

TITLE: Water Quality in Covehead and Brackley Bays

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SUMMARY: Jennifer Roma, Watershed Coordinator, Friends of Covehead-Brackley Bay

From June to October 2000 a water quality study was conducted in Covehead and Brackley Bays by the Department of Environment and Energy. Friends of Covehead and Brackley Bay feel that the information in this report is useful and important for residents of the watershed to know. Therefore, a brief summary of the study has been compiled by Watershed Coordinator, Jennifer Roma. This is meant to be a very brief overview of the study and results. To access the full report, please contact Jennifer Roma at jennifer.roma@gmail.com, or call (902) 368-8972.

WHAT WAS STUDIED?

- Dissolved oxygen
- Salinity
- Suspended solids
- Nutrients (ammonium, nitrate, total nitrogen, and total phosphorous)
- Chlorophyll

WHERE DID THE STUDY TAKE PLACE?:

In order to measure the above items, researchers placed sampling stations in the bays and streams, where samples of water were taken at determined intervals on a daily basis. These station locations remained the same throughout the study. They were located in the middle of the bays (Covehead and Brackley), at estuaries (where the bays and streams meet), in each of the five freshwater streams (Parson's, Auld's, Bell's, Black River, and MacCallum's), at MacMillan's Point, and at the mouth of Covehead Bay, leading into the Gulf of St. Lawrence.

RESULTS:

- Mean nitrate concentrations in the freshwater streams were between 1.29 - 2.93 mg/l. A system considered to be un-impacted might have a reading of closer to 0.37 mg/l.
- Aquatic life in some streams is potentially under threat.
- Total nitrogen concentrations of freshwater streams were between 1.4 - 3.2 mg/l. Levels should be no higher than 0.63 mg/l, at which point eutrophication occurs. Eutrophication is when plant life in the water, especially algae, increases. A higher amount of algae in the water reduces the amount of oxygen. This is harmful to aquatic life.

- The high total nitrogen concentrations were found to be directly linked to the amount of agricultural land that drains into the system. The more agricultural land that drains into a stream, the higher the amounts of total nitrogen.
- Nutrient loading (the amount of nutrients, such as nitrate and phosphorous, found in the water) is higher in Covehead than in Brackley Bay.
 - Nutrient loading in Covehead is higher than Souris & Trout River (both having had anoxic events).
 - Brackley Bay nutrient loading is less than Souris and the same as Trout River.
- The upper estuaries have the highest amount of nutrients. This matches the fact that the upper parts of the bays show more severe symptoms of eutrophic conditions (increased plant growth).
- Brackley Bay seems to have more severe symptoms of eutrophication than Covehead. This could be due to the fact that it has worse tidal flushing and more organic material found in the water.
- Covehead Bay was anoxic (no dissolved oxygen found) from late July to early August during this study while Brackley Bay was anoxic for the majority of the study period (June 16 to October 18, 2000).
 - Even short periods of low dissolved oxygen in the water can damage aquatic life.
- The upper portions of Brackley Bay are particularly challenged.
- Covehead Bay is flushing out at 77% of its potential. Brackley is significantly worse, flushing out at 38% or less. The study does **not** attribute this to the water quality problems in the watershed. It notes that these are natural tidal flows.
- *Potential* barriers to tidal flow include:
 - The bridge at Covehead Harbour,
 - The narrow channel that connects the two bays, at MacMillan's Point, and
 - Sandbars and shallow areas in the bay

NOTE: The study suggests that an oceanographer would have to make an assessment of this tidal flow situation. The idea would be to do a hydraulic assessment of the bridge gap to determine if it is in fact slowing down tidal flow. Also a bathymetry (measuring the depth of the water) and study of tidal mixing between the two bays would have to be carried out to determine if sandbars and sills are affecting upstream water quality. The authors also note that an oceanographer would be able to assess if improving the tidal range, by addressing these potential barriers, would actually overcome the nutrient loading happening in the upper portions of the bays.

- In order to determine if dredging is a viable option the following factors would have to be assessed. Otherwise, the authors suggest that if dredging occurs and these conditions are right (or rather wrong) the area could fill back in, in as little as a couple of months.
 - Direction of the prevailing current,
 - Exposure to storms, and
 - Supply of sediment available in the area.

SUMMARY:

As far as the conditions of the bays, Brackley seems to be in worse shape. It has lower levels of oxygen (and longer anoxic periods), a higher amount of sediment in the water, and naturally flushes at a lower percentage than Covehead. This is likely due to the small opening at the mouth of Covehead, as well as the narrow channel that the tide has to pass through at MacMillan's Point.

Covehead has higher nitrogen loading and this is directly correlated to agricultural land draining into the systems. The upper portions of both bays however are high in phosphorous and chlorophyll (enough to indicate eutrophic conditions). Brackley Bay was actually listed in the Top 10 highest levels of chlorophyll in PEI estuaries (from the PEI Estuaries Study).

Finally, there has been growth of sea lettuce in both bays, especially around Shaw's Beach and the Bayshore Road. When this sea lettuce dies off, it creates the anoxic conditions being seen in the bays.