Water Quality and Its Impact on Tribal Beneficial Uses

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State of the Estuary

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California Indian
Pre-contact
Tribal
Territories
Tolowa
Yurok
Chilula
Wiyot
Whilkut
Chimariko
Mattole
Nongatl
Lassik
Wailaki
Sinkiyone
Kato
Coast Yuki
Huchnom
Lake Miwok
Wappo
Karok
Hupa
Shasta
Modoc
Achomawi
Northern Paiute
Wintu
Atsugewi
Yana
Maidu
Nomlaki
Yuki
Konkow
Pomo
Patwin
Nisenan
Washo
Mono Lake Northern Paiute
Coast Miwok
Sierra Miwok
Owens Valley Paiute-Shoshone
Northern Valley Yokuts
Costanoan
Foothill Yokuts
Monache
Western Shoshone
Tabtulabal
Esselen
Salinan
Southern Valley Yokuts
Kawaiisu
Southern Paiutes
Mojave
Kitanemuk
Chumash
Serrano
Chemehuevi
Gabrieleño
Tataviam
Cahuilla
Hatchidhoma
Gabrieleño
Luiseño
Quechan
Ipai
Tipai
California Indian Library Collections

Tribal Beneficial Uses - Definitions

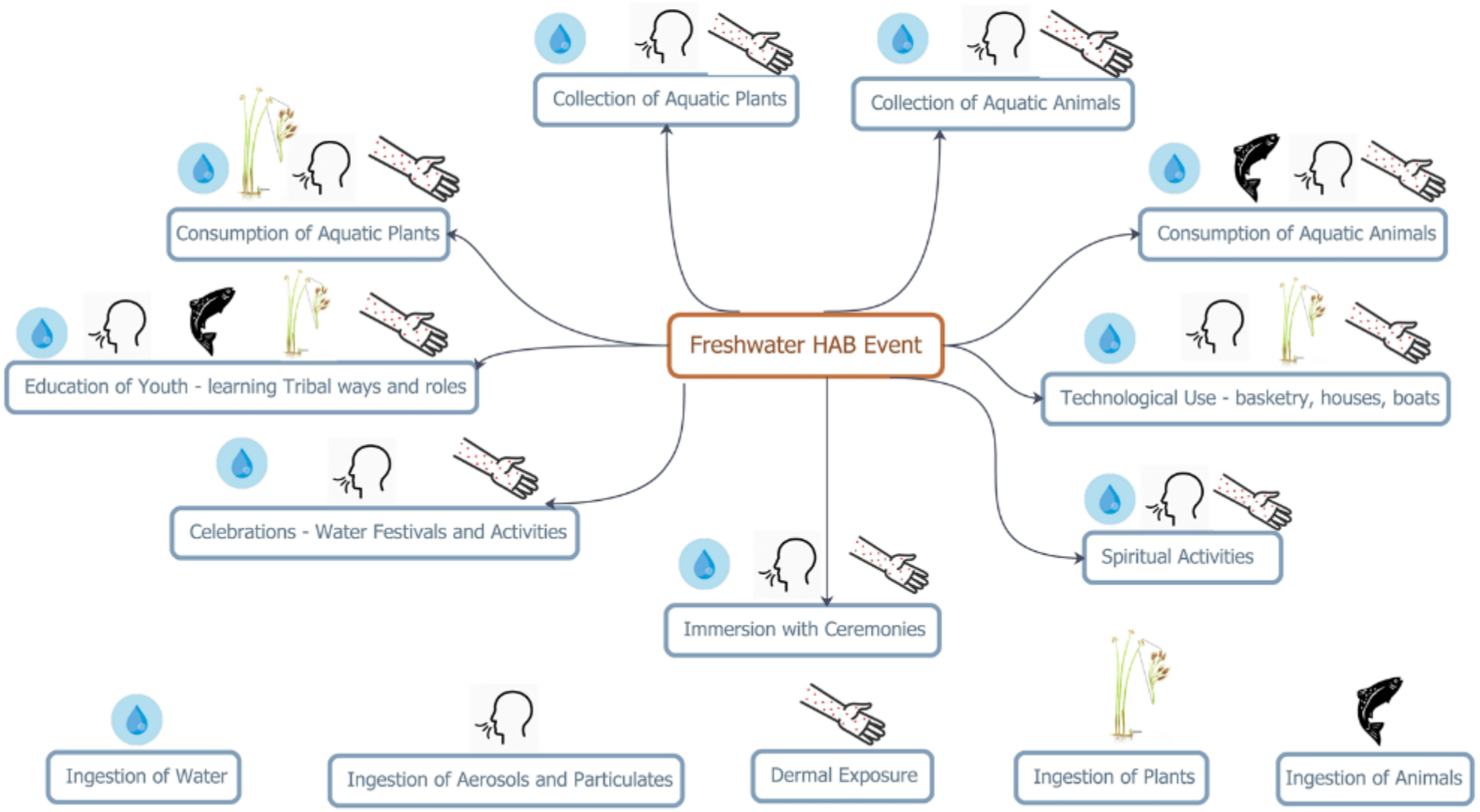
- **Tribal Tradition and Culture (CUL):** Uses of water that support the cultural, spiritual, ceremonial, or traditional rights or LIFEWAYS of CALIFORNIA NATIVE AMERICAN TRIBES, including, but not limited to navigation, ceremonies, or fishing, gathering, or consumption of natural aquatic resources, including fish, shellfish, vegetation, and materials.

- **Tribal Subsistence Fishing (T-SUB):** Uses of water involving the non-commercial catching or gathering of natural aquatic resources, including fish and shellfish, for consumption by individuals, households, or communities of California Native American Tribes to meet needs for sustenance.

Adopted by the State Water Resources Control Board in May 2017
https://www.waterboards.ca.gov/about_us/public_participation/tribal_affairs/beneficial_uses.html

Tribal Cultural Use Conceptual Freshwater Harmful Algal Bloom (FHAB) Impact Pathway

Native peoples were given their land by Creator and honor Creator and their Ancestors by maintaining traditions and cultural landscapes. This is the connection between the land and the people. Uses can be repetitive, gender assigned and long term. Exposures can occur second hand through the use and trade of plants and animals that have been in contact with HABs.



Amending Basin Plans to Protect Tribal Beneficial Uses

- Tribes in California are now engaging with Regional Waterboards to take the next steps of the Clean Water Act – designating water bodies with Tribal traditional uses and identifying Water Quality Objectives related to Tribal Beneficial Uses for these Basin Plans
- All NPDES permits and TMDL clean ups are linked to stated beneficial uses and water quality objectives
- The Clean Water Act requires period review of water quality data against water quality objectives. Available Tribal data is used during these 305b evaluations.

Clear Lake (Xabatin)

- Largest natural freshwater lake in California
- 100 miles of shoreline
- Surface area of 43,785 acres
- Average depth 27 feet, max depth 60 feet
- Oldest lake in North America – sediment cores dating 1.8 million years

Clear Lake Cyanotoxin Monitoring Program

Initiated and developed by Big Valley Band of Pomo Indians and Elem Indian Colony, 2014. **https://bit.ly/ClearLakeCyanoMonitoringProgram**

California Cyanotoxin Guidelines

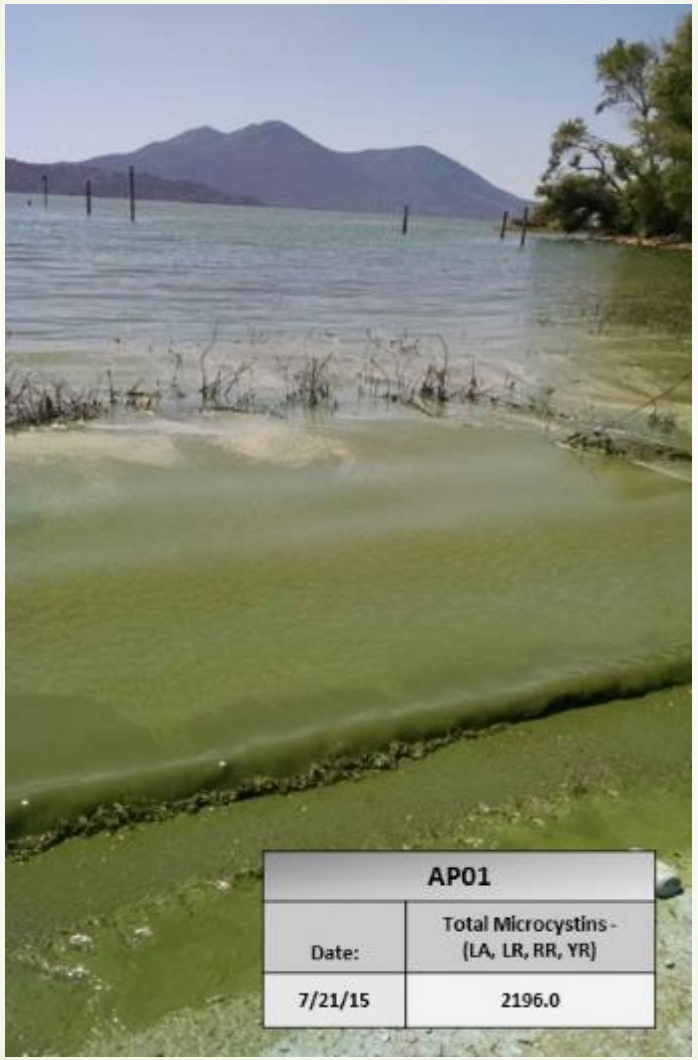
Action levels for selected scenarios

	Microcystins[1]	Anatoxin-a	Cylindro-spermopsin	Media (units)
Human recreational uses[2]	0.8	90	4	Water (µg/L)
Human fish consumption	10	5000	70	Fish (ng/g) ww[3]
Subchronic water intake, dog[4]	2	100	10	Water (µg/L)
Subchronic crust and mat intake, dog	0.01	0.3	0.04	Crusts and Mats (mg/kg) dw[5]
Acute water intake, dog[6]	100	100	200	Water (µg/L)
Acute crust and mat intake, dog	0.5	0.3	0.5	Crusts and Mats (mg/kg) dw[5]
Subchronic water intake, cattle[7]	0.9	40	5	Water (µg/L)
Subchronic crust and mat intake, cattle[7]	0.1	3	0.4	Crusts and Mats (mg/kg) dw[5]
Acute water intake, cattle[7]	50	40	60	Water (µg/L)
Acute crust and mat intake, cattle[7]	5	3	5	Crusts and Mats (mg/kg) dw[5]

'Suggested Action Levels and Six Cyanotoxins', CA OEHHA, 2012

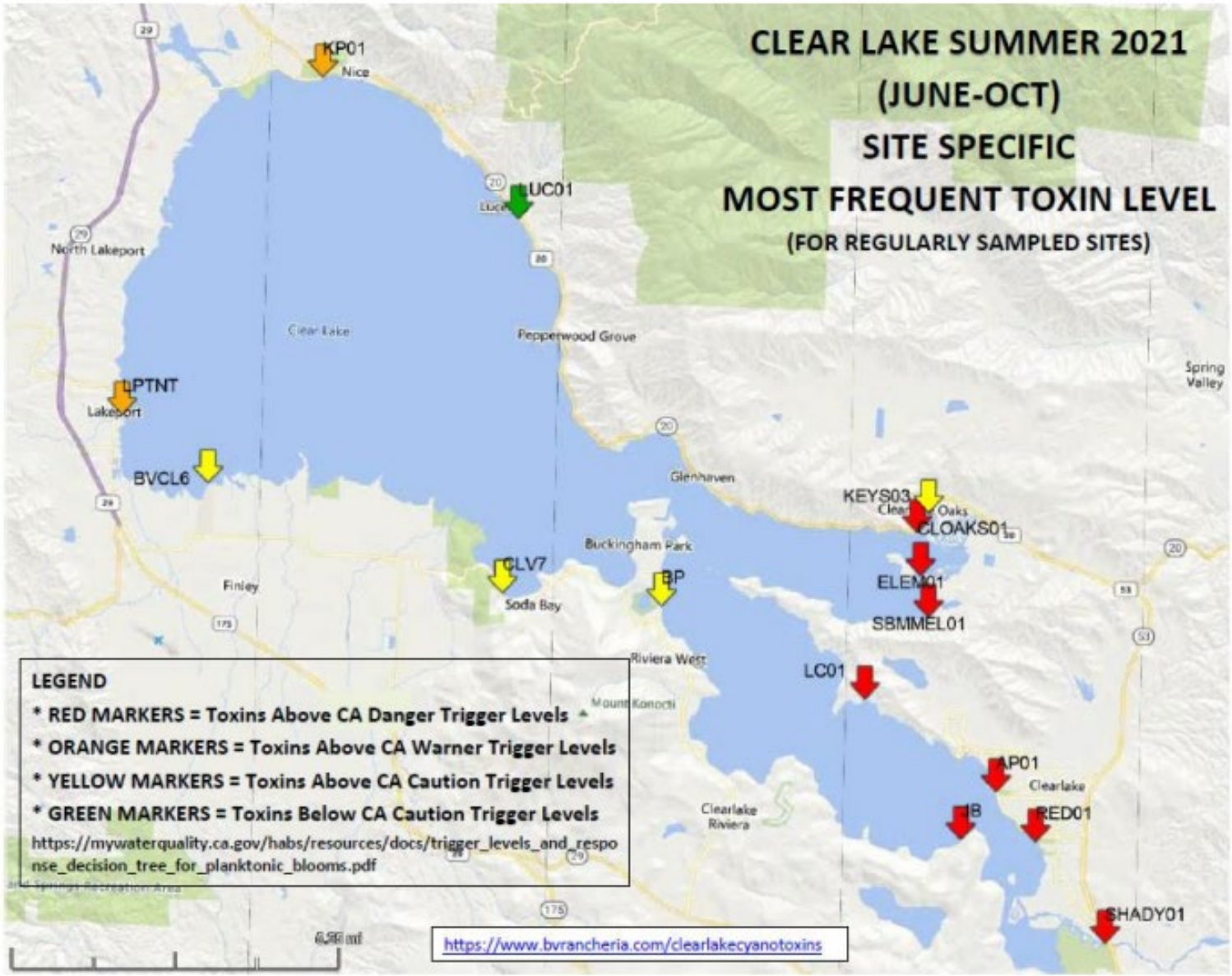
https://oehha.ca.gov/risk-assessment/document/toxicological-summary-and-suggested-action-levels-reduce-potential-adverse

Cyanotoxins' Impacts on Beneficial Uses



HUMAN EXPOSURE

Identifying Trends For Toxin Levels



Cyanotoxins' Impacts on Beneficial Uses

FISH CONSUMPTION

INVENTORY NAME	SITE ID	DATE COLLECTED (see seasonal color chart at bottom of spreadsheet)	SPECIES NAME *species are categorized by different colors	Microcystin RESULT TISSUE (ng/g)	Microcystin RESULT LIVER (ng/g)
83	M4	4/21/2015	CRAYFISH	5.94	
84	609	4/22/2015	BLACK CRAPPIE	4	59.75
85	762	4/23/2015	TULE PERCH	3.02	6.18
86	609	4/22/2015	TULE PERCH	4.56	ND
87	AC1	3/25/2010	HITCH	13.34 ☆	52.42
88	AC1	3/25/2010	HITCH	16.5 ☆	10.89
89	AC1	3/25/2010	HITCH	9.08	1.65
90	AC1	MAY, 2010	HITCH	8.47	7.51
91	215	5/26/2015	LM BASS	1.94	8.04
93	BVCL6	12/12/2017	MUSSEL	28.6 ☆	
100	BVCL6	12/12/2017	MUSSEL	17.25 ☆	
101	BVCL6	12/12/2017	MUSSEL	15.21 ☆	
103	CP	12/14/2017	MUSSEL	12.73 ☆	
104	CP	12/14/2017	MUSSEL	19.53 ☆	
105	CP	12/14/2017	MUSSEL	22.95 ☆	

Table 12: Sport Fish and Shellfish Action Levels for Consumption (ng/g, ww[1])

	Microcystins	Anatoxin-a	Cylindrospermopsin
Sport fish tissue level	☆10	5000	70

Fish Cyanotoxin Study, 2018

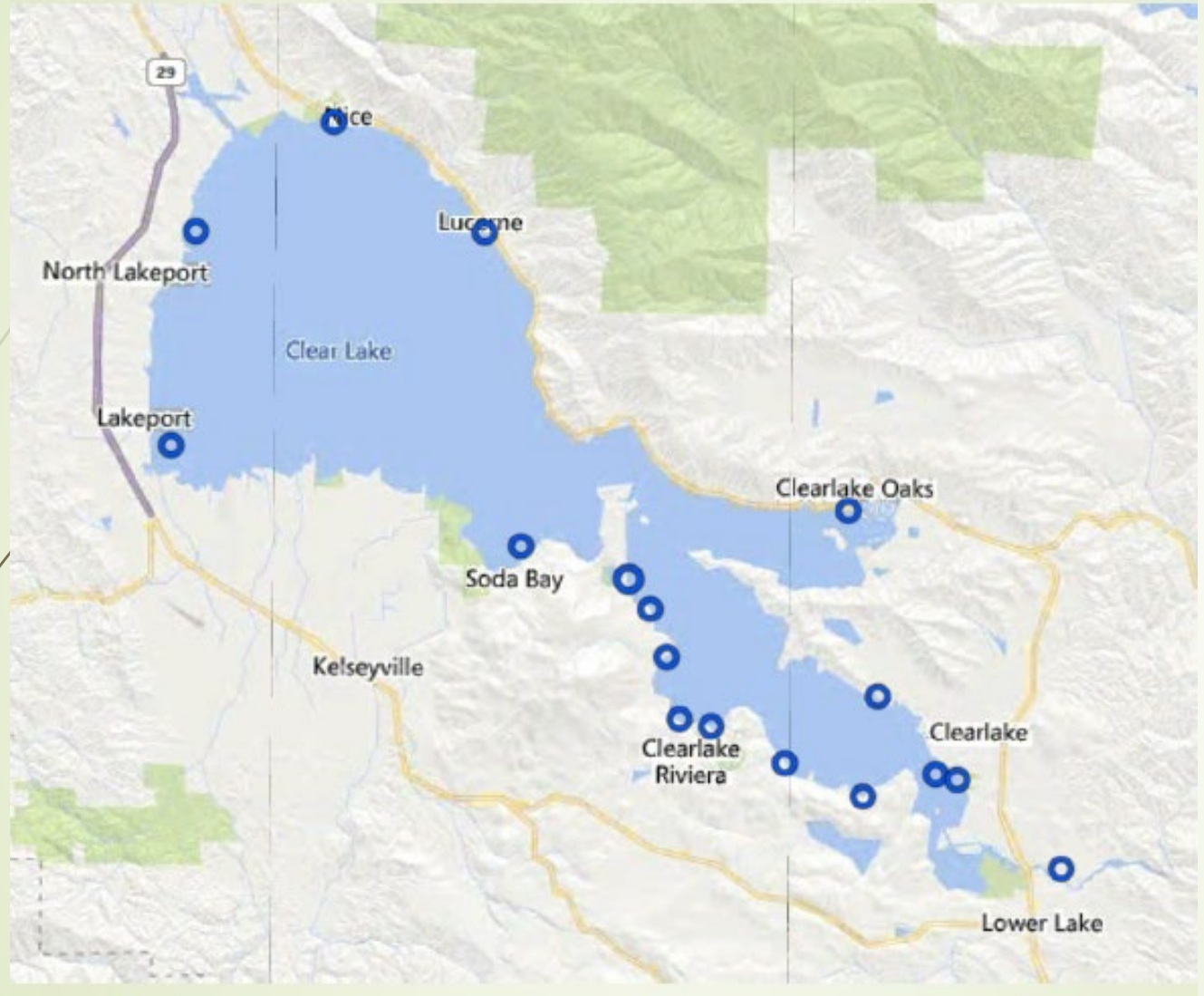
- Using CalEPA EJ funds, Big Valley EPA staff collected fish and shellfish species from 2010-2018 and submitted them to a lab for microcystin cyanotoxin analysis.

- A total of 44 Clear Lake fish (tissue and liver samples) and 49 Clear Lake shellfish (crayfish and mussels), totaling 126 samples and ten species were submitted in February 2018.
  - Multiple species - Tribally important fish
  - All arms of the lake
  - All seasons

FISH	AVERAGE MICROCYSTIN IN TISSUE NG/G	COUNT
CRAPPIE	4.15	8
BLACKFISH	6.91	1
BLUEGILL	ND	2
CARP	13.60	2
CATFISH	2.02	6
CRAYFISH	4.19	23
HITCH	9.81	8
BASS	1.85	7
MUSSEL	10.33	26
TULE PERCH	2.99	9
all fish species	5.90	43
all shellfish species	7.26	49

Data can be found in CEDEN, Parent Project: Clear Lake Fish Cyanotoxin Study
https://ceden.waterboards.ca.gov/AdvancedQueryTool

Cyanotoxins' Impacts on Beneficial Uses



Surface Water Public Water Systems, Clear Lake

DRINKING WATER

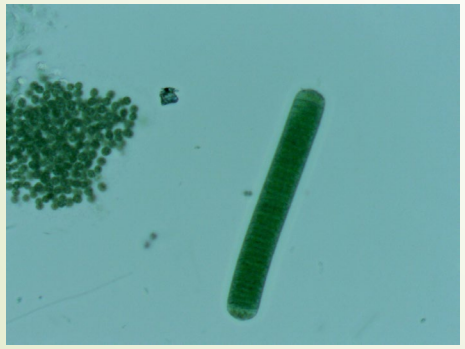
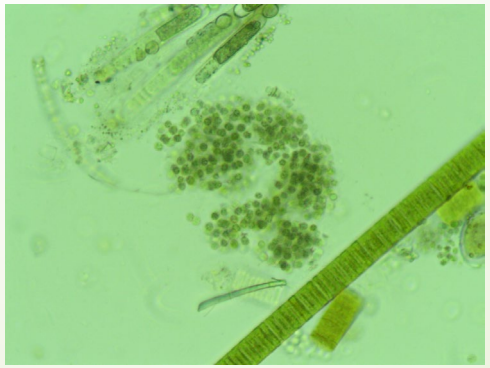
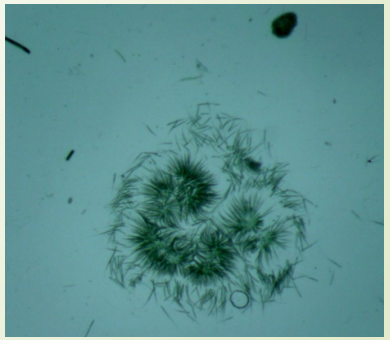
Clear Lake surface water serves approximately 60% of Lake County residents through 17 Public Water Systems.

The Safe Drinking Water Act guidelines on cyanotoxins:

https://www.epa.gov/ground-water-and-drinking-water/drinking-water-health-advisory-documents-cyanobacterial-toxins

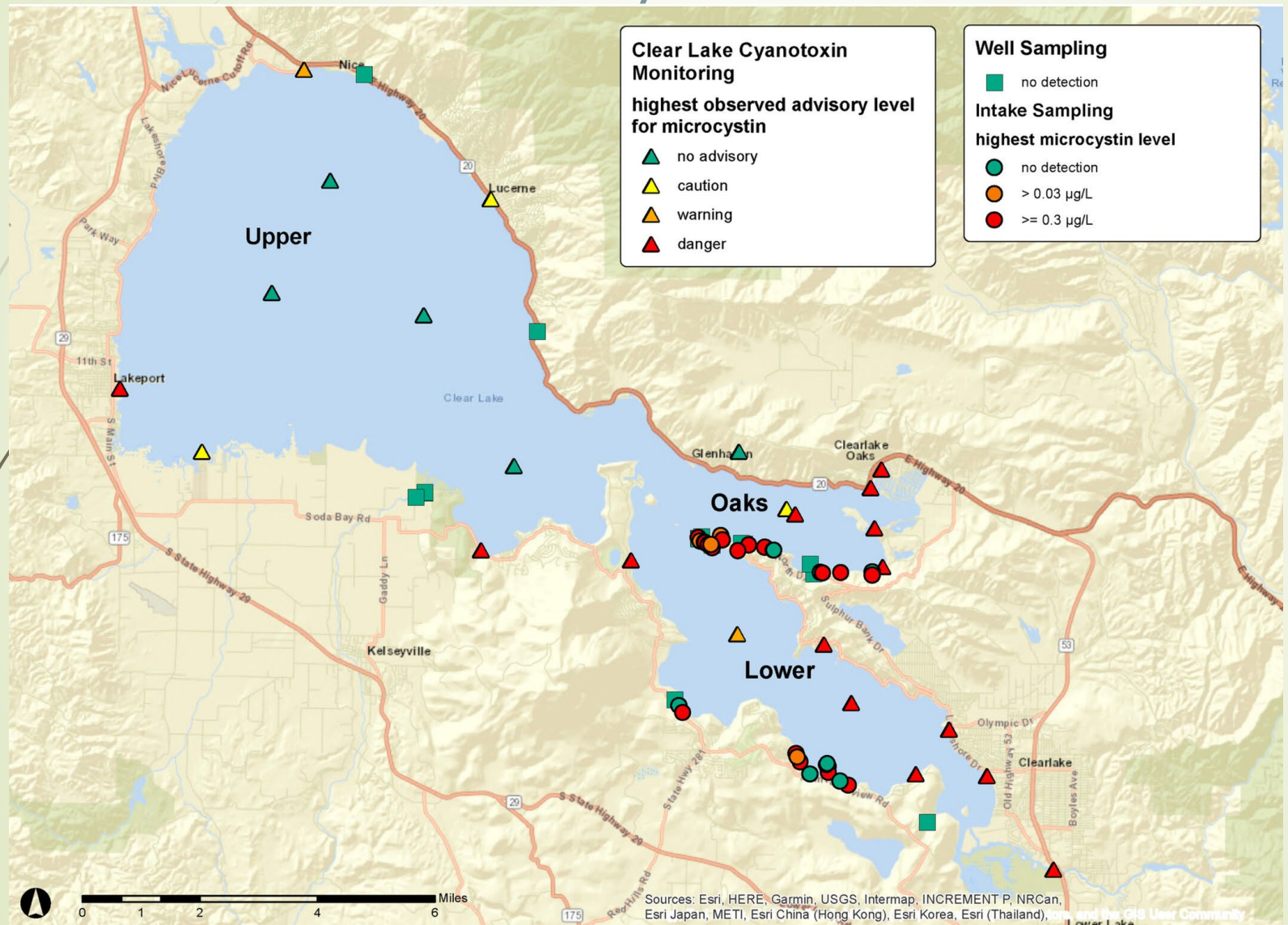
Cal-WATCH Program: Testing of Drinking Water from Private (Self-Supplied) Systems off Clear Lake

- June-October 2021, self supplied (private) tap water from 36 homes collected and analyzed.
- Microscopy identified *Microcystis, Gloeotrichia, Kamptonema spp*. in samples.
- Of the 36 homes, 20 had detectable microcystin in them, with 13 homes above the US EPA Health Advisory of 0.3 µg/L. The highest value in the tap water was 3.85 µg/L.
- Ambient lake microcystin levels reached 160,378 µg/L.

Photos from tap water samples from private intakes, Clear Lake.

Review of Public Water Systems vs Private and cyanotoxin detects



- https://awwa.onlinelibrary.wiley.com/doi/full/10.1002/aws2.1337 - Vulnerabilities of self-supplied water systems with intakes to source water microcystin and cyanobacteria compared with more advanced monitoring and treatment capabilities at public water systems.

Summary

- Tribal water programs can provide much needed information to protection Tribal uses of water
- Exposure scenarios for Tribal traditional activities are still being developed and will be integrated into regional management plans
- Meanwhile, Tribal traditional uses continue, and exposures to unacceptable contaminants continue.

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https://www.bvrancheria.com/clearlakecyanotoxins
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