

Freshwater Resources of the Eastern Canadian Arctic

Summary

Project Leader(s)

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Lakes and wetlands are major ecological features of the circumpolar Arctic, and they provide many essential services including habitats for aquatic wildlife, drinking water supplies for northern residents, and water for industrial activities. Inuit communities and northern scientists have increasingly observed that these resources are highly vulnerable to ongoing climate change. The project proposed here will extend our observations on lakes and wetlands at key sites in the eastern Canadian Arctic, to identify and measure aquatic indicators of environmental change in the past and present. These studies will allow us to make assessments of future changes in northern freshwater ecosystems to help guide the formulation of environmental management policies. We will continue our research on lakes, ice shelves and contaminants along the northern Ellesmere Island coastline based out of Ward Hunt Island Observatory, where we will work with Parks Canada to develop facilities, indicators and protocols for long term monitoring. This coastline lies at latitude 83oN, at the northern limit of Nunavut and thus North America, and it is characterized by many climate-sensitive aquatic ecosystems that are highly dependent on ice. We will extend our research to wetlands by assessing the snow storage and melt patterns in Polar Bear Pass on Bathurst Island (75oN). This Wildlife Sanctuary is composed of a mosaic of lakes and ponds, and seasonal snowmelt is considered the most important source of water to this wetland. The resultant models and understanding should be of broad application to arctic wetland wildlife habitats that have begun to respond strongly to climate change. Permafrost thaw lakes are a prominent component of northern wetland ecosystems, and we will work at several sites including Bylot Island (73oN) and Kuujjuarapik (55oN), to determine the environmental factors that control their ecosystem metabolism and net production of greenhouse gases in the present and future. We will analyze sediment cores from northern waters to assess the natural climate variability in arctic and subarctic Canada, and to identify regional variations in climate sensitivity. Finally we will develop and apply new DNA-based techniques to assess the diversity and function of microscopic life in lakes and wetlands and to develop state-of-the-art molecular indicators of climate responses by northern aquatic ecosystems. We will contribute our findings and expertise on Canadian arctic water resources to the ArcticNet IRISs and panArctic climate impact assessments (e.g. the SWIPA report).

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