

WHO ARE WE?

CA DRINKING WATER PROGRAM



Our program promotes and maintains a physical, chemical, and biological environment that contributes positively to health, prevents illness, and assures protection of the public. We regulate public water systems; oversee water recycling projects; permit water treatment devices; certify drinking water operators; support and promote security; provide support for small water systems; oversee a treatment and research fund; and provide subsidized funding for water system improvements.

Role: convey information from the experts in a responsible way

WHAT ARE WE FACING?



HAB from Drinking Water Perspective

- Public Health Quandary: unregulated contaminants that pose potentially significant health risks and the public interest/concern is growing
- Lack of a strong authority to describe the following:
 - Analytical methods
 - Monitoring strategies
 - Treatment approaches
 - DW Health Risks
- Limited resources → Karen Larsen/Stefan Cajina established workgroup in Fall 2014 to prioritize & formalize

Toledo Tipping Point

Lake Erie: 25 public water systems serving 2.6M people

- Robust program - Ohio had Response Strategy in place since 2010
- August 1, 2014, 11 PM: microcystin > 1 ug/L drinking water advisory threshold for confirmed result (sampling issues)
- August 2, 2014, 2:00 AM: 400,000+ people informed of a DO NOT DRINK advisory
- August 4, 9:35 AM: lifted the advisory
- Lessons cited: 1940s treatment, single source, questionable protocols
- Next steps: inform, analytical, \$, source improvements

Drinking Water Regulations at a glance with respect to cyanotoxins



notification = threshold = provisional max acceptable

These terms are used when there is a high degree of uncertainty associated with toxicology, health risks, difficulties in treatment or chemical analysis.

- WHO guideline (most referenced) – 1 ug/L microcystin-LR
- New Zealand/Australians/Brazil/Canada/Ohio/Oregon+
- Federal level – EPA is developing methods for cyanotoxins and is developing drinking water advisories for the 3 cyanotoxins listed in final CCL3 (microcystin-LR, anatoxin-a, cylindrospermopsin) → UCMR4 (Jan2018)
- State level – evaluating process
 - Recommendation → OEHHA → Establish





Utilities

Citizens

Agency Partners

Business Partners

EPA

(Adjacent Property Owners)

County

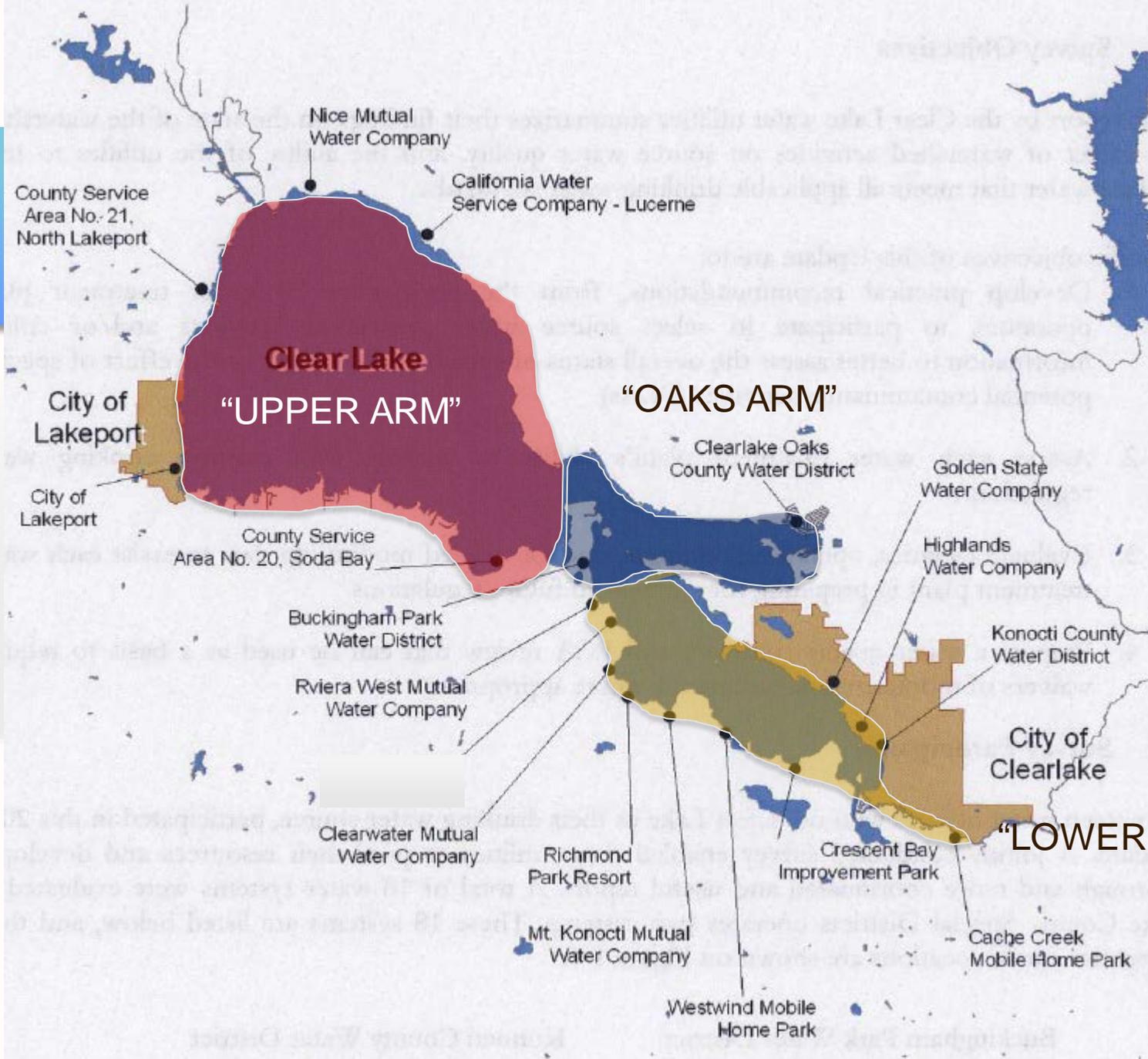
State

WHAT'S THE CLIMATE LIKE?

as it relates to water treatment



- To date (2011+), no cyanotoxins detected in finished water in Clear Lake (however still waiting for Labor Day results from CDPH lab)
- WHO (most referenced) established guideline for DW $<1 \mu\text{g/L}$ microcystin-LR
 - Proposed bill: EPA may have DW advisory, methods, & treatment in 2015
- If detected in finish water, treatment available
- Minimize health impacts – HOW?
 - Need comparable results between laboratories/groups sampling
 - If detected in source waters, need recommendations for water purveyors
 - If detected in drinking water, provide informed support



Cyanotoxin Results

Total Microcystin concentrations, µg/L

Samples collected August 20-21, 2013



SOURCE WATER @ INTAKE

PROCESS WATER

FINISHED WATER RESULTS

Upper Arm

<RL (Nice) 0.16 (CaIW)
0.41 (Lake-NL)
0.15 (Lake-SB)
2.36 (City of Lakeport)

<RL
0.15 (City LP)
-%94

Oaks Arm

0.1 (Oaks) 0.19 (Buck)

<RL

Lower Arm

0.76 (CW)
<RL (Rich) 0.12 (Hi)
<RL (MK) 0.16 (KCWD)
<RL (WW) 0.67 (GS)
0.77 (CB) 0.23 (HarbV)

0.24 (CW) -%68
<RL

**NO DETECTIONS
IN FINISHED WATER
INCLUDING AT
DIALYSIS CENTERS**

RL – reporting limit

Cyanotoxin Results

Clearwater Mutual Water Company Treatment Clarifier acting as an incubator? (since REPLACED)

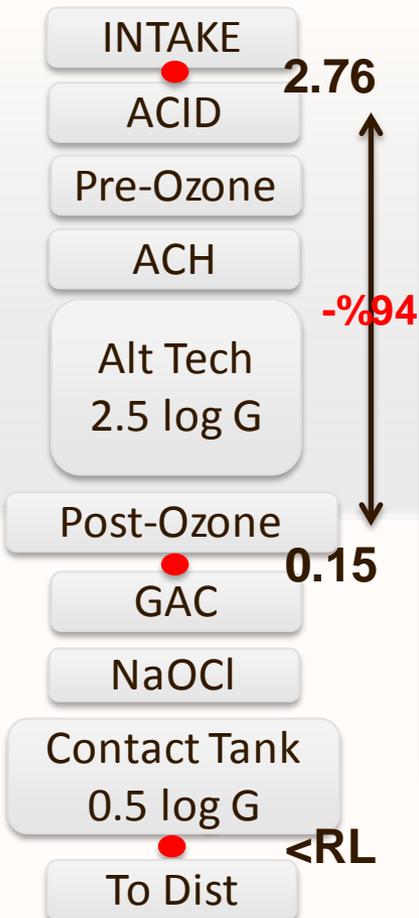


Sampling Point

Hypothetical Cyanotoxin Treatment Assessment @ City of Lakeport



Highest cyanotoxin concentration detected at intake



Tip #1: Use tools to answer questions
Fluorometer? SCM?

Raw:

Monitoring pH? Change in intake depths available? Possible to adapt to behave like a DAF? Recycled water introduced?

Acid addition: in operation? Target pH at what point

Pre-Ozone: Restrict dosage? Or crank it? Effective?

US Filter: evaluate time between flushes; consider using filter aids; consider adding intermediate sample point

Monitor number of backwashes; look for breakthrough

Nature of the charge going on to the filter bed

Post-Ozone: In operation? Effective?

GAC: Know that it is possible for cyanotoxin breakthrough to happen before traditional indicators for spent media are used

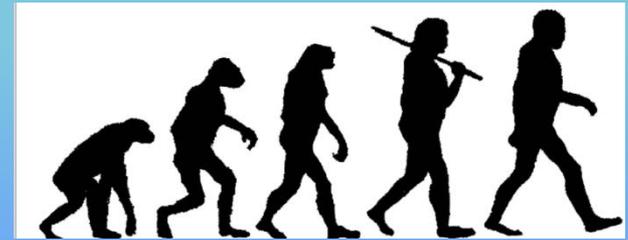
Know CT: 99.9% Giardia lamblia cyst reduction is required

Tip #2: Know what stage the bloom is in

● Cyanotoxin Sample Location

GOT ANSWERS?

I wish. How do we get there?



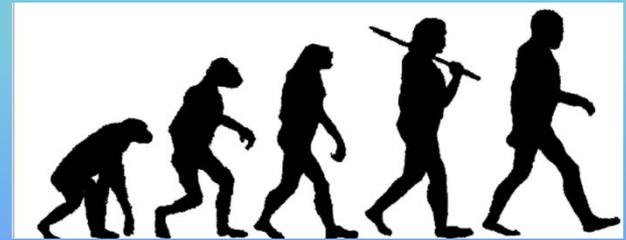
Our Progressive Journey

DW SUPPORT

- DW Workgroup – public, water systems, and staff
- Workshops – inform public water systems & partners
 - Dialysis centers integrated
- Technical resource to troubleshoot treatment issues – still learning (e.g. calls, blitz jar test workshop)
- Use fluorometers to evaluate what the cells are doing as they pass through the plants (have a handheld)
- Collect periodic samples to evaluate treatment in HAB sources
- Inform water systems on regulations & options
 - public health officer authority

GOT ANSWERS?

I wish. How do we get there?



Our Progressive Journey

DW PROGRAM NEEDS:

- If cyanotoxin monitoring in a reservoir occurs, communicate with utilities. (<http://drinc.ca.gov/DWW/index.jsp>)
- What ability do utilities have to control blooms at the source? Guidance on algaecides?
- What does the long term monitoring picture look like & how do we continue to support it?
- Vehicle to keep public informed (what does it all mean?)
- Vehicle to keep water purveyors informed
- Laboratory information & Monitoring framework (big!)
- I found something, now what? Public notice?
- Input on structuring Sanitary Survey (next)

Laboratory List – See Handout



Recommend sampling with amber glass bottles

Based on the EPA CCL3 list (constituents below) and regulations from New Zealand, this is the preferred method of analysis:

- Microcystins, expressed as MC-LR toxicity equivalents
 - Preferred: HPLC-UV/PDA
 - Alternative: LC-MS, ADDA-ELISA, PP2A
- Anatoxin-a
 - Preferred: LC-MS
 - Alternative: HPLC-FLD, HPLC-UV
- Cylindrospermopsin
 - Preferred: LC-MS
 - Alternative: HPLC-PDA



Clear Lake Cyanotoxin Monitoring Framework

What should it look like? Trigger based? Ops based?

Based on cell counts
or fluorometric units?

Source (weekly): ID type and cell counts [fluorometer?]
move to next level of monitoring IF $> 2,000$ cells/mL
move to next level of monitoring [pigment] IF $> ??$ $\mu\text{g/L}$

Source (2x/week): ID type, cyanotoxins
add sampling at entrance to distribution (>0.5 $\mu\text{g/L}$ MC-LR)
Entrance to distribution (2x/week): cyanotoxins
move to next level of monitoring (> 1 $\mu\text{g/L}$ MC-LR)

Immediate Public notification?
Source: ID type?
Entrance to distribution (2x/week): cyanotoxins
@ dialysis centers (2x/week): cyanotoxins

Based on finished water
cyanotoxin concentrations?

Watershed Sanitary Survey (every 5 years)

Time for a special edition? Nutrient Loading

(c) The survey and report shall include physical and hydrogeological description of the watershed, a summary of source water quality monitoring data, a description of activities and sources of contamination, a description of any significant changes that have occurred since the last survey which could affect the quality of the source water, a description of watershed control and management practices, an evaluation of the system's ability to meet requirements of this chapter, and recommendations for corrective actions.

In other words, systems shall have a watershed control program which works to help reduce the potential for contamination in the source water

- All systems combined spent \$130,000 for 2012 report
- How many of you were involved?
- Information is utility heavy?
- How many of you know this is an impaired source for mercury and nutrients?

'impaired source' – on agency list as impaired or threatened by a pollutant and needing corrections

Watershed Sanitary Survey

What could it look like?



AWWA (M57) – authority on safe drinking water

- Land Use Inventory
- BMPs
- Hydrology
- Landfilling
- Excavations
- Sludge disposal
- Septic systems
- Industrial WW discharge
- NPDES (Permitted Sources)
- Ag/landscapes/Golf Course activities
- Special activities
- Impervious cover
- Natural Sources
- Water depth
- Construction
- Recreation
- Impaired Waters

New Zealand uses Catchment Risks

- Land Use
- Livestock
- Human/Animal Waste
- Management practices
- Available Data

This is an important step of your multi-barrier approach to ensure clean safe water!

2017 Watershed Sanitary Survey Report

What could it look like?

- Nutrient loading focused survey?
- Meet with district office to discuss scope of work?
- Get a liaison? Start earlier to get informed?
- Invest in early detection systems at your source?
 - Cyanobacteria blooms, sewage leaks, hazardous runoff, and fish kills (Glasgow et al., 2004)

How would you like to get support with treating algal blooms? (From the RSVP)



From the utilities:

- “Sample testing throughout the summer season.”
- “more research done to determine best practices for optimal treatment performance during algal blooms”
- “Information sharing between agencies and CA DW program. Also, any information on BMPs relating to specific blooms.”
- “Acceptable treatment of algae prior to bloom/die off”

RSVP Poll Results From 13 Utilities

We have the necessary tools to adequately treat water during significant algal blooms

•Did you experience any problems with algae last year as it relates to water treatment?

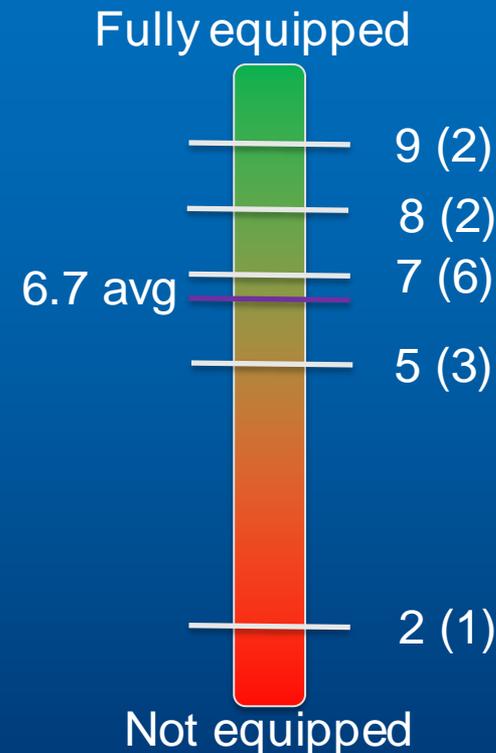
Impacted Operations (↑BW) (11)

↑ Chlorine demand (8)

Sig. altered chemical apps (6)

Sig. Impaired Water Treatment (4)

↑ Taste & Odor compliants (4)



Got Questions?

I do. We do.



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References: AWWA M57 (2010) – Algae Source to Treatment (CT information)

Carolyn Ruttan, Lake County – Department of Water Resource (Cyanobacteria genera information)

Betsy Cawn, Lake County Clean Water Program – storm water discharge permit outreach

THANK YOU!!!

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