

A PATH FORWARD TO LAKE EUGENIA WATER QUALITY IMPROVEMENT

FRIENDS OF LAKE EUGENIA

MAY 2024 REPORT



“WE ARE THEIR FUTURE”

INTRODUCTION

Friends of Lake Eugenia was formed as a charitable organization by Morgan Anderson and Doug Hill, two Lake residents, to address the declining water quality in Lake Eugenia, particularly the acceleration of toxic blue-green algae growth. Failure to address water quality issues in the Lake will jeopardize the ecology of the Lake and the Beaver River, impair recreational use of the Lake, and negatively impact Lake Eugenia property values.

All research work was conducted by Hutchinson Environmental, from Bracebridge, ON, an internationally recognized lake science company. *Friends of Lake Eugenia* funded the \$85,000 study through charitable donations from Lake residents and Lake-associated businesses.

A base-line study was conducted in 2022, which was then used to inform a more detailed study in 2023.

The studies conclude that Lake Eugenia suffers from an excess phosphorous load that fuels toxic algae growth. This excess phosphorous is the result of over one hundred years of phosphorous accumulation in the sediment of the deep area of the Lake in front of the dam. The release of this phosphorous, triggering algae growth, has accelerated in recent years due to warmer temperatures and a shorter ice season. The Hutchinson report addresses this process in detail.

Reversing the decline in Lake Eugenia water quality is achievable using safe and effective methods that have been proven on an international scale. There are two components of remediation:

1. Watershed management, which includes rigorous septic inspection, limiting directed drainage into the Lake via culverts, control of upstream inputs and control of riparian drainage from lots and vacant land surrounding the Lake. These actions will reduce future phosphorus loading but will not alleviate the phosphorous that is currently resident in the Lake sediment.
2. Active water quality management using alum as a binding agent for the sediment-resident phosphorous. This is a non-toxic, proven technique that is expected to yield immediate benefits. Exact cost estimates have not been undertaken; however, funding of remediation could be as little as a one-time \$500 contribution from all the Lake residents.

NEXT STEPS

THERE ARE MANY STAKEHOLDERS INVOLVED IN THE MANAGEMENT OF LAKE EUGENIA WATER QUALITY:

The Lake Eugenia Property Owner's Association has a long-standing interest in the health of Lake Eugenia.

Ontario Power Generation (OPG) owns the property, the lakebed, that Lake Eugenia occupies. OPG does not own the water in the Lake. Water fill and draw-down for power generation is subject to a Provincial Water Management Agreement.

The Grey Sauble Conservation Authority has responsibility for water management in Grey County. The Authority's mandate has been recently revised with less emphasis on water quality. Funding cutbacks for the GSCA have been implemented, making any expansion of their duties problematic.

The Ontario Ministry of the Environment (MOE) does not regulate water quality unless a catastrophic event occurs, such as a chemical spill.

The Grey Bruce Health Unit will post a water quality advisory if sampling from the MOE or the Municipality of Grey Highlands indicates a hazardous situation. There does not seem to be a mechanism to issue an "All Clear" once the advisory has been implemented.

The Municipality of Grey Highlands has recently announced a Grey Highlands Lake Task Force. This may be the much-needed vehicle for a comprehensive approach to water quality in Lake Eugenia.

CALL TO ACTION

The scientific data is now available to take action to improve Lake Eugenia water quality. It is now the responsibility of the stakeholders to initiate the prescribed actions. Selection of an experienced lake remediation contractor will better define the path forward, including costs, methodology, and expected results.

Thank you.

Morgan Anderson

Doug Hill

<https://www.helplakeeugenia.com/>

ACKNOWLEDGEMENTS

THE STUDIES COULD NOT HAVE BEEN COMPLETED WITHOUT THE ASSISTANCE OF OUR SUPPORTERS.

Supporters and contributors to the *Friends of Lake Eugenia*.

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Environmental Sciences Ltd.

2023 Field Study of Lake
Eugenia:
Investigation of potential drivers
of cyanobacterial blooms

Prepared for: The Friends of Lake Eugenia
Job #: J220049

April 15, 2024

Final Report

Signatures

Report Prepared by:



Joel Harrison, Ph.D.
Aquatic Scientist

Report Reviewed by:



Brent Parsons, M.Sc.
Principal and Senior Aquatic Scientist



Plain-language Summary

The water of Lake Eugenia is of high quality most of the time. However, summer blooms of blue-green algae are a concern. This study suggests that the blue-green algae initially grows near the bottom of the lake, in the deep area near the dam and is fuelled by phosphorus released from the bottom of the lake. This phosphorus is released from the bottom of the lake once the oxygen disappears in the deep water. Climate change will likely cause more phosphorus release from the bottom of the lake and more blue-green algae blooms.

Trying to solve the algal bloom problem by mechanically increasing the amount of oxygen in the deep water may not be effective. Instead, we recommend adding an aluminum compound to the bottom waters of a small area of the lake (the deep area near the dam). This will keep the phosphorus from leaving the bottom of the lake so that it cannot cause blooms of blue-green algae. Aluminum (usually as aluminum sulphate) has been added to hundreds of lakes in the United States and is endorsed by the North American Lake Management Society as a safe method for lake restoration. Keeping nutrients from entering the lake, through proper management of septic systems, maintenance of a naturally vegetated shoreline, and limiting agricultural runoff, is also important.

Executive Summary

Lake Eugenia has good water quality with the exception of toxic *Microcystis* blooms. The deep area of the lake stably stratifies and the hypolimnion loses oxygen, causing the release of phosphorus and other elements from the sediments. It appears that hypolimnetic phosphorus supply and high transparency support the growth of *Microcystis* below the mixed layer early in the summer. Blooms later occur during calm conditions, after *Microcystis* has risen into the surface mixed layer. Climate change will continue to enhance the strength and duration of the stratified period, which will result in longer periods of hypolimnetic anoxia, and, it is predicted, more frequent and intense cyanobacterial blooms.

Various strategies for mitigating cyanobacterial blooms were reviewed (dredging, hypolimnetic withdrawal, artificial circulation, hypolimnetic aeration, phosphorus inactivation). Sediment phosphorus inactivation is recommended to prevent internal phosphorus loading and cyanobacterial blooms in Lake Eugenia. Specifically, we recommend injecting aluminum (as alum (aluminum sulphate) or polyaluminum chloride) into the hypolimnion in the deep area of the lake (near the dam). This represents a small area of the lake (~10 ha or <2%), but based on the 2023 study, this is the stably stratified area of the lake where *Microcystis* originates. The added aluminum will bind hypolimnetic phosphorus and prevent the release of phosphorus from the sediments, making this nutrient unavailable to *Microcystis*, thus preventing its growth. This should immediately reduce the likelihood of cyanobacterial blooms in Lake Eugenia (i.e., effects should be observed in the year of treatment). The official position of the North American Lake Management Society is that “alum is a safe and effective lake management tool”. Controlling external nutrient sources (e.g., septic systems, runoff from lawns and agricultural land) is also important, as the watershed is the ultimate source of nutrients to the lake.

