

Research Bulletin

NWT Cumulative Impact Monitoring Program

Rising Waters: How Streamflow is Increasing in the Southern Taiga Plains

Summary

Streamflow has increased across Taiga Plains catchments over the last 50 years, but not everywhere at the same rate. At Scotty Creek in the Dehcho region and the La Martre River in the Wek'èezhìi region, we found that permafrost thaw is increasing groundwater flow to streams. Wildfires are speeding this up and in the Wek'èezhìi region, more rain over time has added to the increase. To better understand and predict future changes, we are using field data to develop a hydrologic model of the La Martre River to support water management decisions and habitat protection.

Why is This Important?

This research helps us understand how climate change, permafrost thaw, and wildfire impact water systems to help predict future changes. These results support sustainable water management, habitat conservation, and planning in NWT communities as the climate continues to change.

What Did We Do?

We worked with Tłı̨ch̓ Environmental Monitors and Dehcho Guardians to collect field data on groundwater, surface water, permafrost, and climate. We used this data to build a computer model of the La Martre River to study the how different factors such as climate change, permafrost thaw, and wildfire affect streamflow.

What Did We Find?

- At Scotty Creek, groundwater makes up to 80% of flow during dry periods and increased 10-25% between 2001 and 2024 due to permafrost thaw.
- More groundwater discharge leads to higher dissolved minerals in streams over time.
- In the La Martre River, more rainfall has increased streamflow, but recent drought could slow or reverse this trend.
- Permafrost thaw, wildfires, and rainfall together drive greater changes in streamflow than one factor alone.



Permafrost peatlands seen along the shores of Lac La Martre by helicopter in June 2023. (Credit: S. Wright)



What Does This Mean?

This research shows how permafrost thaw, wildfire, and precipitation are working together to reshape some water systems in the NWT. The results help communities, governments, and organizations make informed decisions about water management and climate adaptation. The work supports community-driven monitoring programs and helps address concerns about changing water levels, lake drying, and water quality. By incorporating Indigenous and local knowledge and training Environmental Monitors and Guardians, the project builds strong partnerships with communities and supports sustainable resource management in the region.



Members of the research team drilling in Whati to install temperature sensors for permafrost monitoring in 2022. (Credit: S. Wright)

What's Next?

The water and permafrost monitoring network established will continue to be maintained by researchers and community partners to understand longer-term trends. The hydrologic model of the La Martre River will continue to be improved as more data is collected, and will better reflect how permafrost behaves.

Permafrost restricts water in the ground (groundwater) from flowing. When permafrost thaws it allows groundwater to flow and connect to creeks and rivers, which increases streamflow over time.

For More Information

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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.