Theme 1, Project 1.4: The impacts of climate change on the biogeochemistry of peatland pore water in the Hudson Bay Lowland

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Rationale

- Peatlands are important regulators of water flow and are globally significant sources of nutrients and dissolved organic carbon (DOC).
- A delicate balance of water quantity and quality is vital for proper aquatic ecosystem function.
- 80% of peatlands are located in the boreal region where climate change predictions are the most severe.
- Quantity and quality of water released from peatlands are expected to be greatly affected by environmental change, (temperature, moisture) particularly in mid to high latitude regions.
- Despite this the interactive effects of climate change on the biogeochemistry of waters released from peatlands are poorly studied, particularly in the Hudson Bay Lowland.

Description

- To understand the changes in the biogeochemistry of pore water released from northern peatlands under expected climate conditions
- Peat monoliths with vegetation were collected from a poor fen at White River Experimental Watershed Study Area, Ontario to create 84 long term study mesocosms.
- The mesocosms were randomly placed under 6 environmental conditions with various temperature (ambient, +4, +8), CO_2 (ambient, x2) and water table levels (high, low).
- Over 24 months plant community composition, water chemistry, microbial community structure, greenhouse gas production, and nutrient as well as mercury cycling will be quantified.
- Examples of such measures include DOC quantity (total DOC) and DOC quality (SUVA, EEMs, phenol concentration) assessed.

Outcomes

- This study will expand our knowledge of hydrology and biogeochemistry in northern peatlands under expected climate change conditions
- This research will improve our understanding of the influence of climate change on terrestrial carbon stocks by letting us isolate key climate change variables which significantly influence carbon cycling chemistry.
- These findings will also allow us to assess the resilience of fens to climate change and aid our understanding of the sustainability of northern peatlands.