

Landscape and water processes at Cape Bounty, Melville Island

Our work is intended to determine how climate change affects the land and water. Our work involves obtaining water, sediment, and soil, samples from the streams and lakes at Cape Bounty, and determining how vegetation changes with climate. We also study permafrost and the effects it has on water and land. This study is the longest record of changes in rivers and lakes in Nunavut and will be useful for understanding how water and the land will respond to climate and permafrost change, and the potential effects on wildlife and vegetation. We have been doing this work since 2003 and hope to continue in the future, at least until the next PolarYear.

In 2024, we had a camp from late May to end of July. The first team in May used drones and manual measurements to measure snow depth and also collected lake sediment cores and lake water samples to investigate changes in the water chemistry and changes in contaminants in lakes sediments since industrialization. This team also performed some maintenance of a weather station, and downloaded data from various soil monitoring station. A new team arrived in June prior to snowmelt. This team focused on taking measurements of the plants to determine growth rates, patterns and the carbon gas exchanges between soils, plants and the atmosphere. When the rivers started to flow, some team members began to measure the stream discharges, and collected samples one or two times a day to determine patterns in sediment and nutrients in waters over the season and across the landscape. The team that arrived in early July continued with investigations of rainfall and temperature effects on plant and carbon gas exchanges between plants, soils and atmosphere. The last team to arrive in late July aimed to sample water from groundwater seeps, and took water quality measurements to study groundwater flow patterns, and flow rates, and ground water organic matter content and water quality across the watershed. Camp was forced to close earlier than originally planned (closing in late July instead of mid August) as injury prevented one camp supervisor from travelling north for the final leg of the field season.

In 2025 we plan to have a camp operating starting May 26 and ending August 14. Our team in 2025 will continue to take many of the same measurements as we did in 2024, including plant measurements, carbon gas exchanges between plants and the atmosphere, and the stream samples and discharge measurements. This year in May we will again use drone technology to measure snow depth to better constrain snow contributions of snowmelt runoff. In late summer some of the team will be taking measurements of groundwater/soil water to understand how thaw is affecting water movement from the ground to the surface, and the presence of algal mats. We will also sample the fish and lakes for mercury. We have also applied to hire another Inuit Field Research Assistant (IFRA) through the Environment Canada program again this year.