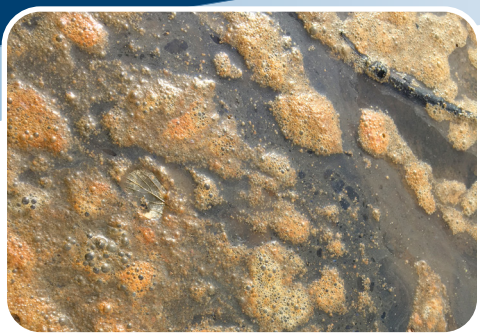
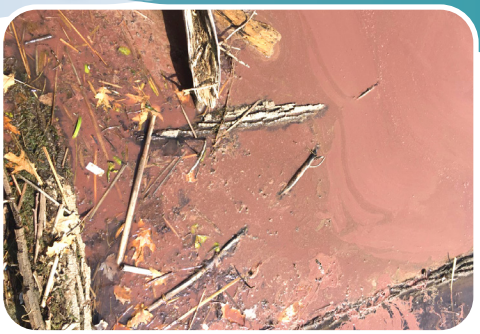
Cedar Lake
Assessing and Addressing Blue-Green Algae Blooms

Minneapolis Park & Recreation Board





Summary of a 2022 study* commissioned by the Environmental Management Department, Minneapolis Park and Recreation Board (MPRB)

Lakes in the Minneapolis park system – and throughout the U.S. – are subject to increasingly frequent and severe blue-green algae blooms.

At Cedar Lake, intermittent low water clarity caused by algae makes the lake unsightly and unappealing for swimming. The lake had scum-forming blue-green algae blooms in 2020 and 2021, and recent MPRB testing found that its predominant blue-green algae type had toxin-producing capabilities. Algae accumulations at Cedar occasionally exceed standards for swimming set by the Minnesota Pollution Control Agency (MPCA).

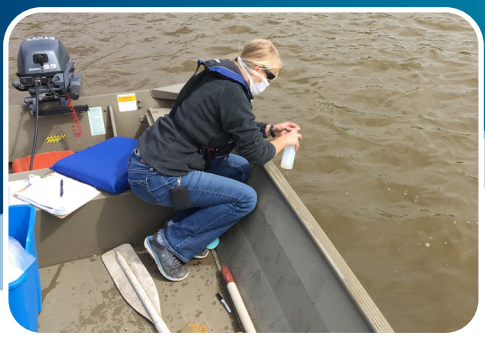
In response, MPRB commissioned a study* in 2022 to assess the conditions driving blue-green algae blooms at both Cedar Lake and Lake Nokomis, as well as strategies to reduce the blooms.

Reflecting MPRB's mission and its Parks for All Comprehensive Plan 2021-2036, the goal is to preserve both lakes' suitability for swimming, fishing, and other recreation. Cedar Lake is a favorite destination for these activities as well as paddling; it is part of the Chain of Lakes Regional Park, visited by an estimated 7.5 million people in 2023.

Factors contributing to Harmful Blue-Green Algae Blooms

Working with a rich data set collected from the lake over 27 years, the study identified the following conditions as key factors.

1. **Strong temperature stratification** leads to low oxygen levels in deep water. Low oxygen creates conditions at the bottom of the lake where phosphorus is released from sediments in the lake bottom into deep water.
2. **Phosphorus released from nutrient-rich lake-bottom sediment** builds up in deep water. Blue-green algae species can travel down to nutrient-rich water to pick up phosphorus and back to the surface to use light. Weather and precipitation patterns in certain years likely exacerbate these conditions.
3. **Nitrogen limitation in late summer** favors growth of certain blue-green algae types that use nitrogen forms other algae cannot, thereby creating conditions favoring blue-green algae in blooms.
4. **Conditions under ice** favor blue-green algae adapted to cold temperatures and low light. Winter temperatures do not stratify water, so phosphorus built up over summer fuels algae growth – as does increased light from low snow cover or snow removal for recreation.



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Treatment options to eliminate or mitigate blue-green algae in Cedar Lake

The study compared scenarios and treatment methods to control blue-green algae blooms in Cedar Lake. It provided concept-level design options and assessed feasibility, including effectiveness, environmental safety, longevity, and cost.

Proactive Strategies: Address phosphorus in lake-bottom sediment

Alum: Alum chemically binds phosphorus within lake-bottom sediment, preventing its release to the water. This treatment is longer lasting when multiple applications and a buffering agent are used. Identified as the most cost-effective treatment option.

Oxygenated Aeration: Microscopic oxygen bubbles pumped into deep water prevent lake-bottom sediment from releasing phosphorus; alum added to the bubbles boosts effectiveness. However, due to costs for complex infrastructure, plus continuous operation, monitoring and maintenance, this option is not cost-effective.

Reactive Strategy: Address blooms in the short term

Algaecide treatments: Hydrogen peroxide and copper sulfate quickly kill blue-green algae. Unlike copper sulfate, hydrogen peroxide does not degrade habitat over time and has fewer effects on other organisms, so it merited further exploration. However, because algaecides don't change conditions that cause blooms, they are not a long-term solution: A perpetual treatment is not cost-effective.

Complementary Strategies

Structural Best Management Practices (BMPs): These reduce phosphorus entering the lake by treating stormwater runoff. Significant resources for planning, design, construction, and ongoing maintenance are required. This strategy does not address existing phosphorus recycling in the lake but could add longevity to treatments.

Aquatic Plant Management: Reduced algae blooms improve water clarity and could significantly increase aquatic plant growth, which would require control to maintain recreation. Promoting native aquatic plants and reducing invasive species in the lakes could be attempted with judicious use of herbicides following MPRB's Integrated Pest Management (IPM) policy.

What's next?

- **Engage** partners to consider proposed strategies.
- **Work** with partners to determine strategies and timelines for implementation.
- **Investigate** annual grant possibilities to support these strategies.
- **Prepare** to address changes in aquatic plant growth.

*** Nokomis and Cedar Lakes Study: Data Review, Stressor Identification, Feasibility Study and Concept Design (2022)**