



Meeting Summary

Technical Advisory Committee

Friday, April 3, 2020

In attendance:

Name	Representing	Affiliation	Position
Michael Johnson	Agriculture (2 seats)	MLJ Environmental	Primary
Melissa Turner	Agriculture (2 seats)	MLJ Environmental	Primary
Stephen McCord	Chair	McCord Environmental Inc.	Chair
Sal Batmanghlich	Coordinated Monitoring (1 seat)	Department of Water Resources	Alternate
Erich Delmas	POTW (3 seats)	City of Tracy	Primary
Cam Irvine	POTW (3 seats)	Robertson-Bryan Inc.	Primary
Tim Mussen	POTW (3 seats)	Sacramento Regional County Sanitation District (Regional San)	Primary
Lisa Thompson	POTW (3 seats)	Regional San	Alternate
Janis Cooke	Regulatory Agencies (3 seats)	Central Valley Regional Water Quality Control Board (Regional Board)	Primary
Bev Anderson-Abbs	Regulatory Agencies (3 seats)	State Water Resources Control Board (State Board)	Primary
Debra Denton	Regulatory Agencies (3 seats)	U.S. Environmental Protection Agency (EPA)	Primary
Selina Cole	Regulatory Agencies (3 seats)	Regional Board	Alternate
Amy Phillips	Stormwater Agencies (3 seats)	El Dorado County	Primary
Karen Ashby	Stormwater Agencies (3 seats)	Larry Walker Associates	Primary
Brian Laurenson	Stormwater Agencies (3 seats)	Larry Walker Associates	Primary
Hope McCaslin Taylor	Stormwater Agencies (3 seats)	Larry Walker Associates	Alternate
Lynda Smith	Water Supply (1 seat)	Metropolitan Water District of Southern California	Alternate

Staff and Collaborators

Name	Affiliation	Position
Dave Ceppos	Consensus and Collaboration Program, Sacramento State	Facilitator
Debbie Webster	Central Valley Clean Water Association	Steering Committee co-chair
Jay Davis	Aquatic Science Center (ASC)	Principal Investigator for mercury monitoring
Jim Orlando	U.S. Geological Survey (USGS), Organic Chemistry Research Laboratory (OCRL)	Project partner
Manisay (Joy) Khamphanh	Department of Water Resources	Steering Committee member
Matthew Heberger	ASC	Program Manager
Michelle Snapp	Regional Board	
Wes Heim	Marine Pollution Studies Laboratory at Moss Landing	Project Partner

Facilitator Dave Ceppos (facilitator) reviewed guidelines for holding online meetings. He advised that the Delta Regional Monitoring Program (Delta RMP) Technical Advisory Committee (TAC) will use its customary [consensus-seeking method](#) for making recommendations. TAC members should use the chat feature in Zoom to cast their “vote,” i.e. green to agree, yellow to express reservations, etc. A TAC member suggested using the Yes, No, and Raise Hand buttons in Zoom’s chat to do voting/consensus seeking. The facilitator stated that based on initial feedback from some TAC members, it has been proposed that the TAC will discuss the consensus-seeking model at the next meeting to assess it’s efficacy thus far.

2. Information: Steering Committee Update

The TAC Chair, Stephen McCord, summarized recent Steering Committee (SC) meetings, including the decisions and action items relevant to the TAC. See here for a copy of his [slides](#).

The SC Meeting Summary from January 10, 2020 was reviewed at the February TAC meeting. Stephen reviewed additional items that were discussed by the SC at its March 11, 2020 meeting and clarified in subsequent Coordinating Committee meetings.

A TAC member asked about the status of the planned USGS high-resolution cruise in May which the SC recently decided to fund.¹ Program manager Matt Heberger replied that it is currently

¹ Note: the USGS Biogeochemistry Group formerly referred to these research cruises as “high-frequency,” but changed recently to using the term “high-resolution.” These two terms

uncertain as to whether they will be allowed to go out due to the state and county “shelter in place” orders. Matt further described this was one of the main goals of today’s meeting--to discuss how the Delta RMP can and should adapt to the current public health crisis.

3. Decision: Approve previous TAC meeting summary and confirm/set future TAC meeting dates

There were no comments on the February 13, 2020 TAC Meeting summary, and it was approved by consensus. [Reminder that approved meeting summaries are posted at <http://sfei.org/DeltaRMP-MeetingMaterials>.]

Upcoming Scheduled Meetings:

(Note: upcoming meetings are likely to be teleconference only)

- SC Meeting, 10am-4pm, May 26, 2020, Regional San

Action Item:

- Poll TAC members to schedule the next TAC meeting for early May (Matt Heberger, by 4/10/2020)

Impact of Coronavirus on the Delta RMP

The facilitator raised the current public health conditions and in that context, posed the following questions to the TAC for discussion:

- Who can still participate?
- How will we interact?
- What platforms should we use?
- What processes might change?

The facilitator stated that videoconferencing is likely to be the new normal for a while. Matt announced that ASC is changing from the JoinMe video conferencing software to Zoom. Zoom has limitations including a potential prohibition for federal employees to use it. We also need to be aware of the possibility of “zoom bombing”. [We may need to take steps to prevent this as our meetings are public. See this blog post by Zoom on [How to Keep Uninvited Guests Out of Your Zoom Event](#).]

Field work in the Bay has ceased due to numerous shelter-in-place orders by local jurisdictions. As noted above, the high frequency monitoring cruise by the USGS Biogeochemistry Group planned for May could be postponed or cancelled.

describe the same type of research, which they pioneered and which is described in [this 2017 report](#).

A TAC member noted that it would be appropriate to check in with the SC about what monitoring activities and projects should be prioritized. Another member suggested that RMP staff reach out to the Regional Board and State Board for guidance. The State Board has issued a directive stating monitoring is an “[essential service](#).”

There was concern that because participation in the Delta RMP is required in several of the dischargers permits, there is a regulatory compliance issue at play. Selina Cole from the Regional Board noted that “participation” in the Delta RMP is determined by annual financial contributions, not by specific compliance monitoring. She agreed to confirm with management that there would not be any regulatory consequences for participants if Delta RMP monitoring is cancelled or delayed due to the coronavirus crisis.

Another member noted the importance of developing contingency plans. The Delta RMP should seek to make progress despite the shelter in place rules: i.e. continue to have meetings, work on reports, publish data and deliverables (albeit remotely until otherwise allowed).

Action Items:

- Ask the Coordinating Committee what Delta RMP monitoring is most important to continue, and whether there are regulatory compliance issues we should be aware of (Matt Heberger, by 4/10/2020).
- Determine what kind of guidance from the Regional Board and State Board affects the Delta RMP (Bev Anderson and Selina Cole, by 4/15/2020).

4. Program Updates and Planning

There are several planned monitoring events in coming months that may be affected by the lockdown:

May 2020	Mercury, prey fish (silversides) at Delta wetland restoration sites
May 2020	High-Resolution Nutrient Monitoring prior to Major Wastewater Treatment Plant Upgrades
May 2020	CEC Fish sampling, MLML planned to coordinate with mercury restoration prey fish sampling
Spring 2020	Pesticides sampling (approximately May-June but at least 30 days following last major rainfall/runoff event in the Valley)
Summer 2020	Pesticides sampling (approximately mid July)

There have already been impacts to Delta RMP activities associated with the statewide shelter in place rules including:

- Aquatic Health Program Laboratory at UC Davis has shut down until further notice

- Uncertainty with all other labs and field crews
- SFEI-ASC staff are working remotely, as are many of our partners
- USGS has cancelled all Bay cruises
- Project planning and coordinating has slowed down

A key question for the TAC is what monitoring is critical to keep moving if possible?

- May high-frequency nutrients cruise
- Mercury prey fish monitoring at wetland restoration sites (later in the meeting, Jay Davis explained the rationale for sampling prey fish in the month of May; see below)

What decisions does the Delta RMP need to make in the near future?

- Whether the Delta RMP should collect water samples and analyze them for pesticides if a toxicity lab is not selected and contracted

Technical Subcommittee Updates

During a recent planning discussion for this TAC meeting the incoming TAC Co-Chairs recommended that for this and future meetings, presenters under this standing update section should follow a consistent format for reports from the technical subcommittees. This approach has been adopted for this meeting and will be discussed fully at the next meeting. The proposed format is as follows:

1. Update - what's happened recently
 - a. monitoring
 - b. meetings
2. Status of deliverables
3. Any recent or new "[deviations](#)" and associated corrective actions
4. Project planning - proposals, monitoring design for the next Fiscal Year, etc.

Pesticides and Toxicity

The next pesticides sampling event is planned for May or June. It is meant to be a dry-weather event and should be scheduled at least 30 days following the last major rainfall/runoff event in the Central Valley. However, we do not yet have a contract with a new toxicity testing laboratory, so the program will not be able run tests concurrently with chemistry analyses until further notice. The toxicity lab selection has been postponed due to legal/administrative concerns raised by the Regional Board, State Board and EPA. Staff from the various agencies and the Delta RMP SC Co-Chairs are working to resolve this. In the interim, resolution of this issue has also been slowed due to the pandemic and shelter in place rules.

Four new deviations/corrective actions reports have been generated since late 2019. The list, and completed forms, are online [here](#).

In February 2019, the Aquatic Health Program Laboratory at UC Davis was not able to perform toxicity testing with *Ceriodaphnia*, because their organisms were not healthy. The samples were

sent to MBC Lab in Southern California, where the samples were analyzed, but the results will be flagged for a hold time violation.

A TAC member suggested that the new toxicity lab should have a contingency plan, i.e. they should have a backup lab identified, in case a test organism culture is compromised or some other problem arises. Matt noted that the current lab, the Aquatic Health Program Laboratory at UC Davis, has relationships with labs in Davis and Fairfield where they would ordinarily send samples as a backup. However, in February 2020, both of these labs had submitted bids to work with the Delta RMP, and staff wished to avoid any possible conflict of interest.

Water samples were collected March 16-18, 2020, but could not be analyzed for aquatic toxicity. The university ordered the shut-down of the Aquatic Health Program Laboratory at UC Davis due to the COVID-19 public health emergency. Samples were extracted for chemical analysis by USGS and these extracts are currently being stored, pending analysis when operations resume. Members of the CUP subcommittee agreed (via email following sample collection) that, for this unique event, pesticide concentrations should be measured in these storm-samples even though toxicity testing could not be performed.

Deliverables

Deltares recently submitted the final draft Pesticides Interpretive Report. This is the second-to-last deliverable. There is still time to give feedback to be incorporated into the final Report. There is not another meeting with Deltares scheduled or in their scope of work, but TAC members should let Matt Heberger know if this is something they feel is necessary.

Other forthcoming deliverables include:

- Pesticides chemistry lab report by OCRL [Lab staff agreed to write an "informal" lab report for submission to the Delta RMP, rather than publishing a formal USGS report]
- Pesticides chemistry Quality Assurance (QA) summary and technical memo
- Formatted pesticides data uploaded to CEDEN

Finally, the TAC had previously requested ASC prepare a draft scope of work for a Water Year 2019 Data Report. The TAC reviewed this and gave feedback at its February meeting. ASC will revise this draft scope, then have it reviewed by the Pesticides Subcommittee, TAC, and SC.

Action Items:

- Facilitate a discussion by the Pesticides Subcommittee: Should the program wait to sample for pesticides until both chemistry and toxicity analyses can be performed? Discuss the pros and cons of this (Ezra Miller, by 4/30/2020).

Mercury

Principal Investigator Jay Davis gave an update on the activities of the Mercury Subcommittee. See his slides [here](#).

Due to the high level of interest in mercury monitoring, Jay had been cc'ing the TAC on many emails with draft reports and proposals. Going forward, TAC members wanting to follow the mercury work more closely should join the Subcommittee mailing list. Please send an email request to Jay or Matt.

Last fall, the SC allocated a lower funding level for mercury monitoring beginning in the upcoming 2020-2021 fiscal year (FY20-21). The Mercury Subcommittee recommends reducing water monitoring in the spring of the current fiscal year. Even though this work has already been planned and funded, it was felt that there would not be a lot of value in sampling in April and May, as we will not be able to extend the time series for water concentrations in the spring months. This represents an optimal design that fits within the budget. (It was noted that April monitoring is not likely anyway due to the shelter-in-place order.)

Program staff are still hoping to conduct prey fish (silversides) monitoring at wetland restoration sites in May. This is the best time of year to sample prey fish because of the food chain connection to bass that we collect in August. It is also compatible with historical data collected by researchers at UC Davis.

A TAC member recommended that staff develop a contingency plan for mercury monitoring. Jay replied that the program will need to do a lot of fine-tuning of the monitoring design in response to the pandemic. It would be helpful if the RMP had a way to review and approve decisions quickly to be able to quickly respond to this crisis, for example, asking members to submit feedback by email, or voting online.

A member asked whether it would make sense to sample water in the same month as the prey fish, in order to have simultaneous measurements in water and fish tissue. Jay replied that because there is a time lag between detection of aqueous methylmercury and mercury uptake in fish, sampling mercury in water and then, a month or two later, sampling fish is the normal protocol. May is optimal for monitoring of prey fish because they are easier to collect, it is when piscivorous wildlife are active, and it aligns with the Statewide mercury objectives. The TAC did not make a recommendation on whether to cancel planned water monitoring for mercury in April and May, nor what the subsequent sampling date might be. The TAC recommended scheduling a discussion at the next TAC meeting, or gathering input via email.

Action Item:

- Coordinating Committee clarify process for addressing contingencies (i.e. should we consider doing the monitoring planned for April at a later time?) Discuss how the Delta RMP can review and approve decisions quickly to be able to quickly respond to this crisis, for example, asking subcommittees to submit feedback by email, or holding SC votes online (Matthew Heberger, by 4/20/2020).

Nutrients

The Nutrients Subcommittee met in January and March 2020. At the March 4, 2020 meeting, the Subcommittee discussed harmful algal blooms (HABs), and there were presentations by Meredith Howard (Regional Board) and Peggy Lehman (DWR) on past work on HABs around the state and in the Delta. [The [draft meeting summary](#) includes links to these presentations.] The subcommittee is working and meeting again to discuss HABs further. We have been waiting on news of outstanding proposals that have been submitted for funding. This will have an impact on what the needs are, and where we feel we can do the most good.

Updates on current work and deliverables:

- Biogeochemical modeling of the 2016 Water Year remains underway by ASC. There was a delay due to the loss of a team member. The project team led by ASC's Dr. Dave Senn would like to give a more detailed update at a future meeting.
- Data analysis for the "Sacramento River Nutrient Change Study" is continuing. Monitoring occurred in the fall of 2019.
- For the project "Cross-Delta Monitoring Using High-Frequency Tools," a 2018 project by the USGS Biogeochemical Group, the draft report and data visualization are now available for review. These will be reviewed first by the Nutrients Subcommittee, then by the TAC.
- For the Chlorophyll-a Intercalibration Study, the draft report is under review by the Study Workgroup. The Workgroup will meet to discuss the report, at a date to be determined.
- The recently-funded High-Resolution Nutrient Monitoring cruise by USGS is still planned for May, but will potentially be cancelled pending shelter in place restrictions. It was planned to occur prior to major wastewater treatment plant upgrades. The USGS has other funding to support future cruises.

Contaminants of Emerging Concern (CECs)

QAPP completion has been delayed as staff are waiting for lab SOPs [from Vista and Physis Labs]. ASC is working to finalize without much additional delay. The CECs Subcommittee met once in January 2020 ([draft summary here](#)) to make a recommendation on lab selection.

There is one time-sensitive item: Moss Landing was intending to coordinate fish collection for CEC analysis with prey fish sampling for mercury at wetland restoration sites in May.

Data Management

Data Management Subcommittee members have drafted a memo regarding Delta RMP CUP Toxicity Data in CEDEN to describe our historic toxicity data for data users, and provide guidance to labs on how we would like them to handle data reporting.

ASC's QA team is revising its Data Management and Quality Assurance Standard Operating Procedures document (QAPP appendix), working with the State Board to harmonize our data review/flagging policies with theirs to be SWAMP comparable.

Action Item:

- Coordinating Committee to review memo regarding addressing conflicting comments on QAPPs (Matt Heberger, by 4/20/2020).

5. Review Delta QAPP revisions related to mercury monitoring at wetland restoration sites

In 2019, the Mercury Subcommittee requested additional funding for mercury monitoring at restoration sites. On September 25, 2019, the TAC recommended this expanded monitoring, while requesting that ASC staff continue to add details to the proposal and QAPP including: (1) distance crews can go from target site, (2) how flows and hydrodynamics affect the connectivity between the sites, (3) additional information on the rationale for station locations, (4) information about RB2 monitoring at Winter Island, and (5) other comments by Central Valley Water Board staff. Items 1, 3, 4 and 5 have been addressed. Jay created a "crosswalk" showing where each element was inserted into the revised Delta RMP QAPP ([link](#)), available upon request.

ASC staff have not yet added hydrodynamic information related to the restoration (and comparison) sites. The key staff member working on this has been on extended sick leave. Jay asked if this missing information will prevent the QAPP from being approved at this time. Regional Board staff and other TAC members stated they support continuing the scheduled sampling while gathering information, and adjusting sampling sites if warranted. A member noted that this information on hydrodynamics is important and has a large bearing on the study, and staff should make this a high priority as it could directly inform adaptive management of site locations and data interpretation.

Jay Davis expressed optimism that this information would be available in the next week or two. Matt showed a Gantt chart for the timeline to finalize QAPP revisions and have it reviewed and approved in the next 6 weeks.

A TAC member expressed concern about when the State Board would be able to review and potentially approve the QAPP.

Action Items:

- Ask State Board staff how long they need to review the document. (Matt Heberger, by 4/10/2020)
- Work with the Mercury Subcommittee to develop an updated monitoring timeline given shelter-in-place restrictions. (Jay Davis, by 4/10/2020)

6. Wrap-up

Schedule TAC meeting for spring/summer 2020. Seek dates/times in the first week of May.

Key agenda items are to review/recommend the following (with expected availability dates):

- Process for resolving conflicting QAPP comments (4/13)
- Pesticides Data Report scope (4/30/2020)
- Toxicity lab selection (?)
- Revised mercury monitoring design for FY20-21 (4/10), 2020 QAPP & FY20-21 monitoring proposal (4/17), data reports (5/1)
- QAPP for CECs (4/17?)
- Draft Report for 2018 HF cruises (4/30?)

Action Item:

- Continue tracking state guidance on the shelter-in-place order, clarifying how it affects the program, and communicating news to stakeholders (Matt Heberger, Selina Cole, through at least 6/30/2020)



Delta RMP Nutrients Subcommittee Meeting Summary

Wednesday, March 4, 2020, 1:00 - 4:00 pm

In attendance:

- Angela Hansen, United States Geological Survey (USGS)
- Bev Anderson-Abbs, State Water Resources Control Board
- Debbie Webster, Central Valley Clean Water Association (CVCWA)
- Ellen Preece, Robertson Bryan Inc.
- Jamie Yin, Aquatic Science Center (ASC)
- Janis Cooke, Central Valley Regional Water Quality Control Board (Central Valley Water Board)
- Lindsay Nelson, MLJ Environmental
- Lisa Thompson, Sacramento Regional County Sanitation District (Regional San)
- Matthew Heberger, ASC
- Melissa Turner, MLJ Environmental
- Meredith Howard, Central Valley Water Board
- Peggy Lehman, Department of Water Resources (DWR)
- Rebecca Franklin, Regional San
- Sal Batmanghilich, DWR
- Stephen McCord, Technical Advisory Committee chair
- Tamara Kraus, USGS
- Tim Mussen, Regional San
- Tom Grovhoug, Larry Walker Assoc.

The purpose of this meeting was to give members an introduction on Harmful Algal Blooms (HABs) and determine what role of the Delta RMP might play in monitoring HABs. Monitoring of HABs has come up as a priority of the State Water Board and was identified as an area of interest for monitoring by the Delta RMP Steering Committee at their January 10, 2020 meeting.

Monitoring Cyanotoxins and Harmful Algal Blooms

Desired outcome: Inform committee on the state-of-the-science with regard to monitoring cyanotoxins and harmful algae.

Meredith Howard of the Central Valley Water Board gave a [presentation](#) (link to PDF of presentation) about the prevalence of HABs in California and the importance of monitoring them. The goal of this section was to determine what type of questions the Delta RMP can answer with the funds allocated and to narrow the scope of the projects that the Delta RMP pursues.

Ellen Preece wrote a review [paper](#) in 2017 about microcystins that summarizes how microcystins can negatively impact human health.¹ Microcystins are a problem across the U.S. and are persistent but are not routinely monitored. Once monitoring started it became clear how widespread they were. HABs are coming more into the public eye, and have been highlighted in the news.

There has been increased pressure from the media and public to monitor HABs. The Water Board has been inundated with questions about HABs, this concern was part of the impetus for [Assembly Bill 834](#), which mandated (but did not fund) a HAB monitoring program.

Central Valley Water Board staff are interested in putting together a long term report of what the DRMP wants to do about HABs going forward. One idea for the risk assessment piece is to identify areas for high risk.

The State Board wrote a strategy [document](#) providing guidance on how to deal with cyanoHABs.² There is a state website and guidance documents for monitoring and reporting. Resources for bloom events are compiled on the [My Water Quality](#) website. There is a need for more monitoring and the Delta RMP may be able to support other monitoring efforts and/or fill some monitoring gaps.

The 60% of HABs reported to the California cyanoHAB portal occurred in the Central Valley region. HABs have been an indicator of broader issues in the Delta and they tend to be site specific. There is a lot of toxigenic algae in CA, especially in wadeable streams, this tends to be benthic algae. Higher toxin concentrations are found in more remote areas.

¹ Preece, E. P., Hardy, F. J., Moore, B. C., & Bryan, M. (2017). A review of microcystin detections in Estuarine and Marine waters: Environmental implications and human health risk. *Harmful Algae*, 61, 31–45. <https://doi.org/10.1016/j.hal.2016.11.006>

² Anderson-Abbs, B., Howard, M., Taberski, K., & Worcester, K. (2016). *California Freshwater Harmful Algal Blooms Assessment and Support Strategy* (No. SWAMP-SP-SB-2016-0001) (p. 39). Sacramento, California: State Water Resources Control Board. https://www.waterboards.ca.gov/sanfranciscobay/water_issues/programs/SWAMP/HABstrategy_phase%201.pdf

SPATT (Solid Phase Adsorption Toxin Tracking, passive sampler) is a useful monitoring method as grab samples alone can underestimate toxin presence. The combination of grab samples and passive samplers can provide valuable insights.

Overview of CyanoHABs in the Delta

Peggy Lehman of DWR gave a [presentation](#) on the history of HABs in the Delta and compared Microcystis presence within the Delta in 2014 and 2017. DWR has monitored HABs since 1999, and determined where HABs are in relation to the marine environment. Water flow can be a major factor in abundance of Microcystis; whether the year is wet or dry makes a difference, with dry years tending to have higher levels of Microcystis. From a management perspective, flow and water temperature are important.

For toxic Microcystis, one must sample toxins often because concentrations change all the time; continuous monitoring is the best.

For 2014 and 2017, the location of X2 was one of the key variables that explained the differences in HAB distributions. X2 is the distance in kilometers from the Golden Gate Bridge where 2 parts per thousand bottom salinity isohaline occurs. Other environmental factors that affect the concentration of Microcystis are nitrogen (N) concentration and freshwater flow. Most of the N that Microcystis takes up is in the form of ammonium, (NH_4^+). Microcystis tend to grow well in clear, warm water ($\sim 25^\circ\text{C}$). When present, under good growing conditions, Microcystis tends to dominate other phytoplankton and take over.

In terms of how water flow impacts Microcystis, 2017 was one of the wettest years on record and Microcystis didn't bloom until October within the Delta, whereas in normal or dryer years they bloom in late August-September. In terms of broader food web implications, the common copepod, *Eurytemora*, is not as sensitive as the *Pseudodiaptomus* copepod to microcystins. Fish have developed deformities after ingesting Microcystis.

Water Board Priorities for Delta HAB Monitoring

- See the bulleted list of questions below
- Overview of submitted Prop 1 and Delta Science Program HABs proposals
- *Desired outcome: Inform committee of Water Board priorities.*

Water Board Delta HABs questions

- What are the spatial and temporal distributions of potential cyanotoxins in the Delta?
 - o First priority is understanding the spatial and temporal distributions and movement in main surface water channels
 - o Secondary priorities are understanding cyanotoxin risks to people (water and possibly sediment at recreational sites) and wildlife (benthic organisms) in greater detail.

- What are the sources of Microcystis cells that create blooms at known hot spots (Discovery Bay, Stockton waterfront, Big Break, possibly South Delta Old and Middle River)?
 - Follow-up: by directly targeting Microcystis source areas for management, is there reasonable potential to improve water quality throughout the Delta?
- What are the characteristics and growth patterns of Microcystis as it moves through the Delta? Specifically, Microcystis is prevalent in the lower San Joaquin River in late summer (e.g. DWR visual scores of 3-4)
 - What are the growth rates of these cells? To what extent are growth rates limited by turbulence and hydrology?
 - What is the potential for production of microcystins from cells in the San Joaquin River?
- What is the likelihood that reducing nutrient loads to the Delta would cause an increase in production of microcystins?

Summary of ideas from the discussion on priorities for a Delta RMP HABs Study:

1. **Spatial distributions of toxins**
 - a. Leverage off USGS and Bay RMP (a benefit of leveraging is the high quality water data that will be paired with this). Combining HAB sampling at High Frequency monitoring stations may help identify environmental conditions influencing HAB formation and abundance.
 - b. Combining HAB sampling with High Frequency mapping cruises could provide a snapshot of the spatial resolution of HABs occurring in the Delta at the time of the experiment and potentially identify hotspots. The mapping cruises would also record data on water conditions occurring inside and outside of blooms, which would help us evaluate bloom drivers. The mapping cruise should be conducted when there is a bloom in the Delta, to provide the most information.
 - c. Put in more long term monitoring stations in areas where HAB blooms are known to occur.
2. **Changes to phytoplankton community composition from the Regional San Upgrade**
 - a. Changes to HAB species
 - i. TBD: sampling technique to identify HAB species and other phytoplankton
 - b. The time frame before and after the Regional San upgrade is the only chance to see the effects of the large change to nitrogen input into the Delta
 - i. TBD: when and where sampling would occur

- c. Changes to strain variation (toxic vs not toxic)
 - d. Some type of statistical or other analysis that will be done to make sure that the observed changes in phytoplankton species composition is a direct result of the Regional San upgrade
3. **Lab experiments to see effects of nutrient changes on phytoplankton**
- a. Could be done with a smaller budget than a full monitoring program
 - b. Allows for better understanding of environmental data and underlying causes

Discussion Priorities for a Delta RMP HABs Study

The goal of this discussion is to determine what niche the Delta RMP can fill and to determine what questions the subcommittee wants to answer.

Microcystis has a high growth rate (determined by DWR using dissolved oxygen studies) at the end of August and beginning of September.

One idea is to use a SPATT sampler on the USGS high frequency cruises. A committee member suggested that we should verify that roughly 30-min exposures to SPATT is sufficient to measure HAB toxins, if SPATT will be used on the cruises. There is the potential for integrating this and putting SPATT bags out for collection. There is an option for funding this idea in addition to through Delta RMP funds. The USGS Biogeochemical group anticipates submitting a proposal for internal USGS funds for some SPATT work in the Delta. Tamara Kraus noted that for all USGS projects there needs to be a 50/50 match between USGS and external collaborators. Pre-proposals for the scheduled fiscal year need to be in by 3/20 (500-600 words), \$95K match.

The group discussed merits of adding SPATT bags to a high-frequency cruise in May. The Nutrients Subcommittee already recommended to the TAC and SC that the Delta RMP fund a May 2020 cruise to collect nitrate, ammonia, phosphate, and other water quality data. It might not make sense to deploy the SPATT in May because there most likely will not be Microcystis then. People are generally interested in doing the SPATT but it's too soon. **[Comment by subcommittee member provided after the meeting:** "Perhaps we could revisit the technical paper written by [Mine Berg and Martha Sutula in 2015](#) to see if they have answered some of these questions and provided direction. they did recommend increased monitoring of the delta among other things."]

A current unknown for the Delta is what is going to happen with the nutrient shift when the Regional San upgrade comes online. Nitrogen loading will be reduced and the consequences for the Delta are unknown. A committee member brought up the point that if one wants to look at effects from Regional San upgrade then the study should take great care to ensure that the project's spatial extent aligns with the water flow coming from Regional San in order to not confound effects. Another study question could be what are the effects of a nitrogen species change.

Another change to the Delta is sea level rise (SLR), which is going to make the Delta saltier and change phytoplankton community composition. SLR is confounded by the long-term effects of climate change. Although SLR in the Delta is important to study, the Delta RMP SC is not focused on funding long-term projects such as SLR.

A further question for the Delta RMP is whether the goal should be to mitigate or manage. The subcommittee should make sure that whatever projects we are going to initiate and/or contribute to will have a tangible positive impact, with clear questions that will be relevant to improved water quality in the Delta.

Next steps

We need to figure out what we should do with the data acquired from the proposed study areas, conduct some directed sampling, and have specific questions so we can collect data to help inform management decisions [made by others]. One question we could look at is if nutrients from Regional San are an important factor in HAB trends.

More work and discussion is necessary to develop tangible project ideas.

Action Item:

- Flesh out some HAB project ideas, including costs, for discussion at the next meeting (Meredith Howard, Janis Cooke, ASC staff)

Next meeting (early April):

- Update on all the projects submitted for funding (Prop 1, etc.)
- The agenda item: Non-HABs Project Discussion, Janis Cooke, will be moved to the next meeting



Delta RMP Nutrients Subcommittee

Meeting Summary

Monday, May 4th, 2020

In attendance:

- Angela Hansen, USGS Biogeochemistry Group
- Bev Anderson-Abbs, State Water Resources Control Board
- Debbie Webster, Central Valley Clean Water Association
- Ellen Preece, Robertson Bryan Inc.
- Jamie Yin, Aquatic Science Center
- Janis Cooke, Central Valley Regional Water Quality Control Board
- Jenna Rinde, Department of Water Resources
- Lynda Smith, Metropolitan Water District of Southern California
- Lindsay Nelson, MLJ Environmental
- Lisa Thompson, Sacramento Regional County Sanitation District (Regional San)
- Matt Heberger, Aquatic Science Center
- Melissa Turner, MLJ Environmental
- Meredith Howard, Central Valley Regional Water Quality Control Board
- Michael Johnson, MLJ Environmental
- Peggy Lehman, Department of Water Resources
- Rebecca Franklin, Sacramento Regional County Sanitation District (Regional San)
- Sal Batmanghlich, Department of Water Resources
- Selina Cole, Central Valley Regional Water Quality Control Board
- Tamara Kraus, USGS Biogeochemistry Group
- Tim Mussen, Sacramento Regional County Sanitation District (Regional San)
- Tom Grovhoug, Larry Walker Associates (LWA)
- Zhenlin Zhang, Department of Water Resources

Approval of recent meeting summaries

The subcommittee approved the following meeting summaries by consensus. The summaries will be converted to PDF and posted on the program website at:

<http://sfei.org/DeltaRMP-MeetingMaterials>

- November 14, 2019
- January 15, 2020
- March 4, 2020

Planning nutrients monitoring and special studies for the 2020-2021 Fiscal Year (FY20-21)

Matt Heberger gave an overview of the context and timeline for planning studies for the upcoming fiscal year. The timeline is outlined [on this slide](#).

A subcommittee member asked whether there could be any impact from the guidance issued by the state Department of Finance which instructed agencies to put a freeze on all new, non-essential contracts (see the [DOF April 30, 2020 Budget Letter](#)). Meredith Howard clarified that the Delta RMP is funded through discharger fees, which are not likely to be impacted by the public health crisis. There is about \$165K remaining for the planning budget and \$102K in SEP funds currently available with more likely

Update on recently funded studies

The goal of this part of the meeting was to develop an understanding of forthcoming projects, knowledge gaps, opportunities for leveraging, and reviewing proposals that could be reused.

Janis Cooke and Ellen Preece gave an overview of the [Benthic Cyanotoxins Prop 1](#) project; the sampling map is [here](#).

Janis summarized the recently-funded study of benthic cyanotoxins. The study is focused on cyanotoxins in water and in benthic organisms, to be sampled 1-2x month for two years, depending on season. The Fisheries Foundation would be collecting samples with a target start date in fall 2020. One of the goals of the project They will also measure toxins (microcystis and saxitoxin) in whole water samples.

Tamara Kraus gave a [presentation](#) and summarized three recently funded studies that the United States Geological Survey Biogeochemistry Group (USGS BGC) will be launching this year. Here is a link to one of the projects Tamara presented on, [USGS Operation Baseline 2.0](#).

The projects Tamara went over are:

1. Monitoring phytoplankton abundance and community structure

This study will evaluate the effects of wastewater-derived nutrients on phytoplankton abundance and community structure in the Delta and Suisun Bay as a response to the Regional San Wastewater Treatment Plant Upgrade. This funds Delta-wide high resolution mapping of water quality, nutrients and phytoplankton (2 surveys in 2020 and 3 surveys in 2021; the Delta RMP is slated to fund 1 survey in 2020), and the addition of fluoroprobes to three water quality monitoring stations.

2. Data to inform modeling efforts in the Cache Slough Complex. This is a data synthesis project to calibrate and validate linked hydrologic-biogeochemical models. This project is a collaboration with the Virginia Institute of Marine Science (VIMS) and DWR to determine the link between nutrients and phytoplankton and the role of aquatic vegetation. One of their study objectives was to determine if the data that USGS collects - particularly in the Cache Slough Complex - could help validate or improve the biogeochemical model that VIMS and DWR are developing.

3. "Counting the small guys": ensuring picocyanobacteria and other small phytoplankton are measured before, during, and after the Sac Regional Upgrade.

The idea behind this project is that larger phytoplankton, such as diatoms, are thought to be better for the food web. However small phytoplankton cells, being very abundant, could be playing a critical, and overlooked, part in the food web. BSA Environmental will do the phytoplankton enumeration and write a paper about the findings.

4. Prop 1 DSP funded Sediment Study

This is a collaboration with USGS and UC Davis' Tomo Kurobe. The idea for this study came out of a synthesis paper written by Dave Senn. The question this project aims to address is whether the benthos is a significant source or a sink for nutrients. This study includes characterizing sediment properties, microbial communities, and measuring benthic fluxes in situ at sites across the Delta. Comparison between non-vegetated and vegetated/wetland sites will be made. Lynda Smith added that another proposal submitted the Wilkerson Group (San Francisco State University) will be funded under the Operation Baseline 2.0 proposal call. Dr. Wilkerson is working on addressing reviewer comments. The proposal is to monitor for potential changes in phytoplankton nitrogen uptake over the next few years.

Action Item:

- Lynda Smith will send a description of the Wilkerson Lab project to the group (Lynda 6/5/20)

Priorities for monitoring in FY20-21

Discuss the results of a [short survey](#) sent to subcommittee members on April 16, to poll members on the level of interest in focusing first on status and trends, or a study of cyanotoxins. The goal of this discussion was to determine shared interests for near term HABs work and to come to a consensus on which question(s) the Delta RMP should answer first.

Peggy Lehman asked what we will be learning from the Status and Trends (S&T) and reiterated the gap in cyanotoxin monitoring. The short poll results showed that all eight members who answered the questionnaire agreed that we should first focus on S&T *and* make the primary effort cyanotoxins.

Peggy suggested that there are emerging toxins such as cyanotoxin and saxitoxin and suggested we should be measuring both. She cautioned that saxitoxin prevalence could increase in the future and it's a toxin worth keeping an eye on. Janis Cooke agreed that monitoring should potentially incorporate multiple toxins such as saxitoxin, anatoxin, and cyanotoxin. One member added that we already know that these toxins are around.

There was some discussion of the public health concern of cyanotoxins and what is within the scope of the Water Board and Delta RMP. Meredith Howard reminded the group that the Water Board is not a public health agency in terms of cyanotoxin impacts to human health and that public health is out of the purview of the Delta RMP. In terms of the role of the Delta RMP and cyanotoxin monitoring, we want to know: is there an impairment, what is the status of the impairment, and how do we mitigate it. Peggy suggested that we should focus on the mitigation. First we get a handle on where the toxins are and then we can make it inform public health. Meredith emphasized that we first need to pinpoint where the HAB hotspots are. There is the potential to use SEP funding for mitigation. Meredith added that there was very likely another \$175K of SEP funding coming in.

Recommendation on proposed project

This section was dedicated to a discussion of options for Delta RMP projects that are responsive to the priorities and studies that can be leveraged from currently funded projects, e.g. [USGS Cyanotoxin Monitoring](#) in the Delta. The desired outcome was to make a recommendation on what types of projects or special studies should be the highest priority.

Tamara presented (presentation [here](#)) on USGS Cyanotoxin Monitoring that was recently funded by an internal USGS call. These funds will be “matched” with the Delta Science Program Study about phytoplankton that was described earlier. Both whole water grab and SPATT samples will be analyzed for LC/MS, which gets at a broader suite of toxins and a subset of the samples will be analyzed using ELISA. The USGS submitted two proposals: one focused on fixed stations, and the other on mapping.

Cost for cyanotoxin projects was an important aspect that was brought up in the last meeting. Cyanotoxin analyses are relatively expensive, which is likely one reason there has not been a consistent monitoring program for cyanotoxins in the Delta.

The two proposals that were recently approved by the USGS HAB Program Cooperative Match Program:

- 1) A modification of the SPATT bags that incorporates them into the boat-based flow through system. Whole water samples will be collected at designated stations where other water samples are collected.
- 2) Collect samples at two fixed stations where the USGS already measures a variety of parameters. One high priority is to co-locate sampling with the fluoroprobes, these locations would likely be Decker Island or Jersey Point.

If the Delta RMP was interested in funding additional cyanotoxin collection and analyses, potential locations are Middle River (USGS station) and Vernalis (DWR Station). Freeport or Hood might also be of interest, though cyanotoxin concentrations in the Sacramento River may not be a priority.

A committee member asked if 15 minutes is enough time for a SPATT bag to collect useful results. Peggy responded yes.

Janis Cooke asked if there is flexibility with the fixed stations, and mentioned the possibility of the Nutrient Management Strategy (NMS) funding the Grizzly Bay station. It's generally useful to put the SPATT bags on stations where there is already data being collected. Fixed stations at Decker and Jersey Point were stations that were put forth as options. There might not be a huge change in nutrients for the Middle River station. DWR/EMP folks could also participate in this project.

Jenna Rinde stated that DWR has also thought about doing the mapping project and would like to have a separate meeting to coordinate. There is the possibility of adding a fluoroprobe to the R/V Sentinel or the Vernalis Station, USGS and DWR could work together. Peggy Lehman, Sarah Lesmeister, Janis Cooke, and Tamara Kraus will have a follow-up meeting regarding developing a proposal. Peggy recommended especially looking at the San Joaquin River as a source of cyanobacteria. DWR and USGS should work together to make sure they are covering as much of the Delta as possible. Tim Mussen emphasized that a station on the San Joaquin is

missing from the overall design. A potential set up is to have a flow through system with SPATT bag attached.

Janis wants to start with inputs to the Delta, Decker and Jersey are interesting areas while there are not many toxins in Freeport. The cost of purchasing another fluoroprobe is ~\$40K to buy it and another ~\$40K to install and maintain it.

Tamara, DWR, and Janis, will work offline and then bring back to the group a specific outline of bullet points and stations in the Central and South Delta, and justification for stations and sampling. Potentially with feedback going via email. The goal of the sampling design would be to pick up all the variables that the different stations would be capturing.

Action item:

- Tamara, Janis, and Jenna get in touch with each other to write a draft/outline cyanobacteria monitoring proposal that leverages collaboration between DWR and USGS (Tamara Kraus, Janis Cooke, and Jenna Rinde, 6/2/20).

Review the Draft USGS [report](#) on High-Frequency Monitoring

Scientists from the USGS Biogeochemistry Group shared the draft report on the Delta RMP-funded 2018 high resolution mapping surveys. Matt shared a link to the draft report with the Nutrients Subcommittee on March 9, and received comments from some participants then. The group had no additional comments on this report. This report will move forward through the TAC and SC and for review and approval for publishing. It was noted that the USGS' internal report approval process can be long.

Action item:

- Give Tamara Kraus a timeline for the commenting period for the USGS High-Frequency Monitoring Report (Matt Heberger and Jamie Yin, 05/28/20)

SEP Funds Cyanobacteria Source Tracking Proposal

The goal of this section was to have the Nutrients Subcommittee make a recommendation on whether this project, [Cyanobacteria Source Tracking Proposal](#), has technical merit and ought to be forwarded to the TAC and SC as a candidate for SEP funding.

A member asked how the cyanobacteria transport will be recorded. Originally there was a modeling component, but this particular SEP proposal doesn't include this. This SEP is the pilot part of the project and will or will not confirm the hypothesis. Peggy Lehman suggested they should sample down to 1m down and also sample the surface.

A member wanted more time to look at the proposal. Lisa Thompson asked how one would know if the sediment source is actually linked to a nearby bloom or not. It was reiterated that this is a pilot study and the goal is to see whether there are some key seed locations.

Action item:

- Everyone who has more comments or questions on the SEP Funds Cyanobacteria Source Tracking proposal should send them to Janis and Ellen (5/25/20).



Mercury Subcommittee Meeting Summary

March 9, 2020

- Jay Davis, Aquatic Science Center
- Debbie Webster, Central Valley Clean Water Association
- Stephen McCord, McCord Environmental
- Karen Ashby, Larry Walker Associates (LWA)
- Wes Heim, Moss Landing Marine Laboratory
- Mike Johnson, MLJ Environmental
- Janis Cooke, Central Valley Regional Water Quality Control Board
- Dan Deetz, U.S. Bureau of Reclamation
- Anitra Pawley, Department of Water Resources (DWR)
- Brian Laurensen, Larry Walker Associates (LWA)
- Matt Heberger, Aquatic Science Center

The purpose of today's meeting: Continuation of discussion on February 27 of the water monitoring design. Shall we make changes to water monitoring in March? If so, what changes should we make? The motivation for this (mid-year) change is that we are going to change the monitoring design next fiscal year, based on guidance from the Steering Committee (SC). Last fall, the SC set a planning budget for mercury monitoring of \$215K for the 2020 – 2021 fiscal year (FY20-21). Based on the new, lower level of funding, it makes sense to begin changing our monitoring program now to make best use of funds by not continuing with a design that will not be sustained in FY20-21.

At the February 27 meeting, staff proposed a reduced design that included water monitoring in March, April, and August, and there was general agreement on the concept. However, there were some details that remained to be worked out, such as the number of stations to include in a reduced design.

The table below shows the planned monitoring elements for the current 2019 – 2020 fiscal year (FY19-20), as presented in the proposal that was approved in the fall:

Year →	2019						2020					
Fiscal Yr →	FY19/20											
Month →	7	8	9	10	11	12	1	2	3	4	5	6
Monitoring element (# of sites sampled)												
Bass - Core			7									
Bass - Restoration			5									
Prey fish											9	
Water	8	8	8	8					6	6	6	6
Sediment												

gray shading = March-October period used for the linkage analysis in the TMDL

Jay Davis presented 3 options for water monitoring in March 2020, shown below:

Option 1 (Low cost, \$56K)

Station	High flow Season (March)	High flow Season (April)	Low flow Season (August)
Sacramento River at Freeport	X	X	X
Lower Mokelumne	X	X	X
Cache Slough	X	X	X
Little Potato Slough	–	–	–
Middle River	X	X	X
San Joaquin River	X	X	X

- Exact timing of 2 high flow sampling events may vary with hydrology
- Combine fish and water sampling in August to save money
- Mar/Apr events capture hydrologic variation and conceptually link to accumulation in silverside in May (link to restoration monitoring)
- August events capture more stable summer condition
- Potato Slough dropped because we have another Central Delta station (Middle River)

Option 2 (Medium cost, \$64K)

Station	High flow Season (March)	High flow Season (April)	Low flow Season (August)
Sacramento River at Freeport	X	X	X
Lower Mokelumne	X	X	X
Cache Slough	X	X	X
Little Potato Slough	X	X	X
Middle River	X	X	X
San Joaquin River	X	X	X

- Same as Option 1 but keeps Little Potato Slough
- Little Potato seems to follow Lower Mokelumne in a more muted way (while Middle River seems to track San Joaquin at Vernalis) – see if this continues
- More even coverage of Delta spatially
- We have already invested a lot in the Little Potato time series – wasteful to drop it

Option 3 (High cost, \$159K)

- Keep all six stations
- Eight months of sampling
- 48 station*events

A subcommittee member suggested that, with regard to high flows, we should set the criteria for when we would sample. We would be targeting peak floodplain inundation in the Cosumnes and Lower San Joaquin, to better understand uptake in the food web. Floodplain inundation typically occurs in January or February. Methylmercury shows up in the food web in April / May. There is a lag time between increases in aqueous methylmercury and the signal in prey fish; the signal is even later in larger predatory fish like bass. Work by Darrel Slotton and the Water Board in the 2000s documented a connection between elevated aqueous methylmercury concentrations in April and May that propagated to fish in July.

We have been gradually strengthening our conceptual model behind what is driving the high concentrations in fish on the Mokelumne and the San Joaquin River at Vernalis. Our current understanding is that after spring flooding of floodplains and wetlands, anaerobic bacteria produce methylmercury. It takes time for the concentrations to increase in water, and then for the pulse of methylmercury to move into prey fish, and then to move into predator fish like black bass. The proposed monitoring design is intended to capture the peak mercury concentrations in water and in indicator organisms. In addition, May sampling of prey fish and August sampling of sport fish is optimal timing for assessing exposure to piscivorous birds (for prey fish) and for humans (for sport fish). This timing is also consistent with the statewide

mercury objectives, which call for prey fish sampling during the breeding season of avian piscivores (February 1 through July 31).

We are targeting prey fish sampling in May 2020 for the first time.

Wes Heim noted that our mercury monitoring crews are not set up for rapid response to monitor rainfall and runoff events. The field collection requires some planning. But it is feasible to adjust the timing of sampling according to the timing of floodplain inundation in a given year.

Recommendation:

- The subcommittee agreed by consensus to monitor water in March and April, and not May and June, and to include Little Potato Slough, e.g. Option 2.

Action Items:

- ASC will write a proposal for next year's monitoring covering the new design for water monitoring.
- Drop water monitoring in May and June.



Mercury Subcommittee Meeting Summary

Friday April 10, 2020

In attendance:

- Anitra Pawley, Department of Water Resources
- Carol DiGiorgio, Department of Water Resources
- Gary Ichikawa, Moss Landing Marine Laboratory
- Janis Cooke, Central Valley Regional Water Quality Control Board
- Jay Davis, Aquatic Science Center (ASC)
- Jennie Fuller, Central Valley Regional Water Quality Control Board
- Karen Ashby, Larry Walker Associates (LWA)
- Lindsay Nelson, MLJ Environmental
- Ling Chu, Department of Water Resources
- Matt Heberger, ASC
- Melissa Turner, MLJ Environmental
- Petra Lee, Department of Water Resources
- Selina Cole, Central Valley Regional Water Quality Control Board
- Stephen McCord, McCord Environmental Inc.
- Tim Mussen, Sacramento Regional County Sanitation District (Regional San)
- Wes Heim, Marine Pollution Studies Laboratory

Link to meeting slides: [DRMP Mercury Subcommittee 2020-04-10.pptx](#)

1) Approve past meeting summaries

The two most recent draft meeting summaries (Feb 27, 2020 & March 4, 2020) were approved by consensus, and will be posted on the website at <http://sfei.org/DeltaRMP-MeetingMaterials>.

2) Draft Mercury Proposal for FY20/21 (Year 5)

Link to the draft proposal: [DRMP Mercury Proposal for FY20-21 2020-04-02.docx](#)

A subcommittee member suggested adding the water sampling station at Sacramento River at Mallard Island at the confluence with San Francisco Bay. This water station would be paired with the bass station at Sherman Island. The group agreed that this was the preferred option.

Jay Davis agreed to include three options in the proposal:

- A) Seven stations for subregional trends in bass, the same seven stations and three sampling events (March, April, and August) for subregional trends in water, and restoration monitoring with five bass stations and eight prey fish stations;
- B) Seven stations for subregional trends in bass, the six stations and three sampling events (March, April, and August) for subregional trends in water, and restoration monitoring with five bass stations and eight prey fish stations; and
- C) Seven stations for subregional trends in bass, seven stations and eight sampling events (March-October) for subregional trends in water, and restoration monitoring with five bass stations and eight prey fish stations.

A member asked whether there were any changes with respect to reporting and deliverables compared to past years. Jay replied that he pushed the deadline for the annual data report back to January instead of December, as it's a more realistic deadline with other year-end deadlines. [In other words, 7 months after data collection is completed, rather than 6.]

ASC agreed to provide provisional data to the TAC and subcommittee for review quarterly. This would not necessarily be in CEDEN format, and would have any QA flags added by the lab, but not by ASC's QA officer. The regular data management and quality assurance process would happen at year end, as in past years.

Action Item:

- Add information into the proposal about quarterly sharing of provisional data with the subcommittee (Jay Davis, by 4/17/2020)

3) Contingency Planning in Response to the Pandemic

The field crew collected water samples in March. Water sampling planned for April could not be conducted due to the shelter in place order. Wes explained that his crew is not able to sample at present, and no one knows when it will change. Monterey has a shelter in place order, and it's a misdemeanor to violate with fines of up to \$1,000. The university has ordered all buildings closed, and staff do not have access.

Jay asked the Subcommittee:

- If the shutdown is ended in time, should we sample water in May?
- If we can't sample in May, should we sample water and fish in June?

One argument in favor of sampling water in May: most MeHg flux comes in floods in high flow years - with no Yolo Bypass flooding this year sampling in May might be just as good as sampling in April.

The Subcommittee recommended sampling (for both water and prey fish) in May. If May is not possible, check in again in a month to decide whether it's worth sampling in June.

Action Item:

- Schedule another Subcommittee call, if May sampling does not occur, to discuss whether it's worth sampling in June (Jay Davis, by 5/15/2020)

4) Discuss Year 1-3 Interpretive Report

Jay Davis distributed the draft report on Feb 26, and gave a high-level overview of it at the last Subcommittee meeting on February 27.

Jay gave an overview of comments received to date on the report, and the process and timeline for revising the report.

The authors are updating the power analysis that was done 3 years ago, by Aroon Melwani at Applied Marine Sciences. However, the preliminary results are counterintuitive, and so Jay is working with one of our science advisors.

Jay stated that he plans to make the revised Interpretive Report available for a second round of review by May 29.

Several reviewers questioned whether additional data are needed for the DWR mercury model. Carol DiGiorgio replied that new data aren't needed at the moment, because the model is being calibrated and validated for a past time period. However, additional data would be useful in the future for comparison to model predictions.

A subcommittee member noted that the linkage analysis is not covered by the management questions, and so is not necessarily appropriate to include in the report.

Janis Cooke, from the Central Valley Regional Board, noted that this information is useful to regulators and is appropriate to include. Jay noted that the linkage analysis is in a "gray area" because it was not included in the set of management and assessment questions articulated by the Program, but has informed the project team's thinking for the last few years, and has explicitly been a part of project proposals every year. Jay feels that not doing it would be a major gap.

It was noted that this is not a technical question, and that it would be appropriate to refer it to the Steering Committee.

Longer term, we should revisit the Management Questions for mercury. Jay thinks that there are some flaws in the original management questions, and we've also made progress on answering the questions.

The Subcommittee discussed the evidence to support the concept of a time lag in the uptake of methylmercury in prey fish and bass in response to increased concentrations in water.

[Related to this, Janis Cooke sent the following comment by email after the meeting: "The Slotton silverside Hg- Foe et al aqueous unfiltered meHg graph may not be the best to illustrate the point that Jay is making about bioenergetics and bioaccumulation. The Slotton-Foe San Joaquin silverside-water sampling were not planned for examining those relationships. Post-collection, we can generate hypotheses. Chris' point about the data was always about the responsiveness of the silversides to a peak in aqueous MeHg and evidence that the aqueous MeHg was entering the food web quickly. The silversides were at least 25 mm in length, if I recall. The data really aren't sufficient for investigating the drop."]

The major comments received on the report to date are shown on the next page.

Action Items:

- Bring the issue about the scope of the mercury interpretive report to the SC for a decision -- should it include the linkage analysis? (Matt Heberger, by 5/15/2020).
- Jay will share the power analysis with the subcommittee when it is ready (Jay Davis, by 4/30/2020)
- Send the unpublished manuscript by Greenfield et al. to the Subcommittee (Jay Davis, by 4/30/2020)
- Send the deliverables timeline that Jay presented to the Subcommittee (Jay Davis, by 4/30/2020)

Major comments received on the first draft of the mercury interpretive report, as of April 10, 2020

(Highlights indicate the more significant ones that Jay discussed during the meeting.)

- **Use of water data in the DWR mercury models?**
- Should evaluate alternative surrogates for MeHg: TSS, turbidity, TOC
- Value of monitoring total and dissolved MeHg
- Statistical significance of comparisons among stations/subareas
- **Higher growth rate at Yolo?**
- **Added Intro text – charge and management questions**

- Tighten up text on goals and objectives
- Finalize year 3 data report before this report
- Basic summary of the monitoring over the three years?
- Show historic stations on map
- Why omit the data point?
- Are we comfortable that there is enough data to make this statement? (Middle River, Potato)
- Should this data be evaluated in terms of the relationship between the values and the water year index?
- Water trends - - can we show the results visually on a map?
- Mass budget: I am a little confused as to why this management and assessment question can not be addressed by the Delta RMP. It is listed as a Q in Table 2 and shows that we are to evaluate it with the water data.
- I think that some clarity should be added to this section to identify what is being achieved
- This does not appear to be refinement of the existing question - rather it poses questions about what is needed to answer the question.
- Linkage: As an overarching comment, if this Q is not captured in Table 2 as a defined management and assessment question then I don't think it should be included in the document.
- Linkage as a priority question: What is the source of this statement?
- Linkage: However the analysis for the specific components of the TMDL reevaluation is outside of the scope of this document IMO
- Don't discuss significance of dataset with point omitted - do not recommend commenting on the significance of trends with data points omitted without justification
- We should be cautious in suggesting that MeHg concentrations in these stations stand apart from the general trends observed across the Delta
- Is anyone adding the Delta RMP aqueous MeHg data into a hydrodynamic model to help evaluate loading, discharge, and budgets? It is quite challenging to understand water movements among stations due to varying outflows and tidal currents.
- Do you mean that there are short periods of high MeHg concentrations in the water near Yolo? If the exposure is continuous, it probably does not matter how fast the water is moving, unless the high flows and turbidity are also making it hard for the fish to find food.

- **Why are these months a potential undue influence?** The fish were alive, feeding, and biomagnifying MeHg during March and April. I am not sure we have identified a good reason to remove these months from the evaluation.
- **It would be helpful to discuss the goals, precision, and other needed data for these models. How will they acquire data if the Delta RMP stops collecting water samples?**
- Effect of restoration on linkage: This would likely require a lot of samples to evaluate with confidence, more than we are proposing.
- **I wonder if it would be beneficial to collect prey fish during the same month as water samples?**
- **I found this report difficult to follow.** It is full of partial spatial and temporal patterns, sometimes seasonal trends or interannual trends, and basically no real patterns that appear to be consistent across time and/or space.
- There are detailed explanations about some patterns at a couple of sites and no discussion about those patterns, or lack thereof, at other sites, e.g., fish tissue concentrations are explained in detail for the Mokelumne site, somewhat less detail for the SJR site and no discussion about the other sites where there seemed to be no source of MeHg.
- You do mention flood plains but then the analyses focus on flow, and the linkage between flow and whatever happens in the floodplain is ignored
- The best pattern is the aqueous MeHg and fish tissue concentrations, but only after using the smaller time window for the Yolo site is the relationship solid for all locations, which means there may be no relationship at all
- This section is a jumble of discussion about trends over space and time.
- The conclusion from previous studies indicates a consistent spatial pattern but from my perspective your data indicate no consistent spatial pattern.
- There is nothing in Figure 2 that provides any information about regressions.
- At the SJ River site, by November the bass tissue concentration (Figure 6) was back to “normal”. Why normal at this site and not at the Cosumnes River site? Maybe the MeHg loads released during the high flow period were significantly lower at the SJR site?
- The Sacramento water index includes a term for previous year’s flow
- *Finally, data from the Mokelumne River station indicate it is necessary to sample frequently to capture month to month variability - Only if you are interested in characterizing the variability.*

- Not having read the Wood et al. report, did they specifically decide that MeHg dynamics would result in an exponential relationship between aqueous and fish tissue concentrations or did they just look for whatever the best fit was even if it was some sort of parabolic fit? Also, they have a y-intercept of 0 which is significant to your discussion later in your report.
- Looking at Figure 15, it's clear that the data for all areas except Yolo remain the same no matter what the time period, i.e., the location of the data points for the 5 non-Yolo sites in all four panels are exactly the same.
- I'm not convinced you confirmed anything because your relationship is linear with an intercept and theirs is exponential without an intercept
- Confirm language regarding DWR modeling
- Explain why we didn't monitor Mokelumne from the beginning
- strong affirmation for including the relationship of bass to water for comparison with the Delta TMDL linkage analysis
- Delta RMP data indicate Yolo Bypass behaves differently, so perhaps a different form of linkage is warranted
- Beyond the scope of this report, but I wonder how one could further explore the drivers of the peak fish mercury in the Mokelumne and San Joaquin. There might be multiple ones - magnitude of peak flows that erode and transport mercury-contaminated material downstream; timing and extent of floodplain inundation and drainage; and change in land use over time, specifically restoration.
- "apparently in response to high flows and floodplain inundation" - could also be in response to restoration, at least in the Mokelumne and Cosumnes watershed



Data Management Subcommittee Meeting Summary

March 3, 2020

In attendance:

- Bev Anderson
- Brian Ogg
- Cam Irvine
- Don Yee
- Matthew Heberger
- Melissa Turner
- Selina Cole

1) Approve Past Meeting Summaries

The subcommittee requested additional time to review the meeting summaries for the past few meetings. Subcommittee members should review the following summaries and provide any comments or feedback by this Friday, March 6. Matt encouraged committee members to suggest edits to the meeting summaries. He and his colleagues are striving to provide the right level of detail and the appropriate tone.

- [2019-08-28](#)
- [2019-11-20](#)
- [2020-01-21](#)

Note that older, approved summaries are on the website at:

<https://sfei.org/DeltaRMP-MeetingMaterials>

Action items:

- Provide comments and suggestions on meeting summaries (Data management subcommittee members, by March 6, 2020)
- Approve meeting summaries at the next meeting (Selina to add to next meeting agenda, by 5/15/2020)

2) Action Item follow-up

(a) Memo regarding Delta RMP CUP Toxicity Data in CEDEN

Here is a link to Google Docs version of memo on "[CEDEN Codes Applied to Delta RMP Toxicity Data](#)," dated March 2, 2020.

The goal of this memo, originally written by Cam Irvine, and subsequently edited by Selina Cole, Tessa Fojut, Brian Ogg, and others was twofold:

- Describe our historic toxicity data for data users
- Provide guidance to labs on how we would like them to handle data reporting

The memo describes a number of project-specific procedures that the Delta RMP would like for the laboratory staff and data managers to follow. Going forward, the committee suggested incorporating some of these details into the QAPP or into ASC's Data Management SOP.

The authors' goal was to provide additional details beyond what is in the Water Board's [Toxicity Data Management SOP](#). In general, the data managers followed SWAMP guidelines. Beginning in 2020, the program may have more flexibility about how we manage the data once the contract with the toxicity lab is managed by ASC.

The subcommittee discussed the specific issue of low conductivity controls and agreed that some additional information could be incorporated in the QAPP going forward. The SWAMP MQOs changed in 2018 so there are some differences in how the results were reported before and after that date. A Committee Member felt that the documentation of this was not clear, and also expressed concern that data managers did not follow all of the guidelines completely or consistently.

The subcommittee would like to finalize its recommendations, as we've been working on this document for some time.

Action item:

- Cam will write up his questions regarding how flags were applied to toxicity data and share this with Brian Ogg. Brian will revisit these data and confirm that the data were flagged appropriately (Cam and Brian 5/26/2020)

Update on the revisions to ASC's draft data management SOP

[Delta RMP Data Management and Quality Assurance Standard Operating Procedures](#)

Matt noted that the ASC data management and quality assurance team has been working on this document. ASC staff met with the state board on January 29th, 2020 to discuss some issues (see below), and agreed to harmonize our data management and QA procedures with those of the SWAMP program. ASC will likely need some additional budget to continue working on this document.

Action item

- Develop a timeline for finalizing the SOP and share it with this Subcommittee (Matt Heberger, by 3/31/2020)

Update on SFEI-ASC blank correcting

ASC's QA officer Don Yee reiterated that ASC does **not** blank correct lab results. We rely on the lab to do this following the method or their SOP.

A committee member noted that the draft SOP used two different terms for blank correction, creating confusion. ASC is working to update the SOP document to clarify.

ASC is updating QAPP table 14.2 to add a column indicating whether the lab method calls for blank correction for each analyte. (Mostly complete, in progress.)

3) Info item - Data QA Summit meeting (link to [2020-01-29 meeting summary](#))

Matt & Don gave an update on the Jan 29 "QA Summit" meeting that was held with the staff of ASC and the State Board/OIMA. The meeting was helpful for ASC to better understand the context in which Delta RMP data are being used. Agency staff use data from CEDEN, including RMP data, for the Integrated Report, e.g. 303(d) listings of impaired waterways. We also learned about the requirements that have been imposed on the Water Boards program by EPA. Water board staff impressed upon us the importance of having our data be consistent with other programs, such as SWAMP.

The main outcome of this meeting SFEI-ASC agreed to amend QA policies for all data that will be reported to CEDEN. We will seek to adopt similar "business rules" for flagging data or applying qualifiers.

A Committee Member asked about rejecting data. When we flag data as rejected, it will not be reported by CEDEN, and data users will not be able to access the data. Rejecting data is relatively rare, but we reserve the right to reject data when it is not usable.

One example is when there is blank contamination or a high noise to signal ratio, making the environmental result totally unreliable. We are working with State Board staff to harmonize ASC's business rules for rejecting data with theirs. It seems that we will increase the threshold that we use for accepting blank contaminated results compared to the rules we use at present.

4) Running agenda item - Program data updates:

QAPP Deviations and Corrective Actions

In the last quarter, ASC staff began using the new deviations and corrective actions form to document issues, and have filled out 13 of them to date. The forms can be found here:

- [Corrective actions](#)

Datasets status

Matt gave a brief update on the status of datasets. The status can be found here (updated periodically):

- [Datasets status](#)

Michael Weaver has taken over project management for data management and QA and knows the details of the status of each Delta RMP dataset. He will be asked to attend the next meeting and give a more detailed update.

Action Item

- Matt will ask Michael Weaver to call in to the next DMS meeting to give a more detailed update.

5) Update on the draft chlorophyll-a intercalibration study report, new due date

Matt noted that they were not able to deliver the draft report by February 28th. We expect to finish the draft report in the next two to three weeks and schedule a work group meeting shortly thereafter.

Action items

- Send out a doodle poll to schedule the next meeting for sometime in May (Selina Cole, by 3/31/2020)

Future agenda items

- Review the draft Data Management and Quality Assurance SOP
- (Remember to add suggested times for each agenda item)
- Review any new deviations forms with the subcommittee