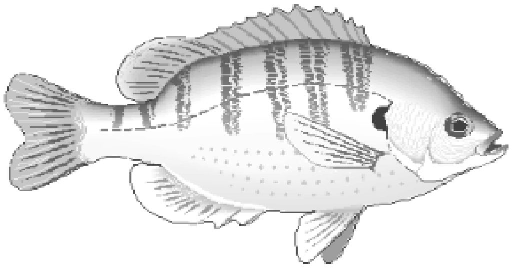
Ohio Pond News

The Ohio State University



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Inside this issue:

Summer 2010 - A Bizarre Summer for Ponds!

Summer 2010 will be remember as being hot and humid, with many days in the 90's and nighttime lows often around 80°F. Rainfall was plentiful if not excessive in most of the state in late May and June, but drought-like conditions began in July and extended into September. These weather patterns resulted in fluctuating pond conditions in Ohio, causing a most unusual summer for ponds. It seems wise to review this past summer and learn from it.

A. ***Harmful Algal Blooms*** -HAB's made the news repeatedly throughout the summer, with Grand Lake St. Mary's leading the way (again!) but nearly 24 large lakes experienced blooms to some degree with health warnings being posted. Not well publicized was the increase in HAB outbreaks in smaller lakes and ponds. While outbreaks in large lakes is thought largely to be due to agricultural inputs, outbreaks in ponds and small lakes occurred for a wide variety of reasons. Many HAB's were due to agricultural runoff, fertilizing lawns, and large concentrations of geese, but some of these blooms did not appear to be related to external sources of phosphorus. These blooms appear to be the result of internal phosphorus cycling which I'll explain in another article in this issue.

The high temperatures played a role in the increased HAB's this summer. While excessive phosphorus is the leading cause of HAB's, high water temperatures can cause HAB's in ponds that would not have occurred had water temperatures been ten degrees cooler. Why? The planktonic algae community has many types, with green algae and diatoms being desirable for the food chain and blue-green algae (cyanobacteria) being the bad guys because they can release toxins. Green algae and diatoms prefer cooler water below 75°F and will suppress HAB producing algae at those temperatures. As waters warm above 75°F, these desirable algae wane and the warm water preferring blue-green algae begin to take over. Above 80°F, blue-green algae really proliferate and can cause worrisome blooms even in water bodies with typical phosphorus levels.

B. ***Filamentous Algae*** - This was one of the worst summers I've seen for filamentous algae. This is another type of algae that thrives in hot summers. August and September were when most problems occurred as water levels declined. Declining water levels concentrate nutrients into a smaller water volume, encouraging algae growth. A number of water bodies experienced HAB blooms after the filamentous algae were controlled in August. An unwanted consequence! Those nutrients from algaecide-killed filamentous algae had to go somewhere and the warm water temperatures allowed blue-green algae to take advantages of this newly-available nutrient source very quickly.

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Did You Know?

- Treating a Harmful Algae Bloom (HAB) can cause the algae's toxins to be released. It is not recommended these blooms be treated with an algaecide for this reason. The pond or lake should be posted if a HAB is present and public visitation could occur.

Summer 2010 - A Bizarre Summer for Ponds! (continued)

C. Submerged Aquatic Plants - A real surprise to me this summer was how few calls I received from pond and lake owners having problems with submerged aquatic plants. Was plant growth that much less prevalent? It is hard to believe so. If submerged plants did have a down year, it could have been related to the wet May across most of the state. Rainy periods not only reduce sunlight amounts due to increased cloud cover (slows plant growth) but continual rains keep pond and lakes murkier which also limits sunlight penetration down into the water. By the time we started to dry out, water temperatures were very high and probably allowed the various, quick growing algae to get the upper hand, thereby shading large areas of ponds and small lakes. This would limit but not eliminate plant growth.

D. Fish Kills - I received very few fish kill calls this summer as compared to past summers. The weather undoubtedly caused this. I chart fish kills and causes each summer and dry summers always have fewer fish kills. Why? The leading type of fish kill is the "summer turnover" when heavy cold rainstorms mix a pond or lake completely and can lower oxygen levels to lethal concentration for fish. The low frequency of heavy rain events in July, August, and September across most of Ohio reduced these sudden mixings. A few 'Super cell" thunderstorms did occur and there were a few turnover fish kills associated with them.

Most fish kills that did occur were due to algae control in July thru September. As I mentioned previously, this past summer was problematic for filamentous algae. A few pond owners and lake managers decided to control the algae and ended up killing too much too quickly. The water body lost a major source of new oxygen (photosynthesis from the algae) plus had to decompose the dying algae which uses up large amounts of oxygen. The end result was dead fish. It would have been advisable to spot treat algae occasionally, doing about 20% every 2-3 weeks.

Thankfully as waters cool in fall, the HAB's will disappear, filamentous algae will die-back, and the few fish kills will end. Hopefully, next summer will be more typical and ponds will behave more normally. I can always dream. At the very least, I'd like fewer harmful algae blooms and coping with the toxins they can produce and release.

Adding Alum to Ponds & Lakes to Reduce Phosphorus

Many of you may have read about the possibility of adding aluminum sulfate to Grand Lake St. Marys to eliminate the bad harmful algal blooms (HABs) that have been occurring there in recent years. This has prompted pond and small lake owners to ask if it will work in their water bodies. Alum works by quickly binding with the phosphorus and causing it to sink to the bottom. This can lead to almost overnight improvement for planktonic algae (including HAB's) problems and reduce filamentous algae and duckweeds over several weeks. Below are several comments about it's potential use in Ohio water bodies:

- Research has shown it works best in ponds and lakes whose phosphorus sources are internal rather than external.
- Systems receiving significant external inputs of phosphorus see at best temporary improvement as those external inputs cause phosphorus levels to rebound quickly and cause re-blooms.
- Best year–long control is achieved with spring applications to prevent later algae and duckweed problems.
- However, spring application inhibits growth of the good planktonic algae required to ensure survival of newly hatched fish fry. Thus, annual spring use can lead to fish community problems, whether stocked or naturally hatched.
- The significant reduction of spring planktonic algae blooms results in very clear water. In many ponds and lakes, this can cause an explosion of submerged plants. Boaters will complain.
- Removing all the phosphorus quickly will eliminate planktonic algae within a day or two. This can cause a fish kill as the dead planktonic algae will decompose quickly and may lower oxygen levels too low to keep fish alive.
- If you want to try adding alum, call me at 614-292-3823 and we can discuss dosage rates and application strategies to minimize stress to aquatic life.

Internal vs. External Phosphorus Inputs

Readers have read many times in this newsletter how high phosphorus levels are the main cause of many aquatic algae and duckweed problems in ponds. These are non-rooted plants that can't easily get nutrients from the pond bottom. Thus, they thrive when the water itself contains high concentrations of nutrients, particularly phosphorus. There are two sources of phosphorus in water bodies: external or outside inputs from the watershed and the internal source from the bottom muck present in many ponds.

External Inputs - A pond or small lake does not need external nutrients to have a well functioning food chain for aquatic life. Indeed, as external phosphorus loading increases, pond owners begin to have more problems with duckweeds and algae. If phosphorus levels become very high, harmful algal blooms are a possibility. Typical sources of external phosphorus includes Canada geese, fertilizing grass adjacent to water bodies, domesticated animals in the watershed (including the pet horse!), agricultural runoff, and septic systems located near a pond or lake. If external phosphorus is likely causing the problem, then management efforts need to focus on the watershed with the goal of minimizing external phosphorus inputs as much as possible. Moving a septic system might not be realistic, but is possible to mitigate agricultural inputs, lawn fertilizations, and goose visitation.

Internal Inputs - Phosphorus sources within a pond or lake itself are typically referred to as internal phosphorus cycling from bottom sediments. As ponds and lakes age, they begin to accumulate organic material on the bottom. This organic material, which I've heard referred to as an "aquatic compost pile", can be high in phosphorus. When the water immediately above the bottom loses it's oxygen (common in June-September) due to decomposition processes, the phosphorus is released into the water column where it can lead to problems. If oxygen remains all summer along the bottom, then the phosphorus remains bound in the sediments as various forms of phosphates (primarily iron) and is not available to influence production of algae and duckweeds. This is desirable. What management strategies are available to minimize or eliminate this internal source of phosphorus? One option is to remove the bulk of organic bottom materials. Historically, this has been done by draining the pond or small lake and using construction equipment to remove the black muck. More recently, bottom suction using divers has been used to remove the materials and dispose them on shore. These remedies can be expensive depending on water body size and how much material has to be removed. Also, a nearby disposal site is preferred to avoid expensive transport of muck to a distant site.

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Pond Factsheet Update

Available at ohioline.osu.edu

Placing Artificial Fish Attractors in Ponds and Reservoirs: OSUE Factsheet A-1.

Pond Measurements: OSUE Factsheet A-2.

Controlling Filamentous Algae in Ponds:

OSUE Factsheet A-3.

Chemical Control of Aquatic Weeds: OSUE Factsheet A-4.

Muddy Water in Ponds: Causes, Prevention, and Remedies: OSUE Factsheet A-6.

Understanding Pond Stratification: OSUE Factsheet A-7.

Winter and Summer Fish Kills in Ponds:

OSUE Factsheet A-8.

Planktonic Algae in Ponds: OSUE Factsheet A-9.

Fish Species Selection for Pond Stocking:

OSUE Factsheet A-10.

Cattail Management: OSUE Factsheet A-11.

Algae Control with Barley Straw: OSUE Factsheet A-12.

Ponds and Legal Liability in Ohio:

OSUE Factsheet ALS-1006.

Ice Safety: OSUE Factsheet AEX-392.

Farm Pond Safety: OSU Factsheet AEX-390.

Notifying the Ohio EPA Prior to Applying Aquatic Herbicides: OSUE Factsheet A-13.

Duckweed and Watermeal: Prevention & Control:

OSUE Factsheet A-14.

When to Apply Aquatic Herbicides: OSUE Factsheet A-15.

Pond Dyes and Aquatic Plant Management:

OSUE Factsheet A-16.

Benefits & Problems of Aquatic Plants in Ponds:

OSUE Factsheet A-17.

Using Grass Carp to Control Aquatic Plants: OSUE Factsheet A-19.

Coping With Canada Geese: Conflict Management and Damage Prevention Strategies: OSUE Factsheet W-3.

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Internal vs. External Phosphorus Inputs (continued)

Another option to turn off the internal phosphorus cycling system is to install a bottom aeration system, either an electric or windmill system. Solar aeration systems are just now becoming available. You have read previously in this newsletter about the benefits of such aeration systems. In terms of phosphorus cycling, a recap is in order. A properly sized and installed bottom aeration system prevents a water body from stratifying into an upper warm, oxygenated layer on top of a cold, un-oxygenated layer near the bottom. If stratification is absent, the water body circulates completely and oxygen remains along the bottom to not only aid in complete decomposition but also keep the phosphorus bound in the bottom sediments and unavailable to grow algae and duckweeds.

Many ponds receive inputs from both internal sources as well as external sources. Addressing only one source may provide only reduced phosphorus levels. Thus, the pond or lake owner needs to closely examine all aspects of his aquatic ecosystem and may need to develop a strategy to minimize both sources simultaneously. For example, it is not unusual to have owners install a bottom aeration system while simultaneously diverting agricultural runoff from the pond or lake via diversion swales.

Visit Ohio State University Extension's WWW site "Ohioline" at ***http://ohioline.ag.ohio-state.edu***

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Keith L. Smith, Associate Vice President for Ag. Administration and Director, OSU Extension.

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