

Hidden Water Risks: Algal Blooms and Contaminants Found in Self-Supplied Drinking Water Systems

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Algal blooms caused by warming temperatures are an increasing threat to drinking water. Public water systems may test for these toxins, but many rural homes that rely on lakes, rivers, or shallow wells often don't have their water tested for cyanotoxins, bacteria, and other harmful pollutants. This means **contamination can go unnoticed, even when households believe their water is safe.** To better understand these risks, we studied drinking water quality in homes that rely on self-supplied water systems across Lake County.



HOW WE STUDIED DRINKING WATER

From 2020-2024, the California Water: Assessment of Toxins for Community Health (Cal-WATCH) team sampled more than 100 households with self-supplied water systems. Our testing focused on exposure to three acute drinking water contaminants:

- Coliform bacteria that indicate water contamination, including E. Coli, that can cause gastrointestinal illness
- Nitrates, which can be harmful, especially for infants and pregnant women
- Microcystin, a cyanotoxin produced by cyanobacteria during harmful algal blooms can cause upset stomach, vomiting, diarrhea, and liver and kidney damage

In 2025, we expanded this ongoing effort by inviting additional households across Lake County to participate, **with an emphasis on homes that might be at higher risk based on location.** Together, results from 2020-2025 illustrate how frequently contamination can occur, when risks are highest, and how these disproportionately affect rural communities that depend on self-supplied systems.

WHY THIS MATTERS

- Clear Lake has experienced an increase in harmful algal bloom (HAB) activity since 2009, raising concerns about drinking water quality for Lake County households that rely on the lake for drinking water.
- **Approximately 19, 655 Lake County residents rely on unregulated, self-supplied water systems**, highlighting the need for targeted monitoring and outreach.
- Because these systems often lack routine monitoring and maintenance, **harmful contaminants such as cyanotoxins and bacteria can go undetected and persist.**
- **Nearby land use and environmental conditions can affect drinking water quality**, increasing the risk that harmful contaminants enter self-supplied water systems. Homes located near pollution sites, septic systems, agricultural activity, flood zones, or vulnerable groundwater areas may face greater risk of undetected drinking water contamination.

WHAT WE FOUND

Over several years of testing, contamination was common in homes with self-supplied water systems - often in ways that would not have been detected without testing. Out of approximately 100 households tested in the early years of the program, **about 6 in 10 had at least one water quality problem.**

Contamination levels also varied by where the water came from:

- Lake intake systems were at highest risk - Microcystin was found in 71% of samples collected, and nearly half were above EPA health advisory levels
- Creek intake systems also showed serious concern, with microcystin found in 2 of 3 samples (both above advisory levels)
- Private and near-shore wells were safer overall, but contamination still occurred, including one home with microcystin above advisory levels

Notably, bacterial contamination - **including E. Coli** - was found across all system types, highlighting ongoing challenges with treatment, filtration, and routine system maintenance regardless of source.



Photo of Creek Intake System

More recent findings reinforced the issue. While only a subset of newly identified eligible homes were sampled, results showed that bacteria continued to be present in some households. Nitrates were detected but remained below regulatory limits, and other chemicals, including pesticides, were not detected.

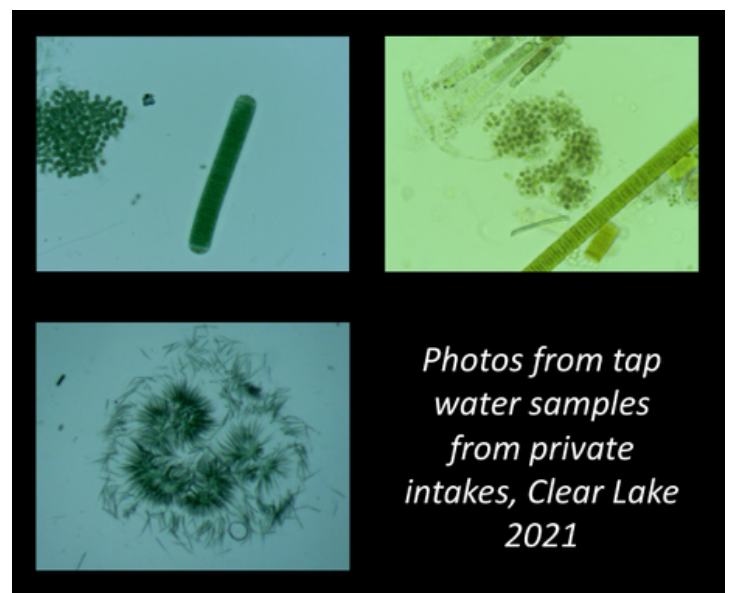
Across multiple years, the findings show a **consistent pattern: Contaminants can—and do—enter the drinking water of homes that rely on self-supplied systems.**

PEAK BLOOMS CAN RAISE THE RISK OF EXPOSURE

During peak algal bloom conditions, risks increased sharply. In late summer 2021:

- Toxin levels in the lake reached extremely high concentrations
- Among homes tested that summer, most had detectable toxin levels in their tap water
- Many exceeded health advisory limits, with some homes showing levels many times higher than what is considered safe

This means that **during severe bloom events, even treated household water was not always adequately protected.**



RECOMMENDATIONS

There are practical steps that residents can take to reduce exposure and protect health:

- **Test drinking water regularly** - homes that rely on self-supplied water systems should test their water regularly to catch problems early. This is especially important during algal bloom season and after heavy rains or flooding.
- **Maintain water treatment systems and if building new or rebuilding, use certified treatment devices** - Not all treatment systems remove contaminants. For example, a filter that improves taste or odor may not remove bacteria, nitrates, or cyanotoxins. Use NSF/UL/WQA/CSA/IAPMO materials when possible and maintain treatment equipment.
- **Public water system expansion** - Where possible, connecting homes to regulated public water systems can provide safer drinking water through continuous monitoring, professional treatment, offering long-term protection.

WHAT'S NEXT IN THE PROJECT?

Building on these findings, the next phase of the study will focus on:

- Continued monitoring bacteria, nitrates, and cyanotoxins to track changes over time and identify conditions that increase risk.
- Resampling homes with updated treatment systems to better understand why bacteria may be detected at the tap but not at the source, pointing to issues along the treatment train.
- Analyzing samples for human and animal (fecal) DNA to help determine whether bacteria originates from human, livestock, wildlife, or environmental sources.
- Continued education for households where contaminants have been detected and for Lake County residents with self-supplied water systems.

Together, these efforts aim to strengthen our understanding of how contamination enters self-supplied drinking water systems and how we can reduce exposure and protect health.

RESOURCES

- **Cal-WATCH**
 - Project information: <https://trackingcalifornia.org/projects/calwatch>
- **Big Valley Band of Pomo Indians**
 - Clear Lake Cyanotoxin issues: <https://www.bvrancheria.com/clearlakecyanotoxins>
- **Lake County Agencies**
 - Lake County Environmental Health: <https://www.lakecountyca.gov/211/Environmental-Health>
 - Lake County Health: <https://www.lakecountyca.gov/158/Public-Health>
- **Help with Treatment/Filtration Assessment**
 - Private Well Assessment: <https://www.rcac.org/environmental/individual-well-program/>
 - Household Water & Septic System Loans/Grants: <https://www.rcac.org/lending/household-water-well-septic-loans/>
 - Certified Water Treatment Devices: https://www.waterboards.ca.gov/drinking_water/certlic/device/watertreatmentdevices.html
- **Publicly Available Data & Tools**
 - What's in your water and potential drought impacts to water supply: <https://www.communitywatercenter.org/drinkingwatertool>
 - California Public Water System Boundaries: <https://hub.arcgis.com/maps/waterboards::california-drinking-water-system-area-boundaries/>