CALFED Bay-Delta Program

Water Quality Program

Stage 1A and Stage 1 Actions

Table 3. Early Implementation Actions (Stage 1A)

DESCRIPTION	DETAILS	GEOGRAPHIC AREA	INDICATORS OF SUCCESS
Veale Tract drainage discharge relocation feasibility study and environmental documentation	Several agricultural discharges from Veale Tract considerably increase salinity and organic matter. Environmental documentation for relocation or treatment of the drains is proposed.	South Delta, Veale Tract, and Old River	Reduced levels of total organic carbon (TOC), pathogens, and nutrients in Contra Costa Water District (CCWD) intake at Rock S1ough
Feasibility study: Management, relocation, and/or treatment of Reclamation District (RD) 800 drain discharge	Urban and agricultural discharges in the RD 800 area may affect south Delta exports for drinking water. Impacts need to be managed.	South Delta, Discovery Bay, and the proposed Mountain House community	Implementation of water-shed best management practices (BMPs) to prevent input of nutrients, pathogens, and TOC
Study: Investigate DO causes and solutions for Lower San Joaquin River and begin implementation	Identify sources of oxygen-depleting substances and eliminate or reduce those sources.	South Delta and Lower San Joaquin River	The Lower San Joaquin River meets DO criteria > 5 mg /L
Pilot studies concerning integrated on-farm management of selenium	Assist in completing integrated on-farm management measures and initiate larger pilot studies. Some measures include marketing of selenium and salt by-products to eliminate the need for salt waste facilities.	Grasslands area and other affected surrounding areas	Reduction of selenium
Elimination of discharges of waste from watercraft in the Delta and tributaries	Certain laws currently allow discharges from watercraft, both recreational and commercial. Laws also allow the State to prohibit such discharges.	Bay and Delta	Elimination of nutrient and pathogen loading from watercraft
Barker Slough watershed restoration	The Barker Slough watershed contributes organic material to the North Bay Aqueduct (NBA) that, after treatment, produces DBPs. Watershed restoration is aimed at eliminating a majority of the organic carbon.	Barker Slough watershed	Reduced levels of TOC, pathogens, and nutrients in the NBA intake
Assessment of sources and magnitudes of loadings of constituents of concern for drinking water	A comprehensive, perpetual, and evolving study of loads of specific drinking water constituents of concern that are discharged, either by point sources or nonpoint sources to the Delta.	The entire Delta and tributaries, as necessary for problem definition and resolution	Reduced levels of TOC, pathogen, and nutrients
Sacramento River mercury source identification and control/ remediation study	The Sacramento River contributes a large portion of the mercury that is discharged to the Delta. Sources need to be further identified, and control measures need to be implemented.	Primarily the eastern tributaries of the Sacramento River	Reduced levels of mercury and reduced public health risks and environmental risks associated with mercury contamination of aquatic organisms
Assessment of diazinon and chlorpyrifos	In the past, urban source control of the common pesticides diazinon and chlorpyrifos has been addressed only through public education. This approach needs to be assessed and implemented along with identifi-cation of the most effective BMPs.	The Sacramento and Stockton urban areas are targeted first; information gained should be applied uniformly throughout the watershed.	Reduced levels of diazinon and chlorpyrifos sufficient to eliminate the toxicity associated with the urban use of these pesticides

D-036107

Table 3. Early Implementation Actions (continued)

DESCRIPTION	DETAILS	GEOGRAPHIC AREA	INDICATORS OF SUCCESS
Education about diazinon and chlorpyrifos	Implementation of the education component and the BMPs recommended to control pesticides in urban stormwater.	The Sacramento and Stockton urban areas are targeted first; information gained should be applied uniformly throughout the watershed.	Reduced levels of diazinon and chlorpyrifos sufficient to eliminate the toxicity associated with the urban use of these pesticides
Cache Creek/Delta mercury source control projects	Cache Creek and Mount Diablo contribute a large portion of the mercury that is discharged to the Delta. First-stage remediation of identified sources needs to be implemented.	Cache Creek, Mount Diablo, and other sources entering the Delta	Reduction of more than 10% of mercury loading of the Delta
Clear Lake upper watershed mercury remediation actions	Sulfur Bank Mine contributes a majority of the mercury to Clear Lake. Early remedial work needs to be implemented to protect the aquatic system and the neighboring public.	Sulfur Bank Mine	Reduction in exposure to mercury for aquatic organisms and the public
Evaluation of TOC	Source identification of TOC and pilot testing of treatment methods on agricultural drain water from Delta islands.	Delta island drains and lower river drains	Reduced levels of TOC that reach the intakes at pumping stations
Evaluation and implementation actions for release of total dissolved solids (TDS) built up during high-flow periods	Utilize the assimilative capacity of the river to reduce TDS build up in agricultural soils. During high-flow periods, the assimilative capacity of the river is likely to be much greater than the TDS build up.	Southern and western San Joaquin Valley	Eliminate salt build up while minimizing impacts on the river

D-036108

D-036109

Table 4. Stage 1 Actions (After Record of Decision)

STAGE 1 ACTIONS	DETAILS	GEOGRAPHIC AREA	INDICATORS OF SUCCESS
1. Prepare project-level environmental documentation and permitting as needed (Years 1-7).	The continuous process of developing and managing the Water Quality Program.	Bay-Delta solution area	
2. Coordinate with other Program elements to ensure that in-Delta modifications maximize the potential for Delta water quality improvements (Years 1-7).	Ongoing coordination and integration.	All areas	
3. Continue to clarify the use of and fine tune water quality performance targets and goals (Years 1-7).	Receive input and incorporate recommendations as results from studies and actions become available.	All areas	

D-036109

Table 4. Stage One Actions (continued)

STAGE 1 ACTIONS	DETAILS	GEOGRAPHIC AREA	INDICATORS OF SUCCESS
4. Conduct the following mercury evaluation and abatement work: *Cache Creek* • Conduct risk appraisal and advisory for human health impacts of mercury (Years 1-5). • Support development and implementation of total maximum daily load (TMDL) for mercury (Years 1-7). • Determine bioaccumulation effects in creeks and Delta (Years 1-4). • Identify and perform source, transport, inventory, and mapping and speciation of mercury (Years 1-7). • Conduct information management and public outreach (Years 5-7). • Participate in Stage 1 remediation (drainage control) of mercury mines if federal Good Samaritan protection is obtained (Years 3-5). • Investigate the sources of high levels of bioavailable mercury (Years 4-7). *Sacramento River* • Investigate the sources of high levels of bioavailable mercury, inventory, map, and refine other models (Years 3-7). • Participate in remedial activities (Year 7).	The objective of this work is to reduce the mercury in the Bay-Delta to levels that are not harmful to aquatic species or to the public and wildlife who consume fish from the Bay-Delta. Complete the initial studies to determine the most bioavailable forms of mercury and their sources and devise a strategy for remediation. In addition to the proposed studies, early remediation of some sources is proposed, provided scientific assessment supports the projects. Remediation of abandoned mines is not recommended without a release of liability from certain federal environmental laws.	Cache Creek, Cache Slough, north Delta, and Sacramento River and its tributaries	Reduced mercury concentrations in fish tissue below what is considered safe for humans and wildlife.

D-036110

Table 4. Stage One Actions (continued)

STAGE 1 ACTIONS	DETAILS	GEOGRAPHIC AREA	INDICATORS OF SUCCESS
Action 4 (cont.) *Delta* • Research the methylization (part of bioaccumulation) process in the Delta (Years 1-2). • Determine sediment mercury concentration in areas that would be dredged during levee maintenance or conveyance work (Years 3-7). • Determine the potential impact of ecosystem restoration work on methyl mercury levels in lower-and-higher trophic level organisms (Years 3-5). • Study the ecological significance of pesticide discharges (using $1.5 million of Ecosystem Restoration Program funds) (Years-1-3).			
5. Conduct the following pesticide work: • Develop diazinon and chlorpyrifos hazard assessment criteria with the California Department of Fish and Game and the California Department of Pesticide Regulations (Year 1). • Support implementation of BMPs (Years 2-7). • Monitor to determine their effectiveness (Years 4-7).	Reduce the concentrations of diazinon and chlorpyrifos in Bay waters and tributaries from agricultural uses and urban uses.	Urban areas and Central Valley agricultural areas	Eliminated aquatic toxicity associated with these two compounds

D-036111

Table 4. Stage One Actions (continued)

STAGE 1 ACTIONS	DETAILS	GEOGRAPHIC AREA	INDICATORS OF SUCCESS
6. Conduct the following heavy metals work: • Determine the spatial and temporal extent of metal pollution (Years 3-7). • Determine the ecological significance and extent of copper contamination (Years 1-3). • Review impacts of other metals, such as cadmium, zinc, and chromium (Year 1). • Participate in Brake Pad Consortium to reduce the introduction of copper (Years 1-7). *Action 6 (cont.)* • Partner with municipalities on the evaluation and implementation of stormwater control facilities (Years 2-5). • Participate in remediation of mine sites as part of local watershed restoration and Delta restoration (Years 2-7).	Heavy metal contamination contributes to aquatic toxicity in upper portions of the watershed and may contribute to the toxicity in the Bay-Delta. These actions are designed to determine the ecological impacts of trace metals and reduce those impacts.	Upper Sacramento River and the Bay-Delta	Eliminated heavy metal toxicity in the Sacramento River and Delta

D-036112

D-036113

Table 4. Stage One Actions (continued)

STAGE 1 ACTIONS	DETAILS	GEOGRAPHIC AREA	INDICATORS OF SUCCESS
7. Conduct the following salinity reduction work in coordination with the San Joaquin Valley Drainage Program: • Develop and implement water quality management activities to improve supply quality (Years 1-7). • Develop and implement a management plan to reduce drainage and the total salt load to the San Joaquin Valley (Years 1-7). • Encourage source reduction programs, including tiered pricing, expansion of drainage recirculation systems, land management, and land retirement where other options are infeasible (Years 1-3). • Conduct pilot projects to evaluate the feasibility of water reuse of various concentrations of saline water through agroforestry. (Years 4-6). • Study the feasibility of desalination methods, including reverse osmosis (Year 7). • Study cogeneration desalination (Year 7). • Implement real-time management of salt discharges (Years 3-7).	The degree of utility of water often is determined by its relative salinity. Higher saline water is associated with higher taste and odor complaints form municipal customers, and is more restricted in its reuse potential. Lowering the salinity of water improves environmental habitat (in the rivers and Delta) as well as reuse potential.	San Joaquin River and its tributaries	Reduced salinity in the San Joaquin River and in soils to be protective of uses of the water and sustainable for agricultural use
8. Conduct the following selenium work: • Conduct selenium research that will fill data gaps in order to refine the regulatory goals of source control actions; determine the bioavailability of selenium under several scenarios (Years 1-5).	Selenium is closely associated with the salinity discussed in the previous section. Some actions overlap the two sections. Selenium is an ecosystem stressor with some effects on aquatic organisms but most noted for it effects on terrestrial animals. Actions are intended to eliminate the toxicity associated with selenium.	San Joaquin Valley and the Bay-Delta	Eliminated reproductive toxicity associated with selenium

D-036113

Table 4. Stage One Actions (continued)

STAGE 1 ACTIONS	DETAILS	GEOGRAPHIC AREA	INDICATORS OF SUCCESS
Action 8 (cont.) • Research the interactions of mercury and selenium (Years 2-3). • Refine and implement real-time management of selenium discharges (Years 1-7). • Expand and implement source control and reuse programs (Years 1-7). • Coordinate with other programs (Years 1-7) (for example, the recommendations of the San Joaquin Valley Drainage Implementation Program, and the Central Valley Project Improvement Act [CVPIA]); for retirement of lands with drainage problems that are not subject to correction in other ways. (The CVPIA alone will retire approximately 70,000 acres of land with selenium-caused water quality problems during Stage 1.)			
9. Conduct the following work concerning sediment reduction work and organochlorine pesticides: • Participate in implementation of the U.S. Department of Agriculture sediment reduction program (Years 1-7). • Promote sediment reduction in construction arenas, urban stormwater, and other specific sites (Years 1-7). • Determine the source areas and ecological impacts of OC pesticides, dioxins, and PCBs; draft a corrective action strategy (Years 3-7). • Implement stream restoration and revegetation work (Years 4-7). • Quantify and determine the ecological impacts of sediments in target watershed; implement corrective actions (Years 4-7). • Coordinate with the Ecosystem Restoration Program on sediment needs (Years 1-3).	Sediment sometimes carries old organochlorine pesticides, such as DDT, and some other compounds, such as dioxins and PCBs. Reductions in sediment may reduce these compounds. More information is needed to understand these pollutants and determine how to control them.	Entire water-shed area and the Bay-Delta	Reduced sediment and OC pesticides and related compounds below water quality criteria levels

Table 4. Stage One Actions (continued)

	STAGE 1 ACTIONS	DETAILS	GEOGRAPHIC AREA	INDICATORS OF SUCCESS
10.	Conduct the following nutrients work: • Complete studies of the causes for DO sag in San Joaquin River (Years 1-2). • Define and implement corrective measures for DO sag (Years 1-7). • Encourage regulatory activity to reduce nutrients discharged by unpermitted dischargers (Years 1-7). • Develop inter-substrate DO testing in conjunction with the Ecosystem Restoration Program (Years 2-4). • Study the effects of nutrients on beneficial uses (Years 4-7).	While nutrients in Bay-Delta water are beneficial (in some respects) to aquatic life, nutrients also causes reductions in Water Quality Program and increases in organic matter in export water.	Entire water-shed area and the Bay-Delta	Balanced nutrient levels for all beneficial uses
11.	Conduct the following work concerning unknown toxicity: • Participate in identifying unknown toxicity and addressing as appropriate (Years 1-7).	Identify sources of toxicity and begin eliminating the associated toxicity	Bay-Delta	Eliminated toxicity
12.	Perform other actions specific to drinking water improvements: • Control TOC contribution through control of algae, aquatic weeds, agricultural runoff, and watershed improvement (Years 1-7). • Study brominated and chlorinated DBP operational controls at water treatment plants and implement incremental improvements as warranted (Years 1-7).	Drinking water protection is complex. Much of the proposed actions are associated with source water protection, while some focus on treatment technology and health studies. Protecting drinking water quality likely will require significant success in many of the proposed actions.	Entire water-shed and Bay-Delta	Reduced drinking water contaminants of concern sufficient to meet state and federal drinking water concentrations

D-036115

Table 4. Stage One Actions (continued)

STAGE 1 ACTIONS	DETAILS	GEOGRAPHIC AREA	INDICATORS OF SUCCESS
• Control pathogens through control of cattle, urban stormwater, sewage, boat discharge, and possibly recreational swimming; includes various projects depending on the area of impact (Years 3-7).			
• Study impacts on recreational swimming impacts and impacts from wild animals (Year 4).			
• Relocate Barker Slough intake (Years 7+).			
Action 12 (cont.)			
• Reduce methyl tert-butyl ether (MTBE) in various areas (Years 3-5).			
• Address water quality problems in terminal reservoirs (Years 3-5).			
• Perform public health effects studies, as needed, to more specifically identify the potential health effects of bromide-related DBPs (Years 1-3).			
• Investigate alternative sources and means of providing high-quality water supply for urban users of Delta water (Years 1-7).			
• Investigate, as needed, advanced treatment technologies for the removal of salt, bromide, TOC, and pathogens from urban water supplies (Years 1-7).			
• Investigate combinations of new supplies and technologies that can minimize salt content of urban water supplies and provide greater public health protection (Years 1-7).			

Table 4. Stage One Actions (continued)

STAGE 1 ACTIONS	DETAILS	GEOGRAPHIC AREA	INDICATORS OF SUCCESS
• Convene a Delta Drinking Water Council in a public forum to consider relevant technical data and inform the governing entity in its consideration of solutions to identified public health issues for urban users of Delta water (Years 1-7).			
• Develop a plan sufficient to meet forthcoming U.S. Environmental Protection Agency and Department of Health Services standards for brominated DBPs (by Year 7).			
13. Conduct the following turbidity and sediment work: • Implement protection actions in the upper watershed to reduce sedimentation of fish spawning habitat (Years 1-7). • Implement erosion control BMPs in the upper watershed (Years 1-7).	Sediment in the upper watershed is harmful to some spawning habitat, although some sediment load in a creek is natural and necessary in a balanced aquatic environment. These actions are intended to eliminate the harmful portion of sedimentation.	Upper watersheds	Eliminated harmful sediment loads
Action 13 (cont.) • Construct sedimentation basins in urban and suburban areas (Years 1-7). • Evaluate the use of a head control structure on lower Dominici Creek (Years 2-4). • Perform quantitative analysis of river sediment loads, budgets, and sources (Years 1-7).			