Blue Ribbon Committee for the Rehabilitation of Clear Lake

Technical Subcommittee
3:00 – 5:00 pm
November 6th, 2019

Meeting Summary #5

Attendees:

Attendees are listed In Attachment A.

Action Items:

1. Mr. Alpers will share the schedule for 3DEP LiDAR data release, if it will be part of a time series of surveys, when the data was taken, and survey resolution information.
2. Mr. Zoller will provide the locations of the County Fruit Frost Program rain gauges and meteorological stations.
3. Ms. DePalma-Dow will request sampling location and constituent information from California Department of Transportation (CalTrans).
4. Ms. DePalma-Dow will provide the costs for the stream gauges on Middle, Kelsey, and Scotts Creeks.
5. Ms. Cortes Cortes and Mr. Alpers will share literature showing the connection between total nutrients in streams and relationship to productivity in lakes for chlorophyll, total suspended solids, and total phosphorous. Ms. Cortes Cortes will also share a table with the constituents TERC analyzes in Clear Lake.
6. CCP will send out the map of current and suggested monitoring sites.
7. CCP will send out a scheduling poll for a Subcommittee meeting by webinar the first week of December.

Welcome and Introductions

Sam Magill (Facilitator) Sacramento State's Consensus and Collaboration Program (CCP) convened, by webinar, the fifth meeting of the Technical Subcommittee (Subcommittee) of the Blue Ribbon Committee for the Rehabilitation of Clear Lake (Committee). A full list of participants is included in Attachment A. An audio recording of the meeting is available online here.

The Facilitator outlined the following meeting objectives:

- Confirm the Technical Subcommittee meeting #4 summary
- Review the Committee feedback on the Annual Report Recommendations
- Identify existing locations and potential new sites for monitoring in the Clear Lake watershed

Confirm Meeting Minutes from August 27th Technical Subcommittee Meeting

No edits were provided to the Summary from the previous Subcommittee Meeting. Any edits can be sent to the Facilitator at s.magill@csus.edu until December 11th.

Presentation: September 26, 2019 BRC Feedback on Annual Report Recommendations

The Facilitator reviewed the seven recommendations approved at the September 26th Committee meeting. Those recommendations, in rough order of priority are:

1. Upper watershed modeling
2. Stream gauges and consistent monitoring of upper watershed and urban sources
3. Bathymetric survey of Clear Lake
4. Review of the implementation and efficacy of existing tribal, local, state, and federal programs, Best Management Practices, and other management requirements in the Clear Lake Basin.
5. Conduct activities to expedite portions of the Middle Creek Restoration Project**
6. Public assessment of perception of Clear Lake water quality issues
7. Light detection and ranging (LiDAR) flight of entire Clear Lake watershed

The Facilitator explained that the first three recommendations all feed into a comprehensive model for the upper watershed that will provide information about what is coming into the lake not only from various streams, but also from urban areas and surrounding lands. On September 26th, the Committee requested that, to provide detail for the second recommendation, the Subcommittee identify locations of existing monitoring and where additional monitoring is needed. The third recommendation for a bathymetric survey complements the work already being done by UC Davis on a hydrodynamic lake model.

The Facilitator described the fourth recommendation as nebulous but ranked highly by the Committee as an important topic to ensure programs in place are functioning the way they are supposed to. The fifth recommendation had been proposed by the Subcommittee as "conduct activities to expedite portions of the Middle Creek Restoration Project." However, at the last Committee meeting, Harry Lyons, Lake County Resource Conservation District, who sits on the Middle Creek Restoration Project team, clarified that no pieces of the project could be expedited individually, but that sending a Committee letter of support would be an appropriate action. This was approved by the Committee.

Broc Zoller, Lake County Farm Bureau, commented that on Scotts Creek there is an opportunity to conduct measurements above and below Tule Lake to determine if the constructed sediment pond improves water quality and sedimentation. That study would help indicate the degree of success to be

expected from the Middle Creek Restoration Project, or encourage other improvement projects in the area. Angela DePalma-Dow, Lake County Water Resources Department (WRD) shared that she has cost estimates for a three-year monitoring project on Tule Lake because of a grant written to determine its hydrologic impact on Clear Lake.

The sixth recommendation was an assessment of public understanding of water quality issues that the Committee conditionally approved, that might incorporate an educational component. The final conditionally approved recommendation, a LiDAR flight of the Clear Lake watershed, had varying levels of support. Clear Lake has relatively recent LiDAR data that is sufficient for the development of an upper watershed model. Ms. DePalma-Dow commented that the Committee doesn't need to be the avenue for LiDAR data, as the US Forest Service (USFS), Bureau of Land Management (BLM), and Pacific Gas & Electric (PG&E) might all be conducting LiDAR surveys in the near future. Charlie Alpers, US Geological Survey (USGS) commented that it looks like USGS has already take LiDAR data of the region with a program called 3-Dimensional Elevation Program (3DEP). Mr. Alpers will share when the data from that survey will be publicly available, if it will be part of a time series of surveys, when the data was taken, and what the resolution for the survey was (see Action Item 1).

Two of the Subcommittee's recommendations were deferred by the Committee to the 2020 Workplan:
- Satellite telemetry and imagery analysis
- Analysis of existing data sets

Susan Ustin, Center for Spatial Technologies and Remote Sensing (CSTARS), UC Davis, is willing to present to the Subcommittee on the available and appropriate remote sensing technologies. In conversation with the Facilitator, she said the Landsat and Sentinel 2 satellites can provide general observations of Clear Lake. Hyperspectral analysis, which would provide more specific observations distinguishing between blue-green algae and green algae, is not available for satellites targeted on Clear Lake currently. However, hyperspectral analysis with drones is commercially available. Dr. Ustin was not aware of remote sensing technology specific to nutrients or to mercury. Dr. Ustin also told the Facilitator that the satellites are regularly surveying the Clear Lake watershed, but processing the data would likely take two to three years, a full-time person for the first year, and cost around $100,000.

Ms. Ryan stated that satellite date does exist to differentiate between blue green and green algae. This information is available online at https://fhab.sfei.org/ and includes an identified a cyanobacteria index. She continued that the inability to remote sense nutrients was part of her concern with earlier satellite reports the County previously provided because they used sediment as a proxy for phosphorous loading; this assumption needs to be groundtruthed.

Ms. DePalma-Dow supported having a presentation by Dr. Ustin and recommended that the Subcommittee identify the specific needs to be met and questions to be answered by remote telemetry. The groundtruthing needs should also be identified and included in cost estimates for any remote telemetry. Karola Kennedy, Koi Nation, said that along with seeking answers to specific questions, she would also like to hear from Dr. Ustin the full package of remote telemetry options available.

Mr. Zoller referenced the [2010 UC Davis Clear Lake Historical Data Analysis report](#) prepared by Winder, Reuter, and Schladow. According to the report, the main sources of excess phosphorous and iron in Clear Lake are typically from sewage and erosion, and excess nitrogen is typically from groundwater inflow. He said that LiDAR provides a picture of the turbidity of sediments entering the lake in the winter, and the only way to control it is to affect the filtration of the streams as they enter the lake. Ms. DePalma-Dow can provide the raw data for the 2010 report upon request.

The Facilitator clarified the first step in refining the satellite recommendation is defining the goals for a satellite study. The next step would be designing a set of questions to be answered about nutrients using satellite data. Dr. Ustin will be invited to present on remote sensing technology after the goals and questions are defined. Ms. DePalma-Dow agreed and advised that the resources of the Committee be used to set up long-term sustainable monitoring programs for future management. Satellite will help find the best monitoring locations but relying on satellite every year could be too expensive to sustain in the long term. Ms. Kennedy and Ms. Ryan agreed with the Facilitator's next steps, emphasizing the importance of monitoring and acknowledging that while Satellites may help determine the streams with the most soil loading, they will not identify areas that need land management improvements.

During the September 26th meeting, the Committee decided the recommendation "Analyze existing Clear Lake data and compile it in an accessible unified database, with database management staff" should be split into two separate recommendations: database compilation and data analysis. Tom Gibson, Committee Chair, committed to providing the Committee with the legislative progress report on Assembly Bill (AB) 1755, which creates the State Open and Transparent Water Data portal. A Committee member also suggested that a 2020 recommendation could be to fund a data management workgroup with local stakeholders collecting data and staff from relevant agencies.

Ms. DePalma-Dow noted that existing data will already need to be compiled and analyzed in order to complete the first recommendation of a watershed model. Alicia Cortes Cortes, UC Davis, shared that the Tahoe Environmental Research Center (TERC) team is currently setting up their database by uploading old data to the Amazon Web Server (AWS) that will be publicly available. TERC's data collected in the field will be processed and added to the AWS database. Ms. Kennedy voiced support for a workgroup that would hold all data gatherers and sharers accountable.

The Facilitator clarified that at this point the recommendations are in the hands of the Committee. The Subcommittee will refine the conditionally approved recommendations, Committee comments on the Recommendations Report are due on November 8th, and December 11th will be the last 2019 Committee meeting finalizing the recommendations.

Mapping Exercise: Identifying Existing and Needed Monitoring/Sampling Resources

The Facilitator shared a Google Earth map of Clear Lake with flags representing monitoring sites previously indicated by WRD, UC Davis, and Big Valley's website. These included cyanotoxin monitoring locations, meteorological stations, dissolved oxygen moorings with sediment traps, and stream turbidity monitoring probes. Mr. Zoller will provide the locations of the County Fruit Frost rain gauges and meteorological stations (see Action Item 2).

In real-time, participants provided locations of other existing monitoring sites or sites where monitoring is needed. Suggested monitoring sites included:

- Multiple on Middle Creek at junctions where land use changes
  - OHV
  - Agriculture
  - County land
  - Urban land
- Multiple locations on Scotts Creek at junctions where land use changes
  - OHV
  - Agriculture
  - County land
  - Urban land
- Rain gauges on Middle Creek to compare with Cow Mountain runoff
- Locations in the City of Clearlake to capture road runoff from dirt roads
- Below the confluence of Clover and Alley Creeks
- Representative storm drains along Highway 20, Below the paper subdivisions to complement CalTrans monitoring locations.
- Schindler Creek in The Oaks
- Morrison Creek
- Turbid Creeks around Clearlake: Bird Valley or Molesworth Creek
- USGS station on Kelsey Creek

Ms. DePalma-Dow will request information from California Department of Transportation (CalTrans) about what they sampled for along Highway 20 and where (see Action Item 3).

Mr. Alpers said that a bridge or cable way for gauging stations could be costly but is necessary for reliable data. Installation of a cable way can cost $120,000, operation and maintenance of a gauge can cost $10,000, and operation and maintenance of a cable way could double that cost. Ms. DePalma-Dow volunteered to provide the costs for the stream gauges on Middle, Kelsey, and Scotts Creeks (see Action Item 4). The Facilitator reminded the Subcommittee that the $5 million associated with AB 707 is for capital projects only, there will need to be other funding sources for data gathering and research. The Committee Chair is also investigating how Senate Bill (SB) 19 could affect resources for the monitoring recommendation. SB 19 was recently passed and would require the State to develop a plan to deploy a network of stream gages to address significant gaps in information necessary for water management. The Facilitation team will work with Resources to determine cost estimates and a financing plan for the 2019 Recommendation.

Mr. Alpers suggested the Subcommittee refine what kind of modeling they recommend. Joe Domgalski, USGS, is willing to present about the model Spatially Referenced Regression on Watershed attributes (SPARROW), which estimates nutrient, sediment, and dissolved solids transport. It's a national approach USGS is doing in major areas to monitor and predict nutrient fluxes and loads. This methodology could utilize sediment "fingerprinting" to help resolve the local controversy over sediment origins. Mr. Alpers

also suggested the Hydrologic Simulation Program – Fortran (HSPF), which developed results from Cache Creek at Rumsey looking at results of the 2015 fires. He said there is a lot of interest in this watershed from a modeling point of view and a number of models that could be applied. Ms. Cortes Cortes agreed.

Ms. Kennedy and Ms. DePalma-Dow supported looking at different modeling options. Ms. DePalma-Dow noted that including the diversity of input from different expertise would be good, but for now it's beyond the scope of what the Committee and Subcommittee are doing. The Facilitator clarified that the Subcommittee and Committee are capturing high level recommendations this year, and the work will continue to become more focused.

Mr. Alpers asked about monitoring parameters, saying that a long-term plan for understanding nutrients must include monitoring the filtered nutrient components in all the tributaries, which is a higher cost. Ms. Cortes Cortes clarified that TERC does measure the filtered components as well as the dissolved fractions and the inorganic components. TERC would appreciate the same type of information from the stream monitoring to understand the watershed inputs. At the request of Ms. DePalma-Dow for the WRD stream sampling program, Ms. Cortes Cortes offered to share a table of the constituents TERC analyzes for the lake, as well as literature showing the connection between total nutrients in streams and relationship to productivity in lakes on chlorophyll, total suspended solids, or total phosphorous. Mr. Alpers volunteered to provide what information USGS had on the topic, as well (see Action Item 5).

The Facilitator encouraged participants to send him any further locations of existing monitoring sites or suggested sites. He will send the completed map to the group (see Action Item 6). He will also send a scheduling poll for a Subcommittee meeting by webinar in the first week of December (see Action Item 7).

Adjourn

ATTACHMENT A: Roster of Participants

Subcommittee Members Present		
First	Last	Organization
Charlie	Alpers	United States Geological Survey
Alicia	Cortes Cortes	University of California Davis, Tahoe Environmental Research Center
Angela	DePalma-Dow	Lake County Water Resources Department
Karola	Kennedy	Koi Nation of Northern California
Sarah	Ryan	Big Valley Band of Pomo Indians
Broc	Zoller	Lake County Farm Bureau

Public Attendants, Committee Members, and Staff	
Name	Organization
Joe Domagalski	USGS
Taran Sahota	Central Valley Regional Water Quality Control Board
Andy Watson	USGS
Sam Magill	California State University, Sacramento