RUSSIAN RIVER

Russian River

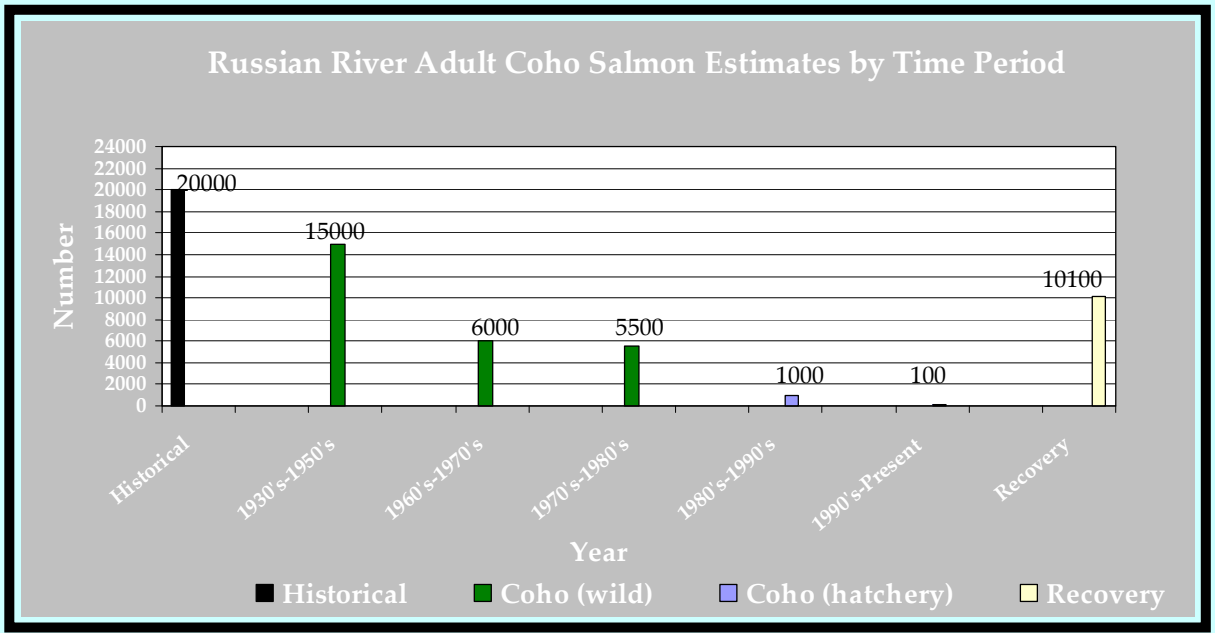
Independent Population
757.4 IP-km of potential coho salmon habitat
Coho salmon , steelhead, and Chinook salmon present

Russian River drains approximately 1,483 square miles of Sonoma and Mendocino County. The Russian River enters the Pacific Ocean near the town of Jenner. Approximately 40 percent of the Russian River watershed is montane or riparian hardwood forest, 18 percent is grassland, 13 percent is agricultural grazing and farm land, and 12 percent is coniferous forest. To date, only 75 percent of the Russian River watershed has been evaluated for erodibility. Even so, 58 percent of the Russian River watershed has moderate to high erodibility after considering slope, precipitation, and the susceptibility of failure of underlying geology. The SWRCB listed the Russian River as having water quality impaired for sediment and temperature in 2003. The water quality impairment listing determined that sediment was impairing habitats beneficial to coho salmon including migration, spawning and rearing habitats, and identified areas disturbed from construction, dams, erosion/siltation, flow habitat modification, silviculture, and removal of riparian vegetation as the probable causes. The majority of the watershed is in private ownership; the remaining 8 percent is state owned park, university land, and federally owned land. Housing development within the Russian River watershed is moderate to high; approximately 148,500 housing units are present in the watershed. There are over 500 small dams on the Russian River and its tributaries (SEC 1996). An additional 2314 other barriers to salmon migration caused by road crossings, diversions, and natural structures. Impassable barriers block salmonids for less than 10 percent of the watershed.

Russian River
Photo by Joe Pecharich

The Watershed at a Glance

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



Russian River

Recovery Target: 10,100 Adult Coho Salmon

Increasing the survival of coho salmon

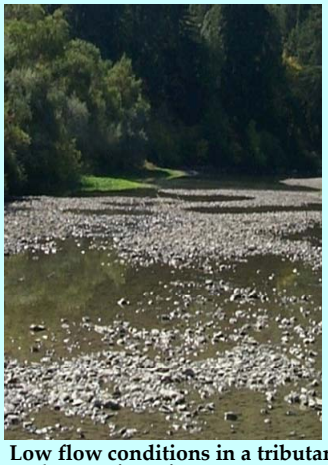
requires **protecting** all individuals from threats that are jeopardizing coho salmon. The highest ranked threats are:

- Agricultural Practices
- Droughts
- Roads and Railroads
- Residential and Commercial Development
- Water Diversion and Impoundment

Preventing the extinction of coho salmon

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

- Improve hydrology to support redds, juveniles, and smolts
- Improve spawning habitat
- Increase and improve pool habitat
- Increase and improve off channel habitat
- Increase the amount of large wood in and near the stream
- Improve riparian shading to cool streams
- Decrease the number of roads near the stream and reduce impacts from remaining roads



Low flow conditions in a tributary to the Russian River
Photo by Joe Pecharich

Advancing recovery of coho salmon in the Russian River requires these priority recovery actions:

- Improve over winter survival by increasing the frequency and functionality of off channel habitats on tributaries
- Install or enhance existing LWD, boulders, and other features to increase stream complexity and improve pool frequency in historic coho streams
- Support the development of new regulations to minimize impacts on spring and summer baseflow from frost protection and other water diversions.
- Use available best management practices for road construction, maintenance, management and decommissioning

. . . in these **core areas:** Sheephouse Creek area of the Willow Creek planning watershed; Freezeout Creek area of the Freezeout Creek Planning watershed; Dutch Bill, Felta, Wallace, Palmer, and Upper East Gray Creek planning watersheds; Purrington Creek area of the Purrington Creek planning watershed

Conservation Highlights

- Conservation Hatchery
- Fish Friendly Farming Program
- Citizen Monitoring
- Agricultural BMP's

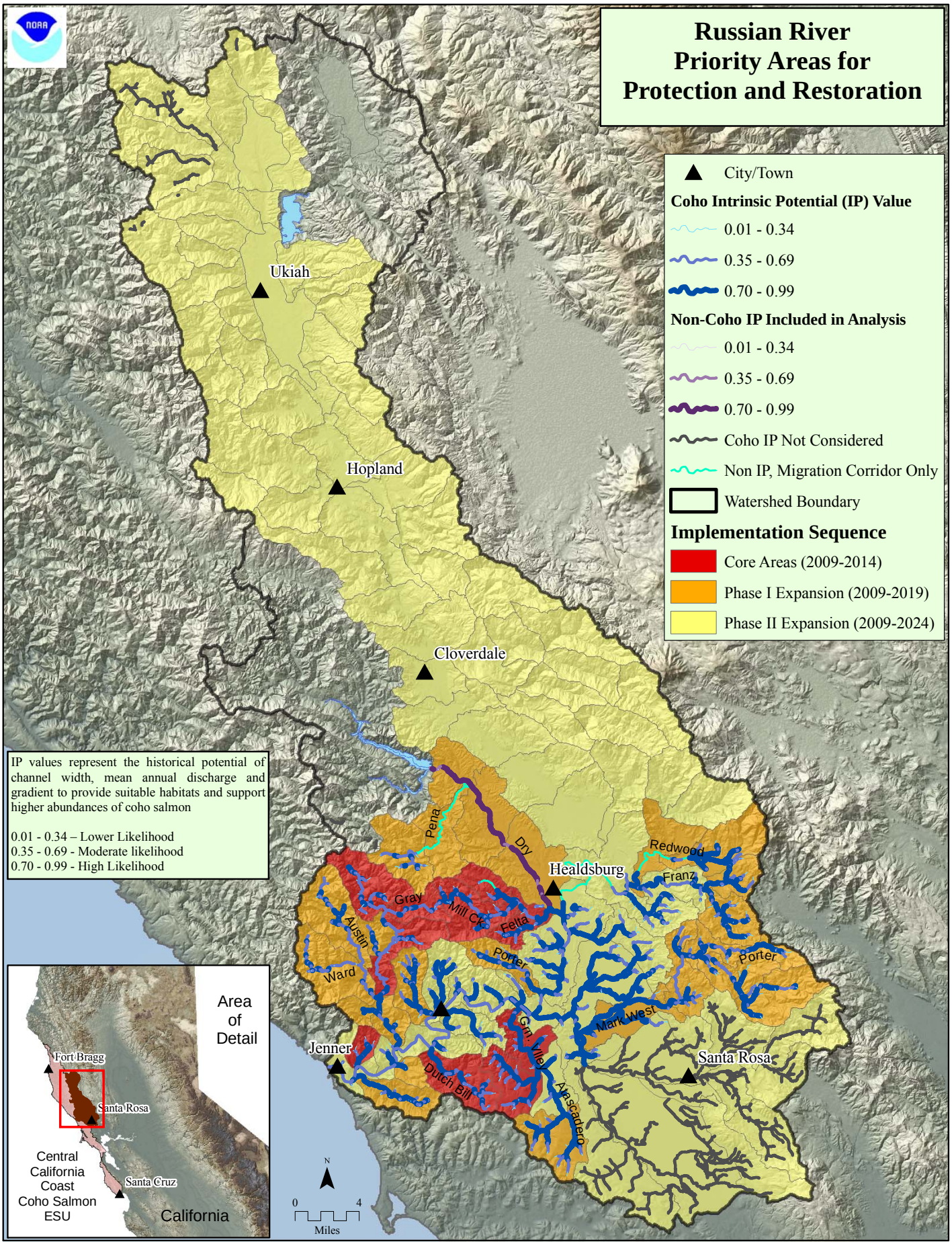
Monitoring on Mill Creek
Photo by Joe Pecharich

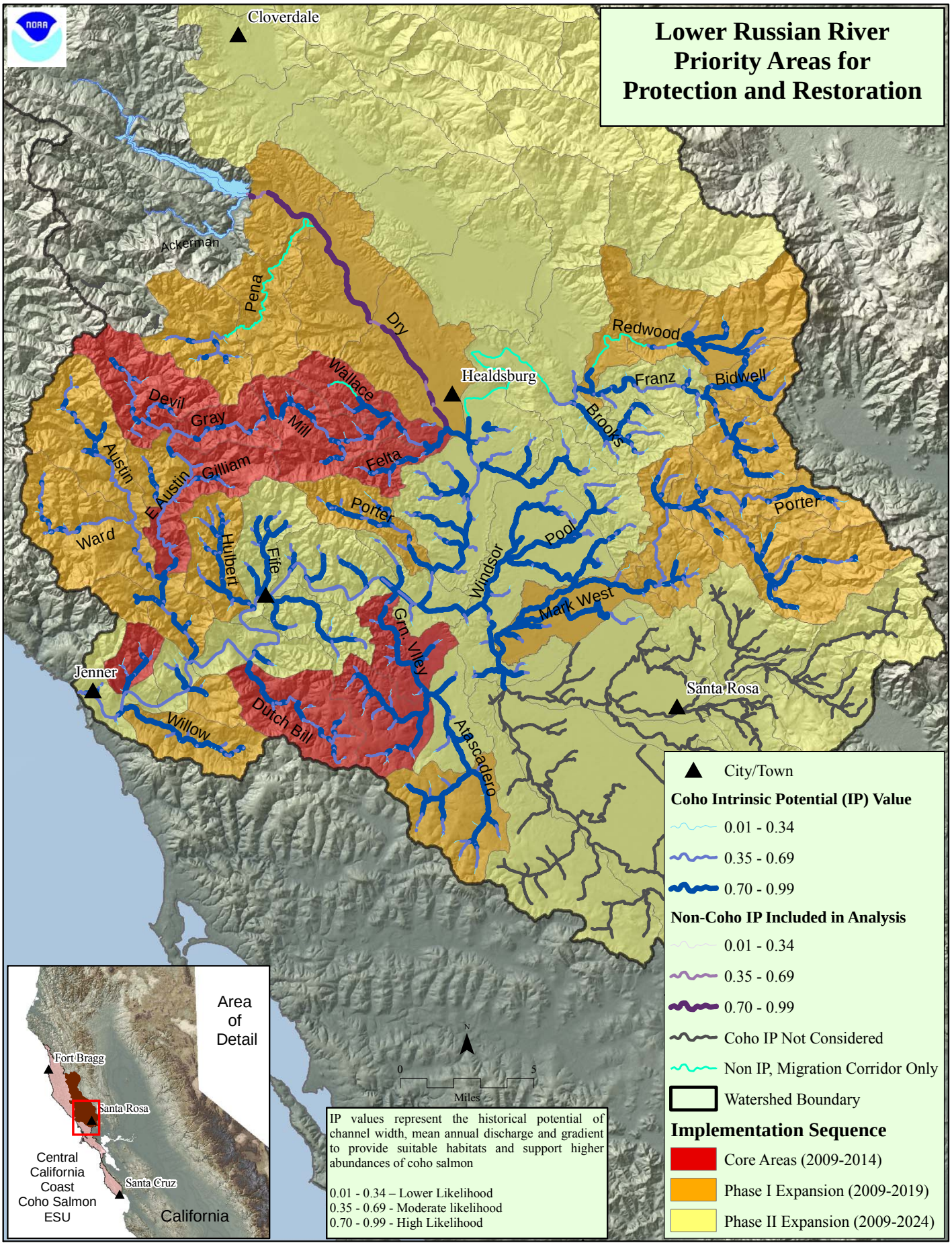
Immediate Needs

√ Develop streamflow monitoring and evaluation programs
√ Expand broodstock releases to other streams
√ Develop tributary acclimation sites/facilities
√ Monitor salmonid trend and abundance

Recovery Partners

US Army Corps of Engineers
NRCS
UCCE
SCWA
MCRRFCD
RWQCB
NFWF
Trout Unlimited
DFG
Regional RCD's
Sonoma Grapegrowers
Russian River Property Association
Sonoma and Mendocino County and City Agencies
Sotoyome, Goldridge, and Mendocino United Winegrowers


Russian River
Priority Areas for
Protection and Restoration
City/Town
Coho Intrinsic Potential (IP) Value
0.01 - 0.34
0.35 - 0.69
0.70 - 0.99
Non-Coho IP Included in Analysis
0.01 - 0.34
0.35 - 0.69
0.70 - 0.99
Coho IP Not Considered
Non IP, Migration Corridor Only
Watershed Boundary
Implementation Sequence
Core Areas (2009-2014)
Phase I Expansion (2009-2019)
Phase II Expansion (2009-2024)
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
Ukiah
Hopland
Cloverdale
Healdsburg
Jenner
Santa Rosa
Pena
Dry
Redwood
Franz
Gray
Mill Ck
Fella
Austin
Porter
Ward
Porter
Grn. Vlley
Mark West
Dutch Bill
Atascadero
Area of Detail
Fort Bragg
Santa Rosa
Central California Coast Coho Salmon ESU
Santa Cruz
California
N
0
4
Miles


Lower Russian River Priority Areas for Protection and Restoration
Cloverdale
Healdsburg
Jenner
Santa Rosa
Ackerman
Pena
Dry
Wallace
Devil
Gray
Mill
Felta
Austin
E Austin
Gilliam
Ward
Hulbert
Fife
Porter
Windsor
Pool
Mark West
Grn. Vlley
Dutch Bill
Willow
Atascadero
Redwood
Franz
Bidwell
Brooks
Porter
City/Town
Coho Intrinsic Potential (IP) Value
0.01 - 0.34
0.35 - 0.69
0.70 - 0.99
Non-Coho IP Included in Analysis
0.01 - 0.34
0.35 - 0.69
0.70 - 0.99
Coho IP Not Considered
Non IP, Migration Corridor Only
Watershed Boundary
Implementation Sequence
Core Areas (2009-2014)
Phase I Expansion (2009-2019)
Phase II Expansion (2009-2024)
N
0
5
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
Santa Cruz
Central California Coast Coho Salmon ESU
California

CCC Coho Salmon
Russian River
CAP Viability Table Results

Analyst	Source	Result	Rating	Target	Habitat Attribute	Indicator	Poor	Fair	Good	Very Good
Flow Panel	Decision Matrix	75	Fair	Spawning Adults	Hydrology	Passage Flows	>75 (score)	51-75	35-50	<35
SEC	PSMFC Database	96%	Very Good	Spawning Adults	Passage	Physical Barriers	<50% of IP-km	50-70% of IP-km	70-90% of IP-km	>90% of IP-km
NCWAP	Decision Matrix	60-90 days	Good	Spawning Adults	Passage	Passage at Mouth	<30 days	30-60 days	60-90 days	>90 days
SEC	CDFG HAB 8	8184.6 m^2	Fair	Spawning Adults	Sediment	Amount of Gravel*	<3400 m^2	3400-21800 m^2	21800-40400 m^2	>40400 m^2
NMFS	Best Prof. judgment	5-10%	Fair	Spawning Adults	Viability	Freshwater Harvest	>10% of pop.	5-10%	<5%	
Flow Panel	Decision Matrix	83	Poor	Eggs	Hydrology	Instantaneous Condition	>75 (score)	51-75	35-50	<35
Flow Panel	Decision Matrix	83	Poor	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	Good	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	92	Poor	Summer Rearing	Hydrology	Baseflow	>75 (score)	51-75	35-50	<35
SEC	CDFG HAB 8	31	Poor	Summer Rearing	Pool Habitat	Shelter Rating	<60 avg. rating	60-80	80-100	>100
SEC	CDFG HAB 8	6%	Poor	Summer Rearing	Pool Habitat	Primary Pools	<30% pools by length	30-40%	40-50%	>50%
SEC/NMFS	Many Sources	NA	Poor	Summer Rearing	Water Quality	Temperature	>30% of IP > 17 C MWMT	Does not meet Good or Very Good	30-60% of IP < 15C MWMT	>60% of IP < 15C MWMT
SEC	CDFG HAB 8	44.2	Poor	Winter Rearing	Floodplain	Complex Habitat**	<50% Connected	50-80% connected	>80% connected	
NMFS	NCWAP	Fair	Fair	Smolts	Estuary	Estuary				
Flow Panel	Decision Matrix	83	Poor	Smolts	Hydrology	Passage Flows	>75 (score)	51-75	35-50	<35
SEC	SWRCB	3.99/10 IP-km	Fair	Smolts	Passage	# of Diversions**	>5 / 10 IP km	1.1-5	0.01-1	0
SEC	CDFG HAB 8	31	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	11%	Poor	Multiple Life Stages	Hydrology	Stand Age			>40 years old	
SEC	NLCDB	2.81%	Very Good	Multiple Life Stages	Hydrology	Impervious Surfaces	>12.01% of WS by area	7.01-12%	3.01-7%	0-3%
SEC	FMMP	9.00%	Good	Multiple Life Stages	Land disturbance	Agriculture	>30% of WS by area	10-30%	0.1-10%	<0.1%
NMFS	CDF THP Dataset	2%	Very Good	Multiple Life Stages	Land disturbance	Timber Harvest	>35% of WS by area	25 - 35%	10 - 25%	<10%
SEC	Many Sources	2 / 100m	Poor	Multiple Life Stages	Pool Habitat	LWD Freq. (BFW 0-10)	<4key pcs/100m	4-6/100m	6-11/100m	>11/100m
SEC	Many Sources	1.2	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	25-50%	Fair	Multiple Life Stages	Riparian Veg.	Species Composition	<25%	25-50%	>50%	Historical Conditions
NMFS	CDF CWHR	13%	Poor	Multiple Life Stages	Riparian Veg.	DBH	<39% Class 5 and 6	40-54%	55-69%	>69%
SEC	CDFG HAB 8	73%	Poor	Multiple Life Stages	Riparian Veg.	Canopy Cover	<75 % avg. over IP-km	75-85%	85-95%	>95%
NMFS	CDF THP Dataset	4.4 mi/sq.mi.	Poor	Multiple Life Stages	Sediment Transport	Road Density	>3 miles/sq. mile	3 to 2.5	2.5 to 1.6	<1.6
NMFS	CDF THP Dataset	4.2 mi/sq.mi.	Poor	Multiple Life Stages	Sediment Transport	Road density 100	>1 miles/sq. mile	1-0.5	0.5-0.1	<0.1
NMFS	Many Sources	Fair	Fair	Multiple Life Stages	Water Quality	Toxicity	Acute	Sublethal or Chronic	No Acute or Chronic	No evidence of toxins or Contaminants
NMFS	Best Prof. judgment	<1 per IP-km	Poor	Spawning Adults	Viability	Adult Density	<1 per IP-km	1-20 per IP-km	20-40 per IP-km	>40 per IP-km
NMFS	Best Prof. judgment	< 0.2 fish/m^2	Poor	Summer Rearing	Viability	Juvenile Density	< 0.2 fish/m^2	0.2-0.5 fish/m^2	0.5-1.0 fish/m^2	>1.0 fish/m^2
NMFS	Best Prof. judgment	<20% IP-km occupied	Poor	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

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

Russian River (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	
RuR-A-1.1	Objective	Estuary	Restore and enhance estuary habitat in the watershed.	1	40	CalFire, California Department of Mines and Geology, CalTrans, CDFG, Mendocino Redwood Company, NRCS, Private Landowners, Public, RCD, RWQCB						TBD	Can be very costly, need to determine number of high risk sites and develop cost estimate.
RuR-A-1.1.1	Recovery Action	Estuary	Develop Estuary Protection and Enhancement Guidelines to maintain estuary function and provide information for estuary restoration.	3	2	CDFG, NMFS, NRCS, Private Consultants	25.00	25.00				50	A rough estimate for an agency or consultant using existing information to develop guidelines.
RuR-A-1.1.1.1	Action Step	Estuary	Restore estuarine habitat and the associated wetlands and sloughs by providing fully functioning habitat (DFG 2004).	2	10	CA Coastal Commission, California Coastal Conservancy, CDFG, Private Landowners						TBD	Costs include staff time to develop estuarine policy, and implementation of restoration actions. Due to an unknown number and type of restoration actions that may be implemented, costs cannot be determined at this time.
RuR-A-1.1.1.2	Action Step	Estuary	Where appropriate, remove structures and/or modify practices which impair or reduce the historical tidal prism and/or estuarine function where feasible and where benefits to coho salmon and/or the estuarine environment are predicted.	3	10	CA Coastal Commission, California Coastal Conservancy, CDFG						TBD	Costs associated with removal of structures will depend on the number and type of structures identified and cannot be accurately determined at this time.
RuR-A-1.1.1.3	Action Step	Estuary	Per the Russian River Biological Opinion, utilize adaptive management to guide future management and development of above guidelines	2	15	NMFS, Sonoma County Water Agency						TBD	Sonoma County Water Agency will incur most of this cost.
RuR-A-2.1	Objective	Floodplain	Improve over-winter survival by increasing the frequency and functionality of off-channel habitats.	1	40	CalFire, California Department of Mines and Geology, CalTrans, CDFG, Mendocino Redwood Company, NRCS, Private Landowners, Public, RCD, RWQCB						TBD	Can be very costly, need to determine number of high risk sites and develop cost estimate.
RuR-A-2.1.1	Recovery Action	Floodplain	Delineate reaches possessing both potential winter rearing habitat and floodplain areas.	2	2	CDFG, NMFS, Private Landowners, Sonoma County Water Agency						TBD	Cost will include GIS and validation in the field.
RuR-A-2.1.2	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.										
RuR-A-2.1.2.1	Action Step	Floodplain	Promote restoration projects designed to create or restore alcove, backchannel, ephemeral tributary, or seasonal pond habitats.	2	60	CDFG, NMFS, NRCS, Sonoma County Water Agency						TBD	Costs to promote and support restoration efforts (e.g. technical assistance) depend on the level of technical assistance provided and the types of projects proposed.
RuR-A-2.1.2.2	Action Step	Floodplain	Target habitat restoration and enhancement that will function between winter base flow and flood stage.	2	60	CDFG, NMFS, NRCS, Sonoma County Water Agency						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 based on recovery needs of the species; however, at this time we do not have sufficient information to estimate those potential costs or identify the actions under which they would fall.
RuR-A-2.1.2.3	Action Step	Floodplain	Implement managed retreat of current development and infrastructure from stream channels and floodplains.	3	30	CDFG, Sonoma County, Sonoma County Water Agency						TBD	Costs depend on the number and types of projects proposed, and cannot be accurately determined at this time.
RuR-A-2.1.3	Recovery Action	Floodplain	Investigate the potential role of the Laguna de Santa Rosa in supporting floodplain and off-channel habitat.										

Russian River (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	
RuR-A-2.1.3.1	Action Step	Floodplain	Fund a hydrological and ecological study to determine the historic role of seasonal lakes and wetland areas of the laguna as over-winter and summer rearing habitat.	3	5	CDFG, Sonoma County Water Agency, SWRCB	36.00	36.00	36.00	36.00	36.00	180	DFG (2004) estimates that include surveying and research efforts have cost about $176,000 on average.
RuR-A-2.1.3.2	Action Step	Floodplain	Fund an investigation of the feasibility of laguna restoration.	3	5	CDFG, Sonoma County Water Agency	36.00	36.00	36.00	36.00	36.00	180	According to DFG (2004), average costs for projects that include surveying and other research efforts that DFG has funded average approximately $180,000.
RuR-A-3.1	Objective	Hydrology	Improve survival at all life stages by improving the spatial and temporal pattern of surface flows throughout spawning, rearing, and migration areas.										
RuR-A-3.1.1	Recovery Action	Hydrology	Reduce water that effects the natural hydrograph, develop alternative water sources, and implementation of diversion regimes protective of the natural hydrograph.	3	2	CDFG, NMFS, NRCS, Private Consultants	25.00	25.00				50	A rough estimate for an agency or consultant using existing information to develop guidelines.
RuR-A-3.1.2	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.										
RuR-A-3.1.2.1	Action Step	Hydrology	Work with SWRCB and landowners to improve flow regimes for adult migration to spawning habitats and smolt outmigration.	2	10	Private Landowners, Sonoma County Water Agency						TBD	Costs to water users may be substantial, but cannot be determined.
RuR-A-3.1.2.2	Action Step	Hydrology	Work with SWRCB and landowners to improve over summer survival of juveniles by re-establishing summer baseflows (from July 1 to October 1) in rearing reaches that are currently impacted by water use.	3	10	RWQCB						TBD	Costs to adjudicate and enforce water allocations cannot be determined at this time.
RuR-A-3.1.3	Recovery Action	Hydrology	Work with water managers on regulated streams to assure adequate and proper consideration is given to fish needs. Develop agreements that will minimize water-use conflicts and impacts on fish and wildlife resources during drought conditions.										
RuR-A-3.1.3.1	Action Step	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).	1	5	Sonoma County Water Agency, USACE						TBD	Changes in flow management may incur costs to diverters and water delivery systems, but costs are unknown.
RuR-A-3.1.4	Recovery Action	Hydrology	Improve compliance with existing water resource regulations via monitoring and enforcement.										
RuR-A-3.1.4.1	Action Step	Hydrology	Identify and eliminate depletion of summer base flows from unauthorized water uses.	1	5	CDFG, NMFS, Private Landowners, SWRCB	100	100	100	100	100	500	Costs to agencies engaged in the identification and elimination will vary depending on degree of cooperation from the diverter.
RuR-A-3.1.4.2	Action Step	Hydrology	Require streamflow gauging devices to determine the current streamflow condition.	2	40	California Coastal Conservancy, CDFG, Private Landowners, RCD, Sonoma County, Sonoma County Water Agency	2.50	2.50	2.50	2.50	2.50	100	Highlighting these issues will likely require MOAs between water users.
RuR-A-3.1.4.3	Action Step	Hydrology	Assess and map water diversions (DFG 2004).	2	20	California Coastal Conservancy, CDFG, NMFS, NOAA RC, Private Landowners, Sonoma County, Sonoma County Water Agency	10.00	10.00	10.00	10.00	10.00	200	Cost estimate for education and technical guidance.

Russian River (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	
RuR-A-3.1.4.4	Action Step	Hydrology	Establish a comprehensive stream flow evaluation program to determine instream flow needs for coho salmon.	2	20	CDFG, NMFS, NOAA RC, Private Landowners, RCD, Sonoma County, Sonoma County Water Agency, SWRCB	250	250	250	250	250	5,000	Promoting these alternatives will take a sustained effort to target willing landowners, and may require substantial investment in infrastructure, and changes to crop management.
RuR-A-3.1.5	Recovery Action	Hydrology	Monitor, identify problems, and prioritize need for changes to water diversion on current or potential coho streams (DFG 2004).										
RuR-A-3.1.5.1	Action Step	Hydrology	Promote alternative frost protection strategies.	2	60	CDFG, Private Landowners, Sonoma County, SWRCB						0	These costs will likely be included as part of the ongoing 1600 agreement requirements per DFG.
RuR-A-3.1.5.2	Action Step	Hydrology	Support SWRCB in regulating the use of streamside wells and groundwater.	2	60	CDFG, NMFS, NMFS OLE, SWRCB						0	Development of supporting infrastructure (e.g. purple pipe systems) will require substantial investment, but costs may also be recovered by savings in water generation.
RuR-A-3.1.6	Recovery Action	Hydrology	To improve connectivity of surface flows with groundwater reduce aggradation and overall sediment load at the watershed scale by treating roads and sources of mass wasting.	2	60	CDFG, NOAA RC, Private Landowners, Sonoma County, Sonoma County Water Agency						TBD	Costs depend on extent of treatments.
RuR-A-3.1.7	Recovery Action	Hydrology	Encourage the use of native vegetation in new landscaping to reduce the need for watering and application of herbicides, pesticides, and fertilizers.	2	5	CDFG, NOAA RC, Sonoma County, Sonoma County Water Agency	4.00	4.00	4.00	4.00	4.00	20	Costs should be minimal for outreach and education. Many existing documents are available, and are part of ongoing programs.
RuR-A-5.1	Objective	Passage	Identify and remove existing passage barriers.										
RuR-A-5.1.1	Recovery Action	Passage	Identify high priority barriers and restore passage per NMFS' Guidelines for Salmonid Passage at Stream Crossings (NMFS 2001a).										
RuR-A-5.1.1.1	Action Step	Passage	Restore passage in high priority areas of the Russian River Watershed as identified by the DFG, NMFS, RCD, the County of Sonoma, Caltrans, and existing fish passage databases. High priority sites identified through DFG watershed surveys (DFG 2009) include: Dry Creek sub-basin: Mill Creek - private dam, Wallace Creek - county culvert, Crane Creek - bedrock sill, Grape Creek - County culvert. Lower River Tributaries: Purrington Creek - county culvert and possible private barriers, Dutch Bill, Duvoul and Grub Creek tributaries - County culverts, Willig Gulch - private culvert. Mark West sub-basin: Porter Creek - crossing at Calistoga Road. Maacama sub-basin: Redwood Creek - private crossing.	1	5	CDFG, NMFS, NOAA RC, Private Landowners, RCD, Sonoma County, Sonoma County Water Agency	400	400	400	400	400	1,998	DFG identified 386 barriers in the Russian River, and estimated the total cost of treatments at $64,255,622 (2004). Cost estimates for these projects were made by simple division, with a per project cost of $166,465.
RuR-A-5.1.1.2	Action Step	Passage	Barriers to upstream and downstream migration in Willow Creek should be corrected by removing or altering the design of the second bridge to allow channel forming processes to occur. The primary factors contributing to obstruction of upstream adult and downstream juvenile migration are the rapid sediment aggradation, widespread flow distribution, and channel disconnection at lower flows. These problems will continue without substantial changes to the bermed roadway at the second bridge.	1	5	CDFG, Sonoma County	33.29	33.29	33.29	33.29	33.29	166	DFG identified 386 barriers in the Russian River, and estimated the total cost of treatments at $64,255,622 (2004). Cost estimates for these projects were made by simple division, with a per project cost of $166,465.
RuR-A-5.1.2	Recovery Action	Passage	Evaluate the feasibility of providing adult passage over Coyote Valley Dam, and Warm Springs Dam (DFG 2004) .	2	3	NMFS HCD, Private Consultants, Sonoma County Water Agency, USACE	16.67	16.67	16.67			50	Cost estimated for feasibility study.

Russian River (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	
RuR-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.										
RuR-A-6.1.1	Recovery Action	Pool Habitat	Encourage retention and recruitment of large woody debris for all historic CCC coho salmon streams to maintain and enhance current stream complexity, pool frequency, and depth. Consult a hydrologist and qualified fisheries biologist before removing wood from streams.	3	60	Board of Forestry, CDFG, Mendocino County Department of Public Works, NMFS, Private Landowners, RCD, Sonoma County, Sonoma County Water Agency						0	Cost is expected to be minimal.
RuR-A-6.1.2	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.										
RuR-A-6.1.2.1	Action Step	Pool Habitat	Install or enhance existing LWD, boulders, and other instream features to increase habitat complexity and improve pool frequency and depth (DFG 2004). Focus on the following areas: tributaries of Austin Creek, Crane Creek, Green Valley Creek, Dry Creek, Forsythe Creek, Grape Creek, Willow Creek, Sheephouse Creek, Porter Creek, Dutch Bill Creek, Redwood Creek, Foote Creek, Kellog Creek, Wine Creek and Yellowjacket Creek.	1	5	CDFG, NOAA RC, Sonoma County, Sonoma County Water Agency	140	140	140	140	140	700	Estimate 35 structures at ~20K per structure. Structures have already been placed in some areas.
RuR-A-6.1.2.2	Action Step	Pool Habitat	Spawning gravels on Green Valley Creek are limited due to channel incision. Structures to decrease channel incision and recruit spawning gravel (using gravel retention structures), should be installed to trap, sort and expand redd distribution in the stream where appropriate.	1	5	CDFG, NOAA RC, Sonoma County, Sonoma County Water Agency	40.00	40.00	40.00	40.00	40.00	200	Estimate 10 structures in these reaches would add complexity at $20K per structure.
RuR-A-6.1.2.3	Action Step	Pool Habitat	In Willow Creek there is a limited supply of large diameter, riparian redwood and Douglas-fir in the watershed. Promote growth of conifers in the riparian zone for later in-channel recruitment.	2	5	CDFG, NOAA RC, Sonoma County, Sonoma County Water Agency	17.50	17.50	17.50	17.50	17.50	88	Cost estimates for placement of LWD range from $20K to $30K per mile. Assuming proximally half the ~7stream miles require treatment, costs would be approximately $25K per mile.
RuR-A-6.1.3	Recovery Action	Pool Habitat	Target habitat restoration and enhancement that will function between winter base flow and flood stage.	2	5	CDFG, NOAA RC, RCD, Sonoma County, Sonoma County Water Agency, USACE						TBD	Costs will depend on what extent and type of solutions are developed.
RuR-A-6.1.4	Recovery Action	Pool Habitat	Evaluate, develop solutions and implement immediate needs to address problems resulting from channelization.	2	5	CDFG, NOAA RC, RCD, Sonoma County, Sonoma County Water Agency, USACE						TBD	Costs will depend on what extent and type of solutions are developed.
RuR-A-6.1.5	Recovery Action	Pool Habitat	Encourage landowners to implement restoration projects as part of their ongoing operations in stream reaches where large woody debris is lacking.	2	20	CDFG, NOAA RC, Private Landowners, RCD, Sonoma County, Sonoma County Water Agency, USACE	60.00	60.00	60.00	60.00	60.00	1,200	DFG estimated the average cost of outreach and education programs at about $60 K per year (2004)
RuR-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.										

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							FY1	FY2	FY3	FY4	FY5	Entire Duration	
RuR-A-7.1.1	Recovery Action	Riparian Vegetation	Assess impacts of exotic vegetation (e.g., Arundo donax, etc.), prioritize and develop riparian habitat reclamation and enhancement programs (DFG 2004).	3	10	CDFG, RCD, Sonoma County, Sonoma County Water Agency						TBD	Costs depend on assessment methods and extent and types of programs implemented.
RuR-A-7.1.2	Recovery Action	Riparian Vegetation	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.	2	5	CDFG, RCD, Sonoma County, Sonoma County Water Agency						TBD	Costs associated with development of a LWD plan are expected to be minimal, however additional costs may occur.
RuR-A-7.1.3	Recovery Action	Riparian Vegetation	Restore and protect riparian vegetation to improve migration and summer/overwintering habitat for coho salmon (DFG 2004). Watersheds identified by DFG as having poor shelter habitat and riparian condition include Turtle Creek, Fife Creek, Porter Creek, Bluejay Creek, Fisher Creek, Grub Creek, and Corral Creek (DFG 2009).										
RuR-A-7.1.3.1	Action Step	Riparian Vegetation	In the Ward Creek sub-basin reforestation to a conifer forest should be a long term strategy to return the area to fully functioning condition. Implementing this type of strategy will need to employ incentives and assistance to landowners. In conjunction with Sudden Oak death programs.	2	20	CDFG, NOAA RC, Private Landowners, RCD, Sonoma County, Sonoma County Water Agency	27.00	27.00	27.00	27.00	27.00	540	DFG estimated the cost of riparian planting at about $180 K per mile (2004), and assumption was that as much as 3 miles will require treatment. Implementation will take advantage of existing programs and will reduce costs somewhat.
RuR-A-7.1.4	Recovery Action	Riparian Vegetation	Fence riparian areas from grazing (using fencing standards that allow other wildlife to access the stream). Watersheds identified by DFG include Porter, Foote, Grub, Franz, and Franchi.	2	10	CDFG, NMFS, NOAA RC, Private Landowners, RCD, Sonoma County, Sonoma County Water Agency, USACE	10.00	10.00	10.00	10.00	10.00	100	Cost based on 10K for 10 years.
RuR-A-7.1.5	Recovery Action	Riparian Vegetation	Promote streamside conservation measures, including conservation easements, setbacks, and riparian buffers (DFG 2004).	2	60	CDFG, Farm Bureau, Mendocino County, NMFS, NRCS, Private Landowners, RCD, Sonoma County						tbd	cost is dependent on the specific conservation measures implemented.
RuR-A-7.1.6	Recovery Action	Riparian Vegetation	Promote alternatives to conventional bank stabilization for public and private projects, including bioengineering techniques (DFG 2004).	2	30	Mendocino County, Private Landowners, RCD, Sonoma County	6.00	6.00	6.00	6.00	6.00	180	Cost is a rough estimate.
RuR-A-8.1	Objective	Sediment	Improve habitat conditions at multiple life stages by reducing sediment inputs to the stream at the watershed scale.										
RuR-A-8.1.1	Recovery Action	Sediment	Address sediment sources from road networks and other actions that deliver sediment and runoff to stream channels, in each sub-basin.										
RuR-A-8.1.1.1	Action Step	Sediment	Maintenance of ditches, culverts, and inboard cutbank slides should be improved to decrease the potential of sediment delivery to Dutchbill and Grub Creeks.	2	10	CDFG, Sonoma County	11.98	11.98	11.98	11.98	11.98	120	Costs cannot be accurately determined due to an unknown extent and type of treatment required, however, road treatment in the Russian River has been estimated at approximately $78,933,524.00 (DFG 2004). Costs associated with this action were estimated by multiplying the approximately 10 stream miles by the per mile cost ($11,982) provided in DFG 2004.
RuR-A-8.1.1.2	Action Step	Sediment	In Purrington Creek several stream crossings exist in Reach 1. These crossings should be improved to eliminate active soil erosion and runoff.	3	10	CDFG, RCD, Sonoma County	38.77	38.77	38.77	38.77	38.77	388	Cost estimate for remediation of three crossing follows DFG (2004).

Russian River (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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RuR-CCC-8.1.1.1	Action Step	Sediment	Maintenance of ditches, culverts, and inboard cutbank slides should be improved to decrease the potential of sediment delivery to Dutchbill and Grub Creeks.	2	10	CDFG, Sonoma County	11.98	11.98	11.98	11.98	11.98	120	Costs cannot be accurately determined due to an unknown extent and type of treatment required, however, road treatment in the Russian River has been estimated at approximately $78,933,524.00 (DFG 2004). Costs associated with this action were estimated by multiplying the approximately 10 stream miles by the per mile cost ($11,982) provided in DFG 2004.
RuR-CCC-8.1.1.2	Action Step	Sediment	In Purrington Creek several stream crossings exist in Reach 1. These crossings should be improved to eliminate active soil erosion and runoff.	3	10	CDFG, RCD, Sonoma County	38.77	38.77	38.77	38.77	38.77	388	Cost estimate for remediation of three crossing follows DFG (2004).
RuR-CCC-8.1.1.3	Action Step	Sediment	In the East Austin Creek watershed, implement results of existing sediment source surveys, and assess remaining watershed road networks to eliminate high priority and high sediment yield sources. Upgrade and decommission sites and road networks where appropriate. These actions include outsloping roads, ditch relief culverts, and installing rolling dips.	2	10	CDFG, NOAA RC, Private Landowners, RCD, Sonoma County	11.98	11.98	11.98	11.98	11.98	120	Road treatment in the Russian River has been estimated at approximately $78,933,524.00 (DFG 2004). Costs associated with this action were estimated by multiplying the approximately 10 stream miles by the per mile cost ($11,982) provided in DFG 2004.
RuR-CCC-8.1.1.4	Action Step	Sediment	Decommission riparian road systems and/or upgrade roads (and skid trails on forestlands) that deliver sediment into adjacent watercourses (DFG 2004). High priority streams identified by DFG habitat reports include Sheephouse Creek, Austin and East Austin Creeks, Pena Creek, Porter Creek, Kidd Creek, Sexton Creek, Gilliam Creek, Hobson Creek, Conshea Creek, Crane Creek, and Schoolhouse Creek (DFG 2009).	2	25	CDFG, Private Landowners, RCD, Sonoma County, Sonoma County Water Agency, State Parks	16.93	16.93	16.93	16.93	16.93	423	Costs cannot be accurately determined due to an unknown extent and types of treatments required, however, road treatment or decommissioning in the Russian River has been estimated at approximately $7,027,012.00 (DFG 2004). Costs associated with this action were estimated by multiplying the approximately 70 stream miles by the per mile cost ($6,045) provided in DFG 2004.
RuR-CCC-8.1.2	Recovery Action	Sediment	Provide incentives to restore high priority sites as determined by watershed analysis, DFG, or CalFire.	1	20	CalFire, CDFG, NMFS						tbd	The cost of incentives is difficult to determine at this time.
RuR-CCC-8.1.3	Recovery Action	Sediment	Close unauthorized trails and conduct appropriate decommissioning practices. Hydrologically disconnect trails from associated waterways.	2	30	California Coastal Conservancy, California Department of Mines and Geology, Mendocino County, NMFS, NOAA RC, Private Landowners, Public, RCD, Sonoma County, State Parks						TBD	Costs cannot be determined until appropriate assessments have been conducted. Costs may vary significantly depending on type of road related problems and whether roads are closed or decommissioned.
RuR-CCC-9.1	Objective	Viability	Re-establish a naturally reproducing run of coho salmon in appropriate subwatersheds.										
RuR-CCC-9.1.1	Recovery Action	Viability	Continue the operation of the Captive Broodstock Program in the Russian River.										
RuR-CCC-9.1.1.1	Action Step	Viability	Annually capture or retain (during rescue efforts) - small numbers of surplus fish from drying streams/habitats in Marin and Sonoma Counties for purposes of broodstock in Russian River, Walker and Salmon Creeks	1	10	CDFG, NMFS, Private Landowners, Sonoma County Water Agency, Trout Unlimited, USACE							Existing operations
RuR-CCC-9.1.1.2	Action Step	Viability	Continue efforts to find long term funding for monitoring of the Russian River Coho Salmon Captive Broodstock Program.	1	10	CDFG, USACE						300,000/year	This action is funded through the ACOE Russian River Biological Opinion.
RuR-CCC-9.1.1.3	Action Step	Viability	Increase coho salmon smolt production at the Russian River Coho Salmon Broodstock facility to a level where consistent returns can be incorporated reliably into the spawning matrix	1	30	CDFG, USACE						0	The action is already funded by the USACE as a result of the Russian River Biological Opinion.
RuR-CCC-9.1.1.4	Action Step	Viability	Improve and expand rearing capacity of the Coho Salmon Captive Broodstock facility.	1	30	CDFG, USACE						TBD	This action is partially funded through the USACE Biological Opinion.
RuR-CCC-9.1.1.5	Action Step	Viability	Increase size at release to attain 160 mm at emigration, to enhance marine survival and increasing adult returns	1	30	USACE	1.33	1.33	1.33	1.33	1.33	40	

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RuR-CCC-9.1.1.6	Action Step	Viability	Continue to utilize surplus fish in additional recovery opportunities (adult releases, releases to extirpated watersheds) and evaluate such actions in the context of recovering coho in the Russian River, extirpated watersheds, and the contribution to the diversity stratum	2	30	CDFG, NMFS						existing operations	
RuR-CCC-9.1.1.7	Action Step	Viability	Establish a release imprinting station on Mill Creek and Green Valley Creeks, 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.	1		CDFG, Private Landowners, Trout Unlimited, UC Extension, USACE						TBD	Cost cannot be determined at this time. More specific methods in development will determine cost.
RuR-CCC-9.1.2	Recovery Action	Viability	Minimize departure from the genetic profile that historically existed in the population.										
RuR-CCC-9.1.2.1	Action Step	Viability	Utilize the hatchery criteria and assessment guidance provided in Spence et al. 2008 when evaluating the risks and benefits of proposed and ongoing hatchery operations	1	30	CDFG, USACE						0	Action not expected to result in significant additional cost.
RuR-CCC-9.1.2.2	Action Step	Viability	Use surplus broodstock to repopulate nearby watersheds (within diversity strata) where populations have extirpated.	1	30	CDFG, NMFS, Sonoma County Water Agency, USACE						TBD	Specific plan needed to estimate cost.
RuR-CCC-9.1.2.3	Action Step	Viability	Continue tointegrate coho salmon from outside of the Russian River, but within the diversity strata, into the spawning programmatically to decrease inbreeding depression and the genetic bottleneck.		10	CDFG, NMFS, USACE							Existing operations
RuR-CCC-9.1.3	Recovery Action	Viability	Continue to 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	CDFG, NMFS, Private Landowners, Sonoma County Water Agency, Trout Unlimited							Existing operations
RuR-CCC-9.2	Objective	Viability	Conduct a comprehensive assessment of watershed processes (e.g., hydrology, geology, fluvial-geomorphology, water quality, and vegetation), instream habitat, and factors limiting coho salmon production (DFG 2004).	1	30	NMFS						tbd	Difficult to quantify at this time due to uncertain scope and extent.
RuR-CCC-9.3	Objective	Viability	Continue and expand the existing coho salmon life-cycle monitoring efforts.	2	25	CDFG, NMFS, Sonoma County Water Agency, USACE	265	265	265	265	265	6,625	The cost can vary depending on the number of stations within the watershed. Recent funding for the Freshwater Creek (Humboldt County) life-cycle monitoring station was $265,000 per season.
RuR-CCC-10.1	Objective	Water Quality	Improve summer rearing survival by reducing instream temperatures in potential rearing reaches. See strategies for restoring and enhancing riparian vegetation.										
RuR-CCC-10.1.1	Recovery Action	Water Quality	Develop site-specific recommendations, including incentives, to remedy high temperatures and implement (DFG 2004) initially in core areas, following with phase 1 and 2 areas.		5	CDFG, NMFS, Private Landowners						TBD	Cannot estimate at this time.
RuR-CCC-10.1.2	Recovery Action	Water Quality	Implement actions to maintain and restore water temperatures to meet habitat requirements for CCC coho salmon in assessed streams (DFG 2004).										
RuR-CCC-10.1.2.1	Action Step	Water Quality	Plant native vegetation to promote streamside shade: increase the canopy by planting native species where shade canopy is not at acceptable levels.	2	10	Mendocino County, Private Landowners, RCD, Sonoma County						TBD	Costs vary with amount and type of planting, labor, and post planting monitoring. DFG (2004) estimated riparian planting projects near roads cost between $30,000 and $35,000 per acre.
RuR-CCC-10.1.2.2	Action Step	Water Quality	Improve riparian and instream conditions in rearing habitats by establishing riparian protection zones that extends from the outer edge of the channel out to the site potential of tree height to allow LWD recruitment.	2	60	Board of Forestry, CalFire, CDFG, Private Landowners						TBD	Costs depend on the size of the buffer area, the level of technical assistance provided and the types of projects proposed.
RuR-CCC-10.2	Objective	Water Quality	Assess and remove sources of toxics from watershed areas or streams.										

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RuR-CCC-10.2.1	Recovery Action	Water Quality	Assess the number of septic systems or other wastewater producers that deliver toxics to the lower mainstem Russian River and tributaries (such as Dutchbill Creek and others). Work with cities and Sonoma County to eliminate these sources of toxic input.	3	5	NMFS, Private Landowners, RWQCB, Sonoma County						tbd	cost is difficult to estimate.
RuR-CCC-10.2.2	Recovery Action	Water Quality	Domestic garbage along Purrington Creek should be cleaned up and existing illegal dump sites along the road should be posted to reduce the possibility of toxic substances entering the creek. These dump sites appear to be routinely visited and periodic patrols by local law enforcement should be encouraged.	3	10	CDFG Law Enforcement, NMFS, NMFS OLE, Private Landowners, Sonoma County						tbd	cost is difficult to estimate at this time.
RuR-CCC-11.1	Objective	Agricultural Practices	Promote agricultural practices that protect and restore CCC coho salmon habitat by working with the agricultural community.										
RuR-CCC-11.1.1	Recovery Action	Agricultural Practices	Solicit cooperation from NRCS, RCDs, Farm Bureau, and others to devise incentive programs and incentive-based approaches to encourage increased involvement and support existing landowners who conduct operations in a manner compatible with CCC coho salmon recovery priorities.	3	60	CDFG, Farm Bureau, NMFS, NRCS, RCD						0	Soliciting cooperation with other agencies and groups is not expected to cost much.
RuR-CCC-11.1.2	Recovery Action	Agricultural Practices	Encourage the NRCS and RCDs to increase the number of landowners participating in sediment reduction planning and implementation.	3	60	CDFG, Farm Bureau, NMFS, NRCS, RCD						0	Soliciting cooperation with other agencies and groups is not expected to cost much.
RuR-CCC-11.1.3	Recovery Action	Agricultural Practices	Completion of Farm Conservation Plans that address sediment source reduction, riparian habitat, forest health, and restoration.	2	10							TBD	Cost will depend on the number of participants. A Farm Conservation Plan is estimated to cost 5k-10k.
RuR-CCC-11.1.4	Recovery Action	Agricultural Practices	Streamline permit processing where agricultural landowners are conducting actions aligned with recovery priorities.	2	5	FishNet 4C, NMFS, Private Landowners, Sonoma County						TBD	Cost are expected to be minimal to streamline permits. Cost to landowners may be high to meet recovery priorities.
RuR-CCC-11.2	Objective	Agricultural Practices	Discourage Mendocino and Sonoma Counties from rezoning forestlands to rural residential or other land uses.										
RuR-CCC-11.2.1	Recovery Action	Agricultural Practices	Coordinate with the agencies that authorize conversions to minimize conversions in key watersheds and discourage forestland conversions.	2	5	CalFire, CDFG, NMFS, RWQCB, Sonoma County, Sonoma County Water Agency, State Parks						0	Costs are expected to be minimal.
RuR-CCC-11.2.2	Recovery Action	Agricultural Practices	Continue to educate and encourage the County of Mendocino to adopt a grading ordinance that meets NMFS, RWQCB, and DFG approval.	2	5	CDFG, MCRRFCD, Mendocino County, Sonoma County, Sonoma County Water Agency, State Parks						0	Costs are expected to be minimal to work with the County of Mendocino. Cost to implement and carryout grading ordinance is likely high. Cost estimates should be determined from counties that have grading ordinance such as Sonoma and Napa.
RuR-CCC-11.3	Objective	Agricultural Practices	Implement the NRCS/RCD coordinated program for fishery restoration practices.										
RuR-CCC-11.3.1	Recovery Action	Agricultural Practices	Maintain and enhance riparian vegetation near agricultural activities and allow trees in riparian areas to age, die and recruit into the stream naturally.	2	5	MCRRFCD, Mendocino County, Sonoma County, Sonoma County Water Agency, State Parks						0	Costs are expected to be minimal and leaving LWD in place may actually save costs.
RuR-CCC-11.3.2	Recovery Action	Agricultural Practices	Work with landowners to assess the effectiveness of erosion control measures throughout the winter period.	2	10	Farm Bureau, NRCS, Private Landowners						TBD	May be possible to carry out this action under the monitoring component of Farm Conservation Plans that are administered by NRCS.
RuR-CCC-11.4	Objective	Agricultural Practices	Support the development of new regulations to minimize impacts on spring and summer baseflow from frost protection and other water diversions.	1	5	CDFG, NMFS HCD, Private Landowners, SWRCB						TBD	Cost to support development of regulations is low. Cost of implementing, and enforcing is expected to be high.
RuR-CCC-12.1	Objective	Channel Modification	Restore or minimize impacts to watershed processes (e.g., riparian, sediment transport, hydrology and estuary function).										

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RuR-CCC-12.1.1	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	MCRRFCD, Mendocino County, Sonoma County, Sonoma County Water Agency, State Parks						0	Costs are expected to be minimal and leaving LWD in place may actually save costs.
RuR-CCC-12.1.2	Recovery Action	Channel Modification	Eliminate the use of gabion baskets and undersized rock within the bankfull channel.	2	60	MCRRFCD, Mendocino County, Sonoma County, Sonoma County Water Agency, USACE						0	Gabion baskets are more expensive than most bioengineered solutions, so implementation may actually save costs.
RuR-CCC-12.1.3	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.										
RuR-CCC-12.1.3.1	Action Step	Channel Modification	Set-back existing levees in strategic areas to increase flood-flow detention and promote flood-tolerant land uses.	2	60	USACE						TBD	Estimating cost is difficult at this time since the extent of work is unknown.
RuR-CCC-12.2	Objective	Channel Modification	All proposed development projects should include habitat protection, and/or alternatives that minimize impacts to salmon habitat.										
RuR-CCC-12.2.1	Recovery Action	Channel Modification	All proposed levees should be designed to account for minimal maintenance associated with an intact and functioning riparian zone.										
RuR-CCC-12.2.1.1	Action Step	Channel Modification	Where new levees or similar flood control projects are planned develop setbacks to allow the river to respond to natural hydrologic process and remain in equilibrium. At a minimum, setbacks should accommodate a 100 year event.	2	60	USACE						TBD	Encouraging agencies to incorporate the above mentioned concepts into their levee planning is not expected to result in a significant expense.
RuR-CCC-12.2.1.2	Action Step	Channel Modification	Flood control projects or other channel modifications facilitating new development (as opposed to protecting existing infrastructure) should be avoided.	3	60	Mendocino County, Sonoma County, USACE						0	Implementation is expected to save costs for developers and land owners in the long run.
RuR-CCC-12.2.2	Recovery Action	Channel Modification	Promote bio-engineering solutions as appropriate (e.g. except where critical infrastructure is located) for bank hardening projects.										
RuR-CCC-12.2.2.1	Action Step	Channel Modification	Thoroughly investigate the ultimate cause of channel instability prior to engaging in site specific channel modifications and maintenance. Identify and target remediation of watershed process disruption as an overall priority.	1	60	CA Coastal Commission, California Coastal Conservancy, California Department of Mines and Geology, CalTrans, FEMA, Mendocino County, NMFS, NOAA RC, NRCS, Private Landowners, Public, RCD, Sonoma County, State Parks						TBD	This should become a standard business practice for all agencies and consulting firms engaged in constructing and designing solutions to address channel stability.
RuR-CCC-12.2.2.2	Action Step	Channel Modification	Discourage stabilization projects which will lead to additional instability either up- or downstream.	2	60	CA Coastal Commission, California Department of Mines and Geology, CalTrans, CDFG						TBD	This recommendation should be adopted as a standard business practice for all agencies and consulting firms involved in actions that address stream stability.
RuR-CCC-12.3	Objective	Channel Modification	Improve regulatory oversight of channel modifying projects to ensure potential effects to coho salmon habitat are fully minimized or mitigated.										

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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	
RuR-CCC-12.3.1	Recovery Action	Channel Modification	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.	2	10	CDFG, MCRRFCD, RWQCB, Sonoma County Water Agency, 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.
RuR-CCC-12.3.2	Recovery Action	Channel Modification	Develop Bank Stabilization and Floodplain Guidelines for use by private and public entities.	2	10	CDFG, MCRRFCD, RWQCB, Sonoma County Water Agency, 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.
RuR-CCC-15.1	Objective	Droughts	Work with land owners or public agencies to acquire water that would be utilized to minimize effects of droughts.										
RuR-CCC-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, MCRRFCD, RWQCB, Sonoma County Water Agency, 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.
RuR-CCC-15.2	Objective	Droughts	Minimize water use and seek alternatives during droughts.										
RuR-CCC-15.2.1	Recovery Action	Droughts	DFG, 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 (DFG 2004).	3	5	Sonoma County Water Agency, USACE	4.00	4.00	4.00	4.00	4.00	20	This activity has already been addressed within the USACE Russian River Biological Opinion.
RuR-CCC-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.										
RuR-CCC-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.	2	10	CDFG, MCRRFCD, RWQCB, Sonoma County Water Agency, 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.
RuR-CCC-15.3.2	Recovery Action	Droughts	Evaluate and prepare contingency plans to breach estuary sandbars to facilitate adult upmigration when instream flows are adequate for passage and spawning if sandbar remains closed by mid-January.	2	15	Sonoma County Water Agency, USACE						0	This activity has already been addressed within the USACE Russian River Biological Opinion.
RuR-CCC-15.3.3	Recovery Action	Droughts	Establish an emergency drought operations center (EDOC), (e.g., Washington Department of Fish and Wildlife, 2001), comprised of the SWRCB, DFG, NMFS, and others to develop emergency rules for augmenting water supplies and mitigating the effects of drought on fish.	2	15	Sonoma County Water Agency, USACE						0	This activity has already been addressed within the USACE Russian River Biological Opinion.
RuR-CCC-15.3.3.1	Action Step	Droughts	Use the emergency drought operations center (EDOC) or other similar group to help discourage poaching of coho salmon by measures to: Cooperate with and provide incentives to landowners to maintain road and trail closures to be effective against trespass; Encourage monitoring of road closures and timely repair of defective or damaged road closure systems; Promote CalTIP, especially how it might apply to spawning coho salmon; and report un-permitted road use to local, State, and federal enforcement personnel during periods when coho salmon are migrating (DFG 2004).	3	60	CalFire, CDFG, FishNet 4C, Mendocino County, MMWD, Private Landowners, Public, RCD, Sonoma County, State Parks						TBD	Costs depend on participation.
RuR-CCC-15.3.4	Recovery Action	Droughts	Work with DFG, Counties, other agencies, and knowledgeable biologists to develop emergency rules and adopt implementation agreements.	2	15	Sonoma County Water Agency, USACE						0	This activity has already been addressed within the USACE Russian River Biological Opinion.

Russian River (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	
RuR-CCC-15.4	Objective	Droughts	Increase enforcement patrols by DFG, State Parks, and NMFS OLE in sensitive spawning and rearing areas.	2	60	CDFG Law Enforcement, NMFS OLE						0	costs are expected to be absorbed into ongoing activity budget.
RuR-CCC-15.5	Objective	Droughts	Work with water managers on regulated streams to assure adequate and proper consideration is given to fish needs. Develop agreements, which will minimize water-use conflicts and impacts on fish and wildlife resources during drought conditions.										
RuR-CCC-15.5.1	Recovery Action	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).	2	60	Sonoma County Water Agency, USACE						0	Flow changes have already been specified for Dry Creek and Russian River mainstem through the USACE Russian River BO.
RuR-CCC-15.5.2	Recovery Action	Droughts	Identify and work with water users to minimize depletion of summer base flows from unauthorized water uses.	3	20	Mendocino County, Private Landowners, RCD, Sonoma County, State Parks						TBD	Costs cannot be determined at this time due to an unknown number of unauthorized users, and the level of enforcement necessary.
RuR-CCC-17.1	Objective	Fishing and Collecting	Minimize interception of CCC coho salmon during the trout and steelhead freshwater sport fishing season.	1	60	CDFG, NMFS						TBD	Minimal cost to recreational fishery is expected.
RuR-CCC-17.1.1	Recovery Action	Fishing and Collecting	NMFS and DFG will work to improve the California Freshwater Sport Fishing Regulations to minimize interception of adult salmonids.	1	2	CDFG, NMFS PRD, Public						0	Cost expected to be minimal.
RuR-CCC-17.1.2	Recovery Action	Fishing and Collecting	NMFS will work with DFG to modify low flow restrictions under Article 4. Supplemental Regulations, Section 8.00 (a).	3	20	CDFG, Counties, FishNet 4C, NMFS, Private Landowners, Sonoma County Water Agency						TBD	Level of promotion that would be effective needs to be determined for accurate cost estimates.
RuR-CCC-17.1.3	Recovery Action	Fishing and Collecting	NMFS and DFG will work to improve the marking strategy of the coho captive broodstock recovery program to decrease confusion with allowable harvested hatchery steelhead.	1	1	CDFG, NMFS						TBD	Cost not determined.
RuR-CCC-17.2	Objective	Fishing and Collecting	Work with landowners and other agencies to conduct actions (e.g., maintain road and trail closures, increase enforcement patrols) that prevent trespassing and poaching activities.										
RuR-CCC-17.2.1	Recovery Action	Fishing and Collecting	Promote CalTip to discourage poaching (DFG 2004).	3	10	CDFG, FishNet 4C, NOAA RC, NRCS, Private Landowners, RCD	10.00	10.00	10.00	10.00	10.00	100	Cost based on 10k for 10 years to fund barriers such as K-rail, gates, or large rocks to block access.
RuR-CCC-17.3	Objective	Fishing and Collecting	Promote public outreach to the fishing community to ensure that coho salmon are properly identified and immediately released if incidentally caught during steelhead fishing.										
RuR-CCC-17.3.1	Recovery Action	Fishing and Collecting	Work with DFG to improve the Fishing Regulation manual to clearly identify differences in body morphology of all potentially present adult salmonids with color photos of diagnostic features (e.g., caudal fin spotting, caudal fin shape, coloration of lower jaw, peduncle width, etc.).	3	20	CDFG, Counties, FishNet 4C, NMFS, Private Landowners, Sonoma County Water Agency						TBD	Level of promotion that would be effective needs to be determined for accurate cost estimates.
RuR-CCC-17.3.2	Recovery Action	Fishing and Collecting	Install/construct permanent signs at all major public access points along the Russian River (below Dry 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.).	3	2	CalFire, CDFG, NMFS						0	Cost is currently being covered by Sonoma County Fish and Wildlife Commission and other agencies.
RuR-CCC-20.1	Objective	Logging and Wood Harvesting	Maintain and expand California's working forestlands and forestlands held by the State, and prevent future conversion of forestlands to agriculture or other land uses.										
RuR-CCC-20.1.1	Recovery Action	Logging and Wood Harvesting	Areas adjacent to currently owned State parks or forestlands supporting Core, Phase I and Phase II priority areas should be considered for purchase (if feasible within the next 5 years).										

Russian River (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	
RuR-CCC-15.4	Objective	Droughts	Increase enforcement patrols by DFG, State Parks, and NMFS OLE in sensitive spawning and rearing areas.	2	60	CDFG Law Enforcement, NMFS OLE						0	costs are expected to be absorbed into ongoing activity budget.
RuR-CCC-15.5	Objective	Droughts	Work with water managers on regulated streams to assure adequate and proper consideration is given to fish needs. Develop agreements, which will minimize water-use conflicts and impacts on fish and wildlife resources during drought conditions.										
RuR-CCC-15.5.1	Recovery Action	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).	2	60	Sonoma County Water Agency, USACE						0	Flow changes have already been specified for Dry Creek and Russian River mainstem through the USACE Russian River BO.
RuR-CCC-15.5.2	Recovery Action	Droughts	Identify and work with water users to minimize depletion of summer base flows from unauthorized water uses.	3	20	Mendocino County, Private Landowners, RCD, Sonoma County, State Parks						TBD	Costs cannot be determined at this time due to an unknown number of unauthorized users, and the level of enforcement necessary.
RuR-CCC-17.1	Objective	Fishing and Collecting	Minimize interception of CCC coho salmon during the trout and steelhead freshwater sport fishing season.	1	60	CDFG, NMFS						TBD	Minimal cost to recreational fishery is expected.
RuR-CCC-17.1.1	Recovery Action	Fishing and Collecting	NMFS and DFG will work to improve the California Freshwater Sport Fishing Regulations to minimize interception of adult salmonids.	1	2	CDFG, NMFS PRD, Public						0	Cost expected to be minimal.
RuR-CCC-17.1.2	Recovery Action	Fishing and Collecting	NMFS will work with DFG to modify low flow restrictions under Article 4. Supplemental Regulations, Section 8.00 (a).	3	20	CDFG, Counties, FishNet 4C, NMFS, Private Landowners, Sonoma County Water Agency						TBD	Level of promotion that would be effective needs to be determined for accurate cost estimates.
RuR-CCC-17.1.3	Recovery Action	Fishing and Collecting	NMFS and DFG will work to improve the marking strategy of the coho captive broodstock recovery program to decrease confusion with allowable harvested hatchery steelhead.	1	1	CDFG, NMFS						TBD	Cost not determined.
RuR-CCC-17.2	Objective	Fishing and Collecting	Work with landowners and other agencies to conduct actions (e.g., maintain road and trail closures, increase enforcement patrols) that prevent trespassing and poaching activities.										
RuR-CCC-17.2.1	Recovery Action	Fishing and Collecting	Promote CalTip to discourage poaching (DFG 2004).	3	10	CDFG, FishNet 4C, NOAA RC, NRCS, Private Landowners, RCD	10.00	10.00	10.00	10.00	10.00	100	Cost based on 10k for 10 years to fund barriers such as K-rail, gates, or large rocks to block access.
RuR-CCC-17.3	Objective	Fishing and Collecting	Promote public outreach to the fishing community to ensure that coho salmon are properly identified and immediately released if incidentally caught during steelhead fishing.										
RuR-CCC-17.3.1	Recovery Action	Fishing and Collecting	Work with DFG to improve the Fishing Regulation manual to clearly identify differences in body morphology of all potentially present adult salmonids with color photos of diagnostic features (e.g., caudal fin spotting, caudal fin shape, coloration of lower jaw, peduncle width, etc.).	3	20	CDFG, Counties, FishNet 4C, NMFS, Private Landowners, Sonoma County Water Agency						TBD	Level of promotion that would be effective needs to be determined for accurate cost estimates.
RuR-CCC-17.3.2	Recovery Action	Fishing and Collecting	Install/construct permanent signs at all major public access points along the Russian River (below Dry 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.).	3	2	CalFire, CDFG, NMFS						0	Cost is currently being covered by Sonoma County Fish and Wildlife Commission and other agencies.
RuR-CCC-20.1	Objective	Logging and Wood Harvesting	Maintain and expand California's working forestlands and forestlands held by the State, and prevent future conversion of forestlands to agriculture or other land uses.										
RuR-CCC-20.1.1	Recovery Action	Logging and Wood Harvesting	Areas adjacent to currently owned State parks or forestlands supporting Core, Phase I and Phase II priority areas should be considered for purchase (if feasible within the next 5 years).										

Russian River (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	
RuR-CCC-20.1.1.1	Action Step	Logging and Wood Harvesting	Should large tracts of forestlands within any watershed identified as a priority in this recovery plan become available for purchase, Federal, State, local government, and non-governmental organizations should consider purchasing the area as a Demonstration Forest or State Park.	3	60	CDFG, Mendocino County, NMFS, RCD, Sonoma County, State Parks						TBD	Impossible to anticipate where and how much land will come available for purchase in the future.
RuR-CCC-20.2	Objective	Logging and Wood Harvesting	Provide for properly functioning watershed processes (e.g., cycles of wood, water and sediment) by promoting long term sustainable forestry practices that support coho salmon habitats.										
RuR-CCC-20.2.1	Recovery Action	Logging and Wood Harvesting	Manage riparian areas for their site potential composition and structure.										
RuR-CCC-20.2.1.1	Action Step	Logging and Wood Harvesting	Conserve and manage forestlands for older forest stages.	2	60	CDFG, Mendocino County, NMFS, Sonoma County, State Parks, USEPA						TBD	Costs cannot be determined at this time, due to an unknown number of variables and research priorities.
RuR-CCC-20.2.1.2	Action Step	Logging and Wood Harvesting	Allow trees in riparian areas to age, die, and recruit into the stream naturally.	2	60	Mendocino County, Sonoma County, State Parks						o	Recruitment of LWD to the stream is critical. This action is mainly a policy issue, with little or no direct costs.
RuR-CCC-20.3	Objective	Logging and Wood Harvesting	Work with state and local agencies reviewing and authorizing timber operations to ensure take of coho salmon is fully minimized.										
RuR-CCC-20.3.1	Recovery Action	Logging and Wood Harvesting	Assign NMFS staff to conduct THP reviews of the highest priority areas using revised "Guidelines for NMFS Staff when Reviewing Timber Operations: Avoiding Take and Harm of Salmon and Steelhead" (NMFS 2004).	3	2	CalFire, CDFG, NMFS						0	Cost is minimal because NMFS/DFG already participate in meetings the Board of Forestry.
RuR-CCC-20.3.2	Recovery Action	Logging and Wood Harvesting	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	10	NMFS	20.00	20.00	20.00	20.00	20.00	200	This action would require funding of a 1/4 time NMFS position. The need for this action may change if the California Forest Practice Rules change and reach a no-take standard.
RuR-CCC-20.3.3	Recovery Action	Logging and Wood Harvesting	Provide information to BOF regarding CCC coho salmon priorities and recommend upgrading relevant forest practices.	3	2	CalFire, CDFG, NMFS						0	Cost is difficult to estimate at this time.
RuR-CCC-20.4	Objective	Logging and Wood Harvesting	The priorities in this recovery plan should serve as a guide for independent Forest Certification.										
RuR-CCC-20.4.1	Recovery Action	Logging and Wood Harvesting	Investigate opportunities to programmatically permit the forest certification program to authorize incidental take for landowners through Section 10(a)(1)(B).	3	60	CalFire, NMFS, Private Landowners						TBD	Cost is difficult to estimate at this time.
RuR-CCC-20.5	Objective	Logging and Wood Harvesting	Develop a California Forest Practice monitoring protocol to determine whether specific practices are effectively meeting intended objectives and are providing for the protection of CCC coho salmon.										
RuR-CCC-20.5.1	Recovery Action	Logging and Wood Harvesting	Consider the development of a Watershed Database (similar to the DFG Northern Spotted Owl database) for salmonids that provides watershed data and information in a consistent fashion to all foresters for consideration in their harvest plans.	3	10	Board of Forestry, CDFG, NMFS	20.00	20.00	20.00	20.00	20.00	200	Developing a database is likely to cost at least $200,000 according to estimates in DFG (2004).
RuR-CCC-20.5.2	Recovery Action	Logging and Wood Harvesting	Consider use of the Monitoring Study Group to create a platform for more large-scale assessments of Rule implementation and effectiveness.	3	20	Board of Forestry, CDFG, NMFS						TBD	Cost is difficult to estimate at this time.
RuR-CCC-20.5.3	Recovery Action	Logging and Wood Harvesting	Develop a framework similar to Washington State that establishes a scientific framework for monitoring the effectiveness of practices in meeting watershed process goals and a decision-making process that is adaptive to the new information.	3	10	Board of Forestry, CDFG, NMFS	20.00	20.00	20.00	20.00	20.00	200	The cost of developing a framework is difficult to estimate, but will likely exceed $200,000 (DFG 2004).
RuR-CCC-23.1	Objective	Residential and Commercial Development	Improve stream maintenance practices to protect instream complexity, hydrologic processes and riparian functions.										

Russian River (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	
RuR-CCC-23.1.1	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	CalTrans, CDFG, MCRRFCD, Mendocino County, Sonoma County, Sonoma County Water Agency, 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.
RuR-CCC-23.1.2	Recovery Action	Residential and Commercial Development	Implement performance standards in Stormwater Management Plans.	2	30	CalTrans, City of Healdsburg, City of Santa Rosa, City of Ukiah, Mendocino County, RWQCB, Sonoma County						TBD	Cost cannot be determined.
RuR-CCC-23.1.3	Recovery Action	Residential and Commercial Development	Maintain intact and properly functioning riparian buffers to filter and prevent fine sediment input from entering streams.	2	30	CalTrans, City of Healdsburg, City of Santa Rosa, City of Ukiah, Mendocino County, RWQCB, Sonoma County						TBD	Cost cannot be determined.
RuR-CCC-23.2	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.										
RuR-CCC-23.2.1	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.										
RuR-CCC-23.2.1.1	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.	3	25	MCRRFCD, Mendocino County, Sonoma County, Sonoma County Water Agency, State Parks						tbd	costs depend on extents and type of mitigation and/or detention proposed, and cannot be determined at this time.
RuR-CCC-23.2.2	Recovery Action	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.	3	30	MCRRFCD, Mendocino County, RCD, RWQCB, Sonoma County, Sonoma County Water Agency, State Parks						tbd	costs to upgrade stormwater discharge points cannot be determined at this time, but may be substantial.
RuR-CCC-23.2.3	Recovery Action	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.	3	20	Mendocino County, Private Landowners, Sonoma County						0	county planning, policies, and permits should be modified to implement this action, and costs are expected to be minimal.
RuR-CCC-23.3	Objective	Residential and Commercial Development	Improve coho salmon survival by minimizing the introduction into the stream environment of sediment or toxic compounds originating from commercial or residential development.										
RuR-CCC-23.3.1	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	MCRRFCD, Mendocino County, RCD, Sonoma County, Sonoma County Water Agency, State Parks, SWRCB, USACE, USEPA						tbd	cost savings may occur with limiting use of pesticides, however, other types of management costs may be more or less, and cannot be accurately determined at this time.

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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	
RuR-CCC-23.3.2	Recovery Action	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.	2	60	MCRRFCD, Mendocino County, RWQCB, Sonoma County, Sonoma County Water Agency, 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.
RuR-CCC-23.3.3	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.	2	60	CDFG, Mendocino County, Private Landowners, Sonoma County						tbd	costs are unknown at this time, and will depend on the number and scope of actions implemented to control erosion.
RuR-CCC-23.4	Objective	Residential and Commercial Development	Minimize potential impacts to coho salmon habitat when planning and developing residential and commercial property.										
RuR-CCC-23.4.1	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).	2	8	Mendocino County, Sonoma County						tbd	Costs cannot be determined at this time.
RuR-CCC-23.4.2	Recovery Action	Residential and Commercial Development	Encourage counties to develop a Sensitive Habitat Ordinance similar to that in place for the County of Santa Cruz.	3	5	Mendocino County, RCD, Sonoma County						0	Cost to county is unknown.
RuR-CCC-23.4.3	Recovery Action	Residential and Commercial Development	Land use zoning should be appropriate to the site and consider the floodplain and riparian functions of stream channels.										
RuR-CCC-23.4.3.1	Action Step	Residential and Commercial Development	Modify Federal, State, local processes, and County General Plans, to eliminate provisions allowing new construction in undeveloped areas within the 100-year flood prone zones in all historic CCC coho salmon watersheds.	2	60	California Department of Mines and Geology, CalTrans, City of Healdsburg, City of Santa Rosa, City of Ukiah, Mendocino County, NMFS, Private Landowners, Public, Sonoma County						tbd	Effective and consistent implementation of these policies are anticipated to have little cost. Modification of policies may be controversial and costs may be high.
RuR-CCC-23.4.3.2	Action Step	Residential and Commercial Development	Work with Sonoma County to develop more protective regulations in regard to exurban development (vineyard and rural residential).	2	20	CDFG, Mendocino County, NMFS, Private Landowners, Sonoma County						tbd	cost is difficult to estimate at this time.
RuR-CCC-23.4.3.3	Action Step	Residential and Commercial Development	Encourage infill and high density developments over dispersal of low density rural residential in undeveloped areas.	1	60	City of Healdsburg, City of Santa Rosa, City of Ukiah, Mendocino County, Sonoma County						0	This action encourages implementation of many existing policies.
RuR-CCC-23.4.3.4	Action Step	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	Mendocino County, RCD, Sonoma County						tbd	Costs associated with development and implementation of ordinances is difficult to determine.
RuR-CCC-23.4.3.5	Action Step	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	Mendocino County, Sonoma County						TBD	This action is basically a policy issue, however additional authorities may be developed to implement the action fully.
RuR-CCC-23.4.3.6	Action Step	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	Mendocino County, Private Landowners, Sonoma County, USACE						0	Stringent review by permitting agencies is expected to reduce costs associated with poorly planned and poorly located developments.

Russian River (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	
RuR-CCC-23.4.4	Recovery Action	Residential and Commercial Development	Where existing infrastructure exists within historical floodplains or offchannel habitats in any historical coho watersheds, and restoration is found feasible, encourage willing landowners to restore these areas through conservation easements, etc.	3	15	CDFG, RWQCB						tbd	This action is basically a policy issue, however additional authorities may be developed to implement the action fully.
RuR-CCC-23.4.4.1	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.	3	25	Mendocino County, Sonoma County						0	Costs associated with policy development are expected to be minimal.
RuR-CCC-23.4.5	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.
RuR-CCC-23.5	Objective	Residential and Commercial Development	Minimize rate, and subsequent adverse affects, of land conversion to residential and commercial development.										
RuR-CCC-23.5.1	Recovery Action	Residential and Commercial Development	Identify areas at high risk of conversion, and develop incentives and alternatives for landowners that discourage conversion.	2	60	Mendocino County, NMFS, Sonoma County						tbd	cost cannot be estimated without specific information.
RuR-CCC-23.5.1.1	Action Step	Residential and Commercial Development	Purchase conservation easements from landowners that currently have grazing or agricultural operations along the estuary.	3	20	Mendocino County, Private Landowners, RCD, Sonoma County						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 Sonoma and Mendocino Counties are likely much higher and cannot be accurately determined at this time.
RuR-CCC-23.5.2	Recovery Action	Residential and Commercial Development	Discourage home building or other incompatible land use in areas identified as timber production zones (TPZ).	2	60	Mendocino County, NMFS, Private Landowners, Sonoma County						0	cost to landowners cannot be determined at this time.
RuR-CCC-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.										
RuR-CCC-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.	2	5	CDFG, RCD						0	cost to expand an existing program are expected to be minimal.
RuR-CCC-24.1.1.1	Action Step	Roads and Railroads	Develop a Salmon Certification Program for road maintenance staff.	3	10	CalTrans, CDFG, MCRRFCD, Mendocino County, Sonoma County, Sonoma County Water Agency						0	Similar existing programs could be modified and implemented at minimal cost.
RuR-CCC-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	MCRRFCD, Mendocino County, RCD, Sonoma County, Sonoma County Water Agency, State Parks						0	Similar existing programs could be modified and implemented at minimal cost.
RuR-CCC-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, RCD						0	cost to expand an existing program are expected to be minimal.
RuR-CCC-24.2	Objective	Roads and Railroads	Minimize sediment input from existing road networks into the aquatic environment.										

Russian River (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	
RuR-CCC-24.2.1	Recovery Action	Roads and Railroads	Assess and implement actions that hydrologically disconnect roads or reduce sediment sources in Core CCC coho salmon areas within five years, Phase I within 10 years, and Phase II areas within 15 years (from 2010).	2	30	Board of Forestry, CalFire, CDFG, Mendocino County, NOAA RC, Private Landowners, RCD, Sonoma County						TBD	costs are dependent on actions chosen.
RuR-CCC-24.2.2	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.	2	5	CDFG, Mendocino County, Sonoma County						0	Cost of coordination should be minimal. Coordination should include County fisheries experts.
RuR-CCC-24.2.2.1	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.	3	10	CDFG, NMFS						0	Prioritizing existing funding mechanisms is not expected to add additional cost to the process.
RuR-CCC-24.2.3	Recovery Action	Roads and Railroads	Establish adequate spoils storage sites throughout the watershed so that material from landslides and road maintenance can be stored safely away from coho streams. Coordinate these efforts with all landowners in the watershed, CalTrans, and county road maintenance staff as appropriate.	2	5	CDFG, Mendocino County, Sonoma County						0	Cost of coordination should be minimal. Coordination should include County fisheries experts.
RuR-CCC-24.2.4	Recovery Action	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.	2	10	CalFire, CDFG, NMFS, Private Landowners						tbd	Cost is difficult to estimate at this time, and ultimately depends on the roads chosen for decommissioning.
RuR-CCC-24.2.5	Recovery Action	Roads and Railroads	Use available best management practices for road construction, maintenance, management and decommissioning (e.g. Hagans & Weaver, 1994; Sommarstrom, 2002; Oregon Department of Transportation, 1999).	1	60	CalFire, CalTrans, Mendocino County, NMFS, NRCS, Private Landowners, Public, RCD, Sonoma County						tbd	Cost cannot be determined at this time but should be adopted as part of future road actions.
RuR-CCC-24.2.6	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	5	CDFG, Mendocino County, NMFS, Sonoma County						0	Cost is expected to be minimal and will likely be absorbed through agency staff time.
RuR-CCC-24.2.7	Recovery Action	Roads and Railroads	Minimize sediment delivery from roads during the winter period.	2	15	CDFG, MCRRFCD, Sonoma County Water Agency, State Parks						0	Collaborative approaches are expected to result in cost savings.
RuR-CCC-24.2.7.1	Action Step	Roads and Railroads	Limit winter use of unsurfaced roads and recreational trails to decrease fine sediment loads.	1	60	CalFire, Mendocino County, Private Landowners, Sonoma County						0	Cost should be considered part of land owner road management plans.
RuR-CCC-24.2.7.2	Action Step	Roads and 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.	2	20	CalFire, City of Healdsburg, City of Santa Rosa, City of Ukiah, FEMA, Mendocino County, Private Landowners, Sonoma County, State Parks						tbd	Cost difficult to determine but may result in a long term cost savings.
RuR-CCC-24.3	Objective	Roads and Railroads	Ensure all existing and new road crossings allow upstream and downstream passage for coho salmon.										
RuR-CCC-24.3.1	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, MCRRFCD, Sonoma County Water Agency, State Parks						0	Collaborative approaches are expected to result in cost savings.

Russian River (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	
RuR-CCC-24.3.2	Recovery Action	Roads and Railroads	Continue to refine, update, and maintain the Coastal Conservancy database of barriers to fish passage (DFG 2004).	3	10	California Coastal Conservancy, CDFG, NMFS						tbd	The cost of this action is difficult to determine at this time.
RuR-CCC-24.3.3	Recovery Action	Roads and Railroads	Use NMFS Guidelines for Salmonid Passage at Stream Crossings (NMFS 2001a) and appropriate barrier databases when developing new or retrofitting existing road crossings.	3	20	Mendocino County, RCD, Sonoma County, State Parks	25.00	25.00	25.00	25.00	25.00	500	Cost could be combined with other road assessment priorities in the watershed.
RuR-CCC-24.3.3.1	Action Step	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.	3	60	Board of Forestry, CalTrans, CDFG, City of Healdsburg, City of Santa Rosa, City of Ukiah, Mendocino County, Private Landowners, RCD, Sonoma County						tbd	Incorporating free span bridges into replacement and new construction plans is unlikely to increase costs. Construction of the bridges will likely be much higher.
RuR-CCC-24.3.3.2	Action Step	Roads and Railroads	All new crossings and upgrades to existing crossings (bridges, culverts, fills, and other crossings) must accommodate 100-year flood flows and associated bedload and debris.	3	60	CalTrans, CDFG, Mendocino County, Sonoma County, State Parks						0	Incorporating 100-year flood flow design specifications into projects is not expected to result in more cost. Implementing the projects may prove more costly than less protective designs.
RuR-CCC-24.4	Objective	Roads and Railroads	Assess and implement actions that hydrologically disconnect roads or reduce sediment sources in Core CCC coho salmon areas within five years, Phase I within 10 years, and Phase II areas within 15 years (from 2010).										
RuR-CCC-24.4.1	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.	3	20	Mendocino County, RCD, Sonoma County, State Parks	25.00	25.00	25.00	25.00	25.00	500	Cost could be combined with other road assessment priorities in the watershed.
RuR-CCC-24.4.2	Recovery Action	Roads and Railroads	Implement actions that reduce sediment and runoff impacts from road networks to stream channel.	2	60	CalFire, CalTrans, CDFG, FEMA, Mendocino County, RCD, Sonoma County, State Parks, USACE						TBD	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.
RuR-CCC-24.4.2.1	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.	3	10	CDFG, NMFS						0	Prioritizing existing funding mechanisms is not expected to add additional cost to the process.
RuR-CCC-24.4.2.2	Action Step	Roads and Railroads	Use available best management practices for road construction, maintenance, management and decommissioning (e.g. Hagans & Weaver, 1994; Sommarstrom, 2002; Oregon Department of Transportation, 1999).	1	60	CalFire, CalTrans, Mendocino County, NMFS, NRCS, Private Landowners, Public, RCD, Sonoma County						TBD	Cost cannot be determined at this time but should be adopted as part of future road actions.
RuR-CCC-24.4.2.3	Action Step	Roads and Railroads	Establish adequate spoils storage sites throughout the watershed so that material from landslides and road maintenance can be stored safely away from coho streams. Coordinate these efforts with all landowners in the watershed, CalTrans, and county road maintenance staff as appropriate.	2	5	CDFG, Mendocino County, Sonoma County						0	Cost of coordination should be minimal. Coordination should include County fisheries experts.
RuR-CCC-24.4.2.4	Action Step	Roads and Railroads	Limit winter use of unsurfaced roads and recreational trails to decrease fine sediment loads.	1	60	CalFire, City of Healdsburg, City of Santa Rosa, City of Ukiah, Mendocino County, Private Landowners, Sonoma County, State Parks						0	Cost should be considered part of land owner road management plans.

Russian River (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	
RuR-CCC-24.4.2.5	Action Step	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.	1	60	CalFire, City of Healdsburg, City of Santa Rosa, City of Ukiah, Mendocino County, Private Landowners, Sonoma County, State Parks						0	Cost should be considered part of land owner road management plans.
RuR-CCC-24.4.2.6	Action Step	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.	3	25	Mendocino County, Sonoma County						0	Costs associated with policy development are expected to be minimal.
RuR-CCC-24.4.2.7	Action Step	Roads and 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	10	Mendocino County, Sonoma County						TBD	This action is basically a policy issue, however additional authorities may be developed to implement the action fully.
RuR-CCC-24.5	Objective	Roads and Railroads	Use NMFS Guidelines for Salmonid Passage at Stream Crossings (NMFS 2001a) and appropriate barrier databases when developing new or retrofitting existing road crossings.										
RuR-CCC-24.5.1	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.	3	60	Board of Forestry, CalTrans, CDFG, City of Healdsburg, City of Santa Rosa, City of Ukiah, Mendocino County, Private Landowners, RCD, Sonoma County						TBD	Incorporating free span bridges into replacement and new construction plans is unlikely to increase costs. Construction of the bridges will likely be much higher.
RuR-CCC-24.5.2	Recovery Action	Roads and Railroads	All new crossings and upgrades to existing crossings (bridges, culverts, fills, and other crossings) must accommodate 100-year flood flows and associated bedload and debris.	2	60	CalFire, CalTrans, CDFG, FEMA, Mendocino County, RCD, Sonoma County, State Parks, USACE						TBD	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.
RuR-CCC-24.5.3	Recovery Action	Roads and Railroads	Continue to refine, update, and maintain the Coastal Conservancy database of barriers to fish passage (DFG 2004).	3	10	California Coastal Conservancy, CDFG, NMFS						TBD	The cost of this action is difficult to determine at this time.
RuR-CCC-26.1	Objective	Water Diversion and Impoundment	Provide incentives to improve instream flows for coho salmon:.										
RuR-CCC-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).	2	10	CDFG, MCRRFCD, RWQCB, Sonoma County Water Agency						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.
RuR-CCC-26.2	Objective	Water Diversion and Impoundment	Collaborate with landowners to minimize impacts on summer base flow from riparian water diversion activities.										
RuR-CCC-26.2.1	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).										
RuR-CCC-26.2.1.1	Action Step	Water Diversion and Impoundment	Promote water conservation best practices such as drip irrigation for vineyards.	2	20	CDFG, Farm Bureau, MCRRFCD, NRCS, Sonoma County Water Agency						0	Promoting water conservation best practices is not expected to result in additional costs.

Russian River (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	
RuR-CCC-26.2.1.2	Action Step	Water Diversion and Impoundment	Promote the use of reclaimed water for agricultural or other uses.	3	60	CDFG, MCRRFCD, RCD, Sonoma County Water Agency, State Parks						0	Costs associated with promoting use of reclaimed water is expected to be minimal.
RuR-CCC-26.2.1.3	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, MCRRFCD, Mendocino County, RCD, RWQCB, Sonoma County, Sonoma County Water Agency						0	Costs associated with promoting conjunctive use of water is expected to be minimal.
RuR-CCC-26.2.2	Recovery Action	Water Diversion and Impoundment	Promote off-channel storage to reduce impacts of water diversion (e.g., storage tanks for rural residential users).	3	20	CDFG, MCRRFCD, Mendocino County, Private Landowners, RCD, RWQCB, Sonoma County, Sonoma County Water Agency						TBD	Costs are minimal to promote. Costs for implementation will depend on the number of participants.
RuR-CCC-26.2.3	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).	3	60	CDFG, MCRRFCD, RCD, Sonoma County Water Agency, State Parks						0	Costs associated with promoting use of reclaimed water is expected to be minimal.
RuR-CCC-26.2.4	Recovery Action	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	MCRRFCD, NMFS, RCD, RWQCB, Sonoma County Water Agency						0	Costs to promote this action are expected to be minimal.
RuR-CCC-26.3	Objective	Water Diversion and Impoundment	Work within existing federal, state and local regulations to minimize coho salmon take from water diversion activities.										
RuR-CCC-26.3.1	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.	2	5	CDFG, MCRRFCD, Mendocino County, RCD, RWQCB, Sonoma County, Sonoma County Water Agency						0	Coordination costs are expected to be minimal, depending on what specific actions are proposed.
RuR-CCC-26.3.1.1	Action Step	Water Diversion and Impoundment	Petition SWRCB to declare the Russian River watershed fully appropriated.	3	15	Mendocino County, RCD, Sonoma County						TBD	Costs associated with development and implementation of ordinances is difficult to determine.
RuR-CCC-26.3.2	Recovery Action	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).	2	5	CDFG, MCRRFCD, Mendocino County, RCD, RWQCB, Sonoma County, Sonoma County Water Agency						0	Coordination costs are expected to be minimal, depending on what specific actions are proposed.
RuR-CCC-26.3.3	Recovery Action	Water Diversion and Impoundment	Require the SWRCB to conduct interagency consultation with the California Department of Fish and Game, and seek technical assistance from 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 provided, and associated costs are expected to be minimal.
RuR-CCC-26.3.4	Recovery Action	Water Diversion and Impoundment	Upgrade the existing water rights information system so that water allocations can be readily quantified by watershed.	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.
RuR-CCC-26.3.5	Recovery Action	Water Diversion and Impoundment	Improve compliance with existing water resource regulations via monitoring and enforcement.	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 provided, and associated costs are expected to be minimal.
RuR-CCC-26.4	Objective	Water Diversion and Impoundment	Develop new policies, regulations and programs to provide suitable flow conditions for CCC coho salmon.										

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							FY1	FY2	FY3	FY4	FY5	Entire Duration	
RuR-CCC-26.4.1	Recovery Action	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.
RuR-CCC-26.4.2	Recovery Action	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.
RuR-CCC-26.4.3	Recovery Action	Water Diversion and Impoundment	Institutionalize programs to purchase easements on water rights to encourage the maintenance of surface flows.	3	10	CDFG, Mendocino County, RCD, RWQCB, Sonoma County						tbd	Costs associated with development and implementation of easement programs cannot be determined at this time.
RuR-CCC-26.4.4	Recovery Action	Water Diversion and Impoundment	Support the Development and implementation of groundwater use regulations.	3	10	CDFG, NMFS, RWQCB						tbd	This action is not expected to result in appreciable cost increase over the efforts currently underway.
RuR-CCC-26.5	Objective	Water Diversion and Impoundment	Investigate and monitor the relationship between instream flow levels and adverse effects to coho salmon habitat.										
RuR-CCC-26.5.1	Recovery Action	Water Diversion and Impoundment	Establish a comprehensive stream flow evaluation program to determine instream flow needs for coho salmon.	2	10	CDFG, MCRRFCD, Sonoma County Water Agency	20.00	20.00	20.00	20.00	20.00	200	Estimated average cost for non-biological studies is approximately $200,000 (DFG 2004).
RuR-CCC-26.5.2	Recovery Action	Water Diversion and Impoundment	Determine and monitor 1600 program compliance related to water diversions (DFG 2004).	2	60	CDFG						0	Implementation is proposed by DFG, and additional costs are not expected.