

California Bay-Delta Program

Drinking Water Quality Program Multi-Year Program Plan (Years 4-7)

Implementing Agencies:

State Water Resources Control Board

United States Environmental Protection Agency

State Department of Health Services

August, 2003



Goals and Objectives

Goals of the Program and CALFED Record of Decision Commitments

The Drinking Water Quality Program (DWQP) goal is to provide safe, reliable, and affordable drinking water to the 22 million Californians who rely on the Delta for all or part of their drinking water. To reach this goal, DWQP actions combine cost-effective improvements in source water quality, advancements in treatment technology, and innovations in water management.

Work has progressed on all of the Record of Decision commitments with emphasis on source water improvement and treatment technologies. The Drinking Water Subcommittee (DWS) of the Bay-Delta Public Advisory Committee has developed a framework for drinking water quality management stemming from discussion of the ROD water quality targets. This framework is captured in the “Equivalent Level of Public Health Protection Draft Decision Tree” (ELPH diagram) named for the language in the ROD (see detailed Program Plan, attached). The ELPH diagram shows the broad range of actions and factors that can affect drinking water quality.

Following the ELPH diagram, the accomplishments and activities of the program are grouped into five categories:

- Improving Delta Water (includes Source Improvement, Conveyance/Delta Operations, and Storage)
- Improving Imported Water (includes CVP/SWP Operations and Storage south of Delta and Source Water Exchanges outside of the Delta)
- Improving Local Sources
- Treatment Options
- Program Management (includes Monitoring/Assessment, Implementation Commitments, and Subcommittee support)

Accomplishments

Improving Delta Water

North Bay Aqueduct Alternative Intake Study: Evaluated relocation of aqueduct intake as part of 2001 DWQP grant.

North Bay Aqueduct Watershed Study: A Proposition 204 grant to evaluate watershed management on Barker Slough has been completed. The project involved monitoring water quality and developing and implementing pilot Best Management Practices (BMPs).

Delta Water Quality Modeling: The DWR Delta Modeling Section with support from the DWQP has completed a number of studies of Delta water quality resulting from various conveyance and storage alternatives.

CVRWQCB Basin Plan Amendment (salinity and boron): The draft BPA was circulated for public review.

DWR Agricultural Drainage Program (salinity and selenium): Includes management and coordination, monitoring and evaluation, on-farm drainage reduction, treatment, integrated drainage management and environmental investigations.

Real Time Monitoring and Management of Salinity: The Regional Board, DWR, and Lawrence Berkeley National Laboratory in cooperation with the USGS and local water districts, implemented a real-time monitoring and modeling program for salinity in the San Joaquin River. Flow and salinity were monitored, and salt load and salt assimilative capacity were modeled, for three years through December 2002.

Improving Imported Water

Sanitary Surveys: DWR completed the sanitary survey of the State Water Projects and its tributaries. DWR also conducted water quality sampling of run-off into the California Aqueduct and the South Bay Aqueduct.

Bay Area Water Quality and Supply Reliability Program: This program is evaluating cooperative projects among Bay Area water districts to meet their water supply reliability and drinking water quality objectives. Phase 1 evaluated overall Bay Area water quality, developed a list of potential projects and provided a qualitative evaluation of the ability of existing infrastructure to provide sufficient high quality water to meet the drinking water objectives in the ROD.

San Joaquin Valley / Southern California Water Quality Exchanges – Metropolitan Water District (MWD) has entered into two partnerships with San Joaquin Valley water agencies to explore water management opportunities to help resolve water supply and water quality management problems.

Operational Improvements/ Recirculation in the San Joaquin River: US Bureau of Reclamation and DWR have completed the modeling studies, which are undergoing management review. The reports will then be forwarded to the fisheries agencies for a preliminary fish and wildlife evaluation.

Improving Local Sources

This program element was added only recently. Implementation will begin in Year 4.

Treatment Options

Ultraviolet (UV) Light Disinfection: A CALFED grant for \$161,000 was awarded to MWD to study integration of UV disinfection with treatment oxidants.

Ion Exchange for Organic Carbon Removal: The DWQP awarded a grant to Solano County Water Agency to investigate application of innovative ion exchange technology for organic carbon removal. Bench scale studies are under way to be followed by a pilot scale system.

Regional Desalination: Agricultural drainage water recycling using membrane technology by Panoche Drainage District (CALFED grant). The project will begin in Year 4.

Desalination Research and Innovation Partnership (DRIP): A MWD project intended to demonstrate innovative desalination technologies to treat a variety of brackish and high salinity wastewaters. The program has already resulted in the development of advanced reverse osmosis (RO) membranes.

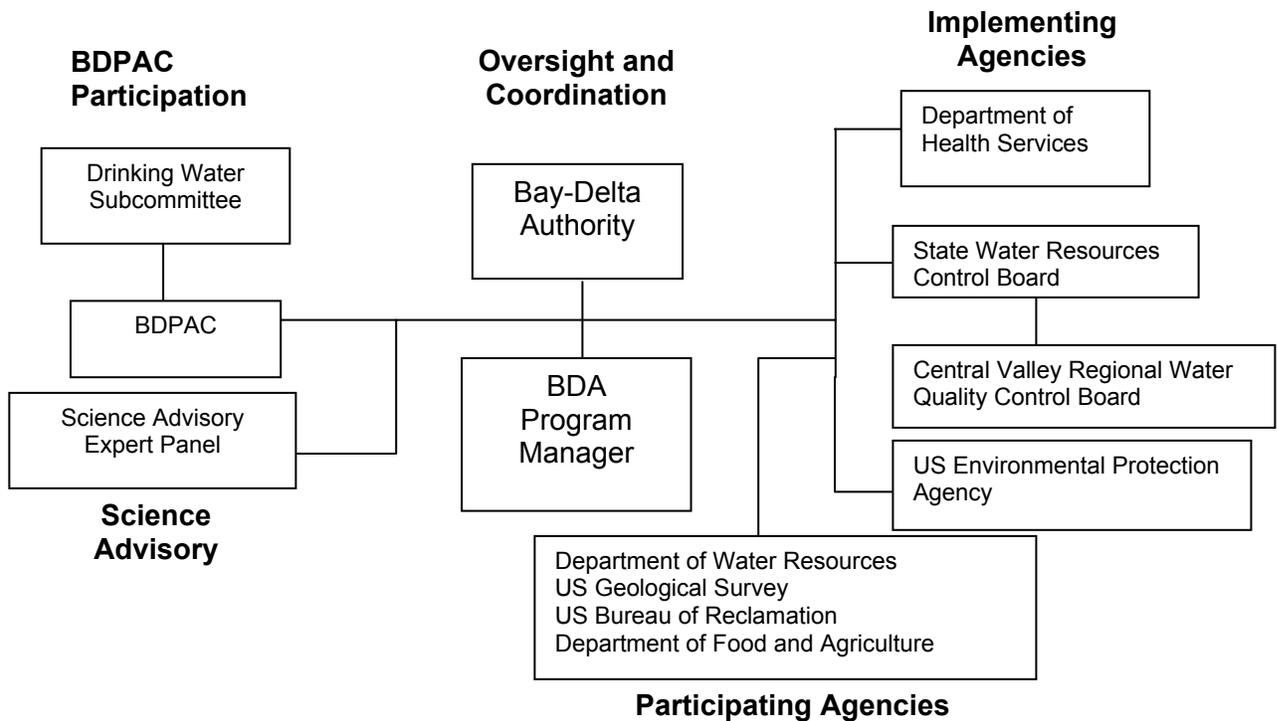
Program Management

Monitoring and Assessment: CALFED Monitoring and Assessment Program (MAP): Identified existing monitoring programs, funded 15 monitoring and assessment projects for \$8 million.

2001 CALFED Drinking Water Quality Program Grants: The DWQP awarded grants for 13 projects totaling \$6.7 million. Emphasis in this first PSP was on monitoring and assessment.

2002 State Water Resources Control Board RFP: The SWRCB with the DWQP taking the lead on the selection process awarded grants for 13 projects totaling \$7.2 million in Prop 13 nonpoint source funds. Seven of these projects related to agriculture in the San Joaquin Valley.

Program Structure



Agency	Roles and Responsibilities
California Bay-Delta Authority	<ul style="list-style-type: none"> Oversight and coordination
Department of Health Services	<ul style="list-style-type: none"> State co-lead Management of treatment technology development, and health effects studies Grant funds manager
State Water Resources Control Board	<ul style="list-style-type: none"> State co-lead, Grant funds manager
Central Valley Regional Water Quality Control Board	<ul style="list-style-type: none"> Management of source protection efforts
U.S. Environmental Protection Agency	<ul style="list-style-type: none"> Federal lead Administration of Clean Water Act and Safe Drinking Water Act via state agencies
Department of Water Resources	<ul style="list-style-type: none"> Municipal water quality investigations SWP water quality monitoring Conveyance program
U.S. Bureau of Reclamation	<ul style="list-style-type: none"> San Joaquin Valley agriculture drainage program CVP water quality monitoring, Recirculation study
Department of Food and Agriculture	<ul style="list-style-type: none"> Conservation programs for agriculture
U.S. Geological Survey	<ul style="list-style-type: none"> Data and science assessments of water quality Contract research

Major Activities

Improving Delta Water

Coordinate with Conveyance Projects – The DWQP will continue to coordinate with conveyance projects in order to fully understand water quality benefits and cost-effectiveness of potential actions including the South Delta Program, Through-Delta Facility/Delta Cross Channel Operations, and flooded island studies.

Schedule: Ongoing

Coordinate with Storage Projects – The DWQP will continue to coordinate with storage projects in order to fully understand water quality benefits and cost-effectiveness of potential Storage actions including North of Delta Off-Stream Storage, Los Vaqueros Reservoir Expansion, and In-Delta Storage.

Schedule: Ongoing

Regional Conceptual Models – As part of the strategic planning process, the DWQP and DWS will develop regional conceptual models in order to assist local water supply agencies with acquiring the information they need to make cost effective investments in improved water quality.

Schedule: Ongoing

Sacramento River Watershed Program – US EPA will be providing an additional \$270,000 in federal funds to continue the program.

Schedule: Continue 2003

Drinking Water Policy for the Delta and its Tributaries – Years 4-7 will be devoted to implementation of the policy work plan. The final product of the working group will be a comprehensive policy proposal that will be provided to the Regional Board for their regulatory adoption (possibly in the form of a Basin Plan Amendment).

Schedule: Completion 2008

North Bay Aqueduct Livestock Fencing Within Watershed – Continuation of work previously implemented in watershed. This project can be completed within one year of authorization to proceed. The SCWA is committed to ongoing monitoring, at the SCWA's cost after completion of the grant.

Schedule: To Be Determined

Improving Imported Water

State Water Project Watershed Sanitary Survey – Future work includes an update report for 2006, as well as the development of modeling tools to track sources and loads of contaminants in the project.

Schedule: Completion 2007

Bay Area Water Quality and Supply Reliability Program – Phase 2 include completion of the analysis and evaluation of those results to identify alternatives or portfolios that group a variety of alternatives together that meet the objectives of the various Bay Area agencies. As Phase 2 nears completion, the Bay Area water districts involved in the project will need to work closely with other Bay Area stakeholders and STATE AND FEDERAL agencies to determine how to proceed with Phase 3, environmental review, feasibility, and design.

Schedule: Completion Spring 2004

San Joaquin Valley / Southern California Water Quality Exchanges – Both the Friant and Kings Partnerships are moving towards investigating specific projects that will facilitate water quality exchanges. In December 2003, Friant and Metropolitan Water District (MWD) approved a Phase 2 Workplan. Soon, MWD will be amending the existing Kings Workplan to address funding specific projects.

Schedule: Completion 2007

Operational Improvements/ Recirculation in the San Joaquin River – Contingent upon funding being identified, USBR will conduct sediment sampling, economic analysis, legal analysis, additional fisheries study, public involvement, and final documentation.

Schedule: Completion 2007

Treatment Options

UV Light Disinfection (CCWD Project) – This is a second UV disinfection project and will be funded with the primary objective to aid utilities using Delta water in developing compliance strategies through modification of existing facilities, and installation of new treatment processes.

Schedule: To Be Determined

Agricultural Drainage Water Recycling Using Membrane Technology – Panoche Drainage District (supported by a CALFED grant) will implement this project to investigate application of membranes to remove salts, selenium, and nutrients.

Schedule: Completion 2007

Desalination Research and Innovation Partnership (DRIP) – A MWD project intended to demonstrate innovative desalination technologies to treat a variety of brackish and high salinity wastewaters. The program has already resulted in the development of advanced reverse osmosis (RO) membranes.

Schedule: Completion 2006

Improving Local Sources

Regional Conceptual Models – As part of the strategic planning process, the DWQP and DWS will develop regional conceptual models in order to assist local water supply agencies with acquiring the information they need to make cost effective investments in improved water quality.

Schedule: To Be Determined

Program Management

Monitoring and Assessment – CALFED Monitoring and Assessment Program (MAP): There are three primary goals for the MAP. 1) Develop a trends monitoring program that will indicate if drinking water quality is changing over time and identify where changes are taking place. 2) Develop a program of studies, conceptual models, numerical models, workshops, and reports that will answer questions about sources, fate, transport, and management of contaminants of concern. 3) Improve access to information related to drinking water quality in the California Bay-Delta Program solution area.

Schedule: Ongoing

2003 SWRCB Grants – Release of \$31.5 million for drinking water quality source improvement projects, including development and assessment of best management practices for discharges from Delta islands, irrigated agricultural and urban sources.

Schedule: January 2004

Year 4 Activities

Improving Delta Water

DWR Agricultural Drainage Program (salinity and selenium): DWR will continue its drainage program including management and coordination, monitoring and evaluation, on-farm drainage reduction, treatment, integrated drainage management and environmental investigations. DWR will also manage Proposition 204 Drainage Reuse Sub-account projects.

Schedule: Ongoing

North Bay Aqueduct Livestock Fencing Within Watershed: Continuation of work previously implemented in watershed. This project can be completed within one year of authorization to proceed. The SCWA is committed to ongoing monitoring, at the SCWA's cost after completion of the grant.

Schedule: To Be Determined

Alternate intake for the North Bay Aqueduct: SCWA will present the results to the California Department of Health Services, Department of Water Resources and California Bay-Delta Authority (CBDA) to determine the next steps. At these future next steps SCWA will include additional public involvement and potentially start the CEQA process.

Schedule: Winter 2003

Improving Imported Water

Bay Area Water Quality and Supply Reliability Program - Phase 2 includes completion of the analysis and evaluation of those results to identify alternatives or portfolios that group a variety of alternatives together that meet the objectives of the various Bay Area agencies. As Phase 2 nears completion, the Bay Area water districts involved in the project will need to work closely with other Bay Area stakeholders and STATE AND FEDERAL agencies to determine how to proceed with Phase 3, environmental review, feasibility, and design.

Schedule: Completion Spring 2004

Treatment Options

Ultraviolet (UV) Light Disinfection (MWD Project)

Schedule: Completion Winter 2004.

UV Light Disinfection (CCWD Project) – This is a second UV disinfection project and will be funded with the primary objective to aid utilities using Delta water in developing compliance strategies through modification of existing facilities, and installation of new treatment processes.

Schedule: To Be Determined

Program Management

2003 SWRCB Grants: Release of \$31.5 million for drinking water quality source improvement projects, including development and assessment of best management practices for discharges from Delta islands, irrigated agricultural and urban sources.

Schedule: January 2004

Initial Assessment of Progress: The (Bay-Delta Public Advisory Committee) BDPAC Drinking Water Subcommittee will complete an initial assessment of progress towards meeting the ROD water quality targets and alternative treatment technologies.

Schedule: December 2003

Integration with the Science Program

There are several key objectives that will depend heavily on the availability of reliable scientific information about the Bay-Delta system. There are a number of critical unknowns for the program including:

1. The TOC and bromide targets in the ROD are intended to protect public health by reducing disinfection byproduct formation. Is TOC the most appropriate measure of disinfection byproduct formation potential?
2. How can source control, water management, and treatment be used most effectively in to reduce risk from disinfection byproducts, pathogens, and other pollutants of concern?
3. What are the long-term trends in ambient concentrations and loads of the drinking water program pollutants of concern (organic carbon, bromide, pathogens, turbidity, salinity, and nutrients)?
4. How will large scale and long term changes to the system affect source water quality? For example: How will increasing population and urbanization of the Central Valley impact source water quality?

The DWQP will establish an expert panel to advise the Drinking Water Subcommittee and the program on the science aspects of these management questions and ROD milestones. The following activities will include scientific review or will be developed cooperatively with the Science Program:

Description	Due
Comprehensive monitoring and assessment program	January 2003
Determine if additional protective measures needed	December 2004
Assess of progress on targets and treatment technologies	December 2003
Final assessment of progress	December 2007
Evaluate full scale treatment implementation	January 2007

Performance Measurement – The program is committed to gathering information about water quality and other measures of program success. This is one of the primary objectives of the monitoring and assessment program. The program has a list of candidate indicators, has established indicators for TOC and bromide in exported water, and plans to develop more indicators as resources and data allow.

Cross-Program Relationships

Conveyance Program – DWQP has contributed resources to the modeling of how water moves through the Delta operations of the Delta Cross Channel to move high quality Sacramento River water to central Delta channels and the export pumps and studies of the proposed screened diversion on the Sacramento upstream of the Delta Cross Channel

Ecosystem Restoration Program – ERP and DWQP water quality problems are frequently associated with the same sources indicating the need for cooperative monitoring and source improvement strategies.

Watershed Management – The Watershed Program and DWQP work cooperatively on grant funding processes and have overlapping program objectives. Building local capacity for watershed management activities provides the mechanism for identifying, guiding, and implementing drinking water quality improvement projects. The Watershed and Drinking Water Quality Programs, working with the SWRCB, have coordinated their grant funding processes.

Water Use Efficiency – An important element of both the WUE and DWQP is promotion of good water measurement and management by agricultural users. Water Use Efficiency is identified as an important element in the ELPH diagram.

Levee System Integrity Program – The Delta levee system provides important protection against salinity intrusion, therefore, the DWQP recognizes the significant influence the progress and success that the LSIP will have on protecting the quality of Delta water supplies.

Storage Program – DWQP is coordinating with the Storage Program since storage projects can have positive or negative effects on Delta Water Quality. The construction of the major dams of both the State and federal water projects greatly reduced seasonal fluctuations in Delta salinity. Additional storage north of the Delta is likewise expected to have water quality benefits. On the other hand, feasibility studies of the proposed in-Delta storage project show that it could increase loadings of some pollutants.

Stage 1 Funding

Drinking Water Quality Funding (\$ in millions)	Program Year							Total
	1	2	3	4	5	6	7	
State	\$37.50	\$4.38	\$44.60	\$3.11	\$2.83	\$2.83	\$2.83	\$98.08
Federal	\$0.00	\$0.00	\$0.00	\$0.00				\$0.00
Local/Water User	\$0.00	\$0.00	\$4.54	\$0.00				\$4.54
Revised Stage 1 (Actual & Expected Funding) ¹	\$37.50	\$4.38	\$49.14	\$3.11	\$2.83	\$2.83	\$2.83	\$102.62
Original ROD (Aug, 2000) ²	\$41.0	\$78.0	\$82.0	\$110.0	\$116.0	\$120.0	\$128.0	\$675.0
Revised ROD (Dec, 2002) ³								\$675.0

¹ Funding for Years 1-2 reflects actual State encumbrances & expenditures and federal obligations. Funding for Year 3 reflects final State and Federal budgets. Funding for Year 4 reflects proposed Governor's and President's budgets. Expected funding in Years 5-7 includes remaining state bond funds until spent and ongoing State base funding. Federal appropriations for Years 5-7 are unknown; therefore, federal funding is not included.

Note: Prop 50 contains \$635 million for Drinking Water Quality in statewide programs. This funding has not been earmarked for the Drinking Water Quality Program, but it is expected that a portion of this funding will meet objectives of the program and be counted in future years.

² Original Stage 1 funding estimates from the Record of Decision.

³ ROD estimates have not been revised. The Stage 1 estimates included in the January 2003 program tracking report are the same as the ROD.

Stage 1 Funding by Task

Drinking Water Quality Funding (\$ in millions)	Program Year							Total
	1	2	3	4	5	6	7	
Improving Delta Water								
Source Control ¹	\$6.67	\$2.22	\$48.31	\$2.15	\$2.02	\$2.02	\$2.02	\$65.40
San Joaquin Valley Agricultural Drainage	\$0.75	\$0.23	\$0.10	\$0.08	\$0.08	\$0.08	\$0.08	\$1.40
North Bay Aqueduct	\$0.19							\$0.19
Improving Imported Water								
Bay Area Water Quality & Supply Reliability Program	\$1.62							\$1.62
San Joaquin Valley/Southern California Water Exchange	\$20.00							\$20.00
Control Runoff into Conveyances	\$1.57							\$1.57
Operational Improvements/Recirculation		\$0.14	\$0.14	\$0.16				\$0.44
Treatment Options								
Treatment Technology	\$5.23							\$5.23
Program Management								
Program Management & Oversight	\$1.48	\$1.80	\$0.60	\$0.73	\$0.73	\$0.73	\$0.73	\$6.79
Revised Stage 1 (Actual & Expected Funding) ²	\$37.50	\$4.38	\$49.14	\$3.11	\$2.83	\$2.83	\$2.83	102.62
Original ROD (Aug, 2000) ³	\$41.0	\$78.0	\$82.0	\$110.0	\$116.0	\$120.0	\$128.0	\$675.0
Revised ROD (Dec, 2002) ⁴								\$675.0

¹ Source control can also improve imported water and local sources.

² Funding for Years 1-2 reflects actual State encumbrances & expenditures and federal obligations. Funding for Year 3 reflects final State and Federal budgets. Funding for Year 4 reflects proposed Governor's and President's budgets. Expected funding in Years 5-7 includes remaining state bond funds until spent and ongoing State base funding. Federal appropriations for Years 5-7 are unknown; therefore, federal funding is not included.

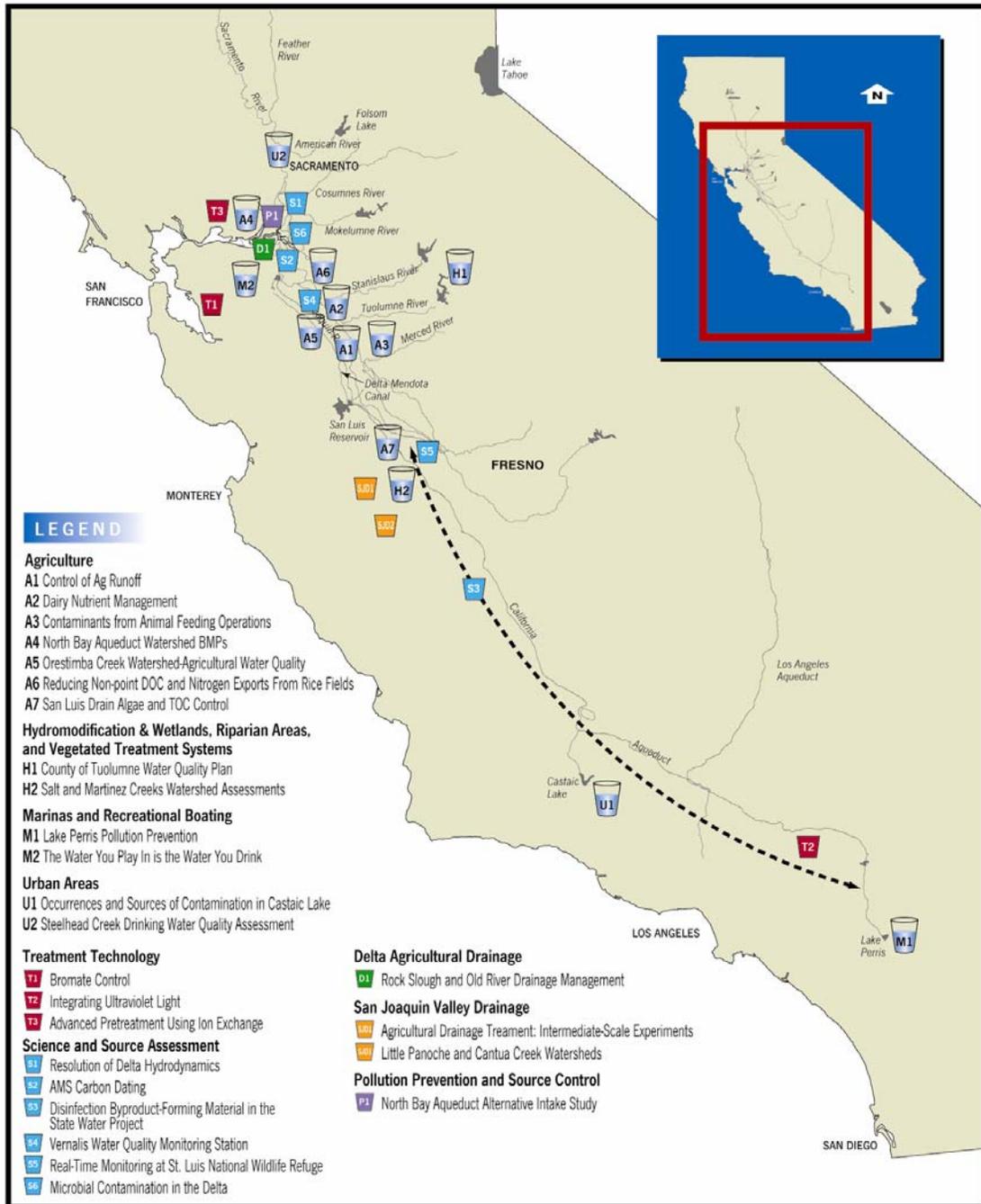
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Project Map

2001-2002 DRINKING WATER QUALITY PROGRAM PROJECTS



**Addendum to
Drinking Water Quality Program
Multi-Year Program Plan
and
Year 4 Work Plan**

August, 2003

Contents

Section	Page
1. Goals and Objectives	1
2. Regional Description of California Water Quality	3
3. Improving Delta Water	4
3.1 Source Improvement.....	5
3.2 Conveyance/Delta Operations.....	8
3.3 Storage.....	10
4. Improving Imported Water	11
4.1 CVP/SWP Ops and Storage (South of the Delta)	11
4.2 Source Water Exchanges out of Delta.....	13
5. Improving Local Sources	14
6. Treatment Options	15
7. Program Management	16
7.1 Administration.....	17
7.2 Drinking Water Subcommittee (DWS)	17
7.3 Implementation Commitments	18
7.4 Monitoring and Assessment	18
7.5 Funding.....	21
8. Year 4 Program Plan	22

1. Goals and Objectives

Safe drinking water is important to all Californians - and to the state and federal agencies that comprise the California Bay-Delta Program, now referred to as the California Bay-Delta Authority (CBDA). One of the objectives of the CBDA agencies is to ensure continuous improvement in the water quality of the Bay-Delta for all beneficial uses.

The Drinking Water Quality Program (DWQP) goal is to provide safe, reliable, and affordable drinking water to the 22 million Californians who rely on the Delta for all or part of their drinking water. To reach this goal, DWQP actions combine cost-effective improvements in source water quality, advancements in treatment technology, and innovations in water management. Overall, DWQP will strive to effectively integrate drinking water source protection, treatment, and distribution in order to improve public health protection. Furthermore, DWQP will support health effects research of Delta drinking water, and will perform comprehensive monitoring and assessment of Delta drinking water quality.

CBDA DWQP studies and actions fall into four broad categories that are intended to:

- Enable users to capture higher quality Delta water for drinking water purposes (timing vs. quantity),
- Reduce contaminants that impair Delta water quality,
- Evaluate alternative approaches to drinking water treatment and distribution, to address growing concerns about pathogens, disinfection by-products, and salinity, and
- Enable voluntary exchanges or purchases of high-quality source waters for drinking water uses.

An important complementary action to the DWQP studies and actions is the study of changes to the configuration of the Delta's channels and islands, some of these changes could have large potential benefits for Delta water quality.

All of these studies and actions must be pursued in conjunction with other California Bay-Delta Program actions to generate significant improvements in drinking water at the tap. The information generated by the drinking water quality studies and actions will serve as the basis for reviews of program effectiveness in 2003 and 2007. These reviews will look at the results of drinking water studies, to assess the continued appropriateness of the water quality targets, advances in treatment technology, and to make recommendations on future actions to improve drinking water quality. Water quality studies and actions must be conducted with monitoring and assessment, and will be coordinated with the appropriate agencies and existing programs.

The August 18, 2000 CALFED Programmatic Record of Decision (ROD) adopted general goals and objectives of (1) continuously improving the quality of the waters of the Bay-Delta system, (2) providing good quality water for all beneficial uses, including in-Delta environmental and agricultural uses, and (3) safe, reliable, and affordable drinking water. For the DWQP, the target for providing safe, reliable and affordable drinking water was expressed as either (1) average concentrations at Clifton Court Forebay and other southern

and central Delta drinking water intakes of 50 µg/L bromide and 3.0 mg/L total organic carbon, or (b) an equivalent level of public health protection using a cost effective combination of alternative source waters, source control and treatment technologies.

The adopted goals and targets were based upon predicted changes in drinking water standards set by the federal Environmental Protection Agency, best-available disinfection techniques, and the best available knowledge of the Delta in 1998 – as opposed to a comprehensive risk assessment or watershed management plan that considered the ability to achieve the targets. The statement of a target and alternative in the ROD gives the DWQP flexibility to consider cost-effectiveness/practicability, changing standards, improved technology, and the exchange of water supplies to better match quality with use. Thus, the ROD drinking water quality improvement targets are a commitment to achieving improved public health protection and reflect the importance of developing and implementing a diversified strategy for achieving water quality goals.

Work has progressed on all of the Record of Decision commitments since its adoption in August of 2000 with emphasis on source water improvement and treatment technologies. The Drinking Water Subcommittee (DWS) of the Bay-Delta Public Advisory Committee, successor to the Delta Drinking Water Council, provides stakeholder input. The DWS has developed a framework for drinking water quality management stemming from discussion of the ROD water quality targets. This framework is captured in the “Equivalent Level of Public Health Protection Draft Decision Tree” (ELPH, ELPH diagram, shown in Figure 1) named for the language in the ROD. Management actions available at the Bay-Delta programmatic scale and at the regional level are shown on the ELPH diagram and described in more detail in a companion document. The next step for the DWS is to develop recommendations for strategic actions and spending.

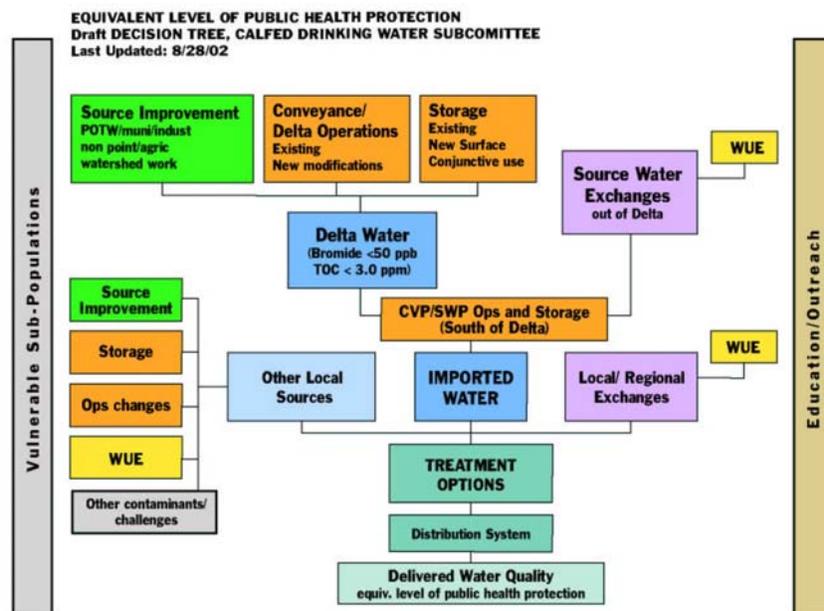


FIGURE 1
ELPH Diagram

The ELPH diagram (Figure 1) frames the categories of actions that the DWQP will address, and also provides a basis for the program's strategic plan (to be developed in Year 4). This program plan begins with a regional description of water quality, then focuses on work being done in the various categories of ELPH actions, and concludes with a discussion of program management. The work being done in the each of the ELPH categories is broken down into past actions, planned future activities, and integration efforts.

2. Regional Description of California Water Quality

The ELPH strategy is adaptable to any region of California, as it captures most of the possible actions available to drinking water suppliers to improve water quality. Suppliers that move water great distances or that have multiple water sources generally have more opportunities to create water quality improvement. A conceptual ELPH strategy for each region is outlined in this section.

Sacramento Valley - Drinking water suppliers in the Sacramento Valley rely on a mixture of ground water supplies and surface water flows from the Sacramento River and its tributaries, the source of about 60 percent of the water flowing into the Delta. These surface water flows may be affected by actions in Source Improvement, Conveyance/Delta Operations, and Storage designed to improve Delta Waters. Source Improvement has the most potential to improve water quality for this region, as source improvement actions occur along the entire reaches of the river and its tributaries. Source Improvement in this region is a strong focus of the DWQP. Monitoring done in this region indicates that agriculture, urban runoff, and municipal wastewater treatment plants are the most significant sources of pollutants. This will be accomplished by identifying sources, quantifying loads, and working with the implementing agencies to establish management practices or improved wastewater treatment where necessary. Individual drinking water suppliers could also look at local/regional water exchanges, local source water quality improvement, water use efficiency, and improved treatment to improve their water quality. The DWQP is also funding studies on applications of innovative drinking water treatment technology to Delta waters.

San Joaquin Valley - Drinking water suppliers in the San Joaquin Valley rely on a mixture of ground water supplies and surface water flows from the San Joaquin River and its tributaries as well as surface water flows imported from the Delta. The San Joaquin River is considerably more degraded than the Sacramento River when it reaches the Delta, so the DWQP is working to improve this region's source water quality through actions along rivers and along the large conveyances that import Delta water to the San Joaquin Valley. Irrigated agriculture, animal feeding operations, managed wetlands, and urban areas are the most likely land uses contributing pollutants to the system. Like the Sacramento, identification, quantification, and implementation of source reduction measures are important objectives. Individual drinking water suppliers in this region could also look at local conveyance improvements, local/regional water exchanges, local source water quality improvement, water use efficiency and improved treatment to improve their water quality.

Delta - The Delta receives water from both the San Joaquin and Sacramento Rivers, which help repulse seawater intrusion from the San Francisco Bay. In addition to the water quality impairment (mostly total organic carbon) from the rivers and their tributaries, this seawater

intrusion moves bromide into the Delta. Delta island peat soils and tidal wetlands also contribute significant total organic carbon loads to the Delta. Delta salinity is managed through the operation of upstream reservoirs, downstream export pumps, and the Delta Cross Channel, while competing with water supply and fishery protection objectives. As a result of these factors, the Delta has highly variable water quality. DWQP actions in Source Improvement, and CBDA actions in Conveyance and Storage can improve Delta water quality. Delta waters are generally used to provide drinking water to the San Francisco Bay Area, the San Joaquin Valley, and Southern California.

San Francisco Bay Area – The San Francisco Bay Area (Bay Area) is a major urban area that uses Delta water, surface water captured in the high Sierra mountains, local rainfall, and groundwater replenished with Delta water and Sierra water. Actions that improve Delta waters will contribute to improved water quality for the region. In addition, the DWQP is financing the study of regional blending and exchange opportunities and advanced treatment technology for this region. Individual drinking water suppliers in this region could also look at actions like local water exchanges, local source water quality improvement, water use efficiency and improved treatment to improve their water quality.

Southern California – Southern California is a major urban area that uses Delta water, Colorado River water, surface water captured in the Sierras, local rainfall, and groundwater replenished from a variety of sources. DWQP efforts to improve this region’s water quality are focused on improving Southern California’s Imported Water supply through Improving Delta Water, facilitating regional Source Water Exchanges, improving CVP/SWP Ops, Conveyance, and Storage, and the study of advanced treatment technology. Individual drinking water suppliers in this region could also look at actions like local water exchanges, conjunctive use programs, local source water quality improvement, water use efficiency and improved treatment to improve their water quality.

These conceptual regional ELPH strategies have many similar elements, like source water quality improvement and the study of advanced treatment, which have been the focus of DWQP efforts because they benefit multiple drinking water suppliers. Referring back to Figure 1, the next several sections will focus on activities broken into their respective ELPH categories (boxes) – starting with actions which improve Delta water (Source Improvement, Conveyance/Delta Operations, and Storage), expanding those to improve Imported water (Source Water Exchanges, CVP/SWP Operations and Storage) and Local Sources (all of the previously mentioned categories applied to local situations, and bringing them altogether at the treatment plant (Treatment Options, Distribution System) – all to achieve a level of public health protection for the drinking water consumer equivalent to achieving the ROD water quality targets for bromide and organic carbon.

3. Improving Delta Water

Delta water quality is affected by and can be improved to some degree through three groups of actions: Source Improvement, Conveyance/Delta Operations, and Storage. Of these three, the DWQP focuses on Source Improvement. The DWQP also engages in Conveyance/ Delta Operations and Storage actions by other California Bay-Delta Program elements to ensure that they identify and evaluate appropriate drinking water quality

criteria, including the cost-effectiveness of conveyance, operations, and storage actions to improve Delta water quality.

3.1 Source Improvement

Source improvement refers in general to improving the water quality of the source waters to the Delta through the implementation of management practices and other water quality control measures to reduce pollutant loads. Implementation of source improvement projects in the Bay-Delta watershed could reduce the discharge of pollutants from point and non-point sources in urban and rural areas and minimize the water quality impacts of increased development and changes in land use on Delta water quality.

ROD Commitments

The CALFED Record of Decision (ROD) includes the following projects and actions related to source improvement:

Drinking Water Quality Program

- Address drainage problems in the San Joaquin Valley to improve downstream water quality
- Implement source controls in the Delta and its tributaries including establishing a comprehensive state drinking water policy for the Delta and upstream tributaries
- Address water quality problems at the North Bay Aqueduct, including implementation of BMPs to improve watershed runoff water quality

Ecosystem Restoration Program

- Assist existing agency programs to reduce turbidity and sedimentation; reduce the impairment caused by low dissolved oxygen conditions; reduce the impacts of pesticides including organochlorine pesticides; reduce the impacts of trace metals; mercury; and selenium; reduce salt sources to protect water supplies; and increase understanding of toxicity of unknown origin
- Improve dissolved oxygen conditions in the San Joaquin River near Stockton

Conveyance Program

- Reduce agricultural drainage in the Delta, including the Old River and Rock Slough Drainage Management Project

Looking Back

The DWQP has had a strong emphasis on source assessment and improvement. Prior to adoption of the ROD, three source improvement projects were funded with US EPA early implementation funding for the DWQP. In Years 1-3 the DWQP funded 12 source improvement projects. These projects focused on nonpoint sources of drinking water pollutants in the San Joaquin Valley, the North Bay Aqueduct watershed, and the Delta. The DWQP also initiated work on development of a Drinking Water Policy for Delta waters and tributaries. The Drinking Water Policy will be critical for protecting source water quality and maintaining progress made in other source improvement efforts. In years 1-3, the DWS,

successor to the Delta Drinking Water Council, was established. Notable achievements of the DWS are development of the ELPH framework and recommendations to the BDPAC on agricultural waivers.

Federal Funding for the DWQP 1999-2000

1. Old River/Rock Slough Drainage Management Project (\$450k)
2. Knightsen Flood Management District and Community Services (\$50k)
3. Salinity and Selenium Project (\$450k)

2001 DWQP PSP (finalized February 2002)

1. Improving Delta Drinking Water Quality: Managing Sources of Disinfection Byproduct-Forming Material in the State Water Project (\$1,369k)
2. Adaptive Real-Time Monitoring and Management of Seasonal Wetlands and the San Luis National Wildlife Refuge to Quantify Contaminant Sources and Improve Water Quality in the San Joaquin River (\$320k)
3. Agricultural Drainage Treatment: Intermediate-Scale Experiments (\$750k)
4. Rock Slough and Old River Drainage Management (\$1,300k)

2002 SWRCB RFP (finalized September 2002)

1. Control of Ag Runoff (\$742k)
2. Dairy Nutrient Management Program (\$272k)
3. Determining Mitigation Strategies to Prevent Contaminants from Animal Feeding Operations from Entering Drinking Water Sources (\$568k)
4. Orestimba Creek Watershed-Agricultural Water Quality Pilot Program (\$275k)
5. Reducing Non-point DOC and Nitrogen Exports from Rice Fields: A Pilot Study and Quantitative Survey to Determine the Effects of Different Hydrologic and Straw Management BMPs (\$870k)
6. San Luis Drain Algae and TOC Control Project (\$145k)
7. County of Tuolumne Water Quality Plan (\$183k)
8. Salt and Martinez Creeks Watershed Assessments (\$200k)
9. The Water You Play In Is The Water You Drink (\$983k)
10. Steelhead Creek Drinking Water Quality Study and Watershed Assessment (\$595k)
11. North Bay Aqueduct Watershed BMPs (\$400k)
12. North Bay Aqueduct Alternative Intake Study (\$1,062)

2002 DWQP

1. Investigating in situ Low Intensity Chemical Dosing to decrease Delta waters DOC concentrations and DBP precursors (\$1,535k split with ERP)
2. Full-Scale Demonstration of Agricultural Drainage Water Recycling Processes Using Membrane Technology (\$216k split with ERP)

Other Funding Sources (Agency)

1. DWR Agricultural Drainage Program (DWR)
2. Sacramento River Watershed Program (USEPA)
3. Grassland Bypass Project (Grassland Bypass Authority and RWQCB)
4. CVRWQCB Basin Plan Amendment (BPA) for Salinity and Boron (RWQCB)
5. Drinking Water Policy for the Delta and its Tributaries (CBDA, CUWA, and SRCSD, \$300k+CBDA)
6. Real Time Monitoring and Management of Salinity in the San Joaquin River
7. San Luis Drainage Feature Re-evaluation (USBR)

Looking Forward

Source Improvement projects will continue to be a high priority for the DWQP in Years 4-7. Nearly all of the projects funded by the DWQP in Years 1-3 are in progress and will be completed in Years 4-7. Projects will be assessed for progress towards programmatic goals. Funding available for full implementation of source improvement projects anticipated in years 4-7 is \$12.7 million from Prop 13 and up to \$91.5 million from Prop 50, Chapter 5. \$31.5 million is available for grants in the current RFP which was initiated in Year 3 but will be completed in year 4. The remaining funds will be distributed as grants in years 4-7. Additional grant funding is possible from other Prop 50 chapters for source improvement projects. The DWQP will focus on three types of source improvement projects: agricultural drainage and runoff improvement, urban source improvement, and development of the Central Valley drinking water policy. The DWQP will continue to support monitoring of sources in the Bay-Delta watershed, and studies of organic carbon, bromide and other pollutants of concern to identify the most cost effective means of source improvement.

2003 SWRCB RFP

\$31.5 for California Bay-Delta drinking water quality source improvement projects. Priorities are development and assessment of best management practices to address discharges from Delta islands, irrigated agricultural, and urban sources.

SWRCB. Years 4-7

Prop 50, Chapter 5 funding for water quality improvement will be available as follows:

Bay –Delta Program Year	4	5	6	7
State FY	2003-04	2004-05	2005-06	2006-07
Amount (\$ in thousands)	36,338	11,555	11,554	11,553

Other Programs Funding Water Quality Improvement Projects (Agency)

1. Clean Water Act Section 319 (USEPA)
2. CBDA Watershed Program
3. CBDA Ecosystem Restoration Program

Cross-linking and Integration

Source improvement is closely linked to several other Bay-Delta program elements. The Ecosystem Restoration Program (ERP) is in the process of identifying and implementing all scales of habitat restoration and has funded a considerable amount of research on water quality issues associated with ecosystem restoration. It has been known for some time that organic carbon concentrations increase as water moves across the Delta. Wetlands and shallow water habitat have also been identified as a potentially major source of organic carbon in the Delta. The DWQP is closely coordinating with the ERP to include organic carbon monitoring in habitat restoration to better understand the issue. The ERP and DWQP need to continue cooperative monitoring programs and source control activities because ERP and DWQP water quality problems are frequently associated with the same sources.

The Watershed Program and DWQP work cooperatively on grant funding processes and have overlapping program objectives, such as improved water quality. Building local capacity for watershed management activities provides the mechanism for identifying, guiding, and implementing drinking water quality improvement projects. For the past two years, the Watershed and Drinking Water Quality Programs, working with the SWRCB, have coordinated their grant funding processes. As an implementing agency for both programs, the SWRCB will continue to be the focus of coordination for these two programs.

3.2 Conveyance/Delta Operations

Improving the quality of the source waters of the Delta is only one aspect of improving Delta water quality. Source waters move through a complex network of natural and manmade channels to both repel seawater intrusion from the San Francisco Bay and supply drinking water intakes in the Delta. The Delta Cross Channel, for example, is operated to route additional high quality Sacramento River flows to central Delta channels and the export pumps, helping to flush out accumulated salinity in the central and southern Delta. To protect fisheries and to keep water levels adequate for Delta agricultural use, temporary barriers are constructed in Delta channels, causing additional changes to delivered water quality. Ways to improve drinking water quality through Conveyance include transporting more water when drinking water quality is good (during high flows) to reservoirs south of the Delta; transporting more Sacramento River water through the Delta Cross Channel or similar screened facility (the Through Delta Facility or TDF); transporting more water to repel seawater intrusion; or through changes to the channels themselves to reduce the Delta's ability to accumulate salt, such as through the reclamation of flooded islands in the Delta.

Assessment of water quality effects of Conveyance actions requires the use of sophisticated models and extensive water quality monitoring. The DWQP has contributed resources to these modeling efforts and helps to identify water quality issues as planning studies proceed. The DWQP supports Conveyance actions through coordination with the California Bay-Delta Conveyance Program and through supplemental funding of its activities to augment water quality investigations. Evaluation of the water quality benefits of conveyance actions is needed to understand the role of conveyance in achieving ELPH.

ROD Commitments

The ROD includes the following projects and actions related to conveyance and Delta operations for water quality improvement:

Drinking Water Quality Program

- Address water quality problems at the North Bay Aqueduct, including studying the feasibility of relocating the North Bay Aqueduct intake
- Study recirculation of export water to reduce salinity and improve dissolved oxygen in the San Joaquin River
- Develop and implement a plan to meet all existing water quality standards and objectives for which the SWP and CVP have responsibility

Conveyance Program

- Evaluate and implement improved operational procedures for the Delta Cross Channel to address fishery and water quality concerns
- Evaluate a screened through-Delta facility on the Sacramento River of up to 4,000 cfs
- Intertie between SWP and CVP facilities at or near Tracy

Ecosystem Restoration Program

- Restore habitat and hydraulic needs on Franks Tract in the Delta to optimize improvements in ecosystem restoration, levee stability, and Delta water quality

Looking Back

In Years 1-3 the DWQP funded a position in the Department of Water Resources Delta Modeling Section to look at the water quality effects of operational changes to the Delta Cross Channel and other actions the Conveyance Program is studying. The Drinking Water Subcommittee received a number of updates on Conveyance Program studies as well. Studies to evaluate the feasibility of relocating the North Bay Aqueduct (NBA) intake were also initiated.

2001 DWQP PSP (finalized September 2002)

1. North Bay Aqueduct Alternative Intake Study (\$1,062)

Other Funding Sources (Agency)

1. Funding of 1 PY in the DWR Delta Modeling Section (CALFED)

Looking Forward

The DWQP has identified a number of Conveyance actions that potentially affect Delta water quality. In Years 4-7, the DWQP will continue to coordinate with the Conveyance Program in order to fully understand potential water quality benefits and the cost-effectiveness of potential conveyance and operations projects. The DWQP has identified a number of specific projects on which it needs to coordinate:

1. South Delta Program (Conveyance)
2. Through-Delta Facility/Delta Cross Channel Operations (Conveyance)
3. Flooded Island Study (Ecosystem Restoration Program)

4. Shallow habitat and tidal marsh habitat creation (Ecosystem Restoration Program)

Cross-linking and Integration

The DWQP will rely on cross-linking and integration with the Conveyance Program and the Ecosystem Restoration Program to evaluate the potential water quality affects of Conveyance actions in the Delta.

3.3 Storage

Another important tool with benefits in many areas of the Bay-Delta Program including water quality improvement is Storage. Storage captures upstream precipitation and snow melt and stores this high quality water for times of need. The California Bay-Delta Program includes several Storage alternatives: Upstream Surface Storage, South of the Delta Surface Storage, In-Delta Surface Storage, Local Surface Storage, Groundwater Storage, and Conjunctive Use. Each of these types can provide water quality benefits in different ways. Existing and New Upstream (of the Delta) storage can provide additional water flows to reduce seawater intrusion or can be coordinated with other types of storage to recapture water quality flows, although their use is restricted by flood storage regimes and they lose volume to trapped sediment. South of the Delta Storage can move high quality high volume flows south of the Delta during less sensitive times for Delta fisheries without the problems of upstream storage. In-Delta Surface Storage would store water in the Delta and could provide immediate water flows for water quality. Local storage can be used to store good quality water conveyed from the Delta during less sensitive times for Delta fisheries. Conjunctive use of groundwater and surface water provides opportunities to optimize the joint use of all water resources in the Delta, and it also can be an effective tool to prevent potential seawater intrusion along the coast and improve water quality as a result of the net increase in groundwater levels over time.

Storage actions are identified as complementary actions in the CALFED ROD (i.e. they were not evaluated programmatically in the EIR/EIS), yet they are an important component of the ELPH diagram. The goal of the DWQP is to ensure the storage investigations include a complete evaluation of the potential water quality benefits and impacts of storage alternatives and an evaluation of the cost-effectiveness of these actions for water quality improvement. This is needed to understand the role of Storage in achieving the ELPH objective and provide an evaluation of the water quality/cost-effectiveness of storage actions that stakeholders can use to make their water quality investment decisions.

ROD Commitments

The CALFED ROD includes the following projects related to Storage and water quality improvement:

Storage Program

- Expand CVP storage in Shasta Lake by approximately 300 TAF
- Expand Los Vaqueros Reservoir by up to 400 TAF with local partners as part of a Bay Area water quality and water supply reliability initiative
- In-Delta storage project – approximately 250 TAF

- Evaluation of Sites Reservoir and additional storage in the upper San Joaquin River watershed
- Groundwater storage and management (conjunctive use)

Looking Back

The DWQP has supported water quality evaluations of storage alternatives through the position funded with the Department of Water Resources (DWR) Delta Modeling Section and through coordination with the Storage Program.

Looking Forward

The DWQP will continue to coordinate with storage projects in Years 4-7 in order to fully understand water quality benefits and cost-effectiveness of potential Storage actions. The DWQP has identified a number of specific projects on which it needs to coordinate, which appear to have the greatest potential to affect water quality:

1. North of Delta Off-Stream Storage (Sites Reservoir, Storage)
2. Los Vaqueros Reservoir Expansion (Storage)
3. In-Delta Storage Project (Storage)

Cross-Linking and Integration

The DWQP needs to coordinate with the Storage Program to achieve its Delta water quality goals.

4. Improving Imported Water

A number of regions depend on source waters which are transported great distances for their drinking water supply. Delta water is transported south via open canals and surface reservoirs, all of which have watersheds and operations that contribute to water quality impairment. The SWP and CVP infrastructure connect with a great number of the state's local water supply systems offering opportunities for regional water exchanges to improve drinking water quality.

4.1 CVP/SWP Ops and Storage (South of the Delta)

The SWP and CVP have extensive infrastructure, both separate and combined, south of the Delta. This infrastructure, which supplies drinking water to a large portion of California, is susceptible to water quality impairment. Two examples of impairment are the canals which receive surface runoff and groundwater pump-ins, and the blending of poorer quality CVP supplies with SWP supplies at O'Neill Forebay. The DWQP is focused on source improvement actions to minimize the impairment of drinking water as it is transported hundreds of miles to the consumer. This ELPH category includes physical infrastructure changes or operational changes that improve water quality.

ROD Commitments

The ROD includes the following projects related to CVP/SWP Operations and Storage and water quality improvement:

Drinking Water Quality Program

- Control runoff into the California Aqueduct and other similar conveyances

Conveyance Program

- Intertie between SWP and CVP facilities at or near Tracy
- A bypass canal to the San Felipe Unit at the San Luis Reservoir

Looking Back

In Years 1-3 the DWQP funded two projects to address surface runoff into the SWP aqueduct, and two projects to assess sources of pollutants in SWP terminal reservoirs in southern California. The DWQP coordinated with the Santa Clara Valley Water District on the evaluation of project alternatives to address the San Luis Reservoir low point issue and the associated water quality problems.

2001 DWQP PSP (finalized February 2002)

1. Little Panoche and Cantua Creek Watersheds (\$200k)

2002 SWRCB RFP (finalized September 2002)

1. Lake Perris Pollution Prevention and Source Water Protection Program (\$1,480k)
2. Assessing the Occurrences and Sources of E. Coli and EC 0157 Contamination in Castaic Lake (\$609k)
3. Salt and Martinez Creeks Watershed Assessments (\$200k)

Other Funding Source (Agency)

1. Control run-off into the California Aqueduct (DWR)
2. Investigate operational improvements/recirculation in the San Joaquin River (BOR)
3. San Luis Reservoir Low Point Improvement Project (Proposition 13 grant)

Looking Forward

In Years 4-7 the DWQP will continue to fund projects addressing runoff and other sources of water quality degradation into the California Aqueduct and similar conveyances and will assess results of these projects in order to fully understand their potential water quality benefits and cost-effectiveness. The DWQP will continue to coordinate with the Santa Clara Valley Water District on the evaluation of project alternatives to address the San Luis Reservoir low point issue and the associated water quality problems.

2003 SWRCB RFP

1. DWQP Funding Available for projects which focus on CA aqueduct conveyance.

Other Funding Source (Agency)

1. State Water Project Watershed Sanitary Survey (DWR)

Cross-linkages and Integration

The DWQP will coordinate with the BOR, DWR, the State Water Contractors, the SWRCB, Central Valley Project Water Authority on actions in this category. These organizations represent owners, operators, and beneficiaries of the CVP and SWP facilities. The DWQP will look for opportunities to leverage funding to expand existing efforts of these organizations to improve imported water supplies. The DWQP will also coordinate with the

Conveyance Program to evaluate the water quality affects of CVP and SWP improvements south of the Delta.

4.2 Source Water Exchanges out of Delta

Another way to improve imported water quality is through Source Water Exchanges. Imported Delta waters currently used for drinking water may be exchanged for higher quality source waters (i.e. Sierra-fed rivers in the southern San Joaquin Valley) currently going to uses with lower water quality requirements. Source water exchanges are meant to allow water supply agencies to take advantage of high quality water from other sources to improve water quality and reliability. These “other sources” are currently applied to uses with lower water quality requirements (usually agricultural) than drinking water, so these exchanges are essentially optimizing the use of water quality in California. While exchanges may alter the timing of flows in the system, they are not operated to increase withdrawals. Indirect impacts of Source Water Exchanges must also be carefully determined to avoid degradation of Delta water quality and avoid un-redressed third party impacts.

ROD Commitments

The CALFED ROD includes the following projects related to Source Water Exchanges for water quality improvement:

Drinking Water Quality Program Complementary Actions

- Establish a Bay Area Blending/Exchange Project
- Facilitate water quality exchanges and similar programs (San Joaquin Valley/Southern California Water Quality Exchange Partnerships)

Looking Back

There are currently two programs underway to explore source water exchange opportunities – the Bay Area Water Quality and Supply Reliability Program and the San Joaquin Valley/Southern California Water Quality Exchange Partnerships. Prior to the adoption of the ROD, the Bay Area Water Quality and Supply Reliability Program was initiated with USEPA early implementation funding for the DWQP. In 2000, the Metropolitan Water District of Southern California initiated the San Joaquin Valley/Southern California Water Quality Exchange Partnerships. In Years 1-3, the DWQP focused on coordination with project proponents who are studying potential source water exchanges in order to better understand their potential water quality benefits and cost-effectiveness. The DWQP did not directly fund any Source Water Exchange studies, but is coordinating with the following studies:

Federal Funding for the DWQP 1999-2000

1. Bay Area Water Quality and Supply Reliability Program (USEPA \$100k)

CBDA 2002

1. Bay Area Water Quality and Supply Reliability Program (CBDA \$1.2 million)

Other Sources of Funding (Agency)

1. San Joaquin Valley/Southern California Water Quality Exchange Partnerships (Proposition 13 Grant to MWD, \$20 million; Friant Water Users Authority, \$3 million)

Looking Forward

In Years 4-5, work funded by California Bay-Delta Program on the Bay Area Water Quality and Supply Reliability Program will continue. The DWQP will also coordinate with local project proponents of source water exchanges and agencies' investigations of Source Water Exchanges in Years 4-7 in order to fully understand their potential water quality benefits and cost-effectiveness, and the role of source water exchanges in achieving ELPH.

DWR

Prop 50, Chapter 5 funding for integrated regional water management will be available as follows:

Bay-Delta Program Year	4	5	6	7
State FY	2003-04	2004-05	2005-06	2006-07
Amount (\$ in thousands)	59,500	56,890	56,020	53,520

5. Improving Local Sources

Few water supply agencies are entirely dependent on the Delta for their source water needs. Most have some combination of alternative surface water, groundwater and Delta water supplies. The ELPH diagram defines Other Local Sources as non-Delta waters, or those waters that will not be improved through Improving Delta Water or Improving Imported Water actions. Local sources often face different water quality challenges. Some of the lessons learned through Improving Delta Water and Improving Imported Water actions will be usable to improve Local Sources. Alternative Local Sources can also improve water quality through supply flexibility and blending with Delta water supplies.

Looking Forward

Local water supply agencies have been studying and implementing improvements to local sources long before the CALFED program and continue to do so. The DWQP is not currently focused on specific actions to Improve Local Sources. The DWQP and DWS will develop a Strategic Plan and Regional Conceptual Models of ELPH in order to provide local water supply agencies with the information they need make the most cost-effective investments in water quality improvements.

Cross-Linking and Integration

The CBDA Watershed Program supports establishment of local watershed programs. Although the highest priority objectives are building local capacity, water quality improvement is an important program goal. Statewide source improvement and source water protection provide water quality benefits in virtually every watershed of the state. For example, the stormwater NPDES permit program regulates a variety of commercial, industrial, and municipal sources of runoff.

6. Treatment Options

Commonly employed treatment technologies for Delta water users are ozone, chloramines, and conventional chlorine disinfection. Advanced treatment studies, tailored to Delta waters and blends of Delta water would add significantly to this portfolio. The use of multiple disinfectants and advanced treatment technologies has the potential to significantly control disinfection byproducts formed during the treatment process. It is important to note, however, that the removal of salts from water remains an extremely costly process.

ROD Commitments

The CALFED ROD includes the following projects related to drinking water treatment for water quality improvement:

Drinking Water Quality Program

- Invest in treatment technology demonstration.
 - Initiate UV disinfection demonstration project by end of 2002
 - Initiate regional desalination demonstration project by end of 2002
 - Evaluate practicability for full-scale implementation by 2007
- Support the Delta Drinking Water Council or successor
 - Evaluate progress towards meeting water quality and treatment technology objectives by the end of 2003

Looking Back

In Years 1-3, the DWQP and USEPA funded 5 drinking water treatment projects to evaluate alternative treatment technologies to reduce formation of DBPs and to continue work on desalination technology development. In Year 2, the DWS presented recommendations to BDPAC on the need to study advanced treatment technologies. The DRIP program has already resulted in the development of advanced reverse osmosis (RO) membranes and other improvements in desalinization.

2001 DWQP PSP (finalized February 2002)

1. Bromate Control with Carbon Dioxide Addition (\$120k)
2. Integrating Ultraviolet Light to Achieve Multiple Treatment Objectives (\$610k)
3. Advanced Pretreatment Using Ion Exchange for Organic Carbon Removal from Delta Water (\$495K)

Other Funding Source (Agency)

1. CCWD Advanced Treatment - Multiple Barrier Study (EPA, \$700k)
2. Desalination Research and Innovation Partnership (DRIP) (EPA)

Looking Forward

Working with the Department of Health Services (DHS) and DWR, the DWQP will continue to support funding of treatment technology studies and pilot projects in Years 4-7.

Treatment technology finding should be coordinated with AWWARF, DRIP, and other

organizations funding research in this area. The DWS will also conduct an initial assessment of progress toward meeting water quality targets and alternative treatment technologies by the end of 2003. Funding available for treatment technology projects anticipated in years 4-7 is up to \$100 million from chapters 4 with additional funding also possible from chapter 6 of Prop 50. The exact amount that will be to treatment technology development within the CALFED solution area is yet to be determined.

Other Funding Source (Agency)

1. Agricultural drainage water recycling using membrane technology (CBDA, \$316k)

7. Program Management

The Drinking Water Quality Program integrates Delta drinking water quality improvement from source to tap. It seeks to reduce drinking water pollutants of concern working from the upper watersheds to the taps of consumers in all areas of the State where Delta water is used. This distinguishes it from existing State agencies with water quality management responsibilities that deal with drinking water supply systems and ambient water quality separately.

Under the California Bay-Delta Authority (CBDA) Act of 2003, the DWQP has three implementing agencies, USEPA, DHS, and the SWRCB. One of the major challenges is making the transition from a program where the majority of program responsibilities were assumed by CALFED staff to a program largely implemented by the agencies named in the Act. Along with this change in implementation is a change in program funding. Unlike most other California Bay-Delta Program elements, the DWQP is not allocated any funding directly from Prop 50. DHS, SWRCB and DWR are the agencies with funding from Prop 50 for water quality actions.

As management of the DWQP and funding shift to the implementing agencies, roles, responsibilities, and available resources need to be identified. Agency roles and responsibilities should fit the existing missions and responsibilities as closely as possible. Currently, DHS implements the federal Safe Drinking Water Act (SDWA) in California. DHS responsibilities include regulation of drinking water suppliers, adoption of State drinking water standards, and distribution of grants and loans for drinking water infrastructure improvements and related actions. The primary focus of DHS programs is from the water treatment plant intake to the tap. The SWRCB and RWQCBs are responsible for implementing the federal Clean Water Act (CWA), the State clean water act (Porter-Cologne), and administration of water rights in California. The SWRCB and regional boards are responsible for protecting surface water and ground water quality throughout the State. USEPA is responsible for overseeing State implementation of the CWA and SDWA and other federal environmental laws and regulations.

For many program tasks, current responsibilities and available funding clearly indicate which agency should have responsibility. For example, since DHS is currently responsible for permitting of water treatment processes, it will be responsible for the treatment technology goals and commitments of the program. Likewise, SWRCB/RWQCB will be responsible for source improvement goals and commitments. The CBDA will be responsible for DWQP oversight and coordination including incorporating ROD commitments into

program actions at the implementing agencies. These include the environmental justice, science, stakeholder consultation, local leadership, and other implementation commitments listed in the ROD. Table 1 summarizes the DWQP roles and responsibilities of the CBDA, implementing, and participating agencies. Some ROD commitments and elements of the ELPH diagram are not clearly associated with any of the three implementing agencies and may require additional agreements with the participating agencies.

Some program tasks also apply to the DWQP in general and cross program boundaries. Support for the BDPAC Drinking Water Subcommittee, general California Bay-Delta Science Program support, establishing expert panels, and performance measures are a few examples. Finding the budget for these critical program activities given the current resources and sources of funding will be a challenge. There is a desperate need for adequate and flexible funding to implement the intent of the strategy outlined in the ELPH diagram.

7.1 Administration

Looking Back

In Years 1-3, CALFED provided management, coordination and oversight for the DWQP, although the DWQP has never been adequately staffed. As of April 2003, dedicated Bay-Delta Program resources at the various agencies consist of an interim program manager (at CBDA), and 1.5 PYs at DHS. The SWRCB/CVRWQCB assigns staff resources as needed to carry out their responsibilities. USEPA has made a staff person available part time on a priority basis.

DHS is currently providing 1.5 PYs of staff resources to the Bay-Delta Program through an Interagency Agreement (IA). The IA, currently undergoing amendment, will expire on June 30, 2004. However, the status of funding for these positions after June 30, 2003 is unknown. One additional position for the DWQP is budgeted for the SWRCB. A number of potential actions and studies have not received funding because of staffing resource limitations.

Looking Ahead

Program management and most staffing will transition from CALFED to DHS and SWRCB/CVRWQCB as state co-leads and US EPA as federal lead in accordance with the California Bay-Delta Authority Act.

7.2 Drinking Water Subcommittee (DWS)

The Drinking Water Subcommittee was formed by the CALFED Bay Delta Public Advisory Committee (BDPAC) in January 2002 and held its first meeting in February 2002. It is a public forum under the FACA Act, and meets monthly to assess, discuss and advise the DWQP through recommendations to the BDPAC.

Looking Back

Much of the first year of DWS meetings was devoted to development of the concepts illustrated in the ELPH diagram and the companion write-up. This is a major step in identifying and describing the complex set of factors that govern the public health risk and costs supplying drinking water from the Delta. The DWS has also submitted a recommendation to BDPAC regarding proposed changes to the RWQCB program for

permit waivers of discharges from irrigated lands. It also presented an information item outlining a proposed policy framework for addressing drinking water impacts of Bay-Delta Program actions. The DWS established broad stakeholder representation in its first year and half and is working to increase its agricultural stakeholder base.

Looking Forward

In Years 4, the DWS will focus on three areas:

- **Development of a Draft Drinking Water Quality Policy Framework:** The DWS has proposed a policy framework to guide mitigation for drinking water quality impacts of Bay-Delta Program actions. The DWS will continue its coordination with other BDPAC subcommittees to refine and recommend a policy to the BDPAC and to the CBDA.
- **Development of a Strategic Plan for the Drinking Water Quality Program:** The DWS has been charged with making recommendations to BDPAC on how best to achieve program goals and objectives. The DWS plans to put these recommendations in the form of a strategic plan.
- **Resources to carry out the Drinking Water Quality Program**

The DWS will also conduct an initial assessment of progress toward meeting water quality targets and alternative treatment technologies by the end of 2003.

7.3 Implementation Commitments

Looking back

The DWQP has incorporated Science, Environmental Justice, and Public Involvement principles into all major program elements. Current activities include:

- Environmental Justice and Tribal interests are important selection criteria in the grant funding processes.
- Environmental justice representatives on the BDPAC Drinking Water Subcommittee.
- CBDA Science Program advice on important DWQP tasks including Delta Drinking Water Policy development, the DWQP Monitoring and Assessment Program, establishing a drinking water expert panel, and developing performance indicators.
- Public participation and information are provided through the Drinking Water Subcommittee, the DWQP web site and project specific public information and outreach activities.

7.4 Monitoring and Assessment

Monitoring and Assessment actions enable the DWQP to establish an understanding of existing water quality, to develop conceptual models of improvement actions, to monitor water quality improvement, and to maintain a transparent process towards DWQP goals. There are four primary action areas for the DWQP Monitoring and Assessment program:

1. Monitor and assess trends to determine if drinking water quality is changing over time, identify where changes are taking place, and develop and assess program performance indicators.

2. Develop studies, conceptual models, numerical models, workshops, and reports to answer questions about sources, fate, transport, and management of contaminants of concern.
3. Develop and use performance measures to guide DWQP actions and to assess the progress of the DWQP.
4. Improve access to information related to drinking water quality in the CALFED solution area.

As part of these actions, the DWQP will facilitate the monitoring and reporting of drinking water quality through existing monitoring programs, such as the SWRCB's existing Surface Water Ambient Monitoring Program.

ROD Commitments

The CALFED ROD includes the following actions related to monitoring and assessment for drinking water quality:

Drinking Water Quality Program

- Implement source controls in the Delta and its tributaries
 - Develop a comprehensive monitoring and assessment program by 2003
 - Evaluate and determine whether additional protective measures are necessary to protect beneficial uses by end of 2004
- Support the ongoing efforts of the Delta Drinking Water Council or its successor
 - Complete an initial assessment of progress toward meeting CALFED water quality targets and alternative treatment technologies by end of 2003
 - Complete final assessment and submit final recommendations on progress toward meeting CALFED water quality targets and alternative treatment technologies by end of 2007

Looking Back

The DWQP has had a strong emphasis on monitoring and assessment activities since the start of the program. Prior to the adoption of the ROD, four monitoring and assessment projects were funded with USEPA early implementation funding for the DWQP. In Years 1-3, the DWQP identified existing drinking water quality monitoring programs and funded 6 projects addressing monitoring and assessment needs in the Delta, San Joaquin River and SWP system. The DWQP also developed a list of candidate indicators for performance measures.

Federal Funding for the DWQP 1999-2000

1. Real-time Water Quality Monitoring Project (\$220k)
2. TOC High Frequency High Variability Study (\$300k)
3. Delta Contaminant Load Study (\$45k)
4. Database Management for Drinking Water Quality (\$100k)

In Years 1-3, the DWQP identified existing drinking water quality monitoring programs and funded four projects. The DWQP also developed a list of candidate indicators for performance measures.

2001 DWQP PSP (finalized February 2002)

1. Resolution of Outstanding Issues in Delta Hydrodynamics and Water Quality Models (\$155k)
2. Determining the Contribution of Riverine, In-Delta, and Aqueduct Sources of Organic Carbon to Loads in the State Water Project using AMS Carbon Dating and Stable Isotope Characteristics (\$396k)
3. Vernalis Real-Time Water Quality Monitoring Station (\$515k)
4. Assessing the Occurrence and Sources of Microbial Contamination in the Sacramento-San Joaquin Delta Region (\$973k)
5. Improving Delta Drinking Water Quality: Managing Sources of Disinfection Byproduct-Forming Material in the State Water Project (\$1,369k)
6. Adaptive Real-Time Monitoring and Management of Seasonal Wetlands and the San Luis National Wildlife Refuge to Quantify Contaminant Sources and Improve Water Quality in the San Joaquin River (\$320k)

Other Funding Sources (Agency)

1. Sacramento River Watershed Program (USEPA)

Looking Forward

In Years 4-7, the DWQP will coordinate with the Science Program to achieve the following:

Year 4: Establish a DWQ Science advisory panel. Complete conceptual models for the primary contaminants of concern, white papers on selected contaminants, and selection of analytical tools (computer models).

Year 5: Complete data collection and monitoring to supply information needed by the selected model or models and conduct initial model runs.

Year 6: Complete the basic network of trends monitoring stations.

Years 6 and 7: Apply the selected models and report results.

Year 7: Evaluate source improvement and program progress.

In Years 4-7, the DWQP will also coordinate with the Science Program to develop Performance Measures. Program is committed to developing water quality performance measures and relevant measures of program success. In 2002, the Program developed candidate indicators for TOC and bromide in exported water. In 2004, the Program, with assistance from a consultant, will begin to expand these indicators to reflect the overall goals of the Program, as well as the commitments in the ROD. At the project level, performance measures are currently included in requests for proposal. Finally, performance measures have been established to track administrative goals. Currently, the Program tracks the number of projects initiated, projects by region and the dollar amounts distributed.

The DWQP will complete the development of indicators for TOC and bromide in exported water, and develop additional indicators as warranted. The DWQP will also coordinate with the Science Program to establish an expert panel to advise the DWS on the following issues:

1. The TOC and bromide targets in the ROD are intended to protect public health by reducing disinfection byproduct formation. Is TOC the most appropriate measure of disinfection byproduct formation potential?
2. How can source control, water management, and treatment be used most effectively in to reduce risk from disinfection byproducts, pathogens, and other pollutants of concern?
3. What are the long-term trends in ambient concentrations and loads of the drinking water program pollutants of concern (organic carbon, bromide, pathogens, turbidity, salinity, and nutrients)?
4. How will large scale and long term changes to the system affect source water quality? For example: How will increasing population and urbanization of the Central Valley impact source water quality?

Cross-Integration and Linkages

The DWQP will coordinate closely with the Science Program when developing and implementing its Monitoring and Assessment actions. The Science Program is establishing protocols for integrating science into the California Bay-Delta Program elements.

7.5 Funding

Looking Forward

The primary source of funding for drinking water quality actions in years 4-7 will be the Water Security, Clean Drinking Water, Coastal and Beach Protection Act of 2002 (Prop 50). None of the Prop 50 funds for water quality are designated for the CBDA. As has been the case in Years 2 and 3, it is anticipated that the primary mechanism for implementation of the program will be through competitive grants. The SWRCB, DHS, and DWR all plan to conduct grant funding processes in Years 4-7 using Prop 50 funds. Since these funds are available statewide and may address other water quality issues, and none of the remaining Prop 50 funding has been specifically designated for the DWQP, the amounts for the program are unknown.

2003 State Water Resources Control Board RFP: The SWRCB released a consolidated RFP which includes \$31.5 million in Year 3 funds for the DWQP. The selection process will begin in Year 3 with final project selection in Year 4.

As the attached Prop 50 expenditure plan indicates, specific sections of the bond are designated for treatment technology and water quality improvements. These correspond to the Source Improvement and Treatment Options boxes in the ELPH diagram. The DWQP will work with the implementing agencies to develop program priorities and selection criteria for these funds.

The proposed Year 4 budget for the DWQP is \$3.1 million. Additional funding for DWQP goals and commitments is expected from Prop 50 but the amount is unknown.

8. Year 4 Program Plan

Goals and Objectives for Year 4

The DWQP will work with the State Water Resources Control Board (SWRCB) on selection of projects submitted in response to the March 2003 Request for Concept Proposals. Criteria and priorities for the \$31.5 million available from FY 02/03 funds for California Bay-Delta Authority (CBDA) Drinking Water projects in this solicitation were provided by the DWQP.

The DWQP will work with the Department of Health Services (DHS) and the SWRCB to develop solicitations for Prop 50 funding available to these agencies in Year 4 (FY 03/04).

The BDPAC Drinking Water Subcommittee (DWS) with support from the DWQP will assess progress towards achieving ROD goals and objectives. The DWS also plans to develop strategy recommendations for implementation of the DWQP based on the ELPH diagram.

Improving Delta Water

The following are descriptions of continuing activity on Drinking Water Quality Program (DWQP) commitments and complimentary actions from the Programmatic Record of Decision (ROD).

Source Improvement

Drinking Water Policy for the Delta and its Tributaries: During year 4, conceptual models and a regional database will be developed. Data needs will be identified and a monitoring program will be developed. Monitoring for essential “missing” elements will begin. Water quality goals will be identified.

Monitoring and Assessment: Monitoring and Assessment Program (MAP):
Year 4: Complete conceptual models for the primary contaminants of concern, white papers on selected contaminants, and selection of analytical tools (computer models).

Sacramento River Watershed Program: In 2003, US EPA will be providing an additional \$270,000 in federal funds to continue the program.

Drinking Water Policy for the Delta and its Tributaries: During year 4, conceptual models and a regional database will be developed. Data needs will be identified and a monitoring program will be developed. Monitoring for essential “missing” elements will begin. Water quality goals will be identified.

Main recommended BMP – livestock fencing within the watershed: It is unknown when Solano County Water Agency (SCWA) will get the authorization to start expenditures. This project can be completed within one year of authorization to proceed.

Salinity TMDL for the lower San Joaquin River: CVRWQCB will continue to work on the TMDL to meet salinity standards and address other water quality problems associated with agricultural drainage in the lower San Joaquin River.

DWR Agricultural Drainage Program (salinity and selenium): DWR will continue to provide technical assistance to the Bay-Delta Program on issues related to agricultural

drainage. This may include review of proposals, contract management, technical studies, program recommendations, and outreach activities.

State Water Project Watershed Sanitary Survey: DWR will implement monitoring and assessment activities prioritized in the report. Examples include an investigation of urban loading into the Delta, studies of organic carbon discharged into the Delta, and modeling pollutant transport through the Delta.

North Bay Aqueduct – livestock fencing within the watershed: When Solano County Water Agency (SCWA) gets authorization to proceed, the project can be completed within one year.

Conveyance/Delta Operations

Alternate intake for the North Bay Aqueduct: By the end of calendar year 2003, Solano CWA will present results to the California Department of Health Services, Department of Water Resources and CBDA to determine the next steps.

South Delta Improvements Program: DWR will seek a final EIR/EIS with a final biological opinion and NCCP determination. A Section 10 permit is sought for the increase in diversions to Clifton Court Forebay and Section 404 permits will be sought for dredging and placement of barriers.

Operational Improvements/ Recirculation in the San Joaquin River: USBR will conduct sediment sampling, economic analysis, legal analysis, additional fisheries study, public involvement, and final documentation.

Storage

Improving Imported Water

Source Water Exchanges Out of Delta

Bay Area Water Quality and Supply Reliability Program: Phase 2 will be completed with the remaining funds from SB 23 through the ABAG contract unless these funds are not extended. In that case, funds from Prop 50 will need to be substituted. Tasks include completion of the analysis and evaluation of those results to identify alternatives or portfolios that group a variety of alternatives together that meet the objectives of the various Bay Area agencies (by February 2004).

San Joaquin Valley / Southern California Water Quality Exchanges: Partnership activities planned for the current year include exploring the feasibility of implementing specific projects.

CVP/SWP Ops and Storage (Out of Delta)

Control Run-off into Conveyances:

Operational Improvements/ Recirculation in the San Joaquin River: USBR will conduct sediment sampling, economic analysis, legal analysis, additional fisheries study, public involvement, and final documentation.

Treatment Technology

Ultraviolet (UV) Light Disinfection (MWD Project): The project duration is 24 months, so it should be completed by mid to late 2004.

Ultraviolet (UV) Light Disinfection (CCWD Project): Advanced Treatment of Delta Water to Meet Future Regulations. Secure funding and begin work on the project.

Regional Desalination: Agricultural drainage water recycling using membrane technology by Panoche Drainage District (CALFED grant). Perform site testing, investigate brine options, finalize system design, and prepare interim report.

Desalination Research and Innovation Partnership (DRIP): Continued work will focus on brine minimization and treatment strategies, and emerging contaminants that may limit future water treatment projects.

Program Management

Administration

Program management will transition from CALFED to DHS and SWRCB/CVRWQCB as state co-leads and US EPA as federal lead. Staff resources, availability of funds, and processes for the implementation of the DWQP need to be determined in greater detail.

Implementation strategy

Most of the funding for program implementation in Year 4 will come from Prop 50. Funding from several chapters of Prop 50 is applicable to the DWQP and will be appropriated to the specified agencies. Prop 50 also specifies the types of projects and programs that can be funded. The constraints of Prop 50, additional enabling legislation, and the policies of the designated agencies will largely determine the general spending strategy for the program. The funding available, designated agency, and planned Year 4 spending is outlined below in the budget section.

Chapter 4 of Prop 50, administered by the DHS will provide funding for the Safe Drinking Water State Revolving fund and other drinking water programs. Funding for drinking water treatment technology in Chapter 6 of Prop 50 will be jointly administered by DHS and DWR.

The following actions will help the program to achieve the goals and objectives of the ROD and the ELPH conceptual framework.

Drinking Water Subcommittee (DWS): The DWS will complete ELPH strategic plan. The DWS will also support, and provide input to development of the Drinking Water Policy for the Delta and its Tributaries.

State Water Resources Control Board Consolidated RFP: In cooperation with the CBDA, the SWRCB released a request for proposals that includes \$31.5 million for CALFED Drinking Water Quality Program (DWQP) grants. Project selection will be guided by criteria and priorities provided by the DWQP. The RFP was released March 19, 2003 starting a two-stage process with final awards scheduled for early 2004.

Sacramento River Watershed Program: In 2003, US EPA will be providing an additional \$270,000 in federal funds to continue the program.

Monitoring and Assessment: Monitoring and Assessment Program (MAP):
Year 4: Complete conceptual models for the primary contaminants of concern, white papers on selected contaminants, and selection of analytical tools (computer models).

Performance Measures: The DWQP will continue to expand and refine the list of performance measure started in year 3. Performance measures will be based on the program's conceptual models.

Implementation Commitments

The DWQP will continue implementation in accordance with the Bay-Delta Program Science, Environmental Justice, and Public Involvement principles described in the Multiyear Plan and the ROD.

Schedule of Major Program Deliverables:

During Year 4 the DWQP will complete or oversee several key program tasks. Important program deliverables will include:

- As successor to the Delta Drinking Water Council, the BDPAC Drinking Water Subcommittee is scheduled to complete an initial assessment of progress toward meeting water quality targets and alternative treatment technologies by the end of 2003. This assessment will incorporate the findings of an expert panel, which will be established with the assistance of the Science Program.
- 2003 SWRCB Consolidated RFP grant award recommendations scheduled for review by the CBDA in late November or early December 2003. This consolidated RFP includes \$12.7 million from Prop 13 and \$18.8 million from Prop 50.

Recommendations for additional drinking water quality related projects to be funded by the Water Security, Clean Drinking Water, Coastal and Beach Protection Act of 2002 (Prop 50) are also expected in Year 4.

Year 4 Proposed Budget

The Drinking Water Quality Program expects approximately \$400,000 in funding for staff and program general program support and another \$2 million from Prop 13 designated for projects to address problems associated with Delta agricultural drainage. The primary source of funding to achieve program goals on the State side will come from Prop 50. The amount of funding available from EPA and other federal agencies is unknown. Except for cost share for some existing projects, local funding applicable to program goals is largely unknown.

Prop 50 expenditure plan – These are the maximum amounts available for all purposes in chapters that could apply to drinking water goals. Actual amounts applicable to DWQP objectives will be less.

Prop 50 Chapter	Designated Agency	Purpose	Year 4 Amount (\$ in millions)
Ch. 3	DHS	Water security grants.	9.9
Ch. 4	DHS	Safe drinking water grants and loans.	99.7*
Ch. 5	SWRCB	Source control.	36
Ch. 6	DWR	Treatment technology and desalination	25
Ch. 8	DWR	Integrated regional water management	59.5

* Because of the commitment to provide matching funds for the State Safe Drinking Water Revolving Fund and spending requirements in the bond, only an estimated \$15 will actually be available for DWQP Projects from this chapter.