of assessments and actions taken to address impacts, and cannot be determined at this time.
LaC-A-23.3	Objective	Residential and Commercial Development	Maintain and restore hydrologic function, protect riparian and floodplain areas, and minimize adverse effects to water quality and instream rearing habitats resulting from commercial and urban development.										
LaC-A-23.3.1	Recovery Action	Residential and Commercial Development	Avoid new development within riparian zones and the 100 year floodprone zones.										

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LaC-A-23.3.1.1	Action Step	Residential and Commercial Development	Support the Marin County Streamside Conservation Area Ordinance. Evaluate current moratorium in San Geronimo Valley for pertinent action items.	2a	10	CDFG, Marin County, NPS, SPAWN, State Parks						0	Costs associated with support and evaluation are expected to be minimal.
LaC-A-23.3.2	Recovery Action	Residential and Commercial Development	Avoid, or at a minimum regulate, the use of commercial and industrial products (e.g. pesticides) with high potential for contamination of local waterways.	2	10	Marin County, Marin RCD, MMWD, NPS, State Parks, USACE, USEPA						TBD	Cost savings may occur with limiting use of pesticides, however other types of management may cost more or less, and cannot be determined at this time.
LaC-A-23.3.3	Recovery Action	Residential and Commercial Development	Design new developments to avoid unstable slopes, wetlands, areas of high habitat value, and similarly constrained sites that occur adjacent to a CCC coho salmon watercourse.	2	60	Marin County, Private Landowners, USACE						0	Stringent review by permitting agencies is expected to reduce costs associated with poorly planned and poorly located developments.
LaC-A-23.3.4	Recovery Action	Residential and Commercial Development	Maintain intact and properly functioning riparian buffers to filter and prevent fine sediment input from entering streams.	1	60	Marin County, Marin RCD, MMWD, NPS, Private Landowners, State Parks						0	Maintenance of existing buffers is not expected to increase costs of recovery.
LaC-A-23.3.5	Recovery Action	Residential and Commercial Development	Patterns of water runoff, including surface and subsurface drainage, should match, to the greatest extent possible, the natural hydrologic pattern for the watershed in timing, quantity, and quality.										
LaC-A-23.3.5.1	Action Step	Residential and Commercial Development	As mitigation for hydrograph consequences, municipalities and counties should investigate funding of larger detention devices in key watersheds with ongoing channel degradation or in sub-watersheds where impervious surface area > 10 percent.	3a	25	Marin County, MMWD, NPS, State Parks						TBD	Costs depend on extent and types of mitigation and/or detention proposed, and cannot be determined at this time.
LaC-A-23.3.5.2	Action Step	Residential and Commercial Development	New development in all historic CCC coho salmon watersheds should meet a zero net increase in storm-water runoff, changes in duration, or magnitude of peak flow.	3a	20	Marin County, Private Landowners						0	County planning, policies, and permits should be modified to implement this action and costs are expected to be minimal.
LaC-A-23.3.5.3	Action Step	Residential and Commercial Development	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.	3b	30	Marin County, Marin RCD, MMWD, NPS, RWQCB, State Parks						TBD	Costs to upgrade stormwater discharge points cannot be determined at this time, but may be substantial.
LaC-A-23.3.6	Recovery Action	Residential and Commercial Development	Provide technical and staff support to counties to encourage general plan updates that include measures to protect coho salmon (DFG 2004).	2	20	CDFG, NMFS						TBD	Costs associated with appropriate general plan updates include staff time and technical assistance, but are likely not prohibitive.
LaC-A-23.3.7	Recovery Action	Residential and Commercial Development	Sediment from existing and future commercial and urban development should be reduced to magnitudes appropriate to the geological setting of the watershed, resulting in no net increase in sedimentation over natural limits.										
LaC-A-23.3.7.1	Action Step	Residential and Commercial Development	Toxic waste products from urban activities should receive the appropriate treatment before being discharged into any body of water that may enter any historic CCC coho salmon waters.	2c	60	Marin County, MMWD, RWQCB, USEPA						TBD	Current discharge permits address part of this action, however, additional regulation may be required to address toxic urban runoff. Costs cannot be determined at this time.
LaC-A-23.4	Objective	Residential and Commercial Development	Minimize rate, and subsequent adverse affects, of land conversion to residential and commercial development.										
LaC-A-23.4.1	Recovery Action	Residential and Commercial Development	Land use zoning should be appropriate to the site and be tolerant to anticipated conditions (e.g., tolerant to frequent flooding).										
LaC-A-23.4.1.1	Action Step	Residential and Commercial Development	Modify Federal, State, city and county regulatory and planning processes to eliminate provisions allowing new construction of permanent infrastructure that will adversely affect watershed processes, particularly within the 100-year flood prone zones in all historic CCC coho salmon watersheds.	3b	20	Marin County, USACE						0	This is essentially a policy issue that could be addressed at minimal cost.

Lagunitas Creek (Coastal) Threats and Associated Recovery Actions

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LaC-A-23.4.1.2	Action Step	Residential and Commercial Development	Purchase conservation easements from landowners that currently have grazing or agricultural operations along the estuary.	3a	20	Marin County, Marin RCD, Private Landowners						TBD	Conservation easements can provide a powerful tool for conservation. Associated costs per acre can be highly variable. Costs for timberlands ranged from $54 to $279 per acre (DFG 2004), and costs in Marin County are likely much higher and cannot be accurately determined at this time.
LaC-A-23.4.1.3	Action Step	Residential and Commercial Development	Counties and municipalities should 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.	3a	25	Marin County						0	Costs associated with policy development are expected to be minimal.
LaC-A-23.4.2	Recovery Action	Residential and Commercial Development	Develop legislation that will fund county planning for environmentally sound growth and water supply and work in coordination with California Dept. of Housing, Association of Bay Area Governments and other government associations (DFG 2004).										
LaC-A-23.4.2.1	Action Step	Residential and Commercial Development	Encourage counties to develop a Sensitive Habitat Ordinance similar to that in place for the County of Santa Cruz.	3a	5	Marin County, Marin RCD						0	Costs associated with policy development are expected to be minimal.
LaC-A-23.4.3	Recovery Action	Residential and Commercial Development	Enforce existing building permit programs to minimize unpermitted construction.	3	20	Marin County, USACE						0	Additional costs associated with recovery are not expected.
LaC-A-23.4.4	Recovery Action	Residential and Commercial Development	Institutionalize programs to purchase land/conservation easements to encourage the re-establishment and/or enhancement of natural riparian communities.	3	30	Marin County, Marin RCD, Private Landowners						0	Costs associated with program development are expected to be minimal.
LaC-A-23.4.5	Recovery Action	Residential and Commercial Development	Work with counties to develop and implement ordinances (e.g. Santa Cruz County Code 2008) to restrict subdivisions by requiring a minimum acreage limit for parcelization in concert with limits on water supply and groundwater recharge areas.	3	15	Marin County, Marin RCD						TBD	Costs associated with development and implementation of ordinances is difficult to determine.
LaC-A-23.4.6	Recovery Action	Residential and Commercial Development	Develop a mitigation policy that requires in-kind replacement of removed large woody debris at a 3:1 ratio.	2	5	CDFG, Marin County, Marin RCD, MMWD, USACE						0	Costs involved in developing policy are expected to be minimal.
LaC-A-23.4.7	Recovery Action	Residential and Commercial Development	Standards and recommendations regarding development should apply to all jurisdictions, including school districts and other special districts not subject to county and/or state related ordinances or policies.	3	10	Marin County						TBD	This action is basically a policy issue, however additional authorities may be developed to implement the action fully.
LaC-A-23.4.8	Recovery Action	Residential and Commercial Development	Support the development and implementation of regulations for activities that intercept groundwater recharge (e.g., use of subsurface tiles in vineyards, impervious surfaces, etc.).	3	15	CDFG, RWQCB						TBD	This action is basically a policy issue, however additional authorities may be developed to implement the action fully.
LaC-A-24.1	Objective	Roads and Railroads	Conduct outreach and education regarding the adverse effects of roads, and the types of best management practices protective of salmonids.										
LaC-A-24.1.1	Recovery Action	Roads and Railroads	Continue education of Caltrans, County road engineers, and County maintenance staff regarding watershed processes and the adverse effects of improper road construction and maintenance on salmonids and their habitats.										
LaC-A-24.1.1.1	Action Step	Roads and Railroads	Develop a Salmon Certification Program for road maintenance staff.	3	10	CalTrans, CDFG, Marin County, MMWD						0	Similar existing programs could be modified and implemented at minimal cost.
LaC-A-24.1.1.2	Action Step	Roads and Railroads	Encourage development and implementation of a program similar to the County of Santa Cruz's Integrated Vegetation Management Plan for Roads Near Perennial Waters (URS Corporation, 2008) regarding roadside maintenance activities to discourage or eliminate unwanted vegetation and promote desirable (native) vegetation.	3	10	Marin County, Marin RCD, MMWD, NPS, State Parks						0	Similar existing programs could be modified and implemented at minimal cost.

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LaC-A-24.1.2	Recovery Action	Roads and Railroads	Expand the NRCS/RCD coordinated permit program to a statewide programmatic ESA consultation that allows funding and technical expertise to small land owners and rural residential property owners.	3	5	CDFG, Marin RCD						0	Cost to expand an existing program are expected to be minimal.
LaC-A-24.2	Objective	Roads and Railroads	Reduce road densities by 10 percent over the next 10 years, prioritizing high risk areas in historical habitats or Core CCC coho salmon watersheds.										
LaC-A-24.2.1	Recovery Action	Roads and Railroads	Decommission riparian road systems and/or upgrade roads (and skid trails on forestlands) that deliver sediment into adjacent watercourses (DFG 2004).										
LaC-A-24.2.1.1	Action Step	Roads and Railroads	Assess and redesign transportation network to minimize road density and maximize transportation efficiency.	3	10	CalTrans, Marin County						TBD	Costs associated with assessment and redesign cannot be determined at this time, however some assessment has already been conducted.
LaC-A-24.2.1.2	Action Step	Roads and Railroads	Decommission or treat the road sites on the priority list of 20 road sites within the San Geronimo subwatershed based on amount of sediment discharge.	2b	30	Marin County, Marin RCD, SPAWN	17.39	17.39	17.39	17.39	17.39	522	Costs cannot be accurately determined due to an unknown extent and types of treatments required, however, road treatment or decommissioning in coastal Marin has been estimated at approximately $13124276.00 (DFG 2004). Costs associate with this action were estimated by multiplying the approximate stream miles by the per mile cost provided in DFG 2004.
LaC-A-24.2.1.3	Action Step	Roads and Railroads	Restoration projects that upgrade or decommission high risk roads in Core areas should be considered an extremely high priority for funding (e.g., PCSRF). Where no Core areas are designated, apply this action to Phase I areas.	2a	2	CDFG, NMFS						0	Reviewing agencies can implement this action immediately at minimal cost.
LaC-A-24.2.2	Recovery Action	Roads and Railroads	Establish a moratorium on new road construction within floodplains, riparian areas, unstable soils or other sensitive areas until a watershed specific and/or agency/company specific road management plan is created and implemented.	2	20	Marin County, USACE						0	Existing authorities of permitting agencies facilitate implementation at minimal costs.
LaC-A-24.3	Objective	Roads and Railroads	Conduct actions that hydrologically disconnect roads in Core areas within five years (from 2010).										
LaC-A-24.3.1	Recovery Action	Roads and Railroads	Conduct road and sediment reduction assessments to identify sediment-related and runoff-related problems and determine level of hydrologic connectivity.										
LaC-A-24.3.1.1	Action Step	Roads and Railroads	NMFS and other stakeholders will work with RCD or NRCS to encourage hiring of consultants to conduct road assessments (first for subwatersheds in Core areas, then for Phase I areas).	3a	10	Marin RCD, MMWD, SPAWN						TBD	Some assessments have already been conducted, but additional costs cannot be determined at this time.
LaC-A-24.3.2	Recovery Action	Roads and Railroads	Implement the most effective best management practices to conduct sediment reduction actions.	3	5	CalTrans, Marin County, Marin RCD, MMWD, NPS, SPAWN						0	NMFS recommends the FishNet 4C best management practices manual, and this resource is readily available.
LaC-A-24.3.3	Recovery Action	Roads and Railroads	Develop a Road Sediment Reduction Plan that prioritizes sites and outlines implementation and a timeline of necessary actions. Begin with a road survey focused on inner gorge roads followed by roads in other settings.										
LaC-A-24.3.3.1	Action Step	Roads and Railroads	Support the MMWD in their efforts to reduce sedimentation from lands in the Lagunitas Creek watershed. MMWD will also coordinate with the Marin County Stormwater Pollution Prevention Program (MCSTOPPP) to make sure that educational materials about non-point source pollution are available to homeowners in the San Geronimo Valley.	2b	10	Marin RCD, MMWD, RWQCB						0	Outreach and education are ongoing, and additional costs are expected to be minimal.
LaC-A-24.3.3.2	Action Step	Roads and Railroads	Develop MOUs with local agencies. MMWD will seek to enter into a MOU with DPR, MCOSD NPS, and MCFD to foster the working relationship between these agencies in terms of road maintenance and sediment control.	3c	5	Marin County, MMWD, RWQCB						0	Increased coordination between county agencies and other stakeholders is expected to result in cost savings.

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LaC-A-24.3.4	Recovery Action	Roads and Railroads	Bridges associated with new roads or replacement bridges (including railroad bridges) should be free span or constructed with the minimum number of bents feasible in order to minimize drift accumulation and facilitate fish passage.										
LaC-A-24.3.4.1	Action Step	Roads and Railroads	Continue to work to restore coho salmon passage at county facilities.	1b	30	CDFG, Marin County, Marin RCD, MMWD						TBD	Costs depend on types of passage improvements proposed, and cannot be accurately determined.
LaC-A-24.4	Objective	Roads and Railroads	Determine extent of roads and railroad networks that directly impede fish passage and take steps to address this threat.										
LaC-A-24.4.1	Recovery Action	Roads and Railroads	Using the most recent established protocols, conduct passage assessments where they do not currently exist.	2	15	Marin RCD, MMWD, NPS, SPAWN, State Parks						TBD	Some assessments have already been conducted, however remaining needs have not been quantified, and costs cannot be determined.
LaC-A-24.4.2	Recovery Action	Roads and Railroads	Conduct collaborative evaluations of priorities for treatment of CCC coho salmon passage barriers, such as the Fish Passage Forum (DFG 2004).	2	15	CDFG, MMWD, NMFS, NPS, SPAWN, State Parks						0	Collaborative approaches are expected to result in cost savings.
LaC-A-26.1	Objective	Water Diversion and Impoundment	Provide incentives to improve instream flows for coho salmon:.										
LaC-A-26.1.1	Recovery Action	Water Diversion and Impoundment	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 (DFG 2004).										
LaC-A-26.1.1.1	Action Step	Water Diversion and Impoundment	Organize and stakeholder group with members of the SWRCB and DWR as well as other interested parties to create the incentive program.	2	60	Marin RCD, MMWD, NPS, Private Landowners, RWQCB, State Parks						TBD	Costs to develop and maintain a functioning group cannot be determined at this time, but would likely not be prohibitive.
LaC-A-26.2	Objective	Water Diversion and Impoundment	Promote water conservation by the public, water agencies, agriculture, private industry, and the citizenry.										
LaC-A-26.2.1	Recovery Action	Water Diversion and Impoundment	Collaborate with landowners to minimize impacts on summer base flow from riparian water diversion activities.										
LaC-A-26.2.1.1	Action Step	Water Diversion and Impoundment	Promote the use of reclaimed water for agricultural or other uses.	3	60	CDFG, Marin RCD, MMWD, NPS, SPAWN, State Parks						0	Costs associated with promoting use of reclaimed water is expected to be minimal.
LaC-A-26.3	Objective	Water Diversion and Impoundment	Improve current laws and policies to control diversions and water use in order to maintain and restore surface flows.										
LaC-A-26.3.1	Recovery Action	Water Diversion and Impoundment	Avoid and/or minimize the adverse effects of water diversion on CCC coho salmon by establishing a more natural hydrograph, by-pass flows, season of diversion, and off-stream storage (DFG 2004).										
LaC-A-26.3.1.1	Action Step	Water Diversion and Impoundment	Promote conjunctive use of water with water projects whenever possible to maintain or restore coho salmon habitat.	3	60	CDFG, Marin County, Marin RCD, MMWD, RWQCB, SPAWN						0	Costs associated with promoting conjunctive use of water is expected to be minimal.
LaC-A-26.3.1.2	Action Step	Water Diversion and Impoundment	Promote passive diversion devices designed to allow diversion of water only when minimum streamflow requirements are met or exceeded (DFG 2004).	3	30	Marin RCD, MMWD, NMFS, RWQCB						0	Costs to remote this action are expected to be minimal.
LaC-A-26.4	Objective	Water Diversion and Impoundment	Explore passage alternatives to regain access to historic habitat blocked by water diversions.										
LaC-A-26.4.1	Recovery Action	Water Diversion and Impoundment	Examine the feasibility of creating passage over Seeger Dam for both adults and smolts to restore access to Nicassio Creek.										
LaC-A-26.4.1.1	Action Step	Water Diversion and Impoundment	Enter into a dialog with MMWD about establishing passage over Seeger Dam.	2									Costs related to discussion and planning are expected to be minimal, however, costs of implementing passage may be substantial.
LaC-A-26.4.1.2	Action Step	Water Diversion and Impoundment	Determine physical and biological constraints of passage and survival in the reservoir and watershed.	2	5	CDFG, MMWD, NMFS						TBD	Costs for a limiting factors analysis are unknown at this time but a likely not prohibitive.
LaC-A-26.4.1.3	Action Step	Water Diversion and Impoundment	Evaluate feasibility of establishing passage to and from Nicassio Creek based on the constraints and implement if feasible.	2	10	CDFG, Marin County, MMWD, NMFS						TBD	Costs associated with implementation depend on type of passage determined to be feasible, and cannot be determined.
LaC-A-26.5	Objective	Water Diversion and Impoundment	Improve current laws and policies to control diversions and water use in order to maintain and restore surface flows.										

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LaC-A-26.5.1	Recovery Action	Water Diversion and Impoundment	Improve compliance with existing water resource regulations via monitoring and enforcement.										
LaC-A-26.5.1.1	Action Step	Water Diversion and Impoundment	Encourage the SWRCB to adjudicate watersheds with CCC coho salmon populations to resolve over-allocation of water resources and provide adequate funding to water masters to enforce allocations.	3	10	RWQCB						TBD	Costs to adjudicate and enforce water allocations cannot be determined at this time.
LaC-A-26.5.1.2	Action Step	Water Diversion and Impoundment	Require the SWRCB to conduct interagency consultation with the California Department of Fish and Game and technical assistance with NMFS on the issuance of water rights permits.	3	15	NMFS, RWQCB						TBD	Additional regulatory authorities may be needed to fully implement this action, and associated costs cannot be determined. However technical assistance may be readily provided, and associated costs are expected to be minimal.
LaC-A-26.5.1.3	Action Step	Water Diversion and Impoundment	Request that SWRCB review and/or modify water use based on the needs of coho salmon and authorized diverters (DFG 2004).	3	10	CDFG, NMFS, RWQCB						TBD	Costs associated with review and modification of use may be substantial, but cannot be determined due to an unknown number of water users.
LaC-A-26.5.1.4	Action Step	Water Diversion and Impoundment	Upgrade the existing water rights information system so that water allocations can be readily quantified by watershed.	3	3	RWQCB						0	This effort is ongoing, and no additional costs are expected.
LaC-A-26.5.1.5	Action Step	Water Diversion and Impoundment	Petition SWRCB to have all CCC coho salmon watersheds declared as fully appropriated.	3	3	CDFG, NMFS, NPS, RWQCB						0	Costs are expected to be minimal.
LaC-A-26.6	Objective	Water Diversion and Impoundment	Develop new policies and regulations to provide suitable flow conditions for CCC coho salmon.										
LaC-A-26.6.1	Recovery Action	Water Diversion and Impoundment	Implement guidelines (e.g. DFG & NMFS 2002) or protective measures anticipated as a result of California's AB2121 stream flow policy.	1	2	RWQCB						0	Implementation of existing guidelines and protective measures is not expected to have additional costs.
LaC-A-26.6.2	Recovery Action	Water Diversion and Impoundment	Encourage the SWRCB to adjudicate watersheds with CCC coho salmon populations to resolve over-allocation of water resources and provide adequate funding to water masters to enforce allocations.										
LaC-A-26.6.2.1	Action Step	Water Diversion and Impoundment	Work with the SWRCB to place a moratorium on summer water diversions in all priority CCC coho salmon watersheds. Focus first on Core Areas, then on Phase I and Phase II areas.	2	5	CDFG, RWQCB						TBD	Costs to water users may be substantial, but cannot be determined.
LaC-A-26.6.2.2	Action Step	Water Diversion and Impoundment	Evaluate requests for on-stream dams above coho migratory reaches for effects on the natural hydrograph and the supply of spawning gravel for recruitment downstream (DFG 2004).	3	5	CDFG, USACE						0	Evaluation costs are expected to be minimal.
LaC-A-26.6.3	Recovery Action	Water Diversion and Impoundment	Support the development and implementation of regulations for activities that intercept groundwater recharge (e.g., use of subsurface tiles in vineyards, impervious surfaces, etc.).	3	20	CDFG, Marin County, MMWD, RWQCB						TBD	Implementation may require additional regulatory authorities and extensive modifications to existing groundwater uses, however, NMFS is not able to estimate costs at this time due to an unknown number of extractors and uses in the watershed.
LaC-A-26.6.4	Recovery Action	Water Diversion and Impoundment	Institutionalize programs to purchase easements on water rights to encourage the maintenance of surface flows.	3	10	CDFG, Marin County, Marin RCD, RWQCB						TBD	Costs associated with development and implementation of easement programs cannot be determined at this time.
LaC-A-26.7	Objective	Water Diversion and Impoundment	Ensure current populations of CCC coho salmon are protected from harm or take and protect all historical habitats from further habitat degradation.										
LaC-A-26.7.1	Recovery Action	Water Diversion and Impoundment	Minimize take attributable to diversion of stream flow through alternatives such as: the operation of off-stream reservoirs, development of infrastructure necessary for conjunctive use of stream flow, and use of reclaimed water.	2	30	CDFG, Marin RCD, MMWD, Private Landowners						TBD	Costs associated with development of alternatives cannot be determined due to the unknown number and types of alternatives that might be proposed.
LaC-A-26.7.2	Recovery Action	Water Diversion and Impoundment	Improve coordination between agencies and others to address season of diversion, off-stream reservoirs, bypass flows protective of coho salmon and their habitats, and avoidance of adverse impacts caused by water diversion (DFG 2004).	2	5	CDFG, Marin County, Marin RCD, MMWD, RWQCB						0	Coordination costs are expected to be minimal, depending on what specific actions are proposed.