

## Citizen Science in the Age of COVID-19

~ Maggie Sullivan, Lake Monroe Watershed Coordinator



*Citizen scientists in the age of COVID-19.*

Two of the key aspects of developing a watershed management plan are to gather water quality data and to engage community members. Holding a water sampling event using volunteers is a great way to achieve both goals at once. Volunteers become more aware of their watersheds and often become powerful advocates for watershed protection. However, the COVID-19 pandemic makes it more complicated. What is the best way to engage local community members in water quality sampling while keeping them safe and respecting that their priorities and available time have likely shifted dramatically?

The Friends of Lake Monroe and the Indiana University Limnology Lab are currently working to develop a watershed management plan for Lake Monroe, located near Bloomington, Indiana. We had planned to host a sampling event in April 2020 but had to postpone due to stay-at-home orders. Over the summer, it became clear that a fall event was feasible if we could answer one question: How do we structure our sampling event to be safe, useful, and attractive to volunteers?

The basic parameters were unchanged. We had identified 125 stream sampling locations throughout the watershed that all eventually flowed into Lake Monroe (Figure 1). Some streams were 20 feet wide and deep enough for kayaking while others were four inches deep and narrow enough to jump across. The sampling locations spanned portions of three counties – Monroe, Brown, and Jackson. We established five staging locations for distributing supplies, consolidating samples, and providing restrooms for volunteers. All that remained was updating our protocols to ensure volunteers were safe and that they were comfortable participating.

Our new motto became “Minimize contact.” We had originally planned on having volunteers gather at each staging location for training before heading out

## Water Sampling Blitz - September 18

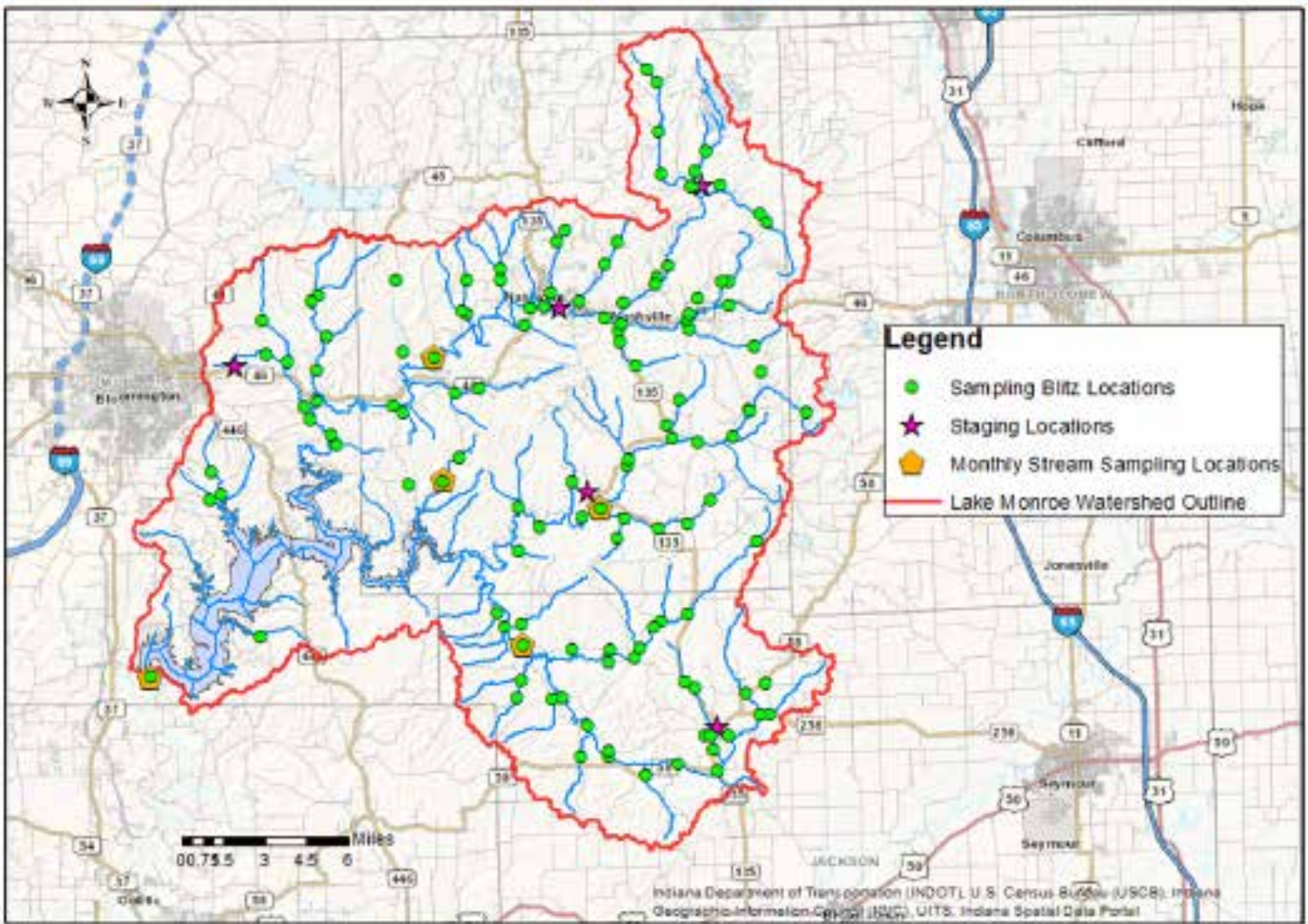


Figure 1. Stream sampling locations through the watershed, all flowing into Lake Monroe.

to sample. Instead, we embraced a flipped classroom format where volunteers were asked to watch pre-recorded training videos prior to the event. We held a live Q&A session over Zoom and sent a follow-up e-mail to all volunteers sharing answers to the most commonly asked questions. Each team was assigned a staggered arrival time to pick up their supplies, further minimizing interactions between volunteers. We added face masks and hand sanitizer to the sampling kits in addition to the standard bottles, thermometer, and pH strips. Volunteers worked in teams of two for safety reasons and were encouraged to team up with a household member. Solo volunteers were assigned a partner and asked to remain socially distanced throughout the event, traveling in separate

vehicles and staying six feet apart at each sampling site.

I am happy to report that our sampling event on September 18<sup>th</sup> was a great success. Participants ranged in age from under 10 to over 70 and feedback was overwhelmingly positive. Many participants praised the training videos and commented that having the materials in advance made them feel more confident in their abilities. While few people took advantage of the masks we provided (since they brought their own), they appreciated the thought and the fact that our staging locations were all outside.

It was a warm sunny day, perfect for sampling. The only disappointment was that many sampling locations were dry due to near-drought conditions last summer.

Of 125 sample sites, 88 had enough water to collect a sample. Samples were analyzed for E. coli, Total Suspended Solids, Total Nitrogen, Nitrate, Ammonia, Total Phosphorus, and Soluble Reactive Phosphorus. These results will give us a better understanding of which areas in the Lake Monroe watershed have higher concentrations of bacteria, sediments, and nutrients.

We are currently working to create and publish an interactive Story Map. This online tool displays sampling results, photos, and other data connected to a geographic map of the project. Participants will be able to click on their sampling sites to see the water quality results, while also getting an overview of how the sites connect with the rest of the watershed.



*Figure 2. Citizen Science Volunteers sampled 88 stream sites throughout the whole Lake Monroe watershed for the fall 2020 Sampling Blitz, collecting water samples, assessing stream conditions, and preparing stream samples for laboratory analysis.*

Next April, we plan to do it all again and see how the results differ from season to season. At this point, we plan to structure the event the same way with only minor tweaks. We plan to recruit a few “stand by” volunteers, since we did have a handful of no shows in September. We are still figuring out the best system for collecting and cataloguing site photos taken by volunteers. Next round we will introduce a file naming convention to keep them a little better organized and we will spend a little

more time training our staging location supervisors so that they can provide a stronger round of quality control. This means ensuring that data forms were completely filled out (with a strike-through of sections that are not applicable instead of leaving them blank) and making sure sample bottles were filled only to the neck.

Our plans may shift again as our county, state, and nation continue to evaluate the pandemic situation and react accordingly. Flexibility seems to be the name of the game these days

and we are doing our best to stay on our toes. Our goal remains the same – collect useful data while engaging community members and helping them understand the importance of protecting our watershed. Wish us luck!

For more details about the project, please visit [www.friendsoflakemonroe.org](http://www.friendsoflakemonroe.org) or contact watershed coordinator Maggie Sullivan at [watershed@friendsoflakemonroe.org](mailto:watershed@friendsoflakemonroe.org) or (812) 558-0217.

# The Future of Algal Blooms Under Climate Change

~ Nick Scubelek

Algae, also known as phytoplankton, are important organisms in aquatic ecosystems because they form the base of the food web. Phytoplankton are photosynthetic, which means that they are able to convert light energy and carbon dioxide into energy and oxygen. Zooplankton then consume the phytoplankton, which are in turn consumed by fish and other organisms. Because they are photosynthetic, the growth of phytoplankton is limited by light availability and water temperature.

As the climate changes, global air temperatures and carbon dioxide concentrations in the atmosphere are increasing. There is more light energy available at the surface of water bodies because as the light travels down the water column, it is scattered and reflected therefore heating up the surrounding water. This is why surface temperatures are warmer than water temperatures at deeper depths. As the air temperatures are increasing, the water temperatures are also increasing as well. Warmer water temperatures allow for gases to diffuse into the water more easily. This means that more carbon dioxide will diffuse into the water providing the phytoplankton with more factors that contribute to growth.

Other limiting factors for algal growth are the nutrients phosphorus and nitrogen. Phytoplankton use nitrogen to build tissues and phosphorus is a critical nutrient in the conversion of sunlight and carbon dioxide into energy through photosynthesis. Phosphorus is naturally scarce in water bodies, so it is considered to be the limiting nutrient in algal growth.

Under a changing climate, the frequency of algal blooms and their effects will increase as seen in Figure 3.

3. Intensity of algal blooms also increases as seen in Figure 4. Some of these effects are reduced aesthetics of the water body, reduced recreation on the water body, production of harmful toxins, and taste and odor problems with the water. Anoxic and hypoxic zones can be created in the lake when the algae die and the oxygen in the water is consumed by the decomposers breaking down the algae. Aerobic life cannot be sustained in environments with a lack of oxygen. This negatively impacts the commercial fishing industry and fisheries.

Property values near bodies of water will decrease as the aesthetics of the lake are degraded from algal blooms. Water treatment costs will increase as the water becomes more degraded. Management and monitoring of algal blooms will also need to increase which costs more money. It has been estimated that algal blooms cost the nation 4.6 billion dollars a year. This price will only increase as algal blooms become more frequent under a changing climate.

Water is essential to all life on the planet. Algal blooms are an issue that

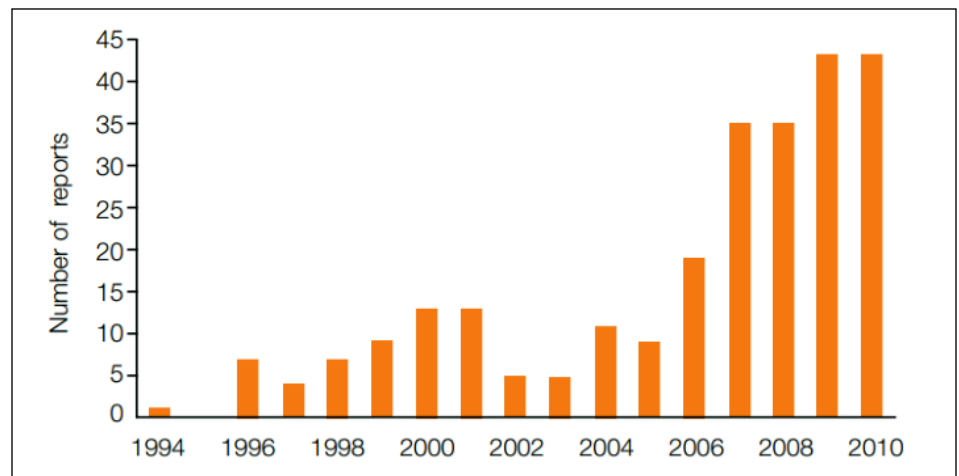


Figure 3. Yearly confirmed reports of algal blooms in Ontario, Canada (Forbes 2017).

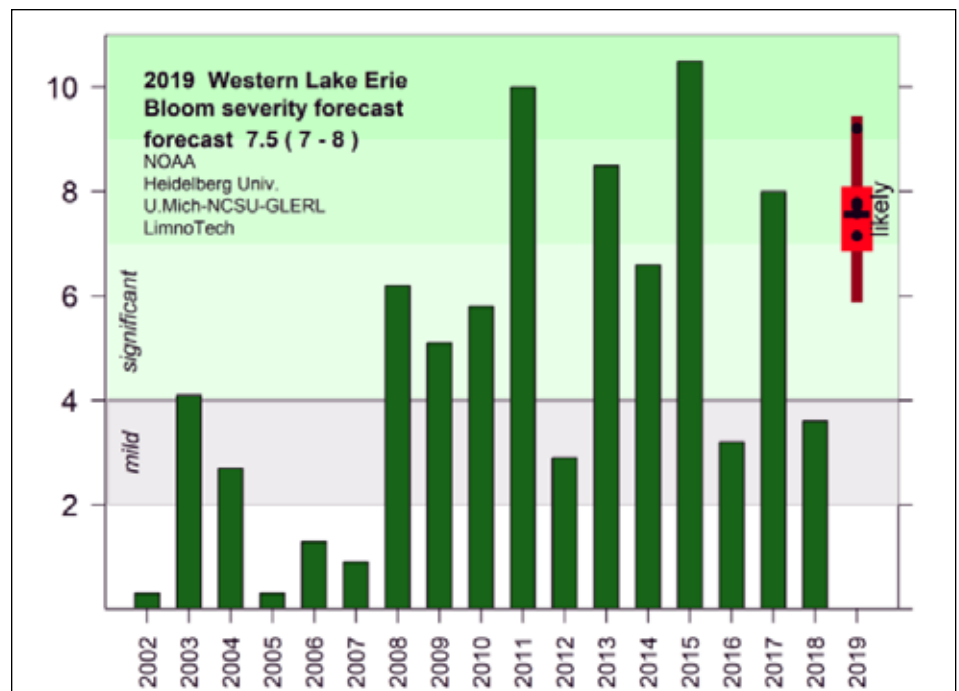


Figure 4. Prediction of algal bloom severity in Western Lake Erie 2020 (NOAA 2019).

managers are already having to deal with, and these will only increase in frequency and duration as the climate changes. It is critical that managers work to manage and control these blooms in the future in order to protect this precious resource.

## AIS Monitoring: Preventing the Spread through the Seasons

~ Chris Hamerla, AIS Coordinator, Golden Sands Resource Conservation & Development Council (Lake Tides, Volume 45, No. 4, Fall/Winter 2020, Wisconsin Lakes Partnership)

Summer 2020 saw a large increase of people enjoying Wisconsin's lakes, rivers, and pretty much all of the outdoors. Many lakes reported busier than average boat landings as people spent more time recreating on the water. This was confirmed by empty shelves at retail stores where boating, kayaking, and fishing equipment would normally be found. With that increase came an increase in first-time boaters and anglers, or people who hadn't done so in many years. This provided an opportunity to educate more people about preventing the spread of aquatic invasive species (AIS). It also

For more info related to IDNR's Aquatic Invasive Species Program:  
<https://www.in.gov/dnr/>

meant we needed to step up monitoring efforts.

### Not Just for Summertime

AIS prevention and monitoring isn't just reserved for the summer. Fall is a good time to look for invasive species like starry stonewort, water hyacinth, and zebra mussels. In 2020 and 2019, residents from two different lakes in Portage County noticed zebra mussels on their docks. Zebra mussels attach to hard surfaces so it is easy to check pontoon tubes, boat hulls, and dock legs, once they are removed from the lake (Figure 5). Even if you didn't think to check those items when they were removed, the mussels will still be there and monitoring can be done now.

While the pleasure boating and waterskiing has gone silent for the year, many water related activities continue to occur, which means AIS prevention steps remain important. Fishing, waterfowl hunting, and trapping are a few of these activities. Remember to inspect and clean all mud, plant material, and organisms from footwear and equipment. Drain all water from your boat and never move plants, organisms, mud, or water.

### An Ounce of Prevention

Following the AIS prevention steps helps preserve quality habitat and avoids negative impacts to recreation as well as potential maintenance and management issues. Monitoring for AIS and reporting suspicious findings can help in management efforts and reduce new found populations from spreading further. Please report findings to local AIS partners or DNR. And remember, the good example we all set while preventing the spread of AIS will help teach others to do the same!

## Pandemic Cabin Fever? Consider Some Landscaping Projects this Winter and Spring!

~ Melissa Laney (Adopted from the *Healthy Lakes & Rivers* and the Wisconsin Lakes Partnership)

More landscaping and home renovation projects have started and some even completed (woo-hoo!) over these months of "staying at home." Decks were built. Gardens expanded or dug in for the first time. While you all hunker down for the winter months, consider some other landscaping projects that will not only



Figure 5. These zebra mussels hitched a ride on the wheels of this removable pier.

improve your property but help the lake and watershed! Figure 6 illustrates some Best Management Practices (BMPs) suggestions of what you can do to improve wildlife habitat, reduce stormwater runoff, and reduce soil erosion and nutrient pollution to the lake and streams.

BMPs are structural, vegetative, or managerial practices used to treat, prevent, or reduce water pollution. They are intended to reduce and slow the flow of runoff from rain and snow-melt. Lake-side BMPs, such as littoral and lake-edge plantings, help slow water running into the lake and protect the shoreline from wave erosion – a win-win! Even little projects add up! The thing that is best about the BMPs is that you can modify them to your specific yard and integrate what works best for your family needs. You might think “how will this little flower bed (rain garden) help in this large watershed?” BMPs add up to have a huge cumulative impact and it’s easier to manage, install, and finance storm runoff in small pockets spread throughout instead of relying on large municipal projects. BMPs help mimic the nature watershed response, which is to

encourage groundwater infiltration. Have fun with your extra time at home and get creative with habitat improvements with some landscaping BMPs!

**(1) Fish Sticks.** Create fish and wildlife habitat – Fish sticks are feeding, breeding, and nesting areas for all sorts of critters, from fish to song birds. They can also prevent bank erosion – protecting lakeshore properties and your lake.

**(2) Native Plants.** Improve wildlife habitat, natural beauty and privacy, and slow runoff. Native plantings include grasses and wildflowers with shrubs and trees. Choose a template based on your property and interests – from bird/butterfly habitat to a low-growing garden showcasing your water view.

**(3) Diversion.** Prevent runoff from getting into your lake and streams. Diversion practices move water to areas where it can soak into the ground instead. Depending on your property, multiple diversions may be necessary.

**(4) Rock Infiltration.** Capture and clean runoff. Rock infiltration practices fit in nicely along roof drip

lines and driveways and provide space for runoff to filter itself. They work best if your soil is sandy or loamy.

**(5) Rain Gardens.** Create wildlife habitat and natural beauty while capturing and cleaning runoff. Rain gardens multi-task – they improve habitat and filter runoff while providing a naturally beautiful view.

## Perspectives

“Water is the most critical resource issue of our lifetime and our children’s lifetime. The health of our waters is the principal measure of how we live on the land.”

~ Luna Leopold



Figure 6. Landscaping BMP suggestions.

# Aquatic Invasive Monitoring Plant Highlight

This will be the 26th plant in the plant highlight series. We will be featuring one aquatic plant in each *Water Column* issue. We will feature both native and invasive plants to improve our plant identification skills. For additional information of this Nonindigenous Aquatic Species (NAS) and many others, explore the USGS Nonindigenous Aquatic Species (NAS) information resource (<https://nas.er.usgs.gov/default.aspx>).

## Narrow-leaved cattail (*Typha angustifolia*), INVASIVE

**COMMON NAMES:** *Typha angustifolia* var. *calumetensis* Peattie, *Typha angustifolia* var. *elongata* (Dudley) Wiegand, lesser reed-mace, nail-rod, small reed-mace, southern reedmace, narrowleaf cattail, narrow-leaf cat-tail.

**DISTRIBUTION:** While it's native range is Northern Africa, temperate Asia, Eurasia (GRIN), it is now present in 45 states.

**DESCRIPTION:** *Typha angustifolia* can be found in the following habitats: marshes, ditches, fens, pond and lake margins, floating bog mats, roadside ditches, irrigation canals, oxbow lakes, and backwater areas of rivers and streams (Figure 7). Narrow-leaved cattail prefers full sun, wet conditions, and muddy soil. It tolerates continuous inundation, seasonal drawdowns, and brackish waters. *Typha angustifolia* also tolerates road salt and excessive silt and nutrients. Its ability to grow rapidly and tolerate environmental stressors enables it to dominate in inhospitable niches.

*T. angustifolia* can grow up to 7 feet tall. The erect shoots consist of long narrow blades 4-12 mm wide when fresh, 3-8 mm when dry. The male (staminate) and female (pistillate) flowers are separated with a gap by 1-8 cm of naked stem. Flowers are straw-colored to medium brown. They are a densely filiform inflorescence that looks like a long corn dog.

In waters where *T. latifolia* (native cattail) and *T. angustifolia* are present, *T. latifolia* will often be in shallower waters closer to the shorelines, whereas *T. angustifolia* can survive in deeper water of 2-3 m.

The best time to try to distinguish *T. angustifolia* from the native *T. latifolia* is in late summer when the flowers are fully developed. *Typha angustifolia* has narrower leaves and a 2-12 cm gap between the male and female portions of the flower (Figure 8 and 9).

### Identification tips:

- Tall grass-like blades
- Narrow leaf blades, usually <10mm
- Gap on stem between male and female flowers
- Flowers long dense reddish-brown fluffy, sausage-shaped flowering heads.



Figure 7. Narrowleaf cattail.



Figure 8. Cattail flower parts.



Figure 9. Cattail flower comparison.

# Volunteer Corner

2020 has been a year of unique challenges for all of us, but that hasn't slowed our volunteer program down in the slightest! During this sampling season, volunteers collected almost 180 samples for chlorophyll-a, total nitrogen, and total phosphorus, and more than 350 Secchi disk readings. Our citizen scientists are absolutely crucial to the work we do to maintain Indiana Lakes.

As we make improvements to the website and volunteer data entry portal, we want to place special emphasis of good record-keeping with these helpful tips:

- 1. Always record your findings on your datasheet** – you can download copies of the Secchi and Expanded Monitor datasheets on our website
- 2. If you can, enter your findings on the website after each reading.** This makes it easier to double-check the data while it's still fresh in your mind and saves you from having to enter the whole season's data at once!
- 3. For expanded monitors, be sure to write down and enter your Chl-a filtered volumes.** These can easily get rubbed off the filter tubes, so having these recorded in a second location is an important backup.

**Have you checked out the Indiana Clean Lakes Program Web page lately?  
Take a look at <https://clp.indiana.edu/>  
and see what's new and happening with the program and with Indiana lakes!**



## WATER COLUMN

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