

STRESSORS AND POTENTIAL RESTORATION ACTIONS				
Stressor Categories	Stessor	Action	Location	
Water Diversions	Diversions	Conduct winter rice flooding and waterfowl pilot project to assess priority locations and flow needs.	Sacramento River Mainstem	
		Support switch from use of potable water to reclaimed water in parks and golf courses.	North Bay	
		Consider water acquisition in Central Valley.	North Bay	
		Support water conservation education.	North Bay	
		Help Sonoma hospital change over to reclaimed water since it is a major local river water user.	North Bay	
		Develop a water budget for low water years.	North Bay	
		Fund programs to keep the USGS stream gages.	North Bay	
		Support local water conservation organizations and water management plans.	North Bay	
Flows	Flow Management	Water acquisition for all life stages (AFRP)	San Joaquin River	
		Tuolumne River flow enhancement study	San Joaquin River	
		Study in-stream flow needs for smolt survival	San Joaquin River	
		Assessment/Feasibility of channel maintenance flows	San Joaquin River	
		Evaluate reoperation of New Melones to mimic seasonal flow variability	San Joaquin River	
		Assess ground water management, water transfers, distribution system efficiency	San Joaquin River	
		Instream Habitat, Flow	Evaluate additional water exchange to ensure passage during critical migration periods.	Deer Creek, Mill Creek
			Convert pumps used in water exchange program from diesel to electrical power source.	Deer Creek, Mill Creek
	Real time flow monitoring		Mill Creek	
			Evaluate habitat above Barrier Falls at Chimney Rock.	Butte Creek
			Extend and expand flow agreement with PG&E.	Battle Creek
	Flow		New flow standards	American River
			Flow Fluctuation Criteria	American River
			Roseville Reclamation Pipeline	American River
			Dry Year Pulse Flow Evaluation	American River
Flow Constraints			Water conservation actions.	Delta
		Manipulation of flow timing.	Delta	
		Water acquisition.	Delta	

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Flows, cont.		Study options for operations for the Old River barrier.	Delta
		Study flows in the Yolo Bypass and San Joaquin River for potential splittail spawning.	Delta
		Study the effectiveness of pulse flows in the San Joaquin system and their relation to potential improvements in survival.	Delta
Entrainment	Entrainment	Assess feasibility, prioritize, install, upgrade, and maintain fish screens.	San Joaquin River
		Conduct screen rehabilitation.	Sacramento River Mainstem
		Install new screens.	Sacramento River Mainstem
		Conduct screen options feasibility study (consolidate diversions, construct in-gravel wells).	Sacramento River Mainstem
		Modifications to Clough Dam	Mill Creek
		Complete fish screens and ladder at Durham-Mutual Dam	Butte Creek
		Complete fish screen and ladder at Adams Dam	Butte Creek
		Complete fish screen and ladder at Gorrill Dam	Butte Creek
		Site survey and engineering analysis for remaining diversion structures along lower Butte Creek (including White Mallard fish screen and ladder, and Drumheller Slough outfall culvert reconstruction).	Butte Creek
		Purchase screened portable pumps as alternative to Little Dry Creek Diversion.	Butte Creek
		Fish screen and ladder at Eagle Canyon Diversion.	Battle Creek
		Options and feasibility analysis for additional fish screens, ladders, and a flow allocation methodology above Eagle Canyon	Battle Creek
		Screen unscreened diversions.	Feather River, Yuba River
		Implement the Daguerre Point Dam Project listed in the spring run chinook report (fish screen, fish ladder, and dam modifications).	Yuba River
		Fish Screen Improvement (Fairbairn WTP)	American River
		Address problems with unscreened diversions, especially on the Napa River.	North Bay

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Entrainment, cont.		Land retirement to decrease the need for water diversion.	Delta
		Establish a cooperative effort to study and implement screening of diversions, including consolidation of diversions where appropriate and screen maintenance. Also need to maximize the cooperative aspects of the program.	Delta
		Change operations and physical facilities at the State and Federal pumps to reduce entrainment.	Delta
		Evaluate possible changes and operations of other diversion facilities to reduce entrainment.	Delta
Migration Barriers	Passage Problems	Structure and operation of ACID.	Sacramento River Mainstem
		Options for passage and reduction of predation at RBDD.	Sacramento River Mainstem
		Evaluate operation of Englebright Dam and Reservoir.	Yuba River
		Replace fish ladder at Iron Canyon.	Big Chico Creek
		Install discharge bypass at One Mile Recreation Area.	Big Chico Creek
		Replace fish ladder at One Mile Pool.	Big Chico Creek
		Improve fish passage at Saelzler Dam.	Clear Creek
		Conduct an options, feasibility, and engineering analysis of fish passage problems and habitat restoration opportunities on Antelope Creek.	Antelope, Cow, Cottonwood, Little Chico Creeks
		Reintroduction of Steelhead Above Folsom Dam	American River
	Barriers to Species of Special Concern	Plan for the removal of barriers on diked bay lands which block movement of smelt.	North Bay
		Make a plan for the removal of barriers for steelhead passage. (RCD already has documents for this kind of project.)	North Bay
		Put balls on power lines to alert birds.	North Bay
		Erect wildlife passage areas on highways.	North Bay
	Migration Barriers	Operate the Delta Cross Channel gates to prevent migration delays of fish. Also consider Georgiana Slough modifications.	Delta
		Fund land retirement adjacent to temporary barriers.	Delta
		Evaluate pulse flow effects on fish migration.	Delta

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Migration Barriers, cont.		Provide dissolved oxygen, migration barrier relief through modifications at the head of Old River.	Delta
Floodplain Changes	Geomorphic Reconfiguration and Increased Channel Complexity	Channel restoration and reconfiguration projects.	San Joaquin River
		Post-flood assessment	San Joaquin River
		Merced River watershed assessment	San Joaquin River
		Stanislaus watershed assessment	San Joaquin River
		Channel maintenance flow assessment	San Joaquin River
		GIS database of habitat and fluvial elements for Stan.	San Joaquin River
	Riparian Revegetation and Restoration	Purchase and restore land at Basso Bridge	San Joaquin River
		Manage post-flood land use for riparian growth	San Joaquin River
		Riparian restoration and revegetation projects	San Joaquin River
	Channels and Floodplains	Stanislaus channel and floodplain maintenance policy	San Joaquin River
	Degraded Instream Riverine Habitat Conditions	Replenish riverine gravels, monitor gravel movement, and schedule Keswick flow for gravel submergence and redistribution.	Sacramento River Mainstem
		Improve rearing habitat by increasing structural complexity.	Sacramento River Mainstem
		Provide adequate flow (> minimum) for spawning habitat and rearing.	Sacramento River Mainstem
	Lack of Shaded Riverine Aquatic Habitat (SRA)	Protect, restore, and re-establish SRA where possible.	Sacramento River Mainstem
		Maintain meander belt where presently active.	Sacramento River Mainstem
		Allow wider meander belt where possible (by land acquisition or discontinuing levee armoring).	Sacramento River Mainstem
		Conduct feasibility study on revegetation of project levees or rocked levees.	Sacramento River Mainstem
		Endorse/partner with ACOE and Rec. Bd. study on re-evaluation of floodplain protection strategy.	Sacramento River Mainstem
	Lack of Floodplain and Riparian Woodland Habitat	Protect/restore riparian forest habitats.	Sacramento River Mainstem

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Floodplain Changes, cont.		Reclaim historic floodplain within current flow context.	Sacramento River Mainstem
		Restore floodplain function by moving/removing private levees.	Sacramento River Mainstem
		Conduct project levee or other rock removal/relocation projects.	Sacramento River Mainstem
		Conduct Yolo Bypass feasibility of establishing floodplain-like conditions at a lower flow split between the bypass and the river.	Sacramento River Mainstem
		Manage hydrograph to allow maximum overbank flooding within flow peak potential.	Sacramento River Mainstem
		Initiate land acquisition in floodplain.	Sacramento River Mainstem
		Revise floodplain management.	Sacramento River Mainstem
		Obtain floodplain easements.	Sacramento River Mainstem
	Lack of Food Supply	Remove non-native plants from the riparian zone, re-establish natives.	Sacramento River Mainstem
	Floodplain and Riparian Woodland Habitat, Flood Management	Encourage fish compatible project responses to flood damage.	Butte Creek
		Evaluate feasibility of reestablishing an interaction between the river and the floodplain.	Butte Creek
		Evaluate feasibility of easements and buffer zones in the upper canyons above Hwy. 99.	Butte Creek
	Wetlands	Wetland/Slough Complex Restoration	American River
	Habitat	Instream Cover (Woody Debris)	American River
		Shaded Riverine Aquatic Habitat Protection/Management	American River
		Spawning Habitat Management	American River
		"Tailrace Habitat" Utilization (below Nimbus)	American River
	Flood Control	Flood Control Channel Improvement	American River
	Lack of Tidal Wetland and Diked Former Wetlands	Acquire land on Napa and Petaluma rivers from willing private land owners.	North Bay
		Restore other land.	North Bay
		Refer to habitat goals and program set by CDFG & USFWS.	North Bay

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Floodplain Changes, cont.		Convert land (approximately 7,000 acres) to tidal wetlands.	North Bay
		Develop plans to buy specific properties that are targets for development before they become unavailable.	North Bay
		Support CALFED goals and process. Pilot studies can be included in the action list.	North Bay
		Increase size of drains to the marsh lands along highway 37 to improve drainage.	North Bay
	Lack of Riparian Cover	Assist RCDs to do outreach to land owners for riparian fencing and range land management training.	North Bay
		Fund vegetation and maintenance in riparian urban corridors.	North Bay
		Develop setbacks for every acquisition.	North Bay
		Support vineyard disease research on Pierces disease in a riparian friendly way.	North Bay
		Study the extent of the Napa riparian zone.	North Bay
		Restore vegetation and complexity to the riparian systems to help cool the water and provide protection for steelhead.	North Bay
	Bank Erosion	Educate public and enforce boat speed in critical areas.	North Bay
		Apply biotechnology techniques.	North Bay
	Lack of Floodplain	Establish setback levees to create shallow water habitat and other priority habitat types. Consider possible adverse trade-offs between habitat types that may be created with setback levees.	Delta
		Create a flood bypass in the southern Delta and on the lower Mokelumne River. Refer to the work of the Levee Technical Committee on this action.	Delta
		Consider land use changes and restoration in the Yolo Bypass.	Delta
		Modify drainage in the Yolo Bypass to reduce fish stranding.	Delta

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Floodplain Changes, cont.		Prioritize areas for use of dredge material or other mechanisms on subsided islands (refer to the work of the Levee Technical Committee).	Delta
		Work with landowners to establish easements for seasonal wetland habitat creation and other priority habitat.	Delta
	Lack of Foraging Habitat	Increase area of flooded agricultural lands. Combine with no net loss of agricultural wetlands that provide foraging habitat for migratory birds.	Delta
		Fund incentives to increase area of agricultural wetlands and foraging habitat for migratory birds.	Delta
		Fund projects to restore tidal mudflats in shallow water habitat.	Delta
		Fund programs to prevent the loss of tidal mudflats and shallow water habitat.	Delta
		Create aquatic habitat that will be useful for foraging.	Delta
Gravel Recruitment	Spawning Gravel and Coarse Sediment Management	Merced River Ranch - purchase dredger tailings	San Joaquin River
		Spawning gravel introduction near LaGrange	San Joaquin River
		Goodwin Canyon gravel replenishment and monitoring	San Joaquin River
		Identify gravel sources for restoration	San Joaquin River
		Coarse sediment deficit/replenishment criteria : Merced	San Joaquin River
		Coarse sediment deficit/replenishment criteria: Stanislaus	San Joaquin River
		Identify locations to introduce gravel: Tuolumne., Merced	San Joaquin River
		Knights Ferry gravel replenishment and monitoring	San Joaquin River
		Take actions to protect gravel sources in tributaries.	Sacramento River Mainstem
		Protect mainstream meander belt as a source of gravel.	Sacramento River Mainstem
		Restore and replenish spawning gravel in North Fork.	Battle Creek

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Fine Sediment	Geomorphic Process: Fine Sediment Management	Gasberg Creek sediment control	San Joaquin River
		Pilot gravel cleaning project	San Joaquin River
		On-farm ag drainage treatment (pilot project)	San Joaquin River
		Sediment management plan for Merced watershed (identify sources)	San Joaquin River
		Pilot gravel ripping study on Stanislaus	San Joaquin River
		Stanislaus Watershed Projects: East Stanislaus RCD	San Joaquin River
		Watershed Projects: Tuolumne and Calveras counties RCD	San Joaquin River
Erosion/Sediment Input/Geomorphic Factors		Increase tributary sediment control.	Sacramento River Mainstem
		Resolve erosion problems.	Deer Creek, Mill Creek
		Implement road related fixes for erosion problems.	Deer Creek, Mill Creek
		Restore riparian vegetation.	Deer Creek, Mill Creek
		Fund recommendations coming out of the local watershed groups.	Battle Creek
		Identify sources of erosion and develop projects and actions for decreasing erosion.	Battle Creek
		Evaluate flood management practices in Lindo Channel	Big Chico Creek
		Reestablish and revegetate riparian areas.	Big Chico Creek
		Develop a watershed plan.	Big Chico Creek
		Reestablish channel maintenance flows	Clear Creek
		Reestablish channel integrity	Clear Creek
		Provide assistance to local watershed groups.	Clear Creek
		Erosion control projects.	Clear Creek
Erosion, Sediment Input, Land Use		Evaluate feasibility of off-channel and sidechannel restoration.	Yuba River
		Fund all or parts of watershed analyses.	Antelope, Cow, Cottonwood, Little Chico Creeks
		Include implementation actions in watershed analyses.	Antelope, Cow, Cottonwood, Little Chico Creeks
		Encourage consolidation of local efforts when reasonable.	Antelope, Cow, Cottonwood, Little Chico Creeks

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Fine Sediment, cont.	Sediments and Aggregations	Support local stewardship groups.	North Bay	
		Support local education on erosion control.	North Bay	
		Support local land owner education efforts.	North Bay	
		Conduct studies on erosion containment transport and flow dynamics.	North Bay	
		Develop models for sediment sources.	North Bay	
		Assess and monitor sediment sources and impacts.	North Bay	
		Strengthen enforcement of best management practices on land development and public and private roads.	North Bay	
		Fund storm water erosion enforcement.	North Bay	
		Facilitate public outreach and discussion with regulators, regulatees, and resource specialists.	North Bay	
Dredging				
Water Quality	Water Quality Assessment and Pollutant Control	Expand Real-time Water Quality Management Network	San Joaquin River	
		Incorporate Tuolumne model with RTWQMN	San Joaquin River	
		Reduce non-point pollution - expand contaminant project work team scope (IEP review and guidance)	San Joaquin River	
		Establish monitoring for physio/chemical/temperature contaminants, including bioassays, dairy waste, impacts on food supply and dormant pesticide dispersal	San Joaquin River	
		Toxicity	Non-point source agricultural runoff: use BMPs, expand riparian buffer zone.	Sacramento River Mainstem
			Colusa Drain.	Sacramento River Mainstem
		Toxicity, Water Quality	Develop a Highway 32 toxic spill contingency plan	Deer Creek
		Water Quality	Evaluate need to fund pathogen control for private aquacultural facilities. Review status with CVPIA programs.	Battle Creek
			Establish a Delta "streamkeeper".	Delta
			Research and develop TMDL's for all non-point and point sources of pollution.	Delta
	Fund land retirement, focusing on high salinity load areas.	Delta		

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Water Quality, cont.		Locate and inventory storm drains emptying into the Delta.	Delta
		Promote educational efforts to prevent inappropriate use of storm drains.	Delta
		Develop and fund a storm water monitoring program.	Delta
		Develop and fund water quality monitoring programs in coordination with existing USGS or other agency upstream and downstream monitoring.	Delta
	Disposal of Accumulated Salts	Determine alternative methods for discharging salts back into bay from salt ponds.	North Bay
		Develop physical infrastructure to remove salt (if necessary).	North Bay
	Agricultural Chemicals	Scientifically designed sampling program based on a scaled down RMP program.	North Bay
Water Temperature	Temperature	Supplemental money for Grasslands to change from March to April	San Joaquin River
		Action to ease water demand from New Melones for agricultural drainage	San Joaquin River
		Temperature management feasibility studies, models, and operations development	San Joaquin River
	Temperature	Folsom Temperature Control Device (TCD)	American River
		Folsom Reservoir Cold Water Pool Management	American River
		Thermal Refugia Utilization	American River
	Toxicity, Water Quality	Pilot flow study for water temperature.	Clear Creek
	Water Quality	Evaluate the effect of a water temperature control device at Englebright Dam.	Yuba River
Introduced Species	Exotic Plants and Animals	Fund control programs.	North Bay
		Conduct research to determine effects, distribution, and best control methods.	North Bay
		Fund pilot exotic species eradication programs.	North Bay
		Community education and manuals to help homeowners to identify and remove exotic species.	North Bay
		Develop strategy for red fox.	North Bay
		Conduct public education and enforcement on introduction of exotic fish and plants to the aquatic habitat.	North Bay

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Introduced Species, cont.	Exotic Species	Implement a program to prevent introduction of exotic species into areas that are currently supporting native species.	Delta
		Provide additional zebra mussel control (refer to the California Task Force for zebra mussel control).	Delta
		Fund studies to better understand the biology of exotic species in order to support control or eradication efforts.	Delta
		Fund additional study of the effects of striped bass on salmonid species.	Delta
		Form a group of cooperating entities into an exotic species "SWAT" team.	Delta
		Study the effects of inland silverside predation on delta smelt.	Delta
		Establish education programs regarding existing exotic species problems and the need to prevent deter future exotic species introductions.	Delta
		Provide additional resources to increase the enforcement of ballast discharge regulations in areas where introduction of exotic species is a risk.	Delta
		Establish a trapping program for brown headed cowbirds and starlings which compete with native species in riparian areas.	Delta
		Implement projects to reclaim priority habitats from exotic plant species.	Delta
Predation and Competition	Predation	Physical removal of predators from gravel pits, including an assessment of impacts on salmon production.	San Joaquin River
	Predation	Decrease predation.	Sacramento River Mainstem
Harvest of Fish and Wildlife	Illegal Harvest	Increase number of wardens	San Joaquin River
		Modify angling regulations	San Joaquin River
		Evaluate biological effectiveness of expanding fisheries law enforcement	San Joaquin River
		Implement a programmatic level increase in law enforcement to reduce poaching.	Deer Creek, Mill Creek, Feather River, Yuba River

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Harvest of Fish and Wildlife, cont.		Focus law enforcement efforts on the creek during critical times for salmon.	Big Chico Creek
	Regulations	Angling Regulations	American River
Population Management	Straying	Eliminate inappropriate attraction flow.	Sacramento River Mainstem
	Population Management	Evaluate need to establish founding population of spring run.	Battle Creek
		Provide input to genetic monitoring of the fish population.	Big Chico Creek
		Evaluate need for founding population of spring run chinook.	Clear Creek
		Evaluate potential for creating more separation of fall and spring-run spawning habitat to reduce or eliminate hybridization.	Yuba River
		Adult salmon counting structures	San Joaquin River
		Improving Stanislaus River escapement monitoring: feasibility of using hydroacoustics	San Joaquin River
		Fall run salmon otolith and scale evaluation	San Joaquin River
		Scale analysis for racial and age composition of chinook	San Joaquin River
		Smolt mortality study	San Joaquin River
		Verification and calibration of screw-trap estimates of Stan. River outmigrants: Feasibility of using hydroacoustics for smolt survival.	San Joaquin River
		Purchase Hills Ferry Barrier land to ensure access and reduce straying	San Joaquin River
	Land Use	Land Use, Forest Management	Encourage USFS, CDF, and BLM to be part of the overall CALFED effort on a programmatic level.
Improve agency and public education on forestry issues on a programmatic level.			Deer Creek, Mill Creek
Coordinate forestry agency management plans with other agencies and conservancies.			Deer Creek, Mill Creek
Fund the Deer Creek watershed conservancy.			Deer Creek
Fund the Mill Creek watershed conservancy.			Mill Creek
Land Use			Fund the Butte Creek Conservancy.

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Land Use, cont.		Encourage continued outreach activities with agricultural interest.	Butte Creek
		Continue to fund site specific actions.	Butte Creek
		Fund Nature Conservancy and other projects specific to barriers and diversions.	Butte Creek
		Fund watershed plan and conservation easements.	Butte Creek
		Encourage coordination between local groups, Park Service, BLM, and USFS.	Clear Creek
	Land Use	Restore riparian vegetation	Feather River, Yuba River
		Identify Off-site Mitigation	American River
		Mitigation/Enhancement Monitoring Plan	American River
		Consultation/Technical Assistance	American River
		Expand San Joaquin National Wildlife Refuge on the Tuolumne and San Joaquin rivers	San Joaquin River
		San Luis National Wildlife Refuge expansion on the San Joaquin River	San Joaquin River
	Change in Agricultural Land Use Intensity	Support local efforts for sustainable agriculture.	North Bay
		Match funding for private landowner actions (for example, "Partners for Wildlife").	North Bay
		Establish buffer areas.	North Bay
		Demonstration farm sites.	North Bay
		Identify lands that have a high potential for mass landslide potential and take early action to prevent erosion.	North Bay
		Establish setback levees.	North Bay
		Acquire floodplain easements.	North Bay
	Urbanization	Acquire wetlands so that there is no more building on them.	North Bay
		Help city councils to limit growth in critical habitats.	North Bay
		Identify way to preserve land with less than fee acquisition.	North Bay
		Present riparian core areas as amenities and educate developers to their value.	North Bay
		Educate local government on how to prevent development in critical areas.	North Bay

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Land Use, cont.		Plug into the local master planning process.	North Bay
		Model planned buildout based on master planning at UC Berkeley Urban Panning Institute.	North Bay
		Acquire buffer zones.	North Bay
		Public education on Best Management Practices (BMP) approach to development.	North Bay
Artificial Propagation of Fish	Hatchery Management	Interim artificial propagation program	San Joaquin River
		Hatchery fish marking program	San Joaquin River
		Develop a hatchery strategy for the SJR	San Joaquin River
		Review and revise operation plan for Merced River Fish Facility	San Joaquin River
		Tuolumne River Hatchery Plan	San Joaquin River
		Hatchery operation modification.	Sacramento River Mainstem
		Evaluate options to provide an isolated water supply for Coleman National Fish Hatchery.	Battle Creek
		Evaluate Battle Creek plan (AFRP).	Battle Creek
		Evaluate hatchery practices at Feather River Hatchery.	Feather River
		Hatchery Management Practices	American River
		Increase Artificial Practices	American River
Climate			
Human Disturbance	Education Programs	Tuolumne River Environmental Education Center	San Joaquin River
		Tuolumne River Interpretive Center Conceptual Plan	San Joaquin River
		Resources education program	San Joaquin River
		Public and angler education programs	San Joaquin River
		Information sharing network for the San Joaquin watershed	San Joaquin River
Wildfire	Fire Management	Fire Management	American River