



# The Effects of a Beaver Dam on Coastal Marsh Water Chemistry in Eastern Georgian Bay

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## Introduction

- Georgian Bay coastal wetlands are among the highest ranked for water quality in all of the Great Lakes basin (Chow-Fraser, 2006)
- Abiotic landscape factors have been shown to influence marsh chemistry (deCatanzaro & Chow-Fraser, 2011)
- Unknown how biotic disturbance such as a beaver dam would alter water chemistry in coastal marshes

## Hypotheses

- Water chemistry taken above a beaver dam will have higher concentrations of total phosphorus (TP), soluble reactive phosphorus (SRP), total ammonia nitrogen (TAN), colour, total suspended solids (TSS), dissolved organic carbon (DOC) and lower amounts of dissolved oxygen (DO), total nitrate nitrogen (TNN), pH, conductivity and sulphate than water sampled below the dam due to lake mixing.
- Coastal wetlands that have been impounded by beavers will have water chemistry that will differ from coastal wetlands in the same way as above

## Methods

- Coastal wetlands were sampled from Severn Sound to Key River from May to August 2010
- Beaver impounded wetlands were sampled from Severn Sound to Parry Sound from May to July 2011
- Water chemistry parameters measured included TP, SRP, TAN, TNN, sulphate\*, conductivity, pH, colour\*, DO, TSS and DOC\*

\*Sampled in 2011 only

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Parameter (Mean Values) *indicates significance between above and below the dam(0.05)	Open Water (n=11) <sup>a</sup>	Coastal Marsh (n=18)(n=33) <sup>b</sup>	Beaver Impounded Marsh (n=15)
Total Phosphorus (µg/L)	5.5	15.3	31.3
Soluble Reactive Phosphorus (µg/L)	0.6	3.7	13.3*
Total Ammonia Nitrogen (µg/L)	8	14.7	36.5
Dissolved Organic Carbon (mg/L)	2.5	16.6 <sup>b</sup>	12.5
Colour (mg/L Pt)	5	116 <sup>b</sup>	205
Total Suspended Solids (mg/L)	0.8	2.1	16.9
Total Nitrate Nitrogen (µg/L)	225	38.3	25.7
Sulphate (mg/L)	11.1	1.4 <sup>b</sup>	0.5*
Specific Conductivity (µS/cm)	180	133	36.5*
pH	8.1	7.3	6*

## Results & Discussion

- Variables sulphate, conductivity, pH, DO and SRP were significantly different above and below the dam
- Formation of a dam prevented lake mixing and caused significant differences in variables where high concentrations were driven by lake processes
- Clear distinction of water chemistry in coastal marshes compared to that of beaver impounded marshes
- Impounded sites are higher in SRP, TP, chlorophyll a, turbidity, TSS, TAN which has increased concentrations due to land inputs and lower in TNN, conductivity and pH (higher lake inputs)
- Results are generally consistent with previous work on beaver impoundments and ponds and confirmed hypotheses (Cirmo & Driscoll, 1993, Fairchild & Velinsky, 2006)

## Implications

- Beaver impoundments within close proximity upstream to a coastal wetland would receive concentrated inputs of nutrients (TP, SRP) and water rich in dissolved organic matter and suspended sediments should a dam break
- With predicted increases in intensity of storms in the future, stable dams may be compromised altering coastal marsh water chemistry

## References

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