



Delta Regional Monitoring Program (Delta RMP)

2016 – 2017 Monitoring and Data

Introduction

The Central Valley Regional Water Quality Control Board (Central Valley Water Board) approved some Small MS4 Permittees to participate in the Delta Regional Monitoring Program (Delta RMP) in lieu of conducting the individual monitoring required under Section E.13 of the National Pollutant Discharge Elimination System General Permit for Waste Discharge Requirements for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems, Order No. 2013-0001-DWQ (Small MS4 General Permit). This report satisfies the upload for Delta RMP monitoring data in the annual report under “Monitoring Study Results” in SMARTS.

Delta RMP data is not intended to be used directly to represent either upstream or downstream water quality for purposes of determining compliance with this Permit. Delta RMP monitoring stations are established generally as “integrator sites” to evaluate the combined impacts on water quality of multiple discharges into the Delta; Delta RMP monitoring stations would not normally be able to identify the source of any specific constituent, but would be used to identify water quality issues needing further evaluation. Delta RMP monitoring data may be used to help establish background receiving water quality. Delta RMP data, as with all environmental monitoring data, can provide an assessment of water quality at a specific place and time that can be used in conjunction with other information, such as other receiving water monitoring data, spatial and temporal distribution and trends of receiving water data, and other point and non-point source discharges, receiving water flow volume, speed and direction, and other information to determine the likely source or sources of a constituent that resulted in exceedance of a receiving water quality objective.

Delta RMP Monitoring Elements

Pesticides

Current use pesticides monitoring began in July 2015 and continued until June 2017. Monthly sampling at five sites also captures targeted events. Targeted events (n = 5/year): Wet Weather: (1) 1st seasonal flush (Water Year), (2) Significant winter storm; Dry weather: (1) Early Spring, (2) Late spring/early summer irrigation season, (3) Late summer irrigation season. All samples undergo chemical analyses and toxicity testing. Test species (endpoints) are: (1) *Selenastrum capricornutum* (growth) (2) *Ceriodaphnia dubia* (survival and reproduction), and (3) *Pimephales promelas* (larval survival and growth). Chemical analysis includes: pesticide scan (USGS list of 153 pesticides), total suspended solids, dissolved organic carbon (DOC) and particulate organic carbon (POC), hardness, and dissolved copper analysis. Pesticide-focused Toxicity Identification Evaluations (TIEs) are conducted for a subset of samples with > 50% of the measured endpoint, to be decided real-time by a TIE subcommittee.



Mercury

This monitoring evaluates mercury cycling in Delta sediment and water, and the uptake of methylmercury (MeHg) into fish. Over a three-year time frame, this project will support annual monitoring of higher trophic level fish and correlate this information to quarterly mercury and MeHg water and sediment concentrations measured at co-located sites. This information is critical to implementing the Delta MeHg TMDL, providing calibration and validation data for a mercury model being developed by the Department of Water Resources, and informing other management and regulatory decisions related to water quality improvement and ecosystem restoration in the Delta.

Sport Fish: Annual sampling at six sites started in August 2016 and is currently ongoing. Indicator of primary interest is methylmercury in muscle fillet of 350-mm largemouth bass (or similar predator species). Sites are located to represent different subareas of the Delta and link with water monitoring.

Water: Quarterly sampling at five sites that align with sport fish monitoring sites. Indicator of primary interest is total methylmercury in water.

Important ancillary parameters include total and dissolved total Hg, chlorophyll a, DOC, suspended sediment concentrations, and volatile suspended solids.

Pathogens

In April of 2015, monthly sampling for a two-year special study began. Year one of the Pathogen Study focused on characterizing pathogen levels (Cryptosporidium and Giardia lamblia) to address the objectives of the Pathogen Special Study required by the Central Valley Drinking Water Policy Basin Plan Amendment. As part of the second round of Long Term 2 Enhanced Surface Water Treatment Rule (LT2), water supply agencies are required to collect Cryptosporidium and Giardia samples monthly for two years in their source waters. These data will be used to determine if the bin levels assigned after the first round of monitoring are still valid or need to be revised. The second round of monitoring will also be used to determine the Basin Plan trigger levels (80% of bin level). The sampling is added to the routine monthly sampling effort of the Department of Water Resources (DWR) Municipal Water Quality Investigations (MWQI). This monitoring ended in April 2017. A report on this monitoring will be submitted to the Central Valley Regional Board in 2018.

Delta RMP Water Quality Monitoring Data

For access to program data, the Delta RMP Project names and codes are listed in Table 1. Data that are currently available in CEDEN are highlighted in yellow. The schedule for release of all other monitoring data is indicated in the columns labeled "Update 2" and "Update 3". The toxicity and copper data are grouped with the pesticide data and use the same project code.



Table 1. Program, Parent Project and Project names and codes for the Delta RMP

ProgramName	ProgramCode	ParentProjectName	ParentProjectCode	ProjectName	ProjectCode	Update 1	Update 2	Update 3
Delta Regional Monitoring Program	Delta RMP	Delta RMP - Current Use Pesticides	DRMP_CUP	2016 Delta RMP Current Use Pesticides	16DRMP5CUP	July, Aug, Sept 2016 Pesticides uploaded and available on CEDEN.	Oct. 2016 - July 2017 pesticide samples not yet received.	Public release of Year 2 field measurements pending approval by Steering Committee.
				2015 Delta RMP Current Use Pesticides	15DRMP5CUP	Year 1 pesticides and toxicity available on CEDEN.	Public release of Year 1 field measurements pending approval by Steering Committee	
		Delta RMP - Mercury	DRMP_Hg	2016 Delta RMP Mercury	16DRMP5Hg	Fish results awaiting upload to CEDEN.	Water results provided, awaiting formatting and upload to CEDEN.	Field results provided, awaiting formatting and upload to CEDEN.
		Delta RMP - Pathogens	DRMP_PAT	2016 Delta RMP Pathogens	16DRMP5PAT	Data uploaded. Public release is pending Larry Walker approval of QA Review Memo.		
				2015 Delta RMP Pathogens	15DRMP5PAT	Year 1 pathogens available on CEDEN.		



Delta RMP Data Reporting

Generally, Delta RMP water quality monitoring data will be available according to the schedule below, starting March 1, 2017. Final monitoring data will be publicly available after being reviewed and analyzed internally and after reports are produced. Final data will be incorporated into CEDEN and at a minimum made available through data portals such as CD3 (SFEI-ASC's Contaminant Data Display and Download tool), Bay Delta Live, etc. See Table 2 for more details.

Table 2. Delta RMP reporting cycle

Deliverable	Frequency	Release date
<i>Data uploads</i>		
Provisional data (available to TAC members)	Variable	Variable
CD3	Annually ¹	March 1
CEDEN	Annually	March 1
<i>Reports</i>		
Annual Monitoring Reports (including QA report)	Annually	March 1
Technical Reports	Variable	Variable

¹Time period of data for annual reporting: pesticides (15 months: July 1 through September 30 of the following year), mercury (July 1 – June 30), pathogens (April 1 – March 31).



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2017 – 2018 Monitoring and Data

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Delta RMP data is not intended to be used directly to represent either upstream or downstream water quality for purposes of determining compliance with this Permit. Delta RMP monitoring stations are established generally as “integrator sites” to evaluate the combined impacts on water quality of multiple discharges into the Delta; Delta RMP monitoring stations would not normally be able to identify the source of any specific constituent, but would be used to identify water quality issues needing further evaluation. Delta RMP monitoring data may be used to help establish background receiving water quality. Delta RMP data, as with all environmental monitoring data, can provide an assessment of water quality at a specific place and time that can be used in conjunction with other information, such as other receiving water monitoring data, spatial and temporal distribution and trends of receiving water data, and other point and non-point source discharges, receiving water flow volume, speed and direction, and other information to determine the likely source or sources of a constituent that resulted in exceedance of a receiving water quality objective.

Delta RMP Monitoring Elements

Mercury

Mercury monitoring evaluates mercury cycling in Delta sediment and water, and the uptake of methylmercury (MeHg) into fish. Over a three-year time frame, this project will support annual monitoring of higher trophic level fish and correlate this information to mercury and MeHg water and sediment concentrations measured at co-located sites. This information is critical to implementing the Delta MeHg TMDL, providing calibration and validation data for a mercury model being developed by the Department of Water Resources, and informing other management and regulatory decisions related to water quality improvement and ecosystem restoration in the Delta. In 2017-18, the Delta RMP added a Mokelumne River site, expanding water measurements from 5 sites to 6. In addition, the water sampling frequency was doubled, from quarterly sampling to 8 events per year. More frequent monitoring will provide essential evidence for regulators implementing the TMDL and contribute to ongoing analytical work by the California Department of Water Resources (DWR), and which will be used to guide regulations and operational decisions related to farming, flood control, and wetland management.



Sport Fish: Annual sampling at six sites started in August 2016 and is currently ongoing. Indicator of primary interest is methylmercury in muscle fillet of 350-mm largemouth bass (or similar predator species). Sites are located to represent different subareas of the Delta and link with water monitoring.

Water: Sampling was conducted during 8 events at 6 sites that align with sport fish monitoring sites. Indicator of primary interest is total methylmercury in water.

Important ancillary parameters include total and dissolved total Hg, chlorophyll a, DOC, suspended sediment concentrations, and volatile suspended solids.

Nutrients

For nutrients, a suite of 3 separate but related projects began. The first, “Cross-Delta Monitoring Using High-Frequency Tools” was carried out by scientists from the U.S. Geological Survey. This project assessed spatial variability of nutrients and related water quality constituents in the Delta at the landscape scale. The project will help to identify “hot spots” of nutrient transformation and to locate internal sources and sinks for nutrients within the Delta.

The second Nutrients project, “Continued Nutrient Data Analysis and Biennial Reporting” is being conducted by the Aquatic Science Center. The project will provide continued synthesis and integration of existing data to characterize status and trends of nutrient-related parameters and planning future monitoring and data analysis work. Major outcomes will be completing data analysis and synthesis work funded in FY16/17, and planning and initiating synthesis work for the biennial report to be completed in FY18/19.

The third Nutrients project, “Chlorophyll Sensor Intercalibration” is a joint effort with San Francisco Bay Nutrient Management Strategy. This project is a multi-agency effort and will enable the Delta RMP to provide input and collaborate with the Bay RMP. The chlorophyll sensor intercalibration study will be a significant first step toward ensuring improved sensor network coordination and was a key recommendation from the September 2016 Delta RMP Nutrient Monitoring Workshop that will help make better use of existing data collection efforts by state and federal agencies.

Pesticides

Pesticides monitoring projects were not approved by the Steering Committee for 2017-18. However, funding was allocated to distribute a request for proposals to draft a report on the Delta RMP’s first two years of current use pesticides data and any other Delta pesticides data available. The report will be titled, “Analysis and Interpretation of Pesticides and Toxicity Monitoring Data in the Sacramento-San Joaquin Delta” and will be available in May 2019.

Pathogens

In April of 2015, monthly sampling for a two-year special study began. Year one of the Pathogen Study focused on characterizing pathogen levels (*Cryptosporidium* and *Giardia lamblia*) to address the objectives of the Pathogen Special Study required by the Central Valley Drinking



Water Policy Basin Plan Amendment. As part of the second round of Long Term 2 Enhanced Surface Water Treatment Rule (LT2), water supply agencies are required to collect Cryptosporidium and Giardia samples monthly for two years in their source waters. These data will be used to determine if the bin levels assigned after the first round of monitoring are still valid or need to be revised. The second round of monitoring will also be used to determine the Basin Plan trigger levels (80% of bin level). The sampling is added to the routine monthly sampling effort of the Department of Water Resources (DWR) Municipal Water Quality Investigations (MWQI). This monitoring ended in April 2017. A report on this monitoring was submitted to the Central Valley Regional Board for final review in September 2018 and will be available on the Delta RMP webpage upon final approval.

Delta RMP Water Quality Monitoring Data

For access to program data, the Delta RMP Project names and codes are listed in Table 1. Data that are currently available in CEDEN are shaded in green. The schedule for release of other monitoring data is indicated in the columns labeled "Update 2" and "Update 3".

Please note that the toxicity and copper data are grouped with the pesticide data and use the same project code.

For more information on current Delta RMP studies, please visit our website:

https://www.waterboards.ca.gov/centralvalley/water_issues/delta_water_quality/delta_regional_monitoring/index.htm



Table 1. Program, Parent Project and Project names and codes for the Delta RMP

Program Name	Program Code	Parent Project Name	Parent Project Code	Project Name	Project Code	Update 1	Update 2
Delta Regional Monitoring Program	Delta RMP	Delta RMP - Current Use Pesticides	DRMP_CUP*	2016 Delta RMP Current Use Pesticides	16DRMP5CUP	Year 2 Pesticides and toxicity data available in CEDEN.	Year 2 field measurements pending approval by Steering Committee.
				2015 Delta RMP Current Use Pesticides	15DRMP5CUP	Year 1 Pesticides and toxicity data available in CEDEN.	
		Delta RMP - Mercury	DRMP_Hg	2016 Delta RMP Mercury	16DRMP5Hg	Year 1 fish tissue data available in CEDEN.	Year 1 water and sediment data available in CEDEN.
		Delta RMP - Pathogens	DRMP_PAT	2016 Delta RMP Pathogens	16DRMP5PAT	Data uploaded. Public release is pending approval of QA Review Memo.	
				2015 Delta RMP Pathogens	15DRMP5PAT	Year 1 Pathogens available in CEDEN.	

* Please note that the toxicity and copper data are grouped with the pesticide data and use the same project code.



Delta RMP Data Reporting

Generally, Delta RMP water quality monitoring data are available according to the schedule below. Final monitoring data will be publicly available after being reviewed and approved. Final data will be incorporated into CEDEN and at a minimum made available through data portals such as CD3 (SFEI-ASC's Contaminant Data Display and Download tool), Bay Delta Live, etc. Pesticides data is available in See Table 2 for more details.

Table 2. General Delta RMP reporting cycle

Deliverable	Frequency	Release date
<i>Data uploads</i>		
Provisional data (available to TAC members)	Variable	Variable
CD3	Annually ¹	March 1
CEDEN	Annually	March 1
<i>Reports</i>		
Annual Monitoring Reports (including QA report)	Annually	March 1
Technical Reports	Variable	Variable

¹Time periods for data and reporting: pesticides (15 months: July 1 through September 30 of the following year), mercury (July 1 – June 30), pathogens (April 1 – March 31).



Delta Regional Monitoring Program (Delta RMP)

2018 – 2019 Monitoring and Data

Introduction

The Central Valley Regional Water Quality Control Board (Central Valley Water Board) approved some small municipal dischargers to participate in the Delta Regional Monitoring Program (Delta RMP) in lieu of conducting the individual monitoring required under Section E.13 of the National Pollutant Discharge Elimination System General Permit for Waste Discharge Requirements for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems, Order No. 2013-0001-DWQ (Small MS4 General Permit). This report satisfies the upload requirement for Delta RMP monitoring data in the annual report under “Monitoring Study Results” in the Stormwater Multiple Application and Report Tracking System (SMARTS).

Delta RMP data is not intended to be used directly to represent either upstream or downstream water quality for purposes of determining compliance with this Permit. Delta RMP monitoring stations are established to evaluate the combined impacts on water quality of multiple discharges into the Delta; Delta RMP monitoring stations would not normally be able to identify the source of any specific constituent but would be used to identify water quality issues needing further evaluation. Delta RMP monitoring data may be used to help establish background receiving water quality. Delta RMP data, as with all environmental monitoring data, can provide an assessment of water quality at a specific place and time that can be used in conjunction with other information, such as other receiving water monitoring data, spatial and temporal distribution and trends of receiving water data, and other point and non-point source discharges, receiving water flow volume, speed and direction, and other information to determine the likely source or sources of a constituent that resulted in exceedance of a receiving water quality objective.

Delta RMP Monitoring

Mercury

Fiscal year 2018-19 mercury monitoring evaluated mercury cycling in Delta water, and the uptake of methylmercury (MeHg) into fish. This year completed the third year of a three-year project to support annual monitoring of higher trophic level fish and correlate this information to mercury and MeHg water and sediment concentrations measured at co-located sites. This information is critical to implementing the Delta MeHg TMDL, providing calibration and validation data for a mercury model being developed by the Department of Water Resources, and informing other management and regulatory decisions related to water quality improvement and ecosystem restoration in the Delta. Last fiscal year, in 2017-18, the water sampling frequency was doubled, from quarterly sampling to 8 events per year. The Delta RMP increased the frequency of water sampling again in 2018-19, this time from 7 months to 10 months per year. More frequent monitoring will provide essential evidence for regulators implementing the TMDL and contribute to ongoing analytical work by the California Department of Water Resources



(DWR). The DWR model will be used to guide regulations and operational decisions related to farming, flood control, and wetland management.

Sport Fish: Annual sampling started in August 2016 and is currently ongoing. Indicator of primary interest is total mercury in muscle fillet of 350-mm largemouth bass (or similar predator species). Total mercury is a close surrogate for the element's more toxic form, methylmercury. The 7 sites sampled in 2018-19 are located to represent different subareas of the Delta and are co-located with the water monitoring sites.

Water: Sampling was conducted during 10 events at 8 sites that align with sport fish monitoring sites. Indicators of primary interest are concentrations of methylmercury and total mercury in water.

Important ancillary parameters include chlorophyll-a, dissolved organic carbon (DOC), suspended sediment concentrations, total suspended solids (TSS), and volatile suspended solids (VSS).

Nutrients

The monitoring component of the "Cross-Delta Monitoring Using High-Frequency Tools" project was completed in 2018 by scientists from the U.S. Geological Survey. This project assessed spatial variability of nutrients and related water quality constituents in the Delta at the landscape scale. The project will help to identify "hot spots" of nutrient transformation and to locate internal sources and sinks for nutrients within the Delta. A final report on this monitoring project is expected by Fall 2019.

Progress continues for the Delta-Suisun water year 2016 hydrodynamic biogeochemical modeling project being conducted by the Aquatic Science Center (ASC). The project will provide continued synthesis and integration of existing data to characterize status and trends of nutrient-related parameters and planning future monitoring and data analysis work. Major outcomes will be a report due December 2019 that will complete the Delta RMP FY18-19 modeling tasks 1 and 2.

The Delta RMP Technical Advisory Committee will discuss how much biogeochemical model application for WY2016 (Delta RMP modeling tasks 3 and 4) ASC's modeling team should aim to complete by March 2020.

The third Nutrients project is the "Chlorophyll Sensor Intercalibration Study". This is a joint project with the San Francisco Bay Nutrient Management Strategy and is a multi-agency effort. The chlorophyll sensor intercalibration study will be a significant first step toward ensuring improved sensor network coordination that will help make better use of existing data collection efforts by state and federal agencies. In 2018-19, Phase 2 was completed when sensors from 6 different agencies were deployed side-by-side for two weeks to compare measurements at different locations in the Delta. These deployments occurred during May, July, and August. The data is currently being analyzed by project scientists and a project report is forthcoming.



Pesticides and Toxicity

Water year 2019 (Oct 1, 2108 – Sept 30, 2019) was Year 1 of a multi-year study of current-use pesticides and aquatic toxicity in the Sacramento-San Joaquin Delta. A rotating basin monitoring design with monitoring at two fixed sites began in October 2018. The study design includes a 4-year monitoring program covering six Delta sub-regions after which an interpretive report will inform adaptive management and improve future monitoring. Samples were analyzed for a suite of 174 Current Use Pesticides (CUP) by the USGS Organic Chemistry Research Laboratory (OCRL). Compounds include fungicides, herbicides, insecticides, and their degradation products. In addition, crews measure field parameters (water temperature, pH, conductivity, dissolved oxygen, turbidity), and document conditions at the field site. The USGS National Water Quality Laboratory analyzes samples for copper and ancillary parameters (total nitrogen, total particulate carbon, particulate organic carbon, and dissolved organic carbon).

The Aquatic Health Program Laboratory at UC Davis will analyze the toxicity of water samples for a suite of test organisms based on current EPA and SWAMP methods:

- *Ceriodaphnia dubia*, a daphnid or water flea (survival, reproduction) – sensitive to organophosphate pesticides
- *Hyalella azteca*, an aquatic invertebrate (survival) – sensitive to pyrethroids
- *Selenastrum capricornutum* (also known as *Raphidocelis subcapitata*), a single-celled algae (growth) – sensitive to herbicides
- *Chironomus 3ilutes*, midge larvae (formerly *Chironomus tentans*) – sensitive to fipronil and more sensitive in chronic exposures to imidacloprid than *C. dubia*.
- *Pimephales promelas* (growth, survival) – chronic and acute effects on whole organism growth and survival

If toxicity exceeding a certain threshold is found in a water sample, a Delta RMP subcommittee may instruct the lab to conduct follow-up investigations to determine the cause of toxicity, by performing a Toxicity Identification Evaluation (TIE). As in past years of Delta RMP monitoring, when significant toxicity is observed exceeding a predetermined threshold the decision to conduct a TIE will be decided by a subcommittee of stakeholders and technical experts.

A report titled, “Analysis and Interpretation of Pesticides and Toxicity Monitoring Data in the Sacramento-San Joaquin Delta” will include the Delta RMP’s first two years of current use pesticides and toxicity data and other data available from 2011-2016. This report and database are expected to be available by Spring 2020.

Delta RMP Water Quality Monitoring Data

For access to program data, the Delta RMP Project names and codes are listed in Table 1. Data that are currently available in the California Environmental Data Exchange Network (CEDEN) are shaded in green. Please note that the toxicity and copper data are grouped with the pesticide data and use the same project code.

For more information on Delta RMP studies, please visit:

https://www.waterboards.ca.gov/centralvalley/water_issues/delta_water_quality/delta_regional_monitoring/index.htm or <https://sfei.org/DeltaRMP>



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Delta RMP Data Reporting

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Table 2. General Delta RMP reporting cycle

Deliverable	Frequency	Release date
<i>Data uploads</i>		
Provisional data (available to TAC members)	Variable	Variable
Pesticides data in NWIS	Variable	Variable
CD3	Annually ¹	March 1
CEDEN	Annually	March 1
<i>Reports</i>		
Annual Monitoring Reports (including QA report)	Annually	March 1
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