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Your Pond and Surviving an Ohio Winter

Eugene Braig, Extension Program Director – Aquatic Ecosystems

I usually describe winter fish kills as uncommon to Ohio. However, when we have one with prolonged stretches of cold and abnormally large amount of accumulating snowfall the potential for winter fish kills increases.



Many game fishes become stressed when dissolved oxygen (DO) concentration falls below 5 parts per million (ppm). Very few fish species can tolerate DO concentrations of 2 ppm or less. The vast majority of fish kills in Ohio ponds will be a result of the loss of DO from the water.

Dissolved oxygen enters aquatic systems by simple

diffusion from the atmosphere and as a byproduct of photosynthesis (i.e., the process by which plants and algae use sunlight to synthesize sugars for their own energy). Most DO in the pond environment (perhaps as much as 70–90%) is likely to have originated in the activity of plants and algae under sunlight. Of course, respiration – by both animals and plants – consumes oxygen. Thus, photosynthesis decreases or ceases if sunlight is obscured and as the sun sets each evening; plants and algae are then consuming oxygen

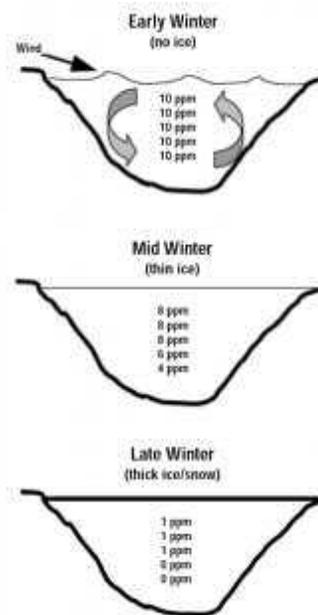


Figure 1: Oxygen depletion scenario during winter ice cover. Oxygen levels are expressed as parts per million (ppm) and show generalized levels and trends (Lynch and Norland 2001).

through respiration like everybody else.

Given their valuable function in producing oxygen, there is a value in managing an appropriate coverage of aquatic plants. Depending upon your management goals for

the pond and its fishery, up to 20% of the surface area is probably appropriate. The presence of planktonic algae is a little too unpredictable, and planktonic algae populations can crash seasonally, suddenly depriving a pond of oxygen production....and filamentous algae simple tend to be a nuisance within ponds. A reasonable coverage of submerged plants both provides ponds with a more consistent source of DO and helps to suppress nuisance blooms of filamentous algae and duckweeds through competition for nutrients.

Cold water is actually better capable of holding DO

than warm water. Metabolism and biological oxygen demand decrease in cold water, but do not completely end. Fish still need to breathe within a healthy concentration of DO to survive. Of course, the greater the biomass of fish in your pond, the more DO they will need to sustain them all.

Problems arise when a pond's surface is completely sealed by ice, ending the diffusion of DO from the atmosphere. If that ice is opaque or if snow is allowed to accumulate on its surface, it limits or cuts off the penetration of sunlight to the plants and algae still present. The addition of DO to pond water through diffusion and photosynthesis ends; the consumption of oxygen, while slowed by cold, continues. If the situation is prolonged for long enough, the pond can deplete its DO supply and cause a fish kill (figure 1).



Ponds with a greater volume of water potentially hold a greater reservoir and DO and tend to be less susceptible to winter kill. (Austin et al. (1996) recommend that ponds be constructed with at least 25% of the area greater than 8' deep for most of Ohio and 10–12' in northern Ohio.) Treating large areas of vegetation with herbicides or an excessive natural die off of aquatic plants in the summer before increases the amount of decomposing organic matter, increasing biological oxygen demand and making a pond more susceptible to winter kill. Maintaining an appropriate coverage of vegetation within a pond that has an appropriate expanse of deep water will have a natural resistance to winter kill; a shallow pond that is choked with excessive vegetation will be much more susceptible to winter kill. If you are unfortunate to have experienced a winter fish kill, know that you have some susceptibility and take actions to mitigate when bad winters are predicted in the future.

Aerating from spring, throughout the summer and into autumn – in particular with a bottom bubbler/diffuser or air lift – can help to sustain healthy DO levels throughout the warm season and improve resistance to winter kill. As winter approaches, suspending an air stone from a float approximately 2' below the water's surface, elevating your diffuser substantially off the bottom, or shifting your diffuser to a shallow area can help keep surface water moving to maintain or erode a hole in ice, allowing some surface agitation and diffusion of atmospheric oxygen.

If you ordinarily aerate with a diffuser from deep water do not operate your aeration system from deep water for long periods of time under ice. Water is densest at 39°F. Thus, deep water (removed from the cold 32°F of surface ice) normally provides some warmer water refuge for fish. Circulating the water column from deep water with a diffuser will force the ordinarily warmer water from the deep, circulate that water mass under the cold of ice, and bring it back down to depth, potentially super cooling the entire water column and stressing fish.

If maintaining an area of open water with aeration is not an option, you can reduce the risk of fish kill by simply removing snow from the ice's surface, allowing the penetration of sunlight to stimulate some photosynthesis and oxygen production. Plan to keep 25–50% of the pond's ice free of snow (the Ohio Department of Natural Resources recommends snow removal from at least 30% as a rule of thumb: Austin et al. 1996).

Pick one management strategy or the other, not both. Aerated ice is not likely safe enough to support weight and allow snow removal. You can find more detailed advice in Extension Fact Sheet A-8-01 *Winter and Summer Fish Kills in Ponds*

In Southeast Michigan and Northwest Ohio Counties, Scientists Looking For Healthy Ash Trees

A few years ago, Kathleen Knight a research forester with the USDA Forest Service's Northern Research Station, was walking back to her car after inventorying ash trees in a research plot at Oak Openings Metropark in Swanton, Ohio. All of the ash trees that she had been monitoring had been killed by emerald ash borer, but just outside of her research plot, Knight

was startled to find a perfectly healthy ash tree.

The tree inspired Knight and her colleague, Jennifer Koch, a research biologist with the USDA Forest Service's Northern Research Station, to investigate exactly how some ash trees are surviving EAB, a non-native invasive insect that has killed millions of trees since it was first discovered in 2002. Their initial research involved survivor ash trees they discovered



or heard about from other scientists, but Knight and Koch are now looking for citizens' help in finding survivor ash trees. In mid-October, the Northern Research Station launched a new on-line system for reporting the location of survivor ash trees in 10 southeastern Michigan counties and 7 northwestern Ohio counties (Williams, Fulton, Lucas, Defiance, Henry, Wood, Ottawa):

<http://www.nrs.fs.fed.us/SurvivorAsh> .

Visitors to the survivor ash page can identify the general location of a tree by entering an address, zip code, latitude and longitude, or even a place name, such as the name of a forest, park or wildlife refuge. Google Maps shows the area, and from there users can zoom in using either map view or satellite view until they can pinpoint a tree's location and mark the spot with a digital "thumbtack."

"To understand the mechanisms of resistance, we need to study more than just a few survivors," Knight said. "We need to be able to look at different species as well as genetic diversity within the same species."

To assure that trees reported to the site are true EAB survivors and not just lucky enough to not yet be infested, Knight and Koch are limiting ash reporting to counties that have been hit hard by EAB. As the

insect continues to spread, they expect to open the survivor ash reporting system to additional locations. Trees reported through the system should be natural ash trees rather than planted ash trees, and they should be 10 inches or more in diameter. Ash trees treated with insecticide to prevent EAB should not be reported.

As survivor ash trees and their locations are identified, Knight, Koch and Ohio State University partners will identify the most promising trees and then collect cuttings (small branches or twigs), which Koch will propagate in a greenhouse. Taking cuttings is relatively non-invasive and will not result in harm to the ash trees. When propagated trees in the lab are big enough, EAB eggs will be placed on the trunk and scientists will study how the trees respond to the insect.

"Over the past two decades, emerald ash borer has changed forest landscapes and has been especially devastating to the ash trees in urban forests," said Michael T. Rains, Director of the Northern Research Station and the Forest Products Laboratory. "The Forest Service is helping cities and states prepare for and recover from EAB invasion with research on the insect, ash trees' resistance to EAB, and management strategies."

So, if you think you have a survivor ash one in one of the listed counties go to

<http://www.nrs.fs.fed.us/SurvivorAsh> and report it!



Return of the Monarch

Danae Wolfe, OSU Extension Educator, Agriculture and Natural Resources

The last few years have been met with noticeable declines in local monarch butterfly (*Danaus plexippus*) populations. Fortunately, the monarch seems to be making a return this season.

Eastern North American populations of monarchs migrate 2,500 miles to overwinter in the mountains of Mexico. What's more fascinating is the fact that their

migration back to the U.S. in the spring and summer takes place over four separate generations of butterflies. In February or March each year, butterflies that overwintered in Mexico come out of hibernation to find a mate. The female butterflies then begin their journey northward and eastward to find a place to lay her eggs. In March or April, butterflies lay eggs on milkweed plants and after about 4 days, the egg will hatch to reveal the first of five larval instars, or stages. The caterpillar feeds and grows for about two weeks before pupating then spends an additional 9-14 days as a chrysalis. When the chrysalis is fully developed,



the monarch butterfly will emerge. Newly emerged butterflies will once again begin the reproductive process by finding a mate, migrating northward and eastward, and laying eggs. The second generation of monarchs will emerge in May or June and the third generation in July or August. Each new butterfly generation lasts only 2-6 weeks, before reproducing and dying.



The fourth generation of monarch butterflies, however, is very different than the three previous. In early fall, the fourth generation of monarch butterflies emerges from their chrysalides and begins the long journey south to overwinter in Mexico. It takes three generations of monarchs to migrate north, but only one generation makes the treacherous journey south in the fall. The future of monarch populations relies on the ability for this fourth generation to safely make it to Mexico.

There are many possible factors that have contributed to the decline of the monarch butterfly in recent years,

but research points to habitat loss as one of the primary culprits. Monarchs are specialist insects, meaning they rely on a particular plant to complete their lifecycle. Monarch butterflies can only lay their eggs on milkweed. As a migratory species, it's vital that milkweed be available along the monarch's entire migratory route for reproduction to be successful.

While loss of milkweed populations along migratory routes has contributed to monarch decline, so too, has loss of overwintering habitat in Mexico. During the winter of 1996 - 97, there were over 20 hectares of overwintering sites occupied by monarch butterflies in Mexico. This past winter, that area reached an all-time low of just 0.67 hectare. Heavy rain and freezing temperatures can cause massive mortality in overwintering monarch populations. In addition, illegal logging and pests damage precious habitat in Mexico.

As a homeowner, you can lend the monarch butterfly a helping hand by planting milkweed and other important nectar plants in your garden. Nectar plants include cosmos, Joe Pye weed, and boneset. Also consider creating a certified monarch waystation by offering all the essentials that monarch butterflies need to thrive. To learn more about monarch waystations, visit monarchwatch.org.

Ohio to Host Ohio River Valley Woodland and Wildlife Workshop

Once again it is Ohio's turn to host the Ohio River Valley Woodland and Wildlife Workshop. The 2015 version will take place **Saturday March 28th** and has moved from the Kings Island Resort and Conference Center to The Sharonville Convention Center. The Kings Island Conference Center closed in November forcing us to quickly try to find a facility in the area that could host our event. Thanks to the Sharonville Convention Center for working with us to make this happen!

The Sharonville Convention Center interestingly enough is a LEED Certified Event Facility (<http://www.usgbc.org/leed>). In 2012, The Sharonville Convention Center underwent a major renovation and expansion initiative with the priority of becoming a sustainable, environmentally-friendly events and meetings facility. In April of 2012, the U.S. Building and Green Council (USGBC) and the Green Building Certification Institute (GBCI) granted the Convention

Center Silver LEED Certification. The building earned six credits from the USGBC – one from every LEED category including Sustainable Sites; Water Efficiency, Energy and Atmosphere; Materials and Resources; Indoor Environmental Quality; and Innovation and Design Process.



2014 Ohio River Valley Workshop at General Butler State Park in Kentucky

While Ohio is the 2015 host, this event couldn't happen without our partners at the University of Kentucky and Purdue University. Thanks to this collaboration we can once again bring you an event with an interesting mix of talk topics and displays with speakers from all three states. Attend this annual event and hear talks on woodland butterflies, woodland fungi, wild turkey, weird things in your woods, how to create your own maps and plans, using wildlife cameras, tree identification and wildlife skull identification just to name just a few.

Registration information will be posted online in February. Early registration will be \$45 and includes all materials and food for the day. Mark your calendar and we hope to see you there!!

2015 Maple Meetings

Once again as we head into the first part of 2015 some woodland owner's thoughts turn to maple syrup production. This year's maple meetings are January 22, 23, and 24.

January 22nd – Morrow County
Lutheran Memorial Camp, 2790 State Route 61,
Fulton, OH 43321

January 23rd – Wayne/Holmes County
Mennonite Christian Assembly Church, Wayne Co.
Rd. 501, 10664 Fryburg Road, South of
Fredericksburg, OH 44627

January 24th – Geauga County
Joe J. S. Miller's Window Shop, 15020 Shedd Road,
Burton, OH 44021

This year's program topics include:

- International Grading System – Are You Ready?
- Revisiting Tapping Guidelines
- Remaking Maple
- Entering A Maple Contest
- Don't Get Ticked
- Food Safety Act and Ohio Department of Agriculture Updates

Registration is \$30 in advance and due by January 12th. Make checks payable to *OSU Extension*.

Contact Cheryl Fischnich at 330-263-3831 for registration information.

There are other maple related events happening around the state. This includes the Maple Syrup Festival, Saturday, March 28, 2015 8:00 a.m. to 12:00 noon at the Williams County Fairgrounds, Montpelier, Ohio. Contact the Williams SWCD at 419-636-9395 Ext 3 for more information or email amichaels@williamsswcd.org.



Workshops on the 2015 Calendar

We are busily working on the 2015 calendar of classes and workshops. As always, keep checking the website for updates. Here is what is in place for the moment. **Mark your calendars!**

January 24 Ohio Christmas Tree Growers Association Winter Meeting Ohio State University – Newark Campus <http://ohiochristmastree.org> for more information

March 4 Ohio Woodland Water and Wildlife Conference for Natural Resource Professionals, Mid Ohio Conference Center, Mansfield, OH
28 Ohio River Valley Woodland and Wildlife Conference Sharonville Convention Center, Sharonville, OH

April 18 2nd Annual Tree School Ohio State University – Mansfield Campus

May 9 Capturing Natures Wonders Digital Photography Class with Jim Doty* Ohio State University – Mansfield Campus

October 17 Capturing Natures Wonders Digital Photography Class with Jim Doty*

*Jim has decided to limit registrations to less than 12 people in order to be able to spend time with each individual as he takes participants through the various steps in digital photography.

You may have noticed that we are offering more classes and workshop at OSU Mansfield. The campus offers us a unique setting in that there is a wide variety of meeting space for indoor sessions but offers us the opportunity to step outside many of the classrooms right into the woods. OSU Mansfield sits on 640 acres, 600 or so of which is wooded. There are streams, vernal pools and woodlands from small pole size up to mature trees along with a few conifer plantations. This setting offers us a nice diversity that we take advantage of in many of our workshops. So, if you get a chance check out one of our classes at Mansfield. There will be more in the future as we continue to work with the Mansfield staff to bring you a mix of educational opportunities.



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Look for newsletter articles, links to fact sheets and other publications by browsing our site. Registration for upcoming Woodland Stewards classes may also be done electronically.

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