WHITE LAKE Property Owners Association Preservation Project

Documented Algal Blooms White Lake: 2013 to 2020

Conrad Grégoire and David Overholt

White Lake - 2015

Algal Bloom Trends in Ontario

Climate change and other stressors have resulted in algal blooms becoming more frequent, occur earlier in the year and persist for longer periods of time. This is a trend reported in the literature and on government web sites.

White Lake is now at capacity which means that any additional input of nutrients makes it more likely that algal blooms will occur. White Lake is a shallow warm water lake and thus is more vulnerable than most lakes in Ontario to both natural and man-made pressures. **We need to do our part in controlling and reducing our impact on White Lake**, especially when other stressors not under our control are intensifying.

In particular, maintaining a healthy shoreline, respecting setbacks for building projects, maintaining septic systems and reducing boat wakes and other disturbances to the shoreline and near-shoreline sediments. All of these actions will reduce the amount of nutrients entering the lake at the very locations where zebra mussels are active.

A recent article in *Cottage Life* magazine (September 21, 2018 issue) reported that Lake Muskoka in Ontario had experienced its sixth confirmed toxic algal bloom in 2018.

Although other lakes in addition to White Lake are now having more algal blooms, this is no reason for us to be complacent or to consider that this is 'normal' and should not be of concern.

In the *Cottage Life* article cited above, it clearly states that "While blue-green algae blooms aren't new, they're becoming more frequent as cottage-country areas grow"

Cottage Life: "Cottagers can do their part by being mindful of their environmental impact. Maintaining a natural shoreline is one easy way to prevent excess nutrients from getting into your lake."

Algal Blooms on White Lake – Historical Data

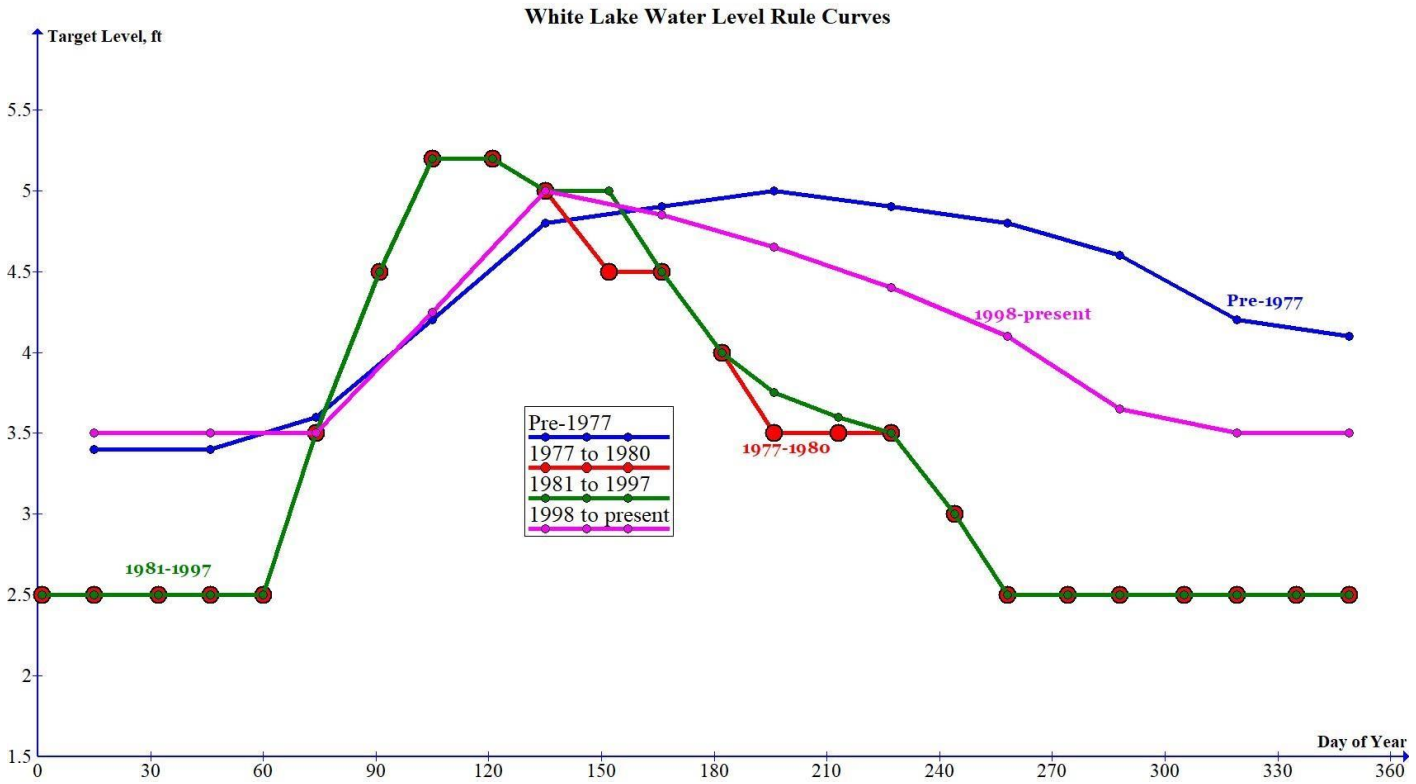
It has been brought up on several occasions at public forums that in the past there were regular lake-wide algal blooms. These comments may be valid, but should not be used to imply that algal blooms in White Lake define its natural state, and so the more recent blooms are nothing to be concerned about.

These comments stem from written reports before and during the 1970s of regular algal blooms on White Lake. These blooms are reported in the literature and require a more rigorous analysis of facts when comparing them to more recent algal blooms.

There are several factors which at that time resulted in (likely green) algal blooms. These include:

1. Water Regime – water levels over the summer months
2. General use of phosphate detergents and related products
3. Poor performance of existing septic or other waste disposal systems

Below is a graph showing the varying water regimes which have been operative on White Lake:



The data used for the above graphs was taken from a paper written by H. von Rosen, Fisheries Management Officer, Carleton Place District, 1989.

The graph shows that up to 1977, water levels in White Lake were kept high (in order to satisfy the desire of the local population for boating purposes). In that report, von Rosen states that within two years of the initiation of this regime that *"midsummer algal blooms appeared, leaving green slime on the shores; rock rubble was covered with calcareous algae"*. Water levels in the lake essentially impeded the turnover of waters in the lake resulting in these algal blooms. Fish populations also suffered. He also states in his paper, that once a change in water regime is made, it takes approximately five years for the change to totally take effect. The current water level regime used is intermediate between very high and very low water levels perhaps giving us the most satisfactory results possible.

Interestingly, on page 10 of the report, von Rosen felt comfortable stating: *"In spite of attempts to explain the ecological reasons for the water regime public reaction to this water rule curve was best described as hostile"*.

During the 1970s, Canada went through the process of banning or reducing phosphates in detergents and other products. It is likely that the high-water level regime in place during the time when phosphates were permitted and used widely, also contributed to the production of algal blooms on White Lake. This source of phosphate is much reduced, although still present today.

In 1973, the White Lake Water Quality Committee conducted a massive sampling of White Lake waters for coliform bacteria. They collected and had analyzed 375 samples on three different occasions. The results of this study were released the same year.

When compared to coliform counts recorded in more recent times (WLPOA studies), the counts were significantly higher in the mid-1970s. This was likely due to the large number of septic or waste disposal systems which were underperforming relative to today's standards. This source of phosphorus would also have been a significant contributor to the algal blooms reported during this time period.

Today the nature and cause of algal blooms in White Lake are quite different as is discussed here and in other parts of this report. We will not elaborate on this further other than to say that outflow from septic systems, the change in phosphorus cycling by zebra mussels, climate change, year-round use of cottages as residences, increased boating effects, shoreline degradation, invasive species and exposed surface runoff should now be the subject of our attention

2020

This year two algal blooms were recorded. The first type of algal bloom which occurred was from filamentous green algae. This bloom lasted, as in previous years, from mid-June until mid-September.

The second type of bloom was from a blue-green alga which occurred in Three Mile Bay and into the main water body, especially on the western side of the lake. In September of 2018, there were two blue-green algal blooms which occurred in the same area of the lake. The first of these blooms was certified as toxin producing, the second was not tested. This year, the bloom was not intense and mostly confined to the water column. Note that the Ministry of the Environment policy towards blue-green algal blooms is: "MOE regards any cyanobacterial (blue-green algae) bloom as potentially toxic, whether or not toxins are detected in the water upon testing"[1]

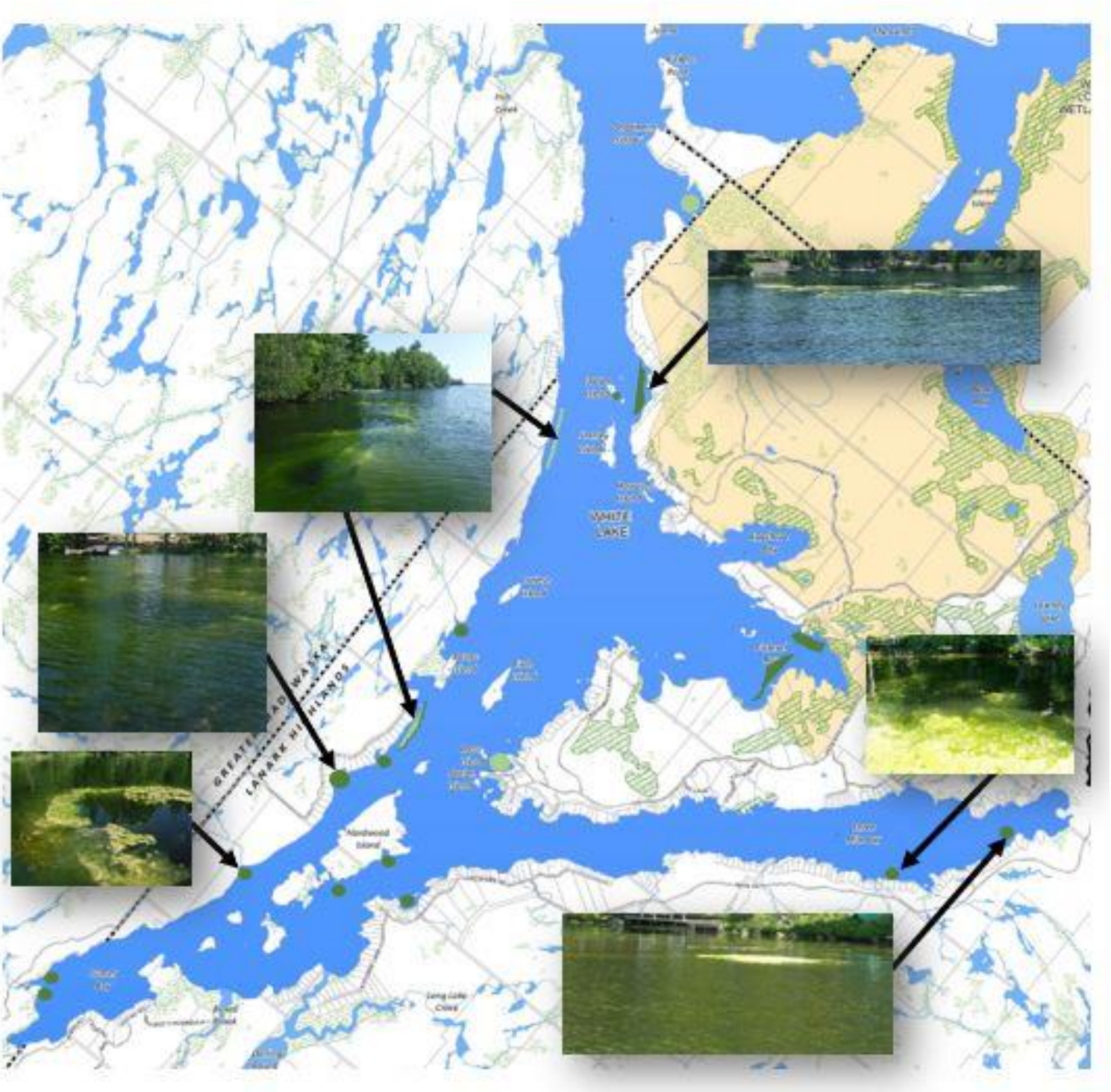
> We emphasize that the algal blooms observed by our team are the minimum number for White Lake, and there may very well have been others on the lake which went undetected or unreported. Currently only two volunteers are monitoring the 22 Km^2 of White Lake, which has a shoreline stretching nearly 100 km!

Green Algal Blooms

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

In order to assess the extent of this bloom, we mapped the occurrences of this bloom over a large part of White Lake. We toured the entire shoreline of White Lake south of Fish Creek in order to present a 'snapshot' for June 20, 2020 of algal bloom locations. We also collected samples at each site for microscopic examination. We were not able to examine the entire shoreline of White Lake (~ 97 km) due to time constraints, and so cannot report on other areas of the lake, in particular Hayes and Bane Bays, The Canal and the White Lake Village Basin. Below is a map of the survey area which includes insets of photos of the actual blooms.

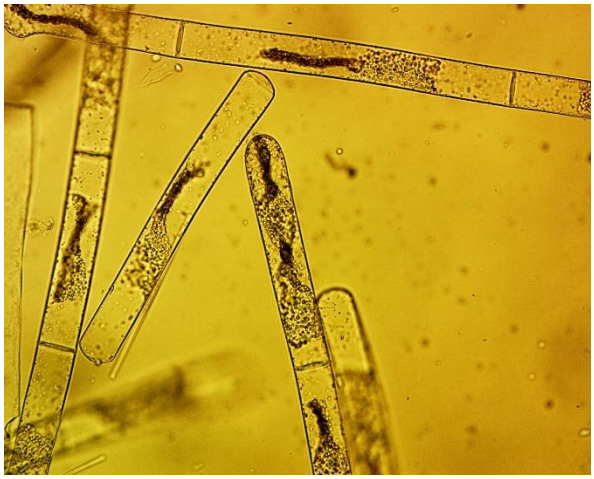
[1] Algal Blooms in Ontario, Canada: Increase in reports since 1994; J.G. Winter, A.M. DeSellas, R. Fletcher, L. Heintsch, A. Morley, L. Nakamoto, and K. Utsumi (all Ontario Ministry of the Environment scientists); *Lake and Reservoir Management*, 27:107-114, 2011.



In the map above, dark green is used to denote simultaneous surface and submerged filamentous green algae, and light green for submerged only. The size of the green dots indicates the relative size of the algal bloom area at each site, as does the length and width

of lines for affected shoreline. The attached photos provide a visual representation of the algal bloom itself.

Thirteen sites with algal blooms were sampled for purposes of identification. All sites sampled showed that the lime-green algal “clouds” forming under the surface represent just one genus of filamentous green algae- a type called Mougeotia, which is also commonly known by the unappetizing name of ‘elephant snot’. This alga does not produce toxins in the water and so the bloom is considered a nuisance bloom. The photo below shows a mass of their filaments magnified 200 times.



In addition to the blooms shown on the map, we observed numerous free-floating masses of the algae on the surface of the lake in locations where there were no visible fixed blooms. Many of the blooms occurred in bays or small embayments along the shoreline. During its lifetime, this alga produces gases which become trapped in the fine mesh of the algal mat and serve to raise the bloom from the lake floor to the surface, where it can be affected by the wind.

When large mats of algae die and decompose, the water column can become anoxic (no oxygen) causing the release of phosphorus trapped in sediments. Sediments contain about 200,000 times the concentration of phosphorus found in lake water. The released phosphorus can trigger a secondary bloom which could be larger than the original event.

Although there were large patches of this algal bloom in areas near unaltered forested shorelines, the most serious and largest blooms were found immediately adjacent to newly de-treed and landscaped cottage lots, and areas of severely altered shorelines. The occurrence and extent of these blooms have increased in recent years which may reflect the growth of zebra mussel populations, climate change and lake overuse.

Filamentous green algae of the type we are seeing in the lake has been resident in the lake for likely a good part of the existence of White Lake. Similar algal blooms have been reported recently in the news, in particular in the Rideau Canal, so the bloom in White Lake is not an isolated event.

Algae bloom when conditions are right for its rapid and uncontrolled growth. These conditions include the presence of excess nutrients (phosphorus), favourable water temperature and clarity, sunlight, and the action of wind and waves. For White Lake, the presence of zebra mussels is an additional factor promoting the growth of filamentous green algae. These mussels tend to concentrate nutrients from open waters to the

shoreline area where filamentous algal blooms occur. The severity of the algal bloom resulting from the sum of the above factors can be intensified by the runoff of nutrients from areas of shoreline which have been de-treed or altered in such a way that nutrients can enter the lake unmoderated by the presence of trees and other natural shoreline vegetation which prevent nutrients from entering the lake.

Viewed from underwater, the algae mass forms very large volumes extending from just below the surface of the lake all the way down to the lake floor. Other aquatic plants become enveloped within the growing mass. Over time, the algae die, collapses into itself and falls to the bottom of the lake.

It is interesting to note that similar algal blooms occurred in 2019 (with lower intensity), but were of another species of filamentous green algae Sirogonium, one of a large family of filamentous green algae found in White Lake.

Blue-Green Algal Blooms

Blue-green algal blooms are not benign and so warrant 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.

This year, White Lake hosted one blue-green algal bloom. The bloom occurred in Three Mile Bay and the main water body, especially on the Western side of the lake. The bloom was identified as he blue-green algae as *microcystis*, which is known to produce toxins.

The bloom was limited to the water column and was not intense enough to warrant testing by the MOE and because the bloom did not result in a surface scum which signals the large-scale death and decay of the algae. Microcystin toxins are usually released at this stage of the algal bloom.

However, the tell-tale surface scum of decaying *microcystis* was observed at several locations including the southern shore of Stanley Island, the eastern shore of Birch Island and the area adjacent to the entrance to Pickerel Bay.

Southern Shore of Stanley Island, September 29, 2020

Fortunately, this surface algal scum dissipated over a period of a few days and it was not necessary to call the MOE for further study. The occupants of the cottages affected were advised of the dangers associated with this type of algal bloom and were asked to treat the bloom as potentially toxic, as is recommended by the MOE.

2019

This year two algal blooms were recorded in White Lake. The first type of algal bloom which occurred was from filamentous green algae. This bloom lasted, as in previous years, from the end of June until mid-September. Large and small patches of this algae were observed in almost every part of the lake save Hayes Bay and the Village Basin. This is a nuisance bloom which occurs along shorelines and can cover very large areas.

The second type of bloom was from a blue-green alga which was concentrated in the lower half of Three Mile Bay. In September of 2018, there were two blue-green algal blooms which occurred in the same area, but were more extensive covering most of Three Mile Bay and parts of the greater lake. The first of these blooms was certified as toxin producing, the second was not tested, but presumed to likely also be toxic. Note that the Ministry of the Environment policy towards blue-green algal blooms is "MOE regards any cyanobacterial (blue-green algae) bloom as potentially toxic, whether or not toxins are detected in the water upon testing"[2]

We emphasize that the algal blooms observed by our team are the minimum number for White Lake, and there may very well have been others on the lake which went undetected or unreported. Currently only two volunteers are monitoring the 22 Km^2 of White Lake, which has a shoreline stretching nearly 100 km!

Green Algal Blooms

The first algal bloom of the year started in late June and continued until the end of September. This filamentous green algae (Sirogonium), grew in large patches along the shoreline. Nutrients, such as phosphorus, supporting this alga comes from both the sediments as well as dissolved in lake water.

Viewed from underwater, the algae mass forms very large volumes extending from just below the surface of the lake all the way down to the lake floor. Other aquatic plants

[2] Algal Blooms in Ontario, Canada: Increase in reports since 1994; J.G. Winter, A.M. DeSellas, R. Fletcher, L. Heintsch, A. Morley, L. Nakamoto, and K. Utsumi (all Ontario Ministry of the Environment scientists); *Lake and Reservoir Management*, 27:107-114, 2011.

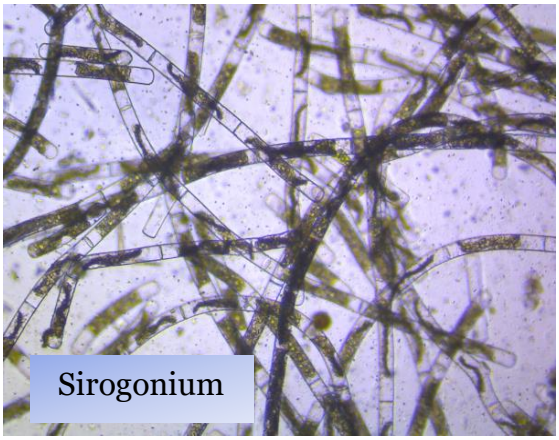
become enveloped within the growing mass. Over time, the algae die, collapses into itself and falls to the bottom of the lake.

Blooms such as the ones pictured below were common in 2019, as in previous years, all along the western shore of White Lake and also in other areas and along island shorelines and Three Mile Bay. This bloom was essentially lake-wide and similar to blooms which occurred in 2017 and 2018 at the same location.

Three Mile Bay – July 1.

Waba Island – August 17.

The algae responsible for these blooms is Sirogonium, one of a large family of filamentous green algae found in White Lake. Blooms of filamentous green algae are stimulated by the presence of zebra mussels in White Lake. Zebra mussels concentrate nutrients from deeper parts of the lake and deposit them in shoreline areas where they thrive. Warmer daytime water temperatures, abundant light and nutrients, provide ideal conditions for the propagation of filamentous green algae along shorelines.


Sirogonium

Even with the onset of cooler weather in late September and October, another filamentous green alga of the Zygnema genus thrives where Sirogonium was present earlier in the year. The algae resemble bright green garlands draped over aquatic plant and persists right up to ice formation on the surface of the lake.


Western Shore – October 19, 2019

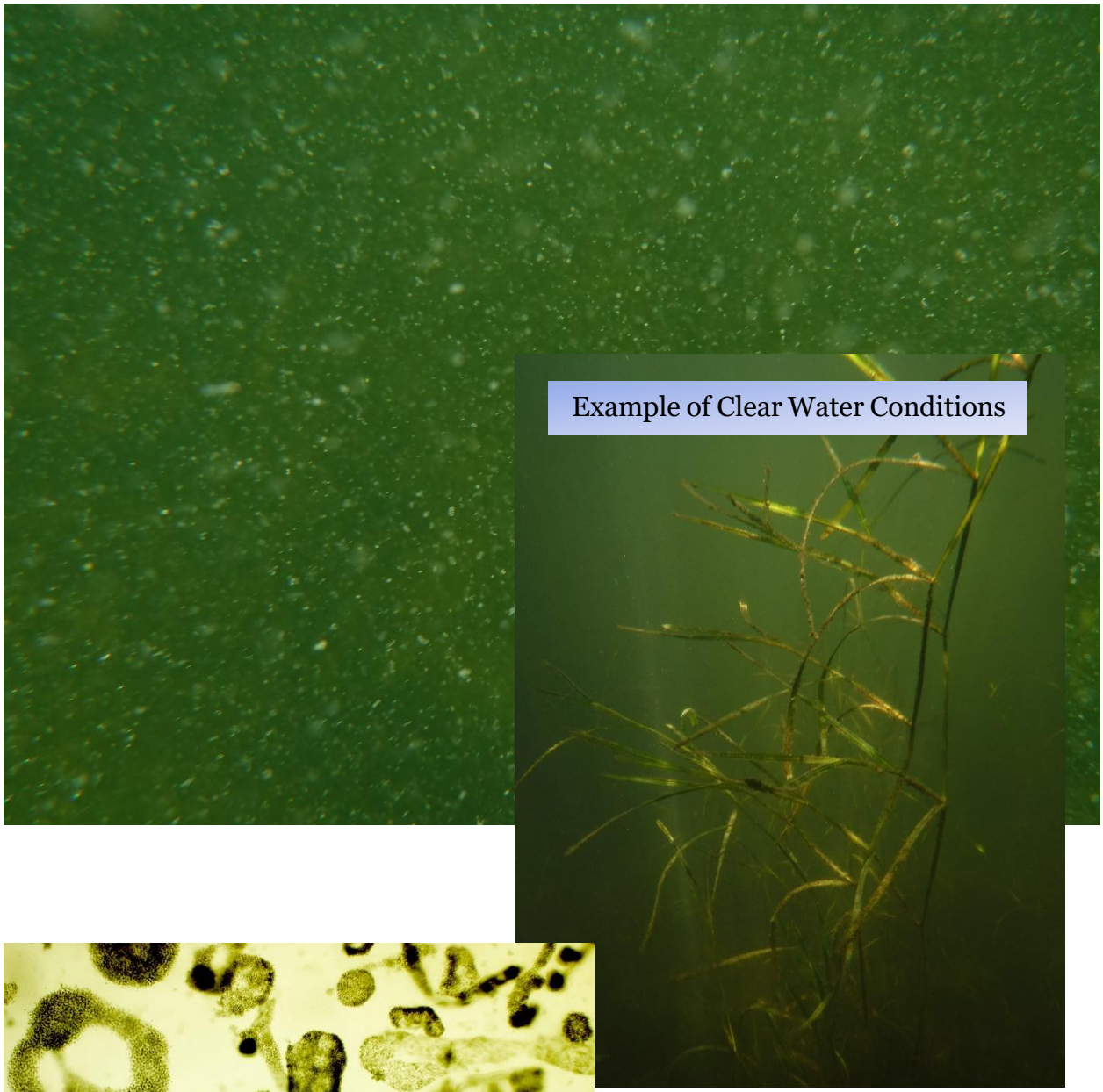
***Blue*-Green Algal Blooms**

Blue-green algal blooms are not benign and so warrant 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.

This year, White Lake hosted one blue-green algal bloom. The bloom occurred in the Eastern half of Three Mile Bay and lasted for over a month starting in mid-September.

Although we had identified the blue-green algae as *microcystis*, we did not report it to the Ministry of the Environment or to our local Health Unit. This is because the bloom did not result in a surface scum which signals the large-scale death and decay of the algae. Microcystin toxins are usually released at this stage of the algal bloom.

Instead, the very intense algal bloom filled the water column in this part of the lake. The water was visibly opaque and full of clusters of blue-green algae. The photos below are underwater photos of the affected waters. A comparison photo showing how the water should look at this time of year is provided for comparison purposes. The identifying photomicrograph of the algae itself is also provided.



Example of Clear Water Conditions

Microcystis: Three Mile Bay 2019

It is possible that local conditions such as wind, temperature, etc. moderated this blue-green algal bloom preventing it from developing further before it has a chance to dissipate.

In 2018, there were two such blooms in Three Mile Bay, one of which was determined to be toxic and the other, although not tested, was potentially toxic as well. It may be no coincidence that these blooms took place on the most altered shoreline on White Lake.

Note that monitoring the extent and longevity of an algal bloom requires much time and effort. Although we try to provide current up to date information, we would need more volunteer help to provide a complete picture of any algal bloom. For blue-green blooms, the Leeds, Grenville and Lanark District Health Unit provides a useful guide for individuals to use in assessing when water becomes safe to use after a toxic bloom is identified.

We must keep in mind that the "Ministry of the Environment regards any cyanobacterial (blue-green algae) bloom as potentially toxic, whether or not toxins are detected in the water upon testing". See literature reference above.

2018

This year five algal blooms were recorded. Three of the blooms were from green algae and two were blue-green. The first blue-green algal bloom contained microcystin toxins at a concentration of 25 ppb (parts per billion). This concentration greatly exceeds the limit for drinking water (1.5 ppb) and also exceeds the limit of 20 ppb for recreational use. The second blue-green algal bloom was reported to the Ministry of the Environment but was not tested by the MOE since it is currently limiting each lake to one sampling per year. The collection and analysis of one sample costs nearly $1,000 and the MOE does not have the resources to follow up on every report. However, the bloom was registered at the Health Unit and classified as *Microcystis* blue-green algae based on photographs of the bloom and photomicrographs of the algae itself which we submitted to the MOE. It is very likely that the second bloom, which was as extensive as the first, was also laden with toxic microcystins. It is worth noting that our group has correctly identified the type and species of all algal blooms which have been documented since the WLPP was founded.

We emphasize that five algal blooms are the minimum number for White Lake, and there may very well have been others on the lake which went undetected or unreported. Currently only two volunteers are monitoring the 22 Km^2 of White Lake, which has a shoreline stretching nearly 100 km!

Green Algal Blooms

The first algal bloom of the season occurred on or about June 10, 2018. This bloom was found in a more remote part of White Lake but was very heavy and extensive in the area of Long Lake Creek East all the way from the creek itself to the point where it met the outflow or Darling Round Lake. This species of green algae is relatively simple to identify because as it dies and decomposes it floats to the surface to form large masses which are often referred to as 'elephant snot'. It is also easy to identify under the microscope.

The second bloom occurred near Sunset Bay extending in patches for about 1 km from the boat launch. The bloom was most intense near the estuary of Boundary Creek. It was evident that wind and wave action were in the process of dissipating the floating masses of algae when it was observed.

The third green algal bloom started in mid-August and continued until the end of September. This filamentous green algae (Sirogonium) grows in large patches along the shoreline. Nutrients, such as phosphorus, supporting this alga comes from both the sediments as well as dissolved in lake water.

Viewed from underwater, the algae mass forms very large volumes extending from just below the surface of the lake all the way down to the lake floor. Other aquatic plants become enveloped within the growing mass. Over time, the algae die, collapses into itself and remains attached to standing aquatic plants resembling bright green garland.

Blooms such as the one pictured above were common in 2018 all along the western shore of White Lake and also in other areas and along island shorelines. This bloom was essentially lake-wide and follows a similar bloom which occurred in 2017.

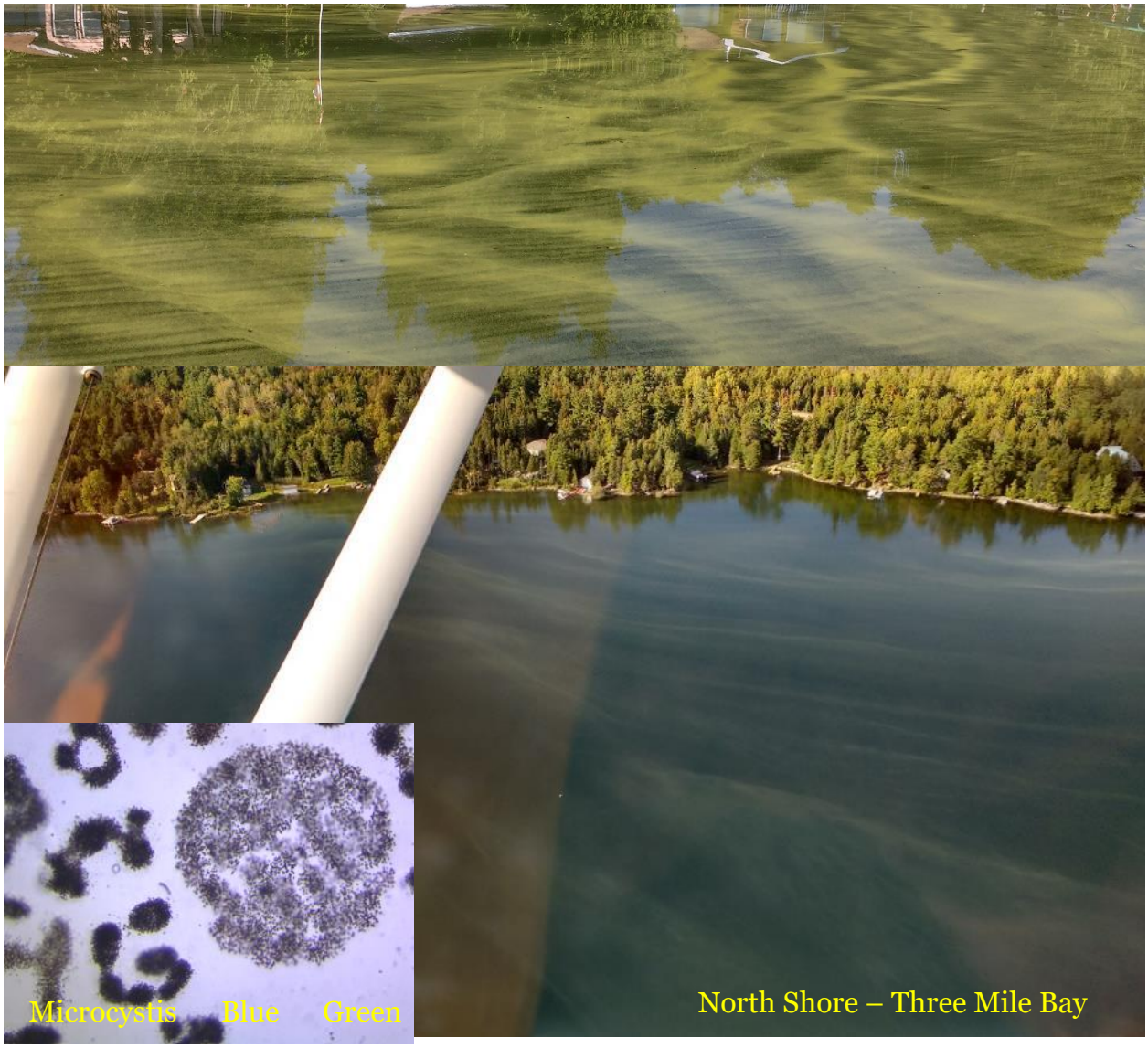
Blooms of filamentous green algae are a consequence of the presence of zebra mussels in White Lake. Zebra mussels concentrate nutrients from deeper parts of the lake and deposit them in shoreline areas where they thrive. Warmer daytime water temperatures, abundant light and nutrients, provide ideal conditions for the propagation of filamentous green algae along shorelines

Blue-Green Algal Blooms

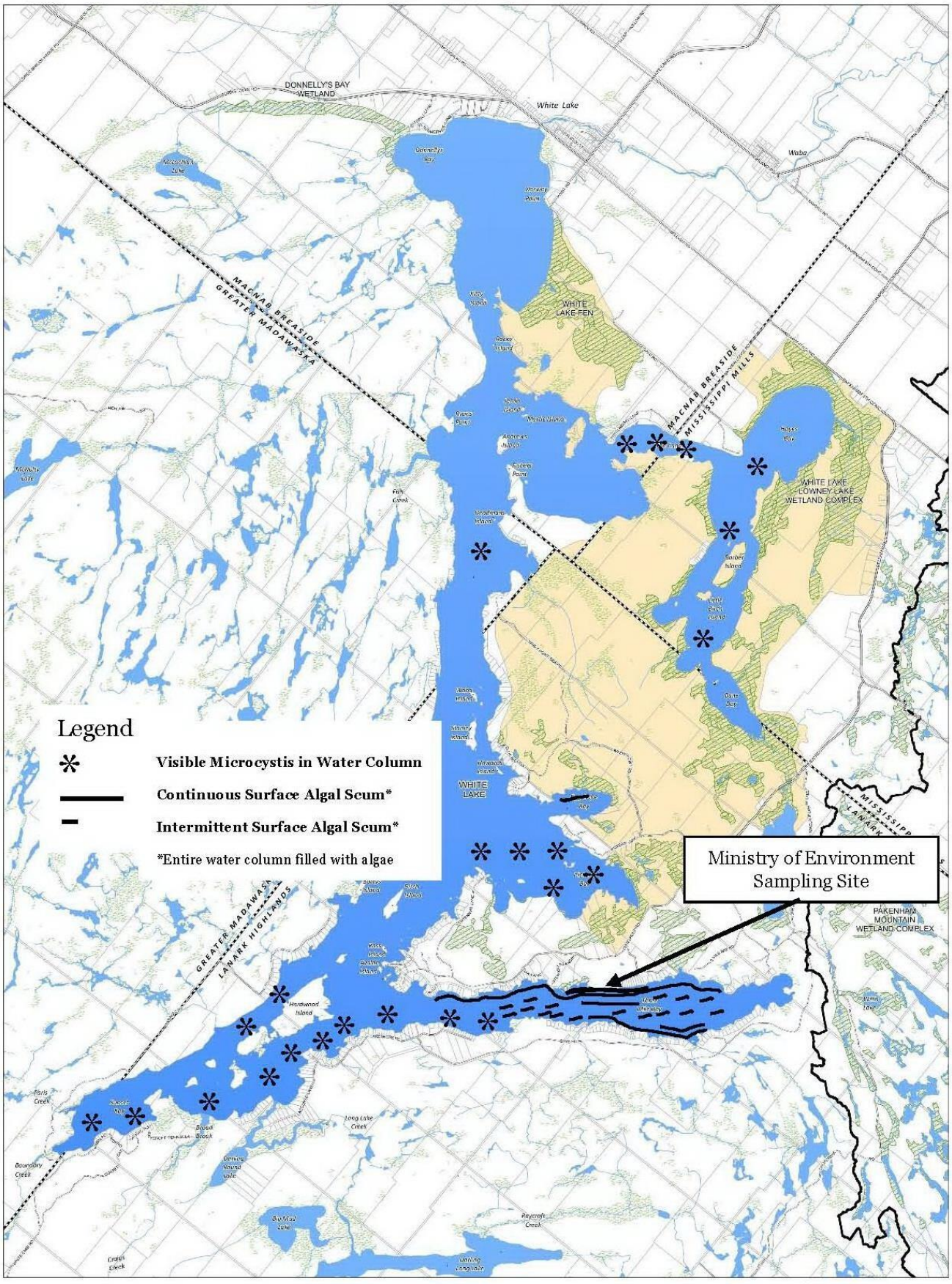
Blue-green algal blooms are not benign and so warrant special attention. When these blooms occur, they can create a public health hazard and anyone using the lake should be apprised of the seriousness of this issue. This year, White Lake hosted two blue-green

algal blooms. It may be no coincidence that these blooms took place on the most altered shoreline on White Lake.

The first bloom was discovered on September 13, 2018. The photos below show the nature of the bloom and its appearance both close up and from above in a float plane.



Extent of September 13, 2018 Microcystis Blue Green Algal Bloom



The map above shows the extent and distribution of the September 13, 2018 *Microcystis* blue-green algal bloom. The algal bloom was most intense on the north shore of Three Mile Bay, but was present right across to the south side of the bay. In most of Three Mile Bay colonies of *Microcystis* were clearly visible from the surface of the lake all the way down to the lake bed.

In another part of the lake, a much smaller but similar bloom was present on the north shore of Thumbnail Bay. Elsewhere (*), smaller populations of *Microcystis* were observed, but these had not yet reproduced to the point of producing surface scum. The bloom lasted approximately 10 days at which point the algae had dissipated.

Note that monitoring the extent and longevity of an algal bloom requires much time and effort. Although we try to provide current up to date information, we would need more volunteer help to provide a complete picture of any algal bloom. For blue-green blooms, the Leeds, Grenville and Lanark District Health Unit provides a useful guide for individuals to use in assessing when water becomes safe to use after a toxic bloom is identified.

A second blue-green algal bloom was observed on October 10, 2018. Using microscopy, we identified this bloom as *Microcystis*. The occurrence of this bloom as well as photomicrographs of the algae was reported to the Ministry of the Environment. An incident number was assigned, but the MOE declined to return to White Lake for another round of sampling and analysis. Citing costs, the MOE informed us that they are limiting samplings to one per year per lake.

Although we have no data to show that the bloom was toxic, it is highly likely that it was considering that the nature of this bloom was the same as the September 13, 2018 bloom and occurred at the same location.

We know from samplings along the north shore of Three Mile Bay that this bloom was as extensive as the September 13, 2018 bloom.

This bloom persisted in the water column for several weeks after surface scum dissipated. Filtered water samples showed that even after three weeks *Microcystis* not only dominated

the algae profile in lake water, it was in fact the only algae present! Note that zebra mussels promote the growth of *Microcystis* blue-green algae.

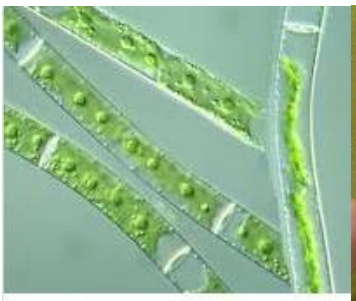
2017

The summer was only starting, but already we had received quite a few enquiries from cottagers about patches or blobs of algae either on the floor of the lake or free-floating and drifting with the wind. Sometimes, a large mat of algae ended up on the shoreline.

We could attribute this lake-wide bloom to the unusually wet spring and early summer weather we experienced. Alternatively, this algal bloom could be one of the predicted consequences of having zebra mussels in White Lake. This is very likely the case.

The WLPP has had a close look at many of these algal masses and have found through microscopic examination that they were all green filamentous algae. These algae are all naturally occurring and are harmless in the sense that they do not produce dangerous toxins. At worst, they are a nuisance especially when they concentrate on your shoreline and begin to rot. Some cultures harvest this stuff and eat it as a green vegetable added to soup and other dishes. The WLPP does not recommend this!

Time will tell if this is an isolated occurrence or if these algal blooms return each year. Very little can be done about these blooms. However, there are some actions we can take to ensure that these blooms are minimized. This can be done primarily by reducing our impact on the lake. In particular, maintaining a healthy shoreline, respecting setbacks for building projects, maintaining septic systems and reducing boat wakes and other disturbances to the shoreline and near-shoreline sediments. All of these actions will reduce the amount of nutrients entering the lake at the very locations where zebra mussels are active.

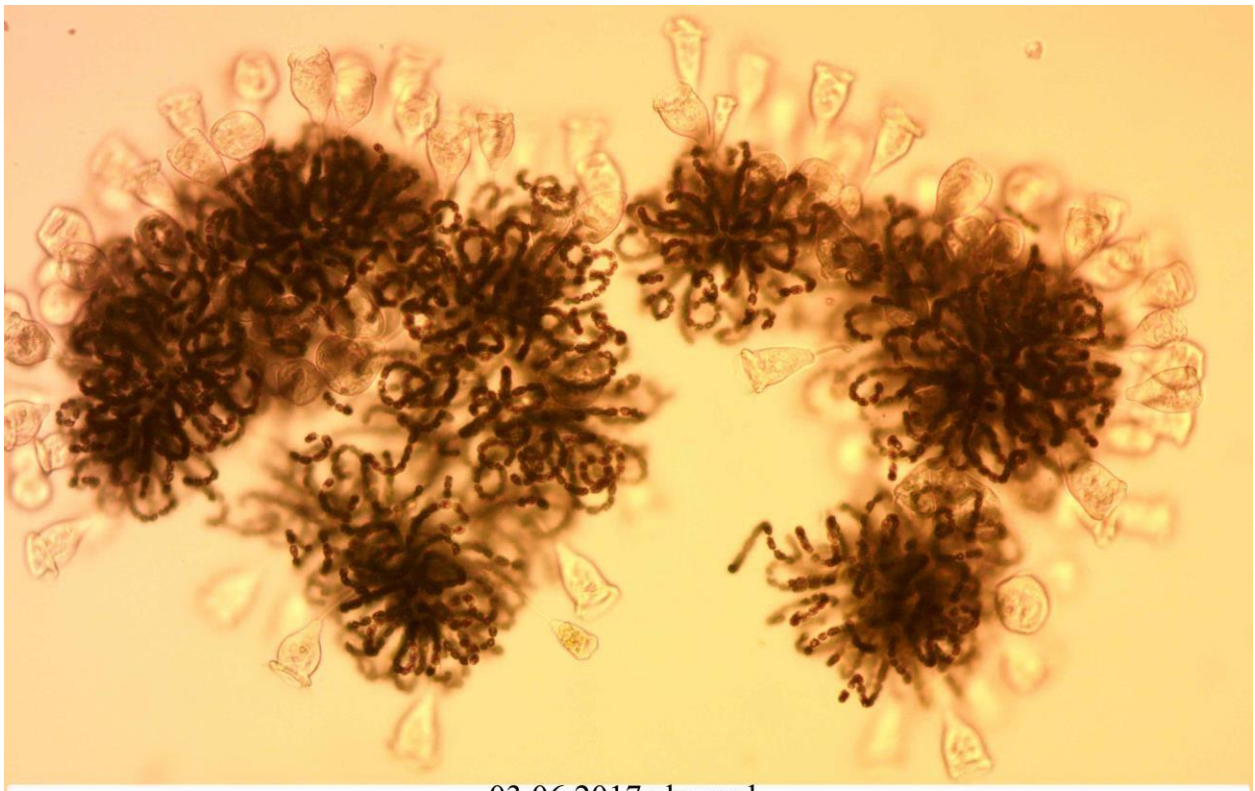


Mougeotia

Sirogonium

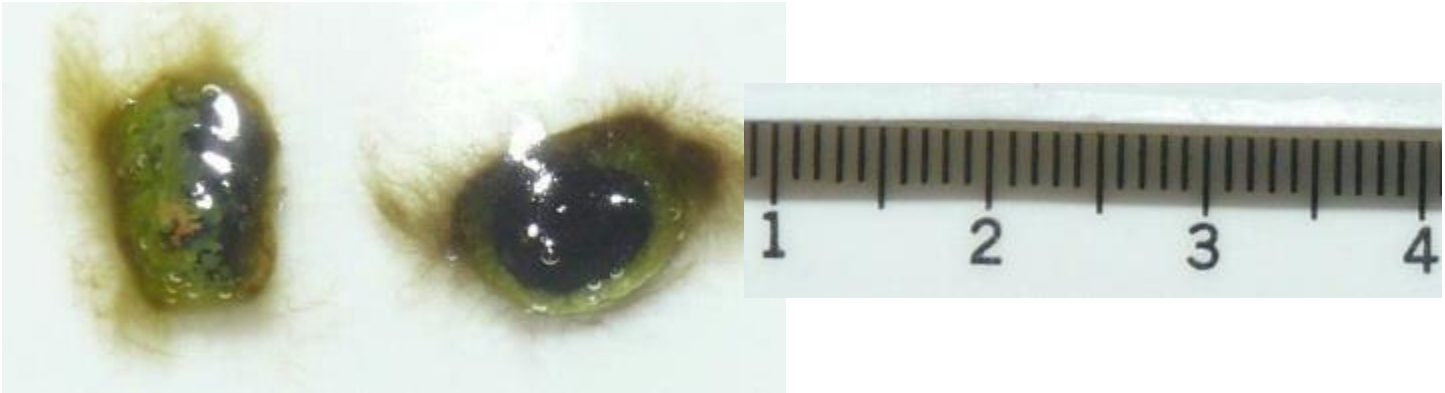
It should be noted that on June 29, 2017 a private citizen did alert the Leeds, Grenville and Lanark Health Unit of a possible blue-greed algal bloom located in the Three Mile Bay area. Two samples were taken by officials and sent for analysis. Luckily, this sample did not contain any toxins nor did it contain any blue-green algae. The sample was found to contain diatoms, golden-brown algae and green algae. All of these species are common in White Lake.

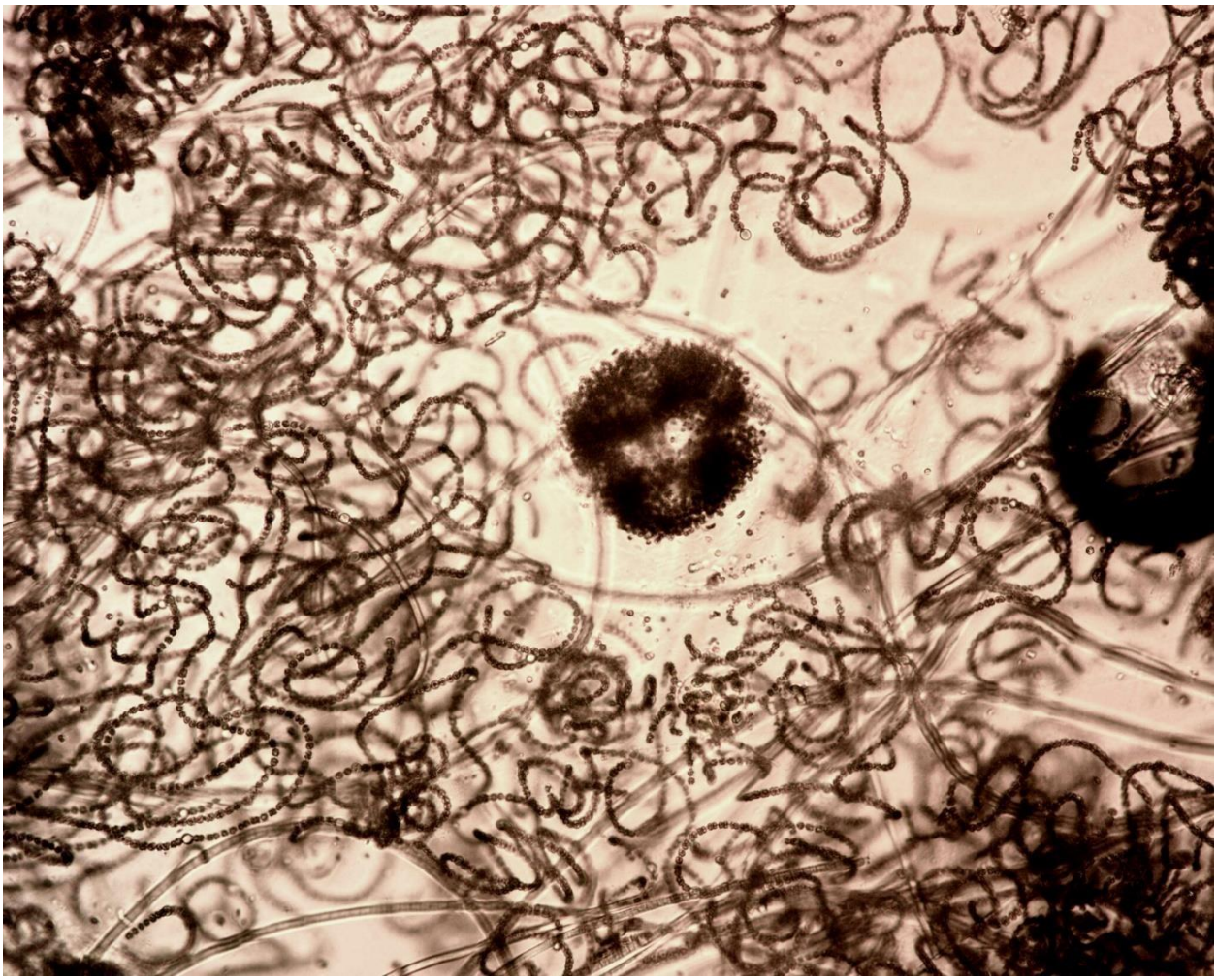
It is well known that the presence of zebra mussels in lakes can promote the growth of microcystis and anabaena blue-green algae. Although there were no blooms of these algae in White Lake during the 2017 summer season, they were detected in water everywhere in the lake we sampled. Below is a photo taken by David Overholt on June 3, 2017. The photo shows anabaena blue-green algae with attached vorticella.



03 06 2017 channel
anabaena & vorticella

Characteristic floating algal masses (pictured below) appeared on August 28, 2017 in Three Mile Bay, near Hardwood Island, Pickerel Bay, and Hayes Bay. The photomicrograph again shows the presence of microsystis and anabaena blue green algae





Above is a photomicrograph of the algal mass retrieved from the lake surface on August 28, 2017.

None of the above observed algal blooms progressed into a full-blown bloom requiring the collection of samples for analysis for toxins. The water column itself was not significantly contaminated with visible algae. However, it is likely that conditions leading to a much larger and more dangerous algal bloom were narrowly averted by factors such as local atmospheric conditions.

2016

The following three photos were taken on Hayes Bay on June 26, 2016. This algal bloom was observed only at this location and nowhere else on the lake.

The same floating masses were observed on October 7, 2016, this time on the western shore of the lake. Microscopic analysis showed that the mass was composed of microsystis and anabaena blue green algae.

None of the above observed algal blooms progressed into a full-blown bloom requiring the collection of samples for analysis for toxins. The water column itself was not significantly contaminated with visible algae. However, it is likely that conditions leading to a much larger and more dangerous algal bloom were narrowly averted by factors such as local atmospheric conditions.

2015

On October 5, 2015 White Lake experienced a significant blue-green algal bloom. The extent of the bloom covered most of the lake. Although surface accumulation of the algae was not as great as in 2014, the entire water column from the surface to depth contained large quantities of Anaboena blue green algae (see micrographs below). Samples of this algal bloom were taken on October 7th by a representative of the Ministry of the Environment and Climate Change and analyzed for toxins. The analysis for microcystins (class of toxic compounds) in this sample found a concentration of less than 0.05 ppb (nanograms per millilitre). This concentration is below the Ontario Drinking Water Quality Standards limit of 1.5 ppb indicating that the lake water was safe to use.

Below are photos of anabaena blue-green algae on White Lake.

Western Shore

North Shore of Three Mile Bay

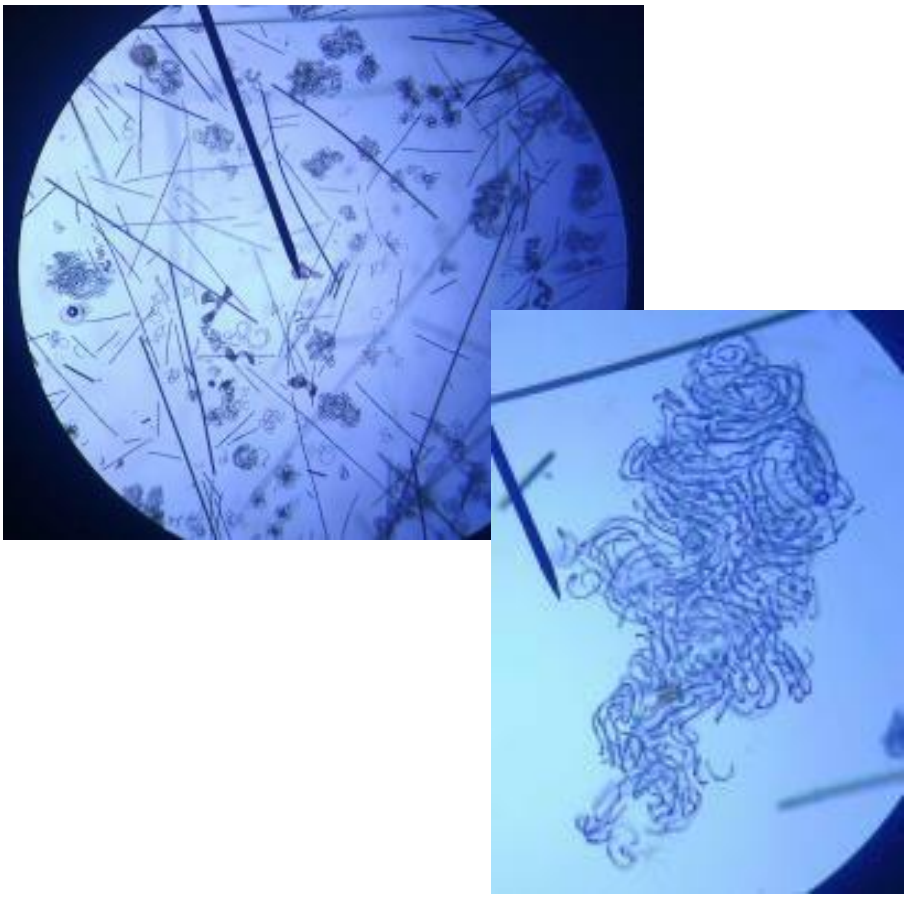


Photo micrograph of Anabaena blue green algae (magnified, inset)

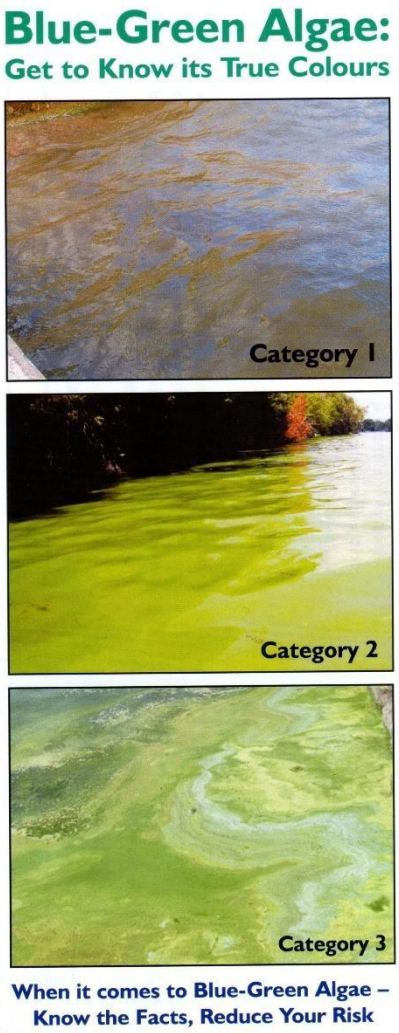
2014

In September of 2014, White Lake experienced a significant blue-green algal bloom. The extent of the bloom covered the entire lake with the exception of parts of Sunset Bay. Samples were taken of this algal bloom by a representative of the Ministry of the Environment and Climate Change and analyzed for toxins. The analysis for microcystin toxin in this sample found a concentration level of 39.46ppb (nanograms per millilitre). This concentration far exceeds the Ontario Drinking Water Quality Standards limit of 1.5ppb. Below are photos of the bloom taken during an overflight of the lake by airplane.

Photo micrograph of Anabaena blue green algae

2013

On September 28, 2013 was recorded the first verified bluegreen algae bloom on White Lake. The event was not localized to a small portion of the lake. the The extent of the bloom was verified by boat and by float plane. The algal bloom covered most of the surface of White Lake and lasted over a week. Its appearance changed depending on weather conditions, location and water depth. Samples were taken by the WLPP and by an Environmental Officer from the Ontario Ministry of the Environment. The sample collected at the height of the algal bloom was by MNRCC Technicians was found to contain Anabaena blue-green algae (confirming what we determined by field microscopy). This is a potentially toxin-producing blue-green algae known to produce microcystins and anatoxins, compounds poisonous to humans. However, analytical results were negative or below the detection limit for these toxins. When comparing photos of our algal bloom with those published in the literature, it was clear that the bloom we observed was a category 2 bloom. It is recommended that during a category 2 bloom that water from the lake not be used for drinking or swimming.



Algal Bloom, Western Shore White Lake: Sept., 2013