

Research Bulletin

NWT Cumulative Impact Monitoring Program

Establishing a biomonitoring program to understand the impacts of Arctic roadways on stream ecosystems

Summary

This project created a stream biomonitoring program along the Dempster Highway and Inuvik-Tuktoyaktuk Highway (ITH) to assess the impacts of road development on stream ecosystem health. Data on stream ecosystem health was collected in partnership with local community organizations, including Inuvialuit Joint Secretariat, Imaryuk Monitors, Inuvik and Tuktoyaktuk Hunters and Trappers Committees, and Tetlit and Gwichya Gwich'in Renewable Resource Councils. Monitoring partners also completed the Canadian Aquatic Biomonitoring Network (CABIN) field certification course. We found that road impacts were minimal on water quality, benthic macroinvertebrates (bugs), and overall stream health along both highways. Future stream monitoring would help detect potential trends in stream ecosystem condition that would provide early warnings of change in stream ecosystem health.

Why is This Important?

Northern communities have expressed concerns related to the impacts of highways on important stream ecosystems. Using existing toolkits from standardized and well-established biomonitoring protocols is key to understanding stream ecosystem health and creating opportunities for long-term monitoring.



Wilfrid Laurier student, Maria Dolan, and Environment and Climate Change Canada Research scientist, Jordan Musetta-Lambert, collecting macroinvertebrate samples. (Credit: M. Chanyi)



What Did We Do?

From 2019-2022, government, community-based, and academic partners used the CABIN protocol (and a suite of other biological and habitat assessments) at all major streams along the Dempster Highway and ITH. At each site, we collected data from stretches of the streams located both upstream (non-highway impacted) and downstream (potentially highway impacted) of the highway. In 2020, the sampling program was led by the Imaryuk Monitors. Follow-up sampling in 2022 was led by newly CABIN-certified Imaryuk Monitors and other community monitors.

What Did We Find?

Under the current operation of these roads, surface runoff from the Dempster Highway and ITH does not measurably affect water quality or macroinvertebrate composition and abundance. While we did not observe impacts from roads, we did observe clear differences in the macroinvertebrate community between boreal (Dempster Highway) and tundra (ITH) streams, which we expected.



CABIN certification course held for community monitors from the Gwich'in Settlement Area and Inuvialuit Settlement Region, July 2022. (Credit: J. Musetta-Lambert)

What Does This Mean?

Given the low volume of traffic, the mass of sediments, nutrients, and contaminants reaching streams by surface runoff from these roads appear to be minimal along the highway. An important contribution and legacy influence of this project is the training of northerners to undertake future monitoring. Such future stream monitoring would help to provide early warning of potential environmental change to stream ecosystems.

For More Information

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NWT Cumulative Impact Monitoring Program (CIMP210)

Chanyi, C-M. 2023. Differences in drifting invertebrate communities across Arctic ecozones and the influence on potential growth of grayling (*Thymallus arcticus*). M.Sc. thesis, Wilfrid Laurier University. 77p.

NWT CIMP is a source of environmental monitoring and research. The program coordinates, conducts and funds the collection, analysis and reporting of information related to NWT environmental conditions. If you're conducting environmental monitoring and research, consider sharing your information with northern residents and decision-makers in a Bulletin.