Ekwǫ̀ Nàxoèhdee K’è

2024 Results



Kokètì

Deèzàatì

Ek'atì

Dedats’eetsaa:
Tłı̨chǫ Research & Training Institute
www.research.tlicho.ca

2025

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ISBN: 978-1-896790-78-7

Table of Contents

Quotes from Tłı̨chǫ Youth 6
Ekwǫ̀ Nàxoèhdee K'è - Introduction 7
2024 Results 15
Kokètì Ekwǫ̀ – Bathurst Caribou 16
Kokètì Ekwǫ̀ Calf Abundance 17
Body Condition & Health at Kokètì (Contwoyto Lake) 18
Kokètì Ekwǫ̀ Habitat 20
Kokètì Ekwǫ̀ Indicator Trends 2016-2024 22
Sahtì Ekwǫ̀ Monitoring Results from Deèzàatì 24
Sahtì Ekwǫ̀ – Bluenose East Caribou 26
Tsıa – Calves 26
Body Condition and Health 28
Sahtì Ekwǫ̀ Habitat 28
Caribou Habitat in August: Drought Conditions 31
Caribou Habitat in September 31
Beverly Caribou Monitoring at Ek'atì (Lac du Sauvage) 34
Tsia – Calves 40
Body Condition and Health 40
Habitat 42
Caribou Forage Around the Mines 42
Mining Disturbance 43
Sampling Program 45
Results from Fish Samples 46
Methodology 55
"We Watch Everything" - Traditional Knowledge Framework 55

Tables

Table 1: Summary of field activities for ENK monitoring, summer and fall 2024 12
Table 2: Summary of animals observed, 2024 15
Table 3: Summary of animal groups observed, 2024 15
Table 4: Summary of body condition score around Kokètì during summer and fall 2024. 18
Table 5: Trends of monitoring indicators for the last nine years: 2016-2024 22
Table 6: Trends of calf abundance over time 2016-2024. 23
Table 6: Trends of calf abundance over time 2016-2024 23
Table 7: Field times for the two teams at Deèzàatì, 2024. 24
Table 8: Body condition score of Sahtì ekwo, September 2024. 28
Table 9: summary of body condition during fall 2024 41
Table 10: Template for wildlife observations 54

Figures

Figure 1: Bathurst herd calving population estimate 2009-2022 13
Figure 2. Distribution of ekwǫ̀ group sizes observed by two ENK field teams at Kokètì 17

Figure 3. a) Daily precipitation, and b) hourly temperature. 21
Figure 4. Occurrence of insect activity score. 21
Figure 5: Classification of caribou observed 26
Figure 6: Daily composition of ekwǫ̀ groups observed during August-September 2024. 27
Figure 7a) Daily precipitation, and b) hourly temperature 32
Figure 8. Occurrence of insect activity score 32
Figure 9: number of caribou observed at Ek'atì, September 2024. 39
Figure 10. Length to mercury (10a) and age (10b) correlation in Lake Trout, length to mercury (10c) and age (10d) correlation in Lake Whitefish and finally, Lake Trout versus Lake Whitefish mercury concentrations correlated with length (10e) in Lac du Sauvage, August 2024. 50
Figure 11. Length to weight correlation in Lake Trout and Lake Whitefish from Lac du Sauvage..... 52
Figure 12. Length at age for Lake Whitefishand Lake Trout from Lac du Sauvage 53
Figure 13: traditional knowledge framework. 56

Maps

Map 1: ENK camps at 9
Map 2: Tłı̨chǫ Landscape Units. 10
Map 3: Team travel routes on Kokètì..... 14
Map 4: Locations of large caribou groups observed by Team A in late July 2024. 16
Map 5: team travel routes on Deèzàatì, Sept 2024. 25
Map 6: Locations of mushrooms counts around Deezaati, August-September 2024. 33
Map 7: locations of lichen samples, and ARU deployment around Ekati, September 2024. 45

Photos

Photo 1: Drum dance at the Kokètì camp, August 2024. 6
Photo 2: Kokètì Basecamp..... 7
Photo 3: Deèzàatì basecamp. 7
Photo 4: ENK camp on Ek'atì (Lac de Gras/Lac du Sauvage). September 2024.. 8
Photo 5: Kokètì camp in channel between Kokètì (Contwoyto Lake) and Fry Inlet..... 11
Photo 6: Team B on esker by Kokètì camp, August 2024 12
Photo 7: Bathurst caribou calves, 1.5 months old. July 27th, 2024. 17
Photo 8: Bathurst caribou in healthy and fat body condition around Kokètì, July 2024. 19
Photo 9: Team B watching caribou at Kokètì, August 2024. 21
Photo 10: Herd standing on ridgeline in the wind to avoid the insect harassment. 22
Photo 11: Yèagoa - young bulls - at Deèzàatì, September 2024. 27
Photo 12: the low water exposed boulder field in the lake. August 2024..... 29
Photo 13: caribou walking through boulder field at Deèzàatì 29
Photo 14: caribou inside the tall willow bushes north of Rawalpindi Lake 30
Photo 15: drone image of tundra fire from 2023 30
Photo 16: Dwarf birch turning brown in early August from the drought. 31
Photo 17: large sized mushrooms..... 33
Photo 18: elders leading the payer at the old gravesite on Tatsotì - Grenville Lake 34
Photo 19: Team repaired the old gravesite on Ets'àitì (Rawalpindi Lake) 34
Photo 20: portaging along the esker on the barrenland, north of Ets'àitì (Rawalpindi Lake). 36
Photo 21: youth Jerrick Camsell with elder Joe Zoe holding the hide of the first Sahtì ekwo harvested during fall in 12 years, August 2024. 37

Photo 22: Bull caribou, Bluenose east herd, August 2024 37
Photo 23: drone photo of canoers on the way to Deèzàatì, August 2024 38
Photo 24: campsite on Ets'àıtì (Rawalpindi Lake). August 2024 38
Photo 25: the new ENK camp at Ek'atì, located on the northeast side of Ek'atì. 39
Photo 26: ENK team by the new cabin at Ek'atì. 39
Photo 27: *woza*: cow with her calf; notice large body size and antler on the calf 40
Photo 28: cow with a calf, followed by a young bull, September 2024 40
Photo 29: Beverly caribou bulls in healthy body condition, September 2024 41
Photo 30: Beverly caribou bull feeding on green grass in dried up lake 42
Photo 31: Beverly caribou feeding on lichen and dried grasses 42
Photo 32: fields of lichen, east of Ekati point lake mine, September 2024. 43
Photo 33: Dillion Smith taking a lichen sample, east of Ekati 43
Photo 34: portage road made by sand from esker. Notice sinkhole forming on side of road 44
Photo 35: destroyed esker; sand removed by machinery from the esker 44
Photo 36: Team positioned on *what'àa* (esker) next to a well used animal trail 57

Tłı̨chǫ Yatıì

Placenames

Kokètì	Contwoyto Lake
Kwıìdlìachı̨ı̨	Fry Inlet (slingshot-handle lake)
Ek'atì	Lac de Gras
Ek'adıì	Island on Lac de Gras
Kwek'atì	This is an older name for Lac de Gras – referring to the white rocks found around the lake
Ewaànıt'ııtì	Courageous Lake
Nǫdìikahtì	Mackay Lake
Łıwets'aɔ̀ats'ahtì	Lac du Sauvage

Deèzàatì	Point Lake
Dı Cho	Big Island on Deèzàatì
Deèzàatìdeè	Coppermine River
Wek'ehaelı̨ı̨tì deh	Parent River
Wek'ehaelı̨ı̨tì	Parent Lake
Saat'ootì	Redrock lake
Tatsotì	Grenville Lake
Gotsokatì	Mesa Lake
Wek'ewhàılııtì / Ets'àıtì	Rawalpindi Lake

Geographical Terminology Useful for Ekwǫ̀ Monitors

Ekwǫ̀ Nǫɔokè	Ekwǫ̀ water crossing (any place an animal can swim across)
Ekwǫ̀ Naɔokè	Ekwǫ̀ water crossing (a place ekwǫ̀ *always* swims across)
Tataà	Land between water bodies
Whatàa	Esker
Hozìı	Barrenland
Hozìı Deè	Barrenland; farthest out, “big barrens”
Hozìı shìa	Hill or mountain on barrenland
Sıh / shıh	Hill or mountain
Daka	High points
Ts’ıwìì	Stands of trees (black spruce) on barrenland
Tì	Lake/water
Ta	Water; prefix of a word to do with water
Deh	River
Taıɔaa	Meandering river
Dehtì	River lake (a lake in the flow of a river)
Dı	Island
Tɬ'à	Bay
tɬ'ą̀ą	Beach
Tabàa	Lake shore or beach
ɔehdah	A point of land
ʔehdahkw’o	Peninsula
Tı k'abàa	Shoreline (walking by the shoreline)
Wha	Sand: prefix to do with sand / or a pole
Nałeezee	Ekwǫ̀ calving grounds
Dechįlaa	Treeline
Chįk'è	North
Sazhį/ sazį	South
k'àbatsǫ̀ǫ̀	East
dą̀ą̀	West

Wildlife Terminology Useful for Ekwǫ̀ Monitors

Hozìı Ekwǫ̀	Barren-ground ekwǫ̀
Kokètì ekwǫ̀	Bathurst ekwǫ̀ herd
Sahtì Ekwǫ̀	Bluenose-east ekwǫ̀ herd
Tǫdzìì	Woodland / boreal ekwǫ̀
Ekwǫ̀ łexè k’eɔàa	Ekwǫ̀ herd
Ekwǫ̀ akwe etłee	Ekwǫ̀ leader / lead ekwǫ̀ (any gender)
Ts’ìda akwe etłee	Cow leader
Chıa/Tsıa	Ekwǫ̀ calf
Ts'ìdaa	Yearling (2 or 3 years old)
Wedzıìke /wedzıìkea	Cow with no calf
Dets'èa	Young cow ekwǫ̀

Dets’e	Mature cow ekwǫ̀
Wozaà	Cow with calf
Yèagoa	Young bull ekwǫ̀ (2 to 3 years old)
Yèago	Bull
Yèagocho	Bull ekwǫ̀, biggest bull
Wedzıìhcho	Oldest bull
Wedzıì	Bull ekwǫ̀
Nadeèzhǫ	Older bull ekwǫ̀
Ekwǫ̀ nàxoèhdee k’è	In the migration of ekwǫ̀
Nadeeɔà	Migrating ekwǫ̀
Ekwǫ̀ na da dıı	Ekwǫ̀ left behind during migration: “ekwǫ̀ that go half way”
Nìızaa	Ekwǫ̀ migrating towards the forest in the fall
Nadèezoǫ	Ekwǫ̀ migrating to the calving grounds
Ekwǫ̀ edè	Ekwǫ̀ antlers
Ekwǫ̀ keè	Ekwǫ̀ tracks
Ekwǫ̀ eto	Ekwǫ̀ trail
Ekwǫ̀ ek’a	Ekwǫ̀ fat
Dìga	Male wolf
Dìga dets’è	Female wolf
Dìgazha/ Dìgaza	Wolf pup/pups
Dìga wozaa /wezaa	Wolf litter
Dìga eɔoo	Wolf den
Dìga nàdè	Wolves family / community / wolves living together
Dìga nàdèe k'è	Wolf habitat
Sahcho	Grizzly bear
Hozìı edzıe	Muskox
Nǫ̀gha	Wolverine
Dıdı	Arctic ground squirrel / barrenland squirrel
Dedìı	Moose
Kw’ıh	Mosquito
Behk’òts’ı̨ą	Arctic tern
Tatsǫ̀ gah	Raven
Hatsǫ̀ga	Crow
Tı tso	Loon
Det’ǫcho	Eagle
Ets’imbaa	Arctic fox

Quotes from Tłı̨chǫ Youth

"This day was the best day of my life, since I saw over 50 caribou this day! A lot of bull caribou, with some calves and cows! Plus, where they were at was amazing scenery! As we were leaving, we saw these amazing caribou swimming to the other side to join the rest of their herd! Was an amazing day for me; had the best time out at Deèzàatì"

"Being on the Barren Lands, especially Deèzàatì was a great experience, especially the cold here is something different but managed to get through it but to know where my grandpa and his parents have travelled back then was an amazing adventure for me, to know where they've travelled and how they used to survive back then, I'd say it was an amazing experience for me and for the team I was with, I enjoyed being with them here for 18 days, made my days more exciting and full of laughter! To also see a lot more caribou, especially bull caribou, it made my year all the worthwhile."

"This day was chilly, but I managed through and saw these beautiful animals, coming towards us slowly! I was so happy and wanted to stay there for longer and see what they would do but I had a good day! I'd say it's worth going to the barrenlands not only for the caribou but to learn more about our culture and heritage of where we come from as Tłı̨chǫ people."



Photo 1: Drum dance at the Kokètì camp, August 2024.

Ekwǫ̀ Nàxoèhdee K'è - Introduction

Started in 2016, the Ekwǫ̀ Nàxoèhdee K'è ekwǫ̀ (ENK) monitoring program has brought Tłı̨chǫ people to the ancestral hozìı ekwǫ̀ (barren-ground ekwǫ̀) harvesting locations on hozìıdee (barrenland). The basecamp at Kokètì (Contwoyto Lake), located in the northernmost region of Tłı̨chǫ traditional territory, is on the summer range of the Kokètì ekwǫ̀ (Bathurst ekwǫ̀) herd; the place where hozìı ekwǫ̀ migrate with their newborn calves to spend the summer.

In an ongoing commitment, the Tłı̨chǫ Government persistently engages in monitoring programs to study and manage the land and ekwǫ̀ herds, guided by the traditional wisdom of Tłı̨chǫ Elders and harvesters. Both the Kokètì ekwǫ̀ and the Sahtì ekwǫ̀ herds have undergone significant declines over the past decade. The latest calving ground surveys, carried out in June 2022, show that the Kokètì ekwǫ̀ population was estimated at 6,851 individuals (Adamczewski et al. 2023), marking a 99% reduction from its peak recorded population of 480,000 in the 1980s. The Sahtì ekwǫ̀ population (Bluenose East herd) was estimated at 23,202 ekwǫ̀ (Boulanger et al. 2022), indicating a modest increase from 19,294 animals counted in the previous survey in 2018 (Boulanger et al. 2019). Because of the critical state of the caribou herds and the importance of caribou for the Tłı̨chǫ culture, language and way of life; the Tłı̨chǫ Government continues the ENK program to study and interact with the ekwǫ̀ herds

The monitoring goal is to assess the state of hozìı ekwǫ̀ within its summer range, with a specific emphasis on four primary indicators: (1) habitat; (2) ekwǫ̀ health; (3) predator presence; and (4) industrial development impacts. The program is a collaboration between the Tłı̨chǫ Government, GNWT-ECC, the Wek'èezhìı Renewable Resource Board (WRRB). Funding was provided by Tłı̨chǫ Government, Burgundy Diamond Mines Ltd., and the GNWT-Cumulative Impact Monitoring Program[1] (CIMP).



Photo 2: Kokètì Basecamp (Pat Kane).



Photo 3: Deèzàatì basecamp (Petter Jacobsen).

The program operates from three basecamps situated on the barrenlands (Map 1). The primary basecamp is located at Kokètì, where ekwǫ̀ monitoring efforts have been ongoing for nine years, starting in 2016 (Photo 2). In the summer of 2020, an additional base camp was established at Deèzàatì (Point Lake) (Photo 3) to monitor the Sahtı ekwǫ̀. Establishing the ekwǫ̀ monitoring program at Deèzàatì was based on WRRBs (2019) recommendation

[1] This project receives funding from Government of the Northwest Territories Department of Environment and Climate Change, Northwest Territories Cumulative Impact Monitoring Program. More info can be found at: http://www.enr.gov.nt.ca/en/services/cumulative-impact-monitoring-program-nwt-cimp

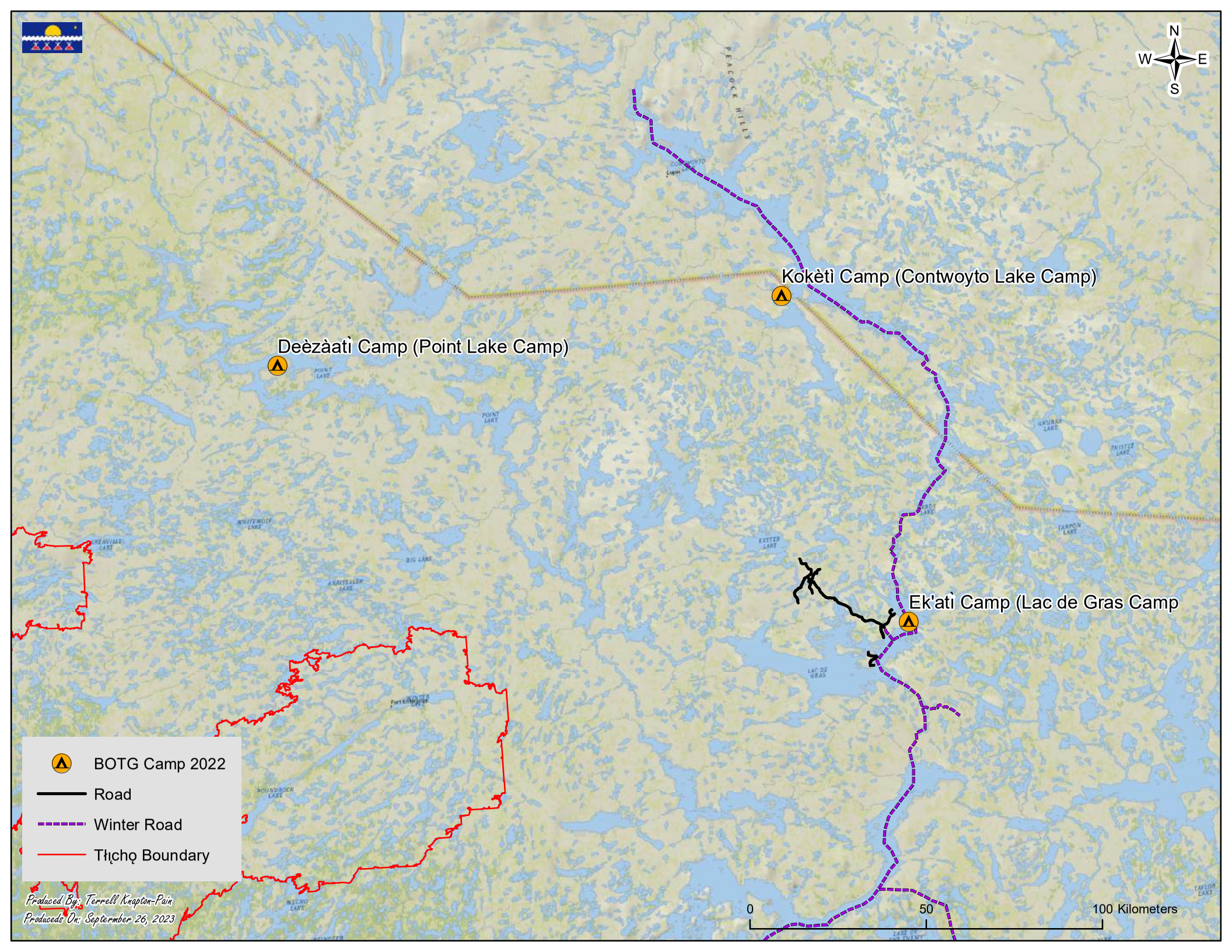
(#15-2019) to expand TG's monitoring to the summer range of Sahtì ekwǫ̀. Deèzàatì was selected because it is the largest waterbody on the Sahtì ekwǫ̀ range within Wek'èezhìı and because of the rich Tłı̨chǫ cultural history on the lake. In August 2022, we expanded the program to Ek'atì (Lac de Gras) and Łıwets'aɔ̀ats'ahtì (Lac du Sauvage) (Photo 4). The long-term plan involves establishing a research camp on Łıwets'aɔ̀ats'ahtì, and initiate research and monitoring activities on the lakes around the mines in the years ahead. We were not able to be at Ek'atì during fall 2023, due to wildfire evacuations and severe smoke conditions on the barrenlands making it impossible to land floatplanes at Ek'atì.



Photo 4: ENK camp on Ek'atì (Lac du Sauvage). September 2024 (Petter Jacobsen).

Between 2016 and 2024, the monitoring and search efforts of the teams have consistently grown, leading to more frequent and comprehensive wildlife observations. Table 1 provides an overview of the program's annual progression, highlighting the increase in monitors, field days, travel distances, and monitoring hours.

Through Ekwǫ̀ Nàxoèhdee K'è, Tłı̨chǫ travel to their ancestral harvesting locations on Kokètì and Deèzàatì, where we reconnect to cultural places and ekwǫ̀. Thus, the program helps Tłı̨chǫ participants to "go back to the original source to remember" (John B. Zoe) the stories, language, knowledge, and cultural ways of life. Through on-the-land monitoring, the ENK program provides an important way for Tłı̨chǫ to continue maintaining the relationship with the land and animals, because "our relationship with ekwǫ̀ defines who we are. It's a foundation for our nàowo – a Tłı̨chǫ concept that encompasses our language, culture, way of life, as well as our knowledge and laws" (Zoe 2012a, p. 69).


N
W
E
S
Kokètì Camp (Contwoyto Lake Camp)
Deèzàatì Camp (Point Lake Camp)
Ek'atì Camp (Lac de Gras Camp
BOTG Camp 2022
Road
Winter Road
Tłı̨chǫ Boundary
Produced By: Terrell Knapton-Pain
Produceds On: September 26, 2023
0
50
100 Kilometers

We apply the Tłı̨chǫ research methodology, "We Watch Everything" to study current environmental conditions, cumulative impacts to ekwǫ̀ health and populations, and directly observe ekwǫ̀ in summer and early fall. The research methodology "Do as Hunters Do" is formed around traditional ways of traveling the land and sharing knowledge through peoples' daily activities and interactions on the land (Zoe 2012b). In and around the lakes, we travel the land by boat and on foot to key geographical features known as ekwǫ̀ nǫ̀ǫ̀kè (ekwǫ̀ water crossings), where Elders have always anticipated ekwǫ̀ herds' arrival. The monitors sit in position, in the same way a traditional hunting party would have done, to wait, and watch the ekwǫ̀ and their habitat. Applying traditional hunting strategies as wildlife monitoring methods, and traditional hunting locations as monitoring places, we conduct research by doing what the ancestors did successfully to survive the harsh sub-arctic environment since time immemorial.

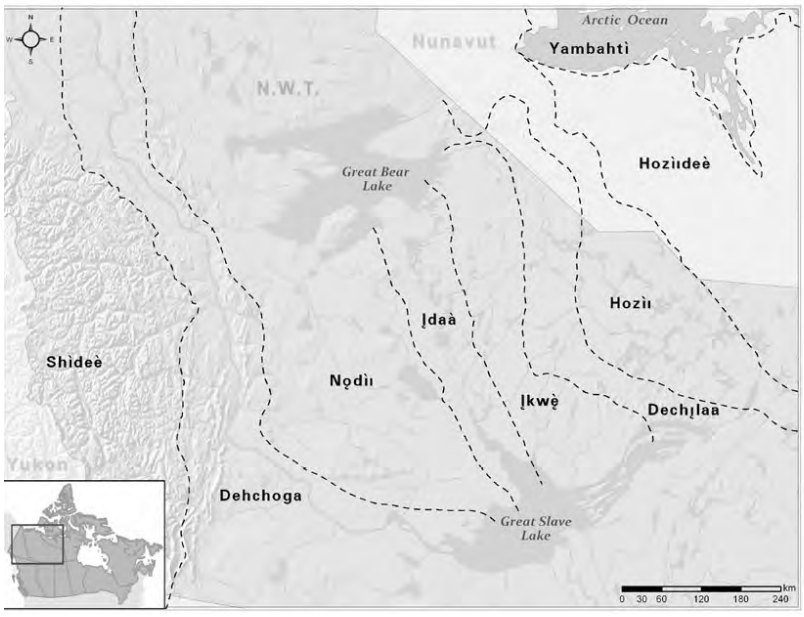
This report presents overview of the 2024 field season, including:

- **Kokètì ekwǫ̀ monitoring results from Kokètì,**
- **Sahtì ekwǫ̀ monitoring results from Deèzàatì**
- **Trends from 2016 to 2024;**

For information about program activities and results from 2016 to 2024, please see our reports, documentaries and photos on the website: https://research.tlicho.ca/research/bootsontheground.

Caribou Monitoring Area and Timeline

The study area is situated entirely within hozìıdee (Map 2), referring to the region beyond hozìı (barrenland); a place without trees and only low-growth shrub vegetation (Andrews 2011). The area is classified as a tundra biome and is in the Arctic Tundra climatic zone. Geographically, the ekwǫ̀ monitoring area is focused around our three camps at Kokètì (Contwoyto Lake), Deèzàatì (Point Lake) and Ek'atì (Lac de Gras/ Lac du Sauvage) and the surrounding land that can be reached within a day's walking distance from lake shorelines (Map 1).



Map 2: Tłı̨chǫ Landscape Units. Source: Andrews 2011

Hozìıdee is a shared region utilized by both the Tłı̨chǫ and Inuit people for harvesting hozìı ekwǫ̀ in summer and fall, fur trapping in winter, and as a trade route facilitating interactions between the two cultures. Inuit and Tłı̨chǫ have a long history of meeting at historical hozìı ekwǫ̀ hunting locations. The land surrounding Kokètì plays a

pivotal role in both the post-calving and summer ranges of the Kokètì ekwǫ̀. Come July, following calving, herds of cows and calves migrate from the calving grounds and join the bulls, aggregating into larger herds. The cows lead their calves to these feeding grounds around Kokètì, allowing the calves to nourish themselves and learn the best plants to eat, to grow and gain fat before the fall migration and the onset of winter.

The Tłı̨chǫ name for Contwoyto Lake is Kokètì, translated as "empty campsite lake," in reference to the many camp sites used by Tłı̨chǫ ancestors around this lake. Kokètì is located at the northernmost extremity of Tłı̨chǫ traditional land use territory and is situated in Hozìidee described as "big barrens" (Andrews 2011). The Burnside River drains water from Kokètì to Bathurst Inlet which is about 175 km to the northwest; the areas around Bathurst Inlet have been the calving ground for Kokètì ekwo and is the basis by which biologists named the Bathurst caribou herd (Thomas 1969).

Kokètì runs approximately northwest to southeast, effectively bissecting the post-calving summer range of Kokètì ekwǫ̀. The land around the large lake provides a low rolling landscape with optimal ekwǫ̀ habitat and refuge from biting insects that are heavily influenced by winds coming off the lake. At its widest point, the lake is approximately 19 kilometres wide, and numerous eskers and islands form nǫʔokè (water crossings) that ekwǫ̀ use to cross the lake. The elongated shape of the lake creates a network of nǫʔokè along both eastern and western shores of the lake that creates corresponding ekwǫ̀ etǫ (ekwǫ̀ trails) worn into the ground as these etǫ are continuously used every summer. Kokètì is accessible by canoe and floatplane during the summer; in the winter months it is reached by snowmobile from Kugluktuk or via winter ice road to Yellowknife. The Tibbitt-Contwoyto Winter Road (TCWR Joint Venture) is built from Yellowknife through Kokètì for mining resupply (map 1), although the winter road access north of the Diavik and Ekati mines has not been open each year. There are currently two non-active mines (Lupin and Jericho) in the monitoring area, and several active mines south of the area (Ek'atì, Diavik, and Gahcho Kuè) as well as several abandoned exploration camps scattered across the landscape.



Photo 5: Kokètì camp in channel between Kokètì (Contwoyto Lake) and Fry Inlet (Aimee Guile).

Field Teams during Summer 2024

During 2024, the program occurred over a combined period of 94 days between July 16st and October 1st, during which five teams (Teams A to E) conducted shifts of three and two weeks, with the combined total of 761 person-days in the field (Table 1). The teams' daily fieldwork was done by boating and walking. The teams travelled the lakes by boat and walked inland to get into proximity to the ekwǫ̀ herds. The daily monitoring locations were determined using the harvesters' knowledge of ekwǫ̀ movement and GPS collar locations of Kokètì ekwǫ̀ provided by GNWT-ECC three times per week.

Table 1: Summary of field activities for ENK monitoring, summer and fall 2024

			Field Days - 2024					Distance			Time			
Herd Range	ENK Camp	Field Team	Start	End	Personnel	# Days	Person -Days	Boat (km)	Walk (km)	Total (km)	Travel (h)	Observation (h)	Total (h)	# Trips
Bathurst	Kokètì	A	16-Jul	02-Aug	8	18	144	532.0	27.3	559.3	29.9	19.8	49.7	8
		B	02-Aug	20-Aug	8	19	152	247.8	21.6	269.4	24.3	5.3	29.6	12
				Subtotal	16	37	296	779.8	48.9	828.7	54.2	25.1	79.3	20
Bluenose East	Deèzàati	C	23-Aug	13-Sep	9	22	198	426.8	31.5	458.3	7.1	16.2	23.3	19
		D	13-Sep	01-Oct	9	19	171	849.1	7.5	856.6	42.4	15.3	57.7	10
				Subtotal	18	41	369	1275.8	39.0	1314.8	49.5	31.4	80.9	29
Beverly	Ek'atì	E	11-Sep	26-Sep	6	16	96	459.9	59.3	519.2	47.3	19	66.3	9
				Total	**40**	**94**	**761**	**2515.5**	**147.2**	**2662.7**	**151.0**	**75.5**	**226.5**	**58.0**



Photo 6: Team B on esker by Kokètì camp, August 2024

The Silent Crisis – Dramatic Decline of the Kokètì Ekwǫ̀

In 2018, the NWT Conference of Management Authorities (CMA) listed the *hozìı ekwǫ̀* (barren ground caribou) as *Threatened* in the Northwest Territories, based on a 2017 assessment by the Species at Risk Committee (SARC 2017). The CMA listing *threatened* means that the barren ground *hozìı ekwǫ̀* species in NWT is declining and there are threats that could cause the species to disappear from the Northwest Territories in our children's lifetime. Furthermore, the listing states that "barren ground caribou is likely to become endangered in the NWT if nothing is done to reverse the factors leading to its extirpation or extinction" (SARC 2018).

For the *Kokètì ekwǫ̀*, the most recent calving ground survey, conducted in June 2022, estimated the total herd population to be 6,843 ekwǫ̀ (Adamczewski et al. 2022). At its historic recorded high in 1986, the Bathurst herd was estimated at about 470,000 ekwǫ̀, and the estimate of 6,843 ekwǫ̀ in 2022 represents just 1.3% of the observed population high. Emigration of some Bathurst ekwǫ̀ to the Beverly herd is likely an important contributing factor in the recent observed decline between 2018 and 2021. The main contributors to the continued decline are low survival rate for adult female *ekwǫ̀*, and poor reproduction rates of the herd, which include low survival rate for calves (Government of the Northwest Territories and Tłı̨chǫ Government Joint Proposal on Management Actions for the Bathurst Ekwǫ̀ (Barren-ground ekwǫ̀) Herd: 2019 – 2021).

This dramatic rate of decline for the *Kokètì ekwǫ̀* herd meets the criteria for being *Endangered*, according to the Committee on the Status of Endangered Wildlife in Canada (COSEWIC 2015). If current trends continue, the Bathurst herd will meet the criteria for *Critically Endangered*. In such a scenario, the herd "may not recover for decades to a size that could sustain a meaningful level of hunting" (TG - GNWT Joint Management proposal for Bathurst *Ekwǫ̀* 2019).

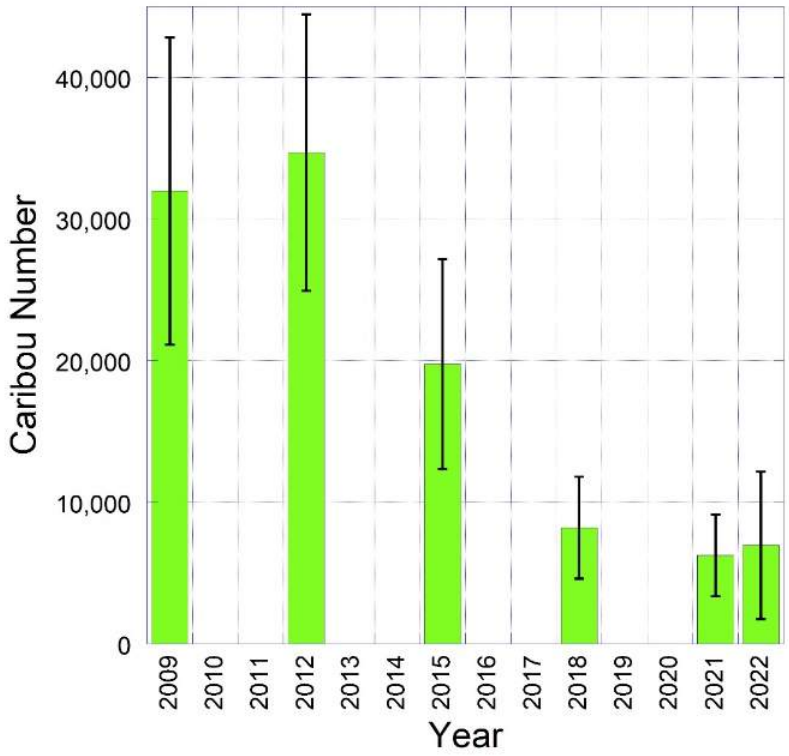
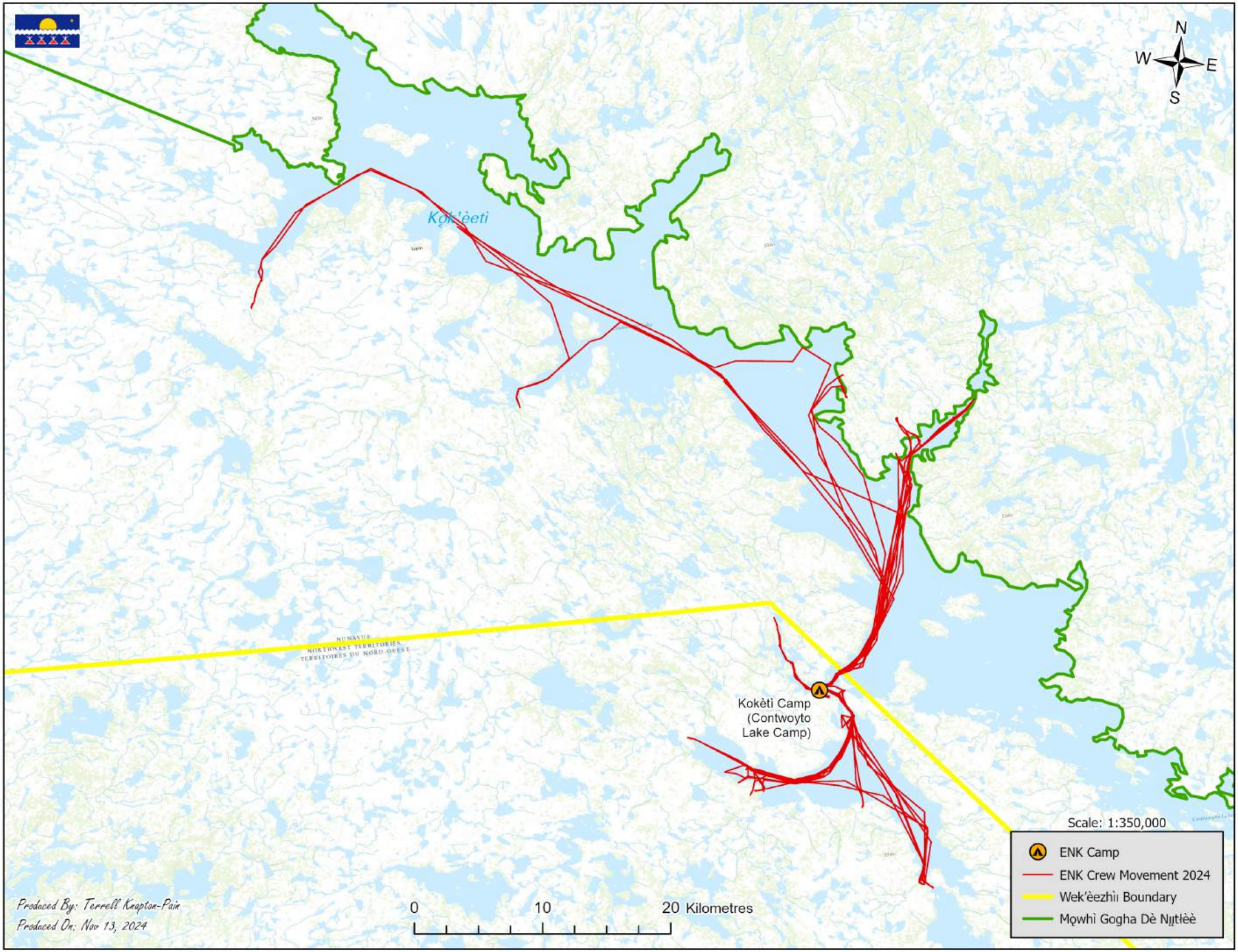


Figure 1: Bathurst herd calving population estimate 2009-2022. Source: Adamczewski et al. 2022.


N
W
E
S
Kǫ̀ǫ̀ 'èeti
NUNAVUT
NORTHWEST TERRITORIES
TERRITOIRES DU NORD-OUEST
Kokèti Camp
(Contwoyto
Lake Camp)
Scale: 1:350,000
ENK Camp
ENK Crew Movement 2024
Wek'èezhìi Boundary
Mǫwhì Gogha Dè Nı̨ıtłèè
0
10
20 Kilometres
Produced By: Terrell Krapton-Pain
Produced On: Nov 13, 2024

2024 Results

Ekwǫ̀ (barren ground caribou) were the most abundant species seen by field teams. A total of 4183 ekwǫ̀ within 125 groups were observed by the five teams. At Kokètì we saw the most ekwǫ̀, 3397 caribou in 43 groups which was a mix of Kokètì Ekwo (Bathurst) and Beverly caribou. At Ek'atì we saw 477 Beverly caribou in 36 groups, and at Deèzàatì 309 Sahtì ekwo (Bluenose east) caribou in 46 groups.

Table 2: Summary of animals observed, 2024

			Animals Observed										
Herd Range	ENK Camp	Field Team	Caribou*	Muskox	Moose	Wolf	Grizzly Bear	Wolverine	Fox	Eagle	Bald Eagle	Golden Eagle	Peregrine Falcon
Bathurst	Kokètì	A	3334	32	0	0	0	0	0	0	4	0	0
		B	63	48	0	0	0	0	0	3	0	0	0
		Subtotal	3397	80	0	0	0	0	0	3	4	0	0
Bluenose East	Deèzàati	C	120	0	7	0	2	0	0	0	3	1	3
		D	189	0	0	1	0	0	0	2	2	0	0
		Subtotal	309	0	7	1	2	0	0	2	5	1	3
Beverly	Ek'atì	E	477	0	1	2	25	2	1	0	0	0	0
	Total		**4183**	**80**	**8**	**3**	**27**	**2**	**1**	**5**	**9**	**1**	**3**

**Team A observed a group of 2000 and 1000 on the 26 and 27 July 2024 on the western shoreline of Contwoyto Lake; these two groups of caribou were likely from the Beverly herd*

- Hozìı edzıe (muskox) were only seen at Kokètì and were the second most observed wildlife species with 80 individuals seen within 7 groups.
- Dedìı (moose) were observed at Deèzàatì, and one moose seen north of Ek'atì. No moose was observed at Kokètì this summer, compared to steady observations during previous summers.
- Dìga (wolves) were not seen at Kokètì. Dìga were not observed at Deèzàatì, although many ekwǫ̀ herds were around the lake. Two Dìga were seen close to camp at Ek'atì.

Table 3: Summary of animal groups observed, 2024

			Groups Observed										
Herd Range	ENK Camp	Field Team	Caribou	Muskox	Moose	Wolf	Grizzly Bear	Wolverine	Fox	Eagle	Bald Eagle	Golden Eagle	Peregrine Falcon
Bathurst	Kokètì	A	17	3	0	0	0	0	0	0	3	0	0
		B	26	4	0	0	0	0	0	2	0	0	0
		Subtotal	43	7	0	0	0	0	0	2	3	0	0
Bluenose East	Deèzàati	C	18	0	2	0	2	0	0	0	0	1	1
		D	28	0	0	1	0	0	0	2	0	0	0
		Subtotal	46	0	2	1	2	0	0	2	0	1	1
Beverly	Ek'atì	E	36	0	1	1	13	2	1	0	0	0	0
	Total		**125**	**7**	**3**	**2**	**15**	**2**	**1**	**4**	**3**	**1**	**1**

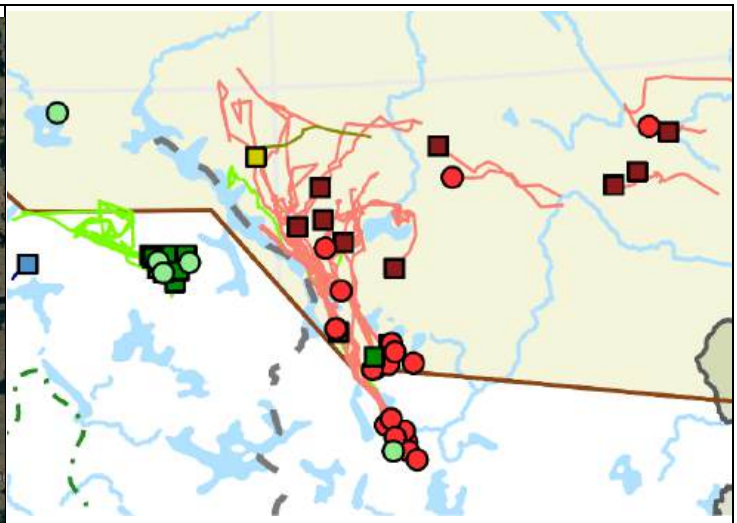
- Sahcho (Grizzly bears) were observed numerous times at Ek'atì with a total of 13 sahcho seen 27 times during the 14 days we stayed at the lake. Sahcho was not observed at Kokètì this summer. Two sahcho were seen at Deèzàatì.
- Wolverines (nogha) were seen two times at Ek'atì.
- Bald eagles (det'ǫcho) were seen only at Kokètì, with three eagles seen in total

Kokètì Ekwǫ̀ – Bathurst Caribou

During July and August, the two teams observed a limited number of ekwǫ̀ around Kokètì, with a total of 397 caribou in 41 groups. Group size ranged from 1 to 300 (estimated); average group size was 10 caribou. Overall, we saw few ekwǫ̀ during the summer period around Kokètì. In July we saw mostly groups of bulls and cows, with bulls dominating the composition. This was the first time we saw larger groups of caribou. In August, mostly yearling bulls were observed, and overall smaller groups around five caribou in total. It is important to note that Team A also saw two large groups estimated to comprise 1000 and 2000 Beverly caribou respectively at the end of July (Map 4) along the eastern shoreline of Kokètì. We were confident that the two large groups of ekwo were from the Beverly herd because they were located within the area used by collared Beverly caribou in late July.



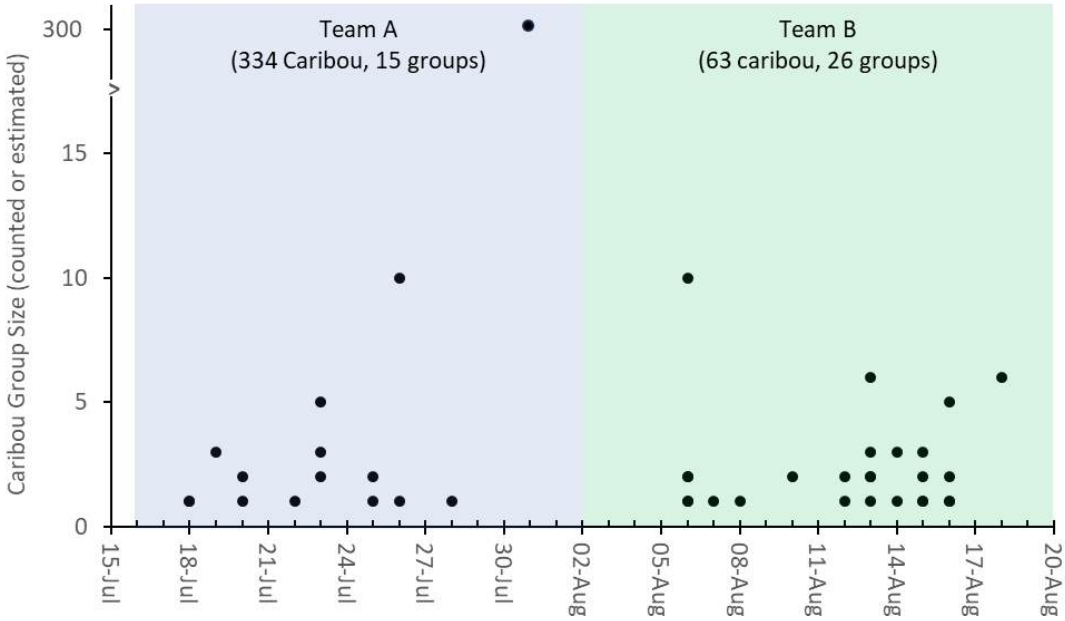
Caribou group observations
Group A-19, 26 Jul 2024, estimated 2000 caribou
Group A-20, 27 Jul 2024, estimated 1000 caribou
Group A-23, 31 Jul 2024, estimated 300 caribou



Map of satellite−collared barren−ground caribou locations with 5−Day Paths (31 July 2024, source: GNWT-ECC).
Red = Beverly caribou
Green = Bathurst caribou
Squares = Female. Circles = Bulls

Map 4: Locations of large caribou groups observed by Team A in late July 2024, and movements of collared caribou from Bathurst and Beverly herds in late July 2024.

Figure 2: Distribution of ekwǫ̀ group sizes observed by two ENK field teams at Kokètì, July to August 2024.



Kokètì Ekwǫ̀ Calf Abundance

Calf to cow ratios were derived from ekwǫ̀ observations that included at least one cow and were observed within one km of field teams. In 2024, the Field Teams A and B at Kokètì observed a total of 41 groups of Bathurst caribou from 18 July to 18 September; 10 of those groups had at least one cow and were used to estimate an overall late summer calf: cow ratio. The 10 groups included a total of 18 cows and 3 calves and resulted in an estimate of 16 calves per 100 cows (i.e., 0.158 ± 0.078 SE); this ratio is low even if most calves survive the coming winter. For example, if late winter calf recruitment was 16 calves per 100 cows in combination with an average adult female survival rate of 85%, the annual rate of increase (λ) would be ~ 0.918, which means it is declining by about 8.6% per year. However, these results are likely not representative of the herd, as the sample size is very small and most of the collared Bathurst caribou were located further west of Kokètì (Map 4).





Photo 7: Bathurst caribou calves, 1.5 months old. July 27th, 2024.

Between 2018 and 2021, we have observed favorable habitat conditions and seen healthy ekwǫ̀ in generally good body conditions around Kokètì. We considered this as a positive sign, indicating the presence of good environmental conditions for the population to grow. However, during these years, we continue to see many herds with few or no calves. During summer 2022 and 2023, we started to see herds with more calves. For two consecutive summer we observed a higher calf abundance in the herds around Kokètì, and during summer 2022, we documented a calf-to-cow ratio of 48 calves per 100 cows. We consider this amount of calves during the summer months to be "good" and "normal," when compared to the low calf numbers seen around Kokètì between 2018 to 2021. However, during summer 2024, we observed very few calves with an estimate of 16 calves per 100 cows. The sample size for this summer was very small, and the results from summer 2024 are likely not representative of the herd because most Kokètì ekwǫ̀ were further west of Contwoyto Lake (Map 4).

Body Condition & Health at Kokètì (Contwoyto Lake)

Overall, the Kokètì ekwǫ̀ observed by monitors were healthy and had good condition. Body conditions were improving over summer and in late August, most animals were in good body condition. At Kokètì, we observed body condition of 29 bulls, 11 cows, and 2 calves respectively. No thin or skinny caribou were seen. Of the 29 bulls, 59 % were fat and 41% were good. Of 11 cows seen, 36% were fat and 64% were in good condition. Both calves were in good condition.

Bulls					**Cows**				
Groups	Individuals				Groups	Individuals			
	Fat	Good	Thin	Total		Fat	Good	Thin	Total
16	17	12	0	29	8	4	7	0	11
	59%	41%	0%	100%		36%	64%	0%	100%

Calves				
Groups	Individuals			
	Fat	Good	Thin	Total
2	0	2	0	2
	0%	100%	0%	100%

Table 4: Summary of body condition score around Kokètì during summer and fall 2024.

Injuries

Of the 397 caribou observed (from the Bathurst herd) only one caribou showed sign of injury. Teams A and B watched 55 caribou within 23 groups to see if any showed signs of injury while walking. On July 6th, Team A noted that one young bull in a group of 10 caribou (4 bulls, 1 cow, 1 calf, and 4 unknown age-sex), was lying down and had an injured hind leg.





Photo 8: Bathurst caribou in healthy and fat body condition around Kokètì, July 2024.

Dìga and other Predators

During summer 2024, the teams did not observe any predator activity. Between July and August, there was no dìga (wolves/*Canis lupus*) activity observed in the vicinity of Kokètì. During summer 2023, we also did not observe any dìga activity around the lake. However, during the previous two years, 2022 and 2021, we saw 14 dìga during each summer. In 2020, zero dìga was reported, while during summer 2019, a high number of 31 dìga observations were recorded.

From our observations from 2017 to 2022, the monitors consistently observed dìga around Kokètì, with some variations in 2020 and 2023 dependent on ekwǫ̀'s proximity to the lakeshore. However, during the last two years we have not seen any wolves.

Sahcho (grizzly bears/*Ursus arctos*/"big guy") were not observed at Kokètì this summer. Overall, we have seen fewer bears over recent years. The two sahcho seen in 2023, which are less than the six sahcho observed in 2022, which was slightly less than the seven sahcho reported in summer 2021. And less than eight bears were observed throughout the summer 2020, and ten sahcho reported during summer 2019. The reported observations for the last years range from 2 to 10 animals per summer, although fewer sahcho have been seen each year.

Dedìı (Moose) Observations

We did not see any dedìı (moose) in summer 2024. During 2023, we saw two dedìı at Kokètì. That was the fourth year dedìı had been seen at Kokètì. One was reported in 2022, seven dedìı was observed in 2021, and 11 dedìı was reported in 2019. Most observation was made around the basecamp between Kokètì and Kwìıdlìachjį̀. Dedìı have not been seen by Tłı̨chǫ monitors prior to 2019, but has become a usual animal to see around Kokètì in recent years.

At Deèzàatì, two dedìı were seen. In 2023, two dedìı were observed and eight dedìı were observed at Deèzàatì in 2022. There are considerable stands of trees and taller shrubs in sheltered valleys around Deèzàatì, and it appears to be better habitat for dedìı compared to the barrenlands around Kokètì.

Kokètì Ekwǫ̀ Habitat

July

During July 2024, the land was dry, which was a continuation of the summer drought of the past two years, 2022-2023. There was not any rain until August 1st, and until then the team noticed that there were few or no wet areas with standing water, that the vegetation was dry, and that the lichen was dry and sounded crunchy when walked on. There was no rainfall while Team A was at Kokètì in the latter half of July, however a total of 26 mm of rain fell in the first two weeks of August (Figure 3a). The elder Henri Gon noticed that there were no puddles like there used to be in the old days and stated that "I have yet to walk across and get my feet wet". Additionally, Henri Gon explained that when caribou food is moist, it's easier for caribou to eat and digest, and subsequently gain weight and fat storage for the coming winter.

Daily temperatures ranged between 5 and 25°C at Kokètì, with a cooler period in early August (Figure 3b) that coincided with rain (Figure 3a). When the team arrived in mid-July, the weather was hot and humid, and the insect activity score (IAS) was more frequently ranked as medium or high until the 27 July and through August insect activity was largely absent (Figure 4). Sometimes, caribou were running around to get away from the biting insects. During last days of July the weather became colder and windy. The cooler temperature and wind decreased the insect activity. There were also a few days with lots of smoke (from wildfires in southern forests), and it became hard to look for caribou as smoke covered the hills.

August

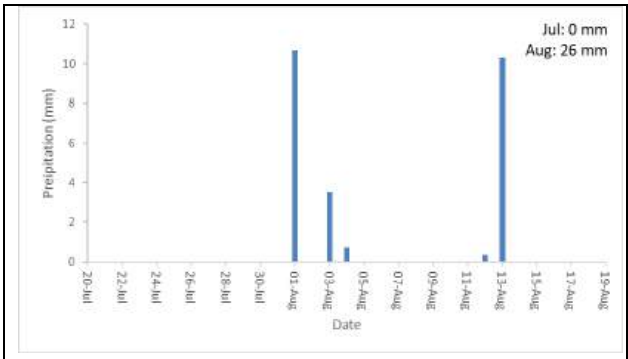
The vegetation was dry until today August 1st, when heavy rain for a whole day, the ground became saturated (Figure 3a). The elder Henri Gon noted that "now the caribou are eating good", and we saw the herds feeding well and walking around. More rain in August provided moisture to the land. Locations around the lake that we visited had become moist, unlike August last year when the land was very dry and crunchy. On windy days the bugs were no present, and on days with low wind the insect activity was still very moderate.

Winds at Kokètì were primarily from the south and west and mostly blowing at a gentle to moderate breeze, 10-20 km/hLight air and light breeze (0-10 km/h) occurred for just over a third of the time at Kokètì. And stronger winds (20-30 km/h) described as a moderate or fresh breeze occurred just over 10% of the time. An analysis showed that insect activity score was positively related to temperature and negatively related to windspeed

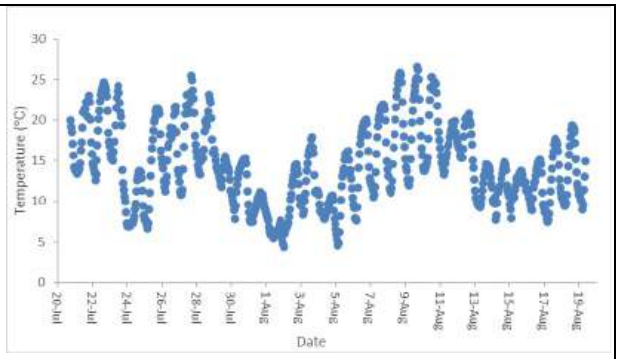
Compared to the last two summers, 2022-2023, the ground had retained moisture and was not as dry and crunchy as it was during last summers. There was also a good abundance of mushrooms, in comparison to the past two years. The overall growth of vegetation and berries had improved. The berries last year, 2023, were very small and dry, but this year the berries had increased in size. According to a youth participant from the visiting Imbe program, "the berries are better than the grocery store berries that we buy", and this feeling seemed to be shared by all the berry picking participants. Heavy smoke from southern forest fires covered the land for a couple of days, which did restrict the team from going on the land.



Photo 9: Team B watching caribou at Kokètì, August 2024.



a)



b)

Figure 3: a) Daily precipitation, and b) hourly temperature based on a portable field weather station at Kokètì, 20 July – 19 August 2024.

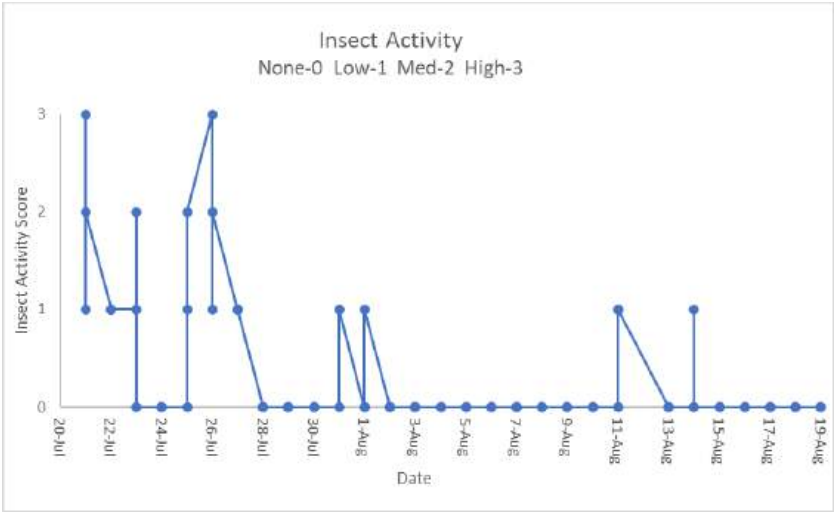


Figure 4: Occurrence of insect activity score (IAS) observed three times daily by monitors at Kokètì.

Kokètì Ekwǫ̀ Indicator Trends 2016-2024

Monitoring Kokètì ekwǫ̀ is based on Tłı̨chǫ people continuing to interact and maintain the relationship with caribou. Being on the land with caribou means watching everything, assessing the culturally defined indicators, developed using the holistic Tłı̨chǫ concept of "We Watch Everything". The elders included several interconnected indicators for monitoring ekwǫ̀ and its habitat, and the table below summarizes results and trends for each indicator per year.

Indicators Over Time

	2016	2017	2018	2019	2020	2021	2022	2023	2024
Weather and Vegetation	Warm, Dry	Mix Dry/Wet	Wet, Windy	Wet, Windy	Wet, Windy	Cool, Windy	Dry, Windy, No insects	Hot, Dry, Tundra Fires	Mix Dry/Wet
Caribou Health	Normal, Many Injured	Normal	Early Fat, Bulls Healthy	Early Fat, Bulls Healthy	Healthy, Fat Animals	Healthy, Fat Animals	Healthy Animals	Healthy Animals	Healthy Animals
Calf Abundance	Normal, High	Normal, High	Normal, Low	Low	Low	Low	Normal, Good	Very Good	Low*
Wolves Observed	1	18	16	31	0	13	9	3	0
Moose Observed	0	0	0	11	0	7	1	2	0

*Small sample size, likely not representative of herd.

Table 5: Trends of monitoring indicators for the last nine years: 2016-2024

The Ekwǫ̀ Nàxoèhdee K'è monitors reported a trend of warm and dry habitat, with high calf abundance in 2016 to 2017, shifting to a trend of cold, wet weather. During the four years, 2018 to 2021, monitors reported ekwǫ̀ habitat and food in generally excellent condition due to much rain and wind, and that ekwǫ̀ health has been observed as "good", including fat bulls and cows, but low calf abundance during the last four summers, from 2018 to 2021 (table above). Although, the good conditions of ekwǫ̀ habitat and ekwǫ̀ body condition, reported from 2018-2022, provide the necessary environmental conditions for the population to grow. However, the monitors observe many groups with few or no calves, and GNWT ECCs calving ground survey shows a continued decline of the Kokètì ekwǫ̀ herd from 8,207 ekwǫ̀ in 2018 to 6,243 in 2021 (Adamczewski et al. 2022).



Photo 10: Herd standing on ridgeline in the wind to avoid the insect harassment. July 2017 (Petter Jacobsen).

During summer 2022, the previous year's climate trend of wet and cold started to change. The summer was very dry and warm. The **summer of 2022** had good forage conditions but short growing season, and some vegetation was drying up at end of summer. The lack of rain and wet ground was comparatively different than the last couple years, with very few mushrooms observed. The summer was characterized as dry and windy conditions which resulted in few or a lack of insects. The water levels in lakes and ponds were deceasing and became very low at the end of fall.

In 2022, the teams reported more calves than we have observed since 2016. During the summer, we observed 44 ekwǫ̀ groups and estimated 48.1 calves to 100 cows. This amount of calves in the herd during summer & fall is considered 'good' and 'normal', compared to low calf numbers we have seen around Kokètì in recent years. Around Ek'atì (Lac de Gras) in August, we observed many Kokètì ekwǫ̀ herds and estimated 34.3 calves to 100 cows. Combining the cow-calf observations at Kokètì and Ek'atì, resulted in an estimate of 39.2 calves per 100 cows for summer 2022. Around Ek'atì, the Tłı̨chǫ monitors also observed a high proportion of tsıdaa and yagoa (young cows and young bulls) in many herds

During **summer 2023**, the shift to warm and dry conditions we experienced during the previous summer was intensified and became even drier and warmer; leading to such dry vegetation, that lightening sparked multiple tundra fires at the south end of Contwoyto Lake, marking our first observation of summer tundra fires in the area. At the same time, we started to see herds with a higher number of calves. This is the second consecutive summer of increased calf abundance in the herds around Kokètì, with an estimated 51.2 calves per 100 cows. This average calf to cow ratio is considered very good for late summer. However, due to the few animals observed the estimate is not well representative of the herd. Nevertheless, it is encouraging that the calves show healthy growth when compared to the low calf numbers seen around Kokètì between 2018 to 2021.

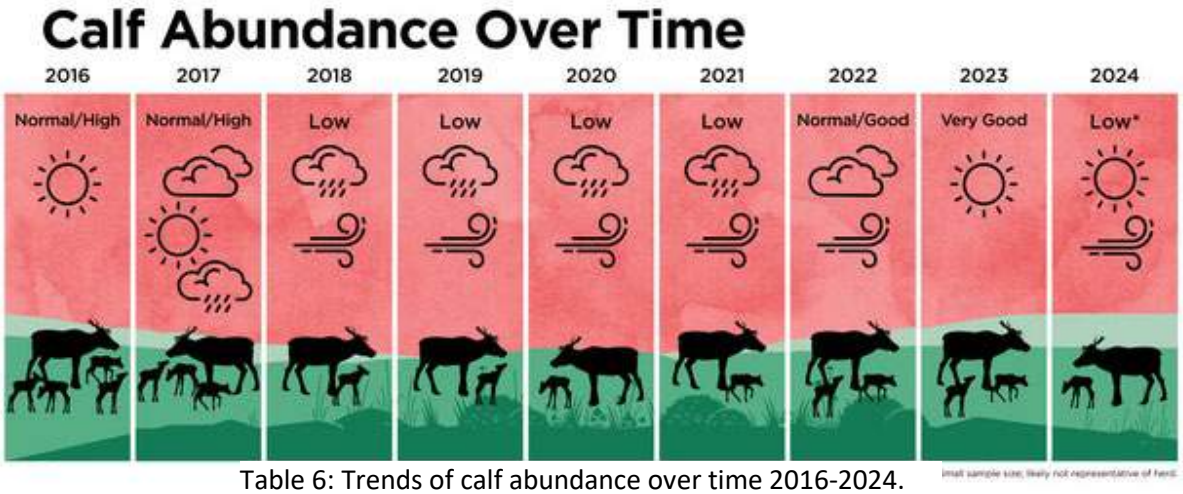


Table 6: Trends of calf abundance over time 2016-2024.

During the start of **summer 2024**, the habitat was dry; a continuation of the summer drought of the past two years (2022-2023). There was not any rain until August 1st, and until then the vegetation was dry, as the lichen sounded crunchy when we walked on it. In August, finally there was rain providing moisture to the land, which contrasted with last year when the land was very dry and crunchy. Compared to the last two summers, 2022-2023, the ground retained moisture due to the rain in August and caribou habitat was not as dry and crunchy as it was during the last two summers. There was also a good abundance of mushrooms, and the overall growth of vegetation and berries had improved, in comparison to the past two years.

The Kokètì ekwǫ̀ were overall healthy and in good body condition. Body conditions were improving over summer and in late August most animals were in good and fat condition. We observed numerous calves in the previous summer, but during summer 2024 we hardly saw any calves in the herds and we estimated 16 calves per 100 cows. We consider this ratio to be low for July and August, even if most calves survive the coming winter. However, the sample size for this summer was very small, as most of the collared Bathurst caribou were located further west, and these results are likely not representative of the herd.

Sahtì Ekwǫ̀ Monitoring Results from Deèzàatì

During fall 2024, two teams of Tłı̨chǫ caribou guardians stayed at the lake from August 23rd to October 1st. Eighteen people stayed at the lake for 41 days. The monitoring was conducted by boat and walking, and the two teams travelled a total of 1315 km.

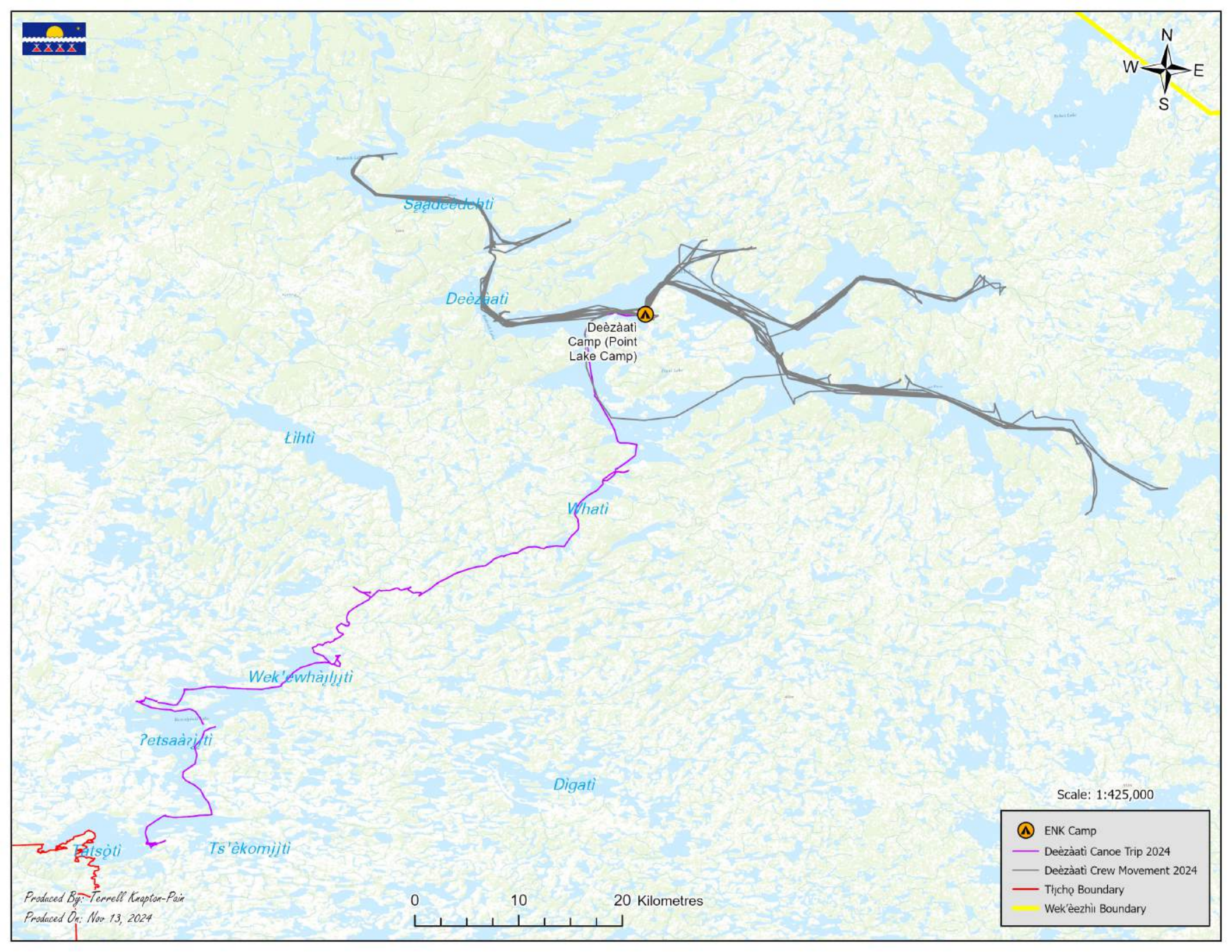
Table 7: Field times for the two teams at Deèzàatì, 2024.

		Field Days - 2024				
ENK Camp	Field Team	Start	End	Personnel	# Days	Person -Days
Deèzàati	C	23-Aug	13-Sep	9	22	198
	D	13-Sep	01-Oct	9	19	171
			Subtotal	**18**	**41**	**369**

		Distance			Time			
ENK Camp	Field Team	Boat (km)	Walk (km)	Total (km)	Travel (h)	Observation (h)	Total (h)	# Trips
Deèzàati	C	426.8	31.5	458.3	7.1	16.2	23.3	19
	D	849.1	7.5	856.6	42.4	15.3	57.7	10
		1275.8	39.0	1314.8	49.5	31.4	80.9	29

Located along the Tłı̨chǫ landscape units of Dechı̨laa (‘edge of the trees’) and within Hozìi (‘barrens’), which correspond to the treeline and barrenlands respectively (Andrews 2011, Tłı̨chǫ Government 2023), Deèzàatì (Point Lake) is a long narrow lake within the upper Coppermine River basin in the central north of the Northwest Territories. Deèzàatì is an example of a dehtì – a lake which is in the flow of a river (Legat et al. 2014a). The seasonal variation of the flow regime through Deèzàatì is relatively low and is influenced by large upstream lakes (Yamba Lake, Ursula Lake, Lac du Sauvage, and *Ek’atì* – Lac de Gras) that attenuate the runoff from snow melt and rainfall events (Coulombe-Pontbriand et a. 1998).

Deèzàatì has a rich cultural history and is an important part of the Tłı̨chǫ traditional territory and cultural landscape that connects people to land through extensive travel and mobility via traditional harvesting trails (Legat et al. 2014b). Deèzàatì has a rich cultural history as Tłı̨chǫ people have travelled and lived there since time immemorial. Deèzàatì was accessed by canoe from the treeline, as people traveled here for ekwǫ̀ harvesting in fall, and by dog team during winter and spring for trapping (Andrews 2011, Legat et al. 2014b). Located along the treeline, the lake contains two ecosystems; a full forest cover exists on its western shores, towards Redrock Lake, while most of the eastern and northern part of the lake is open barrenlands. In between are several pockets of coniferous trees, growing in sheltered bays and along creeks. This combination provides two integrated ecosystems that sustained families of harvesters throughout the year, by providing both access to resources from the forest and from the barrenland. By knowing what to look for, and know-how for making tools, shelters and acquiring fresh meat from the available resources, the unique location of the lake becomes, what the Elders often refer to, as the “bank” or the “store”. Since time immemorial, the continued use of this unique location has created a rich cultural landscape

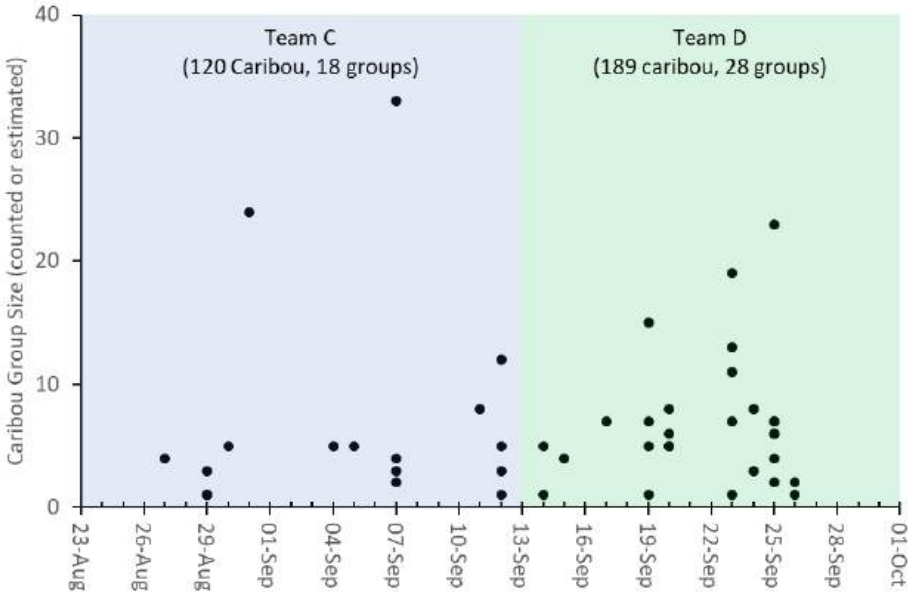

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Deèzàatì Crew Movement 2024
Tłı̨chǫ Boundary
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Sahtì Ekwǫ̀ – Bluenose East Caribou

During mid-August, numerous groups of Sahtì ekwǫ̀ migrated southward towards Deèzàatì and in September and October, groups of ekwǫ̀ were around the lake and surrounding area. Most caribou were seen by second team during mid-September; however, the groups were small and scattered throughout the landscape.

The two teams at Deèzàatì saw a total of 309 caribou in 46 groups. Group size ranged from 1 to 33. Most groups were small, and we did not see any larger herds than 33 animals (Figure 5). Most of the bulls were young animals, there were some lone older bulls but mostly young bulls. The elders mentioned that most of the caribou seen were ts'ıda̰ and yèagoa: young cows and young bulls. Overall, they were in good condition and were foraging well in September.

Figure 5: Classification of caribou observed



Tsıa – Calves

In 2024, the monitoring teams at Deèzàatì observed a total of 46 ekwǫ̀ groups in August and September; 19 of those groups had at least one cow and were used to estimate an overall late summer calf:cow ratio. The 19 groups included a total of 57 cows and 22 calves and resulted in an estimate of 38 calves per 100 cows (i.e., 38.3 ± 7.6 SE); this ratio would be good if most calves survive the coming winter. In general, a caribou herd's trend would be stable if late winter calf recruitment was 35 calves per 100 cows in combination with an average adult female survival rate of 85%. However, we acknowledge that the observed calf to cow ratio may not be representative of the herd because it is based on a small sample of ekwǫ̀ groups and these results should be interpreted cautiously. Of the few calves we saw, they were in good condition and had relatively large body sizes and good antler growth.

For additional context, a stable caribou herd would need to have approximately 35 calves per 100 cows in late winter (March) combined with an average adult female survival rate of 85% (DeCesare et al. 2012). Because some calves will die during summer through to winter, calf to cow ratios in March would most likely be lower than calf counts in September.

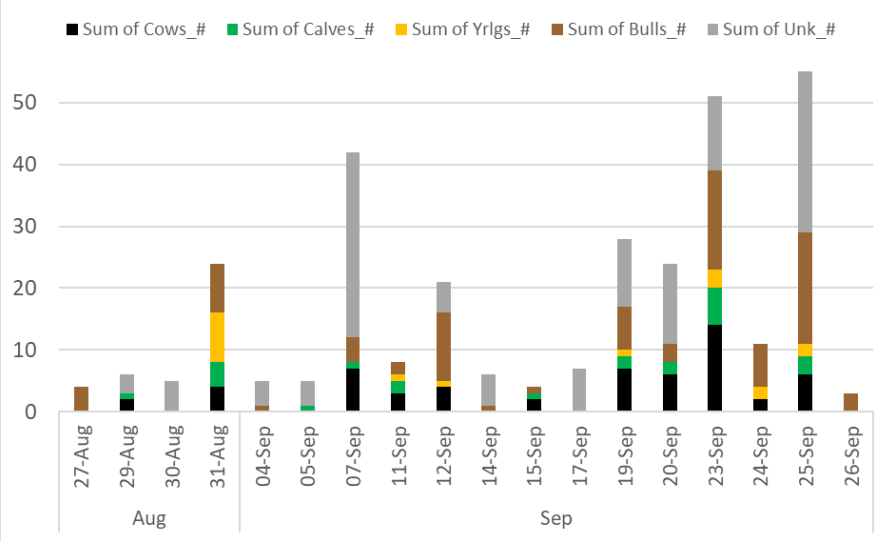


Figure 6: Daily composition of ekwǫ̀ groups observed during August-September 2024.

The calves were considered healthy, with no visible injuries. Calves are not usually fat at this time of the year as they spend their energy to grow. At the end of September, many calves had grown larger in body size. This indicates that calves are healthy and have been growing well since they were born in June. In later fall, the calf's belly also starts to grow as they transition from only drinking milk from its mom to eating grass and vegetation.





Photo 11: Yèagoa - young bulls - at Deèzàatì, September 2024.

Body Condition and Health

The Sahtì ekwǫ were in good shape, and all the adult bulls and cows were described as having good condition or fat. At the end of September, all the caribou we have seen were in very good condition, with straight backs indicating they have amounts of fat stored on their backs and rumps. The big bulls showed white manes, and some started to shed the velvet of their antlers during last weeks of September.

" when you look at their backs it's straight
which is how you can tell they are fat" - Germain Eyakfwo

The teams assessed the body conditions of bulls, cows and calves; as fat, good or thin (skinny).
The two teams observed body condition of 47 bulls, 34 cows, and 13 calves. Of the 47 bulls we saw; 83% were fat and 17% were good. Of 34 cows observed, 38% were fat and 62% were in good condition. Calves showed a similar pattern as cows, with 31% considered fat and 69% in good shape. No thin or skinny caribou were seen. We note that sample sizes were small, especially in calves.

Table 8: Body condition score of Sahtì ekwo, September 2024.

Bulls

Groups	Individuals			
	Fat	Good	Thin	Total
19	39	8	0	47
	83%	17%	0%	100%

Cows

Groups	Individuals			
	Fat	Good	Thin	Total
11	13	21	0	34
	38%	62%	0%	100%

Calves

Groups	Individuals			
	Fat	Good	Thin	Total
10	4	9	0	13
	31%	69%	0%	100%

Injuries

Of the 309 caribou observed, we watched 137 caribou within 21 groups for signs of injury when they walked. On the 27 August, we saw one bull in a group of four that had an injured left hind leg. On the 15th September, we observed a group of 4 caribou (1 bull, 2 cows, and a calf) on a small island with one cow having an injured left hind leg. The cow could not put any weight on her back leg. The Team (D) noted that the caribou were on the island because the cow was injured, as islands acts as a refuge for animals away from predators and insect harassment. All four animals were in good body condition.

Sahtì Ekwǫ Habitat

On the fall range around Deèzàatì in September, the vegetation and ekwǫ food were described as overall good quality. The drought conditions from the last two years were continuing with little to no rain dominating the summer, and fires in the southern forests covered the barrenlands with smoke.

From August 8th to 23rd, a team of 12 people paddled canoes from Tatsotì (Grenville Lake) to Deèzàatì, through the fall range of the Sahtì ekwo (see map 4). The trip was a unique experience, because the

elders had not travelled through that area since the 1960s and were able to identify the environmental changes that had occurred over that time

Low, Warm Water

The water level was extremely low, for the third year in row, and was lower than last year, 2023. Many smaller lakes have completely dried up, and only the dark rocks and boulders were visible. As the water is lower, the water level in the lakes and rivers become shallower, subsequently the sun warms up the shallow water compared to deeper water. While fishing on the canoe trip, we caught jackfish in the locations that should have deep clear water which trout favours. The elders noted that jackfish were not previously found in these areas and were surprised that the water had become lower and warmer, allowing jackfish to appear there.

The low water levels also create rocky shorelines for the ekwǫ̀ to travel on. This rocky edging can potentially cause injuries for the ekwǫ̀; elders noted that the ekwǫ̀ are at risk of getting their hooves stuck between the rocks and get injured in the exposed rocks.



Photo 12: the low water exposed boulder field in the lake. August 2024. (Petter Jacobsen)



Photo 13: caribou walking through boulder field at Deèzàatì

Overgrowing Vegetation

While traveling along the rivers and lakes, we looked for historic camp sites. However, the elders were challenged to recognize the land as there were many landscape changes. The vegetation on the land had grown drastically compared to the 1960s. The tall overgrowing willows were covering the landscape at such a scale that the elder stated,

"The barrenland is becoming smaller" – Joe Zoe

Dwarf birch and willows have grown tall, and in many places, overgrown the campsites that used to be clear of vegetation. At times, elders had a hard time recognizing the locations as willows were covering the land. At one location at Rawalpindi Lake, the elders decided to stop and visit a gravesite. Once we reached the location, it was challenging to find the site, and the whole team spent a long time searching through all the vegetation for the gravesite. Eventually, we located the site, but the elders stated it was

difficult to find, as the tall vegetation had changed the look of the landscape. We spent some time at the old gravesite, rebuilt the broken crib, and the elder performed a prayer ritual held at gravesites on the land. The elder Joe Zoe stated later that the caribou will migrate further north on the barrenlands and were concerned that caribou will not move south as they used to due to the overgrown habitat.



Photo 14: caribou inside the tall willow bushes north of Rawalpindi Lake; notice the antlers sticking up. August 2024. (Petter Jacobsen)

Tundra Fires

Summer of 2023 was very dry, and it was the first time we saw fires burning on the tundra. While canoeing through the lakes on the barren lands, we came across charred landscapes of tundra fires from the previous summer. At the north end of Rawalpindi Lake, there was a large area burned by a tundra fires. The fire was from last year, 2023 and had burned the portage and the land covering 3-4 km of the east side of Rawalpindi Lake. New vegetation was starting to grow up in the charred ground. We did see a few caribou in the area, and some were walking through the burned tundra landscape. We did not see any active tundra fires on the barrenlands this summer.





Photo 15: drone image of tundra fire from 2023. Notice the numerous caribou trails across the tata North of Rawalpindi Lake, August 2024 (Petter Jacobsen).

Caribou Habitat in August: Drought Conditions

Habitat conditions were very dry; a continuation of the last two summers. While walking through the landscape, we noticed the dry vegetation. Especially on higher ground the leaves were brown and dried up by the lack of rain. On dwarf birch, the leaves were turning brown in mid-august from drought conditions, when they should have been in their prime showing green color. Additionally, thick smoke was covering the land from forest fires in the southern forest around Wekweetì. In late August – well past the main growing seasons - there were several days of light rain at Deèzàatì.

After experiencing the dry and hot summer of 2023, we hoped that similar conditions will not appear during 2024 and onwards. As we are starting to see positive signals in the recovery of the Sahtì ekwo, prolonged dry and hot habitat conditions and large fires on their fall and winter forage habitat are not what the herd needs at this critical time in their life cycle.



Photo 16: Dwarf birch turning brown in early August from the drought. (Petter Jacobsen)

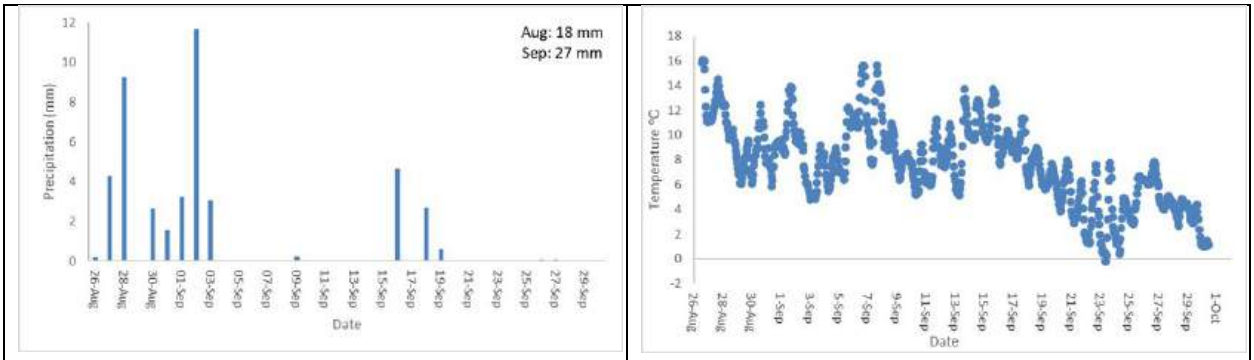
Caribou Habitat in September

Overall, in September, the caribou habitat conditions were good for caribou. The frequent rain and overnight moisture in September had improved the drought conditions, subsequently the vegetation quality became moist. Mushrooms were consistently seen while walking the land. During mid-September, the rain and wind created good forage conditions for the caribou to feed on, and many caribou were described as fat by the elders. Even with strong winds, the vegetation was not dry and crunchy throughout September.

" The food is good for the caribou, that's why they are all fat. "

"The caribou are eating good, because the food is soft, it's easy for them to swallow."
Germain Eyakfwo

Compared to Kokètì, Deèzàati was much cooler because Teams C and D were in the field in late summer and early fall. Daily temperatures ranged from highs of 13-16°C down to lows of 4-6°C through mid September. Through the last half of September, daily temperatures declined consistently with the first frost occurring on the 23 September (Figure 7b), and temperatures thereafter ranging between 1 and 8°C. Rain fall was light and consistent through late August and early September, with 3 days of light rain in mid September (Figure 7a). Cumulative rain through late August was 18 mm and rain fall in September was 27 mm.



a) b)

Figure 7: a) Daily precipitation, and b) hourly temperature based on a portable field weather station at Deèzàatì, 26 August – 30 September 2024

Insect activity was largely absent at Deèzàatì (Figure 8). There were two afternoons (31 Aug and 14 Sep) and one morning (15 Sep) when insect activity was scored as low, and one afternoon (12 Sep) when insect activity was scored high. End of August and September were mostly absent of insects.

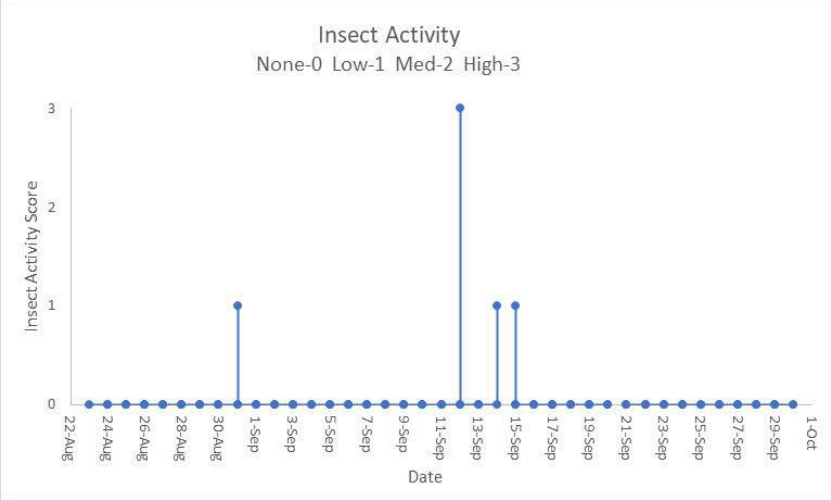
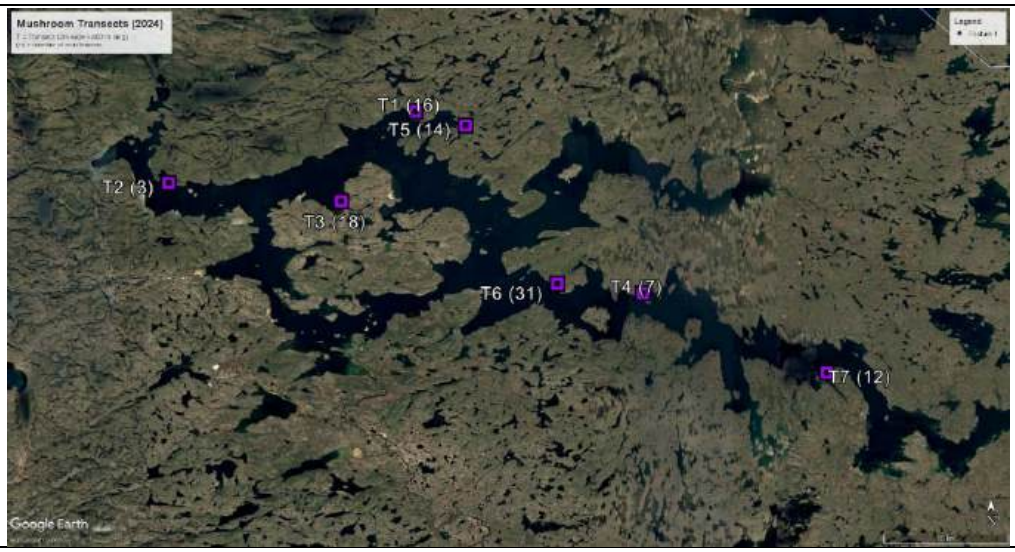


Figure 8: Occurrence of insect activity score (IAS) observed three times daily by monitors at Deèzàatì, 23 August – 30 September 2024.

Winds were primarily from the east and northeast. Although most winds (61.6%) ranged from light to moderate breeze, 0-20 km/h, over a third of the time (38.4%) wind speeds were greater than 20 km/h, which resulted in white caps and moderate waves on the water and less safe boating conditions.

Mushrooms

During August and September, we were consistently seeing mushrooms during our walks on the land. The basic approach we used for counting mushrooms was to walk 400m (based on GPS track) in low shrub areas (dominate ground cover of dwarf birch, willow, bog bilberry, heather, Labrador tea, moss and reindeer lichens) and to count any mushrooms that have a cap larger than 2.5 cm (1 inch). The walk was done in a meandering manner with eyes focused forward & down to walk safely in variable terrain and in a random manner generally with the predominant slope. It was important to not look forward for mushrooms to minimize a biased count. Mushrooms are counted within 2 m (2 steps) of either side of the direct line of travel and a GPS location was taken in the middle (200 m). This method of counting mushrooms may be a useful way of monitoring growing conditions and available food for caribou over the years. We counted mushrooms at seven different locations (Map 6). The range of mushrooms counted was 3 to 31, and the average was 14.4 mushrooms within an 800 m^2 transect (table below). Mushrooms are a general indicator of how much rain had fallen on the land during the growing season and they are a summer food for caribou (Launchbaugh and Urness 1992, Denryter et al. 2017).



Map 6: Locations of mushrooms counts around Deezaati, August-September 2024.

Mushroom transect (2 x 400 m)	Date	Location	Mushrooms counted
T1	27-Aug-24	65.4180; -113.5674	16
T2	29-Aug-24	65.3661; -113.9902	3
T3	30-Aug-24	65.3539; -113.6944	18
T4	31-Aug-24	65.2885; -113.1787	7
T5	01-Sep-24	65.4081; -113.4816	14
T6	07-Sep-24	65.2954; -113.3244	31
T7	12-Sep-24	65.2312; -112.8657	12
		count	7
		min	3
		max	31
		median	14
		mean (x̄)	14.4
		x̄ mushrooms/m2	0.018



Photo 17: large sized mushrooms (John Nishi).

Canoe Trip to Deèzàatì

"We are opening up our ancestors trail" – Joe Zoe

The Deèzàatì canoe trip was aimed to maintain the network of ancient traditional trails in the Tłı̨chǫ region. For 16 days from August 08th to 23rd, we were 12 people that paddled canoes from Tatsotì (Grenville Lake) along the traditional trail to Deèzàatì (Point Lake). The trip was led by the brothers Louis Zoe and Joe Lazare Zoe, who were 85 and 75 years old when they completed the 16-day journey to Deèzàatì. The trail has not been travelled since the 1970s, and there are only a few elders who remembered the entire trail and the associated cultural places. Prior to this project, the trail was about to become forgotten, therefore, the elders wanted to complete this project before they become too old to complete such long journeys on the land. The project's purpose was to find and document the trail and the portages, and transfer knowledge of the land from the elders to the youth, while recording the stories of the traditional trail.

"The purpose of the trip is re-establishment" – John B. Zoe

This project aimed to relive and maintain one of the many traditional trails in the larger region of the Tłı̨chǫ traditional territory. By "reliving," we mean to re-cut the trails before the network becomes overgrown and forgotten, by cutting down new growth and re-marking the entrances and exits of the portages. These actions maintain the extensive network of traditional trails that the Tłı̨chǫ have built and travelled since time immemorial. Most importantly, "reliving" also means to teach the stories of the land, the placenames, and traditional practices of the cultural landscape along the route, and for this to be passed down from elders to youth. Thus, maintaining the trail by reviving the language and oral traditions of the trail network in the collective knowledge of the Tłı̨chǫ community. The Tłı̨chǫ language, culture, and way of life are intimately linked to the land, and this trip was important for the health and well-being of the Tłı̨chǫ people, as we travelled by canoe across the land.



Photo 18: elders leading the payer at the old gravesite on Tatsotì - Grenville Lake (Petter Jacobsen)

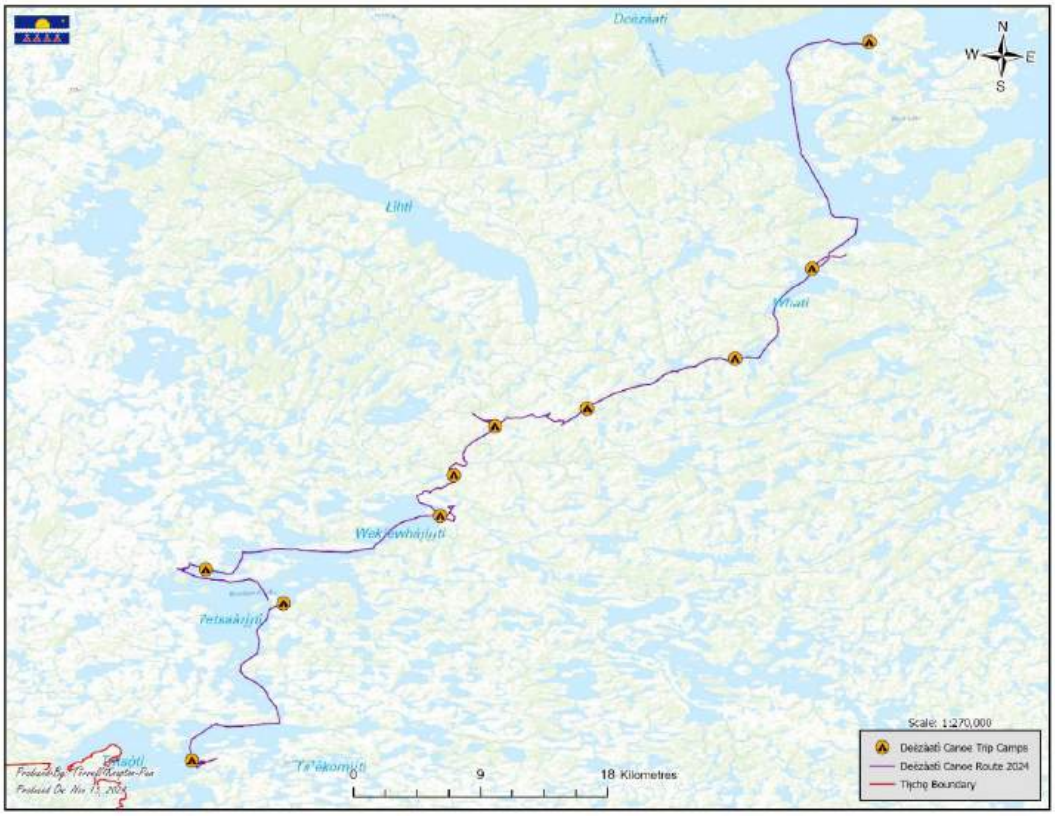


Photo 19: Team repaired the old gravesite on Ets'àıtì (Rawalpindi Lake)

Since the introduction of colonial government policies over the last decades and the settlement into communities, Tłı̨chǫ land-use has decreased in its geographical extent. Additionally, while advances in modern travel such as airplanes and snowmobiles have made transportation easier, they have led to the gradual disuse of the traditional trail system, as people no longer rely on long and hard travel by canoe and dog-team, and they no longer travel into the areas farther away from the settled communities.

"At times mining companies or government say we do not use the land.
It is important to show that we use the land… It is our land" – Joe Rabesca

Deèzàatì is an historically important place for caribou harvesting. The canoe trail all the way to Deèzàatì was well-used before the establishment of the communities, as people traveled from the secure fishing areas at Russell and Marian Lake in the summer, and towards their caribou hunting grounds on the Barrenlands in the fall. The trail has not been travelled around 50 years, and many important cultural sites and its stories can potentially be forgotten, if we do not revive the trail.



Trail Research

The research was conducted using a set of methods, developed by the Tlicho Research and Training Institute. Prior to the trip, several planning workshops were held with community elders focused on participatory mapping exercises to identify the traditional trails and associated cultural places. The mapping exercises were an important first step of the projects for elders to start sharing place-based knowledge and stories about the upcoming journey on the traditional trail.

On the trail, the research methods applied were video and photo documentation, along with GPS recording and detailed fieldnotes. As we traveled the land and made camps at cultural sites, video interviews were conducted with the elders as they described the cultural significance, traditional knowledge and storytelling of each place. During these interviews, the elders explained the cultural place and shared stories of the cultural history and significance of the cultural practices conducted at the locations. Video interviews were also conducted with the youth participants at the start of the trip and once we reach our destination after 16 days on the trail.

On a peninsula on a lake we camped on, there were two stone circles: indicating an historic Tlicho camp location. Additionally, there was one gravesite adjacent to the stone circles. We walked up the site and investigated the area. Once at the gravesite, the elders held a traditional prayer ceremony with our team sitting on the ground around the grave. After the ceremony, the lead researcher and a youth conducted a video-interview of the two elders together, who shared stories of travelling to this lake with their parents and the significance of the topography around the lake for caribou harvesting. The lake holds a rich cultural history, and the video interviews ensures that a visual record of the elders' stories are kept for future generations. This record is especially important as there are only few elders who knows the stories, placenames, and cultural sites of that traditional trail.

After completing the video interview, our team walked around the entire shoreline surveying for additional stone circles or other cultural artifacts. The elder told the team that Tlicho people have lived at this lake since time immemorial, and thus there should be further evidence of traditional land use, if we know what to look for. As we continued the surveying the shoreline the following day, we identified more stone circles further up the shore, as the elders had predicted. Additionally, mapping of cultural places was conducted as we travelled by canoe along the traditional trail using GPS and fieldnotes. The placed-based mapping was completed each day as we travelled along the lakes and rivers. The cultural sites were recorded by GPS, in fieldnotes, and by photo-documentation. A drone was used to capture the landscape perspective. The combination of research methods and technologies provided multiple ways to ensure as much as possible of the cultural landscape was researched and documented.





Photo 20: portaging along the esker on the barrenland, north of Ets'àıtì (Rawalpindi Lake). August 2024 (Petter Jacobsen).

Trail Revival

The key outcome of the trip was that 12 people relived the ancient trail to Deèzàatì. Noone has travelled that trail since the 1970s, and before this trip only few elders remembered the trail and the associated cultural places. After the project, the knowledge from the elders has been transferred to 12 people, who now have learned the trail and the stories from the two elders. At times, it was very emotional for the elders to remember the families and friends they used to travel with there. However, the elders and the canoe team were happy and satisfied that we had completed the 16-day journey and revived this ancient and important traditional trail to the barrenlands.

The land is currently changing, which is something our ancestors taught us, and now we see the effect of climate change in many areas of the environment. The lack of rain and drought we are experiencing during the past two years has led to record low water levels all over the North. The low water in the barrenlands lakes and rivers exposed boulders and rocks that used to be under water and created long, shallow and rocky shorelines we had to portage our canoes over. Addtonbally, vegetation are growing tall and covering many places, subsequently extending the treeline further north. The elders explanined tha the willows once were only low shrubs, but are now growing higher and denser than previously seen on the barrenland. One of the elders that participated on the trip said “the land looks different from what I remember when I traveled with my dad.”



Photo 21: youth Jerrick Camsell with elder Joe Zoe holding the hide of the first Sahtì ekwo harvested during fall in 12 years, August 2024 (Petter Jacobsen).



Photo 22: Bull caribou, Bluenose east herd, August 2024 (Petter Jacobsen).

Reliving a Caribou Fall Harvest

Due to the decline in barren ground caribou populations, severe restrictions on harvesting have been put in place, which has restricted Tlicho from being out on the land engaging in the cultural practices of harvesting caribou. The last time Tlicho harvest caribou on the barrenlands was in 2012. Over 12 years has passed since Tłı̨chǫ have engaged in their important tradition of harvesting ekwǫ on the barrenlands in fall; signifying a long-standing gap in these crucial cultural practices.

This canoe project, by reliving the ancient trail to the caribou harvesting locations on the barrenlands, was an attempt to help address this negative trend. The fact that this was the first time anyone travelled this

trail since the 1970s underscores the desire to reconnect to the land and the cultural ways of connecting to caribou. During the last days of the 16-day journey, we had almost entirely run out of food. For the last two days, we had continuously paddled and completed length portages over challenging terrain. The group was tired and hungry. We still had two more days before we reached our destination. While out of food, we knew we could harvest one bull barren ground caribou from the Sahtì ekwǫ̀ (Bluenose east) caribou herd. Thus, in the early morning, we started to scout for any sign of caribou. It was with low clouds with drizzle rain, and blowing wind from the north, making it feel as fall time was coming to the barrenlands that day. Luckily, we spotted two bull caribou about 3-4 kilometers in the hills to the north. After a lengthy hunt, we managed to harvest one Sahtì ekwǫ̀ bull, which was the first time in 12 years that Tłı̨chǫ have harvested a caribou in the fall.

The youth that were fortunate to participate on this hunt were able to participate in the cultural manners of preparing and packing a caribou and then carry the fat caribou meat into our small camp located on a tall esker overlooking Deèzàatì. The cultural practice of carrying the meat bundle back to the people in our camp brought out memories and knowledge from past hunts, stories of cultural practices and traditions, and created a unique sense of belonging and happiness among the people.

The fact that we successful harvested of a Sahtì ekwǫ̀ bull, the first harvest in 12 years, symbolized a revival of traditional practices. Since this cultural practice has not taken place for over a decade, most Tłı̨chǫ youth growing up today have had few opportunities to travel to the ancestral harvesting locations to reconnect to cultural places and ekwǫ̀. For the participating youth, this experience became a transformative journey that connected our communal well-being to the existence of an abundant biodiversity of the northern barrenlands.

This cultural practice of travelling to the barrenlands to harvest caribou served as an opportunity that actively maintains Tłı̨chǫ relationship with the land and animals. The ability to continue caribou harvesting is not only about hunting; the knowledge and cultural practice of harvesting entails a purpose in life and a cultural tradition carried on from Tłı̨chǫ ancestors. Undertaking this canoe journey and connecting to caribou through the harvest became a way to maintain the Tłı̨chǫ connection with caribou; and equally a way to sustain the cultural identity for the new generations of Tłı̨chǫ growing up today, to also experience the cultural practices and elders teachings while hunting caribou on the barrenlands.



Photo 23: drone photo of canoers on the way to Deèzàatì, August 2024 (Petter Jacobsen)



Photo 24: campsite on Ets’àıtì (Rawalpindi Lake). August 2024 (Petter Jacobsen).

Beverly Caribou Monitoring at Ek'atì (Lac de Gras)

The monitoring team was at Ek'atì for 16 days from September 16th to 27th, 2024. This year was the second year conducting caribou monitoring around Ek'atì. During the 16 days at Ek'atì we saw a total of 477 caribou in 36 groups. We saw mostly small groups of caribou, with largest group of 104 animals. All the caribou were slowly moving east along the eastern shore of Ek'atì. When we arrived on September 11th, there was only one caribou collar located northeast of Ek'atì, and we thought only a few caribou would be around. However, we saw small caribou herds everywhere as we walked on the land around the lakes. All the small herds were slowly migrating in a easterly direction; and it was unclear to the team where all the caribou groups were coming from, as all the Beverly collars were further east and north, while no collars were south of Lac de Gras (should request permission from GNWT to include a collar map for Sep 2024). This presence of numerous Beverly caribou shows that although there are no collars visible on the map, there can still be numerous Beverly herds on the land.



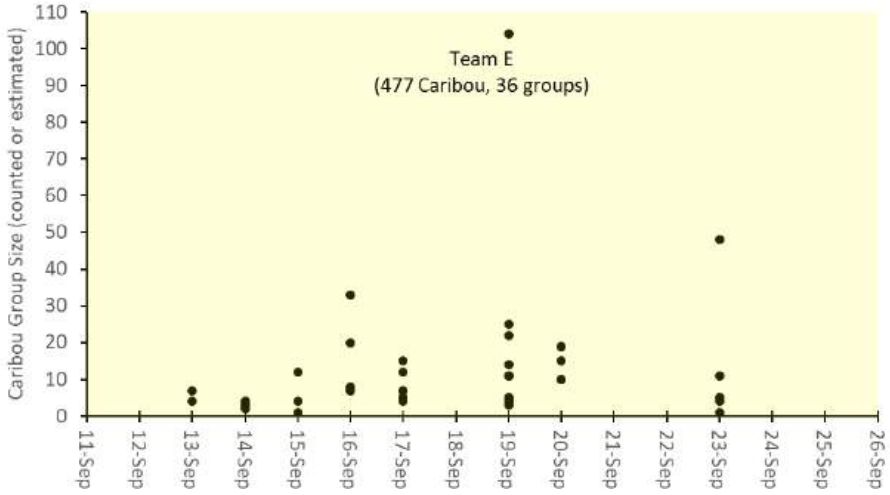
Photo 25: the new ENK camp at Ek'atì, located on the northeast side of Ek'atì.



Photo 26: ENK team by the new cabin at Ek'atì.

The majority of the caribou observed were smaller groups of bulls scattered over the landscape, with a mix of many young and some older bulls. The bulls were feeding well and appeared to be "waiting" until the large groups come. Every day we see them feeding, resting and walking slowly to the east. During mid-September, all the bulls were fat and in good body condition.

Figure 9: number of caribou observed at Ek'atì, September 2024.



Tsia – Calves

After six days of caribou monitoring, we first observed cows with calves. However, in those groups, there were numerous cows but only a few calves. After the first week, we saw numerous caribou groups almost every day, but only five calves in total. Out of the 477 Beverly caribou we observed, we estimated a cow-calf ratio based on 101 cows and 28 calves. We estimated a 26 calf to 100 cow ratio (i.e., 0.259 $\pm$ 0.087 SE). This ratio in late summer is low, because even if most of the calves survived over winter, the herd trend is likely declining. However, the sample size is very small, and result is likely not representative of the Beverly herd, as the larger herds with cows were further east of us. The calves we observed had grown large bodies and were healthy. But there were few calves, even in the herds with many cows.

"The calves look pretty healthy…but we don't see much calves" Bobby Migwi



Photo 27: *woza*: cow with her calf; notice large body size and antler on the calf, September 2024 (Petter Jacobsen).



Photo 28: cow with a calf, followed by a young bull, September 2024 (Petter Jacobsen).

Body Condition and Health

Overall, the caribou were healthy and looked fat. Most of the bulls we saw looked healthy and were fat indicated by a flat back and rounded rumps. The elder mentioned that the bulls look "nice and strong". We saw no skinny bulls. Most bull antlers had lost the velvet off their antler by mid-September. Many bulls were brushing their antlers on tall willow bushes to rub off their antler velvet. While walking the land, we came across tall willows that had literally been destroyed by the bulls' antlers. Sometimes we found remnants of antlers velvet in the willows. At times, the bulls were starting to fight each other; an early indication that the rut season was approaching.



Photo 29: Beverly caribou bulls in healthy body condition, September 2024 (Petter Jacobsen).

The cows were healthy and in fat body condition. We saw no skinny cows. By mid-September, the calves had grown large body sizes, and they appear to be in good health, while running at a fast pace following their mothers. Out of 477 animals, only one animal was injured. One bull had an injured front leg. He was limping while walking, but once the herd started running at a fast pace, the bull ran along with the whole group.

The monitors observed body condition of 114 bulls, 44 cows, and 7 calves. Most bulls (87%) and cows (84%) were fat. Of the seven calves, most (71%) were in good condition, and 29% were fat. We saw no skinny caribou.



Table 9: summary of body condition during fall 2024

Cows

Groups	Individuals			
	Fat	Good	Thin	Total
11	37	7	0	44
	84%	16%	0%	100%

Bulls

Groups	Individuals			
	Fat	Good	Thin	Total
20	99	15	0	114
	87%	13%	0%	100%

Calves

Groups	Individuals			
	Fat	Good	Thin	Total
6	2	5	0	7
	29%	71%	0%	100%

Habitat

Overall, the vegetation and caribou forage conditions were in good quality around the lakes. During September, the ground was moist and wet from the frequent rain, and from the overnight moisture/fog that covered the lowlands every morning. By mid-September, most dwarf birch leaves have fallen off, and caribou don't feed on the dwarf birch anymore. We saw them feeding on lichen, cranberry leaves, and grass in between the bushes. The lichen appears to be in good growth and fluffy during the last week, and the caribou feeding extensively on the lichen. They appear to be feeding significantly at this time of year, before the snow appears in October.

By the end of September, caribou were feeding mainly on lichen and some grasses. Grasses had mostly turned brown, but caribou appeared to still be eating it. The lichen was moist and fluffy from frequent rain and wind, and a few days with sun. We did see a good amount of mushrooms on the ground. During the last two weeks in September, there was no insect activity, and we could see the herds feeding peacefully all day, not bothered by insects or predators.

We saw two bulls feeding on fresh green grass growing on a shallow lake. There was green grass growing on small islands in the lake, and the two bulls walked into the water to feed on grass on the small islands. It was interesting that they were walking into the shallow water in the lake, to feed on the grass. It looked as if they intentionally walked there for the green grass.



Photo 30: Beverly caribou bull feeding on green grass in dried up lake (Petter Jacobsen).



Photo 31: Beverly caribou feeding on lichen and dried grasses (Petter Jacobsen).

Caribou Forage Around the Mines

On Ek'adıì (the island with the Diavik mine), we walked inland from the lake, approximately 3-4 km from Diavik mine. The quality of the caribou food (lichen and other ground vegetation) was in good condition. The frequent rain made vegetation moist and appeared to be good quality food for caribou. There was an abundance of caribou forage along the side of the island. However, it looked like few caribou migrate to the island and we did not see any fresh signs of any caribou on Ek'adıì. Visible in the vegetation were traces of numerous old caribou trails along the shoreline of the island. The vegetation was growing tall back into the trail, and only faint lines of the old trails were visible. It appears that the Misery Road prevents caribou from migrating to the island Ek'adıì.

By Ekati Point Lake Pit, approximately 2-3km west of the Lac du Sauvage Road, the lichen was of good quality based on visual observations. There was no dust visible on the lichen and it appeared moist from recent rain. We collected a lichen sample in a small depression on top of the esker by the Ekati point lake pit.



Photo 32: fields of lichen, east of Ekati point lake mine, September 2024.



Photo 33: Dillion Smith taking a lichen sample, east of Ekati (Petter Jacobsen).

Mining Disturbance

Industrial Noise

The new Ekati Point Lake Pit is currently constructed on the tata between Lac de Gras and Lac de Sauvage. The tata has been a well used caribou migration route. On September 20th, the team walked up from the lakeshore at 3 km distance from the Lac de Sauvage Road. Once we reached the hills above the lakeshore, we noticed the high noise level from the ongoing mining operations. The sound level was described by the team as similar to being close to a construction site in a city. We continued to walk into the tundra hills parallel to the road and Ekati point lake pit, at approximately 3 km distance, until we reached the tall esker 4km inland from the lake. As we walked up to the esker, the noise from the mining operations was described as very high. There was also high helicopter activity in the area. However, when we walked back at the end of the day, it appeared that the workers had left and there was no visible activity there, subsequently the noise level was reduced as well. We observed two young bulls by a small lake on the west side of the esker. The two bulls were feeding and did not seem disturbed by mining operations 4-5 km away. We did not see any other caribou in the area.

On the northeast side of Lac de Gras, approximately 15 km from the Diavik mine, we could clearly hear industrial noise from the mine. The noise source was likely from the mine's generators and could be heard continuously. We observed a group of bulls for two hours along an esker on the northeast side of Lac de

Gras. It appeared that the group of bulls were not bothered by the mining noise. They walked slowly in a northeast direction and were feeding undisturbed.

Industrial noise from mine was also detectable at night at our camp location: approximately 8 km from the Ekati mine point lake pit. When it was quiet at our camp, we heard trucks driving and the reversing beeping sound from trucks. However, it was only detectable once our camp generator was turned off.

Industrial smoke

In the evening of September 17th, a full moon rose over the horizon to the east after sun set. At the same time, we saw above the eastern horizon a line of yellow/green colored smoke extending to the east. The line of smoke was coming from a southwest direction; from the generators at the Diavik mine. The smoke is the same we saw extending from the generators at Diavik mine site far into the horizon in March, while we were monitoring caribou south of Lac de Gras by snowmachine.

Esker Destruction

The Tłı̨chǫ elders have always emphasized the importance of eskers, as important wildlife habitat and places of high cultural significance. During on-going work between the mining companies and TG, the elders stressed the importance of "not touching" the esker, and leave the eskers alone due to their important part of the ecosystem.

On September 14th, the team walked north from Lac du Sauvage, along the winter road portage. The portage road was made of crushed rock and sand. Once we reached the top of an esker, 3 km north of Lac d Sauvage, we noticed that the esker had been destroyed by machinery. Sand had been removed from a large area which was now levelled and tracks from machinery were visible in the remaining sand. Currently the esker looks as a flat soccer field, and not an esker with its natural topographic features. A large sinkhole with a water pool inside was forming next to the road at the highest point. The sand had likely been removed to construct the portage road we walked on.



Photo 34: portage road made by sand from esker. Notice sinkhole forming on side of road, September 2024 (Petter Jacobsen).



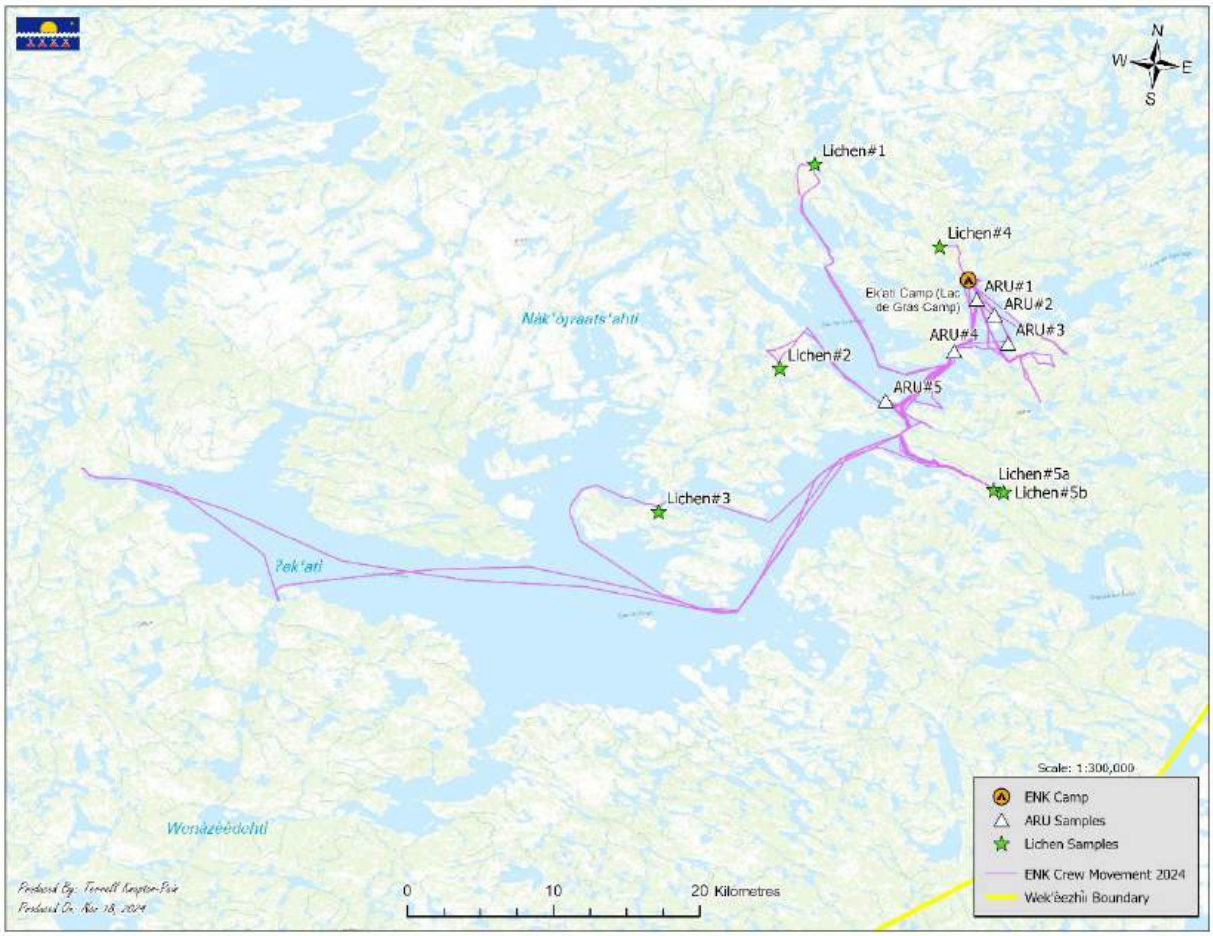
Photo 35: destroyed esker; sand removed by machinery from the esker (Petter Jacobsen).

Sampling Program

For many years, Tłı̨chǫ elders have been concerned about impacts from the operating diamond mines: impacts on caribou, the land and the water. The new ENK camp on Ek'atì has provided a venue for Tłı̨chǫ Government to conduct our own research and investigate; see with our own eyes how the land and animals are around the mines and what the impacts are. To start the research, we started with a few pilot sampling projects this year to test out what we can do and what the people want to conduct further research into. Below are details of the three pilot sampling projects we started.

1) Autonomous Recording Units (ARUs)

During our first trip to Ekati in September 2022, we discovered that the noise level from the two mines were heard at distances up to 30 km away from the mines. The elders were interested in researching how far away the noise is detectable and how wildlife react to the noise. We started a pilot project in collaboration with the SUNY caribou team (https://fateofthecaribou.github.io/) to assess the level of industrial noise around the lake. Based on previous observations, the team noticed the apparent noise from the mines at long distance; and the current pilot project included setting up five ARU devices around the lake at various distances from the mines (see locations in map 7). The ARU devices were tied to a 2x4 post and placed in the ground. The pilot project was based on the timeframe that the team was at Ekati, from September 12th to September 29. Results are not currently available.



Map 7: locations of lichen samples, and ARU deployment around Ekati, September 2024.

2) Lichen Sampling

Impacts from the mine on caribou food has been a concern among the Tłı̨chǫ for many years. Many people are concerned about the potential for pollutants and dust from the mines, being absorbed into the vegetation, and consumed by the caribou. This summer we started a pilot project with Mary Gamberg and Eric Wotton from McGill University, Department of Biology, to take samples of lichen and test for any pollutants or contaminants. We took five lichen samples at various locations around the mines (see map 7).

The method used was to dry lichen samples in an oven at 35°C for 4 days to remove moisture. We weighed each sample before and after drying to calculate how much water they contained. Then we ground the dried samples into powder with a mortar and pestle. To extract pollutants from the samples, we used a simplified version of a method called QuEChERS (which stands for Quick, Easy, Cheap, Effective, Rugged, and Safe). We modified this method based on work by Baduel and colleagues from 2015, and used special filters called Captiva Lipid ND Cartridges to remove proteins and fats. We plan to analyze what pollutants are in each sample using a technique called liquid chromatography-mass spectrometry (LC-MS). We're using a "non-targeted" approach, which means we're looking for any pollutants that might be present, not just specific ones we already know about. This helps us potentially discover unexpected or overlooked contaminants. Results are not currently available.

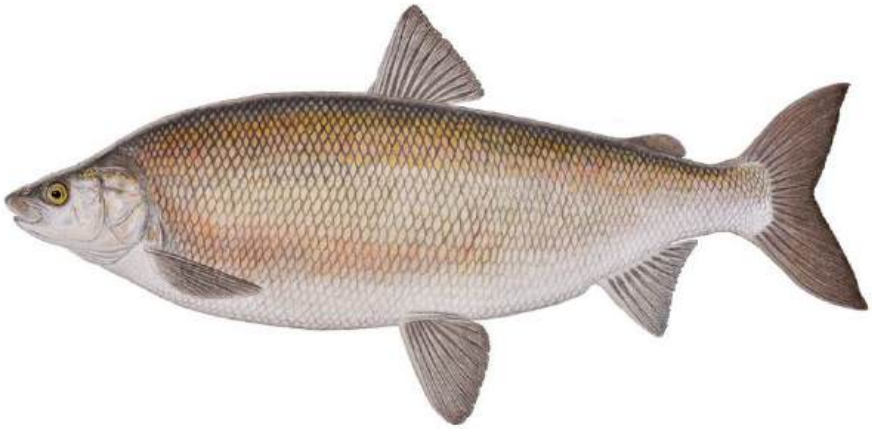
3) Fish Sampling

Tłı̨chǫ people are concerned about impacts to water quality and the fish from the operating mines, we decided to test a fish sampling project. The pilot project is in collaboration with Dr. Paul Vecsei, Tłı̨chǫ Government, Fisheries Biologist.

Results from Fish Samples

Lac du Sauvage is a lake that drains into Lac de Gras through a 45-metre wide and 210-metre-long set of rapids locally called the Narrows. The median flood peak discharge in the Narrows is 17.5 m^3/s making it an important corridor for fish movements and even provides spawning habitat for some species. Lac du Sauvage is ultra-oligotrophic but supports a slow growing but stable population of some eight species of cold-water fishes, including Round Whitefish, Cisco, and Lake Trout. Other native fish species include Lake whitefish, Arctic Grayling, Burbot, Longnose Sucker, and Slimy Sculpin.

For this study, fish were collected using gillnets set at locations determined by community members with the knowledge of where fish species can be caught; nets provided fish for sample collection. The number and duration of gillnet sets were subject to safety considerations (weather) and occurred close to camp. However, the range of habitat requirements for capturing both Lake Trout and Lake Whitefish was present within the area near camp. The fish caught were identified to species, measured to fork length (FL) which is the measurement of a fish's length from tip of snout to fork of its tail, to the nearest millimeter (mm). and weighed (g). Additional data collected included: gender, stage of maturity, and a general description of stomach contents, parasites and/or deformities. The sample size targets for tissue (for contaminants) and otoliths (for aging) were 5 Lake Trout and 10 Lake Whitefish. The species sampled also represented those typically consumed by community members, and sampling of the two species also provided a way to account for differences between benthic (invertebrate feeding) and predatory (feeding on smaller fish) strategies.



Lake Whitefish (Coregonus clupeaformis)



Lake Trout (Salvelinus namaycush)



Burbot “Loche” (Lota lota)

To determine current levels of contaminants in fishes consumed by the community members harvesting fish in Lac du Sauvage, fish tissue samples were collected from 5 Lake Trout, 10 Lake Whitefish and 1 Bubot. Fish processing was done by Tłı̨chǫ Government (TG) biologist Dr. Paul Vecsei.

a. Fish Tissue Analysis

The three fish species which had tissues collected for contaminant analyses were Lake Trout, Lake Whitefish and Burbot.

Mercury

2024 Lake Trout results

In 2024, mercury concentrations in tissues were on average 0.448 mg/kg wwt (wet weight) ranging from 0.190 to 1.130 mg/kg wwt, with six of the twenty fish sampled over the guideline for mercury of 0.5 mg/kg (wet weight, wwt; Health Canada, 2016). Review of mercury concentrations in muscle tissue in relation to fork length and weight suggest positive relationships, in other words, bigger fish have more mercury. But also interesting is the positive relationship linked to age (Figure 10a, 10b). This means that as a rule, older fish will have higher mercury concentrations since they have lived longer and have therefor consumed much more smaller fish over the years. It is by eating other fish that causes the steady increase in mercury in predatory fish like the Lake Trout.

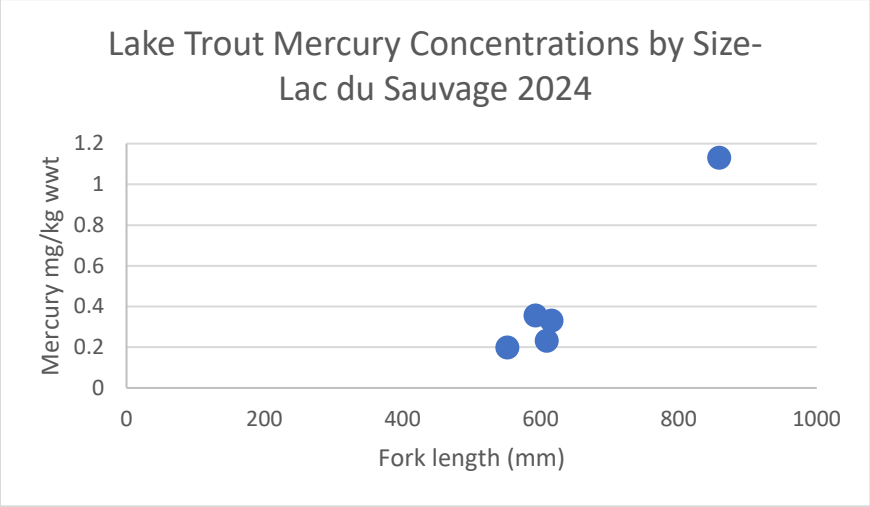
2024 Lake Whitefish results

In 2024, mercury concentrations in tissues were on average 0.052 mg/kg wwt ranging from 0.014 to 0.083 mg/kg wwt, with none of the twenty fish sampled over the guideline for mercury of 0.5 mg/kg. Review of mercury concentrations in muscle tissue in relation to fork length, and age suggest a not-so-obvious positive relationship. In other words, we see bigger and older fish having more mercury in their muscle tissue but the variation is wide-ranging that it is frankly difficult to decern a clear pattern (Figures 10c, 10d).

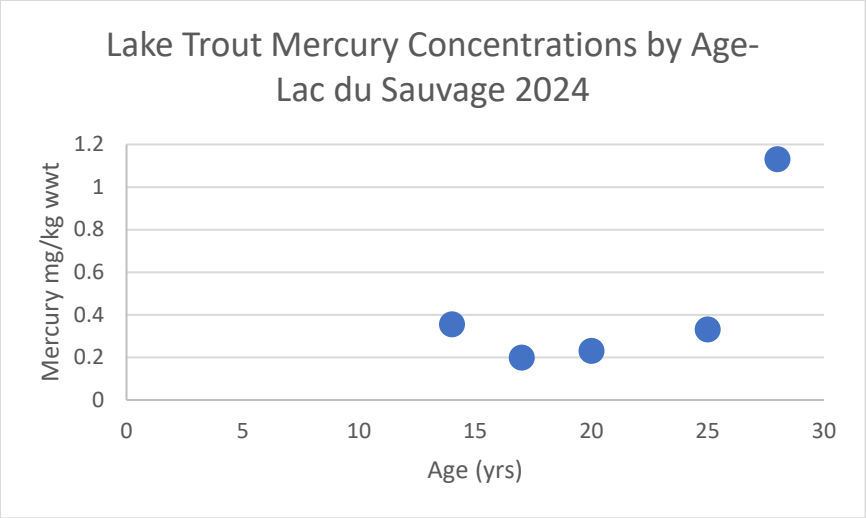
Lake Whitefish consistently show lower mercury concentration in their tissues than Lake Trout, with the clearest differentiation visible with regards to age.

2024 Burbot results

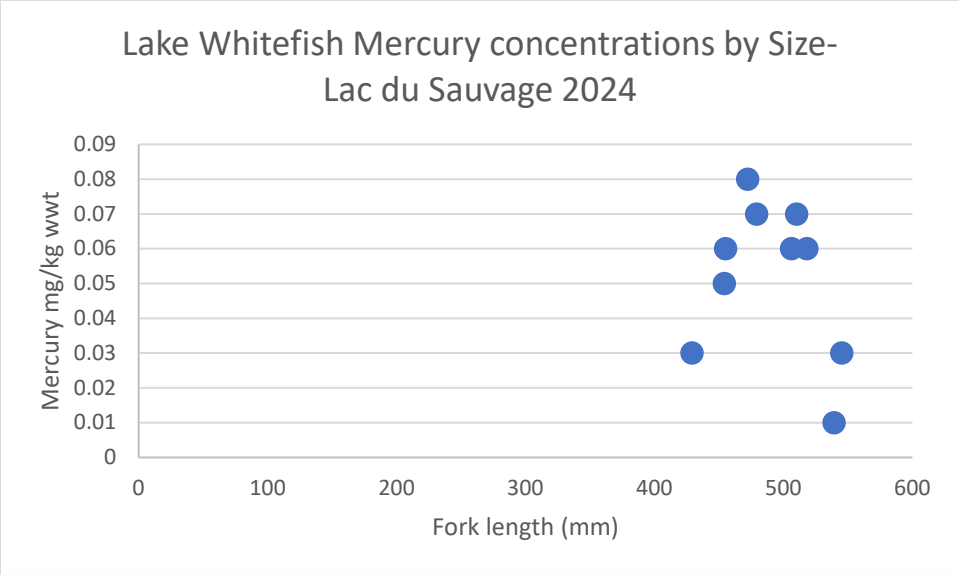
A single Burbot was analysed from Lac du Sauvage in 2024. Mercury concentration in tissues was 0.162 mg/kg wwt which was well below the guideline for mercury of 0.5 mg/kg.



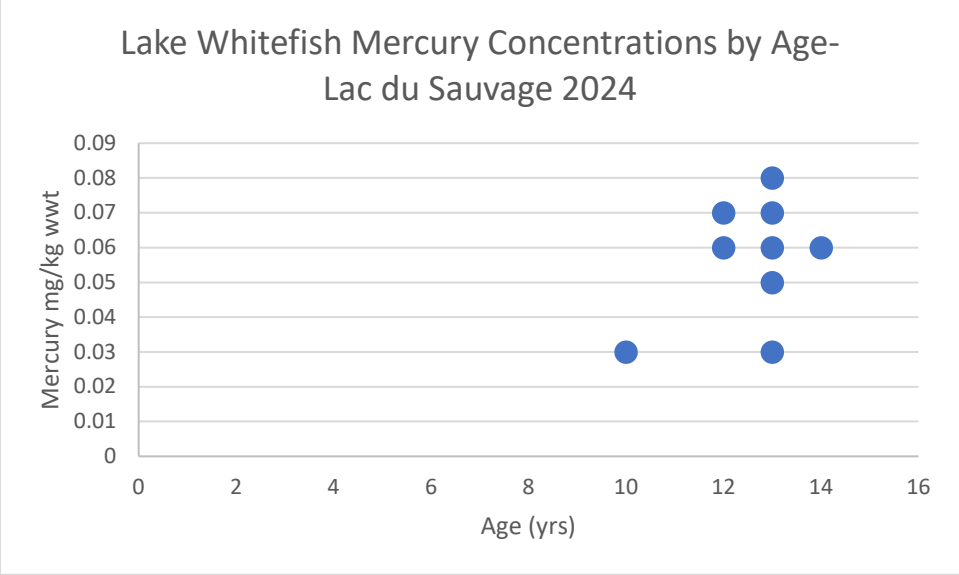
10a


Lake Trout Mercury Concentrations by Age-
Lac du Sauvage 2024
Mercury mg/kg wwt
1.2
1
0.8
0.6
0.4
0.2
0
0
5
10
15
20
25
30
Age (yrs)

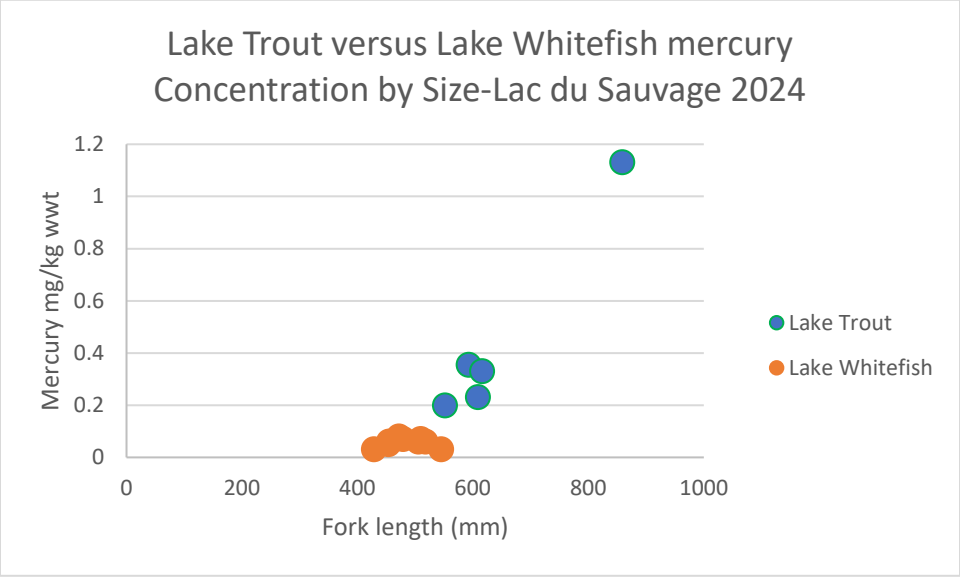
10b


Lake Whitefish Mercury concentrations by Size-
Lac du Sauvage 2024
Mercury mg/kg wwt
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
0
100
200
300
400
500
600
Fork length (mm)

10c


Lake Whitefish Mercury Concentrations by Age-
Lac du Sauvage 2024
Mercury mg/kg wwt
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
0
2
4
6
8
10
12
14
16
Age (yrs)

10d



10e

Figure 10. Length to mercury (10a) and age (10b) correlation in Lake Trout, length to mercury (10c) and age (10d) correlation in Lake Whitefish and finally, Lake Trout versus Lake Whitefish mercury concentrations correlated with length (10e) in Lac du Sauvage, August 2024.

Mercury:

Mercury (Hg) is a naturally occurring element found mainly in rock formations and soil. These sources can be emitted into the atmosphere by volcanism, as well as by natural disruptions of the rock source via erosion and weathering. There are three major mercury species: elemental (Hg0), inorganic (Hg2+), and methyl mercury (MeHg). One major contributor to atmospheric Hg is emissions from the burning of fossil fuels and biomass fuels to produce energy. Due to mercury's long half-life (time it takes for about half of the mercury to be eliminated from the environment) (one to two years), mercury can be deposited far from the original source. Therefore, mercury contamination is a global issue and has resulted in atmospheric deposition in regions that historically are not prone to elevated mercury concentrations (Sunderland & Chmura, 2000). It is the primary reason why TG monitors mercury levels in fish, water and sediment in all inland community lakes and Great Slave Lake. In Canada, mercury levels taken from lake sediments have revealed to be on average two to three times the background level (naturally occurring amount of mercury in the environment) (Vaidya et al., 2000). *Bioavailability* indicates a substance's availability to be absorbed into the body and have an active effect (Environment Canada, 2013). *Bioaccumulation* is the build-up of a substance, such as Hg, within the tissues of a biological organism, and *biomagnification* is the increase of the concentration of a substance within organisms (from food sources) with the increase of trophic level in food chains (Environmental Protection Agency, 2010). MeHg that has the highest toxicity, the greatest bioavailability to humans and fish, and the uppermost ability to bioaccumulate and biomagnify, and therefore is of greatest concern (Gochfeld, 2003).

Arsenic:

2024 Lake trout arsenic

In 2024, arsenic concentrations in tissues were on average 0.04 mg/kg wwt (wet weight) ranging from 0.02 to 0.08 mg/kg wwt, and well below the Canadian guidelines for arsenic contamination in fish and fish products destined for human consumption, set at 3.5 mg/kg.

2024 Lake whitefish results

In 2024, arsenic concentrations in tissues were on average 0.11mg/kg wwt ranging from 0.03 to 0.41 mg/kg wwt, and well below the Canadian guidelines for arsenic contamination in fish and fish products destined for human consumption, set at 3.5 mg/kg

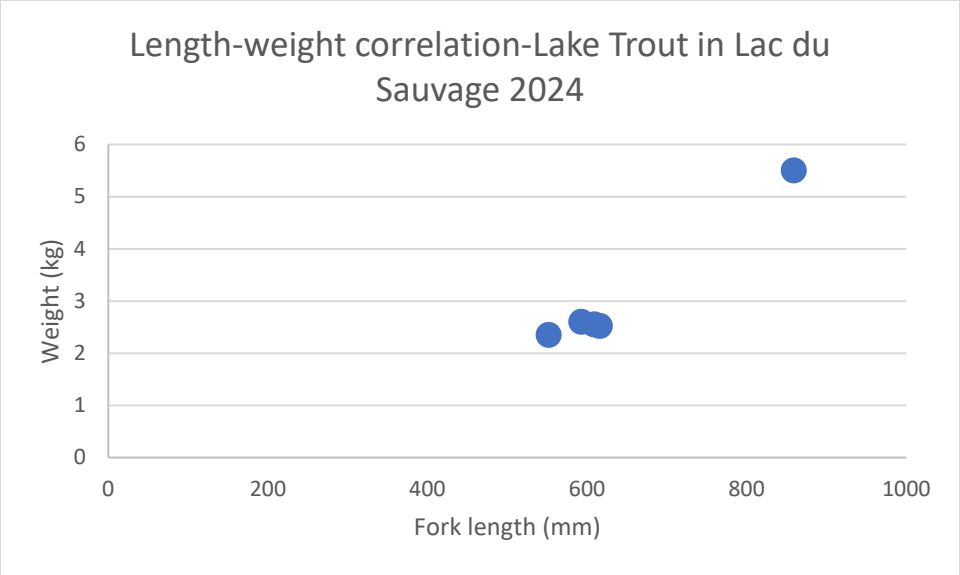
Arsenic is a naturally occurring and abundant metal. The most common natural sources are rock formations, hydrothermal ore deposits, and the water runoff from weathering of the arsenic containing rocks (Wang & Mulligan 2006). Arsenic can be found in four oxidation states, with nearly twenty arsenic species (forms of arsenic), which range in toxicity and mobility. However, in the environment, Arsenic is usually found as inorganic arsenate (As(V)), and arsenite (As (III)), which are among the most toxic forms (Wang et al. 2014). The majority of arsenic is sequestered in rocks, and it is via weathering and erosion processes that mobilize and transport inorganic arsenic into sediment, soils, and water providing exposure sources for biota. These inorganic forms can then be chemically or biologically methylated under anoxic conditions into various organic arsenic species. This includes into volatile forms that are found in the atmosphere, which can be re-deposited into surface waters and soils and once again absorbed by biota (Wang & Mulligan 2006). Anthropogenic sources of arsenic include fertilizers and pesticides, coal burning, and gold mining. Once methylated, arsenic becomes particularly toxic as it is transported in the phosphate chain and then efficiently breaks down or damages DNA (Wang & Mulligan 2006).

In humans, arsenic has been categorized as a group-I carcinogen, and with primary exposure through ingestion of food and drinking water (World Health Organization) and that is why TG considers it important to test water, sediment and fish for arsenic concentrations. Primary exposure routes in fish are via bioaccumulation through food chains, arsenic particulates suspended in water, absorption into the blood stream by membranes (such as gills), or via adsorption on tissue and membrane surfaces (Shah et al. 2009).

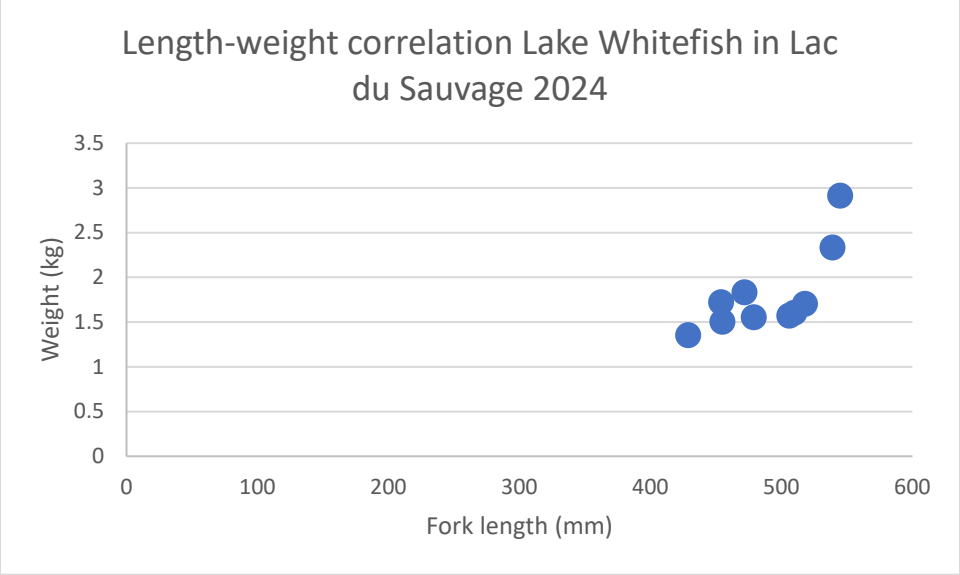
Biological information

Lake trout

Lake Trout from which tissues were sampled for analyses in 2024 (n=5) were on average 646 mm in length (fork length) ranging from 552 to 859 mm (11a). They weighed on average 3104 g (total weight) ranging from 2350 to 5500 g, and were on average 20.8 years old (via otolith aging) ranging from 14 to 28 years. Note: Otoliths are little boney structures occurring in the head of all fish. When removed, and cut into thin transects, growth rings similar to a cut-down tree become visible and can thus be counted for age determination.



11a



11b

Figure 11. Length to weight correlation in Lake Trout 11a and Lake Whitefish 11b in Lac du Sauvage, August 2024.

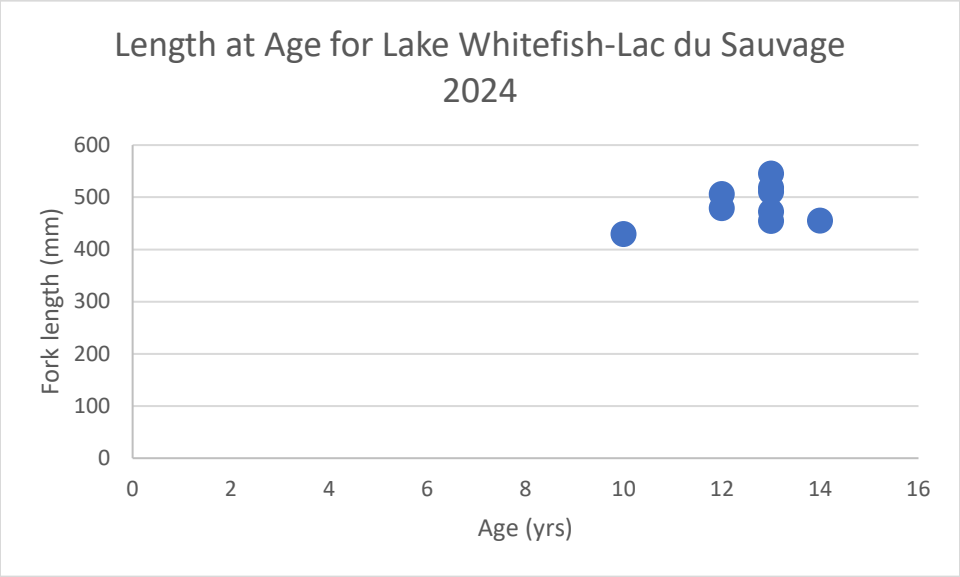
Lake whitefish

Lake whitefish sampled in 2024 (n=10) were on average 490 mm in length ranging from 429 to 545 mm (2b). They weighed on average 1800 g (total weight) ranging from 1500 to 2910 g and were on average 12.5 years old (via otolith aging) ranging from 10-14 years.

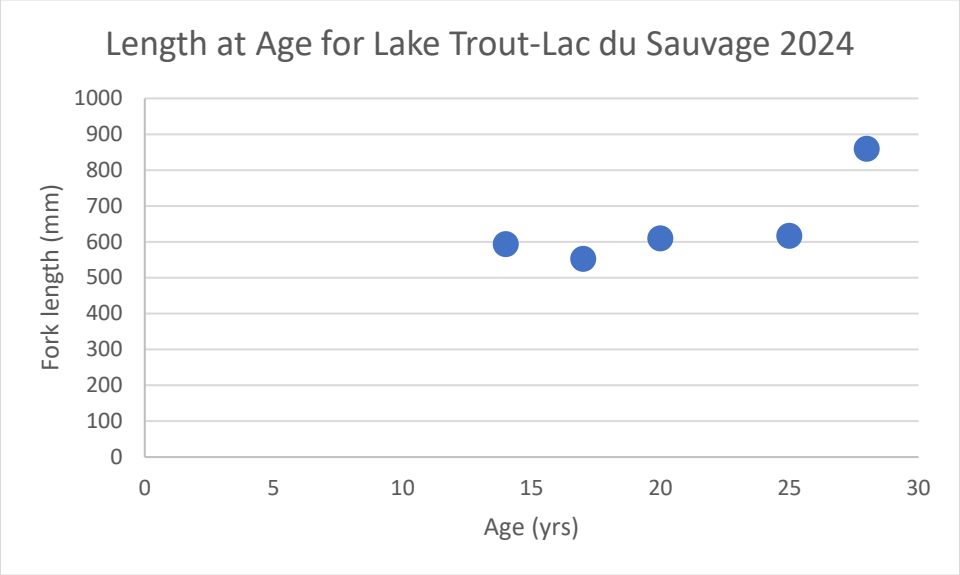
No deformities/abnormalities were noted in any of the fish sampled; parasites were found on the outer stomach wall and surface of other organs in most individuals, though not at levels considered to be abnormal. As observed in other years of the study, Lake Trout stomach contents included Ninespine Stickleback) and that appeared to be digested cisco and juvenile Whitefish. Lake Whitefish stomach contents included an assortment of invertebrates including snails.

Growth Rate

Analysis of fish length, weight, and age can be used to infer attributes of sub-Arctic fish life history and provide insight into the susceptibility of a species to environmental change. The relationship between fish length and weight is one way to characterize growth. Overall, review of age in relation to length for the Lake Trout and Lake Whitefish caught in Lac du Sauvage suggest rapid initial growth followed by minimal increase in size from 10 to 13 years to maximum age (12a, 12b).



12a



12b

Figure 12. Length at age for Lake Whitefish (12a) and Lake Trout (12b) from Lac du Sauvage August 2024.

Discussion

Laying dormant in the sediments, without access to oxygen, mercury can eventually be transformed by micro-organisms (tiny living creatures) into a more dangerous form known as methyl mercury. These compounds can readily associate with suspended and organic matter and be taken up by aquatic organisms. Methyl mercury is attracted to fat and is distributed to the fatty tissues of living organisms. Although methyl mercury is estimated to total 1% of the total mercury content of water, more than 90 % of the mercury in biota is in the form of methyl mercury. All organisms in water may

be exposed to dissolved or suspended mercury, but methyl mercury is bioconcentrated via the food chain. Studies have shown that long-term daily ingestion of approximately 0.25 mg of mercury as methyl mercury may cause the onset of mild neurological symptoms (Health Canada 2011). For these reasons, sampling fish for mercury tissue concentrations was and continues to be a priority.

The Lac du Sauvage samples were within the range seen in more southern community lakes such as Snare Lake and Rae Lakes. Lake trout samples had higher concentrations overall than Lake Whitefish (Fig 10e), which was not unexpected given that they are predatory fish which commonly exhibit higher levels due to bioaccumulation and biomagnification, while lake whitefish primarily feed on invertebrates and zooplankton and typically show lower levels of contaminants (GNWT 2016a, 2016b, Health Canada 2011, Cabana et al. 1994). On average the concentration of mercury in Lake trout tissue was below the guideline, except for one large/old specimen that was double the Health Canada Guideline in mercury level. However, none of the tissue samples for either species showed levels of mercury that were considered abnormal for northern lakes within this Precambrian Shield geomorphology region.

In upcoming years of Lac du Sauvage sampling, water and sediment should be added to the study design. TG would thus be able to determine if in the future, the lake is affected by industry and human activities and climate change. The hope is, with collaboration with academic partners, that such comparisons. could become a regular post-season occurrence. There has been ongoing concern among the Tłı̨chǫ people regarding whether fish are healthy and safe to eat, and Tłı̨chǫ elders continue to emphasize that up-to-date studies documenting contaminant levels to determine the health of fish are needed. Continued standardized sampling at lakes near Tłı̨chǫ communities have helped in tracking environmental changes. The addition of the Lac du Sauvage site to the TAEMP will also help address gaps in watershed knowledge associated with Wek'èezhìı. The Lac du Sauvage location also broadens the geographic coverage of sampling for mercury, as recommended in the Aboriginal and Northern Development Canada (now Indigenous and Northern Affairs Canada) State of Knowledge Report (AANDC 2012).

Table 1: Summary information on fish size and mercury levels in specimens captured during the 2024 Lac du Sauvage summer camp.

Date	Site	Fish #	Species	Length (mm)	Weight (kg)	Merc mg/kg wwt
Summer 2024	Lac du Sauvage	1	LKWH	455	1.5	0.06
Summer 2024	Lac du Sauvage	2	LKWH	429	1.35	0.03
Summer 2024	Lac du Sauvage	3	LKWH	479	1.55	0.07
Summer 2024	Lac du Sauvage	4	LKWH	472	1.83	0.08
Summer 2024	Lac du Sauvage	5	LKWH	454	1.72	0.05
Summer 2024	Lac du Sauvage	6	LKWH	510	1.6	0.07
Summer 2024	Lac du Sauvage	7	LKWH	545	2.91	0.03
Summer 2024	Lac du Sauvage	8	LKWH	506	1.57	0.06
Summer 2024	Lac du Sauvage	9	LKWH	518	1.7	0.06
Summer 2024	Lac du Sauvage	10	LKWH	539	2.33	0.014
Summer 2024	Lac du Sauvage	1	LKTR	859	5.5	1.13
Summer 2024	Lac du Sauvage	2	LKTR	593	2.6	0.354
Summer 2024	Lac du Sauvage	3	LKTR	552	2.35	0.198
Summer 2024	Lac du Sauvage	4	LKTR	616	2.52	0.33
Summer 2024	Lac du Sauvage	5	LKTR	609	2.55	0.23
Summer 2024	Lac du Sauvage	1	BURB	682	2.45	0.162

Methodology

"We Watch Everything" - Traditional Knowledge Framework

Ekwǫ̀ Nàxoèhdee K'è is an applied interdisciplinary research project that bridges observations on biological indicators with the cultural knowledge of local hunters. We use this "biocultural approach" to emphasize the Tłı̨chǫ traditional knowledge of the ecosystem we live in. Biocultural approaches explore the link between biological and cultural diversity, and their interdependency with one another (Pretty et al., 2009; Pilgrim and Pretty, 2010). Our framework of research is based on two methodologies developed over the course of the program, named, respectively, "We Watch Everything" and "Do as Hunters Do."

"We Watch Everything" is a theoretical framework of Traditional Knowledge research founded upon participatory ethnographic research and a set of theoretical concepts shaping the way information is collected, analyzed and interpreted. The use of language, indigenous ontology and perspectives on nature form the pillars of the framework.

Language of Nature

Knowledge of nature is culturally situated and derives from the environmental adaptations of the culture that gave it meaning. Our human experiences of nature are thus tied to their cultural interpretations. Seen through different cultural lenses, a single process in a physical environment may have two (or more) quite different meanings. Furthermore, a person's response towards environmental processes will depend on his or her pre-existing ideas and values within their culture. Thus, the beliefs one holds of the environment direct one's actions towards nature (Ingold 2000; Sharp and Sharp 2015).

Developing a traditional knowledge environmental monitoring framework requires that we recognize and adapt the values and ideas within an indigenous perspective on nature. Using cultural practices related to ekwǫ̀ to direct the monitoring, and indigenous perspectives on nature permeate as a framework, we can glimpse into a different worldview of interactions with the land—one that is as ancient as the people who first hunted ekwǫ̀ in the landscapes of Kokètì, Ek'atì and Deèzàatì.

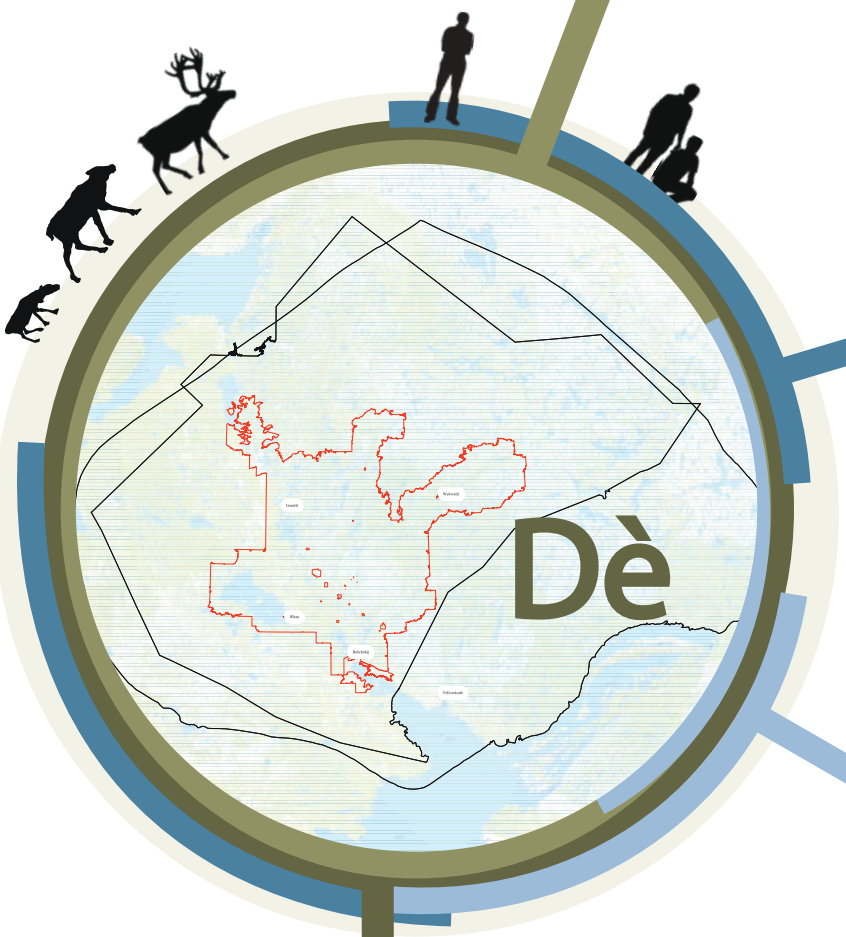
Land-based Theoretical Concepts

To achieve an indigenous perspective, the program employs Tłı̨chǫ words and cultural perspectives deeply ingrained in Tłı̨chǫ ontology. While such theoretical concepts are abstract, they have a very concrete physical practice in the day-to-day thinking of Tłı̨chǫ harvesters. An example is the concept of dè. Dè has a broader meaning than "land," because it refers to a whole ecosystem or environment; "however, where the word ecosystem is based on the idea that living things exist in association with non-living elements, the Dogrib term dè expands the meaning of "association" to encompass the knowledge that everything in the environment has life and spirit" (Legat, Zoe & Chocolate, 1995). Dè is not an independent object "out there," existing separate from culture and our daily lives, but rather is an all-encompassing, holistic system, of which indigenous culture is an integral part. As Allice Legat explains, "dè includes everything because all entities are in the state of existing and have spirit" (2012: 79). Surrounding the concept of dè we defined four key theoretical concepts underlying the program's traditional knowledge framework. These are **sentience, interdependence, communication**, and **time immemorial** (see Figure 13).

TRADITIONAL KNOWLEDGE FRAMEWORK

SENTIENCE

We acknowledge diverse forms of communication between beings in dè, which may be unfamiliar to Western perspectives. Spiritual communication is legitimate knowledge that informs of the presence and abilities of animals and natural elements. We accept that knowledge revealed through spiritual communication is valid and can be used as hunters have always used it.



TIME IMMEMORIAL

We recognize that we engage with an ancient land. Since time immemorial, the people have focused their attention on knowing the seasonal rhythms of sentient animals and geographical and climatic details throughout their land. We recognize that we follow an ancient tradition of walking the same trails, watching the same caribou herd and using the same hunting locations as people have always done.

RESPECT

We recognize all beings, such as caribou, fish and birds, as sentient, intelligent beings capable of communication, memory and personal agency. Furthermore, inanimate beings, such as the wind, are also sentient and can act on choices and influence other beings. We engage in a social relationship with animals and the elements (living and nonliving) when we travel on the land. By respecting the land and water when we camp or travel, through small acts such as paying the water, we follow the elders' teachings and engage with dè as hunters have done since time immemorial.

INTERDEPENDENCE

Humans, caribou and living and nonliving elements of the land live in a dynamic interdependent relationship. For the Tłı̨chǫ, dè is not separated into the biological, social or supernatural spheres, as it is in Western concepts. We recognize the interdependent relationships of all beings and elements of the land.

Acting upon the principles of sentience, interdependence, communication and time immemorial, team members perform individual and collective rituals. One of the simplest and yet most powerful of these is "pay the land." Paying the land is done to neutralize our passage and become aware of our dependence on nature as human beings. This ritual involves simple acts of placing tobacco, or other valuable objects, in the water upon one's first arrival to a place. Other rituals are propitiatory in nature and performed to ask for safety. "Feeding" the fire is a ritual performed collectively to mitigate ones' presence and ask for safe passage and for harmony to be maintained (photos on page 33). Through such actions, the team communicates and engages with the land on a social level; "the land, then, is a living entity with powers that should be respected if harmony is to be maintained" (Legat 2008: 37). During such engagement, the land is comparable to ones' parents, who provide everything for a person's sustenance. Tłı̨chǫ use the word Dè Gogha Nàeɔı̨ ("the land shows favour to us") to understand how the land feels about our presence

Field Methods: "Do as Hunters Do"

"Do as Hunters Do" is the practical implementation of the "We Watch Everything" framework. "Do as Hunters Do" is a useful memetic English phrase that helps to emphasize that our research methodology emulates traditional indigenous ekwǫ̀ hunting in the barrenlands, although no real hunting occurs during the program. Using a participatory action research (PAR) approach, members of the "hunting party" travel to specific locations on the barrenlands to find ekwǫ̀ together, collectively participating, experiencing, and sharing knowledge. Using a PAR approach, the researchers become part of the "hunting team" under the direction of the Elders and the local harvesters, as traditionally done in Tłı̨chǫ culture. This form of PAR research can be defined as a process of self-investigation shaped by collective decision-making among the team members.

The essence of "Do as Hunters Do" is the recognition that a TK monitoring program does not need to develop new methods; rather, it should learn from and adapt to the cultural practices developed, since time immemorial, by experienced indigenous harvesters to sustain their communities in the Arctic environment. In order to comfortably live in the Arctic, Tłı̨chǫ and Inuit hunters developed sophisticated ways of looking at the landscapes surrounding them and locating animals as well as other food sources. Thus, the program uses hunting locations as places of observations, and hunting techniques as the method of observation.



Photo 36: Team positioned on *what'àa* (esker) next to a well used animal trail (Pat Kane).

Hunting Locations as Places of Observation

The “Do as Hunters Do” field methods unfold through a set of techniques and concepts that are specifically related to the landscapes of the barrenlands. These were incorporated as effective tools within our research framework.

Observations at Nǫʔokè

Nǫʔokè (watercrossings) are the closest points of contact between land across waterbodies, used by ekwǫ̀ to cross the numerous large lakes dotting the tundra. Nǫʔokè is a Tłı̨chǫ term for water crossings; it literally means “swim across”, and a nǫʔokè can be any place that ekwǫ̀ or any other animal use to swim across. Tłı̨chǫ also use the more specific term naʔoke to refer to a place where ekwǫ̀ always cross, such as the crossing between Kokètì and Kwìdlìachı̨̀. As part of our methodology, waiting at these crossings allows the researchers to “Do as Hunters Do.”

Nǫʔokè refers to the interface between water, land, and ekwǫ̀ movement. When the herds travel over the vast land, they need to walk around large waterbodies on their migration routes. But at times they prefer to swim across water bodies rather than walk the long way around. In those circumstances, they often enter the water at the point of shortest distance to the other side; although the presence of large boulders or perceived hazards, may influence where the herds decide to cross.

Observations from Daka

Daka (high points) across the landscape such as hozìı shìa (hills on barrenland) and what’àa (eskers) are extensively used by the team to monitor ekwǫ̀, locate features such as favourable habitats, track the progression of predators and other species, and as points of observation with limited insect harassment.

Observations at Tataa

Tataa is an important word to understand ekwǫ̀ migration. It refers to movement patterns of ekwǫ̀ over land formations relative to water bodies, and literally means “in the midst of waters” (Whaèhdôö Nàowoò Kö 2002:21). The large lakes and numerous water bodies encountered on the migration routes create obstacles that the herds must travel around. A tataa is a channel of land between lakes—a land corridor that allows ekwǫ̀ to move between lakes along their migration routes. The concept of tataa is also used by the Elders to refer to a migration route (Whaèhdôö Nàowoò Kö 2002:21).

Hunting Techniques as Methods of Observation

The location of our main camp, close to the naʔokè (water crossing) between Kokètì and Kwìdlìachı̨̀ in Northwest Territories, was located at the northernmost range of Tłı̨chǫ land use. In the past, people travelled by birch bark canoes and later with canvas canoes along the waterways from their settlements south of the treeline to this location purely for ekwǫ̀ hunting. They followed shorelines by boat, then beached at known ekwǫ̀ water crossings. Families set their camps short distances from the crossings, so as not to disturb the potential movement of ekwǫ̀. From camp, hunters walked to hill tops or eskers, where they waited and watched for any movement on the land surrounding the crossing.

The Ekwǫ̀ Nàxoèhdee K’è program has sought to revive ancient traditions and trails by applying similar techniques and concepts. Observations from the daka (hilltops) such as hozìı shìa (hills on barrenland) and what’àa (eskers) are the main tools applied by the team to locate ekwǫ̀. Advised by local hunters, our

main camp was established approximately two kilometres north of the main naʔokè. This location has been used for centuries by Tłı̨chǫ and Inuit. One kilometre west of the main campsite, there is a long, tall esker, stretching in a north-south direction, where we did as hunters have always done; wait and watch the land for animal movement surrounding the naʔokè.

Waiting

The "Do as Hunters Do" methodology is based on walking the land and waiting at strategic places, such as at higher elevations with a viewpoint or known nǫʔokè; places where ekwǫ̀ are expected to migrate. As ekwǫ̀ herds are constantly moving, it is necessary to meet them on their travels, and hunters have identified the best locations to meet them. They regularly travelled to these locations and simply waited.

Waiting also provided an opportunity to feel and become acquainted with the land. Every day, the team sat on the high esker west of the camp for hours, watching, listening, and feeling the weather. Sitting on the esker between two and eight hours each day, in morning, midday and evenings, we had the opportunity to experience weather systems moving over us. Living in close contact with the land fosters a connection with elements of dè that goes beyond ordinary observations.

Waiting is therefore intended as a vigilant watch—a state of mind in which the team members engage personally with the landscape. Such prolonged personal engagement with the daily weather conditions, physical movement over various terrains and close encounters with local animals, shapes the mental state of each team member, and thus the overall team's ability to monitor ekwǫ̀.

Time

The "Do as Hunters Do" methodology requires ample time due to its ground-based approach. Time is required, for example, to adjust to the daily and seasonal weather patterns. Weather decides everything on the barrenlands; the wind and waves direct all movements and actions; thus, plans get delayed and remade constantly. The most appropriate tool we can employ is time, implemented by waiting and watching. A long-term approach is necessary to get more than momentary observations, and to fully understand the life of ekwǫ̀ on the land. Long-term monitoring, defined over years of repeated research periods, allows the researcher and the hunters to discern ecological patterns.

Walking

Walking is simultaneously the slowest form of transportation and the most intimate form of movement over any landscape. As a research method, walking provides the team with the time necessary to watch for details and identify clues of presence left behind by animals. The teams walked between five and 20 kilometres per day. After 73 days of field work at Kokètì, we had covered 3572 kilometres by foot and boat. The long walks into the surrounding landscape were made from daka (high point) to daka, from one high point to the next, often following eskers. As we reached a daka, such as an esker or hilltop, we sit, watch over the surrounding landscape, and wait. If no animal movements were seen for one to three hours, we proceeded to the next daka and continued watching. This is the same method as hunters use when hunting for ekwǫ̀ on the barrenlands in the fall.

Monitoring Indicators: "We Watch Everything"

Monitoring is based on the periodic assessment of key indicators, which were developed using an interdisciplinary approach. Based on the holistic Tłı̨chǫ concept of "We Watch Everything," the elders highlighted several related indicators to be included for an analysis of ekwǫ̀ and habitat assessment. The resulting list of monitoring indicators include: (1) habitat; (2) ekwǫ̀; (3) predators, and (4) industrial development.

Indicator 1: Habitat

- Daily weather pattern (temperature, wind direction, humidity, barometric pressure)
    a. Ekwǫ̀ behaviour in response to weather
    b. Daily insect activity in response to weather
- Ekwǫ̀ and predator behaviour in response to weather/ insect activity
- Conditions of vegetation and ekwǫ̀ forage
- Effects of environmental changes on habitat and ekwǫ̀

Indicator 2: Ekwǫ̀

Ekwǫ̀ health

- Unhealthy: skinny; bony; fatigued
- Healthy: normal conditions. No bones visible on rump and back. Layer of fat shows on the neck and back, and back to rump. Look at tail: if it's short, then the animal is fat and healthy

Hide colour

- Unhealthy: discoloured; patchy
- Healthy: nice colour; no patches. In July: white-coloured hide (shed winter coat in June- July); August: darker more uniform color and shorter hair (new winter coat is coming)

Walking posture

- Unhealthy: limping, or walking with lagging head
- Healthy: prancing, or normal posture; head straight or slightly down when walking

Injured animals

- Number of ekwǫ̀ injured in the herd
- Types of injuries
- Signs of disease

Calves

- Calf-to-cow ratio
- Number of cows without calves
- Number of twins: sign of a healthy herd, as the cow is healthy enough to support two calves—demonstrates cows have not been under stress, and good habitat quality

Indicator 3: Predators

- Number, signs of and location of ekwǫ̀ predators
- Relationship between ekwǫ̀ and predators

Indicator 4: Industrial Development

- Ekwǫ̀ behaviour and movement affected by visible presence, noise, scent from industrial infrastructure and activities

Finding Ekwǫ̀

The main challenge for monitoring ekwǫ̀ is finding ekwǫ̀. In general, Kokètì ekwǫ̀ migrate southwest, from their calving grounds west of Bathurst Inlet, in late June/early July, toward the general area of Kokètì and Kwìdlìachı̨ı̨, and remain in that area throughout July and August, and into September. However, at a finer scale, the herd's movements are very unpredictable. In our field program, the knowledge of the team's harvesters and scientific radio collar data received every two days allowed us to locate the herds and position ourselves in the right location.

Collar Data

Collar information provides a specific geographic location of male and female ekwǫ̀. Every second day, GNWT-ECC biologists provide collar information to the TG's GIS technician, who plots the info onto a grid map of our monitoring area. The info from the grid map is communicated to the team researcher, over satellite phone or as a text message using a Garmin Inreach device, who plots the collar data on a grid map either while on the land (photo 32) or in camp (photo 33). The collar information provides the location of collared ekwǫ̀ at a specific time approximately every second day. The challenge for the program is knowing where the herds are throughout the days in between.

Local Knowledge

Since herds can move long distances each day, local knowledge was necessary to identify where to best position ourselves to intercept ekwǫ̀ before they moved to areas inaccessible by our transportation methods; boating and walking. Building camp near frequently used nǫʔokè and waiting is the traditional and most efficient way to ensure meeting ekwǫ̀. Local knowledge identified which locations would be best suited to have a semi-permanent camp. John Franklin and Mercie Koadloak, who have lived most of their lives on Kokètì, pointed out the best camp locations, and where to go by boat and foot to meet the herds. Their detailed local knowledge of geography and topography, by land and water, was vital for our team's ability to best position itself.

We learned that the success of the program is dependent on doing, as close as possible, what local harvesters and Elders have always done on the lake: travel similar routes; set camp at the same historical campsites and walk the same trails. The task of monitoring is an act of trying to position oneself at places where one anticipates ekwǫ̀ will move through. In Tłı̨chǫ, Kokètì means empty campsite lake, and refers to the many old campsites that have been made at the lake over time. These campsites were chosen for a purpose; namely, for protection from wind or proximity to hunting locations. The program used the same sites for the same reasons.

Field Notes Protocols

Field notes protocols were created to provide consistency between the researchers' observations. Table 12 outlines information collected during each wildlife observation. The templates provide consistency to the daily observations and experience of each team. The template systemizes the direct wildlife recording, while the notes of Elders' explanations are flexible and open-ended, to allow for different durations of each observation and adjusting to the Elders' descriptions. The field books are printed in Rite-in-the-Rain™ waterproof paper.

Table 10: Template for wildlife observations

Date (DD/MM/YYYY): _____ Obs. #: _____

Species: Caribou Wolf Muskox Other: _____

Obs. start time: _____ : _____ (24:00) Obs. end time: _____ : _____ (24:00)

Total obs. time (hours mins): _____

Distance from observer (circle): 0-500m 500m-1km 1-2km 2-3km Other: ____

Waypoint #: _____ Placename (Descr.): _____

Total group size: _____ (circle): Count Estimate

Classification

No. animals classified: Confidence of observation (circle): No Yes

Bulls	Cows	Calves	Yearlings	Unknown	Total

Calf: cow ratio: _____ _____ _____ _____ _____
(0-10 score)
_____ _____ _____ _____ _____

Animal Health

Animal health observed (circle): No Yes (sample counts below)

Body condition:	Fat	Good	Skinny	Total
Bulls				
Cows				
Calves				

Ask Elders if Caribou look healthy and why?: _____

_____

_____

Injuries:	Number and description of injured or sick animals
Bulls	
Cows	
Calves	

More details of observation at back: Yes No

Fecal samples collected (circle): Yes No ID number _____

Ask Elders about Caribou injuries: _____

_____

Behaviour

Movement (coming from/going to): _____

_____

Behaviour (circle): Feeding Bedded – Ruminating Swimming

Walking Running — due to Insects or Predators or _____

_____

Effect on Behaviour

Are weather/insects affecting behaviour and ability to feed? (circle): No Yes

Insect activity (circle): None Low Medium High

Ask Elders how insects are affecting Caribou.: _____

_____

Can you see what they are eating? (circle): No – too far Yes

Description: _____

Caribou Food

Condition of food:	None	Poor growth	Avg. growth	Good growth
Grasses/sedges				
Shrubs				
Lichens				
Mushrooms				
All vegetation				

Ask Elders what Caribou are eating. Does food look healthy? Is food dry or moist?:

_____

_____

_____

Effect on Behaviour

Ask Elders to explain the overall observation: _____

_____

_____

_____

_____

Tłı̨chǫ words/concepts: _____

Additional info in field journal (circle): No Yes (use obs. # for reference)

GPS – Latitude: _____ Longitude: _____

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