



**Municipal Water Quality Investigations Program
2014-2015 Work Plan**

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Final**

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1. MISSION STATEMENT and STRATEGIC PLAN

The mission of the Municipal Water Quality Investigations (MWQI) Program is to:

- a) Support the effective and efficient use of the State Water Project (SWP) as a source water supply for municipal purposes through monitoring, forecasting, and reporting of the Sacramento San Joaquin Delta and the SWP water quality;
- b) Provide early warning of changing conditions in source water quality used for municipal purposes;
- c) Provide data and knowledge based support for operational decision-making on the SWP;
- d) Conduct scientific studies of drinking water importance; and
- e) Provide scientific support to the Department of Water Resources (DWR), the State Water Project Contractors Authority (SWPCA) MWQI Specific Project Committee (MWQI SPC), and other governmental entities.

The current MWQI 5 Year Strategic Plan, effective through June 2017, can be found at:

http://www.water.ca.gov/waterquality/drinkingwater/docs/Final_Appendices_FY13-14WP_20130621.pdf

2. INTRODUCTION

2.1. Background and Work Plan Structure

Through this annual work plan, the MWQI Program conducts water quality monitoring in the Sacramento-San Joaquin Delta (Delta) for municipal and industrial uses, as the Delta is considered part of the SWP. The MWQI program incorporates their Delta water quality monitoring data along with that of the Division of Operations and Maintenance's (O&M) State Water Project monitoring and then produces and disseminates daily and weekly Real-Time Data Forecasting (RTDF) reports as explained in the Municipal Water Quality Investigations Agreement (MWQI Agreement) between DWR's Division of Environmental Services (DES) MWQI Program, SWPCA, and the 16 SWP Contractors who receive municipal and industrial (M&I) supplies from the SWP. The MWQI Program also conducts drinking water research on

Delta water quality, provides data and knowledge based support for DWR operations on the SWP, and provides scientific drinking water expertise and support to DWR, the MWQI SPC, other governmental entities, and stakeholders. Finally, the MWQI Program supports data and database infrastructure management and sharing to enhance and improve the long-term storage and retrieval of RTDF data, administers essential program management activities mandated by DWR's policies and procedures, and works to ensure the health and safety of staff in the workplace.

This annual work plan describes work to be performed by the MWQI Program for the fiscal year (FY) 14-15 (July 1, 2014 to June 30, 2015). Work identified in this work plan is prioritized and developed by MWQI Program management staff and the SWPCA MWQI SPC. Adjustments to the MWQI Program may be made at any time in a Program Year through a decision of DWR with the concurrence of the MWQI TAC, and with the concurrence of the MWQI SPC for work performed under the MWQI SPC Account. Examples of adjustments are unforeseen events such as staff vacancies, workload shifts, or other resource demands placed on the program by DWR upper management.

The MWQI Program is composed of staff from the Municipal Water Quality Investigations, Water Quality Special Studies, and the MWQI Field sections. In addition, project partners from various organizations work directly with program staff. The SWPCA MWQI SPC is composed of the State Water Contractors who take M&I water supplies from the SWP, all of whom have an interest in the monitoring of the quality of drinking water supplies in the Delta and in the SWP.

Approval of the annual work plan is provided by "voting members" of the MWQI Technical Advisory Committee (TAC), which includes MWQI Program management staff, and the SWPCA MWQI SPC members committed to funding the MWQI Program's planned work. Other TAC representatives include the California Department of Public Health (CDPH); Contra Costa Water District (CCWD), which is an invited participant associated with the TAC; the MWQI SPC program management consultant; and other invited members of outside agencies.

Representatives serving on the MWQI SPC can differ from those serving on the MWQI TAC.

The majority of the MWQI Program (\$2.7 million in FY 14-15) is funded by the MWQI SPC through the Statements of Charges. Additional funds are provided through the MWQI SPC for the items listed in Section 3.2 of this Work Plan and under the "MWQI SPC Fund" column of

Table 1. CCWD also provides funding to the MWQI SPC for the items listed in Table 1. The MWQI SPC members are:

1. Alameda County Flood Control and Water Conservation District, Zone Seven
2. Alameda County Water District
3. Antelope Valley-East Kern Water Agency
4. Castaic Lake Water Agency
5. Central Coast Water Authority
6. Crestline-Lake Arrowhead Water Agency
7. Kern County Water Agency, Municipal and Industrial Use
8. Mojave Water Agency
9. Metropolitan Water District of Southern California
10. Napa County Flood Control and Water Conservation District
11. Palmdale Water District
12. San Bernardino Valley Municipal Water District
13. San Geronio Pass Water Agency
14. San Luis Obispo County Flood Control and Water Conservation District
15. Santa Clara Valley Water District
16. Solano County Water Agency

2.2. Work Plan Elements

The MWQI Program collects discrete data, collects and disseminates real-time data, and conducts water quality studies to develop an understanding of the sources of drinking water contaminants which affect the quality and treatability of water supplied to municipal water purveyors. The MWQI Program provides technical water quality expertise and data to support modeling efforts to other units within DWR, to local municipal water agencies, and to the State Water Resources Control Board (SWRCB) and the Regional Water Quality Control Boards, and contributes water quality expertise while participating in regulatory and planning processes as

described in the work plan elements. The following work plan elements are essential functions of the MWQI Program and are further explained in subsequent sections of this work plan.

- Water Quality Assessment
- The Real-Time Data and Forecasting Comprehensive Program (RTDF-CP) including real-time water quality monitoring, forecasting, and data dissemination
- Science Support (Special Studies)
- Emergency Response
- Workplace Safety
- Other Water Quality Program Related Activities – funded by the MWQI Program
- Program Management
- DWR Support Activities – not funded by the MWQI Program
- Data to support the efforts of the DWR modelers and MWQI project partners.

Three appendices complement the work plan by providing more in-depth information regarding the essential elements of MWQI Program. These appendices are:

- Appendix 1 – MWQI Program FY 14-15 work plan element costs and staff workload assessments.
- Appendix 2 – Project Management documentation.
- Appendix 3 – Work plan schedule and process.

2.3. MWQI Program Responsibilities

In addition to the already mentioned responsibilities, MWQI program managers and staff will participate in various drinking water quality activities external to the program, such as regulatory activities (SWRCB, Central Valley Regional Water Quality Control Board, and CDPH) that can affect drinking water quality and operations of the SWP. MWQI Program staff will coordinate such activities with the MWQI SPC as in the past.

MWQI Program responsibilities:

- Conduct long-term discrete water quality monitoring (grab samples) in the Delta
- Conduct real-time water quality monitoring (automated, high frequency data collection stations) in the Delta
- Provide scientific support on Delta, SWP, and drought related drinking water issues
- Analyze Delta drinking water quality monitoring data
- Provide Delta drinking water quality historical data
- Provide SWP drinking water quality early warning (RTDF-CP) data
- Provide SWP drinking water quality forecasting (RTDF-CP) data and information
- Provide support to the MWQI SPC

MWQI Program staff also provides support on occasion to:

- The Delta Stewardship Council
- The Delta Conservancy
- The State Water Resources Control Board for their CDEN database development efforts
- The California Water Quality Monitoring Council for their “My Water Quality” web portal development efforts
- The Interagency Ecological Program (IEP) for their strategic plan efforts, annual workshop and IEP work teams
- The California Water Plan for periodic update and review efforts
- The DWR Safety Office for workplace safety efforts
- DWR’s emergency response efforts, if needed and where possible
- DWR’s annual effort in producing Bulletin 132, Chapter 4 – Water Quality
- DWR drought activities

Customers/Regulators using MWQI data:

- SWPCA MWQI SPC
- Contra Costa Water District
- Central Valley Regional Water Quality Control Board
- California Department of Public Health
- DWR's Operation Control Office
- DWR's Bay Delta Office
- Delta Conservancy
- Other State government agencies
- US Environmental Protection Agency
- Bay Delta Conservation Plan

2.4. Program Accomplishments

The MWQI Program has accomplished a number of goals listed in the FY 13-14 work plan. These include:

- Continuous operation of five real-time water quality stations
- Continuous data dissemination of water quality reports
- Weekly distribution of short-term water quality forecasts
- Monthly distribution of volumetric, EC, and organic carbon source fingerprints
- Installation of modified water delivery systems at Hood and Vernalis stations which have decreased the maintenance costs at these stations. The same systems will soon be installed at the other 3 stations.
- Completion of version 2 of the Field Station Real-Time Monitoring Standard Operating Procedures for Gianelli WQ station.
- Completion of WARMF Model development for the Sacramento and San Joaquin Rivers

- Completion of O&M historical data entry project
- Migration of quality controlled Real-Time Monitoring Data to WDL for data dissemination and science support.
- Completion of California Integrated Water Quality System (CIWQS) Database Search.
- Publication of MWQI Summary Report to website.
- Prepared Urban Sources and Loads Report to post on website and had summary report published in the IEP Newsletter
- Finished several projects to develop data for simulation of historical conditions for the Delta and Aqueduct water quality models including assembling, synthesize, and refining EC, DOC, and bromide data necessary to define boundary condition. These projects are part of a large RTDF-CP Water Quality Forecast project involving the Bay Delta Office (BDO) and Operations Control Office (OCO).

2.5. Changes/Updates from the 2013-14 Work Plan

The new MWQI Program's work plan continues to evolve to meet the changing water quality, regulatory, and data sharing landscape while following DWR policies and processes. In this work plan cycle, several special studies projects are ongoing and continue forward from the FY 13-14 work plan, and many of these projects will be completed within the FY 14-15 work plan cycle. A number of the tasks associated with the RTDF-CP were planned to continue into the FY 14-15 work plan.

The MWQI Program staff is required to use both Water Resources Engineering Memorandum 65a (WREM65a) and Project Management Book of Knowledge (PMBOK) standards when planning and conducting their scientific special studies since 2013. For more information about these standards see the previous MWQI FY 13-14 work plan. Staff responsible for planning and conducting scientific special studies, called lead investigators, manages their projects using the basic process steps of initiating, planning, executing, monitoring and controlling, and closing a project. MWQI staff will use project initiation forms, as well as charters, resource agreements, and project management plans to plan, conduct, and control their projects. DWR resource agreements serve as an agreement between the MWQI Program Manager and the Program

Manager in other DWR Divisions doing the work. Lead investigators may need to incorporate a resource agreement into their projects if support is required from other DWR Divisions.

To ensure the success of the new special studies, the study's lead investigators are responsible for developing and refining: the project management integration, scope of work, timelines, and cost estimates, quality; staffing and equipment requirements; and communication management, risk management, procurement management, and stakeholder management plans. Also, the study's lead investigators are responsible for identifying their project's specific reporting requirements and relationships, participant roles and responsibilities, and monitoring change control and reporting policies and procedures. By incorporating their knowledge along with the basic process steps of project management, the lead investigators have additionally integrated principles of sound scientific study design and have developed milestone tracking steps that will need to be accomplished in order to achieve an effectively managed project while efficiently producing deliverables within scope, schedule, and budget.

Some projects in this work plan have not yet been thoroughly discussed and developed with the MWQI Program staff and the MWQI SPC members, therefore staff do not yet possess enough information to develop the project initiation forms or project charters. When sufficient information is developed and if there are sufficient staff resources, the special project may be included in this work plan cycle or may be included in the next work plan cycle.

The MWQI SPC is committed to ensuring the success of the MWQI Program's planned work and therefore, has identified project partners or subject matter experts (SME's) that have been serving as technical advisors on several of the special study projects. Project partners have guided and given advice to staff throughout their projects to completion. Throughout the life of the special study projects, staff has been encouraged to meet regularly with their project partners and provide periodic updates during monthly TAC meetings.

Special study final reports will be posted on the MWQI Program's website at:

<http://www.water.ca.gov/waterquality/drinkingwater/>. Before publication, special study final reports will follow DWR's publication policy and will be initially peer-reviewed by the MWQI staff then MWQI Program management followed by the project partners and MWQI SPC, and finally by DWR's upper management. Some of the completed reports may be published as journal articles.

2.6. Challenges

The following are challenges associated with the management of the MWQI Program, and the Municipal Water Quality Program (MWQP) Branch.

2.6.1 Staffing

In April of 2013, the MWQI Program experienced a Senior Environmental Scientist vacancy. In June of 2013, the MWQI Program experienced an Environmental Scientist vacancy, in the MWQI Field Section. The Senior Environmental Scientist vacancy was filled in June 2013. The Environmental Scientist vacancy was filled in December 2013, but was moved from the MWQI program and placed in the QA/QC program. Currently, there are no vacancies in the MWQI Program.

2.6.2 State Budget Actions

The Governor has declared that California is currently in a state of emergency due to the current multi-year drought. MWQP management staff has been called-on by DWR to provide expertise on municipal water uses during high-level drought management planning meetings. Staff time outside of management has not yet been used for drought efforts. It is highly likely that MWQP staff will be called on during FY 14-15 to provide services to the State in its management of the drought situation. If this fact changes, the MWQP Branch Chief will discuss needs with MWQI management, MWQI SPC, and the TAC.

The Governor's 2011 mandatory reduction in cell phones and vehicles had a significant impact on DWR, DES and the MWQI Program. The current DES policy requires that staff members conducting remote field work are in possession of a State issued cell phone. Currently, the Field Section uses pool phones to conduct their routine water quality sampling and station support activities. Non Field Section staff members are required to check-out phones from the Field Section when conducting field work.

2.6.3 Executive Orders

The Governor's 2011 order for state agencies to reduce their number of vehicles by 50%, never resulted in MWQI losing vehicles, but it did result in the mobile monitoring vans not being purchased in previous fiscal years. During the FY 13-14, one of these mobile lab vans experienced serious engine and transmission issues that resulted in the vehicle being taken out of service. The other mobile lab van has also experienced issues. At times, these issues have

caused MWQI difficulty completing intended field work in a timely and efficient fashion. The replacement vans are on order and will be delivered by the end of the FY 13-14.

Finally, per the Governor's executive order, B-06-11 of 2011, travel restrictions continue to be fully enforced by DWR therefore, only mission-critical in-state travel which fits certain exemption categories will be approved.

The MWQI Program will adjust accordingly by addressing the program's core functions while becoming more flexible with project deadlines, prioritizing training, and reducing the number of meetings that staff are required to attend.

3. PROGRAM FUNDING NEEDS

3.1. MWQI and MWQI SPC Funds

The new three-year MWQI Agreement between the MWQI Program, SWPCA, and the 16 SWP Contractors who receive M&I water from the SWP, took effect in January 2014. For FY 14-15, the total budget is \$3 million with \$2.7 million for the DWR MWQI Program and \$286,500 for the MWQI SPC fund. The DWR MWQI Program portion will fund staff salaries including benefits, assessments, operating expenses, Real-Time Data Forecasting, support to the DWR modelers, and research on the quality of drinking water supplies taken from the Delta. For this FY 14-15 budgeting purposes MWQI will be using an assessed labor rate of \$97 for Environmental Scientists and \$127 for engineers. The MWQI SPC portion will provide funds to retain consultants, and purchase certain goods and services deemed necessary and desirable for station operation and research by both the MWQI TAC and the MWQI SPC. The estimated budget expenses for this work plan cycle are shown in Table 1.

The majority of the \$2.7 million budget for the MWQI Program is funded by the SWPCA MWQI SPC through the Statement of Charges. Additional funds are provided through the MWQI SPC for the items listed in section 3.2 of this work plan and under the "MWQI SPC Fund" column of Table 1. The Contra Costa Water District also provides funding to the MWQI SPC for the items listed in Table 1.

A new contract between the MWQI Program and the San Luis and Delta Mendota Water Authority (SLDMWA) is current and effective through December 2015. With this contract in

place, SLDMWA can continue to provide supplemental support of the MWQI Program water quality monitoring equipment installed at the Jones Pumping Plant.

The FY 14-15 MWQI Program and MWQI SPC budget is presented in Table 1 below, followed by an updated explanation of MWQI and MWQI SPC expenditures. Partner staffing in this budget reflects 1 Person Year or 1 PY each for the Bay Delta Office and Operations Control Office and 0.6 PY for the Division of Operations & Maintenance's Environmental Assessment Branch.

Managing and controlling the work done by MWQI program partner staff will be accomplished using resource agreements. Resource agreements are mutually agreed-upon work products and approved by Program Managers within the respective DWR Divisions. Resource agreements can vary in length and be renewed or revised at any time with approvals by the participating Program Managers.

For budgeting purposes DWR assesses overhead charges to the hourly rate of each member of the MWQI staff. These assessments help to cover overhead costs including;

- MWQI staff leave (holiday, vacation, sick, etc...)
- Administrative staff
- Management staff
- Executive staff (including personnel, legal, fiscal, facilities, etc.)
- Building costs and maintenance
- Vehicle costs
- Employee Benefits
- Other DWR expenses

While the hourly employee costs including assessments have been static for many years they are subject to change. At times unexpected costs may be assessed to the hourly rate of MWQI staff. These increases in assessments may be due to a number of reasons including, but not limited to, emergency response, lawsuits, and legislative mandates. NOTE - The MWQI Program is being reimbursed \$90,000.00 in FY 13-14 for assessments that should have been charged to the correct DWR program. In general these costs come in the form of temporary increases to assessments over a short period of time.

Table 1. Program Element Costs FY 14-15 (MWQI and MWQI SPC funds)

Workplan Element	Program Element	2014/15 IO#	Labor Hours	Labor Cost	Contract costs	OE&E ^c	Total Cost	MWQI/SPC Fund	Total Budget
5	Water Quality Assessment								
5.1	Routine Monitoring Program	VWQASSMENT13	752	\$72,944		\$5,000	\$77,944		\$77,944
5.2	Short-term Monitoring	VWQASSMENT13	1824	\$176,928		\$54,000	\$230,928		\$230,928
6	RTDF-Comprehensive Program								
6.1	RTDF-CP Real Time Monitoring								
	6.1.1 ^a MWQI Real Time Stations	VRTMONITOR13	2336	\$226,592	\$21,400	\$55,000	\$302,992	\$25,000	\$327,992
	6.1.2 Gianelli WQ Station	VGIANNELLI13	1064	\$103,208	\$4,600	\$8,000	\$115,808		\$115,808
6.2	RTDF-CP Water Quality Forecasting								
	6.2.1 BDO- Bay Delta Office Modeling	VRTBDOMODL13	1768	\$224,536			\$224,536		\$224,536
	6.2.2 OCO- Operations Control Office Modeling	VRTOCOMODL13	1768	\$224,536			\$224,536		\$224,536
	6.2.3 Model Support - Trends Analysis, modeling, rpt	VTRENDSAMR13	104	\$10,088			\$10,088		\$10,088
6.3	RTDF-CP Information Management and Data Dissemination								
	6.3.1 RTDF Data Dissemination & Reporting	VRTDDISRPT13	1264	\$122,608			\$122,608	\$13,000	\$135,608
	6.3.2 Administration and Database Activities ^b						\$0	\$62,400	\$62,400
7	Science Support (Special Studies)								
7.1	7.1 Limnology of the SWP	VLIMNOLOGY13	1944	\$188,568			\$188,568	\$65,000	\$253,568
	7.1.1 Nutrient Budget Study	VNTDYNSTDY13	1144	\$110,968			\$110,968		\$110,968
	7.1.2 Nutrient Limitation Study	VLIMNUTLIM14	360	\$34,920			\$34,920		\$34,920
	7.1.3 Nutrient and Nutrient Ratio Influence on Community Species Composition	VLIMNRATIO14	144	\$13,968			\$13,968		\$13,968
	7.1.4 Light Limitation in the SWP	VLIMLIGHTL14	688	\$66,736			\$66,736		\$66,736
	7.1.5 Algal and Macrophyte Growth Study	VLIMAMGROW14	120	\$11,640			\$11,640		\$11,640
	7.1.6 Spatial-temporal Distribution of Melosira in the SBA	VLIMMELOSI14	696	\$67,512			\$67,512		\$67,512
	7.1.7 Distribution of Macrophytes in the SWP	VLIMMACROP14	600	\$58,200			\$58,200		\$58,200
	7.1.8 Wide Swings in Canal pH Study	VLIMPHSTUD14	528	\$51,216			\$51,216		\$51,216
	7.1.9 San Luis Reservoir Study	VLIMSLRSRV14	0	\$0			\$0		\$0
	7.1.10 Dyer Reservoir Study	VLIMDYRSRV14	0	\$0			\$0		\$0
	7.1.11 Del Valle Reservoir Study	VLIMDLRSRV14	0	\$0			\$0		\$0
7.2	7.2.1 Cattle Impacts to SWP Water Quality	VSANSURVEY14	480	\$46,560			\$46,560		\$46,560
7.3	7.3 FDOM Phase II	VFDOMPOCS013	800	\$77,600		\$2,000	\$79,600		\$79,600
7.4	7.4 Urban Sources and Loads Investigation	VURBANSL0013	80	\$7,760			\$7,760		\$7,760
7.5	7.5 O'Neill Forebay Mixing Study	VONEILFRBY13	80	\$7,760			\$7,760		\$7,760
7.6	7.6 Spectrofluorometer Study	VSPCTROFLU13	160	\$15,520			\$15,520	\$2,000	\$17,520
7.7	7.7 Tidal Marsh Restoration Literature Review	VTIDALMRSH13	160	\$15,520			\$15,520		\$15,520
7.8	7.8 Feasibility Study for MWQI Portable Monitoring Sta.	VPORTBLSTN13	80	\$7,760			\$7,760		\$7,760
8	Other MWQI Funded Program Activities								
8.1	Administration Work	VDWRRQDDPC13	1640	\$159,080		\$10,000	\$169,080		\$169,080
8.2	Field Unit Office Duties	VFUOFCWORK13	1200	\$116,400		\$5,000	\$121,400		\$121,400
8.3	O & M WQ other duties (Daniel may not be charging to this IO#)	VOMWQH00013				\$500	\$500		\$500
8.4	MWQI Annual Workplan	VWORKPLAN013	528	\$51,216			\$51,216		\$51,216
8.5	DWR Bulletin 132	VBULL132WQ13	120	\$11,640			\$11,640		\$11,640
8.7	Workplace Safety	VSAFTYDOCS13	136	\$13,192		\$500	\$13,692		\$13,692
8.8	Emergency Response	V911RESPNS13	40	\$3,880			\$3,880		\$3,880
8.9	Miscellaneous meetings attended by staff	VOTHERWQPA13	400	\$38,800			\$38,800		\$38,800
9	Program Management-Status Reporting	VPROGMMGMT13	1792	\$173,824			\$173,824	\$89,100	\$262,924
10	Non-MWQI Funded Program Management			\$0			\$0		\$0
11	Other Required Program Costs				\$3,000		\$3,000	\$30,000	\$33,000
11.1	MEO Insurance & Fuel	G1111290005I				\$1,000	\$1,000		\$1,000
	Total		24800	\$2,511,680	\$29,000	\$141,000	\$2,681,680	\$286,500	\$2,968,180

^a 6.1.1 Includes contracts with San Luis & Delta Mendota Water Authority, and maintenance contracts for WQ Station analyzers. ^b Includes Dennis' time(funded by the MWQI SPC). ^c Operating Equipment & Expenses

* DWR assessments are equally charged to programs to cover costs of Departmental overhead expenses. For example, administration, legal, and executive offices.

**The MWQI Program includes 11 PY for staff and 3 PY for program partners in OCO, BDO, and O&M. ES Staff time has been calculated at \$97 per hour, and Engineer Staff time at \$127 per hour.

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3.2. Explanation of Table 1 Program Element Costs for FY 14-15 Work Plan Projects

Specific Tasks to be Implemented using MWQI SPC Funds

The MWQI SPC will provide funding to provide technical support on program tasks associated with the MWQI Program:

Program Element 6.1.1 MWQI Real Time Stations

- **\$25,000** allocated, if needed, for real time station and special study equipment and/or rental needs

Program Element 6.3.1 RTDF Data Dissemination & Reporting

- Consultant to provide technical expertise on the RTDF-CP Program up to **\$13,000**.

Program Element 6.3.2 Administration and Database Activities

- Consultant to provide technical and managerial expertise with RTDF-CP administration, database activities, and data management support up to **\$62,400**.

Program Element 7.1 Limnology of SWP

- Consultant will act as the Project Manager to provide technical and managerial expertise for the Limnology of SWP Study up to **\$40,000**.
- **\$25,000** allocated, if needed for equipment purchases.

Program Element 7.6 Spectrofluorometry Study

- Consultant to provide technical expertise on the MWQI Spectrofluorometry Study up to **\$2,000**.

Program Element 9 Program Management/Status Reporting

- Consultant to administer MWQI SPC managed fund and serve as a liaison between MWQI and the MWQI SPC up to **\$80,000**. The MWQI SPC Consultant will provide technical and managerial expertise on program tasks associated with the MWQI Program. The consultant serves as a member of the MWQI TAC, administers the MWQI SPC fund, and serves as a liaison between the MWQI SPC and the MWQI Program. The

SWPCA General Manager will charge time to this budget when working on MWQI activities or attending meetings.

- Program Management expenses including State Water Contractor staff services, legal, administration expenses, and Annual Meeting costs up to **\$9,100**.

Program Element 11 Unassigned Funds

- Consultant to continue work on artificial neural network model, up to **\$30,000**.

MWQI contracts required for FY 14-15 Work Plan Elements

The MWQI Program maintains a planned budget of **\$29,000** to cover the total expenses of the following contracts:

1. Element 6.1.1 – The contract has been extended with the SLDMWA that covers minor repair work and the cost of phone service at the Jones Pumping Plant where MWQI maintains a RTDF water quality station. The service is necessary for safety reasons since staff may be working for extended periods of time in the lower level of this pumping plant where their cell phones may not have service, and in case of emergency staff would need access to a working landline phone (**\$2000**).
2. Element 6.1.1 – The MWQI Program maintains the contract with All Cal Services that provides a portable toilet at the Hood RTDF WQ Station. This service is necessary since staff may be on-site for extended periods of time while calibrating the instruments and there are no other similar facilities in the local vicinity (**\$1000**).
3. Element 6.1.2 – The GE/Sievers contract provides the MWQI Program preventative maintenance services, reagents, and labor for repair and service of the Sievers organic carbon analyzers (**\$26,000**).

MWQI Operating Equipment and Expenses using the MWQI Program's Planned Budgeted Funds

Program Element 5.1 Routine Monitoring Program

- **\$5,000**, allocated for equipment and supplies related to the discrete monitoring program.

Program Element 5.2 Short Term Monitoring

- **\$54,000**, allocated for contract lab analysis costs, equipment, and supplies.

Program Element 6.1.1: MWQI Real-Time Stations

- **\$55,000** allocated for the purchase of replacement filters, miscellaneous station supplies, and analyzer specific components and service agreements.

Program Element 6.1.2: Gianelli WQ station

- **\$8,000** allocated for the purchase of replacement filters, miscellaneous station supplies, and analyzer specific components and service agreements.

Program Element 7.3: FDOM Proof of Concept Phase II Study

- **\$2,000** allocated for repairs and the purchase of quantitative standards for instrument calibrations.

Program Element 8.1: Administration Work

- **\$10,000** allocated for training classes, registration fees, travel related expense, and the cost for the annual or offsite meetings. The Annual Meeting costs may include rental fees for a facility, A/V equipment and technical assistance, deposit for reserving dates and other miscellaneous meeting package elements. This budget covers the additional training expenses for new staff and promoted staff in the MWQI Program.

Program Element 8.2: Field Unit Office Duties

- **\$5,000** allocated for needed repairs to Field Section prep trailer and the trailer deck.

Program Element 8.3: O&M WQ Other Duties

- **\$500** allocated for the purchase of quantitative standards for instrument calibrations.

Program Element 8.7: Workplace Safety

- **\$500** allocated for the purchase of miscellaneous safety equipment for example, vehicle fire extinguishers and first aid kits, personal flotation devices, earplugs, safety glasses, etc.

Program Element 11: Other Required Program Costs

- **\$1,000** allocated for the expenses associated with insurance and fuel for the MWQI Program's field support sampling vehicles. Currently the Field Support Section has four vehicles in its service fleet, two vans and two trucks that are necessary to maintain the MWQI Program's continuous monitoring and support to various special studies.

4. Municipal Water Quality Investigations Program Budget Impacts

Staff time may shift occasionally from the work described in this work plan due to situations that may arise, such as the need to work on drought activities, Bay Delta Conservation Plan (BDCP), or other DWR priority activities. MWQI Program core elements will receive priority throughout this fiscal year work plan, and are listed in priority of importance to the MWQI SPC. If it becomes apparent that there are demands on these core elements, the water quality monitoring, RTDF-CP and support will continue as the highest planned priority.

4.1. Priority List for MWQI Program Core Elements

1. Water quality monitoring (both real-time and discrete) at existing stations and sites
2. Modeling duties associated with real-time forecasting used in the RTDF daily and weekly reports
3. Production and dissemination of daily and weekly RTDF reports
4. Data management activities pertaining to database infrastructure enhancement and development to improve long-term storage and retrieval of RTDF data
5. Special Studies

6. Program management activities listed in the MWQI agreement and those mandated by DWR required for health and safety of the MWQI Program staff. This includes monthly MWQI TAC meetings and budget updates.
7. Other required Program activities that are mandated by DWR and/or essential to the MWQI Program (i.e. purchasing, contracts, budgeting, 2014 DWR Environmental Scientist Workshop, safety and policy training, specific meetings and conferences).

4.2. MWQI Program Potential Core Element Impacts

Work on specific program core elements that could be delayed pending any staff vacancies or re-prioritization to other projects by DWR Management (as in, drought work):

- Report production deadlines and timelines associated with some tasks
- Cross-training of MWQI staff on modeling and GIS functions
- Delay of RTDF data management tasks when assistance is needed from the Division of Technology Services or MWQI Program staff. The MWQI Program's Data Management Consultant (Dennis Huff) can continue to work his regularly scheduled hours since his contract costs are funded by the MWQI SPC.
- If needed, implementation of special studies will be delayed to accommodate core Program elements.

To ensure that core functions are not affected, some staff may curtail participation in MWQI Program's related meetings such as the Environmental Scientist Workshop.

5. WATER QUALITY ASSESSMENT

Water quality assessment has been a key feature of the MWQI Program since its inception in 1983. MWQI Program data are used by DWR, the MWQI SPC, non-governmental organizations, the public, and numerous other federal, State, and local agencies. These entities use MWQI data for drinking water supply planning studies, to identify long-term trends in drinking water quality, and to help DWR and other agencies develop research and mitigation measures to reduce drinking water contaminants in Delta waters and the SWP. Additionally, in collaboration with the Bay Delta Office (BDO), Operations & Maintenance (O&M), and

Operations Control Office (OCO), monitoring data from the Delta and California Aqueduct are used to further develop the “early warning” system that provides advance notice to Delta water users of possible drinking water quality problems.

The MWQI Program provides this information to the MWQI SPC so that they may better manage source water quality conditions. Monitoring data are collected through two different monitoring strategies, 1) discrete grab samples, and 2) continuous real-time monitoring via remotely located instrumentation. This section focuses on discrete or ‘grab sample’ monitoring for FY 14-15. Section 6.1 focuses on continuous, remote real-time monitoring.

Outside of routine discrete monitoring, additional costs were to be incurred in FY 13-14 to purchase two new vehicles. The two MWQI mobile laboratory vans have reached the end of their useful life, and their replacements should be received in FY 14-15. The intent was for one van to be purchased in FY 13-14 and one in FY 14-15, but due to the State purchasing process, MWQI will be receiving both vans in FY 14-15. The initial estimate described in last year’s work plan was \$90,000 per van. Since retrofitting is no longer planned, the vans’ actual cost will be reduced to closer to \$30,000 per van. The plan is for the charges to be applied to the FY 13-14 and not impact the budget of the FY 14-15 work plan. These vehicles, and all work and equipment described in this section will be charged to Water Quality Assessment, IO# VWQASSMENT13.

Discrete monitoring in the FY 14-15 work plan is similar to the FY 13-14 work plan. The only difference from FY 13-14 is the addition of 3 sites, one of which was added mid-FY 13-14. These changes bring the total number of MWQI monitoring locations to 28. Twelve of these sites are part of the MWQI Program’s long-term monitoring program with data available for a number of years. The additional monitoring sites are associated with short-term modeling support and other approved special studies.

Table 2 lists all of the monitoring sites planned for FY 14-15. Figure 1 is a map of the discrete and real-time sampling sites. Table 3 lists projects and expected delivery dates of data associated with each location.

5.1. Routine Monitoring Program

IO# – VWQASSESSMENT13, Funds Budgeted – \$77,944, Hours Budgeted - 752

The collection at long-term monitoring sites remains mostly unchanged from FY 13-14; the exception being the slight relocation of the Rock Slough monitoring site at the Contra Costa Water District's fish screen facility. In March 2014, the site was moved from the canal bridge behind the fish screen to the actual fish screen location on Rock Slough. This is less than 500 feet from the canal bridge location.

As part of real-time instrument quality control, discrete samples are collected bi-weekly at the Banks Pumping Plant, Jones Pumping Plant, Gianelli Pumping Plant, and Hood and Vernalis river stations. These river and canal samples are collected to examine instrument performance, but since they are collected from the appropriate location in the waterways, they are also representative discrete samples. Discrete sample data are available through the DWR's Water Data Library (WDL).

Deliverables and timelines associated with discrete sample collection are shown in Table 3.

5.2. Short-term Monitoring

IO# – VWQASSESSMENT13, Funds Budgeted – \$230,928, Hours Budgeted - 1824

Aside from MWQI's routine monitoring program, other samples are collected for what is termed "short-term monitoring" activities. These activities only involve monitoring and do not have an associated report due from MWQI staff. Therefore, short-term monitoring is listed here in Element 5 along with the routine monitoring. Monitoring activities tied to special studies are covered in work plan Element 7. In FY 14-15, one short-term monitoring project will be added, two will continue, and one will be dropped.

MWQI will be removing the reference to last year's Eastside WARMF/Yolo DSM2 study, but monitoring at the sites associated with this short-term monitoring effort will continue under the DSM2 Nutrient Study (Sec. 5.2.1). Eastside WARMF/Yolo DSM2 monitoring was initiated in 2010 to help improve both WARMF and DSM2 model response. Sampling was conducted monthly and during storm events. The study was to run through October 2013 with the possibility of it continuing an additional 1-2 years. Because of the overlap with DSM2 Nutrient Study, this project has been removed from the FY 14-15 work plan.

The continuing and new short-term monitoring projects are described below.

Table 2 lists all of the monitoring sites planned for FY 14-15. Figure 1 is a map of the discrete and real-time sampling sites. Table 3 lists projects and expected delivery dates of data associated with each location.

5.2.1 DSM2 Nutrient Study

A Delta Simulation Model 2 (DSM2) nutrient modeling study was put forward by the MWQI SPC for inclusion in MWQI's FY 13-14 work plan and is being continued for the FY 14-15 work plan.

The goal of this monitoring is to define water quality conditions at key DSM2 nodes located throughout the Delta region so that the DSM2 nutrient model can be improved. Weekly data were requested last year, but the MWQI's resources do not allow for sampling at that frequency. To meet the data needs, MWQI Program staff will sample the DSM2 nodes twice a month.

Monitoring for the DSM2 nutrient model will continue for an additional year, through the end of the FY 14-15 work plan. At that time, the need for continued monitoring will be assessed. Project management documentation of this study can be found in Appendix 2. A separate monitoring plan document is in the process of being completed, and describes the details behind this study.

5.2.2 Cache/Yolo Complex Pre-Restoration Baseline Monitoring

In the coming years, numerous ecologically driven restoration projects are planned to be constructed in the Cache Slough Complex. The Cache Slough Complex includes the Yolo Bypass, Liberty Island, Sacramento Deep Water Ship Channel and other north-west Delta tributaries that drain into the Cache Slough system, a tributary of the Sacramento River near Rio Vista. Planned restoration projects are of various sizes but cumulatively could total over 8000 acres. These planned habitat restoration activities will have unknown impacts to in-stream drinking water quality; therefore, they may result in additional costs to drinking water municipalities treating thru-Delta water. Currently, other DWR groups and sister agencies are beginning to initiate baseline monitoring efforts as required by the Fish Restoration Program Agreement (FRPA). FRPA is an agreement between DWR and the Department of Fish and Wildlife to implement habitat restoration actions for listed fish species under the Biological Opinions and Incidental Take Permit for SWP operations in the Delta. The proposed FRPA monitoring program is still in the initial phase of development and it is unclear if drinking water

quality concerns will be covered by the FRPA monitoring plan and when monitoring might commence.

Due to the uncertainty regarding FRPA monitoring, and with the backing of the MWQI SPC, the MWQI Program will conduct a two-phased approach to help define baseline, pre-restoration water quality in the Cache Slough Complex. Phase 1 involves working with FRPA to make sure that drinking water quality monitoring concerns are addressed in future FRPA monitoring. If this is successful, the MWQI Program may be able to step-back from its monitoring responsibilities tied to Phase 2 of this study. Phase 2 is the MWQI Program staff leading field monitoring of key locations in the Cache Slough Complex. Both phases will run concurrently. A separate monitoring plan has been completed which describes the details of this study.

5.2.3 Pathogen Special Study Monitoring

MWQI will collaborate with the Drinking Water Policy Work Group and possibly, the Delta Regional Monitoring Program to conduct a special study on pathogens and indicator organisms in the Delta. The monitoring will be conducted at the same time that the drinking water agencies conduct the next round of monitoring to comply with the Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR). That monitoring is scheduled to begin in April 2015 and will end in March 2017. The Drinking Water Policy Work Group is currently working on a proposed monitoring plan that will be submitted to the Delta Regional Monitoring Program. MWQI's role will be to collect the pathogen samples and ship them to the laboratory for analysis. The number of monitoring locations has not been determined but it will likely be six to ten of the existing MWQI monitoring locations.

Table 2. MWQI Discrete Grab Sampling Stations.

#	Stations	WDL Stations (ID)	Analytes Collected	Frequency	Study
1	Natomas East Main Drainage Canal	NATOMAS EMDC A EL CAMINO RD (A0V83671280)	Std. Mineral, nutrients, TOC, DOC, UVA, turbidity, bromide, metals	Monthly	Routine
2	American River at E.A. Fairbairn WTP Intake	American River at W.T.P. (A0714010)	Std. Mineral, nutrients, TOC, DOC, UVA, turbidity, bromide	Monthly	Routine
3	Sacramento River at West Sacramento WTP Intake	Sacramento River at W. Sac Intake Structure (A0210451)	Std. Mineral, nutrients, TOC, DOC, UVA, turbidity, and bromide, metals	Monthly	Routine
4	Sacramento River at Hood	Sacramento R A Hood (B9D82211312)	Std. Mineral, nutrients, TOC, DOC, UVA, turbidity, bromide, Mn	Once every two weeks	Routine
5	Sacramento River at Mallard Island	Sacramento River @ Mallard Island (E0B80261551)	Std. Mineral, nutrients, TOC, DOC, UVA, turbidity, bromide, CBOD, BOD	Once every two weeks ¹	Routine, DSM2 Nutrient
6	San Joaquin River near Vernalis	San Joaquin R. nr. Vernalis (B0702000)	Std. Mineral, nutrients, TOC, DOC, UVA, turbidity, bromide, Mn, CBOD, BOD	Once every two weeks	Routine, DSM2 Nutrient
7	Old River at Bacon Island	Old River at Bacon Island (B9D75811344)	Std. Mineral, nutrients, TOC, DOC, UVA, turbidity, bromide	Monthly	Routine
8	Old River at Station 9	Old R. nr. Bryon (St 9) (NEAR HWY 4 BRIDGE) (B9D75351342)	Std. Mineral, nutrients, TOC, DOC, UVA, turbidity, bromide, Mn	Monthly	Routine
9	Banks Pumping Plant at Headworks	Delta P.P. Headworks at H.O. Banks PP (KA000331)	Anions, TOC, DOC (MWQI); Std. Mineral, turbidity, UVA, TOC, DOC, bromide, total phosphorous, total suspended solids, phytoplankton, purgeable organics, taste and odor (MIB & geosim), asbestos, and radiological, pesticides and herbicides(O&M)	Depending on analyte, Bi-weekly (MWQI), Monthly (O&M), or Quarterly (O&M)	Routine
10	Contra Costa Canal @ Rock Slough	Contra Cost Canal @ Rock Slough Fish Screen (B9C75861385)	Std. Mineral, nutrients, TOC, DOC, UVA, turbidity, and bromide	Monthly	Routine
11	Middle River @ Union Point	Middle River A Union Point	Std. Mineral, Turbidity, UVA, TOC, DOC, Bromide, nutrients, Mn	Monthly	Routine

#	Stations	WDL Stations (ID)	Analytes Collected	Frequency	Study
		(B9D75351292)			
12	Jones Pumping Plant at DMC	Eastside Delta Mendota Canal intake at Jones PP (B9C74781351)	Anions, TOC, DOC	Once every two weeks	Routine
13	Gianelli Pumping/Generating Plant	Gianelli WQ Station near Pumping Plant (ON003050)	Anions, TOC, DOC	Once every two weeks	Routine
14	Colusa Ag Drain near Sacramento River	Ag Drain on Colusa Basin Main Drain (A0294500)	Std. Mineral, nutrients, TOC, DOC, UVA, turbidity, bromide, Suspended Solids	Monthly & Rice Drainage events	Routine
15	Shag Sl. @ Liberty Island (Yolo Bypass West Toe Drain)	ShagSI@LibIsIBr (B9S81841416)	Std. Mineral and nutrients, TOC, DOC, UVA, suspended solids, chlorophyll, CBOD, BOD, THMFP, HAAFP	Biweekly	Cache Slough Complex; DSM2 Nutrient
16	Mokelumne River @ Benson's Ferry	Benson's Ferry (B9D81371295)	Std. Mineral, nutrients, TOC, DOC, UVA, turbidity, bromide, suspended solids, chlorophyll, CBOD, BOD	Biweekly	DSM2 Nutrient
17	Calaveras River @ UOP Footbridge	Calaveras R @ UOP (B9D75851208)	Std. Mineral and nutrients, TOC, DOC, UVA, suspended solids, chlorophyll, CBOD, BOD	Biweekly	DSM2 Nutrient
18	Sacramento River @ Westin Boat Dock	SacR. @ Westin BtDoc (B9D832212010)	Std. Mineral and nutrients, TOC, DOC, UVA, suspended solids, chlorophyll, CBOD, BOD	Biweekly	DSM2 Nutrient
19	Southern tip of Liberty Island	S. Liberty Is. (B9D81461410)	Std. Mineral and nutrients, TOC, DOC, UVA, suspended solids, chlorophyll, THMFP, HAAFP	Biweekly	Cache Slough Complex
20	Cache Slough nr Ryer Island (Lower Cache Slough)	Cache Sl nr. Ryer Is (B9D81281401)	Std. Mineral and nutrients, TOC, DOC, UVA, suspended solids, chlorophyll, THMFP, HAAFP	Biweekly	Cache Slough Complex
21	Miner Slough above Prospect	Miner Sl @ Hwy84 Br (B9D81751379)	Std. Mineral and nutrients, TOC, DOC, UVA, suspended solids, chlorophyll, THMFP, HAAFP	Biweekly	Cache Slough Complex
22	Miner Slough below Prospect (but above	Miner Sl below P (B9D814103910)	Std. Mineral and nutrients, TOC, DOC, UVA, suspended	Biweekly	Cache Slough Complex

#	Stations	WDL Stations (ID)	Analytes Collected	Frequency	Study
	confluence with Cache Slough)		solids, chlorophyll, THMFP, HAAFP		
23	Lisbon Weir (Yolo Bypass East Toe Drain)	YOLOBYLISBON (B9D82851352)	Std. Mineral and nutrients, TOC, DOC, UVA, suspended solids, chlorophyll, THMFP, HAAFP	Biweekly	Cache Slough Complex
24	Sacramento Shipping Channel above Prospect Island	SDWC (B9D81621397)	Std. Mineral and nutrients, TOC, DOC, UVA, suspended solids, chlorophyll, THMFP, HAAFP	Biweekly	Cache Slough Complex
25	Upper Cache Slough (below Ulatis Creek)	Upper Cache Sl (B9S81841416)	Std. Mineral and nutrients, TOC, DOC, UVA, suspended solids, chlorophyll, THMFP, HAAFP	Biweekly	Cache Slough Complex
26	Lindsey Slough at Hastings Island Bridge	Lindsey Sl. at Bridge (B9D81481421)	Std. Mineral and nutrients, TOC, DOC, UVA, suspended solids, chlorophyll, THMFP, HAAFP	Biweekly	Cache Slough Complex
27	Wildlands Restoration outfall at Stair-step	Wildlands B9D82011403	Std. Mineral and nutrients, TOC, DOC, UVA, suspended solids, chlorophyll, THMFP, HAAFP	Biweekly	Cache Slough Complex
28	Liberty Cut at Stair-step	LibertyCut@StrairStep B9D82011400	Std. Mineral and nutrients, TOC, DOC, UVA, suspended solids, chlorophyll, THMFP, HAAFP	Biweekly	Cache Slough Complex

- ¹ Mallard Island is a monthly *routine* monitoring location, but for the DSM2 Nutrient study samples will be collected every two weeks.
- Physical Parameters collected at all sites: Temperature, pH, Turbidity, Dissolved Oxygen, and Specific Conductance
- Standard Mineral analysis includes: Ca, Mg, Na, K, B, Alkalinity, Chloride, Bromide, Nitrate, Sulfate, Dissolved Solids, Specific Conductance
- Standard Nutrient analysis includes: Nitrate + Nitrite, Ammonia, Organic Nitrogen and Ammonia, Total Phosphorus (unfiltered), and orthophosphorus

Figure 1. MWQI Discrete and RTDF Monitoring Locations, FY14/15

1. Natomas East Main Drainage Canal
2. American River at E.A. Fairbairn WTP
3. West Sacramento WTP Intake
4. Sacramento River at Hood
5. Sacramento River at Mallard Island
6. San Joaquin River near Vernalis
7. Old River at Bacon Island
8. Old River at Station 9
9. Banks Pumping Plant
10. Rock Slough at CCWD Fish Facility
11. Middle River at Union Point
12. Jones Pumping Plant
13. Gianelli Pumping Plant
14. Colusa Basin Ag Drain
15. Shag Slough at Liberty Island
16. Mokelumne River at Benson's Ferry
17. Calaveras River at UOP Footbridge
18. Sacramento River at Westin Boat Dock
19. South tip of Liberty Island
20. Cache Slough nr. Ryer Island
21. Miner Slough at Highway 84 Bridge
22. Miner Slough downstream of Prospect Island
23. Lisbon Weir
24. Sacramento Shipping Channel
25. Upper Cache Slough
26. Lindsey Slough at Hastings Cut
27. Wildlands Restoration Outlet
28. Liberty Cut at Stairstep

-  RTDF and Discrete Sampling Stations
-  Routine, Discrete Locations
-  Special Study, Monitoring Locations

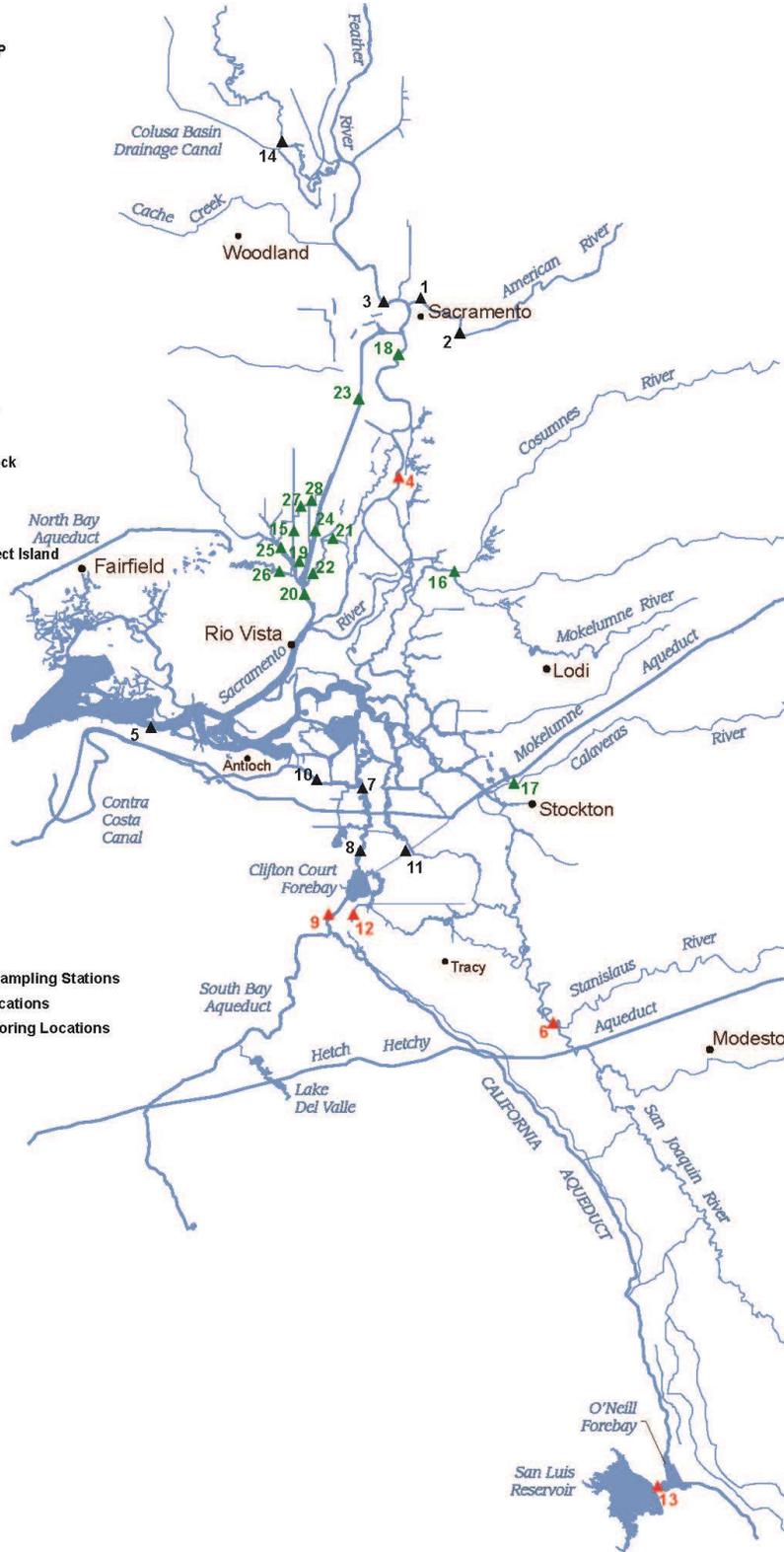


Table 3. Routine and Special Study Discrete Grab Sample Deliverables and Timelines

Deliverable	Participants	Start Date	Estimated Completion Date
Records of monthly and bi-weekly monitoring data.	MWQI	N/A	Currently available upon request
Records of periodic calibration of field monitoring equipment	MWQI	N/A	Currently available upon request
Records demonstrating consistent and timely application of QA/QC procedures	MWQI	N/A	Currently available upon request
Timely analysis and posting of results to the Water Data Library	MWQI	N/A	Monthly Available on-line
Eastside Streams WARMF and Yolo DSM2 Monitoring	MWQI	October 2010	Complete
DSM2 Nutrient Monitoring	MWQI	September 2013	Reassess Feb 2015
Cache Slough Complex, FRPA Engagement	MWQI	June 2013	Reassess Feb 2015
Cache Slough Complex Monitoring	MWQI	September 2013	Reassess Feb 2015

N/A = not applicable or available

6. REAL-TIME DATA AND FORECASTING COMPREHENSIVE PROGRAM

The RTDF-CP focuses on providing a single location that compiles and disseminates real-time drinking water quality data gathered across agencies to enable water managers to make operating decisions based on observed and forecasted changes in water quality. The RTDF-CP includes a network of real-time water quality monitoring stations and a modeling component intended to allow greater predictive ability of water quality in real-time and the future.

The RTDF-CP crosses organizational boundaries within DWR and gathers data from other agencies to obtain valuable information. Historically, the geographic scope of the MWQI Program was confined to the Delta. However, the scope of real-time monitoring and forecasting encompasses not only the watersheds of the Delta, but also the SWP, and portions of the

federal Central Valley Project that are interconnected to the Delta and SWP. As a result, this element includes MWQP funded positions within DWR's Bay Delta Office (BDO), the Operations Control Office (OCO), and the Division of Operations and Maintenance, Water Quality Section (O&M WQ) as well as a contract with the SLDMWA.

The RTDF-CP Consists of Three Principle Activities:

1. Remote instrumentation that provides real-time water quality data
2. Modeling to provide water quality forecasting
3. Information management and dissemination of real-time data to interested parties

Emergency response is also part of the RTDF-CP, but is treated separately in this work plan.

Real-time monitoring, forecasting and data dissemination activities are guided by the RTDF Steering Committee, a group of technical experts composed of MWQI Program staff, Contra Costa Water District and participating MWQI SPC agencies. The RTDF Steering Committee reports to the MWQI TAC.

6.1. RTDF-CP Real-Time Monitoring

Real-time water quality data are used to:

- a) Make informed operational decisions affecting the Delta and SWP.
- b) Support the development of water quality forecasting tools for better management of SWP water supplies.
- c) Provide early warning of changing water quality conditions for users downstream.
- d) Provide information for water quality and water supply planning studies.

In addition to DWR and the MWQI SPC, this information is used by many federal, state, and local agencies, non-governmental organizations, and the public.

This program element is comprised of:

- a) Instrumentation installed at key remote locations.

- b) Field operations which ensure proper operation and maintenance of all automated sampling equipment.
- c) The timely transmission of real-time data.
- d) The documentation of Standard Operating Procedures.
- e) The implementation and documentation of data QA/QC.

6.1.1 MWQI Real Time Stations

IO# – VRTMONITOR13, Funds Budgeted – \$302,992, Hours Budgeted - 2336

(Note: Field Support Section staff will continue to charge to the specific RTDF charge number (VRTMONITOR13). Field office labor associated with real-time monitoring (RTM) includes: ordering RTM supplies; phone consultation with instrument manufacturers; creation of RTM QC sampling runs; creation of instrument specific chemical standards, solutions, and reagents; in-office repairs to station peripheral components such as pumps, compressors, etc., cleaning of equipment used on RTM runs; data entry and analysis of RTM QC data; and working on instruments remotely via Remote Desktop and data logger telemetry programs. Commodity and service charges will also continue to be charged to the RTDF Charge number.

Table 4 summarizes station locations, water quality parameters, and automated analyzer equipment used by the MWQI Program's RTM. Figure 1 shows the location of the RTM stations.

Currently, there are four MWQI Program remote real-time stations located in the Delta and one south of the Delta (Table 4). The Delta stations include Hood located on the Sacramento River near the town of Hood, Banks Pumping Plant located at the head of the California Aqueduct, Jones Pumping Plant located at the head of the Federal Central Valley Project (CVP) Delta-Mendota Canal and Vernalis located on the San Joaquin River near the town of Vernalis. The southern station, Gianelli, is located within the O&M San Luis Field Division on O'Neill Forebay below San Luis Reservoir. Gianelli is funded separately from the other stations as the work is funded through an Environmental Scientist position which is part of a resource agreement with O&M. In addition station expenses are tracked independently to better control costs.

In the past year, a new sample flow manifold system was installed at Hood and Vernalis. These manifolds cut down on the amount of sample water needed for organic carbon analysis. This in turn decreases staff travel time used for station visits, and consumables used by the analyzers

making it less expensive to operate the instrument. In the near future, three more of these systems will be installed at Banks, Jones and Gianelli making the field aspect of the RTDF more efficient and cost effective.

One of the deliverables in the FY 13-14 work plan focused on creating a Quality Controlled (QC'd) real-time data set for station online data. This deliverable was completed in December of 2013. Interested parties now have the ability to look up real-time data that has gone through a screening process (document to be completed by June 2014) using the WDL. The WDL is the preferred storage location due to its ability to query results as the user's needs dictate, and the general understanding that data within the WDL have been QC'd.

6.1.2 Gianelli WQ Station

IO# – VGIANNELLI13, Funds Budgeted – \$115,808, Hours Budgeted - 1064

In order to more closely track time and expenditures related to the Gianelli water quality station, a separate IO was created (VGIANNELLI13). The funding for this station goes largely toward the salary for an Environmental Scientist position held within O&M Water Quality.

Table 4. MWQP Real-Time station locations, parameters, and equipment

MWQP Station/CDEC Station	MWQI Program Parameters & Instruments	Non-MWQI Program Parameters
Sacramento River at Hood (CDEC = SRH)	TOC, DOC (Sievers 900-oxidation)	Water: chlorophyll, EC, DO, pH, temperature and turbidity. Atmospheric: solar radiation, temperature, wind speed and direction.
San Joaquin River near Vernalis (CDEC = SJR)	TOC, DOC (Sievers 5310-oxidation) bromide, chloride, nitrate, sulfate, (Dionex ICS-2100)	Water: chlorophyll, DO, EC, pH, river flow and stage, temperature and turbidity.
Delta P.P. Headworks (CDEC = HRO)	TOC, DOC (Sievers 5310-oxidation), bromide, chloride, nitrate, sulfate, (Dionex ICS-2100)	Water: EC, fluorescence, pH, pump discharge, temperature, turbidity, UVA 254. Atmospheric: temperature, wind speed and direction.
Jones Pumping Plan (CDEC = TRP)	TOC, DOC, (Sievers 5310-oxidation), bromide, chloride, nitrate, sulfate, (Dionex ICS-2100)	Water: EC, pump discharge, temperature.
Gianelli P/G Plant (CDEC = ONG)	TOC, DOC (Sievers 5310), EC, temp, turbidity, DO, pH (YSI 6600) bromide, chloride, nitrate, sulfate (Metrohm IC 850)	N/A

N/A = not applicable or available

The RTDF-CP will continue to monitor water quality using in-situ instrumentation providing current, real time, water quality information.

Table 5 summarizes the deliverables and timelines associated with real-time monitoring.

Table 5. Real-Time Monitoring Deliverables and Timelines

(Lead organization(s) are shown in bold)

Deliverable	Participants	Estimated Start Date	Estimated Completion Date
Continue operation of automated stations at Hood, Banks, Jones, Vernalis, and Gianelli	MWQI Program, O&M Water Quality	Ongoing	Ongoing
A) Update SOPs: documenting maintenance, operation and quality assurance/quality control of all in-situ equipment.	MWQI Program O&M Water Quality	July 2013	A) TBD
B) Continue to work towards standardizing, streamlining, and consolidating DWR's in-situ equipment, data quality control, and data dissemination.	MWQI Program O&M Water Quality NCRO IEP	N/A	B) Ongoing
Evaluate the need, and planning for, other installations per the RTDF-CP (together with RTDF Steering Committee).	RTDF SC MWQI TAC	July 2008	Ongoing
Provide readily accessible data and fill in TDS/EC data gaps on pump-in activities. TDS data is posted in WDL Check 13 = KA007089 Check 21 = KA017226 Check 23 = KA019705 Check 29 = KA024454 Check 39 = KA029021 Semitropic 2 = GKA02098 Semitropic 3 = GKA02070 CVC = GKA02380 Kern Water Bank Canal = GKA02382	O&M WQ	July 2008	Ongoing

Deliverable	Participants	Estimated Start Date	Estimated Completion Date
Arvin Edison Canal = GKA02773.			

N/A = not applicable or available

6.2. RTDF-CP Water Quality Forecasting

IO# – VRTBDOMODL13, Funds Budgeted – \$224,536, Hours Budgeted - 1768

IO# – VRTOCOMODL13, Funds Budgeted – \$224,536, Hours Budgeted - 1768

IO# – VTRENDSAMR13, Funds Budgeted – \$10,088, Hours Budgeted - 104

The modeling/forecasting component of the RTDF-CP continues to update and make improvements to existing models to further develop their capabilities. These include the WARMF tributary watershed models and DSM2 Delta and Aqueduct Extension models. The MWQP continues to collaborate with the OCO and the BDO to accomplish these forecasting tasks. The objective of this effort is to better incorporate forecast modeling insight with water quality monitoring and maximize the use of modeling results by water quality managers.

In FY 12-13 BDO completed WARMF model calibration. The model can now be used for DOC forecasts in the Sacramento and San Joaquin rivers. Another FY 12-13 goal was to produce weekly DOC forecasts for the Delta and the California Aqueduct. This goal has been achieved. The weekly report, sent out each Monday, now includes the DOC forecasts.

During the previous fiscal year, the MWQP focused on the Historical and Short-term forecasts and on tasks associated with Seasonal Forecasts. During FY 14-15, the modeling sub-group of the RTDF Steering Committee suggested potential new areas of model development which would provide new information that could be helpful to interested parties and would also improve modeling capabilities.

The modeling sub-group of the RTDF Steering Committee will continue to work on the implementation of these ideas. The new task list will be used to coordinate all of the modeling products and will be updated each month to track work completed by the BDO and OCO. In addition, the new task list will continue to be reviewed and discussed at the monthly RTDF Steering Committee meetings.

In late 2013, the RTDF Steering Committee decided that due to the completion of many of the modeling tasks, the Gantt chart, previously used to monitor the progress of the modeling tasks, would no longer be needed. For FY 14-15, the RTDF Steering Committee will adopt an Excel based spreadsheet to monitor future modeling activities; similar to the one currently used for BDO project monitoring. There are two PYs devoted to modeling activities; one in BDO and one in OCO. In addition, MWQI staff provides support for some of the modeling tasks.

6.2.1. Continuous Refinement of Current Models

Lead Investigator – Bryant Giorgi and Siqing Liu

The models and the data that are used in the models are continuously updated and refined by the BDO and OCO modelers. This is considered to be a routine ongoing task.

A potential new project was identified by the modeling sub-group to improve forecasting capability for Delta consumptive use. Examples of possible improvements include preparing up-to-date Delta land use surveys each year, installing flow gauges at key Delta locations and improving Delta precipitation data available from the existing station or adding new precipitation stations. This project needs further refinement by the modeling sub-group.

6.2.2. Improve How Aqueduct Pump-ins are Handled in MWQI Water Quality Forecasts

Lead Investigator – Bryant Giorgi

Project Partner –Tony Liudzius

Short-Term Forecasts

Interested SWP urban contractors and MWQI staff will investigate if data for planned or scheduled aqueduct pump-ins for the near term (defined here as less than 2 months) are available and the feasibility of obtaining this information on an ongoing basis. The goal of this effort is to include more accurate, up-to-date pump-in information in the MWQI short-term water quality forecasts.

If improved pump-in information is available, this effort will include establishing procedures for acquiring the information on an ongoing basis. Also, if any support tools are needed to help automate and process pump-in forecasts for inclusion in the water quality forecasts they will be developed under this project.

Seasonal Forecasts

This task is the same as described above for the short-term forecasts, except that the desired scheduled or planned pump-in information will be for the current year (or slightly longer) to conform with the timeframe used in the Seasonal water quality forecasts.

6.2.3. Assessment, Collection, and Archiving of Aqueduct Pump-in Data

Lead Investigator – TBD – MWQI Staff Person

Project Partner – Tony Liudzius

This project consists of identifying and cataloging all known sources of actual aqueduct pump-in data (both flows and water quality). If it is determined this information is useful to the MWQI Program or in producing water quality forecasts, this task will include data gathering and storing the information on an appropriate database or archive which will be available to appropriate parties.

6.2.4. Compare Water Quality Forecast to Actual Conditions

Lead Investigator – Bryant Giorgi

Project Partner – Elaine Archibald

This project consists of a study/investigation comparing forecast water quality from the MWQI models with actual water quality conditions over a specified study period to gain a better understanding of how the models work. The structure, goals, and deliverables of this study and the specific period to be examined will be established by the study work group. One possibility is to examine the first three to four months of 2014 when water quality conditions declined due to the drought and some Contractors were surprised at the concentrations of bromide and organic carbon in water pumped from the Delta.

6.2.5. Improving the DSM2 Nutrient Model

Lead Investigator – Hari Rajbandhari

Project Partner – Elaine Archibald

Hari Rajbandhari (DWR BDO) developed the capability to simulate nutrient dynamics and primary production in DSM2 QUAL in 1995. RMA refined the model under contract to MWDSC in 2009. Since that time, additional data have been collected by MWQI and others that can be used to refine the model. The first step in this project will be to determine the questions that need to be asked to better understand nutrient dynamics in the Delta. Once the questions are identified, the next step will be to determine which models are needed to answer the questions and what data are needed to refine or calibrate the models. The DSM2 Nutrient Model may be sufficient to answer some questions; however, a more sophisticated nutrient model may be needed to answer other questions.

6.2.6. Adding Additional Wastewater Treatment Plants to the Fingerprint

Lead Investigator – Siqing Liu and MWQI Staff Person

Project Partner – Elaine Archibald

The Delta Modeling Section of BDO has developed a fingerprint model that shows the percent of treated wastewater at various locations in the Delta and the contributions of EC and DOC from these wastewater treatment plants. It currently includes the Sacramento Regional Wastewater Treatment Plant, the Stockton Regional Wastewater Control Facility and the Manteca-Lathrop Wastewater Control Facility. There are nine other wastewater treatment plants that discharge to the Delta. The goal of this project is to add as many additional Delta wastewater treatment plants as possible to the fingerprint model, based on the availability of effluent flow, EC, and DOC data.

In FY 13-14, MWQI staff conducted a search of the CIWQS database for wastewater treatment effluent data. That information will be updated through the end of 2013 and earlier data will be obtained from files at the Central Valley Regional Water Board. These data will be provided to BDO so that the fingerprint model can be updated through 2013.

6.2.7. Potential Planning Studies

Lead Investigator – TBD

Project Partner – TBD

The RTDF Steering Committee will investigate the need to conduct planning studies based on project operations under assumed hydrologies, water demands, institutional constraints, and project operation goals. Using different scenarios, planning studies would be a great tool for determining potential drought related issues.

Table 6. Example of New Task List

Task #	Partner	Model	Headline	Task	Start	Projected Finish	% Complete
1	OCO	Aqueduct Extension	Add/Refine pump-ins	New Pump-in addition	July 2014	September 2014	25%
2	BDO	HEC-RAS	WARMF Replacement	Trial HEC-RAS model run	July 2014	December 2014	25%

6.3. RTDF-CP Information Management and Data Dissemination

IO# – VRTDDISRPT13, Funds Budgeted – \$122,608, Hours Budgeted - 1264

This program element includes the information management and data dissemination tasks associated with the RTDF real time stations and the synthesis of real-time data from a variety of federal, State and local agency water quality monitoring programs. The RTDF-CP provides rapid data quality control, analysis, and dissemination of results to all interested parties. QC'd RTDF real time data, are stored in the California Water Data Library (WDL) (<http://wdl.water.ca.gov/>) and on an MWQP server and posted to DWR's California Data Exchange Center (CDEC) (<http://cdec.water.ca.gov/>). Daily and weekly summary emails containing a variety of information including real time data, modeling results, Delta commentary, weather updates, hydrological conditions, and other information that is of interest to the MWQI SPC and other users are sent out and posted to the RTDF-CP web site: (http://water.ca.gov/waterquality/drinkingwater/rtdf_rprt.cfm).

Information management and dissemination tasks have the goal of enabling real-time analytical data and modeled forecasting data to be presented in user-friendly information products. Tasks under this program element include:

- a) Continued refinement of the WDL data set (i.e. fully accessible historical MWQI Program data, and repository for current O&M Water Quality and MWQI Program water quality data).
- b) Continued database management refinement.
- c) Continued development and enhancement of online tools for editing, evaluating and interpreting MWQI Program water quality data (QA/QC and scientific visualization).
- d) Improving means to distribute daily and weekly water quality reports via the internet.
- e) Improving database development for storage and management of real-time data.

The MWQI Program has developed, and continues to improve in-house software used for data QC and display. The Field Unit’s maintenance and calibration records and field journal entries have been integrated into this tool enabling all MWQI staff to evaluate real-time data. Staff also continues to make improvements to the MWQI Program Management application, website and database. This application produces the MWQI Program monthly status report for review at TAC meetings.

Tasks and deadlines for the data dissemination portion of the RTDF program are shown below in Table 7.

Table 7. Information Management and Data Dissemination Deliverables and Timelines

(Lead organization(s) is (are) shown in bold)

Task	Participants	Estimated Start Date	Estimated Completion Date
Improve/Upgrade database infrastructure. This task includes: A) Continue to implement updates and patches as appropriate.	MWQI Program	A) January 2009 B) January 2009	A) Ongoing B) Ongoing

Task	Participants	Estimated Start Date	Estimated Completion Date
<p>B) Continue enhancement of manual and automated QA/QC processes to the database.</p> <p>Initial screening tools have been completed. Continued evaluation is needed to eliminate questionable data. Work on capability to test and apply to historic data.</p> <p>C) Continue to develop the station journal database and applications, including the creation of intranet browsing tools.</p> <p>D) Continue to develop desktop data management tools. Enhance plotting capabilities. Link time series and QA/QC.</p> <p>E) Continue to document and maintain infrastructure.</p> <p>F) Add new sensors to the database as needed</p>		<p>C) January 2010</p> <p>D) January 2010</p> <p>E) July 2009</p> <p>F) January 2010</p>	<p>C) Ongoing</p> <p>D) Ongoing</p> <p>E) Ongoing</p> <p>F) Ongoing</p>
<p>Improve Field Data Communications. This task includes:</p> <p>A) Continue to develop, test and enhance intranet/ internet components.</p> <p>B) Develop and implement as feasible procedures,</p>	MWQI Program	<p>A) January 2011</p> <p>B) July 2011</p>	<p>A) Ongoing</p> <p>B) Ongoing</p>

Task	Participants	Estimated Start Date	Estimated Completion Date
practices and standards for supporting the reliability of field system data systems.			
Provide timely access to current QA/QC'd SWP operations data i.e. conduct QA/QC on historical data and remove inconsistencies and gaps.	OCO/Office of Reconciliations	N/A	Ongoing
<p>Development and enhancement of RTDF data dissemination products,</p> <p>A) As needed, add new stations & sensors to the website or daily summary table.</p> <p>B) * As needed, enhance the website presentation.</p> <p>C) Enhance procedures for emailing the daily summary report.</p>	MWQI Program	<p>A) N/A</p> <p>B) N/A</p> <p>C) N/A</p>	<p>A) Ongoing as needed</p> <p>B) * Ongoing as needed</p> <p>C) Ongoing as needed</p>

N/A = not applicable or available

* The RTDF web page is currently being reviewed for updating. This should take place over the next few months pending review and approval of the RTDF Steering Committee.

7. SCIENCE SUPPORT (SPECIAL STUDIES)

The Special Studies described in this MWQI Program FY 14-15 work plan have been identified by the MWQI Program in consultation with the MWQI SPC as valuable contributions to improving drinking water quality through improved understanding of processes affecting source waters, storage, and conveyance. Some studies from the FY 13-14 work plan are ongoing and updated summaries of these studies are discussed below, along with summaries of proposed new special study work.

7.1. Limnology of the SWP

MWQI SPC Project Manager – Rich Losee

Lead Investigators – Mark Bettencourt, Ted Swift, Marcia Scavone-Tansey & Jason Moore

IO# – VLIMNOLOGY13, Funds Budgeted – \$188,568, Hours Budgeted - 1944

This project was originally conceived, in the FY 13-14 Work Plan, as a long-term limnological and ecological study of the State Water Project. It has evolved to more directly address the Contractors specific issues and concerns with the goal of demonstrably improving the management of the SWP, particularly with regard to drinking water quality, through the application of limnological and ecological principles. The SWP Contractors have identified an extensive list of problems, issues and concerns associated with drinking water quality of the SWP. These issues range from the occurrence of objectionable levels of algal produced taste and odor compounds, to indirect impacts on drinking water quality through the obstruction of Contractor aqueduct turnouts by aquatic plant material. Improved management of these problems will be achieved by gaining an understanding of the limnology and ecology of the organisms involved and applying this knowledge to develop optimal control and treatment strategies. This is an ambitious multi-year program; to be successful it will require cooperation and collaboration across Divisions within DWR, including O&M Water Quality, OCO, and the Field Divisions, as well as the MWQI SPC, consultants and academics. An important function the MWQI staff will perform is the coordination of the efforts of the participating entities.

The various water quality problems and issues are often related by a common parameter that causes or exacerbates the problem. For example, Delta water has eutrophic to hypereutrophic nutrient levels that support the excessive growth of filter clogging algae on the South Bay

Aqueduct, taste and odor producing cyanobacteria throughout the SWP, and submersed macrophytes in several parts of the system. Therefore, a study of nutrients in the SWP will contribute to the solution of multiple Contractor problems. The science support studies will be designed in such a way as to efficiently provide information to be applied to multiple MWQI SPC member problems. In the Work Plan the support studies are organized as follows: nutrient related, organism growth and growth rate related, spatial and temporal distribution of the problem organisms in the aqueduct, photosynthesis driven pH excursions, and reservoir limnology.

The MWQI SPC has contracted with Rich Losee to serve as the project manager to coordinate and lead this project.

7.1.1. Nutrient Budget Study

Lead Investigator – Marcia Scavone-Tansey

Project Partners – Rich Losee and Elaine Archibald

IO# – VNTDYNSTDY13, Funds Budgeted – \$110,968, Hours Budgeted - 1144

Nutrients play an important role in the proper functioning of aquatic ecosystems. However, when they are present in excessive concentrations, the algal and aquatic plant growth that occurs may cause a variety of undesirable effects, such as algal blooms and heavy submersed macrophyte growth, which can result in elevated organic carbon, reduced dissolved oxygen, significant taste and odor (T&O) issues, production of toxic algal compounds, high levels of ammonia and undesirable disinfection byproducts, physical obstruction in conveyance facilities, obstruction in water treatment filters, and increased costs of water treatment. The goals of this study are to understand the nutrient sources to the SWP and their fate and transport in the SWP. Several objectives have been accomplished in the first year of this study including the assembly of an extensive dataset from which nutrient budget and other analyses will be performed. In this next phase of the study, the objective is to investigate Delta nutrient sources as well as turn-in and runoff nutrient input to SWP conveyance and storage facilities by developing nutrient budgets at the export pumps and selected reaches within the SWP. These are paper studies that are likely to spawn additional studies to improve our understanding of specific fate and transport processes in the SWP. The additional studies will be identified after this phase of the work is completed. A progress report will be completed after the data analysis has been conducted. A decision will be made at that time as to whether this report will become

an official MWQI work product or if the results of this study will be combined with the results from other studies within the broader Limnology Project.

Table 8. Nutrient Budget Study Deliverables and Timelines

Deliverables	Participants	Estimated Start Date	Estimated Completion Date
Obtain water quality and flow/pumping data for Phase 2 locations	MWQI Program MWQI SPC	April 2014	June 2014
Develop time series graphs for Phase 2 locations	MWQI Program MWQI SPC	July 2014	September 2014
Conduct additional data analysis for Phase 2 locations and prepare Draft Report	MWQI Program & Project Services Office	September 2015	December 2014
Submit Draft Progress Report to DWR management and MWQI SPC for review	MWQI Program MWQI SPC	December 2014	March 2015
Respond to comments and finalize Progress Report	MWQI Program MWQI SPC	March 2015	April 2015

7.1.2. Nutrient Limitation Study

Lead Investigator – Ted Swift

Project Partner – Rich Losee

IO# – VLIMNUTLIM14, Funds Budgeted – \$34,920, Hours Budgeted - 360

The objective of this study is to investigate the theoretical nutrient limitation as it might occur over space and time in the SWP. This is a paper study using the nutrient data assembled in the Nutrient Budget Study (Project 7.2.1) and literature information on limiting nutrients for the algal and macrophyte species that occur in the Delta and aqueducts and lakes of the SWP. The first step will be to calculate the nutrient ratios at locations of problematic algal or macrophyte growth in the SWP to determine which nutrients may be limiting during different seasons of the year. A progress report will be completed after the data analysis has been conducted. A decision will be made at that time as to whether this report will become an official MWQI work product or if the results of this study will be combined with the results from other studies within the broader Limnology Project.

The next step will be to explore the feasibility of developing a nutrient status index for key locations in the SWP. This would be updated after each sampling event when the data are available from the WDL and reported, possibly in the RTDF update.

Table 9. Nutrient Limitation Study Deliverables and Timelines

Deliverables	Participants	Estimated Start Date	Estimated Completion Date
Conduct literature review of nutrient limitation for Melosira, T&O producing algae and submersed macrophytes.	MWQI Program MWQI SPC	July 2014	July 2014
Examine nutrient ratios	MWQI Program MWQI SPC	July 2014	July 2014
Develop nutrient status index	MWQI Program MWQI SPC	August 2014	August 2014
Submit Draft Progress Report to DWR management and MWQI SPC for review	MWQI Program MWQI SPC	August 2014	September 2014
Respond to comments and finalize Progress Report	MWQI Program MWQI SPC	September 2014	September 2014

7.1.3. Nutrient and Nutrient Ratio Influence on Community Species Composition

Lead Investigator – Ted Swift

Project Partner – Rich Losee

IO# – VLIMNRATIO14, Funds Budgeted – \$13,968, Hours Budgeted - 144

The primary objective of this literature review is to follow the progress of Irwin van Nieuwenhuysen’s work and the Dick Dugdale group’s work on nutrients and nutrient ratios as they affect benthic and planktonic algal community composition, respectively. After conducting the literature review and reviewing the information developed in the Nutrient Budget Study (Project 7.2.1) and the Nutrient Limitation Study (Project 7.2.2), hypotheses of SWP community algal species composition will be developed. These hypotheses will be tested in future studies of algal species composition. The work product from this study will be a progress report summarizing the key findings from the literature review and a list of hypotheses to be tested in the next phase of work.

Table 10. Nutrient and Nutrient Ratio Influence on Community Species Composition Study Deliverables and Timelines

Deliverables	Participants	Estimated Start Date	Estimated Completion Date
Conduct literature review and examine data	MWQI Program MWQI SPC	March 2015	March 2015
Submit Draft Progress Report to DWR management and MWQI SPC for review	MWQI Program MWQI SPC	March 2015	April 2015
Respond to comments and finalize Progress Report	MWQI Program MWQI SPC	April 2015	April 2015

7.1.4. Light Limitation in the SWP

Lead Investigator – Ted Swift

Project Partner - Rich Losee

IO# – VLIMLIGHTL14, Funds Budgeted – \$66,736, Hours Budgeted - 688

The objective of this study will be to determine the amount of light reduction necessary to sufficiently reduce the growth of algae and submersed macrophytes to control the problems they cause in the SWP. This study will support the development of strategies and treatments to control filter clogging diatoms on the SBA, taste and odor producing algae throughout the SWP and submersed macrophytes in the SWP aqueducts.

The first step in this study is to conduct a literature review of light limitation of filamentous diatoms (*Melosira*, specifically if available), benthic cyanobacteria (T&O producers if available) and submersed macrophytes (particularly of problematic species in the SWP). Note that Maggie Spoo-Chupka of MWDSC should be used as a primary resource for the T&O producers. Another task in this study will be to refine the turbidity versus light attenuation regression using the existing IEP database of turbidity and photic depth. The work product from this study will be a progress report summarizing the key findings from the literature review and the analysis of the turbidity and photic depth data. The progress report should address the practicality of using light reduction to control algal or macrophyte growth.

The next step will be to develop a protocol to measure light and light attenuation in the SWP aqueducts. After the protocol has been developed and reviewed, sensors will be purchased and tested at locations that will be determined later in this study.

Table 11. Light Limitation in the SWP Study Deliverables and Timelines

Deliverables	Participants	Estimated Start Date	Estimated Completion Date
Conduct literature review and examine data	MWQI Program MWQI SPC	August 2014	September 2014
Submit Draft Progress Report to DWR management and MWQI SPC for review	MWQI Program MWQI SPC	October 2014	October 2014
Respond to comments	MWQI Program MWQI SPC	November 2014	November 2014
Develop light measuring protocol and submit to DWR management and MWQI SPC for review	MWQI Program MWQI SPC	December 2014	January 2015
Respond to comments and finalize protocol	MWQI Program MWQI SPC	February 2015	February 2015
Purchase sensors	MWQI Program MWQI SPC	February 2015	March 2015

7.1.5. Algal and Macrophyte Growth Study

Lead Investigator – Ted Swift

Project Partner - Rich Losee

IO# – VLIMAMGROW14, Funds Budgeted – \$11,640, Hours Budgeted - 120

The objective of this study will be to develop methods to measure algal and macrophyte growth rates in the laboratory and in the field. The first step in this study is to conduct a literature review on the following topics:

- Laboratory methods for measuring growth and primary production of algae in culture to assess the response of species of interest to manipulated parameters affecting growth, such as light and nutrient levels.

- Field method to estimate primary production for whole reaches of the aqueduct
- Field method to measure photosynthetic rates for small areas of the aqueduct benthic community where flow/turbulence or light intensity varies. The latter will be used to assess small scale vertical and horizontal differences in primary productivity.

The work product from this study will be a progress report summarizing the key findings from the literature review.

Table 12. Algal and Macrophyte Growth Study Deliverables and Timelines

Deliverables	Participants	Estimated Start Date	Estimated Completion Date
Conduct literature review	MWQI Program MWQI SPC	February 2015	February 2015
Submit Draft Progress Report to DWR management and MWQI SPC for review	MWQI Program MWQI SPC	February 2015	March 2015
Respond to comments and finalize Progress Report	MWQI Program MWQI SPC	March 2015	March 2015

7.1.6. Spatial-temporal Distribution of *Melosira* in the SBA

Lead Investigator – Jason Moore

Project Partner – Rich Losee

IO# – VLIMMELOSI14, Funds Budgeted – \$67,512, Hours Budgeted - 696

The objective of this study is to assess the spatial and temporal distribution of filter clogging diatoms in the SBA. The first phase of this study is to conduct a literature review and develop a method for sampling *Melosira* in the SBA to determine its spatial and temporal distribution. The work product from this study will be a progress report summarizing the key findings from the literature review. After the method has been developed and reviewed, MWQI staff will coordinate with O&M Water Quality and with the Delta Field Division to determine the most efficient way to conduct the field work. A monitoring plan will be developed to assess the distribution of *Melosira* biomass in the SBA to help determine a method to more efficiently manage filter clogging by these algae. Ideally, the monitoring will be conducted during the algal growth season of June to October, 2014.

Table 13. Spatial-temporal Distribution of *Melosira* in the SBA Study Deliverables and Timelines

Deliverables	Participants	Estimated Start Date	Estimated Completion Date
Conduct literature review and develop sampling method	MWQI Program MWQI SPC	May 2014	May 2014
Submit Draft Progress Report to DWR management and MWQI SPC for review	MWQI Program MWQI SPC	June 2014	June 2014
Respond to comments	MWQI Program MWQI SPC	June 2014	June 2014
Develop monitoring plan and coordinate with O&M	MWQI Program O&M MWQI SPC	June 2014	June 2014
Conduct monitoring	MWQI Program O&M MWQI SPC	July 2014	October 2014
Submit Draft Progress Report to DWR management and MWQI SPC for review	MWQI Program MWQI SPC	November 2014	December 2014
Respond to comments and finalize Progress Report	MWQI Program MWQI SPC	December 2014	January 2015

7.1.7. Distribution of Macrophytes in the SWP

Lead Investigator – Jason Moore

Project Partner – Rich Losee

IO# – VLIMMACROP14, Funds Budgeted – \$58,200, Hours Budgeted - 600

The objective of this study is to assess the macrophyte distribution and abundance, especially in the Coastal Branch and the San Luis Canal reach of the California Aqueduct and to determine if it is feasible to control macrophyte growth in the SWP. The Coastal Branch may be the best location to control macrophytes because of its small size. The first phase of this study is to conduct a literature review of submersed macrophyte sampling methods. The work product from this study will be a progress report summarizing the key findings from the literature review. After the method has been selected, MWQI staff will coordinate with O&M Water Quality and with the

San Joaquin Field Division to determine the most efficient way to conduct the field work. A monitoring plan will be developed prior to field work initiation.

Table 14. Distribution of Macrophytes in the SWP Study Deliverables and Timelines

Deliverables	Participants	Estimated Start Date	Estimated Completion Date
Conduct literature review and develop sampling method	MWQI Program MWQI SPC	August 2014	September 2014
Submit Draft Progress Report to DWR management and MWQI SPC for review	MWQI Program MWQI SPC	September 2014	October 2014
Respond to comments and finalize Progress Report	MWQI Program MWQI SPC	October 2014	November 2014
Develop monitoring plan and coordinate with O&M for field work in next work plan cycle	MWQI Program O&M MWQI SPC	January 2015	February 2015
Macrophyte sampling pilot study	MWQI Program O&M MWQI SPC	June 2015	July 2015

7.1.8. Wide Swings in Canal pH Study

Lead Investigator – Jason Moore

Project Partner – Rich Losee

IO# – VLIMPHSTUD14, Funds Budgeted – \$51,216, Hours Budgeted - 528

The goal of this effort is to apply limnological principles to decrease the treatment plant difficulties resulting from photosynthetically driven pH excursions in the SBA. Note that a solution to this problem will likely also solve the *Melosira* filter clogging issue. The objectives of this study are to 1) understand the magnitude of the problematic pH excursion events and the inorganic carbon chemistry and buffering capacity of the SBA; and 2) to quantify the magnitude and diurnal dynamics of specific pH excursion events before, during, and after algaecide treatment. The first step will be to analyze the historical data to identify the magnitude and frequency and seasonality of pH excursion events, and to understand the inorganic carbon

chemistry and buffering capacity during the events. The work product from this phase will be a progress report that discusses the key findings from the data review. This work will be conducted by Rich Losee in April 2014.

The next phase will be to conduct monitoring during pH excursion events. This will involve continuous measurement of pH and oxygen, upstream and downstream of the reach of interest on the SBA before, during and after treatments to control *Melosira*. Inorganic carbon and alkalinity of the water will be monitored to assess the buffering capacity. This phase of the study will require coordination with O&M Water Quality and the Delta Field Division. Ideally, the monitoring will be conducted during the algal growth season of June to October, 2014.

Table 15. Wide Swings in Canal pH Study Deliverables and Timelines

Deliverables	Participants	Estimated Start Date	Estimated Completion Date
Analyze historical data	MWQI SPC	April 15, 2014	Completed
Submit Draft Progress Report to DWR management and MWQI SPC for review	MWQI Program MWQI SPC	May 2014	June 2014
Respond to comments and finalize Progress Report	MWQI Program MWQI SPC	June 2014	July 2014
Develop monitoring plan and coordinate with O&M	MWQI Program MWQI SPC	June 2014	July 2014
Conduct pilot monitoring	MWQI Program O&M MWQI SPC	July 2014	October 2014
Submit Draft Progress Report to DWR management and MWQI SPC for review	MWQI Program MWQI SPC	November 2014	December 2014
Respond to comments	MWQI Program MWQI SPC	December 2014	January 2015

7.1.9. San Luis Reservoir Limnology Study

Lead Investigator – TBD

Project Partner - TBD

IO# – VLIMSLRSVR14 Funds Budgeted – \$0 – hours 0

This study will involve conducting profiles in San Luis Reservoir to better understand the water quality implications of drawing the reservoir down.

7.1.10. Dyer Reservoir Limnology Study

Lead Investigator – TBD

Project Partner - TBD

IO# – VLIMDYRSVR14 Funds Budgeted – \$0 – hours 0

The water quality impacts of bird roosting and operations of Dyer Reservoir will be investigated in this study.

7.1.11. Del Valle Reservoir Limnology Study

Lead Investigator – TBD

Project Partner - TBD

IO# – VLIMDLRSVR14 Funds Budgeted – \$0 – hours 0

This study will investigate the limnological conditions in Del Valle Reservoir and potential methods of controlling methyl mercury.

7.2. State Water Project Watershed Sanitary Survey Update

Since 1990, the water agencies treating water from the SWP have been required to conduct a watershed sanitary survey every five years. This is a requirement based on the California Surface Water Treatment Rule, and is administered by the California Department of Public Health (CDPH). In Title 22 of the California Code of Regulations, a sanitary survey is defined as “a physical and hydrogeological description of the watershed, a summary of source water quality monitoring data, a description of activities and sources of contamination, a description of any significant changes that have occurred since the last survey which could affect the quality of the source water, a description of watershed control and management practices, an evaluation of

the system's ability to meet requirements of this chapter, and recommendations for corrective actions.”

Initially, the SWC, and more recently the MWQI SPC, has assumed responsibility for conducting the Watershed Sanitary Survey of the SWP. The California State Water Project Watershed Sanitary Survey, 2011 Update (2011 Update) was conducted by a Consultant under contract to the DWR and was overseen by the MWQI Program Sanitary Survey Subcommittee.

Although a sanitary survey is required to be completed every five years, last year marked the beginning of a new format for the State Water Project Watershed Sanitary Survey. In prior years, one survey was completed to satisfy the mandated requirement in the 5th year. This was a tremendous effort each time the survey was completed. CDPH, MWQI Program staff, and MWQI SPC have agreed to an approach that will make the sanitary surveys more useful to CDPH and the MWQI SPC, and will not require an inordinate amount of staff time in one year. The new format will consist of annual sanitary surveys. The first four sanitary surveys will focus on a particular issue or region of interest. The fifth survey will be a review of water quality data for the entire SWP. The five annual reports will be submitted to CDPH as they are completed and will be packaged together in the 5th year. This new format has been developed with the approval of CDPH, and will satisfy the requirement of a sanitary survey every 5 years.

7.2.1 Status of Cattle Grazing in the SWP

Lead Investigator – Sonia Miller

Project Partner – Elaine Archibald

IO# – VSANSURVEY14, Funds Budgeted – \$46,560, Hours Budgeted - 480

This project is the second annual survey using the new format. The focus will be on an analysis of the impacts of cattle grazing in the watershed areas of various State Water Project facilities. Each of the previous SWP Watershed Sanitary Surveys has addressed cattle grazing in various watersheds of the SWP. The objective of this sanitary survey is to update the information and consolidate it into one report. The previous SWP Watershed Sanitary Surveys will be reviewed to determine which watersheds have (or previously had) cattle grazing. A detailed scope of work will be developed that identifies the watersheds that will be included and the methodology for updating the information on cattle grazing and grazing management practices and for assessing potential impacts on water quality. The draft scope of work will be submitted to the Sanitary

Survey Subcommittee for review and approval in July 2014. The scope will likely consist of the following tasks:

- **Conduct Regulatory and Policy Review** – State and local regulations and policies on cattle grazing in watersheds of drinking water supplies will be described.
- **Evaluate and Analyze Cattle Grazing Data** – The information on number of cattle, seasonality of grazing, and grazing management practices will be updated for each watershed. Any activities that have occurred to limit the impacts of grazing, such as development of grazing management practices or installation of fencing will be described.
- **Describe Impacts on Water Quality** – Pathogen and indicator bacteria data will be reviewed to determine if there are any discernible impacts of cattle grazing on water quality.
- **Develop Key Findings and Recommendations** – Key findings and recommendations will be developed based on the analysis of the cattle grazing information and water quality data.
- **Prepare Report** – The sections of the report will be as follows:
 - I. Executive Summary
 - II. Introduction
 - III. Regulatory Environment
 - IV. Current Status of Cattle Grazing in the Watersheds of the SWP
 - V. Water Quality Impacts of Cattle Grazing
 - VI. Findings and Recommendations

The Status of Cattle Grazing in the SWP deliverables and timelines are shown below in Table 16. Project management documentation for this study can be found in Appendix 2.

Table 16. Status of Cattle Grazing in the SWP Deliverables and Timelines

Deliverables	Participants	Estimated Start Date	Estimated Completion Date
Develop detailed scope of work	MWQI Program & MWQI SPC	July 2014	July 2014
Obtain data for analysis and prepare Draft Report	MWQI Program & MWQI SPC	July 2014	October 2014
Submit Draft Report to Sanitary Survey Subcommittee for initial review	MWQI Program & Sanitary Survey Subcommittee	October 2014	November 2014
Respond to comments	MWQI Program	December 2014	December 2014
Submit Revised Draft Report to Sanitary Survey Subcommittee for review	MWQI Program & Sanitary Survey Subcommittee	December 2014	January 2015
Respond to comments	MWQI Program	January 2015	January 2015

7.3. Fluorescence of Dissolved Organic Matter (FDOM) Project

Lead Investigator – Shaun Rohrer

Project Partner – Alex Rabidoux

IO# – VFDOMPOCS014, Funds Budgeted – \$77,600, Hours Budgeted - 800

Phase I of this project, FDOM Proof of Concept study, will continue into FY 14-15 while it goes through the review and editing process. Data collection for the Phase I will continue during the implementation of the new work plan, however the data for Phase II can be collected concurrently. Data collection for Phase I will end in July 2014 (one full year from initial deployment) and the final report will begin to be developed in June. The final report will build on what was presented in the Phase I mid-study report while adding in the last six months of data. Deliverable and timeline for this are included in Table 17.

Building on the FDOM Proof of Concept study, Phase II will expand on information currently being gathered by Phase I. Currently, a custom built fluorometer (a Turner Designs Cyclops 7)

is installed at Banks Pumping Plant (Banks) on the State Water Project (SWP). At the end of Phase I, FDOM will be correlated to dissolved organic carbon (DOC) and a regression model will be obtained. Literature reviews have shown significant relationships between FDOM and DOC and it may be possible to use FDOM as a proxy for DOC measurements. Phase II will not only expand on the FDOM and DOC relationship, but also add in correlations between FDOM and TOC and FDOM and disinfection by-products formation potential (DBP-FPs). Currently, the regression model being run for FDOM is correlated to DOC measurements using a filtered water sample. Phase II will expand on this correlation and run samples of unfiltered water through the FDOM and see how those values correlate with the TOC concentrations as the real world application of FDOM sensors will be deployment in the field without the benefits of filtering. DBP concentrations will be obtained through an outside laboratory (Weck Lab) submitted through grab samples. The amount of sampling is yet to be determined, but may be monthly or bi-weekly. It may be necessary to determine the least amount of samples needed to develop the correlation between FDOM and DBP's.

Certified standards of differing concentrations of Quinine Sulfate will be used to test the "drift" of the data being collected by the fluorometer. Standards will be administered monthly. As demonstrated by the MWQI field unit during Phase I, proper maintenance is required for FDOM data consistency. Cleaning of the FDOM's lens and flow through cap will need to be made bi-weekly at a minimum. After two weeks, bio-fouling may occur affecting the quality of the data. It may be necessary to repair the instrument if the sensor is found to be damaged in some way throughout the term of Phase II.

The FDOM will be deployed at Banks for one year to encompass seasonal changes. Since the equipment is already installed, it may be possible to run the end of the Phase I concurrently with the beginning of Phase II. Phase I will wrap up in June 2014, but it is possible to begin Phase II as early as May 2014. Phase II will run from May 2014 to May 2015. A mid study progress report will be developed (November 2014-January 2015) with a final report at the end of the project. The FDOM Phase II project deliverables and timelines are shown below in Table 17 and 18. Project management documentation for this study can be found in Appendix 3.

Table 17. FDOM Phase I Study Deliverables and Timelines

Deliverables	Participants	Estimated Start Date	Estimated Completion Date
Continue with Data Collection	MWQI Program	June 2014	July 2014
Begin draft of Final Report	MWQI Program	June 2014	August 2014
Submit draft report to DWR management and MWQI SPC for review	MWQI Program & MWQI SPC	August 2014	September 2014
Respond to Comments	MWQI Program	September 2014	September 2014
Submit Revised draft report to DWR management and MWQI SPC for review	MWQI Program	September 2014	October 2014
Respond to comments	MWQI Program	October 2014	December 2014
Submit Draft Final Report to DWR Editors for formatting and editorial review	MWQI Program & MWQI SPC	December 2014	December 2014
Publish Final Report	MWQI Program	January 2015	January 2015

Table 18. FDOM Phase II Study Deliverables and Timelines

Deliverables	Participants	Estimated Start Date	Estimated Completion Date
Literature Review	MWQI Program	April 2014	May 2014
Finalize Study Plan	MWQI Program & MWQI SPC	April 2014	May 2014
Complete Installation	MWQI Program	May 2014	May 2014
Collect Data	MWQI Program	May 2014	May 2015
Analyze data and prepare Mid Study Report	MWQI Program	November/December 2014	January/February 2015
Submit Mid Study Report to DWR Management and MWQI SPC for review	MWQI Program & MWQI SPC	February 2015	March 2015
Analyze data and prepare Draft Report	MWQI Program	June 2015	August 2015
Submit Draft Report to MWQI SPC for review	MWQI Program	August 2015	September 2015
Respond to comments	MWQI Program	September 2015	September 2015
Submit Revised Draft Report to DWR management and MWQI SPC for review	MWQI Program & MWQI SPC	September 2015	October 2015
Respond to comments	MWQI Program	October 2015	October 2015
Submit Draft Final Report to DWR Editors for formatting and editorial review	MWQI Program	October 2015	November 2015

Finalize Comments	MWQI Program	November 2015	November 2015
Publish Final Report	MWQI Program	December 2015	December 2015

7.4. Urban Sources and Loads Investigation

Lead Investigator – Rachel Pisor

IO# – VURBANSL0013, Funds Budgeted – \$7,760, Hours Budgeted - 80

This is an ongoing study that began in the FY08-09 work plan. The tasks that will be completed in this work plan cycle consist of the editing and reviewing processes that occur prior to publication of the final report.

Prior to this work plan, the draft report was reviewed by DWR management and MWQI SPC. The work from the previous work plan consists of an editorial review by technical writers in the Project Services Office, incorporation of their comments, an additional review of an updated QA/QC section, and a final review from DWR management. Incorporation of management comments and the approval to print process is projected to take place in the current work plan. The Urban Sources and Loads Investigations project deliverables and timelines are shown below in Table 19.

Table 19. Urban Sources and Loads Investigations Deliverables and Timelines

Deliverables	Participants	Estimated Start Date	Estimated Completion Date
Send Draft Final Report to DWR Editors and incorporate edits from editors	MWQI Program & Project Services Office	February 2014	Complete
Draft Final Report for review by MWQI	MWQI Program	Mid-April 2014	Complete
Approval to Print Process	MWQI Program	May 2014	August 2014
Final Report Published	MWQI Program	August 2014	August 2014

7.5. O'Neill Forebay Mixing Study

Lead Investigator – Jason Moore

Project Partners – Tony Liudzius and Elaine Archibald

IO# – VONEILFRBY13, Funds Budgeted – \$7,760, Hours Budgeted - 80

This study was initiated during the FY08-09 work plan to investigate the amount of mixing that occurs in O'Neill Forebay between the various source waters. A preliminary report was drafted by MWQI staff in the 3rd quarter of 2012. The scope of the project was expanded to include a spreadsheet modeling approach in the 1st quarter of 2013. Analysis continued until the final model was developed in October 2013

First Draft of the revised report is complete as of March 2014. The future O'Neill Forebay Mixing Study project deliverables and timelines are shown below in Table 20.

Table 20. O'Neill Forebay Mixing Study Deliverables and Timelines

Deliverables	Participants	Estimated Start Date	Estimated Completion Date
Submit Draft Report to MWQP management and MWQI SPC Project Partners for review	MWQI Program & MWQI SPC	2008-2009 work plan	Complete
Review draft and receive comments from MWQP Management and MWQI SPC Project Partners	MWQI Program & MWQI SPC	March 2014	June 2014
Respond to Comments	MWQI, Program	June 2014	June 2014
Submit Revised Draft Report to MWQI SPC and OWQ Chief for review	MWQI, Program, OWQ Chief, & MWQI SPC	July 2014	July 2014
Respond to Comments	MWQI, Program	August 2014	September 2014
Send Draft Final Report to DWR Editors for formatting and editorial review	MWQI Program & Project Services Office	September 2014	September 2014
Incorporate comments	MWQI Program	October 2014	November 2014
Send draft for final review by DES Chief and DWR Executive	MWQI Program, DES Executive Secretary, DES Chief, & DWR Executive office	November 2014	February 2015
Incorporate Comments	MWQI Program	February 2015	March 2015
Publish Final Report	MWQI Program, DWR Publishing, & DES IT	March 2015	April 2015

7.6. Spectrofluorometer Study

Lead Investigator – Ted Swift

Project Partner – Rich Losee

IO# – VSPCTROFLU13, Funds Budgeted – \$15,520, Hours Budgeted - 160

This is a study that began in the FY09-10 work plan, to be substantially complete before the FY14-15 Work Plan. This research was identified as an area of expertise needed by the MWQI Program. This study evaluates the utility of spectrofluorometry as a method of rapidly quantifying COCs such as DOC, and organic nitrogen as a source of DBP precursors by correlating spectral peaks in the fluorescence excitation-emission matrix (EEM) with lab analyses for DOC, nutrients, and DBP precursors, using samples from 12 stations within and around the Delta, and two wastewater treatment plants. This study also seeks to identify distinctive characteristics of Delta source waters to provide “fingerprints” that could be used to validate Delta water quality models. The final report is expected to be substantially complete by the beginning of the FY, with a low level of MWQI effort to maneuver it through final DWR management approval in the FY14-15 Work Plan. The spectrofluorometer deliverables and timelines are shown below in Table 21.

Table 21. Spectrofluorometer Study Deliverables and Timelines

Deliverables	Participants	Estimated Start Date	Estimated Completion Date
Incorporate 1 st round comments	MWQI Program	March 2014	30 May 2014
Submit Draft Report to MWQP management and MWQI SPC for review	MWQI Program & MWQI SPC	30 May 2014	30 May 2014
Review draft and receive comments from MWQP Management and MWQI SPC Project Partners	MWQI Program & MWQI SPC	2 June 2014	28 July 2014
Respond to Comments	MWQI, Program	28 July 2014	15 August 2014
Submit Revised Draft Report to MWQI SPC and OWQ Chief for review	MWQI, Program, OWQ Chief, & MWQI SPC	15 August 2014	29 August 2014
Respond to Comments	MWQI, Program	29 August 2014	12 September 2014
Send Draft Final Report to DWR Editors for formatting and editorial review	MWQI Program & Project Services Office	12 September 2014	10 October 2014
Incorporate comments	MWQI Program	13 October 2014	16 October 2014
Send draft for final review by DES Chief and DWR Executive	MWQI Program, DES Executive Secretary, DES Chief, & DWR Executive office	17 October 2014	6 January 2015 -3 February 2015
Incorporate Comments	MWQI Program	6 January 2015 -3 February 2015	27 January 2015 - 24 February 2015
Publish Final Report	MWQI Program, DWR Publishing, & DES IT	30 January 2015 – 27 February 2015	13 February 2015-13 March 2015

7.7. Tidal Marsh Restoration Literature Review

Lead Investigator – Sonia Miller

Project Partner – Alex Rabidoux

IO# – VTIDALMRSH13, Funds Budgeted – \$15,520, Hours Budgeted - 160

This is an ongoing special study started in the FY10-11 work plan. The purpose of this study is to review, compile, and summarize existing research on the impact of tidal wetlands in the Delta. State, federal, and local agencies will be adding thousands of acres of tidal marsh to the Delta. Several examples include the most recent draft of the Bay Delta Conservation Plan (BDCP) which proposes creation or restoration of 65,000 acres of tidal wetland in the Delta, including the Suisun Marsh. The recent Delta Smelt Biological Opinion for SWP operations in the Delta also calls for the restoration of 8,000 acres of intertidal and sub-tidal wetlands.

One negative impact from wetland restoration is the production of dissolved organic carbon (DOC) which at high concentrations can cause disinfection by products (DBPs) during the chlorination process of water treatment. DBPs are carcinogenic, highly regulated, and can lead to increased scrutiny and regulation of water treatment plant operations.

The deliverables and timelines are shown below in Table 22. Project management documentation for this study can be found in Appendix 2.

Table 22. Tidal Marsh Literature Review Deliverables and Timelines

Deliverables	Participants	Estimated Start Date	Estimated Completion Date
Prepare Draft Report for MWQP management	MWQI Program	Complete	Complete
Respond to Comments	MWQI Program	Complete	Complete
Submit Draft Report to MWQP management and MWQI SPC Project Partners for review	MWQI Program MWQI SPC	June 2014	August 2014
Respond to Comments	MWQI Program	September 2014	September 2014
Submit Revised Draft Report to MWQI SPC and OWQ Chief for review	MWQI, Program, OWQ Chief, & MWQI SPC	September 2014	October 2014
Respond to Comments	MWQI, Program	October 2014	October 2014
Send Draft Final Report to DWR Editors for formatting and editorial review	MWQI Program & Project Services Office	October 2014	November 2014
Incorporate Comments	MWQI Program	November 2014	November 2014
Send draft for final review by DES Chief and DWR Executive	MWQI Program, DES Executive Secretary, DES Chief, & DWR Executive office	November 2014	March 2015
Incorporate Comments	MWQI Program	March 2015	March 2015
Publish Final Report	MWQI Program, DWR Publishing, & DES IT	March 2015	April 2015

7.8. Feasibility Study for MWQI Portable Water Quality Monitoring Station

Lead Investigator: Arin Conner

IO# – VPORTBLSTN13, Funds Budgeted – \$7,760, Hours Budgeted - 80

This is an ongoing study from the FY 10-11 work plan, and timelines associated with this study continue to remain flexible to accommodate field staff's primary responsibilities associated with real-time station operations and maintenance. Meanwhile, using a self-contained, portable monitoring station continues to provide the benefit of allowing for the collection of real-time water quality data without committing to the construction cost normally associated with a permanent facility. Moreover, portable stations, much like the one installed at the Gianelli pumping plant, could potentially be used as a semi-permanent installation with the addition of security devices, ample electrical supply, and some simple preparations. Ready-made portable stations are now currently available at reasonable cost, are cost-effective alternatives to the cost of permanent buildings, and can be pre-ordered and outfitted to the specifications required by the client. This study will investigate the feasibility of using a ready-made portable station including features necessary to outfit a portable water quality station using minimal staff time and cost. Actual construction of the portable station would be dependent upon approval by the MWQI Program and the MWQI SPC. The acquired information including design specification and quotes will be summarized in a draft report and provided to the MWQI SPC.

The deliverables and timelines are shown below in Table 25.

Table 23. Portable Water Quality Monitoring Station Deliverables and Timelines*

Deliverables	Participants	Estimated Start Date	*Estimated Completion Date
Investigate the design and cost of constructing a portable water quality station	MWQI Program	June 2012	August 2012
Identify alternatives of ready-made prefabricated portable buildings	MWQI Program	August 2012	November 2012
Investigate options to design specifications	MWQI Program	November 2012	December 2012
Identify alternatives of power sources, HVAC systems, and exterior and interior lighting	MWQI Program	February 2013	March 2013

Obtain quotes	MWQI Program	June 2013	June 2013
Summarize information in a draft report	MWQI Program	June 2014	August 2014
Publish final report	MWQI Program	August 2014	October 2014

*Schedule is subject to change.

8. OTHER MWQI FUNDED PROGRAM ACTIVITIES

MWQI staff work on some tasks that seem peripheral to the approved projects, but are actually an inescapable part of the job. For this reason internal order numbers (IO's) under Section 8 are intended to describe these tasks and help define the associated time requirements. In this section administrative activities, employee safety, and other *overhead* type requirements are discussed.

In addition to these, MWQI staff is occasionally requested to support other DWR activities. For example, MWQI staff may be asked to provide technical assistance, review and revise plans, or provide support that improves workplace safety practices. Such assistance by the MWQI staff may directly or indirectly benefit the MWQI program stakeholders and the MWQI SPC, and therefore is funded by the MWQI budget.

As it has done in the past, MWQI will continue to inform the TAC and MWQI SPC members about work on these tasks. MWQI will achieve this through updates during the monthly TAC meetings, by providing details in this and future work plans, and through expenditure reports presented quarterly at TAC meetings.

8.1. Administration Work

IO# – VDWRQDDPC13, Funds Budgeted – \$169,080, Hours Budgeted – 1640

In general, the *Administrative Work* IO (VDWRQDDPC13) covers meetings, conferences, training, and certain office duties for all MWQI staff. Each of these is more closely described below.

All training and conferences fall under this section. MWQI Program staff attend training classes focused on drinking water quality, but also attend classes outside of water quality to develop their skills and prepare for career advancement. Another form of training is workshop

attendance, such as the annual Environmental Scientist Workshop; and conference attendance, such as the IEP Workshop, CWEMF Annual Meeting, Bay Delta Science Conference, etc.

Other required program activities include office duties such as preparing training and travel expense claim forms; general email activities; preparing MWQI meeting agendas, handouts, and meeting minutes; and preparing equipment maintenance contracts. Also, most in-house meetings attended by staff are charged to this IO, including the TAC and Branch meetings. Staff time is also charged to this IO for attending and preparing for the MWQI & Contractors *Annual Meeting*.

Preparation of the MWQI Fact Sheet - The MWQI Specific Project Committee (SPC) has requested that MWQI prepare a brief (2 to 5 page) fact sheet that summarizes the major accomplishments at the end of each FY. The purpose of this report is to highlight the value of the MWQI Program to senior managers and board members of the SWP M&I Contractors. The MWQI SPC will develop the format and prepare the report for FY 2013/2014 and MWQI staff will then develop the FY 2014/2015 report using the same format. The production of this fact sheet will be done by MWQP management staff. Funding for this fact sheet comes from the management budget.

Table 24. MWQI Accomplishments Report Deliverables and Timelines

Deliverables	Participants	Estimated Start Date	Estimated Completion Date
Discuss major accomplishments at TAC meeting	MWQI Program & MWQI SPC	April 2015	April 2015
Submit draft report to MWQI SPC for review	MWQI Program	May 2015	May 2015
Submit final report to MWQI SPC	MWQI Program	June 2015	June 2015

8.2. Field Unit Office Duties

IO# – VFUOFCWORK13, Funds Budgeted – \$121,400, Hours Budgeted - 1200

The Field Unit Office Duties IO (VFUOFCWRK13) is intended to track the cost of the Field Section facility by tracking time and expenses charged to maintaining the Bryte Trailer offices. This IO also acts as the general charge number for field section staff when attending section meetings and other general office activities. This information will be a valuable planning tool for the senior staff member leading the Field Section, which will allow for the budgeting of facility repairs, as needed.

8.3. O&M Water Quality Other Duties

IO# – VOMWQH00013, Funds Budgeted – \$500, Hours Budgeted - are paid for by O&M

The MWQI Program funds 0.6 PY of a position within O&M, which is managed under a resource agreement (an agreement between the two divisions explaining work to be performed). This FY, all MWQI related charges for this position will fall to the Gianelli water quality station operation IO which is covered in Section 6.1.2. This FY, Element 8.3 is only planned to be used to pay MWQI's share of the O&M employee's training (60%).

8.4. MWQI Annual Work Plan

IO# – VWORKPLAN013, Funds Budgeted – \$51,216, Hours Budgeted - 528

The cost of staff time spent developing, reviewing, and producing the final annual work plan will be tracked within the MWQI Program so that management, staff, and the MWQI SPC can gain an understanding of the time and cost involved in producing this document. This information will provide a valuable tool for planning, organizing, managing, and controlling the production of future work plans.

Charges to this section (IO# VWORKPLAN13) are all work plan development activities including work plan meetings, work plan text development, budget and timelines, and project initiation documents. All of this information is included in the annual work plan document. All steps beyond those described here are to be charge to the specific study IO number and not the work plan IO.

8.5. DWR's Bulletin B132, Chapter 4 - Water Quality

IO# – VBULL132WQ13, Funds Budgeted – \$11,640, Hours Budgeted – 120

The MWQI Program staff will actively participate in writing the appropriate portions of the DWR Bulletin 132, Chapter 4 - Water Quality for version 132-13. Bulletin 132, Management of the California State Water Project, is a series of annual reports that describe the status of SWP operations and water deliveries. Each annual report updates information regarding project costs and financing, water supply planning, power operations, and significant events that affect the management of the SWP. Each also presents hydrologic information for the water year, capital construction information for the fiscal year, and water delivery, operations, maintenance, and other activities for the calendar year.

The cost of staff time spent revising and reviewing specific sections within chapter 4-water quality that pertain to the MWQI Program will be tracked so that management staff and the MWQI SPC can gain an understanding of the time and cost involved in producing our contributions to this document that is required by DWR to be provided annually to the SWP Contractors. This information will provide a valuable management tool for planning, organizing, managing, and controlling staff's work time on the production of future bulletins.

8.6. MWQI Agreement

If MWQI Program staff assist with developing any future MWQI funding agreement their work time and costs will be tracked and reported through the quarterly expenditures reports. It is not anticipated that staff will spend any time in FY 14-15 since the three year agreement covering FY 14-15 to FY 16-17 was executed in February 2014.

8.7. Workplace Safety

IO# – VSAFTYDOCS13, Funds Budgeted – \$13,692, Hours Budgeted – 136

Per the Resources Agency Secretary, DWR developed a DWR Safety Office and has a Chief Safety Officer that is responsible for leading DWR's implementation of a world-class workplace safety program. The workplace safety program will provide uniformity and consistency across DWR, and involves every staff member contributing to a safer workplace. DES is committed to supporting DWR's workplace safety program with its total quality management approach; commitment to the health and safety of its employees, partners and visitors; and values workplace safety through leadership, recognition, and education.

DES created a Safety Support Workgroup to enhance and refine its comprehensive workplace safety program both in office and field locations; ensure compliance with all applicable federal, State, and local laws and regulations; provide the required inspections, assessments, corrective actions, training, and reporting; and make recommendations that will elevate the DES workplace safety program to meet DWR's goals of a world-class level.

MWQI staff will contribute to this broader workplace safety program effort by contributing staff time in the division level efforts. On the project/study level, MWQI staff will ensure that safety equipment, safety protocols and documentation, and required training are part of every project. All of the work on safety program development, safety meeting attendance, and project specific safety activities and equipment will be charged to the Workplace Safety IO number (VSAFTYDOCS13).

8.8. Emergency Response

IO# – V911RESPNS13, Funds Budgeted – \$3,880, Hours Budgeted – 40

Any staff involvement with emergency response (ER) during this work plan cycle will include: attending ER meetings, restocking of drinking water quality ER kits, providing emergency assistance for drinking water quality monitoring as requested by emergency responders and assisting the DWR's Emergency Management Committee (EMC) as needed in the development of a DWR Drinking Water Quality ER Plan.

8.9. Miscellaneous Meetings Attended by Staff

IO# – VOTHERWQPA13, Funds Budgeted – \$38,800, Hours Budgeted – 400

The MWQI Program staff has historically contributed to numerous DWR support activities that pertain to the MWQI Program and will continue to provide support as needed. The cost of staff time spent on these support activities will be tracked so that management staff and the MWQI SPC can gain an understanding of the time and cost involved. This information will provide a valuable management tool for planning, organizing, managing, and controlling staff's workloads, project time allocations, and overall costs to the MWQI Program.

The following information provides a brief description where staff may be requested to provide their drinking water quality expertise:

- California Water Quality Monitoring Council (CWQMC) - (Per Senate Bill 1070, the MWQI Program staff will actively participate in the CWQMC collaboration network that requires the boards, departments and offices within the California Environmental Protection Agency (Cal/EPA) and the California Natural Resources Agency to integrate and coordinate their water quality and related ecosystem monitoring, assessment, and reporting. MWQI Program staff will assist in improving the coordination and cost-effectiveness of water quality and ecosystem monitoring and assessment, enhance the integration of monitoring data across departments and agencies, and increase public accessibility to monitoring data and assessment information by participating in meetings, and providing technical support and water quality data.
- State Water Resources Control Board (SWRCB) - The MWQI Program staff will actively continue to support data dissemination activities to the California Environmental Data Exchange Network (CEDEN) data portals, and provide technical support in the development of the Regional Monitoring Programs (RMP).
- DWR California Water Plan - The MWQI Program staff will actively participate in writing the appropriate water quality portions of the CA Water Plan and any updates to future Plans. No work is anticipated in FY 14-15 since the 2013 Water Plan was recently completed and the next one is due in 2018.
- DWR's GIS efforts - The MWQI Program staff will participate occasionally in the monthly GIS meeting because GIS is a powerful tool that is used in some instances on special studies to help us visualize, analyze, interpret, and understand data to reveal relationships, patterns, and trends. The MWQI Program staff may also occasionally participate in GIS training classes and the annual GIS conference.
- Delta Conservancy educational outreach events

9. PROGRAM MANAGEMENT - STATUS REPORTING

IO# – VPROGMMGMT13, Funds Budgeted – \$173,824, Hours Budgeted – 1792

The MWQI Program Senior Environmental Scientists are responsible for these following specific management tasks:

- Supervise and direct the work of the MWQI Environmental Scientists and scientific aides and other technical staff assisting with MWQI projects.
- Assign and distribute staff work then monitor staffing levels, project schedules, monitor and evaluate work performance, and conduct staff workload assessments to improve efficiency, save time, resources and money.
- Conduct routine staff meetings, prepare staff's annual appraisal and development (A&D) reports, determine staff training needs, approve staff's training and time-off requests, and verify and approve staff attendance.
- Coordinate the preparation, or prepare and provide the appropriate MWQI Program meeting agendas, monthly status report, budget expenditure reports, and meeting minutes.
- Coordinate the MWQI-SWP Urban Contractors annual meeting.
- Ensure MWQI TAC members continue to receive all draft materials, and that committee members continue to have the opportunity to participate in technical meetings of interest.
- Monitor progress on MWQI Program elements outlined in work plan.
- Address personnel, contracted services, and equipment related issues for the MWQI Program.
- Conduct interviews and hire qualified staff to backfill vacancies.
- Provide technical support to management for meetings, conference and workshops related to drinking water quality issues.
- Prepare correspondence as needed to provide information to the MWQI SPC.

All time spent on these tasks is charged to the *Program Management* IO number (VPROGMMGMT13). Only Senior Environmental Scientist in the MWQI branch charge to Program Management.

10. NON-MWQI FUNDED PROGRAM MANAGEMENT

As stated previously, since DWR is a matrix management organization staff may be requested to assist with supporting various DWR activities by providing technical support, evaluations and analysis of data, timely document and plan reviews, and may occasionally attend meetings. Some of these support activities are not funded by the MWQI Program budget. For example, the MWQI Program staff who assist with writing, evaluating data pertaining to drinking water related research, or conducting reviews of BDCP project chapters, environmental documents, and plans will charge the BDCP budget. Also, the MWQI Program staff that assist with the DWR Water Planning Information Exchange (PIE) efforts will charge the Water PIE budget.

The amount of work time that staff spends on these types of non-MWQI funded activities is infrequent, and rarely impacts their normal workloads. MWQI program staff members serve as DWR's technical drinking water quality experts. Work done on non-MWQI projects is beneficial to DWR and is indirectly beneficial to MWQI stakeholders.

11. OTHER REQUIRED PROGRAM COSTS

IO# – G1111290005I, Funds Budgeted – \$1,000 for Mobile Equipment Operations (fuel & vehicle insurance), Funds budgeted for PSO – \$3000 for the portable restroom contract

The DWR Project Services Office (PSO) provides technical reviews, evaluations, analysis and presentation of data pertaining to water related research projects and programs and is used by the MWQI Program staff for technical reviews of special studies and reports prior to publication. The cost of PSO support services has historically been covered by the DWR monthly overhead assessments which are spread out amongst DWR Divisions' budgets. As of July 1, 2013 the PSO services were no longer covered by DWR's overhead assessments. As of the writing of this work plan, the PSO has not yet made available the cost of their technical review and support services, but the MWQI Program allocated \$3000 for this work plan cycle to cover costs incurred for any technical reviews of the special studies.

The Artificial Neural Network Project (ANN) may continue into FY 14/15. A placeholder budget of \$30,000 was approved by the MWQI SPC.

DWR's Mobile Equipment Operation's (MEO) provides insurance and fuel to support the vehicles used by the Field Support Section staff for their routine water quality assessment

efforts. The MEO office staff will continue to support the MWQI Program by providing customer support through cost effective fleet management and maintenance of mobile equipment owned by DWR. The MWQI Program allocated \$1000 for this work plan cycle to cover costs incurred for this support.

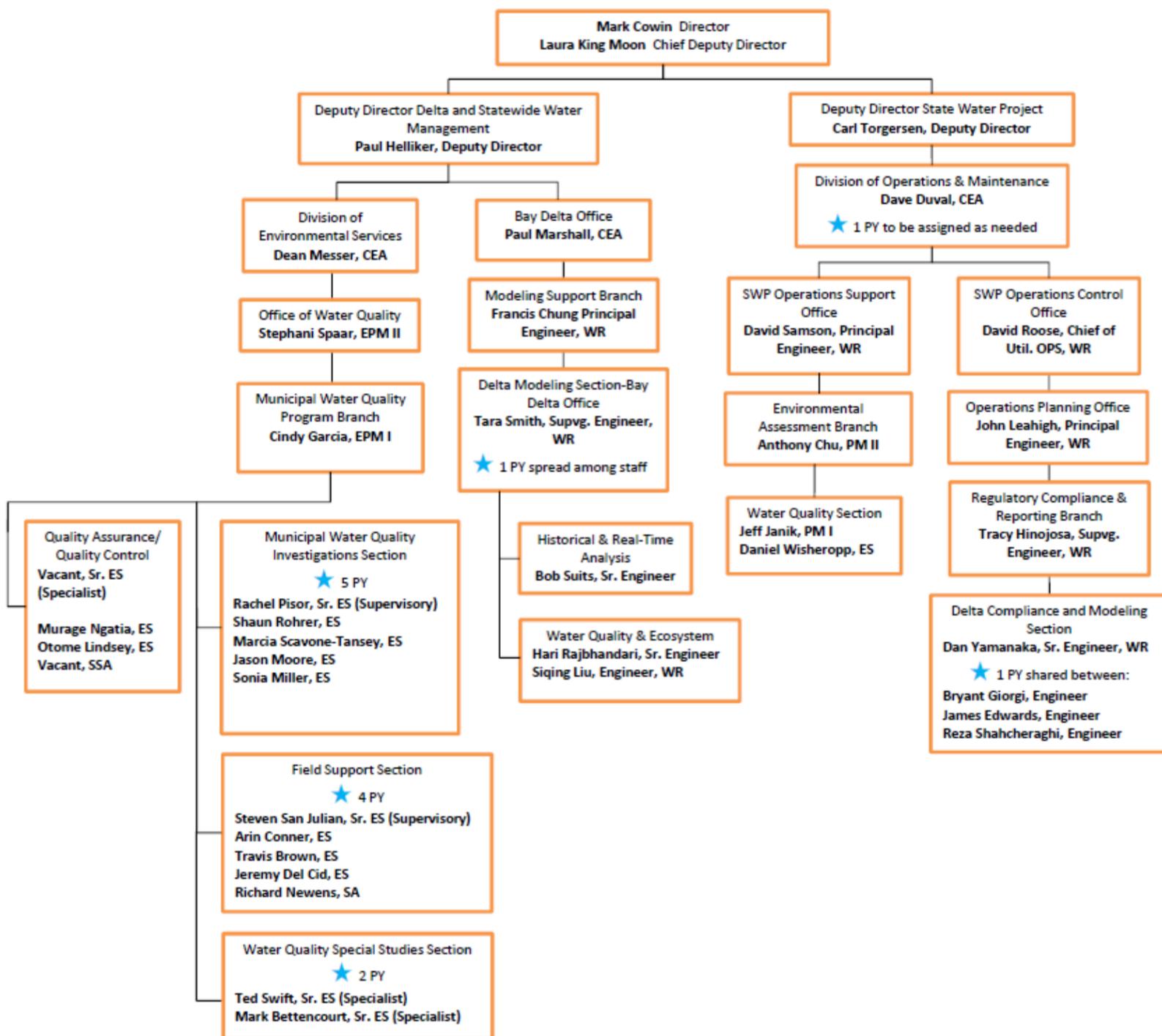
Expenditures for these types of services not assigned to any specific program element will be tracked and reported in the column entitled "Operating Equipment and Expenses", on the monthly expenditure reports that will be provided as handouts prior to the TAC meetings.

The MWQI Program is not responsible for directly tracking expenditures of the MWQI SPC Fund, but Program staff will work directly with MWQI SPC staff to obtain the expenditure amounts periodically and will include these amounts in the monthly expenditure reports provided prior to the TAC meetings.

On occasion, if the MWQI Program needs additional water quality monitoring equipment, laboratory services, or technical support from consulting services, Program management staff will discuss the need for these types of additional services with the MWQI SPC Consultant and the MWQI SPC. The cost of additional services will also be tracked and reported in the monthly expenditure reports.

12. ORGANIZATION CHART

Org Chart of MWQI Funded Positions in The Department of Water Resources



JOB TITLE ABBREVIATIONS
 CEA: Career Executive Appointment
 ES: Environmental Scientist
 WR: Water Resource
 EPM: Environmental Program Manager
 PM: Program Manager
 SSA: Staff Services Analyst
 SA: Scientific Aide

★ Indicates position(s) funded by the MWQI Program.
 The two positions in the Division of O&M and the one position in the Bay Delta Office were among the seven new positions added to carry out the RTDF Comprehensive Program when the MWQI Program expanded in 2007/2008.

6/18/2014

13. GLOSSARY OF ACRONYMS AND TERMS

<u>ANN</u>	<u>Artificial Neural Network</u>
<u>AMS</u>	<u>Accelerated Mass Spectrometry</u>
<u>BCP</u>	<u>Budget Change Proposal</u>
<u>BDCP</u>	<u>Bay Delta Conservation Plan</u>
<u>BDO</u>	<u>Bay Delta Office</u>
<u>BMP</u>	<u>Best Management Practices</u>
<u>Br</u>	<u>Bromide</u>
<u>Ca</u>	<u>Calcium</u>
<u>CBDA</u>	<u>California Bay Delta Authority</u>
<u>CBOD</u>	<u>Chemical Biological Oxygen Demand</u>
<u>CCWD</u>	<u>Contra Costa Water District</u>
<u>CDEC</u>	<u>California Data Exchange Center</u>
<u>CDPH</u>	<u>California Department of Public Health</u>
<u>CIWQS</u>	<u>California Integrated Water Quality System</u>
<u>CUWA</u>	<u>California Urban Water Agencies</u>
<u>CVP</u>	<u>Central Valley Project</u>
<u>CVDWPWG</u>	<u>Central Valley Drinking Water Policy Work Group</u>
<u>CWQMC</u>	<u>California Water Quality Monitoring Council</u>
<u>DBP</u>	<u>Disinfection by-product</u>
<u>DDT</u>	<u>Dichloro-Diphenyl-Trichloroethane (insecticide)</u>
<u>DES</u>	<u>Division of Environmental Services</u>
<u>DFG</u>	<u>California Department of Fish and Game</u>
<u>DMC</u>	<u>Delta-Mendota Canal</u>
<u>DO</u>	<u>Dissolved Oxygen</u>
<u>DOC</u>	<u>Dissolved Organic Carbon</u>
<u>DOE</u>	<u>DWR Division of Engineering</u>
<u>DSIWM</u>	<u>Division of Statewide Integrated Water Management</u>
<u>DSM2</u>	<u>Delta Simulation Model 2</u>
<u>DWR</u>	<u>California Department of Water Resources</u>
<u>DWR EMC</u>	<u>Department of Water Resources Emergency Management Committee</u>
<u>EEM</u>	<u>Excitation-Emission Matrix</u>
<u>EC</u>	<u>Specific Electric Conductivity</u>
<u>EPA</u>	<u>U.S. Environmental Protection Agency</u>
<u>FDOM</u>	<u>Fluorescence of Dissolved Organic Matter</u>
<u>FRPA</u>	<u>Fish Restoration Program Agreement</u>

FSR Feasibility Status Report, used in information technology planning

FY Fiscal Year

GC-MS Gas Chromatography Mass Spectrophotometer

GIS Geographic Information System

HAA Haloacetic Acid

HAAFP Haloacetic Acid Formation Potential

IC Ion Chromatography, Inorganic Carbon (e.g., dissolved carbon dioxide)

IEP Interagency Ecological Program

IO Internal Order number

IT Information Technology

KHP Potassium hydrogen phthalate

LC-MS Liquid Chromatography Mass Spectrometry

MEO Mobile Equipment Operations

MWDSC Metropolitan Water District of Southern California

MGD Million Gallons per Day

MWDSC Metropolitan Water District of Southern California

MWQI Municipal Water Quality Investigations

MWQI SPC Municipal Water Quality Investigations Specific Projects Committee

Na Sodium

NALMS North American Lake Management Society

NEMDC Natomas East Main Drainage Canal

NDBA N-nitroso-di-n-butylamine

NDMA N-nitroso-dimethylamine

NDPA N-nitroso-di-n-propylamine

NHD National Hydrography Dataset

NMEA N-nitroso-methylethylamine

NMOR N-nitrosomorpholine

NPDES Non-Point Discharge Elimination System

NPYR N-nitroso-pyrrolidine

NMR Nuclear Magnetic Resonance (analysis)

O&M Department of Water Resources Division of Operations and Maintenance

O&M WQ Division of Operations and Maintenance Water Quality Section

OC Organic carbon

OCO Operation Controls Office (DWR O&M)

OEE Operating Expenses and Equipment

QA/QC Quality Assurance/Quality Control

P/G Pumping/Generation

PCB polychlorinated byphenyls
PY Person Year
QA/QC Quality Assurance, Quality Control
QC Quality Control
RTD Real-time Data
RTDF Real-time Data and Forecasting Program
RTDF-CP Real-time Data and Forecasting – Comprehensive Program
RTM Real Time Monitoring
SBA South Bay Aqueduct
SCWA Solano County Water Agency
SDIP South Delta Improvement Program
SLDMWA San Luis and Delta Mendota Water Authority
SME Subject Matter Expert
SOP Standard Operating Procedure
SPC Specific Project Committee
SUVA Specific ultraviolet absorbance
SWC State Water Contractors
SWP State Water Project
SWPCA State Water Project Contractors Authority
SS Sanitary Survey Update
TAC Technical Advisory Committee
TBD To Be Determined
TDS Total Dissolved Solids
THM Trihalomethane
THMFP Trihalomethane formation potential
TKN Total Kjeldahl Nitrogen
TMDL Total Maximum Daily Load
TNC The Nature Conservancy
TOC Total (dissolved and suspended particulate) organic carbon
UCD University of California at Davis
USBR U.S. Bureau of Reclamation
USGS United States Geological Survey
UVA *n* Ultraviolet absorbance at wavelength *n*
VAMP Vernalis Adaptive Management Program
WARMF Watershed Analysis Risk Management Framework
WDL California Water Data Library
WWTP Waste Water Treatment Plants