

Your Pond Update

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A Management Challenge: Water Quality in Residential-Neighborhood Ponds

I've recently been musing, and that is a dangerous prospect for anybody paying attention; it places you at risk for an outburst of semi-technical, limnological verbosity. So, here goes...

Regarding programming for pond management, there is a huge body of literature targeted to small ponds and do-it-yourself management by individual property owners. Similarly, larger sites get a great deal of attention and are often actively and professionally managed by government entities—municipality, county, state, and even federal—for the benefit of the general public. Those bigger sites are often given the title of “lake” or “reservoir.” However, somewhere in between are water bodies of small to moderate size that are privately owned and managed, either spanning multiple individual lots or situated on the common property of a homeowners association (HOA). Unfortunately, the pond-management interests of stakeholders in such sites receive relatively little attention. This quarter's article will discuss residential ponds, especially those that serve stormwater-management functions, and represents an early effort to target some material to those private pond and lake sites with multiple owners/stakeholders.

The nature of the challenge

Stormwater basins span a diverse range of form and function. The term implies a pond or basin that has been engineered and built to buffer flooding by detaining stormwater before overwhelming the capacity of local streams. Some only serve temporary water-detention and are periodically dry. Those called retention ponds (or “wet ponds”) generally maintain a permanent pool of water. Many also provide the valuable service of absorbing problematic sediment, nutrients, and other pollutants from surface runoff before they can reach natural surface waters (i.e., “water-quality ponds”). The Ohio Department of Natural Resources (ODNR 2014) summarized this function well enough:

Water quality ponds are stormwater ponds designed to treat runoff for pollutants and control increases in stream discharge and bedload transport. ... Water quality ponds remove pollutants by settling, chemical interaction and biological uptake by plants, algae and bacteria. The efficiency of settling suspended solids and the ability to treat dissolved pollutants is improved with the addition of wetlands and permanent pools. Water quality ponds are often designed to provide flood control by including additional detention storage above the volume specified in this practice.

...Water quality ponds are appropriate for residential, commercial and industrial areas... [and] can be used to address water quality and stream stability concerns.

Deliberately retaining problematic sediment and nutrients from the developed landscape that a pond is engineered to serve creates substantial management challenges by inviting issues related to cultural eutrophication. (Cultural eutrophication is an academic-sounding way of saying that a water body is hastened towards functional old age by human activity.) Of course, eutrophication can be mitigated by implementing select management practices. This initial article will only address permanently flooded sites, including retention or “wet extended detention” (ODNR 2014) ponds and borrow-pit lakes.

Managing water quality in retention and other residential ponds

These sites are human-made and intensively managed to serve human interests, **so consider managing to deliberately and sustainably best serve the site's intended goals and functions**, even where management might sometimes differ from the function of more natural systems.

Ohio's standards for stormwater management, specifically section 2.6 within Chapter Two: Post-Construction Stormwater Management Practices (ODNR 2014), offer excellent guidelines for design and construction of stormwater ponds to both maximize effective function and manage eutrophication. ...And borrow-pit lake bathymetry is generally outside the control of residential developers (Figure 1); glaciation certainly is (for those rare residential developments along natural kettle lakes). Thus, instead of pond design and construction, we will discuss some aspects of managing existing pond/lake sites.



Figure 1. Westlake, a reclaimed borrow pit near Sidney, OH (Eugene Braig 2015).

The reduction or management of nutrient loads and sediment accumulation—the primary drivers of eutrophication on such sites—is the essence of management. Some additional maintenance may be required for pond sites that are regulated to serve stormwater management (Table 1).

Table 1. Typical maintenance activities for water-quality ponds (from ODNR 2014). While Ohio's stormwater standards only recommend semi-annual inspection for invasive plants, that particular activity could be almost constant as residents use the site. New invasions should be dealt with as rapidly as possible to avoid the formation of dense, monotypic stands.

Schedule	Management activity
Monthly	Mow embankment and clean trash and debris from outlet structure. Address any accumulation of hydrocarbons.
Annually	Inspect embankment and outlet structure for damage and proper flow. Remove woody vegetation and fix any eroding areas. Monitor sediment accumulations in forebay and main pool.
Semi-annually	Inspect wetland areas for invasive plants.
3–7 years	Remove sediment from forebays.
15–20 years	Monitor sediment accumulations in the main pool and clean as pond becomes eutrophic or pool volume is reduced significantly.

One nice feature of HOA's regarding the management of a watershed: HOA's typically have the ability to impose rules over some activities of their residents and on their landscapes. Feel free to develop rules with objectives to improve water quality or sustain the functionality of your pond/lake. It's often a good idea to create a pond/lake committee with the specific function of making management recommendations to the HOA at large for the pond/lake site in general and its fisheries (if present).

Ponds accumulate sediment over time; stormwater ponds, especially so. As the stormwater-management functions related to pond volume are lost, the pond will ultimately need to be dredged of excess sedimentation (Figure 2). Unfortunately, moving earth tends to be an expensive proposition. Be certain your HOA is financially prepared as the need approaches, taking the disposal of dredge material into consideration. Table 1 provides some preliminary guidance for planning. You can fine-tune expectations for your site as you discover how it behaves within its unique landscape setting.



Figure 2. One of the Foxwood Villa stormwater ponds in the midst of a dredge operation (City of Toledo Engineering Service 2015).

New-home builds are common features to the watersheds of new residential ponds or lakes. An HOA may want to specify requirements for sediment and waste management on construction sites within a basin's watershed and try to impose fines for non-compliance. Some best management practices may already be required by local ordinances, so feel free to be that watchdog regarding construction around your own lake/pond.

Phosphorus (P) is most often the most limiting nutrient in freshwater; aquatic green stuff (plants and algae) is usually "hungry" for soluble P, so relatively small increases in the availability of that nutrient can press an aquatic site towards eutrophication. An HOA can consider restricting the application of P to landscaping within a watershed. Most residential lawn fertilizers available in Ohio now deliberately omit P, but P is still available in turf-starter fertilizers. Consider only permitting the application of P to new lawns or requiring a soil test before application. Phosphorus is more soluble from pond sediments in the absence of dissolved oxygen. Consider diffuser aeration in deep water to help manage the release of excessive P from sediments.

Consider tolerating some coverage by submerged aquatic plants (the classic "seaweeds") to both augment water quality and provide the right level of predator-prey interaction for pond fisheries. Up to 20% coverage is appropriate to most permanently inundated sites. You can find some initial recommendations for species selection and establishing beds of aquatic vegetation provided by Lynch (2006), ODNR (2014), and the Missouri Department of Conservation (2015). I intend to provide more detail on this subject with a later newsletter.

Sport fisheries will be at much greater risk to winter kill in nutrient-rich, shallow ponds. Austin et al. (1996) recommend at least 25% of a pond be greater than 8 feet deep throughout most of Ohio (12 feet deep in the north of the state) to provide sufficient refuge for fish (differing slightly from recommendations in ODNR 2014). If you don't have sufficient depth and a surface area of at least one half acre, it will be more difficult to successfully manage a self-sustaining fishery.

Choose your battles

The site's primary function—especially detention of water and pollutants—must take priority if it conflicts with other intended uses, whether those other uses serve aesthetics, recreation... whatever. If the site's design serves the surrounding landscape as intended, but the design isn't likely to support a sport fishery, for example, don't expect it to do so. Don't plant ornamental woody vegetation on engineered earthen dikes or dams. Don't plant ornamental wetland vegetation where it might clog or otherwise impede the effectiveness of an outflow structure. Etc.

Supplemental management actions should reflect compromise to at least partially recognize the expectations of each user/owner/stakeholder. Of course, doing so potentially subjects a site to the “too many cooks–spoiled broth” cliché. Once again, consider forming a designated committee to advise pond/lake management.

Management of nuisance vegetation with herbicides carries some risk and potential for liability. While herbicide applications by individual Ohio citizens within product-label guidelines are permitted on private pond sites, no individual resident should take it upon him/herself to apply herbicides to common property or a shared pond/lake. If weed management via herbicides is determined to be an appropriate action for your common property, hire a licensed applicator.

Regarding all of the above, your local Soil and Water Conservation District (SWCD) office is often a good place to check on local regulations and successful pond/lake management practices in the area. Develop a good relationship with your local SWCD staff and county’s Extension educators. ...And, as always, feel free to drop me a line with any of your specific pond-management questions.

References

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