Steering Committee Meeting Agenda

May 29, 2019 10:00 am – 4:30 pm

Location
Large Conference Room (Room 119),
Department of Water Resources
3500 Industrial Blvd #131
West Sacramento, CA 95691

Remote Access
Call-in: 415-594-5500,
Access Code: 238-626-034#
Online: https://join.me/sfei-conf-cw2

#	Agenda Item and Desired Outcomes	Attachments	Start & Lead
1	**Introductions and Review Agenda** Introduce TAC and SC members, establish quorum, and explain goals of the meeting.		10:00 Adam Laputz
2	**Decision:** Approve meeting summary from past meetings and confirm/set upcoming meeting dates. <u>Desired outcomes:</u> • Approve meeting summaries • Select a date for SC meeting in August 2019 • Select a date for a day-long Multi-Year Planning Meeting with SC and TAC in summer/fall. • Select a date for the joint SC/TAC meeting in the fall. **(Please bring your calendar to the meeting!)**	Draft Summary of Feb 22, 2019 SC Meeting Draft Summary of Apr 23, 2019 SC Teleconference	10:05 – 10:15 Adam Laputz

#	Agenda Item and Desired Outcomes	Attachments	Start & Lead
3	**Information: Technical Advisory Committee Update** Updates on recent TAC meetings. Desired outcome: • Informed committee.	Draft Summary of May 9, 2019 TAC Meeting Draft Summary of May 24, 2019 TAC Teleconference [to be distributed once available]	10:15 – 10:30 Stephen McCord
4	**Discussion: Proposed monitoring and special studies for FY19-20** The draft FY19-20 workplan includes proposed monitoring and special studies for mercury, nutrients, current use pesticides, and contaminants of emerging concern. The proposals have been developed by the technical subcommittees and reviewed by the TAC. Reviews of the proposals by TAC members are summarized. Project leads will give a short presentation followed by time for questions and discussion. • Nutrients: Lisa Thompson • Mercury: Jay Davis • CECs: Matthew Heberger • Pesticides: Jim Orlando Desired outcome: • Inform committee on monitoring activities and proposals for the upcoming fiscal year	Draft FY19-20 Workplan and Budget Memo: Summary of TAC comments on technical projects	10:30 – 12:00 Matthew Heberger
	Lunch		12:00 – 1:00
5	**Decision: Approve FY19-20 Workplan and Budget** The proposed FY19-20 workplan and budget includes the Core Programmatic Tasks in addition to the monitoring and special projects reviewed before lunch. Desired outcome: • Approval of the FY19-20 Workplan and Budget • Choice of funding level for mercury monitoring from among three options	Approval of the FY18/19 Workplan and Budget (see item 4)	1:00 – 2:00 Matthew Heberger

#	Agenda Item and Desired Outcomes	Attachments	Start & Lead
6	**Workplan Progress Update** Report by ASC on the implementation of the workplan to date, including the draft Quality Assurance Project Plan for CEC monitoring and progress on the Pesticides Interpretive Report by the contractor Deltares. **Desired outcomes:** • Informed committee • SC input on timing of milestones and key opportunities for input.	Project Schedule (Gantt Chart) including milestones, deliverables (link) Delta RMP Stoplight Reports	2:00 – 2:30 Matt Heberger
7	**Information: Delta RMP Finances** The Finance Update Memo summarizes Delta RMP revenues, expenses, and reserve fund status. Additional funds have been requested by Deltares, the contractor for the Pesticides Interpretive Report currently underway. Desired outcomes: • Informed committee • Approval of additional funding for Deltares	Finance Update Memo Budget Request Memo from Deltares	2:30 – 3:00 Matthew Heberger Finance Committee representative
	Break		**3:00 – 3:15**
10	**Discussion: Multi-Year Planning** The proposed 2019 – 2020 Fiscal Year Workplan includes funding for a day-long multi-year planning workshop. The goals of the workshop will be to set priorities for the program over the next 5 years and . Desired outcome: • Input on the planned day-long multi-year planning workshop this summer/fall. • Set date and location for workshop	Draft Agenda for a Multi-Year Planning Workshop Table of Management Drivers	3:15 – 4:15 Matthew Heberger
11	**Wrap Up** • Confirmation of action items from this meeting • Suggest agenda items for future meetings.		4:15 Adam Laputz
	Adjourn		**4:30**

Publications

funded wholly or in part by the Delta RMP

Pulse of the Delta

Aquatic Science Center. “The Pulse of the Delta: Monitoring and Managing Water Quality in the Sacramento - San Joaquin Delta.” Oakland, California, 2011.

Aquatic Science Center. “The Pulse of the Delta: Linking Science & Management through Regional Monitoring.” Richmond, California, 2012. https://www.sfei.org/documents/pulse-delta-linking-science-management-through-regional-monitoring.

Nutrients reports by USGS

1. An introduction to high-frequency nutrient and biogeochemical monitoring for the Sacramento–San Joaquin Delta, northern California. 2017. http://pubs.er.usgs.gov/publication/sir20175071

2. Synthesis of data from high-frequency nutrient and associated biogeochemical monitoring for the Sacramento–San Joaquin Delta, northern California. 2017. http://pubs.er.usgs.gov/publication/sir20175066

3. Designing a high-frequency nutrient and biogeochemical monitoring network for the Sacramento–San Joaquin Delta, northern California. 2017. http://pubs.er.usgs.gov/publication/sir20175058

Nutrients reports by ASC

1. Characterizing and quantifying nutrient sources, sinks and transformations in the Delta: synthesis, modeling, and recommendations for monitoring. 2015. http://sfbaynutrients.sfei.org/books/dwr-contract-deliverable

2. Nutrient Monitoring Planning Workshop - Summary of Existing Nutrient Monitoring Programs, Data Gaps, and Potential Delta RMP “No Regrets” Monitoring Activities. 2016. http://www.waterboards.ca.gov/rwqcb5/water_issues/delta_water_quality/delta_regional_monitoring/studies_reports/drmp_workshop_rpt_20161017.pdf

3. Assessment of Nutrient Status and Trends in the Delta in 2001–2016: Effects of drought on ambient concentrations and trends. 2018. https://www.sfei.org/documents/delta-nutrient-status-2018

4. Delta RMP Nutrients Synthesis: Modeling to Assist Identification of Temporal and Spatial Data Gaps for Nutrient Monitoring. 2018. https://www.sfei.org/documents/delta-nutrients-modeling

5. Beck, M. W., T. W. Jabusch, P. R. Trowbridge, and D. B. Senn. “Four Decades of Water Quality Change in the Upper San Francisco Estuary.” *Estuarine, Coastal and Shelf Science* 212 (November 2018): 11–22. https://doi.org/10.1016/j.ecss.2018.06.021.

Pathogens

1. Pathogen Study Final Report, by Larry Walker Associates. 2018. https://www.waterboards.ca.gov/centralvalley/water_issues/delta_water_quality/delta_regional_monitoring/reports/pathogens/drmp_path_study_1517.pdf

Pesticides

1. Delta Regional Monitoring Program Annual Monitoring Report for Fiscal Year 2015–16: Pesticides and Toxicity. http://www.sfei.org/documents/delta-pesticides-2016
2. De Parsia, M., J.L. Orlando, M.M. McWayne, and M.L. Hladik. “Pesticide Inputs to the Sacramento-San Joaquin Delta, 2015-2016: Results from the Delta Regional Monitoring Program.” Sacramento, California: U. S. Geological Survey, California Water Science Center, 2018. https://pubs.er.usgs.gov/publication/ds1089.

Mercury

1. Mercury and Methylmercury in Fish and Water from the Sacramento-San Joaquin Delta: August 2016 – April 2017. https://www.sfei.org/documents/delta-mercury-2016

Forthcoming Publications

- Summer 2019: Year 2 Pesticides Data Report, Matt DeParsia and Jim Orlando, USGS
- Summer 2019: Cross-Delta monitoring using high-frequency monitoring tools, USGS Biogeochemical Research Group.
- Summer 2019: Year 2 Mercury Monitoring Report, Jay Davis, ASC, and Wes Heim, Moss Landing Marine Laboratory
- Fall 2019: Pesticides and Toxicity Interpretive Report, Erwin Roex, Deltares
- Fall 2019: Chlorophyll sensor intercalibration study report
- Fall 2020: Pulse of the Delta, Vol. 3

Materials for Agenda Item 2

DRAFT Technical Advisory Committee Meeting Summary

May 9, 2019

at the Central Valley Regional Water Board, Rancho Cordova

Attendees:

TAC members, alternates, and staff present:

TAC Members	Representing	Affiliation	Position
Clark, Stephen	Stormwater	Pacific Eco Risk	alternate
DiGiorgio, Carol	Flood control and habitat restoration	Department of Water Resources (DWR)	member
Domagalski, Joe	Coordinated monitoring	U.S. Geological Survey (USGS)	alternate
Hoffman, Krista	Water supply	DWR	alternate
Irvine, Cam	POTW	Robertson-Bryan Inc.	alternate
Johnson, Michael	Agriculture	MLJ Environmental	alternate
Laurenson, Brian	Stormwater	Larry Walker Associates (LWA)	member
Mussen, Tim	POTW	Regional San	member
Phillips, Amy	Stormwater	El Dorado County	member
Taylor, Hope	Stormwater	LWA	alternate
Turner, Melissa	Agriculture	MLJ Environmental	alternate
Van Nieuwenhuyse, Erwin	Coordinated monitoring	Interagency Ecological Program (IEP) / US Bureau of Reclamation (USBR)	member

Ex-officio and staff

Cole, Selina	Staff, TAC alternate	Central Valley Regional Water Quality Control Board (Central Valley Board)
Cooke, Janis	Staff,	Central Valley Board
Davis, Jay	Staff	Aquatic Science Center (ASC)
Heberger, Matthew	Staff	Aquatic Science Center (ASC)
Howard, Meredith	Staff	Central Valley Board
McCord, Stephen	TAC Co-Chair	McCord Environmental
McClure, Danny	Staff	Central Valley Board
Morris, Patrick	Staff	Central Valley Board
Ogg, Brian	Staff	SWAMP/State Water Board

Others

Heim, Wes		Moss Landing Marine Laboratories
Orlando, Jim		U.S. Geological Survey (USGS)
Thompson, Lisa		Sacramento Regional County Sanitation District
Trouchon, Mike		LWA

1. Introductions and Agenda

Participants approved the agenda.

2. Decision: Approve TAC Meeting Summary for January 17, 2019 TAC meeting and confirm future TAC meeting dates

The committee reviewed the upcoming meeting calendar and set the dates below for the July and September TAC meetings.

Upcoming Scheduled Meetings

- Steering Committee Meeting: Wednesday, May 29, 2019, 10:00 – 4:00, Department of Water Resources, 3500 Industrial Blvd. #131, West Sacramento, CA
- TAC Meeting: Friday, July 19, 2019, 10:00 – 4:00, Location TBD
- TAC Meeting: Friday, September 13, 2019, 10:00 – 4:00, Location TBD

Decisions:

- Future TAC meeting dates were set for July 19 and September 13.
- The TAC Meeting Summary for January 17, 2019 was approved by consensus, with one minor change as noted under action items below.

Action Item:

- Confirm meeting room locations for the July and September meetings and forward date, time, and location information to the committee (Matt Heberger, by 5/31/2019).
- Update the TAC Meeting Summary to reflect an Errata sheet was also added to the FY16-17 Toxicity Report (see Agenda Package Page 10) (Matt Heberger, by 5/31/2019).

3. Information Item: Steering Committee Update

Matt Heberger noted that, with the new participants who have joined the program in the past year, the Delta RMP has grown to a $1.2 - $1.3 million/year program. The additional funding has so far allowed the program to expand mercury monitoring and to add an entirely new focus area on Contaminants of Emerging Concern (CECs). Matt also suggested it would be appropriate to begin using a small portion of program funds to provide lunch for Steering Committee and Technical Advisory Committee Meetings in the next fiscal year. There were no objections from the committee to that proposal, and Matt will present the idea to the Steering Committee for approval.

Matt also advised the committee that the SWAMP contract for toxicity testing is set to expire in March 2020, and Delta RMP will need to pay for toxicity testing out using Delta RMP funds for the second half of the 2019 -2020 fiscal year. Staff propose to continue the toxicity testing program as designed through the end of Water Year 2020, i.e. continuing to use the Aquatic Health Program Laboratory at UC Davis in order to maintain continuity and allow us to finish up year 2 of the study. Funds will be budgeted for toxicity identification evaluations (TIEs) if they are called for. The estimated cost to the Delta RMP is $167,500. We may wish to open a competitive bidding process for toxicity testing in Year 3, or Water Year 2021. In the instance that we do switch laboratories, it may be appropriate to send split samples to both old and new labs for a period of time to evaluate intercomparability of the results.

4. Technical Subcommittee and Monitoring Updates

Updates were provided from the subcommittees covering Mercury (Jay Davis), Nutrients (Matt Heberger), and Pesticides (Jim Orlando). The committee also discussed the following tables included in the agenda package:

- Past & Planned Monitoring Events
- Status of Delta RMP Datasets

Mercury

The following areas were covered: Sampling, Analysis, Reporting and Planning

Sampling: For FY18-19, fish sampling was done in August and September. Water sampling is being done at 8 sites over 10 months. There was no water sampling done in November or December, as planned. Monthly water sampling began again in January. The next water sampling will be the week of May 13.

Analysis: As a result of a couple of problems with one of Moss Landing Marine Laboratory's instruments, sediment samples were sent to Monterey Analytical Laboratory for analysis of Total Organic Carbon. This has caused about a 3-month delay in the report on Year 2 of Mercury monitoring.

Reporting: The deadline for the Draft Year 2 Report was December 2018 but was delayed due to data not being finalized until early 2019. The report is 90% complete and is expected to be complete by the week of May 20.

Planning: The Mercury subcommittee has held 3 meetings since the end of February developing the Mercury Proposal for FY19-20. (Presented under Agenda Item #6)

Nutrients

Matt Heberger provided a brief update on the two special projects: Chlorophyll Sensor Intercalibration, and Water Year 2016 Model Development.

Chlorophyll Sensor Intercalibration: Phase I consisted of planning the study and assembling a workgroup, and was completed in FY17-18. Phase II is well underway in FY 18-19. Tasks 1 and 2 are complete. Task 3, the Laboratory Intercalibration Study, is scheduled for Spring-Summer 2019, and 10 labs are participating. There will be 3 sampling events, the first of which was just completed. The final component, Task 4, (Fall 2019) will be a summary report with recommendations for next steps. Phase III is tentatively planned for FY 20-21 to provide "further investigation into sources of variance and/or strategies for minimizing variance."

Water Year 2016 Model Development: This is a Delta RMP Special Study to set up the model for 2016. After an initial delay in securing a contractor, Task 1 (Obtain and format WY2016 Hydrodynamic input and output files) is being conducted by ASC staff and is scheduled for completion in July 2019. The Steering Committee approved this change in staffing in February 2019. ASC is planning to invite the Principal Investigator of this project to give a presentation at a future TAC meeting.

Pesticides

Three sampling events have been conducted. The first was a minor storm on December 18-19, 2018. The second event from February 4-6 , 2019 was a bigger storm, and the third and final storm/snowmelt runoff event was April 29-30. We were unable to capture a third storm, and the sampling plan in the QAPP specified that Fifty pesticides were detected over the first 2 events. There was some toxicity to the algae species *Selenastrum* in the February sampling, in terms of a decrease in algae growth relative to a control. A toxicity identification evaluation (TIE) was conducted, and while inconclusive, suggested that observed toxicity may have been due to metals or polar organic compounds. Jim Orlando, head of the USGS Pesticide Fate Research Group (PFRG), ordered a metals scan by the National Water Quality Laboratory (NWQL). A review of these data by TAC members did not find high levels of metals that would explain the toxicity.

Action Items:

Include a discussion on the frequency of algal toxicity identified in the recent sampling on the next meeting agenda of the Toxicity Workgroup. The workgroup should meet to meet to discuss this before mid-June, prior to the next sampling event. (Matt Heberger, by 5/31/2019).

5. Discussion: Ranking for monitoring proposals for FY19-20

Matt Heberger demonstrated the process for filling in the questionnaires for ranking monitoring proposals. The Decision Grid results will be assembled into a package of information for the Steering Committee, showing proposal strengths and weaknesses, level of support among technical advisors and supporting and dissenting viewpoints. TAC members should fill in the questionnaires for both the Nutrients and Mercury Monitoring Proposals for FY19-20 no later than Friday, May 16, 2019.

Action Items:

- Complete ranking questionnaires for Nutrients and Mercury Monitoring Proposals for FY19-20 no later than Friday, May 16, 2019 (TAC members, by 5/16/2019)
- Send TAC members the funding level guidance given by the SC at last fall's joint meeting (Matt Heberger, by 5/10/2019)
- Compile ranking questionnaire results and distribute to the TAC for discussion via conference call on Friday, May 24, 1:00 – 3:00 PM. (Matt Heberger, by 5/21/2019).

6. Discussion: Review monitoring proposals for FY 2019-20 (1)

Janis Cooke presented the proposal for the Sacramento River Nutrient Change Study Phase 1. Jay Davis presented a proposal for Mercury Proposal for FY19-20. The full draft proposals were distributed to TAC members via email.

Action Items:

- As we finalize the choice of mercury monitoring locations, speak with restoration managers, to find out more about the construction, phasing, and hydrology of individual projects (Jay Davis or April Robinson, by 9/30/2019).

7. Discussion: Review monitoring proposals for FY 2019-20 (2)

Matt Heberger presented the proposal for Pesticides and Toxicity Monitoring in Water Year 2020. The estimated cost to Delta RMP due to changes in the funding source for the tox testing in 2020 will increase by approximately $167,500. This is the amount needed to cover the funding gap for the last six months of the fiscal year. The committee requested that the Pesticides Subcommittee begin developing a plan to address the shortfall. The committee also suggested expanding the proposed budgeted amount +/- 25%, and to consider the possibility of accelerating the study by adding more random sites.

Matt Heberger also presented a CEC Project Planning Update. The proposal we submitted to the Delta Stewardship Council under Prop 1 to expand CEC monitoring was not funded. The development of the Quality Assurance Project Plan for the study is a month or two behind schedule, however will be completed in time for monitoring to begin late summer or fall of

2019. The final draft of the QAPP will be distributed to the TAC for review as soon as it is finished, with a target date of May 31. The TAC will have an opportunity to discuss the QAPP at the July 19th TAC meeting. The committee requested the Prop 1 Proposal review be distributed to the Steering Committee and the TAC when it is available. The CEC budget estimates will be forwarded to the TAC the week of May 13.

Action Items:

- Consider adding an increased funding option for the pesticides monitoring project that will accelerate the schedule and complete the study more quickly. (Matt Heberger, by 5/18/2019).
- Consult the Toxicity Workgroup and/or Pesticides Subcommittee to assist in planning any toxicity intercomparison we may do (Matt Heberger and Liz Miller, by 8/15/2019).
- Distribute Prop 1 proposal review to Steering Committee and TAC when it is available (Matt Heberger, when available).
- Distribute CEC Budget estimates for FY19-20 to TAC.

8. Study Planning Timeline

Selina Cole presented a draft Delta RMP Study Development Process. The goal is to create and follow a study development process that reduces the need for last minute changes and results in the QAPP being finalized before a study and sampling begins. The committee suggested the process be modified for use with both annual cycle projects and short-term/special studies. Finalization of the new process will be scheduled as a discussion item for the long-range planning meeting later in 2019.

Action Item:

- Incorporate a version of the proposed study planning timeline in the materials for the multi-year planning workshop (Matt Heberger and Selina Cole, by 8/15/2019)

9. Update on Pesticides Interpretive Report

Deltares has produced three sets of deliverables, including the database and a technical memo describing their planned approach. ASC is reviewing the timeline and milestones for completing the study, including further opportunities to provide input and feedback. Significant comments have been received on the technical memo, and there was general agreement Deltares should be given three weeks to revise the tech memo based on comments. The revision should be done in track changes, so it is clear they have responded to comments. Notice to proceed will be given after the Delta RMP has completed a review of the Deltares response. Matt Heberger will also contact Deltares about scheduling an additional in-person meeting to ensure that the committee understands the methods that Deltares will be using for the analysis.

Action Items:

- Ask Deltares to submit a track changes version of the tech memo to see exactly what has changed and how they responded to comments/suggestions rather than asking them to provide a formal response to comments. (Matt Heberger, by 5/15/2019).
- Suggest to Deltares to add a meeting to discuss the methods memo before we give them a notice to proceed with the analysis (Matt Heberger, by 5/15/2019).

10. Management Drivers for Regional Monitoring

The committee discussed the revised 2019 Management Drivers table. The table is intended to provide information and context for the forthcoming long-range planning workshop in the Fall of 2019. Suggested revisions include:

- Add the following to the list of drivers:
    - Department of Pesticide Regulations (DPR) Surface Water Protection Program
    - Department of Toxic Substances Control (DTSC) Safer Consumer Products Program (SCP)
- Consider modifying the table to show the nexus of Management Drivers with the Delta RMP Management Assessment Questions?

Action Items:

- Add DPR and DTSC programs to Management Drivers Table, and incorporate a cross reference to Delta RMP Management Assessment Questions if possible (Stephen McCord, by 5/15/2019).

11. Information: Status of Deliverables and Action Items

- Action items are as covered in the Summary

Materials for Agenda Item 4

Memo

To: Delta RMP Steering Committee

From: Matthew Heberger, Aquatic Science Center

Date: May 18, 2019

Re: Description of this year's proposal development, selection, and ranking process

This memo provides a description of the process followed by ASC and the TAC in developing, selecting, and ranking proposals for monitoring and special studies for the 2019 – 2020 fiscal year (FY19-20). The purpose of the review process was to:

- Identify any areas where proposals should be improved or strengthened.
- Recommend to the SC which proposals merit funding.
- Document the level of support for proposals among TAC members and any dissenting opinions.

We developed this ranking process in collaboration with stakeholders in response to direction from the Steering Committee to better capture the range of opinions and level of support among TAC members. We piloted this approach last year, and this is our second year using this approach. We welcome your feedback as we continue to improve and streamline the process. Overall, we sought to follow the proposal review process as it was outlined by the ad hoc Decision Grid Working Group in 2017. For more information, see the agenda package for the 10/24/2017 Delta RMP Joint TAC-SC Meeting, Item 8.

Proposal template

Each proposal follows a roughly similar template and includes:

- Title
- Executive summary
- Background and motivation
- Applicable management decisions and assessment questions
- Study approach
- Map(s) of proposed monitoring locations (if applicable)
- Data Quality Objectives, including a statement of the null hypothesis, planned analytical methods, and tolerable limits on decision errors (if applicable)
- Schedule of deliverables
- Budget

Proposals were included in the agenda package for the TAC meeting on May 9, 2019. At this meeting, the Principal Investigators gave an overview of each proposal and answered

questions. About an hour of time was allocated for each study for presentations and for discussion of the proposals by TAC members.

Ranking Questionnaire

Following the meeting, TAC members had the opportunity to rank and provide feedback on proposed monitoring and special projects for nutrients and mercury. We created a standardized questionnaire for each proposal using Google Forms, and invited all TAC members to fill in the questionnaire for each proposal. The questionnaires were based on the "Decision Grid" developed by a working group in 2017 and consisted of a series of questions. Some questions asked for a numerical ranking (1 to 5, with 5 being the highest score), and other questions asked for a written response. The numeric responses represented the level of agreement with a statement such as "The proposal demonstrates how the results will be presented." We instructed respondents to interpret the responses as follows:

1. Strongly disagree
2. Disagree
3. Neutral (neither agree nor disagree)
4. Agree
5. Strongly agree.

At the May 9 TAC meeting, we demonstrated the use of the questionnaire, and also reminded committee members of the conflict of interest COI policy in the Delta RMP Charter (i.e. the duty to *disclose* any COI and to *recuse* oneself from discussion and decision making on any item where an individual may have a conflict).

TAC members were invited to fill out the questionnaires one for the proposed nutrients special study and for proposed mercury monitoring. In total, 8 TAC members filled in the questionnaires. We summarized the results of these questionnaires, and included the summary in the agenda package for a May 24, 2019 TAC teleconference meeting. The summaries included the average score for questions with a numeric reply, and the distribution of scores.

In summary, we have endeavored to provide the Steering Committee a packet of information that will allow them to gage the level of support for proposals among TAC members, and any perceived strengths and weaknesses. Further, where possible, we have amended the proposals in response to feedback from TAC members. The packet of information for each focus area being forwarded to the SC includes:

1. Proposal(s)
2. Summary of numeric ranking by TAC members
3. Compilation of comments by TAC members

Materials for Agenda Item 4: **Nutrients Proposal**

Delta RMP Nutrient Subcommittee FY19/20 Workplan Proposal

Sacramento River Nutrient Change Study Phase 1: Effluent Valve Replacement Hold

Investigators: Lisa Thompson and Tim Mussen (Regional San), Mine Berg (Applied Marine Sciences), Brian Bergamaschi and Tamara Kraus (USGS), and Wim Kimmerer (San Francisco State University)

Project Description

This study will track the effects of changes in nutrient loading resulting from a short-term wastewater hold at the Sacramento River Wastewater Treatment Plant (SRWTP). In the summer of 2019, scheduled wastewater effluent holds will occur during the Effluent Valve Replacement (EVR) project, part of the EchoWater upgrade at the SRWTP. During an EVR hold, no treated effluent will enter the Sacramento River for a period of up to 48 hours. Based on prior research (Kraus et al. 2017) this should create a parcel of effluent-free river water over six miles long in the Sacramento River. The impacts of short-term changes in nutrient loading will be tracked in parcels of water with and without effluent during movement downstream in the Sacramento River and nearby channels.

The project consists of one week-long river sampling campaign, field measurements laboratory analyses, numeric modeling, and reporting. The project will use multiple methods, including boat-mounted, high frequency monitoring of nutrients and fluorescence; discrete sampling for analyses of water quality, phytoplankton and zooplankton abundances, clam biomass, and phytoplankton carbon uptake (to determine growth rates). Data and hydrodynamic modeling will be used to evaluate the response of phytoplankton to a range of nutrient loads and forms, as well as factors of light, turbidity, water residence time, and grazing by zooplankton and clams. See the end of the document for conceptual model and project hypotheses.

The project team is targeting an EVR hold in **August 2019** for the field work. All data review and submissions, data analyses, modeling, and reporting would be complete within 18 months of the field work.

Delta RMP is asked to fund a portion of the project. Regional San will provide staff hours and equipment for project oversight, development of the QAPP, collection of water samples, and coordination of a final report. Other support is described within the task list and budget.

Study Area

The study will occur in the lower Sacramento River and downstream connecting channels, including Georgiana Slough and the Mokelumne River (Figure 1). The channels in the study area are close enough to the SRWTP that water parcels with or without treated effluent can still be detected and tracked in the river water (i.e., prior to complete mixing). In the shallower lower Mokelumne River and Georgiana Slough, light penetrates a greater proportion of the water column than in the deeper lower Sacramento River. Elevated light levels increase the potential for rapid phytoplankton growth when other regulating factors are favorable, namely low turbidity, shallow water depth or stratification, sufficient nutrient concentrations, and low grazing pressure.

Figure 1. Map of the Sacramento-San Joaquin River Delta showing project sampling sites in the lower Sacramento River, Georgiana Slough, and North and South Forks Mokelumne River. (Credit: Regional San)

Study Design

Regional San staff will sample at a total of 12 “grab sample” stations, three along the Sacramento River, three along Georgiana Slough, three along the North Fork Mokelumne River and three along the South Fork Mokelumne River. The USGS high frequency sampling boat will sample these river segments daily during the week of field work. At each “grab sample” station, vertical profiles of temperature, pH, electrical

conductivity, dissolved oxygen and photosynthetically active radiation (PAR) will be taken. Discrete samples will be collected for turbidity, chlorophyll *a*, picoplankton and phytoplankton enumeration, zooplankton enumeration and growth rates, and dissolved inorganic nutrient concentrations. If visual survey of a station indicates that potentially harmful algal species such as *Microcystis sp*. are present, the team will collect separate water samples for BSA Environmental Services to measure microcystins. Clams will be collected using benthic trawls.

Phytoplankton enumeration will allow examination of any changes in the proportions of beneficial and potentially harmful phytoplankton. During the 1-week study, changes in phytoplankton growth rates and zooplankton growth rates are expected to be detectable and potentially also changes in phytoplankton biomass. Because changes in zooplankton abundance would be minimal during this short time period and difficult to detect, the study will examine growth of zooplankton.

River discharge, velocity, and other water-quality characteristics from three of USGS' fixed monitoring stations Freeport (0.2 km upstream of SRWTP) and Walnut Grove and Decker Island (29.2 km and 39 km downstream of SRWTP, respectively) will be used to plan sampling events and document continuous river conditions. Treated effluent flow rate data (hourly averages) will be provided by SRWTP personnel, along with effluent water quality data, including daily ammonia (NH_4^+) and weekly nitrate (NO_3^-) concentrations.

Tasks and Scope of Work

This proposal is for the Delta RMP to provide $250,000 for project tasks plus up to $30,000 for ASC to manage subcontracts.

All of the project tasks are described below, with tasks proposed for funding by the Delta RMP listed first. Funds from sources outside of the Delta RMP for other tasks have been secured. Although it would not be funding the entire project, Delta RMP will receive updates and final reports for the entire project. Regional San will provide staff for preparation and review of submissions of data to be uploaded to CEDEN.

Tasks to be funded by the Delta RMP:

1. Plankton and Zooplankton Enumerations: This task will be led by Dr. John Beaver, BSA Environmental Services, Inc. For discrete water samples, BSA staff will identify and count phytoplankton and zooplankton to the lowest taxonomic level possible (e.g., family, genus, or species). Three replicate phytoplankton and zooplankton samples, and one picoplankton sample will be enumerated per station. The purpose of this task is to describe changes to phytoplankton abundance and species composition in the river resulting from reduced nutrient concentrations, compared to high-nutrient control water.

2. Phytoplankton Growth Evaluations: This task will be performed by Dr. Mine Berg, Applied Marine Sciences, Inc. (AMS). Onboard the Regional San boat, AMS will measure photosynthetically active radiation (PAR) [measure of light availability in different parts of the water column], variable fluorescence (Fv/Fm) [a metric of photosynthetic activity and health status of photosynthetic cells], and carbon (C) uptake by phytoplankton. The purpose of this task is to directly measure phytoplankton growth during changes in nutrient conditions. This work will help determine when and where growth is occurring and identify if growth changes occurred at particular nutrient concentrations.

3. Numeric Modeling of Proportional Water Volumes and Mixing, Subtasks 1-3: This task will be performed by Resource Management Associates (RMA) using their suite of Delta numerical model applications. The modelers and field researchers will be in close contact both before and after the field surveys take place to ensure that: the models focus on confluences in the study area where there is uncertainty regarding water inflows and tidal fluxes, the field data are collected at locations that will assist the modelers in calibrating their models to the water movements occurring during the specific week of the field work, and that the field researchers have a clear understanding of the modeling results. The purpose of this task is to better understand water sources, mixing, transport time and age, which will improve interpretation of the data collected. For example, having proportions of source waters at each location sampled, along with travel time estimates, allows more accurate determination of whether changes in phytoplankton biomass and species composition are due to growth, grazing, or dilution by tributary inflows.

    a. RMA will estimate the percentage of source waters supplied to Georgiana Slough and North and South Forks Mokelumne River during the EVR hold. Model calculations will help identify sources of phytoplankton, zooplankton, nutrients, and other chemical constituents by identifying the proportion of water in each river sample from different sources. Upstream sources include SRWTP effluent stream, Sacramento River, Mokelumne River and Cosumnes River, and potentially a downstream source from the San Joaquin River depending on inflow levels and tidal mixing.

    b. RMA will refine the existing RMA model grid of the study area to improve the spatial resolution by increasing the grid dimension from 1-D to 2-D at major confluences and other areas of interest. The existing RMA model grid is one-dimensional at some confluences, so increasing the grid to two dimensions will improve the spatial resolution of the flow and transport and stage calibration locally and at selected downstream locations.

c. RMA will test and refine model performance of the 2-D grid at the confluences of the Sacramento River and Georgiana Slough, the Sacramento River and the Delta Cross Channel, and the Delta Cross Channel and Snodgrass Slough. The model will be refined using data collected by Regional San in this study. Vertical and cross-channel profiles of temperature, dissolved oxygen, and electroconductivity measurements will be used to test the model's replications of water mixing.

d. RMA will use their particle tracking module to calculate particle transport through the study area and estimate travel time of parcels of water entering the study area from different sources or time points.

Task 3 deliverables will include a final report describing background information for the modeling applications, data acquisition, modeling results, and interpretation of results. Modeling results will include estimates of source water volumes and mixing at sampled locations and times, documentation on grid updates and checks of flow and stage calibration, metadata used in modeling refinements. Particle-tracking products will be documentation describing the particle tracking model set-up, travel time estimates and two movie-style visualizations of particle transport.

Tasks supported by other funds and in-kind contributions:

4. Zooplankton Growth and Condition: This task will be led by Dr. Wim Kimmerer, RTC-SFSU. Dr. Kimmerer and his staff will sample zooplankton while onboard the Regional San boat. SFSU staff will determine zooplankton abundance, biomass using a FlowCam, and life-stage (copepods) or size (cladocera) distributions, and reproductive rates. Zooplankton growth rates will be determined by sorting field-collected zooplankton into cohorts by size and monitoring their growth in short-term incubations. Analyses will evaluate zooplankton abundance, growth, reproduction, and mortality relative to environmental and nutrient conditions. They will also collect and analyze samples molecularly for identification of foods consumed by the zooplankton.

5. Discrete water quality sampling: Regional San staff will collect grab samples for laboratory analyses of chlorophyll *a*, dissolved inorganic nutrients, and phytoplankton and zooplankton abundance plus associated field measurements (temperature, dissolved oxygen, pH, electrical conductivity, and turbidity) aboard Regional San's vessel, the Guardian. Regional San Environmental Laboratory staff operate this vessel for monthly Sacramento River water quality compliance sampling. Collection of grab samples will be closely coordinated with the high frequency data collection to ensure the correct timing of grab samples in parcels with and without wastewater.

6. High frequency water quality data collection and analyses with mapping: This task will be led by Dr. Brian Bergamaschi and Dr. Tamara Kraus, USGS. USGS will characterize changes occurring during transport of wastewater-free parcels in comparison to associated wastewater-containing parcels down Sacramento River and into distributary channels, including characterization of changes in nutrients, phytoplankton community, and net ecosystem productivity. High speed maps will be made using boat-mounted, flow-through instrumentation system collecting continuous, underway measurements of location, time, temperature, conductivity, pH, dissolved oxygen, turbidity, beam attenuation, dissolved organic matter fluorescence, chlorophyll-a fluorescence and nitrate. Real-time data will be used to detect the presence and absence of treated wastewater effluent and to quantify wastewater-derived constituent concentrations. A key outcome of the high frequency data collection will be nitrogen transformation (e.g., nitrification) rates across a range of nutrient concentrations and habitat types.
7. Laboratory Analyses of Water Samples: Water will be analyzed by the Regional San Environmental Laboratory for ammonium, nitrate/nitrate, dissolved phosphorus, and dissolved inorganic carbon.
8. Clam collection and analyses: This task will be led by Dr. Tim Mussen, Regional San Environmental Laboratory and Scientific Research Section. Dr. Mussen and a Regional San intern will conduct clam enumerations (counts and biomass) and use these data to calculate clam grazing rates.
9. Reports and manuscripts: This task will be led by Dr. Lisa Thompson, in collaboration with the rest of the Project Team. Products will include quarterly progress reports and a final project report/manuscript. Regional San will also coordinate and ensure preparation of a QAPP for all components of the project. QAPP components for Delta RMP-funded activities can be excerpted and copied into the Delta RMP QAPP. Water quality, phytoplankton, zooplankton, and clam data collected during this project will be subjected to quality assurance/quality control review and then submitted for upload to CEDEN using the Chemistry, Field Collection, and Taxonomy templates.

Relevance to Delta RMP Management and Assessment Questions

This proposal directly addresses the following Delta RMP Management and Assessment Questions. Specific information gaps identified in the Delta Nutrient Research Plan (DNRP, CVRWQCB 2018) are listed on pg 10.

Status and Trends –Questions 1 and 1.C

1. How do concentrations of nutrients (and nutrient-associated parameters) vary spatially and temporally?

C. Are there important data gaps associated with particular water bodies within the Delta subregions

10. Explanation: Previous study of a wastewater hold did not investigate effects in channels other than the Sacramento River.

11.

12. Sources, Pathways, Loadings and Processes – Questions 1, 1.A, and 2A

1. Which sources, pathways, and processes contribute most to observed levels of nutrients?
   A. How have nutrient or nutrient-related source controls and water management actions changed ambient levels of nutrients and nutrient-associated parameters?

2. How are nutrients linked to water quality concerns such as harmful algal blooms, low dissolved oxygen, invasive aquatic macrophytes, low phytoplankton productivity, and drinking water issues?
   A. Which factors in the Delta influence the effects of nutrients on the water quality concerns listed above?

Explanation: The project will track the effects of a significant change in nutrient loading from wastewater. Comparisons among channels and with/without SRWTP effluent will allow examination of factors of light availability and water residence time.

Forecasting Scenarios

How will nutrient loads, concentrations, and water quality concerns from Sources, Pathways, Loadings & Processes Question 2 respond to potential or planned future source control actions, restoration projects, water resource management changes, and climate change?

Explanation: The project is an opportunity to examine effects of a major change in nutrient loads. On an annual average basis, current nitrogen loads from Regional San and the Sacramento River upstream of Regional San are 14,000 and 18,500 kg N/day, respectively. In fall, when the project monitoring will occur, the difference will be more marked as Sacramento River upstream nitrogen loads are lower than the yearly average.

Effectiveness Tracking

How did nutrient loads, concentrations, and water quality concerns from Sources, Pathways, Loadings & Processes Question 2 respond to source control actions, restoration projects, and water resource management changes?

Explanation: The project is a preview of nutrient changes expected due to the Regional San EchoWater upgrade. The project uses an adaptive management approach to monitoring by utilizing pre-planned infrastructure changes to field-test hypotheses of effects of the upgrade.

Budget

Task	Description	**Proposal to Delta RMP** [1]	Other funding and in-kind **secured**
1	Phytoplankton and zooplankton enumeration (BSA Environmental Services)	$30,000	$0
2	Phytoplankton growth evaluations (Applied Marine Sciences, Inc).	$103,000	$0
3	Numeric modeling of proportional water volumes and mixing (Resource Management Associates) [2]	$117,000	$0
4	Zooplankton growth and condition (San Francisco State University) [3]	$0	$170,000
5	Discrete water quality sampling (Regional San) [4]	$0	$211,635
6	High frequency data collection and mapping (USGS) [5]	$0	$210,000
7	Laboratory analyses of water samples (Regional San)	$0	*(within Task 5)*
8	Clam collection and analyses (Regional San)	$0	*(within Task 5)*
9	Reporting and manuscripts (Regional San and project team)	$0	*(within Task 5)*
	Subcontract Management [6](ASC)	$12,500	$0
	Project totals	$262,500	$591,635

1. Proposal calls for Delta RMP support up to $250,000 plus contract administration.
2. Project Team is seeking funding for final $8,688 to completely fund the full modeling component
3. Task supported by State Water Contractors and Metropolitan Water District
4. Applied Marine Sciences and SFSU will have staff on Regional San boat to collect data and samples for tasks 2 and 4, respectively.
5. Task supported by USGS ($60,000 for in-kind boat and equipment resources) and US Bureau of Reclamation ($150,000).
6. Includes executing and managing contracts, reviewing and paying invoices, reporting to SC and finance subcommittee regarding status of agreements and payments. Does not include reporting about project findings and technical information, which will be done by Regional San and project team.
7.

Supporting Information

Background - Best Available Science and Conceptual Models

Water and nutrients from the Sacramento River enter Georgiana Slough, and, via the Delta Cross Channel, the North Fork Mokelumne River and South Fork Mokelumne River, providing an opportunity to test the effects of changes in water transit time, depth, light, and nutrient loading on phytoplankton and zooplankton productivity and biomass. High frequency boat mapping, performed by the USGS in support of the Delta Regional Monitoring Program, is able to detect patterns in numerous aquatic variables in these side channels, including nutrient concentrations, turbidity, and chlorophyll a. Biogeochemical model predictions (Zhang et al. 2018) suggest that EchoWater Project upgrades to the SRWTP will result in substantial changes in nutrient concentrations in these side channels. During the EVR holds the load of ammonia and nitrate from SRWTP will be zero, providing an opportunity to investigate the potential impacts of nutrient load reductions that are lower than those mandated in SRWTP's current NPDES permit.

Under our conceptual model, the factors of transit time, light, and nutrient loading will result in different outcomes for phytoplankton productivity and biomass occurring in the side channels compared to those living in the mainstem Sacramento River. In the mainstem Sacramento River, where water depth is sufficient to make light limiting to phytoplankton growth (AMS 2017), we predict that decreased nutrient loading will have little effect on phytoplankton biomass or the higher levels of the aquatic food web (Figure 2). However, in the side channels, where a combination of decreased depth, increased transit time, and decreased turbidity may increase light availability (i.e., euphotic zone depth), we predict that phytoplankton productivity and biomass will be regulated by nutrient availability. Under scenarios with lower nutrient loading, we would expect to see less phytoplankton growth and biomass than under the current loading scenario. The diagrams in Figure 2 assume that nutrient loading from other sources upstream of Freeport are constant across situations, and that during the summer SRWTP effluent is a high proportion of the total nutrient load to the Sacramento River. The diagrams assume a time frame of days, during which increases in phytoplankton and zooplankton growth rates would be detectable, and potentially also changes in phytoplankton biomass. However, changes in zooplankton abundance and clam biomass would be minimal during this short time period and difficult to detect. These diagrams do not make an assumption about whether increased phytoplankton biomass would be in the form of beneficial or harmful algal species, but we would be able to observe any changes through the high frequency boat mapping surveys, and through phytoplankton enumerations (species counts and biomass). Changes in nutrient loading from SRWTP will be apparent in the mainstem Sacramento River, but are unlikely to manifest in changes in phytoplankton response until the water reaches the river side channels, where other key factors, namely depth, transit time, and euphotic zone depth are more favorable for phytoplankton growth.

This project, termed "Sacramento River Nutrient Change Study Phase 1" will generate useful stand-alone information. Furthermore, the Phase 1 project is part of a larger proposal to study impacts of other events that change nutrient loads. These events include steps in SRWTP upgrade process and operation

of Delta cross-channel gates. The project design makes use of these already-planned operations to conduct adaptive management experiments to inform future nutrient management in the Delta.1

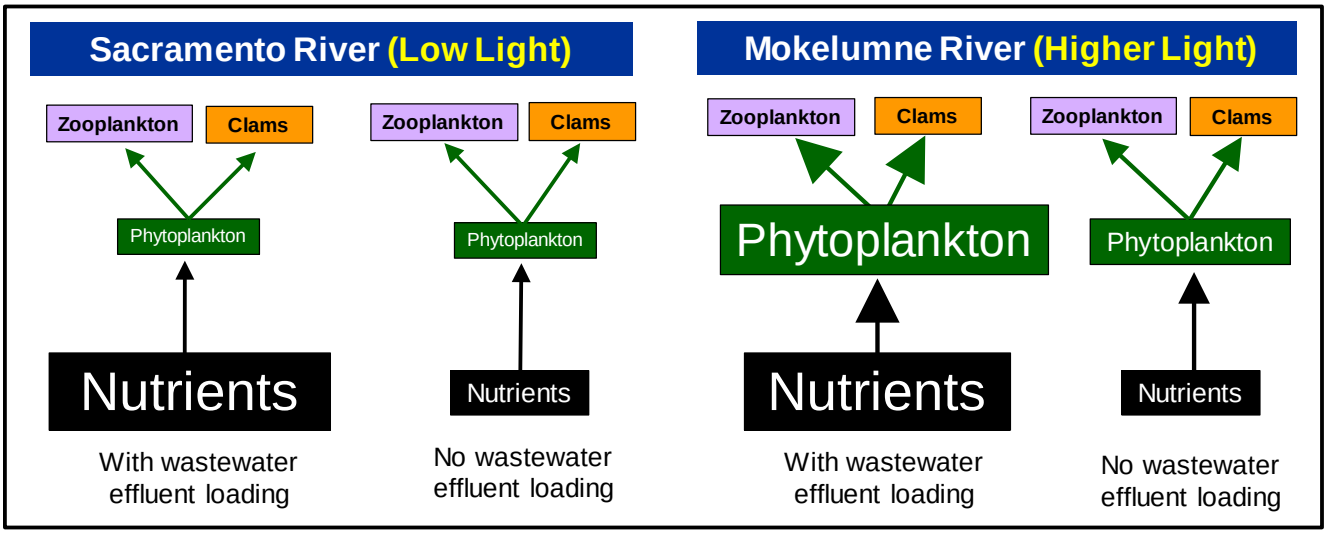


Figure 2. Food web diagrams showing potential nutrient load (focusing on dissolved inorganic nitrogen, DIN) and biomass transfer under four situations: (1) Current effluent nutrient loading, (2) No effluent loading, as will occur during Effluent Valve Replacement holds, (3) Current loading plus increased light availability, and (4) No effluent loading plus increased light availability. The thickness of each arrow indicates the amount of nutrients or biomass transferred through the food web, relative to the other situations. The font size of the text shows biomass at each trophic level relative to the other situations. Outcomes for nutrient loading scenarios BNR Part 1 and BNR Part 2 are anticipated to be intermediate to the more extreme contrast between current effluent nutrient loading and the EVR no effluent loading scenario.

Questions and Hypotheses to be addressed in Phase 1 and future phases

Question 1: Will a substantial reduction in DIN concentrations have a positive, neutral, or negative effect on desirable phytoplankton growth in the Delta?

> Hypothesis 1: A substantial reduction in DIN concentration will have a neutral impact on phytoplankton growth in the Delta.

[1] Operational changes envisioned for investigation in future phases of the Sacramento River Nutrient Change Study:

(1) In the summer of 2020, there will be a moderate reduction in Sacramento River nutrient concentrations when roughly half of the EchoWater Project Biological Nutrient Removal (BNR) process is initiated.
(2) In the summer of 2021, the EchoWater Project BNR process will be fully operational, which will further reduce average nutrient concentrations in the Sacramento River.
(3) In early spring 2020, near the end of the seasonal winter closure of the Delta Cross Channel, there may be a long slow drawdown of nutrient concentrations by phytoplankton and denitrification in the Mokelumne River.

Question 2: How will low and high irradiance combined with a substantial reduction in DIN concentrations impact phytoplankton growth in the Delta?

Hypothesis 2A: A substantial reduction in DIN concentration will have a neutral impact on phytoplankton growth in the Delta under low irradiance.

Hypothesis 2B: A substantial reduction in DIN concentration will have a negative impact on phytoplankton growth in the Delta under high irradiance.

Question 3: How will increased residence time combined with a substantial reduction in DIN concentrations impact phytoplankton growth and biomass accumulation in the Delta?

Hypothesis 3A: A substantial reduction in DIN concentration will have a neutral impact on phytoplankton growth in the Delta under low residence time.

Hypothesis 3B: A substantial reduction in DIN concentration will have a negative impact on phytoplankton growth in the Delta under high residence time.

Question 4: How will grazing pressure change and impact phytoplankton biomass accumulation with increased irradiance and water residence times under high and low nutrient scenarios?

Hypothesis 4A: Under low residence time and low irradiance, grazing pressure will not impact phytoplankton biomass accumulation with either low or high DIN concentrations.

Hypothesis 4B: Under high irradiance and low residence time, grazing pressure will not impact phytoplankton biomass accumulation with either low or high DIN concentrations.

Hypothesis 4C: Under high residence time and high irradiance, grazing pressure will negatively impact phytoplankton biomass accumulation with high DIN concentrations but not with low DIN concentrations.

Relevance to Delta RMP Management Driver – Delta Nutrient Research Plan

This proposal addresses key scientific uncertainties and fills important information gaps identified in the Delta Nutrient Research Plan (DNRP, CVRWQCB 2018. Specifically, this project will address, in part, six management sub-questions posed in the DNRP.

1. What are the main factors affecting potential nutrient-related effects and how does the relative importance of these factors vary with space and time? (Delta Nutrient Research Plan, Table 1, p. 23)
2. What are the important processes that transform nutrients in the Delta and what are the rates at which these processes occur? (Delta Nutrient Research Plan, Table 1, p. 23)
3. Can nutrient management in the northern Delta (e.g., Yolo Bypass, Sacramento River, and Sacramento Deep Water Ship Channel) increase abundance or nutritional quality of pelagic phytoplankton? (Delta Nutrient Research Plan, Table 1, p. 23)
4. What is the level and type of change in nutrients needed to affect change in HABS, macrophytes, or phytoplankton abundance? (Delta Nutrient Research Plan, Table 1, p. 23)

5. What are the most likely alterations in nutrient conditions due to climate change, Delta habitat restoration, and changes in nitrogen forms and loads? (Delta Nutrient Research Plan, Table 1, p. 24)
6. What nutrient levels are needed to support adequate primary productions and a healthy food web, particularly for endangered fish species? (Delta Nutrient Research Plan, Table 1, p. 24)

References

Applied Marine Sciences, Inc. (AMS). 2017. Final Report: Spatial and seasonal patterns in irradiance phytoplankton, and grazers along the Sacramento River, California. Submitted to Sacramento Regional County Sanitation District, Sacramento, California. August 14, 2017. 65 p.

Central Valley Regional Water Control Board (CVRWQCB). 2018. Delta Nutrient Research Plan. 40 p.

Kraus TEC, Carpenter KD, Bergamaschi, BA, Parker AE, Stumpner EB, Downing BD, Travis NM, Wilkerson FP, Kendall C, Mussen TD. 2017. A river-scale Lagrangian experiment examining controls on phytoplankton dynamics in the presence and absence of treated wastewater effluent high in ammonium Limnology and Oceanography 62 (3): 1234-1253.

Zhang, Z., Senn, D., Holleman, R., & Nuss, E. (2018). Annual Progress Report for Delta-Suisun Bay Biogeochemical Modeling Project (Progress report). Richmond, CA: San Francisco Estuary Institute. URL: http://sfbaynutrients.sfei.org/sites/default/files/2018_nms_fy2018_annual_report.pdf

Materials for Agenda Item 4: **Nutrients Proposal Score Sheet**

Delta RMP Monitoring Proposal Questionnaire #1: Sacramento River Nutrient Change Study

7 responses

Name

7 responses

Cameron Irvine

Stephen McCord

Stephen Louie

Carol DiGiorgio

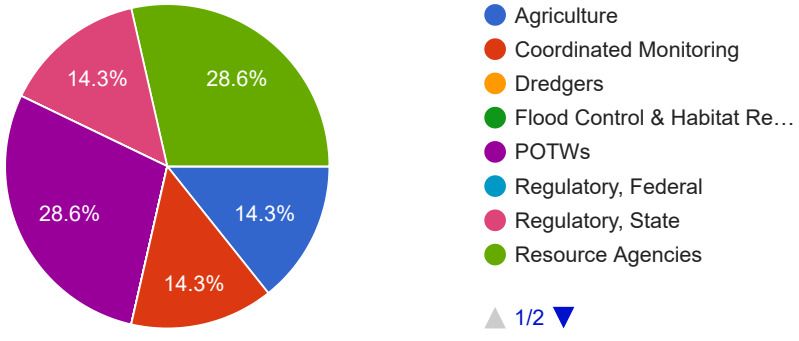
Janis

Melissa Turner

Tim Mussen

Representing:

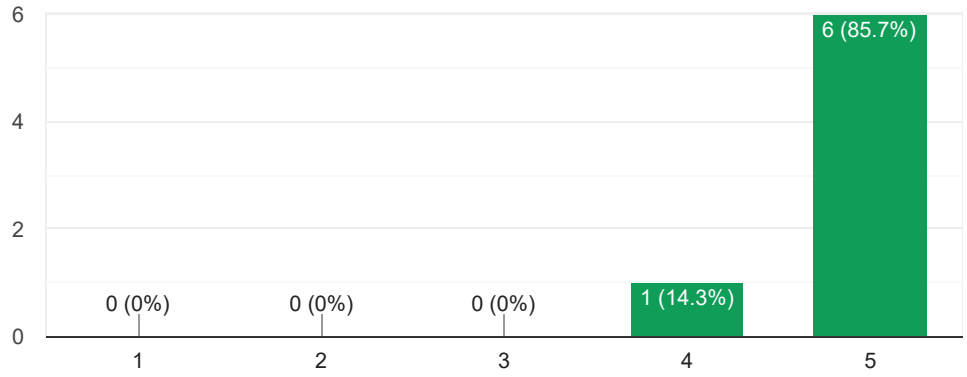
7 responses



A. Study Plan Responsiveness

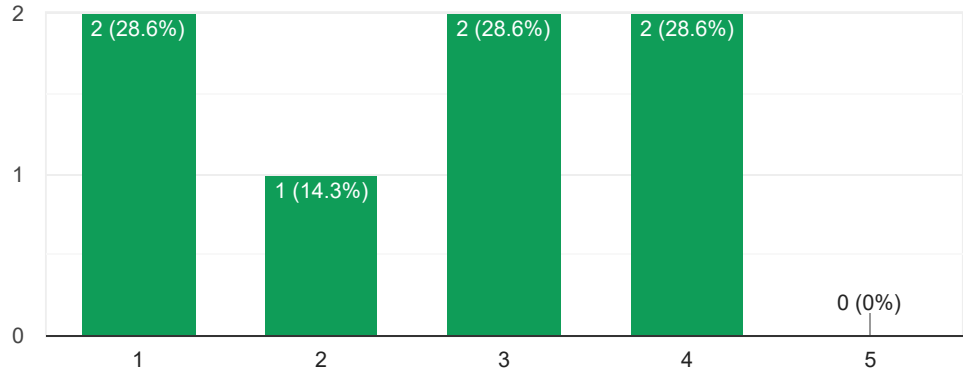
1. Does the study proposal identify the management question addressed?

7 responses



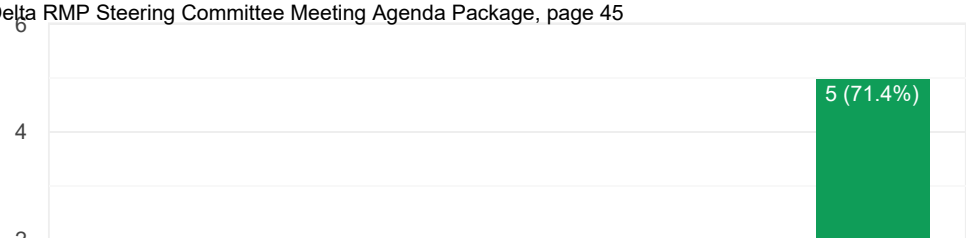
2. Are the Data Quality Objectives (DQOs; EPA 2006) clearly defined?

7 responses



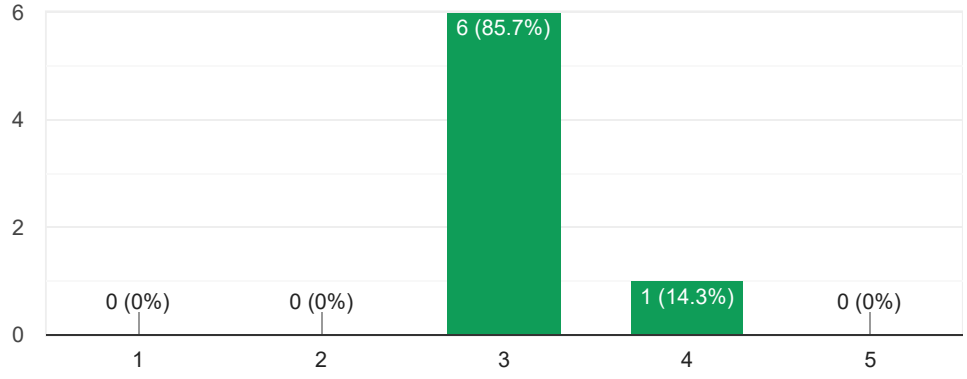
3. Does the study provide testable hypotheses (written as assessment questions or otherwise)?

7 responses



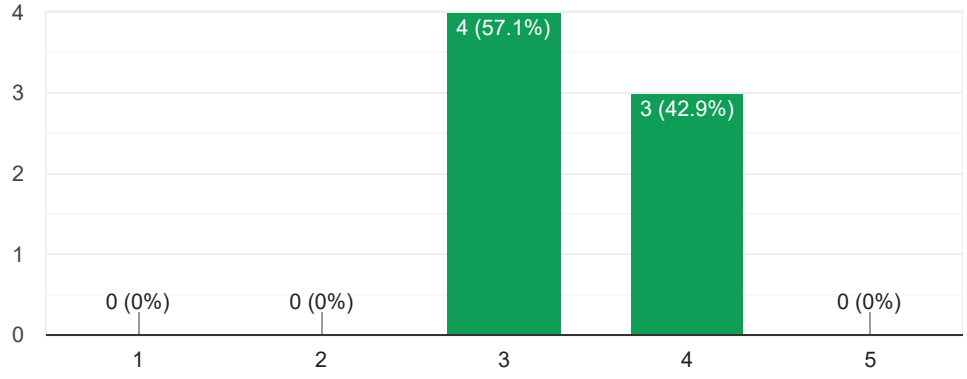
4. Does the proposal demonstrate how the results will be presented?

7 responses



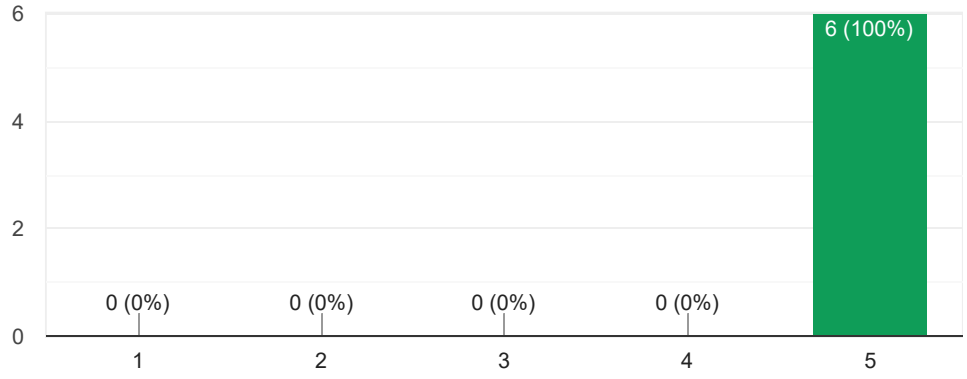
5. Does the proposal adequately demonstrate how the results will be interpreted?

7 responses



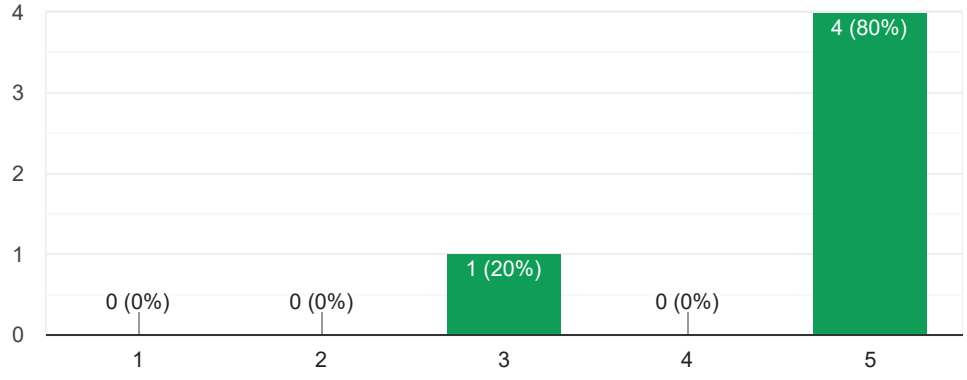
6. Does does the proposal contribute to a larger body of data that can be used to answer Management Questions in the future?

6 responses



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

5 responses



8. Comments on the overall study plan responsiveness:

4 responses

There are several interacting components and uncertainty in the results, so the data analysis will understandably be exploratory to some extent.

The RMP survey questions in this section asked to demonstrate how the results will be presented or interpreted. I didn't see any example figures, etc. to answer these questions. I'm assuming that the references in this proposal would have this kind of information. Per the proposal, a QAPP will be created, however, I didn't see a direct discussion in the proposal regarding clearly defined DQOs.

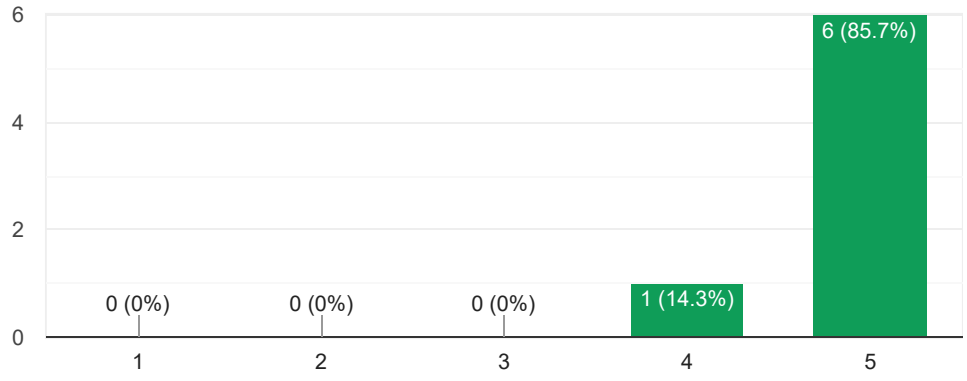
Proposal contains the info necessary to evaluate technical merit and utility to the Delta RMP. DQO should have been included but can appropriately be placed in the QAPP

Additional information could be provided to better explain how change will be quantified and what analysis will be done to test the hypothesis. It is a little unclear how the RMA model results, real time data and grab data results will connect to one another to verify that the grab samples are collected at the correct time to ensure that any change (or lack of change) is a direct result of the reduction in DIN and not a result of the study design.

B. Technical Foundation

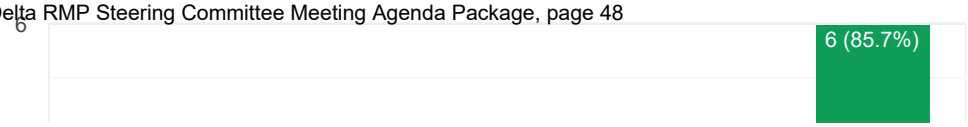
1. Geographic scope. Does the location selection support the study objectives?

7 responses



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

7 responses



3. Comments on the geographic scope:

3 responses

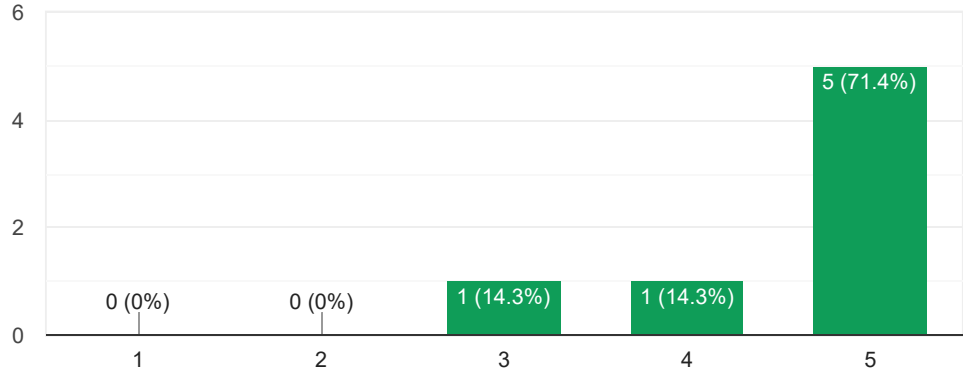
It's the reach in which Regional San dilutes within a week

Study will occur in the area of greatest changes in nitrogen concentrations downstream of Sacramento River Wastewater Treatment Plant, both during the EVR hold and in the future. It utilizes several channels for comparisons. I expect the study will provide useful info about nutrient uses and transport, as well as predicted impacts of the Regional San upgrade.

This study targets the region of the Delta that will undergo the greatest change in ammonia concentrations, according to hydrodynamic and nutrient modeling.

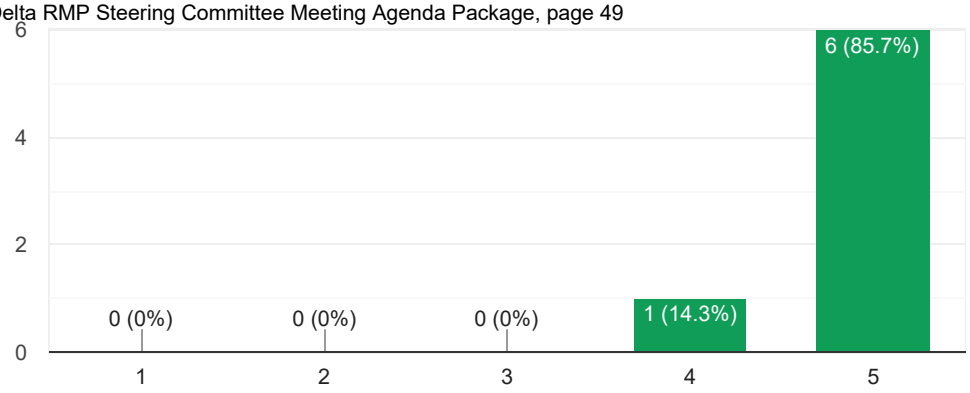
4. Temporal resolution. Is the temporal scope and resolution of the study justified based on available data?

7 responses



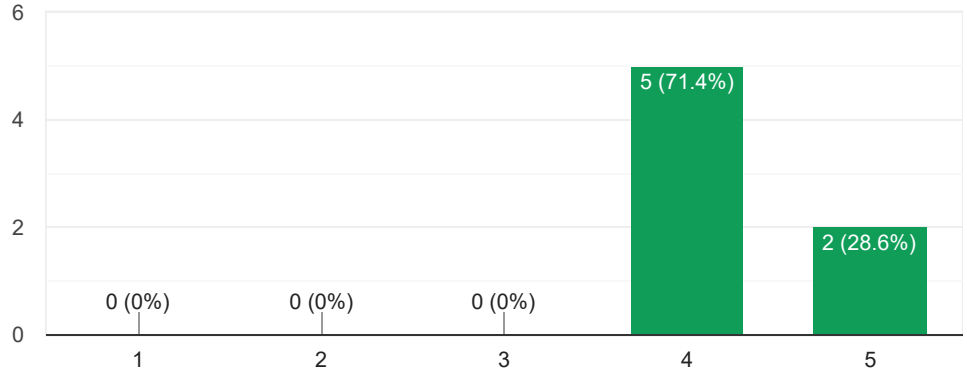
5. Temporal resolution. Does the study clearly define the conditions of interest (e.g. high flows)?

7 responses



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 responses



7. Comments on temporal scope:

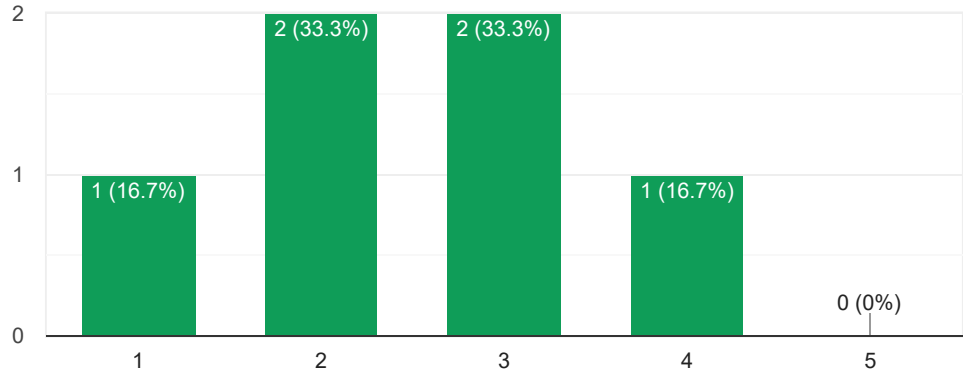
2 responses

Optimal time of year; 1 week will cover a range of tidal influences

Previous work by USGS showed that parcels of water with and without effluent can be distinguished for the duration of the study period. The endpoints for examining effects of nutrients (phytoplankton biomass, growth rates, and community composition and zooplankton growth within size classes all exhibit measurable rates of change less than the study period.

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

6 responses



8.5. Comments on sample collection:

5 responses

The bias is that turning off all effluent is different than the future condition of effluent with less TN.

It was unclear to me how Regional San was targeting sample collection so that they were collecting samples from both the no treated effluent and treated effluent waters. The proposal identifies 12 discrete sampling points. Is the high frequency monitoring done by USGS informing Regional San when to collect samples? I'm assuming sampling is done once at each sampling point during the study window, but if you are collecting samples both with and without effluent, is the sampling number doubled? Based on the short time frame, would you expect to see biomass changes in clams?

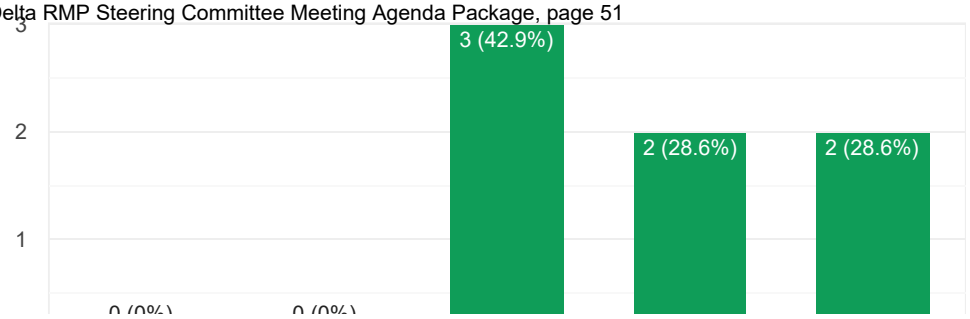
No biases or sources of error identified

Discrete sample collection not fully described within the proposal; possibly relying on the QAPP for this information.

I assuming that a high score means that the project does not introduce biases or errors.

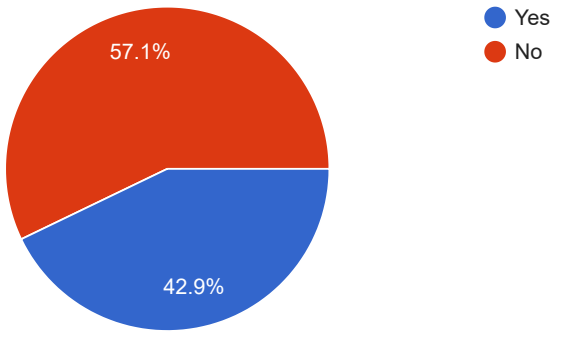
9. Monitoring tools. Where do the analytical tools fit on the 'established methods' spectrum? (1 = experimental, 5 = long-established, known, reliable)

7 responses



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

7 responses



11. Comments on monitoring tools:

4 responses

Good to see that additional data collected independently (e.g., USGS and SRWTP) will be leveraged to interpret results.

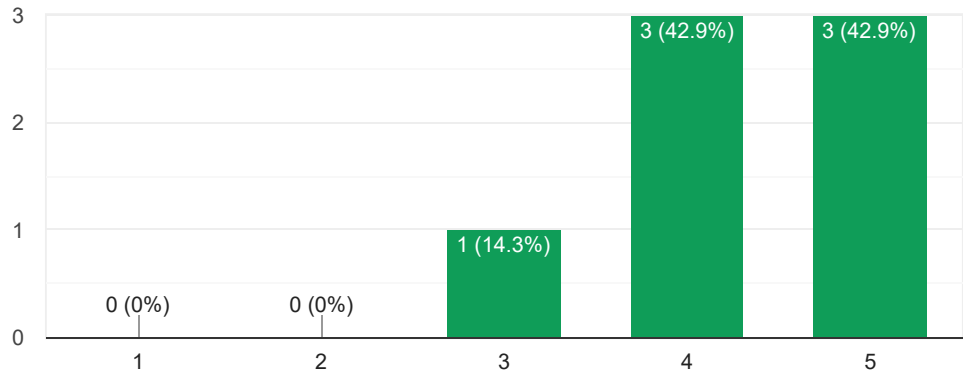
Sample collection and analyses, including phytoplankton and zooplankton ensnared growth and high frequency monitoring are established methods. New modeling will refine and build on existing modeling tools.

Missing some details regarding how samples will be collected and reference to a history of using similar sampling and analytical methods; could be helpful to indicate with some text which monitoring methods are standard and have been used during similar studies. I believe this is the case but that assumption relies on the reader being well versed on nutrient monitoring and past studies. There is no discussion of potential bias in sampling and/or how that will be mitigated.

All of the methods described in this proposal have been used successfully in previous studies by the investigators.

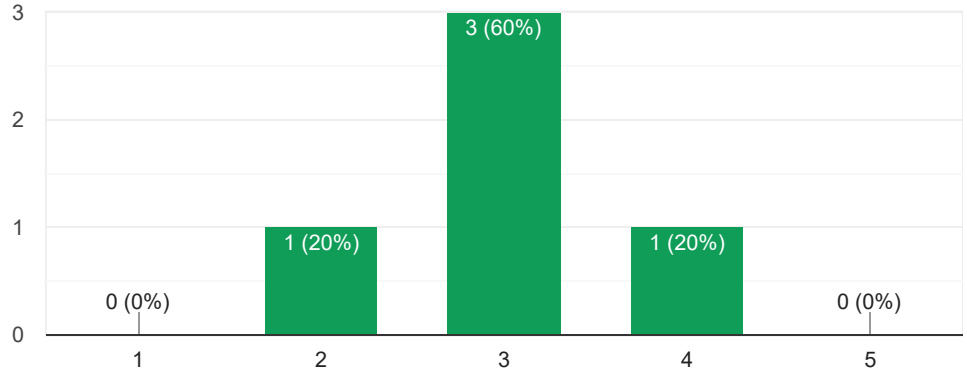
12. Interpretation. Are study condition controls adequately considered given the study timeframe, data collection frequency, and proposed interpretation to answer study hypotheses reliably? Consider whether the study approach sufficiently identifies and addresses sources of variably in the study.

7 responses



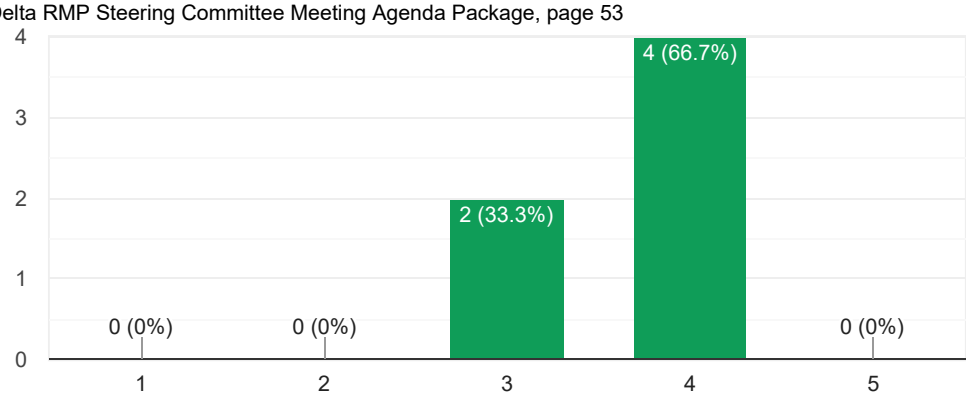
13. Interpretation. Does the study have statistical power sufficient to answer study hypotheses reliably during the study timeframe? Consider whether the study has adequately evaluated expected data variability to meet study objectives.

5 responses



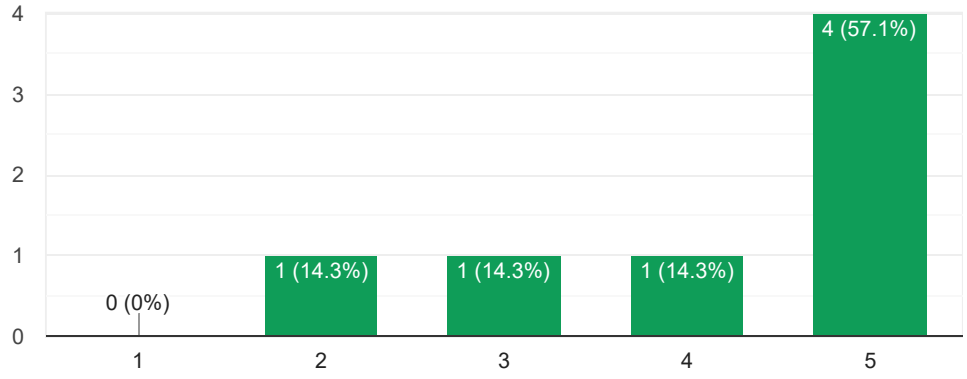
14. Interpretation. Is the basis for outcome assessments technically supported?

6 responses



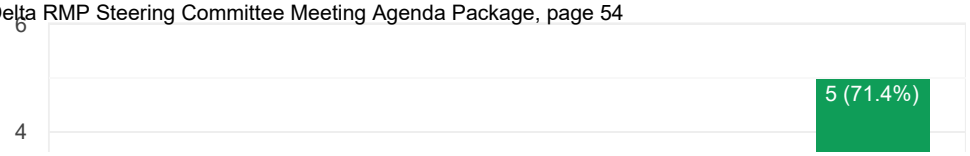
15. Interpretation. Does the proposed study create new information to evaluate beneficial use attainment?

7 responses



16. Interpretation. Do the proposed study's research questions and outputs address specified management questions?

7 responses



17. Comments on interpretation:

5 responses

There is not a current beneficial use impairment listing for nutrients in the study area, but data may be used to determine if beneficial uses are being impaired.

lacking any details on statistical power analysis

12- general answer that different channels provide comparisons but are not controls. 13-previous Lagrangian study authors used similar statistics analyses to evaluate relationships between parameters. To improve data evaluation, the modeling is included to better understand water mixing and residence time. 14-unclear. 15-limited used for BU unless harmful algae are observed, which triggers particular sampling.

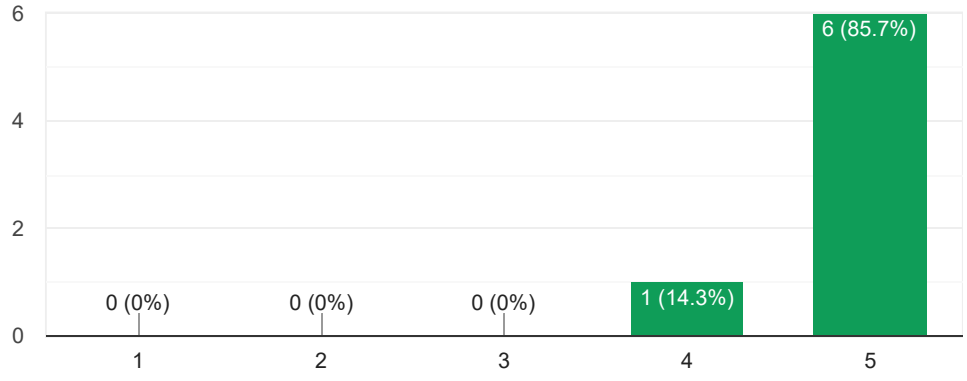
There could be additional details about how the results will be interpreted including how variability of the results will be assessed and what that will mean. Additional explanation of how the data from the different projects (real time data, modeling and discrete sampling) will be evaluated together to verify the assumption laid out in the proposal including the timing of sampling and quantification of change in the various end points.

This study tests ecological responses to a large difference in nutrient concentrations within the river system. Therefore, the full suite of environmental factors that can influence on plankton growth are incorporated into this design, which can be very challenging to duplicate in a controlled laboratory setting.

C. Budget, Priority, and Coordination Considerations

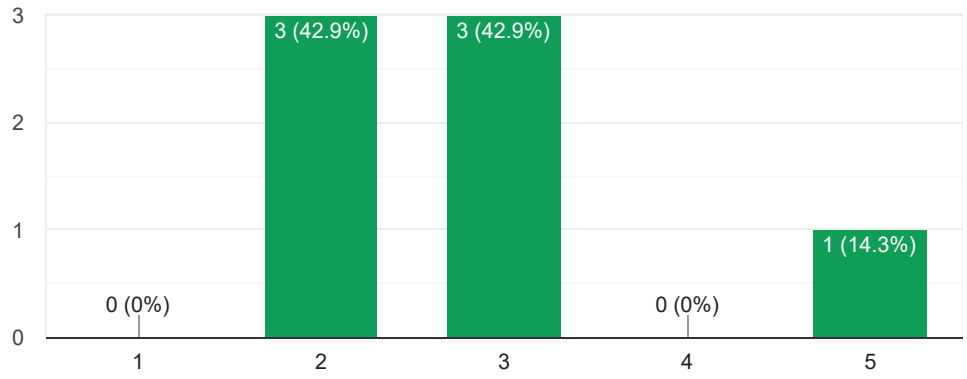
18. Technical Merit. Does the proposed study overall have technical merit?

7 responses



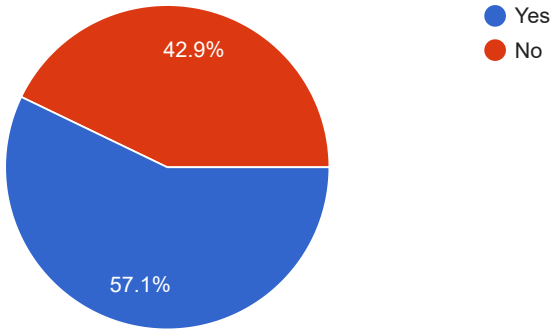
1. Budget. Is the proposed budget scalable in size?

7 responses



2. Budget. Is the proposed study modular?

7 responses



3. Comments on budget:

4 responses

One footnote associated with the budget stated that the Project Team was still seeking funding of $8,688 to completely fund the modeling component. No mention is made on what will happen if this amount is not located.

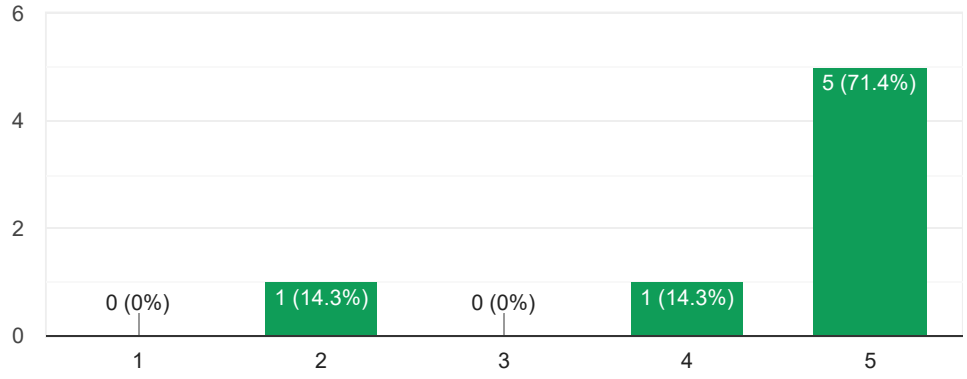
Technical merit is high. Budget is not scalable or modular. All sampling sites, events are important to the one-time study, as are multiple endpoints of nutrient effects. Modeling is integral part of study, as it is designed to support the data interpretation.

The project seems modular but that may not apply as much with this proposal since the DRMP is not funding the whole thing.

The subgroup decided to include funding support from multiple organizations to cover the research expenses, rather than requesting higher levels of funding from the Delta RMP.

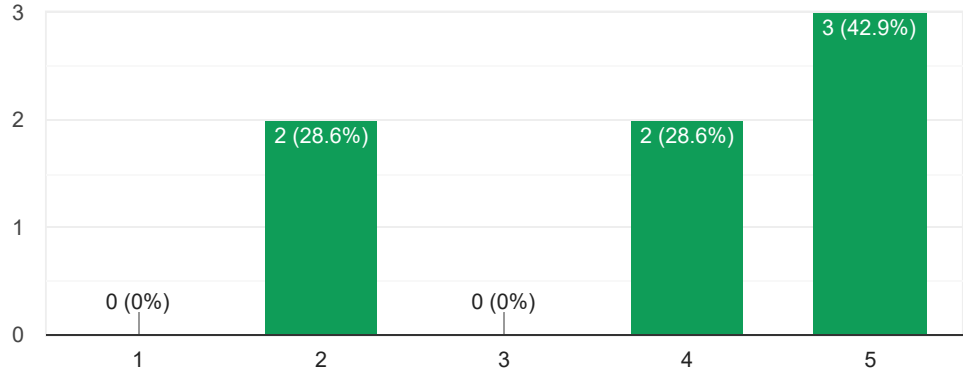
4. Priority. Is there urgency to conducting the monitoring, such as to inform planned policies or regulations?

7 responses



5. Priority. Does the study timeframe allow it to inform time-sensitive decisions?

7 responses



6. Comments on priority:

4 responses

Only chance to do this one

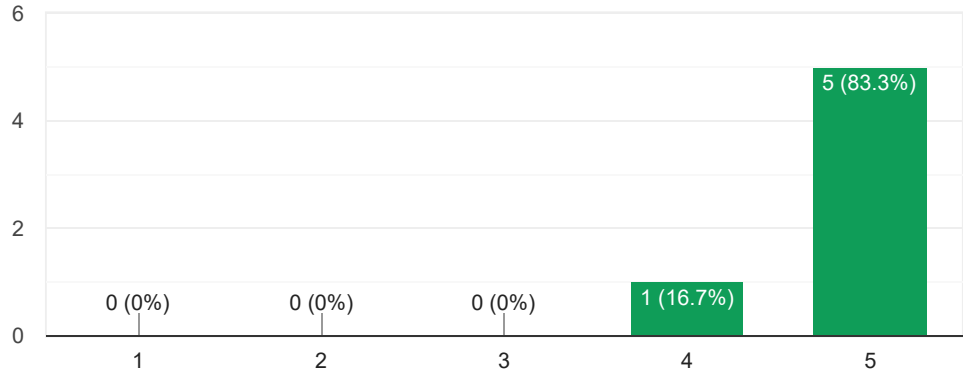
High priority for conducting in summer/fall 2019 to take advantage of an EVR hold. This period preferred, as eutrophic conditions (high air temps, low flows) are likely at their peak. Baseline (with effluent) data must be collected before summer 2020, when phase 1 of upgrade is implemented. The study won't affect regulatory decisions or timing of the upgrade. It will contribute to filling top-ranked information gaps identified in Delta Nutrient Research Plan.

The priority of this project relates more to the timing of this unique situation where Regional San will hold effluent.

This study is designed to investigate potential ecological effects resulting from high nutrient concentrations before Delta nutrient loads are significantly reduced by new wastewater treatment plant operations. This study will also take advantage of unusually long wastewater diversions occurring at the treatment plant in 2019.

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

6 responses



8. Comments on coordination:

5 responses

The study is coordinating with other efforts to provide high value.

It is coordinated with several sponsors

Study has good support (in-kind and $$) from other entities.

The proposal is already coordinated with other efforts.

This study is aligned with the goals of the Delta Nutrient Research Plan and has gained funding and in-kind support from multiple Delta organizations.

Overall Comments

Overall comments:

4 responses

Technically sound approach is described very well in the proposal. It would be helpful for the QAPP to describe DQOs and provide more information about how data will be interpreted.

The Nutrients Subcom identified this project as its top priority for this year. Special studies are most appropriate for nutrients monitoring.

I recommend funding

Overall agree with the funding of the study. The comments are more in regards to some details lacking (possibly relying on the QAPP to provide the details). In addition, it would be helpful to have a better understanding of what metrics will be used to test the hypothesis especially between the different data sets.

Materials for Agenda Item 4: **Mercury Proposal**

Summary of Mercury Proposal for FY19/20 (Year 4 of Delta RMP Mercury Monitoring)

Continued monitoring of methylmercury in Delta fish and water is proposed to address the highest priority information needs related to revision and implementation of the Methylmercury TMDL (re-opening of the TMDL is scheduled for 2020). The window for inclusion of new data in the TMDL revision could close as soon as December 2019. Monitoring with the current design is proposed to continue through October 2019. During the second half of the fiscal year (January-June 2020) a transition to a second phase of monitoring is proposed. The second phase would address the critical need for continued monitoring of subregional trends in fish and water, and would add a monitoring element focused on assessing the local and subregional impact of habitat restoration projects on methylmercury impairment.

Three monitoring elements are proposed.

1. **Subregional trends in bass** - Continued annual monitoring of methylmercury in black bass at seven stations (distributed among the TMDL subregions) will firmly establish baseline concentrations and interannual variation in support of monitoring of long-term trends as a critical performance measure for the TMDL. This design will be re-evaluated after completion of a 10-year period (2014-2023).
2. **Subregional trends in water** - Continued monitoring of methylmercury in water at six stations on a near-monthly basis during the biologically-relevant time period (Mar-Oct) will further solidify the linkage analysis (the quantitative relationship between methylmercury in water and mercury in sport fish) in the TMDL and be valuable in verifying trends and patterns predicted by numerical models of methylmercury transport and cycling being developed for the Delta and Yolo Bypass by the California Department of Water Resources (DWR) and the USGS. These models will allow testing of various land and water management scenarios.
3. **Restoration monitoring** - Annual monitoring methylmercury in black bass and prey fish at new stations (seven for black bass and 16 for prey fish) located near habitat restoration projects will assess the subregional impact of the projects on impairment. The San Francisco Bay Regional Water Board has obtained $30,000 for monitoring methylmercury impacts of a restoration project on Winter Island in the West Delta and is interested in coordinating with the Delta RMP. This proposal presents an illustrative strawman for the design of the restoration monitoring element - the details of the design for the restoration monitoring (station locations, mix of bass and prey fish stations) will

be determined with input from restoration managers and Delta RMP committee members.

Four options have been scoped out for consideration.

Option A: **At the level of funding allocated in the Multi-Year Plan ($290,000)**, the design would include:

- Subregional trends in bass;
- Subregional trends in water (8 stations, 4 events from Jul-Oct 2019; 6 stations, 4 events from Mar-Jun 2020)
- An interpretive report on the 3.5 years of monitoring to date that would inform the TMDL revision

Option B: **At an increased funding level (Multi-Year Plan amount plus 34%, or $389,000)**, the design would include:

- All elements from the $290,000 funding level; and
- Initiation of baseline restoration monitoring in three Delta tidal wetland restoration areas (including the West Delta), with seven added black bass stations and 16 added prey fish stations.

Option C: **At an increased funding level (Multi-Year Plan amount plus 25%, or $360,000)**, the design would include:

- All elements from the $290,000 funding level; and
- Initiation of baseline restoration monitoring in two Delta tidal wetland restoration areas, with five added black bass stations and nine added prey fish stations.

Option D: **At a decreased funding level (Multi-Year Plan amount minus 25%, or $220,000)**, the design would include:

- Subregional trends in bass;
- Subregional trends in water (reduced level) (8 stations, 4 events from Jul-Oct 2019; 6 stations, 2 events from Mar-Jun 2020); and
- No interpretive report on the 3.5 years of monitoring to date.

Management Drivers Addressed

Mercury monitoring addresses the Delta Methylmercury TMDL, which establishes goals for cleanup and calls for a variety of control studies and actions.

Management and Assessment Questions Addressed

The management and assessment questions addressed by each of the methylmercury monitoring elements are indicated in **Table 1**. In addition, the combination of water and fish monitoring addresses a critical data need for management that is not captured in the current set of questions for the Program: data to strengthen the linkage analysis that is a key component of the technical foundation for the TMDL.

Data Quality Objectives/Null Hypothesis

The initial and preliminary data quality objective (DQO) for subregional bass trend monitoring is the ability to detect a trend of mercury in fish tissue of 0.040 ppm/yr. This DQO can be refined when additional data are available. The null hypothesis is that there is no trend. MQOs are identical to those used in other mercury studies throughout the state and the country for determinations of impairment and trend detection. These MQOs generally call for indices of accuracy and precision to be within 30% of expected values.

The subregional water monitoring is primarily being collected to solidify understanding of the correlation of fish methylmercury with aqueous methylmercury (i.e., the linkage analysis) and to provide essential input data for the models being developed by DWR and USGS. Hypothesis testing will not be a primary use of the water data.

The restoration monitoring with bass and prey fish will focus on the same kind of trend evaluation described for subregional bass trend monitoring above, and the same considerations apply.

Table 1 *Delta RMP mercury management and assessment questions addressed by each mercury monitoring element. Questions highlighted in yellow were identified by the Steering Committee as the highest priority for initial studies.*

Type	Core Management Questions	Assessment Questions	Sub-Questions	Subregional Trends in Bass	Subregional Trends in Water	Restoration Monitoring
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?	1. What are the status and trends in ambient concentrations of total mercury and methylmercury (MeHg) in fish, water, and sediment, particularly in subareas likely to be affected by major sources or new sources (e.g., large-scale restoration projects)?	A. Are trends over time in MeHg in sport fish similar or different among Delta subareas?	X		
			B. Are trends over time in MeHg in water similar or different among Delta subareas?		X	
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 (e.g., benthic flux) and sinks in the Delta?	1. Which sources, pathways, and processes contribute most to observed levels of MeHg in fish?	A. What are the loads from tributaries to the Delta (measured at the point where tributaries cross the boundary of the legal Delta)?		X	
			B. How do internal sources and processes influence MeHg levels in fish in the Delta?	X	X	X
			C. How do currently uncontrollable sources (e.g., atmospheric deposition, both as direct deposition to Delta surface waters and as a contribution to nonpoint runoff) influence MeHg levels in fish in the Delta?			
Forecasting 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?	1. What will be the effects of in-progress and planned source controls, restoration projects, and water management changes on ambient methylmercury concentrations in fish in the Delta?		X	X	X
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?	[none]		X	X	X

Monitoring to Support Implementation of the Methylmercury TMDL

Background and Motivation

Concentrations of methylmercury in fish from the Delta exceed thresholds for protection of human and wildlife health. The Methylmercury TMDL (Wood et al. 2010) is the driver of actions to control methylmercury in the Delta, establishing water quality goals and directing various discharger groups to conduct monitoring and implement measures to minimize methylmercury impairment of beneficial uses.

The TMDL established three water quality objectives for methylmercury in fish tissue: 0.24 ppm in muscle of large, trophic level four (TL4) fish such as black bass ("black bass" includes largemouth, smallmouth, and spotted bass); 0.08 ppm in muscle of large TL3 fish such as carp; and 0.03 ppm in whole TL2 and TL3 fish less than 50 mm in length. Furthermore, the TMDL established an implementation goal of 0.24 ppm in largemouth bass at a standard size of 350 mm as a means of ensuring that all of the fish tissue objectives are met. Largemouth bass are widely distributed throughout the Delta and are excellent indicators of spatial variation due to their small home ranges. Past data for largemouth bass were a foundation for the development of the TMDL, including the division of the Delta into eight subregions. Monitoring of largemouth bass in these subregions therefore provides the most critical performance measure of progress in addressing methylmercury impairment in the Delta.

The TMDL describes a statistically significant relationship between the annual average concentration of methylmercury in unfiltered water and average mercury in 350 mm largemouth bass when data are organized by subregion. This linkage provides a connection, essential for management, between methylmercury inputs from various pathways (e.g., municipal wastewater, municipal stormwater, agricultural drainage, sediment flux in open waters, and wetland restoration projects) and impairment of beneficial uses. Because of this linkage, the TMDL established an implementation goal of 0.06 ng/L of unfiltered aqueous methylmercury. In response to TMDL control study requirements, the Department of Water Resources (DWR) is leading development of numerical methylmercury transport and cycling simulation models for the Delta and Yolo Bypass. Monitoring of aqueous methylmercury is therefore needed to:

1) better quantify the fish-water linkage that is the foundation of the TMDL,
2) evaluate attainment of the TMDL implementation goal,

3) support calculations of mercury and methylmercury loads and mass balances,
4) support development of mercury models for the Delta and Yolo Bypass, and
5) support evaluation of the fish data by providing information on processes and trends.

In FY 2016/2017 the Delta RMP initiated a methylmercury monitoring program for fish and water. Largemouth bass were collected in late summer 2016 (September) from six stations distributed across the subregions. Quarterly sampling of methylmercury and mercury (and ancillary parameters) in water at five stations began in August 2016.

In FY 2017/2018, methylmercury monitoring of fish and water continued. Funding was allocated to sample fish at six stations and water at six stations for eight months. The eight months to be sampled were to be the March-October period used for the linkage analysis in the TMDL. In late 2017, the Mercury Subcommittee decided, based on data needs related to a Regional Board decision to revise the TMDL in 2020, that a more optimal use of the available funds would be to shift to sampling water at eight stations (adding stations in the West Delta and at the export pumps) and to add sampling in January and February (). This design would provide information to update the methylmercury mass balance for the Delta by sampling two export stations (in the West Delta and at the pumps) and sampling during high flows in the winter. The FY 2017/2018 plan also included funds for quarterly sediment sampling to support the DWR methylmercury modeling effort, and any future methylmercury modeling.

In FY 2018/2019, the design that was established in the latter part of FY 2017/2018 was continued, with sampling of fish at seven stations in August/September and sampling of water at eight stations monthly during the biologically-relevant period (March-October) plus two high flow months (January and February of 2019) to inform the loads assessment (Table 2). Sediment sampling was discontinued due to funding limitations.

Proposed Approach for FY 2019/2020

The window for inclusion of new data in the TMDL revision is planned to close in December 2019. Monitoring with the current design is proposed to continue through October 2019. An interpretive report covering the first 3.5 years of monitoring (from August 2016 to October 2019) will be prepared in December 2019 to inform the TMDL deliberations. During the second half of the fiscal year (January-June 2020) a transition to a second phase of monitoring is proposed. The second phase would add a monitoring element focused on assessing the subregional impact of habitat restoration projects on methylmercury impairment.

Three monitoring elements are proposed for the second phase of Delta RMP methylmercury monitoring.

1. **Subegional trends in bass** - Continued annual monitoring of methylmercury in black bass at seven stations will firmly establish baseline concentrations and interannual variation in support of monitoring of long-term trends as a critical performance measure for the TMDL. This design will be re-evaluated after establishment of a 10-year time series.
2. **Subregional trends in water** - Continued monitoring of methylmercury in water on a near-monthly basis will further solidify the linkage analysis (the quantitative relationship between methylmercury in water and mercury in sport fish) in the TMDL and be valuable in verifying trends and patterns predicted by a numerical model of methylmercury transport and cycling being developed for the Delta and Yolo Bypass by the California Department of Water Resources (DWR) - this model will allow testing of various land and water management scenarios. The need for continuation of this monitoring, including the duration and the level of effort, will be assessed as part the interpretive report on phase 1 of the monitoring.
3. **Restoration monitoring** - A new element of annual monitoring methylmercury in black bass and prey fish at new stations located near habitat restoration projects will assess the subregional impact of the projects on impairment. The San Francisco Bay Regional Water Board has obtained $30,000 for monitoring methylmercury impacts of a restoration project on Winter Island in the West Delta and is interested in coordinating with the proposed Delta RMP monitoring. This monitoring should begin with a level of effort that is sufficient to detect the potential subregional impact of restoration projects, and could be tapered off over time if the results indicate a lack of impact.

Applicable Management Decisions and Assessment Questions

The Delta Methylmercury TMDL is the embodiment of management decisions for methylmercury in the Delta, establishing goals for cleanup and calling for a variety of control studies and actions. With providing information to support TMDL implementation in mind, the Mercury Subcommittee carefully considered the assessment questions articulated by the Steering Committee and Technical Advisory Committee for mercury.

The Delta RMP management and assessment questions addressed by each of the methylmercury monitoring elements are indicated in **Table 1**. In addition, the combination of water and fish monitoring addresses a critical data need for management that is not captured in

the current set of questions for the Program: data to strengthen the linkage analysis that is a key component of the technical foundation for the TMDL.

Monitoring of subregional trends in bass is addressing questions relating to Status and Trends, Forecasting, and Effectiveness Tracking. Status and Trends Question 1A is a high priority for managers that relates to the TMDL, and is a primary driver of the sampling design for subregional bass trend monitoring. Annual monitoring of bass mercury is urgently needed to 1) firmly establish a baseline for each Delta subregion and 2) to characterize the degree of interannual variation, which is essential to designing an efficient monitoring program for detection of long-term trends. In addition to addressing status and trends, this monitoring will provide an essential foundation for Forecasting Scenarios (past trends are a starting point for projecting future conditions) and Effectiveness Tracking (evaluating whether water quality is improving at the subregional scale as a result of management actions).

Monitoring of subregional trends in water is addressing all of the major categories of Delta RMP management questions (Status and Trends; Sources, Pathways, Loadings, and Processes [SPLP]; Forecasting Scenarios; and Effectiveness Tracking). Data on concentrations of methylmercury in water are valuable as an indicator of Status and Trends as they can be compared to the TMDL implementation goal of 0.06 ng/L of unfiltered aqueous methylmercury. The use of water data to update the mass budget addresses SPLP Question 1A and is a key element of the TMDL. Aqueous methylmercury concentrations are essential input and validation data for the models that DWR and USGS are developing for the Delta that will elucidate the processes affecting methylmercury patterns and allow forecasting and testing of various water management scenarios (DiGiorgio et al. 2016; Windham-Myers et al., 2016). Water concentration data will also be valuable in Effectiveness Tracking, allowing assessment of status relative to the implementation goal and of changes in loading in the context of the overall mass budget for the Delta.

Monitoring of subregional trends in bass and water will also provide information on the influence of climate, hydrology, and ecology. For example, the first two years of monitoring have already spanned the end of a prolonged drought and a high flow year, providing an opportunity to examine the impact of extreme variation in flow on methylmercury concentrations in fish and water.

Restoration monitoring will address questions relating to SPLP, Forecasting Scenarios, and Effectiveness Tracking. The basic concern with restoration projects is that they may enhance net methylmercury production within the Delta ecosystem, and represent an internal source that increases as the projects proceed (SPLP Question 1B) – restoration monitoring will track

whether this occurs or not. Restoration monitoring will yield insights into which types of projects, if any, impact net methylmercury production and food web accumulation (Forecasting Scenarios Question 1) and whether internal loadings change and ambient water quality shows net improvement as a result of restoration projects (Effectiveness Tracking).

Approach

Subregional Trends in Bass

Design	7 fixed stations (**Figure 1**), largemouth bass only
Key Indicator	Annual average methylmercury in muscle fillet of 350 mm largemouth bass (or similar predator species), derived through analysis of 16 individual bass or other predator species at each station
Parameters	Total mercury*, Total length, Fork length, Weight, Sex, Moisture, Estimated age
Frequency	Annual
Schedule	Sample in August and September
Duration	Monitor through 2025 and then re-evaluate
Co-location	Water MeHg and Hg Other water parameters
Contractors	SFEI (design, data management, reporting), MLML (sample collection, chemical analysis, reporting)
Coordination	DWR, USGS (sampling of flow monitoring stations)
Cost	$61,000

* Total mercury measured as proxy of methylmercury because methylmercury comprises more than 90% of the total mercury in sport fish.

Summary of Results to Date

Results from the first year of DRMP methylmercury monitoring are presented in the Year One Data Report (Davis et al. 2018) and the Year Two Data Report (in prep). The reports provide details on the sample collection and processing, chemical analysis, quality assurance, and the results. Highlights of the results are briefly discussed here.

Results from the first two rounds of DRMP fish monitoring are presented in **Figure 2**, with data from prior fish sampling in or near these stations provided for context. Time series

with more than three observations are available for four of the six stations. The existing time series are characterized by a high degree of inconsistency in stations, species, and sampling approach over time, highlighting the need to build a consistent dataset for trend evaluation. The data do suggest a preliminary answer to management question 1A, and a possible effect of the very high flows in 2017. Up through 2016, the data suggested a decline in concentrations at the San Joaquin River at Vernalis over the period of record, while concentrations appeared to be stable at the other three stations. Therefore, the data give a preliminary indication that trends do vary among the Delta subregions. In 2017, concentrations were significantly higher than 2016 at four of the six stations, most markedly at the Mokelumne River station, suggesting a possible effect of the high flows in that year, again with variation among the subregions in the degree of elevation. Additional rounds of consistent sampling are needed to confirm the long-term patterns and the potential influence of hydrology in 2017.

Subregional Trends in Water

Design	8 fixed stations through October 2019; 6 stations after that (dropping the Mallard Island and Mendota Canal stations (**Figure 1**)
Key Indicator	March-October average total (unfiltered) methylmercury at each station
Parameters	Total (unfiltered) methylmercury, filtered methylmercury, unfiltered total mercury, filtered total mercury, total suspended solids (TSS), chlorophyll a, dissolved organic carbon, volatile suspended solids. Field measurements will include dissolved oxygen, pH, and specific conductance.
Frequency	8 events per year
Schedule	Two 4-month blocks (Jul-Oct; Mar-Jun) of monthly samples
Duration	Monitor through FY 19/20 and then re-evaluate
Co-location	Sport fish sampling Other water parameters
Coordination	DWR, USGS (sampling of flow monitoring stations)
Cost	$187,000

Summary of Results to Date

Results for March-October average total (unfiltered) methylmercury at each station for the first year of sampling are briefly summarized here. Data for the other water parameters are presented in the Year One Data Report (Davis et al. 2018) and the Year Two Data Report (in prep).

Concentration of MeHg in unfiltered water ranged from 0.044 – 0.385 ng L^{-1}. Figure 3 presents long-term time series of March to October annual averages of unfiltered MeHg concentrations for Delta RMP stations. Sacramento River concentrations have remained constant with good agreement between historic data and current data. Lower Mokelumne results were similar to previously reported values given the large variability of MeHg concentrations for this site. Cache Slough MeHg concentrations were in good agreement with previously reported values. No historic data are available for Little Potato Slough, but MeHg concentrations were consistent with results reported for 2016. Middle River MeHg concentrations were within the range of historic data. San Joaquin River 2017 and 2018 MeHg concentrations were similar to previously reported values with 2017 on the higher end and 2018 on the lower end when compared to historic results. Sacramento River at Mallard 2018 results were in good agreement with previously reported MeHg concentrations. Delta Mendota Canal MeHg concentrations were within the range of previously reported values.

Restoration Monitoring

Design (Preliminary)	Proposal Option B: 7 new black bass fixed stations and 16 new prey fish fixed stations in three areas – Northeast Delta, Northwest Delta, and West Delta (Figures 4-6) Proposal Option C: 5 new black bass fixed stations and nine new prey fish fixed stations in two areas – Northeast Delta and Northwest Delta (Figures 4-5)
Key Indicator	Bass: annual average methylmercury in muscle fillet of 350 mm largemouth bass (or similar predator species), derived through analysis of 16 individuals at each station Prey fish: Annual average methylmercury in whole fish, based on 6 composites of 10 individuals of the indicator species at each station
Parameters	Total mercury, Total length, Fork length, Weight, Sex, Moisture, Estimated age*
Frequency	Annual
Schedule	Bass: sample in August-September Prey fish: sample in April-June
Duration	Monitor through 2023 and then re-evaluate
Co-Location	None
Contractors	SFEI (design, data management, reporting), MLML (sample collection, chemical analysis, reporting)
Coordination	Coordinated with Region 2 monitoring in the West Delta ($30K over 2 years in funds from Region 2)
Cost	Proposal Option B: $122,000 total for the year**: $108,000 from Delta RMP**; $14,000 from Region 2 to cover 4 prey fish sites in and around Winter Island Proposal Option C: $78,000 total for the year (all from Delta RMP)

* for bass only

Restoration monitoring will focus on three areas in the Delta where restoration activity is concentrated (Figures 4-6). In each of these areas, bass stations and prey fish stations will be strategically located. This proposal presents an illustrative strawman for the design of the restoration monitoring element - the details of the design for the restoration monitoring (station locations, mix of bass and prey fish stations) will be determined with input from restoration managers and Delta RMP committee members. The bass station locations will be selected to detect the potential aggregate impact of restoration projects at the subregional scale. Prey fish

station locations will be selected to a) link specific restoration projects to the trends that are observed in the bass, and b) track trends in reference tidal wetlands to aid in the interpretation of the prey fish data from the project-specific stations. The time series obtained for the bass and prey fish at these stations will be compared to each other, to the Subregional Bass Trend stations, and to historic data to evaluate whether restoration causes an increase in methylmercury in fish.

The San Francisco Bay Regional Water Board (Region 2) has obtained $30,000 for monitoring methylmercury impacts of a restoration project on Winter Island in the West Delta and is interested in coordinating and fitting in with the proposed Delta RMP monitoring. The Region 2 funds can help allow for monitoring in the West Delta, and for more intensive sampling in and around the Winter Island project.

The sampling station locations shown in Figures 4-6 are preliminary. The allocation and placement of stations will be refined by the Mercury Subcommittee if the Steering Committee approves the mercury monitoring at the funding levels of options B or C.

The sooner these restoration monitoring time series are initiated, the more valuable they will be for detecting the impacts of restoration projects. Some of the restoration projects have not yet been implemented, and some have been implemented recently.

Other biosentinel restoration monitoring projects in the region have shown that restoration in some instances does not lead to methylmercury increases (e.g., Robinson et al. 2018). If prey fish stations are yielding results that indicate a lack of change from baseline conditions, they can be phased out. Results from the first three years of this monitoring can be evaluated in 2024 to determine whether monitoring can be tapered back.

Data Quality

The measurement quality objectives (MQOs) for measurements of methylmercury and mercury in fish and water are shown in Appendix 1. These MQOs are the same as MQOs used in mercury studies throughout California, with statewide fish monitoring by the Surface Water Ambient Monitoring Program as a prominent example. The MQOs generally call for indices of accuracy and precision to be within 30% of expected values. Data of this quality are routinely used for determinations of impairment and trend detection throughout the state and the country. The variance attributable to the analytical process is one of the contributors to the overall variance observed in the data. This variance is therefore accounted for in the power estimates provided in the next section.

Power to Detect Long-term Trends - Bass Sampling

The power to detect interannual trends in largemouth bass mercury on a per station basis was evaluated using existing data. Even the best existing time series for the Delta have low statistical power to detect trends due to infrequent sampling and varying sampling designs of studies performed over the years (**Figure 2**). One of the goals of the initial phase of Delta RMP fish mercury monitoring is to obtain robust information on interannual variation to support future power analysis. As part of the mercury proposal for FY 2017/2018 we conducted a power analysis on the small amount of information presently on hand. Appendix 2 provides the methods and details on the results. This analysis will be updated after a few years of new data have accumulated.

Power analysis summary

Power for trend detection at a single station based on grand mean estimates of observed variance across stations. Pink shading indicates scenarios with greater than 80% power.

		10 Years		20 Years		30 Years	
Trend	N Fish/Yr	Annual	Biennial	Annual	Biennial	Annual	Biennial
0.010 ppm/yr	12	0.11	0.09	0.20	0.15	0.40	0.27
0.020 ppm/yr	12	0.13	0.13	0.44	0.27	0.81	0.60
0.030 ppm/yr	12	0.21	0.17	0.69	0.45	0.99	0.85
0.040 ppm/yr	12	0.29	0.19	0.88	0.61	1.00	0.98
0.010 ppm/yr	16	0.21	0.19	0.33	0.27	0.55	0.44
0.020 ppm/yr	16	0.27	0.24	0.65	0.46	0.93	0.77
0.030 ppm/yr	16	0.36	0.32	0.86	0.64	1.00	0.96
0.040 ppm/yr	16	0.47	0.36	0.97	0.82	1.00	1.00

These preliminary results indicated that increasing the number of fish per station would be effective in increasing power. With 16 fish per station and annual sampling, 80% power would be expected for several of the 20-year scenarios. Beginning with year 2 (FY 2017/2018) the design for fish monitoring was therefore modified to include 16 fish per station. The monitoring results for the San Joaquin at Vernalis suggest that trends of up to 0.040 ppm/yr are possible. The results highlight the importance of initiating consistent time series.

Power Analysis - Water Sampling

Not applicable. The primary objectives of the water sampling are to strengthen the linkage analysis and support model development. The water monitoring is not intended as a primary tool for long-term trend monitoring.

Reporting and Deliverables

With three years of monitoring completed, and an opportunity to inform the revision of the TMDL, the fall of 2019 will be an opportune time to prepare an interpretive report that provides a more thorough assessment of the dataset generated by this program and a comparison to data from other studies. This report will be drafted by December 2019 so the findings can be considered in the process of TMDL revision.

Deliverable	**Due Date**
Draft Interpretive Report on Years 1-3	December 2019
Final Interpretive Report on Years 1-3	March 2020
Draft Data Report on Year 4 (FY 19/20)	December 2020
Final Data Report on Year 4 (FY 19/20)	March 2021

Budget

	Funding Level			
	290	389	360	220
	MYP Level	+34%	+25%	-25%
OPTIONS FOR 19/20	A	B	C	D
	19/20	**19/20**	**19/20**	**19/20**
Core Bass (7 sites from 18/19 on)	61	61	61	61
Water (6 sites, 8 events after Jan 20)	186	186	186	146
Sediment				
Oversight, Coord., Data Mgt, Reporting	60	60	60	35
Restoration	0	122	78	0
Total	307	429	385	242
Region 2		15		
MLML In-Kind	25	25	25	25
Delta RMP	282	389	360	217

Proposed Multi-Year Plan With Restoration (Option B)	**16/17**	**17/18**	**18/19**	**19/20**	**20/21**	**21/22**	**22/23**
Core Bass (7 sites from 18/19 on)	45	52	61	61	63	65	67
Water (6 sites, 8 events after Jan 20)	65	153	259	186	164	169	174
Sediment		29					
Oversight, Coord., Data Mgt, Reporting	18	25	35	60	35	35	35
Restoration				122	122	122	122
Total	128	259	355	429	384	391	398
Region 2 In-Kind				15	15		
MLML In-Kind	21	25	30	25	25	25	25
Delta RMP	107	234	325	389	344	366	373

Table 2 Sampling schedule for Delta RMP mercury monitoring. The March-October period used for the linkage analysis in the TMDL is indicated with gray shading.

Year →	2016						2017						2018												2019												2020											
Fiscal Yr →	FY 16/17												FY17/18												FY18/19												FY19/20											
Month →	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6
Monitoring element (# of sites sampled)																																															
Sportfish (bass)		6												6													7												14										
Prey fish																																						9										
Water		5			5			5		5						6			8	8	8	8	8	8	8	8	8	8					8	8	8	8	8	8	8	8	8			6	6	6	6
Sediment																6			6			6		6																								

Figure 1. Planned subregional bass and water sampling stations for methylmercury in FY19/20.

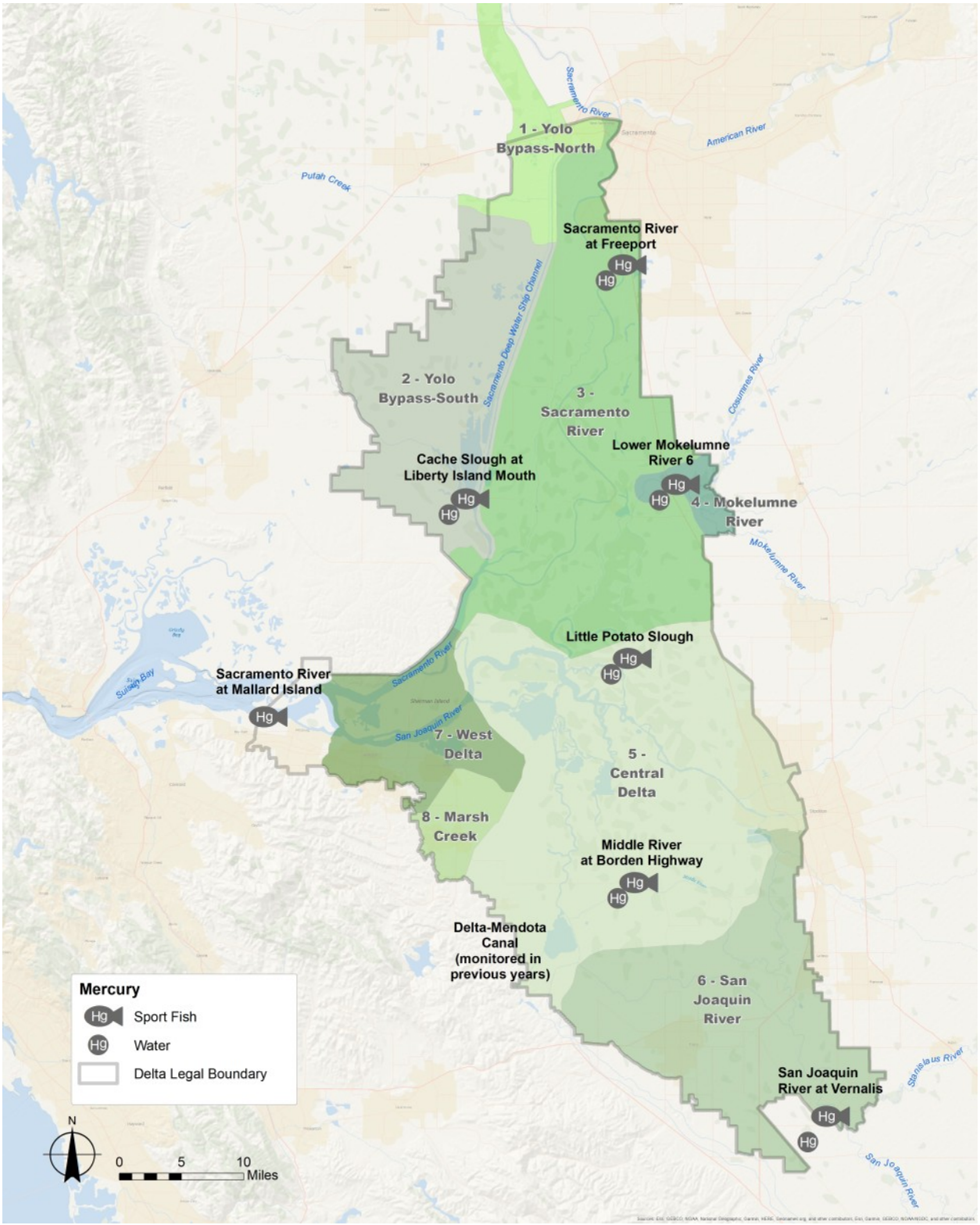


Figure 2. *Long-term time series of mean mercury (ppm wet weight) in black bass for Delta RMP stations and nearby stations sampled historically. Details on following page.*

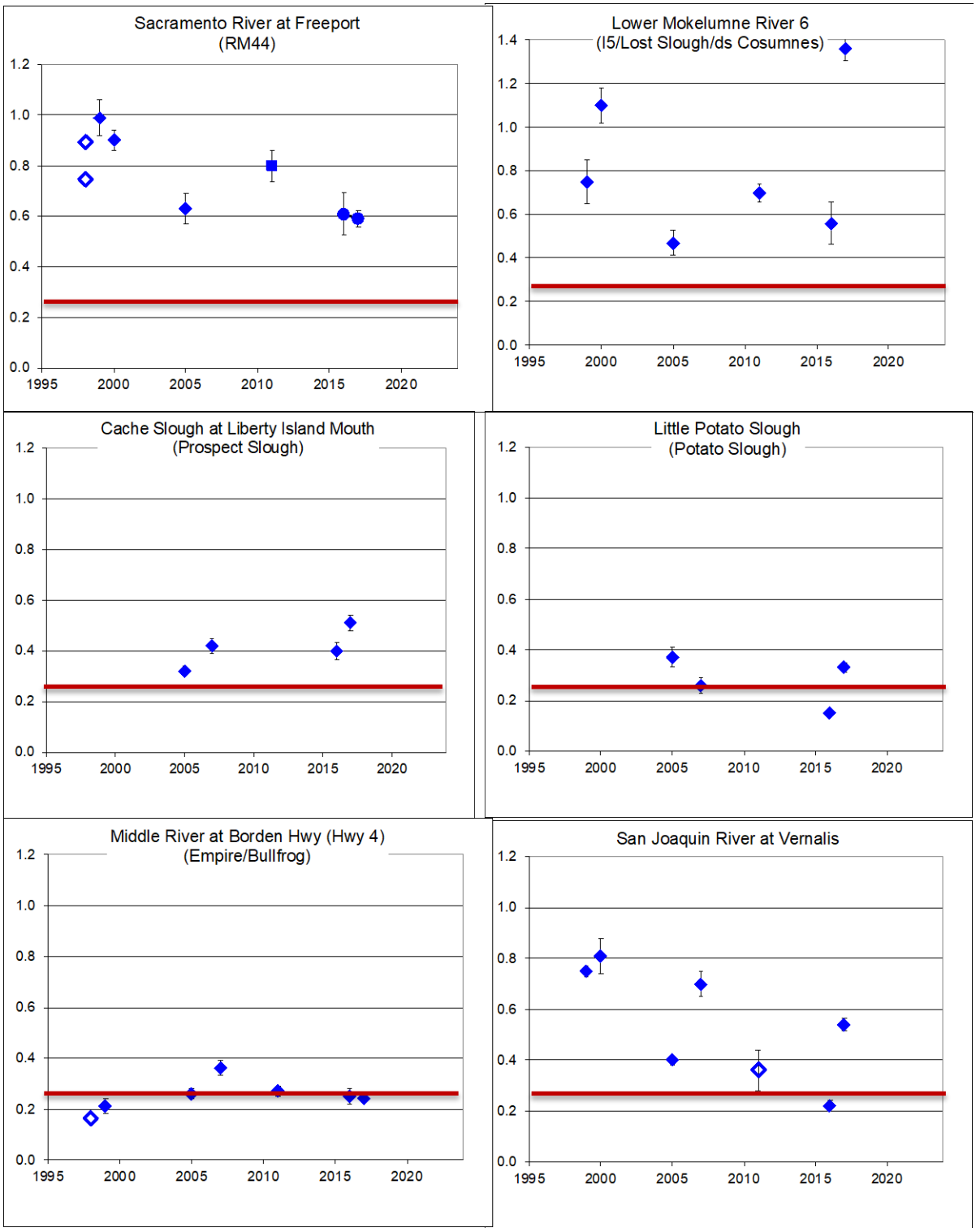


Figure 2 Details

Points generally show 350 mm length-adjusted means (exceptions to this noted in plot details below) and error bars indicate two times the standard error. Filled symbols indicate 350 mm length-adjusted means, hollow symbols indicate individual composite samples or arithmetic means when the station did not have a significant length:mercury correlation. Diamonds indicate largemouth bass; squares are spotted bass; circles are smallmouth bass. Data sources: Delta RMP - 2016; the Surface Water Ambient Monitoring Program (Davis et al. 2013) - 2011; the Fish Mercury Project (Melwani et al. 2009) - 2005-2007; the CALFED Mercury Project (Davis et al. 2003) - 1999-2000; the Delta Fish Study (Davis et al. 2000) - 1998; and the Sacramento River Watershed Program (2002) - 1998. Red lines show the TMDL goal of 0.24 ppm.

Sacramento River at Freeport
Stations - Freeport: 2016; RM44: All other years
Statistics - Individual composite results: 1998; 350 mm length adjusted mean: all other years

Lower Mokelumne River 6
Stations - Lower Mokelumne River 6: 2016; Mokelumne River near I-5: 2011; Lost Slough: 2005; Mokelumne River downstream of the Cosumnes River: 1999, 2000

Cache Slough at Liberty Island Mouth
Stations - Cache Slough at Liberty Island Mouth: 2016; Prospect Slough: 2005, 2007

Little Potato Slough
Stations - Little Potato Slough: 2016; Potato Slough (aka San Joaquin River at Potato Slough): 2005, 2007

Middle River at Borden Hwy (Hwy 4)
Stations - Middle River at Borden Hwy (Hwy 4): 2016; Middle River near Empire Cut: 2011; Middle River at Bullfrog: 1998, 1999, 2007; Middle River at HWY 4: 2005
Statistics - Individual composite result: 1998; 350 mm length adjusted mean: all other years

San Joaquin River at Vernalis
Stations - Same station all years

Figure 3. *Annual mean aqueous unfiltered methylmercury concentration at each Delta RMP monitoring station sampled from October 2017 through June 2018. Plots based on March-October data.*

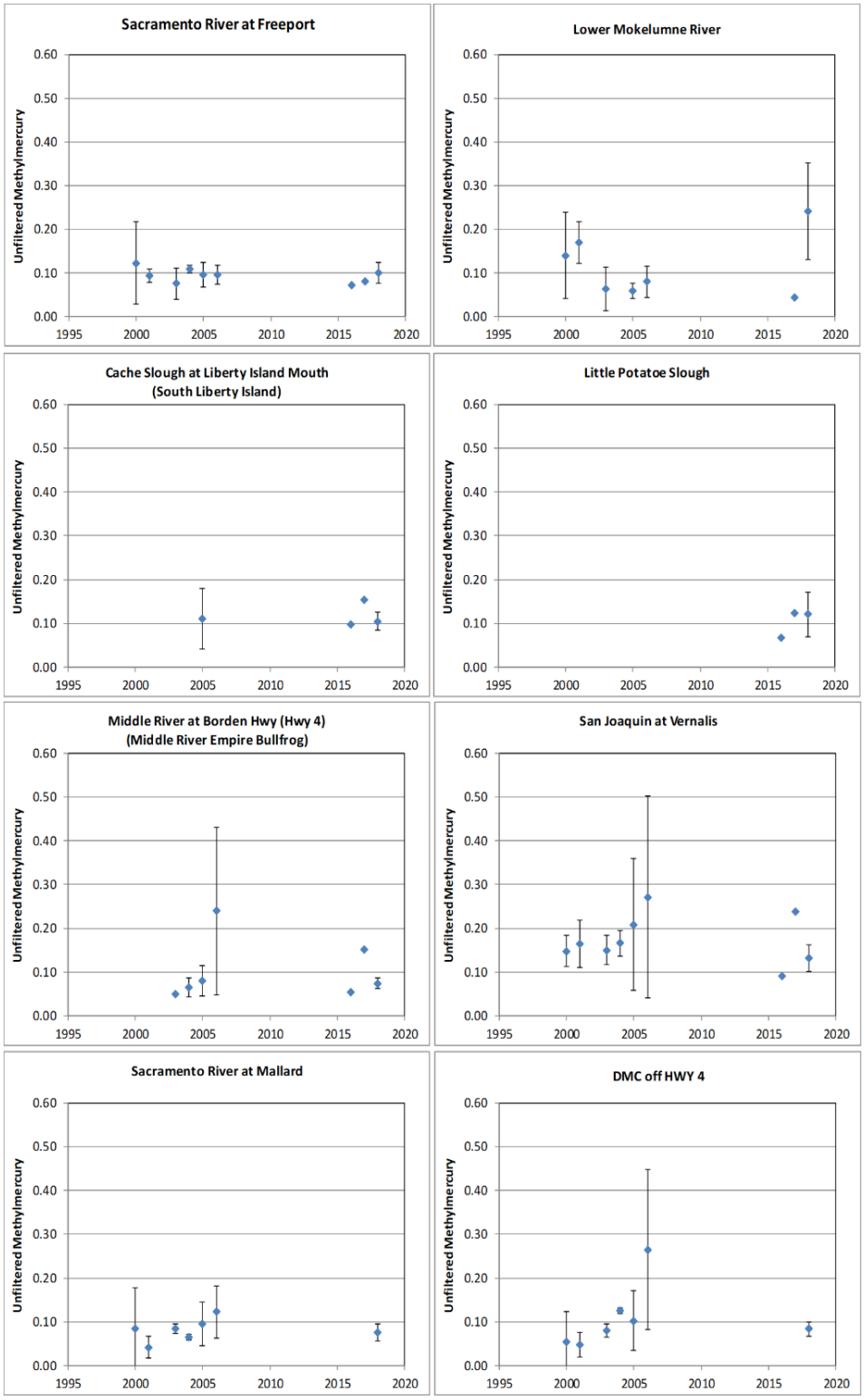


Figure 4. Preliminary design for Restoration Monitoring in the northwest Delta. Xx add overall spotting map

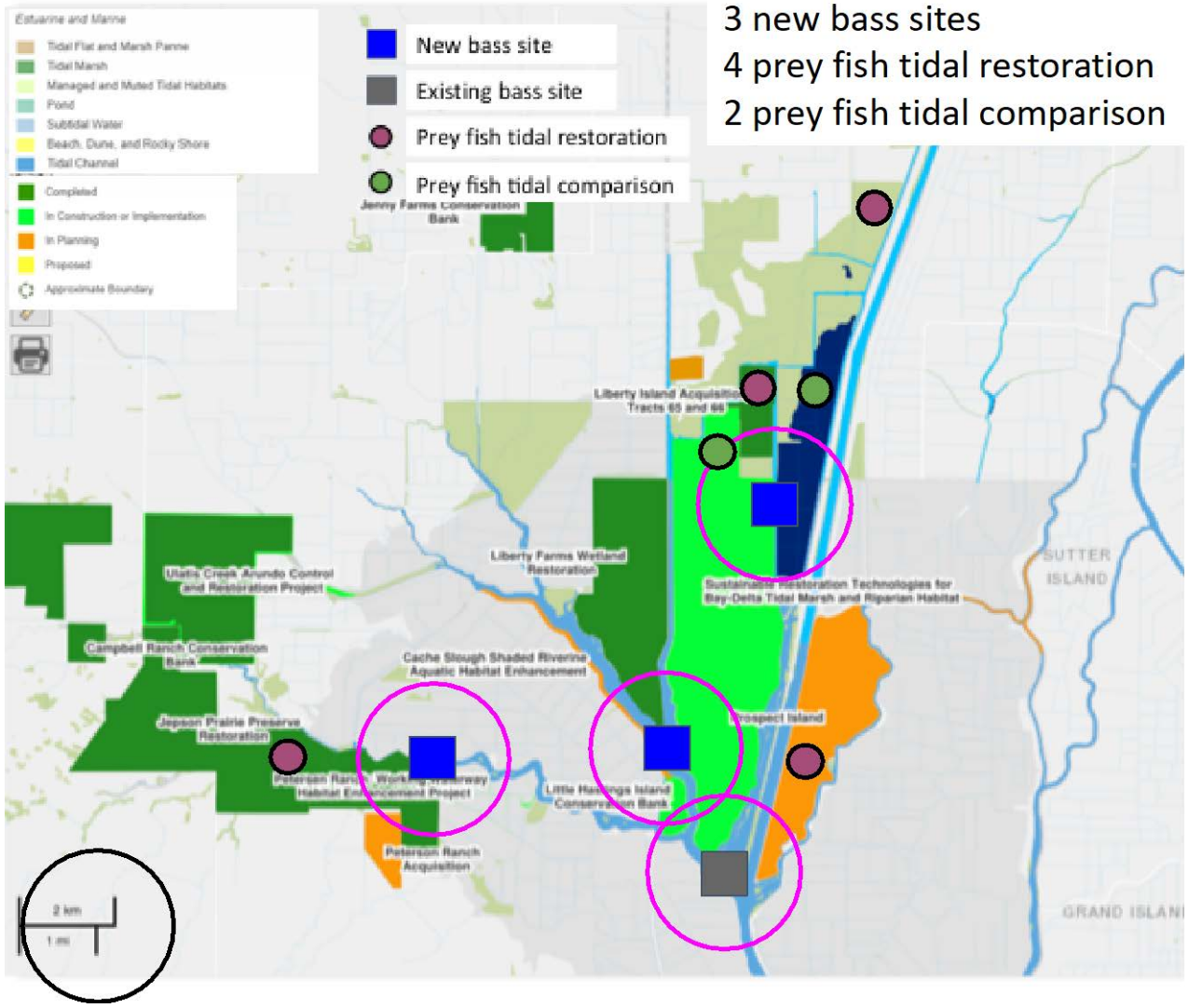


Figure 5. Preliminary design for Restoration Monitoring in the northeast Delta.

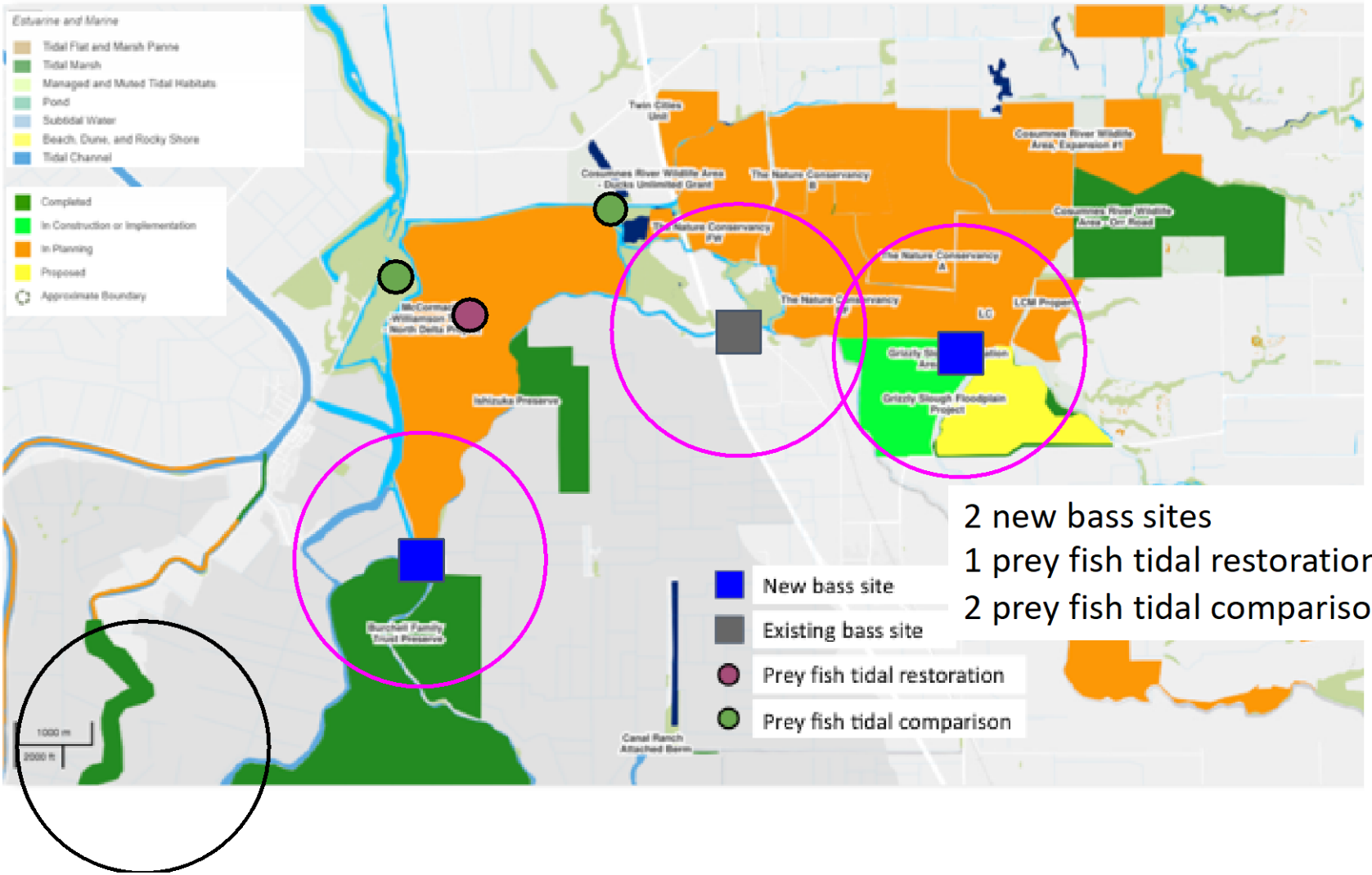
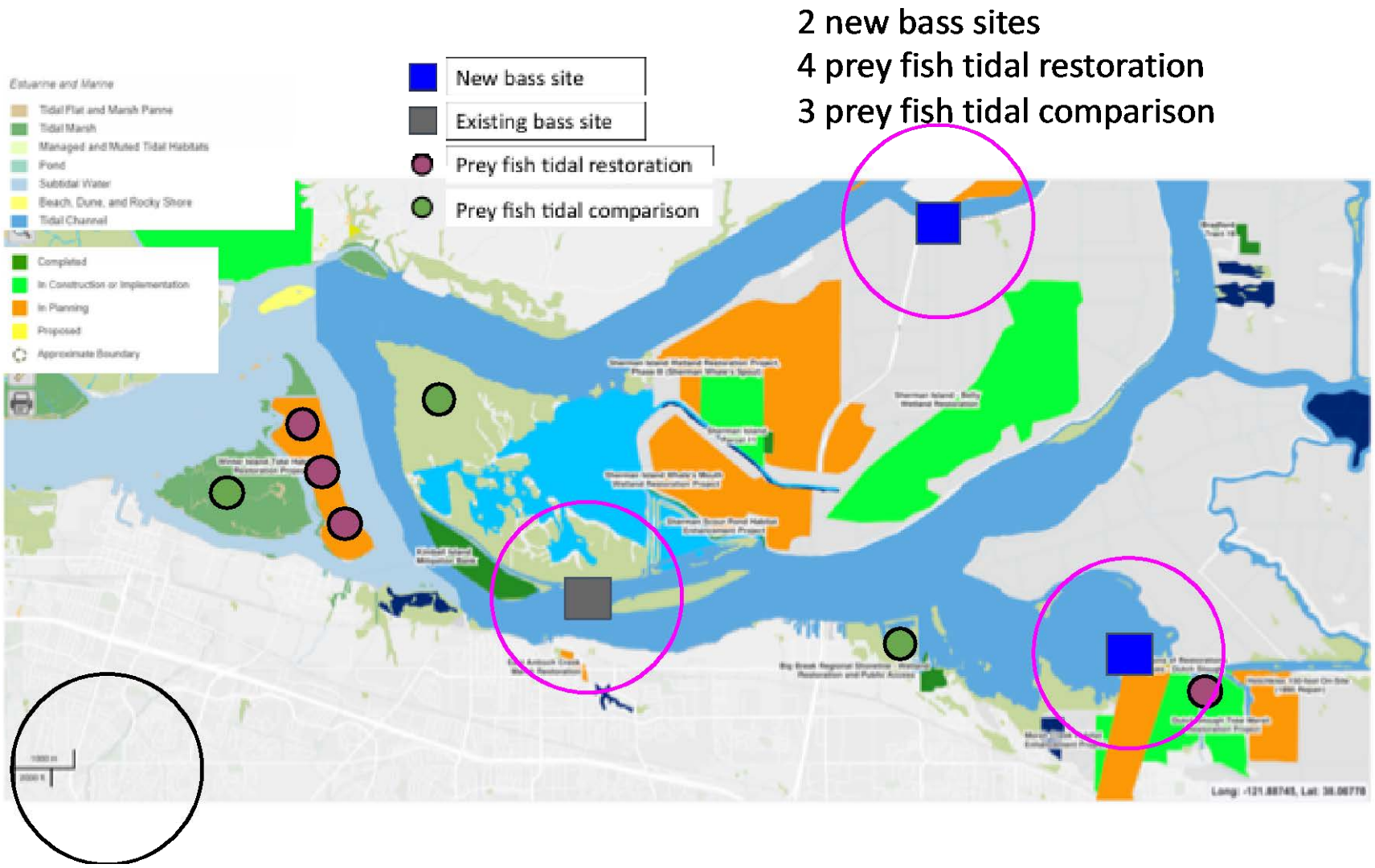


Figure 6. Preliminary design for Restoration Monitoring in the west Delta.



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Materials for Agenda Item 4: **Mercury Proposal Score Sheet**

Delta RMP Monitoring Proposal Questionnaire #2: Restoration monitoring for methylmercury in black bass and prey fish

8 responses

Name

8 responses

Karen Ashby

Carol DiGiorgio

Stephen McCord

Stephen Louie

Janis

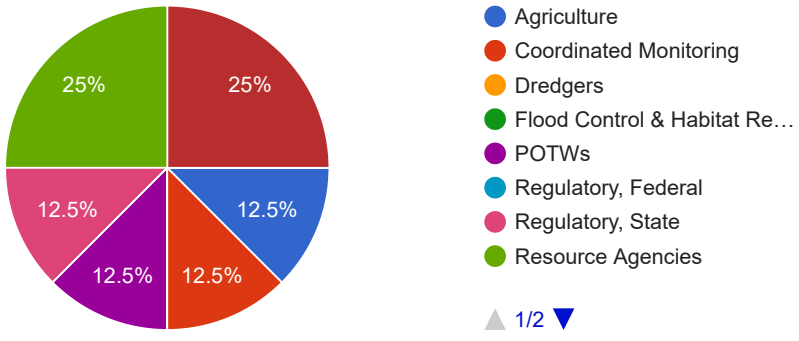
Melissa Turner

Tim Mussen

Brian Laurenson

Representing:

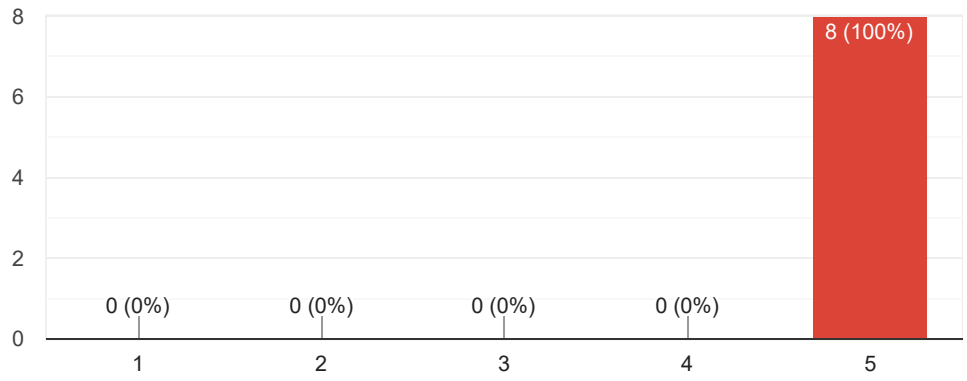
8 responses



A. Study Plan Responsiveness

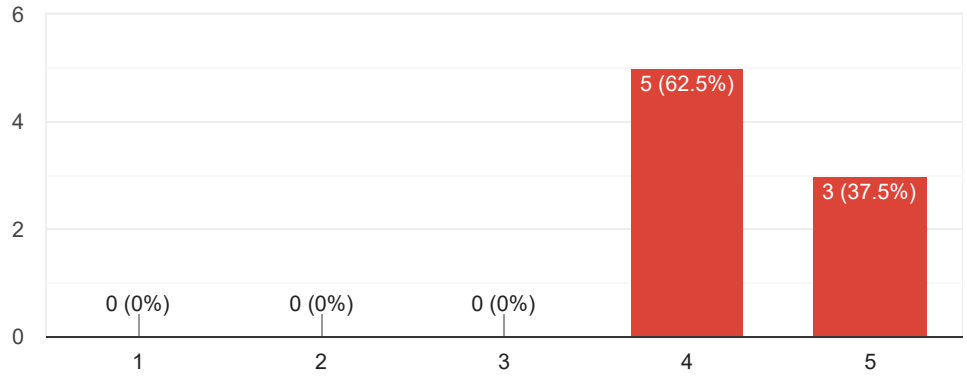
1. Does the study proposal identify the management question addressed?

8 responses



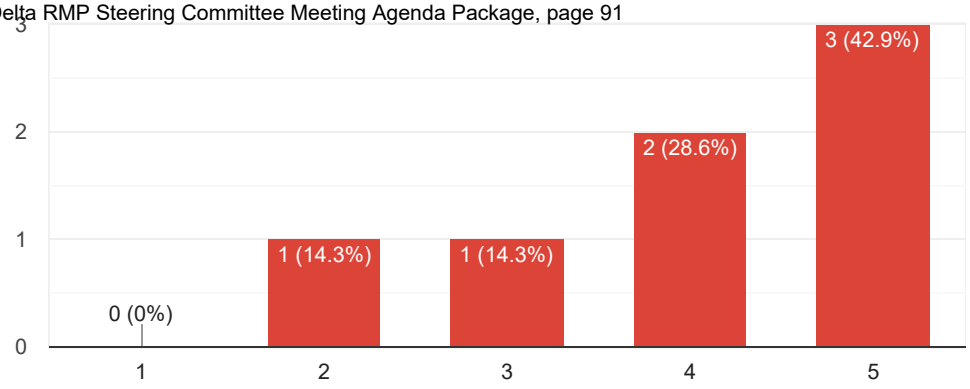
2. Are the Data Quality Objectives (DQOs; EPA 2006) clearly defined?

8 responses



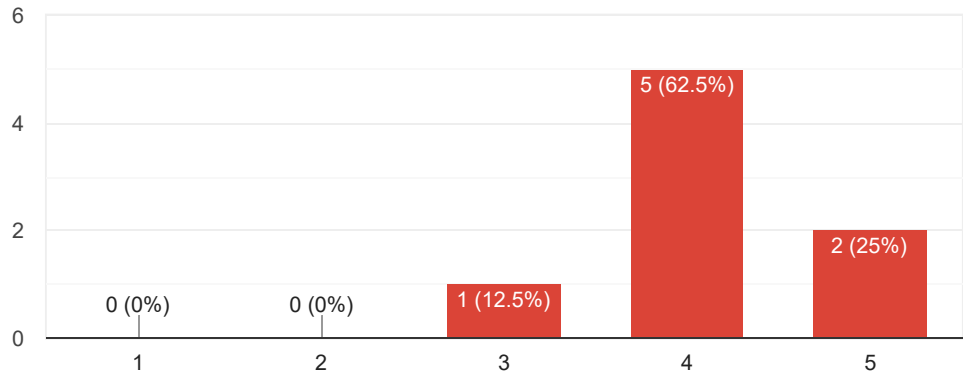
3. Does the study provide testable hypotheses (written as assessment questions or otherwise)?

7 responses



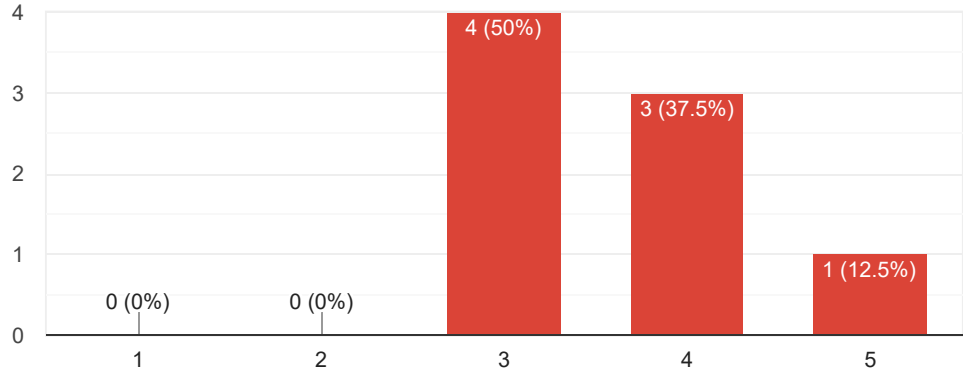
4. Does the proposal demonstrate how the results will be presented?

8 responses



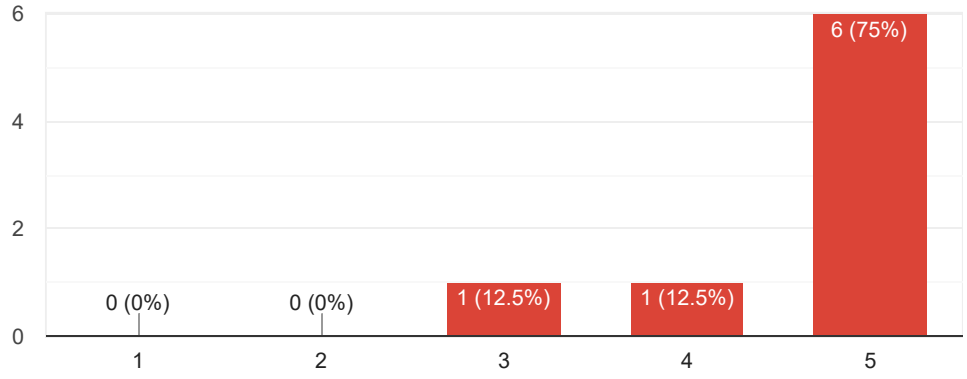
5. Does the proposal adequately demonstrate how the results will be interpreted?

8 responses



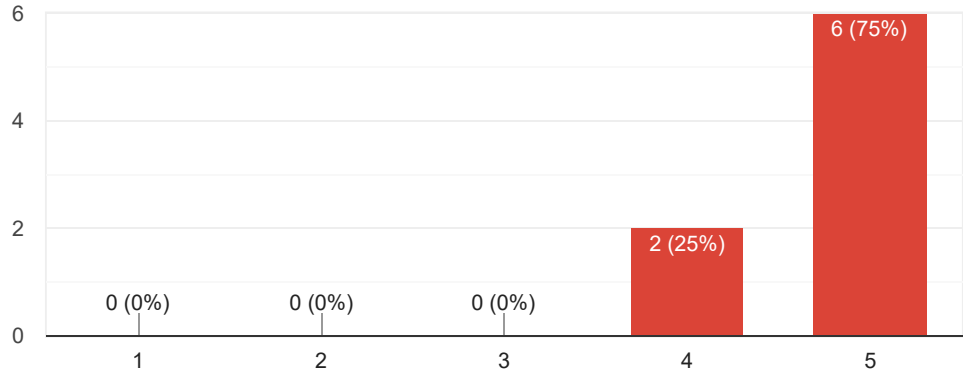
6. Does does the proposal contribute to a larger body of data that can be used to answer Management Questions in the future?

8 responses



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

8 responses



8. Comments on the overall study plan responsiveness:

4 responses

Missing hypotheses and data presentation and interpretation plan for the restoration site component. These can be included in the QAPP. I recommend citing Slotton et al., previous prey fish sampling in the Delta.
Top budget option is higher than initial Steering Committee direction, but I understand that including this option is acceptable to Steering Committee co-chairs.

Reporting and Deliverables section references an interpretive report and a data report; unclear what will be included in each. The interpretation of the results is a bit vague although example graphs are included in the end. Additional description of what will be in the interpretive report vs the data reports and what analysis will be performed on the data could be helpful for clarification. The reference to the Restoration Project monitoring in particular is vague in how effectiveness tracking will be done.

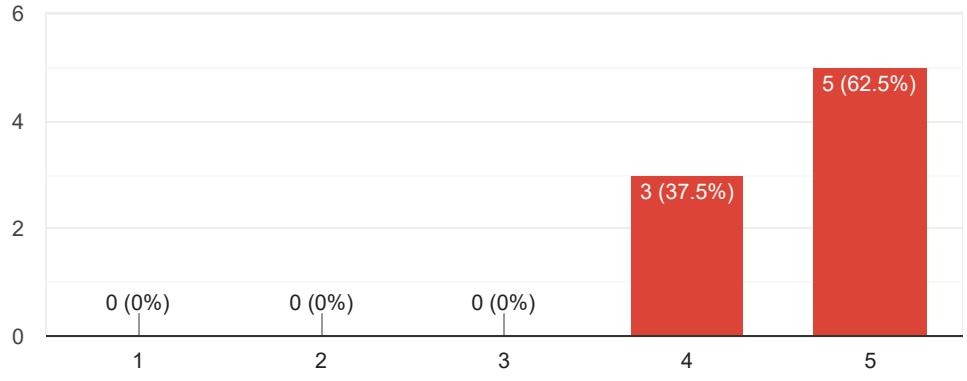
Further descriptions for how restoration monitoring results would be evaluated and interpreted would help support their inclusion in the study. Important factors should include the hydrological connectivity between corresponding tidal restoration and tidal comparison locations. Is there is any existing prey fish data for comparison. What species of fish will be used as the prey fish indicator species?

I understand that the restoration area monitoring is at a "strawman" level of development. The study plan is responsive certainly to a "pre-proposal" submittal, but doesn't completely address the spatial and interpretative design elements for the restoration monitoring. I think it is important that the SC consider restoration monitoring - the study plan is likely sufficient to at least provide more direction to develop details and coordination.

B. Technical Foundation

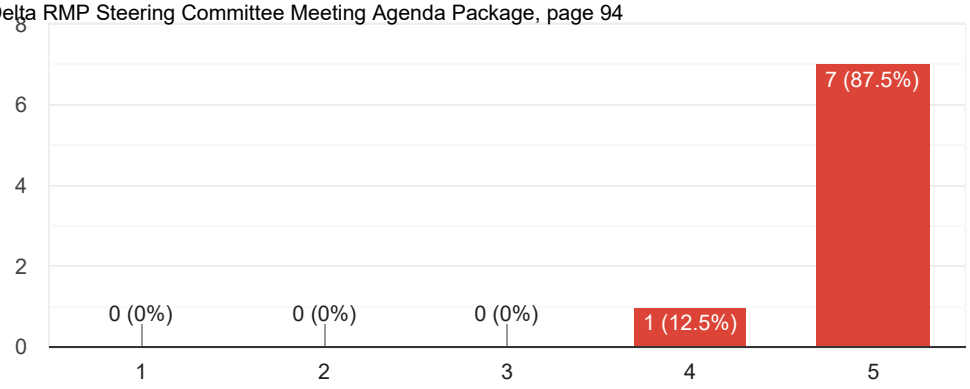
1. Geographic scope. Does the location selection support the study objectives?

8 responses



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

8 responses



3. Comments on the geographic scope:

4 responses

Wetland restoration is a key unknown factor in understanding mercury transformations and bioaccumulation

Study covers all of the legal Delta by sampling in 7 subareas (for fish). Addition of the restoration site sampling would enable data collection in an area of uncertainty in the TMDL analyses, namely the potential impacts of wetland and floodplain restoration on methylmercury concentrations and loads.

Unclear on the Restoration Monitoring location selection and how it closely links to existing restoration projects and their status. There is mention that some of this will be worked out later.

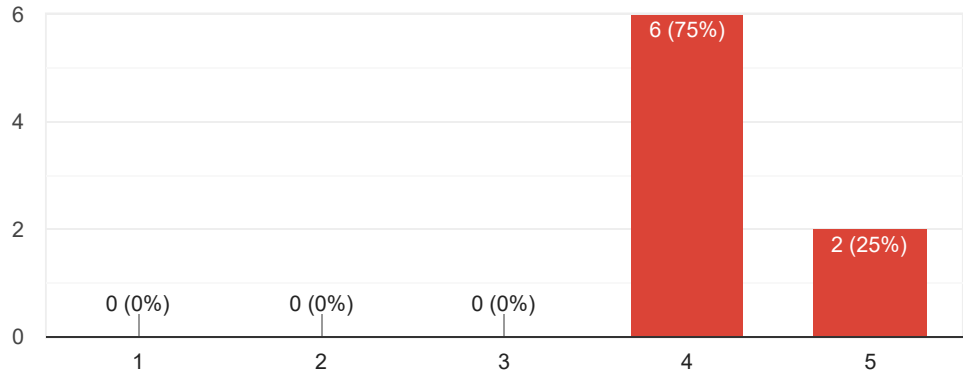
The details of the methods for comparing tidal and reference location results are deferred until the resource managers can be consulted. I'm interested to know more about how the systems are managed and how site fidelity is maintained. It seems reasonable, but some description would be helpful.

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

8 responses

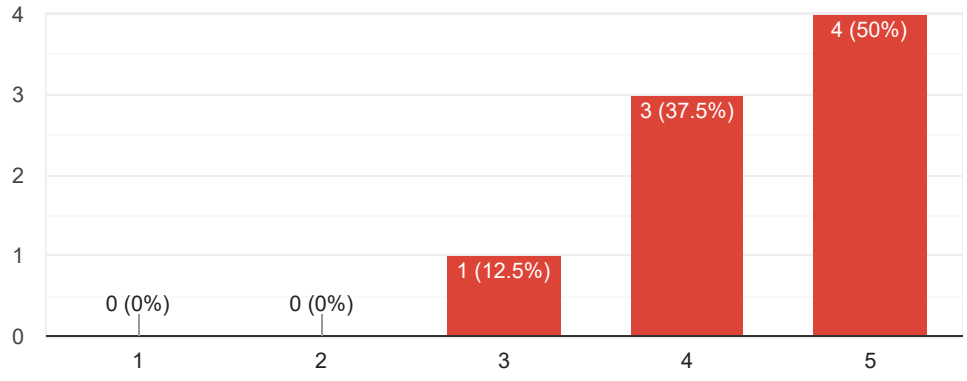
5. Temporal resolution. Does the study clearly define the conditions of interest (e.g. high flows)?

8 responses



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

8 responses



7. Comments on temporal scope:

4 responses

combining decadal fish monitoring with more frequent water sampling

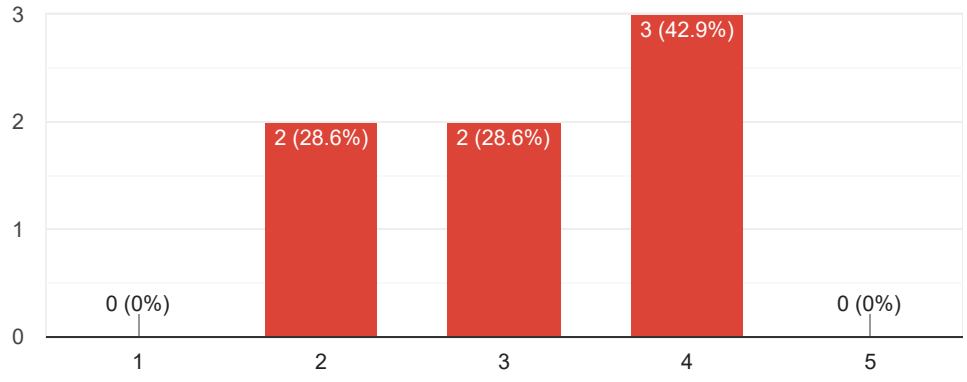
Selection of timing of fish and water samples in line with significant amount of prior data collection in the Delta and other California inland water bodies (e.g., SWAMP BOG, CALFED mercury studies, Delta mercury TMDL). Water sample timing guided by conceptual model of methylmercury bioaccumulation by fish. Power analyses indicate the value of continuing annual fish sampling. For restoration site work, the focus on late spring-early summer for prey fish sampling is appropriate, as it indicates potential risks to bird and mammal early life stages that eat fish.

Within the proposal there is reference to a lack of consistent data and the need to consistency in station, species and sampling approach. It seems like the stations and frequency of sampling are a balance between budget and desire for more data but its still not clear on what would be gained with additional monitoring locations or events. There is reference to a decrease in stations after October 2019 but its not clear on how that does or does not affect the ability of the study design to assess trends.

The power analysis presented suggests that long time periods (>20yr) are necessary to see the changes of interest and that the study would be reviewed in 2026. As background it would be helpful to understand the type of variables of restoration management that might affect tissue concentration, whether there is some dynamic period when the areas are constructed/initiated - I think these are resolvable.

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

7 responses



8.5. Comments on sample collection:

6 responses

The main questions that I have regarding sample collect are: 1) do we need to collect fish annually or can we collect them every other year and still obtain high quality data; 2) how dependent is the restoration portion of the proposal on the other portions of the study (subregional trends in water and bass)

Item 8 is not phrased like the others, and it's unclear what to select

Large bass and water sampling not new and do not introduce bias or errors. For the restoration portion, the proposal identifies some sample sites as "reference". During TAC meeting, TAC members and the Mercury Subcommittee Chair acknowledged that these may not be true reference sites and that wetland characteristics (e.g., hydrology, channel morphology, age of wetland, upland inundation frequency, upland land use, vegetation type, etc) would need to be considered to interpret study findings. Information on wetland characteristics would thus need to be gathered. Calling the sites "reference" is ok for generating and testing hypotheses.

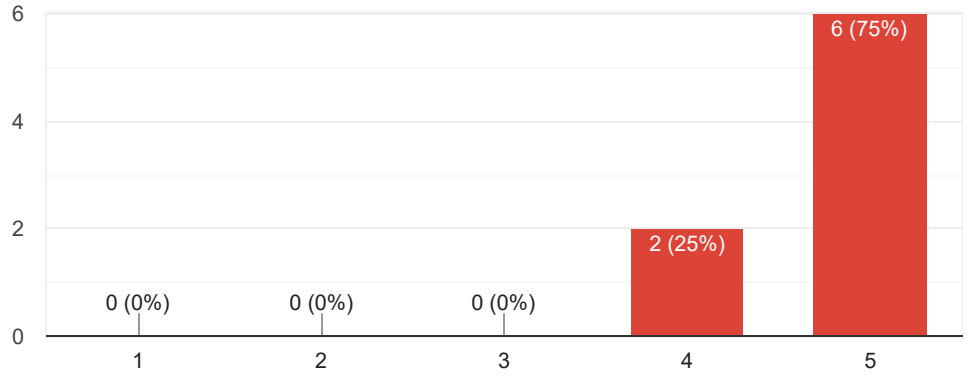
The language references existing protocols that are consistent with other similar studies; relies on QAPP for details. Does not discuss potential bias.

I assume a high score means the proposal has low biases or error.

Approach seems reasonable, pending more details described previously

9. Monitoring tools. Where do the analytical tools fit on the 'established methods' spectrum? (1 = experimental, 5 = long-established, known, reliable)

8 responses



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

8 responses

11. Comments on monitoring tools:

5 responses

Long term status and trends results will need to be compared to the Delta Hg TMDL.

stage data at established stations will be used to help interpret results

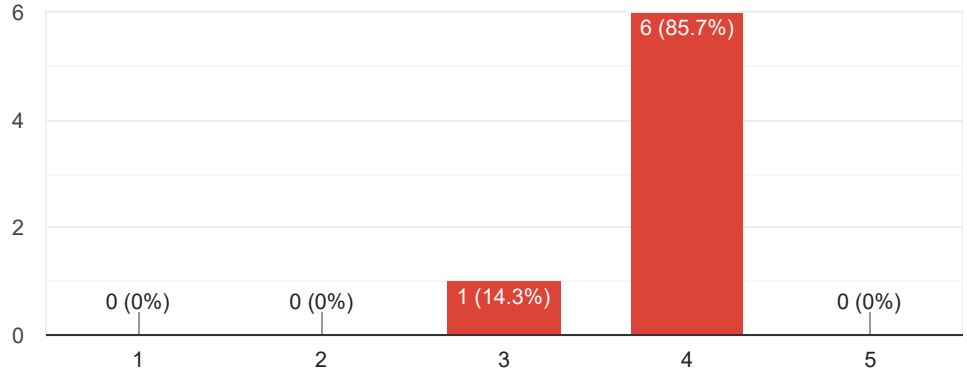
Sport and prey fish and water sampling and analyses methods are established. data presentation methods and statistical analyses for mercury data have been developed and published. Note on #10 - historical data will be important for examing trends, but this study plus published literature sufficient for those comparisons.

Builds upon previous studies already completed (as well as continuing to monitor in future years) to determine trends.

The restoration monitoring study would require knowledge of restoration project developments, management, and surrounding hydrology to help interpret the outcome.

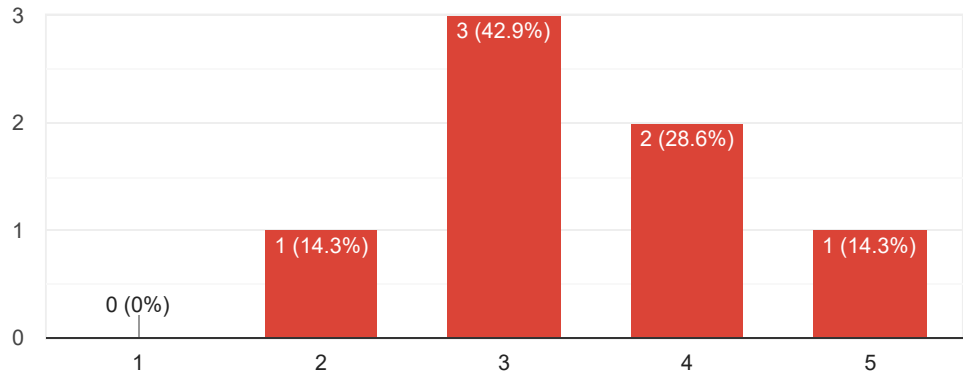
12. Interpretation. Are study condition controls adequately considered given the study timeframe, data collection frequency, and proposed interpretation to answer study hypotheses reliably? Consider whether the study approach sufficiently identifies and addresses sources of variably in the study.

7 responses



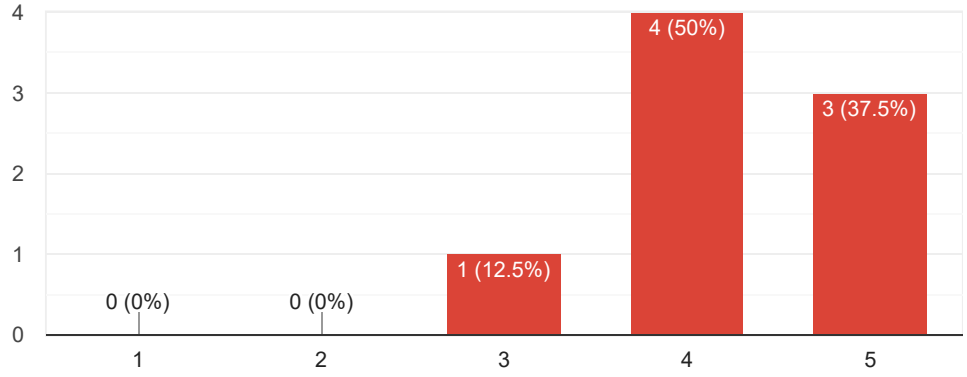
13. Interpretation. Does the study have statistical power sufficient to answer study hypotheses reliably during the study timeframe? Consider whether the study has adequately evaluated expected data variability to meet study objectives.

7 responses



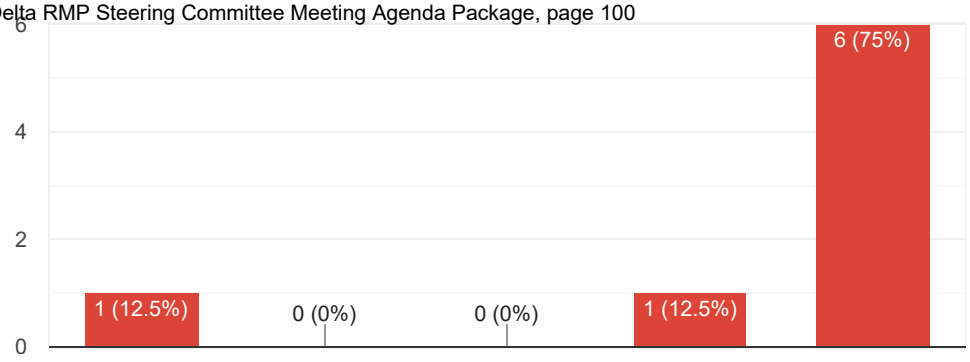
14. Interpretation. Is the basis for outcome assessments technically supported?

8 responses



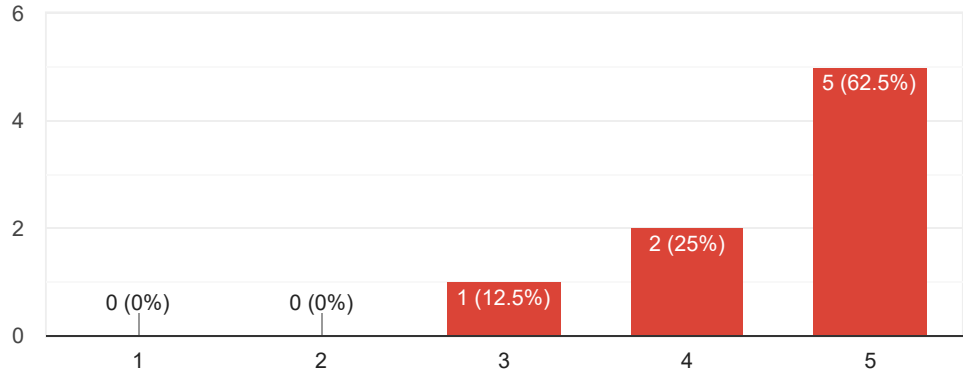
15. Interpretation. Does the proposed study create new information to evaluate beneficial use attainment?

8 responses



16. Interpretation. Do the proposed study's research questions and outputs address specified management questions?

8 responses



17. Comments on interpretation:

5 responses

For the Restoration Monitoring component, it will be tricky to find comparison sites. This could make it difficult to draw conclusions on whether tidal restoration is impacting receiving waters. What if the same prey species cannot be collected at all restoration and comparison sites? Will a multi-species approach be used? If you can't catch the same species across sites, then how does this affect the outcome?

transitioning from TMDL re-evaluation support; continue long-term trends monitoring; adding restoration monitoring prior to key actions

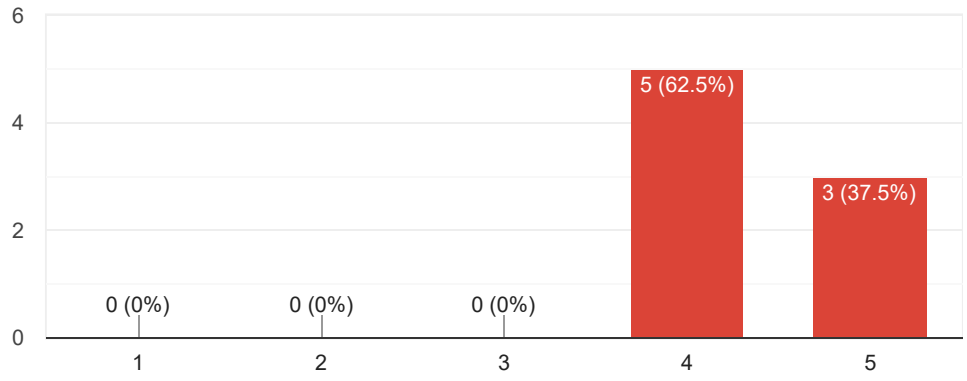
#13 - proposal notes that restoration sites and sampling plan is not finalized. Mercury subcommittee will need to consult with wetland managers and restoration programs, then finalize sampling plan. I wasn't able to evaluate if restoration portion (sites, events, and # fish) is sufficient for robust statistical evaluation. There are previously published data sets for mercury in small fish in wetlands that can be compared.

The study relies on multiple years of funding (up to 20) to be able to detect trends but this is clearly indicated with a power analysis. Uncertain about the outcome assessments associated with the Restoration Monitoring.
Q18 - largest concern is the Restoration Monitoring; many of the details of how the locations, project information and results will be interpreted and used.

More details are necessary and the Steering Committee may benefit from a description of the TMDL relevance of the relative changes the evaluation can detect over different study periods.

18. Technical Merit. Does the proposed study overall have technical merit?

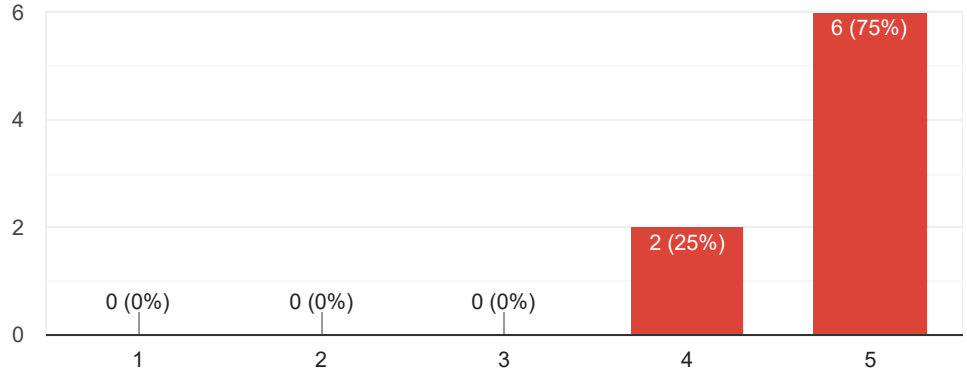
8 responses



C. Budget, Priority, and Coordination Considerations

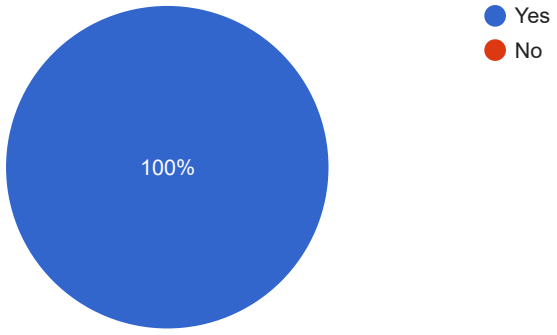
1. Budget. Is the proposed budget scalable in size?

8 responses



2. Budget. Is the proposed study modular?

8 responses



3. Comments on budget:

3 responses

To me one of the key questions is how dependent is the restoration monitoring on the fish and water trend monitoring.

scalable by +/- 25%, modules shouldn't be dropped

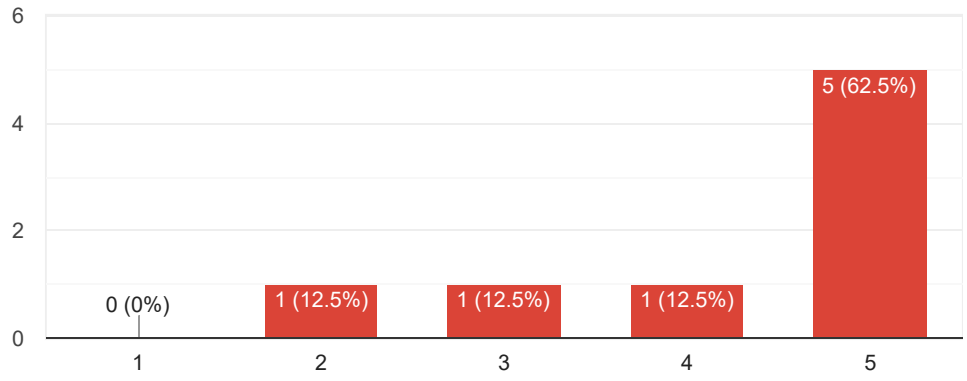
budget is modular and scalable. costs per module of study seem reasonable, given the numbers of sampling events and locations.

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

8 responses

5. Priority. Does the study timeframe allow it to inform time-sensitive decisions?

8 responses



6. Comments on priority:

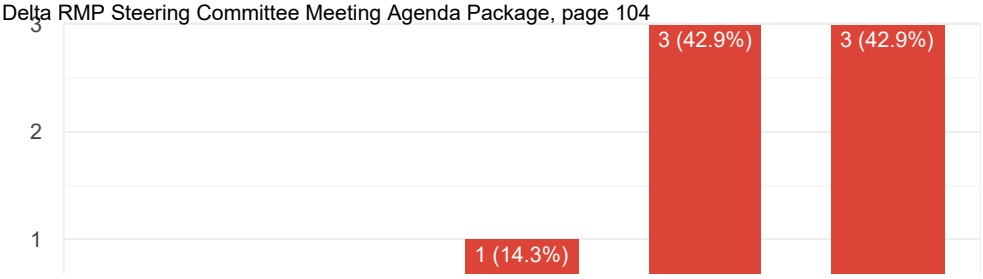
2 responses

Water Board staff will review and revise the Delta TMDL analyses, beginning in 2020. This is the last year of Delta RMP monitoring that can be used in the review. Wetland restoration will continue after 2020. Any information gathered about tidal wetland methylmercury impacts can continue to be used for wetland design considerations and to help determine the need for future, site-specific monitoring.

Need more input from the Regional Board and the DSP independent review panel (Advisory) to best understand priority.

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

7 responses



8. Comments on coordination:

3 responses

not discussed, but could coordinate with restoration project proponents

Delta RMP has already investigated options for coordinating fish and water sampling, as these efforts are not new. When restoration monitoring work plan is revised, Mercury Subcommittee should carefully review monitoring occurring at or nearby for other purposes to evaluation possibilities for coordination. For example, Delta Sciencr Program is funding food web monitoring at McCormack Williamson.

Proposal mentions coordination with DWR efforts

Overall Comments

Overall comments:

3 responses

I recommend funding the study. I recommend Option C, which includes restoration site sampling at 2 locations and water sampling through 2020.

Largest concern is centered around the sampling design proposed for Restoration Monitoring. Without a good understanding of what restoration projects (and their status) are occurring in the areas it hard to evaluate if the locations and sampling frequency are adequate. It is also difficult to determine how much additional monitoring events (or stations) would help in identifying trends spatially and temporally. Additional details to better support the number of locations and events could help clarify this including any reference to past data that indicate why removing stations from the design does not affect the ability of the study to assess trends. There is reference for the need for a consistent study design so it would be good to know that this is the design that is the best option for assessing trends and that this won't need to change in the future.

I appreciate inclusion of the restoration area components, and I think it will be helpful to provide SC context of why it is important in the context of the TMDL - some participants not near the restoration areas might not understand the usefulness of the information.

Materials for Agenda Item 6

DATE: May 20, 2019

TO: Delta RMP Steering Committee

THROUGH: Delta RMP Finance Committee

FROM: Matthew Heberger, Program Manager, Aquatic Science Center

RE: Summary of Delta RMP Financials for the period ending March 31, 2019

This memorandum provides an update of budgets and expenses for the Delta RMP and the balance of the Undesignated Reserve Fund. The figures in this memo are current through March 31, 2019, or the third quarter of fiscal year 2018-19 (Q3 FY18-19).

Financial Snapshot

Financial Assets	
Cash	$1,267,848
Accounts Receivable	$0
	$1,267,848
Liabilities	
Subcontracts	$544,630
ASC Planned Labor & Expenses	$302,071
	$846,701
Other	
Reserve Fund	$171,322
Expected Revenue	$140,000

Definitions:

Financial Assets – Includes cash and cash equivalents and accounts receivable. We refer here only to "financial" assets as the Delta RMP does not own any physical assets such as equipment or supplies.

Reserve Fund – A dedicated "set aside" fund maintained in ASC's accounting system. If there are excess funds in the Program account at the end of a budget year, the funds can

be put into the Reserve Fund to be applied toward subsequent years of Program implementation with approval of the Steering Committee.

Cash – Money in the ASC checking account and savings account that belongs to the Delta RMP.

Accounts Receivable - "The balance of money due to a firm for goods or services delivered or used but not yet paid for by customers" (Investopedia). In our case, this represents invoices that we have sent to Delta RMP contributors but which have not yet been paid.

Liabilities – "A company's legal financial debts or obligations that arise during the course of business operations" (Investopedia). These can be thought of as "encumbered funds" that are restricted for a given purpose, such as subcontracts or honoraria, or planned labor or direct expenses.

Expected revenue is revenue that we *expect* to receive, but we have *not yet invoiced*, therefore it is **not** counted under accounts receivable. In our case, this consists of contributions from participants who have a policy of paying after completion of work.

Revenue in FY18-19

As we are nearing the end of Fiscal Year 2018-19, there are few changes to report in revenue. We invoice most participants in the beginning of the fiscal year, and the vast majority have already paid. The two exceptions to this are the State Water Contractors and CalTrans. As noted, their policy is to pay *after* work has been performed, so we cannot invoice them right away. As we have not yet invoiced these amounts, they are not "accounts receivable" in our accounting system. Nor do we want to lose track of these funds for planning, so we include them in a category we're calling "expected revenue." The expected contributions are:

(1) $60,000 from the State Water Contractors, upon completion of the draft pesticides interpretive report. This work is underway by our subcontractor Deltares.
(2) $80,000 from CalTrans. Expected deliverables are 4 Steering Committee meeting summaries and 4 Technical Advisory Committee meeting summaries. We plan to invoice Caltrans for the full amount in June 2019.

Following is a summary of how actual revenue differed from the revenue forecast in the workplan. This summary is copied over from the previous finance report, as nothing has changed, but includes less detail. In the FY18-19 workplan, we reported an expected revenue for the fiscal year of **$900,256**. Since that time, we received word of three new participants joining the program. Two of these agencies are or will be contributing directly to the Delta RMP:

- $200,000 California Department of Water Resources
- $80,000 California Department of Transportation (CalTrans)

The other new participant, the US Army Corps of Engineers, is contributing $50,000 to the Delta RMP by directly paying the USGS for field work and lab analysis. This contribution is being tracked as an "in kind" contribution because this cash is not paid to ASC. A more detailed description of this arrangement was provided in the June 29, 2018 finance memo.

Based on the 2 new direct contributors to the program, we revised the revenue forecast for FY18-19 upward by $280,000 to **$1,180,256.**

To date, we have collected 93% of expected revenue. ASC sent invoices to Delta RMP participants in May 2018, with payments expected by July 30, 2018. To date, we have issued 50 invoices, and all 50 have been paid, for a total of $1,100,256. As noted above, we have not yet invoiced CalTrans for their expected $80,000 contribution, and plan to do so in June 2019.

Interest Income

Interest earned by the Delta RMP project to date is as shown below in Table 1. Delta RMP funds are pooled with other SFEI-ASC funds in a state-run account referred to as the Local Agency Investment Fund (LAIF). Each quarter, ASC finance staff calculate the share of interest owed to each program based on their proportion of the cash invested.

Table 1. Interest earned to date by the Delta RMP

Fiscal Year	Quarter	Time Period	Interest Earned
FY14-15	Q3	Jan 1 – Mar 31, 2015	$7.08
FY14-15	Q4	Apr 1 – Jun 30, 2015	$121.62
FY15-16	Q1	Jul 1 – Sep 30, 2015	$284.39
FY15-16	Q2	Oct 1 – Dec 31, 2015	$455.30
FY15-16	Q3	Jan 1 – Mar 31, 2016	$801.25
FY15-16	Q4	Apr 1 – Jun 30, 2016	$955.38
FY16-17	Q1	Jul 1 – Sep 30, 2016	$1,287.58
FY16-17	Q2	Oct 1 – Dec 31, 2016	$1,363.06
FY16-17	Q3	Jan 1 – Mar 31, 2017	$1,611.89
FY16-17	Q4	Apr 1 – Jun 30, 2017	$1,799.93
FY17-18	Q1	Jul 1 – Sep 30, 2017	$3,695.80
FY17-18	Q2	Oct 1 – Dec 31, 2017	$3,721.76
FY17-18	Q3	Jan 1 – Mar 31, 2018	$3,901.73
FY17-18	Q4	Apr 1 – Jun 30, 2018	$3,901.81
FY18-19	Q1	Jul 1 – Sep 30, 2018	$5,825.83
FY18-19	Q2	Oct 1 – Dec 31, 2018	$8,420.44
FY18-19	Q3	Jan 1 – Mar 31, 2019	$9,165.32
		Total	**$47,320.17**

Note that neither our past nor current workplans included a forecast for interest income, so this amount may be thought of as a "windfall." In the past, we have periodically reported that the program is receiving interest income. However, we have not explicitly done anything with these funds.

Henceforth, we recommend transferring any interest earned to the Undesignated Reserve Fund each quarter. Funds in the reserve can be saved or allocated by the Steering Committee to support monitoring activities or special studies. A draft motion is provided below to make the first such transfer official.

Draft Motion: "Transfer interest income earned to date, in the amount of $47,320.17, to the Undesignated Reserve Fund."

Changes to FY18-19 Workplan Expenses

Since the workplan was approved in May 2018, we have made several changes to the budget based on updated plans and priorities. These changes are shown in Table 2 on the next page. The net result of these changes is a $108 decrease in planned expenses:

Original Budget	$1,098,244
Amendments (net)	+$108
Revised Budget	**$1,098,352**

Most of these changes have been discussed previously. The only change in the last quarter is the addition of *Task 6D. Additional Toxicity Testing*, in the amount of $4,640. This new subtask will fund the Aquatic Health Program Laboratory at UC Davis to perform some additional analyses requested by the Toxicity Workgroup. Specifically, it covers a nutrient add-back experiment in low-conductivity controls for the chronic *Ceriodaphnia dubia* toxicity test, and includes up to 4 tests at $1,160 each. This planned expense is described in more detail in an April 9, 2019 memo to the Finance Committee, and was approved unanimously by members of the Finance Committee via email in April 2019.

Table 2.Changes to the planned expenses from the original FY18-19 workplan

Task	Subtask	Expense Type	Original Budget	Budget Amendment	Revised Budget	Rationale
01. Core Functions	A. Program Planning	Labor	$68,250	–$3,120	$65,130	Transferred $3,120 from ASC labor to subcontracts. Contract with AMS for Dr. Aroon Melwani to perform power analysis and statistical analysis for the pesticides monitoring design.
		Subcontracts	$0	+$3,120	$3,120	Transferred from labor to subcontracts, per note in row above.
	C. Proposal Writing	Labor	$0	+$8,306	$8,306	New subtask added in Oct 2018, with authorization of the Finance Committee. Provides for ASC staff time to write and submit a Prop 1 grant proposal for CEC monitoring.
04. Nutrients Special Studies FY18-19	A. Nutrients Modeling Study	Subcontracts	$85,000	–$35,000	$50,000	Cancelled the planned subcontract with Deltares when they changed their mind about writing hydrodynamic model converter code. Transferred to ASC labor. This work is being done by Dr. Allie King, new hire in the nutrients group.
		Labor	$101,000	+$35,000	$136,000	Transferred from subcontracts to ASC labor. See note above.
05. Mercury Monitoring FY18-19	A Data Collection and Analysis	Subcontracts	$242,130	+$46,581	$288,711	Budget amended by Steering Committee on Oct 29, 2018. We decided to increase the number of mercury water sampling events from 8 to 10 per year.
06. Pesticides Monitoring FY18-19	A. Field sample collection and laboratory analysis	Subcontracts	$199,873	–$44,356	$155,517	Budget decreased by $44,356, as the US Army Corps of Engineers made a direct cash contribution to the subcontractor USGS that will cover a portion of the planned work. This in-kind contribution to the program is in lieu of making a cash contribution to ASC to pay for their Delta RMP dues.
	B. Toxicity reporting	Subcontracts	$15,063	–$15,063	$0	Cancelled this planned subcontract with AHPL, per communications with Melissa Morris at State Board Office of Information Management and Analysis. Most of the planned deliverables under this subtask will be provided by the State Water Board at no expense to the program.
	D. Additional Toxicity Testing	Subcontracts	$0	+4,640		Funds for the Aquatic Health Program Laboratory at UC Davis to perform some additional analyses requested by the Toxicity Workgroup. Covers a nutrient add-back experiment in low-conductivity controls for the chronic *Ceriodaphnia dubia* toxicity test. Includes up to 4 tests @ $1,160 each. Described in an April 9, 2019 memo to the Finance Committee. Approved by Finance Committee via email in April 2019.
Net change to planned expenses in the FY18-19 workplan				*+$108*		

Expenses

Job-to-date (JTD) expenses through the third quarter of the fiscal year are tracking roughly in line with expectations. A summary of expenses by task is shown in Table 3. Additional details are shown in Table 6 at the end of this memo.

Table 3. Planned and actual expenses by task, through Mar 31, 2019.

Task	Planned expense	Actual JTD Expense	Percent spent
Tasks Authorized in the FY17-18 Workplan*			
02.D Science Advisors Honoraria	$10,000	$9	0%
04.B Pulse of the Delta draft	$40,000	$1,178	3%
08. Pesticides Interpretive Report	$88,000	$12,390	14%
10. Mercury Monitoring FY17-18	$233,561	$232,280	99%
Subtotal	**$371,561**	**$245,857**	**66%**
Tasks Authorized in the FY18-19 Workplan			
01. Core Functions*	$132,706	$91,688	69%
02. Governance	$134,800	$74,110	55%
03. Quality Assurance	$32,500	$31,858	98%
04. Nutrients Special Studies FY18-19	$228,400	$57,014	25%
05. Mercury Monitoring FY18-19	$323,791	$84,287	26%
06. Pesticides Monitoring FY18-19	$201,155	$12,580	6%
07. CEC Monitoring Plan FY18-19	$45,000	$25,818	57%
Subtotal	**$1,098,352**	**$377,355**	**34%**
Grand Total	**$1,818,942**	**$623,213**	**34%**

*Only showing FY17-18 open tasks and subtasks. Completed tasks have been closed and the surplus was transferred to the Undesignated Reserve Fund on Oct 29, 2018.

Table 4 shows expenses by category (ASC labor, subcontracts, and direct expenses). The subcontractor expenses are low in particular, as we do not log the expense until invoices are received and paid out.

Table 4. Budget and job-to-date expense for FY18-19 by category of expense.

	Budget	Expense JTD	Percent spent
Labor	$535,814	$269,746	50%
Subcontracts	$562,038	$107,318	19%
Direct Expense	$500	$291	58%
Total	**$1,098,352**	**$377,355**	**34%**

Undesignated Reserve Fund

Table 5 shows a running list of deposits and withdrawals into the Undesignated Reserve Fund. The current balance of undesignated funds is $171,322.

Table 5 Delta RMP Undesignated Reserve Fund ledger.

Budget Year	Deposit or Withdrawal		Authorized By	Date	Amount	Comment
FY14-15	Deposit		Steering Committee	2015-06-16	$41,000	Released funds allocated for CUP monitoring in FY14-15 budget in order to re-allocate these funds into the FY15-16 budget for CUP monitoring.
FY14-15	Deposit		Staff	2015-07-21	$51,903	Extra revenue received in FY14-15. Actual revenue minus budgeted expenses for FY14-15 (number is updated whenever budget is changed, date reflects most recent update)
FY15-16	Withdrawal		Steering Committee	2015-06-16	-$41,000	Released funds allocated for CUP monitoring in FY14-15 budget in order to re-allocate these funds into the FY15-16 budget for CUP monitoring.
FY15-16	Withdrawal		Steering Committee	2016-04-25	-$20,000	Released funds for Pathogen Trigger study (TBD) not to exceed $20K; see description in FY16-17 workplan
FY15-16	Deposit		Steering Committee	2016-04-25	$100,000	SC directed that SFCWA funding of $100K (contribution for FY15-16) be transferred to reserve.
FY16-17	Withdrawal		Steering Committee	2016-04-25	-$100,000	SC directed that $100K be withdrawn from the reserve to be reallocated as revenue for FY16-17. SFCWA contribution in Spring 2017 will be allocated to the FY17-18 budget.
FY15-16	Deposit		Steering Committee	2016-07-20	$84,444	SC approved that $84,444 be transferred from FY15-16 revenue to the reserve as undesignated funds.
FY16-17	Withdrawal		Steering Committee	2016-10-18	-$10,000	SC approved up to $10,000 for coordinating and drafting a response to the External Panel Review. Funds were allocated to FY16-17 Task 1.C.
FY16-17	Withdrawal		Finance Committee	2017-05-23	-$7,500	Finance Subcommittee approved transfer of funds to cover final phase of External Review.
FY14-15	Deposit		Steering Committee	2017-07-28	$725	Transferred unused FY14-15 to the Reserve Fund.
FY17-18	Deposit		Steering Committee	2018-03-02	$25,910	SC voted to unencumber the $25,910 FY15-16 surplus transfer the amount to the Reserve Fund
FY16-17	Deposit		Steering Committee	2018-03-02	$8,097	SC voted to unencumber the $8,097 FY16-17 surplus and transfer the amount to the Reserve Fund
FY17-18	Deposit		Steering Committee	2018-10-29	$37,743	SC voted to unencumber $37,743, the surplus from completed tasks in the FY17-18 workplan and transfer these funds to the Reserve Fund.
				Total	$171,322	

Invoices

Please follow this link to download the invoices covered by this memo:

https://drive.google.com/drive/folders/108tIjZrjgeU8iIuzNHi7QhruwCnfYfG0?usp=sharing

Attachments – Detailed Expense Tables

See the following pages for detailed tables of expenses by task:

Table 6. Planned and actual expenses for *uncompleted* tasks authorized in the Delta RMP FY17-18 Workplan, by task and subtask, with details on expenses in the last quarter.

Table 7. Planned and actual expenses for tasks authorized in the Delta RMP FY18-19 Workplan, by task and subtask, with details on expenses in the last quarter.

Revenue Forecast for the 2019 – 2020 Fiscal Year and beyond

The Steering Committee approved a 3% fee increase for all participants at its meeting on July 17, 2019. The decision reached that day was:

> "The SC approves a fee increase of 3% by all financially contributing participants in the 2019 – 2020 fiscal year (FY19-20) and no additional increase for the following 2 fiscal years (FY20-21 and FY21-22)."

Based on this, the forecast revenue in FY19-20 from participant contributions is **$1,215,663**. A list of participants and their expected contribution is shown in Table 9.

Note that the Army Corps of Engineers is expected to continue supporting the Delta RMP by funding the USGS California Water Science Center to fund portion of our pesticides monitoring. The expected amount in FY19-20 is **$51,500,** a 3% increase over the previous year. Other in-kind contributions are expected from cooperators, and are noted in the forthcoming proposed workplan for FY19-20.

Funds Available for Budgeting in the 2019 – 2020 Fiscal Year

Funds available for budgeting in the next three years are shown in Table 8.

Table 8. Funds available for budgeting in over next three years.

Annually Recurring:	
Forecast revenue for FY19 to FY21	**$1,215,663**
Available Cash (one time use only):	
Cash on hand less current liabilities	$421,147
Expected revenue from FY17 and FY18	$140,000
Interest earned	$47,320
Funds from Reserve*	$21,322
	$629,789

*The Finance Committee has recommended maintaining a balance of $150,000 in the reserve fund. However, the full amount of $171,322 is available for funding projects at the Steering Committee's discretion.

A significant cash cushion is available. This has come about because past budgets were conservative, and only budgeted funds that were expected at the time. However, in the past two years, new participants have joined, leading to a windfall. Further, careful tracking of expenses has allowed us to close out the last two fiscal years as a whole under budget, despite some difficulties with certain tasks (such as data management and pesticides reporting) going over budget.

While this entire amount could be spent in FY19-20, it may be more prudent to spread it over a few years. Our understanding is that we are no longer expecting any major new contributors to the program. Therefore, we recommend annual budgets over the next 3 years that include the annual revenue expected from contributors, of around $1.2 million, and spreading the $630K in available funds over 3 years:

Annual revenue	$1,215,663
One third of cash	$209,930
Recommended annual budget for next 3 years	**$1,425,593**

Table 9. Delta RMP participants and their expected financial contribution for the 2019 – 2020 fiscal year.

Category	Participant	Expected Contribution
Agriculture	East San Joaquin Water Quality Coalition	$37,198
	Sacramento Valley Water Quality Coalition	$36,050
	San Joaquin County and Delta Water Quality Coalition	$38,795
	Westside San Joaquin River Watershed Coalition	$41,200
Agriculture Total		$153,243
Dredgers	Port of Stockton	$46,350
	Port of West Sacramento	$15,450
	Sacramento Yacht Club	$3,090
Dredgers Total		$64,890
Flood control and habitat restoration	California Department of Water Resources	$206,000
Flood control and habitat restoration Total		$206,400
POTW	Brentwood, City of	$8,343
	Davis, wastewater	$8,240
	Discovery Bay	$4,791
	Ironhouse Sanitary District	$3,506
	Lodi wastewater	$5,929
	Manteca wastewater	$6,291
	Mountain House	$5,768
	Rio Vista Beach	$2,060
	Rio Vista NW	$1,471
	Sacramento Combined Wastewater (City of Sacramento)	$13,699
	Sacramento Regional County Sanitation District	$99,518
	Stockton, City of	$12,463
	Tracy wastewater	$10,300
	Vacaville wastewater	$11,340
	Woodland wastewater	$9,270
POTW Total		$202,989
Stormwater	CalTrans	$82,400
	Ceres, City of	$15,450
	Colusa County	$5,150
	Davis, stormwater program	$20,600
	El Dorado County	$20,600
	Hughson, City of	$2,575
	Lathrop, City of	$10,300
	Lodi, stormwater program	$20,600
	Manteca, City of, stormwater program	$20,600

Category	Participant	Expected Contribution
	Modesto, City of	$23,896
	Oakdale, City of	$5,149
	Patterson, City of	$10,300
	Rio Vista, City of (stormwater program)	$5,150
	Ripon, City of	$5,150
	Riverbank, City of	$10,300
	Rocklin, City of	$20,600
	Sacramento County	$103,000
	San Joaquin County	$10,300
	Stanislaus County	$20,600
	Stockton & San Joaquin County	$59,946
	Sutter County	$2,575
	Tracy, City of, stormwater program	$20,600
	Turlock, City of	$20,600
	Vacaville, City of, stormwater program	$20,600
	West Sacramento	$15,450
	Woodland, City of, stormwater program	$15,450
	Yolo County	$10,300
	Yuba County	$10,300
Stormwater Total		$588,841
Grand Total		$1,215,663

Table 6. Planned and actual expenses for uncompleted tasks authorized in the Delta RMP FY17-18 Workplan, by task and subtask, with details on expenses in the last quarter.

Task	Subtask	Budget	Total Expense JTD	Budgeted funds remaining	Projected end date for task	*Percent of duration elapsed*	Percent of budget spent	Expenses in previous quarter	Staff and subcontractors billing	Description and Notes
02. Governance	D. Science Advisors	$10,000	$9	**$9,991**	2019-06-30	*88%*	0%	$0		Earmarked for paying honoraria to our science advisors. Delayed in FY17-18 due to the lengthy nomination and selection process. Small expense was due to a previous billing error.
04. Communications	B. Pulse of the Delta Draft	$40,000	$1,178	**$38,822**	2020-10-31	*52%*	3%	$0		Most labor deferred; originally planned for FY17-18; SC chose to postpone publication until Fall 2020.
08. Year 1-2 CUP Interpretive Report	A. Report (subcontract)	$80,000	$3,045	**$76,955**	2019-06-30	*88%*	4%	$0		Earmarked to pay the consultant Deltares for the Pesticides Interpretive Report. Subcontract in the amount of $77,450. To date, we have not received any invoices from Deltares. Some spending on ASC labor ($3,045) occurred before SC made decision to outsource this task. Labor hours were for compiling data and planning the study, including a detailed presentation on proposed analysis methods. **Deliverables completed:** Deliverables 3.1 and 3.2 (database and tech memo on methods) sent to TAC during the past quarter.
	B. Contract Management (Pesticides Report)	$8,000	$9,346	**($1,346)**	2019-06-30	*88%*	117%	$1,617	Heberger, Matthew (12 hrs)	**Outputs:** Answered contractor questions via email. Facilitated communication between Deltares and TAC members. Coordinated review process for two deliverables. Handled budget amendment request. As this work has suffered multiple delays, it has required extra communication with the contractor.
09. Nutrients	A. Cross-Delta Monitoring Using High Frequency Tools	$195,000	$195,000	**$0**	2019-03-31	*100%*	100%	$0		**Outputs:** USGS has completed all 3 of the 3 planned high-frequency cruises on May 15-17, 2018, July 24-26, 2018, and October 16-18, 2018. **Deliverables completed:** None to date, although the Principal Investigator Brian Bergamaschi has given presentations about the provisional results to the SC. Expected deliverables include (1) draft report, (2) electronic maps, and (3) data files containing results of monitoring cruises.
10. Mercury Monitoring FY17-18	A Data Collection and Analysis	$209,016	$209,106	**($90)**	2019-03-31	*100%*	100%	$77,897	Two invoices from Moss Landing Marine Laboratory in this quarter: 2019-01-17 -$6,850.00 corrections for previous overbilling 2019-02-12 $84,747.00 Jan, Apr, Jun 2018 water sampling and lab analysis	Earmarked for paying subcontract with Moss Landing Marine Laboratory (MLML). **Outputs:** All of the planned sampling events have been completed. All data has been submitted by the lab to ASC; and we are currently finalizing a data report. Note that a typo in the budget under-funded this project by $90. **CLOSED**
	B. RMP Data Management	$19,545	$20,561	**($1,016)**	2019-03-31	*100%*	105%	$7,837	Franz, Amy (2.5 hrs) Ross, John (8 hrs) Weaver, Michael (58 hrs) Yee, Donald (5 hrs)	**Outputs:** Checked in, formatted, and QA'ed data on sediment mercury, grain size, and ancillary water quality parameters. Communicated with Moss Landing Marine Laboratory staff regarding issues with grain size and chlorophyll-a measurements. Handled questions from Principal Investigator and project manager. **Deliverables**: Data management and QA of mercury data completed in Mar 2019. (Deadline extended by 3 months due to delay in receiving data from the lab.)

Task	Subtask	Budget	Total Expense JTD	Budgeted funds remaining	Projected end date for task	*Percent of duration elapsed*	Percent of budget spent	Expenses in previous quarter	Staff and subcontractors billing	Description and Notes
	C. Technical Oversight	$5,000	$2,613	**$2,387**	2019-03-31	*100%*	52%	$0		**Outputs:** No billing in this quarter. **Deliverables:** None. Planned deliverable is a draft mercury data report due in Dec 2018, final in March 2019. Remaining hours for the principal investigator to help draft and oversee production of the data report.
176. CUP Monitoring (authorized in FY16/17)	B. Pesticide Laboratory Work	$154,029	$154,032	**($3)**	2017-12-31	*349%*	100%	$42,369	Invoice from USGS California Water Science Center: 2/28/2019: $28,972.55	Earmarked for paying subcontractor (USGS). **Final invoices received and paid this quarter.** Delay in invoicing was due to the need to spend down federal funds first, in order to make full use of the 10% cost share on labor and materials that is described in our Joint Funding Agreement between ASC and USGS covering Delta RMP monitoring. **Outputs:** All planned and contracted lab work has been completed. **Deliverables:** All data has been published in NWIS. Publication in CEDEN is pending SC approval.
		$720,590	**$594,890**	**$125,700**			**83%**	**$129,720**		

Table 7. Planned and actual expenses for tasks authorized in the Delta RMP FY18-19 Workplan, by task and subtask, with details on expenses in the last quarter.

Task	Subtask	Budget	Total Expense JTD	Budgeted funds remaining	Projected end date for task	Percent of budget spent	*Percent of duration elapsed*	Expenses in last quarter	Staff and subcontractors billing	Description and Notes
01. Core Functions	A. Program Planning	$68,250	$32,087	**$36,163**	2019-06-30	47%	*75%*	$3,476	Buzby, Nina (0.25 hrs) Heberger, Matthew (23 hrs) Salomon, Micha (3.5 hrs)	**Outputs**: Internal coordination, staff meetings, labor planning, oversight and project management. Tracking and updating stoplight reports of action items and deliverables. **Deliverables completed:** Updated workplan following SC meeting and addition of pesticides/ planning budgeting for FY19-20.
	B. Contract and Financial Management	$56,150	$24,215	**$31,935**	2019-06-30	43%	*75%*	$7,116	Heberger, Matthew (10.5 hrs) Hunt, Jennifer (9 hrs) Lofthouse, Meredith (46 hrs)	**Outputs:** Internal accounting; subcontract management; checked and approved internal and external invoices; tracked expenses by task. Prepared quarterly finance memo and met with finance subcommittee on Feb 13, 2019. **Deliverables completed:** Quarterly finance memo and Finance Committee meeting; finance update to SC.
	C. Proposal Writing (Added Oct 2018)	$8,306	$7,285	**$1,021**	2018-10-31	88%	*100%*	$0		**Deliverables completed:** Prop 1 grant proposal submitted to Delta Stewardship Council in October 2018. Unfortunately, we received notification in April 2019 that our proposal was not funded. **CLOSED**
02. Governance	A. SC meetings	$38,400	$12,781	**$25,619**	2019-06-30	33%	*75%*	$7,250	Subcontractor Invoices: Daphne Orzalli, administrative support: $985 ASC Labor: Heberger, Matthew (46.5 hrs)	**Outputs:** Planned and coordinated Feb 22, 2019 SC Meeeting. Held two coordinating Committee meetings. Updated decision record and action items tracking sheets. Followup on SC meeting action items. Communications with SC members. **Deliverables completed**: Agenda package and meeting summary for SC meeting.
	B. TAC meetings	$59,400	$12,557	**$46,843**	2019-06-30	21%	*75%*	$12,336	Expenses: McCord Environmental Invoices: 2019-03-01 $2,520.00 2019-03-31 $960 2019-03-31 $985 Daphne Orzalli, administrative support: $985 ASC Labor: Heberger, Matthew (41.5 hrs)	**Outputs:** Planned and coordinated Jan 17, 2019 TAC meeting. Prepared materials for agenda package. Began planning for May TAC meeting. **Deliverables completed:** Agenda package and summary for TAC meeting. Updated action items tracking sheet.
	C. Technical Subcommittees	$37,000	$13,599	**$23,401**	2019-06-30	37%	*75%*	$9,265	Davis, Jay (18 hrs) Franz, Amy (2 hrs) Heberger, Matthew (35.5 hrs) Robinson, April (4 hrs)	**Outputs**: Planning of and participation in technical subcommittee meetings for: CECs: Feb 14 Mercury: Feb 2, Mar 8 Nutrients: Jan 14, Feb 26 Pesticides: Feb 26 **Deliverables completed:** Agenda packages and Meeting Summaries for 5 meetings.
03. Quality Assurance	A. Quality Assurance	$17,500	$11,810	**$5,690**	2019-06-30	67%	*75%*	$4,043	Franz, Amy (1.5 hrs) Heberger, Matthew (21 hrs) Ross, John (4 hrs) Salomon, Micha (0.5 hrs) Yee, Donald (3 hrs)	**Outputs:** Revisions to the Delta RMP Quality Assurance Program Plan, to troubleshoot toxicity-related issue, and to update for upcoming fiscal year. Edits to the the Data Management and Quality Assurance Standard Operating Procedures document. **Deliverables completed:** none. New QAPP version to be circulated in spring.

Task	Subtask	Budget	Total Expense JTD	Budgeted funds remaining	Projected end date for task	Percent of budget spent	*Percent of duration elapsed*	Expenses in last quarter	Staff and subcontractors billing	Description and Notes
	B. Technical Oversight and Coordination	$15,000	$8,461	**$6,540**	2019-06-30	56%	*75%*	$5,319	Buzby, Nina (2 hrs) Franz, Amy (16.25 hrs) Heberger, Matthew (4 hrs) Ross, John (16 hrs) Yee, Donald (2 hrs) Kauhanen, Pete (5.25 hrs)	**Ouputs**: Variety of miscellaneous items related to running a multifaceted monitoring program: Wrote memo on sample archiving options. Correspondence with AHPL and OIMA re: C. dubia toxicity testing methods Researched toxicity benchmarks for metals to help interpret recent aquatic toxicity testing results and toxicity identification evaluations (TIEs). Noted belatedly that 5.25 hours by Pete K. are an error and have been reversed. Correction will be shown in next finance report.
04. Nutrients Special Studies FY18-19	A. Nutrients Modeling Study	$186,000	$18,283	**$167,717**	2020-06-30	10%	*37%*	$23,549	King, Alexandra (202.5 hrs)	**Outputs:** Excerpted from a longer progress report by lead modeler Allie King: Compiled input to Delft3D-FM (the hydrodynamic model) for the Water Year 2016 simulation including the following: (1) flow and temperature in tributaries; (2) withdrawals; (3) gate operations; (4) wind field. We are assembling the input data in a manner that will make modeling water years beyond WY2016 easy. Several months of work are required to spin up one water year, but with a little extra work, we can do things in such a way that spinning up another water year will only take one week. Created Python routines for automatically importing data; new wind model has been released as open source to the modeling community.
	B. Chlorophyll Inter-calibration Study	$42,400	$874	**$41,526**	2019-06-30	2%	*75%*	$4,519	Heberger, Matthew (15.5 hrs) Yee, Donald (1 hrs) Wu, Jing (15 hrs)	**Outputs**: Statistical analysis and summary of data from the side-by-side sensor deployment. Correspondence with research team Meeting with senior scientist and QA officer to plan lab intercalibration. Correspondence with partners, compiling data from sensor intercalibration exercise. Planning and coordination for the second component of the study, the lab intercalibration
05. Mercury Monitoring FY18-19	A Data Collection and Analysis	$288,711	$0	**$288,711**	2019-06-30	0%	*75%*	$78,464	Two invoices received and paid this quarter: 2019-01-17 $23,290.00 July 2018 water monitoring 2019-03-21 $55,174.00 Aug 2018 fish monitoring	Earmarked for paying subcontractor Moss Landing Marine Laboratory for field sampling and lab analysis. **Outputs:** Water and fish monitoring conducted
	B. Mercury Data Management and Quality Assurance	$29,930	$1,321	**$28,609**	2020-03-31	4%	*43%*	$2,546	Bezalel, Shira (1.5 hrs) Franz, Amy (0.75 hrs) Ross, John (10 hrs) Weaver, Michael (11 hrs)	**Outputs:** Internal coordination meeting. Checked in electronic data deliverables for for Field Measurements and Habitat Observations and Jan2019 Collection information. Loaded incoming Fish Hg data, performed completeness check. QA officer performed Fish QA. **Deliverables completed**: None to date.
	C. Technical Oversight and Coordination	$5,150	$0	**$5,150**	2020-03-31	0%	*43%*	$0		**Outputs**: None to date. **Deliverables**: Planned deliverable is a year-end data report.
06. Pesticides Monitoring FY18-19	A. Field sample collection and laboratory analysis	$155,517	$0	**$155,517**	2019-09-30	0%	*60%*	$8,842	No invoices received yet.	Earmarked for paying subcontractor, USGS Organic Chemistry Research Laboratory (OCRL) for field sampling and lab analysis.
	B. Toxicity reporting							$0		**Subtask cancelled:** This subtask was included in the workplan, to provide stakeholders with additional documentation related to toxicity testing, but subsequently cancelled following input by the State Water Board, which manages the contract with the UC Davis toxicity lab.

Task	Subtask	Budget	Total Expense JTD	Budgeted funds remaining	Projected end date for task	Percent of budget spent	*Percent of duration elapsed*	Expenses in last quarter	Staff and subcontractors billing	Description and Notes
	C. Pesticides Data Management and Quality Assurance	$40,998	$0	**$40,998**	2020-03-31	0%	*43%*	$1,076	Franz, Amy (8 hrs) Yee, Donald (1 hrs)	**Outputs:** Set up Jira and smartsheet for project tracking; asigned work to DS team. Send collection information template to USGS for Dec. and Feb samples, Performed database cleanup. Internal coordination. Created metadata necessary for adding new sampling sites to CEDEN, worked with GIS staff member to create required. "Water Body Type Codes." Added sites to the CEDEN "controlled vocabulary." **Deliverable completed**: No official deliverables yet. We have provided provisional data to the TAC for review.
	D. Additional Toxicity Testing	$4,640	$0	**$4,640**	2019-09-30	0%	*60%*	$0		NEW budget line created this quarter, to cover additional toxicity testing by the Aquatic Health Program Laboratory at UC Davis. See finance memo for details. No ASC labor, earmarked to pay lab as subcontractor. The lab will invoice us toward the end of the project, on or after Sept 2019.
07. CEC Monitoring Plan FY18-19	A. Coordination and planning	$22,000	$2,122	**$19,878**	2019-06-30	10%	*75%*	$10,977	Gilbreath, Alicia (2.5 hrs) Heberger, Matthew (49 hrs) Hunt, Jennifer (22 hrs)	**Outputs:** Drafting CEC Sampling and Analysis Plan, which is being incorporated into the QAPP. Coordination and planning; contacting other agencies looking for cost-sharing opportunities, phone calls with bivalve researchers. Corresponded with SCCWRP staff re: labs for CECs. Planning, obtaining quotes from vendors and agencies for lab analysis and field work. Project planning, correspondence with labs, discussions about boats and crews. Phone calls with project partners re: bivalve sampling, fish sampling. Correspondence with DPR regarding water and sediment sampling Meetings with MLML and SFEI staff to discuss SAP. Phone calls with Axys labs and with Moss Landing Marine Laboratory **Deliverables completed**: Elements of the planned Sampling and Analysis Plan incorporated into the QAPP.
	B. QAPP Amendments	$23,000	$474	**$22,526**	2019-06-30	2%	*75%*	$7,833	Sutton, Rebecca (1.5 hrs) Yee, Donald (3 hrs) Franz, Amy (12.75 hrs) Heberger, Matthew (10 hrs) Weaver, Michael (19.5 hrs) Wong, Adam (31 hrs)	**Outputs:** Drafted QAPP sections and compiled tables. Collected SOP documents from participating field crews and labs. **Deliverable completed:** 70% deliverable presented to CEC subcommittee and TAC.
Total		**$1,098,352**	**$145,868**	**$952,484**	**2020-06-30**	**13%**	*37%*	**$186,611**		

Quotation

Deltares
Enabling Delta Life

San Francisco Estuary Institute
Mr M. Heberger
4911 Central Avenue
Richmond, CA 94804
UNITED STATES

Date	Number of pages	
April 5, 2019	2	
Contact person	**Direct number**	**E-mail**
Erwin Roex	+31(0)88 335 7864	Erwin.Roex@deltares.nl

Subject
request for additional budget

Dear Mr Hewberger, dear Matthew

In response to the communication we had before by e-mail and telephone I submit to you a request for extra budget regarding the project “Analysis and interpretation of pesticides and Toxicity monitoring in the Sacramento-San Joaquin Delta”.

The request for extra budget has the exact price of **10 300** USD including all direct and indirect costs.

Justification
In our proposal we have proposed to use three major databases with pesticides data in our evaluation and interpretation, namely the USGS, the CEDEN and the SURF database. In order to do a proper evaluation of the three databases, they were merged into one harmonised database. We had anticipated a number of activities to be performed, when merging databases from different institutes. However, this request for extra budget is to our opinion justifiable based on the following bottlenecks and extra activities we have encountered during the project so far:

- Both the CEDEN and the USGS database contained more than only pesticide data. The pesticide data could not be filtered out automatically, and this had to be done hand. Extra time involved:4 hours for the USGS database and 4 hours for the CEDEN database.
  Extra Costs involved 1800 USD (senior tariff).

- During the merging of the databases, we observed that the names of the same compound often differed between databases and that CAS numbers, which are usually used to crosslink between tables were not always available. Especially in the SURF database, a large number of “vague” compound names were used.
- In total, the extra time involved to construct a harmonised overall database was 2 days, costs involved: 2900 USD (junior tariff).

Quotation

- During the project, it became apparent that the toxicity data of the RMP project (2017-2018) had to be revaluated. Besides, the update of the SURF database was anticipated. As we had already started our analyses, a delay in the project and additional activities were performed, duration 8 hours, costs involved 1450 USD (junior tariff).

- We observed that a number of replicate analyses (same location, same date) were present in the different databases, both for chemical analyses and toxicity. I took us some time to figure out how to handle these. Additional costs involved, 8 hours 1450 USD (junior tariff).

- During the progress, additional feedback loops of databases and products were incorporated in the planning. With this feedback and comments additional time of 12 hours is involved (2700 USD, senior tariff).

Taking this into account, it must be stressed that in the end we are very pleased with this project, and the activities we are performing. From our side we are also learning a lot of new methods and insights.

If you have any questions, please don't hesitate to contact me.

With kind regards,

Erwin Roex

Materials for Agenda Item 7

Delta RMP Deliverables

Key to Status Colors:
Checkmark indicates complete.
Green indicates that there are over 90 days until the deliverable is due.
Yellow indicates a deliverable is due in less than 90 days.
Red indicates a deliverable that is overdue.

	Task	Deliverable	Assigned To	Due Date	Status	Old Due Date	Due Date Extended	Comments
1	**FY17/18 Delta RMP Workplan**							
2	**3. Quality Assurance**							
3	3.A. Quality Assurance	Revised QAPP for FY18-19	Matthew Heberger	09/30/18	✓			Distributed to signatories on Nov 21, 2018.
4	3.A. Data Management and QA Standard Operating Procedures	Submit Standard Operating Procedures (due to SWAMP QAO on July 1, 2018)	Matthew Heberger	06/30/18	✓			Requested by Melissa Morris, SWAMP QA Officer, as a condition of approving QAPP.
5	**4. Communications**	"Pulse of the Delta" Draft	Matthew Heberger	06/30/20				As of Dec 2018, the SC has approved the main themes and an outline. SC decided to push back publication of report to 2020. Note that budget does not include layout or design.
6	**8. Pesticides Interpretive Report**							
7	8.B. Contract Management	RFP for Pesticides/Toxicity Interpretive Report	Matthew Heberger	11/15/17	✓			RFP issued in in spring 2018, proposals due March 16.
8	8.B. Contract Management	Signed contract and scope of work	Matthew Heberger	03/31/18	✓			
9	**8.A. Interpretive Report (Deltares)**							
10	8.A.1. Stakeholder Engagement & Input							
11	8.A.1. Stakeholder Engagement & Input	M1.1. Meeting #1: Kickoff meeting with contract manager (ASC)	Erwin Roex	07/01/18	✓			Kickoff meeting between Matt and Erwin held on July 12, 2018 via Skype.
12	8.A.1. Stakeholder Engagement & Input	M1.2. Meeting #2, In-person with stakeholders to discuss overall approach and data compilation	Erwin Roex	09/25/18	✓			Meeting held on morning of Sept 25 at Regional San.
13	8.A.1. Stakeholder Engagement & Input	D1.3. Presentation at stakeholder meeting #2	Erwin Roex	09/25/18	✓			Erwin's Powerpoint slide presentation was distributed to the Pesticides Subcommittee and TAC following the meeting.
14	8.A.1. Stakeholder Engagement & Input	D1.4 Minutes of stakeholder meeting #2	Erwin Roex	10/15/18	✓			Matt H. wrote up a meeting summary, saving Deltares from having to complete this step.
15	8.A.1. Stakeholder Engagement & Input	M1.3. Meeting #3, In-person meeting with Deltares to present data and methods to TAC	Erwin Roex	12/10/18	✓	11/09/18		Postponed to Dec 10, 2018.
16	8.A.1. Stakeholder Engagement & Input	D1.5 Presentation at meeting #3	Erwin Roex	12/10/18	✓	11/09/18		
17	8.A.1. Stakeholder Engagement & Input	D1.6 Minutes of meeting #3	Erwin Roex	12/17/18	✓	11/16/18		
18	8.A.1. Stakeholder Engagement & Input	M1.4. Meeting #4: Teleconference to discuss Draft Report	Erwin Roex	03/31/19				
19	8.A.1. Stakeholder Engagement & Input	D1.7 Presentation at Meeting #4	Erwin Roex	03/31/19				
20	8.A.1. Stakeholder Engagement & Input	D1.8 Minutes of Meeting #4	Erwin Roex	04/15/19				
21	8.A.2. Compilation of existing data and literature							
22	8.A.2. Compilation of existing data and literature	D 2.1: Summary of the definitive data set.	Erwin Roex	12/24/18	✓	09/30/18		As of Oct 19, 2018, State Board staff are still making adjustments to the Delta RMP toxicity data, preventing Deltares from finalizing their analysis.
23	8.A.2. Compilation of existing data and literature	D 2.2: Excel file containing the definitive database with both pesticide and toxicity results to be used in further analysis.	Erwin Roex	12/24/18	✓	09/30/18		
24	8.A.2. Compilation of existing data and literature	D 2.3: Technical memo describing the principles, methodology and metadata used to construct the final database and displaying some basic visualizations.	Erwin Roex	12/24/18	✓	09/30/18		
25	8.A.3. Analysis Methods Report							
26	8.A.3. Analysis Methods Report	D 3.1. Updated list of water quality thresholds	Erwin Roex	01/15/19	✓	10/31/18		Per Erwin Roex, expected to deliver by end of February 2019. Update: Update on 3/20: expect by end of March. PI states that team has encountered many problems an inconsistencies in the data that caused delays.

	Task	Deliverable	Assigned To	Due Date	Status	Old Due Date	Due Date Extended	Comments
27	8.A.3. Analysis Methods Report	D 3.2 Draft memorandum on analytical methods to be used	Erwin Roex	01/15/19	✓	11/30/18		
28	8.A.3. Analysis Methods Report	D 3.3: Final memorandum on analytical methods to be used	Erwin Roex	02/15/19				
29	8.A.4. Interpretive Report							
30	8.A.4. Interpretive Report	D4.1 First Draft Report	Erwin Roex	01/31/19				Shown in their proposal as due in Nov, but changed to Jan. It doesn't make sense for them to issue a draft of the report until they have agreement on the analysis methods, to be discussed in Nov and finalized in Dec.
31	8.A.4. Interpretive Report	D4.2 Final Draft Report	Erwin Roex	03/31/19				
32	8.A.4. Interpretive Report	D4.3 Final Report	Erwin Roex	05/31/19				
33	**9. Nutrients Special Studies**							
34	9.A. Cross-Delta Monitoring Using High-Frequency Tools	Report from USGS on Cross-Delta High Frequency Monitoring Project	Brian Bergamaschi	03/31/19				The Nutrients Subcommittee decided to postpone the project so all 3 cruises will happen in Water Year 2018, commencing in spring, once flows recede. This delay sets the deadline for the final report as early 2019 as a draft. The final report will include a discussion of how the HF data should be used in the context of other monitoring data.
35	9.A. Cross-Delta Monitoring Using High-Frequency Tools	Electronic versions of maps produced by the project	Brian Bergamaschi	03/31/19				
36	9.A. Cross-Delta Monitoring Using High-Frequency Tools	Data files containing constituent concentration data and location information	Brian Bergamaschi	03/31/19				
37	9.B. Continued Nutrient Data Analysis and Biennial Reporting	Prepare, coordinate, and provide technical support to up to 4 nutrient subcommittee meetings	Philip Trowbridge	06/30/18	✓			Meetings held on 9/29/17, 12/1/17, 1/18/18, 2/15/18. 4 project proposals for FY18-19 were developed.
38	9.B. Continued Nutrient Data Analysis and Biennial Reporting	Outline for biennial synthesis report to be completed in FY18-19	Philip Trowbridge	06/30/18	✓			Proposal prepared for Nutrient Subcommittee. The Subcommittee set this project as a low priority for further action.
39	9.B. Continued Nutrient Data Analysis and Biennial Reporting	Design additional statistical analyses to be completed in FY17-18	Philip Trowbridge	09/30/17	✓			This task was a placeholder for any follow-on analyses after the three synthesis reports were completed. The subcommittee did not authorize any additional statistical analyses so this task no longer relevant.
40	9.B. Continued Nutrient Data Analysis and Biennial Reporting	Complete additional statistical analyses and prepare technical report	Philip Trowbridge	12/31/17	✓			This task was a placeholder for any follow-on analyses after the three synthesis reports were completed. The subcommittee did not authorize any additional statistical analyses so this task no longer relevant.
41	9.C. Chlorophyll Sensor Intercalibration	Prepare, coordinate, and facilitate Phase 1 Technical Team Meetings	Philip Trowbridge	06/30/18	✓			3 meetings held on 9/28/17 and 12/5/17 and 2/6/18.
42	9.C. Chlorophyll Sensor Intercalibration	Develop Phase 2 Project Plan, including study design, logistics, and institutional coordination	Philip Trowbridge	06/30/18	✓			Proposal for Phase II study prepared and presented to the SC on 5/11/18.
43	**10. Mercury Monitoring**							
44	10.B. Mercury Monitoring	Mercury Data Uploaded to CEDEN	Amy Franz	01/31/19		11/30/18		As of Sept 2018, MOST FY17/18 data has been received from the lab. Data management will not marked as complete until QA is complete and data is uploaded to CEDEN. Update Nov 2018: MLML reports that there were problems with the TOC data (broken/malfunctioning equipment). They sent samples to an external, commercial lab to analyze for TOC. These data are not expected to be reported to her until early December. Matt (ASC project manager) instructed ASC data services team to delay doing the data management and QA of this dataset, so that it can all be done together, rather than processing two separate datasets, which would result in extra time and expense. (TOC is an important ancillary parameter for interpreting the mercury results, and I decided that even though we have 99% of the data, it did not make sense to move forward with an incomplete dataset.) New timeline to complete the QA is about mid-January taking into account planned time off for staff around the holidays. Update 2/13/2019: Moss Landing delivered the data and ASC will fast track Data Management and Quality Assurance.
45	10.B. Mercury Monitoring	Mercury QA Memo	Don Yee	05/31/19		11/30/18		As of Jan 2019, QA is complete for the fish tissue data, but we are waiting for the complete results for water and sediment.
46	10.C. Technical Coordination	Draft Mercury Data Report	Jay Davis	05/31/19		12/31/18		See note above about pushing back deadline by 2 months in order to wait for the full dataset and avoid going over budget.
47	10.C. Technical Coordination	Final Mercury Data Report	Jay Davis	07/31/19		03/31/19		
48								
49	**FY18-19 Delta RMP Workplan**							
50	**1. Program management**							
51	A. Program planning	Detailed Workplan and Budget for FY19-20	Matthew Heberger	05/01/19	✓			
52	A. Program planning	Updated Communications Plan (if necessary)	Matthew Heberger	06/30/19				
53	A. Program planning	Updated Monitoring Design Summary (if necessary)	Matthew Heberger	06/30/19				
54	A. Program planning	Amended Charter (if necessary)	Matthew Heberger	12/31/18	✓			Some charter amendments were made at the Oct 29, 2018 SC meeting. Charter was amended and posted on the website.
55	A. Program planning	Quarterly Report #1 on Deliverables and Action Items	Matthew Heberger	09/30/18	✓			
56	A. Program planning	Quarterly Report #2 on Deliverables and Action Items	Matthew Heberger	12/31/18	✓			This will accompany the SC meeting package and finance memo.

	Task	Deliverable	Assigned To	Due Date	Status	Old Due Date	Due Date Extended	Comments
57	A. Program planning	Quarterly Report #3 on Deliverables and Action Items	Matthew Heberger	04/30/19	✓			
58	A. Program planning	Quarterly Report #4 on Deliverables and Action Items	Matthew Heberger	07/31/19				
59	**B. Contract and financial management**							
60	B. Contract and financial management	Quarterly finance update #1	Matthew Heberger	10/08/18	✓			
61	B. Contract and financial management	Quarterly finance update #2	Matthew Heberger	02/01/19	✓			
62	B. Contract and financial management	Quarterly finance update #3	Matthew Heberger	05/01/19	✓			
63	B. Contract and financial management	Quarterly finance update #4	Matthew Heberger	07/30/19				
64	B. Contract and financial management	Invoices to Delta RMP participants/contributors	Matthew Heberger	06/15/19				In addition, invoices will be sent as needed to any new Delta RMP participants that may join during the year.
65	B. Contract and financial management	New or extended contracts for those Delta RMP participants that require a contract in order to pay ASC	Matthew Heberger	06/30/19				Participants requiring a contract include Regional San, Caltrans, State Water Contractors (formerly SFCWA)
66	B. Contract and financial management	Contracts with subcontractors, labs	Matthew Heberger	06/30/19				After the workplan has been approved by the SC, put in place contracts with any labs, contractors. USGS, MLML, McCord, Orzalli, AMS, and others.
67	**2. Governance**							
68	**A. Steering Committee meetings**							
69	Coordinating Committee Pre-Call #1	Agenda and informal summary	Matthew Heberger	06/15/18	✓			
70	Coordinating Committee Post-Call #1	Agenda and informal summary	Matthew Heberger	07/31/18	✓			
71	Coordinating Committee Pre-Call #2	Agenda and informal summary	Matthew Heberger	10/15/18	✓			
72	Coordinating Committee Post-Call #2	Agenda and informal summary	Matthew Heberger	11/15/18	✓			
73	Coordinating Committee Pre-Call #3	Agenda and informal summary	Matthew Heberger	01/15/19	✓			
74	Coordinating Committee Post-Call #3	Agenda and informal summary	Matthew Heberger	02/28/19	✓			
75	Coordinating Committee Pre-Call #4	Agenda and informal summary	Matthew Heberger	05/15/19	✓			
76	Coordinating Committee Post-Call #4	Agenda and informal summary	Matthew Heberger	06/15/19				
77	SC Meeting #1 (2018-07-17)	Agenda Package	Matthew Heberger	07/07/19	✓			
78	SC Meeting #1 (2018-07-17)	Meeting Summary	Matthew Heberger	09/28/18	✓			
79	SC Meeting #2 (2018-10-29)	Agenda Package	Matthew Heberger	10/14/18	✓			
80	SC Meeting #2 (2018-10-29)	Meeting Summary	Matthew Heberger	12/28/18	✓			
81	SC Meeting #3 (2019-02-22)	Agenda Package	Matthew Heberger	01/15/19	✓			
82	SC Meeting #3 (2019-02-22)	Meeting Summary	Matthew Heberger	03/29/19	✓			
83	SC Meeting #4 (May 2019)	Agenda Package	Matthew Heberger	05/31/19				
84	SC Meeting #4 (May 2019)	Meeting Summary	Matthew Heberger	06/28/19				
85	SC Teleconference (as necessary)	Agenda Package	Matthew Heberger	06/28/19	✓			
86	SC Teleconference (as necessary)	Meeting Summary	Matthew Heberger	06/28/19	✓			
87	**B. Technical Advisory Committee meetings**							
88	TAC Meeting #1 (2018-09-21)	Agenda Package	Matthew Heberger	09/14/18	✓			Meeting held on Sept 21, 2018. Agenda package sent on Sept 17.
89	TAC Meeting #1 (2018-09-21)	Meeting Summary	Matthew Heberger	10/05/18	✓			Draft distributed to TAC via email on Oct 3, 2018.
90	TAC Meeting #2 (2019-01-17)	Agenda Package	Matthew Heberger	12/31/18	✓			Meeting held on Jan 17, 2019. Agenda package sent on Jan 9.
91	TAC Meeting #2 (2019-01-17)	Meeting Summary	Matthew Heberger	01/15/19	✓			Draft distributed to TAC via email on Jan 28, 2019
92	TAC Meeting #3 (Spring 2019)	Agenda Package	Matthew Heberger	02/28/19	✓			
93	TAC Meeting #3 (Spring 2019)	Meeting Summary	Matthew Heberger	03/15/19	✓			
94	TAC Meeting #4 (Summer 2019)	Agenda Package	Matthew Heberger	06/30/19				
95	TAC Meeting #4 (Summer 2019)	Meeting Summary	Matthew Heberger	07/15/19				
96	TAC Teleconference (as necessary)	Agenda Package	Matthew Heberger	06/30/19	✓			An 3-hour teleconferences was held on June 29, 2018 to discuss Monitoring proposals for FY 2018-19, pesticides and CECs.
97	TAC Teleconference (as necessary)	Meeting Summary	Matthew Heberger	06/30/19	✓			

	Task	Deliverable	Assigned To	Due Date	Status	Old Due Date	Due Date Extended	Comments
98	**C. Technical Subcommittees**							
99	Pesticides subcommittee meetings							
100	Pesticides Subcommittee Meeting #1	Meeting agenda package; meeting summary	Matthew Heberger	08/01/18	✓			
101	Pesticides Subcommittee Meeting #2	Meeting agenda package; meeting summary	Matthew Heberger	08/28/18	✓			
102	Pesticides Subcommittee Meeting #3	Meeting agenda package; meeting summary	Matthew Heberger	09/13/18	✓			
103	Pesticides Subcommittee Meeting #4	Meeting agenda package; meeting summary	Matthew Heberger	12/31/18	✓			
104	Pesticides Subcommittee Meeting #5	Meeting agenda package; meeting summary	Matthew Heberger	03/31/19	✓			
105	Pesticides Subcommittee Meeting #6	Meeting agenda package; meeting summary	Matthew Heberger	06/30/19	✓			
106	Nutrients subcommittee meetings							
107	Nutrients Subcommittee Meeting #1	Meeting agenda package; meeting summary	Philip Trowbridge	09/30/18	✓			
108	Nutrients Subcommittee Meeting #2	Meeting agenda package; meeting summary	Philip Trowbridge	12/31/18	✓			
109	Nutrients Subcommittee Meeting #3	Meeting agenda package; meeting summary	Philip Trowbridge	03/31/19	✓			
110	Nutrients Subcommittee Meeting #4	Meeting agenda package; meeting summary	Philip Trowbridge	06/30/19	✓			
111	Mercury subcommittee meetings							
112	Mercury Subcommittee Meeting #1	Meeting agenda package; meeting summary	Jay Davis	10/31/18	✓			
113	Mercury Subcommittee Meeting #2	Meeting agenda package; meeting summary	Jay Davis	03/31/19	✓			
114	CEC Subcommittee meetings							
115	CEC Subcommittee Meeting #1	Meeting agenda package; meeting summary	Matthew Heberger	10/31/18	✓			
116	CEC Subcommittee Meeting #2	Meeting agenda package; meeting summary	Matthew Heberger	03/31/19	✓			
117	Toxicity work group meetings							
118	Toxicity Work Group Meeting #1	Meeting agenda package; meeting summary	Matthew Heberger	09/13/18	✓			
119	Toxicity Work Group Meeting #2	Meeting agenda package; meeting summary	Matthew Heberger	06/30/19	●		⚑	Meeting planned for June 24, 2019.
120	**3. Quality Assurance**							
121	A. QAPP Revision	Draft revised QAPP to send to signatories	Don Yee	09/28/18	✓			Revised QAPP required to kick off FY18-19 monitoring, adding new and revised elements for pesticides monitoring.
122	A. QAPP Revision	Spring 2019 QAPP Revisions to signatories	Don Yee	07/15/19	●			Budgeted for a minor revision in the spring of 2019, following the approval of the FY19/20 workplan to account for any updated labs, protocols, etc. Note that the creation of a separate QAPP to cover CEC monitoring is included under a separate budget line and is listed as a standalone deliverable.
123	**4. Nutrients Special Studies**							
124	**4.B. Chlorophyll Sensor Intercalibration Study**							
125	Chlorophyll Sensor Intercalibration Study	Assessment of Chlorophyll Sensor Methods In Use	Matthew Heberger	12/31/18	✓			USGS will lead this task
126	Chlorophyll Sensor Intercalibration Study	Presentation to WG on Field Intercalibration Exercises	Liz Stumpner	12/31/18	✓			Liz gave a presentation about this at the Workgroup meeting on 3/13/2019.
127	Chlorophyll Sensor Intercalibration Study	Report on Laboratory Intercalibration Study	Matthew Heberger	05/31/19	●		⚑	The lab intercalibration was delayed until the spring to give us more time to organize the logistics and to recruit labs to participate. First round of samples will be taken the week of 4/22.
128	Chlorophyll Sensor Intercalibration Study	Summary Report with Recommendations for Next Steps	Matthew Heberger	06/30/19	●			
129	Chlorophyll Sensor Intercalibration Study	Workgroup Meeting #1, Agenda and Summary	Matthew Heberger	09/30/18	✓			WG Meeting #1 held Sept 28, 2018
130	Chlorophyll Sensor Intercalibration Study	Workgroup Meeting #2, Agenda and Summary	Matthew Heberger	12/31/18	✓			WG Meeting #2 held Dec 5, 2018
131	Chlorophyll Sensor Intercalibration Study	Workgroup Meeting #3, Agenda and Summary	Matthew Heberger	03/31/19	✓			Meeting planned for March 2019
132	Chlorophyll Sensor Intercalibration Study	Workgroup Meeting #4, Agenda and Summary	Matthew Heberger	06/30/19	●			
133	**4.A. WY2016 Modeling and Monitoring Synthesis**							
134	WY2016 Modeling and Monitoring Synthesis	Progress Report to Nutrient Subcommittee or Delta-Suisun Modeling Team	Matthew Heberger	07/31/18	✓			Provided progress report to RB5 to give to the STAG. Gave a presentation to the STAG on 9/18/18.
135	WY2016 Modeling and Monitoring Synthesis	Progress Report to Nutrient Subcommittee or Delta-Suisun Modeling Team	Matthew Heberger	01/31/19	✓			This update should be given at the Delta-Suisun Team Meeting
136	WY2016 Modeling and Monitoring Synthesis	Progress Report to Nutrient Subcommittee or Delta-Suisun Modeling Team	Matthew Heberger	07/31/19	●			This update should be given at the Delta-Suisun Team Meeting

	Task	Deliverable	Assigned To	Due Date	Status	Old Due Date	Due Date Extended	Comments
137	WY2016 Modeling and Monitoring Synthesis	Progress Report to Nutrient Subcommittee or Delta-Suisun Modeling Team	Matthew Heberger	01/31/20				This update should be given at the Delta-Suisun Team Meeting
138	WY2016 Modeling and Monitoring Synthesis	Create WY2016 Hydrodynamics Model Output	Matthew Heberger	06/30/19		03/31/19		WY2016 hydrodynamics will be developed in DFM by SFEI staff. The STAG/Nutrients Subcmte was briefed of this change on 9/18/18 and agreed. Allie King, PhD, a new SFEI staff scientist, began working on this in Nov 2018.
139	WY2016 Modeling and Monitoring Synthesis	Develop Converter Code	Matthew Heberger	12/31/19				Code will be developed during 2019. Code could not be developed in 2018 without delaying the project. The STAG/Nutrients Subcmte was briefed of this change on 9/18/18 and agreed.
140	WY2016 Modeling and Monitoring Synthesis	Draft Report for Delta RMP Committee Review	Matthew Heberger	03/31/20				
141	WY2016 Modeling and Monitoring Synthesis	Final Report	Matthew Heberger	06/30/20				
142	**5. Mercury Monitoring FY18-19**							
143	5.A. Mercury Data collection and analysis	Year 3 Mercury Data Report	Jay Davis	12/31/19				
144	5.B. Mercury Data Management and Quality Assurance	Mercury Fish and Water QA Summary Technical Memo	Don Yee	10/31/19				
145	5.B. Mercury Data Management and Quality Assurance	Formatted and QA'ed Mercury Data uploaded to CEDEN	Amy Franz	10/31/19				
146	**6. Pesticide Monitoring Water Year 2019**							
147	6.A. Field sample collection and laboratory analysis	Amendments to QAPP describing sampling and analysis for pesticides chemistry and aquatic toxicity	Don Yee	09/30/18	✓			
148	6.A. Field sample collection and laboratory analysis	Pesticides chemistry provisional data shared with TAC, Event #1	Matthew Heberger	12/31/18	✓			Updated 2/13/19: ASC has received from OCRL: (2) scanned field data sheets, and (3) Chain of Custody forms. Still expecting (1) Provisional results in a spreadsheet. Analysis of the samples was delayed because of the federal government shutdown.
149	6.A. Field sample collection and laboratory analysis	Pesticides chemistry provisional data shared with TAC, Event #2	Jim Orlando	02/28/19	✓			(1) Provisional results in a spreadsheet, (2) scanned field data sheets, and (3) Chain of Custody forms.
150	6.A. Field sample collection and laboratory analysis	Pesticides chemistry provisional data shared with TAC, Event #3	Jim Orlando	05/31/19		03/31/19		Monitoring conducted April 29-30, 2019. USGS OCRL staff plan to distribute chemistry results as soon as they are available, around mid-May
151	6.A. Field sample collection and laboratory analysis	Pesticides chemistry provisional data shared with TAC, Event #4	Jim Orlando	05/31/19				(1) Provisional results in a spreadsheet, (2) scanned field data sheets, and (3) Chain of Custody forms.
152	6.A. Field sample collection and laboratory analysis	Pesticides chemistry provisional data shared with TAC, Event #5	Jim Orlando	06/30/19				(1) Provisional results in a spreadsheet, (2) scanned field data sheets, and (3) Chain of Custody forms.
153	6.A. Field sample collection and laboratory analysis	Pesticides chemistry provisional data shared with TAC, Event #6	Jim Orlando	07/31/19				(1) Provisional results in a spreadsheet, (2) scanned field data sheets, and (3) Chain of Custody forms.
154	6.A. Field sample collection and laboratory analysis	Pesticides Chemistry Lab Report	Jim Orlando	12/31/19				Report to the Delta RMP; not a formal USGS Data Series Report.
155	6.B. Toxicity reporting	Aquatic toxicity provisional data shared with TAC, Sampling Event #1	Marie Stillway	12/31/18	✓			ASC has contracted with AHPL to produce this reporting, as it is NOT covered under the contract with SWAMP. In lieu of a formal report, the lab manager will provide provisional data and information on the labs internal processes and controls, including: A) SWAMP Toxicity Transformers (no charge); B) Bench Sheet Copies; C) Reference Toxicant Control Charts; D) Corrective Actions Table.
156	6.B. Toxicity reporting	Aquatic toxicity provisional data shared with TAC,, Sampling Event #2	Marie Stillway	02/28/19	✓			
157	6.B. Toxicity reporting	Aquatic toxicity provisional data shared with TAC,, Sampling Event #3	Marie Stillway	06/15/19		03/31/19		Sampling event conducted April 29-30, 2019. Typically takes 4-6 weeks to obtain results.
158	6.B. Toxicity reporting	Aquatic toxicity provisional data shared with TAC,, Sampling Event #4	Marie Stillway	05/31/19				
159	6.B. Toxicity reporting	Aquatic toxicity provisional data shared with TAC,, Sampling Event #5	Marie Stillway	06/30/19				
160	6.B. Toxicity reporting	Aquatic toxicity provisional data shared with TAC,, Sampling Event #6	Marie Stillway	07/31/19				
161	6.C. Pesticides Data Management and Quality Assurance	Pesticides chemistry QA Summary and Technical Memo	Don Yee	12/31/19				
162	6.C. Pesticides Data Management and Quality Assurance	Formatted pesticides data uploaded to CEDEN	Amy Franz	12/31/19				
163	**7. CEC Monitoring Plan for FY19-20**							
164	7.A. CEC Monitoring Coordination and planning	Draft CEC Sampling and Analysis Plan	Matthew Heberger	03/04/19	✓			Incorporated into the QAPP per State Board request.
165	7.A. CEC Monitoring Coordination and planning	Final CEC Sampling and Analysis Plan	Matthew Heberger	05/31/19				
166	7.B. QAPP Amendments to cover CEC Monitoring	Draft QAPP for CEC monitoring	Matthew Heberger	03/25/19	✓			70% draft shared with TAC in April 2019
167	7.B. QAPP Amendments to cover CEC Monitoring	Final QAPP for CEC monitoring	Matthew Heberger	05/31/19				

Delta RMP Action Items

Key to Status Colors:
Checkmark indicates done.
Green indicates greater than 90 days until the deliverable is due.
Yellow indicates a deliverable is due within 90 days.
Red indicates a deliverable that is overdue.

	Task	Date Created	Due Date	Assigned To	Status	Comments
1	**Steering Committee (SC) Action Items**					
2	**SC Action Items 2018-05-11**	**05/11/18**				
3	Finalize the February 5, 2018 & March 2, 2018 Meeting Summaries and post to the website.	05/11/18	05/30/18	Matthew Heberger	✓	
4	Circulate a Doodle Poll to select a date for the Fall Joint SC/TAC Meeting. (Matt Heberger	05/11/18	05/30/18	Matthew Heberger	✓	Meeting scheduled for Oct 29, 2018 at the Cal/EPA building.
5	Distribute login information for the TAC web site to the committee. Utilize a push notification for updates going forward.	05/11/18	05/30/18	Matthew Heberger	✓	Detailed instructions sent on May 17 to TAC and SC members, subject line "How to Access Delta RMP Data." I have also put most of this information on a new page on our TAC workspace website for easy reference. Visit https://sites.google.com/a/sfei.org/delta-rmp/ and click "Data Access."
6	Technical Committee should discuss co-chair/chair needs and bring recommendation to the next Steering Committee meeting	05/11/18	07/17/18	Stephen McCord	✓	Discussed by the TAC at its June 12 meeting. See meeting summary for details.
7	Consider submitting a Prop 1 funding for the CEC Study and Pesticides Monitoring. This item should be added to the next TAC meeting agenda.	05/11/18	06/04/18	Matthew Heberger	✓	We looked into the possibility and did not see it as a good fit. One challenge is that the program does not have in place an approved pesticides monitoring design which could be expanded through grant funding. Another challenge is that this grant program is for "studies" and not ongoing monitoring, and there needs to be a strong link to wildlife.
8	Put in place subcontract with Deltares (for the Pesticides Interpretive Report)	05/11/18	06/15/18	Matthew Heberger	✓	
9	Finance Subcommittee will discuss the options/framework for an overall funding process and how to make the process more efficient and bring a proposal to the next Steering Committee meeting.	05/11/18	06/30/18	Dalia Fadl	✓	The finance committee held a meeting to discuss financing options on June 19.
10	Technical Advisory Committee will develop a strategic plan for utilizing the Science Advisors	05/11/18	06/30/18	TAC members	✓	
11	**SC Action Items 2018-07-17**	**07/17/18**				
12	Verify that the budget in the workplan is correct, and reflects the 50% funding approved for the chlorophyll-a sensor intercalibration study.	07/17/18	07/27/18	Matthew Heberger	✓	It was correct.
13	Put Multi-Year Planning on the agenda for the Fall Joint Meeting.	07/17/18	09/28/18	Matthew Heberger	✓	
14	As we are planning the pesticides study, make sure we take into consideration the ILRP monitoring that is occurring at Ulatis Creek, to make sure that we are not duplicating efforts.	07/17/18	09/28/18	Matthew Heberger	✓	
15	Send suggested edits of the mercury data report to ASC.	07/17/18	07/27/18	Steering Committee	✓	
16	At the next SC meeting, the data management subcommittee should give a report on its findings and recommendations. This update should include updated recommendations on last year's planned Data Assessment Framework Workshop.	07/17/18	09/28/18	Matthew Heberger	✓	I have included this on the agenda for the meeting, and the co-leaders of this subcommittee are preparing a report.
17	**SC Action Items 2018-10-29**	**10/29/18**				
18	Create charter language guidelines for the creation and assignment of Steering Committee seats.	10/29/18	01/15/19	Patrick Morris	✓	Volunteers include Rebecca Franklin, Stephanie Hiestand, Patrick Morris, Dan Reardon, Greg Gearhart. The group has met once and will have a followup meeting in Jan 2019.
19	Update charter following the revisions approved by the SC.	10/29/18	12/31/18	Matthew Heberger	✓	
20	Distribute Draft QAPP to TAC for "red flag" review.	10/29/18	10/31/18	Matthew Heberger	✓	
21	Adam Laputz will draft a memo with instructions and timeline for the TAC regarding how the program plans to resolve lack of consensus over toxicity testing methods. The memo will be reviewed by the coordinating committee, then distributed to the TAC.	10/29/18	11/15/18	Adam Laputz, Patrick Morris	✓	These issues were (completely?) resolved at the Nov 9, 2018 Toxicity Work Group meeting.
22	Stephen McCord will revise the Management Drivers table. Like items will be grouped in the table and an explanatory column will be added defining the relationship of the Delta RMP goals and projects with the individual drivers. Upon completion, the revised table will be reviewed by the Coordinating Committee.	10/29/18	12/15/18	Stephen McCord	✓	
23	Add a long-term planning workshop to the FY20/21 workplan and add the workshop to the summer 2019 meeting schedule.	10/29/18	05/15/19	Matthew Heberger	✓	

	Task	Date Created	Due Date	Assigned To	Status	Comments
24	Develop a timeline for the overall long-term planning process, coordinating revision of the Drivers Table with the budget priorities developed by the subgroups and distribute to the SC/TAC members.	10/29/18	12/31/18	Matthew Heberger	✓	
25	Develop a cover sheet for future Delta RMP publications	10/29/18	12/31/18	Matthew Heberger	✓	
26	Add a list of recent publications to the SC meeting agenda		02/10/19	Matthew Heberger	✓	
27	Conduct a Doodle Poll to schedule a conference call in December for committee input on the desired format and key messages for the Pulse of the Delta.	10/29/18	11/15/18	Matthew Heberger	✓	
28	**SC Action Items 2019-02-22**	**02/22/19**				
29	Finalize the October 29, 2018 and December 19, 2018 SC Meeting Summaries and post to the website.	02/22/19	03/15/19	Matthew Heberger	✓	
30	Secure meeting rooms for May 29, 2019 and August 5, 2019 SC Meetings and forward calendar invitation for the May and August meetings	02/22/19	03/15/19	Matthew Heberger	✓	
31	A volunteer group of SC members will discuss how to resolve the toxicity testing/data upload issue.	02/22/19	03/22/19	Greg Gearheart, Michael Johnson, Rebecca Franklin, Selina Cole	✓	
32	Amend the workplan and budget to reflect the transfer of the $35,000 for Task 4A to ASC	03/20/19	03/20/19	Matthew Heberger	✓	
33	Post a complete list of Delta RMP contributors, and dollar amount of contributions, to website	02/22/19	02/28/19	Matthew Heberger	✓	
34	The Coordinating Committee will convene the small workgroup and develop a recommendation for the Steering Committee on the process for data management, and approval or certification of data (i.e., confirm the data quality assurance process and turn existing standard operating procedures into a Data Management Plan).	02/22/19	03/31/19	Adam Laputz, Debbie Webster, Patrick Morris, Stephen McCord	✓	This group has met twice and has produced a document on how existing data in CEDEN can be updated or amended if necessary. ASC staff are currently revising their draft Data Management and QA SOP doc. This revised draft should address most of the short-term data management concerns.
35	Forward a copy of the Deltares deliverables and schedule information on TAC and Pesticides Subcommittee review discussions to Steering Committee members	02/22/19	03/15/19	Matthew Heberger	✓	
36	Inquire with contractor for the recently awarded Delta Monitoring Enterprise Review to see if a project overview is possible for the Delta RMP summer planning meeting.	02/22/19	04/15/19	Matthew Heberger	✓	From Edmund Yu, Delta Independent Science Board, who is the contract manager for the study: "It will be possible for us to provide a progress report to the Delta RMP Steering Committee this summer. We will likely have an ISB member do it, but this is subject to change based on the date of the meeting and what the Steering Committee wants out of the presentation. However, it will be important to note that the inventory will not be done by July/August."
37	TAC condense the Management Drivers Table into a more focused and prioritized list.	02/22/19	04/30/19	Stephen McCord	✓	
38	**SC Action Items 2019-04-23 Teleconference**					
39	Central Valley Board Staff to give a report to the SC on the results of fire monitoring to the Steering Committee.	04/23/19	06/30/21	Adam Laputz		
40						
41	**Technical Advisory Committee (TAC) Action Items**					
42	**TAC Action Items 2018-06-12**	**06/12/18**				
43	Set a meeting of the Pesticides Subcommittee Meeting, Friday, November 9, 2018, 3-4 hours, to meet with the team from Deltares	06/12/18	06/30/18	Matthew Heberger	✓	
44	Set a "supplemental" meeting of the TAC for June 29, phone and online only. Purpose is to review and make a recommendation on the pesticides monitoring proposals.	06/12/18	06/15/18	Matthew Heberger	✓	
45	Draft a scope of work for toxicity reporting that describes a smaller effort to bring the total estimated costs closer to the 250k proposed budget.	06/12/18	06/15/18	Matthew Heberger	✓	ASC staff worked with AHPL lab manager to develop a quote for supplemental information provided to us at a cost of $15K, rather than the $50K report.
46	Revise the ranking questionnaire (for the pesticides monitoring design) with suggested edits and distribute to the TAC. The TAC will then have a week to complete the rankings.	06/12/18	06/30/18	Matthew Heberger	✓	
47	Follow up with swamp on flagging of Chironomus toxicity data, specifically what is the meaning and implication of being flagged as "survey data."	06/12/18	06/30/18	Beverly Anderson-Abbs	✓	
48	Clarify what action/feedback is being requested from the steering committee at July 17, 2018 meeting on the CEC monitoring proposal.	06/12/18	06/30/18	Brian Laurenson	✓	
49	Include an agenda item in the July 17, 2018 steering committee meeting agenda to evaluate compensation for the TAC chair	06/12/18	06/30/18	Matthew Heberger	✓	Following discussion with the Coordinating Committee, it was agreed to handle this as part of the FY19/20 budgeting process.
50	For the memo "Plan for Science Advisor Input in FY18/19," add the names of the list of science advisors with the overall calendar of milestones/due dates. Add the following phrase at the end of the second sentence in the science advisor job description: "…to better support the goals of the Delta RMP."	06/12/18	08/31/18	Matthew Heberger	✓	
51	**TAC Action Items 2018-06-29**	**06/29/18**				
52	Find out how Chironomus toxicity data will be flagged in CEDEN and what implications that has for use by regulators	06/29/18	07/12/18	Beverly Anderson-Abbs	✓	
53	Schedule meetings of the Pesticides Subcommittees and Toxicity Workgroup for July and August	06/29/18	07/12/18	Matthew Heberger	✓	

	Task	Date Created	Due Date	Assigned To	Status	Comments
54	Send a track changes version to TAC members to show exactly what changed	06/29/18	07/01/18	Matthew Heberger	✓	
55	TAC members with any additional comments, especially any dissenting opinions should send any additional comments or feedback	06/29/18	07/01/18	TAC members	✓	
56	Stephen McCord to send his “talking points” about the proposal to TAC members for review	06/29/18	07/10/18	Stephen McCord	✓	
57	Distribute slide presentation about the pesticides monitoring proposal to TAC members	06/29/18	07/12/18	Matthew Heberger	✓	
58	**TAC Action Items 2018-09-21**	**09/21/18**				
59	Schedule doodle poll for next pesticides subcommittee meeting	09/21/18	10/07/18	Matthew Heberger	✓	
60	Revise the June 29 tac summary; in the paragraph beginning “one tac member noted…” to replace the “would not” with “may not be useful.”	09/21/18	09/30/18	Matthew Heberger	✓	
61	Revise pathogens monitoring final report with committee comments. Committee members to submit final comments no later than Tuesday, 9/25.	09/21/18	10/15/18	Brian Lauerson	✓	
62	Request TAC approval of the FY16/17 Pesticides data at the joint meeting agenda, prior to an SC vote on whether to approve and publish. (TAC members wanted more time to review the data.)	09/21/18	10/15/18	Matthew Heberger	✓	
63	Jim Orlando requested Matt send him a copy of the appendix to the QAPP.	09/21/18	10/15/18	Matthew Heberger	✓	
64	Invite one or more science advisors to the November 9, 2018 pesticides subcommittee (with Deltares). Also, schedule a one hour meeting with the science advisors (without Delatares) after the subcommittee meeting.	09/21/18	10/15/18	Matthew Heberger	✓	This meeting has been postponed until Dec 10 and changed to a teleconference. Invited our two pesticides advisors, Drs. Nowell and Cherr.
65	Include a specific science advisor engagement plan in next year’s work plan.	09/21/18	05/15/19	Matthew Heberger	✓	
66	Work with Cam Irvine to revise tox testing information in presentation.	09/21/18	10/15/18	Matthew Heberger	✓	Recorded by Daphne. Emailed Cam to disambiguate. Neither of us could understand what it meant.
67	Matt will develop a timeline for completion of the QAPP and distribution to the TAC for review and approval. This will be added to the agenda of the next pesticides subcommittee (date TBD).	09/21/18	10/05/18	Matthew Heberger	✓	
68	Matt will begin the process of securing funding and assistance for writing a CEC-related prop 1 proposal. CEC subcommittee could also assist ASC in writing and review of the proposal.	09/21/18	10/05/18	Matthew Heberger	✓	
69	Matt will look into securing a guest speaker for October 29th joint meeting.	09/21/18	10/15/18	Matthew Heberger	✓	
70	Incorporate the following suggested items from the committee into the joint meeting agenda (see meeting summary for list)	09/21/18	10/15/18	Matthew Heberger	✓	
71	Ask Dave Mount from EPA his expert opinion on the use of an alternative mid-range conductivity control for toxicity testing with Ceridaphnia dubia	09/21/18	10/03/18	Matthew Heberger	✓	Received an email from Debra Denton with Dr. Mount's comments on Oct 3.
72	Propose that OIMA revise the memo on the use of low-conductivity controls for toxicity testing with Ceriodaphnia dubia.	09/21/18	10/03/18	Matthew Heberger	✓	Informed by Melissa Morris via email on Oct 2 that they are considering revising their guidance documents, but the timeline is uncertain.
73	**TAC Action Items 2019-01-07**	**01/07/19**				
74	Update project management plan (Gantt chart) with correct dates for the Pulse publication timeline (Fall 2020)	01/17/19	01/25/19	Matthew Heberger	✓	
75	Contact Janis Cooke regarding bivalve sampling program she is managing and potential for coordinating/cost-sharing	01/17/19	01/25/19	Matthew Heberger	✓	Matt spoke to Janis on Jan 25. She is contracting with the Fisheries Foundation, a nonprofit fish biology firm in Elk Grove. Only one of their planned monthly sampling sites is in the same location as the planned Delta RMP sampling sites, however other sites on the Sacramento River are somewhat close to ours. They field crew is planning on 3 days to monitor all 10 of their sites. We had presumed it would take 2 days to monitor our 5 sites for bivalves and sediment. So it appears economies of scale are likely to be minor. However, we will consider obtaining a bid from this firm.
76	Update monitoring event summary worksheet to correct typo (Mercury sampling planned in 2019).	01/17/19	01/25/19	Matthew Heberger	✓	
77	Add an errata sheet to the toxicity lab reports, to indicate to readers that the C. dubia data has been modified after the report was written, and that data users should obtain updated data from CEDEN, and be aware that tables and summaries may be inaccurate.	01/17/19	01/31/19	Matthew Heberger	✓	This report was updated and the new file was published online. https://www.sfei.org/documents/delta-pesticides-2016 An email was sent to the TAC on 2019-03-24.
78	Update and reconfirm members of our TIE Committee	01/17/19	01/31/19	Matthew Heberger	✓	
79	Add Ted Swift (DWR) to the chlorophyll intercalibration workgroup	01/17/19	01/31/19	Matthew Heberger	✓	
80	Add "science strategies" to our table of management drivers	01/17/19	01/31/19	Matthew Heberger	✓	
81	Distribute announcement on pesticides symposium to TAC members	01/17/19	01/31/19	Matthew Heberger	✓	
82	This spring, review the management and assessment questions for each focus area with the relevant technical subcommittee.	01/17/19	01/31/19	Matthew Heberger	✓	Pesticides Subcommittee on Feb 26, 2019 recommended adding a question related to drinking water impacts. To discuss at a future TAC/SC meeting. Background material is a white paper by Kelly Moran and distributed to the subcommittee by Armand Ruby. Further, now that the Delta RMP is planning monitoring for CECs, it is appropriate to put in place "Management and Assessment Questions" for this focus area. ASC scientists are creating a "strawman" first draft to be discussed by the TAC and SC.

	Task	Date Created	Due Date	Assigned To	Status	Comments
83	Schedule a pesticides subcommittee meeting for this spring in order to review the wet weather/high flow monitoring triggers and potentially lower them.	01/17/19	01/31/19	Matthew Heberger	✓	
84	**TAC Action Items 2019-05-09**	**05/09/19**				
85	Confirm meeting room locations for the July and September meetings and forward date, time & location information to the committee	05/09/19	05/31/19	Matthew Heberger		
86	Update the TAC Meeting Summary to reflect an Errata sheet was also added to the FY 16/17 Toxicity Report	05/09/19	05/31/19	Matthew Heberger		
87	Put on the agenda for a meeting of the Toxicity Workgroup: How to deal with persistent algal toxicity that we are seeing in this monitoring season.	05/09/19	06/15/19	Liz Miller, Matthew Heberger	✓	
88	Send TAC members the funding level guidance given by the SC at last fall's joint meeting.	05/09/19	05/10/19	Matthew Heberger	✓	
89	Add the standard or threshold of 0.24 ppm to the mercury time series plots in the proposal and report.	05/09/19	05/19/19	Jay Davis	✓	
90	As we finalize the choice of mercury monitoring locations, speak with restoration managers, to find out more about the construction, phasing, and hydrology of individual projects.	05/09/19	09/30/19	April Robinson, Jay Davis		
91	Consult the mercury subcommittee and the TAC on the final choice of sampling sites, species monitored, and sampling timeframe.	05/09/19	09/30/19	Jay Davis		
92	Consider adding an increased funding option for the pesticides monitoring project that will accelerate the schedule and complete the study more quickly.	05/09/19	05/18/19	Matthew Heberger	✓	This suggestion came about after Matt mentioned that the CEC study budget would be lower than the target of $250K, due to the large amount of in-kind contributions from project partners for field sampling in particular. The thinking was that this may free up extra money for other focus areas, e.g. pesticides. However, in assembling the overall program budget, there was nothing left over. A key reason for this is that the SWAMP contract which has funded our aquatic toxicity testing for the last several years is going to expire in March 2020, meaning that the program will have to pay for tox. testing on its own in the second half of Water Year 2020, to the tune of $169,000 (!).
93	Send the CEC budget to the TAC as well as the SC once it is finalized.	05/09/19	05/31/19	Matthew Heberger		
94	Consult the Toxicity Workgroup and/or Pesticides Subcommittee to assist in planning any toxicity intercomparison we may do.	05/09/19	08/15/19	Liz Miller, Matthew Heberger		
95	Incorporate a version of the proposed study planning timeline in the materials for the multi-year planning workshop	05/09/19	08/15/19	Matthew Heberger, Selina Cole		
96	Suggest to Deltares to add a meeting to discuss the methods memo before we give them a notice to proceed with the analysis.	05/09/19	05/12/19	Matthew Heberger	✓	
97	Ask Deltares to submit a track changes version of the tech memo to see exactly what has changed and how they responded to comments/suggestions rather than asking them to provide a formal response to comments.	05/09/19	05/12/19	Matthew Heberger	✓	
98	Send instructions to TAC members that you can leave a question blank if you feel that it does not apply or is not relevant.	05/09/19	05/12/19	Matthew Heberger	✓	
99	Add DPR and DTSC programs to Management Drivers Table, and incorporate a cross reference to Delta RMP Management Assessment Questions if possible	05/09/19	05/15/19	Stephen McCord	✓	
100						
101	**Coordinating Committee Action Items**					
102	**Coordinating Committee Meeting 2018-06-07**					
103	Debbie agreed to talk to her technical advisors about the issues with the toxicity lab to ensure that we are adequately dealing with concerns about past data and are able to move forward with seeking approval of a plan for the upcoming year.	06/07/18	06/28/18	Debbie Webster	✓	
104	Send pesticides monitoring proposals to our expert advisors	06/07/18	06/28/18	Matthew Heberger	✓	
105	Confirm whether Melissa Turner is still willing and able to give a presentation about ILRP monitoring	06/07/18	06/28/18	Matthew Heberger	✓	
106	Add information on population to Matt's spreadsheet of Delta RMP contributors and their amounts.	06/07/18	06/28/18	Selina Cole	✓	
107	Consider organizing special meeting of SC delegates to discuss pesticides proposals between June 25 and July 3	06/07/18	06/28/18	Debbie Webster	✓	
108	Call the Army Corps today and remind them that they need to make their $50K contribution promptly. They are under an MOU to pay within 15 days.	06/07/18	06/07/18	Matthew Heberger	✓	
109	**Coordinating Committee Meeting 2018-10-06**					
110	Propose a deadline on our Data Management and Quality Assurance SOP, check with Melissa Morris that it's acceptable.	10/06/18	10/15/18	Matthew Heberger	✓	Ms. Morris confirmed that "Yes, if the updates meet the requirements of a QAPP for the new sections, we can keep the conditional approval going as long as needed to complete the SOP. "
111	Provide an update on the Data Management and Quality Assurance SOP document to the Steering Committee.	10/06/18	10/29/18	Matthew Heberger	✓	Update scheduled for Joint Meeting on 10/29.

	Task	Date Created	Due Date	Assigned To	Status	Comments
112	Patrick to write a 1-2 page memo explaining why DWR is in the program; their participation is required in 3 different permits covering barriers, eco-restore, etc. Include in this memo the current participant categories, e.g. stormwater, wastewater, regulatory-state, etc.	10/06/18	10/15/18	Patrick Morris	✓	
113	Send a note to the Steering Committee: Ask members whether they have any changes to the Charter?	10/06/18	10/08/18	Matthew Heberger	✓	
114	Consider a change to the Charter so that the TAC does not require co-chairs.	10/06/18	10/15/18	Matthew Heberger	✓	Agendized for 10/29 meeting.
115	Consider allowing alternates for the Steering Committee chairs.	10/06/18	10/15/18	Matthew Heberger	✓	Agendized for 10/29 meeting.
116	Invite Mike Wackman and Stephen McCord to future Coordinating Committee Meetings.	10/06/18	10/29/18	Matthew Heberger	✓	
117	Send calendar invitations for planned meetings	10/06/18	10/15/18	Matthew Heberger	✓	
118	**Coordinating Committee Meeting 2019-02-05**					
119	Matt to invite Brian Bergamaschi, USGS, to give a presentation about the high-frequency monitoring. If Brian or his colleagues are not available, invite an SFEI ecologist to talk about "A Delta Transformed" or "A Delta Renewed" reports. If no speaker is available on relatively short notice, just end the meeting early.	02/05/19	02/10/19	Matthew Heberger	✓	
120	**Coordinating Committee Meeting 2019-03-05**					
121	Matt to speak with Melissa Morris at State Board/OIMA to find out if there are any remaining concerns with toxicity testing procedures.	03/06/19	03/15/19	Matthew Heberger	✓	
122	After this, Matt to communicate with the SC what procedures the data management and QA team at SWAMP have agreed to follow.	03/06/19	03/31/19	Matthew Heberger	✓	Matt H. gave an update to the SC on this item at the 2019-04-23 Teleconference meeting.
123	Verify that SWAMP has a process in place for correcting errors we may find in the data after it is uploaded.	03/06/19	03/31/19	Matthew Heberger	✓	
124	**Coordinating Committee Meeting 2019-05-08**					
125	Selina to send Matt the list of “study questions” from the state CEC guidance, as a starting point for developing management and assessment questions for RMP monitoring	05/08/19	05/25/19	Selina Cole		
126	Patrick Morris to talk with Adam and Danny McClure about whether and how the Delta RMP could support the Pyrethroids TMDL.	05/08/19	05/25/19	Patrick Morris		
127						
128	**Pesticides Subcommittee Action Items**					
129	**Pesticides Subcommittee Meeting 2018-08-01**	**08/01/18**				
130	Share Deltares contract with the Pesticides Subcommittee (so they can see timeline and deliverables)	08/01/18	08/03/18	Matthew Heberger	✓	
131	Consider putting a discussion of human health impacts of contaminants on the agenda for the Fall Joint Meeting	08/01/18	10/01/18	Matthew Heberger	✓	This recommendation came out of a discussion at the Pesticides Subcommittee where we were reacting to a newspaper article on the use of glyphosate in the Delta. The TAC was decidedly less enthusiastic about this idea when we discussed it on 9/21.
132	Plan a presentation about GRTS for the next meeting of the Pesticides Subcommittee on 8/28.	08/01/18	08/22/18	Aroon Melwani	✓	
133	Research the issue of GRTS sample draw along polylines vs. in polygons, perform a brief literature review, speak to experts and advisors, and come back to the group with options at our next meeting	08/01/18	08/15/18	Matthew Heberger	✓	
134	Share DPR’s criteria for storm sampling with the group.	08/01/18	08/15/18	Cam Irvine	✓	
135	Add Alisha Wenzel to the list of people to be informed regarding TIEs.	08/01/18	08/15/18	Patrick Morris	✓	
136	A subset of subcommittee members agreed to help draft relevant sections of the QAPP related to toxicity	08/01/18	08/21/18	Cam Irvine	✓	
137	**Pesticides Subcommittee Meeting 2018-08-28**	**08/28/18**				
138	Create a series of maps for the subcommittee, showing channels classified by depth,e.g. 2m, 3m, 4m	08/28/18	09/05/18	Matthew Heberger	✓	
139	Create 2-3 different “GRTS draws” demonstrating the effect of unequal probabilities	08/28/18	09/05/18	Aroon Melwani	✓	
140	Run queries against the DPR PUR database on common almond pesticides, to determine when they are applied in the Delta	08/28/18	09/08/18	Scott Wagner	✓	
141	Ask SFEI QA officer about whether he would support forgoing field dupes for toxicity testing	08/28/18	09/08/18	Matthew Heberger	✓	
142	Clarify whether SWAMP will pay for field duplicates for water toxicity tests through its contract with AHPL, or whether funding for field dupes would have to come out of Delta RMP funds.	08/28/18	09/08/18	Matthew Heberger	✓	Rate of field duplicates of 5%. Only results in 3 additional env. samples per year, not a large additional expense.
143	**Pesticides Subcommittee Meeting 2018-09-13**	**09/13/18**				

	Task	Date Created	Due Date	Assigned To	Status	Comments
144	Revise the analyte list in the Quality Assurance Program Plan (QAPP) based on new information from Jim Orlando	09/13/18	09/25/18	Matthew Heberger	✓	
145	send committee members Google Earth (KML) files of the sample frame (waterways classified as deep/shallow), and the points generated by GRTS, so that each member can review in “high def” by zooming in.	09/13/18	09/18/18	Matthew Heberger	✓	
146	Include a brief writeup in our sampling plan explaining why we chose the 2.5 m depth cutoff (balance between deep/shallow, ecological significance, looked right based on members knowledge of the Delta).	09/13/18	09/28/18	Matthew Heberger	✓	
147	**Pesticides Subcommittee Meeting 2018-09-25**	**09/25/18**				
148	Regarding Deltares’ literature search and “gray literature,” be sure that it includes recent monitoring overviews, especially those by Delta RMP members Joe Domagalski and Debra Denton.	09/25/18	11/09/18	Erwin Roex	✓	Sent these documents to Erwin Roex, PI.
149	Look into adding data from California Integrated Water Quality System (CIWQS, commonly pronounced “sea-wicks”), especially any ambient or receiving water samples. (This came with a reminder that we are analyzing water quality conditions in the Delta, not estimating loadings or investigating pollutant sources).	09/25/18	11/09/18	Erwin Roex	✓	Erwin Roex has corresponded about this with Debra Denton and Joe Domagalski.
150	Include the “Legal Delta” boundary on future maps. Matt to send the “legal Delta boundary” shape file to Erwin.	09/25/18	09/30/18	Matthew Heberger	✓	
151	Erwin to contact Xuyang Zhang at DPR to resolve discrepancies in the SURF database. The SURF database may include information that are not included elsewhere and should be included. Xuyang will help resolve questions, e.g. clarify what fraction the results represent (suspended sediment, dissolved, or total)/	09/25/18	10/15/18	Erwin Roex	✓	
152	Matt to look into the data that was recently added to the Regional Data Center (and CEDEN) by SFEI, check whether there is data that should be included for this study, and verify that it is included in the Deltares database.	09/25/18	09/30/18	Matthew Heberger	✓	Here is an article about the project where SFEI digitized and uploaded dozens of "legacy" datasets to the Regional Data Center and CEDEN. Since these data are all in CEDEN, they were included in the download by Deltares scientists. https://www.sfei.org/news/completed-deduce-delta-environmental-data-understanding-california-estuary#sthash.CHfgJwe8.dpbs
153	Xuyang Zhang agreed to provide to Deltares a list of pesticides registered for use in California from 2011 to present.	09/25/18	10/07/18	Xuyang Zhang	✓	Emailed on Oct 5.
154	Deltares hand selected compounds to remove from their database to exclude non-pesticides (pharmaceuticals, industrial chemicals) based on their expert judgment. Erwin agreed to share list of excluded parameters to confirm none are pesticides.	09/25/18	10/15/18	Erwin Roex	✓	
155	Danny McClure agreed to send (via Matt at ASC) additional information about pyrethroids bioavailability.	09/25/18	10/07/18	Danny McClure	✓	
156	Confirm that USGS data includes analyses from all 3 labs that have participated in Delta studies: KS, CO, CA.	09/25/18	10/15/18	Erwin Roex	✓	Shortly after the meeting, Joe Domagalski confirmed that all 3 were included.
157	Joe Domagalski to provide a cross-walk table that relates USGS “parameter codes” to CAS Registry Numbers.	09/25/18	10/07/18	Joe Domagalski	✓	
158	Where the pesticide data from CEDEN had FRACTION = “not recorded,” it may be possible to determine this information based on the project. Danny McClure agreed to help research this.	09/25/18	10/15/18	Danny McClure	✓	
159	Deltares team to confirm that they are dealing with QA samples appropriately. Some of the data in CEDEN represent samples that were collected for QA purposes, such as field blanks, field duplicates, matrix spikes, etc.	09/25/18	11/09/18	Erwin Roex	✓	Include description in next deliverable.
160	In some occasions, toxicity identification evaluations (TIEs) were performed as a followup to positive toxicity tests. These data are not readily available via the public interface to CEDEN. Melissa Turner volunteered to help provide these data to Deltares.	09/25/18	10/15/18	Melissa Turner	✓	Email reminder sent in Oct 10, 2018
161	Some of the values in the “Result” field were negative. Deltares assumed these were errors and deleted them. However, they may be meaningful. Consider investigating these to verify these do not contain some “coded” information. Matt to check with ASC’s data management team.	09/25/18	10/10/18	Matthew Heberger	✓	According to the CEDEN "Chemistry Data Submission Guidance Document," the Result field may be blank. It says nothing about inserting negative values. Project scientists should look at the corresponding values in the field ResQualCode. For information on possible values and their meaning, see: http://ceden.org/CEDEN_Checker/Checker/DisplayCEDENLookUp.php?List=ResQualLookUp
162	Distribute to members a “primer” or useful background materials on the use of species sensitivity distributions (SSD) and the multi-species potentially affected fraction (msPAF).	09/25/18	10/10/18	Matthew Heberger	✓	Compiled a few references via internet search. Emailed research team to ask for other suggestions. Seems best reference is a highly-cited textbook from 2001 by Posthuma et al. Sent to Technical Advisory Committee and Pesticides Subcommittee with a suggestion to begin with Chapters 1 and 16.
163	Deltares should consider performing simple analyses that will provide useful information to the Delta RMP and to regulators and paint a more complete picture than would be obtained with only a single method. For example, a simple summary of exceedances of EPA’s Aquatic Life Benchmarks. Matt to provide a link or table to Deltares.	09/25/18	09/30/18	Matthew Heberger	✓	I confirmed that this is in fact required in their contract. It states that, at a minimum, the investigators shall compare observed pesticide concentrations to appropriate benchmarks.
164	Have the Delta RMP science advisors review the proposed methods for the study; invite them to our forthcoming meeting of the Delta RMP.	09/25/18	10/15/18	Matthew Heberger	✓	Update Oct 16: Erwin has requested postponing this meeting, since they have had trouble compiling the "definitive" database. (Changes keep being made to the toxicity data.)
165	The researchers should filter out sampling locations that represent ditches, farm ponds, etc. that are not connected to Delta waterways. The focus should be on Delta surface waters (not groundwater, and not other types of water, such as irrigation water). Matt can share GIS data of surface water features with Deltares that should be helpful for screening).	09/25/18	09/30/18	Matthew Heberger	✓	Emailed the research team information and links to CARI and NHD, two GIS datasets of surface water features.

	Task	Date Created	Due Date	Assigned To	Status	Comments
166	Consider rescheduling the Nov 9 Pesticides Subcommittee meeting to a later date, possibly hold a teleconference that day and meet again with Deltares in person at a later date.	09/25/18	10/25/18	Matthew Heberger	✓	Rescheduled at the request of Erwin Roex. The toxicity data is still not finalized, so they cannot finalize their database and begin their analyses.
167	**Pesticides Subcommittee Meeting 2019-02-26**	**02/26/19**				
168	Schedule a meeting of the toxicity workgroup to meet to discuss the results of recent toxicity testing, in particular to brainstorm potential causes of persistent low-level toxicity observed to Selenastrum algae	02/26/19	03/15/19	Matthew Heberger	✓	Meeting scheduled for Jun 24, 2019
169	Consider analyzing samples for additional metals. Jim Orlando to check prices for us.	02/26/19	03/05/19	Jim Orlando	✓	
170	Marie will send text messages in addition to emails if the TIE discussion is to take place on a weekend	02/26/19	04/30/19	Marie Stillway	✓	Marie has agreed to do this in the future.
171	Revise the QAPP with the proposed changes to the storm triggers for pesticides monitoring.	02/26/19	06/30/19	Matthew Heberger		
172	Draft a new assessment question related to drinking water impacts for consideration by the TAC and SC (Matt, by March 10, 2019).	02/26/19	03/10/19	Matthew Heberger	✓	To discuss at a future meeting of (a) Pesticides Subcommittee, (b) TAC, (c) Steering Committee. See: https://docs.google.com/open?id=1VyR85nJc3MKSVrb5iMXhf5FWP51NuZ0USialvTycXDM&authuser=matth@sfei.org&usp=drive_fs Proposed question: 3. To what extent to current use pesticides contribute to human health risk in the Delta? A. Do pesticides occur at concentrations that exceed water quality regulatory values and benchmarks (“reference values”) for human health?
173	Armand Ruby agreed to distribute a white paper having to do with pesticides and human health vs. ecotoxicity.	02/26/19	03/15/19	Armand Ruby	✓	Email reminder sent on 3/6/19.
174						
175	**Toxicity Work Group Action Items**					
176	**Toxicity Work Group Meeting 2018-09-13**	**09/13/18**				
177	Marie to double check whether her lab can report biomass as an additional endpoint without incurring additional expense or running afoul of their contract with SWAMP.	09/13/18	10/01/18	Marie Stillway	✓	Marie confirmed that her lab can report biomass at no additional expense.
178	Share working draft of the QAPP with subcommittee members	09/13/18	09/15/18	Matthew Heberger	✓	
179	Send a reminder of how to access files on the Technical Advisory Committee (TAC) workspace website.	09/13/18	09/30/18	Matthew Heberger	✓	Detailed instructions for how to access Delta RMP data are here: https://sites.google.com/a/sfei.org/delta-rmp/data-access
180	AHPL to to send revised data to SWAMP where C. dubia tests were terminated at the wrong time.	09/13/18	10/15/18	Marie Stillway	✓	Marie confirmed that she sent revised results to Brian Ogg at the State Water Board in the last week of Sept 2018.
181	Get Melissa Morris' input on the mid-range EC control issue.	09/13/18	10/01/18	Matthew Heberger	✓	
182	Send the final sample frame shapefile to Joe D. and Jim O.	09/20/18	10/01/18	Matthew Heberger	✓	
183	**Toxicity Work Group Meeting 2018-11-09**					
184	Write up the new procedures agreed to related to low-conductivity controls for Ceriodaphnia toxicity testing; Share this with Marie and the group	11/09/18	11/15/19	Cam Irvine, Matthew Heberger	✓	
185						
186	**Data Management Subcommittee Action Items**					
187	**Data Management Subcommittee Meeting 2018-04-25**					
188	Send the final meeting summary	04/25/18	05/10/18	Matthew Heberger	✓	
189	Send the Data Management SOP to the group once our QAO has had a chance to review it.	04/25/18	05/15/18	Matthew Heberger	✓	
190	Create some graphics or a flowchart that shows how we manage data	04/25/18	05/31/18	Amy Franz	✓	
191	**Data Management Subcommittee Meeting 2018-06-26**					
192	Add dates/times to flowchart of Current Use Pesticides Data Management and Quality Assurance	06/26/18	07/31/18	Amy Franz	✓	
193	Add dates/times to flowchart of Current Use Pesticides Data Management and Quality Assurance	06/26/18	07/31/18	Amy Franz	✓	
194	Add USGS QA/QC review and data management process details to the flowchart. See Selina’s listed suggestions	06/26/18	07/31/18	Amy Franz, Matthew Heberger	✓	
195	Bev to follow up with Melissa Morris and with Greg Gearheart to find out if data in NWIS only will suffice	06/26/18	07/31/18	Beverly Anderson-Abbs	✓	
196	Make a list of pros and cons of stopping NWIS data translation to CEDEN. Also identify the appropriate level of QA/QC effort necessary by USGS and ASC to reduce duplication of data management tasks and identify cost savings accordingly.	06/26/18	07/31/18	Amy Franz, Jim Orlando	✓	
197	Send comments concerning the SOP to Matt by COB on Wed, June 27.	06/26/18	07/27/18	Subcommitee Members	✓	

	Task	Date Created	Due Date	Assigned To	Status	Comments
198	Add a Corrective Action Protocol that details lines of responsibility in the QAPP regarding who at the lab is responsible, what specific actions will be triggered if a batch fails the QC process, and who should be notified.	06/26/18	07/31/18	Amy Franz, Matthew Heberger		
199	In the QAPP, add a description of all QA/QC performed on the data, by USGS and ASC. Add a timeline for which things happens once vs. monthly vs. quarterly.	06/26/18	07/31/18	Amy Franz, Matthew Heberger		Can't recall if we ever did this.
200	Ask Wes Heim, where does MLML store their data and in what format? Other than what they submit to us? Do they have some kind of database?	06/26/18	07/31/18	Selina Cole		
201	**Data Management Subcommittee Meeting 2019-01-16**					
202	Any member who wishes, please provide input or edits to the mission statement	01/16/19	01/31/19	Subcommittee Members		"The data management subcommittee reviews policies and procedures related to data management and quality assurance and makes recommendations related thereto, with a goal of having the program collect high quality data that is usable and widely accessible, and in the most efficient and cost-effective way possible."
203	Discuss the issue of batch vs. submittal flagging at a future TAC meeting.					
204	ASC should plan to include a data management plan in all future technical proposals for monitoring or special studies	01/16/19	05/15/19	Matthew Heberger		
205	**Data Management Subcommittee Meeting 2019-03-26**					
206	Provide some additional details about the "QA lite" that ASC has proposed to do with each batch of pesticides data as it arrives? Matt to check with Amy and Don.	03/26/19	06/30/19	Matthew Heberger		
207	Add some info to the workplan and QAPP about the process of communication between ASC and the lab. Send a few sentences about this to Selina to include in a memo to the TAC.	03/26/19	06/30/19	Matthew Heberger		
208	Continue to document and summarize our business rules for applying flags in our Data Management and Quality Assurance SOP. (This is a todo in FY19-20).	03/26/19	06/30/19	Amy Franz, Don Yee, John Ross, Matthew Heberger		
209	Amy to look into what happens when the collection records are duplicate for the tox and pesticide data. (Potential to create some conflict.) [We discussed with Brian Ogg, and he indicated this would not cause any problems, and is a non-issue in his mind.]	03/26/19	06/30/19	Amy Franz		
210						
211	**Finance Committee Action Items**					
212	For the next finance update, also include a project progress update. Highlight progress on deliverables, any changes that have been made to monitoring plans, warning of any delays.	05/02/18	01/15/19	Matthew Heberger	✓	To be included in the next Finance Update and at subsequent SC meetings. It became clear that the "stoplight reports" are not serving the needs of the group, who wish to have greater insight into project progress. Update Oct 2018: To be included in the next quarterly finance report. Now that we have created a thorough "waterfall" Gantt Chart for the entire project, we will report on "% Complete" and "% of Budget Spent" for tasks and subtasks in future quarterly reports.
213	Create a spreadsheet that we can share with Finance Committee members that show more financial details (Selina to provide template)	05/02/18	07/15/18	Matthew Heberger	✓	I reminded Selina about this and she no longer remembered what this was.
214	From now on, do not change budgets unless there has been a major change in scope or deliverables. Keep budgets the same and maybe spend more or less on different tasks and subtasks but don't actually transfer money in the budget.	07/02/18	12/31/18	Matthew Heberger	✓	Implementing this new policy beginning in FY18/19. In the past, we re-allocated funds among subtasks at the request of the Finance Committee. At the time, they preferred that we "move $2,000 from Task 1A to 1B" rather than simply going overbudget on one task and staying under on another. From our point of view, either practice is acceptable, although the former is simpler.
215						
216	**Nutrients Subcommittee Action Items**					
217	Work with Janis to schedule subcommittee meetings for November, February, and March.	09/25/18	10/15/18	Matthew Heberger	✓	
218	Send Brian Bergamaschi any ideas or suggestions for analyses or visualization of the USGS high-frequency monitoring data	02/26/19	03/15/19	Nutrients Subcommittee members	✓	ASC staff provided comments. I do not know how many other subcommittee members were in touch with Brian, but they received reminders to do so.
219	Russ Brown will provide Brian Bergamaschi his spreadsheet model to determine the residence time based on flow and travel time. Russ will also provide Brian some examples using a branched channel format to display concentrations rather than the color-coded format Brian's ESRI mapping program used	02/26/19	03/10/19	Russ Brown	✓	
220	Regarding the FY19-20 proposal for Delta nutrients monitoring during planned shutdowns of discharge from Regional San, Matt to assess the amount of funds for ASC to perform contract management of the three contracts under this project. General assumption was a standard 10%.	02/26/19	03/15/19	Matthew Heberger	✓	
221	Subcommittee members should send Janis any questions on project tasks as Lisa and Janis will be firming up the budget.	02/26/19	03/15/19	Nutrients Subcommittee members	✓	
222	Janis will send Subcommittee members an email on next steps for submitting proposal recommendations to RMP.	02/26/19	03/15/19	Janis Cooke	✓	
223						
224	**CEC Subcommittee Action Items**					
225	**CEC Subcommittee Meeting 2018-08-22**					
226	Consult with colleagues to provide a review of the budget with consideration of a more detailed plan	08/22/18	08/31/18	Matthew Heberger	✓	

	Task	Date Created	Due Date	Assigned To	Status	Comments
227	Develop a timeline/Gantt Chart prior to the Joint Meeting to include interim deliverables and points for stakeholder input.	08/22/18	10/15/18	Matthew Heberger	✓	
228	Provide a timeline for the QAPP and information that can be provided to the Joint Meeting	08/22/18	10/15/18	Matthew Heberger	✓	
229	Develop a budget for Prop 1 application and notify the co-chairs and Finance Committee of intent to apply.	08/22/18	10/26/18	Matthew Heberger	✓	
230	Fill in technical details for the sampling plans including sampling methods and number of clams needed	08/22/18	01/30/19	Matthew Heberger	✓	
231	Ask Melissa Morris whether an individual QAPP or a QAPP added to the Delta RMP is preferred.	08/22/18	08/31/18	Dawit Tadesse	✓	Confirmed 23 August 2018 the QAPP should be developed as an individual plan
232	Provide a link to the Hood CEC study.	08/22/18	08/31/18	Brian Laurenson	✓	Link sent via email on 22 August 2018.
233	Provide CEC Reports from Region 1 and Region 4.	08/22/18	08/31/18	Dawit Tadesse	✓	Reports sent via email on 23 August 2018
234	Update the CEC subcommittee on progress regarding the SEP policy amendment and development of the SEP proposal.	08/22/18	09/30/18	Patrick Morris	✓	Patrick gave an update at the CEC meeting in Dec 2018.
235	**CEC Subcommittee Meeting 2018-10-10**					
236	Prepare a proposed schedule (Gantt chart) with interim deliverables and opportunities for input for the CEC Subcommittee to review before inclusion in the agenda package for the SC/TAC Joint Meeting	10/10/18	10/16/18	Matthew Heberger	✓	
237	Work with Brian Laurenson on a report out for the SC/TAC Joint Meeting	10/10/18	10/21/18	Matthew Heberger	✓	
238	Obtain letters of support for the CEC Prop 1 grant proposal	10/10/18	10/21/18	Matthew Heberger	✓	
239	**CEC Subcommittee Meeting 2019-02-24**					
240	ASC to research whether it would be desirable to measure grain size distribution for sediment	02/14/19	03/15/19	Matthew Heberger	✓	
241	Matt to verify the target list of analytes in the State Guidance to check which ancillary parameters are required/recommended.	02/14/19	03/15/19	Matthew Heberger	✓	
242	Brian to send Matt the name of his contact at MWQI.	02/14/19	03/15/19	Brian Lauerson	✓	
243	Matt to contact MWQI about the possibility of cost-sharing or piggybacking.	02/14/19	03/15/19	Matthew Heberger	✓	
244	Matt to look at the Aquatic Ecosystems Dashboard to see whether it contains any information on what other ancillary parameters were collected during CEC studies.	02/14/19	03/15/19		●	
245	Matt to look into costs for bird egg sampling	02/14/19	03/15/19	Matthew Heberger	✓	
246	Matt to research whether these species have good site fidelity.	02/14/19	03/15/19	Matthew Heberger	✓	
247	ASC to research what size range of clams is desirable. See if there is language about this in related studies or guidance documents.	02/14/19	03/15/19		●	
248	Brian L. will send Matt the targets that the Coordinated Monitoring Program (CMP) used for the Sacramento urban area.	02/14/19	03/15/19	Brian Lauerson	✓	
249	**CEC Subcommittee Meeting 2019-04-03**					
250	Matt to ask Bryn Phillips, who runs the SPOT monitoring, if the site on the American River at Discovery Park is one of the SPOT monitoring locations, or if they are stopping there especially for us. Also need to confirm that their sampling methodology and equipment is appropriate for CEC sample collection, compatible with other field crews	04/03/19	04/15/19	Matthew Heberger	✓	
251	Matt to compile information on what questions we are seeking to answer by analyzing bird eggs.	04/03/19	04/15/19	Matthew Heberger	✓	
252	Selina to send some information from her birding app on where cormorant nests may be in the Delta.	04/03/19	04/15/19	Selina Cole	✓	From Selina: There are several apps out there by the National Audubon Society, but the Audubon Bird Guide app has a great feature – you can download field guide data to access photos, audio, and range maps offline. It also has a bird alert notification system you can set up to get alerts when a particular bird species of interest is in your proximity (has been spotted nearby). There are also various "twitcher" groups (amature ornithologists) that have similar info available online. Just depends on what you're looking for.
253	Document the method for clam tissue homogenization more thoroughly	04/03/19	04/15/19	Matthew Heberger	●	
254	Insert into the plan that the CEC Subcommittee will meet after fish collection and before the fish are shipped to the lab, so the committee can make a recommendation on which species to analyze.	04/03/19	04/15/19	Matthew Heberger	✓	
255	ASC to consider adding Weck to analyze galaxolide and other compounds.	04/03/19	04/15/19	Matthew Heberger	✓	See Analyte Comparison Table for a thorough exposition of which lab should analyze which analyte for each matrix: https://docs.google.com/spreadsheets/d/1mVm7aeRM0CxBj5HWpDL0eClRJdF3rLg8y2TwV_59_r8/edit#gid=1103446397
256	Matt to put together a side-by-side comparison of the competing labs, listing price, MDL, and RL, as it relates to the MTL or other threshold we are trying to be lower than.	04/03/19	04/15/19	Matthew Heberger	✓	See Analyte Comparison Table: https://docs.google.com/spreadsheets/d/1mVm7aeRM0CxBj5HWpDL0eClRJdF3rLg8y2TwV_59_r8/edit#gid=1103446397

	Task	Date Created	Due Date	Assigned To	Status	Comments
257	Define “batch” in the QAPP and tables.	04/03/19	04/15/19	Matthew Heberger	🔴	
258	Matt to specify in the QAPP (and change budget if necessary) that labs should run an LCS and MS at a minimum rate of one per batch.	04/03/19	04/15/19	Matthew Heberger	🔴	
259	Matt to get details about what exactly a “minimalist” quarterly QA would entail.	04/03/19	04/15/19	Matthew Heberger	🔴	
260	Ask labs how long they retain records, and whether they could prepare a Level IV data package for us in the future upon request.	04/03/19	04/15/19	Matthew Heberger	🔴	
261	If we get the Prop 1 grant, and will be doing non-targeted analysis, ask Dr. Tom Young if the Level IV data package has information that would be useful to him.	04/03/19	04/15/19	Matthew Heberger	✓	We received word that we did not receive the grant, so this was a moot point.
262	CEC Subcommittee members should submit comments on the draft QAPP by April 19.	04/03/19	04/15/19	Matthew Heberger	✓	Received a few comments from subcommittee members.
263	**CEC Subcommittee Meeting 2019-04-24**					
264	Add site-specific collection methods to the QAPP	04/24/19	05/15/19	Matthew Heberger	🔴	
265	Request documentation of sample collection methods of the SPOT program from Bryn Phillips	04/24/19	04/30/19	Matthew Heberger	✓	
266	Check on Lisa Thompson’s membership status in the mailing list	04/24/19	04/30/19	Matthew Heberger	✓	Her Google account had been automatically disabled. We were able to help her re-enable.
267	Ask Vista laboratory whether they will report chemical analytical results below the MDL, and whether there is any update on their effort to obtain lower MDLs	04/24/19	04/30/19	Matthew Heberger	✓	Yes, they will report below the MDL if they are confident it is a detect. They have not made progress on doing studies that would lower their MDL.
268	Ask SFEI’s CEC lead scientist Rebecca Sutton about whether there are new thresholds for PFAS compounds that may have been recently published	04/24/19	04/30/19	Matthew Heberger	✓	There are no new ecotoxicological thresholds that she is aware of. However, Becky cautioned me that experience matters when it comes to analyzing PFAS compounds. Not every lab who offers this service has the experience to produce robust results.
269	Report back to the subcommittee via email on the outcomes of the last two items as soon as possible	04/24/19	04/30/19	Matthew Heberger	✓	Email sent on 5/6 with the lab choice.
270	Consider applying for Supplemental Environmental Project (SEP) funds to cover components of the study that were part of our unsuccessful Prop 1 proposal	04/24/19	08/31/19	Patrick Morris	🟢	Matt will work with Patrick on this.
271						
272	**Chlorophyll Intercalibration Work Group Action Items**					
273	Invite Stephanie Smith from YSI to participate in our study by attending meetings and/or reviewing documents	03/15/19	04/05/19	Liz Stumpner	✓	
274	Add the grab sample results to the time series plots	03/16/19	03/25/19	Matthew Heberger	🔴	
275	If you have ideas or suggestions for additional analyses, please send them to Matt	03/17/19	03/29/19	WG members	✓	
276	Create a project page on the Delta RMP Workspace website for project files and documents	03/18/19	03/29/19	Matthew Heberger	🔴	
277	Inquire about the availability of the DWR vessel, the Sentinel	03/19/19	03/29/19	Mike Dempsey	✓	
278	Ask Raphael Kudela, UC Santa Cruz, to participate in the study	03/20/19	04/10/19	Dave Senn	✓	
279	Remind labs to fill out the survey about their methods	03/21/19	03/29/19	Liz Stumpner	✓	
280	Send Matt the names and contact information for the 3 new labs that agreed to participate in the study	03/22/19	03/29/19	Liz Stumpner	✓	
281	Find out which lab Jim Cloern uses	03/23/19	03/29/19	Liz Stumpner	✓	They analyze chl-a in their own lab.
282	Contact Dr. Anke Mueller-Solger and ask whether she has any information or analysis to contribute to our study	03/24/19	03/29/19	Dave Senn	✓	
283						
284	**Informal Action Items**					
285	Add to the next finance memo: "bank account" style statement that shows at a glance how much money we have, how much we are expecting, and how much in savings.	02/12/18	04/15/18	Matthew Heberger	✓	Added to the 2018 Q1 Finance Memo. Requesting feedback on the format.
286	Send twice yearly roster updates to RB5 staff to update on the website. This is an appendix to the Charter	05/15/18	07/31/18	Matthew Heberger	✓	Request by Selina Cole
287	Send twice yearly roster updates to RB5 staff to update on the website. This is an appendix to the Charter	05/15/18	12/31/18	Matthew Heberger	✓	Sent 2018-10-29
288	Send twice yearly roster updates to RB5 staff to update on the website. This is an appendix to the Charter	05/15/18	07/31/19	Matthew Heberger	🟡	
289	Send twice yearly roster updates to RB5 staff to update on the website. This is an appendix to the Charter	05/15/18	12/31/19	Matthew Heberger	🟢	
290	Consider updates to 2 sections of the charter. How data is managed and when it is released, and Conflict of Interest.	06/18/18	10/01/18	Matthew Heberger	✓	Request by Greg Gearheart. We have not received a specific proposal for what changes to make. Current understanding is that the Data Management Subcommittee is looking into these issues and will make recommendations.
291	Ask subcommittees whether there are projects or reports that would benefit from feedback from our science advisors	07/19/18	08/31/18	Matthew Heberger	✓	Placed on the agenda for the Pesticides Subcommittee

	Task	Date Created	Due Date	Assigned To	Status	Comments
292	Respond in writing to Melissa Turner's comments on the FY16/17 Pesticides data and QA memo	08/13/18	08/31/18	Don Yee	✓	
293	Create a poster for the Bay Delta Science Conference and present it to the SC for approval at their July 2018 meeting	05/07/18	07/07/18	Matthew Heberger	✓	Notification sent via email as it was not ready in time for the SC meeting in July. Poster presented at BDSC, Sept 10 -12.
294	Put in place a contract between ASC and Caltrans so that they can contribute financially to the Delta RMP and fulfill their requirements to conduct Delta Mercury Control Program (Delta Mercury TMDL) monitoring and other monitoring in the Delta. Approval letter from RB5 dated 2018-05-16 (on file).	05/16/18	10/15/18	Patrick Walsh	✓	
295	Adam to speak to Tom Mumley regarding Contra Costa County's contribution to the Delta RMP. The County has a Phase 1 MS4 permit for its unincorporated areas. It straddles both Region 2 (Bay) and Region 5 (Central Valley), however the majority of the population is in the Bay. In 2015, there was discussion of asking them to contribute to the Delta RMP. RB5 staff and leadership would like for the County to begin paying their fair share to the Delta RMP.	07/20/18	08/31/18	Adam Laputz	✓	Adam informed Matt in Sept 2018 that this conversation took place. Central Valley Board staff should follow up with Contra Costa County if their stormwater discharge permit will be modified to require their participation in the Delta RMP.
296	Send twice yearly roster updates to RB5 staff to update on the website. This is an appendix to the Charter.	05/01/18	01/31/19	Matthew Heberger	✓	Update sent on 5/19/2019.
297	Consider an amendment to the Communication Plan (or next year's workplan?) that says we plan for 2 rounds of review for most reports. Any more than this would be considered an exception and would need certain approvals (?), timeline extension, and budget increase.	10/23/18	06/30/19	Delta RMP SC	🟡	Bring to the SC at a future meeting. See file Google Drive\Delta RMP\Delta RMP Documents\Foundational Documents\Communication Plan\Communications Plan Potential Update 2018-10-23.txt
298	Consider drafting a State Board resolution on guiding principles and minimum expectations for regional monitoring programs.	11/15/18	03/31/19	Greg Gearheart	🔴	From a meeting with Greg on Nov 15. He proposed this to help clarify common issues and pitfalls that crop up with collaborative monitoring projects around the state. The state allows dischargers to participate in these programs, and they are a form or regulatory relief. In return, there should be a set of minimum standards around quality assurance, timeliness of reporting, etc.
299	SFEI staff will meet with Melissa Morris for training/ discussion around SWAMP expectations for Quality Assurance Program Plans (QAPPs), Data Quality Assessment, and other Data Management and Quality Assurance issues.	11/15/18	02/28/19	Matthew Heberger	✓	Training held on Jan 7, 2019.
300	Update the Data Management and Quality Assurance SOP document, with a specific focus on how mercury data is managed.	11/15/18	09/30/19	Amy Franz	🟢	Unfunded task which requires a significant effort. Planning to include funding request into next fiscal year's workplan. Update April 2019: There are unused funds in the FY18-19 budget, and I have asked our data services team to work on this document.
301	Write a memo on how stakeholders ought to communicate with labs through the contract manager, rather than calling or emailing them directly with questions, which it is felt is inefficient and inappropriate. (Melissa is the contract manager for toxicity testing at the Aquatic Health Program Laboratory at UC Davis (AHPL), and Matt is the contract manager for pesticides chemistry at USGS Organic Chemistry Research Laboratory (OCRL).	11/15/18	12/31/18	Matthew Heberger	✓	To include in the agenda package for the next TAC meeting and/or SC meeting.
302	Invite the group of regulators and staff (State Board, Regional Board, and SFEI staff) to have a meeting 2-4 times per year to "caucus" as necessary in advance of Steering Committee meetings.	11/15/18	02/15/19	Matthew Heberger	✓	Matt has reminded agency staff about this twice.
303	Consider putting in place policies around how long stakeholders have to review drafts, how many opportunities they will be given to review	11/15/18	03/31/19	Matthew Heberger	✓	Proposal: plan for 2 review periods for most documents, especially important ones. A single review period should suffice for things such as meeting summaries, memos, etc. There will be a draft > comments > final draft > comments > final. After each of the 2 rounds of review, a response to comments will be issued, compiling the major comments and suggested edits into one document, and with a brief explanation of how the authors responded to the comment. This document will exclude minor comments, comments about formatting, grammar, spelling, style, etc.
304	Consider formalizing "Rules of Order" for meetings, as it is felt we would benefit from having more structure and formalized decision making.	11/15/18	03/31/19	Matthew Heberger	🔴	To discuss at the next meeting of the ad hoc committee on governance.
305	Send Matt suggestions or proposed revisions to the Charter related to SC decision-making and governance, particularly as it relates to the creation of new seats on the Steering Committee.	12/19/18	01/15/19	Dan Riordan, Dave Tamayo, Debbie Webster, Greg Gearheart, Patrick Morris, Rebecca Franklin, Selina Cole, Stephanie Hiestand	✓	As a result of an ad hoc subcommittee on governance, charged with examining how votes are allocated and how new SC seats are created. To be discussed at a follow-up meeting on Jan 31.
306	Draft a template of a comment that can be inserted into the CEDEN database comment for cases in the C. dubia toxicity test where sample conductivity is low, but the control does not meet test acceptability criteria and therefore the sample is compared to the regular medium-hardness control. In cases like these, the sample may be shown as toxic, but it may not be (entirely) due to toxic contaminants, but rather due to a deficiency of ions that these organisms need in order to thrive.	03/22/19	03/28/19	Cam Irvine, Melissa Turner	✓	
307	Make proposed edits to the QAPP document and circulate these changes to this group for comment	03/22/19	04/05/19	Matthew Heberger	✓	
308	Ask contacts at SCCWRP for recommendations for aquatic toxicity testing labs	03/11/19	03/29/19	Matthew Heberger	✓	
309	Ask Wes Heim if the cost share that we get from Moss Landing would still be applicable if the funds were coming via a state contract.	03/11/19	03/29/19	Matthew Heberger	🔴	Emailed Wes this question again on 5/2, and discussed with him by phone. Still awaiting reply. I believe he did not immediately know the answer and was checking with Office of Sponsored Programs and San Jose State University.
310	Make a plan to consider options for our toxicity spending in FY19-20. The SWAMP contract only goes through March 2020, so will not cover the entire Water Year. We will need to transition to our own spending. It should be lean and cost effective since it is our own money.	03/11/19	03/29/19	Matthew Heberger	✓	Update Apr 2019: Have discussed this issue with Coordinating Committee. Our preference is to use State Board funds to contract with Moss Landing Marine Laboratory for mercury monitoring. Will be part of the workplan creation, but should have a strawman proposal for Coordinating Committee in advance.

	Task	Date Created	Due Date	Assigned To	Status	Comments
311	Communicate new policy related to expanded mercury monitoring to the Steering Committee	03/11/19	03/29/19	Adam Laputz, Patrick Morris	✓	Previously, the thinking was that we were putting a lot of resources into Hg monitoring in support of the Mercury TMDL, which had a strict deadline for information that could be considered in the rulemaking, and then we would drop down to a lower level of surveillance monitoring. However, now DWR has joined the program, and they are our largest financial contributor. They have joined as a condition of their CWA Section 401 Certifications for wetland restoration projects. They were allowed to drop certain monitoring activities as a result, and are contributing the Delta RMP instead. And one of the key concerns of these projects is that mercury in wetland sediment could be remobilized and/or methylated (converted to its more toxic organic form). Therefore, it is appropriate that we direct more resources to this area.
312	If the SC approves funding for lunches at meetings, set it up with our admin department (see howto notes from Anna), ask our contacts in Sacramento if they know of good, reliable caterers.	05/20/19	06/15/19	Matthew Heberger		
313	Plan to send TAC and SC agenda packages so they come out 2 weeks (10 business days) before meetings in the future.	05/20/19	07/31/19	Matthew Heberger		From a conversation with Patrick Morris and Meredith Howard. They (Central Valley Water Board Staff) are working on being better coordinated. They would like to have a week to review agenda packages, then a week in which they could meet before the meeting. 5 business days just isn't enough for them. Even more important if they're expected to coordinate with folks from the State Board, etc. Meredith stressed that we should send them out even if they are not 100% complete. They would rather have some of the materials so they can get started reading, then receive the remaining pieces later.
314	Ask the Finance Committee Meetings if they'd prefer for me to schedule the meetings from now on. If not, send a reminder to a Finance Committee representative to schedule the meeting well in advance of future meetings. Better yet, schedule them as soon as we know the dates for upcoming SC meetings. The sooner they are in the calendar, the better for our planning purposes.	05/20/19	07/31/19	Matthew Heberger		Dalia Fadl used to do this, but it is appropriate for ASC to take over this function now that she has left the committee.

Materials for Agenda Item 10

Multi-Year Planning Workshop
DRAFT AGENDA

Date and location TBD, summer/fall 2019
10:00 am– 5:00 pm

Remote access will be available.

1.	**Introductions and review goals for the meeting** Goals for the meeting: ● Provide overarching guidance to the TAC and subcommittees on funding levels for monitoring and special studies for 2020. ● A general framework for planning over the next 5 years.	10:00
2.	**Discussion: Anticipated management decisions and policies, and related information needs** The TAC has developed a list of upcoming management decisions relevant to the Delta RMP. Steering Committee members will be asked to identify their highest priorities and to identify any issues that are missing from the list. **Materials:** Table of Management Drivers **Desired outcome**: Consensus on management drivers and deadlines for the Delta RMP	9:05
	Decision: Modify the Management and Assessment Questions In 2014, The Delta RMP agreed upon a set of management questions that reflect specific concerns about multiple aspects of the Delta and the impacts of human activities. Since then, the program has sought to conduct monitoring programs or special studies that start to answer these questions. It is worth revisiting whether we are asking the right questions. **Desired Outcomes:** ● Confirmation of our existing questions, or edits to the existing list of questions. ● Identify which questions are the top priority.	10:00

	Lunch	**12:00**
	Where the Delta RMP Fits In There are dozens of monitoring programs active in the Delta, and the scientific and information needs far outstrip our budget. We will go through an exercise to list our Strengths, Weaknesses, Opportunities, and Threats (SWOT) to help us identify where we can best invest our time and resources. **Desired outcomes:** ● Confirm the overall objectives of the Delta RMP over the next five years. ● Identify key obstacles to the program's success and begun discussing how to overcome these.	1:00
3.	**Discussion: Specific program priorities for 2020-2021 and general priorities for 2021 to 2023.** A brief overview of each item will be presented as each is discussed. ● Projected revenue and planned budgets by focus area: o Emerging Contaminants o Pesticides & Aquatic Toxicity o Mercury o Nutrients **Materials**: Draft Multi-Year Plan **Desired outcome:** Agreement on funding levels by focus area (priorities expressed as rough dollar allocations for special study areas over the next five years).	3:00
4.	**Summary, Action Items, Adjourn**	**5:00**

Additional questions for discussion:

- Should we hire a facilitator or expert with experience in strategic planning?
- Is a day-long workshop the ideal length?
- Who should attend the meeting?
- What preparation should be done by staff and/or by the subcommittees to ensure the meeting is a productive one?

	Drivers							Stakeholder Relevance									Priority Constituents Relevance					
Row	Policy, Plan, or Activity	Status	Geographic Scope	Lead(s)	Timing	Links/ References	Relevance to Delta RMP	POTW	Strm.	Agric.	Mon.	Supply	Dredg.	Rsc.	Reg.	Habitat	C U Pests	Hg	Nut's	CECs	Other	Comments
1	Statewide Mercury Provisions	Existing (Adopted/ Implemented)	Statewide	SWRCB	2017	https://www.waterboards.ca.gov/water_issues/programs/mercury/	1	Y	Y	Y	N	Y	Y	Y	Y	Y	N	Y	N	N	N	Delta MeHg TMDL supersedes. This may be relevant if tribal and subsistence beneficial uses are considered for the Delta.
2	Pyrethroid Pesticides Control Plan (Basin Plan Amendment), including Research Plan	Existing (Adopted/ Implemented)	Central Valley Region (Region 5)	CVRWQCB	2018	https://www.waterboards.ca.gov/centralvalley/water_issues/tmdl/central_valley_projects/central_valley_pesticides/pyrethroid_tmdl_bpa/	1	Y	Y	Y	N	N	N	Y	Y	N	Y	N	N	N	N	TMDL requires consideration of adoption of pyrethroid water quality objectives within fifteen years. Research Plan needed to address "considerable uncertainty in the characterization of the extent of the pyrethroid problem, the potential reductions needed, and the effectiveness of management practices and techNlogy to control pyrethroid discharges."
3	Delta Nutrient Research Plan	Existing (Adopted/ Implemented)	Delta	CVRWQCB	2018	https://www.waterboards.ca.gov/centralvalley/water_issues/delta_water_quality/delta_nutrient_research_plan/	1	Y	Y	Y	Y	Y	N	N	Y	Y	N	N	Y	N	N	Effort led by the Central Valley Regional Water Quality Control Board. For the past 2 years, the Delta RMP has made it a goal to support the implementation of the Delta Nutrient Research Plan. Nutrient Subcommittee meetings have been held in conjunction with the NRP Stakeholder and Technical Advisory Group (STAG) since early 2018. Linked to statewide nutrient plan.
4	Central Valley Diazinon and Chlorpyrifos Control Plan (Basin Plan Amendment)	Existing (Adopted/ Implemented)	Central Valley Region (Region 5)	CVRWQCB	2017	https://www.waterboards.ca.gov/rwqcb5/water_issues/tmdl/central_valley_projects/central_valley_pesticides/	1	Y	Y	Y	N	N	N	N	Y	N	Y	N	N	N	N	Already banned for urban use & believed no longer an issue in urban tributaries.
5	Delta Methylmercury Total Maximum Daily Load, Phase II	Existing (Adopted/ Implemented)	Delta	CVRWQCB	2022	https://www.waterboards.ca.gov/rwqcb5/water_issues/tmdl/central_valley_projects/delta_hg/	1	Y	Y	Y	N	Y	Y	Y	Y	Y	N	Y	N	N	Sediment	Delta RMP mercury monitoring to: 1) better quantify the fish-water linkage that is the foundation of the TMDL, 2) support calculations of mercury and methylmercury loads and mass balances, 3) support development of mercury models for the Delta and Yolo Bypass, and 4) support evaluation of the fish data by providing information on processes and trends. 5) potential-evaluate habitat restoration on methylmercury levels.
6	CECs monitoring program	In Development	Statewide	SWRCB	On-going	https://www.waterboards.ca.gov/water_issues/programs/swamp/cec_aquatic/	1	Y	Y	Y	N	Y	N	N	Y	N	N	N	N	Y	N	CECs special study conducted by Delta RMP should be evaluated in statewide context. The State Water Board has developed recycled water policy that included CECs. Far less is known about impacts on ecosystems. Drinking water policy relevance?
7	Surface Water Protection Program	In Development	Statewide	DPR	On-going	https://www.cdpr.ca.gov/docs/emon/surfwtr/index.htm	1	N	Y	Y	N	N	N	N	Y	N	Y	N	N	N	N	DPR supports its regulatory rule-making process with surface water quality monitoring, surface water quality modeling, a surface water quality database, and assessment of water quality impacts. The regulations identify pesticides that have a high potential to contaminate surface water in outdoor nonagricultural settings, and require pest control businesses, including maintenance gardeners, that apply these pesticides to take actions to minimize that contamination.
8	Safer Consumer Products Program	In Development	Statewide	DTSC	On-going		1	Y	Y	N	N	Y	N	N	Y	N	Y	N	N	Y	N	Use of monitoring data is essential to the implementation of the Program, and consideration of potential drinking water quality impacts is an important aspect of the chemical designation process: https://dtsc.ca.gov/wp-content/uploads/sites/31/2018/07/SCP-Final-Regs-Text-10-01-2013.pdf
9	Sediment Quality Provisions for Enclosed Bays and Estuaries (Part I and Part II)	Existing (Adopted/ Implemented)	Statewide	SWRCB	2018	https://www.waterboards.ca.gov/water_issues/programs/bptcp/sediment.html	2	Y	Y	Y	N	Y	Y	N	Y	N	N	N	N	N		Sediments in bays and estuaries are often contaminated with a variety of pollutants stemming from sources including industrial and agricultural discharges, municipal wastewater treatment plants and storm water. Exposure to contaminated sediments can have a significant effect on the health, diversity and abundance of invertebrates such as clams and worms. Foraging fish and birds may also be exposed by ingesting contaminated invertebrates or sediments. In turn, those organisms consuming contaminated fish may be exposed to toxic pollutants. These effects underscore the need to develop sediment quality objectives that protect aquatic ecosystems and human health. The State Water Resources Control Board (State Water Board) intends to develop and adopt sediment quality objectives (SQOs) for enclosed bays and estuaries. This process will require approximately four years to complete. See link for project progress. Note that a decade-old study found little to no toxicity in Delta sediments.
10	Central Valley-Wide Salt and Nitrate Control Program (CV-SALTS)	Existing (Pending SWRCB adoption)	Central Valley Region (Region 5)	CVRWQCB	On-going	https://www.waterboards.ca.gov/centralvalley/water_issues/salinity/#saltnitrate_cp_bpa	2	Y	Y	Y	N	?	N	N	Y	N	N	N	N	N	EC and Nitrate	Management of salt and nitrate required by the Basin Plan Amendment (BPA) will likely reduce the loading of nitrate to the Delta as all dischargers are required to reduce the loads discharged to either surface or groundwater.
11	Strategy to Optimize Resource Management of Storm Water (STORMS) - Project 6a. Establish Statewide Framework for Urban Pesticide Reduction	In Development	Statewide	SWRCB	2019	https://www.waterboards.ca.gov/water_issues/programs/stormwater/storms/strategy.shtml	2	N	Y	Y	Y	N	N	Y	Y	N	Y	N	N	N	N	Basin Plan Amendment? Compliance measure in STORMS for MS4 Permittees is to "Conduct pesticide monitoring, with an option to comply through participation in a coordinated statewide urban pesticide monitoring program." Delta RMP should coordinate future Delta RMP pesticides monitoring with the STORMS Statewide monitoring plan.
12	SF Bay Hg TMDL	Existing (Adopted/ Implemented)	Central Valley Region (Region 5), SF Bay Region (Region 2)	CVRWQCB	2005	https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/TMDLs/sfbaymercurytmdl.html	2	N	N	N	N	N	N	N	Y	N	N	Y	N	N	N	The Delta has a total mercury (THg) load allocation, which requires monitoring to assess compliance; CVRWQCB has allocated THg load reduction to Cache Creek Settling Basin (managed by DWR) based on this allocation.
13	Delta Smelt Resliency Strategy	Existing (Adopted/ Implemented)	Delta, SF Bay	Resources Agency	2016	http://resources.ca.gov/delta-smelt-resiliency-strategy/	2	N	Y	Y	Y	N	N	Y	N	Y	Y	N	N	N	Y	Under a comprehensive strategy, state and federal agencies will work to rapidly improve conditions for endangered Delta smelt, which are close to extinction. The strategy represents a management shift for state and federal water and wildlife agencies, which are addressing multiple stressors on Delta smelt in a systematic way while studying the synergy of the actions.
14	Water Quality Criteria Development for Oxyfluorfen, Prometryn, Simazine, Trifluralin and Fipronil	Future	Central Valley Region (Region 5)	CVRWQCB	?	https://www.waterboards.ca.gov/rwqcb5/water_issues/tmdl/central_valley_projects/central_valley_pesticides/criteria_method/	3	Y	Y	Y	N	N	N	N	N	N	Y	N	N	N	N	Water quality criteria have developed; these have not been adopted as water quality objectives.
15	Ammonia Water Quality Objectives	Future	Central Valley Region (Region 5)	CVRWQCB	?	https://www.waterboards.ca.gov/centralvalley/water_issues/basin_plans/oldtriennialreviews/2018tr/2018_1016_2018tr_workplan.pdf	3	Y	N	?	Y	N	N	N	Y	N	N	N	Y	N	N	

	Drivers							Stakeholder Relevance									Priority Constituents Relevance					
Row	Policy, Plan, or Activity	Status	Geographic Scope	Lead(s)	Timing	Links/ References	Relevance to Delta RMP	POTW	Strm.	Agric.	Mon.	Supply	Dredg.	Rsc.	Reg.	Habitat	C U Pests	Hg	Nut's	CECs	Other	Comments
16	Dissolved Oxygen Objectives	Future	Central Valley Region (Region 5)	CVRWQCB	2021	https://www.waterboards.ca.gov/centralvalley/water_issues/basin_plans/oldtriennialreviews/2018tr/2018_1016_2018tr_workplan.pdf	3	Y	Y	Y	Y	N	N	Y	Y	Y	N	N	Y	N	N	Development of site-specific dissolved oxygen objectives for: Sacramento-San Joaquin Delta, Lower Stanislaus River, Old and Middle Rivers.
17	Curernt use fungicides and herbicides toxicity reference values	In Development	Central Valley Region (Region 5)	UC Davis	2020	https://www.waterboards.ca.gov/centralvalley/water_issues/basin_plans/oldtriennialreviews/2018tr/2018_1016_2018tr_workplan.pdf	3	Y	Y	Y	N	N	N	Y	Y	N	Y	N	N	N	N	The Board has contracted $375,000 with UC Davis to develop toxicity reference values for current use fungicides and herbicides found in the Delta on resident algal species. This work involves phytoplankton LC50 determination following four-day growth tests with up to four herbicides and fungicides commonly detected in Delta waters. Need to ID nexus to Delta RMP.
18	Conservation and Recovery Activities (for salmon, steelhead, and green sturgeon)	Existing (Adopted/ Implemented)	Statewide	NOAA Fisheries	On-going	https://www.westcoast.fisheries.Naa.gov/central_valley/	3	N	N	Y	N	N	N	Y	N	Y	Y	Y	Y	Y	N	DFW conducting research on non-native species and contaminants. Need to ID nexus to Delta RMP.
19	Statewide Bacteria Provisions & Use Attainability Analyses	Existing (Adopted/ Implemented)	Statewide	SWRCB	2018	https://www.waterboards.ca.gov/bacterialobjectives/	3	Y	Y	Y	N	N	N	N	Y	N	N	N	N	N	Bacteria Indicators	The provisions allow the Regional Water Board to develop criteria for natural source exclusions. This seems like a perfect project for the Delta RMP to tackle. Finally, it is my understanding that the Provisions do not apply to agricultural discharges.
20	Biological Integrity Assessment Implementation Plan & Biostimulatory Substances Amendment	In Development	Statewide	SWRCB	2017-2022?	https://www.waterboards.ca.gov/water_issues/programs/biostimulatory_substances_biointegrity/	3	Y	Y	Y	N	N	N	N	N	N	N	N	N	N	Various	To develop based on results of Statewide Nutrient Study Plan; need to ID reference conditions in Delta; also address harmful algal blooms (HABs).
21	Temperature Criteria and Objectives	Future	Central Valley Region (Region 5)	CVRWQCB	?	https://www.waterboards.ca.gov/centralvalley/water_issues/basin_plans/oldtriennialreviews/2018tr/2018_1016_2018tr_workplan.pdf	3	Y	N	?	Y	N	N	Y	Y	N	N	N	Y	N	Y	
22	Delta Science Plan Update	Existing (Adopted/ Implemented)	Delta	Delta Stewardship Council	2018	http://deltacouncil.ca.gov/docs/delta-science-plan/draft-delta-science-plan-update-public-review-august-22-2018	3	N	N	N	Y	N	N	Y	N	Y	N	N	N	Y	Y	Related to RMP holistically, but does not include specific water quality management drivers.
23	Delta 2017-2021 Science Action Agenda	Existing (Adopted/ Implemented)	Delta	Delta Stewardship Council	2017-2021	http://scienceactionagenda.deltacouncil.ca.gov/	3	N	N	N	Y	N	N	Y	N	Y	Y	Y	Y	Y	Y	The Science Action Agenda is a four-year science agenda for the Sacramento-San Joaquin Delta that prioritizes and aligns science actions to inform management decisions, fills gaps in knowledge, promotes collaborative science, builds the science infrastructure, and achieves the objectives of the Delta Science Plan. The primary purpose of the IEP Science Agenda is to guide the development of the IEP Annual Work Plans.
24	Cannabis Cultivation General Order	Existing (Adopted/ Implemented)	Statewide	SWRCB	2017	https://www.waterboards.ca.gov/water_issues/programs/cannabis/	3	?	?	N	N	N	N	?	Y	N	Y	N	Y	N	?	Relevant to stakeholders other than State and Regional Water Boards? Ag will not allow cannabis operations to join; no registered pesticides approved for use on cannabis.
25	Operations (dam releases, barriers)	Existing (Adopted/ Implemented)	Statewide	DWR, USBR	On-going	http://wwwoandm.water.ca.gov/ https://www.usbr.gov/mp/ncao/	3	N	N	N	N	Y	N	Y	N	Y	N	N	N	N	N	Need to ID nexus to Delta RMP. Increased flows from dam releases dilute contaminants and may lessen their environmental impact. Releases can cause changes to water temperature, dissolved oxygen, suspended sediment, and other water quality parameters.
26	Drinking Water Policy	Existing (Adopted/ Implemented)	Central Valley Region (Region 5)	CVRWQCB	2014	https://www.waterboards.ca.gov/centralvalley/water_issues/drinking_water_policy/	3	Y	N	N	Y	Y	N	N	N	N	N	N	N	N	Bacterial Indicators	Pathogen study completed; RWQCB to review policy in 2023 if there are significant changes to the characteristics of the project area, drinking water treatment standards based on source water quality, or knowledge regarding drinking water constituents of concern
27	North SF Bay Selenium TMDL	Existing (Adopted/ Implemented)	Central Valley Region (Region 5), SF Bay Region (Region 2)	SFBRWQCB	2016	https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/TMDLs/seleniumtmdl.shtml	3	Y	N	Y	N	N	N	N	Y	N	N	N	N	N	Selenium	Fully approved and in effect since Aug 2016. Primary load allocation is "Central Valley Watershed", waste load allocation (WLA) to POTW, no WLA to stormwater dischargers, of signficance to agriculture as part of CV Watershed. Full attainment expected by 2019.
28	Control of Selenium in the Lower San Joaquin River Basin (San Joaquin River Selenium TMDL)	Existing (Adopted/ Implemented)	Central Valley Region (Region 5)	CVRWQCB	2001	https://www.waterboards.ca.gov/centralvalley/water_issues/tmdl/central_valley_projects/san_joaquin_se/	3	N	N	Y	N	N	N	N	Y	N	N	N	N	N	Selenium	Approved in August 2001 Subsurface agricultural drainage discharges from this area are the major source of selenium.
29	Statewide Toxicity Provisions	In Development	Statewide	SWRCB	Early 2019	https://www.waterboards.ca.gov/water_issues/programs/state_implementation_policy/tx_ass_cntrl.html	3	Y	Y	?	N	N	N	N	N	N	Y	N	N	N	N	
30	Clean Water Act Section 401 Water Quality Certifications (dredge and fill permits)	Existing (Adopted/ Implemented)	Central Valley Region (Region 5)	CVRWQCB	On-going	https://www.waterboards.ca.gov/centralvalley/water_issues/water_quality_certification/	4	N	N	N	Y	Y	Y	Y	Y	Y	?	Y	Y	N	N	DWR, two ports, and a yacht club have been required to participate in Delta RMP via 401 WQ cert. conditions. RMP provides overall, cumulative monitoring instead of project specific monitoring. Restoration Projects (e.g., under BDCP, EcoRestore http://resources.ca.gov/ecorestore/and BiOps) & adaptive management
31	Regional Stormwater Permit	Existing (Adopted/ Implemented)	Central Valley Region (Region 5)	CVRWQCB	2016	https://www.waterboards.ca.gov/water_issues/programs/stormwater/phase_ii_municipal.html	4	N	Y	N	N	N	N	N	Y	N	Y	Y	N	Y	N	Where rather than each small community having its own discharge permit, they have "blanket" coverage under a regional permit that applies to smaller communities, typically those with a population less than 100,000. Regional Permit requires Permittees within the legal Delta to join the Delta RMP when obtaining coverage. Permittees outside the legal Delta may be required to participate in the Delta RMP "if directed and approved by the Executive Officer to address all or part of the local water quality monitoring requirements of this Order."