Minerva Park and Urban Ponds:
A Few Tailored Slides
Some Pond Management References

• Austin, M. et al. 1996. Ohio pond management handbook: a guide to managing ponds for fishing and attracting wildlife. Ohio Department of Natural Resources, Division of Wildlife, Columbus, OH.
  – http://wildlife.ohiodnr.gov/species-and-habitats/pond-management

• Many older pond-management fact sheets available via correspondence (revisions pending):
  – braig.1@osu.edu

• Occasional newsletter articles:
  – http://senr.osu.edu/YourPondUpdate

• My listserv:
  – https://lists.osu.edu/mailman/listinfo/pond-management-news
Some topic-specific pond-management references

Pond construction considerations in vast detail:


For construction and management of stormwater ponds (specifically section 2.6 within Chapter Two: “Post-Construction Stormwater Management Practices”):

- ODNR (Ohio Department of Natural Resources). 2014. Rainwater and land development: Ohio’s standards for stormwater management, land development and urban stream protection, 3rd edition. ODNR Division of Soil and Water Conservation, Columbus.
My function today

• I will not tell you what to do: management decisions are yours.

• If you express an intent or objective for the site, I will advise regarding potential methods to achieve.

• I will discuss likely/potential outcomes of proposed management actions.

• Ask questions: I’m here to serve you and already paid for.
Urban ponds: a challenge

• Watersheds usually thoroughly developed.
  – Large proportions of impervious surface.
  – Heavily fertilized.
• Both retention (permanent ponds) and detention (often dry) basins are designed to absorb problem pollutants and excessive flow.
Pond succession

- Erosion
- Runoff
- Sedimentation
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Pond succession
The aging process

Eutrophication

A homeowners association lake in Geauga Co. with some substantial nutrient issues (Keith Anderson 2014)
The aging process

The essence of eutrophication:

• Directly translates as the accumulation/availability of excessive nutrients (especially phosphorus: P) and accumulation of sediments.

• Management problems become more likely:
  – Likelihood of problem algae blooms ↑.
  – Likelihood of seasonal fish kills ↑.
  – Depth ↓; sunlight penetration relative to depth ↑.
  – Volume/capacity to retain/store storm water ↓.
  – Etc.
The aging process

Take heart!

- Eutrophication is not analogous to my weary, old knees.
- Slowing the aging process translates to slowing the accumulation of sediment and nutrients.
  - Externally: watershed management practices (nearly impossible for portions of watershed outside your jurisdictional control).
  - Internally: tolerate some coverage by aquatic plants (≤ 20%) and aerate with diffusers (not fountains!) where possible.
Slope and depth

• **Shoreline slope:** Favor 3:1 or steeper (Austin et al. 1996, USDA 1997).
  - 4:1 or flatter can be tolerated in swimming areas or where there are safety concerns related to public access (USDA 1997).

• **Depth:** as aquatic habitat (e.g., for fishes), plan at least 8’ depth spanning at least 25% of the pond (Austin et al. 1996).
  - Less depth (25% at 6–8 feet) required for stormwater considerations only (ODNR 2014).
Shallow ponds...

• Have less volume resulting in...
  – Less storage capacity for water (especially important to stormwater retention).
  – Less reservoir of dissolved oxygen under ice cover (important to fishes to survive winter).
  – Less dilution of soluble nutrients from the watershed.

• Place much more (or all) of the pond’s bottom in the photic zone (aquatic plants more likely to become weed problems).

• Cease to function as ponds: functionally become wetlands (which is perfectly acceptable…if you want a wetland).
The aging process

Sediment accumulation:
• Ultimately requires to regain a pond’s functional “youth.”

Foxwood Villas dredging in progress
(City of Toledo Engineering Services 2015).
Available pond resources (from the perspective of green stuff that lives in freshwater)?

- Water.*
- Physical habitat (the water column itself or substrate/sediment).*
- Sunlight (energy).
- Nutrients (especially carbon, nitrogen, and phosphorus with the latter usually considered limiting).

* Givens considering the nature of ponds and lakes.
1) Clear-water, plant-dominated or 2) turbid, algae-dominated state of shallow lakes: each state is relatively stable and resistant to change (e.g., Scheffer et al. 1993; Scheffer and van Nes 2007).

• Assumptions:
  – Turbidity increases with nutrient availability.
  – Vegetation reduces turbidity.
  – Vegetation disappears when critical turbidity is exceeded.

• Stabilizing mechanisms:
  – Aquatic plants or their absence.
  – Planktivorous fish.
  – Etc.

(modified from Scheffer et al. 2001)
## Suggested management-activity schedule

<table>
<thead>
<tr>
<th>Schedule</th>
<th>Activity</th>
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<tbody>
<tr>
<td>Monthly</td>
<td>Mow embankment and clean trash and debris from outlet structure. Address any accumulation of hydrocarbons.</td>
</tr>
<tr>
<td>Annually</td>
<td>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.</td>
</tr>
<tr>
<td>Semi-Annually</td>
<td>Inspect wetland areas for invasive plants.</td>
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<tr>
<td>3-7 years</td>
<td>Remove Sediment from forebays.</td>
</tr>
<tr>
<td>15-20 years</td>
<td>Monitor sediment accumulations in the main pool and clean as pond becomes eutrophic or pool volume is reduced significantly.</td>
</tr>
</tbody>
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ODNR (2014).
Basic management considerations

- Keep lawn waste out of ponds.
- Fertilize conservatively with phosphorus-free fertilizers.
- Mow lawns as tall as possible to promote root growth.
- Do not over-water (1–2 inches/week total).
- Discharge downspouts to lawns rather than impervious surfaces.
- Maintain native plants in landscape.
- Plant rain gardens.
- Maintain 25–50-ft-wide vegetated buffer strips around ponds.
- Pick up trash and pet waste before entering ponds or storm sewers.
- Do not dump household or automotive chemicals in yards or storm drains.

The Stormwater Coalition of the Toledo Metropolitan Area Council of Governments (May 2015)
Delaying old age

Sediment accumulation:

- Promote settling at inflows prior to entry into main basin:
  - As possible, construct forebay…
  - Or maintain separate settling basin above main pond.
  - Tolerate stands of terrestrial and wetland vegetation in the watershed.

Forebay conceptual design (ODNR 2014).
Minerva Park

• Lacks depth to function as a quality pond/lake.
  – Currently suffers from all the old- and shallow-pond issues previously discussed.

• Regaining pond function likely involves expensive dredging operation.
Minerva Park
(August 2019)
Forebay or wetland/wildlife habitat

- North Pond could function as a quality-habitat forebay (almost ready-made).
- Inlet end of main basin would require more engineering/modification.
  - Contract with specialized environmental consulting firms as necessary.
  - Maintain connectivity of permanent waters to sustain small predators and minimize mosquito production.
  - Maintain dense coverage of preferably native plants.
Forebay or wetland/wildlife habitat

- Mosquito management by predators:
  - Dragonflies will happily colonize permanent, oxygenated waters.
  - Introduce tolerant wetland fishes: ideally natives like Blackstripe Topminnow (a killifish), Central Mudminnow (a small pike), or even Fathead Minnow (an actual minnow and easily available from bait stores).
Forebay or wetland/wildlife habitat

- Native wetland vegetation is gorgeous.
Some parting shots

• Recognize that all resident stakeholders **legitimately care** for the quality of their lake, even if focused on different aspects of its use/function.

• Compromise is absolutely necessary to 1) manage a lake site that serves diverse uses and 2) to recognize the legitimacy of diverse stakeholder interests.

• **You can’t rewrite nature.** Recognize that management actions are likely to have many intertwining and potentially unforeseen effects beyond intent: adaptive responses may become necessary. Seek precedent and call on expert assistance as necessary.

• Long-term maintenance of an old lake can become expensive: always keep potential large projects in mind when planning finances (projects like whole-site dredging, substantial dam repair, or site improvements).
Minerva Park
and Urban Ponds

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Minerva Park public meeting, 23 September 2019