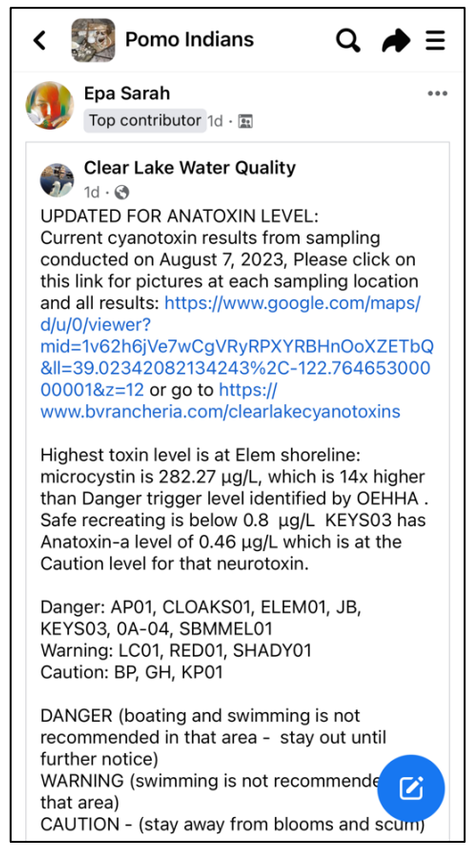
Bay Area Council GRANTS Final Reports – Big Valley Rancheria

Grant 1: *Mitigating Climate Change Impacts Threatening Community Ecosystems and Health on Clear Lake*
Grant 2: *Data-Driven Planning for Multi-Species Climate Resiliency on Clear Lake*

Big Valley Rancheria Environmental Protection Department (BVR EPA) used each of the grants listed above to expand and deepen water quality monitoring on Clear Lake, surrounding lakes, and waterways within Big Valley Band of Pomo Indian's traditional territories. The grant supported training of Tribal staff in advanced water quality data entry, assessment, and interagency collaboration for climate emergencies and climate action plans. Data collected by BVR EPA has been shared with Clear Lake Tribes and water purveyors, Lake County Water Resource Dept., UC Davis Tahoe Environmental Research Center scientists, CalEPA, USEPA Water Quality Exchange, Central Valley Regional Water Quality Control Board, State Water Resources Board, and the Office of Environmental Health Hazards Assessment.

In a recent meeting of the Socio-economic Subcommittee of the Blue Ribbon Committee for the Rehabilitation of Clear Lake (https://resources.ca.gov/Initiatives/Blue-Ribbon-Committee-for-the-Rehabilitation-of-Clear-Lake), the socioeconomic impacts of BVR EPA's consistent monitoring and reporting on Clear Lake Water quality was noted. For example, BVR EPA's ongoing water quality reports, made available on the BVR EPA website and via Facebook postings, help residents and visitors make healthier choices about whether or not to use tap water for drinking and bathing; help residents and tourists make informed decisions about how and when to recreate in the lake (for example, tourists coming to Lake County who are concerned about water quality and potential HAB blooms are able to consult BVR EPA posts and decide where they can recreate safely in the lake, protecting their health and that of their family pets; ditto for Airbnb and VRBO property owners); and helps local physicians and veterinarians to determine how to diagnose cases of potential waterborne cyanotoxin poisonings.



BVR EPA fields constant phone calls and FB messages about the water quality postings and website data. Lake County Water Resources Dept. and Environmental Health also relies on the publicly available data to respond to constituent queries.

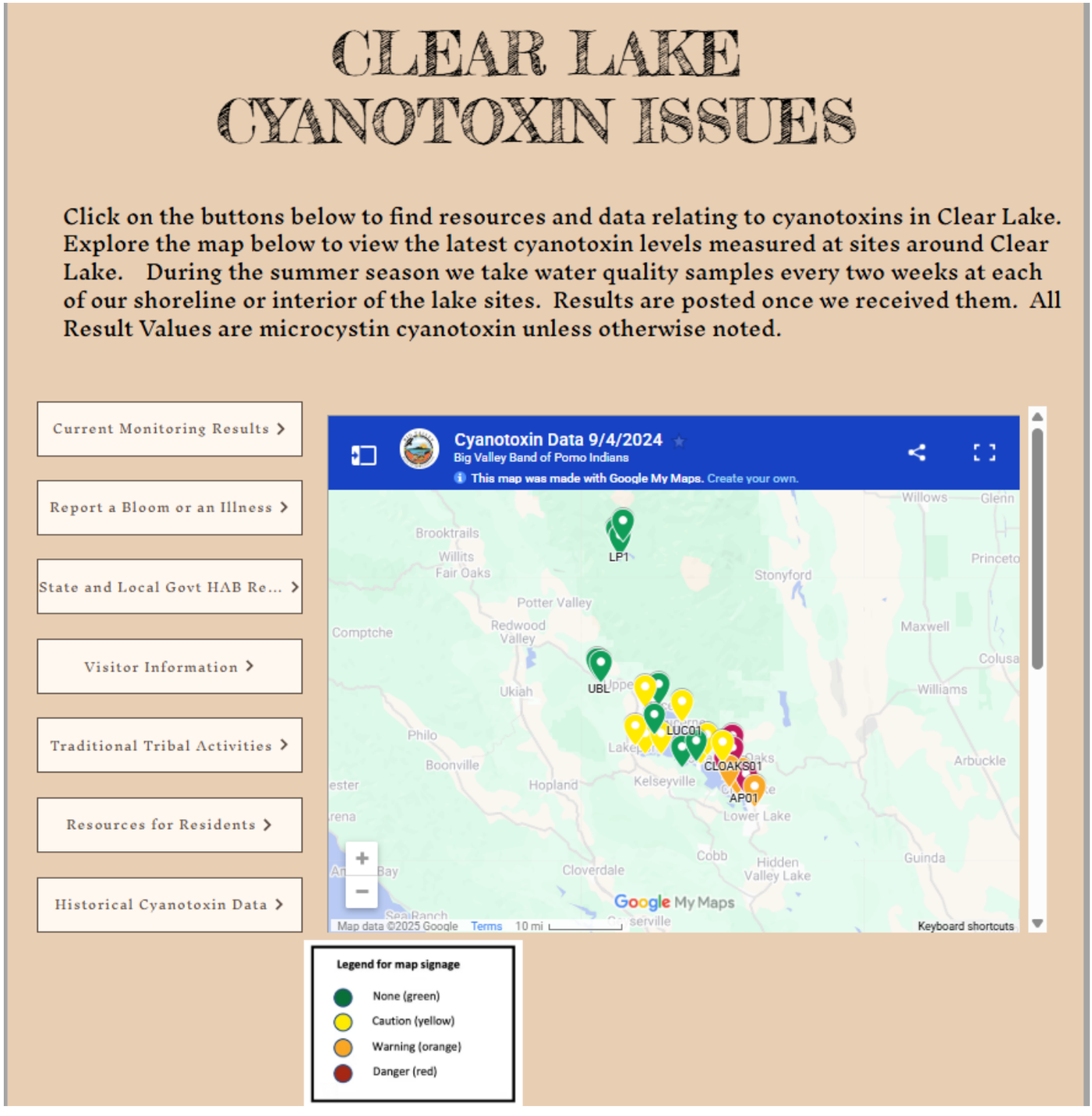
Clear Lake Cyanotoxin monitoring and reporting out

Data collected using grant funds that supported the purchase, installation, and management of sophisticated data loggers and sensors in Clear Lake is provided to regional and statewide planning agencies. Water quality monitoring results are sent to Mywaterquality.ca.gov (CCHABs) and shared in the County cyanobacteria messaging group; shared with the CalWatch team (OEHHA, State Waterboards and Tracking California), and is also shared online, on our website, and social media[1].

[1] A roundup of relevant websites: **URL FOR RESOURCES – CYANOS**
https://mywaterquality.ca.gov/habs/do/ - Healthy water habits
https://mywaterquality.ca.gov/habs/resources/human_health.html - human health impacts
https://oehha.ca.gov/media/downloads/risk-assessment/fact-sheet/dogownerfactsheet2018.pdf - dog owners fact sheet
https://mywaterquality.ca.gov/habs/resources/fish_wildlife.html - fish and wildlife impacts
https://mywaterquality.ca.gov/habs/what/drinking.html - drinking water impacts
https://www.bvrancheria.com/clearlakecyanotoxins - Big Valley toxin page
https://www.facebook.com/ClearLakeWaterQuality - Big Valley Facebook cyanotoxin page

On every Facebook post, Sarah inserts weblinks with additional resources including physician and veterinary resources if someone thinks they or their animals may have been exposed to a HAB, drinking water information, etc. where people can search by zip code (with microscopy and site conditions) providing additional public resources for public education and benefit.

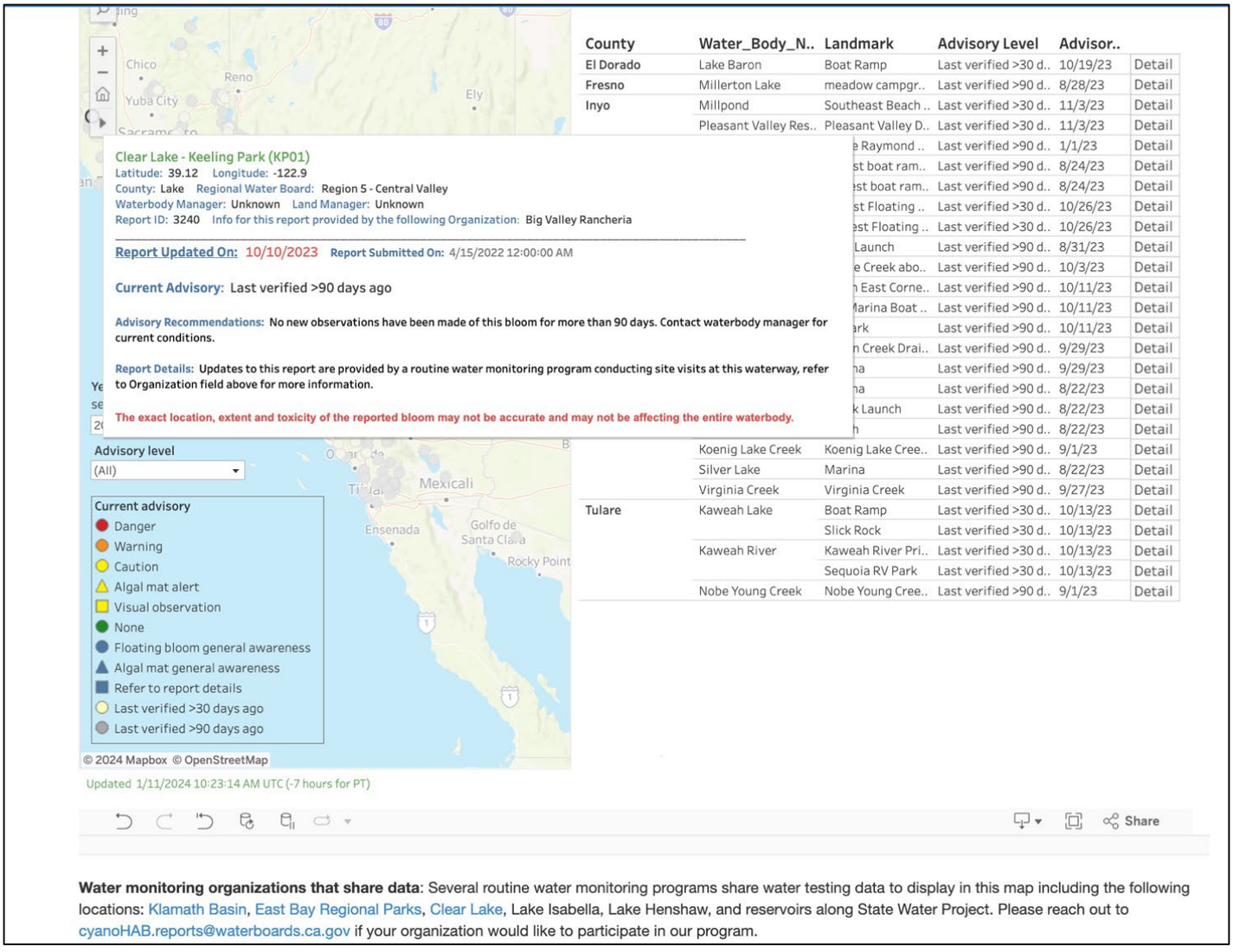
With technical support provided by FlowWest, BVR EPA cyanotoxin monitoring data is now available via Google Maps with additional information www.bvrancheria.com/clearlakecyanotoxins . The BAC grants leveraged a CALWATCH Tracking California project (Public Health Institute and Big Valley Rancheria) to update the website, making it much more user friendly with additional data layers for agency personnel (and the public) to dive deeper into the results if they are interested. A screenshot from that website shows current monitoring results; additional tabs on the side of the searchable map provide further resources and information.



Also beginning in summer 2023, Lake County Environmental Health sampled other water bodies in the County (Lake Pillsbury and Upper and Lower Blue Lakes) for cyanotoxins and microscopy and bringing water samples from multiple locations to BVR EPA, meaning that BVR EPA is now doing water monitoring for every major water body in the county, except Hidden Valley Lake, which is privately owned. BVR EPA routinely sends out internal inter-agency reports on the lab analyses and microscopy.

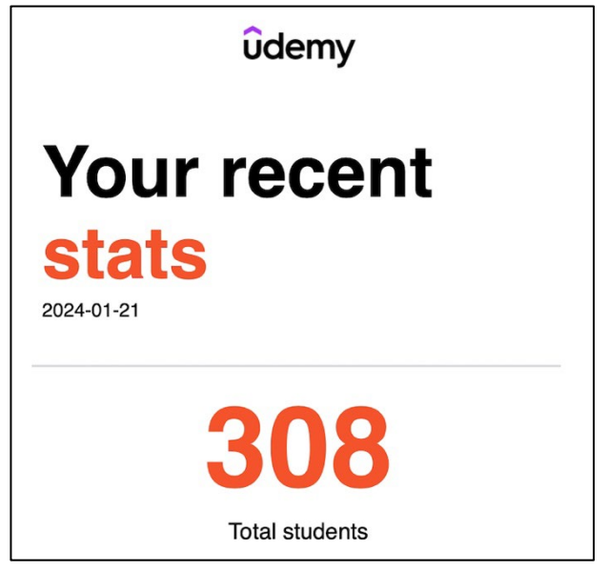
In addition to Clear Lake water quality monitoring, BVR EPA is doing creek cyanotoxins monitoring through a CalWatch project (benthic cyanobacteria) and it is reported on the BVR EPA website and Facebook and uploaded to WQX (cf. the federal data aggregation site The Water Quality Portal).

The data appears on a searchable map on the California Water Quality Monitoring Council's website (https://mywaterquality.ca.gov/habs/where/freshwater_events.html), as shown by the example below:



County	Water_Body_N..	Landmark	Advisory Level	Advisor..	
El Dorado	Lake Baron	Boat Ramp	Last verified >30 d..	10/19/23	Detail
Fresno	Millerton Lake	meadow campgr..	Last verified >30 d..	8/28/23	Detail
Inyo	Millpond	Southeast Beach ..	Last verified >30 d..	11/3/23	Detail
	Pleasant Valley Res..	Pleasant Valley D..	Last verified >30 d..	11/3/23	Detail
		e Raymond ..	Last verified >90 d..	1/1/23	Detail
		st boat ram..	Last verified >90 d..	8/24/23	Detail
		st boat ram..	Last verified >90 d..	8/24/23	Detail
		st Floating ..	Last verified >30 d..	10/26/23	Detail
		st Floating ..	Last verified >30 d..	10/26/23	Detail
		Launch	Last verified >90 d..	8/31/23	Detail
		e Creek abo..	Last verified >90 d..	10/3/23	Detail
		East Corne..	Last verified >90 d..	10/11/23	Detail
		Marina Boat ..	Last verified >90 d..	10/11/23	Detail
		ark	Last verified >90 d..	10/11/23	Detail
		n Creek Drai..	Last verified >90 d..	9/29/23	Detail
		na	Last verified >90 d..	9/29/23	Detail
		na	Last verified >90 d..	8/22/23	Detail
		k Launch	Last verified >90 d..	8/22/23	Detail
		n	Last verified >90 d..	8/22/23	Detail
	Koenig Lake Creek	Koenig Lake Cree..	Last verified >90 d..	9/1/23	Detail
	Silver Lake	Marina	Last verified >90 d..	8/22/23	Detail
	Virginia Creek	Virginia Creek	Last verified >90 d..	9/27/23	Detail
Tulare	Kaweah Lake	Boat Ramp	Last verified >30 d..	10/13/23	Detail
		Slick Rock	Last verified >30 d..	10/13/23	Detail
	Kaweah River	Kaweah River Pri..	Last verified >30 d..	10/13/23	Detail
		Sequoia RV Park	Last verified >30 d..	10/13/23	Detail
	Nobe Young Creek	Nobe Young Cree..	Last verified >90 d..	9/1/23	Detail

Udemy Course
To amplify initially envisioned as a citizen science course for local Lake County residents, the online Udemy course has reached >300 students from California, the greater United States, and around the world. The course has been also used twice by Tribal participants joining BIA-sponsored water quality monitoring workshops held by BVR EPA.



Small Grants Program
BVR EPA awarded a grant of $6000 to Lake County Office of Education Learning Support Specialist in Science Taylor Observatory STEAM Center Educator & Coordinator to support a project team including six classroom teachers from five schools around the lake, 221 students, two aides, five chaperones, one field biologist, and two Taylor Observatory STEAM Center educators. The teachers will incorporate the background and testing science into their curriculum. The students will collect the data on field trips. The students will analyze their own results and share their results with other members of the team. The data will be analyzed both by location and for the lake. Connections to lake health, eutrophication, and climate change will be analyzed. The Taylor educators are applying for the grant and organizing the field study from pre-testing lessons, collection of data, and post collection analyzing and sharing of the results.

The results for this team's efforts will function as a benchmark (a starting point) for a comparative long-term study of the environmental conditions of Clear Lake by Lake County middle and high school students and their teachers. It is expected that the participating students will learn the science behind the lake that is in their community. They will discover the reasons for its diversity of wildlife, how it has played a significant role in the ecology of the area, the impacts of its condition to those living near its shores, and how the changes in environmental conditions can affect nature's balance. This imbalance acts as a catalyst that damages the sustainability of the area and has a far-reaching impact on the ecology, economy, health, and heritage of the area.

Photos from Teacher Jeanne Metcalf-Budrow students from Terrace School (7th and 8th graders) taken April 20, 2022

Students will learn the reasons for these changes, and provide evidence through water analysis of phosphates, nitrates, pH, dissolved oxygen, turbidity, temperature, and mercury, as well as a study of the bacterial, algal, plant, and animal species endemic and introduced to the lake, beneficial and problematic. It is expected that the eutrophication of the lake will be observed firsthand, and data collected will support the findings. Harmful algal blooms, and their reasons for occurring, will be better understood. It is hoped that this learning can continue on an annual basis with new students and more schools participating.

The cumulative data and learning will function to help improve and protect Clear Lake for the present and future. The Taylor Observatory STEAM Center and the Lake County Office of Education recognizes the essential role the Big Valley Band of Pomo Indians play in the pursuit of a healthy Clear Lake and hopes to bridge a connection between this pursuit and the teachers and students of Lake County.

Tissue sampling: During the grant periods, BVR EPA was involved in: Updating our inventory of approximately 150 fish, shellfish and mud hen tissue samples collected during multiple opportunistic sampling events (e.g., during CDFW electrofishing events or with Robinson Rancheria doing carp eradication), developing updated more refined sampling methods for updated SOPs for fish tissue sample preservation and improving our tissue preservation methods. New freezer from CIEA (California Indian Environmental Alliance) and MOU to be the regional fish tissue collection center.

Additional Outcomes:
To fulfill our goal of "collaborative interagency communications and meetings to review data findings and discuss incorporating into climate emergency and action plans," BVR EPA provided substantive and influential input into 305b evaluations, Clear Lake Total Daily Maximum Load limits (TDMLs), California Environmental Protection Agency's Office of Environmental Health Hazard Assessment (**OEHHA**), California's Freshwater Harmful Algal Bloom (FHAB) program, Lake County Integrated Water Management Plan, updated Hazard Mitigation Plans, and Public Water Systems planning to address climate emergencies and climate action plans due to impaired waters.

BVR EPA's grant-sponsored collection of tissue samples and laboratory analyses of tule, fish, shellfish, and mud hen for cyanotoxins and methylmercury provided novel data sets leading to altered Clear Lake TMDLs, OEHHA Fish Consumption Guidelines for tribal subsistence consumption, and more widespread inclusion of Tribal Beneficial Uses (TBUs) in local, state, & regional climate action, adaptation, and mitigation plans.

The results of BVR EPA's water quality monitoring on Clear Lake and associated waterbodies has been shared with policy-making agencies, including the ones listed below in a screenshot taken from BVR EPA's website.

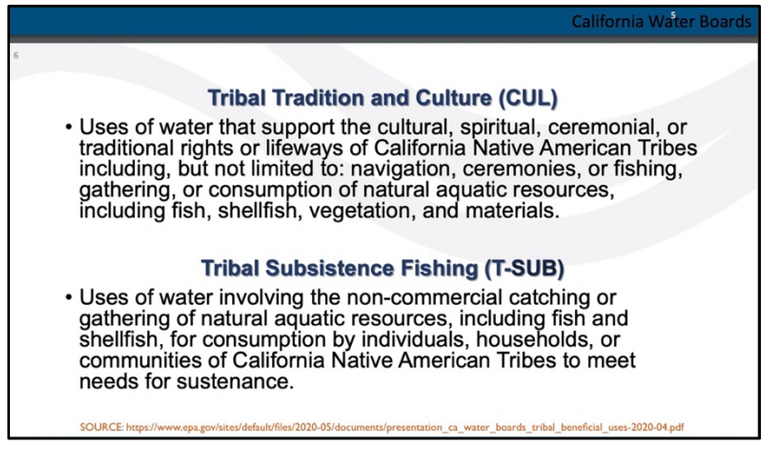
Here are some topics that we are involved in and are critical for the Lake's health:

- **Triennial Review for Clear Lake**
  https://www.waterboards.ca.gov/centralvalley/water_issues/basin_plans/triennialreviews/2018tr/2018_1016_2018tr_workplan.pdf
- **Update on the Clear Lake Nutrient TMDL**
  https://www.waterboards.ca.gov/centralvalley/water_issues/tmdl/central_valley_projects/clear_lake_nutrients/
- **Blue Ribbon Panel for Clear Lake**
  https://resources.ca.gov/Initiatives/Blue-Ribbon-Committee-for-the-Rehabilitation-of-Clear-Lake
- **Post Mendocino Complex Fire monitoring**
  http://www.lakecountyca.gov/Government/PressReleases/protecting.htm

BVR EPA + UC Davis Tahoe Environmental Research Center (UCD TERC) collaboration: UCD TERC gives bimonthly water samples from Clear Lake to BVR EPA and BVR EPA reports out on the results; UCD TERC includes analyses of BVR EPA data in their research.

BVR EPA submitted multiple comments to the Regional Board Basin Plan reports for TBUs on Clear Lake, got the TBU definition approved in the Basin Plan, and was adopted by the Regional Board, and sent a letter designating the affected waterbodies and the water quality issues in each water body.

Presentations made by Sarah Ryan with data collected as part of BAC I (began in 6/15/20) & II:



- Tribal Beneficial Uses and HAB Monitoring Programs in California CCHAB July 2020
- Clear Lake's Cyanotoxin Monitoring Program Kelseyville Rotary Club August 2020
- Creating Partnerships/Building Networks to Manage HABs: Clear Lake Cyanotoxin Monitoring Program - US EPA Webinar Series March 2021
- Climate Change Impacts and Big Valley Band of Pomo Indians at OEHHA Regional Tribal Workshop May 2021
- Contaminants and Tribal Water Programs DTSC - Department of Toxic Substances Control, CAL-EPA, July 2021
- Pollution and Prejudice in Clear Lake, CalEPA Environmental Justice webinar and video on the Bay Area Air District YouTube channel (https://youtu.be/9QqzYHoQtWg?si=OLVgKR23saJ6dHp9), August 2021
- Tribal Cyanotoxin Monitoring Programs: Clear Lake and Beyond, Sonoma State University September 2021
- Water Quality Monitoring and Citizen Science Fish Kill Tracking on Clear Lake, Clear Lake Cyanobacteria Task Force October 2021
- Tribal Data Stewardship, California Ocean Observing Systems Focus Group, December 2021

- Clear Lake Cyanotoxins Monitoring Program: Tribal Beneficial Uses, US EPA March 2022.
- Clear Lake Cyanotoxins Monitoring Program: Tribal Beneficial Uses, US EPA March 2022.
- Big Valley Band of Pomo Indians' Environmental Programs and Tribal Beneficial Uses, Sonoma State University, April 2022
- Implementing a Public Health Based Cyanotoxin Monitoring Program, California Water Data Science Symposium June 2022
- Incorporating Cumulative Risk into Tribal Risk Assessments at Tribal Lands Environment Forum August 2023
- Spotlight on a Tribal Cyanotoxin Monitoring Program, Cyanosymposium October 2023
- Clear Lake's Toxic Legacy: Exploring Cyanotoxin Production and Its Impact on Beneficial Uses, California Lake Management Society March 2024

EPA United States Environmental Protection Agency

Occurrence and Effects of Harmful Algal Blooms in Fish and Shellfish

March 22nd 2022

12:00 – 4:00 PM ET | 11 AM – 3 PM CT
10 AM – 2 PM MT | 9 AM – 1 PM PT

A webinar hosted by U.S. EPA, Office of Water, Office of Science and Technology

Photo by Dr. Lorraine Backer, CDC (2002)

Webinar Goals

Share information on the occurrence and impacts of HABs in fresh and marine fish and shellfish.

Learn about ways to protect human health and the environment from the risks of HABs and their toxins.

Microsoft Teams Meeting

This is a free webinar and no registration is needed.

Join on your computer or mobile app

Click here to join the meeting

Or call in (audio only)

+1 757-578-1812, 748650441#

United States, Virginia Beach

Phone Conference ID: 748 650 441#

Agenda

Session 1: Occurrence and Effects of CyanoHABs in Freshwater Fish and Shellfish	
12:00 – 12:10 PM	**Welcome and Logistics** *Lesley D'Anglada, Dr.P.H.* *U.S. EPA, Office of Science and Technology*
12:10 – 12:40 PM	**Cyanotoxins in Freshwater Fish and Shellfish, Risk Assessment and Management** *Bastiaan Ibelings, Ph.D.* *University of Geneva*
12:40 – 1:10 PM	**Cyanotoxins in California's Fish and Shellfish: Current Framework and Future Opportunities** *Beckye Stanton, Ph.D.* *Office of Environmental Health Hazard Assessment, CA*
1:10 – 1:40 PM	**Clear Lake Cyanotoxins Monitoring Program: Toxins and Tribal Beneficial Uses** *Sarah Ryan* *Big Valley Band of Pomo Indians, Lakeport, CA*
1:40 – 2:00 PM	**Update U.S. EPA Office of Research and Development's Research Planning for Cyanotoxin Detection Methods in Tissues and Other Matrices** *Toby Sanan, Ph.D.* *Office of Research and Development*
2:00-2:10 PM	**Break and Polling Questions**
Session 2: Occurrence and Effects of HABs in Estuarine and Marine Fish and Shellfish	
2:10- 2:40 PM	**Overview of Marine Toxins in Fish and Shellfish** *Vera Trainer, Ph.D.* *Northwest Fisheries Science Center, NOAA*
2:40 – 3:10 PM	**Anatoxin-A in Sea Figs Associated with Human Food Poisonings in France** *Ronel Bire, Ph.D.* *French Agency for Food, Environmental and Occupational Health and Safety*
3:10 – 3:40 PM	**Freshwater Cyanotoxins: A Threat to Marine Food Security** *Misty Peacock, Ph.D.* *Northwest Indian College*
3:40 – 4:00 PM	**Discussion**
4:00 PM	**Adjourn**

Phone Conference ID: 748 650 441#
3:40 – 4:00 PM Discussion
4:00 PM Adjourn

Addressing the Clear Lake Hitch Emergency

The Clear Lake hitch, a species endemic to Clear Lake that is of high cultural and ecological significance, is a listed species with the California Department of Fish and Wildlife (CDFW), and a candidate for listing by the US Fish and Wildlife Service. BVR EPA and local Tribes have been advocating for the hitch for over a decade, and water quality data collection supported by these grants is useful for the hitch because it tells us where the low dissolved oxygen (DO) areas in the lake are located (and cyanobacteria blooms trigger low DO levels), leading to fish die-offs.

Because BVR EPA is monitoring multiple contaminants and water bodies in most of the county, and because those waterways flow into the Lake, the funding is helping us see trends in the area. Many hitch-bearing creeks dry up early, inhibiting hitch fry from returning to the Lake, and our water data collection is showing when those creeks go dry. DO, temperature, pH, and ammonia levels (freshwater aquatic organisms health is related to ammonia levels) are also important to hitch, and we are trying to understand a trigger level of cyanotoxins for fish health and mortality.

Big Valley EPA's prioritization to protect a culturally significant and endemic species that spawned in local creeks necessitated a review of the groundwater surface water interconnectedness in the Tribe's traditional areas. Agencies that are starting to look at groundwater management are accepting data that Tribes and others have been collecting. Big Valley's water chemistry, velocity and disconnected waters data was shared with CDFW and the Waterboards.

Leveraging Funds $592,298

Bay Area Council California Resilience funding for this project was leveraged to create more projects and programs in the community. Funding included:

- "Clear Lake Regional Tribal Collaborative Capacity Building Project," USEPA, $400,000 to develop a regional strategic plan for collecting, managing and accessing data", 2021.
- "Monitoring and Adaptation to Conserve Clear Lake Cultural Keystone Species," SW CASC, $82,106, to support tule restoration and monitor Clear Lake hitch habitat, 2021.
- "Anticipating Climate Change Impacts on Tribal Waterbodies and Beneficial Uses," BIA, $110,192, to develop workshops on starting Tribal water monitoring programs that are responsive to the priorities of the Tribe and utilizing locally collected data to assess gaps in programs, 2021.

Summary
The first BAC grant supported increased engagement in watershed management activities to protect culturally significant species. Successes included the installation of accessible real time water quality dataloggers, development of citizen science classes, multi-agency collaboration efforts on fish kills.

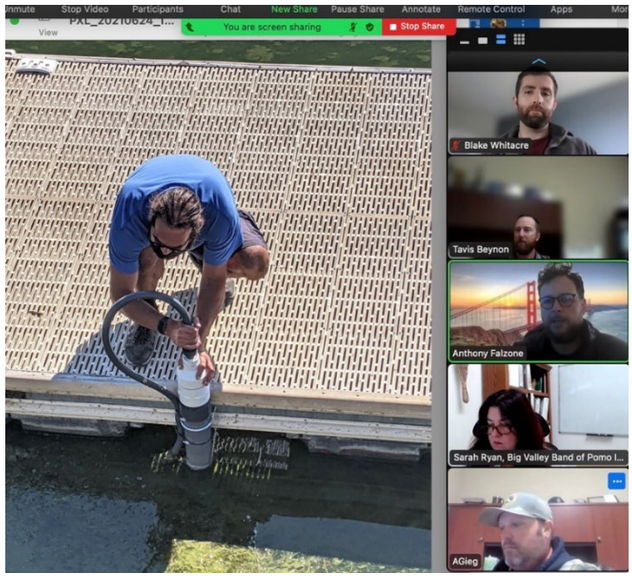
FINAL REPORT: BACII

Data-Driven Planning for Multi-Species Climate Resiliency on Clear Lake

To address and mitigate climate change-induced harmful algal blooms (HABs) and fish kills on Clear Lake, Big Valley Rancheria (BVR) Environmental Protection Department (EPA) – with the assistance of this Bay Area Council California Resilience Challenge grant proposed to: (1) install a critically needed third data logger in the Upper arm of Clear Lake, (2) augment our data collection, processing and sharing capacity, (3) provide substantive input to Clear Lake and watershed plans using Tribal data, and (4) conduct more extensive testing of culturally significant species. Significant work has been undertaken with earlier Bay Area Council funding to support a community wide program of data collection and sharing to support climate resilience that engaged many.

1. Install a third data logger

Try as we might, we were unable to install the third data logger during this grant program period. The water purveyor renovated their dock which was not completed until late 2024. (This is a screenshot from one of the several meetings to try to get movement on the installation of the third data logger.) There are no other water purveyors with docks that extend into the lake anywhere else along the north shoreline. We discovered that this water purveyor bought water monitoring equipment to measure phycocyanins (the pigment produced by cyanobacteria), so we are discussing how to best integrate our planned monitoring equipment at their location in the future.



New pH sensors were installed at the two existing data loggers on Clear Lake. This water chemistry sensor is an important indicator of cyanobacteria bloom (pH rises during bloom events) and was also used by the water purveyors where the data loggers are sited. We were informed by supervisors that having real time pH allows the water plant to improve treatment of the raw water. pH influences the effectiveness of various water treatment processes and if the pH falls outside the range of the acceptable 6.5-8.5 (during a cyanobacteria bloom the lake has been known to get as high as 10.5), the water operators will adjust treatment. Because many thousands of people drink the treated lake water from Riviera West and Clearlake Oaks public water systems, helping support those efforts is rewarding.

2. Augment our Data Collection, Processing and Sharing Capacity

BVR EPA continued to build water quality monitoring dashboards providing accessible data sources from BVR EPA monitoring including from the dataloggers and water quality and quantity monitoring.

The datalogger equipment has a private dashboard with a direct feed derived from the sensors. FlowWest created a dashboard that shows location and data from the sensors and this is now linked to Big Valley's website where it shows the data in real time (www.bvrancheria.com/epa).

Environmental Data Collection

Water Quality Dashboard (65 years)

Current Clear Lake Cyanotoxin Data

Current Air Quality Monitoring Data

Current Met Station Data

Total Mercury Results for Clear Lake Fish, 2015

Clear Lake Fish Cyanotoxin Study, 2010-2018

Clear Lake Water Quality Monitoring | **Live Data** | **Historic Data** | **Community Science**

Realtime Monitoring

Select a monitoring location using the map, water quality feature from the drop down, and date range below to update the chart

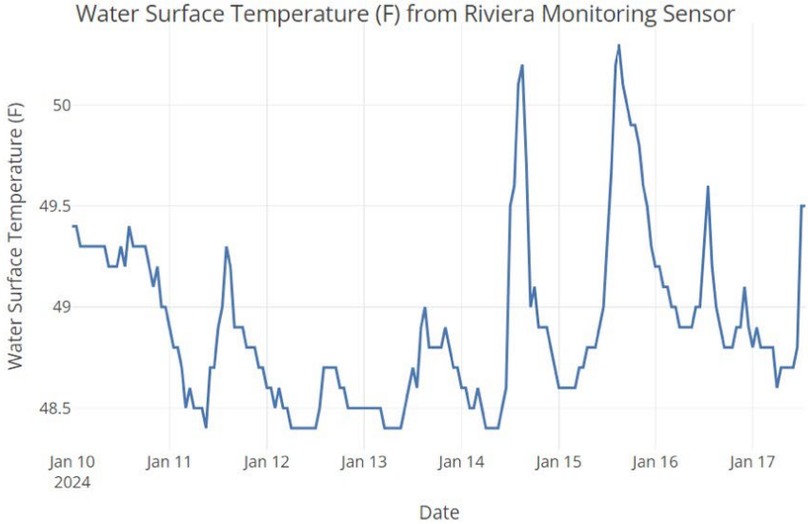
Sensor Locations

Water Quality Features

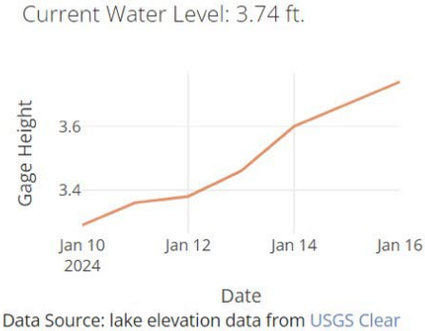
Surface Temperature (F)

Date Range Input: YYYY-MM-DD

2024-01-10 to 2024-01-17



Data Source: hourly water quality data from WQData Live API



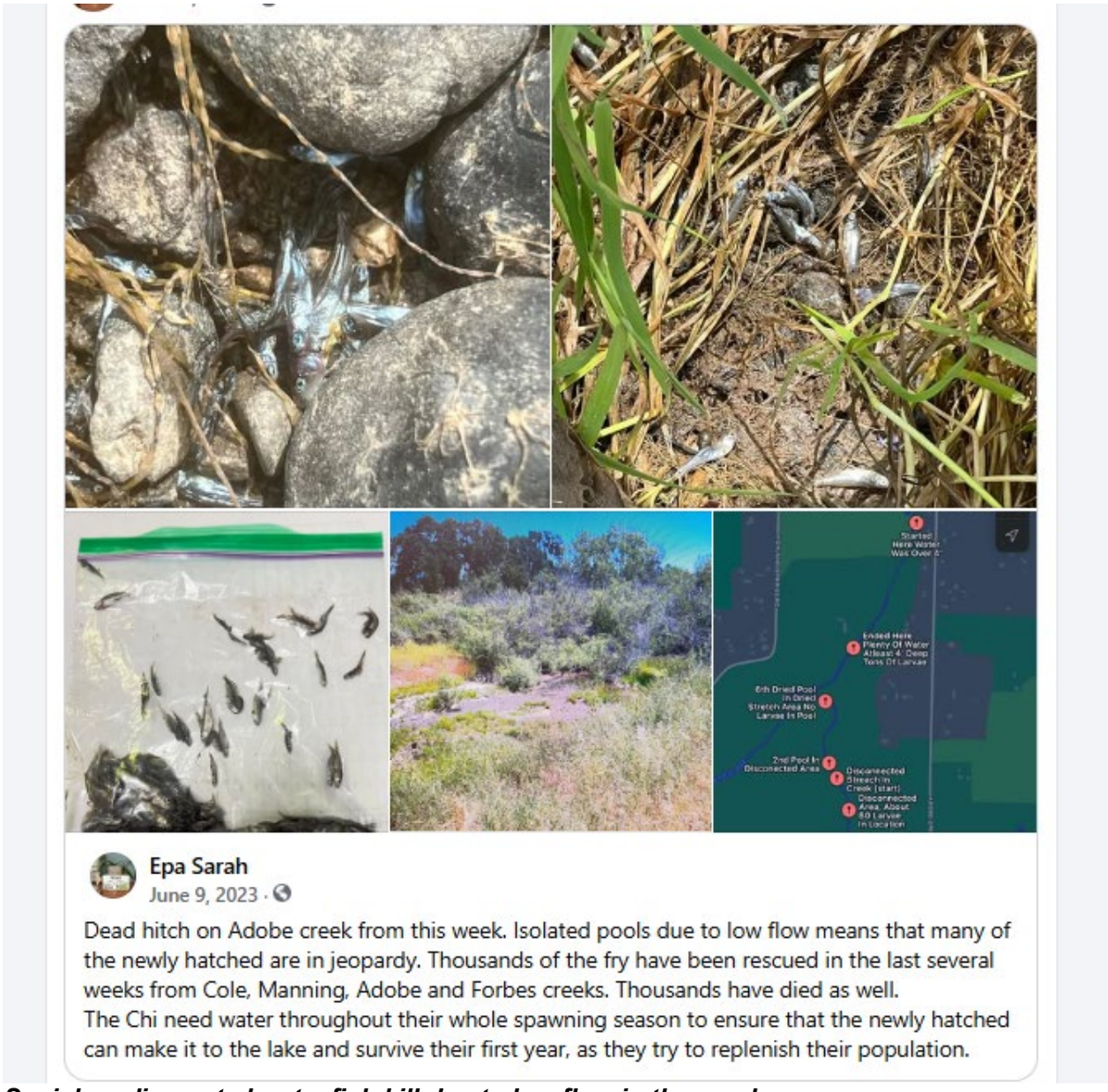
Data Source: lake elevation data from USGS Clear Lake Gage at Lakeport.

Clear Lake is a natural freshwater lake in Lake County in the U.S. state of California, north of Napa County and San Francisco. It is the largest natural freshwater lake wholly within the state, with 68 square miles (180 square kilometers) of surface area. At 480,000 years, it is the oldest lake in North America. It is the latest lake to occupy a site with a history of lakes stretching back at least 2,500,000 years. The data for Clear Lake is collected from two sensors, one on the west side of Clear Lake (Riviera West), and another on the east side of Clear Lake (Clearlake Oaks).

Visualize the hourly data of interest from WQData Live for the past 90 days. Use the drop down menu to select the water quality data of interest, hover the mouse over the graph to find the value of a specific hour, and drag the mouse over the chart to zoom in on the graph. The lake elevation graph displays the daily value from the USGS gage when the date range interval is bigger than two days. The graph displays quarter-hour value when the date range interval is smaller than two days.

This interactive data site - see the screenshot below - provides WQData Live for a 90-day date range. The feed is limited to just a few of the parameters that are collected because they are the ones of most interest to researchers for harmful algal bloom evaluation: surface water temperature, dissolved oxygen, chlorophyll and phycocyanin.

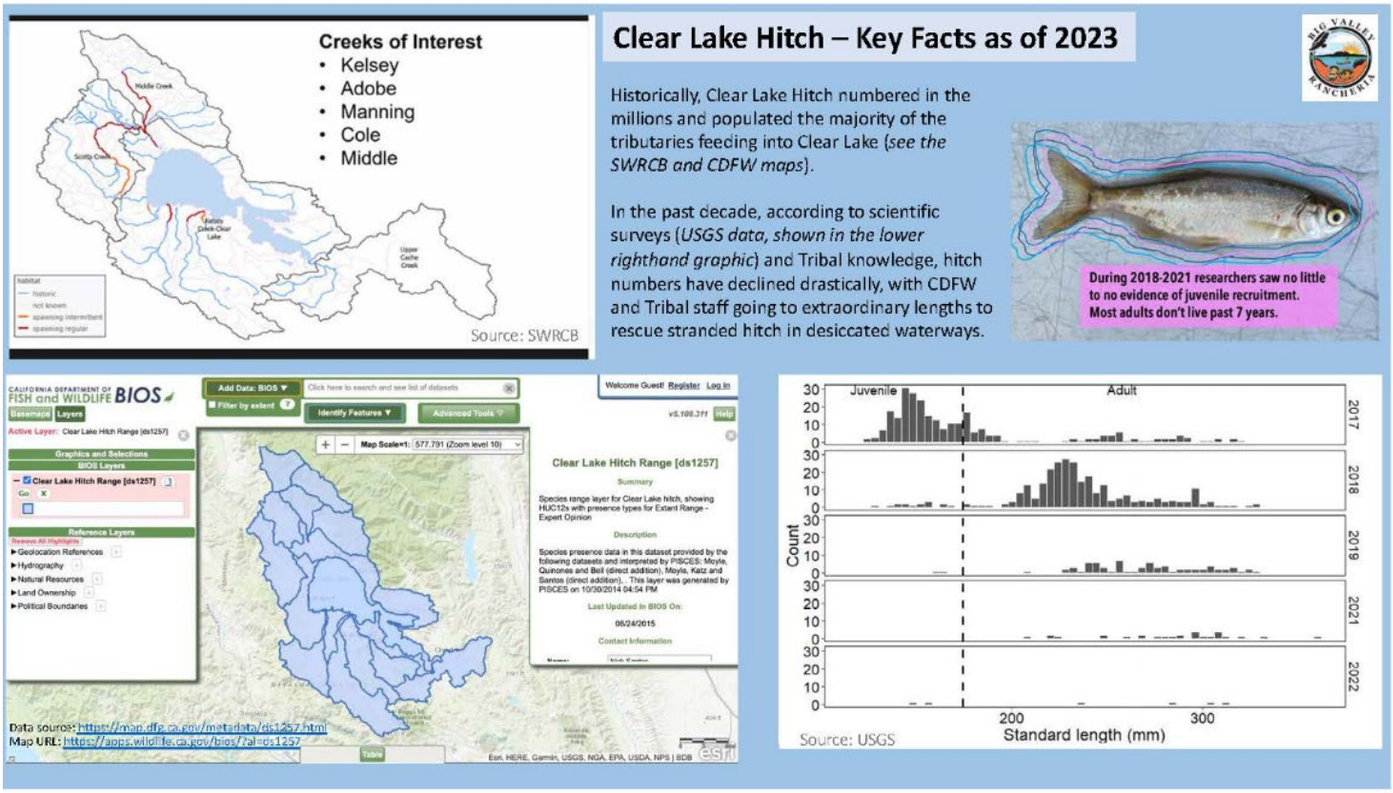
The data was available to the community, agencies, and the Tribes to see water quality changes in the lake in two of the most cyanobacteria affected arms. No other publicly available real time water quality of Clear Lake exists.



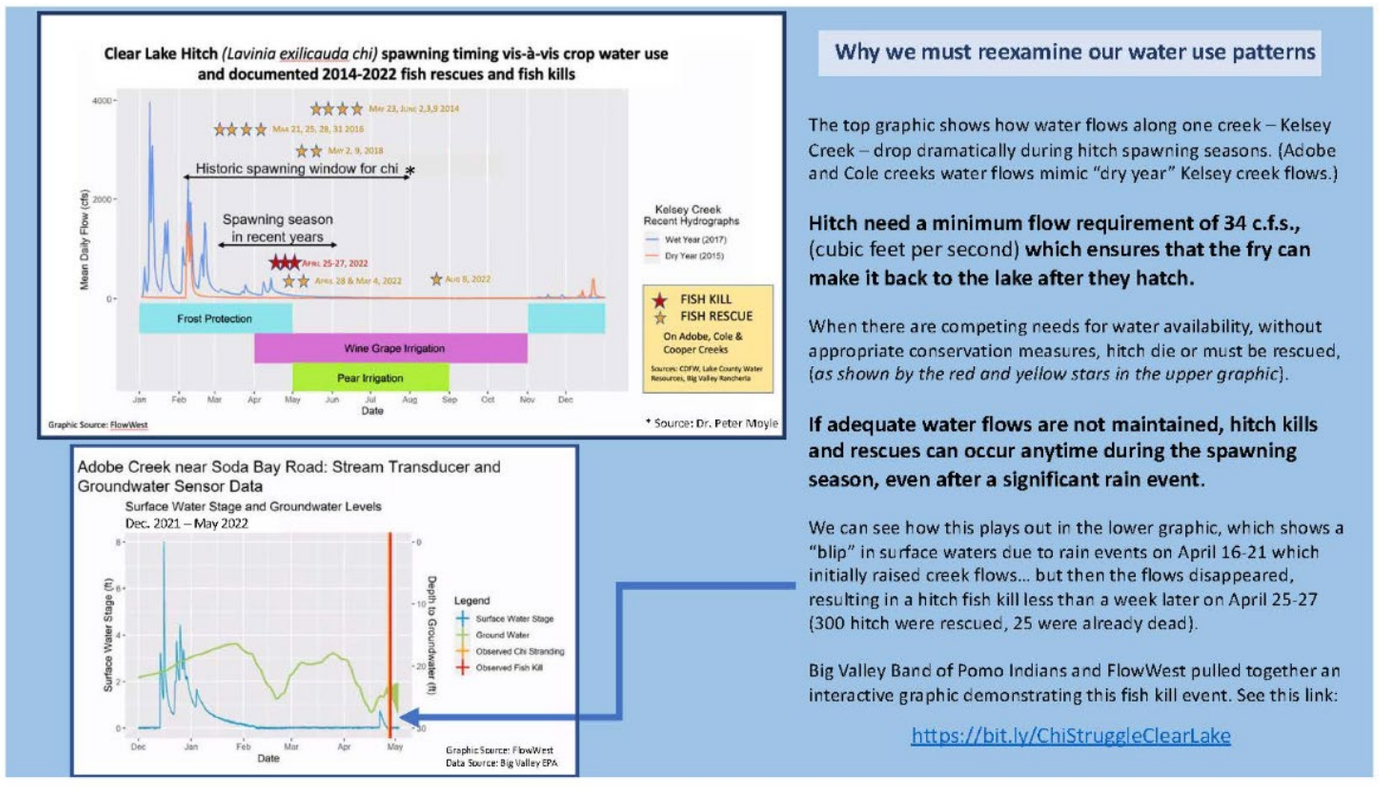
Social media post about a fish kill due to low flow in the creeks

With Bureau of Indian Affairs funding, BVR EPA worked with consultants to develop fish passage requirements and depth/flow suitability in one of the main Clear Lake hitch bearing streams. Minimum flow recommendations were developed to meet fish passage needs, and creek water level vulnerabilities due to groundwater pumping were identified in the Adobe Creek Chi Habitat Suitability Assessment, 2023. 2D modeling was conducted using LiDAR data, pressure transducers installed in 2018 and sonic water level indicators installed in local wells in 2021.

The Tribe also worked with the Office of Environmental Health Hazard Assessment (OEHHA) to develop a report on climate change impacts for their 2022 Update to the Climate Change Indicators Report. https://oehha.ca.gov/climate-change/epic-2022/impacts-tribes/impacts-climate-change-big-valley-band-pomo-indians The report highlights Tribally collected data showing trends in water temperature, fires, cyanotoxins and loss of species.

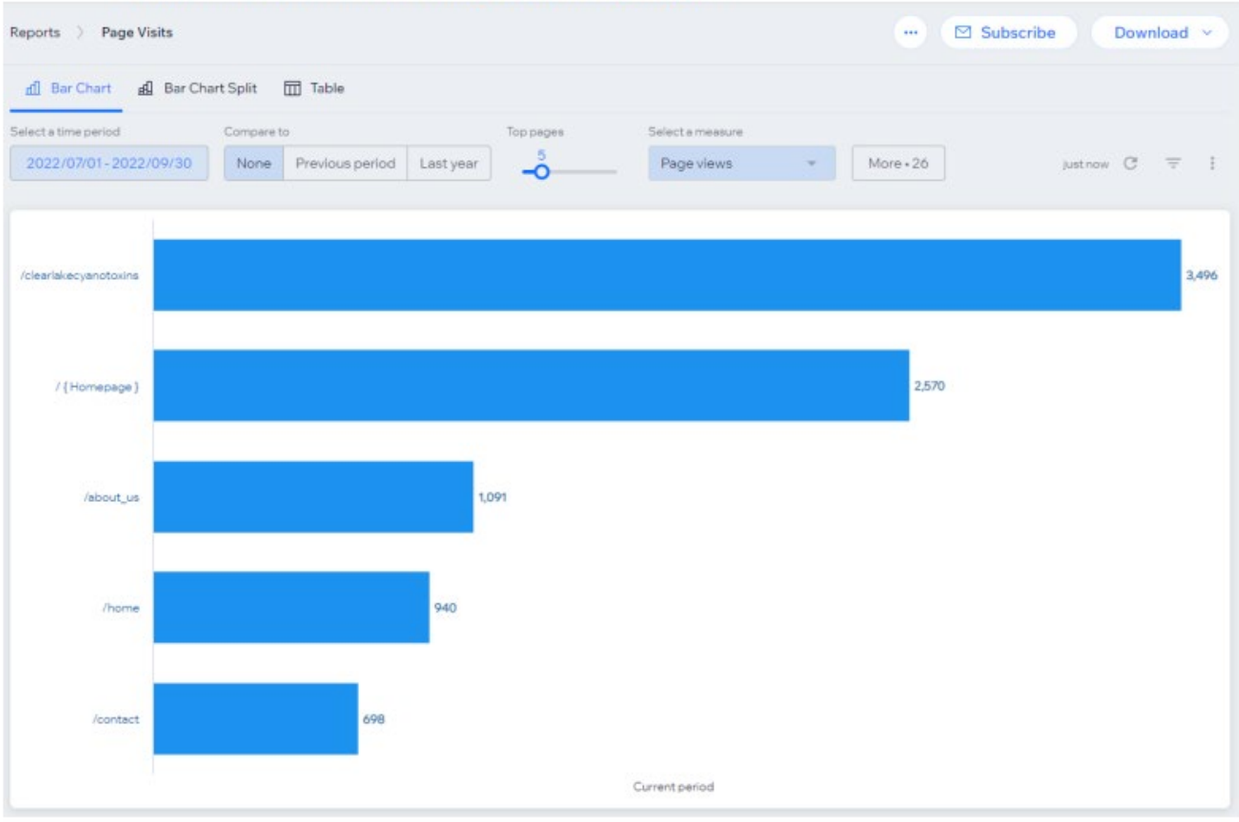


Front and back of an outreach flyer on water use and the Clear Lake hitch

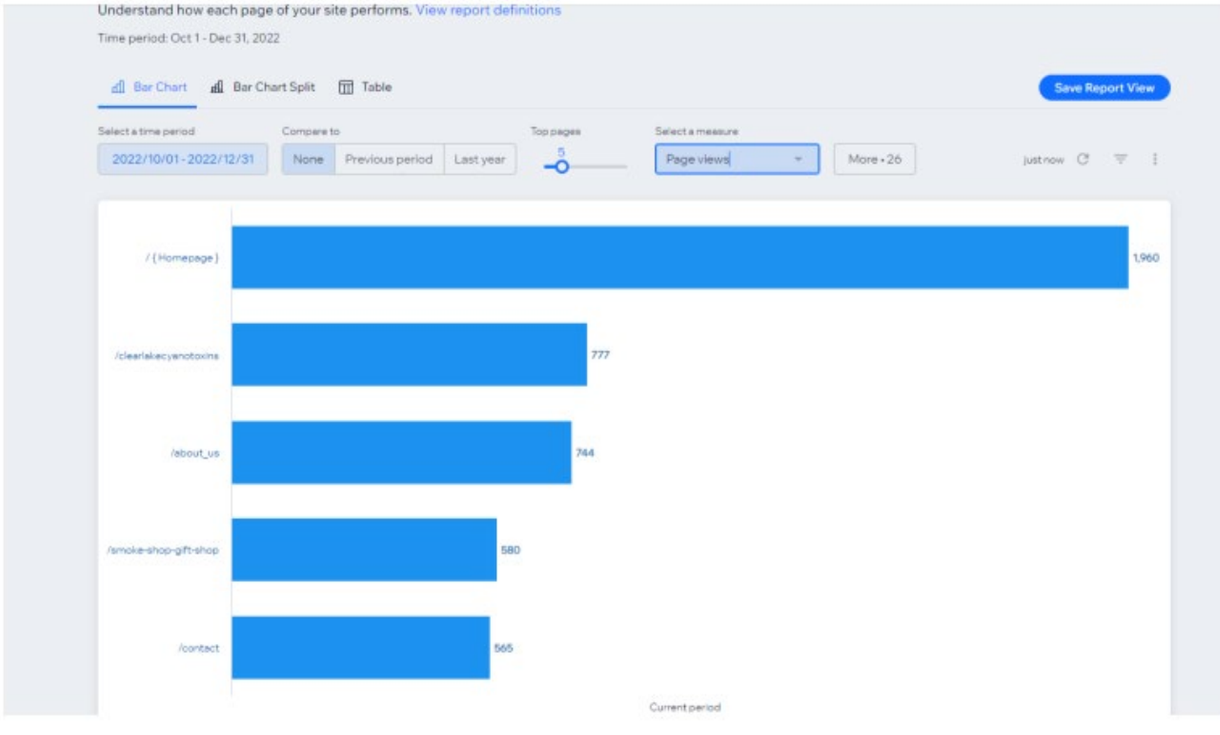


The Tribe continued to post water quality data on Clear Lake on www.bvrancheria.com/clearlakecyanotoxins page and tracked the analytics of the posts. The page provides information about the cyanotoxin levels and recommendations for safety. Below is a screenshot of some summer and winter page views analytics.

PAGE VIEWS FOR TOP 5 PAGES from www.bvrancheria.com :



PAGE VIEWS FOR TOP 5 PAGES from www.bvrancheria.com :



The Tribe intends to create a Clear Lake Data Collaborative portal page and invite Tribes and other data collectors to submit watershed data. Using Exchange Network grants, the Tribe is developing tools to quality control the data more quickly and accurately and support others to do the same. There is now a WQX Upload process through Shiny App that simplifies the process of review and submittal. BVR EPA presented on this process and new tools at a June 2024 Exchange Network forum. https://exchangenetwork.net/wp-content/uploads/2024/06/EN-Forum-Slides-June-13-2024.pdf

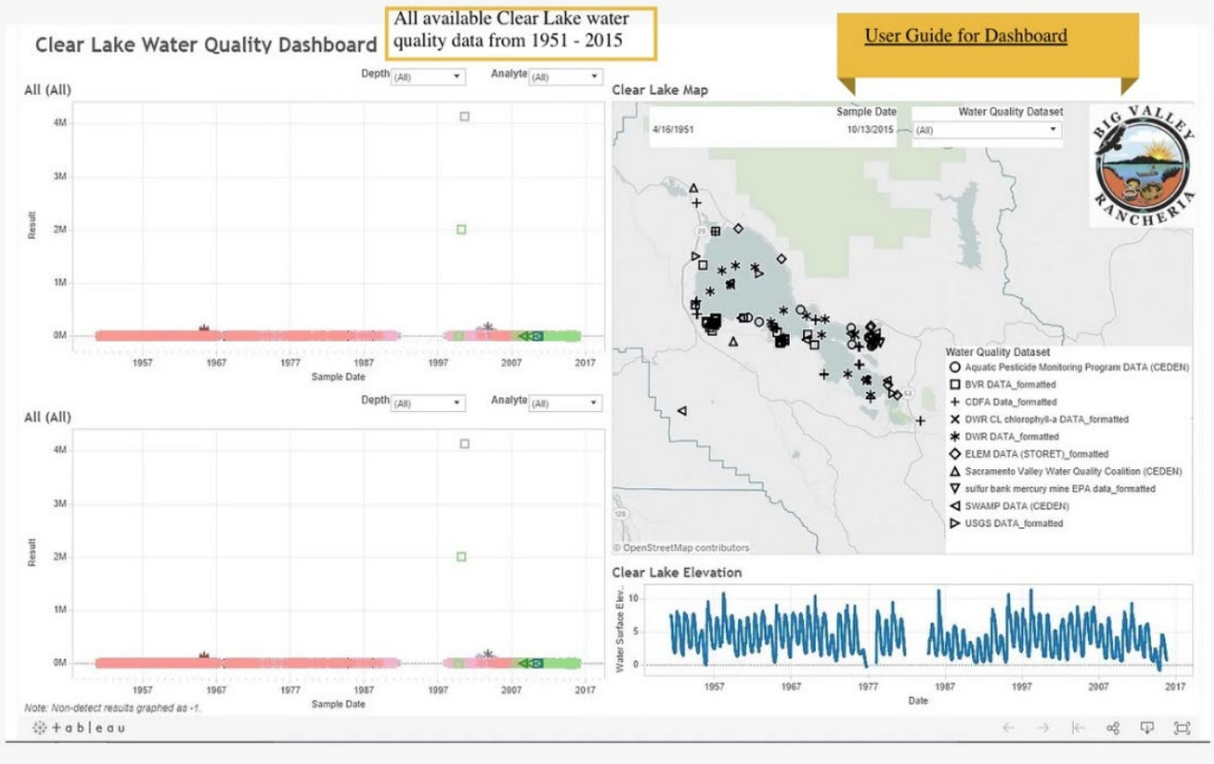
R9 Project Highlight

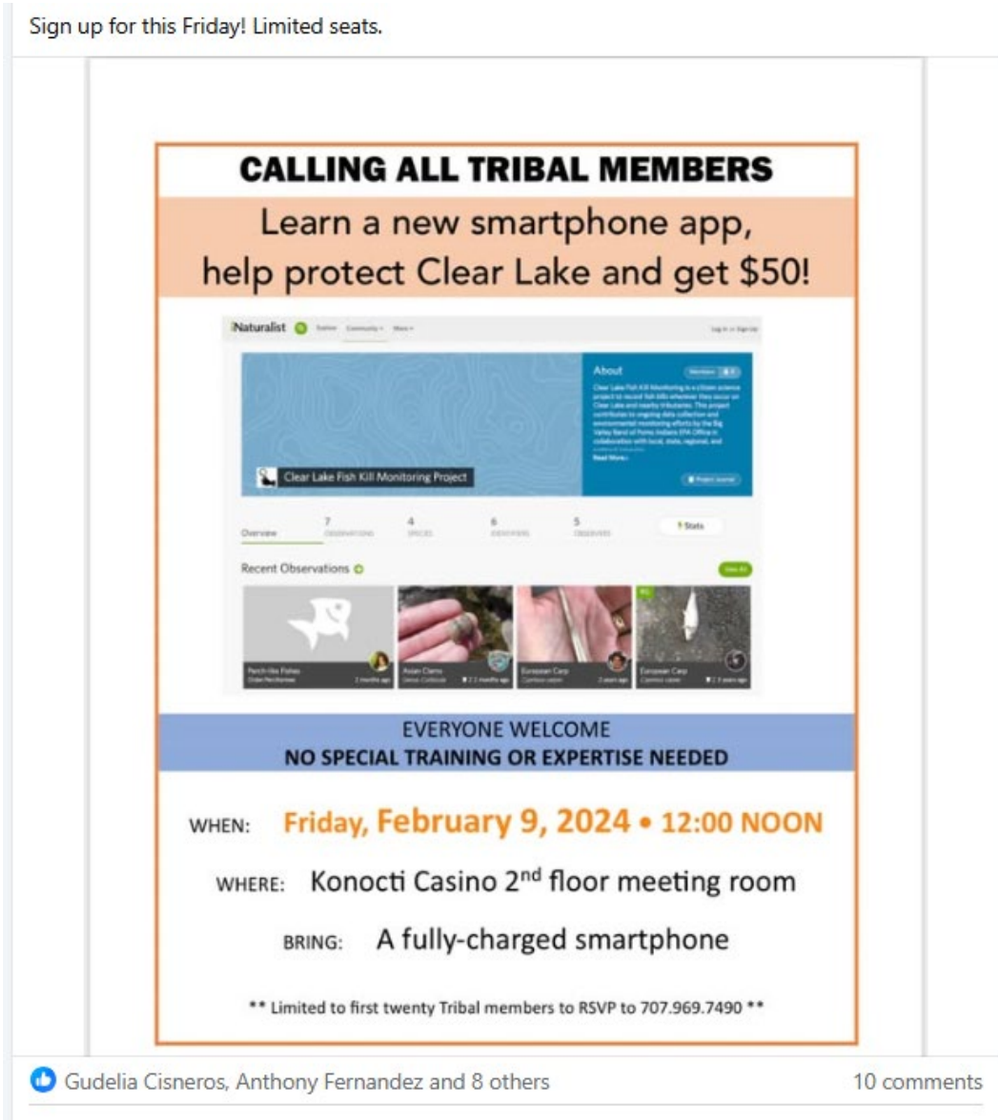
Grantee Org: Big Valley Rancheria Band of Pomo Indians
Award Year: 2020
EN Partnership Grant? No
EN Project Opportunity: EN Grant Priorities: 1, 2, and 5
Project Description: Clear Lake Comprehensive Water Quality Monitoring Program

Notable Project Highlights/ Accomplishments:

- A dashboard partially funded by this project is on Big Valley's webpage www.bvrancheria.com/epa and click on the Real Time Data Sondes or go to https://flowwest.shinyapps.io/bvr-wq-live/
- Removing obstacles to true adaptive management.
- More focused management and restoration actions to achieve the water quality, native fish populations, and agricultural goals for the basin.
- Empowering the tribe to be a major contributor to the management and restoration of the tributaries and Clear Lake.

The data portal will be completed in 2025. Existing historical watershed data exists on the Clear Lake Water Quality dashboard found on www.bvrancheria.com/epa.





Trainings for data collection happened at the water quality workshops as well as smaller sessions to learn how to use iNaturalist to track observations. Two trainings took place as part of this project. Both young and old created profiles on iNaturalist and walked the Big Valley shoreline and nearby lands to log the species they saw. Each participant uploaded at least four species during the training events, adding to the understanding of species diversity in the area. Approximately twenty two people participated in both trainings, held in February and May 2024.

3. Substantive Input to Clear Lake and Watershed Plans Using Tribal Data

Clear Lake Hitch Consultations

After bringing Tribal elders to an early 2022 California Fish and Game Commission meeting to discuss the decline of the Clear Lake hitch, the Tribe was able to utilize the interest and concern of the attendees to create consultation opportunities. One important activity that took place with Tribal data was the development of the first Clear Lake Hitch Emergency Summit, in December 2022. This summit was a government-to-government meeting hosted by the Big Valley Band of Pomo Indians and was attended by more than seventy-five state agency Directors Tribal Liaisons, Tribes, and local government. The goal was to discuss actions that could be taken to protect the Clear Lake hitch. Authorizing regulations, funding, co-management opportunities and specific actions were discussed during this day long summit. Big Valley EPA staff presented on their water quality and water quantity data to show the need for improved water quality management in the area. The Tribe was able to show that during drought conditions, and with low flow conditions, the endemic fish was particularly stressed.

The Clear Lake Hitch summit occurred again in 2023 and 2024, bringing funding and collaboration to the watershed, continuing to address the issues that were discussed in the first summit. State agencies have reviewed water use, fish passage barriers, and illegal diversions, addressing issues with enforcement compliance. Big Valley staff helped develop the Clear Lake Hitch Task Force and Clear Lake Hitch Implementation Team to continue the dialogue that developed amongst the Tribes and state agencies. The collaboration has led to such activities as:

- The development of a Clear Lake hitch page https://www.waterboards.ca.gov/waterrights/water_issues/programs/clear-lake-hitch/
- The approval of a local Hitch emergency by the Lake County Board of Supervisors
- A groundwater/surface water study of hitch bearing streams by the California Waterboards
- A minimum flow study of hitch bearing streams by the CDFW https://wildlife.ca.gov/Conservation/Watersheds/Instream-Flow/Studies/Clear-Lake-Watershed-Studies

- The development of a Clear Lake Hitch Data Synthesis team lead by USGS
- Collaboration of Waterboards with Lake County Code Enforcement on illegal cannabis grows

BVR EPA continued to support Tribal attendance at all Clear Lake hitch and watershed meetings. Tribal leadership attended at spoke at multiple meetings during this project, providing input on management actions needed to protect the species.

Thank you to Mares Ellis-Burrows and her two sons Calvin and Paul, Ron Montez, Doyle Fred, @FredBriones, Nikcole Whipple, @TaylorWoodson and Jeanine Pfeiffer for attending or calling in to speak and be present for the Chi today. We had a unanimous vote for the Emergency Information Order. Great job Big Valley and friends!

2023 Waterboards agenda item on the Clear Lake hitch

Clear Lake Hitch Emergency Summit

December 8th, 2022

Prayer and Breakfast	8:30 AM (30 min)	
Opening Ceremonies	9:00 AM (45 min)	
Opening Statement by Tribal Leadership	9:45 AM (25 min)	Robinson Rancheria, Big Valley, HPUL, Scotts Valley
Tribal Elders Presentations	10:10 AM (40 mins)	
Introductions	10:50 AM (10 min)	Main Table (Name and Affiliation)
Break	11:00 AM (10 min)	
CDFW Opening Remarks	11:10 (10 min)	CDFW
Life History and Population Trends	11:20 AM (10 min)	CDFW
Actions in Progress	11:30 AM (15 min)	CDFW
Review of Enforcement and Non-Compliance Issues, Creek Water Usage, and Impacts	11:45 AM (15 min presentation, 45 min discussion)	Big Valley, Scotts Valley
Lunch (Served Onsite)	12:45 PM (30 min)	
Dams, Diversions, and Detention Structure Operations and Levees Impacts	1:15 PM (15 min presentation, 45 min discussion)	HPUL, Robinson Rancheria
Predation, Disease, and Water Quality Impacts	2:15 PM (10 min presentation, 30 min discussion)	Robinson Rancheria and Big Valley
Break	2:55 PM (10 min)	
Immediate and Long-Term Actions that Remain	3:05 PM (40 min)	Tribes
Co-management and Commitments	3:45 PM (30 min)	All
Adjourn	4:15 PM	

Scotts Valley Band of Pomo

Agenda for the first Clear Lake Hitch summit

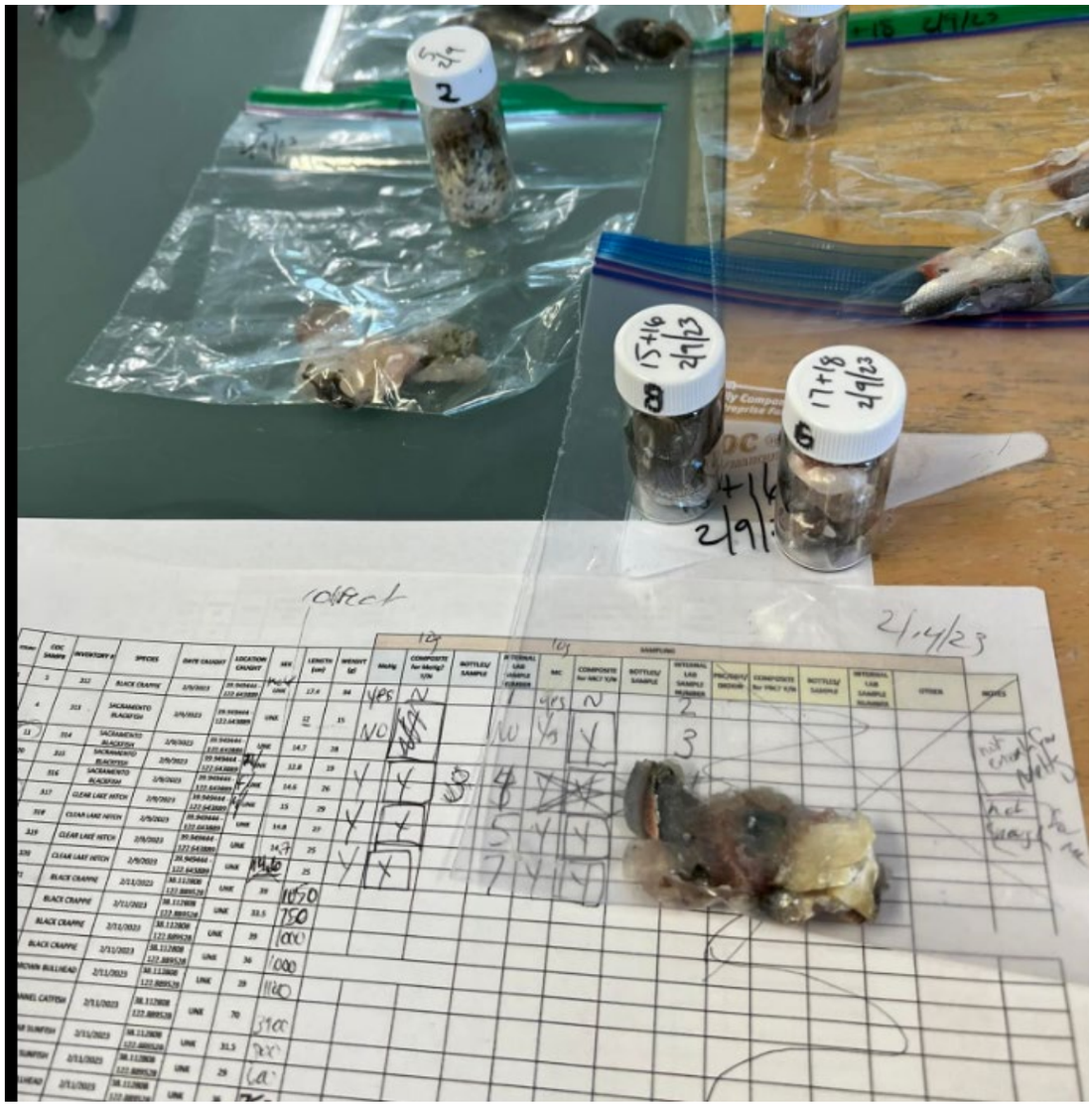
2020-2022 California Integrated Report

BVR EPA submitted data and comments to the California Waterboards during their 305 (b) evaluation of waterbodies in the Central Valley region including Clear Lake and its tributaries. Approximately 10,500 rows of data was submitted from Tribal water quality monitoring conducted from 2010-2018 which was used to list Clear Lake for microcystin, dissolved oxygen and pH.

Blue Ribbon Committee Involvement
BVR EPA continued to take part in both the quarterly membership meeting as well as the monthly Technical Subcommittee. The Tribe submitted proposals for watershed health totaling approximately $2.5 million which are still in contracting with the California Natural Resources Agency. These grants include restoration projects, water quality monitoring, data management and integrating Traditional Ecological Knowledge into the updating mapping systems of groundwater dependent ecosystems.

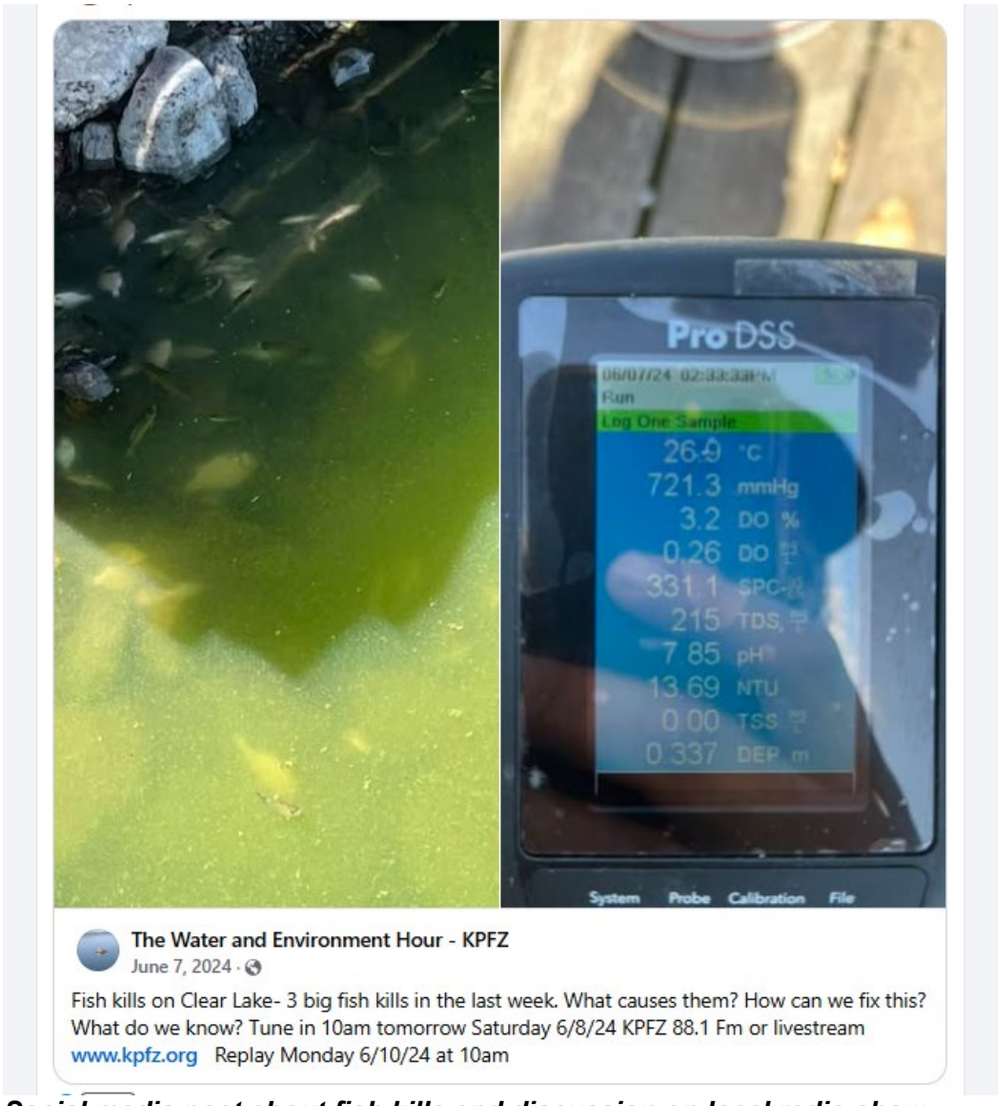
4. Testing Culturally Significant Species

Tissue Testing
Fish and Shellfish were collected in 2022 and 2023 from all three arms of Clear Lake and two creeks to send off for mercury and cyanotoxin analysis. Forty-eight tissue samples (composites of sixty-five fish and shellfish) were analyzed for microcystin cyanotoxin analysis. Twenty-nine samples had microcystin detects, none were over the sportfish consumption action level of 10 ng/g, but subsistence consumption should have a much lower action level for safe consumption. This continues to be reviewed with California's Office of Health Hazard Assessment.



Prepping fish for send off to lab for microcystin and mercury analysis

Tracking Fish Kills
The Tribe continued to respond to fish kills in the Lake, collect water quality data and fish tissue if needed. Big Valley's Environmental Director is the host of a radio show on local public radio, the Water and Environment Hour, and regularly reports on BVR EPA activities and other environmental issues.



Social media post about fish kills and discussion on local radio show

Leveraging Funds $368,296
Bay Area Council California Resilience funding (second grant) was leveraged to enhance the tasks and goals of the project. Funding applied for and received included:

- "Flow Measuring Project," California Department of Water Resources, $70,000 to obtain equipment to conduct flow monitoring in local creeks for the Clear Lake hitch, 2023.
- "Big Valley Subbasin Water Resources Monitoring and Data Analysis Project," California Department of Fish and Wildlife, $198,296 to conduct water quality and water quantity monitoring, analyze groundwater and surface water trends, monitor habitat conditions and complete a hydrodynamic modeling of instream flow, 2023.
- "Big Valley Band of Pomo Indians Clear Lake Stewardship," Resources Legacy Fund, $100,000 to support water and fisheries work to protect water quality and native fisheries, 2024.

Summary
By initiative-taking engagement and leadership, Big Valley Band of Pomo Indians was able to document conditions of the Clear Lake watershed, collaborate with a variety of agencies and stakeholders, increase environmental literacy in the local community and protect culturally significant species. These efforts improve community and species resiliency in the face of uncertain climate conditions.