Data Management Plan

For the Sacramento-San Joaquin Delta Regional Monitoring Program

Version 2.0

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ACRONYMS

Acronyms	Definition
AOAC	Association of Official Analytical Chemists
ASTM	American Society for Testing and Materials
BOD	Board of Directors
CEC	Constituents of Emerging Concern
CEDEN	California Environmental Data Exchange Network
CVRWQCB	Central Valley Regional Water Quality Control Board
CV	Central Valley
DMP	Data Management Plan
Delta RMP	Delta Regional Monitoring Program
DMAC	Data Management Advisory Committee
EDD	Electronic Data Deliverable
ELAP	Environmental Laboratory Accreditation Program
EO	Executive Officer
FY	Fiscal Year
IPR	Initial Precision and Recovery
MeHg	Methyl Mercury
MDL	Method Detection Limit
MRL	Minimum Reporting Limit
MQO	Measurement Quality Objective
MS4	Municipal Separate Storm Sewer System
NOAA	National Oceanic and Atmospheric Administration
NWIS	National Water Information System
PDF	Portable Document Format
POTW	Publicly Owned Treatment Works
QA	Quality Assurance
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
QAPrP	Quality Assurance Program Plan
QC	Quality Control
QMP	Quality Management Plan
RDC	Regional Data Center
RPD	Relative Percent Difference
RSD	Relative Standard Deviation
SAP	Sampling and Analysis Plans
SEP	Supplemental Environmental Project

SOP	Standard Operating Procedure
SC	Steering Committee
SWRCB	State Water Resource Control Board
TAT	Turn-around Times
TAC	Technical Advisory Committee
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey

1 INTRODUCTION

1.1 PURPOSE

This document outlines the policies for data management and governance of data generated under the Delta Regional Monitoring Program (Delta RMP). The purpose of this Data Management Plan is to:

- Establish consistency of the Delta RMP data management policies with the core principles of open data as identified by the State Water Resource Control Board (Resolution No. 2018-0032)
- Identify how the Delta RMP will ensure data are of known and documented quality
- Identify practices to protect data integrity with standards and protocols
- Identify protocols to establish data responsibility and accessibility

This Data Management Plan outlines the policies and procedures enacted by the Delta RMP to manage the availability, usability, integrity, and security of the data generated under the projects and studies funded by the Program. This Data Management Plan is the umbrella document outlining the data governance policies of the Delta RMP.

Data governance is defined as the collection of processes, roles, policies, standards, and metrics that ensure the effective and efficient use of information in enabling an organization to achieve its goals. It establishes the processes and responsibilities that ensure the quality and security of the data used across an organization. Data management, which is the process by which data governance policies are enacted, deals with the logistics of processing and storing data and is described in project specific QAPPs. Data governance is the strategy for how those logistics ensure that data are consistent and trustworthy and are not misused.

This Data Management Plan outlines the overall strategy and policies for data quality management and establishes the criteria by which data acceptability under the Delta RMP can be determined. This document forms the overarching framework under which project-specific data management procedures can be established to compile and use the data generated under individual projects. These procedures are defined in the project planning documents described below. The Data Management Plan is the highest-level document defining the data quality management approach of the Delta RMP from a programmatic level. All project documents defining data management procedures and data quality reviews shall be in accordance with the procedures established in this

document (unless otherwise approved prior to project implementation) to be acceptable under the Delta RMP.

Revisions to this Data Management Plan will occur according to the timelines and process identified in **Updates to this Document**.

1.2 GUIDING PRINCIPLES

The Delta RMP has developed this Data Management Plan using the following guiding principles. These principles include: 1) open data principles outlined by the SWRCB, 2) ensuring known data quality sufficient to meet the objectives of the associated project or study, 3) data accessibility as required by Resolution R5-2021-0054, and 4) defined procedures for each area of the data life cycle.

1.2.1 Open Data

According to the SWRCB Open Data Resolution (Resolution No. 2018-0032), the State Water Board commits to the five core principles for open data defined in **Table 1**.

The goal of the Delta RMP is to generate data in accordance with these principles. The policies and procedures outlined in this document define the ways in which the Delta RMP ensures that data are of known quality and are publicly available. The open data principles as defined by the Delta RMP are also provided below in **Table 1**.

Table 1. Core principles for open data as defined by the State Water Resource Control Board and the Delta RMP.

Open Data Principle	State Water Board Policy	Delta RMP Policy	Data Management Plan Sections
Make Data Accessible	Our organization values transparency and strives to make all critical public data available in machine readable datasets with metadata and data dictionaries.	The data and information produced by the Delta RMP are made available to participants, stakeholders, and ultimately the public according to the steps and policies outlined in the Data Management Plan. To promote transparency, data and reports generated are published to databases and the deltarmp.org website for public access.	**8 Data Publication**
Understand Data Quality and Integrity	Our data are of known and acceptable quality, and we deploy practices to protect its integrity with standards and protocols.	Data generated by the Delta RMP are of a known quality according to the policies and procedures implemented at each stage of the data life cycle (**Figure 1**).	**4 Planning, 5 Data Acquisition Guidelines, 6 Data Processing, 7 Data Use and Analysis, 8 Data Publication**Data Publication**, 9 Archival and Disposition** Archival and Disposition

Open Data Principle	State Water Board Policy	Delta RMP Policy	Data Management Plan Sections
Improve Data Literacy	Our whole organization understands its data needs and responsibilities, can speak the language of data science the staff and managers have robust data science capacity.	Data generated by the Delta RMP are managed by data experts and thoroughly reviewed by technical advisors with an understanding of data needs and responsibilities. Technical advisors and data management staff provide tools to assist with reading data, working with data, and communicating with data to improve the data literacy of Delta RMP stakeholders.	**3 Data Quality Management Roles and Responsibilities, 5 Data Acquisition Guidelines, 7 Data Use and Analysis, 8 Data Publication**
Use Data to Govern	Our organization uses data to govern and makes decisions that are in the best interest of our mission(s).	Decision making and planning is informed by data collected from both within the Delta RMP and by outside entities contributing to an understanding of regional water quality conditions and trends.	**4 Planning, 7 Data Use and Analysis**
Govern Data	Our organization takes proactive steps to develop effective data and information technology management practices to ensure our data flows to where it is needed in a timely manner while complying with our data sharing policies.	The Delta RMP governs data according to the policies in the Data Management Plan.	All Sections

1.2.2 Data Quality

One of the primary purposes of this document is to ensure data generated by the project are of a known quality and are sufficient to meet the objectives of the associated project or study.

For the data collection purposes of the Delta RMP, data quality refers to the reliability of the information gathered by the Delta RMP to serve its intended purpose of supporting the characterization, planning, and decision-making regarding water quality in the Delta. Though multiple agencies and projects collect data under the Delta RMP, the data management policies imposed by the Delta RMP must ensure that data integrity is consistent across all aspects of the Program. Data integrity ensures the reliability of information based on its accuracy, validity, and consistency across multiple projects with similar data types within the RMP and throughout each stage of the data life cycle for each project. Data integrity is obtained by having data free of errors and with consistent definitions, terminology, formats, procedures, and timeliness. Therefore, for the Delta RMP data are determined to be of a known quality if they are:

- **Accurate:** the data stored are the correct values and are representative of the real-world scenarios they are meant to describe.
- **Complete:** the data obtained constitute a large percentage of the total amount of data expected.
- **Unique:** unique datasets are free of redundant or extraneous entries.
- **Valid:** data conform to the syntax and structure defined by the business rules and database requirements defined.
- **Timely:** data are sufficiently up to date for their intended use.
- **Consistent:** data are consistently represented in a standard way throughout the dataset(s).

Procedures for data quality assurance and control must be present at each step of the data life cycle (defined below). Where more intensive planning documents with the distinct purpose of defining how the above criteria are met is required, such as a QAPP, these documents will be in agreement with the policies in this document. This document serves as minimum requirements for how data should be generated, processed, and stored as a project receiving funding from the Delta RMP.

1.2.3 Data Accessibility

Per Resolution R5-2021-0054, all data generated under the Delta RMP must be published in CEDEN, NWIS, or an otherwise approved publicly accessible data repository. Alternative data repositories must be approved by the CVRWQCB EO. Data repositories for historical and ongoing Delta RMP projects are provided in **Table 10**.

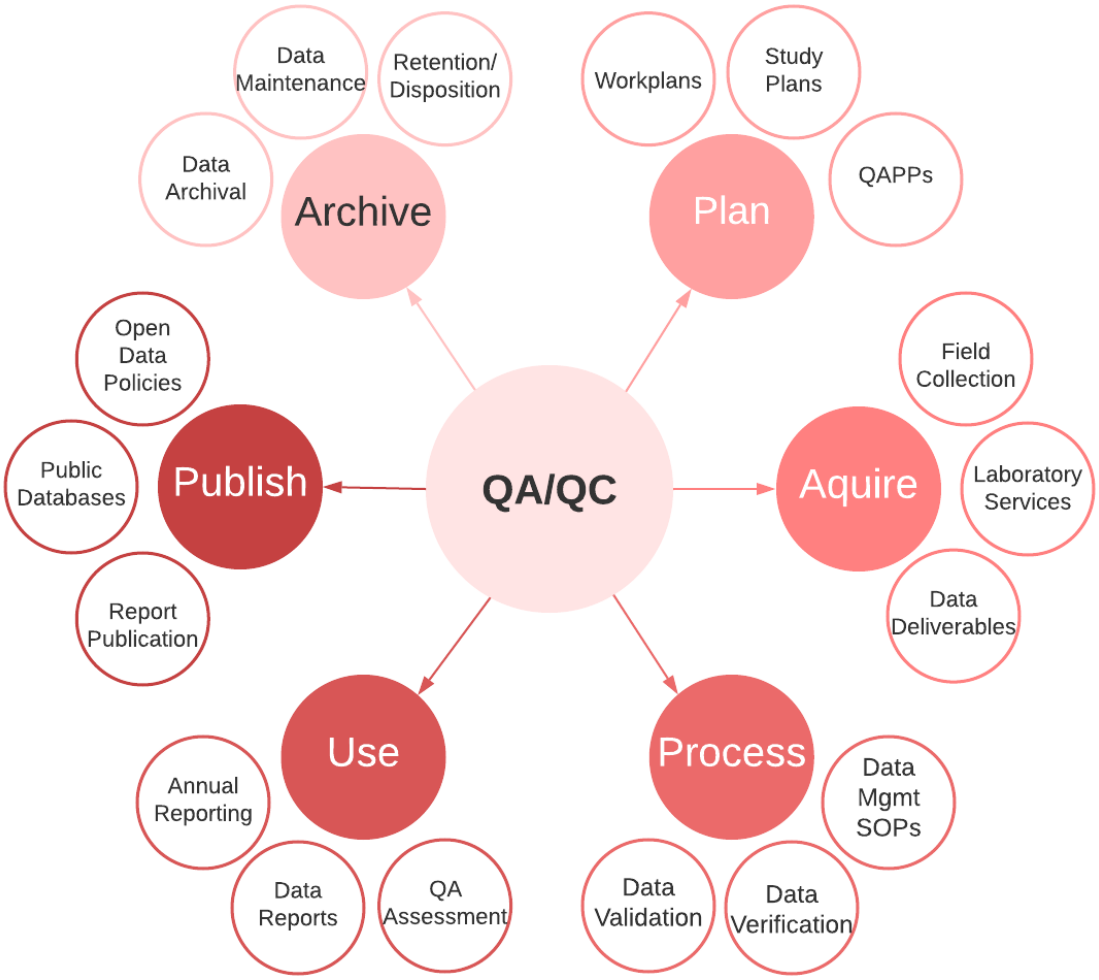
Wherever possible, the preferred data repository for surface water quality data generated by the Delta RMP is CEDEN. CEDEN is not configured to accommodate all types of water quality data resulting in a need for some data to be published to a different location. In such cases, data must be formatted, uploaded, accessed and secured in any alternate location must be clearly defined in the project planning documents (see below) prior to the implementation of the project design. See **Data Publication** for more details.

1.2.4 Data Life Cycle

The following sections of this document establish the requirements for how data quality will be maintained at each step of the data life cycle. For the purposes of the Delta RMP, the data life cycle is defined as the following:

1. **Plan.** The planning stage includes the necessary steps and documentation to define the reason, purpose, and methods by which data will be generated and obtained for a given project or study.
2. **Acquire.** Data acquisition includes the monitoring, analysis, or other means of obtaining environmental data results to be used by the Delta RMP.
3. **Process.** Data processing defines how the data obtained will be processed, reviewed, verified, and stored.
4. **Use.** Data use involves the reporting and the answering of study questions defined in the planning stages.
5. **Publish**. Data publication is concerned with how the data generated will be made available to Program stakeholders, external data users, regulators making decisions regarding the quality of waters in the Delta, and the general public.
6. **Archive**. Data archival involves the long-term storage, post hoc maintenance, and disposition of data and ancillary information generated for a given project or study.

Figure 1. Data life cycle.



2 PROGRAM BACKGROUND

The purpose of the Delta RMP is to educate and inform decisions on how to protect and, where necessary, restore beneficial uses of water in the Sacramento-San Joaquin River Delta area of California, by producing objective and cost-effective scientific information critical to understanding regional water quality conditions and trends.

The Delta RMP pursues the following objectives:

- Improve the efficiency of water quality data collection and management in the Delta.
- Generate information that informs and educates the public, agencies, and decision makers.
- Raise awareness of Delta water quality conditions and how they impact beneficial uses.
- Foster independent science, objective peer review, and a transparent review process.

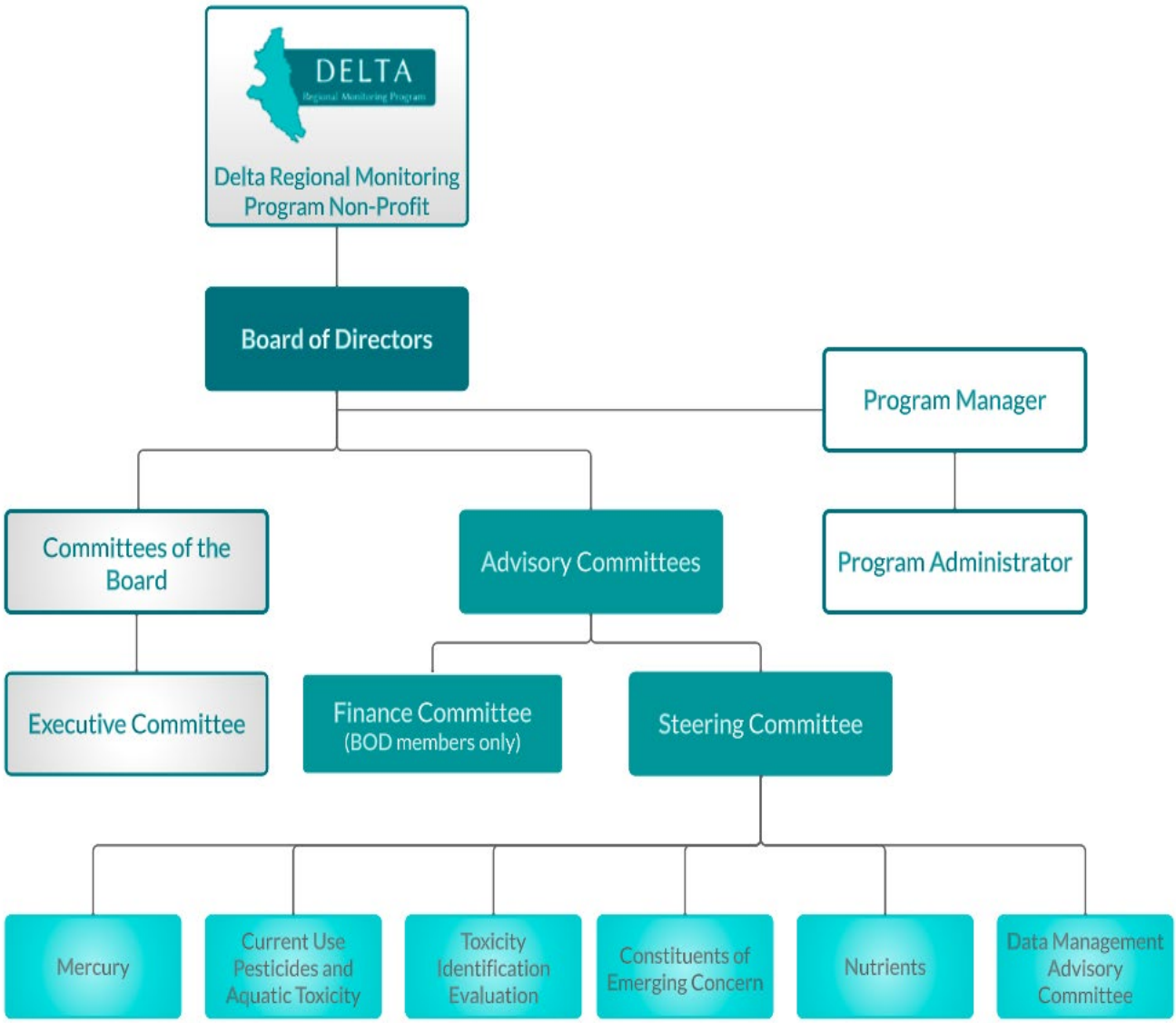
The Delta RMP is implemented with stakeholder participation of various coordinated monitoring, resource, regulatory and regulated entities as well as scientists and interested parties. These groups give technical and policy recommendations to the Board of Directors (BOD) through participation in the Steering Committee, various project-specific technical advisory committees (TACs) and other advisory committees according to the organizational structure outlined in **Figure 2**.

The implementation of the Program is also done in close coordination with the Central Valley Regional Water Quality Control Board (CVRWQCB) to ensure that the Delta RMP continues to effectively and efficiently implement coordinated monitoring projects that generate useful data to inform management decisions and Central Valley Water Board actions in lieu of individual monitoring requirements and/or studies. Unless otherwise approved by the CVRWQCB's Executive Officer (EO), all monitoring and data generation occurring under this Data Management Plan (DMP) must be in accordance with the submission requirements and due dates defined in Attachment A of Resolution R5-2021-0054, *Approval of Delta Regional Monitoring Program Governance Structure and Implementing Entity* (see **Regulatory Conditions**).

In accordance with Resolution R5-2021-0054 and R5-2013-0130, the CVRWQCB has modified existing individual and group monitoring programs to allow dischargers to participate in the Delta RMP in lieu of conducting their current individual monitoring efforts. The funds contributed to the Delta RMP are used to support the collection of

scientific data in the Region to support the goals of the Program. To ensure these goals are met, the data generated under the Delta RMP must be managed and governed in a consistent way and be of known quality such that these data can be used for assessments and decisions aimed at protecting and improving the water quality in the Delta. This document represents the data management policies enacted by the Delta RMP to ensure these objectives are met.

Figure 2. DRMP Non-Profit structure.



2.1 ORGANIZATIONAL BOARD AND COMMITTEES

The Delta RMP is implemented by a governing board and a series of advisory committees (**Figure 2**), each of which contains representatives from the various agencies contributing

to the Program. The groups represented on these committees and their responsibilities are outlined in the DRMP Bylaws. The DRMP Program Manager and Program Administrator report directly to the BOD and assist with implementing the program including attending and facilitating BOD, Steering Committee, and TAC meetings. Details regarding roles and responsibilities is included in the section **Data Quality Management Roles and Responsibilities.**

2.1.1 Board of Directors

The BOD makes all binding decisions for the Delta RMP. As such, the BOD sets the data governance policies for the generation and use of scientific data by the Delta RMP. Where necessary, the BOD also enters into contracts with entities and individuals for the collection, processing, or analysis of data according to the policies outlined in this document. The BOD oversees implementation of policies and priorities of the Delta RMP, including the implementation of data management procedures.

The BOD oversight of the data governance policies used by the Delta RMP includes the Executive Committee, a committee of the Board made up of the Delta RMP BOD officers, which has the authority between BOD meetings to make decisions and take action relative to the operation of the organization on behalf of the BOD.

2.1.2 Steering Committee

The Steering Committee is a standing Advisory Committee to the BOD. The Steering Committee advises on strategic direction and policies and procedures to implement the Delta RMP in a manner consistent with regulatory conditions and priorities. The Steering Committee also recommends direction for technical committees and reviews and recommends technical products to the BOD for approval. The Steering Committee makes recommendations to the BOD concerning focus areas for monitoring, study designs, and data management. In addition, the Steering Committee makes recommendations to the BOD regarding study plans, data policy changes, and data assessments including Data Reports and Interpretive Reports. The Steering Committee provides direction to the Technical Advisory Committees (TACs) in terms of monitoring designs and priorities or may request advice or recommendations concerning technical questions.

2.1.3 Technical Advisory Committees

Technical Advisory Committees provide technical recommendations to the Steering Committee and the BOD for the implementation of a specific project or monitoring sector. The individual TACs are provided specific tasks and/or deliverables by the BOD (e.g., the "TAC Charge") and/or the Steering Committee (e.g., direction to develop a Study Plan).

The TACs are one of several entities that develop study plans in coordination with the project lead and Program Manager based on direction from the Steering Committee. Study plans are reviewed by the TACs for technical appropriateness based on direction provided by the Steering Committee. Once the TAC determines that the study plans are ready for Steering Committee review, they are recommended by the TAC to the Steering Committee for approval by the BOD. Study plans may be short-term, annual, or multi-year depending on direction from the Steering Committee and monitoring priorities. Study designs include the details of implementing a study plan including specific hypothesis to be tested, sample locations, sample collection frequency, sample analytes, analysis methods, preliminary data deliverables, planned reports to summarize results, and timeline and schedule for all the study design elements to be completed. Study designs are incorporated into the Annual Monitoring Workplan and associated Quality Assurance Project Plan (QAPP) (or other approved data documentation) to meet Resolution R5-2021-0054 requirements and data quality objectives of the monitoring design. The TAC reviews and recommends the approval of the QAPPs directly to the BOD for submittal to the CVRWQCB for final approval.

The TACs provide advice and guidance on the technical presentation of project data and on the application of data business rules according to the project needs. Program personnel (defined below in **Data Quality Management Personnel**) compile questions and request advice of the TACs on data management protocols and the implementation of data policies within the context of the project goals and the intended data use. Each TAC reviews data deliverables and technical work products and works with the Delta RMP Program Manager to ensure that the project data are meeting the objectives of the monitoring design in accordance with the associated data management documentation.

2.2 REGULATORY CONDITIONS

A variety of permittees throughout the Central Valley, regulated by the CVRWQCB, contribute and participate in the Delta RMP. In 2013, the CVRWQCB passed Resolution R5-2013-0130 allowing Delta RMP participation in lieu of some receiving water monitoring/special study requirements. As such, the close collaboration with the CVRWQCB is essential to ensure the continued value and effectiveness of regional monitoring in lieu of individual monitoring and special studies that otherwise might be required by CVRWQCB for participating permittees.

In October 2021, the CVRWQCB passed Resolution R5-2021-0054 approving the updated Delta RMP governance structure as a vehicle for this modified monitoring approach to occur. Attachment A of Resolution R5-2021-0054 outlines the reporting requirements of the Delta RMP to the CVRWQCB in order to ensure added value of the

coordinated efforts under the Program are adequate to investigate water quality issues in lieu of individual monitoring and special studies.

The requirements in Resolution R5-2021-0054 for a Data Management Plan include:

- Demonstrate consistency with the core principles of the SWRCB open data policies (as defined in Resolution No. 2018-0032),
- Identify how the Delta RMP will ensure data are of known and documented quality and identify practices to protect data integrity with standards and protocols, including protocols to establish data responsibility and accessibility.
- Include a plan to upload all data to the California Environmental Data Exchange Network (CEDEN) or the National Water Information System (NWIS) or, in the event data cannot be uploaded to CEDEN or NWIS, another Executive Officer approved publicly accessible database. All data must be uploaded to one of these identified databases within 6 months of the last sampling event date in the QAPP (unless otherwise approved by the CVRWQCB EO).

3 DATA QUALITY MANAGEMENT ROLES AND RESPONSIBILITIES

3.1 DATA QUALITY MANAGEMENT PERSONNEL

The oversight of the data governance policies defined in this document and the implementation of these policies through the specific data management protocols enacted under the Delta RMP are the responsibility of the individuals described below. Specific roles on a project level are defined in the QAPP or the appropriate project-planning documents (as defined in **Planning**). **Table 2, Table 3**, **Table 4**, and **Table 5** include an overview of the roles and responsibilities for data quality management personnel identified below and the BOD, Steering Committee, and TACs described in the previous section. These four tables include an entity / person responsible for approval which could be programmatic (e.g., BOD) or external (e.g., CVRWQCB). In those case, the process for approval includes having the BOD approve the document for submittal to the external entity for final approval.

3.1.1 Program Manager

The Program Manager oversees all technical programs and associated leadership and staff for each technical area of the Delta RMP. The Program Manager is responsible for planning and overseeing Delta RMP projects to ensure that they are completed within a timely manner and within budget. It is the Program Manager's responsibility to plan projects, prepare budgets, monitor progress, and keep the BOD and stakeholders informed.

The Program Manager is responsible for the implementation of projects in accordance with Resolution R5-2021-0054, approved Annual Monitoring Workplans and QAPPs (or other approved data documentation), and the data governance policies defined in this document. The Program Manager ensures the communication of direction, decisions, and challenges to implementation between technical staff and committees, the CVRWQCB, the Steering Committee, and the BOD. The Program Manager oversees the technical staff in charge of implementing the data management procedures within their own individual project datasets. The Program Manager provides oversight on the compliance of these procedures with the expectations and policies of the Delta RMP and, where necessary, seeks guidance on the application of these procedures or the refinement of the Delta RMP policies based on the operation of the project-level procedures.

3.1.2 Program QA Officer (QAO in the QAPP)

The Delta RMP Program QA Officer provides ultimate quality assurance oversight for field and laboratory procedures, and final data review and assessment of completeness, accuracy, and precision of data generated by this project, including the drafting of QA Assessments (see **Data Use and Analysis**). The Delta RMP QA Officer is independent of any direct data generation, such as sample collection, field parameter recording, or laboratory analysis.

The Program QA Officer, in coordination with the Program Manager, is responsible for reviewing protocols enacted by individual project personnel to ensure compliance with the overall requirements and data governance policies of the Delta RMP, including reviewing project data both for accuracy and comparability, and data quality (as defined in **Table 1)**.

3.1.3 CVRWQCB QA Representative and Officer

Per Resolution R5-2021-0054, the CVRWQCB QA Officer or the SWRCB QA Officer has the authority to approve project QAPPs. The CVRWQCB QA Officer, CVRWQCB QA Representative, or the SWRCB QA Officer can approve deviations as specified in Section **4.5 Deviations**. In the event that there is no QA Officer for the CVRWQCB, the CVRWQCB QA Representative and the SWRCB QA Officer will fill the role for the implementation of the Delta RMP while that position is vacant.

Data management and quality assurance oversight of Delta RMP projects and studies is conducted in coordination with the CVRWQCB QA Representative. The QA Representative works in collaboration with the Delta RMP QA Officer to ensure project and data quality goals are met and assesses whether the specific Delta RMP data policies occur in compliance with Resolution R5-2021-0054 unless otherwise approved by the Executive Officer or CVRWQCB.

3.1.4 CVRWQCB Executive Officer

The CVRWQCB Executive Officer reviews and approves Delta RMP annual workplans, the Data Management Plan and any modifications. This is done to ensure the effectiveness of regional monitoring and adequate monitoring and assessment of cumulative impacts that alter water quality, in lieu of individual monitoring and special studies, in investigating water quality issues in the Delta. To ensure the Delta RMP's adherence to the United States Environmental Protection Agency (USEPA) and SWRCB's principles and guidance for open data and quality assurance, the Executive Officer requires development, submission, and approval of data management and quality assurance project plans.

3.1.5 SWRCB QA Officer

The State Water Resource Control Board (SWRCB) QA Officer provides oversight to ensure data generated under the Delta RMP are consistent with SWRCB data quality management policies and with the SWRCB Open Data Resolution (2018-0032).

The SWRCB QA Officer reviews and approves individual project quality assurance documentation, specifically all QAPPs developed by the Delta RMP (see **Quality Assurance Project Plans**). Additionally, the SWRCB QA Officer is one of three individuals who may also approve deviations to the QAPP (see section **Deviations** for details on the approval process). At the request of the Program Manager or the CVRWQCB QA Representative, the SWRCB QA Officer may be brought into discussions regarding the proper implementation of data management policies for the Delta RMP.

3.1.6 Project Leads

The Delta RMP defines the Project Lead as the person responsible for ensuring the project is completed according to the planning documentation and cm. A Project Lead may be referred to by other programs as the Project Manager or Principal Investigator.

The Project Lead facilitates the implementation of the project under the guidance of the Delta RMP Program Manager. The Project Lead is responsible for the coordination of sampling, laboratory analysis, and data reporting as prescribed in the study design. Prior to monitoring (if applicable), the Project Lead is responsible for ensuring that all parties involved with collecting and analyzing samples are aware of both field and laboratory roles and responsibilities. The Project Lead is responsible for ensuring communication between all parties and the Delta RMP regarding the status of the project and any deviations from the Monitoring Workplan, QAPP, or appropriate project planning document.

3.1.7 Data Managers

Data managers are the individual experts assigned in the QAPP or appropriate project-planning document and are responsible for the handling and oversight of the results produced by a specific project or study. Data managers work directly with the Project Lead and Program Manager and serve as the point of contact regarding the data they oversee. Data Managers are responsible for processing, reviewing, managing, controlling, and preserving the integrity of the electronic records generated by their project. They coordinate with the Program Manager regarding the procedures and timeliness of the processing, QA/QC review, and publication of the project results. These individuals also work with the Program Manager to implement their specific data protocols in agreement with the data management policies of the Delta RMP.

The Program Manager works in coordination with the Program QA Officer, the CVRWQCB QA Representative, and the SWRCB QA Officer to ensure that the data managed by the Data Managers meets the requirements of the data management documentation (e.g., QAPP), and the Data Management Plan (**Table 2)**. In addition, project data are provided to and reviewed by the TAC to ensure compliance with the associated data management documentation (e.g., QAPP).

Table 2. DRMP Roles and Responsibilities for Data Life Cycle - Plan.

Role / Responsibility	Plan				
	Study Plans / Proposals	DRMP Annual Monitoring Workplan	QAPPs [1]	DMP	Deviation Forms
Meets Resolution Requirements	Program Manager	Program Manager	Program Manager	Program Manager	Program Manager
Meets DMP Requirements	Program Manager, Program QA Officer, CVRWQCB QA Representative	Program Manager	Program Manager, Program QA Officer, CVRWQCB QA Representative	Program Manager, Program QA Officer, CVRWQCB QA Representative, SWRCB QA Officer	Program Manager, Program QA Officer, CVRWQCB QA Representative
Develop / Review	Varies by project but can include TAC, Program Manager, outside entities	Program Manager	Project Lead, Program Manager, TAC	DMAC, Program Manager, Program QA Officer	Program Manager, Data Manager, Project Lead
Recommend	TAC, Steering Committee	Steering Committee	TAC	DMAC, Steering Committee	Not Applicable
Approve	DRMP BOD	DRMP BOD, CVRWQCB EO	DRMP BOD, SWRCB QA Officer	DRMP BOD, CVRWQCB EO	CVRWQCB QA Representative, SWRCB QA Officer
Distribute	Program Manager	Program Manager	Program Manager	Program Manager	Program Manager

[1] QAPP signatories must all sign a QAPP for it to be considered final. Signatories are not listed under the Approve Role/ Responsibility since their signature is to indicate that they will implement the QAPP per their role/responsibility outlined within the document.

Table 3. DRMP Roles and Responsibilities for Data Life Cycle - Acquire Documents and Procedures.

Role / Responsibility	Acquire						
	Field Collection SOPs	Field Results/ Collection documentation	Laboratory SOPs	Laboratory Method Validation Packages	EDDs / Preliminary Data (Stage 1)	Verified Data (Stage 2)	Finalized / Complete Data (Stage 3)
Meets Resolution Requirements	Program Manager	Program Manager	Program Manager	Not Applicable	Program Manager	Program Manager	Program Manager
Meets DMP Requirements	Program Manager, Program QA Officer, CVRWQCB QA Representative	Data Manager	Program Manager, Program QA Officer, CVRWQCB QA Representative	Program Manager, Program QA Officer, CVRWQCB QA Representative	Data Manager	Program QA Officer	Program Manager, Program QA Officer, CVRWQCB QA Representative
Develop	Project Lead	Field Samplers	Laboratory	Laboratory	Laboratory	Data Manager	Program QA Officer
Recommend	TAC	Data Manager	Program QA Officer	Program QA Officer	Data Manager	Program QA Officer	TAC
Approve	(As part of QAPP) DRMP BOD, CVRWQCB EO, SWRCB QA Officer	(Data Publication) TAC	(As part of QAPP) SWRCB QA Officer	SWRCB QA Officer	Not Applicable	Not Applicable	TAC
Distribute	Program Manager	Data Manager, Program Manager	Program Manager	Program Manager	Data Manager, Program Manager	Data Manager, Program Manager	Data Manager, Program Manager

Table 4. DRMP Roles and Responsibilities for Data Life Cycle - Process and Use.

Role / Responsibility	Process		Use		
	Data Management SOPs	Data Rejection	Data Reports / QA Assessments	Delta RMP Annual Report	Interpretive Reports
Meets Resolution Requirements	Program Manager	Program Manager, Program QA Officer, CVRWQCB QA Representative, SWRCB QA Officer	Not Applicable	Program Manager	Not Applicable
Meets DMP Requirements	Program Manager, Program QA Officer, CVRWQCB QA Representative, SWRCB QA Officer	Program Manager, Program QA Officer, CVRWQCB QA Representative, SWRCB QA Officer	Program QA Officer	Program QA Officer	Program QA Officer
Develop / Review	Data Manager (per project)	Laboratory, Data Manager, TAC	Project Lead, Data Manager, Program QA Officer	Program Manager	Project Lead, TAC
Recommend	TAC	Program Manager, Program QA Officer, CVRWQCB QA Representative, SWRCB QA Officer	TAC, Steering Committee	Program Manager	TAC, Steering Committee
Approve	(As part of QAPP) DRMP BOD, CVRWQCB EO, SWRCB QA Officer	Program Manager, Program QA Officer, CVRWQCB QA Representative, SWRCB QA Officer	DRMP BOD	DRMP BOD	DRMP BOD
Distribute	Program Manager	Program Manager	Program Manager	Program Manager	Program Manager

Table 5. DRMP Roles and Responsibilities for Data Life Cycle - Publishing and Archiving.

Role / Responsibility	Publish		Archive	
	CEDEN (approved) Data Transfers	Delta RMP Website Document Publication	Dataset Maintenance	Document Retention / Disposition
Meets Resolution Requirements	Program Manager	Program Manager	Program Manager	Program Manager
Meets DMP Requirements	Program Manager, Program QA Officer, CVRWQCB QA Representative	Program Manager	Program QA Officer	Program Manager
Develop	Data Manager	Program Manager	Data Manager	Program Manager
Recommend	Program QA Officer	Program Manager	Not Applicable	Not Applicable
Approve	TAC	BOD	Not Applicable	Not Applicable
Distribute	Program Manager	Program Manager	Program Manager	Program Manager

3.2 DATA MANAGEMENT OVERSIGHT

The Data Management Advisory Committee (DMAC) is the primary body overseeing the consistency and documentation of Delta RMP policies and providing recommendations for protocols related to data quality and data management. The DMAC members review and provide feedback on this DMP while working to be consistent with the expectations contained within Resolution R5-2021-0054. The DMAC recommends the drafts and revisions of the DMP for review by the Steering Committee. The DMAC also reviews and provides feedback on the development of the Delta RMP QAPP Template to be used for the development of consistent quality assurance documents across Delta RMP projects (see **Delta RMP QAPP Template**).

As the primary Advisory Committee to the Board regarding the implementation of the Program, the Steering Committee has oversight over the development and implementation of various projects to ensure they are in accordance with the data management policies outlined in this document.

The BOD has the ultimate authority to adopt this document and any subsequent revisions or updates developed by the DMAC or others. Upon recommendations from the Steering Committee, the BOD adopts the policies contained in this document and approves this Data Management Plan for submittal to the CVRWQCB for approval by the Executive Officer (EO), per the Resolution.

The Delta RMP Program Manager, in coordination with the Program QA Officer and the CVRWQCB QA Representative, are responsible for providing oversight on individual Delta RMP projects regarding the adherence to data quality expectations and the implementation of the Delta RMP data management policies. Individual data managers are the primary individuals enacting policies.

Final and verified data are reviewed by the TACs who then make a recommendation for publication. This review process generally includes a Data Report with a Quality Assurance Assessment. The BOD has given the TACs authority to review, finalize, and publish data in accordance with the Data Management Plan policies and Resolution requirements. All data must be published to an approved public database within six months of the last sampling event date in the QAPP, unless otherwise approved by the CVRWQCB EO. The roles of the TACs in data review are further outlined in **Data Deficiencies**.

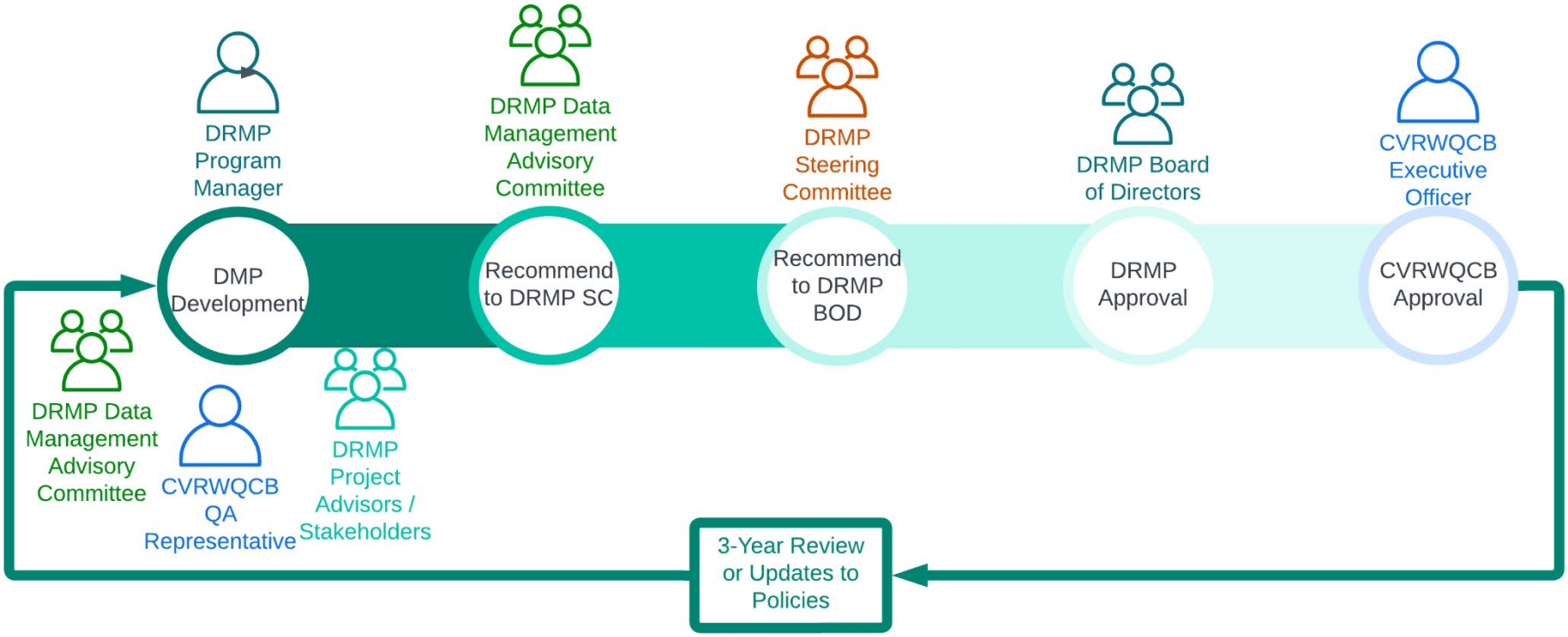
3.3 UPDATES TO THIS DOCUMENT

The process by which this document is developed, updated, and approved is summarized in **Figure 3**. It is the responsibility of the Program Manager to maintain and update this document as needed. At a minimum, the Data Management Plan must be reviewed and revised every three years, per Resolution R5-2021-0054. At the discretion of the Program Manager, BOD, and the DMAC, this may occur more frequently when new protocols/processes affecting data management are identified and/or if existing protocols outlined in this document require an amendment.

The final version of this Data Management Plan and any subsequent revisions must be approved by the CVRWQCB EO. Changes to this document will be developed by the Program Manager in coordination with the DMAC and the CVRWQCB QA Representative, and in consultation with the SWRCB QA Officer. Updates will be reviewed by the Steering Committee for recommended approval by the BOD unless otherwise directed by the BOD or Executive Committee. Once approved by the BOD, the Program Manager or President will submit the revisions to the CVRWQCB EO for approval.

Versions of the Data Management Plan will be tracked using numbers with a single decimal place. The number prior to the decimal point should increase as revisions to the document are developed according to the process outlined in **Figure 3**. Updates made during the review and response to comments from the groups recommending and approving the document revisions are tracked with the numbers after the decimal point. For example, the original Data Management Plan submitted for CVRWQCB EO approval was version 1.0. Versions of this Data Management Plan were tracked as v1.1, 1.2, etc. to address comments received on the submittal. The next submittal of the Data Management Plan submitted to the CVRWQCB EO is v2.0 to indicate an updated Data Management Plan.

Figure 3. Typical Update and approval process for the Delta RMP Data Management Plan.



4 PLANNING

Project planning and the associated documentation is a crucial element of the data quality management procedures of the Delta RMP. Before Delta RMP funds can be used for project implementation, all projects and studies must develop, submit for review, and obtain concurrence and approval of the appropriate planning information. The Delta RMP has different levels of planning to allow for long-term allocation of funds as part of budget planning which spans three to five years and planning that occurs on an annual basis as part of the fiscal year. As part of long-term planning, the Delta RMP prioritizes monitoring sectors for when efforts will be focused on planning, monitoring, and reporting; this prioritization is done to allocate more resources to a specific monitoring sector and then rotating between the different monitoring sectors in terms of prioritization. The multi-year planning process and status is referenced in the Annual Monitoring Workplan. Multi-year study plans are used to cover three to five years of project scoping for a specific monitoring sector. However, the Delta RMP has built in flexibility with its planning to allow for short term funding of research or special studies. Data management planning is an essential component of individual project approval and implementation. The level of detail of data management planning will vary based on based on the type of planning document.

The types of planning documents and the scenarios in which they are required are defined below. All documents developed prior to data collection must provide sufficient information such that the Delta RMP technical advisors, stakeholders, Steering Committee, and BOD members can clearly understand the following key data governance questions:

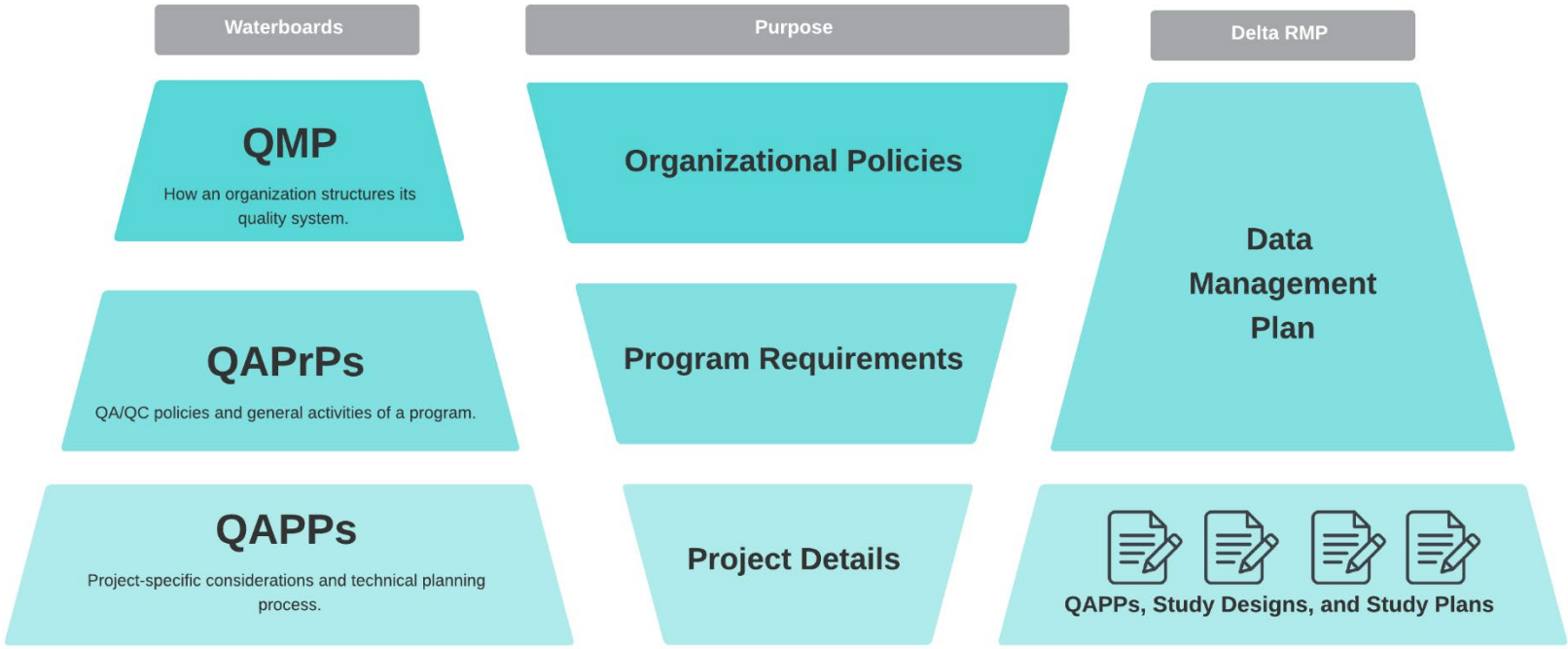
- What are the data being collected?
- Where and how are the data being collected and used?
- How accurate and how precise must the data be?
- Which rules must the data follow?
- Who is involved in the various stages in a data life cycle?

Planning documents for the Delta RMP may vary in detail and complexity and likely will fall into one of three program implementation levels: the programmatic level across all projects and studies funded under the Delta RMP, the study plan level that outlines study design criteria to be implemented across the study plan length (e.g. from short-term to multiple years) for budget and scoping purposes, and the project-specific level used for implementing a study design including details required in the Resolution R5-2021-0054 . The programmatic documents address organizational policies and the overall

requirements of all projects (e.g., Data Management Plan). The study plans are developed to scope projects and budgets and are used to develop more detailed study designs and data management documents (project level documents) at the time of implementation. The project level documents address the necessary details and strategy for the specific purpose for which data are intended to be used under the project study design.

The hierarchy of Delta RMP and its implementation in program documents can be compared to the three levels of the State Water Boards documents, namely, the State's Quality Management Plan (QMP), Quality Assurance Program Plans (QAPrPs), and project specific QAPPs (**Figure 4**). The planning documents of the Delta RMP should be in accordance with the policies outlined in the Water Boards planning documents.

Figure 4. Planning documents hierarchy for the Delta RMP and the Water Boards.



4.1 INTENDED DATA USE AND PLANNING DOCUMENTATION REQUIREMENTS

There are four general categories for most Delta-RMP-funded projects are anticipated to fall under which are described in more detail below: Status and Trends, Collaboration Studies, Research Studies, and Supplemental Environmental Projects (SEPs). The category into which a project falls, along with the ultimate intended use of the project data defines the level, scope, and types of planning documents that should be required by the Delta RMP prior to project implementation.

Depending on the project's scope, size, and goals for data use, the format of data management procedures documentation may vary. All planning documentation should contain a clear definition of the scope and intended data use, as well as a clear explanation as to how those definitions feed into established data quality objectives, which are ultimately used to make project decisions. At a minimum, project planning documents that includes monitoring must provide a study design to be included in the Annual Monitoring Workplan which includes the information required by Resolution R5-2021-0054:

- Specific hypothesis to be tested
- Sample locations
- Sample collection frequency
- Sample analytes
- Analysis methods
- Preliminary data deliverables
- Planned reports to summarize results
- Timeline and schedule of all of the study design elements to be completed

4.1.1 Required QA Documentation in Study Plans

The Delta RMP Steering Committee and appropriate TAC will review all study plans prior to implementation or further development and provide a recommendation to the BOD regarding funding. The Steering Committee assesses whether to fund or participate in collaborative and research projects based on several factors including if there is a quality assurance plan associated with the project. Since a study plan may be short term or for multiple years, it may not include required project-specific study design details which must be developed prior to project implementation and included in both the data management document (e.g., QAPP) and Annual Monitoring Workplan. The Monitoring

Workplan is reviewed by the Steering Committee and recommended to the BOD for approval.

As more multiyear monitoring workplans and QAPPs are developed under the Delta RMP, an Annual Monitoring Workplan will be developed from information included in the focus area monitoring workplans and QAPPs in order to meet the requirements of Resolution R5-2001-0054. Once approved by the BOD, the Program Manager or President submits the Annual Monitoring Workplan for approval by the EO.

As described in the following sections, it is preferred for all Delta RMP funded projects to have a QAPP or QAPP equivalent document (e.g., other quality assurance documentation exists). When the Study Plan is submitted to the Steering Committee for recommendation for funding, the Study Plan will include existing quality assurance plan documentation; if that documentation does not exist (or is not robust enough), the Study Plan will include enough QA documentation for the project to accomplish the goals and objectives of the project including roles and responsibilities of data management and oversight (e.g., include details to the questions listed in **Table 6)**.

4.1.2 Status and Trends

The status and trends project pathway is appropriate for projects fully managed and funded by the Delta RMP to assess one of the Delta RMP's primary assessment and management questions. This may include long-term monitoring projects or a discrete study (e.g., CEC Pilot Study) over short-term or multiple monitoring years. Typically, all data collected will be published to CEDEN and will follow the data processing and publication requirements defined in this Data Management Plan. Such projects will require the development of a QAPP according to the requirements outlined in **Quality Assurance Project Plans** prior to project implementation. It is expected that whenever possible, Delta RMP data will be published into CEDEN and be associated with an approved QAPP.

4.1.3 Collaboration Studies

Collaboration studies are environmental studies or projects that are being conducted outside of the Delta RMP, but to which the Delta RMP is contributing funding or support. These studies are generally existing studies that align with the monitoring or data collection goals of the Delta RMP meaning that the data are collected and managed in a way that aligns with the **Guiding Principles** outlined in this DMP. Likewise, much of the documentation that would be developed by the Delta RMP for an internally implemented project will be the responsibility of the external entity to develop, maintain, and implement. The DRMP Program Manager will have oversight on the implementation of

the approved study design and data management procedures and work closely with the collaborating entity to ensure that Resolution requirements are met, and data are managed according to the DMP. Data collected with funding from the DRMP must be made publicly available in a format approved by the EO.

Where collaborative study data are intended to be published to CEDEN, an associated QAPP or QAPP equivalent will be provided for review by stakeholders and the appropriate TAC. If data are not intended for CEDEN, the study design shall clearly define the means by which the data will be made public which must be approved by the EO. For data that cannot be uploaded to CEDEN or NWIS, the study design will propose an alternative for EO approval. An alternative could be a different publicly accessible database. If none exists, a file that is able to be manipulated and posted to a public website can meet the requirements.

The collaborators in charge of implementing the project must answer the Delta RMP **Data Management Questions** and must meet the minimum requirements of the **Individual Study Plans and Proposals**. The QA documentation provided by the project lead will be reviewed by the Delta RMP to ensure that the data will meet the objectives of the study. During the study design development process, the TAC will review and provide technical guidance as needed to ensure that the QA documentation is sufficient to meet the objectives of the study. The study design reviewed by the Steering Committee will include the TACs assessment and recommendation. At a minimum, answers to the following seven questions must be provided as part of the study design:

1. What is driving the collection of the data?
2. What data will be collected?
3. How will the data be organized (and managed)?
4. How will the data be documented?
5. How will data quality be assured?
6. How will the data collected be made accessible?
7. How will the data be used?

4.1.4 Research Studies

Research studies are projects or investigations which can be used by the Delta RMP to gather supplementary data or information; such studies may not require the development of a full QAPP to be implemented by the Delta RMP. For example, the Delta RMP was a partner and financial contributor for an intercalibration study for chlorophyll fluorescence sensors in the Bay-Delta which would be classified as a research study.

These types of projects may be funded by the Delta RMP in order to plan for larger projects that would require a QAPP. The data collected by the project may not be crucial to the overall goals of the Delta RMP but may be useful if funding is available and ancillary information is needed. This may include exploratory studies for which the Delta RMP is using funds to explore the feasibility of innovative data collection or analysis techniques, facilitate an understanding of a larger issue, or provide information for developing more in-depth or better-defined status and trend monitoring plans.

Data generated by research studies may not be appropriate or possible to publish to CEDEN and therefore different data management documentation will be required. A study design must be developed which at a minimum meets the requirements to be included in the Delta RMP Annual Monitoring Workplan, as defined by Resolution R5-2021-0054. For projects that do not have a monitoring component, the Delta RMP will work with the CVRWQCB EO to get concurrence on the project approach prior to proceeding. For data that cannot be uploaded to CEDEN or NWIS, the study must propose an alternative for EO approval. An alternative could be a different publicly accessible database. If none exists, a file that is able to be manipulated and posted to a public website can meet with this requirement.

The QA documentation provided by the project lead will be reviewed by the Delta RMP to ensure that they meet the objectives of the study. The TAC will review and ensure that the QA documentation is sufficient to meet the objectives of the study during the study design development. The study design reviewed by the Steering Committee will include the TACs assessment and recommendation. At a minimum answer to the following seven questions must be provided as part of the study design:

1. What is driving the collection of the data?
2. Identify the data to be collected?
3. How will the data be organized (and managed)?
4. How will the data be documented?
5. How will data quality be assured?
6. How will the data collected be made accessible?
7. How will the data be used?

4.1.5 Supplemental Environmental Projects

There is currently no funding agreement between the DRMP and CVRWQCB; if there is an agreement in the future, the Data Management Plan will be updated to include

specifics of how Delta RMP SEP funded projects will adhere to SWB Resolution 2019-0011 and SEP Statewide Policy.

4.2 DELTA RMP ANNUAL MONITORING WORKPLANS

Monitoring priorities and study designs are assessed based on recommendations from the Steering Committee to the BOD. The Delta RMP develops study plans of varying lengths of time for monitoring areas.

Per Resolution R5-2021-0054, the Delta RMP provides an Annual Monitoring Workplan and associated fiscal year (FY) budgets (July 1st through June 30th) to the CVRWQCB by May 1 which, at a minimum, includes:

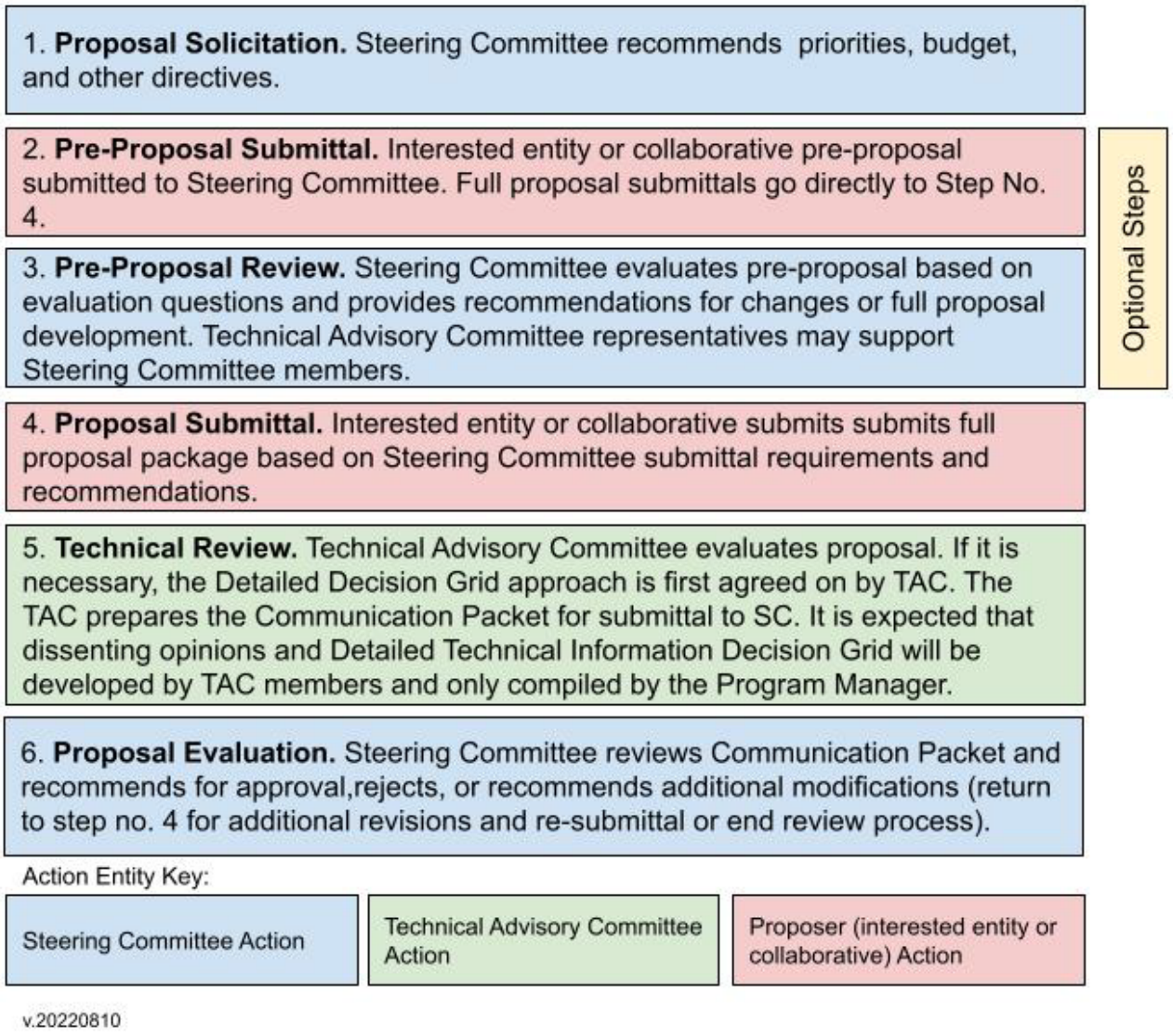
- All projects the Delta RMP will implement over the next fiscal year.
- An initial draft budget estimate for each project. The final budget shall be submitted as a separate document by June 30.
- Management, monitoring, and assessment questions to be addressed by each project in the Annual Monitoring Workplan.
- A study design to address the monitoring and assessment questions. The study design shall include:
    1. Specific hypothesis to be tested
    2. Sample locations
    3. Sample collection frequency
    4. Sample analytes
    5. Analysis methods
    6. Preliminary data deliverables
    7. Planned reports to summarize results
    8. Timeline and schedule for all of the study design elements to be completed

Individual study designs or plans are developed through the TACs per direction by the Steering Committee. The BOD approves the individual study plan which may span multiple years and may not necessarily coincide with the fiscal year. The study plans are included as appendices to the Annual Monitoring Workplan for reference. The individual study designs are included in the Annual Monitoring Workplan with details pertaining to monitoring that will occur during the fiscal year.

4.3 INDIVIDUAL STUDY PLANS AND PROPOSALS

Projects and studies seeking Delta RMP funding and/or support should go through a Delta RMP proposal process. The proposal process is established to ensure consistent and transparent evaluations of proposed studies and to ensure that studies fit into the goals of the Delta RMP. The most recent proposal process is outlined in **Figure 5** under the previous Delta RMP governance structure and includes the potential for a pre-proposal step if directed by the SC that this step is necessary. The relevant TAC will review the Decision Grid template and determine the relevant evaluation criteria prior to starting proposal reviews. The Delta RMP may revise this process to more adequately address current proposal process needs and the new Delta RMP governance structure. Until that time, the process in **Figure 5** will be used for guidance unless otherwise directed by the BOD. The full Delta RMP Proposal Process and Decision Grid document is included in **Appendix B** which was modified in 2022 from the previous March 7, 2018 version to reflect the current Delta RMP governance structure.

Figure 5. Delta RMP proposal process guidance.



At a minimum, proposal reviews should ensure that:

- Study questions/hypotheses and areas of study fit into the overall Delta RMP monitoring strategy.
- Data quality objectives (EPA QA/G-4) of the project are clearly defined.
- Temporal scope and resolution are technically sufficient.
- Logistics to acquire data (collect and analyze) are adequately defined, feasible, and technically sound.
- Costs generally fit within the confines of the budget established by the BOD. If costs exceed the budget established, additional justification for its value and why the project should be considered may be required.

As part of the proposal, the study design must establish how the policies in this document will be enacted over the course of the study. Specifically, details regarding data collection and analysis, how data are received, processed, and verified, a reference to the document containing the specific steps used to process and verify data, how and when data will be provided to the Delta RMP, the identification of an approved public data repository to which those data will ultimately be uploaded, the specific steps by which this will be achieved (especially if not through an established process, such as a Regional Data Center transfer or direct management by State Board), and the specific timeline by which data publication will occur.

4.3.1 Data Management Questions

Projects receiving funding by the Delta RMP must, at a minimum, provide the information necessary to understand the Data Management Plan and procedures to be used while implementing the project. For the purposes of the Delta RMP, this information sufficiently answered by the 24 elements of a QAPP; however, where a QAPP is not developed or provided, the study design must at a minimum provide sufficient information regarding data quality and data management at each step in the data life cycle (see **Intended Data Use and Planning Documentation Requirements** for scenarios where QAPP equivalent documentation may be required instead of a QAPP). This can be done through providing sufficient detail to answer each of the questions defined in **Table 6**. These questions may be answered within the study design itself or as an attached questionnaire.

The Program Manager will be responsible for oversight of the implementation of the Data Management Life Cycle procedures in coordination with the CVRWQCB QA Representative to ensure compliance with Resolution R5-2021-0054, Data Management policies, and consistency with planning documentation (e.g. Multi-Year Study Plan, study design, QAPP).

Table 6. Delta RMP data management questions.

Data Management Life Cycle	Delta RMP Data Management Questions	Associated QAPP Element
Plan	What is the name of the document with the details of the study plan?	--
Acquire	Who will be collecting field samples?	Element 4/A4
	What protocols will be used (provide specific steps or attach SOP)?	Element 11/B2
	What samples / matrices will be collected?	Element 6/A6
	How will the quality of data collection be assessed / monitored?	Element 14/B5
	What quality control samples will be collected and at what frequency?	Element 14/B5
	Provide the specific list of constituents analyzed by the laboratory.	Element 13/B4
	Who will be conducting the analysis?	Element 4/A4
	What applicable accreditations do the analyzing agency / laboratory have?	Element 4/A4
	How will the quality of analysis be assessed?	Element 7/A7
	What quality controls samples will be required and at what frequency?	Element 14/B5
	How will field and / or laboratory results be provided?	Element 9/A9
Process	Who is responsible for processing and checking data?	Element 4/A4
	What specific checks will be conducted on the data received (provide checklist or SOP)?	Element 23/D2
	How will data be formatted?	Element 9/A9
	What will be done when data checks discover deficiencies?	Element 19/B10
	Where will data be stored / maintained once checks have been run?	Element 19/B10
	Will any additional data verification steps be followed? If so, at what frequency and who is responsible?	Element 23/D2
	Will any data validation steps be followed? If so, at what frequency and who is responsible?	Element 23/D2
Use	How will data be analyzed?	Element 6/A6
	Are any specific data formatting or processing requirements for this analysis?	Element 19/B10
	How will the results of the analysis be reported / provided to the Delta RMP?	Element 21/C2
	How will overall data quality be assessed / summarized for the Delta RMP?	Element 21/C2
	How will the associated data be provided to the Delta RMP?	Element 9/A9

Data Management Life Cycle	Delta RMP Data Management Questions	Associated QAPP Element
Publish	How will associated data be made public?	Element 9/A9
	Will data be published to CEDEN (or NWIS)?	Element 9/A9
	Describe the pathway by which data will be loaded into CEDEN (or NWIS)?	Element 19/B10
	By when will data loading occur?	Element 6/A6
	Who is responsible for ensuring data are made public?	Element 4/A4
	How will the Delta RMP be notified data have been published?	Element 21/C2
	Will copies of reports be provided to the Delta RMP for publication on the Delta RMP website?	Element 21/C2
Archive	Where will data be stored once the report is complete?	Element 9/A9
	Will any ancillary or metadata be archived / stored long term?	Element 9/A9
	Who is responsible for archival / storage / maintenance?	Element 19/B10
	Will data or reports generated be disposed of? If so, at what time?	Element 9/A9

4.4 QUALITY ASSURANCE PROJECT PLANS

If the Delta RMP project will collect data that can be stored and publicly accessible in CEDEN, a QAPP shall be developed to provide a detailed record of the scope and objectives of data collection activities and the procedures and types of QA/QC required to meet these objectives. All QAPPs developed by or through the Delta RMP must follow the 24 Elements defined by the USEPA and adhere to the guidance and requirements of the SWRCB and as outlined in the State Quality Management Plan (QMP).

Unless otherwise approved, Delta RMP QAPPs must be developed and submitted to the CVRWQCB for review by May 1 for any upcoming projects beginning implementation within the next fiscal year (July 1 – June 30). If unanticipated projects or project updates prevent QA documentation from being developed by May 1, the timelines for QAPP development, review, and finalization should be defined in coordination with the CVRWQCB and approved by the CVRWQCB EO. All Delta RMP QAPPs must be reviewed and approved by the SWRCB QA Officer or the CVRWQCB QA Officer (in the event that this position is filled) and the CVRWQCB QA Representative. Project implementation cannot occur until the QAPP is approved or an alternative approval is received by the EO for projects where a QAPP is not required.

Separate QAPPs will be developed for individual Delta RMP projects. A single QAPP may apply to the entirety of a project's duration and does not need to be resubmitted annually for established ongoing projects (unless a revision is required). If the study plan spans multiple years, the QAPP must be reviewed annually to assess whether a revision to reflect major, substantive changes is necessary. The Program Manager is responsible for ensuring annual reviews of QAPPs occur. Small, non-substantive changes are made through QAPP amendments; however, a QAPP must be revised every three years to incorporate all updates into a single document. Amendments and revisions to QAPPs shall occur as needed according to the requirements outlined below.

4.4.1 Delta RMP QAPP Template

To facilitate consistency of programmatic requirements and standards across individual QAPPs, the Delta RMP has developed a QAPP Template which should be used for developing QAPPs. The QAPP Template is prepopulated with certain program-level descriptions (e.g., Delta RMP governance structure), requirements (e.g., language ensuring consistency with Resolution R5-2021-0054), and standards. The QAPP Template also contains guidance language to aid individuals developing a Delta RMP QAPP in ensuring all required project information is included in the final document.

The DMAC is responsible for reviewing and providing feedback on the Delta RMP QAPP Template to be used in the development of future QAPPs. Updates to the QAPP Template shall be made in coordination with the DMAC and the CVRWQCB QA Representative; the SWRCB QA Officer will be consulted on updated to the QAPP Template as needed. The QAPP Template must remain consistent with USEPA and SWRCB guidance documents; all QAPPs developed with the template will still require approval by all signatories prior to project implementation.

All new QAPPs developed by the Delta RMP should follow the QAPP Template format. In the event that the use of the QAPP Template is not appropriate for the development of a QAPP, the decision should be made in coordination with the Delta RMP Program Manager, the Delta RMP Program QA Officer, the CVRWQCB QA Representative, and the DMAC members.

4.4.2 QAPP Amendments

During the implementation of a project, discrepancies between the elements planned within the QAPP and the most feasible or effective implementations can arise. The study design will anticipate as best as possible logistical, temporal, and weather constraints that may affect the study design to allow for flexibility. However, not all such circumstances can be predicted resulting in a discrepancy between the planned elements and the scenario at the time of implementation. Such discrepancies may warrant an amendment to the QAPP to ensure the document is most accurately reflecting the project implementation. Amendments to QAPPs shall be completed using the Delta RMP QAPP Amendment Form (**Appendix C**). Documentation of QAPP amendments must at a minimum contain:

- The project and QAPP version number being amended,
- The specific section(s) of the QAPP to which the amendment applies,
- The reason why the amendment is needed,
- Details of the specific changes being made.

The changes in a QAPP amendment must be detailed using track changes notation. All changes should be highlighted, with added information indicated as regular text with yellow highlights, and deleted information indicated as stricken through with yellow highlights. Information being added and removed must be included in the details of changes on the QAPP Amendment Form.

The Delta RMP Program Manager is responsible for ensuring QAPP amendments are created and approved as needed. The Program Manager is responsible for ensuring that all amendments are communicated with the TAC and appropriate stakeholders including

the Steering Committee Chair and BOD. All QAPP amendments will be developed in coordination with the Delta RMP QA Officer, the CVRWQCB QA Representative, the SWRCB QA Officer, and the appropriate TACs, project personnel, and laboratory or field staff. Amendments must be reviewed and approved by all signatories affected by the specific portions of the QAPP updates; approval will be indicated via electronic signature from all parties. Once signed by all parties, the amendment form is considered the official documentation of the updated procedures or requirements; the changes do not need to be reflected in a new version of the entire document to be redistributed to all participants in Element 3 of the QAPP.

Amendment forms will be tracked and filed by the Delta RMP and can be requested from the Program Manager at any time.

4.4.3 QAPP Revisions

A QAPP revision occurs when major, substantive changes to the project will be implemented or after the three-year effective window of a QAPP; revisions require an update and resubmittal of the entire QAPP. Revisions will be reviewed and approved by all signatories on the document. When complete, a revision will be re-distributed to all individuals identified in Element 3 of the QAPP.

Individual QAPPs will be reviewed annually to determine if a revision is necessary; however, a QAPP must be revised every three years at a minimum. The Program Manager is responsible for ensuring annual reviews occur. Revisions and amendments should be tracked as outlined below in **QAPP Version Control**.

4.4.4 QAPP Version Control

All Delta RMP QAPPs should include a version number on the title page of the document. All documents must also contain a tracking of revisions, with the date and a brief description of all amendments and revisions previously approved.

The version numbering should contain a number with a single decimal place. The number prior to the decimal point should increase as full document revisions occur, with the original, approved document created prior to project implementation beginning as Version 1.0. The numbers after the decimal point should increase as amendments are made to the document. For example, a QAPP labeled Version 1.3 has not been revised since the original approval but has been updated via three approved amendment forms; QAPP version 2.1 has undergone one revision and one amendment since that revision. In the event that a tenth amendment form is created, the document must be revised to capture all previous nine amendments and should be resubmitted to the project signatories for a full review and revision.

Approved amendment forms are attached to QAPPs and tracked in the revision history as they are generated to provide ongoing documentation of minor changes; the changes documented in the amendment form are incorporated into the full QAPP upon the next revision of the document.

4.5 DEVIATIONS

Deviations are events or actions that do not occur according to the requirements outlined in the Delta RMP Annual Monitoring Workplan, Data Management Plan, or the applicable QAPP. Proper documentation must be provided if any deviations from any of the established procedures or requirements of the planning documents outlined above occur during project implementation. This includes deviations from the Annual Monitoring Workplans, project QAPPs, or this Data Management Plan. Notification of these deviations to the CVRWQCB must occur according to the requirements outlined in Resolution R5-2021-0054. Deviations to the QAPP that can prevent project and data quality objectives from being met shall be described in the QAPP and must be approved by the CVRWQCB QA Representative, the SWRCB QA Officer, or the CVRWQCB QA Officer prior to implementation. When prior approval is not possible, the deviations must be reported to the CVRWQCB QA Representative within seven calendar days of the Delta RMP staff, BOD, participants, or contractors becoming aware of the deviation. Communication regarding a deviation can occur by phone or email depending on the time sensitivity of the issue; it is then followed up with a formal deviation form that is signed by all parties with responsibilities outlined in the deviation and corrective actions.

All deviations are reported in quarterly reports, as well as discussed in the Annual Report due February 1 of each year (see **Annual Reporting**). This discussion should address the corrective actions that were established at the time of the deviation and an assessment of how those corrective actions have or have not solved the issue that originally caused the deviation, thereby assuring that deviations do not occur frequently in the future.

If a discrepancy is discovered during a review, the Program Manager and Program QA Officer will discuss the discrepancy with the personnel responsible for the activity. The discussion will include the accuracy of the information, potential cause(s) leading to the deviation, how the deviation might impact project data or data quality and the corrective actions that might be considered. If anticipated, all deviations from the respective planning document must receive approval from the CVRWQCB QA Representative, the SWRCB QA Officer, or CVRWQCB QA Officer prior to implementation; when unanticipated, deviations will be reported to the CVRWQCB QA Representative within seven calendar days of the Delta RMP staff, BOD, Delta RMP participants, or Delta RMP contractors becoming aware of the deviation, per Resolution R5-2021-0054. The

Program Manager is responsible for documenting and communicating all deviations from this QAPP to the TAC and appropriate stakeholder groups.

Once QAPP deviations are identified and a resolution determined, the process is documented with a Delta RMP QAPP Deviation Form. At a minimum, deviation forms must document:

- A description of the deviation that occurred
- Reason for the deviation
- Impact on the present and completed work
- Corrective actions taken as a result, by when and by whom

Once completed, deviation forms are reviewed and approved by the CVRWQCB QA Representative, and, on approval, circulated for signatures of all involved parties. The Program Manager will follow up with the responsible party tasked with implementing the corrective actions and track when they are performed. Deviations and corrective actions are reported for the previous fiscal year in the Delta RMP Annual Report that is submitted annually to the CVRWQCB on February 1.

5 DATA ACQUISITION GUIDELINES

5.1 FIELD COLLECTION

The methods for sample collection, preservation, and storage used by the Delta RMP, its contractors, and/or the entities implementing a study or project must follow established accepted procedures such as those established by the guidance regulations of the USEPA, the USGS, the Standard Methods for the Examination of Water and Wastewater or other recognized and/or published sources. Protocols developed for specific projects are described in Standard Operating Procedures (SOPs), Sampling and Analysis Plans (SAPs), and/or project QAPPs. Where these items are not required, a valid reference to the established protocols being employed must be provided as part of the project planning documentation.

All data collection taking place through projects or studies under the Delta RMP must provide field method documentation, or a reference to the acceptable established methods being employed.

5.2 LABORATORY SERVICES

The analytical methods required for analysis by contract laboratories are project-specific and should be established and described in the quality assurance planning documents for each individual project. Where possible, the laboratory methods used should follow established protocols, such as those promulgated by the USEPA, Standard Methods for the Examination of Water and Wastewater, USGS, American Society for Testing and Materials (ASTM), and Association of Official Analytical Chemists (AOAC). When these methods are conducted by a commercial laboratory, that laboratory should have ELAP accreditation, if offered, for analysis of samples under those methods. ELAP accreditation, if offered, for analysis of samples by a non-commercial laboratory is strongly encouraged. If non-commercial laboratories are not certified for the analysis by ELAP, or alternative test procedures are to be used, the laboratory shall submit at least annually performance-based method validation data package for review by the Program Manager and the SWRCB QA Officer. The SWRCB QA Officer will review this information to ensure that the methods are aligned with the quality management policies of the Water Boards (as defined in the SWRCB Quality Management Plan).

The SWRCB QA Officer review should include an assessment of the validation and performance data for the method that will be used for analysis. The data package submitted for review should include:

- Method Detection Limit (MDL) study(ies) data for all analytes, including:
  - A summary of the MDL procedure that is followed by the laboratory
  - Date of MDL determination
  - Spike amount used in the determination
  - Measured result for each replicate in the MDL determination
  - MDL calculations
- Minimum Reporting Limit (MRL, or quantitation limit) verification study for the matrix being assessed
- Summary of the process or protocol for the MRL verification that the laboratory follows
- Acceptance criteria used by the laboratory
- Example data over time that shows the raw results of the verification process.
- Initial precision and recovery (IPR) data, including
- Spike amounts used in the determination
- Standard deviation or relative standard deviation (RSD) of the measurements
- Acceptance criteria used by the laboratory
- QC samples, where applicable
- The laboratory acceptance criteria for the QC samples provided
- Linear calibration ranges

For all laboratories analyzing samples for a Delta RMP project, procedural documentation must be made available to Program staff when requested including SOPs. The Delta RMP keeps SOPs on file and reviews them for acceptability of project requirements. At a minimum, SOPs must be provided to the SWRCB QA Officer for review and approval. Proprietary SOPs provided to the Delta RMP will be kept confidential.

5.3 DATA DELIVERABLES

All data deliverables will be provided to the Delta RMP and subsequently to the CVRWQCB within the timelines required in Resolution R5-2021-0054 unless otherwise approved and stated in the QAPP. Resolution deadlines are outlined below in **Table 7**.

Table 7. Data deliverable requirements per project as required by R5-2021-0054.

Data Deliverable	Description	Time Period	Due Date	Frequency
Preliminary Raw Data	Unverified/raw results provided by the laboratory	Previous Event	60 calendar days (from sample analysis)	Per Event
Exceedances	Any monitoring results that exceed the water quality metrics provided by the CVRWQCB	Previous Event	60 calendar days (from sample analysis)	Per Event
Finalized Data (Stage 2 Data)	Results provided in an approved format, having been verified and completed any corrective actions, if applicable	Previous Event	6 months (from sample analysis)	Per Event
Published Data	Upload data to CEDEN (or other EO approved public database)	Previous monitoring period	6 months (from last sampling event in QAPP)	Per Monitoring Period [1]

[1] A monitoring period as defined in the project planning documents. Monitoring periods, for example, may occur on a fiscal year, a water year, or encompass the completion of the study.

All data should be provided to the Delta RMP in an electronic data deliverable (EDD) format. Wherever possible, EDDs should be formatted for CEDEN comparability; however, at a minimum, data must be made available in a machine-readable format that can be processed electronically and uploaded into a database. Specific EDD formats should be defined in the project **Planning** defined above. In addition to the EDD formats, data may also be provided by laboratories or project personnel in the form of PDF laboratory reports where necessary and/or agreed upon in the planning stage.

Data deliverables from the Delta RMP to the CVRWQCB and project stakeholders occur in several stages based on the level of review the data and/or datasets have undergone. These stages are defined below and outlined in **Figure 6** for data managed through the Central Valley Regional Data Center (CV RDC).

5.3.1 Preliminary Raw Data

Preliminary data are defined as data provided by the laboratory but not yet processed, reviewed, or verified by project staff according to the data management protocols established for the project. The Program Manager often provides preliminary data to

stakeholders upon receipt as a means of providing initial information regarding the status of project deliverables and provisional results. When possible, the Program Manager or a delegate uploads preliminary results to Delta RMP electronic data sharing platform and at a minimum makes data available to the respective TAC and the CVRWQCB as soon as possible to ensure transparency of data receipt and processing procedures. The Program Manager or a delegate also emails preliminary results directly to the CVRWQCB as a notification of their availability for review.

Preliminary data are informative but are not meant to be considered finalized or treated as properly qualified project data. Raw data files (e.g., preliminary data) may remain accessible to project stakeholders via data sharing platforms but should not be used in place of data that have gone through any of the stages described below. The data review process includes three stages of data and is performed by the data management personnel identified in the QAPP or other data management documentation.

5.3.2 Stage 1 – Reviewed Data

Reviewed data are of higher quality than preliminary but have not yet undergone the steps necessary for finalization. Reviewed data (Stage 1) have undergone data verification checks required by the data management protocols for the project as defined in the QAPP and/or study plan. Reviewed data may still be undergoing further verification, may be subject to review by the appropriate TAC, or be subject to updates by laboratories and/or the data providers pending ongoing discussions or corrective actions. This data will be shared on the DRMP Droplet and will be clearly labeled so as to distinguish it from the preliminary version. See **Data Processing** for more details regarding data review procedures.

For data managed through the CV RDC, the Data Manager loads reviewed data into the database, but does not apply compliance codes (i.e., the Compliance Code is “Pend” indicating pending QA Review). The Data Manager uploads the reviewed EDD with indicators regarding updates and adjustments to the sharing platform; the Data Manager can generate exports of reviewed data from the CV RDC on request.

5.3.3 Stage 2 – Verified Data

Stage 2 data have gone through initial and any secondary verification steps established by the project requirements. In order for data to be classified as Stage 2, all outstanding questions and corrective actions must be resolved or concluded.

For data managed through the CV RDC, verification occurs on three levels: results, batches, and datasets. The Program QA Officer or a delegate review the data loaded in the CV RDC for compliance with the project QAPP. Data that have undergone secondary

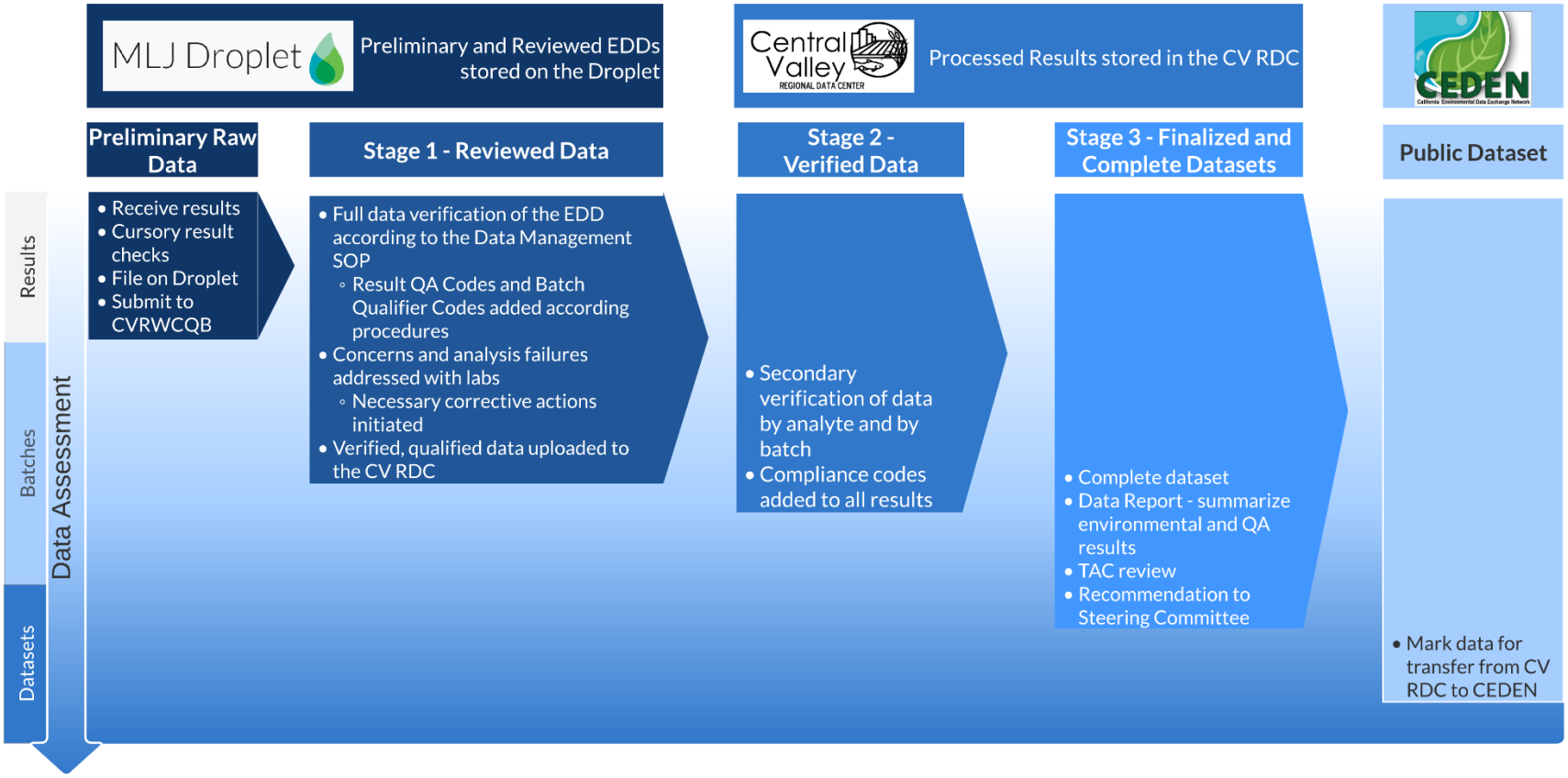
verification and have the appropriate compliance codes applied are considered “final” on a results level and on a batch level. However, the full dataset assessment cannot occur until all the samples for the monitoring period (as defined in the planning documents) have been collected and have undergone the process for finalization. The Program Manager is responsible for providing result-level exports of data that have been processed through the secondary verification level within 6 months of sample analysis or the last sampling event date in the QAPP, per Resolution R5-2021-0054 (**Figure 7**).

5.3.4 Stage 3 – Finalized and Complete Datasets

Finalized and complete datasets (Stage 3) constitute an entire dataset that has been processed through Stage 2 for the project. The main distinction between Stage 2 and Stage 3 datasets is that data cannot move to Stage 3 without the complete dataset for the project having been processed through Stage 2. Data in Stage 3 can be assessed together for the data quality indicators (DQIs) required in the QAPP or project planning document in preparation for becoming publicly available through the appropriate online database such as CEDEN.

For data being loaded to CEDEN through the CV RDC, Stage 3 data have undergone secondary verification and have the proper CEDEN Compliance Code applied in the CV RDC database for all data under the same CEDEN Project Code. The Program Manager and Program QA Officer conduct QA assessments on complete and finalized datasets as defined in **Data Use and Analysis**, after which they can be approved for **Data Publication**.

Figure 6. Data stages for results managed through the CV RDC.



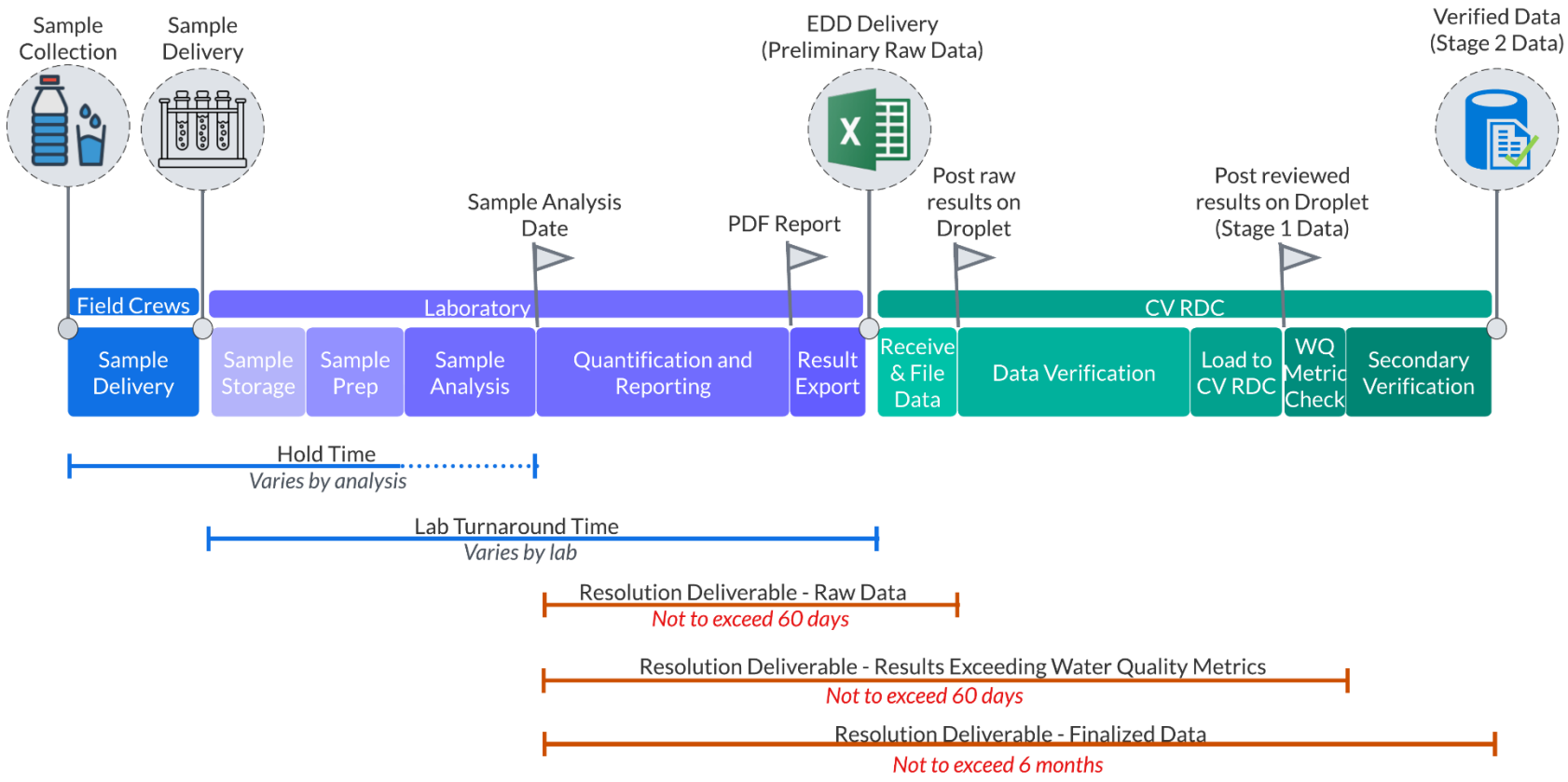
5.3.5 Data Deliverable Timelines

Where laboratories are contracted by the Delta RMP, all established data deliverable turn-around times (TATs) must ensure the data can be received within the timelines of Resolution R5-2021-0054 unless approval for a different timeline is otherwise obtained from the CVRWQCB EO. Note that TATs may be longer than the Resolution timelines due to additional sample preparation requirements, such as tissue homogenization. A TAT is defined as the period of time from the receipt of the sample by the laboratory to the provision of results back to the Delta RMP. Within the confines of the agreed-upon TAT, the analyte-specific hold time dictates the required timelines that must be met by the laboratory between sample receipt and sample analysis; the Resolution timelines are based on the sample analysis dates and therefore dictate requirements between sample analysis and reporting of results, as shown in **Figure 7**. The expected TATs should be communicated with the laboratory to ensure compliance with the Resolution, QAPP and/or Annual Monitoring Workplan deadlines for each project and to meet the hold time requirements outlined in the project specific documentation.

Where necessary, extension to the Resolution timelines may be granted based on situation specific rationale and with the approval of the CVRWQCB EO.

The status of data deliverables for individual projects will be communicated with the TAC members, and Delta RMP stakeholders, including the CVRWQCB. The goal of communication regarding deliverables is to keep Delta RMP participants, regulatory agencies, and other stakeholders informed regarding the status of project data. The method by which this communication occurs, and tools being used by project staff to facilitate this communication, should be clearly defined in the project planning documentation and made readily available to those expected to use them. The expectation and timelines for receiving the intermediate data deliverables described above must be documented prior to project implementation.

Figure 7. Data finalization process and deadlines for Delta RMP data managed through the CV RDC.



5.4 DATA FORMATTING REQUIREMENTS

Data formatting requirements are defined by the destination database to which they will ultimately be uploaded. Wherever possible, Delta RMP data deliverables should be provided in a CEDEN-comparable format to help ensure validity and consistency with other projects and datasets. The CEDEN data templates can be found on the CEDEN website (http://www.ceden.org/ceden_datatemplates.shtml). All data formatting expectations should be established with the data providers and/or laboratories prior to entering into a contract; where possible, the data formatting should be specified in the agreement to provide services.

Where data formatting requirements cannot be met, a detailed plan to reformat the data and the verification steps to guard against transcription errors must be clearly defined in the project planning documents.

6 DATA PROCESSING

6.1 DATA MANAGEMENT PROCEDURES

Data management procedures include the steps by which data is received from the laboratory and/or data provider, reviewed, and transferred or uploaded into the appropriate database(s). The procedures to complete each of these steps and the individuals responsible should be clearly defined in the project planning documentation.

6.2 DATA VERIFICATION

Data verification is the process of evaluating the accuracy, consistency, validity, and completeness of a specific dataset against the pre-determined data quality requirements. The specific steps for completing these evaluations should be established in a QAPP and/or the appropriate project planning documents. Where the specific steps to complete these evaluations are not required to be developed for the Delta RMP, specific check lists or references to established data verification steps should be provided. If not established in a QAPP, the data handling and review procedures, the tracking of completion of these procedures, and the individuals responsible should be defined in the project planning documentation.

At a minimum the data verification steps must include an assessment of the project results against the established project measurement quality objectives (MQOs), along with documentation regarding how samples that do not meet MQOs are flagged and handled.

Data verification for projects managed and implemented by the Delta RMP will take place on two levels: initial verification and secondary verification.

The purpose of the initial verification is to ensure that the original data provided by the laboratory includes the required data fields, formatted correctly, and flagged according to the QAPP requirements. Initial verifications are done by the data managers responsible for receiving the original data from the laboratory and communicating with the laboratory regarding any missing values or inconsistent reporting of data.

The purpose of the secondary verification is to perform a second check of the data against the MQOs in the QAPP to ensure that all qualifying codes are applied consistently throughout the dataset on both a result and batch level. The secondary verification is completed by the Program QA Officer or a delegate independent of data generation as specified in the QAPP.

The deliverables and timing of these verification steps are defined above in **Data Deliverables**.

The Program Manager and Program QA Officer are responsible for ensuring data verification occurs according to the project and program requirements. The general data verification procedures for projects under the Delta RMP should include:

- Verification of the results against the original sample collection records to ensure all expected results are received.
- Verification of sample processing and analysis information against the requirements outlined in the QAPP or the project study plan; this should include checks for:
- Expected analytes,
- Expected methods,
- Reporting limits and minimum detection limits,
- Batch definition,
- Reporting units, and
- Test requirements.
- Verification that data are formatted in a way that is consistent with the project requirements and the business rules of database into which the dataset will be loaded.
- Verification that all quality control evaluation calculations are complete (e.g., RPDs).
- Verification of hold time compliance.
- Verification of all environmental and QC sample results against the MQOs outlined in the QAPP or project planning documents, and, where results do not meet the MQOs, verification that the proper data qualifier is applied to the record. Checks against MQOs should include an evaluation of:
- QC sample frequency,
- Detections in blank samples,
- Recoveries of spiked samples and surrogates, and
- Precision metrics of duplicate samples.
- Verification of hold time compliance.
- Verification that all records are unique, and no duplicated data exist in the dataset.
- Verification that all required fields are completed.

Data verification should be sufficiently documented and, where failures are observed, result in the correct application of qualifier flags as defined according to the project planning documents and valid values associated with the database to which the results will be uploaded. Data deficiencies that imply a systematic failure and/or affect the usability of the data will be evaluated by the Program Manager, Program QA Officer, and CVRWQCB QA Representative in coordination with the appropriate TAC, or through a project-specific data validation process as discussed below.

6.3 DATA VALIDATION

Data validation is an analyte- and sample-specific process that extends the evaluation of data beyond method, procedural, or contractual compliance (i.e., data verification) to determine the analytical quality of a specific dataset. Data validation includes a determination, where possible, of the reasons for any failure to meet method, procedural, or contractual requirements, and an evaluation of the impact of such failure on the overall data set (EPA QA/G-8).

Data validation steps provide a broad assessment of data compliance with project requirements, usability, and suitability for their intended use. The goal of data validation is to evaluate if the data quality requirements established in the project planning documents have been achieved and to determine the impact on data quality of those that were not met. Such assessments may be conducted as part of long-term interpretive reports, trend analyses, or ad hoc quality assessments as requested by the Steering Committee or BOD. Project-specific validation may occur for projects that require additional, project-defined scrutiny to assess usability. At this time there are no programmatic data validation requirements for the data generated by Delta RMP projects.

Project-specific data validation requirements should be defined in the project planning documents and established based on the needs of the specific project. Data validation includes similar metrics as those assessed during data verification; however, data validation may take in more data surrounding the project including an assessment of trends in concentrations (even if the data meet MQOs), comparison of QC results to environmental samples and other QC samples beyond required flagging rules, and assessment an evaluation of how qualified data may affect data usability.

General data validation procedures that may occur could include:

- An assessment of contamination
    - This may include an evaluation of observed contamination in field or laboratory blanks in relation to observed concentrations in the environmental samples, the method detection limit, and within the context of the specific analyte and/or analysis.

- An assessment of accuracy
    - This may include an evaluation of positive control samples against the expected analytical results and the established control limits. Where failures occur an assessment of a single control sample in relation to other controls within the batch and the implications regarding the possibility of false positive or negative environmental results.
- An assessment of precision
    - This may include an evaluation of duplicate samples against the established level of acceptable variability and within the context of the measured environmental results, the method detection limits, any other measures of repeatability associated with the samples, and any possible environmental and laboratory factors contributing to observed variability.
- An assessment of sample handling in the field and laboratory and the impacts of any sample processing failures on the results.

6.4 DATA DEFICIENCIES

Final datasets (generally defined by a CEDEN project code or a single monitoring cycle) should be presented to and reviewed by the appropriate TAC. In the absence of a defined data validation process, at a minimum any significant data quality control failures and data deficiencies should be assessed by the experts of the appropriate TAC in coordination with the Program Manager, Program QA Officer, and CVRWQCB QA Representative within the context of the intended data use and the project goals. Such deficiencies should be communicated to data users, stakeholders, the Steering Committee and BOD as a result of this review.

Most data deficiencies are anticipated to be addressed through the deviation documentation process (see **Deviations**). This process ensures that all deviations from the project planning documents, including those that occur for legitimate or unavoidable reasons that cannot be addressed through corrective actions (e.g., an incomplete dataset due to sample failures caused by the COVID-19 pandemic) are sufficiently documented.

The process for identifying, communicating, and documenting data rejection decisions is outlined in **Figure 8**. The decision to accept or reject data will be made jointly by the Program QA Officer, the Program Manager, the CVRWQCB QA Representative, and if necessary, SWRCB QA staff. Data rejections will be documented with a deviation form or QAPP amendment and require the approval of the QA Representative and/or the SWRCB QA Officer. Decisions regarding accepting and rejecting data should also be informed by input from the TAC.

There are three time-steps where data may be identified for rejection: 1) identified by the laboratory prior to reporting to the Delta RMP, 2) during data verification (either Stage 1 or Stage 2), and 3) during the finalization of the data through the TAC process (Stage 3). Missing analytical records will be discussed in the Delta RMP Annual Report and Data Reports; rejection decisions may also lead to amendments to data management procedures and/or the QAPP.

- Laboratory Review: The following situations will be communicated to the Program QA Officer, the Program Manager, the QA Representative, and, if necessary, the SWRCB QA Officer and documented in the laboratory report. The QA Representative or the SWRCB QA Officer will determine if a deviation form or other documentation is necessary.
    - The laboratory identifies that the analysis did not meet performance standards (e.g., instrument failure) or a quality control failure that results in the inability to accurately quantify the analyte.
    - When the QAPP (or equivalent quality assurance documentation) does not clearly identify the performance standard not being met or quality control failure, the laboratory will provide a justification for the recommendation to omit the results from the reports.
- Data Management Verification: data verification occurs when the data are reviewed and flagged by the Data Manager (Stage 1) and again when the Program QA Officer reviews and verifies that data are flagged according to this QAPP (Stage 2).
    - Stage 1 – the Data Manager identifies egregious or numerous failures of MQOs during data review and notifies Program QA Officer, the Program Manager, the QA Representative, and, if necessary, the SWRCB QA Officer about the concern and potential for data rejection.
    - Stage 2 – the Program QA Officer identifies a situation during the secondary verification procedures where rejection of data is recommended.
    - In both cases, the Program QA Officer, the Program Manager, the QA Representative, and, if necessary, the SWRCB QA Officer will determine if the data should be rejected. The QA Representative or the SWRCB QA Officer will determine if a deviation form or QAPP amendment is necessary.
- TAC Review: the TAC will review the finalized dataset (Stage 3) and associated Data Report to assess the quality of the data relative to the project goals. During this review, TAC members may identify project-level data quality concerns that were not previously identified by the laboratory, Data Manager, or Program QA

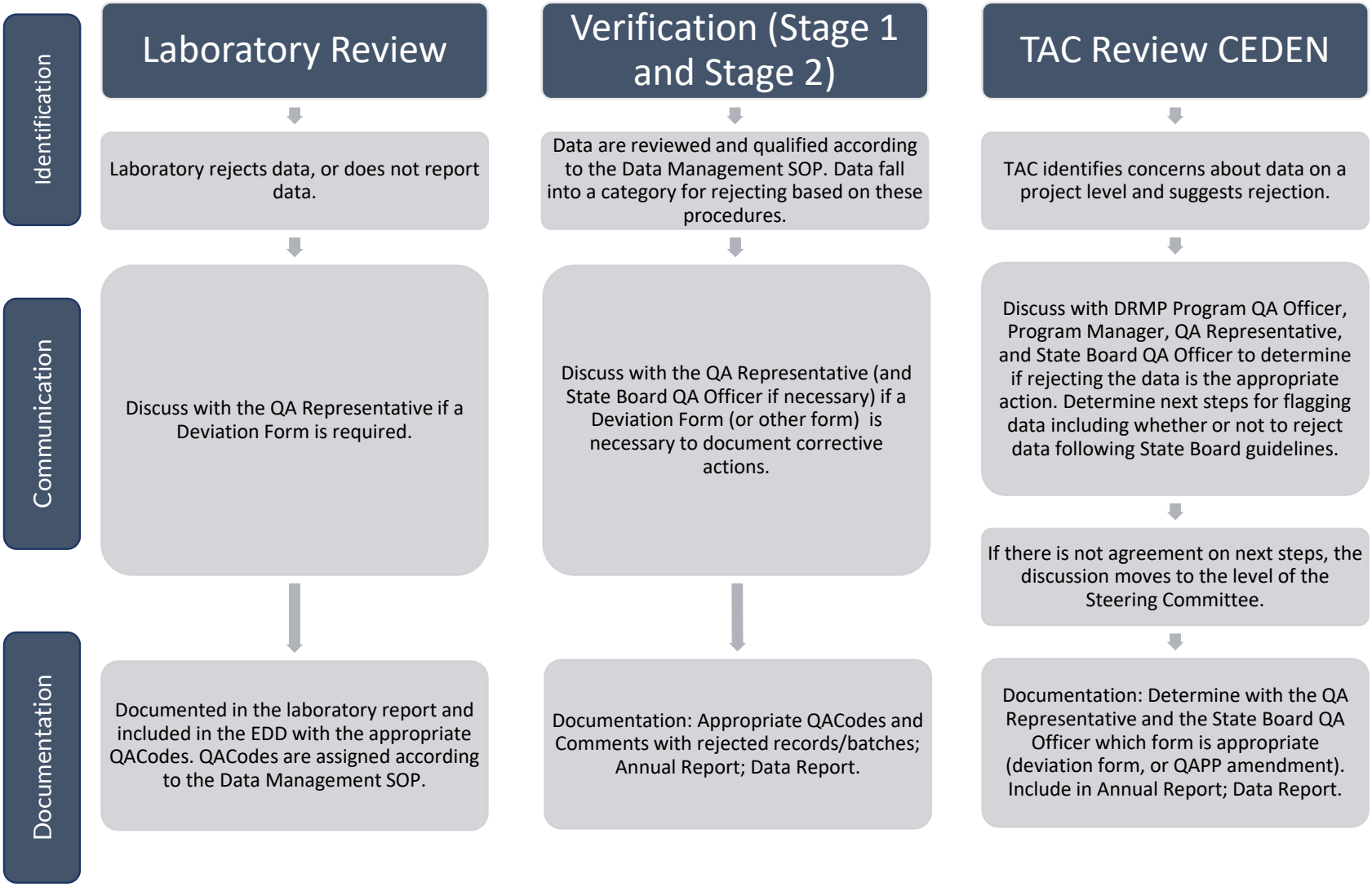
Officer. These situations will be communicated to the Program QA Officer, the Program Manager, the QA Representative, and the SWRCB QA Officer to determine if the results should be flagged and/or rejected to address the concern. The QA Representative or the SWRCB QA Officer will determine if a deviation form or QAPP amendment is necessary.

If the Program QA Officer, Program Manager, CVRWQCB QA Representative, and SWRCB QA Officer agree to reject, qualify, or not publish data, the agreed upon next steps will be documented, implemented, and communicated to the TAC and Steering Committee. If the Program QA Officer, Program Manager, CVRWQCB QA Representative, and SWRCB QA Officer cannot agree on whether to reject, qualify, or not publish data, the discussion will be elevated to the Steering Committee for a recommendation, and then on to the CVRWQCB EO and DRMP Executive Committee for discussion prior to a final decision by the CVRWQCB EO.

In the case where the Program QA Officer, Program Manager, CVRWQCB QA Representative, and SWRCB QA Officer cannot agree on whether to reject, qualify, or not publish data, two short memos, each authored by the proponents of the solution and describing the issue and proposed resolution, will be provided to the Steering Committee Chair for dissemination to the Steering Committee and discussion at the next Steering Committee meeting. The Steering Committee will be asked to provide advice and/or make a recommendation to the BOD/Executive Committee concerning the data. As described in the Steering Committee Responsibilities and Voting language, consensus on a recommendation may come from an informal vote or simple question such as "Is any SC member opposed to a recommendation?" If there is clear consensus, the recommendation will be included in the meeting summary as being reached by consensus and that no vote was needed. If the Steering Committee members cannot come to consensus on a recommendation, the Steering Committee member(s) that are not in agreement should put forth a workable compromise to see if consensus can be gained. After discussion, if consensus cannot be gained informally, the Steering Committee Chair should ask for a recommendation to vote on (i.e., moved and seconded by SC members). Voting should be recorded as green (in favor), white (abstain), yellow (stand aside), and red (opposed/block). A single block means that consensus has not been achieved. Majority and minority opinions, reservations, and oppositions will be noted verbally at the meeting, including the member who has made such recommendations, and documented in the meeting summary.

Following the Steering Committee meeting, the Steering Committee Chair and the CVRWQCB Steering Committee member will provide the two memos and communicate the Steering Committee's recommendation (either consensus or non-consensus) to the CVRWQCB Executive Officer. The CVRWQCB Executive Officer will consult with the DRMP Executive Committee prior to making a final decision.

Figure 8. Process for identifying, communicating, and documenting data rejection decisions.



The process and specific criteria by which data can be determined as deficient enough for rejection should be defined in the project planning documents. Where necessary for the project goals, secondary criteria for egregious data quality violations can be established as a part of data validation procedures to evaluate usability (e.g., a project MQO for precision may be an RPD of 25%, whereas the secondary criteria may dictate that an RPD greater than 50% should result in rejection of samples). Data management documentation should include these criteria to be reviewed by the TAC, Program Manager, and Program QA Officer and approved by the CVRWQCB QA Representative and SWRCB QA Officer in addition to procedures for how to manage and store rejected data.

7 DATA USE AND ANALYSIS

7.1 DATA REPORTS / QUALITY ASSURANCE ASSESSMENT

Upon completion of all required data verification and validation procedures, complete and final datasets (generally defined by a CEDEN project code or a single monitoring cycle) should be presented in the form of a Data Report. A Data Report provides a comprehensive assessment of what was completed and how it compares to the planned expectations. These reports address the following items:

- What data were collected?
- What methods were used (sample collection, sample preparation, analytical methods)?
- What were the results?
- Were any deviations or QA issues identified and/or resolved?

A crucial element of the Data Report is an evaluation of the quality of the dataset as a whole in the form of a QA Assessment. The purpose of the QA Assessment is to identify the data quality goals established for the data in the QAPP or project planning documents and evaluate how the data received compared to these objectives. The QA Assessment includes:

- An overview of the data verification and, if applicable, validation procedures used
- An accounting of the data that were successfully verified/validated
- An assessment of completeness, which may include:
    - Planned samples successfully collected, transported, and analyzed by the laboratory
    - Frequency of required quality control samples
    - Sample batch requirements
- An assessment of specific project MQOs, which may include:
    - Contamination
    - Precision
    - Accuracy
    - Test acceptability
- An assessment of sample handling and preservation

- An overview of specific corrective actions taken as a result of failure to meet MQOs or project requirements

The completion of a Data Report at the prescribed project interval is overseen and coordinated by the Program Manager. The QA Assessments are overseen by the Program QA Officer. The QA Assessments are done on an entire dataset as defined by the study design and/or QAPP (e.g., a single water year, the conclusion of a study); intermediate assessments for the review of project requirements or to meet other reporting deadlines may be conducted as well. The QA Assessments are presented to the TAC, assessed by the Steering Committee for recommending approval, and approved by the BOD.

7.2 ANNUAL REPORTING

In accordance with Resolution R5-2021-0054, an Annual Report shall be submitted by February 1 of each year by the Delta RMP for the previous fiscal year. This report summarizes all monitoring projects or studies conducted during the prior fiscal year. The report will include:

- A list of all publicly available datasets with applicable data (including data and metadata)
- Explanations for why any aspect of the Annual Monitoring Workplan was not completed
- Any deviations from the Annual Monitoring Workplan, Data Management Plan, or the QAPP.
- A quality assurance section that identifies and describes all QAPP deviations and any other project deviations that impacted the quality of the Delta RMP data in order to ensure data are of known and documented quality and includes the following assessment for monitoring that occurred within the previous June 30 to July 1 FY period:
    - A list and description of all deviations to the QAPP
    - The corrective action(s) taken to address the deviation(s)
    - A description of how the Delta RMP monitors the effectiveness of any corrective actions and ensures any deviations do not occur frequently in the future
    - A summary of dataset completeness, precision, and accuracy
    - A list and description of sample comparisons or tests that did not meet minimum test acceptability criteria for analyses or were considered invalid

- Results for all analyses completed during the reporting period and comparison of results to previous year's observations, if applicable
- A list of monitoring data (and associated metadata) that do not meet predetermined QC measures and MQOs

The quality assurance section of the Annual Report may reference a previously completed Data Report containing a QA Assessment provided each of the above items are sufficiently addressed. If no previously completed assessment is available for data collected within the previous FY, then the Annual Report assessment will be completed on those data in addition to any future evaluations of the dataset as a whole.

The Program Manager is responsible for compiling the Delta RMP Annual Report, and for obtaining the necessary summaries, information, and available data from individual project managers.

In addition, quarterly reports will also be submitted in accordance with Resolution R5-2021-0054. The Delta RMP reporting requirements outlined in Resolution R5-2021-0054 are summarized below in **Table 8**. Though less focused on the data collected by individual projects, the quarterly reports include an accounting of deviations that occurred within the quarter for which the report is being generated. Any projects receiving SEP funding will also provide a quarterly accounting of the total samples collected and analyzed during the previous quarter as a part of the SEP quarterly reporting. Quarterly and Annual Reports required by Resolution R5-2021-0054 are submitted to the CVRWQCB by the dates specified in **Table 8**, but do not require approval by the CVRWQCB EO. Annual Reports are provided to the BOD prior to submittal to the CVRWQCB.

Table 8. Delta RMP reporting requirements from R5-2021-0054.

DELIVERABLE	LEVEL	TIME PERIOD	DUE DATE	DESCRIPTION	FREQUENCY
Annual Report	DRMP	Previous July-June	February 1	• Summary of projects conducted during prior fiscal year, • List of public datasets, • QA section (completeness, precision, and accuracy)	Annually
Quarter 1 Report	DRMP	July-September	November 1	• Decisions made by the BOD, • Challenges encountered (deviations), • Changes to foundational documents, • Policy/procedure changes.	Quarterly
Quarter 2 Report	DRMP	October-December	February 1		
Quarter 3 Report	DRMP	January-March	May 1		
Quarter 4 Report	DRMP	April-June	August 1		

Deliverable	Level	Time Period	Due Date	Description	Frequency
Quarter 1 SEP Report	Project	July-September	November 1	• Summary of project progress, • Current expenditures for each task, • Total samples collected and analyzed, • Indication on reports and website project received SEP funds	Quarterly, when SEP funding is used
Quarter 2 SEP Report	Project	October-December	February 1		
Quarter 3 SEP Report	Project	January-March	May 1		
Quarter 4 SEP Report	Project	April-June	August 1		

7.3 INTERPRETIVE ASSESSMENTS AND STUDIES

Large assessments of trends and interpretation of data collected by the Delta RMP should be addressed through Interpretive Reports. The general differences between a Data Report and Interpretive Report are summarized in **Table 9**. Whereas the more frequent Data Reports provide an accounting of the data that were collected and an assessment of their quality according to the requirements set out at the beginning of the project, an Interpretive Report provides a broader assessment of the meaningfulness of the data collected by the project within the context of the water quality concerns of the monitoring sector and overall water quality issues in the Delta. An Interpretive Report may achieve this by including any of the following elements:

- An evaluation of Management and Assessment Questions identified during project planning
- An evaluation of hypotheses tested using data collected
- An assessment of what the data indicate regarding water quality
- Recommendations for further data collection and assessments

The necessity, goals, scope, timing, and contributing data for such assessments will vary by project and by monitoring sector. Such reports will be developed at the direction of the BOD after recommendation by the Steering Committee and may be informed by long-term planning processes and/or from the specific study designs for individual projects. The Steering Committee may also identify a need for an Interpretive Report to be developed as individual projects are implemented and will provide guidance on the specific report components expected as the need is identified. These requirements should be informed by the project planning documentation developed and the original intended data use established during project development.

Table 9. Contents of a Data Report compared to an Interpretive Report.

COMPONENT	DATA REPORTS	INTERPRETIVE REPORTS (TECHNICAL REPORTS)
Purpose	Documents the activities of the monitoring program over the prior period; share the final data with project partners and collaborators in a timely way.	Document specific studies and synthesize information from the Delta RMP and/or diverse sources in relation to specific topics and prioritized assessment questions; in-depth evaluation of monitoring and special study results.
Frequency	Generally Annual	Will vary; e.g. every two (2) - three (3) years or on completion of a study design, as directed by the Steering Committee and approved by the BOD.
Period of Record	Previous monitoring cycle	Varies
Management and Assessment Questions	For the period of record - a) What data were collected? b) What methods were used (sample collection, sample preparation, analytical methods)? c) What were the results? d) Were any QA issues identified and/or resolved?	Management and assessment questions outlined within the monitoring project/study's approved work plan.
Historic/Past Data	Not included.	Included as applicable to address management questions.
Supplemental Information	Reports will include a QA Assessment that summarizes any problems and documents any non-conformances with the QAPP.	Reports will synthesize results and may make recommendations for monitoring adaptations and future studies.

8 DATA PUBLICATION

Whenever possible, Delta RMP monitoring results should be published to the CEDEN or NWIS databases, per Resolution R5-2021-0054. Publication to CEDEN is the preferred publication route to ensure data comparability for Delta RMP data across projects. Publication to NWIS can be done in addition to or in place of CEDEN publication. Other public data repositories may be used on an ad hoc basis, which must be approved by the CVRWQCB EO.

The repository to which data will be published, along with the mechanism by which the upload will happen (e.g., upload to CEDEN through an RDC) must be identified in the project planning documents. In some cases, data may not be able to be published to CEDEN, such as novel analysis techniques that the database structure cannot currently store (e.g., qPCR data for the Microcystis project) or for data collected from waterbodies that are not waters of the State (e.g., some effluent source monitoring sites for the CEC Pilot Study). These scenarios should also be clearly identified in the project planning documents including the Delta RMP Annual Monitoring Workplan, along with an explanation why the data cannot be loaded into an approved public data repository and how the data will be shared with the Delta RMP stakeholders and data users. Prior to project implementation, the associated Delta RMP Annual Monitoring Workplan must be approved by the EO. At a minimum, these data must be provided in a machine-readable electronic format to the Delta RMP BOD, SC, appropriate TACs, and the CVRWQCB as well as made available upon request.

Finalized datasets must be uploaded to the public repository identified in the project planning documents within six months of the last sampling event, per Resolution R5-2021-0054 unless otherwise approved.

8.1 OPEN DATA POLICIES

The data collected by the Delta RMP are considered key to producing objective and cost-effective scientific information critical to understanding regional water quality conditions and trends in the Delta. Delta RMP data should be made available as machine-readable datasets with established metadata and data dictionaries.

The intended locations of these datasets shall be identified through the planning stages of projects by way of study plans and the Delta RMP Annual Monitoring Workplan; availability of specific datasets through public repositories will be communicated through individual project reports and the Delta RMP Annual Report.

8.2 DATABASE PUBLICATION

Past and ongoing datasets generated in part or fully through Delta RMP funding are stored in a combination of public and independent database repositories managed by State and Federal agencies and past and current Delta RMP contractors. The locations of these results are identified in **Table 10**.

The repositories in **Table 10** are intended as permanent storage to house fully processed and finalized datasets. Finalized and complete datasets (Stage 3 data) are reviewed by the appropriate TAC, whose members recommended the data for publication, usually in coordination of a review of an associated Data Report and/or QA Assessment outlining the results of any data verification and validation conducted. Technical Advisory Committees can only ensure data are sufficient to meet project goals to the extent possible based on the data verification provided (not validation). Unless otherwise directed by the BOD, the TAC can direct data management staff to publish Stage 3 data sets to public data repositories (such as CEDEN) once the TAC has reviewed the Stage 3 data and resolved any outstanding comments on the Data Report and/or QA Assessment. Typically, the recommendation from the TAC to approve the Data Report (by way of a recommendation from the Steering Committee to the BOD) coincides with direction to publish data to a public database.

All data collected using Delta RMP funds must be provided to the Delta RMP. Intermediate data deliverables (raw EDDs, processed EDDs, preliminary reports and results) are made available to the appropriate TACs, CVRWQCB staff, project personnel, and relevant stakeholders through the data sharing Droplet website, but are not made readily available to the public. Specific intermediate or ancillary data deliverables (as defined in **Data Deliverables**) or non-publishable results can be requested from the Program Manager.

Table 10. Public and independent database repositories for past and ongoing projects (up through 2023) funded by the Delta RMP.

Monitoring Sector	Parent Project Name	Project Phase	Public			CV RDC	SFEI RDC	SWAMP	Other
			CEDEN	NWIS	CDEC				
Constituents of Emerging Concern	CEC Pilot Study (2020-2023)	Ongoing	X			X		X	

Monitoring Sector	Parent Project Name	Project Phase	Public			CV RDC	SFEI RDC	SWAMP	Other
			CEDEN	NWIS	CDEC				
Current Use Pesticides	Current Use Pesticides – Rotating Basin Design (2019-2024)	Ongoing	X	X		X	X		
	Current Use Pesticides – Fixed Site Design (2015-2019)	Completed	X	X			X		
Mercury	Delta RMP – Mercury (2016-2022)	Long-Term Planning	X				X	X	
Nutrients	High Frequency Mapping								Data Portal [1]
	Chlorophyll Sensor Intercalibration Study (2018-2019)	Completed		X	X				
	Microcystis SEP Project (2020-2021)	Completed							Data Files [2]
	Cyanobacteria Study (2021-2023)	Ongoing		X					
Pathogens	Delta RMP – Pathogens (2015-2016)	Completed	X				X		

[1] High frequency mapping results are available through the USGS Delta Survey Data Portal is, located at: https://tableau.usgs.gov/views/SFBD_Data_Portal/Mapping2018and2020?%3AisGuestRedirectFromVizportal=y&%3Aembed=y

[2] qPCR data cannot currently be stored in CEDEN. Analysis results were distributed to Delta RMP stakeholders in Excel format.

8.3 DOCUMENT PUBLICATION

The Delta RMP posts the final, approved reports and approved SC and TAC meeting notes on the Delta RMP website (https://deltarmp.org/) for public accessibility and review. Publication of final PDF reports through the website may not include accompanying data exports or attachments in Excel format. Available planning documents, including project QAPPs, and how to access publicly available data are posted on the Delta RMP website for public review.

9 ARCHIVAL AND DISPOSITION

Data archival occurs in any independently managed database (e.g., the CV RDC) and in the public repository (e.g., CEDEN) in which they are stored. Data collection records, ancillary information, and copies of reports are archived in cloud servers from which they are accessed by Delta RMP stakeholders through the Droplet file sharing platform and the Delta RMP website.

Any servers housing databases or file folders in which Delta RMP data or documents are housed should be backed up frequently, at least nightly, with backups replicated to at least one independent server to create redundancy and allow for instant replication if a failure occurs.

9.1 MAINTENANCE OF PUBLIC DATASETS

Public datasets should be considered final and should require minimal maintenance. Wherever possible, data processing, verification, finalization, and reporting steps should be taken to ensure that the datasets housed in public databases are complete and finalized and do not require updates. Nevertheless, in the event that published data do require changes, updates should be made by the data owner (e.g., the laboratory submitting the data) with the approval of the public entity managing the database.

Prior to updating the database, the BOD, Steering Committee, and appropriate TAC should be briefed on the updates that will be made, the reason for the updates, and the timeline by which they will be republished. The Program Manager is responsible for ensuring necessary data changes occur, and all updates will be made in coordination with the Program QA Officer and the CVRWQCB QA Representative.

For data uploaded to CEDEN through the CV RDC, changes to data are made in the CV RDC. Changes must be communicated to CEDEN staff and the agency associated with the project through the use of the CEDEN Data Modification Request Form (http://ceden.org/procedures.shtml) prior to database synchronization.

9.2 DOCUMENT RETENTION AND DISPOSITION

Data records generated by Delta RMP projects are stored indefinitely in the public database to which they are uploaded. Any data records processed through the CV RDC will be stored indefinitely on the CV RDC server.

Finalized reports that are available on the Delta RMP website will be stored indefinitely on a cloud server managed by MLJ Environmental.

Ancillary and raw data collection records and documents will be retained by the Delta RMP for a minimum of ten years. These records may include scans of original field sheets and COCs, preliminary raw data files, intermediate report drafts, and ancillary information.

10 REFERENCES

California Regional Water Quality Control Board, Central Valley Region. 2021. Resolution R5-2021-0054. *Approval of Delta Regional Monitoring Program Governance Structure and Implementing Entity*. https://www.waterboards.ca.gov/rwqcb5/board_decisions/adopted_orders/resolutions/r5-2021-0054_res.pdf.

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State Water Resources Control Board Resolution No. 2018-0032. 2018. *Adopting Principles of Open Data as a Core Value and Directing Programs and Activities to Implement Strategic Actions to Improve Data Accessibility and Associated Innovation*. https://www.waterboards.ca.gov/board_decisions/adopted_orders/resolutions/2018/rs2018_0032.pdf.

State Water Resources Control Board. 2017. *Quality Management Plan – Policy Guidance*. QMP-001 v2.0. https://www.epa.gov/sites/default/files/2015-06/documents/g5-final.pdf.

United States Environmental Protection Agency. 2006. *Guidance on Systematic Planning Using the Data Quality Objectives Process*. EPA QA/G-4. https://www.epa.gov/sites/default/files/2015-06/documents/g4-final.pdf.

United States Environmental Protection Agency. 2002. *Guidance for Quality Assurance Project Plans*. EPA QA/G-5. https://www.epa.gov/sites/default/files/2015-06/documents/g5-final.pdf.

Appendix A – Data Management Plan Terms and Definitions

TERM	DEFINITION
Accuracy	The degree to which the data item correctly describes the object in context of appropriate real-world situation and attributes.
Completeness	An indication of the comprehensiveness of available data, as a proportion of the entire data set expected to address specific information requirements.
Consistency	The absence of significant differences between the data items representing the same objects based on specific information requirements.
Corrective Action	Step(s) taken to identify the root cause of a problem and implement a solution that eliminates the cause of a nonconformity as to prevent its recurrence.
Data Governance	The process of managing the availability, usability, integrity, and security of the data created and collected by an organization. It establishes the processes and responsibilities that ensure the quality and security of the data used across an organization.
Data Integrity	The reliability of the information based on its accuracy, validity, and consistency across its life cycle. Underlying issues related to data integrity include definitions, entry errors, terminology, formats, procedures, and timeliness.
Data Life Cycle	the sequence of stages that a particular unit of data goes through from its initial generation or capture to its eventual archival and/or deletion at the end of its useful life. The Delta RMP defines the stages of the data life cycle as 1) Plan, 2) Acquire, 3) Process, 4) Use, 5) Publish, and 6) Archive.
Data Management	The procedures for collecting, validating, storing, organizing, and maintaining the data created and collected by an organization.
Data Quality	The reliability of the information to serve its intended purpose of supporting the planning, decision making, and operations of an organization, program, and/or project.
Data Quality Indicator	The quantitative statistics and qualitative descriptors used to interpret the degree of acceptability or utility of data to the user.
Data Quality Objective	The qualitative and quantitative statements that define the appropriate metrics that will be used to establish the level of quality for project.

Term	Definition
Data Validation	The analyte- and sample-specific process that extends the evaluation of data beyond method, procedural, or contractual compliance (i.e., data verification) to determine the analytical quality of a specific dataset, including determinations, where possible, of the reasons for any failure to meet method, procedural, or contractual requirements, and an evaluation of the impact of such failure on the overall data set.
Data Verification	The process of evaluating the accuracy, consistency, validity, and completeness of a specific dataset against the pre-determined data quality requirements.
Delta RMP Annual Report	Report completed by February 1 each year containing the elements required by R5-2021-0054 covering any monitoring projects or studies conducted during the prior fiscal year.
Delta RMP Data Report	Report summarizing a completed dataset and providing a comprehensive assessment of what was completed and how it compares to planned expectations, including what was collected what methods were used, a summary of results, and a summary of any deviations or QA issues identified and/or resolved.
Delta RMP Interpretive Report	Report providing an assessment of trends and/or the meaningfulness of the data collected by a project within the context of the water quality concerns of the monitoring sector and overall water quality issues in the Delta.
Delta RMP QA Assessment	An evaluation of the quality of the dataset as a whole with the purpose of identifying the data quality goals established in the QAPP or project planning documents and evaluating how the data received compare to these objectives.
Deviations	Events or actions that do not occur according to the requirements outlined in the Delta RMP Workplan, Data Management Plan, or the applicable QAPP.
Measurement Quality Objective	The specific criteria to which environmental or quality control measures are compared to determined acceptability.
Quality Management Plan (QMP)	A document that outlines how an organization structures its quality system and describes its quality policies and procedures, criteria, roles, responsibilities, and authorities for environmental data.
Quality Assurance Program Plan (QAPrP)	A document that describes the Quality Assurance/Quality Control (QA/QC) policies and general activities of a program.
Quality Assurance Project Plan (QAPP)	A document that addresses the project-specific considerations and documents a project's technical planning process for obtaining environmental data.

TERM	DEFINITION
QAPP Amendment	The documentation of an official change to QAPP requirements in response to unpredicted circumstances resulting in a discrepancy between the planned elements and the scenario at the time of implementation, targeted to specific sections of a QAPP, and approved by only the affected parties.
QAPP Revision	The updated draft of an entire QAPP document that incorporates all up-to-date project information and requirements and that is approved by all QAPP signatories.
Quality Assurance	A system of management activities to ensure that a process, item, or service is of the type and quality needed by the user.
Quality Control	The specific steps taken to determine the validity of specific sampling and analytical procedures.
Stage 1 Data	Reviewed data that have undergone data verification checks required by the data management protocols for the project as defined in the QAPP and/or study plan, but which may still be undergoing further verification, be subject to review by the appropriate TAC, or be subject to updates by laboratories and/or the data providers pending ongoing discussions or corrective actions.
Stage 2 Data	Data that have gone through initial and any secondary verification steps established by the project requirements and for which all outstanding questions and corrective actions have been resolved or concluded.
Stage 3 Data	Finalized and complete datasets that have been fully processed (through Stage 2) and for which the complete dataset can be assessed for the data quality indicators required in the QAPP or project planning document in preparation for publication.
Studies - Collaboration	Collaborative studies are partially funded by the Delta RMP with other funding sources (collaborators). Often a Collaboration Study is a project managed and implemented by another entity (e.g., USGS) that the Delta RMP is contributing funds to meet the Delta RMP goal of producing cost-effective scientific information critical to understanding regional water quality conditions in the Delta.
Studies - Research	Research studies are projects or investigations which can be used by the Delta RMP to gather supplementary data or information to better understand regional water quality conditions in the Delta. Research studies examples include laboratory or field bioassays to test specific hypothesis, analytical method development or improvements, intercalibration studies, and testing of novel techniques. The Delta RMP may fund all or part of a research study and depending on the study design, other project planning documents may be used in place of a QAPP.

TERM	DEFINITION
Studies – Status and Trends	Status and trends projects are designed to improve understanding of regional water quality conditions and trends in the Delta and better inform decisions on protecting and restoring beneficial uses. These project are usually designed and implemented directly through the Delta RMP to answer management and assessment questions; however, outside funding may also be used to supplement Delta RMP resources.
Studies – Supplemental Environmental Projects	A Supplemental Environmental Project (SEP) is an environmentally beneficial project that is included as part of a settlement for environmental violations. Violators can voluntarily agree to undertake such projects in lieu of part of the penalty that they are required to pay for the violations.
Study Design	Resolution R5-2021-0054 requires that a study design be provided within the Annual Monitoring Workplan to address monitoring and assessment questions and to address the following information: 1. Specific hypothesis to be tested, 2. Sample locations, 3. Sample collection frequency, 4. Sample analytes, 5. Analysis methods, 6. Preliminary data deliverables, 7. Planned reports to summarize results, and 8. Timeline and schedule for all of the study design elements to be completed.
Study Plan	An umbrella document which includes details on monitoring efforts and associated studies and may include a plan for studies to be conducted over multiple years (e.g., 3 -5 years). The study plan includes the background/rationale to describe the overarching goals for each project within the study plan. This includes the purpose, key assumptions, hypotheses, quality control and reporting, including an overview of the spatial and temporal components of the study design, schedule, and budget. For studies with a monitoring component, the study design is included to provides enough details to understand where, when, and what will be monitored. Specific details are later developed as part of the Annual Monitoring Workplan and QAPP or appropriate project-planning document.
Timeliness	The degree to which data are up-to-date and available within an acceptable time frame, timeline, and duration. Timeliness should be defined in the QAPP and meet the objectives of the organization, program and/or project to inform decisions and actions.
Turn-around Time (TAT)	The period of time from the receipt of the sample by the laboratory to the provision of results back to the Delta RMP.
Uniqueness	A measure of duplication of identified data items within a data set.
Validity	Conformity to the syntax and structure of the defined business rules for data management.

Appendix B – Delta RMP Study Plan Proposal Review Process and Decision Grid

Delta Regional Monitoring Program Study Plan Proposal Review Process

(Revised March 7, 2018; July 15, 2022)

This Delta Regional Monitoring Program (RMP) Study Plan Proposal Review Process (Proposal Review Process) document outlines the process by which study plan proposals will be solicited, reviewed, and vetted and provides details on the coordination and communication expectations between the key participants. This process was originally finalized on March 7, 2018 and is being updated as part of the Delta RMP Data Management Plan. The document has been updated to reflect changes to the Delta RMP organization structure that have occurred since the last revision.

The Technical Advisory Committee (TAC) provides recommendations to the Steering Committee (SC) for future monitoring designs and/or studies. The SC then makes a recommendation to the Board of Directors (BOD) who makes the final decision. External stakeholders and the various monitoring specific TACs (e.g., nutrients, pesticides, mercury, and constituents of emerging) can propose monitoring components and/or proposals for consideration by the SC in response to stated SC priorities. The TACs will evaluate proposals using the consistent process described in this document and then inform the SC on recommendations and their rationale so that the SC can make recommednaations to the BOD regarding funding decisions and proposal approvaals. A standardized review process will allow the TACs to make recommendations based on consistent and agreed-upon criteria. Dissenting opinions will also be provided to the SC.

The evaluation criteria may change based on input from the SC, but they are intended to:

1. Support consistent, transparent, and technically defensible evaluations,
2. Provide a process for the TAC to follow, and
3. Enable clear communications and be responsive to the direction received from the SC.

The stepwise process is shown in **Figure 1** and relies on guidance from the SC both in proposal solicitation and pre-proposal review and a technical review performed by the TAC.

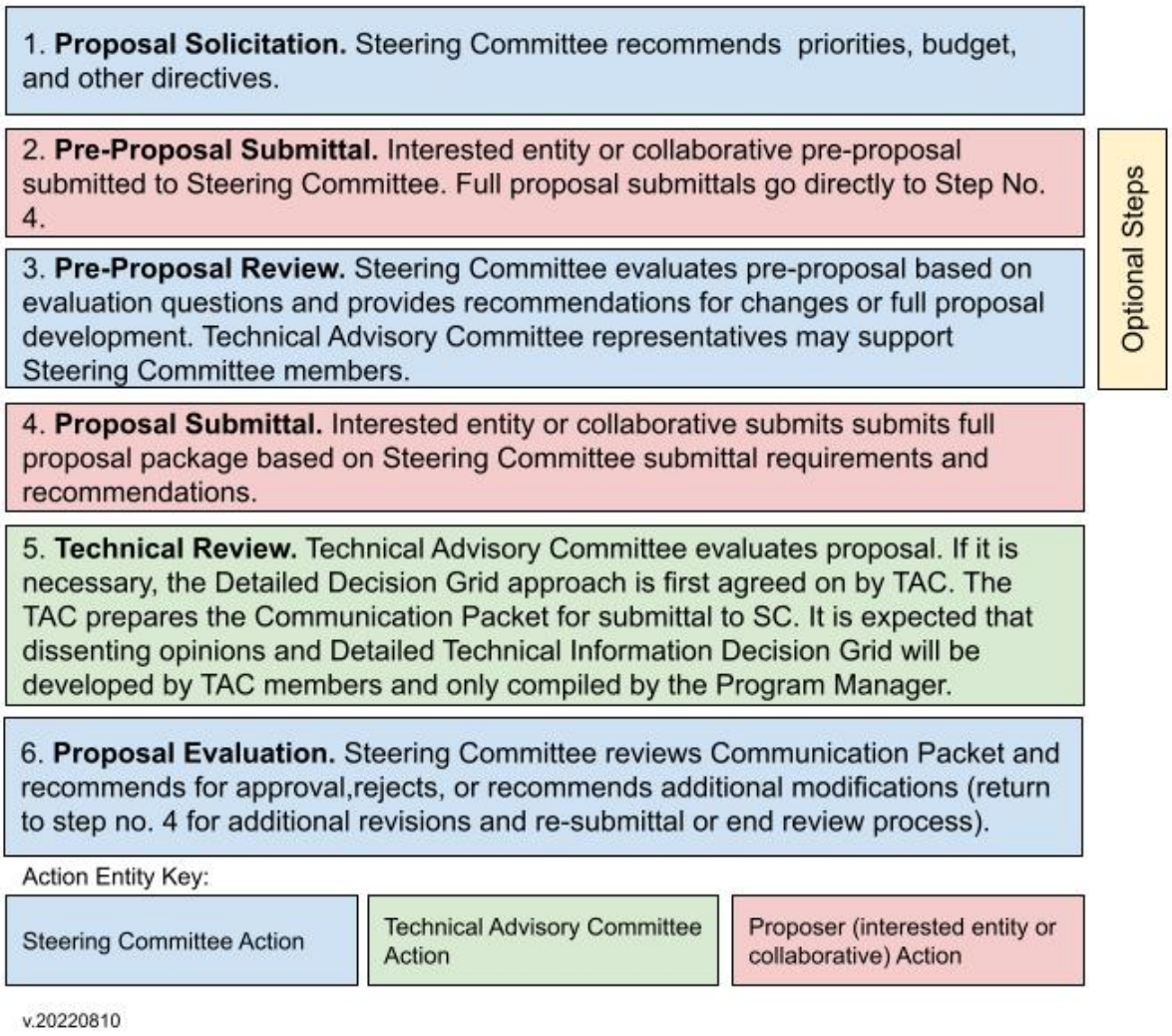

Figure 1. Proposal Review Process Steps

1. PROPOSAL SOLICITATION (STEERING COMMITTEE)

The SC provides guidance for study priorities, budget considerations, key management questions that must be addressed and any other considerations that would narrow the focus of potential proposals. The TACs can also make specific requests to the SC for clarification through the Coordinating Committee or directly.

Considerations may include whether the proposal should focus on longer term status and trends or shorter term special studies. Under the previous organization, the SC and TAC jointly and iteratively developed study priorities through the Monitoring Design Summary, which includes prioritized "Assessment Questions" that are intended to support the Charter "Management Questions".

The SC in coordination with BOD may develop study-specific needs and case-specific evaluation criteria, constraints, budget limitations, etc., as necessary, but these should be clearly communicated to potential study plan developers (i.e., TAC or external parties). This will help

guide the proposal development and also will allow the TAC to evaluate the proposals in an efficient and consistent manner.

2. PRE-PROPOSAL SUBMITTAL (PROPOSER)

The potential study proposer may **optionally** submit a Pre-Proposal that describes the study sufficiently for the SC to provide feedback, but prior to a significant study planning effort. A recommended template and SC review questions for the pre-proposal submittal are provided as **Attachment A**. This format can be modified, but should provide clear responses to the evaluation criteria. It is intended to be a one to two page summary of the proposed study.

3. PRE-PROPOSAL REVIEW (STEERING COMMITTEE)

The **optional** pre-proposal SC review is intended to identify general concerns and focus the proposal on SC membership needs. SC members may consult with TAC representatives to interpret or evaluate technical issues in the pre-proposal. This step is not intended as a thorough technical review, but rather an assessment of the willingness of the SC to consider the full proposal.

4. PROPOSAL SUBMITTAL (PROPOSER)

The study proposer submits a study work plan for review by the specificTAC. The November 2014 Design Summary (revised and approved June 16, 2015) was used as the work plan for the orginal Delta RMP studies. The proposal should consider EPA Data Quality Objective (DQO) guidance[1] "Systematic Planning" elements, as well as schedule and consideration of the Delta RMP Management Questions as part of the DQO "Project Goal". The DQO elements of Systematic Planning that should be included in the proposal, as modified for the Delta RMP are as follows:

1. **Organization** – Identification and involvement of the project team and leadership, sponsoring organization, scientific experts, etc. (e.g., all customers and suppliers). Background information and identification of relevant studies or coordination opportunities.
2. **Project Goal** – Description of the project goal, objectives, and study questions and issues. This may include a hypothesis statement(s) that the study proposes to address and whether the Delta RMP management and assessment questions are directly addressed.
3. **Schedule** - Identification of project schedule, resources (including budget), milestones, and any applicable requirements (e.g., regulatory requirements, contractual requirements). The project may need to provide components or modules that can be implemented when funding is available.
4. **Data Needs -** Identification of the type of data needed and how the data will be used to support the project's objectives. Provide a description of the proposed analytical and assessment tools that would be used and the resulting measurements provided to test any study hypotheses.
5. **Criteria:** Determination of the quantity of data needed and specification of performance criteria for measuring quality**.**
6. **Data Collection:** Description of how and where the data will be obtained (including existing data) and identification of any constraints on data collection.

[1] https://www.epa.gov/sites/production/files/documents/guidance_systematic_planning_dqo_process.pdf

7. **Quality Assurance (QA):** Specification of needed QA and quality control (QC) activities to assess the quality performance criteria (e.g., QC samples for both field and laboratory, audits, technical assessments, performance evaluations, etc.).
8. **Analysis:** Description of how the acquired data will be analyzed (either in the field or the laboratory), evaluated (i.e., QA review/verification/validation), and assessed against its intended use and the quality performance criteria. Provide examples of the data products expected.

5. TECHNICAL REVIEW (TECHNICAL ADVISORY COMMITTEES)

Proposals will be reviewed by the relevant TAC based on the **Attachment B** Evaluation Criteria as a starting point. The Summary Recommendations Decision Grid is a required TAC end product that is informed by the Detailed Assessment Grid **(Attachment C)**. The TAC prepares a discussion of consensus recommendations, dissenting opinions, and any requests for clarification from the SC.

Decision Grids

The Summary Recommendations Decision Grid (see **Attachment C** template) is the primary communication tool that is intended to be more standard, though it may be modified by SC direction. The Summary Recommendations Decision Grid is a framework to ensure consistency among reviewers and assist with communication back to the SC. The Summary Recommendations Decision Grid will be prepared by the TAC as an executive summary of the TAC findings in the areas of evaluation.

The Detailed Assessment Grid (see **Attachment D** template) informs the conclusions in the Summary Decision Grid. It can also be customized through agreement by the TAC to provide more detail and consider 1) Specific Evaluation Criteria and 2) Scoring / Rating. Depending on the type of proposals, there may be a desire to use a straight forward scoring system, or it may be determined by the SC to use subjective rating terms such as “Meets Criteria”, or it may suffice to use (+) and (–) notations to indicate acceptability. Comments, including differing opinions, on how proposals meet each element of the evaluation can also be included in the decision grid. The TAC will determine how the Detailed Assessment Grid will be populated prior to the initiation of the review.

It is expected that TAC members are responsible for preparing any dissenting opinion materials for the Program Manager to compile. TAC members are responsible for preparing technical elements of the Detailed Assessment Grid.

Technical Advisory Committee Recommendations

While the goal of each TAC is to provide consensus[2] recommendations to the SC, this will not always be possible. For this reason, the following guidelines should be adhered to during the TAC evaluation:

- SC may be asked to clarify its priorities and policy issues identified during the program development or review process.

[2] The TAC will agree on a consensus or consensus-seeking process prior to the review of any proposal.This may require development of specific written protocols that are agreed-upon by the TAC, the Steering Committee, and the Board of Directors.

- When consensus cannot be reached by the TAC on what monitoring to recommend, discuss and document differing interpretations or opinions.
- TAC message points and dissenting opinions are vetted through the TAC prior to distribution to the SC.

Recommendations would be provided to the SC in a communication packet along with the specific recommendations from the TAC, references, any dissenting points of view, and additional narrative discussion, as necessary. The Communication Packet will include the following:

1. Summary of Consensus Recommendations, Dissenting Opinions, and Requests for Steering Committee Clarification [1-2 page compilation of key messages]
2. Summary Recommendation Decision Grid [required]
3. Detailed Assessment Grids [optional, format decided by TAC]

6. PROPOSAL EVALUATION (STEERING COMMITTEE)

The Steering Committee reviews the proposal with consideration to the technical recommendations and Communication Packet provided by the TAC. The Steering Committee membership may request that the TAC present their findings at a Steering Committee meeting or that the Proposer provide additional information. The Steering Committee can then take action on the proposal, including a request for additional information or revisions. Specific recommendations or comments should be documented and appropriately communicated.

Attachment A. Pre-Proposal Template

The Pre-Proposal submittal is intended to be a 2-5 page executive summary of proposed study concepts and applicability to Management and Assessment Questions. The Delta RMP Steering Committee will review the pre-proposal and provide feedback on level of interest and specific requested refinements. The Pre-Proposal submittal is expected to summarize the expected proposal key elements with an emphasis on DQO Systematic Planning Elements No. 1 through No. 4.

The Steering Committee may consider the following questions in evaluating pre-proposals:

1. How does the study address Delta RMP management and assessment questions?
2. How does the study inform planned policies, regulations, or management decisions?
3. How does the monitoring coordinate with other Delta activities?
4. Can the study be developed to fit available Delta RMP and other available funding mechanisms? For example, could the study be phased or merged with other efforts?

Attachment B. Evaluation Criteria for Decision Grids

Potential evaluation criteria fall into three categories: 1) Management and Assessment Questions, 2) Technical Foundation, and 3) Budget, Priority, Coordination and Other Considerations. The SC will give guidance on whether some criteria have more importance than others, whether or not some criteria can be given more weight, and/or whether some criteria are not applicable.

The listed evaluation criteria are important for various reasons but may not be comprehensive. There is flexibility in this process for the SC to add new (or change) evaluation criteria for the Summary Recommendations Decision Grid and the TAC to decide on elements or the need for the Detailed Assessment Grid. Evaluation criteria should be reviewed and refined prior to soliciting and reviewing proposals. The SC can communicate priorities and offer guidance to the TAC in its review process by 1) selecting pre-proposals that address SC priorities and 2) providing the TAC with refined evaluation criteria.

I. Management and Assessment Questions

Management questions are set by the SC, and the TAC may propose assessment questions as testable study components to help answer the management questions. Assessment questions are included as part of the Monitoring Design Summary (revised June 2015); however, these may change over time depending on study needs and to build toward addressing the management questions. Prior to soliciting proposals, the Management and Assessment Questions should be prioritized by the SC to give guidance to both the entities submitting a proposal and the TAC members reviewing the proposals.

A) Is the proposal responsive to the Charter **management question(s)** prioritized by the SC**?** [0 – not responsive or unclear, 1 – limited responsiveness, 2 – supporting information only, 3 – potentially responsive in later phases, 4 - moderate probability to directly address management questions, and 5 – high probability to directly address management question]
   1) **Status and Trends.** Is there a problem or are there signs of a problem?
      a) Is water quality currently, or trending towards, adversely affecting beneficial uses of the Delta?
      b) Which constituents may be impairing beneficial uses in subregions of the Delta?
      c) Are trends similar or different across different subregions of the Delta?
   2) **Sources, Pathways, Loadings, and Processes.** Which sources and processes are most important to understand and quantify?
      a) Which sources, pathways, loadings, and processes (e.g., transformations, bioaccumulation) contribute most to identified problems?
      b) What is the magnitude of each source and/or pathway (e.g., municipal wastewater, atmospheric deposition)?
      c) What are the magnitudes of internal sources and/or pathways (e.g. benthic flux) and sinks in the Delta?
   3) **Forecasting Water Quality Under Different Management Scenarios**
      a) How do ambient water quality conditions respond to different management scenarios?
      b) What constituent loads can the Delta assimilate without impairment of beneficial uses?
      c) What is the likelihood that the Delta will be water quality-impaired in the future?
   4) **Effectiveness Tracking**

a) Are water quality conditions improving as a result of management actions such that beneficial uses will be met?
b) Are loadings changing as a result of management actions?

B) Does the proposal adequately state and support the prioritized Monitoring Design Summary **Assessment Questions or other assessment questions developed to address Management Questions**? For example:
1) Are the assessment questions testable or otherwise provide an outcome threshold that can be measured against? [0 – no measureable thresholds or testable assessment questions, 1 – threshold or testable assessment question is not complete or relies on inference, 5 – threshold is established beneficial use impairment indicator]
2) Does the proposal adequately demonstrate how the results will be presented and interpreted? [0 – no data product or interpretation approach provided, 3 – data product and interpretation approach is not complete, 5 – data product and interpretation approach is clearly stated and responsive to study hypothesis and objectives]

II. Technical Foundation

The technical foundation of the proposal is evaluated based on how well the proposed study answers the management and assessment questions. This evaluation is based on the USEPA **Data Quality Objectives** guidance, which can be used as a reference for this evaluation. This includes both the assessment of data quality, geographic and temporal characterization, and how well understood the proposed tool "outcomes" are. The following are evaluation criteria that may be modified by the SC or TAC, in consultation with the SC, to appropriately evaluate different types of proposed studies. This section also provides guidance on how to consider each of the evaluation criteria (e.g., scoring) when completing the Detailed Decision Grid (Attachment D) which is then summarized in the Summary Recommendation Decision Grid (Attachment C). Note that the Attachment D examples were developed for evaluating pesticide monitoring plans but can easily be adopted for other types of Delta RMP studies by changing some of the evaluation criteria. Alternative scoring can also be considered, as appropriate for each review. For example, each criterion could be scored on a scale of 1-3 based on the following criteria: 1 – Adequately addresses the criterion, 2 – Partially addresses the criterion, 3 – Does not address the criterion.

A. Are monitoring objectives clearly defined? [0 – not stated, 3 – not clearly stated, 5 – clearly stated]

B. Are the data sources and information inputs clearly stated? [0 – not stated, 3 – not clearly stated, 5 – clearly stated]

C. Is the **geographic scope** of the study well defined? Does the study characterize conditions within the Delta, tributaries into the Delta, or only a smaller assessment area? [0 – not stated, 3 – not clearly stated, 4 – clearly stated for smaller assessment area outside of Delta, 5 – clearly stated and within the Delta]

D. Is the **temporal scope and resolution** of the study well defined? Does the study clearly define the conditions of interest (e.g. high flows)? Can the results of the study be used to evaluate trends over the timescale of interest or target magnitude of change? [0 – not stated, 1 – not clearly defined, 3 – clearly defined but does not capture resolution or time

period of interest, 5 – clearly stated and responsive to resolution and time period of interest]

E. Is the analytical approach adequately described and developed? [0 – no methods described, 1 – significant method omissions, 3 – methods not well established or rely on additional information, 5 – as described methods can achieve study objectives]

F. How **well established and understood are the monitoring tools**? [0 – tools are not described well enough to evaluate, 1 – tools require additional information or inference to draw conclusions or are known as unreliable, 3 – tools are available with inter-laboratory calibration studies, 5- tools are well-accepted methods such as EPA test procedures or the equivalent.]

   i. Does the study employ standard analytical methods? How well tested are the methods?
   ii. How well are outcomes from monitoring tools linked to environmental effects?
   iii. Are effect thresholds known that reliably characterize beneficial use impairment?
   iv. How well are effect end points linked to impacts on beneficial uses – if not, are required additional studies to provide such linkage well-articulated?

G. Are measurement quality objectives clearly stated to ensure that data collected are of sufficient quality and quantity to support the study objectives? [0 - not provided, 1 – insufficient, 3 – minimum recommended to support study objective, 5 – exceeds minimum requirements and provides robust documentation to reliably quantify method performance]

H. Does the proposal clearly state how the data will be collected? [0 – not stated, 3 – not clearly stated, 5 – clearly stated]

III. Budget, Priority, Coordination, and Other Considerations

A) Does the proposal meet the **budget** specified by the SC? [0 – no budget provided, 1 insufficient budget information, 3 – may meet budget specified under phasing or certain conditions, 5 – meets budget specified under all scenarios]

B) **Priority/timeliness** - Is there urgency to conducting the monitoring, such as to inform planned policies or regulations? [0 – timeliness not clear, 1 – no urgency, 3 – moderate urgency (3-5 years), 5- high urgency (<2 years)]
   1) Does the monitoring respond to a stated SC priority?
   2) Is there enough lead time to generate the information needed to support upcoming decisions?
   3) Do the monitoring elements need to be completed in a certain order relative to (and contingent upon) other ongoing or future activities?
   4) Can the monitoring be coordinated with other efforts to increase data power or reduce overall study cost or duration?

C) Will the study build upon, add to, and/or compliment other studies conducted by the Delta RMP? [0 – not stated, 1 – does not compliment Delta RMP studies, 3 – builds on previous Delta RMP work, 5 – is critical component to ongoing or needed Delta RMP work]

D) Do the monitoring objectives incorporate consideration of **regulatory program requirements** (TMDLs, Waste Discharge Requirements, Basin Plan monitoring and

surveillance, etc.)? [0 – not stated, 1 – not required in regulatory program, 3 – assessment information needed for evaluation of programs, 5 – required by permit or Basin Plan]

E) Can the study leverage external studies and resources for added efficiency or additional priority benefits? [0 – not stated, 1 – no external coordination benefit, 3 – some external coordination benefit, 5 - extensive external coordination benefit]

F) Is the monitoring plan complete or is **additional information necessary** before the study could be implemented? [0 – not stated or unclear, 1 – significant information needed, 3 – moderate information needed, 5 – no additional information needed]

Attachment C. Summary Recommendation Decision Grid Templates

A. STUDY PLAN RESPONSIVENESS

This section evaluates the completeness of the study plan proposal and its consistency with the Delta RMP priorities and stakeholder interests.

1. Does the study proposal identify the management question addressed?

2. Are the Data Quality Objectives (DQOs; EPA 2006) clearly defined?

3. Does the study provide testable hypotheses (written as assessment questions or otherwise)?

4. Does the proposal demonstrate how the results will be presented?

5. Does the adequately demonstrate how the results will be interpreted?

6. Does does the proposal contribute to a larger body of data that can be used to answer Management Questions in the future?

7. Does the proposed study plan include an estimated budget that is responsive to Steering Committee guidance?

8. Comments on overall study plan proposal responsiveness

B. TECHNICAL FOUNDATION

1. Geographic scope. Does the location selection support the study objectives?

2. Geographic scope. Does the study adequately characterize an area relevant to the Delta RMP?

3. Comment on geographic scope

4. Temporal resolution. Is the temporal scope and resolution of the study justified based on available data?

5. Temporal resolution. Does the study clearly define the conditions of interest (e.g. high flows)?

6. Temporal resolution. Can the results of the study be used to evaluate trends over the timescale of interest or target magnitude of change?

7. Comments on temporal scope:

8. Sample collection. Does the proposed data collection method introduce biases or errors that are not adequately mitigated or measured?

8.5. Comments on sample collection:

9. Monitoring tools. Where do the analytical tools fit on the ‘established methods’ spectrum?

10. Monitoring tools. Are additional information/data outside of the proposed study required to interpret study data and outcomes?

11. Comments on monitoring tools:

12. Interpretation. Are study condition controls adequately considered given the study timeframe, data collection frequency, and proposed interpretation to answer study hypotheses

reliably? Consider whether the study approach sufficiently identifies and addresses sources of variably in the study.

13. Interpretation. Does the study have statistical power sufficient to answer study hypotheses reliably during the study timeframe? Consider whether the study has adequately evaluated expected data variability to meet study objectives.

14. Interpretation. Is the basis for outcome assessments technically supported?

15. Interpretation. How much additional new information does the proposed study require to evaluate beneficial use attainment?

16. Interpretation. How much do proposed study assessment questions and outcomes address specified management questions?

17. Comments on interpretation:

C. Budget, Priority, and Coordination Considerations

1. Budget. Is the proposed budget scalable in size?

2. Budget. Is the proposed study modular?

3. Comments on budget:

4. Priority. Is there urgency to conducting the monitoring, such as to inform planned policies or regulations?

5. Priority. Does the study provide enough time to inform time sensitive decisions?

6. Comments on priority:

7. Coordination. Can the monitoring be coordinated with other efforts to increase data power or reduce overall study cost or duration?

8. Comments on coordination:

D. General Comments

Provide general comments, concerns, or critical issues regarding the proposed study:

PREVIOUS VERSION OF EVALUATION GRID

Evaluation Criteria	Score	Comments
I. Management / Assessment Questions		
A. [Relevant Management questions listed here as directed by the Steering Committee or as appropriate for the proposed study]		
B. Are the assessment questions testable or do they otherwise provide an outcome threshold?		
C. Does the proposal adequately describe how the results will be presented and interpreted?		
II. Technical Foundation		
A. Are monitoring objectives clearly defined?		
B. Are the data sources and information inputs clearly stated?		
C. Is the **geographic scope** of the study well defined? Does the study characterize conditions within the Delta, tributaries into the Delta, or only a smaller assessment area?		
D. Is the **temporal scope and resolution** of the study well defined? Does the study clearly define the conditions of interest (e.g. high flows)? Can the results of the study be used to evaluate trends over the timescale of interest or target magnitude of change?		
E. Is the analytical approach adequately described and developed?		
F. How **well established and understood are the monitoring tools**?		
G. Are measurement quality objectives clearly stated to ensure that data collected are of sufficient quality and quantity to support the study objectives?		
H. Does the proposal clearly state how the data will be collected?		
III. Budget, Priority, Coordination, and Other Considerations		

Evaluation Criteria	Score	Comments
A. Does the proposal meet the budget specified by the SC?		
B. Priority/timeliness - Is there urgency to conducting the monitoring, such as to inform development of planned policies or regulations?		
C. Will the study build upon, add to, and/or compliment other studies conducted by the Delta RMP?		
D. Do the monitoring objectives incorporate consideration of regulatory program requirements (TMDLs, Waste Discharge Requirements, Basin Plan monitoring and surveillance, etc.)?		
E. Can the study leverage external studies and resources for added efficiency or additional priority benefits?		
F. Is the monitoring plan complete or is additional information necessary before the study could be implemented?		

Scoring Example: Each criterion could be scored on a scale of 1-3 based on the following criteria:

1 – Adequately addresses the scoring criterion

2 – Partially addresses the scoring criterion

3 – Does not address the scoring criterion

Attachment D. Detailed Assessment Grid Template

DETAILED PROPOSAL EVALUATION CRITERIA

Evaluation Criteria	Comments/ Score[3]
I. Management / Assessment Questions	
Links to Management Action(s)	
A. Management Questions (DRMP Charter)[4]	
1. Is there a problem or are there signs of a problem? [Consider - Will the proposed study allow the DRMP to determine the extent to which pesticides contribute to toxicity in the Delta?] a. Is water quality currently, or trending towards, adversely affecting beneficial uses of the Delta? b. Which constituents may be impairing beneficial uses in subregions of the Delta? c. Are trends similar or different across different subregions of the Delta?	
2. Sources, Pathways, Loadings, and Processes. Which sources and processes are most important to understand and quantify? [Consider - Will the proposed study allow a better understanding of the spatial/temporal distribution of currently used pesticides identified as likely causes of toxicity in the delta?] a. Which sources, pathways, loadings, and processes (e.g., transformations, bioaccumulation) contribute most to identified problems? b. What is the magnitude of each source and/or pathway (e.g., municipal wastewater, atmospheric deposition)? c. What are the magnitudes of internal sources and/or pathways (e.g. benthic flux) and sinks in the Delta?	
3. Forecasting Water Quality Under Different Management Scenarios a. How do ambient water quality conditions respond to different management scenarios? b. What constituent loads can the Delta assimilate without impairment of beneficial uses? c. What is the likelihood that the Delta will be water quality-impaired in the future?	

[3] See scoring and guidance in Appendix B

[4] Is the proposal responsive to the Charter management and assessment question(s) prioritized by the SC? Consider – what information is needed to answer these Management Questions and if tools are currently available. Note that not all Management Questions may be relevant or need to be addressed by any/all proposals.

Evaluation Criteria	Comments/ Score[3]
4. Effectiveness Tracking a. Are water quality conditions improving as a result of management actions such that beneficial uses will be met? b. Are loadings changing as a result of management actions?	
B. Assessment Questions?[5]	
Status and Trends	
1. To what extent do pesticides contribute to observed toxicity in the Delta? [6]	
1.1. Which pesticides or degradates have the highest potential to be causing toxicity in the Delta and therefore should be the priority for monitoring and management? a. If samples are toxic do detected pesticides explain the toxicity? b. If samples are not toxic do detected pesticide concentrations exceed other thresholds of concern, e.g., water quality objectives or Office of Pesticide programs aquatic toxicity benchmarks)?	
1.2. What are the spatial and temporal extents of lethal and sublethal aquatic and sediment toxicity observed in the Delta? a. Do aquatic or sediment toxicity tests at targeted sites indicate a toxic response? b. If answer to A is yes, which other toxicity indicators should guide monitoring and management of pesticides in years 2+?	
2. What are the spatial/temporal distributions of concentrations of currently used pesticides identified as likely causes of observed toxicity?	
2.1 Which pesticides have the highest risk potential based on DPR's risk prioritization model and should be included in chemical analyses? a. Is the list of pesticides included in USGS pesticide scan sufficient for Delta RMP monitoring design? b. Are methods available to monitor pesticides with high-risk potential not included in USGS pesticide scan?	
2.2. How do concentrations of the pesticides with the highest risk potential vary seasonally and spatially?	
Sources, Pathways, Loadings, & Processes	

[5] Assessment Questions from the DRMP QAPP (2016). Example provided for pesticides. Note that not all Assessment Questions may be relevant or need to be addressed by any/all proposals.

[6] Consider – what information is needed to answer these Assessment Questions and if tools are currently available.

Evaluation Criteria	Comments/ Score[3]
1. What are the principal sources and pathways responsible for aquatic and sediment toxicity observed in the Delta? 2. What are the fates of prioritized pesticides and degradates in the environment? 2.1. Do physical/chemical properties of priority pesticides, application rates and processes, and ambient conditions influence the degree of toxicity observed? 3. What are the spatial/temporal use patterns of priority pesticides?	
Forecasting & Scenarios 1. How do pesticide concentrations respond to different management scenarios? 2. What current use pesticide loads can the Delta assimilate without exceeding water quality criteria established to protect beneficial uses? 3. How will climate change affect concentrations and/or loadings of pesticides and impacts to aquatic species?	
Effectiveness Tracking 1. Are pesticide-related toxicity impacts decreasing over time?	
C. Does the proposal adequately demonstrate how the results will be presented and interpreted? [see proposed process diagram]	
D. Does/how does the proposal address or contribute to a body of data that could be used to answer Management Questions and Assessment Questions in the future (if not all addressed initially)?	
II. Technical Foundation	
A/B. Are the Data Quality Objectives (DQOs; EPA 2006) clearly defined? (External PR Comment) 1. State the Problem 2. Identify the Goals of the Study 3. Identify Information Inputs 4. Define the Boundaries of the Study 5. Develop the Analytical Approach 6. Specify Performance or Acceptance Criteria 7. Develop the Plan for Obtaining Data	
C. Geographic Scope 1. Is the location selection rationale given and do these stations support the study objectives?	

Evaluation Criteria	Comments/ Score[3]
2. Is the geographic scope of the study well defined? 3. Does the study characterize conditions within the Delta, tributaries into the Delta, or only a smaller assessment area? 4. Does the proposal aim to characterize conditions in the Delta (as a whole) or at fixed stations? **(External PR Comment)**	
D. Temporal Scope and Resolution	
1. Is the temporal scope and resolution of the study well defined? 2. Does the study clearly define the conditions of interest (e.g. high flows)? 3. Can the results of the study be used to evaluate trends over the timescale of interest or target magnitude of change? 4. Program reliability and variability would be quantified over long term **(External PR Comment)**	
E. Sampling	
1. How do the sampling methods fit on the 'established methods' spectrum and how does that affect data interpretation and usability for decision making or answering study objectives? 2. Do the sample collection or analysis methods introduce any known or potential bias (e.g. cross-sectional composites vs. side bank grabs, sample collection in the non-target points of the hydrograph, etc.)? 3. Are there data to be considered (e.g., controls or reference samples) when interpreting results?	
F. Analysis	
1. How do the analytical methods fit on the spectrum of 'established methods'? 2. Are data expected to be sufficiently reliable and reproducible for answering study objectives and/or for decision making? 3. Statistical design – is there sufficiently robust coverage for a strong statistical evaluation that will detect changes over time? **(External PR Comment)**	
G. Interpretation	
1. How well are outcomes from monitoring tools linked to environmental effects? 2. Are effect thresholds known that reliably characterize beneficial use impairment? 3. How well are effect end points linked to impacts on beneficial uses – if not, are required additional studies to provide such linkage well-articulated? 4. How well are effect end points linked to management decisions?	

Evaluation Criteria	Comments/ Score[3]
5. Proposal addresses reproducibility and reliability of program (**External PR Comment)**	
III. Budget, Priority, Coordination, and Other Considerations	
A. Does the proposal meet the budget specified by the SC?	
1. Is the budget met? 2. Is the proposed study scalable (workable with increased or decreased funding)? 3. Is the proposed study modular (expandable to include other studies (e.g., CECs, biomarkers, or tissues) if funding is available?	
B. Priority/timeliness	
1. Does the monitoring respond to a stated SC priority? 2. Is there urgency to conducting the monitoring, such as to inform development of planned policies or regulations? 3. Is there enough lead time to generate the information needed to support upcoming decisions? 4. Do the monitoring elements need to be completed in a certain order relative to (and contingent upon) other ongoing or future activities? 5. Can the monitoring be coordinated with other efforts to increase data power or reduce overall study cost or duration?	
C. Will the study build upon, add to, and/or compliment other studies conducted by the Delta RMP?	
1. Are there links to relevant current programs (e.g., pyrethroid control program)? (**External PR Comment)** 1. Is there a connection with current SPOT sampling locations? 2. Are there links to MS4 permittee sampling?	
D. Do the monitoring objectives incorporate consideration of regulatory program requirements (TMDLs, Waste Discharge Requirements, Basin Plan monitoring and surveillance, etc.)	
E. Can the study leverage external studies and resources for added efficiency or additional priority benefits?	
F. Is the monitoring plan complete or is additional information necessary before the study could be implemented, interpreted, or completed?	

Appendix C – Delta RMP QAPP Amendment Form

QAPP Amendment Form

PROGRAM: Delta Regional Monitoring Program (DRMP)

PROJECT:

PREVIOUS QAPP VERSION:

AMENDED QAPP VERSION:

PREPARED BY:

DATE SUBMITTED:

Title: Amendment to add an Additional Mercury Monitoring Event

Section of QAPP affected:

Reason for Changes:

Detail of Changes:

Approval:

The amendment(s) detailed within this document shall be effective upon signature completion of all parties listed below. By signing this amendment, all parties listed below acknowledge and accept these changes. A copy of this document shall be distributed to all parties within the QAPP distribution list and shall be included and/or attached to all distributed copies of the original QAPP.

DRMP Program Manager:	_____ Melissa Turner	Date:
DRMP Quality Assurance Officer:	_____ Will Hagan	Date:
:	_____	Date:
:	_____	Date:
Quality Assurance Representative, CVRWQCB:	_____ Selina Cole	Date:
Quality Assurance Officer, SWRCB:	_____ Andrew Hamilton	Date: