Municipal Water Quality Investigations Program Work Plan January - December 2020

FINAL WORK PLAN

State of California
Natural Resources Agency
DEPARTMENT OF WATER RESOURCES

Municipal Water Quality Investigations Program
Work Plan
January – December 2020

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List of Acronyms and Terms

BDO	Department of Water Resources Bay Delta Office
CCWD	Contra Costa Water District
CDEC	California Data Exchange Center
CVP	Central Valley Project
CY	Calendar Year
DES	Division of Environmental Services
DMC	Delta-Mendota Canal
DO	Dissolved Oxygen
DOC	Dissolved Organic Carbon
DSM2	Delta Simulation Model 2
DWR	California Department of Water Resources
EC	Specific Electric Conductivity
EPA	U.S. Environmental Protection Agency
EMP	DES Environmental Monitoring Program
FDOM	Fluorescence of Dissolved Organic Matter
FY	Fiscal Year
IC	Ion Chromatography
IEP	Interagency Ecological Program
IO	Internal Order number
MEO	Mobile Equipment Office
MWQI	Municipal Water Quality Investigations
MWQI SPC	Municipal Water Quality Investigations Specific Projects Committee
Na	Sodium
NEMDC	Natomas East Main Drainage Canal
O&M	DWR Division of Operations and Maintenance
O&M EAB	Division of Operations and Maintenance Environmental Assessment Branch
OC	Organic Carbon
OCO	Operation Controls Office (DWR O&M)
OE&E	Operating Expenses and Equipment
P/G	Pumping/Generation
PY	Position Year
QA/QC	Quality Assurance/Quality Control
QC	Quality Control
RA	Resource Agreement
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
SOP	Standard Operating Procedure
SPC	Specific Project Committee
SWP	State Water Project
SWPC	State Water Project Contractors

TBD	To Be Determined
TOC	Total Organic Carbon
WDL	California Water Data Library

1. MISSION STATEMENT

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

1. 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 Sacramento-San Joaquin Delta and the SWP water quality;
2. Provide early warning of changing conditions in source water quality used for municipal purposes;
3. Provide data and knowledge-based support for operational decision-making on the SWP; and
4. Provide scientific support to the Department of Water Resources (DWR), the State Water Contractors (SWC) MWQI Specific Project Committee (MWQI SPC), participating SWP Contractors, and other governmental entities.

2. INTRODUCTION

2.1 MWQI Program Background

The MWQI Program monitors and evaluates water quality in the Sacramento-San Joaquin Delta (Delta) to produce a comprehensive information base for State Water Contractors and other interested parties. MWQI generated data, incorporated with non-program data, are disseminated via daily and weekly reports at the Real-Time Data and Forecasting–Comprehensive Program (RTDF-CP) web site located at: http://rtdf.info/

DWR staff also represent MWQI interests when interacting with external organizations such as the State Water Resources Control Board (SWRCB), the Central Valley Regional Water Quality Control Board (CVRWQCB), the CVRWQCB's Nutrient Stakeholder and Technical Advisory Group (STAG) and the Delta Regional Monitoring Program (RMP).

Finally, MWQI staff support database infrastructure management, and the administration of essential program management activities mandated by DWR, including the development of quality assurance to ensure data are of a known and documented quality and efforts to ensure workplace health and safety.

2.2 MWQI Program – Program Partners

The MWQI Program has several Program Partners who work in other DWR Divisions (see the organization chart below) including O&M's Environmental Assessment Branch (EAB), the Operations Control Office (OCO), the Bay-Delta Office (BDO), and Quality Assurance Quality Control (QA/QC) Support Services. The MWQI Program and its Program Partners use resource agreements to manage workloads, staff resources, and budgets across DWR Divisions. Each resource agreement (RA) is prepared, reviewed, approved, and kept on-file by the program managers involved in the agreement. Typically, the duration of a RA is one to three years and agreements are renewed when workloads change. For this work plan cycle, MWQI Program has in place resource agreements that have been approved through fiscal year 2020-2021 (July 1, 2020 through June 30, 2021) for the following Program Partners:

O&M - Environmental Assessment Branch
OCO - Regulatory Compliance & Reporting
BDO - Delta Modeling Section

2.3 MWQI Program Core Elements

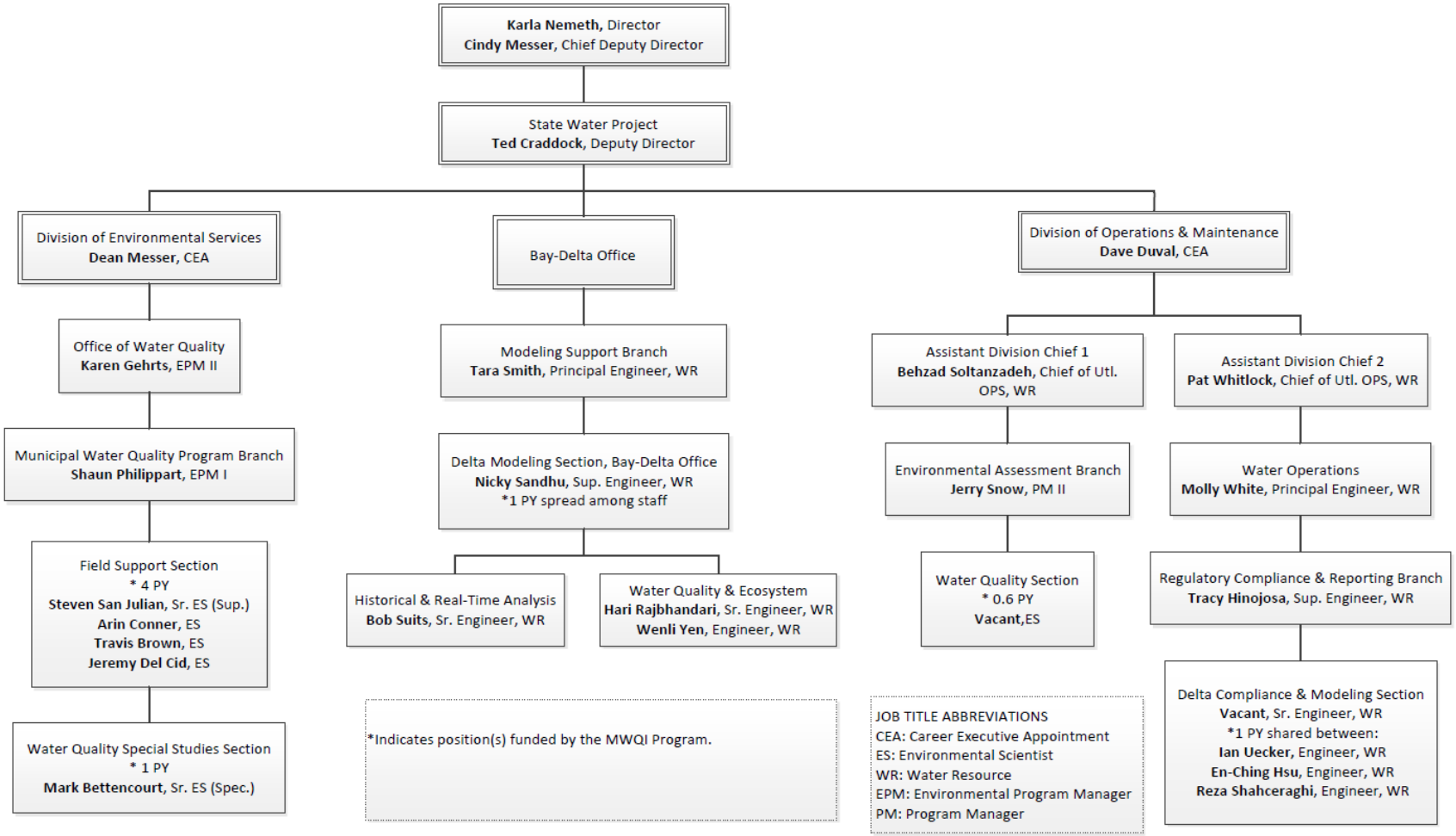
MWQI Program core elements will receive priority, though staff time may occasionally shift away from the work described in this work plan. Examples include work on drought activities, CA WaterFix, and EcoRestore. If it becomes apparent that core elements will be affected, adjustments will be made to keep the program moving forward.

Core elements are listed in priority of importance to the MWQI SPC:

1. Water quality monitoring (real-time and discrete) at existing stations and sites.
2. Modeling duties associated with producing short-term water quality forecasts and performing historical updates of existing models.
3. Production and dissemination of daily and weekly RTDF reports.
4. Data management activities pertaining to database infrastructure enhancement and improvement of long-term RTDF data storage and retrieval.
5. Program management activities listed in the MWQI funding agreement and those mandated by DWR health and safety. This includes RTDF Steering Committee meetings, budget updates, Bulletin 132 updates, and support to department emergency, drought, and O&M programs.
6. Other required Program activities mandated by DWR or essential to the MWQI Program (i.e. purchasing, contracts, budgeting, safety and policy training, specific meetings and conferences).

2.4 DWR MWQI Program Organization Chart

Figure 1. DWR org chart showing positions funded by MWQI Program funds.



3. PROGRAM FUNDING NEEDS

3.1 MWQI Agreement and MWQI Specific Project Agreement

The Municipal Water Quality Investigations Agreement (MWQI Agreement) between the Department of Water Resources, the State Water Contractors (SWC), and the MWQI Specific Project Committee of the State Water Contractors provide the funding authority for DWR's MWQI Program costs. DWR's MWQI Program costs include salaries and benefits of DWR staff working for the MWQI Program, overhead, equipment, supplies and operating expenses associated with the Program. These DWR MWQI Program costs are funded through the annual statement of charges of those SWP Contractors who participate in the MWQI Program. The new MWQI Funding Agreement is in effect from January 1, 2020 to December 31, 2022, which covers the timeframe of this calendar year (CY) based annual work plan.

The State Water Contractors MWQI Program Specific Project Agreement (MWQI Specific Project Agreement) establishes an independent, supplemental funding authority to support the objectives of the MWQI Program. SWP Contractors who are signatories to the MWQI Specific Project Agreement collectively form the MWQI Specific Project Committee (MWQI SPC) which carries out the work. Funds collected from the participating contractors form the MWQI SPC Account. Additionally, the Contra Costa Water District, which is not a SWP Contractor and not a signatory to the MWQI Specific Project Agreement, provides funding to support the MWQI Program. The MWQI SPC Fund is generally used to pay for MWQI Program related costs that are not administered by DWR. These costs include hiring and retaining consultants, special studies or investigations, administrative and related costs, and if emergency or urgent needs warrant, the purchase of equipment or supplies for the MWQI Program or facilities.

The CY 2020 MWQI Program contract budget total is $3.1 million, with $2,434,620 assigned to the DWR MWQI Program, and the remaining portion for the MWQI SPC fund. The MWQI SPC will begin budgeting on a calendar basis as of January 1, 2020.

The estimated budget expenses for this work plan CY are shown in Table 1.

This work plan covers January to December 2020. The 12-month budget is presented in Table 1 below and is followed by an explanation of MWQI Program expenditures in Table 2. Partner staffing in this budget reflects 1 Position Year (1 PY = 1778 hours/year = 221 working days) each for the BDO and OCO, and 0.6 PY for the Division of O&M EAB.

Table 1. January – December 2020 Program Element Costs for MWQI Program

Workplan Element		Program Element	2020 IO#	Labor Hours	Labor Cost	Contracts	OE&E	Total Cost
5		**Water Quality Assessment**						
	5.1	Routine Monitoring Program	VWQASSMENT13	1890	$236,250		$150,000	$386,250
	5.2	Short-term Monitoring (included w/ 5.1)	VWQASSMENT13					
	5.2.3	Endothall Monitoring	VWQASSMENT13	96	$12,000			$12,000
6		**RTDF-Comprehensive Program**						
	6.1	6.1.1 MWQI Real Time Stations	VRTMONITOR13	2320	$290,000	$44,000	$140,000	$474,000
		6.1.2 Gianelli WQ Station	VGIANNELLI13	830	$103,750	$14,000	$20,000	$137,750
	6.2	6.2.1 Bay Delta Office Modeling	VRTBDOMODL13	1628	$293,040			$293,040
		6.2.2 Operations Control Office Modeling	VRTOCOMODL13	1438	$258,840			$258,840
		6.2.3 Improve Aqueduct Pump-In Dynamics	VPUMPINDYN15	220	$39,600			$39,600
		6.2.4 Compare WQ Forecasts to Actual Conditions	VCOMPAREWQ15	120	$21,600			$21,600
	6.3	RTDF-CP Information Management and Data Dissemination	VRTDDISRPT13	790	$114,550			$114,550
7		**Special Studies**						
	7.1	FDOM Project	VFDOMPOCS013	366	$45,750			$45,750
	7.3	Support for Nutrient Concerns	VMWQSPCSTD19	140	$20,300			$20,300
	7.5	Data Display and Review	VMWQSPCSTD19	120	$15,000			$15,000
	7.6	Volumetric Fingerprint Data	VRTBDOMODL13	150	$27,000			$27,000
	7.7	Chlorophyll Study	VMWQSPCSTD19	140	$25,900			$25,900
	7.8	Monitoring at High Slack Tide	VMWQSPCSTD19	24	$4,440			$4,440
8		**Other MWQI Funded Program Activities**						
	8.1	Administration Work	VDWRRQDDPC13	1960	$362,600		$48,000	$410,600
	8.2	Field Unit Office Work	VFUOFCWORK13	920	$115,000			$115,000
9		**Other Required Program Costs**						
	9.1	MEO Insurance, Fuel, & Maintenance					$5,000	$5,000
	9.2	In-Kind Services	VINKINDSER19	224	$28,000			$28,000
		Total		**13,376**	**$2,013,620**	**$58,000**	**$363,000**	**$2,434,620**

* 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 5 PY for staff and 2.6 PY's for program partners in OCO, BDO, and O&M. Labor rates are estimated at: ES - $125/hour, Sr ES Spec - $145/hour, Sr ES Sup - $185/hour, WR Engineer - $180/hour

3.2 Explanation of Program Element Costs for Work Plan Projects

Table 2. January – December 2020 MWQI Program Contract and Operating Expenses & Equipment (OE&E) Costs

Program element:		OEE for the WP	Justification	CY2020 Cost
5.1	WQ Assessment	Routine Monitoring Program	Monitoring equipment, consumables, & contract lab costs	$40,000
5.1	WQ Assessment	New Monitoring boat	Replaces old boat	$110,000
6.1.1	RTDF	MWQI Real Time Stations - equipment & filter replacement	consumables	$50,000
6.1.1	RTDF	YSI replacement probes	consumables	$50,000
6.1.1	RTDF	All Cal Services - portable toilet at Hood real time station	Employee Health & Safety	$2,000
6.1.1	RTDF	Thermo-Fisher service contract for 3 Dionex IC analyzers (Banks, Vernalis, Jones)	Annual maintenance and repair	$23,000
6.1.1	RTDF	GE/Sievers - service contract for 4 organic carbon analyzers (Hood, Banks, Jones, Vernalis)	Annual maintenance and repair	$19,000
6.1.1	RTDF	New Truck	Replaces old truck	40,000
6.1.2	Gianelli WQ Station	Thermo-Fisher service contract for 1 Dionex IC analyzers (Gianelli)	Annual maintenance and repair	$9,000
6.1.2	Gianelli WQ Station	GE/Sievers - service contract for 1 organic carbon analyzers (Gianelli)	Annual maintenance and repair	$5,000
6.1.2	Gianelli WQ Station	Equipment repairs and replacement, filters, reagents, etc.	consumables	$20,000
8.1	MWQI Administration	Facility Maintenance, meetings, conferences, training for MWQI staff	Conferences and training fees and per diem	$40,000
8.1	MWQI Administration	4 new computers	Replaces old computers	$8,000
9.1	Mobile Equipment Office	Replacement Truck and Boat	Billed to Section 5 and 6, above	0
9.1	Mobile Equipment Office	Vehicle maintenance, fuel, and insurance		$5,000
		TOTAL Contract & OEE COSTS:		$421,000

4 WORKLOAD ASSESSMENT

For CY2020, a workload assessment was conducted to determine whether staff had enough work to occupy 100% of their time. This assessment looked at 8 full-time staff, which includes MWQI Program staff and the 3 funded partner staff in OCO, BDO, and O&M. The assessment assumes that staff have 1778 hours of production time during the year. The assessment does not use the total hours in a year (2080) because total hours includes vacation, holidays, sick, etc., where staff do not produce work. The workload assessment (Table 3) is a vital tool in managing staff workloads, project status, and impacts to the MWQI budget.

Table 3. Work Load Assessment for CY2020		MWQP Staff					Non-MWQP Staff				
Work Plan Element	IO#	Arin Conner	Travis Brown	Jeremy Del Cid	Steven San Julian	Mark Bettencourt	O&M EAB- Vacant	OCO - Hsu/ Shahcheraghi	BDO - Yin/Rajbhandari	Total Hours	Total PYs
		(HOURS ALLOTTED)									
5.1 Routine Monitoring Program	VWQASSMENT13	600	600	600	30	30	30	0	0	1890	1.1
5.2.1-.2 Short-term Monitoring	VWQASSMENT13										
5.2.3 Endothall Monitoring	VWQASSMENT13	24	24	24	0	24	0	0	0	96	0.1
6.1.1 MWQI Real Time Stations	VRTMONITOR13	580	580	580	0	580	0	0	0	2320	1.3
6.1.2 Gianelli WQ Station	VGIANNELLI13	0	0	0	0	0	830	0	0	830	0.5
6.2.1 BDO- Bay Delta Office Modeling	VRTBDOMODL13	0	0	0	0	0	0	0	1628	1628	0.9
6.2.2 OCO- Operations Control Office Modeling	VRTOCOMODL13	0	0	0	0	0	0	1438	0	1438	0.8
6.2.3 Improve Aqueduct Pump-In Dynamics	VPUMPINDY15	0	0	0	0	0	0	220	0	220	0.1
6.2.4 Compare WQ Forecasts to Actual Conditions	VCOMPAREWQ15	0	0	0	0	0	0	120	0	120	0.1
6.3.1 RTDF Data Dissemination and Reporting	VRTDDISRPT13	0	0	0	0	790	0	0	0	790	0.4
7.1 Fluorescence of Dissolved Organic Matter (FDOM)	VFDOMPOCS013	48	50	170	0	48	50	0	0	366	0.2
7.2 North Valley Regional Recycled Water Program	VMWQSPCSTD19	0	0	0	0	0	0	0	0	0	0.0
7.3 Support for Nutrient Concerns	VMWQSPCSTD19	0	0	0	0	140	0	0	0	140	0.1
7.4 Pesticide and Herbicide Use in the Delta	VMWQSPCSTD19	0	0	0	0	0	0	0	0	0	0.0
7.5 Data Display and Review	VMWQSPCSTD19	20	20	20	20	20	20	0	0	120	0.1
7.6 Volumetric Fingerprint Data	VRTBDOMODL13	0	0	0	0	0	0	0	150	150	0.1
7.7 Chlorophyll Study	VMWQSPCSTD19	0	0	0	140	0	0	0	0	140	0.1
7.8 Monitoring at High Slack Tide	VMWQSPCSTD19	0	0	0	24	0	0	0	0	24	0.0
8.1 Administration Work Training/RTDF/meetings	VDWRRQDDPC13	120	120	120	1500	100	0	0	0	1960	1.1
8.2 Field Unit Office Work	VFUOFCWORK13	311	309	190	64	46	0	0	0	920	0.5
9.1 In-Kind Services	VINKINDSER19	75	75	74	0	0	0	0	0	224	0.1
Staff Hours Committed 1778 work hours/year = 221 days.	Total	1778	1778	1778	1778	1778	930	1778	1778	13376	7.5

5 WATER QUALITY ASSESSMENT

Water quality assessment has been a key feature of the MWQI Program since its inception in 1990. MWQI's monitoring data are used by many groups, including DWR, the MWQI SPC, non-governmental organizations, and by the public. MWQI monitoring data are used in drinking water supply studies, to identify long-term trends in drinking water quality, and to help DWR and other agencies research and mitigate drinking water issues in Delta waters and the SWP. Additionally, in collaboration with the BDO, O&M EAB, and OCO, monitoring data are used to further develop an "early warning" system that provides advance notice to Delta water users of possible drinking water quality problems. Monitoring data are collected by 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 January-December 2020. Section 6.1 focuses on continuous, remote real-time monitoring.

See Table 4 for the list of 2020 monitoring locations, with associated analytes, and Figure 2 for the discrete and real-time sampling sites map.

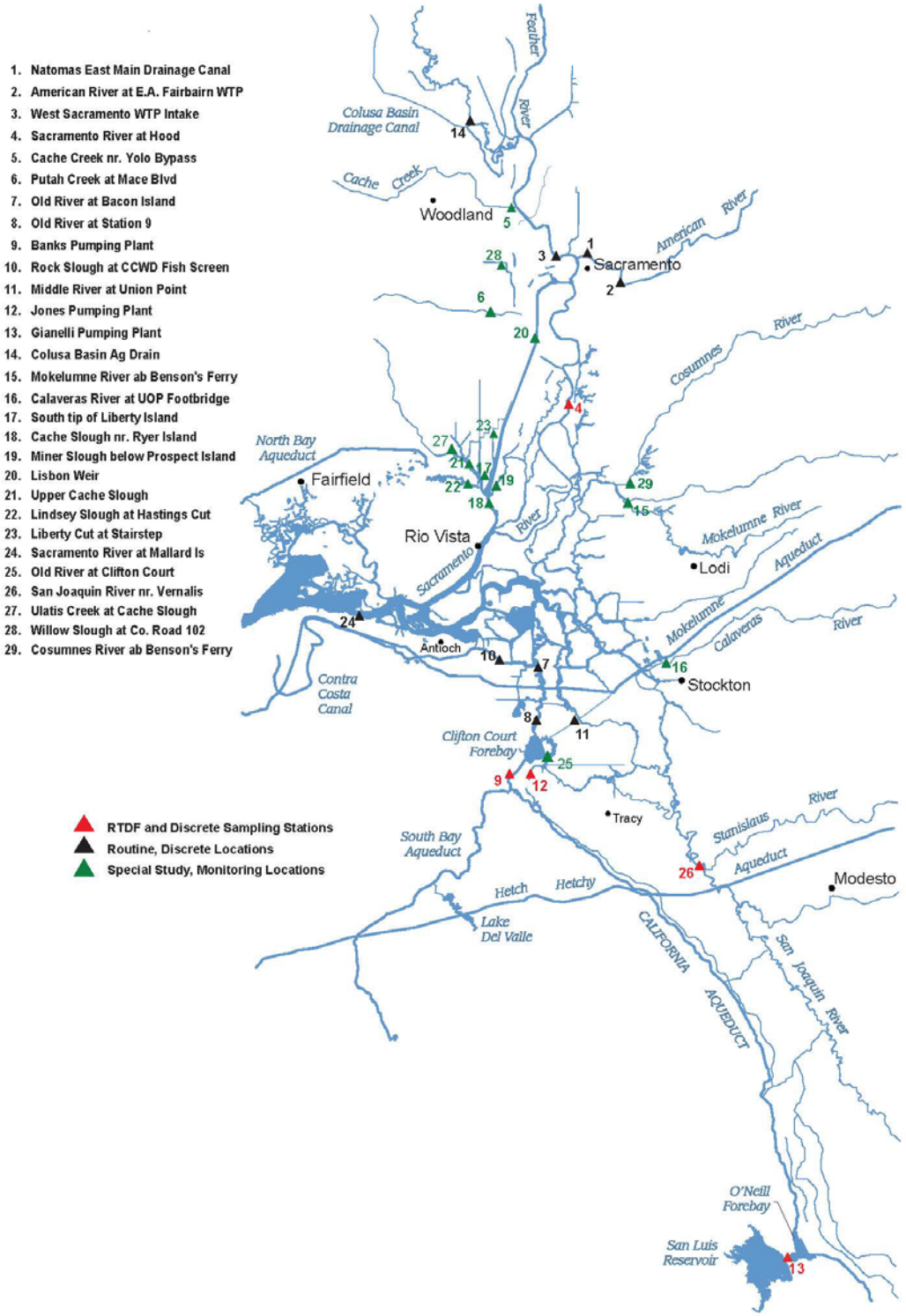
Table 4. MWQI Program's Discrete Sampling Stations

#	Stations	WDL Stations (ID)	Analytes Collected	Frequency	Study
1	Natomas East Main Drainage Canal	NATOMAS EMDC at EL CAMINO RD (A0V83671280)	Std. Mineral, nutrients, TOC, DOC, bromide, chlorophyll, metals	Flow Based, Monthly	Routine
2	American River at E.A. Fairbairn WTP Intake	American River at W.T.P. (A0714010)	Std. Mineral, nutrients, TOC, DOC, bromide, chlorophyll	Monthly	Routine
3	Sacramento River at West Sacramento WTP Intake	Sacramento River at W. Sac Intake Structure (A0210451)	Std. Mineral, nutrients, TOC, DOC, bromide, chlorophyll	Monthly	Routine
4	Sacramento River at Hood	Sacramento R A Hood (B9D82211312)	Std. Mineral, nutrients, TOC, DOC, bromide, chlorophyll	Monthly	Routine, RTDF
5	Cache Creek at Yolo Bypass	CacheCreek@YB (A30001)	Std. Mineral, nutrients, TOC, DOC, bromide, chlorophyll	Flow Based, Monthly	DBIM
6	Putah Creek	Putah Creek at Mace Blvd (B9D83141418)	Std. Mineral, nutrients, TOC, DOC, bromide, chlorophyll	Flow Based, Monthly	DBIM
7	Old River at Bacon Island (D28A)	Old River @ Rancho Del Rio (B9D75821344)	Std. Mineral, nutrients, TOC, DOC, bromide, chlorophyll (EMP collecting)	Monthly	Routine
8	Old River at Station 9	Old R. nr. Bryon (St 9) (NEAR HWY 4) (B9D75351342)	Std. Mineral, nutrients, TOC, DOC, bromide, chlorophyll	Monthly	Routine
9	Banks Pumping Plant at Headworks	Delta P.P. Headworks at H.O. Banks PP (KA000331)	Anions, TOC, DOC, chlorophyll (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 collecting)	Monthly; Monthly or quarterly	Routine, RTDF
10	Rock Slough at CCWD Fish Screen	Contra Cost Canal at Rock Slough Fish Screen (B9C75861385)	Std. Mineral, nutrients, TOC, DOC, bromide, chlorophyll (NCRO Collecting)	Monthly	Routine
11	Middle River @ Union Point	Middle River A Union Point (B9D75351292)	Std. Mineral, nutrients, TOC, DOC, bromide, chlorophyll	Monthly	Routine
12	Jones Pumping Plant at DMC	Delta Mendota Canal intake at Jones PP (B9C74781351)	Anions, nutrients, TOC, DOC, chlorophyll	Monthly	RTDF
13	Gianelli Pumping/Generating Plant	Gianelli WQ Station nr. Pumping Plant (ON003050)	Anions, TOC, DOC, chlorophyll	Monthly	RTDF
14	Colusa Ag Drain nr. Sacramento River	Ag Drain on Colusa Basin Main Drain	Std. Mineral, nutrients, TOC, DOC, bromide, suspended solids, chlorophyll	Monthly	Routine

#	Stations	WDL Stations (ID)	Analytes Collected	Frequency	Study
		(A0294500)			
15	Mokelumne River upstream of Benson's Ferry	MOKELUMNE R (B2D81531267)	Std. Mineral, nutrients, TOC, DOC, bromide, suspended solids, chlorophyll	Monthly	DBIM
16	Calaveras River @ UOP Footbridge	Calaveras R @ UOP (B9D75891188)	Std. Mineral, nutrients, TOC, DOC, bromide, suspended solids, chlorophyll	Flow Based, Monthly	DBIM
17	Southern tip of Liberty Island	S. Liberty Is. (B9D81461410)	Std. Mineral and nutrients, TOC, DOC, suspended solids, chlorophyll	Monthly	Cache Complex
18	Cache Slough nr Ryer Island	Cache Sl nr. Ryer Is (B9D81281401)	Std. Mineral and nutrients, TOC, DOC, suspended solids, chlorophyll	Monthly	Cache Complex
19	Miner Slough below Prospect	Miner Sl below P (B9D81410400)	Std. Mineral and nutrients, TOC, DOC, suspended solids, chlorophyll,	Monthly	Cache Complex
20	Lisbon Weir (Yolo Bypass East Toe Drain)	YOLOBYLISBON (B9D82851352)	Std. Mineral and nutrients, TOC, DOC, suspended solids, chlorophyll (AES collecting)	Monthly	Cache Complex
21	Upper Cache Slough	Upper Cache Sl (B9S81841416)	Std. Mineral and nutrients, TOC, DOC, suspended solids, chlorophyll	Monthly	Cache Complex
22	Lindsey Slough at Hastings Island Bridge	Lindsey Sl. at Bridge (B9D81481421)	Std. Mineral and nutrients, TOC, DOC, suspended solids, chlorophyll,	Flow Based, Monthly	Cache Complex
23	Liberty Cut at Stair-step	LibertyCut at StairStep (B9D81971401)	Std. Mineral and nutrients, TOC, DOC, suspended solids, chlorophyll,	Monthly	Cache Complex, DBIM
24	Sacramento River @ Chipps Island- D10 (Replaces Mallard Island-D10A)	Sacramento River at Chipps Island- D10 B9D80281551	Std. Mineral, nutrients, TOC, DOC, bromide, chlorophyll (EMP collecting)	Monthly	Routine, DBIM
25	Old River at Clifton Court	West Canal at Clifton Court FB Intake (B9D74981334)	Std. Mineral, nutrients, TOC, DOC, bromide, chlorophyll	Monthly	EMP
26	San Joaquin River near Vernalis	San Joaquin R. nr. Vernalis (B9D74051159)	Std. Mineral, nutrients, TOC, DOC, bromide, chlorophyll	Monthly	Routine, RTDF, DBIM, EMP
27	Cache Slough nr. Ulatis Creek	Cache Sl @ Hastings Cut (B9S81761444)	Std. Mineral, nutrients, TOC, DOC, bromide, chlorophyll	Flow Based, Monthly	Cache Complex
28	Willow Creek at County Road 102	Willow Slough @ Road 102 (A82000)	Std. Mineral, nutrients, TOC, DOC, bromide, chlorophyll	Flow Based, Monthly	DBIM

- Physical Parameters collected at all sites: Temperature, pH, Turbidity, Dissolved Oxygen, and Specific Conductance

Figure 2. MWQI Discrete and RTDF Monitoring Locations, CY 2020



5.1 Routine Monitoring Program

Sampling at long-term, routine monitoring locations remains mostly unchanged, with the only alteration being that NEMDC monthly collection was changed to be flow-based. This is due to the inability to get a representative sample at very low flow conditions. During such low flow conditions, a sample will not be collected.

For RTDF station quality control (Section 6), discrete samples are collected once per month at the Banks Pumping Plant, Jones Pumping Plant, Gianelli Pumping Plant, Hood, and Vernalis stations. These river and canal samples are collected to examine instrument performance and are also used as discrete data representative of the sample location. Discrete sample data are available through DWR's Water Data Library (WDL).

5.2 Short-term Monitoring

Aside from MWQI's routine monitoring, other samples are collected for short-term monitoring projects. These projects are described below.

5.2.1 Delta Boundary Inputs Monitoring

Principle Investigator – Steven San Julian
Project Partners – Hari Rajbhandari & Leslie Palencia

The Delta Simulation Model 2 (DSM2) nutrient monitoring study ended in December 2018, but continued and refined monitoring at some locations is justified to fill data gaps. Therefore, MWQI will monitor some sites on a monthly time step, and other sites seasonally based on the stream's calculated flow contribution. The data will be useful for MWQI and contractor analysis and also be available for further DSM2 model development. Sites monitored for this study will be:

- Sacramento River at Hood (monthly)
- Mokelumne River above Benson's Ferry (monthly)
- San Joaquin River near Vernalis (monthly)
- Sacramento River near Mallard Island (monthly)
- Liberty Cut in Yolo Bypass (monthly)
- Cosumnes River above Benson's Ferry (monthly, may change to flow-based)
- Calaveras at UOP (sampled only when flow threshold met)

5.2.2 Cache Slough Complex, Stage 2 Monitoring

Principle Investigator –Steven San Julian
Project Partners – Justin Pascual and Leslie Palencia

In December 2018, Cache Slough Complex baseline monitoring ended after about 5 years of twice monthly sampling. The original study goals were: 1) to describe water quality conditions in the Complex prior to restoration occurring, and 2) determine if an existing tidally restored site (Wildlands) increased concentrations of constituents of

concern in the Complex. Although, these questions have been answered, other questions have arisen. In Stage 2 monitoring, which began in January 2019, we adjusted monitoring to meet the new study goals. The new goals are 1) determine where/what occurs in the west side stream watersheds that results in seasonal spikes in concentrations of key constituents, and 2) to continue to grow the database of data in the Cache Slough Complex over the next year, albeit on a smaller scale than conducted previously. See Figure 2 for map of locations and Table 4 for the constituent list.

5.2.3 Endothall Monitoring

Project Partners – Steven San Julian (MWQI) & Leslie Palencia (SWC*)*

MWQI collaborated with O&M and the MWQI SPC to monitor Endothall at Clifton Court Forebay and O'Neil Forebay in 2019. Applications in the SWP have been somewhat effective in treating aquatic vegetation, but endothall degradation is complex and affected by environmental conditions, such as water temperature of aquatic vegetation biomass. If endothall does not breakdown or is not completely absorbed by plant material, it can adversely affect human health; the drinking water MCL for Endothall is 0.1 mg/L.

Therefore, monitoring is planned to assess chemical degradation in the treatment forebays and adjacent waterways. O&M has tentative plans to treat again in 2020. If treatment occurs, MWQI plans to support O&M monitoring efforts by supplying field staff, autosamplers, and other resources, as needed.

6 REAL-TIME DATA AND FORECASTING COMPREHENSIVE PROGRAM

The RTDF-CP focuses on providing real-time water quality data and related information gathered from multiple sources. This enables water managers to make operational decisions based on observed and forecasted changes in water quality. The RTDF-CP includes a network of real-time water quality monitoring stations that provide current water quality conditions and a modeling component that provides both historical and predictive water quality characterizations. Monitoring performed by the RTDF-CP encompasses the Delta, watersheds of the Delta, the SWP, and portions of the federal Central Valley Project (CVP). In addition, funded positions within the MWQI Program are also found within DWR's BDO, OCO, and O&M Environmental Assessment Branch.

The RTDF-CP Consists of Three Principle Activities:

1. Remote instrumentation that provides real-time water quality data
2. Modeling that provides historical water quality fingerprints and water quality forecasting
3. Information management and data dissemination

These three activities are guided by the RTDF Steering Committee, a group of technical experts composed of MWQI Program staff, CCWD staff, and participating MWQI SPC agencies.

6.1 Real-Time Monitoring

The real-time monitoring section of the RTDF-CP produces water quality data that supports the development of water quality forecasting tools, provides current and advanced notice of water quality conditions, provides information for water quality and water supply planning studies, and can be used by drinking water treatment plant operators to make informed operational decisions.

This program element is comprised of:

1. Instrumentation installed at key remote locations in and around the Delta
2. Field operations that provide timely repair and maintenance of all station equipment
3. Timely dissemination of real-time data
4. Standard Operating Procedure documentation and instrument QA/QC documentation
5. Implementation and documentation of data QA/QC.

6.1.1 MWQI Program Real Time Stations

The RTDF-CP continues to operate five remote real-time monitoring stations; four located in the Delta and one south of the Delta (Table 5). The Delta stations include Hood, located on the Sacramento River near the town of Hood, Banks Pumping Plant, located at the head of the SWP, Jones Pumping Plant, located at the head of the Delta-Mendota Canal (part of the CVP) and Vernalis, located on the San Joaquin River near the town of Vernalis. The southern station, at Gianelli Pumping Plant, is located within O&M's San Luis Field Division on O'Neill Forebay below San Luis Reservoir.

Table 5 summarizes station locations, MWQI Program and non-MWQI Program water quality parameters, and the automated analyzers used by the MWQI Program RTM element. Figure 2 shows the location of the RTM stations.

Field office labor associated with real-time monitoring (RTM) includes:

1. Ordering RTM supplies, phone consultation with instrument manufacturers
2. Creation of RTM Quality Control (QC) sampling runs
3. Creation of instrument-specific chemical standards, solutions and reagents
4. Repairs to station peripheral components
5. Maintenance of equipment used on RTM field runs
6. Analysis of all RTM data
7. Remote operation of instruments.
8. Updating stations manuals, standard operating procedures, and quality assurance project plans

Table 5. MWQI Program Real-Time station locations, parameters, and equipment

MWQI Program Station/CDEC Station	MWQI Program Parameters & Instruments	Non-MWQI Program Parameters
Sacramento River at Hood (CDEC = SRH)	TOC, DOC (Suez, Sievers 900) (and Ammonia and Phosphate analyzer install sometime this year)	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 (Suez, Sievers 5310) bromide, chloride, nitrate, sulfate, (Thermo-Fisher Dionex ICS-2100)	Water: chlorophyll, DO, EC, pH, river flow and stage, temperature and turbidity. Atmospheric: solar radiation, temperature, wind speed and direction
Banks Pumping Plant - Delta Headworks (CDEC = HRO)	TOC, DOC (Suez, Sievers 5310), bromide, chloride, nitrate, sulfate, (Thermo-Fisher Dionex ICS-2100), YSI EXO Sonde (EC, Temp, DO, pH, FDOM, Algal Fluorescence) and Turner C3 Fluorometer (Algal Fluorescence)	Water: EC, fluorescence, pH, pump discharge, temperature, turbidity Atmospheric: temperature, wind speed and direction.
Jones Pumping Plan (CDEC = TRP)	TOC, DOC, (Suez, Sievers 5310), bromide, chloride, nitrate, sulfate, (Thermo-Fisher Dionex ICS-2100), and YSI EXO Sonde (EC, Temp, DO, pH, FDOM, Algal Fluorescence)	Water: EC, pump discharge, temperature.
Gianelli P/G Plant (CDEC = ONG)	TOC, DOC (Suez, Sievers 5310), EC, temp, turbidity, DO, pH (YSI 6600) bromide, chloride, nitrate, sulfate (Thermo-Fisher Dionex ICS-2100), and YSI EXO Sonde (EC, Temp, DO, pH, FDOM, Algal Fluorescence)	Pump and Generation discharge

6.1.2 Gianelli WQ Station

To track time and expenditures related to the Gianelli water quality station, a separate IO was created (VGIANNELLI13). Most of the funding for this station goes toward the salary of an Environmental Scientist position held within the O&M EAB (Environmental Assessment Branch). Responsibilities for this position are similar to those at the MWQI stations. Although the Environmental Scientist position with EAB is currently vacant, it is expected to be filled prior to the start of 2020.

6.2 RTDF-CP Water Quality Forecasting

The modeling/forecasting component of the RTDF-CP continues to update and improve existing models to further develop their capabilities. The objective of this effort is to better incorporate modeling insight with water quality monitoring to maximize the use of modeling results by water quality managers.

The modeling effort continues to focus on Historical representations (fingerprints), Short-Term Aqueduct Forecasts and Seasonal Forecasts (seasonal forecasts are currently under evaluation). These efforts are scheduled to continue through this work plan cycle.

6.2.1. BDO Modeling

BDO staff, the model mechanics, periodically work on MWQP/RTDF model issues and special projects as needed. They will continue to be involved when model issues arise, and the models require adjustment. (This includes potential work to incorporate aqueduct turn-in water into the seasonal and short-term aqueduct models. The goal being to see how model output is affected by this water.) New projects may also be added to this task, with further discussion between MWQP staff and the MWQI SPC.

The MWQI SPC will work with BDO staff to discuss the feasibility of a new project on Delta Salinity Constituent Relationships, which is a continuation of work previously conducted by the MWQI SPC on developing constituent relationships between salinity, and chloride, and bromide. Other areas where assistance from BDO may be needed are technical input into a MWQI SPC project on Improving Seasonal Forecasts (Project 6.2.4) and possibly developing a volumetric fingerprint for the Aqueduct model (Project 7.6).

6.2.2. OCO Modeling

OCO staff, the model operators, continue to produce seasonal forecasts, short-term aqueduct forecasts and monthly historical fingerprints. Working with the BDO modelers, if need be, they continue to update and work on improving model reliability. (Since OCO staff run the models, they will also be involved with turn-in water model dynamics and work to incorporate this data.) OCO will provide a justification for alternative method for forecasting DOC (short-term) and will complete additional calibration with more DOC data.

6.2.3. Improve Aqueduct Pump-in Dynamics in the MWQI Program Water Quality Forecasts

Principal Investigator – OCO Staff Member (En-Ching Hsu) and MWQI Program Staff (Shaun Philippart)
Project Partner –Tony Liudzius

Although the original intention of this project was to incorporate pump-ins into the short-term and seasonal forecasts, it is desired to allocate additional effort into running the Aqueduct model with historical pump-ins first. In 2018, OCO provided Aqueduct model results at checks 21, 29, 41 and 66 with and without pump-ins for bromide and EC using 2014 historical data. During 2019, OCO ran the Aqueduct model with additional historic data (2014 and 2015) for two constituents, nitrate and arsenic. Modeling results show that arsenic can be modeled as a conservative constituent, and an analysis of the data demonstrated that for 2014, the DWR model data was similar to data generated from a Kern County Water Agency model and to discrete arsenic data collected in the Aqueduct. For 2020, the plan is to obtain modeling data from Kern County and to compare the Kern modeling results with the DWR model, and discrete data from 2015.

<u>Short-Term Forecasts</u>
The MWQI SPC and MWQI Program staff will investigate whether scheduled near-term aqueduct pump-in (defined here as less than 2 months, likely weekly) data is available

and whether obtaining this information on an ongoing basis is feasible. If this information is available, the effort will include establishing procedures for acquiring the information and determining if any support tools are needed to help automate and process the data. The goal would be to include accurate, up-to-date pump-in information in the MWQI Program short-term water quality forecasts.

The project will also include developing a protocol so that pump-in data is transferred on a regular basis to OCO, such that OCO will continuously update the historical aqueduct simulation to include pump-ins (updated monthly, analogous to the historical Delta simulation).

6.2.4. Comparison of Water Quality Seasonal Forecasts to Actual Conditions

The original intention of this project was to improve the accuracy of the long-term forecasts, as the forecasts do not match well with actual conditions, particularly the earlier forecasts. The MWQI SPC has decided to retain a consultant to investigate sources of uncertainty in order to possibly improve seasonal forecast results. Technical support and data may be needed from OCO.

6.3 RTDF-CP Information Management and Data Dissemination

This program element includes data dissemination and information management tasks associated with the synthesis of real-time data and related information that is derived from the RTDF-CP and a variety of federal and state water quality monitoring programs. The element produces, gathers, organizes and disseminates this information via the WDL (http://wdl.water.ca.gov/), the California Data Exchange Center (CDEC) (http://cdec.water.ca.gov/) and the RTDF-CP web page: http://rtdf.info/

In addition, daily and weekly summary emails containing a subset of information including real time data, Delta commentary, weather updates and hydrological conditions are sent to interested parties. (This information is also posted on the RTDF-CP web site.) Information provided on the RTDF-CP web page gives users a single location to search for related water quality information.

6.3.1. RTDF Data Dissemination and Reporting

Information management and data dissemination tasks performed by MWQI and the Technical Consultant, TetraTech include:

1. Continued refinement of the WDL data set
2. Continued refinement of the MWQI Program database
3. Continued development and enhancement of online tools for editing, evaluating, and interpreting MWQI Program water quality data (QA/QC and data visualization).
4. Improve means to distribute daily and weekly water quality reports via the internet
5. Improve database functionality

Tasks for the data dissemination portion of the RTDF program are shown below in Table 6.

Table 6. Information Management and Data Dissemination Deliverables and Timelines

Task	Participants	Start Date	Ongoing
Improve/Upgrade database infrastructure	MWQI Program		
A) Continue to implement updates and patches as appropriate.		A) Began Jan 2009	A) Ongoing
B) Continued enhancement of manual and automated QA/QC processes		B) Began Jan 2009	B) Ongoing
C) Continue to develop the station journal database and applications.		C) Began Jan 2010	C) Ongoing
D) Continue to develop desktop data management tools, enhance plotting capabilities, link time series and QA/QC.		D) Began Jan 2010	D) Ongoing
E) Continue to document and maintain infrastructure.		E) Began Jul 2009	E) Ongoing
F) Add new sensors to the database as needed		F) Began Jan 2010	F) Ongoing
Improve Field Data Communications	MWQI Program		
A) Continue to develop, test and enhance intranet/ internet components.		A) Began Jan 2011	A) Ongoing
B) Develop and implement as feasible procedures, practices and standards for supporting the reliability of field data systems.		B) Began Jul 2011	B) Ongoing
Development and enhancement of RTDF data dissemination products	MWQI Program		
A) As needed, add new stations & sensors to the website or daily summary table.		A) N/A	A) Ongoing as needed
B) As needed, enhance the website presentation.		B) N/A	B) Ongoing as needed
C) Enhance procedures for emailing the daily summary report.		C) N/A	C) Ongoing as needed

7. SPECIAL STUDIES

Although the special studies group has disbanded, the studies outlined below will be worked on this year by existing staff.

7.1 Fluorescence of Dissolved Organic Matter (FDOM) Project

Principal Investigator – Jeremy Del Cid
Project Partner –Justin Pascual/Steven San Julian

The purpose of the original project was to investigate the use of FDOM as a proxy for organic carbon measurements. The FDOM report is complete but is currently being edited and formatted by DWR Publications for web publication. The report will likely be signed off and finalized in early 2020.

One of the recommendations from the FDOM final report was to install FDOM sensors at different locations 1) to determine how the FDOM responds to different water sources, and 2) to determine how YSI FDOM probes compare to the *Turner* probe used in the FDOM Final Report. Therefore, in 2020, staff will work with the DWR Environmental Monitoring Program on the installation of FDOM sensors at Hood and Vernalis. YSI FDOM probes have already been installed at Banks, Jones and Gianelli Stations. Staff will make FDOM data from all five stations available on CDEC and will start to compare the YSI FDOM data to discrete and continuous organic carbon data.

7.2 North Valley Regional Recycled Water Program

Principal Investigator – Leslie Palencia
Project Partner – Steven San Julian

The Central Valley Regional Water Quality Control Board adopted a discharge permit in February 2016 that permits the cities of Modesto and Turlock to discharge up to 59,000 acre-feet of recycled tertiary treated waste-water into the Central Valley Project Delta Mendota Canal (DMC). The recycled water will be transferred to the Del Puerto Water District and to the Central Valley Project Improvement Act. The city of Modesto began discharging recycled water into the DMC in December 2017, while the city of Turlock will not start discharging into the DMC until early 2020. A monitoring study was implemented by the city of Turlock in December 2016 to assess if there are water quality effects as the result of the addition of recycled water into the DMC.

- With the addition of the City of Modesto and the City of Turlock treated wastewater effluent being discharged directly into the Delta Mendota Canal, there is concern about the possibility of increased nutrient loading and resultant algal blooms downstream. The City of Turlock has reached an agreement with the SWC to monitor for ammonia, nitrate, TKN, dissolved ortho P, total P, temp, EC, pH and DO at upstream and downstream locations of the discharge. They will also monitor for algal biomass, chlorophyll-a, pheophytin-a and algal toxins at McCabe and upstream of the discharge. For this project, DWR staff should evaluate the City of Turlock's data as well as data already collected by DWR at McCabe. Check 13, Gianelli and Pacheco were

originally considered in the initial evaluation, but were determined to be difficult to trace back to Turlock discharge as other water sources dominate at these locations. The SWC is also concerned about increased EC and Constituents of Emerging Concern from the treated tertiary discharges from Modesto and Turlock. MWQI staff will assist the MWQI SPC in sample collection for the upstream and downstream monitoring sites for CECs, beginning in 2020. Additionally, MWQI staff will start monitoring for ammonia, TKN, ortho-P and phosphorus at Jones.

Questions to be answered are:

- Did concentrations of ammonia, nitrate, TKN, dissolved ortho P, total P, temp, EC, pH and DO change at the downstream location once Turlock began discharging in 2019? What are the baseline concentrations at the downstream location prior to start of Turlock discharge?
- Are the upstream and downstream locations statistically different for ammonia, nitrate, TKN, dissolved ortho P, total P, temp, EC, pH and DO, prior to Turlock discharge? Initial evaluation shows that there is no difference between the upstream and downstream locations for nitrate and ortho P. The detection limits for ammonia and TKN are too high and most of the data is non-detect, making it difficult to detect differences.
- Are the upstream and downstream locations statistically different for ammonia, nitrate, TKN, dissolved ortho P, total P, temp, EC, pH and DO, once Turlock discharge commenced?
- Have concentrations of algal biomass, chlorophyll-a, pheophytin-a and algal toxins changed at McCabe once Turlock began discharging in 2019? What is the baseline concentrations at McCabe prior to Turlock discharge?

A spreadsheet with the constituent graphs and a short summary of any notable data and trends will be provided to the contractors bi-annually.

7.3 Support for Nutrient Concerns

Principal Investigator – Mark Bettencourt
Project Partner – Shaun Philippart

MWQI staff will investigate the feasibility of installing a real-time ammonia analyzer at the Sacramento River at Hood Station. This is an important location because Sacramento Regional Sanitation's (Regional San) WWTP outflow is just upstream of Hood and is a major contributor of ammonia into the Sacramento River. Regional San has been mandated to switch to tertiary treatment by 2021, which will greatly reduce the amount of ammonia entering the system. MWQI would like to establish a baseline ammonia level before the treatment process is switched to monitor any changes that may occur to North Delta water quality. MWQI staff will also investigate the feasibility of monitoring for phosphate at the San Joaquin River at Vernalis station due to the possibility that agricultural inputs upstream of the station may affect phytoplankton blooms in the southern Delta.

To establish the ammonia baseline, a real-time ammonia analyzer that utilizes an ion-selective probe was purchased and installed at Hood. After four months of periodic operation, the analyzer was unable to produce reliable data, and after extensive troubleshooting, it was determined that the probe was the issue. To rectify the problem, ABB provided the MWQI program with a third-party probe, a Thermo-Fisher ammonia ISE and after initial testing, the probe appears to work as expected. The next step is to re-install the analyzer at Hood and begin to analyze standards and compare discrete lab ammonia data with the analyzer data. This should take place in December 2019.

Since phosphate is also of concern, staff will be testing out a real-time analyzer at Hood to see if it can provide us with reliable values. If it can, it will be transferred to the Vernalis station due to potential phosphate input from agricultural sources. Testing at Hood is a logistical decision due to Hood's proximity to our main office. The analyzer uses a standard colorimetric method to determine phosphate levels. The analyzer has been installed but has not been evaluated yet. As with the ammonia analyzer, if the phosphate unit proves capable, calibrations, check standards and grab sample comparisons with Bryte lab will be done to verify that the analyzer is providing valid data.

7.4 Pesticide and Herbicide Use in the Delta

Principal Investigator – Leslie Palencia
Project Partner – Steven San Julian

The increased use of chemicals to control floating and submerged vegetation in Delta waterways is of concern to downstream water contractors. This study will collect and summarize historical pesticide and herbicide usage in Delta waterways from the Dept. of Boating and Waterways. Any chemical use trends based on location and or timing should be noted. Questions for the study could be:
-What locations had the highest annual usage of pesticides or herbicides (lbs. or gallons)?
-For locations with higher chemical usage, are the chemicals applied in certain months or seasons?
-Has aquatic vegetation been increasing in recent years?

Data may be best displayed graphically. This data will serve to confirm the increased use of pesticides and herbicides, as well as increased vegetative growth. The information will be presented to the contractors on annual basis to discern trends in pesticide and herbicide use.

7.5 Data Display and Review

Principal Investigator – Shaun Philippart
Project Partner – Steven San Julian

This project consists of two annual tasks, short-term modeling comparison and the generation of graphs that follow the Sanitary Survey format, and a comparison between continuous data collected by O&M and MWQI at two RTDF stations--Jones and Banks.

The objective of short-term modeling comparison is to determine how well the modeling data performs at predicting three water quality variables--specific conductance, bromide, and total organic carbon--during different seasons and water years. Data will be analyzed from the following three stations on an annual basis: Banks, Check 13, and Check 41. The results from the retrospective analysis and an investigation of any anomalies of the 2019 modeling and lab data will be presented to the contractors by no later than June 1, 2020.

MWQI staff will produce real-time and discrete data graphs for the RTDF stations (Banks, Jones, Gianelli, Vernalis, and Hood) that follow the Sanitary Survey format for the following constituents: specific conductance, total organic carbon, bromide, turbidity, total phosphorus, and total nitrogen. The objective of this task is to ensure the MWQI program reviews the data it collects on an annual basis and to produce graphs that can be used in the Sanitary Survey. The graphs for each station will be presented to the contractors by no later than June 1, 2020.

MWQI and O&M both monitor water quality at the Jones and Banks stations. Now that MWQI staff have installed YSI EXO2 sondes at these locations, there is redundancy in the collection of the following parameters: water temperature, pH, dissolved oxygen, specific conductance, and turbidity. MWQI staff will analyze the datasets between the two groups to determine how data collected between the groups, which use different instruments, compares. The objective of this study is to make a recommendation by October 1, 2020 on how monitoring should continue at these sites (e.g., MWQI takes monitoring responsibilities or reduces the number of constituents recorded by the YSI instrument).

7.6 Volumetric Fingerprint Data

Principal Investigator – Shaun Philippart
Project Partner – Bob Suits

Bay-Delta Office staff can provide daily volumetric fingerprint data (1975-2016), which consists of percent by volume of five water sources, ranging from 0 to 100, for up to 80 location in the Delta. This data can be paired with real-time specific conductance and discrete anion data (e.g., chloride, bromide) to develop specific regression equations for anions based on water source. For example, the regression equation for estimating bromide from specific conductance will differ based on seawater intrusion and riverine source water contributions (e.g., Sacramento River versus San Joaquin River. MWQI staff will work to make this data available on the http://rtdf.info/ site.

7.7 Chlorophyll Study

Principal Investigator – Steve San Julian
Project Partner – Atlasi Daneshavar

The primary objectives of this study: 1) compare chlorophyll *a* data collected by two different instruments, *Turner Designs* and YSI, at Banks; and 2) study correlation between phycocyanin-specific fluorescence measured by *Turner Designs* probe and cyanobacterial biomass at Pacheco Pumping Plant. The principal investigator and project partner will develop a study proposal that can be shared with RTDF group by March 1, 2020

7.8 Monitoring at High Slack Tide – Feasibility Study

Principal Investigator – Steve San Julian
Project Partner – Scott Waller

MWQI will work with DWR Environmental Monitoring Program (EMP) staff to determine the feasibility of monitoring at high slack tide for all the constituents that are currently being collected. The EMP has been monitoring during high slack tide at all of their sites since 1975. Collecting data at high slack tide will allow for data analysis across a broader range of sites in the Delta. The rationale for collecting data at a specific phase of the tidal cycle (e.g., high slack) is to reduce variability in the data that results from sampling at random times during the tidal cycle, when there is either ebb or flood water movement. A recommendation on this topic will be presented to the contractors by no later than April 1, 2020.

8. Administrative Work

8.1 General Required Program Costs

The majority of time billed to this IO covers most of the line-level program management costs for the MWQI program (Steven San Julian's time). This includes supervisory level duties, meetings, schedule development, coordination with various program partners, oversight and assistance on MWQI programs and projects, etc. For staff, the Administrative Work IO is used for time and fees associated with meetings, conferences, trainings and various other Department level events. MWQI staff are also occasionally requested to support other DWR activities. For example, staff may be asked to provide technical assistance, review and revise plans, or provide support that improves workplace safety practices. Such assistance may directly or indirectly benefit the MWQI Program stakeholders and the MWQI SPC, and therefore will be charged to the MWQI budget. If these activities are directly related to specific projects that have an IO, those IOs will be billed, but the default billing for these instances will fall to the Administrative Work IO.

MWQI Program staff will continue to inform the RTDF Steering Committee and MWQI SPC about work related to these tasks. MWQI will achieve this by providing updates during the RTDF meetings, in monthly expenditure reports, and by providing details in this and future work plans.

8.2 Field Unit Office Work

MWQI program staff work mainly out of the Bryte Field Facility, located in West Sacramento. There are costs associated with the maintenance, upkeep, and restoration of the MWQI part of the facility for which MWQI is responsible. Since MWQI is required to provide a charge number for such costs, it makes sense for those charges to be separated out from the normal *Administration Costs* associated with Section 8.1. The MWQI program is responsible to bear the cost associated with unallocated labor; and so, activities deemed unrelated to other projects will be billed to 8.2. This means that some of the time billed to this IO is time that could be available to work on other MWQI projects or on non-MWQI funded projects (Section 10). Any such expenditures will be addressed in RTDF meetings prior to allocation.

9. Other Required Program Costs

In this workplan, *Other Required Program Costs* is split into two parts. The first part being all charges billed to overhead. There are many categories of charges that fall under overhead, but the largest are charges associated with mobile equipment. DWR's Mobile Equipment Office (MEO) provides insurance, fuel, and vehicle maintenance and repair for MWQI vehicles and vessels. This part is unchanged from the 2019 workplan. One caveat is that the cost of new vehicle and vessels is not billed to overhead but is billed directly to MWQI IO numbers. In 2019, the MWQI Field Section ordered a replacement truck and boat. In 2020, the Field Section will be taking delivery of these vehicles, which will result in the charges hitting the 2020 budget. Estimated cost for these items is $40,000 for the truck, and $110,000 for the boat. In this workplan the truck has been budgeted to VRTMONITOR13, while the boat has been budgeted to VWQASSMENT13.

The second part of *Other Required Program Costs* is new to the workplan this year and covers work that MWQI does for non-MWQI projects--but that are still billed to the MWQI fund. These activities are also referred to as *in-kind services.* Our involvement in these projects is cleared in advance with the MWQI SPC. Time billed for these in-kind services will be bill to a new IO (VINKINDSER19).

In CY2020, MWQI plans to provide in-kind services for a Delta Regional Monitoring Program project looking at Contaminants of Emerging Concern (CECs) in the Sacramento and San Joaquin River lower watersheds. MWQIs involvement in this project will be limited to sample collection at selected river sites, during quarterly sampling events in 2020. Total hours required for this project are 224 hours. Staff will bill this time to the new, in-kind services IO.

10. Non-MWQI Funded Activities

At times, MWQI program staff will work on other Department activities which are unrelated to the MWQI program and will therefore not be billed to the MWQI budget. The list of projects that might fall under this section are too numerous to mention, but some examples are bio-monitoring for construction activities or conducting field work for the Environmental Monitoring Program (EMP). It is not possible to precisely track these hours as they are billed to many charge numbers, but MWQI staff time billed to these activities is generally less than 200 total hours per year.