

Winter 2014-15
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Deep Winter Preparations for Citizen Scientist Programs – Join the Team!

~ *Melissa Clark*

Each winter and early spring, the Indiana Clean Lakes Program gears up for another sampling season, attends the Indiana Lakes Management Society annual conference, trains new volunteers, and explores additional ways to expand lake stewardship and grow the citizen scientist program. We have a variety of avenues to share these exciting programs such as this newsletter and conferences, but we can also visit with your lake association, council, and groups.



Limnology 101 Workshop scenes – ILMS annual conference.

Currently our lake volunteers are sampling water quality parameters, including Secchi disk transparency, total phosphorus, and chlorophyll-a. Many of these Citizen Scientists have joined us at previous Aquatic Invasive Species (AIS) and Macrophyte workshops to learn about plant identification and mapping techniques. They are helping the state track the distribution of these AIS and providing their lake group with knowledge to better understand, manage, and protect their wonderful lake.

This year, we are fully geared up to launch the Zebra Mussel Monitoring Program! We have volunteers on lakes that are known to house these invasive bivalves to serve as “control” lakes and to test our sampling substrate. More importantly, we have volunteers on lakes that are still free from these hitch hikers! These lakes will be monitored for “early detection” with the artificial substrates placed near the boat ramp, which is well documented as the source location of introduction – boats. This will piggyback onto IDNR’s efforts to inform boaters about cleaning boats, trailers, and equipment before entering lakes. *Prevention is ultimately the most important strategy!* However, they are so easily spread that lake groups should plan accordingly and be prepared. To carry through on the early detection efforts, lake groups should have rapid response plans if zebra mussels are detected and if the desire is to eradicate and keep them out.

Two monitoring approaches:

1. Veliger monitoring – Veligers are zebra mussel larvae. They are not visible to the naked eye and are planktonic, thus they are floating around in the water column. They can get caught on equipment, intake pipes, and boat motors. Sea Grant has developed a veliger monitoring kit that comes complete with sampling equipment, instruction booklet, and



Zebra mussel veliger.

instructional video. They are available for \$300 from www.sgnis.org.

2. Adult monitoring with the Indiana Clean Lakes Program

– Scientists currently document that most inland lakes become infested by an introduction of adults rather than veligers, which usually occurs at public ramps. The CLP Citizen Scientists will install a monitoring kit near the boat ramp, which will be suspended by a marked buoy or attached to the pier. These

volunteers will monitor monthly for mussels that “settle” or attach to the artificial substrate. Very young adults will just make the surface feel like sandpaper. Volunteers then cut off portions of the substrate and ship them back to our lab for identification and confirmation. We will track the distribution and help lake associations and groups through the process and rapid response considerations.

Please contact us if you’d like to join this program! We need volunteers on lakes with zebra mussels and



CLP zebra mussel monitoring kit.

most importantly those that don't to monitor for early detection!

Some rapid response options:

Unfortunately, eradication is very difficult as with most invasive species. The potential control methods for a zebra mussel infestation vary with each specific infestation site; important features include the uses of the waterbody, extent of infestation, size of the waterbody, and linkage to other sites, infested or unaffected. While Indiana does have an Aquatic Nuisance Species (ANS) Management Plan, it does not have a statewide rapid response plan for zebra mussels in Indiana. Below are some options from the Rapid Response Plan for the Zebra Mussel (*Dreissena polymorpha*) in Massachusetts.

1. Drawdown and exposure

– If the infestation is within an impoundment with water level control capability, drawdown may be a viable control technique. Removing all water from a lake or pond and allowing it to dry may eliminate the zebra mussel infestation; however, this technique involves many technical and biological issues. A drawdown of the lake or pond could result in the eradication of many desirable plant and fish species. An effort could be made to capture and relocate desirable species, but this would be an expensive and lengthy undertaking. Impoundments that are spring fed may be difficult to keep dry and the mussels may survive. The water would have to be filtered or otherwise treated to ensure no small eggs or larvae escape. Alternatively, it may be possible to hold the water in a separate basin or to dispose of the water in a way that limits risk of zebra mussel transfer (e.g., ground water infiltration). All of these approaches are likely to be time consuming and expensive, if even practical.

2. Physical removal – Physical removal of the mussels using manual scraping and water jets can be used on a small scale with success, but are not likely to be successful for large infestations. If the infestation is believed to be limited to a few individuals or even a few patches of mussels, physical removal may be successful in removing the target organisms.

Even with a few individuals, however, it may be difficult to determine if the eradication was 100% successful. One advantage of physical removal is minimal impact on native and desirable species, as these methodologies are localized and can be somewhat selective.



3. Suffocation – As zebra mussels need oxygen to survive, one control technique is to reduce the oxygen level below the lethal limit of zebra mussels. However, this will almost certainly have a major impact on other aquatic organisms and is not usually recommended for use outside of industrial facilities.

4. Thermal treatment – Hot water can kill zebra mussels, although many other aquatic organisms can also be harmed as well. Industrial and public utilities are experimenting with thermal controls for zebra mussels, and on a localized basis this

approach may have merit, but it is not a recommended large scale technique for whole lake application.

5. Biological control – Augmenting or introducing natural predators and species specific diseases or parasites may be considered, but is not likely to result in the eradication of the infestation. The change in ecosystem dynamics due to introductions of new organisms or the augmentation of present organisms may be detrimental to the overall health of the ecosystem in some cases, so care must be taken with this approach. An exception may be certain fish species, like freshwater drum, which prey upon zebra mussels effectively. As with most biological predator-prey interactions, cycles of abundance are typically set up and eradication is unlikely, but some measure of control can be achieved.

Just this past fall, the first lake treatment of the bacteria-based pesticide, “Zequanox,” was applied to Christmas Lake, Minnesota. The U.S. Environmental Protection Agency (EPA) approved Zequanox for open water use to combat invasive zebra and quagga mussels in lakes, rivers, recreation areas and other open bodies of water in the summer of 2014. Zequanox, the industry’s only selective and environmentally compatible molluscicide, was first approved by the EPA in 2012 for mussel control in enclosed systems and infrastructures for energy producers, manufacturing companies and golf courses. Since this first application, other lakes have started their own studies to explore the efficacy. Be sure to be on the lookout this summer for the results and follow up!

6. Chemical control – Industries and public utilities that experience problems due to zebra mussel biofouling may use chemicals to clear the fouling. Chlorine and various pesticides are effective and can be used with limited risk inside those

facilities. However, the potential negative effects of chlorine and other chemicals on the aquatic environment may be great if applied in open water. There are few known chemical controls suitable for use against zebra mussels in an open environment. Experimentation with various paints and other applied coatings has shown some promise, but these will not combat existing infestations. If the target area is small and water exchange can be controlled, it may be possible to apply some of the harsher chemicals with limited impacts to non-target populations in the lake, but great care must be taken and this approach has generally not been applied. The Army Corps of Engineers has published a “Zebra Mussel Chemical Control Guide” that can be accessed at http://el.erdc.usace.army.mil/zebra/zmis/zmishelp/zebra_mussel_chemical_control_guide.htm. This guide includes information about the various chemical treatments used to combat zebra mussel fouling.

Other control techniques that are currently being used or experimented with by industry and utilities are radiation, mechanical filtration, removable substrates and complete re-design of systems in critical areas. None of these appears particularly applicable for overall lake use.

The aforementioned control techniques may be practical on a small scale, but are likely to be very expensive and less effective on a larger scale. The importance of early detection and rapid response to a new infestation cannot be overemphasized. The expense of larger undertakings alone may limit the ability of public agencies to combat an infestation, and the permitting complications of larger scale efforts may add an additional barrier to success. In many cases, eradicating an introduced population may not be practical, and instead the control and management of the infestation is set as the target goal. In these cases, it becomes a

management issue and every effort should be made to control or slow the movements of these mussels to other waterbodies. Each infestation must be handled separately, and the characteristics of each waterbody will dictate which management tools are appropriate.

Contact the Indiana Cleans Program to get involved!

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Aquatic Plant Adaptations

~ Kate Drake

The many varied appearances of plants are due to the unique traits each plant has that allow them to get the nutrients and energy they need to live. This means that plants that live underwater are often specially adapted for that environment. Aquatic plants live in a very different world than terrestrial plants. Most plants are prepared for photosynthesis and gas exchange with a waxy, protective covering, or cuticle, and guard cells on external pores that

can open and close. These allow for photosynthesis and gas exchange to occur while minimizing water lost to the air (see Figure 1). They also have stems for structural support and use roots for anchoring and to access water and nutrients in the soil. Aquatic plants typically have the same or similar features, but with different strengths and weaknesses that are unique to their environment and allow them to thrive under water.

Plants exist along a gradient of dry to wet soils to aquatic areas (Figure 2). For example, aquatic plants may have leaves that float on top of the water, be fully submerged in the water, or both. Emergent species exist between the drier upland area and the fully aquatic area and may grow in shallow water and emerge above the water (Figure 3). They are uniquely adapted to that transitional environment. However, here we are going to focus on fully aquatic plants.

Floating leaf plants are rooted in the ground with leaves that float on top of the water. Floating leaves are often wide and flat, such as those of water lily or floating leaf pondweed (Figure 4). This helps to increase buoyancy, as well as surface area for photosynthesis and gas exchange. An especially thick cuticle is also common on the upper surface of floating leaves and helps to repel water droplets.

Living at the surface of the water means that floating leaves have to cope with weather as well as the movement of water. The thicker, waxy leaves allow the flexibility to move with water while still providing protection from weather, such as wind or rain. Smooth edges also create less opportunity for ripping due to surface water movement. The roots are often primarily for anchoring and may not be as extensive as those of terrestrial plants. Stems

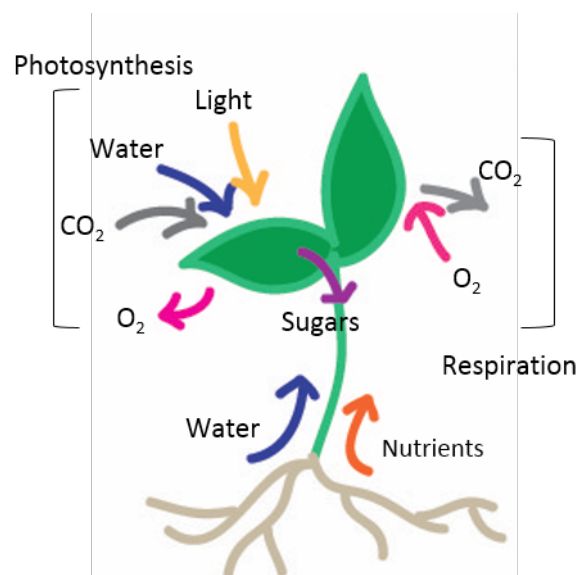


Figure 1. Photosynthesis.

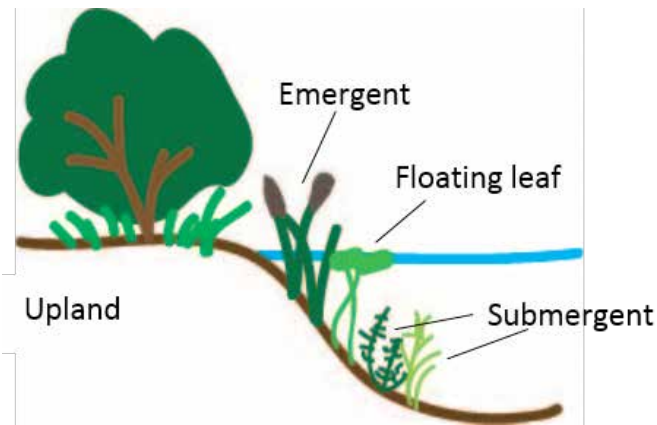


Figure 2. Littoral plant zones.



Figure 3. Emergent plants: *Pontederic cordata*, pickerelweed.



Figure 4. Floating and rooted plants: *Nymphaea spp.*, water lily.

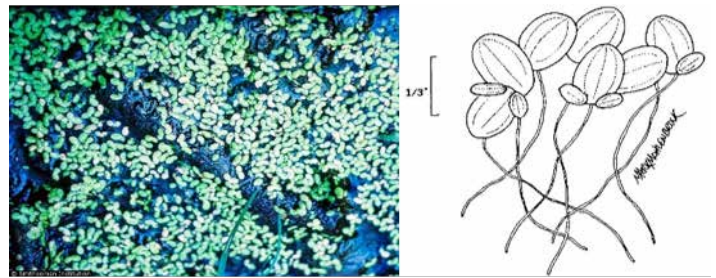


Figure 5. Free-floating plants: *Lemna spp.*, duckweed.

are typically more flexible also. This increases ability to move with water and further reduces risk of damage. The weight of the leaves is supported by the water and there is no need for the strong and relatively rigid stems of terrestrial plants to remain upright. The duckweed family is a special type of floating leaf plant that are generally very small and have no stem at all. Instead, the leaves float above small roots that are hanging in the water (Figure 5).

Submergent plants, on the other hand, live fully under water. They also benefit from flexible stems and leaves. However, the broad, smooth shapes of floating leaf plans would act like sails under water, which could catch the plants in currents and pull them up or damage them. Instead, submergent leaves are often fine and threadlike or divided (Figure 6),

which allows water to pass through the plant and reduces the impact of water. These divided leaves also have the added benefit of increased surface area for photosynthesis. This is important, as light access is reduced under water and can be further limited by turbidity or algal blooms. Increased surface area is also valuable for gas exchange and nutrient uptake. For submerged plants, it is not as important for roots to access nutrients and water in the soil because they can also be absorbed directly from the surrounding water. This is further enabled by a very thin or absent

cuticle. Another result of this is that roots are often reduced, although they are still important for anchoring. The adaptations that aquatic plants possess to allow them to live underwater are varied and interesting. The more you explore the vegetation around you, the more you will begin to see these characteristics.

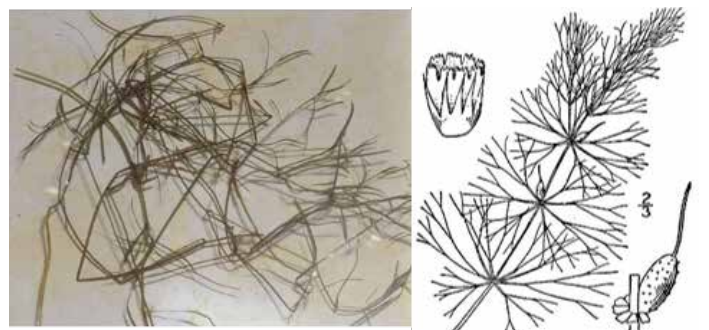


Figure 6. Submergent plants: *Stuckenia pectinata* (Sago pondweed), *Ceratophyllum demersum* (Coontail)

27th Annual Indiana Lake Management Conference Update

~Sara Peel

The Indiana Lakes Management Society hosted the 27th Annual Indiana Lake Management Conference on March 4 and 5 at the Oakwood Conference Center on beautiful, frozen Lake Wawasee! More than 135 individuals attended the conference being treated to great presentations about local lakes, soil health and cover crops, aquatic plant management, Limnology 101 and rain garden design. More importantly, they spent time networking with other lake residents, managers and professionals (Figure 1 and 2).

This year, ILMS honored three Indiana individuals and groups for the tireless work they do to improve conditions within their own backyard and throughout Indiana's lakes.

- Ray Dausman, an Indiana Clean Lakes Program and Lake Manitou Association volunteer from Rochester, Indiana was recognized for his involvement with his lake and watershed. Ray's efforts include hosting an Aquatic Invasive Plant Identification Training Workshop, helping to spread the message about Hydrilla and its impacts at Lake Manitou, and attending the Indiana Watershed Leadership Academy to better understand his lake and watershed. Ray attends lake association and drainage board meetings, encouraging others to engage in lake and watershed management and dedicating his time to monitoring water quality in Lake Manitou. For these efforts, Ray was recognized as the Volunteer of the Year (Figure 3).

- The Knapp Lake Area Conservancy District (KLACD) was recognized as the Outstanding Lake



Figure 1. Ice fishing on Lake Wawasee.



Figure 2. ILMS conference attendees.



Figure 3. Ray Dausmann, a CLIP and Lake Manitou Association volunteer from Rochester, Indiana, is recognized as the Volunteer of the Year.

Association/Group for their efforts to move forward with their regional sewer district. KLACD leads the way on the project submitting grant and permit applications, hiring consultants, reviewing engineering and feasibility studies and negotiating with the potential regional sewer district partners. Without their hard work, the project would not be moving forward (Figure 4).

- ILMS awarded the outstanding implementation project award to the Tippecanoe Watershed Foundation’s Soil Health Initiative. TWF worked with the local soil and water conservation districts to identify and implement cover crop and no till projects focused on improving soil health throughout the watershed. Their efforts resulted in more than 4,000 acres of cover crop plantings in 2014 and beyond!

ILMS would also like to recognize the student scholarship winners – Josiah Hartman from Grace College (Figure 5) and Kristin Berger of Indiana University. Josiah and Kristin represent the future of lake management in Indiana. All student scholarship funding is provided through the conference silent auction – attendee donations totaled more than \$1500 at the 2015 conference, which will allow ILMS to award three student scholarships at our 2016 conference! Alix Underwood, also from Grace College, received the award for the best student presentation for her talk on “Blue-green algae in northern Indiana lakes: An analysis of the microcystin algal toxin over 2010-2013 in lakes of Kosciusko County, Ind.” (Figure 6).

Over the remainder of the spring, summer and fall, ILMS will partner with lake associations and groups throughout the state to bring the conference to lake residents and enthusiast through our workshop series. Scheduled workshops will



Figure 4. Nick Stanger, who also sits on the WACF Board of Directors, accepted the Outstanding Lake Association Award.



Figure 5. Josiah Hartman of Grace College, received the best student presentation award.



Figure 6. Alix Underwood of Grace College, received the best student presentation award.

highlight the new Indiana Clean Lakes Program plant monitoring program, dam maintenance and monitoring, lake association successes, county lakes council efforts and successes, and the Northern Indiana Lakes Festival. If you are interested in hosting a workshop, contact ILMS' workshop co-chairs, Sarah Powers (sarellis@indiana.edu) and Diana Castell (dcastell@mac.com).

WATER COLUMN

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

Volunteer Corner

~Sarah Powers

We are very excited to share that one of our volunteer lake monitors has again won the Volunteer of the Year Award from the Indiana Lakes Management Society (ILMS). ILMS recognized Ray Dausman for Volunteer of the Year at the 27th Annual ILMS conference March 5th and 6th at Oakwood Conference Center in Syracuse, IN. Ray has been extremely involved in his lake community volunteering his time and efforts to maintain and improve the water quality of Lake Manitou in Rochester, IN.



In 2010, Ray attended the Indiana Watershed Leadership Academy having no direct experience in watershed management, but with a clear interest in helping to restore Lake Manitou after a multi-year treatment to control Hydrilla. Ray was an enthusiastic participant and he brought a new perspective from the lake aspect to the Academy.

In 2013 Ray began participating in the Indiana Clean Lakes Program Volunteer Lake Monitoring Program as a Citizen Scientist collecting water quality data on Lake Manitou. While Ray has only been volunteering with the group since 2013, when he took over monitoring efforts for Dennis Grossnickle, he has been one of the most active volunteers since that time. In 2014 Ray submitted 20 Secchi disk measurements from Lake Manitou, with only 2 others collecting more measurements on an individual Indiana lake. Ray also collected total phosphorus and chlorophyll-a samples monthly from May through August that were processed at Indiana University.

Ray has been an active in the volunteer lake monitoring program helping to coordinate an Aquatic Invasive Plant Identification Training Workshop in Rochester this past fall. He worked with the local community to facilitate a location and advertising. His efforts helped bring 9 individuals from 4 separate lakes together to learn about aquatic invasive plants and how to become a volunteer plant monitor. Since that time Ray has continued to promote the program and encourage participation on Lake Manitou.

Ray Dausman is an enthusiastic lake citizen who continues to bring new information to his association whether it be through newsletter articles, workshops, or grant funding for new projects. He has spent countless hours volunteering his time and I think we could all benefit from this enthusiasm.

Perspectives

*“The color of springtime is in the flowers;
the color of winter is in the imagination.”*

~ Terri Guillemets

Aquatic Invasive Monitoring Plant Highlight

This will be the 11th 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.

American Lotus (*Nelumbo lutea*) – NATIVE

American lotus is an emergent and floating aquatic plant. The large tuber and creeping rhizome roots are anchored in the mud and have been used as a food source. The seed is also edible and known as “alligator corn.” While this plant is native to the United States, it is often considered a nuisance because of the large colonies formed by its growing pattern and spread.

You can find more information about our Invasive Plant Monitoring Program and the American Lotus on the Clean Lakes Program website www.indiana.edu/~clp. We will be updating the Invasive Plant Monitoring page to include links to several resources and tips on identification guides.

Identification tips:

- Large and completely round leaves (no slit like water lilies)
- If floating, leaves are flat
- If emergent, leaves are conical
- Flowers are large yellowish-white with >20 petals
- The seed structure (the receptacle) dries brown and is often used in dried flower arrangements
- Often form large colonies

