WHITE LAKE PROPERTY OWNERS ASSOCIATION ENVIRONMENT VOLUNTEERS

2024 Water Quality Monitoring Program and Research Activities

Summary and Highlights

Conrad Grégoire PhD and David Overholt BA

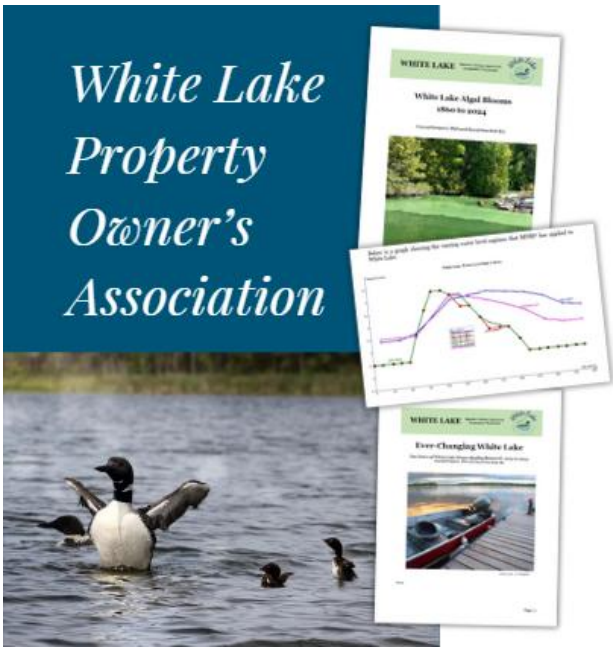
White Lake Marsh…Nature's Water Purification System

White Lake Property Owners Association Wins Environment Award

The Federation of Ontario Cottage Associations (FOCA) has given the 2024 Terry Rees award to the White Lake Property Owners Association (WLPOA). FOCA has a membership of 525 lake and road associations representing 250,000 families living seasonally and year-round in waterfront communities across Ontario.

The award is given annually to a FOCA member association that has demonstrated innovation in its work, and dedication to community betterment.

The WLPOA received the 2024 Award for environmental monitoring and stewardship of White Lake by enthusiastic community science volunteers Conrad Grégoire and David Overholt.



For the last 12 years Conrad and David have been sampling White Lake every two weeks at 9 separate sites, collecting water samples and doing physical measurements. They write and distribute bi-monthly White Lake Checkups, monthly Environment Bulletins, annual State of the Lake Reports, and a White Lake Science website that goes into great detail on various environmental issues effecting the lake. They also conduct wildlife monitoring including loon and cormorant counts, and provide extensive environmental education through the website, webinars, bulletins, and ongoing community science efforts. They have participated in FOCA's Lake Partner Program for over a decade.

1.1 Introduction

2024 marked the 11th year that we have been monitoring water quality in White Lake. In our work, we keep track of changes in phosphorus concentrations, water clarity, algal blooms and much more in order to accurately asses water quality. The interpretation of this data is validated by research reports in the scientific literature. This approach forms the basis of annual water quality reports. Data obtained over a period of years is valuable in detecting long and short-term trends. The more data we have the more realistic is our assessment of the changing state of White Lake.

Water quality is a term which can mean different things to different people. Depending on your interest, it could refer to clear water, good fishing, or water suitable for drinking free of toxic chemicals or pathogens. In fact, it is all of these and more. Wikipedia defines it as "the chemical, physical, and biological characteristics of water based on the standards of its usage. The most common standards used to monitor and assess water quality convey the health of ecosystems, safety of human contact, and condition of drinking water".

In this Summary Report we provide highlights of our findings for 2024. For a complete referenced account of our work, we ask that you access the White Lake Science Website for full-length Water Quality Monitoring Reports as well as Special Reports on individual topics.

1.2 The State of White Lake Report

In 2022, we published The State of the Lake Report; White Lake and the Environment. The state of White Lake is constantly changing over time. However, over the years since the arrival of settlers, certain events have made dramatic changes to lake water quality. Among these are logging operations during the 1800s, the construction of the dam at Waba Creek in 1845 (reconstructed 1948 and 1968), and the arrival of invasive species such as the Zebra Mussel in 2015.

This State of the Lake report is a snapshot of the condition of the lake today. It explains why and how the lake is changing and what we can do to help preserve the lake.

This report, along with extensive information available on the White Lake Science website, provides the reader with a comprehensive source of virtually all available data collected and reports written on the lake by government and independent sources.

The annual collection of chemical and biological data allows us to detect when significant changes to the lake occur, and guides us in our research on White Lake water quality. More changes are coming with possible invasions of more aquatic invasive species, and the increasing effects of climate change and lake overuse. At some point, a new State of the Lake report may then have to be written.

1.3 Algal Blooms - 2024

During 2024 one algal bloom was observed. This algal bloom was a filamentous green alga. This bloom occurred in early June and lasted for about a month. Green algal blooms are unsightly, but do not produce any dangerous toxins.

Although high concentrations of blue-green algae were observed in late September and in October, we determined that these did not constitute a bloom and therefore did not pose a threat to the general population.

2024 was only the second year in eleven years of monitoring during which there were no blue-green algal blooms. During those 11 years, White Lake experienced 16 blue-green algal blooms.

1.4 Total Phosphorus, Water Clarity, Water Levels and Temperature

<u>Total Phosphorus</u>

Total phosphorus levels in White Lake changed dramatically when zebra mussels infested the lake. Prior to this event, total phosphorus concentrations reached levels of about 22 parts per billion. These concentrations were above the Provincial Water Quality Objective at the time. Once zebra mussels were established, total phosphorus levels measured decreased by about 50% and have not changed greatly since that time.

Unfortunately, lower total phosphorus levels were not achieved by any improvement in lake usage, but rather because of a side effect related to the presence of zebra mussels. Zebra mussels filter out suspended phosphorus-containing particles leaving behind the dissolved phosphorus that algae thrive on. Also, zebra mussels eat green algae but leave blue-green algae intact making it easier for this type of toxin producing algae to bloom.

Now, algal blooms occur annually when the measured total phosphorus level is about 10 parts per billion (ppb). Ministry of the Environment scientists are now proposing using a different measure in setting its new objective for a lake at shoreline development capacity. For White Lake, the new maximum is 11 parts per billion. Total phosphorus levels in White Lake currently peak at about 14 parts per billion, which is over the new limit.

Water Clarity

Water clarity, as expressed as the Secchi depth, doubled after zebra mussels arrived in 2015. Since that time, water clarity has remained relatively stable from year to year. Any variations are likely due to weather conditions and changes in the number and size of active zebra mussels in the lake. One of the reasons why there has been an increase in aquatic plant growth and spread to deeper waters, is the greater intensity of sunlight now available at any given depth. On average, water clarity for 2024 was slightly greater than for 2023 with minimum Secchi depths of about 3 m (lowest water clarity) recorded in mid-August and a maximum of 8.0 m recorded in early October.

Temperature

When comparing lake water temperatures measured during the past ten years, 2024 results were about mid-range or average for the period. The maximum temperature recorded was 26.6 C.

Water Levels

Water depth levels during the entire 2024 ice-free season were significantly higher, by about 10 cm, than the target depths. This is a departure from previous years where generally, levels more closely followed the Ministry of Natural Resources program.

We are not aware that the Ministry of Natural Resources Forestry, who manage the dam, has decided to change the rule (blue line) in favour of greater lake depths. We will continue to monitor water levels and report annually on them.

1.5 Loon and Cormorant Counts

We were not able to complete a thorough loon survey in 2024. We can report that there were only 9 chicks on the lake down from 22 last year. Anecdotal observations suggests that the number of adults was comparable to those of recent years. We are not aware of the reason for lower chick counts.

Our observations (taken every two weeks) show that there are currently fewer than ten cormorants making White Lake their home. Considering the presence of non-reproductive juveniles, this translates to about 4 or 5 nesting pairs.

Over the last six years, cormorant numbers have ranged from 8 to 17 individuals.

1.6 Environmental DNA (eDNA) Analysis for Detection of Invasive Species

The Federation of Cottage Associations (FOCA) invited the White Lake Property Owners Association to participate in a series of experiments in an effort to apply eDNA techniques to the early detection of the presence of aquatic invasive species. These techniques analyze

DNA from lake waters in an effort to provide an early detection of the presence of invasive species. The full report is published in the full-length version of our annual report.

Testing for the presence of zebra mussels and the spiny waterflea was done on water samples collected at three different locations on the lake.

As expected, White Lake tested positive for zebra mussels as this invasive species has been well established in the lake since 2015. White Lake tested negative for spiny waterflea. We have not received any reports of the presence of this invasive nor have we observed them in the field.

1.7 White Lake Water Quality is in Decline: What can we do?

Over the last eleven years, we have completed many studies on White Lake in addition to monitoring changes in water quality. During this time, we have published over 1300 pages of annual and special reports. All of these are available on the White Lake Science Website. We have also co-authored an academic research paper in collaboration with Carleton University, published in an international journal, which supports all of our findings with more hard evidence.

Our special reports on the History of White Lake Water Quality and on White Lake Algal Blooms: 1860 to 2023 unambiguously demonstrate that White Lake water quality is in decline. A cursory reading of personal accounts on White Lake water quality in *White Lake, The Early Years*[1] (available on the members only section of the White Lake Property Owners Association website) reinforce our findings.

It may also be instructive to read our 2022 State of the Lake Report and our recent (short) report entitled Ever-Changing White Lake.

Our goal is to collect and interpret data and to persuade property owners around White Lake to act responsibly. At times, this may require a change in mindset and a re-evaluation of how we are treating the lake.

Many people are not aware that septic systems do not prevent nutrients from entering the lake. The purpose of septic systems is to render human waste free of dangerous pathogens. In fact, the Ontario Ministry of the Environment clearly states that all nutrients, such as phosphorus, entering a septic system located within 300m of the lakeshore, will eventually reach and be discharged into the lake environment. The same assertion also applies to any fertilizers, pesticides, and herbicides.

White Lake water quality is being affected by climate change, invasive species, and lake overuse. We can make a difference by following the well-developed guidelines for reducing our impact on the lake.

[1] White Lake, The early Years, White Lake Property Owners Association, 2000, 64 pages.

One of the most important actions a property owner can take is to restore their shoreline to a natural state using native plants. Maintaining fully-treed lots as much as possible interrupts and/or delays movement of nutrients from septic systems to the lake. Using native plants will improve water quality, reduce shoreline erosion, enhance wildlife habitat and increase resilience to the effects of climate change and severe weather events.

Two recently published reports from Watersheds Canada both explain the importance of vegetated shoreline buffers and offer a guide to preparing a shoreline naturalization planting plan. We recommend that you access and read these documents if you want to know more about how to best preserve and improve White Lake water quality.

As in any society, there is always a fraction of property owners who will not fully understand the impact that they are having on the lake. It could also be that they are not interested in knowing, and/or just want to enjoy the lake.

This is when governments can intervene and take action to preserve White Lake. The people who are charged with managing the lake (with the assistance of the Ministry of the Environment Conservation and Parks), are the Councils of the four municipalities sharing White Lake. It is difficult to find evidence that White Lake is being effectively managed by any level of government.

Since the Township of Lanark Highlands has both the greatest number of taxpayers of any municipality and a large percentage of its own taxpayers located on White Lake, it has both the most to lose as well as the most to gain when it comes to the health of White Lake.

One suggestion is for LH to take the lead and establish a 4-municipalty committee which could effectively manage White Lake. This committee would provide a forum for local taxpayers to bring forward concerns related to the management of the lake.

Log on to your municipality's website. Contact your councillors by email and urge them to bring to Council our concerns and request the formulation of an action plan to preserve White Lake for future generations.

Photo Credit: Joyce Benham