

NWT Environmental

Research Bulletin (NERB)



NWT Cumulative Impact Monitoring Program (NWT CIMP)

A source of environmental monitoring and research in the NWT. The program coordinates, conducts and funds the collection, analysis and reporting of information related to environmental conditions in the NWT.

NWT Environmental Research Bulletin (NERB)

A series of brief plain language summaries of various environmental research findings in the Northwest Territories. If you're conducting environmental research in the NWT, consider sharing your information with northern residents in a bulletin. These research summaries are also of use to northern resource decision-makers.

Monitoring cumulative impacts of mining development on Bathurst caribou habitat

The Bathurst herd faces threats from a range of natural and human pressures. This project builds on previous research (see NERB Issue 9), looking at the mechanisms that may be responsible for disturbance impacts from resource development in Bathurst caribou habitat areas. We looked at how far dust, visual and noise impacts from mining operations reached in caribou habitat. The project successfully improved remote sensing-based methods so that hard-to-monitor disturbances can be measured.

Why is this research important?

The population of the Bathurst caribou has declined 98% from about 470,000 animals in the mid-1980's to about 6,240 in 2021. This project seeks to address community concerns about the impacts of noise, dust, and other mining related disturbances on caribou.

What did we do?

Building on previous research, we developed a new approach providing quantitative estimates of airborne particulate matter and noise levels around the Ekati and Diavik mine complex. Specifically, we:

- Used remote sensing-based methods to measure fine particulate matter plumes;
- Used sound and vibration meters to measure the reduction rates of noise levels to estimate the zone of noise from various sources; and
- Developed a remote sensing-based framework for developers and land managers to implement cumulative impacts monitoring on caribou.



The instruments used to measure the concentration of airborne particulate matter.
(Credit: W. Chen)

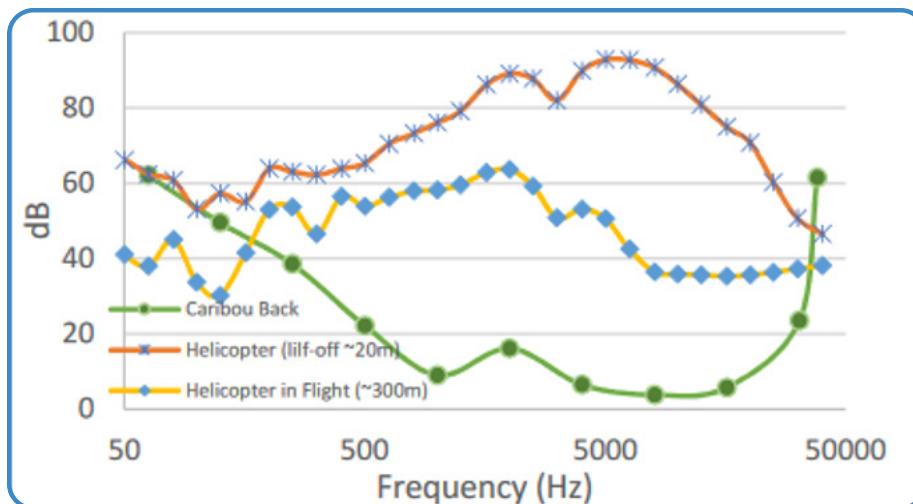
What did we find?

Based on five years of field measurements, we found that:

- The maximum distance of dust during snow-free months from a frequently used haul road was about 1 to 1.5 km.
- Dust on snow increased from March to May/June when the melt started.
- The maximum distance the sound of an aircraft taking off is likely audible to caribou is about 6 km in summer and 6.5 km in winter and was the loudest source of noise measured.
- The maximum distance at which a caribou is likely able to distinguish a mining operation visually, is about 5 km.

What does this mean?

Project results provide information and tools that could be used to study the impacts of noise and dust on Bathurst caribou. These findings and other monitoring data can enhance decision-makers' ability to design and implement effective mitigation.



Examples of sound spectrum recorded near an aircraft (helicopter) in 2017. Caribou back, in the legend, refers to the hearing threshold of caribou from behind; they are most sensitive to sound from the back which is why it is used. (Credit: W. Chen)

What is fine particulate matter?

Fine particulate matter is the name for a range of particles that are less than 2.5 microns (μm) in diameter, often referred to as PM 2.5. They can stay airborne for weeks until being deposited during rain, travel long distances dependent on wind directions and speeds, and usually are the result of multiple sources.

Recommended Reading

Boulanger, J., K. G. Poole, A. Gunn, J. Adamczewski, and J. Wierzbowski. 2021. *Estimation of trends in zone of influence of mine sites on barren-ground caribou populations in the Northwest Territories, Canada, using new methods*. Wildlife Biology 2021.

Mackenzie, R., Dryneck, P., Pea, B., Dryneck, J., Quitte, W., Football, B., Judas, R., Smallgeese, J., Judas, J., Kodzin, J. (2013) *Cumulative Impacts on the Bathurst Caribou Herd: A Thcho, Traditional Knowledge Study, Research and Monitoring Program*, Thcho Government.

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