



PONDerings®

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BACKYARD CONSERVATION

We All Play a Role

THE FIGHT AGAINST Harmful Algal Blooms & Aquatic Invasive Species

Dr. West Bishop, Algae Scientist and Water Quality Research Manager, SePRO Corp.

Harmful Algal Blooms (HABs) and Aquatic Invasive Species (AIS) are two of the biggest threats to our Nation's precious water resources. These organisms cause hundreds of billions of dollars in ecological and economic damage to water resources across the US every year. Acknowledging the risks to recreation, property values, water supply, flood control, wildlife habitat, and more, lake associations, citizen groups, landowners, and government agencies spend massive amounts of time and money on prevention and management efforts. This article will briefly discuss the risks that HABs and AIS pose to your lake or pond, the common species to look out for, and what can be done to help protect your water resource.

Harmful Algal Blooms (HABs)

In freshwater systems, like most lakes and ponds, the main culprit of HABs are toxic cyanobacteria. These are often referred to as blue-green algae, but they are not your run-of-the-mill algae. Make no mistake, these cyanobacteria are very different, an entirely different kingdom of classification than all other common true algae. They are prokaryotic bacteria where most utilize light for energy to grow. If you have water, toxic cyanobacteria, if not there already, will likely find you at some point. They come in all shapes and sizes, from microscopic, tiny cells to scattered colonies/rafts, thick "pea soup" surface scums, benthic gooey clumps, and thick fibrous mats.

(Continued on page 2)

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The Fight Against Harmful Algal Blooms and Aquatic Invasive Species (continued from page 1)

Most algae are beneficial and provide important ecological services, such as supporting the food chain and providing oxygen. However, these cyanobacteria can produce countless chemical compounds, including many toxins, that can greatly impact human and animal health in numerous ways. They are not good for you or your lake or pond, and the more we learn about them, the more toxins we uncover, the more unique exposure routes (like aerosolization) are revealed, and the increasingly terrible impacts on human health are understood. Cyanobacteria are a formidable opponent in managing your water resources. They can adapt rapidly to various conditions and even change their genome to thrive in dynamic conditions. They don't play fair and might be cryptic in nature. My career has focused on innovating and advancing new technologies to combat this growing and ever-changing plague.

Aquatic Invasive Species (AIS)

Plants
Common invasive plant species include submerged weeds (Hydrilla, Eurasian Watermilfoil, Starry Stonewort [macro algael], floating weeds (Azolla, European Frog-bit, Giant Salvinia), and emergent weeds (Purple Loosestrife, Phragmites, Reed Canary Grass). These can clog boat motors and jet ski intakes and commonly displace beneficial native plant communities. Additionally, they limit water flow, which could cause flooding and clog structures needed for irrigation, hydropower, or potable intakes. They also can impede fish habitat, add to muck accumulation, and create anoxic zones harming wildlife.

Mollusks
Whether it's clams (Asian Clam), snails (Chinese Mystery Snail, Island Apple Snail, New Zealand Mud Snail), or mussels (Zebra, Quagga, or Golden Mussel), the spread of invasive or even nuisance mollusks (that harbor disease or parasites like swimmer's itch) is on the rise. These can devastate many uses of the water resource and greatly impede recreational activities or your ability to enjoy the water.

Other
Many other invasive animals, like many types of fish and crustaceans, are lurking out there. For example, The Great Lakes has been inundated with over 180 non-native species from across the globe. These can all cause negative impacts and both short- and long-term problems. Invasive fish include (Alewife, Asian Carp Species, Northern Snakehead, Round Goby, and Sea Lamprey). Some problematic Crustaceans include (Marbled Crayfish and Spiny Waterflea).

Call to Action
Since reading this article, you are aware of the potential threat of HABs and AIS lurking in your water body. It is now your responsibility to be a good steward of that precious resource. So, what can you do to protect your water and keep people, pets, and wildlife associated with it safe from these potential threats?

The
Stewards
of Water

Stormwater Conservation: Proper Stormwater Management Protects Your Property and the Environment

Alex Cecil, Charlotte Branch Manager, AQUA DOC Inc.

Stormwater conservation is an essential aspect of water quality and land management. Properly managing stormwater devices not only prevents erosion and flooding but also helps preserve water quality and the environment. At AQUA DOC, we specialize in stormwater management solutions that contribute to the overall health and functionality of your stormwater devices. Often referred to as Best Management Practices (BMPs) or Stormwater Control Measures (SCMs), these stormwater devices have a critical role in slowing down and filtering runoff from the landscape.

As water flows over a landscape after a rain event or snowmelt, it picks up various contaminants, such as sediment, fertilizers, trash, chemicals, and debris, and carries them into these stormwater devices. The stormwater runoff is then filtered as it makes its way through the device leaving behind most of the contaminants in the stormwater device. These contaminants can degrade water quality, harm aquatic life, and increase frequency of harmful algal blooms. In a stormwater pond, sediment will accumulate over time reducing the volume of water a pond can hold which can lead to flooding and erosion downstream. Regular removal of sediment helps prevent buildup of debris reducing the likelihood of obstructed flow, flooding, and costly dredging.

Stormwater devices help filter nutrients through vegetative buffers by uptake of nutrients which reduces algal growth. Adding the proper plants around a stormwater pond has many benefits and is often required by local municipalities. Vegetative buffers can help stabilize the shoreline where grass would typically not thrive. These buffers also slow the flow of water to prevent erosion during heavy rain events and remove nutrients from the water column. Vegetative buffers also provide a wonderful habitat for native species to thrive while increasing the aesthetic beauty.

Adding aeration can breathe life into stormwater ponds by adding much needed oxygen to the water body. Increased oxygen levels help breakdown organic debris on the pond bottom that typically cause algae blooms and a reduction in stormwater volume the pond can hold. Effective stormwater management plays a critical role in controlling flooding and water quality through routine inspections and treatments. At AQUA DOC, we are committed to helping owners manage these stormwater devices and conserving water quality. Our team offers a range of services to keep these SCMs in optimal condition:

- **Maintenance:** Regular maintenance is critical to ensuring these devices are performing efficiently. We offer a full-service program that inspects and maintains all components of the stormwater device throughout the year.
- **Annual Inspections:** Our expert team offers thorough inspections through qualified personnel, which in many of our territories are required by local municipalities.
- **Stormwater Repairs:** During inspections or maintenance, AQUA DOC can provide expert guidance and recommendations on bringing stormwater devices into compliance.
- **Technical Support:** We can also provide support with stormwater conversion, dredge planning, cost estimating, and budget analysis.

1. Be Vigilant

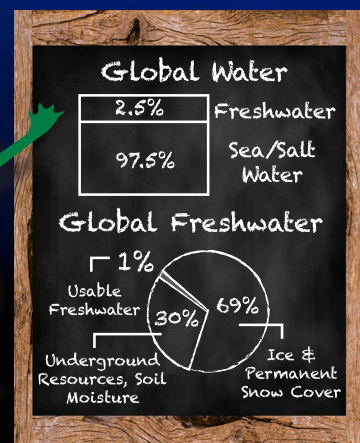
Keep a close eye on your lake or pond, implement a robust monitoring program, and look for any changes and/or signs of cyanobacteria or different invasive species (See Pictures). However, some cyanobacteria and invasive species are cryptic and tiny, requiring a microscopic or pigment analysis to be assessed. If you have concerns, don't be afraid to consult with an expert who can properly identify these potential issues.

2. Be Proactive

Minimize nutrients that could enter your freshwater system (runoff, waterfowl), take steps to reduce and offset organic muck, decrease ammonia, and mitigate the availability of internal accumulations of nutrients, especially phosphorus. Well-mixed and aerated systems provide valuable habitat and deter many HABs. Consider using phosphorus inactivation products designed to bind with and reduce phosphorus concentrations and slow the aging process of your lake or pond. Also, take common-sense steps to limit the dumping of AIS or watercraft carrying their propagules into your water.

3. Be Fierce

Don't let them get a foothold; intervene early. The more HABs or AIS there are and the longer they are allowed to persist, the more difficult it becomes to get them out. Be aggressive and use the most advanced and scientifically defensible technologies to rid your system of this potentially toxic or harmful nuisance without hesitation.



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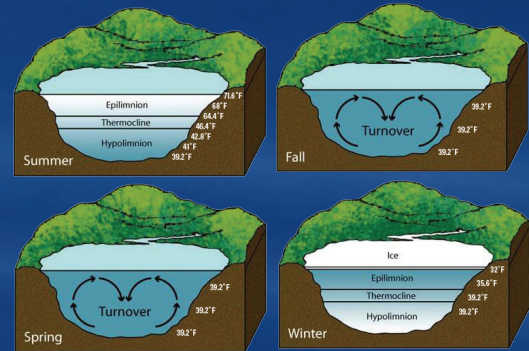
AFTER MANAGEMENT

Your Pond Through the Seasons: Stratification Basics

Edward Kwietniewski MS, CLM, Aquatic Biologist, AQUA DOC Inc.

Ponds are dynamic; that is, they are in a state of constant change. This may not seem evident as the pond you see every day may appear the same today as it did yesterday. But your pond is undergoing yearly, monthly, weekly, and even daily changes that can impact how they function and are managed. If a pond is going to be taken care of properly, then knowledge of these changes is important for owners to consider. For today, let's focus on one important seasonal change that ponds in the Northern U.S. commonly experience called **stratification**.

Stratification is the process by which layers of water of different densities are developed in a pond or lake's water column. Normally, this is generated by changes in temperature as colder water sinks and warmer water rises. In the northern states, this characteristic will promote seasonal changes in waterbodies as we have a cold winter, warm summer, and shifting periods in the fall and spring. In the summer, warm or hot days will increase the temperature of your surface waters while leaving bottom depths colder. This creates two distinct layers: a warmer upper layer called an **epilimnion** and a colder layer on the bottom called the **hypolimnion**. In between these two layers is the **thermocline** where temperature change is most rapid. Once fall arrives and temperatures begin to drop, the warmer epilimnion begins to cool which causes it to become dense and sink. This eventually causes a mixing event where the top and bottom layers of water will blend and become uniform. When fall becomes winter, stratification will once again become present in the water column. This time, however, the coldest water will be on the surface while warmer water will be on the bottom. This is due to a property of water where it's most dense at 4°C (about 39°F). Temperatures in the winter are commonly well below this which causes very cold, less dense water to freeze and float (think ice). Once spring arrives, mixing will occur again (just like in the fall) until summer temperatures reappear, and the process starts over.



So, seasonal temperature changes in a pond or lake can impact stratification but what does this mean for pond and lake management? A lot! In the summer, the hypolimnion and epilimnion may not interact with each other. Since oxygen is lost from the bottom-up and there is little interaction with the oxygen-rich surface waters, the hypolimnion may lose oxygen. This will change the chemistry of bottom sediments and cause phosphorus to be released internally which will, in turn, support nuisance algae and plant growth. Additionally, oxygen-poor waters can negatively impact gilled organisms and reduce their habitat range in your pond or lake. Checking bottom oxygen levels and temperature can help determine if your pond is experiencing stratification. If so, an aeration system may be able to help prevent this process from occurring and reduce internal nutrient loading from occurring.



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