

## Blue Ribbon Committee for the Rehabilitation of Clear Lake

### Technical Subcommittee

12:00 – 4:30pm

July 9<sup>th</sup>, 2019

### Meeting Summary #3

#### Attendees:

Attendees are listed in Attachment A.

#### Action Items:

1. Subcommittee members will determine who to invite to discuss aquatic plants and weed control at future Technical Subcommittee meetings.
2. Angela DePalma-Dow, Lake County Water Resources Department, informed she would provide county data on aquatic plan treatment (including algal mitigation companies) for Subcommittee members.
3. Subcommittee will work to obtain bathymetry data from a nonprofit fishing company to provide to Geoffrey Schladow, University of California Davis (UCD), for ground truthing. Geoffrey Schladow expressed doubt that those data would be sufficient and recommended that consideration be given to undertake a modern bathymetric survey.
4. Ms. DePalma-Dow will investigate providing aerial photos the state obtained during the Camp Fire to Subcommittee members.
5. Broc Zoller, Farm Bureau, to ask the Farm Bureau for more information on the Erosion Protection Education Commission (EPEC).
6. Sam Magill, California State University, Sacramento, will follow up with the Natural Resources Agency to speak with the Subcommittee on whether funds intended for capital improvements include follow-up monitoring and who takes care of the maintenance for suggested capital improvements.
7. Ms. DePalma will provide Mr. Magill contact information for him to connect with Yolo County Flood Control and the Watershed Protection District for a possible tour of Cache Creek Dam.
8. Mr. Magill will send out a confirmation e-mail to the Subcommittee for the next Technical Subcommittee meeting to take place August 27<sup>th</sup>.
9. Ms. DePalma-Dow asked whether Taran Sahota, Central Valley Regional Water Quality Control Board (Regional Water Board), would be invited to present or participate in future Subcommittee discussions.

## Welcome and Introductions

Sam Magill (Facilitator) from Sacramento State's Consensus and Collaboration Program (CCP) convened the third meeting of the Blue Ribbon Committee for the Rehabilitation of Clear Lake (Committee), Technical Subcommittee (Subcommittee). He led introductions for Subcommittee members followed by members of the public. A full list of participants is included in Attachment A. An audio recording of the meeting is available online [here](#).

Mr. Magill outlined the following meeting objectives:

- Confirm the Technical Subcommittee meeting #2 summary.
- Hear updates on UCD data update to the Subcommittee regarding Clear Lake mooring deployments.
- Confirm initial assumptions and recommendations developed.
- Review Committee feedback from the Blue Ribbon Committee meeting on June 5<sup>th</sup>
- Open discussion on additional assumptions and recommendations.

## Confirm meeting minutes from May 17<sup>th</sup> Technical Subcommittee Meeting

Sarah Ryan, Big Valley Rancheria noted Big Valley Rancheria conducted the Fish Cyanotoxin study not UCD. Ms. DePalma-Dow asked for clarification on the reasoning behind the Chemistry 101 suggestion in meeting summary for the second Subcommittee meeting. Karola Kennedy, Koi Nation and Jim Steele, Robinson Rancheria explained the action item's purpose to help the Subcommittee develop a stronger understanding of water chemistry as it relates to phosphorus, iron and Sulphur. Ms. Kennedy suggested having short factual presentations at the beginning of each Subcommittee to establish a baseline level of information at future meetings. Ms. DePalma-Dow requested to be included in "Chemistry 101" presentations to the Subcommittee in the future.

Broc Zoller, Farm Bureau corrected his affiliation listed on the draft Technical Meeting Summary #2 to the Farm Bureau.

Mr. Magill encouraged members to send additional updates via e-mail should more arise.

## Update: UC Davis Mooring Sites

Geoffrey Schladow, UC Davis Tahoe Environmental Research Center introduced himself and thanked the Subcommittee for the opportunity to present. He explained sensors have been deployed on seven moorings around the lake. They are used to detect oxygen and temperature information; data is downloaded every three months. Mr. Schladow presented information gathered to date from the stations, including recently observed temperature and oxygen trends. His presentation can be found online [here](#).

The following questions and comments were posed by Subcommittee members:

- Mr. Steele noted sediment could already have anoxic conditions and asked whether sediment with anoxic conditions was studied by UCD.
  - Mr. Schladow explained there is a base rate of release which will be determined with lab incubations. Once water becomes anoxic, there is nothing to stop phosphorous entering the water. Mixing of the lake caused by high winds disperses phosphorus, which is taken up by algae.
- Mr. Steele mentioned the presence of cyanobacteria at the bottom of Clear Lake at the end of the winter. He noted mixing already occurred within the water column and suggested phosphorus could be taken up in other ways.
  - Mr. Schladow commented it is possible that cyanobacteria and other algae can take up phosphorous and store it whether they are sitting on the bottom or suspended in the water column. He noted the United States Geological Survey (USGS) is currently measuring water column temperatures and lake chemistry to understand these processes more.
- Mr. Steele drew parallels to scenarios offered for Lake Erie and Clear Lake and wondered to what extent temperature and light drive blooms to occur earlier in the year. He suggested UCD research the oxygen, temperature, and sediment interface using phosphorous as an example.
  - Mr. Schladow highlighted UCD's goal to calibrate 3D lake models with new chemical and biological information. He added that once the 3D models are calibrated, UCD will have the ability to the run scenarios Mr. Steele described.
- Ms. Ryan commented on the presence of cyanobacteria on the bottom of Clear Lake and expressed the need for the Subcommittee to further discuss aquatic weed control in Clear Lake **Action Item 1**. She highlighted the value native aquatic vegetation has in mitigating effects of cyanobacteria and commented that the presence of blooms throughout Clear Lake impact beneficial usages. She noted cyanobacteria is present in places where aquatic weed species are treated or removed.
  - Ms. DePalma-Dow confirmed plants compete with cyanobacteria in lab environments and informed the Subcommittee that data must be viewed where treatments occur. She said a lot of the harmful algal blooms are located in Upper Arm where treatments are not occurring because cloudy water and high turbidity hinders aquatic plant growth. Ms. DePalma-Dow informed she would provide county data on aquatic plant treatment activity for Subcommittee members **Action Item 2**.
- Ms. DePalma-Dow noted some lakes experience anoxic conditions in different periods of the year. Understanding the historical prevalence of anoxic conditions of Clear Lake may help establish baseline goals for guiding management decisions.
  - Mr. Schladow noted UCD is using the estimates of phosphorus release rates determined from the research of Nurnberg and Welch (Nurnberg 1988, Welch and Cooke 1995) to determine whether the conditions from their data are reconfirmed or if new findings are determined.
- Ms. DePalma-Dow asked where UCD collected data for the bathymetry noted in the presentation and noted the data she provided to Mr. Schladow could be more accurate. UCD recommends undertaking a modern bathymetric survey to inform future lake modeling efforts.
- Mr. Zoller wondered whether Mr. Schladow could correlate temperatures to the locations illustrated in the presentation and asked whether inputs into the streams had different

temperatures throughout the year. Mr. Schladow responded there is value in knowing the temperatures for Middle Creek and emphasized the Subcommittee should also prioritize which streams to address beyond Middle Creek.

- Mr. Schladow explained smaller streams have a minor effect on Clear Lake. He added later in the conversation that UCD is measuring the temperatures of three major streams at West End and noted temperatures from streams dilute quickly once they reach the Lake. He suggested utilizing modeling and highlighted the development of a 3D model which could help trace where individual stream plumes and storm drain plumes go.
- Amy Little, State Water Resources Control Board (SWRCB) thanked Mr. Schladow for the information and asked if existing meteorological station data is also used. She asked whether the study would continue on through the fall and inquired about how data pertaining to fluxes is being refined. Ms. Little wondered whether UCDs work was the first to quantify internal loading for Clear Lake.
  - Mr. Schladow explained the quantifications in his presentation are estimates, which he is hoping to better quantify spatially in each arm. He noted the study is a 3-year study and UCD completed the first year.

Members of the public expressed the following comments and questions:

- Carolyn Ruttan, Clear Lake Environmental Research Center, noted a nonprofit boating company conducted a recent bathymetric survey in Clear Lake. The Subcommittee will investigate how to obtain the boating company's bathymetry data to provide for ground truthing opportunities. **Action Item 3.**
  - Mr. Schladow later in the conversation described the difficulty of completing a detailed bathymetry of Clear Lake.
  - Alex Forest, University of California Davis Tahoe Environmental Research, mentioned Garmin was working to update bathymetry for fishing purposes. This data may include significant interpolation.

Mr. Magill thanked Subcommittee members and members of the public for their comments and noted moving forward, presentations will be focused on specific items of interest needed to formulate recommendations for the full Committee's consideration.

### **Presentation: Assumptions and Recommendations**

Mr. Magill noted the goal of this portion of the agenda was to confirm initial assumptions and recommendations for consideration by the Committee. He highlighted comments made on the distinctions between challenges caused by internal loading and challenges related to the watershed. He recalled Subcommittee members expressed the desire for a potential GIS model to establish a deeper understanding of the watershed. He emphasized other recommendations and assumptions were offered prior to the meeting and expressed the goal to confirm and add to the Subcommittee's existing list.

Mr. Magill asked members to respond to the following questions:

1. What must be known to manage the lake/watershed for human caused disturbances?
2. What must be known to use adaptive management techniques to manage lake/watershed natural processes?
3. What is already known in the literature about natural lake and watershed processes and human disturbances? Can it be applied to a warmwater system like Clear Lake?
4. What actions or regulations are already planned or implemented to restore the lake (indicate level of success of implemented actions)?
5. What monitoring is in place and what are the results?

Subcommittee members offered the following comments and recommendations to the question “What must be known to manage the lake/watershed for human caused disturbances?”:

- Ms. DePalma-Dow expressed the need for monitoring and emphasized follow-up plans for analysis should accompany any monitoring on Clear Lake. She stressed analysis would enable the Subcommittee to determine the relevance and meaning of data from a variety of sources.
- Ms. Ryan agreed with Ms. DePalma-Dow and added that water quality standards for usages of the lake exist. She expressed her concern that the the Department of Water Resources (DWR) uses only state databases available and does not include the federal database or tribal information. She highlighted the problem of the lack of feedback mechanisms when DWR regions report their data back to DWR for integrated water reports. Ms. DePalma-Dow informed some progress has been made integrating state databases with Central Valley Regional Water Quality Board (Regional Water Board) reporting requirements. When integrated reports occur at regional levels the Region 5 Central Valley Water Quality Control Board will review water quality data at the state, federal and regional levels.
- Ms. DePalma-Dow asked whether it is within the scope for the Committee to offer recommendations to establish a platform where locals can add data to filter into the California Environmental Data Exchange Network (CEDEN).
  - Ms. Ryan added data must be put within a useable format. There are different data formats; changing formats and adding data into CEDEN is timely and costly. Ms. Ryan recommended hiring a fulltime staffer for managing Clear Lake data.

Mr. Magill made note of the key points on data sharing and the discussion pertaining to how data can be made accessible, who has access, and how it is evaluated and analyzed. Mr. Magill asked members what must be known to use adaptive management techniques to manage lake and/or watershed natural processes.

Subcommittee members gave the following responses:

- Ms. Ryan expressed the challenge of internal loading within Clear Lake and highlighted the value to correct land use efforts. She said controlling internal loading within the lake may require specific localized measure, but any effort to control internal loading is likely temporary.
  - Mr. Steele expressed the need to determine nutrient loss and lock up rates to score the level of effort in the upper watershed. There is a need for management efforts to be quantified and highlighted the value vegetation has to lock-up nutrients to prevent algal

blooms. Depending on the amount of phosphorus from internal loading, the impacts of projects such as Middle Creek Restoration could be minimal. Quantification by stream in the upper watershed by sub-watershed groups is crucial. He concluded that historical changes to land uses, the number of major flood and fire events, and changes such as the Circle Pipeline and are critical to understand. Understanding processes and cycles, and monitoring data collection to establish feedback loops is imperative.

- Mr. Zoller said recommendations should be based on what is known and added that the Subcommittee knows sediment is coming from upper watersheds. He noted flood control and gravel mining operations on Kelsey Creek have created significant sediment sources. Mr. Zoller stressed addressing similar issues upstream of Clear Lake rather than focusing on individual landowners and emphasized the value of focusing on large items that will have a large effect. Middle Creek is the biggest single thing that can be done, and the modeling will help determine the next project to focus on.
- Ms. Little noted the value of modeling and expressed the need to identify an ultimate management tool and how to support the tool with a monitoring framework to identify literature and data gaps. She noted the discussion on internal and external loading adds a complexity in developing an integrated internal and upstream/upper watershed model. She noted the value of existing and preliminary information to determine where to devote efforts: e.g. if internal loading accounts for over 60 percent then concentrate on a lake-based model, but if the problem is mixed and split 50-50, upstream management activities could have a larger impact.
- Ms. Ryan underscored the need to understand historical changes made around the lake such as septic systems and gravel mining operations. She added that evaluations for permits for gravel mining need to be more thorough. BMPs are not tested and there is no follow up for mitigation measures. She stresses reviewing policies and BMPs in place to determine what is or is not working. There is no follow-up monitoring once permittees are cleared to operate.
  - Mr. Steele commented gravel mining operations could have changed overtime; additional investigation of gravel mining impacts on Clear Lake may be needed. Participants also explained that gravel mining requires a streambed alteration permit from the California Department of Fish and Wildlife; it is not a locally driven effort.

Mr. Magill summarized the committee's comments and desire to understand what is occurring in the upper water shed such as gravel mining, agricultural uses and grading ordinances, and transitioned to discuss what actions or regulations are already planned or implemented to restore the lake.

Subcommittee members gave the following responses:

- Ms. DePalma-Dow expressed the need to have pre and post monitoring related to the Middle Creek Restoration Project and suggested investigating Tule Lake activities as a potential major source of nutrient-rich sediment.
- Mr. Magill asked whether LiDAR would be a good resource to address gaps pertaining to the Middle Creek Restoration Project or for analyzing Tule Lake.
  - Ms. DePalma-Dow mentioned she could provide aerial photos the state obtained during the Camp Fire **Action Item 4**. LiDAR flights must be conducted at appropriate times

during the year to ensure useable data. This recommendation will continue to be refined throughout 2019.

- Ms. Ryan asked what it would take for the county to increase monitoring of development projects.
  - Ms. DePalma-Dow used Stormwater as an example and explained the county would need to submit Stormwater Quality Plan to be approved by state and submit data to the California Stormwater Multiple Applications and Reports Tracking System (SMARTS). Lake County is supposed to conduct inspections of all developments, but there is insufficient staff available. Those doing the developments must still do BMPs, inspections and submit their data to the county. She noted a previous recommendation to determine the BMPs in place and how to measure their effectiveness.
- Ms. Steele noted many challenges during winter storms are due to high profile single energy events. He stressed the need to focus BMP evaluations on large high energy events over smaller events.
- Ms. DePalma-Dow noted the cities and counties have stormwater management plans, but do not have the staff available to enforce them.
  - Ms. Kennedy expressed the lack of inspection and enforcement as a crucial problem and questioned why building is continuing under the current situation. Ms. DePalma-Dow suggested adding fees to local development that should go towards stormwater monitoring.
- Mr. Steele discussed the Erosion Protection Education Commission (EPEC), which was established in Lake County to review agricultural practices around Clear Lake. He believed the Farm Bureau was commissioned and noted the value of solving problems through cooperatives like EPEC.
  - Mr. Zoller will ask the Farm Bureau for more information concerning EPEC. **Action item 5.** He stressed the importance of concentrating on filtering systems such as Scotts Creek and Kelsey Creek.
- Ms. Ryan mentioned challenges posed by septic systems and outdated permits. She noted the high density of 30 septic systems near Big Valley Rancheria that are not a part of existing sewer pipelines; water quality data from the area shows high levels of fecal coliform.
  - Mr. Zoller mentioned expanding the Circle Pipeline could be a solution. Mr. Steele added failing systems could be required to connect to sewer systems.
- Ms. DePalma-Dow asked whether capital improvement funds for the Committee could include follow-up monitoring. She noted capital improvement project recommendations need to include post monitoring activities and timeframes.

Mr. Magill will follow up with the Natural Resources Agency regarding speaking with the Subcommittee, and whether funds intended for capital improvements include follow-up monitoring and who takes care of the maintenance for suggested capital improvements. **Action Item 6.**

Mr. Magill opened the floor for public comment.

Public Comment

- Peggie King commented dissolved oxygen readings were taken for Scotts Creek and Tule Lake; Tom Suchanek gave Mr. Schladow the meta data collected. She added that sampling was done at Tule lake near the levee. Elevated methylmercury readings have also been detected in the area.
- Ms. King said completion of the Full Circle Pipeline was never constructed. Projected costs were roughly \$100 million and could significantly reduce the environmental impacts of untreated effluent.
- Ms. Ryan stated special districts does not differentiate between septic systems around clear lake and septic systems within the county. Subcommittee members recommended digitizing the available data.
- Ms. King expressed that recommendations from the Subcommittee should be vetted by the referenced agencies.

### Open Discussion: Assumptions and Recommendations

Mr. Magill transitioned Subcommittee members to discuss known disruptors, planned or past changes made to Clear Lake, proposed changes and new monitoring or management opportunities.

The following is the full list of topics generated by the Subcommittee. These items do not represent any level consensus or prioritization.

#### Known disruptors

- Excess nutrients' such as Nitrogen/Phosphorus
- Anoxic conditions
- Herbicides
- Mercury contamination from Sulphur Bank *and* natural sources
- Sediment discharge from dirt roads
- Municipal Separate Storm Sewage System (MS4) issues
- Seawalls
- Release schedules from Cache Creek Dam
- Griggs Riffle channelization
- Keys channelization
- Indirect/direct impacts from herbicides
- Shoreline and emergent vegetation management (e.g. primrose/noxious plant removal *and* tule replanting)
- Waste rock dam mercury discharge
- OHV issues
- Channelization of streams (generally)
- Lack of public education regarding shoreline vegetation management
- *Potential new issue*: new invasive species such as quagga or zebra mussels

#### Planned or Past Changes

- Circle pipeline
- Grading ordinance (county)
- TMDL restrictions (mercury and nutrient)
- Farm Nutrient Management Plans
- Resurfacing/capping waste rock dam
- Sulphur Bank stormwater improvements
- County stormwater management plan and ordinance
- Local Agency Management Programs (LAMPs)

- Mitigation activities associated with fires

#### Proposed Changes

- Middle Creek Restoration Project
- Update load allocations from nutrient TMDL
- UCD Hydrodynamic model
- Multiple dredging projects



### New Monitoring or Management

- NEW LiDAR flights; compare results to previous results to identify erosion hotspots
- Stream gauges and continuous monitoring of perceived hotspots to ground truth LiDAR results.
- Pre/post project monitoring to ensure compliance with existing regulations (i.e., SMARTS database)
- “Full Circle” pipeline completion
- Tule replanting
- Single POC for data management and analysis (may involve new hire)
- Stormwater buffer ponds (may increase mosquito production/vector control issues)
- Ranking streams by flow and relative health
- Satellite imagery
- Land Trust shoreline acquisition
- Climate change projections and modeling (recommendations to include climate scenarios)
- Fish recommendations from 2010 UC Davis report
- CLERC grant proposals
- Analyze load contributions from Tule Lake and Scott Creek
- Increased funding for county inspections
- Focused management actions for known disruptors such as gravel mining sites

### **Scheduling Discussion**

Subcommittee members decided to meet on August 27<sup>th</sup>. Mr. Magill will send out a confirmation e-mail to members. **Action Item 8.**

### **Public Comment**

- Ms. DePalma will connect with provide Mr. Magill contact information for him to connect with Yolo County Flood Control and the Watershed Protection District for a possible tour of Cache Creek Dam **Action Item 7.**
- Rick Orwig highlighted the complexity of the challenges the Subcommittee is working to address and noted it as a health and safety issue. He noted the large issue is the economy of lake county and how it affects the community. He asked if any agencies or organizations have studied how issues like algal blooms affect tourism and the economy.
  - Mr. Magill noted the Center for Regional Change is researching some of the economic impacts of Clear Lake. He noted the full Committee would like to establish a separate socioeconomic subcommittee.
  - Ms. DePalma-Dow and Mr. Steele noted the 1994 Clean Lakes Report studied why individuals were not coming. Cyanobacterial blooms are documented as a problem.
- Mr. Orwig expressed the need for data to collected be collected, organized and tracked for the future, and underscored the need for a permanent data librarian position. Mr. Steele echoed the need for a unified data collection mechanism.

### Final Thoughts

Mr. Magill asked Subcommittee members for any closing thoughts:

- Ms. DePalma-Dow asked whether Taran Sahotan, Regional Water Board, would be invited to present or participate in future Subcommittee meetings **Action Item 9**. Ms. Kennedy mentioned Ms. Sahotan may have more information on what the Farm Bureau, Bureau of Land Management and the United States Forest Service are doing to meet TMDL requirements.
- Ms. Ryan noted the National Water Quality Portal shows all data from state and local agencies to see where monitoring locations are installed and mentioned data is available to download.
- Ms. Ryan mentioned she enjoyed the approach of identifying bite sized chunks of information.

### Adjourn

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### ATTACHMENT A: Roster of Participants

Committee Members Present		
First	Last	Organization
Alex	Forrest	University of California Davis
Amy	Little	State Water Resources Control Board
Broc	Zoller	Lake County Farm Bureau
Geoffrey	Schladow	University of California Davis, Tahoe Environmental Research Center
Karola	Kennedy	Koi Nation of Northern California
Jim	Steele	Robinson Rancheria
Sarah	Ryan	Big Valley Band of Pomo Indians
Angela	DePalma-Dow	Lake County Water Resources Department
Joe	Domagalski	United States Geological Survey

Members Absent	
Name	Organization
Greg Giusti	University of California Agriculture and Natural Resources
Tom Suchanek	United States Geological Survey

Public Attendants and Staff	
Name	Organization
Alicia Cortes	Member of the public
Carolyn Ruttan	Member of the public
Carter Jessop	US EPA
Drew Stang	University of California, Davis
Jamie Scott	Lake County Vector Control District
Micaiah Palmer	California State University, Sacramento
Mike Shaver	Middletown Rancheria

Sam Magill	California State University, Sacramento
Peggie King	Member of the public
Rick Orwig	Member of the public

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