Government of Northwest Territories

Northwest Territories
Cumulative Impact Monitoring Program

Tłı̨chǫ Ndek'awoo
Tłı̨chǫ Government

Northwest Territories Environmental Research and Monitoring Results Workshop: Wek'èezhìı Region

December 13-14th, 2022

Abstract Volume

Cover Photograph

Near K’eàgotì Field Camp, Wek’èezhìı Region, NWT;
Paul Vescei

Compiled by M. Seabrook

Recommended Citation:

Seabrook, M. (compiler), 2022. NWT Environmental Research and Monitoring Results Workshop: Wek’èezhìı Region Abstracts; Northwest Territories Cumulative Impact Monitoring Program, Yellowknife, NT. NWT CIMP Abstracts Volume 2022

Table of Contents - Ordered by Author (*denotes presenter)

NWT Cumulative Impact Monitoring Program (NWT CIMP)

Brekke*, L.

NWT Cumulative Impact Monitoring Program, Department of Environment and Natural Resources, Government of the Northwest Territories, Yellowknife, NT
Lorraine_Brekke@gov.nt.ca

https://nwtdiscoveryportal.enr.gov.nt.ca/geoportaldocuments/1%20-%20Brekke%20-%20CIMP%20overview.pdf

https://nwtdiscoveryportal.enr.gov.nt.ca/geoportaldocuments/10%20-%20Brekke%20-%20Making%20use%20of%20Results%20(not%20presented).pdf

NWT CIMP is a monitoring and research program administered by the Government of the Northwest Territories, Department of Environment and Natural Resources.

The program supports environmental decision-making by generating baseline, cumulative impact and environmental trend information. Many other agencies share responsibility for environmental monitoring in the NWT. It is NWT CIMP's role to fill information gaps to better understand cumulative impacts.

The NWT CIMP Steering Committee made up of regional Indigenous governments and Indigenous organizations, guide the program. The Mackenzie Land and Water Board and the Mackenzie Valley Environmental Impact Review Board provide advice to this committee as observers.

NWT CIMP has three key activity areas related to monitoring and research:

1. The program works with key decision-makers, the Steering Committee and others to determine monitoring priorities;
2. NWT CIMP conducts, coordinates and funds monitoring, research and analysis.
3. NWT CIMP communicates results to decision-makers and communities.

The program currently focuses on three priority valued components: caribou, water and fish.

This presentation introduces NWT CIMP, the type of information generated, how this information can be used and where to find it.

Project results of NWT CIMP projects are available on the NWT Discovery Portal www.nwtdiscoveryportal.enr.gov.nt.ca, the Inventory of Landscape Change, the Mackenzie Datastream, our website, www.nwtcimp.ca, or by contacting nwtcimp@gov.nt.ca.

Changes in Vegetation Across the Range of the Bathurst Caribou Herd

Danby*, R.[1], Bonta, C.[1], Dearborn, K.[2], King, G.[3], and Mennell, R.[1]

(1) Department of Geography & Planning, Queen's University, Kingston ON
(2) Department of Biology, University of Winnipeg, Winnipeg MB
(3) Augustana Science Department, University of Alberta, Camrose AB
ryan.danby@queensu.ca

https://nwtdiscoveryportal.enr.gov.nt.ca/geoportaldocuments/2%20-%20Danby%20Presentation.pdf

Vegetation change in response to climate change is one hypothesis for the rapid decline of the Bathurst caribou herd. Our project examines this through (i) range-wide monitoring of vegetation changes using high frequency satellite imagery, (ii) ground-validation of satellite trends using tree ring analysis and plant community sampling, and (iii) a robust, updated analysis of herd distribution and range use. This presentation provides an overview of results obtained to date for each of these three objectives.

The satellite image analysis reveals significant changes in the seasonality and peak annual production of vegetation across portions of the Bathurst caribou herd's range since 2000. However, there is substantial spatial variability in these trends. In forested areas below treeline, the trends are heavily influenced by time since the last fire; but in the tundra areas above treeline the trends are more closely aligned with the effects of climate change. Field validation of the satellite image analysis indicates that sites on the herd's summer range where increased productivity was observed have a higher shrub canopy cover than sites that did not exhibit increased productivity. However, there is no significant differences in the age of shrubs between these sites. This suggests that increased growth of shrubs, not the establishment of new shrubs, may be responsible for the changes observed in the satellite imagery. Finally, updated analysis of caribou telemetry locations reveals substantial reductions in the extent of the Bathurst caribou herd's annual and seasonal distribution as the population declined. There have also been changes in the location of core seasonal use areas as well as in the timing of use of these seasonal ranges.

These trends suggest that climate-driven changes in vegetation could have been a contributing factor in the Bathurst herd's decline. However, it remains challenging to untangle the potential effects of these changes from the myriad of other possible factors affecting the herd. Additional work is being conducted to integrate the results from these three separate lines of inquiry to better understand the relationships between range condition and caribou dynamics.

Ekwǫ̀ Nàxoèhdee K'è – 'Boots on the Ground'

Jacobsen*, P[1]., Judas, R[2]., Steinwand, T[1]., Zoe, L[3].

(1) Tłı̨chǫ Government, Behchokǫ̀, NT
(2) Elder from Wekweètì
(3) Elder from Gametì, NT
petterfjacobsen@gmail.com

https://nwtdiscoveryportal.enr.gov.nt.ca/geoportaldocuments/5%20-%20Jacobsen%20-%20ENK%20presentation.pdf

The *Kokètì ekwǫ̀* (Bathurst caribou) has seen one of the most dramatic herd declines, down to only 6200 animals in 2021. The Tłı̨chǫ people has relied on *Kokètì ekwǫ̀* since time immemorial, but a harvest ban since 2015 reduced peoples' interaction with the herd and the land. To advance traditional knowledge research and on-ground caribou monitoring, Tłı̨chǫ Government started up the *Ekwǫ̀ Nàxoèhdee K'è*- Boots on the Ground program. Using traditional ways of traveling the land, by boat and on foot, to key geographical features known as *ekwǫ̀ nǫʔokè* (water crossings), where elders anticipate *ekwǫ̀* herds' arrival, the monitoring team sit in position, as traditional hunters did, waiting, and watching the *ekwǫ̀* and their habitat.

Using traditional hunting methods as wildlife monitoring methods, and traditional hunting area as monitoring locations, Tłı̨chǫ elders created the research methodology, "*We Watch Everything*" to study *ekwǫ̀* and cumulative impacts focusing on the key indicators: (1) habitat; (2) *ekwǫ̀* health condition; (3) predators, and (4) industrial development. The main basecamp is at Kokètì where we have monitored Kokètì ekwǫ̀ for seven years, since 2016. During summer 2020, the program established a base camp on Deèzàatì (Point Lake) to monitor the *Sahtı ekwǫ̀* (Bluenose East caribou herd), and a 3rd research camp was established during summer 2022 at Ek'atì (Lac de Gras). The program is a collaboration between the Tłı̨chǫ Government, GNWT-ENR, the Wek'èezhìi Renewable Resource Board (WRRB). Funding was provided by Tłı̨chǫ Government, Arctic Canadian Diamond Company, and the GNWT-Cumulative Impact Monitoring Program (NWT CIMP).

The monitoring detected a trend of warm/dry habitat in 2016-17, followed by windy, wet habitat from 2018-21, with overall good quality ekwǫ̀ summer and fall forage. Caribou health is observed as "good" and bulls gaining fat reserves early in season. The good habitat and health conditions provide the necessary environmental conditions for the population growth; however,

we observed a low calf abundance and see herds with few or no calves. Impacts from climate changes are: earlier spring melt; permafrost melt with collapsing eskers; disappearance of summer snow changing caribou behavior; and increase of new species as bald-eagles and moose. Through *Ekwǫ̀ Nàxoèhdee K'è*, Tłı̨chǫ people are traveling back to ancestral harvesting locations and reconnect to cultural places and *ekwǫ̀*. Thus, the program allows Tłı̨chǫ to "go back to the original source to remember" the stories, language, knowledge, and cultural ways of life that connects us to *ekwǫ̀*.

The role of parasites in caribou health and population trends

Padilla, B.J*.[1], Kutz, S.[1], Pruvot, M.[1] Aleuy, O.[2]

(1) University of Calgary Faculty of Veterinary Medicine
(2) University of California – Santa Barbara
benjamin.padilla@ucalgary.ca

https://nwtdiscoveryportal.enr.gov.nt.ca/geoportaldocuments/3%20-%20Padilla%20presentation.pdf

Populations of barren-ground caribou have declined significantly over the past 30 years, with the Bathurst herd experiencing perhaps the most concerning and long-lasting decline. While there are many interacting factors influence caribou populations, however, parasites are often overlooked as drivers of caribou populations. We have worked with Ekwǫ̀ Nàxoèhdee K'è to bridge Traditional and scientific knowledge to understand how parasites influence the health populations of Bathurst caribou. In April 2022 we held a knowledge sharing workshop with Tłı̨chǫ̀ Elders to talk about the most important factors influencing health and populations of ekwǫ̀, and to brainstorm ideas to improve field monitoring methods for Ekwǫ̀ Nàxoèhdee K'è. We used what we learned from this workshop to develop a guide for improving observations of caribou while out on the land, and a method for collecting fecal samples for analysis of stress and load of stomach parasites.

We also developed a computer model to describe how stomach parasites and biting insects reduce caribou body condition, reproduction, survival, and population size. Our model shows that combined costs of avoiding biting insects and growing warble fly larvae can have big impacts on caribou populations. We also used the model to understand the impacts of a stomach

nematode called *Ostertagia*. When caribou are infected with *Ostertagia* they forage less. Our model showed that reduced foraging caused by stomach parasites caused lower body condition, survival, and reproductive output (calves) in caribou. These results show that small changes in parasite load, quantity and quality of caribou forage, and energy expenditure by caribou (such as running from insects) can have big impacts on caribou body condition and population dynamics.

Cumulative Effects Assessment of Four Barren-ground Caribou Herds in the Northwest Territories

Carlson, M.[1], Nishi, J.[2], Stubbs, T.[3], Clark, K.[4], **Routh*, M.[4]**, and Winbourne, J.[5]

(1) ALCES Landscape and Land-use Ltd., Ottawa, ON
(2) EcoBorealis Consulting Inc., Millarville, AB
(3) Headwater Strategy Group Ltd., Victoria, BC
(4) Department of Environment and Natural Resources, Government of the Northwest Territories, Yellowknife, NT
(5) TK and Ecological Consulting, Victoria, BC
Melanie_Routh@gov.nt.ca

https://nwtdiscoveryportal.enr.gov.nt.ca/geoportaldocuments/4%20-%20Routh%20-%20presentation.pdf

Barren-ground caribou (*Rangifer tarandus groenlandicus*) are an ecological and cultural keystone species of the Canadian North. Recent population declines have raised concerns about caribou management and conservation and highlighted the importance of long-term monitoring. Understanding the current and future impacts of landscape change on the population dynamics of barren-ground caribou is critical in enhancing northern decision-makers' and communities' perception of the cumulative impacts of landscape change on this important species.

We collaboratively developed a decision-support tool that simulates the cumulative effects of landscape changes (e.g., climate and wildfire), project development (e.g., all-season roads and mineral development), and management practices (e.g., harvest levels) on the habitat quality and population dynamics of the Tuktoyaktuk Peninsula, Cape Bathurst, Bluenose-West, and Bluenose-East herds of barren-ground caribou. This work was accomplished collaboratively with the Wek'èezhìı Renewable Resources Board, Sahtú Renewable Resources Board, Gwich'in

Renewable Resources Board, and Wildlife Management Advisory Council (NWT). We used ALCES (A Landscape Cumulative Effects Simulator) Online as the simulation tool. During the first year of the project, ALCES Online was initialized with various spatial data layers (e.g., wildfire, landcover type, temperature) and seasonal barren-ground caribou habitat models for the Tuktoyaktuk Peninsula, Cape Bathurst, Bluenose-West, and Bluenose-East herds. In Year 2 and 3, we developed the landscape change model that simulates how caribou habitat will change as a result of climate change, wildfires, and land-use in a 50-year timeframe (2010-2060). We also developed a seasonal population dynamics model, a simulation model that estimates how migratory barren-ground caribou populations may respond to changes in caribou habitat and vital rates. In Year 3, we produced a summary of publicly available Indigenous knowledge on the key drivers of change (e.g., climate, wildfire, predation, competition, harvest) that Indigenous people have observed in the past and present affecting the habitat and population of the Tuktoyaktuk Peninsula, Cape Bathurst, Bluenose-West, and Bluenose-East herds.

Initial results from preliminary scenarios of the Bluenose-East herd suggest population dynamics are sensitive to cow mortality; cow mortality is a key driver of population trend that warrants consideration in implementing strategies for harvest management and herd monitoring. Climate change, through changes in precipitation, temperature, and evaporation, also affected caribou habitat availability. A reduction in winter caribou habitat is projected as a result of the loss of old forest from increasing wildfires. Indigenous knowledge holders have reported a number of similar drivers affecting caribou habitat and their populations. These observations will be used in comparison to the changes simulated by ALCES Online. Further works needs to be completed to investigate the impacts of future land-use and management practices on the Bluenose-East herd, and more work is needed to simulate these scenarios for the Bluenose-West, Cape Bathurst, and Tuktoyaktuk Peninsula herds. We hope the outcome of this project can provide meaningful evidence-based information to northern decision-makers and community members who are actively working on this species in the Northwest Territories and Kitikmeot region of Nunavut.

The Northwest Territories Thermokarst Mapping Collective: A northern-driven collaborative mapping framework for understanding the distribution and effects of permafrost thaw

Rudy, A.C.A*[1], Kokelj, S.V.[1], Gingras-Hill, T.[2], Daly, S.[2], Morse, P.[3], Wolfe, S.[3], Baltzer, J.[2], Fraser, R.[4], Lantz, T.[5], O'Neill, H.B.[3], Quinton, B.[2], Weiss, N.[1], van der Sluijs, J.[6], Chiasson, A.[7], Ferguson, C.[8], Paul, J.[2], Pope, M.[9], Wilson, A.[1], Young, J.[7]

(1) Northwest Territories Geological Survey, Government of the Northwest Territories, Yellowknife and Inuvik NT
(2) Wilfrid Laurier University, Yellowknife NT
(3) Geological Survey of Canada, Natural Resources Canada, Ottawa ON
(4) Canadian Centre for Remote Sensing, Natural Resources Canada, Ottawa ON
(5) University of Victoria, Victoria BC
(6) Northwest Territories Centre for Geomatics, Government of the Northwest Territories, Yellowknife NT
(7) University of Alberta, Edmonton AB
(8) Aurora Research Institute, Inuvik NT
(9) Queen's University, Kingston ON
ashley_rudy@gov.nt.ca

https://nwtdiscoveryportal.enr.gov.nt.ca/geoportaldocuments/6%20-%20Rudy%20%20presentation.pdf

This talk overviews the development, implementation, and progress of a CIMP-funded northern-driven project called the Northwest Territories Thermokarst Mapping Collective (TMC). In this project, permafrost researchers across Canada collaborated to produce empirically-based inventories of thermokarst landforms and indicators of permafrost thaw sensitivity for the Northwest Territories (NT), Canada. The project has addressed a significant knowledge gap on the distribution of permafrost-driven geohazards and thaw-sensitive terrain and has fostered science collaboration and linkages with stakeholders. Increased NT-based permafrost science capacity enabled project development and implementation by providing project leadership and fostering partnerships with government and academic collaborators focused on addressing project and stakeholder needs. Ongoing communications of methods and maps have informed study design and strengthened linkages with northern organizations and Indigenous partners. Theme-based inventory methods supported mapper training and implementation, and the flexible data infrastructure facilitated continued engagement of Canada-wide research partners and mapping progress without interruption by the COVID-19 pandemic. Mapping results will

provide the first inventory describing the thermokarst terrain types for a 2 million km^2 region of northwestern Canada. The resulting data and analyses contribute to a more holistic understanding of thaw-driven landscape change and support novel opportunities for regional and community-based syntheses. This knowledge will refine depictions and inform the modelling of thaw-sensitive permafrost terrain, which is urgently required to understand better what permafrost thaw means for Canada's North.

Tłı̨chǫ Highway Wildlife Monitoring Program

Steinwand, T.*

Culture and Lands Protection, Tłı̨chǫ Government, Behchokǫ̀, NT
tyanna.steinwand@tlicho.ca

https://nwtdiscoveryportal.enr.gov.nt.ca/geoportaldocuments/8%20-%20Steinwand%20-%20Presentation%20(1).pdf

The Tłı̨chǫ Highway Wildlife Monitoring Program (THWMP) is a new collaborative project between the Tłı̨chǫ Government and the Department of Environment and Natural Resources (ENR), Government of the Northwest Territories (GNWT). The program's goals are to provide date on changes to harvesting and habitat including:

1. Monitor changes in harvest after the Tłı̨chǫ Highway is complete;
2. Monitor impacts of Tłı̨chǫ Highway on hozìı ʔekwǫ̀ winter habitat; and
3. Develop a Tłı̨chǫ harvest monitoring and reporting program for hozìı ʔekwo, t̨ǫ̀dzı,and dediì.

Harvesters can voluntarily report the harvest of, for example, a moose or caribou to the Tłı̨cho Government and be eligible in a monthly draw for a gas drum as prize. GNWT-ENR is conducting various studies such as the use of remote wildlife cameras and collaring programs for monitoring.

The purpose of this presentation is to discuss the program goals, Elder/harvester committee meetings, monitors working on the road, voluntary harvest reporting, ENR studies (cameras, collaring), vegetation studies, proposed dust study, stream monitoring, Inuvik/Tuktoyaktuk monitor exchange and ongoing concerns brought forward by the committee and monitors.

Marian Watershed Stewardship Program (MWSP)

Vecsei, P*[1]., Knapton-Pain, T.[1]

(1) Lands Protection and Renewable Resources, Tłı̨chǫ Government, Behchokǫ̀, NT
paul.vecsei@tlicho.ca

https://nwtdiscoveryportal.enr.gov.nt.ca/geoportaldocuments/9%20-%20Vecsei%20-%20Marian%20River%20(MWSP).pdf

The Marian Watershed Stewardship Program (MWSP) is a community-based monitoring programs designed to determine whether fish, water, and sediment quality are changing over time, and whether fish and water are safe to consume. The MWSP consist of science-based fish, water and sediment sampling at four sites within the Marian River corridor. The uppermost site is well upstream from proposed future mining activity. Community members undertake contaminants-related monitoring, including the collection of samples and observations using both Tłı̨chǫ and scientific knowledge. All programs use extensive laboratory analysis of samples collected. Results are annually presented to relevant communities.

Tłı̨chǫ Aquatic Ecosystem Monitoring Program (TAEMP) and Dinàgà Aquatic Ecosystem Monitoring Program (DAEMP)

Vecsei, P*[1]., Knapton-Pain, T.[1]

(1) Lands Protection and Renewable Resources, Tłı̨chǫ Government, Behchokǫ̀, NT
paul.vecsei@tlicho.ca

https://nwtdiscoveryportal.enr.gov.nt.ca/geoportaldocuments/7%20-%20Vecsei%20-%20TAEMP.pdf

The Tłı̨chǫ Aquatic Ecosystem Monitoring Program (TAEMP) and recently added Dinàgà Aquatic Ecosystem Monitoring Program (DAEMP) are community-based monitoring programs designed to determine whether fish, water, and sediment quality are changing over time, and whether fish and water are safe to consume. The TAEMP consist of science-based fish, water and sediment sampling through each of the four Tłı̨chǫ communities so that every community

has samples collected and analysed once every four years. The DAEMP is centred within the North Arm of Great Slave Lake. As community-driven programs, both involve community members in conducting contaminants-related monitoring, including the collection of samples and observations using both Tłı̨chǫ and scientific knowledge. All programs use extensive laboratory analysis of samples collected. Results are annually presented to relevant communities.