Assessing Health of Filley Pond Using Biotic and Chemical Indicators

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Why Filley?

Once hailed as "Bloomfield's Jewel," Filley Park was a hot spot for hiking, skating and fishing. Though over time, Filley Pond has become clogged with silt, endured the invasions of the European water chestnut and geese, and the park has suffered from litter and pollution. The town of Bloomfield is now launching a major restoration project, that includes the dredging of Filley Pond, removal of the dam and the instillation of a rock ramp fish ladder in Wash Brook that bypasses the pond. This project is expected to decrease stagnation, mitigate pollution and increase the amount of nutrients in the water, improving suitability for life and even the possibility of introducing fish.

However, little up to date information is available on the health and water quality of Filley Pond and the Wash Brook. Gathering data using biotic and chemical indicators before and after this restoration will provide valuable information about the success of this project in restoring the health of the Filley Park ecosystem. The objective of this investigation is to collect macroinvertebrates and perform different water chemistry tests to assess the health of Filley Pond and the Wash Brook ahead of the restoration.

Fig A. Map of testing sites in Filley Pond and Wash Brook, and shows bridge, dam and storm drain locations. Fig B. Map created using aerial imagery basemap; both maps created using ArcGIS

Macroinvertebrate Collection

Different macroinvertebrates have different tolerances for pollution and other stream conditions. Macroinvertebrates with higher sensitivity (ie. Mayflies, stoneflies) indicate better water quality, while those with lower sensitivity (ie. Leeches, sow bugs) indicate the opposite.

- Samples collected in Wash Brook at sites 1-4 (Fig A) on 10/15/17 and 10/16/17
- Equipment: Ice cube trays; scrub brush; forceps; D-net; waders
- Macroinvertebrates were dislodged via manual disruption of silt/rocks, and removed with brushes
- Specimens were collected with D-net and visually identified using DEEP identification cards

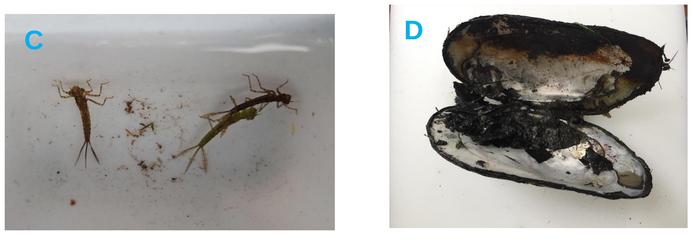

Fig C. (left) Damselflies collected in ice cube tray; Fig D. (right) Freshwater mussel; all samples collected in Wash Brook

Water Chemistry/Quality Tests: Materials and Methods

Chemical water tests can indicate a variety of characteristics in a system, from the presence of unwanted ions (TDS/conductivity) to suitability for certain plant and animal life (dissolved oxygen, pH).

- Water samples were collected at sites 1, 2, 3 and 5 on 10/16/17 and 11/21/17 and data was recorded
- Data was collected using the Urbante Meter at four sites in Wash Brook
- Equipment: Urbante meter; nitrate strip kit; pH strip kit; phosphate ampoule kit; dissolved oxygen ampoule kit

Fig E. (left) Beatrice using the Urbante meter to collect data at Site 1; Fig F. (right) Photo taken in Wash Brook near storm drain, showing oil runoff.

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Macroinvertebrate	Sensitivity
Damselfly (*Zygoptera Spp.*)	Moderately Sensitive
Dragonfly (*Anisoptera Spp.*)	Moderately Sensitive
Aquatic Sow Bug (*Asellus aquaticus*)	Least Sensitive
Snail (*Scientific name*)	Least Sensitive
Crayfish (*Astacopsis gouldi*)	Least Sensitive
Aquatic Worm (*Oligochaeta*)	Least Sensitive
Leech (*Hirudinea*)	Least Sensitive
Freshwater Mussel (*Margaritifera margaritifera*)	Least Sensitive

Fig G. All individuals found at collection sites (Fig H), images from CT DEEP Riffle Bioassessment (Fig I)

Acknowledgements

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References

1. *Vertex Water Features. Pond or Lake Water Chemistry. [accessed 25 January 2018]* <https://www.vertexwaterfeatures.com/pond-water-chemistry>
2. *Lake Access. Trophic Status. [accessed 25 January 2018]* <http://www.lakeaccess.org/ecology/lakeecologyprim15.html>

Results

- Average total number of *Least Sensitive* individuals more than triples the average total number of *Moderately Sensitive* individuals
- No macroinvertebrates of the *Most Sensitive* category found at any location

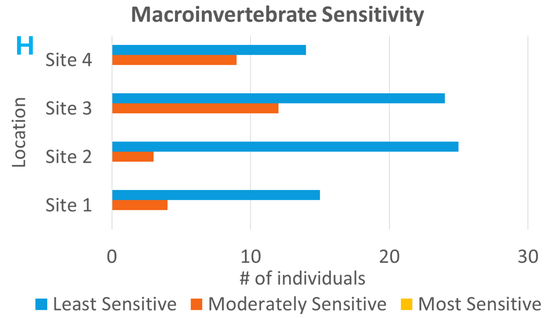

Fig H. Number of moderately and least sensitive individuals collected at Sites 1-4

Fig I . CT DEEP Riffle Bioassessment packet used to identify individuals

- Average recorded water temperature was 16.3 °C
- Highest conductivity and TDS was recorded downstream at the location closest to the storm drain (Site 1)
- No amount of phosphate, nitrite or nitrate was traceable; dissolved oxygen remained mainly consistent, averaging at 7 PPM; the pH averaged at 7

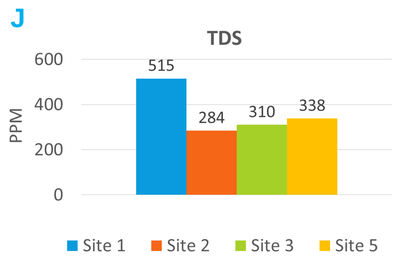

Fig J. TDS measured using Urbante meter; TDS is the measurement of dissolved minerals/ions, and can be an indicator of pollution

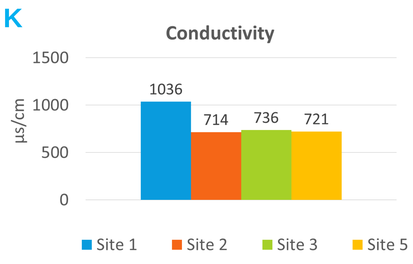

Fig K. Conductivity measured using Urbante meter; conductivity is a measurement of dissolved ions/salts and can also be an indicator of pollution

Conclusions

- No highly sensitive individuals were identified in Wash Brook at sites within the vicinity of Filley Pond; the absence of these individuals, which serve as bioindicators of good water quality, and the recorded presence of only moderately and minimally sensitive individuals shows that the water quality of Wash Brook within the vicinity of Filley Pond is poor.
- Conductivity & TDS peaked at Site 1, likely because it was located near a storm drain. This finding indicates the presence of runoff that likely contained road salts or other pollutants. Overall, the levels of conductivity/TDS determined at Site 2,3 and 5 would be considered moderate or normal for a freshwater river[1]
- The absence of measurable nitrites/nitrates or phosphates and the average pH and DO levels; Filley Pond could be classified as an oligotrophic system, which would indicate that it has low plant nutrients and limited to good sustainability for activity/growth[2]

Further Research

This project establishes a baseline for further investigation into the health of Filley Pond and the water quality improvements after restoration, and provides information necessary for determining the successfulness of the restoration project. Taking steps to provide information about Filley Pond and Wash Brook is vital to restore and protect the park's ecosystems, and polish a jewel that should once again be a pillar in the Bloomfield community.