Don't Leave it to Beaver:
Comprehensive Pond Restoration in the Face of Wildlife-enhanced Stormwater Impacts

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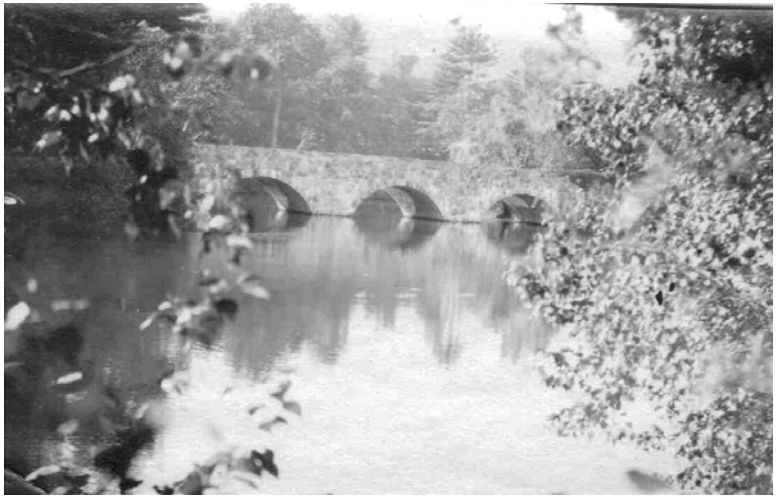
A Quick Note about Beavers

- Beavers are not the enemy
  - Ecosystem engineers and their work can provide a number of positive ecological and water quality services
  - However, beaver activity is not always compatible with existing land uses or management goals
  - This story serves as a case study for identifying and managing those potential conflicts as part of a larger pond restoration plan

Project Background

- Flowering Pond - Origins
  - Originally the Moseley family's private estate pond in Newburyport, MA
  - Impounded in a narrow, sheltered valley
  - Tiny – approximately 2.0 acres
  - Surrounded by gardens and rural matrix of fields, forest, and wetlands
  - Crossed by bridge, which became a iconic spot for photographs

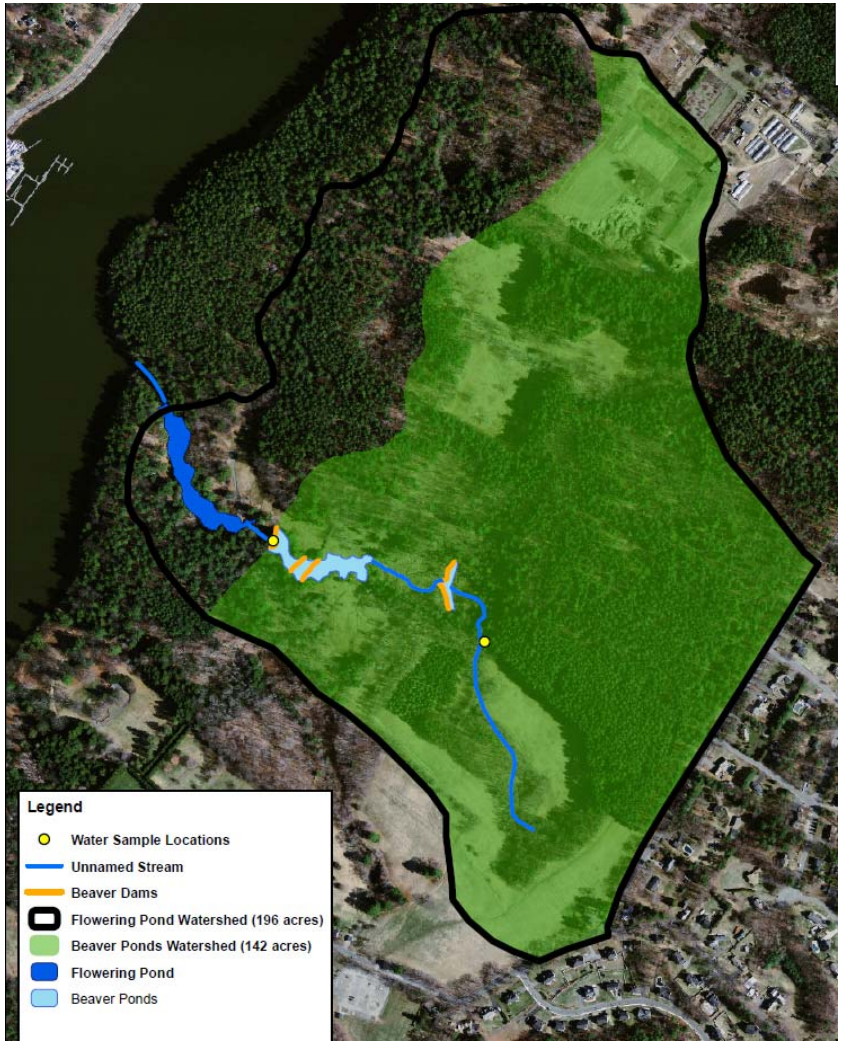


Project Background

- Flowering Pond - Maudslay State Park
  - Became state park in 1985
  - Due to erosion/sedimentation over time, pond filled in, restricting water flow under the historic bridge
  - DCR and Maudslay State Park Association desired to bring back the open waters of Flowering Pond for passive recreation, aesthetics, and ecological restoration
  - Restoration process started with assessment of the pond and development of a lake management plan in 2012

The Setting

- Flowering Pond watershed
  - Small by absolute standards – just 186 acres – but somewhat large relative to pond
  - Almost entirely within state park boundaries
  - Watershed primarily forest and fields
  - Very little impervious surface
  - However, multiple beaver dams present upstream of Flowering Pond



The Issues: Part One

- Excessive sedimentation
  - Extensive deposits of sediments, most notably on upstream side of bridge
  - Water no longer flowed under all three arches of the bridge
- Nuisance aquatic vegetation
  - Excessive duckweed, rooted plant growth, and algae imparted a lawnlike look to Flowering Pond for much of the growing season

The Issues: Part Two

- Stormwater Runoff
  - Watershed almost entirely within park with minimal impervious area but stormwater still a problem
  - Stormwater issues occurred where road and trail system funneled runoff into pond
  - People and wildlife reinforce by following these channels as preferential pathways between pond and upland

The Issues: Part Three

- Shoreline Erosion
  - Felled (by beavers)/fallen trees destabilized bank along the shoreline
  - Pond loop trail was sloped toward pond and eroded
  - Steep slopes down to pond

The Issues: Part Four

- Series of several beaver dams up to 4’ high upstream of the pond
  - Source of nutrients to downstream waters - phosphorus in outlet from beaver ponds was more than that at twice inlet
  - Increased temperature and reduced dissolved oxygen of flow to pond
  - Potential public safety issue
  - Uncontrolled release of sediments would quickly refill restored pond
  - All of these impacts magnified by the large size of the beaver ponds relative to Flowering Pond – might not be a problem for a larger receiving water

The Plan: Step 1, Year 1

- Start with the Beavers
  - Ignoring or delaying this step could truncate lifespan of restoration project
  - Trap and remove remaining beavers
  - Breach the beaver dams
    - Start downstream and work way up
    - Work gradually, over several days for tallest dam
    - Allow water to drain slowly to keep discharge in check and minimize mobilization of sediment
  - Added selective tree removal to prevent shoreline destabilization due to treefall
  - Completed in 2013

The Plan: Step 2, Year 2

- Address Stormwater & Erosion
  - Installed two rain gardens to capture stormwater runoff from park road and steep trail run
  - Loamed, stabilized, and replanted slopes near bridge
  - Revegetation with a mix of native plants and heirloom ornamental shrubs
  - Graded shoreline trails, backfill with gravel, and retain with anchored timbers on pond side
  - Completed in 2014

The Plan: Step 3, Years 3, 4, and 5

- Dredge the Pond
  - Complex permitting – local, state, and federal permits/approvals needed
  - Dredging "in the dry"
  - Drew water down in the fall to prepare
  - No discharge control so water pumped over spillway
  - Kept fingers crossed for cold winter…

The Plan: Step 3, Years 3, 4, and 5

- Dredge the Pond
  - Ended up with fifth warmest winter on record
  - Eventually, with persistence, ingenuity, and few days of colder weather, dredging was completed in 2017
  - Focused dredging on southern end of the pond, nearest the bridge to remove accumulated sediments
  - Constructed a shallow wetland bench near the northern end of the pond to enhance shoreline habitat
  - Overall, removed ~1,500 cubic yards

Restoration – 2013 to 2018

The Results So Far

- Pond once again extends upstream of bridge
- New wetland bench stable and growing in
- Beavers kept at bay
- Monitoring continues

Acknowledgments

Lakes and Ponds Program

Maudslay State Park Staff

Friends of Maudslay/Maudslay State Park Association

Thank You!