

To Restore or Not to Restore; That is the McQuestion

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When is a pond not a pond? When it struggles to be six inches deep with increasing sediment and decreasing oxygen? When it is on the 303d list of impaired waters as failing to meet designated uses supporting aquatic life and primary contact recreation? When there is no boat access or enough water for boats or swimming? When the local citizen science group gives up its urban pond monitoring because the water is so shallow and the temperatures are so high? When the primary substrate structures are shopping carts and shipping pallets? When your high school senior environmental science job shadow is so grossed out by the smell of the over eight-foot-long sediment cores that he decides to enroll in art college instead?

A pond by any other name might still smell of methane. A lot of people had given up on the McQuesten watershed and turned their attention to other urban waters.

To the New Hampshire Rivers Council (Council) came a heart-wrenching plea: When an eight year-old girl comes to you with wild, native eastern brook trout and asks why they died, there *is* no McQuestion about restoration of the McQuesten watershed.

What began as the Council's annual watershed clean-up in partnership with employees from Anheuser-Busch observing World Environment Day, grew into a comprehensive watershed restoration and management plan that was implemented with stunning on-the-ground results and nearly immediate water quality improvements.

The Council, in partnership with the New Hampshire Department of Environmental Services, New Hampshire Fish and Game Department, City of Manchester, Town of Bedford, nonprofits,

and local businesses, galvanized the planning efforts to restore the McQuesten watershed – a third of which is covered by impervious surfaces (Figure 1a-c).

McQuesten Brook and its tributary in Manchester and Bedford, New Hampshire, were obstructed by four dams (three on an unnamed tributary forming the McQuesten Ponds and one on the mainstem) created in the early 1950s and squeezed through two undersized culverts. Downstream in the Town of Bedford, McQuesten was subjected to further torture as it passed under a collapsed historical stone culvert and two more undersized culverts before reaching the Merrimack River via a perched culvert under Interstate 293.

The story of McQuesten Pond or, more accurately “ponds,” has nothing to do with the brook and everything to do with an urban planning vision. Early on, the City of Manchester envisioned the land along the tributary as a residential area. “Paper roads” were created on maps. Piles of rocks, concrete, and granite curb fragments were brought to the area as placeholders and became three causeways across the tributary, which were functioning as dams and creating a series of ponds. On the brook's mainstem, an impressive do-it-yourself dam was built with cinder blocks and stuccoed with concrete at the outlet of a nearly 8,000-foot long culvert carrying the brook underneath neighborhoods. The dam impounded not only water but an array of debris. It was there that the eastern native brook trout were trapped and died (Figure 2). It was dubbed the “fish killer dam,” and everyone agreed its days were numbered.

Development in the commercial and residential areas brought with it decades of runoff that accumulated as

over a dozen feet of sediment in the impoundments. The tree canopy that once shaded the tributary withered and died in the impoundments. Water temperatures rose, oxygen plummeted, and the pond became shallow and choked with algae (Figure 3). While some area residents cared about the pond area, others treated it as a dumping ground. Snow was plowed from the “riparian” parking lots taking with it dumpster overflow, shopping carts, shipping pallets, bottles, cans, and an amazing array of discarded items including construction waste, furniture, a coffin wagon, and a four-foot-tall stuffed crab. For over a decade, leading up to the dams de-construction and culvert removals in the summer of 2016, McQuesten Pond failed to meet designated uses supporting aquatic life and primary contact recreation. The impoundments were always full and did not allow for flood storage. Businesses and area residents were flooded regularly during even small storms. McQuesten Brook had lost its way.

With funding from New Hampshire Department of Environmental Services Watershed Assistance Grants, New Hampshire Fish and Game Department, Samuel P. Hunt Foundation, and Council member dues, partners contracted with Comprehensive Environmental, Inc., to study the watershed and draft a plan with specific recommendations and priorities to improve watershed quality. The Council contracted with Inter-Fluve Inc. to design the dams removal project in Manchester while the Town of Bedford worked with their engineering team on the three culverts downstream. The on-the-ground work was funded through New Hampshire Department of Environmental Services Watershed Assistance Grants and Aquatic Resource Mitigation Programs, and



Figure 1 a-c. Google Earth images of McQuesten Ponds over time.



Figure 2. Eastern brook trout were found dead behind the impoundment on the main tributary to McQuesten Brook.

matched with Council membership dues. The City of Manchester Department of Public Works donated equipment, labor, and the hauling and disposal of materials from dam removal sites. The Town of Bedford provided match through their capital improvement program, including engineering and construction costs.

The City's Department of Public Works crews gathered one morning in 2016 with volunteers in the heat of high summer to remove the Fish Killer Dam. Area homeowners provided access to the steep site through their backyards to allow for compressed air hoses to snake down the steep banks from generators. With two jackhammers and hand tools, the dam was removed just after midday. Several volunteers were dispatched to Taco Bell for take-away food while others continued to clean up the first site. City crews left the site to deploy heavy equipment to the three tributary dams. Within a week, all of the dams were removed (Figure 4).

Carefully coordinated with the Manchester city crews' work on the three tributary dams, the Town of Bedford was removing three culverts downstream. It replaced one with a full spanning bridge over McQuesten Brook. The collapsed road crossing under which the brook disappeared was removed. The third culvert was removed completely and the road discontinued, with the purchase and demolition of a house on the other side of the culvert. The purchase and demolition was less expensive than replacing a



Figure 3. The uppermost and main McQuesten Pond was choked with algae for most of the year.



Figure 4. A member of the Manchester Department of Public Works removing the obstruction that formed the main McQuesten Pond

culvert or building a second bridge to keep the road open. The cost to the Town of Bedford to purchase the property was used as non-federal match to leverage federal grant funding for the project.

The City of Manchester Department of Public Works was not a stranger to recognizing when change was needed. Staff had previously played a major role in the removal of a dam in the northern part of the city where a pond was also on the 303d list and flooding was becoming more common and affecting businesses, residents, and infrastructure.

The final McQuestion: What about that perched culvert at the Merrimack River? The McQuesten plan (and conventional wisdom) cited it as a barrier to aquatic organism passage. However, it is keeping large fish from the Merrimack from entering McQuesten Brook, which protects the eastern native brook trout from predation. For now, the culvert remains. While we are on the culvert topic, the Council will not be pressing to daylight the portion of McQuesten Brook that flows through that 8,000-foot culvert. The brook mainstem flows through a highly developed part of Manchester and Bedford. Perversely, the passage through darkness is keeping the water clear, cold, swift, and full of oxygen where it daylights into a surprisingly wooded area. Standing and looking downstream, one can see the meanders of a recovering

habitat and forget that this is one of the most urban and highly developed areas of the largest city in New Hampshire. These two features could be a Shakespearian tragedy for most watersheds but for now, they benefit McQuesten Brook.

The eastern native brook trout size and population density in this urban area has rivaled that of those found in pristine mountain streams in New Hampshire. The dam and debris that trapped and killed the fish is removed and they now move freely through the cool waters of the mainstem and tributary. They thrive and reproduce naturally with no stocking intervention (Figure 5).

On the first morning after the dam removals, night herons, ducks, songbirds, deer, raccoons, native trout, and other fish and wildlife were exploring the newly restored habitat. They found rich sources of food; clear, cool water;

and other benefits within the restoration area. Their tracks are evidence of the amazing diversity supported by this newly restored urban oasis. Workers at nearby stores and offices come to the area throughout the year to park and sit in their cars to enjoy a midday meal.

The New Hampshire Rivers Council and its partners plan to continue intensive monitoring at all the restoration sites for at least five years including monumented photo points, electrofishing, particle counts, habitat assessments, and ambient sampling that the Council and partners conducted before and



Figure 5. Mature, healthy eastern native brook trout.

during the restoration. So far, the post-restoration dissolved oxygen monitoring is promising. Data loggers deployed in the restored reaches of McQuesten Brook during the summer of 2017 monitored dissolved oxygen concentration and saturation every 15 minutes. Once the data were analyzed by the NHDES, they informed the Council that McQuesten Brook was consistently meeting the designated uses of aquatic life with dissolved oxygen concentration and saturation well above the state standard. Confirmation monitoring will continue in 2018 for primary contact designated uses as chlorophyll-*a* concentrations are measured in the former impounded reach of McQuesten Pond. It is anticipated that McQuesten Brook and the area of the former ponds will be removed from the 303(d) list for both impaired designated uses during the 2018 and 2020 assessment cycles.

McQuesten Brook is finding its way again with cool and oxygenated water from feeder streams and underground springs. Native tree, shrub, grass, and wildflower seeds buried under water for nearly seventy years are sprouting and growing lushly in the rich bottom sediments of former ponds (Figure 6a and 6b).

To restore or not to restore? If you ask local businesses, residents, native eastern brook trout, and the other wildlife flourishing there today, me thinks there is no question.

See the plan and learn more at NHRivers.org.

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Figure 6a. The former uppermost and main McQuesten Pond during the autumn after the dam removals. The brook is meandering with feeder stream and springs through the former impoundment areas.



Figure 6b. McQuesten Brook finding its way again. The vegetation is sprouted from seeds buried under the impoundments for decades. Woody material was left on the site to provide natural habitat and stream flow regimes.