

Characterizing and monitoring permafrost in Kugluk Territorial Park *How do changing permafrost conditions impact ATV trails?*

Key Messages

- Ice wedges are numerous in the Kugluk Territorial Park area and are common sites of permafrost decay along the access road and ATV trail.
- Park managers and community leaders are using information from permafrost research and monitoring to prevent terrain disturbances along the ATV route that improves access to Kugluk Territorial Park for Nunavummiut.
- Knowing how the permafrost conditions in the Arctic are changing will help communities build infrastructure that is functional and sustainable.



What we are doing

Researchers, local youth, and other community members are studying permafrost conditions in Kugluk Territorial Park and setting up monitoring sites to record future changes. Their study focuses on the terrain surrounding the access road and ATV trails in the park to understand how changing permafrost conditions affect this important transportation passage for the community of Kugluktuk.

What we have learned

Based on early findings from permafrost coring and ground-penetrating radar, researchers found that the tundra in this area has a high ice content with numerous ice wedges. This makes the terrain sensitive to thawing, erosion, and collapse and has contributed to an increase in both the number and size of ponds in the area. While these processes are occurring naturally due to the climate warming, they are also affected by surface disturbances, such as regular ATV use.

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Researchers, including Kugluktuk youth and park staff, operate a portable earth auger to sample permafrost: POLAR



Community outreach and participation

Key steps for the success of this collaborative project include:

Community Input

Researchers work together with the Kugluk Community Joint Planning and Management Committee (CJPMC) to set research goals and monitor the project's progress.

Knowledge Transfer

Youth, Indigenous Knowledge holders, and researchers learn from each other by participating in youth camps, Nunavut Parks Days activities, and special events.

Training

Project leads invest time and resources in youth engagement and training opportunities throughout the lifespan of the research project.

Mobilizing results

Researchers make results available to community decision makers through public radio interviews, reporting directly to the CJPMC, and participating in conferences.

Why it matters

The results from this study informed a decision to build a new boardwalk ATV trail in Kugluktuk Territorial Park by identifying areas of ice-rich permafrost and patterns of permafrost degradation. The new ATV route decreases negative impacts on the tundra ecosystem. Ongoing community-led monitoring efforts along the new ATV trail will help ensure it remains safe and operational in the long term.

As the Arctic climate continues to warm, changing permafrost conditions will have major effects on the performance, safety, and reliability of northern transportation routes. This research helps build an understanding of how permafrost is changing in the regions, allowing communities to build infrastructure that meets both the needs of the community and the needs of the changing tundra environment.

Ice wedges

Permafrost can contract and crack in cold winter temperatures. When this happens, water from spring snowmelt fills these cracks and later freezes. The resulting vein of ice that appears in the permafrost is known as an ice wedge, which can grow in height, width, and depth over time as this cycle of melting and freezing repeats.

On the ground, ice wedges appear as raised ridges in the landscape. When viewed from above, ice wedges create a distinct polygon landscape pattern.



This aerial photo (above) shows the new Kugluk Territorial Park ATV trail under construction in 2019. Ice wedges, a feature of permafrost, are visible. The permafrost soil sample (upper right), collected along the ATV trail, has high ice content: POLAR