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NWT Cumulative Impact Monitoring Program

How does beaver activity affect tundra stream ecosystems?

Summary

Beavers are expanding their range north, into the tundra. When they build dams, they change how water moves through streams, which may affect the plants, animals, and people who rely on those streams. We studied how beaver dams impact Arctic streams by looking at water chemistry, benthic invertebrates (aquatic bugs), and food webs. We found that beaver dams do affect streams, but natural streambed conditions (i.e., whether a stream has a sandy or rocky bottom) are just as important.

Why is This Important?

Community members in the Inuvialuit Settlement Region have expressed concerns about how beavers are changing stream ecosystems. Our results provide key insight into the health of fish-bearing streams that are impacted by beaver activity, and points to which kinds of streams are more at risk.

What Did We Do?

- We studied 15 streams with and without active beaver dams between Inuvik and Tuktoyaktuk.
- We gathered habitat and water chemistry data, collected benthic invertebrates, and used stable isotopes to study food webs.
- We compared streams with and without beavers to see how beaver dams change stream ecosystems.

Megan Cullen and Max Kotokak Sr.sampling downstream of an active beaver dam in the ISR. (Credit: J. Musetta-Lambert)

What Did We Find?

- Streams with gravel bottoms had lower dissolved organic carbon (DOC), lower total mercury (THg) and more disturbance-sensitive invertebrates, compared to sand-bottomed streams which had higher DOC, higher total mercury, and more disturbance-tolerant benthic invertebrates.
- Beaver dams increased DOC and THg in both sand- and gravel- bottomed streams, and caused benthic invertebrate communities in gravel streams to shift toward disturbance-tolerant species.
- Beaver dams did not strongly affect benthic invertebrate communities in sand streams, or food web structure in either streambed type. No measurements for any water chemistry variables exceeded concentrations that would be harmful to stream biota.

What Does This Mean?

Beavers are changing Arctic streams, but they are not the only factor. Natural stream features like sediment type and flow velocity are important to understanding how ecosystems respond. Some streams may be more sensitive to beaver activity than others. This study provides a reference point for monitoring freshwater health in the future as beaver populations grow and move north.

For More Information

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Jordan Musetta-Lambert and Max Kotokak Sr. (Imaryuk Monitor - Inuvik) assembling hydrological monitoring equipment near Stanley Creek, a major stream draining into Imaryuk (Husky Lakes) in the Inuvialuit Settlement Region. (Credit M. Cullen).