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NWT Cumulative Impact Monitoring Program

Polycyclic Aromatic Hydrocarbons (PAHs) Levels in Small-bodied Fish Along the Mackenzie River from Norman Wells to Fort Good Hope

Summary

In response to concerns of Sahtú residents about the impact of oil extraction operations on fish health, we re-examined small-bodied fish data and tested archived fish samples collected in 2005 for polycyclic aromatic hydrocarbons (PAH). Samples had been collected from sites along the Mackenzie River between Norman Wells and Fort Good Hope. Overall, concentrations of PAHs were low in these fish with no clear pattern relative to sample location.

Why is This Important?

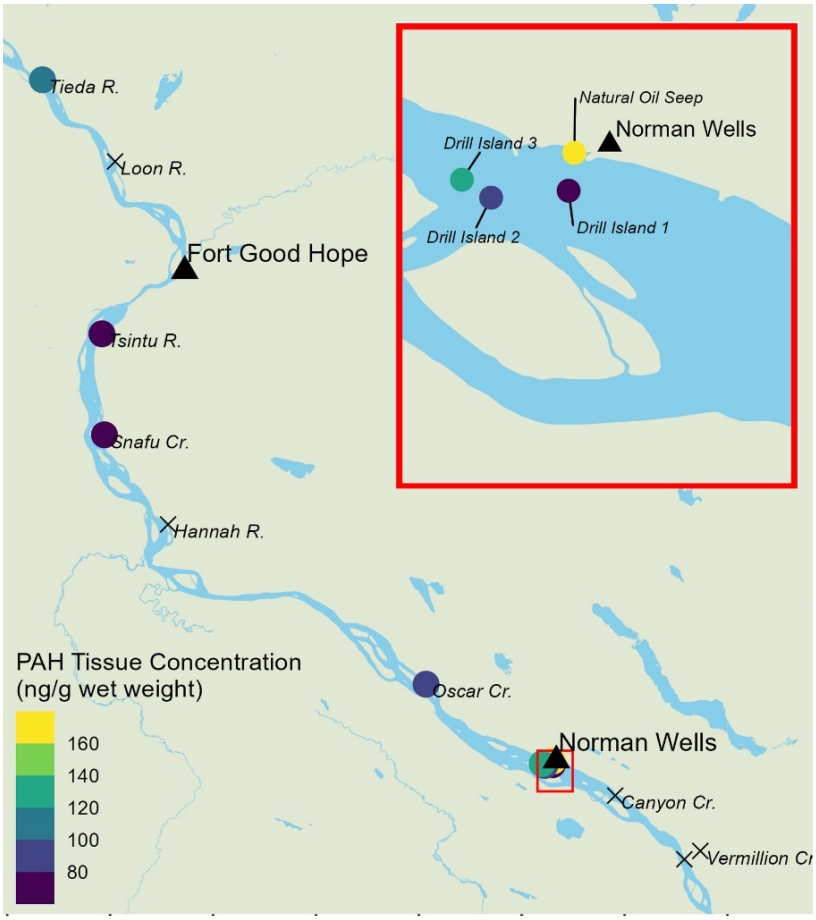
Indigenous communities in the Sahtú are concerned about whether oil extraction and associated activities occurring in the vicinity of Norman Wells are affecting the health of fish in the Mackenzie River, including downstream.

What Did We Do?

- In 2005, we caught (using beach seines) and archived small-bodied fish from sites along the Mackenzie River between upstream of Norman Wells and downstream of Fort Good Hope and stored them at -30°C. Samples also were taken near three drill islands, offshore of the natural oil seeps in Norman Wells, and in Vermillion Creek, a tributary of the Mackenzie River.
- In 2024, we analyzed the tissues of archived small-bodied fish for PAH. concentrations: Lake Chub from 8 sites, Trout Perch from 2 sites, Slimy Sculpin from 2 sites, and Cisco from one site. Small-bodied fish are commonly used for fish research on environmental impacts on river and stream ecosystems because they are common, abundant and have small home ranges.

What Did We Find?

- Lake Chub were the most commonly caught species.
- Different species were more common in different areas (Cisco upstream of Norman Wells, Lake Chub between Norman Wells and Fort Good Hope, Trout Perch downstream of Fort Good Hope, and Slimy Sculpin in Vermilion Creek).
- PAH concentrations in the small-bodied fish were very low overall.
- The chemical composition of the PAHs detected indicates petrogenic sources (e.g., oil and gas or natural oil seeps).
- Lake chub caught offshore of Norman Wells had a unique chemical signature which likely comes from natural oil seeps nearby.



Locations for the small-bodied fish survey along the Mackenzie River, August 2005. Coloured circles indicate sites where Lake Chub were present and the PAH concentrations of their tissue, all of which were very low. All other sampling sites are marked with an X.

What Does This Mean?

- Preliminary results of our study found no evidence that oil extraction operations had increased PAH concentrations in the study area.

What are PAHs?

Polycyclic aromatic hydrocarbons (PAHs) are a group of organic compounds that occur naturally in coal and oil deposits (e.g., oil and gas, natural oil seeps) and are produced when organic matter burns (e.g., wildfires, wood heating). At high concentrations, many PAHs can pose risks to the health of the aquatic ecosystem.

For More Information

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NWT Cumulative Impact Monitoring Program (CIMP 222)

Beach seining for small-bodied fish in the Mackenzie River. (Credit: M. Evans)