WHITE LAKE PRESERVATION PROJECT

White Lake at a Glance
2019

Assessing the health of White Lake is a complex issue which requires scientifically gathered data and expert interpretation of this data. However, nature has a clever way of summarizing all of this data and making it obvious to us when things are not going well. She does this by creating algal blooms when the nutrient content of the lake water becomes too high. Although the presence of algae in a lake is normal and beneficial to aquatic life, excess algae in the form of algal blooms can in some cases produce toxins harmful to us and can even cause serious illness if ingested. White Lake is now experiencing some of these toxic algal blooms. Toxic algal blooms were documented in 2014, 2015 and again in 2018. Algal blooms can also be detrimental to fish life and make the lake unattractive due to poor water colour, and the sight of strings of algae clinging to rocks and vegetation. Left untended, a lake could enter a phase of decay where dangerous algal blooms occur frequently and eventually lead to the 'death' of the lake itself. Is there cause to worry about White Lake?

White Lake is a shallow lake with an average depth of 10 ft (3.1 M) and a surface area of 22.7 square kilometres. The watershed feeding water into White Lake is only 211 square kilometres, which is a relatively small area of forest and farmland providing water to the lake. As it turns out, the volume of White Lake is flushed with new water less than once per year. Most lakes are flushed by several lake volumes per year. This means that over the course of a year, some lake water is not flushed out of White Lake resulting in the year over year accumulation of nutrients and other materials in the lake.

Over its entire surface area, 90.7% of White Lake has been designated as littoral, which means that most of the lake is comprised of marshes or areas considered as shoreline subject to wave action and/or the dense growth of water plants. Consequently, White Lake is classified as a biologically productive lake which is one that produces large quantities of algae, phytoplankton, zooplankton, water plants and aquatic animals such as fish. This can be a good thing unless the lake becomes too productive; then it begins to fill up or, in technical terms, becomes eutrophic.

Phosphorus (P) is an element essential to aquatic life, but in excess can cause serious negative consequences for a lake ecosystem. Phosphorus concentration levels in a healthy lake should range between 5 and about 15 parts per billion (ppb). Although P measurements have been taken in White Lake for many years, up to 2014 these measurements have not been done in a systematic manner and not at locations representing the entire lake surface. In 2014 the White Lake Preservation Project (WLPP) began a Water Quality Monitoring Program consisting of systematic monthly sampling for Total Phosphorus (TP). Nine separate locations spanning the entire lake are now being monitored. Other chemical parameters such as oxygen content, temperature, conductivity and chlorophyll-a (a measure of algae concentrations), plus several other parameters such as water clarity are also being monitored. The sampling sites monitored for TP throughout the spring to fall months, showed that TP concentrations continuously rise during the summer and peak in early fall with concentrations which can exceed 20 ppb. At this TP concentration, the lake is in danger of becoming eutrophic. The WLPP monitoring program has shed light on year to year trends in TP levels as well as provide insights into the sources and eventual fate of TP entering White Lake. The reader is encouraged to read the annual WLPP Water Quality Monitoring Reports which can all be downloaded from our website at www.WLPP.ca.

Phosphorous is a common element and can find its way into the lake from many sources, both natural and as a result of human activity. Natural P sources include airborne dust and pollen, the dissolution of P-containing rocks, rainwater run-off, erosion, internal loading from sediments, and the occasional breach of a large beaver dam.

Humans can also contribute significant amounts of P to the lake. Domestic septic systems and most commercial sewage treatment plants do not remove P, which then leaves the treatment system and eventually migrates to the lake, especially if there are no trees or shrubs present between the septic system and the lake to absorb released P. The P in these septic systems comes from P-containing detergents and cleansers and from human waste. Other man-made sources include fertilizers, and pet and farm animal waste.

Phosphorus from all sources concentrates in the bottom sediments of lakes which can contain P levels hundreds of thousands of times higher than the water above it. Release of sediment-bound P occurs when the oxygen content of water above the sediments is low and nearing zero as a result of oxygen consumption due to the decay of algae and vegetation and also when there is a low turnover from bottom to surface waters. Conditions such as these have been measured in White Lake. It is also possible for P to re-enter the lake from sediments even if there is significant oxygen in the water above. Data confirms that his is the case for White Lake. The disturbance of lake sediments in shallow areas of the lake by boats, and shoreline erosion from the wakes of fast, large, and wake-boarding boats operating too close to the shoreline can also release sediment bound P into the lake water.

In 2016, the lake was invaded by zebra mussels which are now present in vast numbers in all parts of the lake. Our study results confirm published accounts showing that the presence of zebra mussels alters the chemistry of the lake. Of particular interest is the significant increase in water clarity resulting from the filtering effect of zebra mussels. The total phosphorous levels measured in the lake water decreased by about 50 percent when compared to values obtained prior to the arrival of zebra mussels. The much lower levels of total phosphorous found in the lake since 2016 season is due to the explosion of zebra mussel populations throughout the lake. Lower phosphorous levels are entirely due to the transfer of phosphorous (in plankton) from the water column to near-shore sediments by filter-feeding zebra mussels, a process which encourages green and blue-green algal blooms to occur. In 2018 there were three green algal blooms and two toxic blue-green algal blooms. The effects of zebra mussels as well as climate change are only two of the multiple stressors affecting White Lake which, taken together, make the lake more susceptible to algal blooms due to human activity.

The Lakeshore Capacity Assessment Handbook (Govt. of Ontario) provides estimates for human contributions of P to lakes based on the number of cottages, permanent residences, resorts, etc. found on lakes. White lake has over 500 cottages plus 7 resorts, campgrounds and trailer parks. The measured concentration of total phosphorus coupled with the frequency and severity of algal blooms indicate that White Lake is at Capacity. A calculation of lake capacity using the Provincial Model confirms this.

White Lake is by its very nature a sensitive lake. Many government and biological assessment reports going back to the 1970s state that White Lake is on the cusp of becoming eutrophic and needs to be cared for by those who use it and enjoy it. We cannot influence natures input of P to White Lake, but there is much we can do to limit ours and thus protect its natural beauty. Restoring the natural shoreline, eliminating the use of fertilizers and P containing products, requiring septic system inspections and upgrades, preventing shoreline erosion and controlling development along the shoreline can contribute to keeping the lake in good condition. All four Municipalities which border White Lake need to collaborate and harmonize bylaws on issues related to the lake and they also need to carefully scrutinize any development plans which could threaten White Lake, which after all belongs to all of us as well as to future generations.

Note: All the data, interpretation and documentation presented in this report can be found on the WLPP website at www.WLPP.ca

Conrad Grégoire January, 2019