



**WHITE LAKE** Property Owners Association  
Environment Volunteers



# Summary and Highlights

## Water Quality Monitoring Program and Research Activities 2021



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# **2021 Water Quality Monitoring Program and Research Activities**

## ***Summary and Highlights***

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### **1. Introduction**

2022 marks the 9<sup>th</sup> year that we have been monitoring water quality in White Lake. A number of parameters are monitored which are indicative of water quality. This data, as well as reports in the scientific literature, form the basis of annual reports. Data obtained over a period of years is also studied for long and short-term trends. The more data we have the more accurate is our assessment of the state of White Lake

In this Summary Report we provide highlights of our findings for 2021. For a complete referenced account of our work, we ask that you access the [White Lake Science and Information Website](#) for full-length Water Quality Monitoring Reports as well as Special Reports on individual topics.

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”.

### **2. The State of White Lake**

White Lake is a shallow warm-water lake with high productivity of both plant and animal life. As such, it is very sensitive to nutrient inputs.

One way to assess the impact that nutrient inputs are having on a lake is the number and frequency of algal blooms. Algal blooms are both a sign and a measure of declining water quality.

A recently published [report](#) traces the history of algal blooms in White Lake from 1860 to 2021. The detection of algal blooms prior to the construction of the concrete dam at Waba Creek is based on the analysis of sediments using special [techniques](#). Algal blooms to 1977 are reported in the scientific literature and in reports published by the Ministry of the Environment Conservation and Parks. For the period starting in 1977 and ending in 2012 (25 years), no algal blooms were recorded.

Starting in 2013 and to the present, at least one algal bloom occurred in each of these nine years. Four algal blooms were recorded in 2018, two in 2019 and 2020. In 2021, there were 5 algal blooms. In each of these nine years, there was at least one blue-green algal bloom, some of which released toxins into the lake.

Annual algal blooms are a sign that White Lake is under stress and cannot absorb any increase in nutrients or other impacts of human activity, such as shoreline erosion.

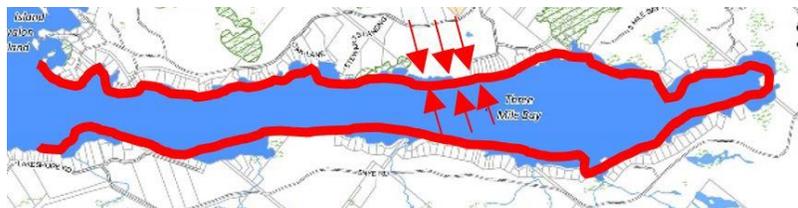
Three factors combine to create this situation: lake overuse, invasive species, and climate change.

## 2.1 Lake Overuse

From 1977 to 2008, the number of cottages, trailers and commercial tourist units on White Lake have increased from 475<sup>1</sup> to 1538, an increase of 324%. Available numbers also show that from 1985 to 2018, permanent homes on White Lake increased by 354% to 209. These trends are continuing today with ever increasing human impact on the lake. More people spending more time using White Lake inevitably means greater amounts of septic system outflow, more and larger boats, etc.

## 2.2 Invasive Species

The presence of zebra mussels in the lake has changed the way phosphorus is cycled [creating a near-shore zone](#) where nutrients concentrate causing algal blooms in the spring and fall. This zone is depicted as the red line in the above figure.



Phragmites is slowly invading our marshlands and could eventually displace cattails and other native plants. Fish and other animals which depend on cattail marshes for reproductive purposes will be harmed. European milfoil is now resident and spreading in White Lake. There are a number of other invasive species including quagga mussels and a number of very harmful plants which could enter the lake soon if nothing is done to stop them.

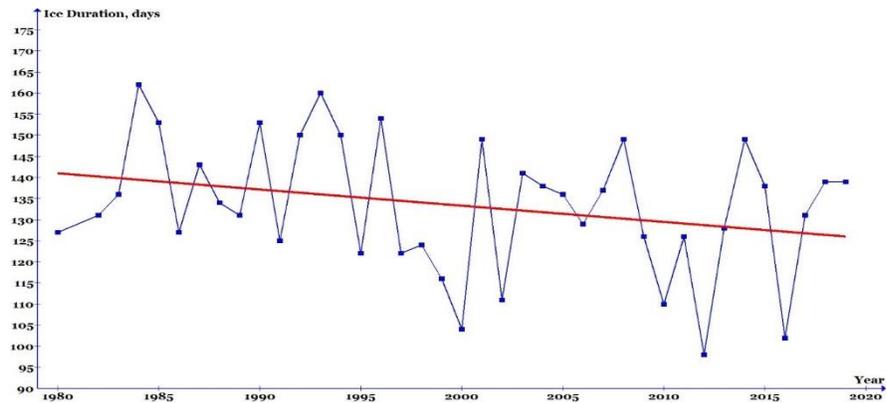
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<sup>1</sup> J.P. Ferris, White Lake Integrated Resources Management Plan, Part I, *Ministry of Natural Resources, Lanark and Renfrew Counties, December 1985.*

### 2.3 Climate Change

Climate change is causing unpredictable and unexpected weather patterns. In recent years White Lake has experienced tornados, a microburst and high wind events causing damage to buildings and infrastructure. Low-snow winters, and prolonged periods of hot weather have resulted in lower water levels and higher water temperatures.

Since 1980, the ice-free season on White Lake has increased by nearly 2 weeks, as shown by the downward sloping redline on the graph to the right. This means that there are now two additional weeks per year for cottagers and residents to be at the lake and to be using the lake for residential and recreational purposes.



### 3. Algal Blooms - 2021

The first algal bloom of the year was a green algal bloom which started in mid-June and continued until the end of summer. This bloom was green filamentous algae, which grew in large patches along the shoreline. Nutrients, such as phosphorus, supporting this alga comes from sediments, shoreline runoff where shorelines are disturbed, as well as nutrients dissolved in lake water.

Blue-green algal blooms are not benign and so warrant our special attention. When these blooms occur, they can create a public health hazard and anyone using the lake should be apprised of the seriousness of this issue.

In 2021, White Lake hosted four blue-green algal blooms: each twice and in two locations. These blooms occurred simultaneously in two occasions. The first on September 16, and the second on October 8, 2021. The two types of algal blooms were: *Anabaena* (now called *Dolichospermum*), and *Microcystis*. The *Anabaena* bloom occurred in the main body of the lake (deepest water), Pickerel Bay and areas along the eastern shoreline. The *Microcystis* bloom was located mainly in Three Mile Bay and adjacent areas.

The simultaneous occurrence of different types of blue-green algae has never been recorded before in White Lake. Prior to the infestation of White Lake with zebra mussels, only *Anabaena* blue-green algal blooms were recorded. Since the arrival of zebra mussels, only *Microcystis* blue-green algal blooms were observed. In 2021, we observed five algal blooms which is the largest number ever recorded for White Lake.

The Ministry of the Environment, Conservation and Parks (MOECP) reported that these algal blooms contained toxins at significant but not dangerous levels.

The map on the right shows the location, extent, and nature of the four blue-green algal blooms in White Lake. Other occurrences of these blooms in previous years have shown the same pattern of distribution. It is likely not a coincidence that the blooms are most intense in areas of concentrated lakeshore development such as Three Mile Bay, Pickerel Bay, and adjacent shorelines.



### What Can We Do?

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.

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 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 MOECP), are the Councils of the [four municipalities](#) sharing White Lake.

Since the Township of Lanark Highlands has both the greatest number of taxpayers of any municipality and the greatest number 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-municipality 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.*

## **4. Total Phosphorus and Water Clarity**

### **4.1 Total Phosphorus**

Total phosphorus levels in White Lake changed dramatically when zebra mussels infested White 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. Once zebra mussels were established, total phosphorus levels 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 of the presence of zebra mussels. Now, algal blooms occur annually when the total phosphorus level is about 10 parts per billion, which is below the Provincial Objective. The MOECP is now using a different measure in setting its new objective, which for White Lake is now 11 parts per billion. Total phosphorus levels in White Lake currently peak at about 14 parts per billion.

### **4.1 Water Clarity**

[Water clarity](#), as expressed as the Secchi depth, doubled when zebra mussels arrived. 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 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.

## **5. Loon and Cormorant Counts**

2020 was a devastating year for the Common Loon. The overabundance of a species of black fly, which specifically attacks loons, forced them off of their nests. As a result, the number of loons on the lake was reduced by 34% and the number of chicks reduced by 83%.

Unfortunately, the loon population did not recover in 2021 and the numbers of loons, mating pairs and chicks did not change appreciably. We can only hope that the situation improves in 2022.

For the past three years, we have been observing the number of double-crested cormorants calling White Lake home. So far, our observations indicate that the population is growing but at a very small rate. In 2021, we estimate that there are about 4 to 5 nesting pairs on the lake.

## **6. Invitation**

For more information on the above topics and more, the reader is invited to read the full 2021 Water Quality Monitoring Program Report available on the [White Lake Science and Information Website](#). We can be contacted at [WhiteLakeScience@gmail.com](mailto:WhiteLakeScience@gmail.com).