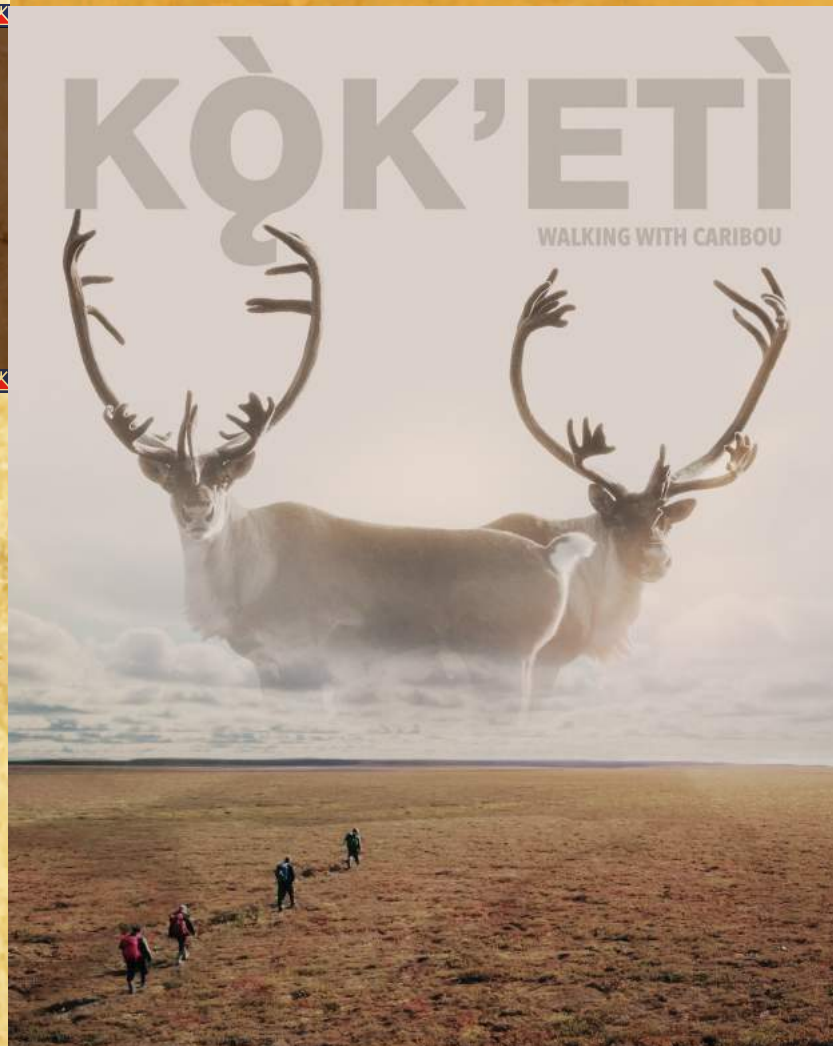


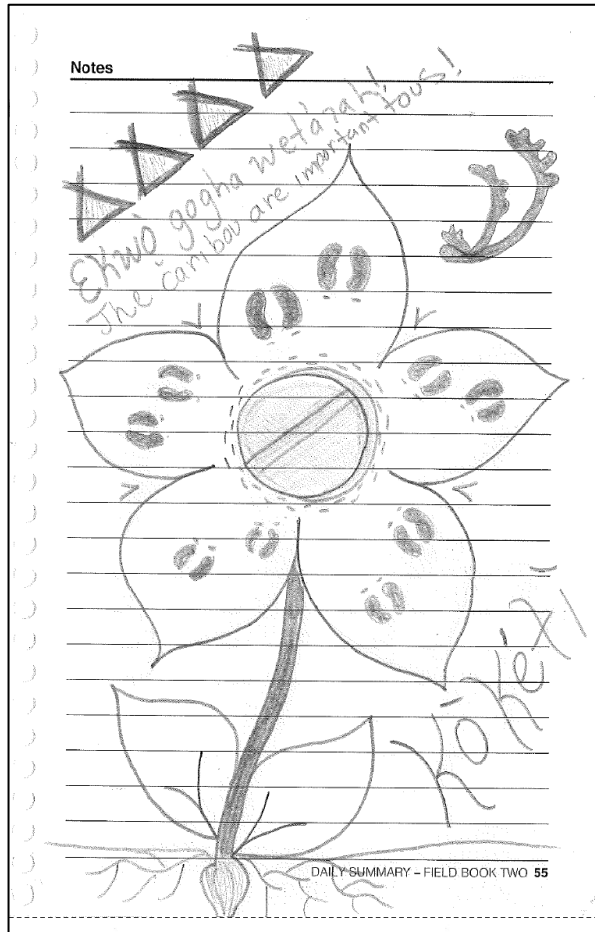
Ekwo Nàxoèhdee K'è

2021 Results



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2022



“It is amazing to know that after a time of sleeping, we as a people have awoken and have returned to our barren-grounds, trying our best to help the ekwo. We may not be here for the same reasons our ancestors were here for, however the protection of our ekwo is vital for future generations to sustain themselves. We are not here for ourselves; we are here for our future Tlicho! We are blessed, we are here, we are praying for you!!!”

Janelle Nitsiza, July 2021

Leon Ekendia

has been a central part of Tłıchq Government's Ekwò Nàxoehdèe K'è (Boots on the Ground) ekwò monitoring program, since the start at Kokèti (Contwoyto Lake) in 2016 and setting up the program at Deèzàatì (Point Lake); he was deeply involved and committed to the program until his unexpected passing in November, 2021.

Leon made tremendous contributions to the research program, that is now world renowned. He filled many roles, such as Elder, safety officer, camp helper and ekwò monitor. Leon loved this work, being immersed in the natural habitat of the ekwò as he returned year after year to the barrenland.

Leon was very skilled on the land. He had a natural strong and caring leadership style and was always willing to pass on his teachings. He was a patient, hard working and respectful man who took immense pride in sharing and teaching the Tłıchq culture and way of life. Leon had a gentle way of doing things and he led by example, which made him a wonderful teacher. He was a natural leader and an excellent team player!

Leon wanted the best for the program and the people involved. He was always willing to speak up for what he believed in. He was not one to get upset but believed in good communication. He always enjoyed a good laugh and often incorporated humor as part of his teachings.

Tłıchq Spirituality was a big part of Leon's life. He often led the team in daily prayers and the weekly Feeding the Fire Ceremony. Leon believed that our Creator is always in control and that we need to acknowledge and honor that each day. Through his prayers, we could ask for safety while doing our work on the land; guidance for each day of research and hope that the ekwò populations will increase in the future.

The staff of the Department of Culture and Land Protection and all the participants of the Ekwò Nàxoèhdee K'è program are mourning Leon's passing. Tlıcho Government is eternally grateful for Leon's contributions to the program. Without the guidance from Leon and the other Elders, the program would not be what it is today. Leon will be missed by all who had the honour of working with him. May Leon's wonderful spirit and good intentions guide us all as we continue on our journey walking in the path of the ekwò.



Leon Ekendia and his wife Nora Ekendia. Deèzàati, September 2020.



Michel Louis Rabesca and Leon Ekendia. Kokèti, July 2016.



Leon Ekendia. Kokèti, August 2019.



Leon Ekendia. Kokèti, August 2018.



Russell Drybones and Leon Ekendia. Kokèti, August 2019.



Roy Judas and Leon Ekendia. Kokèti, July 2016.

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Tłjchq Yatì

Placenames

Kokètì	Contwoyto Lake
Kwiidliachjì	Fry Inlet (slingshot handle lake)
Ek'atì	Lac de Gras
Ek'adiì	Island on Lac de Gras
Ewaànit'itì	Courageous Lake
Nqdiikahtì	Mackay Lake
Łiwets'awòats'ahtì	Lac de Sauvage

Deèzàatì	Point Lake
Dì Cho	Big Island on Deèzàatì
Deèzàatideè	Coppermine River
Wek'ehaeljiti deh	Parent River
Wek'ehaeljiti	Parent Lake
Saat'ootì	Redrock lake
Tatsotì	Grenville Lake
Gots'qkàtì	Mesa Lake
Wek'ewhàilutì/ Ets'àitì	Rawalpindi Lake

Geographical Terminology Useful for Ekwò Monitors

Ekwo Nqokè	Ekwò Water crossing (any place animal can swim across)
Ekwo Naokè	Ekwò Water crossing (a place ekwò <i>always</i> swims across)
Tataà	Land between water bodies
Whatàa	Esker
Hozì	Barrenland
Hozì Deè	Barrenland; farthest out, "Big barrens"
Hozì shìa	Hill or mountain on barrenland
Sih / shih	Hill or mountain
Daka	High points
Ts'iwì	Stands of trees (black spruce) on barrenland
Tì	Lake/water
Ta	Water; prefix of a word to do with water
Deh	River
Taraa	Meandering river
Dehti	River lake (a lake in the flow of a river)
Dì	Island
T'à	Bay
t'ąq	Beach

Tabàa	Lake shore or beach
ɔehdah	A point of land
ʔehdahkw'o	Peninsula
Ti k'abàa	Shoreline (walking by the shoreline)
Wha	Sand: prefix to do with sand / or a pole
Nafeezee	Ekwò calving grounds
Dechɟlaa	Treeline
Chɟk'è	North
Sazɟ/ sazɟ	South
k'àbatsòò	East
dàà	West

Wildlife Terminology Useful for Ekwò Monitors

Hozii Ekwò	Barren-ground ekwò
Kokèti ekwò	Bathurst ekwò herd
Sahti Ekwò	Bluenose-east ekwò herd
Tòdziì	Woodland ekwò
Ekwò ɬexè k'èɔàa	Ekwò herd
Ekwò akwe etfee	Ekwò leader / lead ekwò (any sex)
Ts'ida akwe etfee	Cow leader
Chia/Tsia	Ekwò calf
Ts'idaa	Yearling (2 or 3 years old)
Wedziike /wedziikea	cow with no calf
Dets'èa	Young cow ekwò
Dets'e	Mature Cow ekwò
Wozaà	Cow with calf
Yèagoa	Young bull ekwò; 3-year-old
Yèago	Bull
Yèagocho	Bull ekwò, biggest bull
Wedziicho	Oldest bull
Wedziì	Bull ekwò
Nadeèzhò	Older bull ekwò
Ekwò Nàxoèhdee K'è	In the migration of ekwò
Nadeeɔà	Migrating ekwò
Ekwo na da dii	Ekwò left behind during migration: "ekwò that go half way"
Niizaa	Ekwò migrating towards the forest in the fall
Nadèezoɔ	Ekwò migrating to the calving grounds
Ekwò Edè	Ekwò antlers
Ekwò keè	Ekwò tracks
Ekwo eto	Ekwò trail
Ekwò ek'a	Ekwò fat
Dìga	Male wolf
Dìga dets'è	Female wolf

Dìgazha/ Dìgaza	Wolf pup/ pups
Dìga wozaa /wezaa	Wolf litter
Dìga eᵑoo	Wolf den
Dìga nàdè	Wolves family, community / wolves living together
Dìga nàdèe k'è	Wolf habitat
Sahcho	Grizzly bear
Hozì edzie	Muskox
Nògha	Wolverine
Dìdì	Ground squirrel / barrenland squirrel
Dedì	Moose
Kw'ih	Mosquito
Behk'òts'jà	Arctic tern
Tatsò gah	Raven
Hatsòga	Crow
Tì tso	Loon
Det'qcho	Eagle
Ets'imbaa	Arctic fox

Executive Summary

In 2021, four monitoring teams spent July, August, and September on the Kokèti ekwò (Bathurst caribou) summer range at Kokèti (Contwoyto Lake). Due to Covid-19 travel restrictions in September, the last team at Kokèti and the two teams planned to conduct monitoring at Deèzàati were cancelled.

The teams observed a total of 117 ekwò groups and the total number of *ekwò* observed was 3359. Most groups were fewer than ten ekwò. We estimated an overall calf: cow ratio as 38 calves out of 100 cows, based on sightings of 69 ekwò groups. Calf ratio is observed with higher confidence in ekwò groups that occur within 1 km from the observer. For the 40 ekwò groups observed within 1km, the estimated calf:cow ratio was 40 calves per 100 cows. The estimate of 38-40 calves per 100 cows in summer is considered *average to low* and would likely indicate a declining population trend. However, the number is higher than the 29 calves per 100 cows observed during summer 2020, and the 31 calves per 100 cows observed in 2019. The higher number can possibly be explained by the mixing of the Bathurst and Beverly herds in August.

Overall, ekwò appeared healthy, and by the time of mid-August, the elders described the bulls, cows, and calves to be all in good conditions. Eight injured ekwò were observed within eight separate groups out of a total of 117 ekwò groups. Of all ekwò groups observed, the total of eight injured ekwò represented approximately 0.2% of all ekwò observed. The injured ekwò were observed walking with a limp due to injured legs.

The overall conditions of the summer habitat conditions and ekwò forage were described as very healthy, largely because the vegetation was lush, moist, and productive. The consistent rain and moist soil, resulting in plentiful, high-quality forage, which was particularly evident by the richness and good quality of lichen, grasses, shrubs, and dwarf birches. There was not an abundance of mushrooms, as has been observed in previous summers, and berries were reported as smaller and less abundant, compared to the high abundance of berries during fall 2020.

There were 14 dìga (wolf/*Canis lupus*) observed, compared to zero dìga observed in 2020 and to the higher number of 31 dìga observations in summer 2019. Most sightings were of single dìga; and pairs were seen on two occasions, and a group of 3 dìga was observed once. In September, the three dìga were observed killing a calf. Seven sahcho (grizzly bears/*Ursus arctos*/ "big guy") were observed, and two sahcho were observed near the basecamp; all observations were of a single animal. In 2020, eight bears were observed and during summer 2019 more animals were observed with a total of ten sahcho. 16 det'òcho (eagle) were observed. The number of eagles observed per year shows a persistent and steady presence of eagle around Kokèti. A possible bald eagle nest was located on the south shore of Fry Inlet. The bald eagle summer range is typically limited to the forest landscape and does not reach into the barrenland. First observed in 2005 by residents on Kokèti, bald eagles are now a permanent presence around Kokèti.

For the past four years (2018 to 2021), Ekwò Nàxoèhdee K'è monitors have observed that ekwò habitat and food has generally been in excellent condition due to much rain and wind, and that ekwò health has been observed as "good", including fat bulls and cows observed in August and September. The good condition of ekwò habitat and ekwò body condition provide the necessary environmental conditions for the population to grow. However, the monitors observe many groups with few or no calves, and the GNWT's calving ground survey shows a continued decline of the herd.

Ekwò Nàxoèhdee K'è - Introduction

Started in 2016, the Ekwò Nàxoèhdee K'è ekwò monitoring program has brought Tłıchq̓ people to the ancestral hozı ekwò (barren-ground ekwò) harvesting locations on hozııdee (barrenland). The basecamp at Kokèti (Contwoyto Lake), located in the northernmost region of Tłıchq̓ traditional territory, is on the summer range of the Kokèti ekwò (Bathurst ekwò) herd; the place where hozıı ekwò bring their newborn calves to spend the summer.

Both the Kokèti ekwò and the Sahtı ekwò herds experienced sharp declines during the last decade. The most recent calving ground surveys, conducted in June 2021, estimated a total of 6,243 Kokèti ekwò; a 99% decline since its estimated highest recorded population numbers of 480,000 in the 1980s. The Sahtı ekwò population was estimated at 23,202 ekwò, which is a slight increase from 19,294 animals counted in the previous survey in 2018. The Tłıchq̓ Government continues its monitoring efforts to study and monitor the ekwò herds based on the traditional knowledge of Tłıchq̓ elders and harvesters. The monitoring objectives are to examine the conditions of hozıı ekwò on its summer range, focusing on the key indicators: (1) habitat; (2) ekwò condition; (3) predators, and (4) industrial development. The program is a collaboration between the Tłıchq̓ Government, GNWT-ENR, the Wek'èezhıı Renewable Resource Board (WRRB). Funding was provided by Tłıchq̓ Government, GNWT-ENR and the GNWT-Cumulative Impact Monitoring Program¹ (CIMP).



Photo 1: Kokèti Basecamp (P. Kane)



Photo 2: Deèzàati basecamp (P. Jacobsen)

The program has two basecamps on the barrenlands (map 1). The main basecamp is at Kokèti where we have monitored ekwò for seven years, since 2016 (Photo 1). During summer 2020, the program established a base camp on Deèzàati (Point Lake) (Photo 2) to monitor the Sahtı ekwò (Bluenose East ekwò herd). Establishing the ekwò monitoring program at Deèzàati was based on WRRBs (2019) recommendation (#15-2019) to expand TG's monitoring to the summer range of Sahtı ekwò. Deèzàati was selected as its the largest waterbody on the Sahtı ekwò range within the Wek'èezhıı and because of the rich Tłıchq̓ cultural history on the lake.

¹ This project receives funding from Government of the Northwest Territories Department of Environment and Natural Resources, Northwest Territories Cumulative Impact Monitoring Program. This article is Project CIMP94. More info can be found at: <http://www.enr.gov.nt.ca/en/services/cumulative-impact-monitoring-program-nwt-cimp>

From 2016 to 2021, the teams have steadily increased the monitoring and search effort each year, which has resulted in more frequent and detailed wildlife observations. Table 1 shows the progression and increase of monitors, field days, distance travelled and monitoring hours per year of the program.

Monitoring Efforts 2016-2021





	2016	2017	2018	2019	2020	2021
 Caribou Monitors	8	10	10	25	40	28
 Field Days	26	40	40	57	48	66
 Distance Travelled	481 kms	1186 kms	1784 kms	3240 kms	2561 kms	3572 kms
 Monitoring Hours	140	207	218	325	190	266

Table 1: Monitoring Efforts 2016-2021

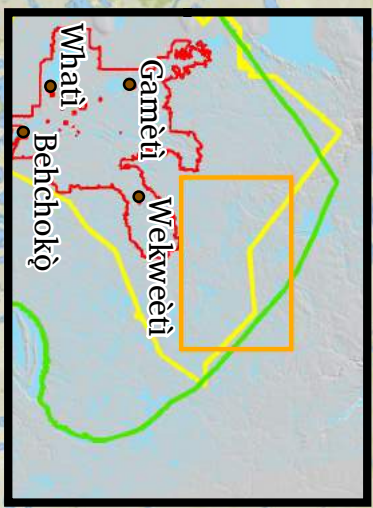
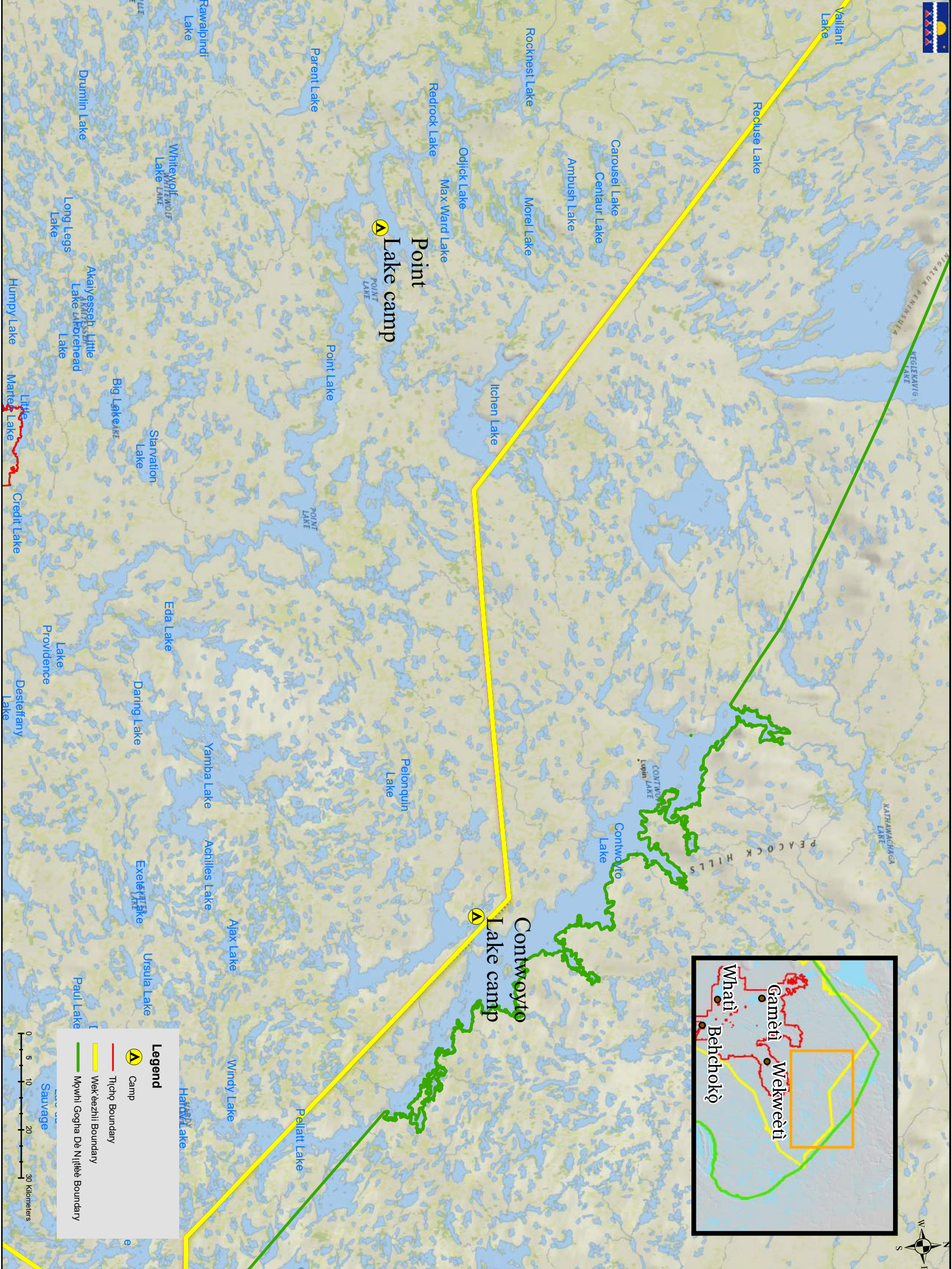
Through Ekwò Nàxoèhdee K'è, Tìchq travel to their ancestral harvesting locations on Kokèti and Deèzàati, where we reconnect to cultural places and ekwò. Thus, the program helps Tìchq participants to “go back to the original source to remember” (John B. Zoe) the stories, language, knowledge, and cultural ways of life. An important process to continue maintaining the relationship with the land and animals, because “our relationship with ekwò defines who we are. It’s a foundation for our nàowo – a Tìchq concept that encompasses our language, culture, way of life, as well as our knowledge and laws” (Zoe 2012a, p. 69).

We apply the Tìchq research methodology, “We Watch Everything” to study current environmental conditions, cumulative impacts to ekwò health and population numbers, and examine the ekwò life cycle firsthand. 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 ekwò nqòkè (ekwò water crossings), where elders have always anticipated ekwò herds’ arrival. The monitors sit in position, in the same way a traditional hunting party would have done, to wait, and watch the ekwò and their habitat. Using traditional hunting methods 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 from time immemorial.

This report presents overview of the 2021 field season, including:

- **Monitoring results from Kokèti;**
- **Trend Analysis from 2016 to 2021;**
- **Suggested Management Recommendations for Kokèti ekwò.**

For information about program activities and results from 2016 to 2021, please see our reports, documentaries and photos on the website <https://research.tlicho.ca/research/bootsontheground>.



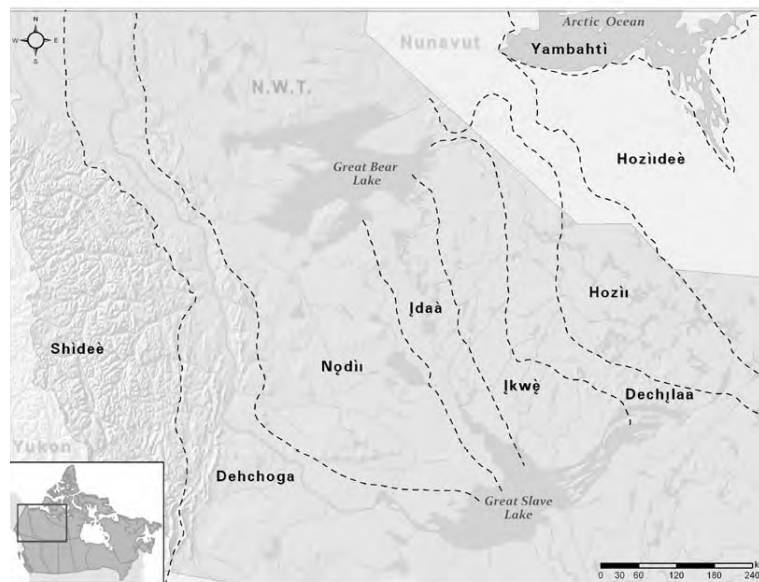
Legend

- Camp
- Titchò Boundary
- Wek'èezhii Boundary
- Mòwhtì Goghna De Nitlèes Boundary



Kokèti Monitoring Area and Timeline

The study area is situated entirely within hozìdee (map 2), referring to the region beyond hozìi (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. The ekwò monitoring area is geographically focused around Kokèti (Contwoyto Lake), Kwìdliachjì (Fry Inlet), and the surrounding land within one day's walking distance from these lakes (map 3). The Tłjchq name for Contwoyto Lake is Kokèti, translated as "empty campsite lake," in reference to the many camps erected around this lake throughout history. Kokèti is located at the northernmost extremity of Tłjchq traditional land use and is situated in Hozìdee described as "big barrens" (Andrews 2011). The lake is importantly situated directly southwest of Bathurst Inlet, home to the herds calving grounds. Hozìdee is shared by the Tłjchq and Inuit people for harvesting hozìi ekwò in summer and fall, fur trapping in winter, and as a trade route between the two cultures. Inuit and Tłjchq have a long history of meeting at historical hozìi ekwò hunting locations.



Map 2: Tłjchq Landscape Units. Source: Andrews 2011

The areas around Kokèti are central to the post-calving and summer ranges of the Kokèti ekwò. In July, during post-calving aggregation, herds of cows and calves move from the calving grounds and mix with the bulls to form large herds. The cows bring their newborn calves to the feeding areas around Kokèti, where the calves can grow strong and feed properly prior to fall migration and the onset of winter.

Kokèti runs approximately northwest to southeast, bisecting the post-calving summer range of the Kokèti ekwò and providing a low rolling landscape with optimal habitat and refuge from biting insects, which are heavily influence by the high winds sometimes coming off the lake. At its widest point, the lake is approximately 19 kilometres wide, and numerous eskers, moraines, and islands form nqòokè (water crossings) that ekwò use to cross the lake. The elongated shape of the lake creates a network of nqòokè along both eastern and western shores of the lake that creates corresponding ekwò etq (ekwò trails) dug deep into the ground as the etq are used every summer. Kokèti 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 Kokèti for mining resupply, 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 (Ekati, Diavik, and Gahcho Kuè) as well as abandoned exploration camps scattered across the landscape.

Field Teams

During 2021, our monitoring at Kokèti took place over a 72-day period between July 3rd and September 12th, during which four teams (Teams A, B, C and D) conducted approximately three-week shifts (Table 2). Due to Covid-19 public health restrictions during end of summer, the last field team for September was cancelled and the two teams at Deèzàati planned for September was cancelled. No fieldwork was done at Deèzàati in 2021.

Table 2: Field Time at Kokèti, summer 2021

	Start	End	# Days
Team A	03-Jul	20-Jul	18
Team B	20-Jul	06-Aug	17
Team C	06-Aug	24-Aug	19
Team D	24-Aug	12-Sep	19
TOTAL DAYS			73

At Kokèti, the teams traveled 3572 kilometres by boat and walking (see tracks on map 3), and 266 hours traveling and watching wildlife (Figure 1). The teams travelled the lakes by boat and walked inland to get into close proximity to the ekwò herds. The daily monitoring locations were determined using the harvesters' knowledge of ekwò movement and GPS collar locations of Kokèti ekwò provided by GNWT-ENR.

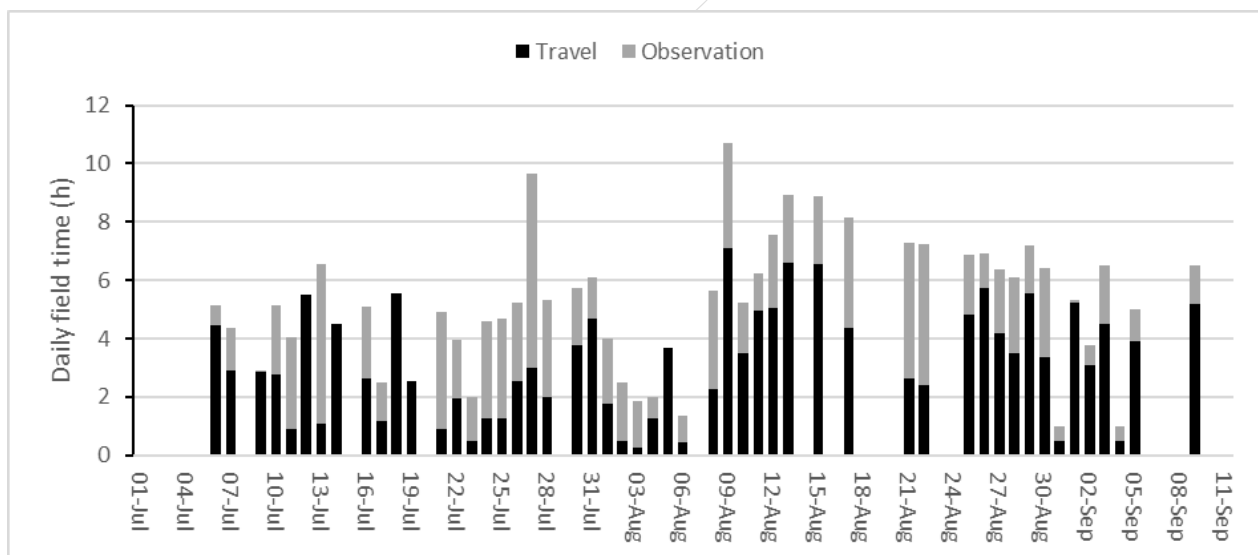
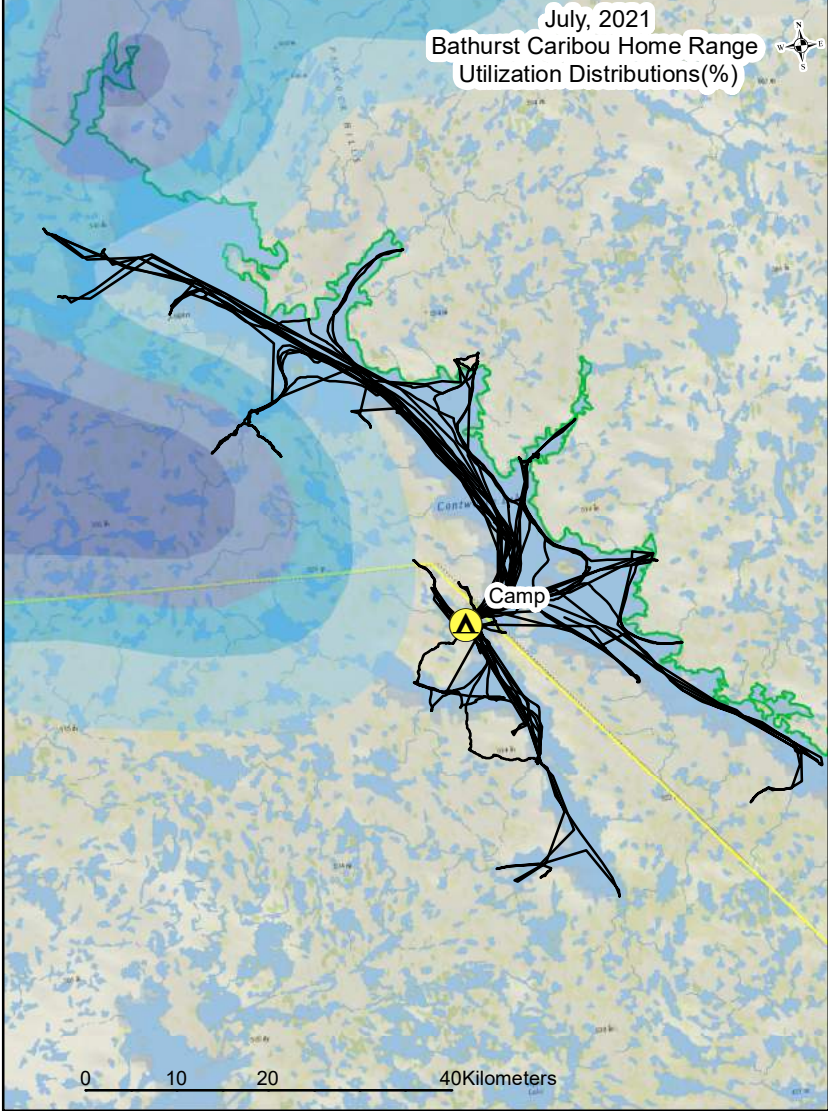
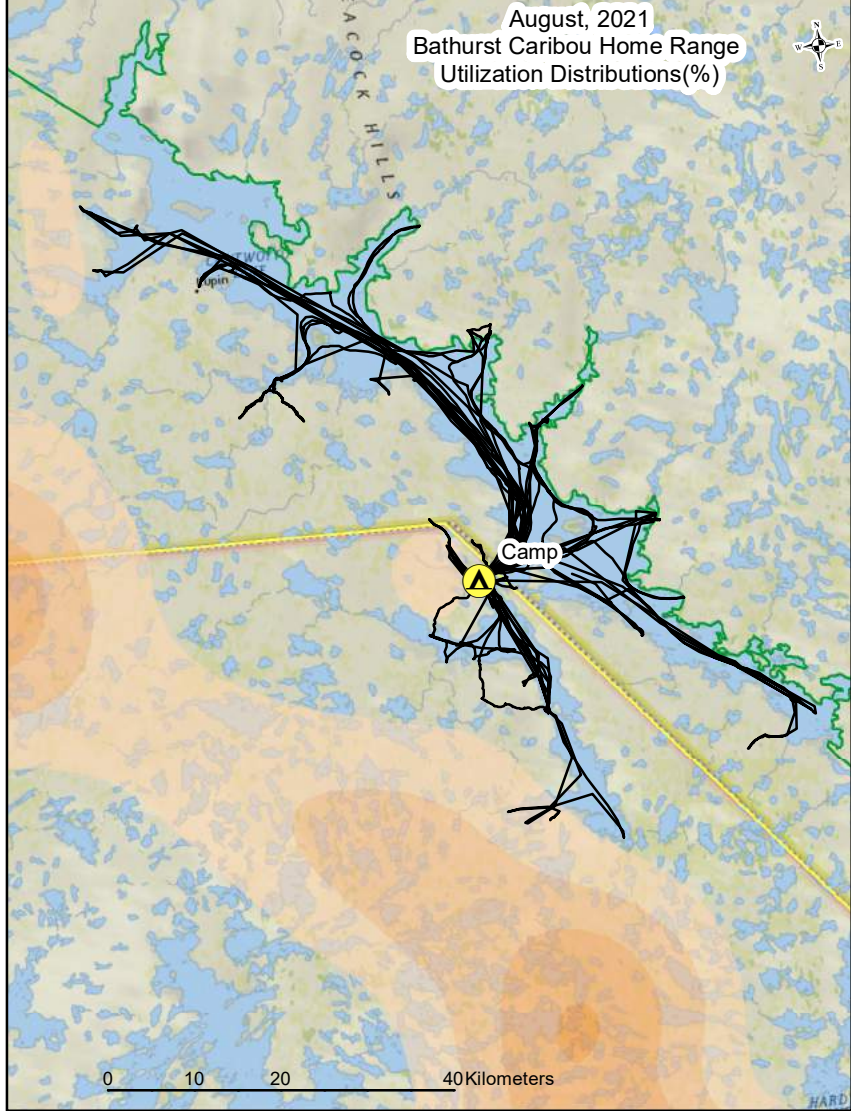


Figure 1: Daily time spent traveling and observing

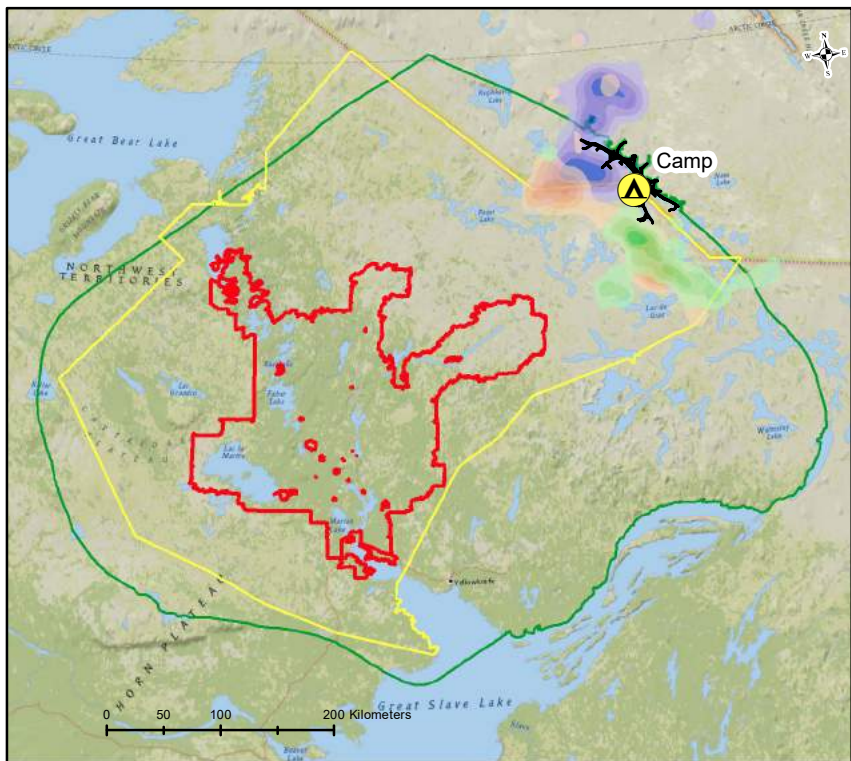
July, 2021
Bathurst Caribou Home Range
Utilization Distributions(%)



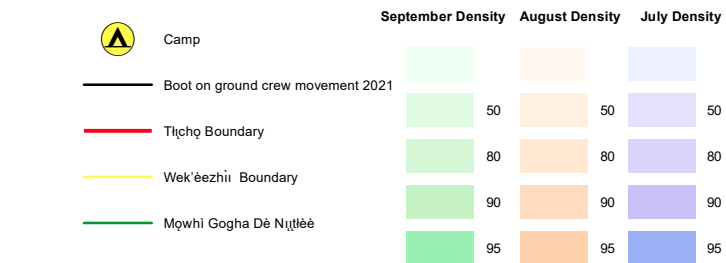
August, 2021
Bathurst Caribou Home Range
Utilization Distributions(%)



September, 2021
Bathurst Caribou Home Range
Utilization Distributions(%)



July, August, September, 2021 Bathurst Caribou Home Range
Utilization Distributions(%)



The Silent Crisis – Continued Decline of Kokèti Ekwò

In 2018, the NWT Conference of Management Authorities (CMA) listed the *hoziì ekwò* (barren ground ekwò) 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 *hoziì ekwò* species in NWT is declining and there are threats that could cause the entire species to disappear 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 *Kokèti ekwò*, the most recent calving ground survey, conducted in June, 2021, estimated the total herd population to be 6,243 *ekwò* (Government of the Northwest Territories and Tłı̄chų Government Joint Proposal on Management Actions for the Bathurst Ekwò (Barren-ground caribou) Herd: 2022 – 2024). Overall, the rate of decline in the herd slowed from 2018 and was approximately 8% per year from 2018 (8,207 adults) to 2021 (6,243 adults). Previously, the Bathurst ekwò herd had declined by ~58% from a June 2015 herd estimate of 19,769 *ekwò* in the Bathurst herd to the 8,207 estimated in June 2018 (Adamczewski et al. 2019). At its historic recorded high in 1986, the Bathurst herd was estimated at about 470,000 *ekwò*, and the estimate of 6,243 *ekwò* in 2021 represents just 1.3% of the population high. Emigration of some Bathurst *ekwò* to the Beverly herd is likely an important contributing factor in the recent observed decline between 2018 and 2021. Emigration of known Bathurst cows over this period included: six of 34 (17.6%) in June 2021; three of 17 (17.6%) in June 2019; and three of 11 (27.3%) in June 2018 (Adamczewski et al. 2022). The main contributors to the continued decline are low survival rate for adult female *ekwò*, and poor reproduction rates of the herd, which include low survival rate for calves (Government of the Northwest Territories and Tłı̄chų Government Joint Proposal on Management Actions for the Bathurst Ekwò (Barren-ground *ekwò*) Herd: 2019 – 2021).

This dramatic rate of decline for the *Kokèti ekwò* 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 *Ekwò* 2019). The next survey was conducted in June 2022.

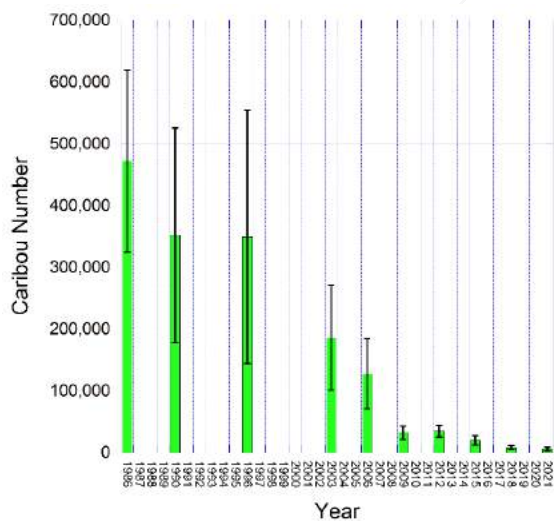


Figure 2: Bathurst herd calving population estimate 1986-2021. Source: Adamczewski et al. 2022.

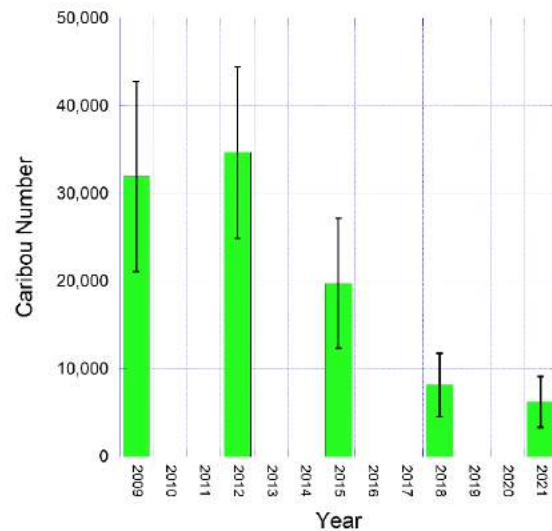


Figure 3: Bathurst herd calving population estimate 2009-2021. Source: Adamczewski et al. 2022.

2021 Results

At Kokèti, the teams observed a total of 117 groups of *ekwò* (table 3) (barren ground *ekwò/Rangifer tarandus groenlandicus*) and the total number of *ekwò* observed was 3359 individuals (table 4). The total individual count represents the cumulative sum of all *ekwò* in groups seen by the field teams. Since the same groups of *ekwò* were likely seen through some consecutive days, it is important to note that *ekwò* sightings represent a relative index of abundance in the area and not a population estimate. The group sizes ranged from a single animal to a large group of 601 *ekwò*. *Ekwò* groups were observed throughout the field season, however many of the large herds were located to the north of Kokèti in July and southwest of Kokèti for large part of August and September, and at times inaccessible by the field teams (see map 3: *ekwò* distribution during summer months).

Table 3: Numbers of Groups Observed							
	Ekwò	Muskox	Moose	Wolf	Grizzly Bear	Wolverine	Eagle
Team A	16	--	1	7	1	1	5
Team B	23	14	3	--	1	--	3
Team C	16	1	--	1	2	--	1
Team D	62	5	2	2	1	--	4
	117	20	6	10	5	1	13

In total, the teams observed 114 groups of *ekwò* over 73 field days. All other wildlife observations were recorded, as follows:

- Hozì edzie (muskox/*Ovibos moschatus*) were the second most abundant wildlife species observed with a total of 20 groups seen comprising 302 individuals. Group size ranged from 1 to 52 muskoxen.
- Dìdìi (moose) was observed on six occasions for a total of seven animals, compared to zero in 2020, and 11 *dìdìi* observed in 2019. *Dìdìi* have not been seen by Tł̨ch̨q monitors prior to 2019.
- A total of 13 Dìga (wolf/*Canis lupus*) were observed. On two occasions, a wolf walked right into basecamp.
- There were four sahcho (grizzly bears/*Ursus arctos*) observed at Kokèti. Two of the sahcho were observed in close proximity to the basecamp.
- One nògha (wolverine/*Gulo gulo*) was observed by Team 1 in July. The other field teams did not see wolverine.
- Sixteen individual det'òcho (eagle) were observed on 13 occasions throughout the field season; both golden eagle and bald eagle were observed. One nest of possibly a bald eagle was discovered on south end of Fry Inlet.

Table 4: Numbers of Animals Observed							
	Ekwò	Muskox	Moose	Wolf	Grizzly Bear	Wolverine	Eagle
Team A	44	--	1	9	1	1	5
Team B	1085	126	3	--	1	--	4
Team C	800	60	--	1	4	--	1
Team D	1430	116	3	4	1	--	6
	3359	302	7	14	7	1	16

Ekwò Habitat

The summer habitat conditions and ekwò forage around Kokèti and Kwìdliachjì were described as very healthy, largely because the vegetation was lush, moist and productive. The consistent rain and moist soil, resulting in plentiful, high-quality forage, which was particularly evident by the richness and good quality of lichen, grasses, shrubs and dwarf birches (Photo 3). In early July, the vegetation started a good growing season, and willows and grasses were green, and an abundance of flowers were blooming. There was not an abundance of mushrooms, as has been observed in previous summers. The elders explained that even though the plants seem not to be ready, the ekwò will still eat it. In August, the vegetation and ekwò forage continued to be in good condition. Likely due to lower temperatures in August, berries such as blueberries, cranberries, cloudberry, were reported as smaller and less abundant, compared to the high abundance of berries during fall 2020. In September, ekwò food continued to be in good conditions. At times, lichen was dry, but stayed moist during days of rain.

In late August and September, ekwò was observed mainly foraging on willows and dwarf birch. The elder Joe Zoe explained that dwarf willows have high oil content in late fall (September) and ekwò get “good fats” from willows. Elders also mentioned that “they also want to save some of the lichen for the winter. They know where it is and where they will migrate to in the winter”. On a few occasions, ekwò was eating grass by the shoreline. Monitors explained that ekwò do this when they have an upset stomach. Throughout the summer and fall, vegetation remained moist and fresh, and provided plentiful forage for ekwò.



Photo 3: bulls feeding in an abundance and variety of vegetation, August 24th 2022, Kokèti. Photo: Katie Orlinsky

Summer is a key season for ekwò. For calves, the nutrition they get from nursing from their mothers is obtained from green vegetation through the summer, and young subadult ekwò need nutrition from green plants to reach adult body size and sexual maturity. For adult females, summer grazing conditions are also crucial for meeting their nutritional demands to regain muscle and store fat on their bodies as well as for continuing production of energy-rich milk for their calves. Adults need to eat growing plants in order to regain body mass lost in the winter and spring, so they are in prime condition for the fall breeding season. Bulls need to grow muscle and antlers, and accumulate fat for the rut and to survive the coming winter.

Ekwò and Biting Insects

Monitors recorded weather conditions and biting insect activity three times daily. The biting insect activity index (Figure 4a) was a categorical value ranging from 0 to 3, with 0 indicating no activity of insects and 3 reflecting high activity.

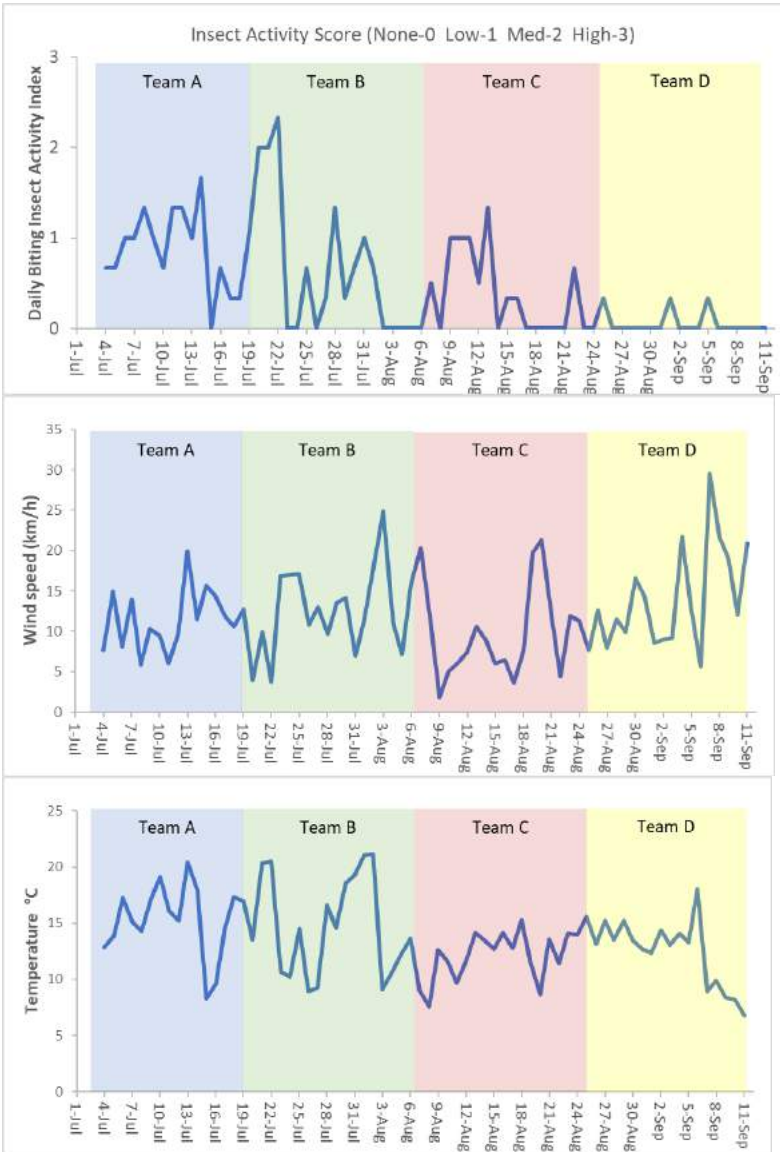


Figure 4: Trend in average daily biting insect activity index scores and related wind speed and temperature conditions.

In early July, biting insects were consistently present, but the activity index ranged from low to medium mostly due to cold air coming of the lake ice which remained until mid-July. Later in July, a higher activity level was reported on days with low wind, then remained at medium to low for most days. The biting insect activity index was consistently low or no activity in August, except for few days with low wind in early August, and low and no activity throughout September (Figure 4a). The general pattern of insect activity was inversely related to wind conditions – that is biting insects were more active when winds were low or calm.

In August, the low biting insect index was likely due to the comparatively lower temperatures (Figure 4c) combined with high and variable wind conditions (Figure 4b). Although temperature declined through early September 2021, it was warmer compared to early frost conditions in September 2020. The cooler temperatures and wind kept insect activity low through late August and

September 2021. In turn, ekwò spent more time feeding peacefully. Biting insects influence ekwò feeding behavior and activity levels, which may affect body condition and pregnancy rates of ekwò. Biting insects like mosquitoes and black flies feed on the blood of ekwò to get the protein and iron produce eggs. Parasitic insects such as warble flies and bot flies rely on ekwò to complete the larval stages of their life cycles; warble fly larvae grow and develop under the skin of ekwò until they emerge, and bot fly larvae mature in the nasal passages and throat pouches of ekwò until they are coughed out.

Kokèti Ekwò

At Kokèti, the teams observed a total of 117 *ekwò* groups and the total number seen by the field teams was 3359 *ekwò* (Figure 5). Through the 2021 summer field season, the *ekwò* group sizes ranged from single animals to a large group of ~601 (Figure 5). Although most *ekwò* groups comprised of fewer than 10 *ekwò* (62%, 73 of 117 groups) (Figure 6), sightings of six large groups contributed to almost half (47%) of the total number of *ekwò* observed.

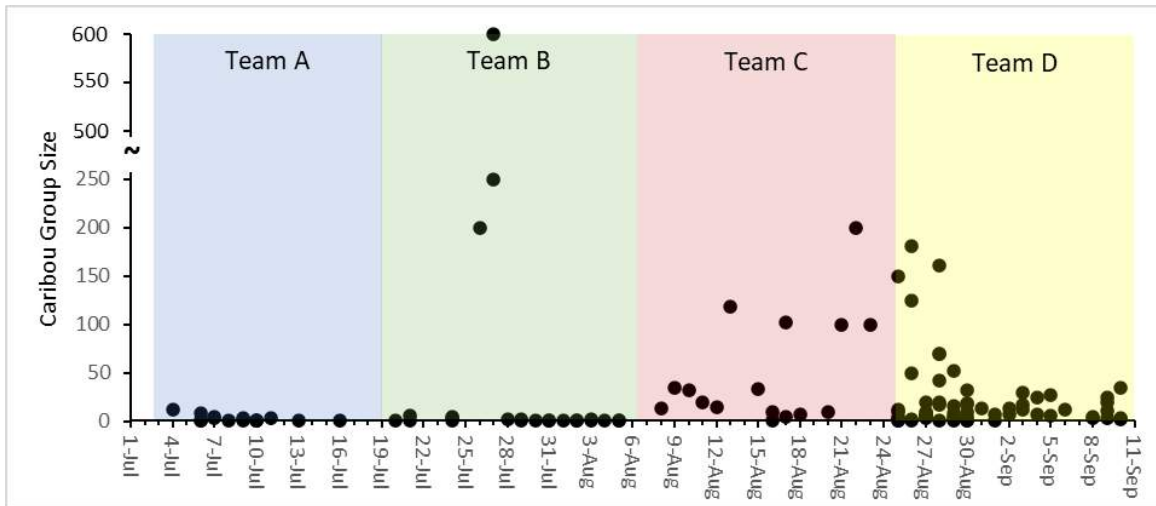


Figure 5: Group sizes of Bathurst *ekwò* observed at Kokèti during the 2021 season (total groups = 117; size range 1-601; average = 28.7; median = 6).

Few *ekwò* were observed for the first three weeks of the field season that started on the 3 July 2021. Through most of July, *ekwò* group sizes were small (Photo 4) and comprised fewer than 12 *ekwò*. On July 26th and 27th Team B saw three larger groups of 200, 250, and 601 respectively, and then resumed seeing small groups of fewer than ten *ekwò* for the rest of the month and through the first week of August (Figure 5). Ten groups ranging in size between 100 to 200 *ekwò* were consistently seen over a two-week period by Teams C and D between August 13th and 28th. Observed group sizes trended downward in size through late August and the first 10 days of September (range: 1-52) (Figure 6).



Photo 4: smaller groups of *ekwò*, mainly bulls, seen in early July. Photo: Stephanie Behrens, July 2021.

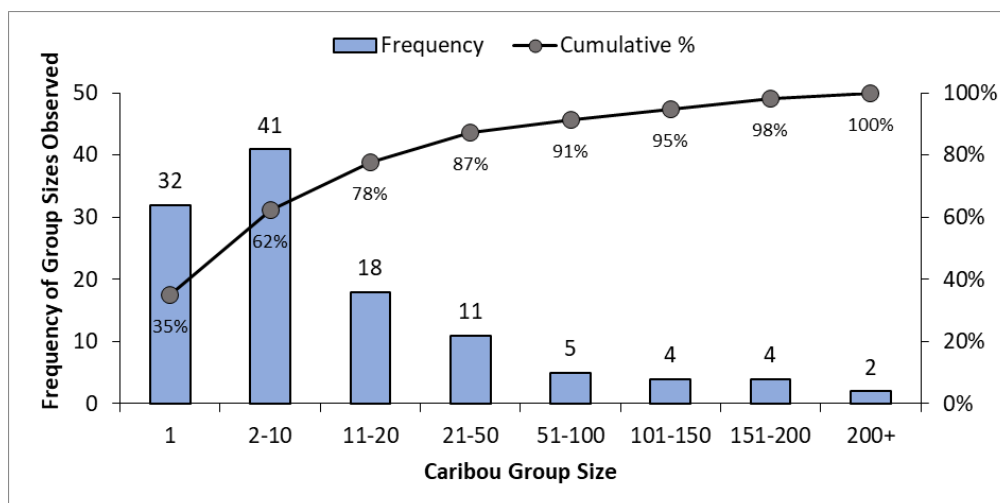


Figure 6: Frequency and cumulative distributions of observed ekwò group sizes (total groups = 117).

Ekwò Calf Abundance and Calf: Cow Ratios

Of the 117 *ekwò* groups observed by all field teams, 69 groups were used to estimate an overall calf:cow ratio. These groups were selected based on the criterion that at least one adult female *ekwò* was identified within the group. The estimated calf:cow ratio was 38 calves out of 100 cows based on sightings of 69 *ekwò* groups observed between July 24 and September 11th. Calf ratio is observed with higher confidence in *ekwò* groups that occur within 1 km from the observer. For the 40 *ekwò* groups observed within 1km, the estimated calf:cow ratio was 40 calves per 100 cows (Table 5).

Table 5: Summary for *ekwò* groups that were used to estimate calf:cow ratios for July to September 2021.

Summary	Ekwò Groups with at least 1 cow (all distances)			Ekwò Groups with at least 1 cow (≤ 1000 m away)		
	Group size	Cows	Calves	Group size	Cows	Calves
Number of animals (n)	69	508	196	40	296	118
Average (mean)	27	7	3	30	7	3
minimum	1	1	0	1	1	0
maximum	250	83	30	200	62	25
	Calves per 100 Cow Ratio	SE*	CV†	Calves per 100 Cow Ratio	SE	CV
Summary	38.5	0.03	0.08	40	0.04	0.11

*Standard Error †Coefficient of Variation

The first cow and calf pair were seen by Team B in a small group of five *ekwò* on July 24th. This sighting was followed three days later by an observation of at least 30 calves and 80 cows in a group of ~250 *ekwò* (7). Over the next 12 days, few *ekwò* and no calves were seen. From August 8th to the end of the field season, calves were consistently observed with cows in *ekwò* groups, although the proportion of cows with calves was variable.

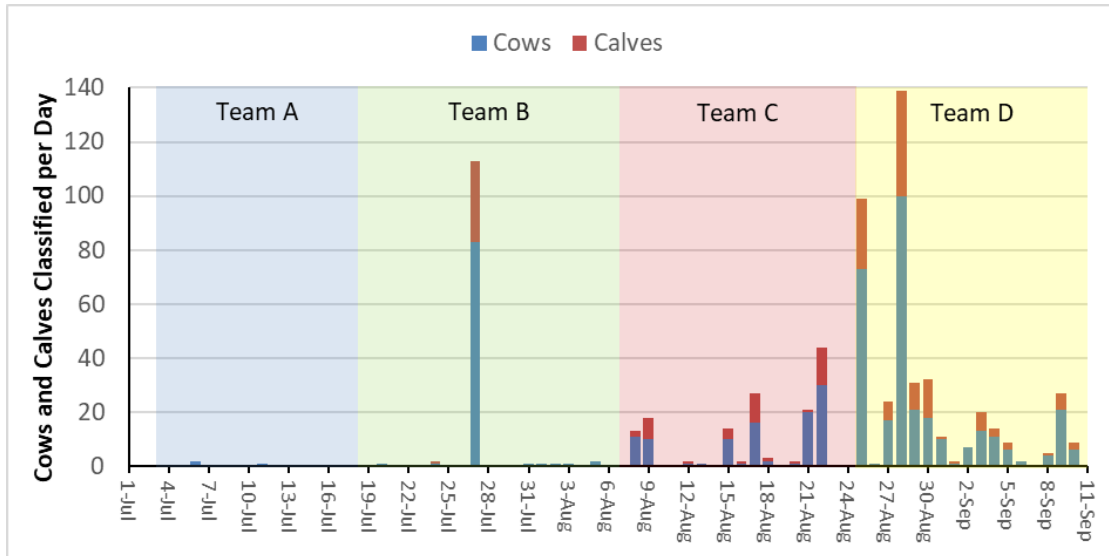
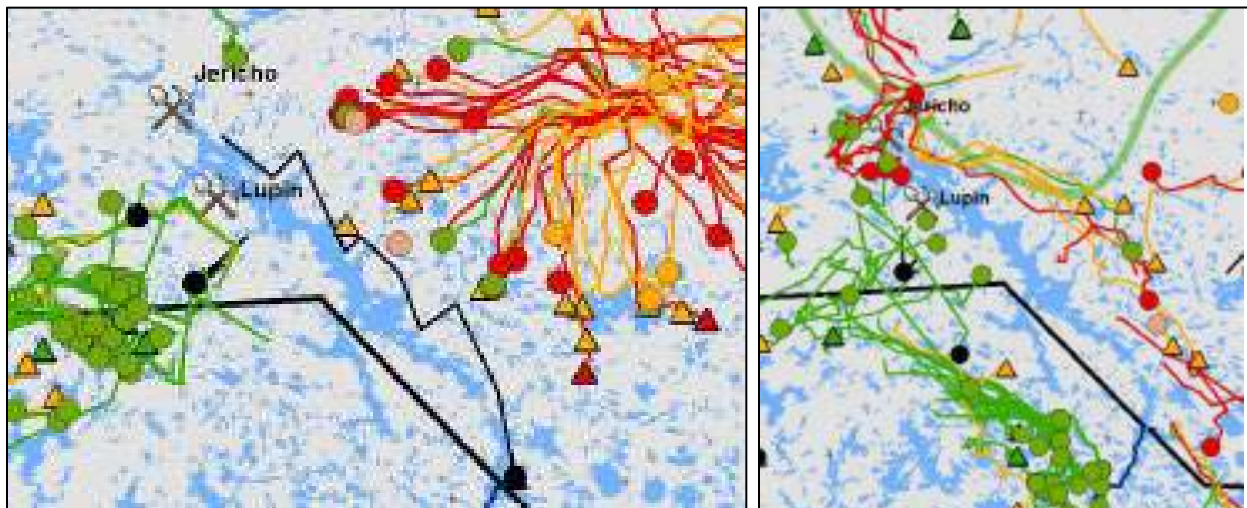


Figure 7: Daily totals of cows and calves that were classified in a ekwò group

The estimate of 38-40 calves per 100 cows in summer is considered *average to low* and would likely indicate a declining population trend if it were truly representative of the herd. For context, an ekwò herd with an average adult female survival rate of 85% would need to have approximately 35 calves per 100 cows in late winter (March) to have a stable population growth rate. Because some calves will die through fall and winter, calf to cow ratios in late winter would most certainly be lower than calf counts in summer. However, the number is higher than the 29 calves per 100 cows observed during summer 2020, and the 31 calves per 100 cows observed in 2019. The higher number can possibly be explained by the movement of Beverly ekwò towards Kokèti in August and the subsequent mixing of the Bathurst and Beverly herds in August (Map 4).



Map 4: Ekwò Collar Maps showing mixing of Beverly ekwò (red points/lines) and Bathurst ekwò (green points/lines) around Contwoyto Lake on August 6th (left) and on August 16 (right), 2021. Source: GNWT-ENR.

Ekwò Health

In July, ekwò appeared healthy, and the herds still had the winter coats. The cows were observed as thinner than the bulls. Elders explained that the cows usually get “thinner after they give birth.” By the end of July, bulls were observed as fat, and by the time of mid-August, the elders described the bulls, cows and calves to be all in good conditions (Photo 5). By end of August, all the ekwò observed were described as “really good and fat” and it was noted that their “bellies look full and fat”. Only one bull, that was injured, appeared skinny and with visible ribs.

Elders noted that velvet was starting to fall off ekwò antlers on the 4th September 2021. One calf was observed still wearing some of its winter coat on August 27th, and elders noted it needs to swim across water to rid of the old hair.

Monitors observed ekwò health by noting a) body condition of bulls and cows within a group, and b) any occurrences of physical injuries to individual ekwò within a group. Body condition was ranked as fat, average (“good”), or thin, and was based on visual assessment of fatness at three general areas of the body including the neck and shoulders, ribs, and base of tail and hips. Fat ekwò had rounded rumps with no noticeable protrusions of bones on the hips or along the top of the spine. Ekwò in average condition were considered normal and healthy. Ekwò that were thin appeared “boney”, “skinny” and in poor body condition.



Photo 5: Healthy and fat bulls, mid-August 2021. Photo: Katie Orlinsky, National Geographic.



Healthy cow with a calf, mid-August 2021. Photo: Katie Orlinsky, National Geographic.



A curious calf walking up to photographer. Photo: Katie Orlinsky, National Geographic.

Injured Animals

Injured ekwò were observed as single individuals within eight separate groups out of a total of 117 ekwò groups (7%) that comprised 674 ekwò (Table 6). Ekwò appeared healthy in 41 groups that represented 2,151 animals; no comments were noted on ekwò health or presence of injuries in 68 groups of ekwò that comprised 534 animals (Table 6). When aggregated across all ekwò groups observed over summer 2021, the total of 8 injured ekwò represented approximately 0.2% of all the ekwò observed (Table 6).

The injured ekwò were 3 bulls and 5 cows that walked with a limp due to an injured leg (Table 7). Observers noted hind leg lameness in two of the bulls. One of the lame bulls had a back leg injured, it was noted that the tail was “sticking straight out” and the ribs were visible. These signs indicate that the bull was in poor body condition. The bull was laying still on the ground, the team suspected he was dead but when they approached, the bull moved and stood up eventually. Despite the few lame ekwò observed, cows made up over half (4362.5%) of the injured animals seen and bulls comprised the remainder (37.5%) of the injured animals. Yearlings, calves and unknown sex/age classes were not observed with obvious leg injuries (Table 7).

Although there are many potential causes of leg or hoof pain ranging from soft tissue injury (sprain or strain), injury to a joint, bone fracture, dislocation, or localized infection, the focus was on detecting an abnormal gait or behavior of individual ekwò.

Table 6: observations of ekwò health and injuries

	Ekwò appeared healthy	No comments on health	One injured ekwò seen in a group	Sum
No. Groups	41	68	8*	117
%	38%	62%	7%	100%
Ekwò in Groups	2,151	534	674	3,359
%	64%	16%	20%	100%

* Three bulls and five cows had an injured leg and walked with a limp; each ekwò occurred in a separate group

Table 7: Observations of ekwò that walked with a limp due to injury in a leg or hoof.

Bull	Cow	Yearling	Calf	Unknown	Total
3	5	0	0	0	8
37.5%	62.5%	0%	0%	0%	100%



Photo 6: Ekwò calf killed by dīga behind camp; Aimee Guile and Joe Zoe investigating.



Photo 7: Ekwò calf killed by dīga: the nose and mouth were first removed by the dīga.



A dīga walked into camp through the bear fence wires. Photo: Katie Orlinsky, National Geographic.



A dīga walking through camp



Dīga swimming across channel by camp Photo: Katie Orlinsky, National Geographic.



White dīga by camp. Photo: Katie Orlinsky, National Geographic.

Dìga and other Predators

From July to September, there were 14 dìga (wolf/*Canis lupus*) observed, compared to zero dìga observed in 2020 and to the higher number of 31 dìga observations in summer 2019. The 14 dìga were observed on 10 separate occasions. Most sightings were of single dìga; and pairs were seen on two occasions, and a group of 3 dìga was observed once. One of the single dìga (5th July 2021) had brownish-black fur and surmised that it may be close to its den. Three observations of white dìga on the 7th July 2021, were likely sightings of the same breeding pair. The two dìga were initially seen on an esker by the field camp. One wolf was seen as it was walking with a fish in its mouth. On a later occasion in the day, the dìga pair split up after they saw the team. The male was fat and the female was thinner likely because she was nursing pups. The team also observed as the two dìga watched and approached a group of three ekwò, but the dìga did not actively pursue or hunt the ekwò. In September, three dìga were observed killing a calf. Three dìga came towards the esker behind our basecamp. They walked as a group with one leader showing where to go. They started chasing an adult ekwo but switched to a calf. The calf was not able to stay upright in the uneven ground, and it became a short chase. The dìga killed the calf by ripping out its mouth and nose (photo 6 & 7) to stop it from breathing, then the dìga opened the stomach and separated the intestines from the body. The dìga left when they noticed the team, but will have gone back to the kill site later. The kill site was hard to find at first, but the ravens led us to it.

In summer 2021, seven *sahcho* (grizzly bears/*Ursus arctos*/ “big guy”) were observed on five occasions. Two of the *sahcho* were observed in close proximity to the basecamp and all observations were of a single animal. During 2020, eight bears were observed throughout the summer. During summer 2019, more animals were observed with a total of ten *sahcho*. In September 2021, one grizzly bear was observed digging and moving big rocks away chasing a ground squirrel. As it had caught the squirrel and started to eat it, a bull ekwò walked right up the esker behind the bear. The ekwò was surprised and spooked, but the bear did not pay any attention to the ekwò, as it was focused on the ground squirrel. The elder mentioned that only older bears that dig like that, as younger bears do not know how to.

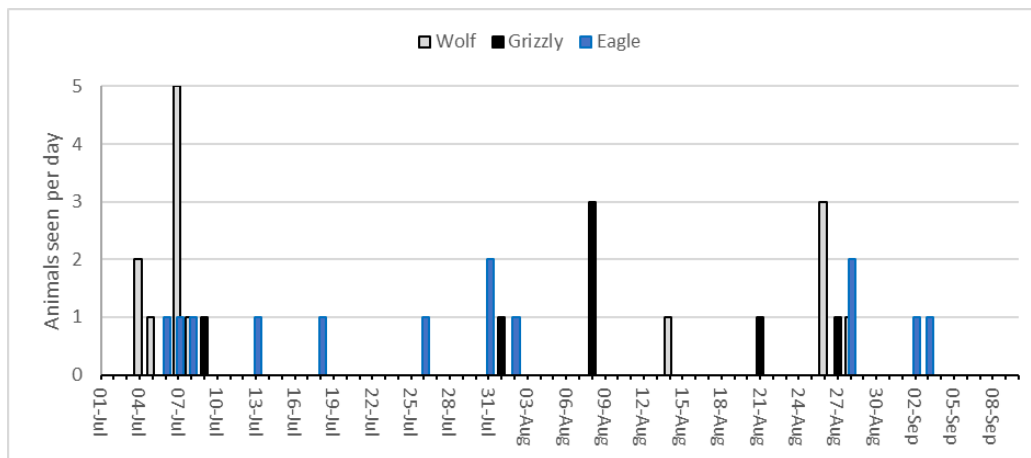


Figure 8: Predator observations per day

One group of three *nògha* (wolverine/*Gulo gulo*) was observed. The group of *nògha* was most likely a mother with two kits. The other field teams did not see wolverine. In both 2020 and 2019, one group of three *nògha* (wolverine/*Gulo gulo*) were observed, which was most likely a mother with two kits

16 *det'qcho* (eagle) were observed on 13 separate occasions. Of the 13 observations, two sightings were of eagle pairs and the remainder were of single birds. This was a few more observations than the 12

det'qcho observed in 2020, and the 23 *det'qcho* observed in 2019. The number of eagle observed per year shows a persistent and steady presence of eagle around the lakes Kokèti and Fry Inlet. A possible bald eagle nest was located on the south shore of Fry Inlet (Photos 8).

All predators appeared healthy with no injuries or health issues noted.

Didi (Moose) Observations

For the second year during the monitoring program, *didì* were observed at Kokèti. Seven animals were sighted, and the groups size ranged in size from one individual to two moose. The first observations occurred in mid-July, and three observations occurred in the first days of August, while last observation was on August 30th, when three moose was observed. Most observation was made around the basecamp between Kokèti and Kwìdliachji. The first known observation of *dedì* in this area was made in July 2019 (which was also the first observation of *didì* by any Inuit full-time resident at Kokèti). No *didì* was observed during 2020. The *didì* likely movement was northeast from *Dezàati* (Point Lake) to Kokèti, following the lakesides and river valleys where sufficient forage, such as willows and dwarf birch, can be found.

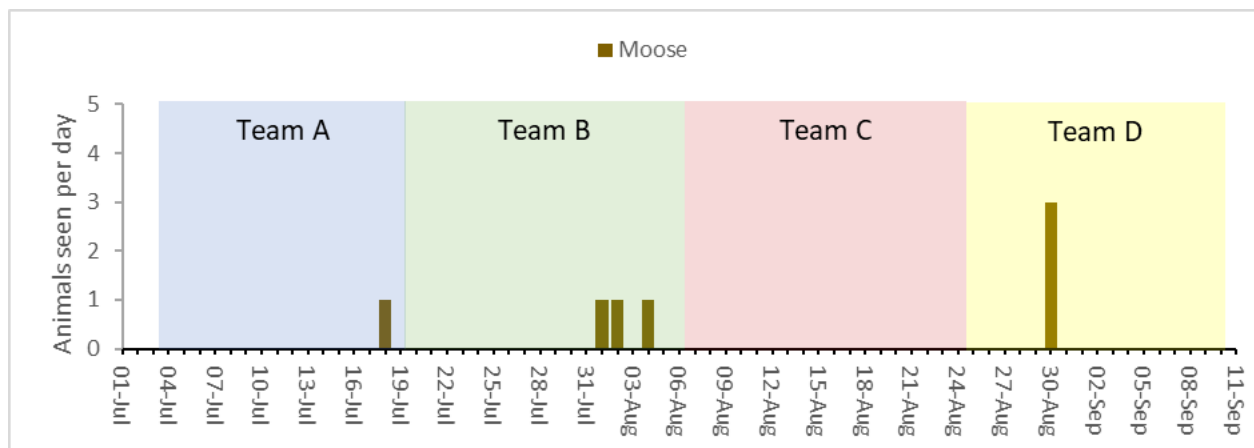


Figure 9: *Didì* observations per day

Bald Eagle Nests

A nest of possibly by a bald eagle was found on the southern shoreline of Fry Inlet (Photo 8). The nest was found on September 3rd; a time of year when any chicks would have left the nest. The team saw an eagle sitting on a large rock within a shallow area on Fry Inlet. As the team approached, they found that the eagle was sitting on a nest made of lichen, moss, and dwarf birch twigs, and that there were abundant fish remains (bones) at the site (Picture x).

The northernmost extent of the bald eagle nesting range is believed to follow the treeline, over 150km south of Fry Inlet. The barrenlands does not have the usual building material, as large branches and sticks, that bald eagle use to build nests. The nest on Fry Inlet was built with locally available sticks and roots, and lichen and moss from muskeg. Due to lack of tall trees and cliffs in the area, the bird built the nest on a large boulder in a shallow part of the lake (photo x).

In August 2017, another possibly bald eagle nest was located on the northeast side of Kokèti. The remnants of the nest had fallen from the ledge it originally been located which was visible by the large amount of whitewash on the side of boulder (photo 9). The nest was build using survey stakes and willow sticks and roots. The survey stakes have compensated for the lack of large branches in the barrenland

environment. In the 1970s and 80s, exploration companies put out thousands of survey stakes at 25 meters intervals in the valleys around the north side of Contwoyto Lake, and over time the stakes have fallen and moved around by wind and water. In the valleys around an old exploration camp in Long Bay, east shore of Contwoyto Lake, over 11,000 survey stakes were put out, according to the local residents at Kokèti. Now, the local raptor populations utilize remnants of the exploration activities to build nest (Photo 10), which provides nesting material for bald eagles to move their range further north. Both nest locations will be further investigated during upcoming fieldwork during summer 2022.



Photo 8: A possible bald eagle nest on boulder on Fry Inlet, September 2022. Photo: Aimee Guile.



Photo 9: a possible bald eagle nest found by a large boulder on northeast side of Contwoyto Lake, July 2017.



Photo 10: remnants of a possible bald eagle nest by boulder on northeast side of Contwoyto Lake, July 2017. Notice the survey stakes used to build nest.

Mining Disturbance

In August, the team visited the Lupin mine site, on north side of Kokèti. A strong smell of gasoline and oil was detectable in the air. There were visible spills of gas or oil on the ground. Reportedly the fuel smell was strong enough to give monitors headache while being on the ground. Around the mine site, orange colored Styrofoam material was scattered all over the ground; material that wind can easily spread over the land and into the lake.

The elders stated that the ekwò migration routes will be disrupted in the area by the mining operations. The oil and gas spilled on the ground can damage hooves of the animals, and this was especially important for calves walking through the area, as the calves are only about a month old once they reach area around Lupin mine. Two bulls were observed walking along the gravel road by the shoreline of Kokèti (Photos 11 and 12).

We recommend the Nunavut Lands Inspector to visit the Lupin mine site and investigate the source of oil spills and smell. Additionally, any necessary clean up needs to be conducted before ekwò herds migrate through the mine site and adjacent roads during summer 2022.

	
<p>Photo 11: Bull ekwò by Lupin mine site. Photo: Katie Orlinsky, National Geographic; August 2021.</p>	<p>Photo 12: Bull ekwò by Lupin mine site; walking along the gravel road. Photo: Katie Orlinsky, National Geographic; August 2021.</p>



Joe Zoe holding a “feeding the fire” ceremony. Photo: Katie Orlinsky, National Geographic.



Tyanna Steinwand and a curious ekwò. Photo: Katie Orlinsky, National Geographic.



Photos by Katie Orlinsky, National Geographic – August 2021.

Indicator Trends 2016-2021

For the past four years (2018 to 2021), Ekwò Nàxoèhdee K'è monitors have observed that ekwò habitat and food has generally been in excellent condition due to much rain and wind, and that ekwò health has been observed as “good”, including fat bulls and cows observed in August and September. The good condition of ekwò habitat and ekwò body condition provide the necessary environmental conditions for the population to grow. However, the monitors observe many groups with few or no calves, and GNWT ENRs calving ground survey shows a continued decline of the *Kokèti ekwò* herd from 8207 ekwò in 2018 to 6243 in 2021 (Adamczewski et al. 2022).

Monitoring *Kokèti ekwò* is based on periodic assessment of indicators, developed using the holistic Tłıchǫ concept of “*We Watch Everything*”. The elders included several interconnected indicators for monitoring ekwò and its habitat. Table 8 summarize results and trends for each monitoring indicator per year.

Indicators Over Time

	2016	2017	2018	2019	2020	2021
 Weather and Vegetation	Warm, Dry	Mix Dry/Wet	Wet, Windy	Wet, Windy	Wet, Windy	Cool, Windy
 Caribou Health	Normal, Many Injured	Normal	Early Fat, Bulls Healthy	Early Fat, Bulls Healthy	Healthy, Fat Animals	Healthy, Fat Animals
 Calf Abundance	Normal, High	Normal, High	Normal, Low	Low	Low	Low
 Wolves Observed	1	18	16	31	0	13

Table 8: Trends of monitoring indicators 2016-2021

The Ekwò 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 with good forage and habitat, resulting in good health conditions but low calf abundance during the last four summers, from 2018 to 2021 (Table 7).

During the summers of 2016 and 2017, warm and dry weather conditions were prevalent and resulted in dry, “crusty” ekwò forage. The summers were similarly warm and dry except for periods of rain and cold temperatures (table 9). During a few of that season’s heat waves (especially in August, where temperatures at *Kokèti* reached 30 degrees Celsius) *ekwò* forage was dry and crusty. Harassment by biting insect was high during these days, and we observed herds walking into the wind on high elevation to minimize insect harassment. Ekwò were in “normal” body condition, but were unable to build up fat reserves in July, due to high insect harassment. During 2016 to 2017, monitors observed that ekwò had “normal” and average body condition, and ekwò groups had at times high calf abundance, with most cows accompanied by calves, resulting in nearly a one-to-one calf-cow ratio.

Weather/Vegetation Over Time

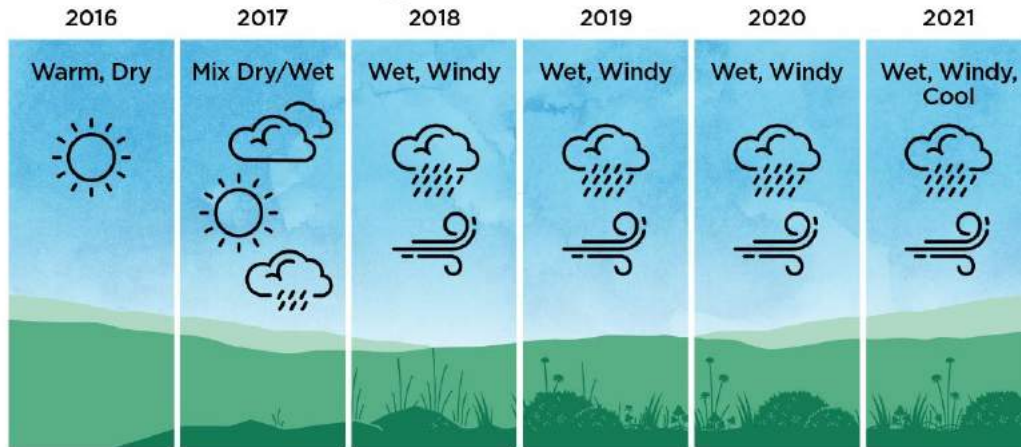


Table 9: Summer weather/vegetation conditions over time: 2016-2021.

During the summers of 2018 and 2019; the weather trends turned cold, windy, and with frequent rain showers. The vegetation quality was good and tundra flowers and mushrooms were visibly abundant, as compared to previous years. This was optimal environmental conditions for *ekwò*, with consistently good foraging conditions and with much less insect harassment. The herds had more time to feed uninterrupted and build up fat reserves, without the need to continuously run from biting insects. With the continuously cold and windy weather, the bulls started to accumulate fat reserves on their rumps and lower back and grew large and wide, palmated antlers earlier in the season (in mid-July), compared to earlier years. During July and August, the Bathurst herd showed signs that it was in strong and normal health. Thus, *ekwò* were healthy, and bulls were building fat reserves in mid-July. Although weather and forage conditions were favourable for *ekwò* fitness, however, in summer 2018 the positive trend had changed and we observed a declining trend in calves.

Caribou Health Over Time

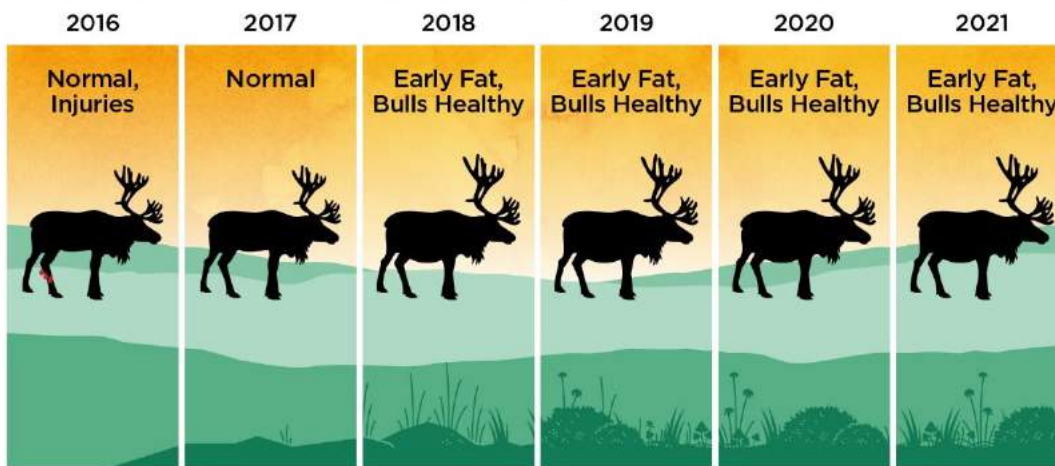


Table 10: Ekwò Health over Time: 2016-2021

While forage conditions were favourable in the summer of 2019, and the herds went into the fall in good physical condition, the majority of cow groups had few or no calves at all—a continuing negative trend in calf population from 2018. Interestingly, though the summers of 2018 and 2019 brought favourable weather conditions for vegetation growth—which consequently improved ekwò health—those two years also saw declines in calf abundance.

The summers of 2020 and 2021 were comprised of similarly favorable weather conditions for ekwò; with continuously cool temperatures, strong winds and frequent rain. This weather created good vegetation quality and low activity of biting insect. Consequently, the monitors reported healthy and strong animals throughout the summers. While forage conditions were considered ‘good’ and ekwò showed healthy body conditions, the calf to cow ratio remained low; similar to previous two years. With the favorable environmental conditions and strong animal health, we expected that more calves were born and survived the summer. However, that was not the case for the summers of 2020 and 2021.

Calf Abundance Over Time

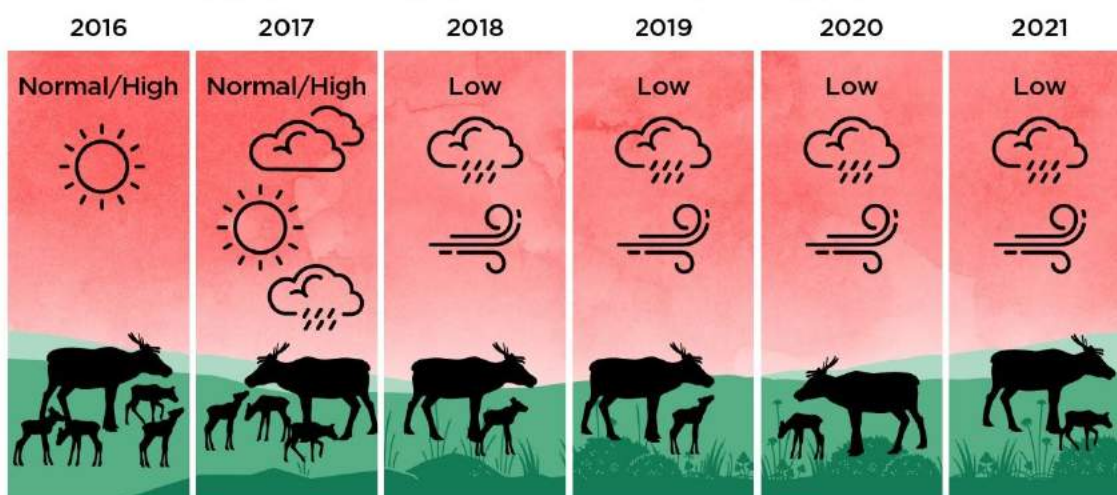


Table 11: Calf Abundance over Time: 2016-2021.

Over the six years of monitoring at Kokèti, more calves were seen during the first three years (2016-2018) of the program and comparatively fewer calves have been seen in recent years (2019-2021).

In 2019, we applied a more systematic way of observing cow-calf groups and estimated an overall calf:cow ratio of 31 calves per 100 cows (i.e., $0.307 + 0.056$ SE); this would be considered low, because it suggests that by summer less than one-third of breeding-aged females had a calf. Eighty-nine (89) *ekwò* groups were used to estimate an overall calf:cow ratio. During summer 2018, we observed a high number of yearlings (calves born in 2016 and 2017) and we anticipated that summer of 2019 would show an increase in calf abundance as those yearlings matured and became able to have offspring (*ekwò* females will generally get pregnant for the first time when they are 2+ years old, and have their calf when they are 3 years old). That was not the case as the negative trend continued with low numbers of calves observed.

In 2020, we estimated an overall calf:cow ratio ratio of 29.1 (± 6.2 SE) calves to 100 cows based on a total of 37 *ekwò* groups observed (Figure 6). The group sizes ranged from a single animal to an estimated group

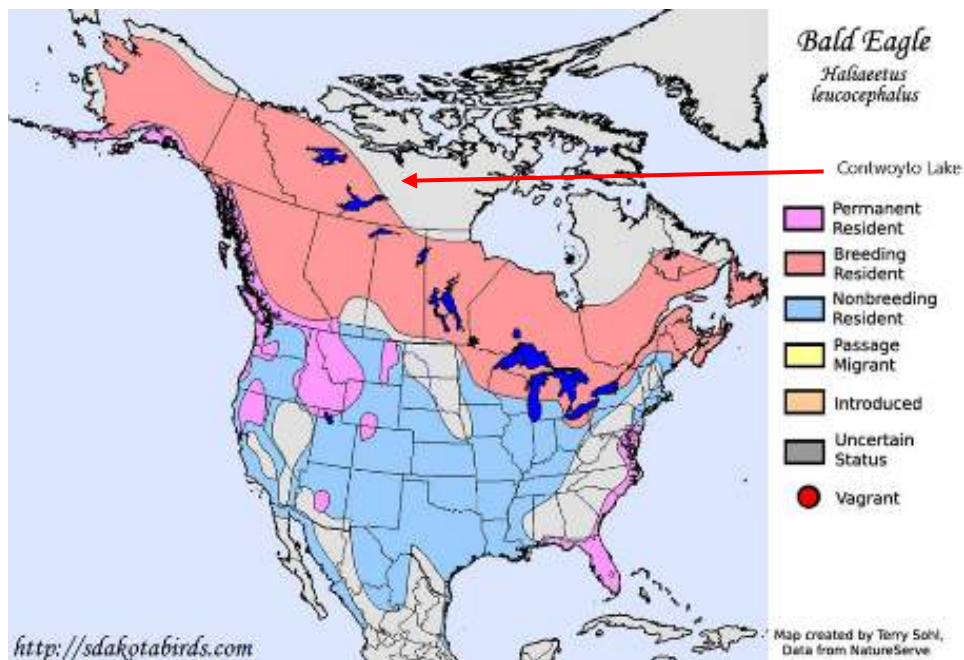
of 328. The observed calf to cow ratio was considered low and would likely indicate a declining population trend, if it truly represents the whole Kokèti ekwò herd. However, during summer 2020 fewer ekwò were seen and group sizes were smaller than previous years.

In summer 2021, more calves were observed compared to the previous two years. We estimated an overall calf:cow ratio of 39.2 calves per 100 cows, which is a higher proportion of calves compared to 29 calves to 100 cows observed in 2020, and 31 calves per 100 cows observed in 2019. The higher ratio of calves seen in 2021 indicates better calf survival in summer compared to those previous years. However, the mixing of Beverly herd with the Kokèti ekwò around Contwoyto lake in August may explain the higher proportion of calves seen in 2021.

Bald Eagles Expanding Range onto Kokèti Ekwò Summer Range

According to the traditional knowledge of current residents of Kokèti, bald eagles (*Haliaeetus leucocephalus*) were never seen in or around the lake prior to 2005. To our knowledge, the first observed observations of bald eagles in the area occurred in the summer of 2005.

Prior to observations of bald eagles at Kokèti, the northernmost border of the breeding range and most of the summer range was thought to generally follow the treeline from the northwestern corner of the Northwest Territories to the southern border of Nunavut (Map 5). While the landscapes of Contwoyto are characterized by extensive aquatic and fish habitats, this environment is not an ideal bald eagle breeding habitat due to the lack of tall trees and/or vertical cliffs, to build their nest. The terrain surrounding Contwoyto Lake is characterized by arctic climatic conditions, which often see no waterbody surface melt until June. A warming climate, earlier snow melt, and therefore the earlier availability of nesting habitat or more prey have the potential to create new opportunities for bald eagles in the area.



Map 5: Range of Bald Eagle in North America. Source: https://www.sdakotabirds.com/species/maps/bald_eagle_map.htm

Bald eagles are opportunistic feeders subsisting mainly on fish and therefore thriving near bodies of water such as wetlands, rivers, seacoasts, and other large bodies of water. With a natural range covering most of North America, where adequate food exists and human disturbance is somewhat limited, the bald eagle can be considered an “indicator” species signalling a rich aquatic habitat.

The frequency of observation of bald eagles, both juvenile and adults, over the past six years demonstrates an expansion of its summer range, and of two possible nest locations implies that the bald eagle has moved its breeding range north of the treeline onto the barrenland. Expansion of the bald eagle on the summer range and possibly further north to the ekwò post-calving and summer range adds a new predator for the Kokèti ekwò. On the Bathurst range, a new predator adds pressure to an already direly stressed herd. The remaining questions are how far north their summer and breeding ranges are expanding and the ability of eagles’ preying on ekwò calves.



Photo 13: Bald eagle on lake ice eating scraps of ekwò hide. Kokèti, July 2nd 2018. Photo: John Franklin Koadloak



Photo 14: A possible bald eagle nest on boulder in shallow part of Fry Inlet. Kokèti, September 2022. Photo: Aimee Guile.

Methodology

“We Watch Everything” - Traditional Knowledge Framework

Ekwò 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 Tłıchų and Inuit knowledge (*Inuit Qaujimaqatuqangit—IQ*) 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 ekwò 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 ekwò in the landscape of Kokèti.

Land-based Theoretical Concepts

To achieve an indigenous perspective, the program employs Tłıchų words and cultural perspectives deeply ingrained in Tłıchų ontology. While such theoretical concepts are abstract, they have a very concrete physical practice in the day-to-day thinking of Tłıchų 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 Alice 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 10).

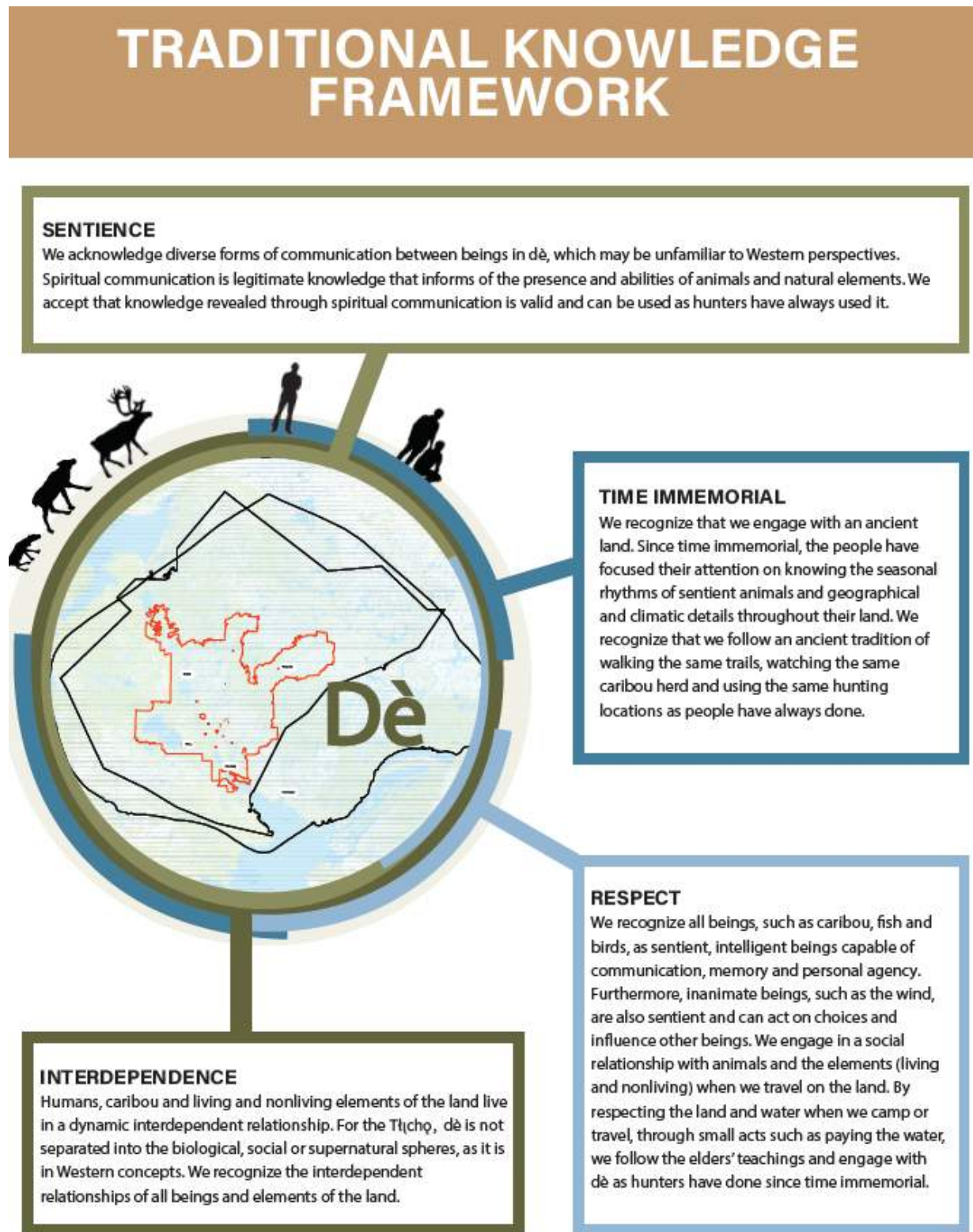


Figure 10: Traditional Knowledge Framework.

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 the people’s sustenance. Tł̨chq̨ use the word *Dè Gogha Nàeɔ̨j* (“the land shows favour to us”) to understand how the land feels about our presence

“Do as Hunters Do” Field Methods

“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 ekwò hunting in the barrenlands, although no real hunting occurred during the program. Using a participatory action research (PAR) approach, members of the “hunting party” travel to specific locations on the barrenlands to find ekwò 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 Tł̨chq̨ 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, Tł̨chq̨ 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 15: Team positioned on What'aa (esker) next to a well used animal trail (P. 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 *Kokèti*. These were incorporated as effective tools within our research framework.

Observations at Nq̄okè

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

Nq̄okè refers to the interface between water, land, and *ekwò* 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 *hozī shia* (hills on barrenland) and *what'aa* (eskers) (photo 15) are extensively used by the team to monitor *ekwò*, 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 *ekwò* migration. It refers to movement patterns of *ekwò* over land formations relative to water bodies, and literally means “in the midst of waters” (Whaèhdȫ Nàowò 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 *ekwò* to move between lakes along their migration routes. The concept of *tataa* is also used by the elders to refer to a migration route (Whaèhdȫ Nàowò Kö 2002:21).

Hunting Techniques as Methods of Observation

The location of our main camp, close to the *nāokè* (water crossing) between *Kokèti* and *Kwìdliachj̄* in Northwest Territories, was located at the northernmost range of Tł̄chq̄ 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 *ekwò* hunting. They followed shorelines by boat, then beached at known *ekwò* water crossings. Families set their camps short distances from the crossings, so as not to disturb the potential movement of *ekwò*. From camp, hunters walked to hill tops or eskers, where they waited and watched for any movement on the land surrounding the crossing.

The Ekwò Nàxoède K'è program has sought to revive ancient traditions and trails by applying similar techniques and concepts. Observations from the *daka* (hilltops) such as *hozī shia* (hills on barrenland) and

what'aa (eskers) are the main tools applied by the team to locate ekwò. 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 Tłıchq 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 *nʔokè*; places where ekwò are expected to migrate. As ekwò 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 ekwò.

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 ekwò 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 ekwò 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 Tł̓chq̓ concept of “We Watch Everything,” the elders highlighted several related indicators to be included for an analysis of ekwò and habitat assessment. The resulting list of monitoring indicators include: (1) habitat; (2) ekwò; (3) predators, and (4) industrial development.

Indicator 1: Habitat

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

Indicator 2: Ekwò

Ekwò 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 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 ekwò 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 ekwò predators
- Relationship between ekwò and predators

Indicator 4: Industrial Development

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

Finding Ekwò

The main challenge for monitoring ekwò is finding ekwò. In general, ekwò migrate southwest, from their calving grounds west of Bathurst Inlet, in late June/early July, toward the general area of Kokèti and Kwidiachijj, 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 ekwò. Every second day, GNWT-ENR 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 in camp (photo 16) or while on the land (photo 17). The collar information provides the location of collared ekwò at a specific time approximately every second day. The challenge for the program is knowing where the herds are throughout the days in between.



Photo 16: Johnny Boline, Cody Mantla and Tyanna Steinwand plotting ekwò collar location on map in camp. Photo: Katie Orlinsky.



Photo 17: Janet Rabesca, Joe Zoe and Roy Judas discussing ekwò locations over map in the boat on Contwoyto Lake. Photo: Katie Orlinsky.

Local Knowledge

Since herds can move long distances each day, local knowledge was necessary to identify where to best position ourselves to intercept ekwò before they moved to areas inaccessible by our transportation methods; boating and walking. Building camp near frequently used nq̄okè and waiting is the traditional and most efficient way to ensure meeting ekwò. 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 Kokèti, 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 ekwò will move through. In Tł̨chq̨, Kokèti literally 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 12: 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): _____ Dist. from observer (m): _____																															
Placename (Descr.): _____																															
Waypoint #: _____ ; N _____ ° _____ " W _____ ° _____ "																															
Temp: _____ °C Wind: speed: _____ km/h; direction: _____ (e.g. N, SW)																															
Precip (circle): No Fog/Drizzle Rain - Lt Med Hvy Other: _____																															
Insect Activity (circle): None Low Medium High																															
Number and Classification	Total group size: _____ (circle): Count Estimate																														
	No. animals classified:																														
	<table border="1"> <thead> <tr> <th>Bulls</th> <th>Cows</th> <th>Calves</th> <th>Yearlings</th> <th>Unknown</th> <th>Total</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>	Bulls	Cows	Calves	Yearlings	Unknown	Total																								
	Bulls	Cows	Calves	Yearlings	Unknown	Total																									
	Calf:cow ratio: _____ (0-10 score)																														
	Animal health observed (circle): No Yes (sample counts below)																														
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Bulls																															
Cows																															
Calves																															
Walking posture (circle): Good pace Slow pace																															
Description: _____																															
Behaviour	Movement (coming from / going to): _____																														
	Behaviour (circle): Feeding Bedded – Ruminating Swimming Walking Running – due to insects or Predators or _____																														
	Are weather / insects affecting behaviour and ability to feed? No Yes																														
	Can you see what they are eating? No – too far Yes																														
	Description: _____																														
	<table border="1"> <thead> <tr> <th>Condition of food:</th> <th>None</th> <th>Poor growth</th> <th>Avg growth</th> <th>Good growth</th> </tr> </thead> <tbody> <tr> <td>Grasses / sedges</td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td>Shrubs</td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td>Lichens</td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td>Mushrooms</td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> <tr> <td>Other:</td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>	Condition of food:	None	Poor growth	Avg growth	Good growth	Grasses / sedges					Shrubs					Lichens					Mushrooms					Other:				
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	Grasses / sedges																														
	Shrubs																														
	Lichens																														
Mushrooms																															
Other:																															
Ask elders / monitors why? _____																															

Effect on Behaviour	Tł̨chq̨ words / concepts: _____																														
	Confidence of observation (circle): No Yes																														
	Photographs or video footage (circle): No Photos Video																														
	Additional info in field journal (circle): No Yes (use obs # for ref)																														

Summary

In 2021, four monitoring teams spent July, August, and September on the Kokèti ekwò (Bathurst caribou) summer range at Kokèti (Contwoyto Lake).

The teams observed a total of 117 ekwò groups and estimated the total number of ekwò observed at 3359. Most groups were fewer than ten ekwò. The estimated calf: cow ratio was 38 calves out of 100 cows, based on sightings of 69 ekwò groups. The estimate is considered *average to low* and would likely indicate a declining population trend. However, the number is higher than observed during summer 2020 and in 2019. The higher number can possibly be explained by the mixing of the Bathurst and Beverly herds in August.

Overall, ekwò appeared healthy, and by the time of mid-August, the elders described the bulls, cows, and calves to be all in good conditions. Eight injured ekwò were observed, and of all the ekwò groups observed over summer 2021, the total of eight injured ekwò represented approximately 0.2% of all ekwò observed. The injured ekwò were observed walking with a limp due to injured legs. The overall conditions of the summer habitat conditions and ekwò forage were described as very healthy, largely because the vegetation was lush, moist, and productive. The consistent rain and moist soil, resulting in plentiful, high-quality forage.

There were 14 dìga (wolf/*Canis lupus*) observed, compared to zero dìga observed in 2020 and to the higher number of 31 dìga observations in summer 2019. In September, three dìga were observed killing a calf. Seven sahcho (grizzly bears/*Ursus arctos*/ “big guy”) were observed, and two sahcho were observed near the basecamp; all observations were of a single animal. In 2020, eight bears were observed and during summer 2019 more animals were observed with a total of ten sahcho. 16 det'qcho (eagles) were observed, and a possible bald eagle nest was located on the south shore of Fry Inlet. The bald eagle summer range is typically limited to the forest landscape and does not reach into the barrenland; however, bald eagles are now a permanent presence around Kokèti.

For the past four years (2018 to 2021), Ekwò Nàxoèhdee K'è monitors have observed that ekwò habitat and food has generally been in excellent condition due to much rain and wind, and that ekwò health has been observed as “good”, including fat bulls and cows observed in August and September. The good condition of ekwò habitat and ekwò body condition provide the necessary environmental conditions for the population to grow. However, the monitors observe many groups with few or no calves, and the GNWT's calving ground survey shows a continued decline of the herd.

Based on six years of watching the Bathurst summer range, the *Ekwò Nàxoèhdee K'è* ekwò monitoring program makes four recommendations:

Recommendations for Kokèti Ekwò Management

- 1) continue zero harvest of the Kokèti ekwò to promote recovery of the declining herd, and follow the rules of the no-hunting zone (Mobile Core Bathurst Ekwò Mobile Zone);
- 2) support wolf hunting by indigenous harvesters on the barren-ground ekwò core use area;
- 3) advance actions on climate change—urge territorial and Canadian governments to commit to climate change action, and
- 4) protect ekwò by establishing a Kokèti Ekwò Conservation Area.

Continued Monitoring Topics

In upcoming field seasons, the program will continue to monitor:

- Health and calf abundance trends of the Kokèti ekwò herd.
- Habitat and forage quality, and the effects of climate change on habitat and ekwò behaviour.
- The relationship between ekwò, dìga and indigenous harvesters.
- Impacts of industrial development on ekwò habitat.

Further Research Topics

We suggest that further research related to ekwò decline should include:

- How the loss of cultural practices associated with less *ekwò* harvesting, meat processing and hide preparation affect social and cultural identity in northern communities?
- How this loss of opportunities to pass on the knowledge, language and culture of the hunt affect the social and cultural identity of younger generations in northern communities?
- How does the inability to hunt *ekwò* affect food security concerns in Tłıchq and other indigenous communities?

Ekwò Nàxoèhdee K'è has given participants, old and young, the opportunity to live in close contact with ekwò and gain direct experience with the land and animals. This program has, however, also been an emotional journey for many harvesters. While happy to see ekwò, all felt the visual impact of lower population numbers than ever; others felt nostalgia and sadness at the fewer opportunities to maintain their traditional practices. Elder Joe Lazare Zoe summed up the feelings of all on the real implications to his community from the ekwò decline: *“how can I be happy [to see ekwò], when my wife and kids back home are hungry.”*

Program Plans for 2022

Our plans for summer 2022 include the following:

- Establish a 3rd camp at Ek'atì (Lac de Gras/ Lac de Sauvage).
 - We will start monitoring ekwò and habitat in the vicinity of the Ekati and Diavik mines
 - assess impacts from mining on ekwò habitat and behavior.
 - We are working with Arctic Diamond mining company to secure a multi-year funding agreement.
- Operate the ekwò monitoring camps at Kokèti in July, August, and September to continue monitoring Kokèti ekwò.
- Operate the Deèzàati camp in September to monitor Sahti ekwò.
- Train more Tłıchq people in “monitoring and research” on how to observe, assess and document ekwò health, herd numbers and habitat conditions.
- Develop collaborative partnership with University of Calgary researchers to include TK in research on ekwò health.

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