

Ekwò zò gha dzô nats'êdè
“We Live Here For Caribou”
Cumulative Impacts Study
on the Bathurst Caribou



Tłichò
Traditional Knowledge
and Land Use Study



Dedats'eetsaa:
Tłichò Research & Training Institute
www.research.tlichò.ca

2016

Dedats'eetsaa: Tłıchq Research and Training Institute

Ekwò zò gha dzô nats'êdè - "We Live Here For Caribou"

Cumulative Impacts Study on the Bathurst Caribou

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Cumulative Impacts Study on the Bathurst Caribou

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ISBN Number: 978-1-896790-53-4

Executive Summary

This study is based on the traditional knowledge (TK) of the people in Wekweètì, Northwest Territories. It investigates the connection between Tłı̨chq̓ and the Bathurst caribou from three perspectives: 1) the importance of caribou in the hunting economy, and thus as a foundation for maintaining the Tłı̨chq̓ culture, language and way of life; 2) cumulative impacts on the herd and 3) the connection between ecosystem and culture, and the co-dependent erosion of biological and cultural diversity. Lastly, the report outlines several steps to resolve these issues.

First, this report has identified numerous physiological abnormalities and health issues that have begun to occur in caribou. Specifically, it addresses Tłı̨chq̓ hunters and harvesters' observations of tainted meat, hides, livers and bone marrow, low fat content, diseased and deceased animals and changing population dynamics. Second, the report examines the underlying factors behind these health issues and the cumulative impacts from (1) the resource extraction industry, (2) the outfitting hunting camps, and (3) disrespectful harvesting towards individual caribou and the animal as a species. Finally, the report describes the current state in a continually evolving caribou-human relationship, which incorporates new activities of industrial development, outfitter hunting and disrespectful behaviour, as it has become part of the *ndè*—the caribou habitat.

The Tłı̨chq̓ who participated in the study identify the establishment of large-scale mines and associated industrial activities on the Bathurst caribou habitat as the main factor behind caribou health defects and changes to their behaviour and migration. Relying on Tłı̨chq̓ concepts of the human-caribou relationship, the study has showed how human activities on caribou habitat have negatively affected the herds. In response, caribou have chosen to avoid centers of mining activities, due to poor-quality forage and noise and dust pollution. The activities of the resource extraction industry around the Ek'atì (Lac de Gras) area, have established a "wall" blocking the main caribou migration route, the Ek'atì *tataa*. Since there are obstructions on their trail, the caribou have chosen to migrate to other areas, and thus the migration routes have divided at Ek'atì. The elders name this avoidance as *inǝ dè ǝǝgoèhshì* which correlates to the zone of influence, as documented in scientific studies.

The study correlates mining activities to health issues; however it does not demonstrate any biochemical pathways to link the abnormal health issues and pollution from mines. The hunters emphasize they are not veterinarians or biologists, and cannot pinpoint the chemical links between pollutants, forage and disease. Furthermore, the study does not demonstrate that the impacts of mining activities relate directly to population decline. The study does, however, identify an urgent need for further research: a combination of TK and science, to connect the demonstrated physiological abnormalities to their source; i.e. to link biology and testimony to the main factors of disturbance.

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Tlicho Placenames

Beʔaitì	Winter Lake
Deèzàati	Point Lake
ʔedaàtsotì	Artillery Lake
Ek'atì	Lac De Gras
Ek'adii	Island on ʔek'atì
ʔetsaàʔʔti	Rawalpindi Lake
ʔewaànit'uitì	Courageous Lake
ʔezotì	Jolly Lake
Itseetì	Hottah Lake
Kòk'èetì	Contwoyto lake
Ìiwets'aʔòats'ahtì	Lac de Sauvage
Nqdiikahti	Mackay Lake
Tatsotì	Grenville Lake
Tsotì	Little Marten Lake
Wekweètì	Snare Lake

1. Introduction

As much as humans have a history of living with animals, so too animals have a history of living with humans. Interactions form the basis of all relationships, whether they are human-to-human, human-to-animal or animal-to-animal. Essential to the long-term relationship between people and barren-ground caribou is respectful interaction, to maintain the delicate ecological balance and ensure renewal. This report is a summary of traditional knowledge research on the relationship between the Tłı̨chǫ people and the barren-ground caribou. In this case, the people's knowledge is based on interactions in a relationship that forms the very basis of life in Wekweètì. The community of Wekweètì is located where it is entirely because of the caribou—the Bathurst caribou have reliably migrated there for generations. The people built their homes on shores of Lake Wekweètì to intercept the herd as they travel from their summer range in the Barrenlands to their winter range in the forest. But in recent years, the Bathurst caribou have changed their migration routes and no longer migrate towards the lake and the people of Wekweètì.

This study is based on the traditional knowledge (TK) of the people in Wekweètì, Northwest Territories. It investigates the connection between people and the Bathurst caribou from three perspectives: 1) the importance of caribou in the hunting economy, and thus as a foundation for maintaining the Tłı̨chǫ culture, language and way of life; 2) cumulative impacts on the herd from a) the resource extraction industry, b) commercial outfitting camps and c) disrespectful harvesting, and 3) the connection between ecosystem and culture, and the co-dependent erosion of biological and cultural diversity. Lastly, the report outlines several steps to resolve these issues.

First, this report has identified numerous physiological abnormalities and health issues that have begun to occur in caribou. Specifically, it addresses community members' complaints of tainted meat, hides, livers and bone marrow, low fat content, diseased and deceased animals and changing population dynamics. Second, the report examines the underlying factors behind these health issues and the cumulative impacts from (1) the resource extraction industry, (2) the outfitting hunting camps, and (3) disrespectful behaviour. Finally, the report describes the current state in a continually evolving caribou-human relationship, which incorporates new activities of industrial development, outfitter hunting and disrespectful behaviour, as it has become part of the *ndè*—the caribou habitat.

The Tłı̨chǫ who participated in the study identify the establishment of large-scale mines and associated industrial activities on the Bathurst caribou migration route and feeding grounds as the main factor behind the abnormal changes to caribou health, behavior and migration. The study correlates mining activities to health issues; however it does not demonstrate the biochemical pathways linking mine pollution to the expression of health defects in caribou. The hunters emphasize they are not veterinarians nor biologists who can pinpoint the chemical links between pollutants, forage and disease. They identify an urgent need for further research; a combination of TK and science, to connect the demonstrated physiological abnormalities to their source, i.e. to link biology and testimony to the main factor of disturbance. Furthermore, the study does not demonstrate how the impacts of mining activities lead directly to population decline.

This report follows in the tradition of previous TK reports completed by Tłı̨chǫ Government, and relies on the Tłı̨chǫ concept of *ndè* when referring to the land. The concept of *ndè* has a broader meaning than the English word "land," and can refer to a whole ecosystem or environment; "however, where ecosystem is based on the idea that living things exist in association with non-living elements, the Dogrib term *ndè* is based on the idea that everything in the environment has life and spirit" (Legat, Zoe & Chocolate, 1995).

The land is thus a social landscape where people, animals and natural elements engage in a social relationship based on respectful behaviours towards each other, in a similar manner to two persons interacting with each other.

1.1. Background

1.2. Research Objectives

The objectives of this traditional knowledge (TK) study derived from Tłı̄ch̄q elders and harvesters' desire to communicate the numerous changes they have observed among the Bathurst caribou in their habitat. The community of Wekwèti is located in the centre of the Bathurst caribou wintering range; thus the Tłı̄ch̄q harvesters monitor the conditions of the Bathurst herd and its habitat as they daily track, hunt, fish, trap, butcher and eat traditional country food. Due to the numerous changes the caribou and their habitat have undergone in recent decades, the Tłı̄ch̄q Research and Training Institute initiated this study with funding from the GNWT Cumulative Impact Monitoring Program (CIMP-GNWT) to document these observations, so that the knowledge of the people can be shared with decision makers within local and regional governments and with the wider public.

The purpose of the research was to identify the environmental changes observed by the people who live in the centre of the Bathurst caribou range. The specific questions asked throughout the research were:

- Can you explain the relationship between people and caribou?
 - What is respectful behaviour between people and caribou?
 - Do you know legend stories of Tłı̄ch̄q and caribou?
- What are the current health conditions of Bathurst caribou?
 - Have you observed any changes?
- Describe the Bathurst caribou migration patterns.
 - Are there any changes to the fall/spring migration routes?
- Have you noticed any other changes to the caribou population?
- What are the current conditions of the caribou habitat, both their summer and winter ranges?
 - What are the conditions of vegetation and important caribou food?
- Have you noticed any changes to local climate conditions?
- Can you identify factors of disturbance to Bathurst caribou herd and habitat?
 - What are the reasons behind changes to caribou health and behaviour?
- How can we understand the cumulative effects from the factors of disturbance?

The study focused on these objectives within the framework of the Tłı̄ch̄q concept of *ndè*. These objectives were the focus of the workshop and interviews, but the elders most often focused on other related areas of interest, in order for the research team to understand certain concepts. The process of interviewing and conducting traditional knowledge research are outlined in section 2.1: Interviews, under Methodology. Furthermore, these research objectives are smaller pieces of the "bigger picture" within the people-caribou relationship, which the elders in this study emphasize, and which this report has attempted to describe.

1.2.1. Wekweèti and the Bathurst Caribou

The research was conducted in Wekweèti, an isolated community north of Great Slave Lake, inhabited by about 150 people. The community is located on the north shore of the lake Wekweèti. The lake is important due to its geography: long and narrow, it stretches in a northeast to southwest direction from the open Barrenlands in the east by Beᶱaiti (Winter Lake), and southwest into the shelter of the trees towards Snare River (see Figure 3 for a map of Wekweèti). Beᶱaiti was the location where the Franklin Expedition overwintered on their quest to find an overland route to the Northwest Passage, hence the English name Winter Lake. The community is located at the northern edge of the boreal forest, and so the people of Wekweèti are referred to as Dechᶱ Laagot'ᶱi - the people of the edge of the woods (Legat 2012). Wekweèti—Snare Lake—has always been an important travel route, in summer and fall by canoe, and in winter, when the lakes are frozen, by dog-sled and snowmobile. The caribou also use the lakes as a transportation corridor on their bi-annual migration between the Barrenlands and their wintering grounds in the forest. Every summer and fall, the Bathurst caribou herd migrates from its calving grounds on the Barrenlands near Bathurst Inlet, on the Arctic Ocean, south toward its wintering grounds in the forest. And in the spring time, around April and/or May, the herds migrate back from the forest north to the calving grounds, where they give birth to a new generation of caribou (See Figure 1 for the location of Wekweèti within the range of the Bathurst caribou). Thus, to intercept the movement of caribou between the Barrenlands and boreal forest, Tᶱᶱchᶱ use Wekweèti the lake as their travel route to the barrenlands where they can hunt caribou.



Figure 1: Range of the Bathurst caribou herd, based on satellite-collared cows between 1996 and 2008 (Chen et al 2014).

For an economy based on hunting, the movement of caribou is of utmost importance. Wekweèti, as well as the entire river system towards Beᶱaiti, have been so important for caribou hunting that a group of

families decided to permanently build their log houses on the northern shore of the lake in early 1970s. Without fail, from that time until the early 2000s, the inhabitants of Wekweèti saw a steady stream of caribou following the contours of the frozen lake. Every year, during August and September, the people travelled by boat along the shore of Wekweèti and northeast to Beᶱaiti, to hunt caribou. The movement of caribou through the area was so secure and so steady that the people decided it could support their livelihood as hunters. The people of Wekweèti often say *ekwò zò gha dzô nats'édè*: "we live here for caribou."

Starting in the late 1990s the people started noticing that the Bathurst caribou herd's behaviour, migration routes and population were changing. To estimate population numbers, the ENR-GNWT conducts aerial surveys over the calving grounds of the Bathurst caribou. In 1986, the population was estimated to be 472,000. The herd had declined to 349,000 animals by 1996, and declined further to 128,000 by 2006. In 2012 there were only 35,000 members of the herd to be seen. The population estimate in 2015 was between 15,000 and 22,000 animals.

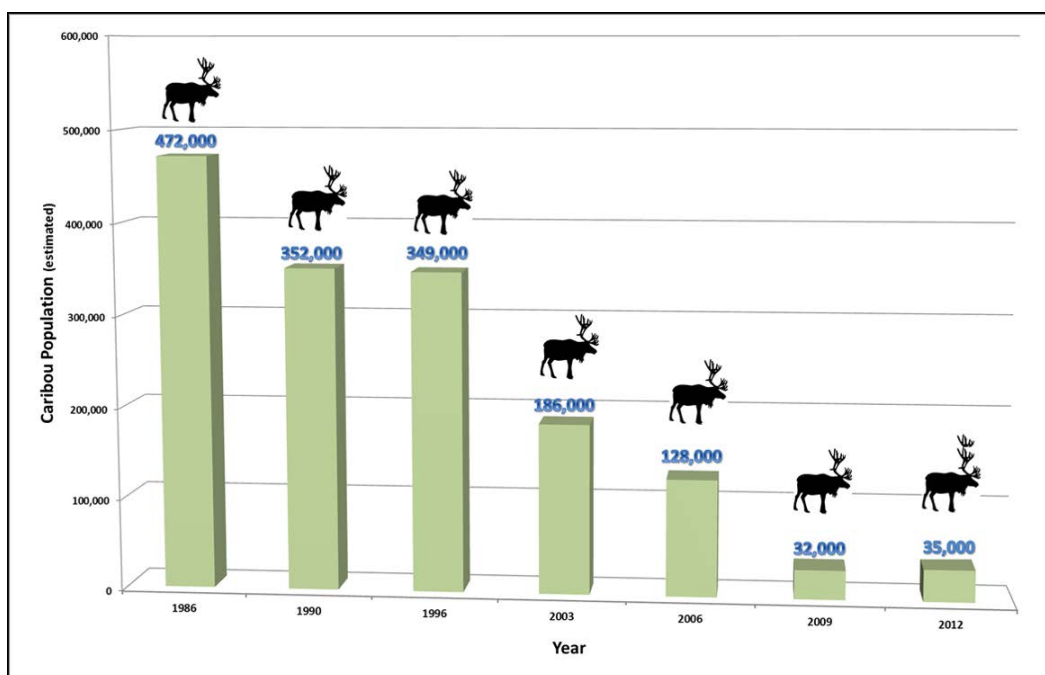


Figure 2: Population of the Bathurst Caribou Herd. Source: ENR-GNWT

1.3. Tłjchq

The traditional territory of the Tłjchq is vast, and the network of hunting trails extends far into every corner of their lands. While the four Tłjchq communities of Behchokq, Whati, Gameti and Wekweèti are located in the boreal forest, their land stretches far north of the tree line into the tundra where many of their hunting grounds for caribou are located. The traditional land use areas of the Tłjchq lie within the boundary known as "*Mqwhi Gogha Dè Njttèè*" of which was outlined by Chief Mqwhi during the negotiations of Treaty 11 in 1921 (Helm 1994). The traditional land consists of the area between Great Slave Lake and Great Bear Lake, from the Horn Plateau in the southwest, and as far north as the Coppermine River and Contwoyto Lake (see Figure 4: Tłjchq Regional Boundaries).

On August 4, 2005, the Tłjchq Agreement—the first land, resource, and self-government agreement in the N.W.T.—came into effect. This Agreement was signed by the Tłjchq, the Government of Canada, and the

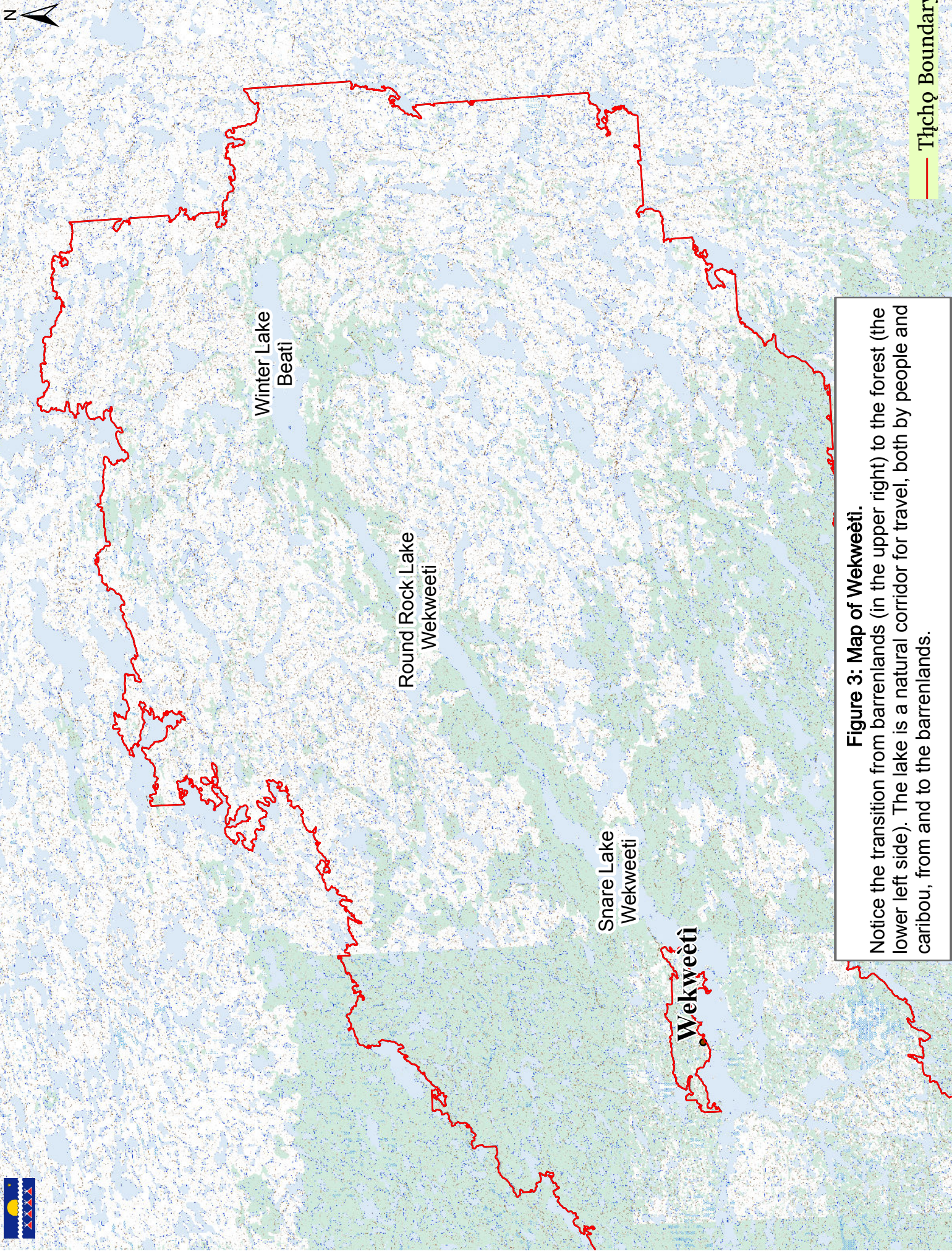
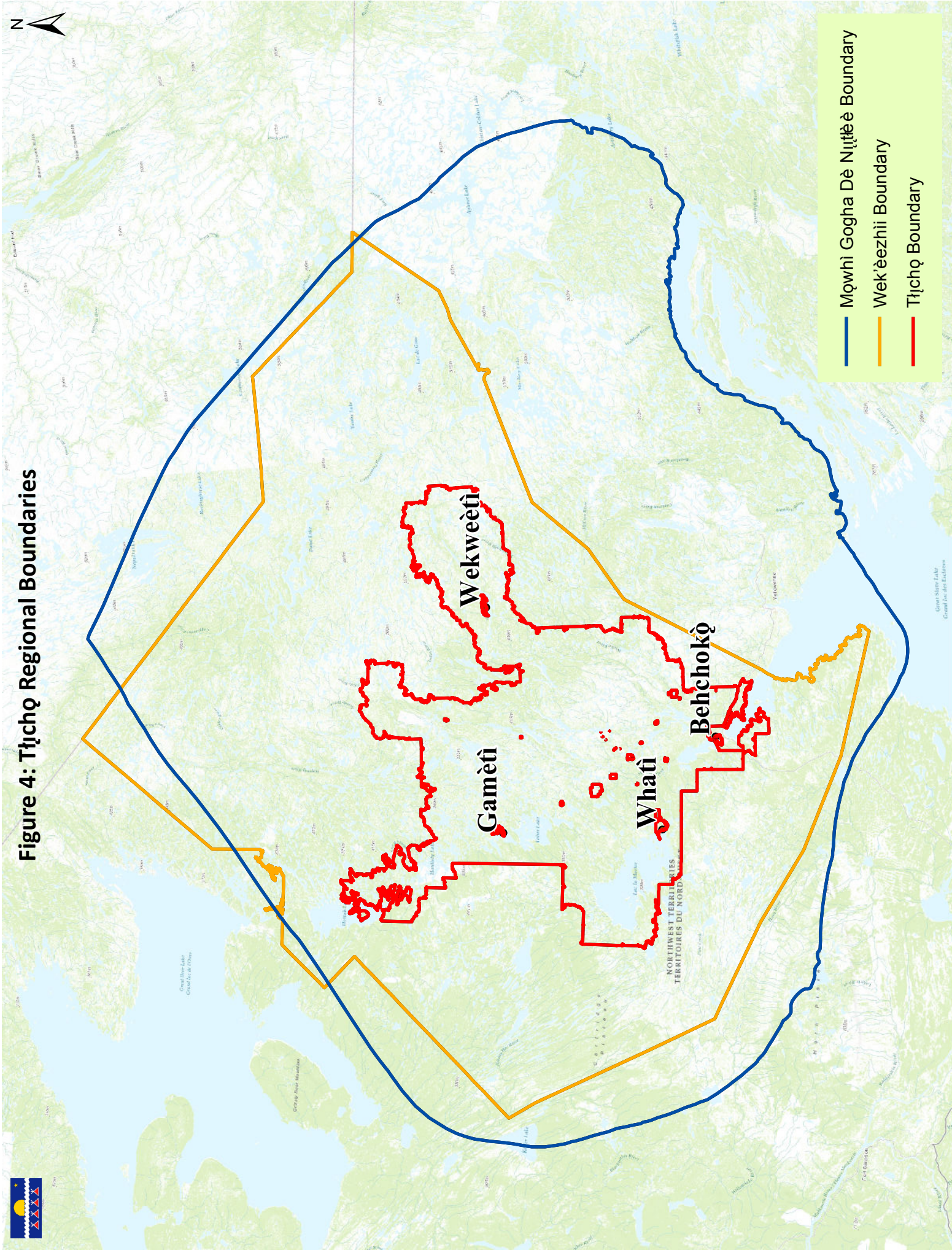


Figure 3: Map of Wekweëti.

Notice the transition from barrenlands (in the upper right) to the forest (the lower left side). The lake is a natural corridor for travel, both by people and caribou, from and to the barrenlands.

— Tł̨chq̨ Boundary

Figure 4: Tłıchq Regional Boundaries



- Mowhi Gogha De Nıjtłıe Boundary
- Wek'ezhıi Boundary
- Tłıchq Boundary

Government of the N.W.T, and established the Tłıchq Government's full powers and jurisdiction over 39,000 km² of Tłıchq lands, wildlife, and resources. The Tłıchq Agreement not only created the Tłıchq Government, but also set its mandate to preserve, protect and promote Aboriginal and Treaty rights and way of life—including culture, language, heritage, lands, economy and resources—for all Tłıchq today and for future generations to come.

The significance of the Agreement is that the Tłıchq people have ownership of 39,000 km² of land surrounding the four Tłıchq communities, including surface and subsurface rights. The Agreement guarantees participation in the Wek'èezhii Renewable Resource Board and the Wek'èezhii Land and Water Board, the co-management boards governing the resources within Tłıchq traditional lands. The Tłıchq have their own lawmaking power over all Tłıchq citizens, including aspects of education, child and family services, income support, social housing, and other services.

1.4. Dedats'eetsaa: Tłıchq Research and Training Institute

This project was conducted by the Tłıchq Research and Training Institute (TRTI). The Institute intends to bring together academic, government, non-governmental organizations (NGOs), and corporate and local Tłıchq organizations to collaborate on research in social, cultural, environmental, health, and wellness concerns for the Tłıchq. The mandate of TRTI is to advance the study of Tłıchq lands, language, culture, and way of life through the promotion of research and its use in education, training, planning, and monitoring purposes.

TRTI pursues its mandate by promoting research projects and activities involving elders and youth; developing and training Tłıchq researchers; developing and using indigenous research design and appropriate community methodologies; publishing work in a variety of media including online at www.tlichq.ca; developing the Tłıchq Digital Database of oral history, maps, photographs, video, and other documentary resources; reviewing proposed research submitted for licensing through the Aurora Research Institute; and providing support and assistance to approved research projects while promoting collaboration with academic and corporate partners.

1.5. Traditional Knowledge Studies

To understand the complex knowledge base of indigenous societies, one must consider the amount of time the Tłıchq people have lived on their land. For millennia, the ancestors studied and understood, in great detail, the cycles of the land and animals through each season, in order to know where and how to obtain necessary resources at any given time of the year. These understandings of people's relationship with the land do not only apply to the sub-arctic but are generally true for indigenous peoples worldwide. In describing the relationship between the aboriginals in Australia and their land, Wade Davis (2009: 157) states:

Imagine for a moment if all the genius and intellect of all the generations that have come before you had been concentrated on a single set of tasks, focused exclusively on knowing a particular piece of ground, not only the plants and animals but every ecological, climatic, geographic detail, the pulse of every sentient creature, the rhythm of every breath of wind, the patterns of every season.

Davis illustrates how a people who have occupied one land historically bind all of their knowledge and philosophy to the land. Thus, the strength of one's connection to the land is determined by the way he or she thinks about their existence within it.

By learning traditional knowledge from indigenous elders, the land and animals become easier to understand. The philosophy, within traditional knowledge, does this because the land itself and all beings are sentient persons with the ability to act and chose based on personal agency, the land then becomes a social landscape.

Traditional knowledge is taught orally between community members. This method of learning makes the knowledge adaptive to new situations and observations and is thus, not static. Knowledge is shared personally and often communicated by an elder when he or she thinks the receiving person is ready to learn. Orally-transmitted knowledge is based on cultural ways of behaving and relating together with the specific information. Traditional knowledge is thus a process of learning based on personal experience that then becomes one's perspective, rather than a series of facts that are universally true. As traditional knowledge is personal, a focus on who is right or wrong or what is true becomes insignificant, while a focus on whose perspective is presented is often more useful (Castellano 2004).

A traditional knowledge study focuses on peoples' knowledge of cultural values, activities, animals and environment in a defined area. Many, but not all, traditional knowledge studies are conducted in relation to proposed development projects. The purpose of identifying traditional knowledge relative to a specific area is to inform decision-makers and development-planners about histories, or possible spirit beings dwelling in a place that only the local people know about. Once identified, various measures or project alterations can be implemented to help avoid or protect the locations that the local people value. As such, traditional knowledge studies can help promote understanding of potential impacts on an area and its inhabitants from proposed developments. These studies are conducted with elders, men and women, and/or harvesters who have knowledge and personal experience of the issue or area under study.

In recent decades, there has been much debate over the different interpretations of the term "traditional knowledge" (TK). Traditional knowledge is claimed by some to be specific knowledge of animals, the environment, and their interactions. Huntington (1998) defined TK as "the system of knowledge gained by experience, observation and analysis of natural events that is transmitted among members of a community." This definition depicts traditional knowledge as a system of knowledge parallel to that of field biology. Others define traditional knowledge as a knowledge system based on a worldview that focuses on the complex whole, and includes more than the physical, technical view of the environment (Freeman 1992). Spak (2005) provides an alternative definition: "the culturally and spiritually-based way in which Indigenous people relate to their eco-systems." This interpretation highlights the interrelationship between culture, nature, and spirituality and emphasizes the importance of respectful relationships between people and the land.

The elders and hunters interviewed for this study place high value on the method of seeing and personally experiencing a place or situation in their evaluation of what is true. They are clear that the knowledge they shared in this study is not hearsay heard or read somewhere, but is true, as they have seen it with their own eyes and experienced it personally.

2. Methodology

Following the methodological standards of the TRTI, this study applied a qualitative research methodology. This approach was based on workshops and individual, in-depth interviews, and working closely with the elders and harvesters who have personal experience and knowledge of the research topic. As the research topic was caribou, most of the research was conducted during the winter months. It is during winter that caribou stay closer to Wekweèti and thus people interact and learn about the animals. The right timing of the research was important to identify and document the conditions that the harvesters observed while hunting. The plan was to hold a pre-hunt workshop to explain the research process to the hunters and their families before they started hunting, and a post-hunt workshop and individual interviews to document the knowledge the harvesters and their families have observed during the hunting season. The timing of workshops and interviews was crucial in building trust and getting the active hunters engaged in the entire research process.

The research process served other purposes besides solely research, as it became a place for younger hunters and community members to learn from elders and experienced hunters about caribou and cultural rules surrounding caribou and being on the land. The workshops thus became a learning process for everyone involved in the project.

2.1. Interviews

The interviews involved a combination of semi-directive and open-ended interview techniques. These two techniques allowed for fluidity and flexibility in the interviews, which is an essential part of research with indigenous elders (Struthers 2001), and created a comfortable space for elders to freely share their knowledge and tell their stories while continuing to follow the objectives of the research. The individual interviews lasted from one to two hours in duration. The interviews were recorded with digital recorders, and qualified local translators transcribed the interviews into English. The language used for the research was Tłjchq or English, depending on the preference of the participants. Sometimes a combination of both languages was used.

The interviews did not systematically follow the questions outlined above. Based on professional experience working with Tłjchq harvesters and elders, the interviews followed the lead of the topics the elder wanted to speak about regarding the issue. The sections in the research guidelines were then marked off as the conversation unfolded. Any topics not addressed by the elder/harvester were specifically asked about in a later part of the interview. This interview technique applied to both the open-ended and semi-structured methods. The differences in techniques used during the interviews were often based on the personal characteristics of each elder. Each elder had different knowledge and different ways of expressing him- or herself. Some elders elaborated more than others and expressed themselves in long monologues. During such interviews it was better to adapt to the characteristics of the elder and sit and learn rather than interrupt with a series of questions (Jacobsen 2011). This method follows the cultural characteristics of learning among the Dene and Tłjchq cultures, in which learning is mainly done by personal observation and experience and storytelling, rather than solely by direct questioning (Legat 2012; Goulet 1998). The open-ended interviews, in which the elder took the time to explain the areas he/she felt were important, were usually the most successful and insightful interviews.

A note should be made of the context and use of the questioning process during interviews with Tłjchq elders. The interview is comprised of the two actions of teaching and learning: the elder is the teacher

while the researcher is learning. The Tłjchq, as with other Dene peoples, have similar ways of teaching and learning that are different from those of Euro-Canadians. In many ways, the elder wants the researcher to learn in the same ways as they learn, preferably through personal experience and observation (Goulet 1998; Guedon 1988; Ridington 1988). The use of direct questions yielded useful information and descriptive stories of the land, but as stated above, the most informative interviews were those in which the elders took the role of storyteller and described their own experiences from the land. This method of research is more in tune with Tłjchq traditional forms of teaching and thus, enhanced the research process.

The research process goes far beyond formal workshops and interviews. As the researchers of the Dedats'eetsaa Tłjchq Research and Training Institute work with the Tłjchq people, elders and hunters on numerous other projects throughout the year, the research topics have been discussed numerous times during many evenings, dinners, travels and around many campfires over a number of years. Commonly, the hidden and more personal side of a specific issue arises when the audio recorder is turned off, the sun has set and the campfire is lit.

2.2. Cameras and Photo-voice

The workshops and individual interviews were conducted with the aid of several large-print photos of caribou. These photos assisted the elders to reflect on the details in the image and elaborate on the various body parts displayed. During the discussions on caribou health and physiology, the photos were instrumental in developing an accurate description of what the hunter had seen weeks before out on the land.

During the research conducted in winter 2015, the hunters were provided with waterproof disposable cameras. The purpose was for hunters to photo-document their observations of abnormalities in caribou health. Numerous verbal testimonies have been recorded by the researchers since winter 2013 and the hope was that use of photo-documentation will enhance the identification and documentation process by having actual photos alongside the harvesters' descriptions. Unfortunately, cameras are not a normal part of a hunter's toolbox and was most often forgotten at home or lost. Although the trial has yet to produce documents of value, it was worth a try from a research methodological perspective.



Photo 1: Researcher Rita Wetrade interviewing elder Jimmy Kodzin, Wekweèti, May 12th, 2015. Notice the use of photo-voice and maps.

2.3. Mapping and Geographical Scope of the Study

The geographical study area focused on the entire winter and summer range of the Bathurst caribou herd: from their calving grounds on northern Barrenlands by the Bathurst Inlet, southeast to the boreal forest by Great Slave Lake, and northwest towards Itseeti (Hottah Lake) (See Figure 1 for range of Bathurst caribou herd). The research focused both on the immediate hunting area around Wekweèti (from Snare River and northeast to the lake Beᓇaiti by the Barrenlands) and on the larger range of the Bathurst caribou and hunting area of the Tłjchq. As the Tłjchq travel long ways to harvest a variety of resources on their land, it was important to also focus on a larger geographical scale to understand the relevance of travel routes and caribou migration. This dual focus allowed for an understanding of the Tłjchq culture and harvesting economy, both locally and in a larger geographical context.

The elders recorded their knowledge directly onto printed maps of the area (scale 1:250,000 for the larger region and 1:100,000 for the local study area), during the workshop and individual interviews. Printed maps were used during the workshop and interviews. The traditional knowledge documented on the maps was digitized and entered into a GIS (Geographic Information System).

2.4. Analysis

Content analysis of the interviews consisted of identifying main categories and applying category codes to all the information, starting first with the notes and transcripts from the focus groups and interviews. Broad categories quickly emerged, such as "health" or "hunting." Once these broad categories were identified, sub-categories or codes were identified, such as "fall hunt" and "caribou fat" under the broader category of "hunting". Several broad categories and numerous codes were identified over the course of reviewing all the interview notes and transcripts. The last step in the analysis was to select parts of the elders' statements to be included under each category. This step was particularly important, as it provided each category with meaning and personal stories from the elders' lived experience on the land. Once no further categories had emerged, and the researchers were satisfied that all the cultural values and activities in the study area had been identified, the maps and report were produced.

The study used no quantification of information. Instead, it relied heavily on information from harvesters who had a deep knowledge of caribou and the land to share. As noted above, the challenge—as well as the benefit—of working with traditional knowledge, is that one is working with people's knowledge, not data. The amount and quality of the information a person chooses to share is based on many human factors, such as the individual's character and personality. Furthermore, not all aspects of traditional knowledge are revealed in an interview setting. Valuable knowledge was documented in the interviews, but the extent of the knowledge transmitted through the interview method is not complete. In the researchers' experience, interviews only move the research to a certain point. But in sharing time together outside the formal interview process, elders and harvesters share knowledge that they did not explain in an interview setting. Traditional knowledge research is a process of learning detailed knowledge from people in direct—but also, importantly, more indirect—ways. Elders often explain specific knowledge during particular situations, and not necessarily when asked directly.

The analysis has relied on interviews and workshops held between 2013 and 2015. Some of the material has already been published in the previous report Cumulative Impacts to the Bathurst Caribou Herd: A Tłjchq Traditional Knowledge Study, published in 2013.

2.5. Research Participants and Activities

The research involved a total of 14 elders and harvesters from Wekweètì and two elders from Behchokò. The selection of participants was completed using a snowball technique (Bryman, Alan & Teevan 2005). Several respected, knowledgeable elders in the community were asked to identify other knowledgeable elders and harvesters who have extensive knowledge and personal experience of the study area; these persons subsequently identified other harvesters. The workshop in the community had an open-door policy. Interested adults and youth were always welcome to join the conversation.

A total of 16 persons were involved in the study. Two elders from Behchokò who used to live and hunt in Wekweètì was involved in the study during winter 2013, and 14 persons from Wekweètì were involved in the following official research activities:

- January 2013 – workshop with community members
- May 2013 – five individual interviews
- May 2013 – five individual interviews
- May 2013 – two individual interviews with Behchokò elders
- September 2013 – verification workshop with community members
- February 12-15th, 2015 – workshops with community members
- May 5th, 2015 - six individual interviews
- May 6th, 2015 – six individual interviews

Additionally, numerous visits, dinners, travels, canoe trips and evenings have been shared between the research team and the community members, in which the research topics have been discussed at length.

2.6. Limitations of the Study

Caribou. No one study or report can cover the topic. This was one study over a set timeframe with a number of people in one of the four Tłı̨ch̨ communities. The study has only managed to cover the topics those people thought were important to focus on in the set timeframe of the study. Other persons in other communities might have focused on other topics within the overarching topic of the Bathurst caribou. This study used both public workshops, open to the whole community, and individual interviews. We tried to cover the community by including hunters and community members of all ages and both sexes. Each individual interviewed had a different perspective, based on his or her personal experience with caribou.

Traditional knowledge should not be interpreted as a set of data, instead as knowledge that is connected to a way of life and infused with emotions, beliefs and personal experience. A written TK report should not be seen as a collection of community's knowledge as a whole, but more as a reflection of knowledge shared in the process of a research project. When traditional knowledge is disconnected and taken out of its original, oral, cultural context, translated into English and written into a report, some elements of its significance may become altered.

3. Research Results

The people of Wekweètì (Snare Lake) have long followed the secure and steady migration of barren-ground caribou to the shores of Lake Wekweètì. The herds use the lake as a travel route from the Barrenlands to their wintering grounds in the surrounding forest. But over the past few decades, from late 1990s to present, people in Wekweètì have observed numerous changes in the caribou and its habitat. This section outlines the environmental changes observed by elders and hunters in Wekweètì.

The research results are comprised of two sections. The first section includes observations of abnormal physiological changes in caribou, specifically of meat, organs (and in particular the liver), bone marrow and fat content, deceased animals and population dynamics. The second section explores factors behind the environmental and physiological changes (factors of disturbance), focusing on cumulative impacts from (1) the resource extraction industry, (2) the outfitting hunting camps, and (3) disrespectful harvesting.

The report documents a direct correlation between mining activities and health issues; however, the study does not demonstrate the biochemical pathway linking pollution from mines to the abnormal health issues. The hunters emphasize they are not veterinarians, doctors or biologists who can pinpoint the chemical links between pollutants, forage and disease. Further research, by combining TK and science, is needed to demonstrate how mine pollution impact caribou forage and how that, in turn, affects caribou health and behavior. TK can contribute the people's direct knowledge of abnormal health issues and caribou movement, their detailed knowledge of *ndè*, the functions of their ecosystem and how activities from mining industry impacts that ecosystem. We need to combine the strengths of western science and TK, where TK can provide the current conditions of caribou and habitat, and science can identify the biochemical pathways that connect the physiological abnormalities to their source or sources.



Photo 2: Harry Rabesca packing a caribou bundle, ʔewaànit'ııtı (Courageous Lake) August 24th, 2012.

3.1. Conditions of the Bathurst Caribou and their Habitat

3.1.1. Caribou Health

The caribou interact with their surroundings in a similar way to humans. The quality of food and the ability (or inability) to rest influence the health of the animals. Tłı̨chq̓ elders, who have lived alongside and interconnected with the caribou since time immemorial, emphasize that caribou are similar to people in that they have the ability to make conscious choices about what to eat, where to travel and what to do there.

For the people of Wekweètì, the close migration of caribou and their ability to hunt the animals is the source of their economy and culture. In a successful hunt, the Tłı̨chq̓ hunters butcher the animals on site where they are shot. The men hunt the animals, remove the skin and separate the animal into several large cuts. During the winter, the hunters bring the butchered caribou back home by snowmobile sled. Once the meat is unloaded back at the hunter's house, the caribou meat becomes the woman's domain and responsibility. The women cut the large chunks of meat into smaller pieces for cooking, and separate some of the more tender cuts to make large quantities of dry meat. As the Tłı̨chq̓'s main source of food and protein, caribou meat is of central importance for people and essential part of the Tłı̨chq̓ culture. Sharing meat between families is an unquestionable social code, without the necessity for asking or saying thanks.

Caribou meat is examined, cut, cooked and eaten almost every day by people in the communities. All this meat processing makes the Tłı̨chq̓ experts of animal's physiology and health. In recent years, from the late 1990s to present, community members have started to notice abnormalities in the smell and taste of the caribou while butchering, preparing and eating the meat. Bobby Pea, a hunter from Wekweètì, described a recent experience:

This January I went hunting after I came home. Past Gahchodii Island there is a lake where Joe shot two caribou. He signalled to me so I drove up to him. He was cutting up one caribou, the fat on the caribou was thick. In the stomach and lungs blister-like substances were showing. He didn't know what to do so he asked me what to do. I told him a caribou that fat should not be wasted, you should just take it home as it is. The rest of the caribou took off further ahead, he said, so I went after the herd.

Bobbie Pea, May 6th, 2015

As the hunter described, physiological abnormalities have been detected in various parts of the caribou body. In this case, Bobby and Joe observed blister-like substances in the stomach and lungs of the animal. Other hunters have observed abnormalities in the meat, liver, bone marrow, lungs/ribs, fat content and hides.

3.1.2. Meat

Fifty years ago when we went hunting and cut the meat, there was nothing wrong with it. Juicy and delicious when we cooked it. Now it's not the same at all. It's not fresh and juicy. It's different than before.

Jimmy Kodzin, Feb 11th, 2015

The meat from caribou is exceptionally soft and easy to prepare, since the fat, veins and muscles are easily separated, as opposed to meat from pork or cow, where the fat, veins and muscles are more integrated with each other. The meat is flavourful and delicious when the animals are healthy. But over the past decade, the hunters have detected a different smell to the meat while butchering and cutting. While before it was relatively odourless, current observers report a strong and different smell.

When you cut the caribou, it smells. Some of them smell; as soon as you open it, you smell it. But some of these you cut it open it smells really good, just like before, but some of them is not like that. Just smells; it hits you really strong.

William Quitte, April 2013

In addition to the smell, some parts of the meat are covered in what appears to be a form of pus. The women who cut and prepare the meat for cooking know the details of the various body parts, and described the unusual pus as sometimes of white and yellow color. On various parts of the meat, there are often white spots and blister-like substances. Noella Kodzin, an active elderly woman from Wekweèti, has prepared caribou meat all her life. She has made the following observation while preparing dry meat:

Before 1990 there were lots of caribou and the meat was good. We cut up the meat to make dry meat. Today I still make dry meat even with all kinds of meat that we get. That's what I do, I don't waste any meat. I cut out the small white blistered areas in the folds of the meat and put them aside to throw away. It wasn't like that in the past when we used to make dry meat from the back strap. Now it is not unusual when working with any part of the caribou that there would be small white spots in the folds of the meat...It wasn't like that in the past; today when we work on the meat there would be lots of that.

Noella Kodzin, May 6th, 2015

Young hunter Johnny Bolin from Wekweèti explained his recent experience while butchering caribou meat:

In the past when we used to cut up the meat it was juicy and delicious. Now there are hardly any fluids in the meat. When we went hunting recently there were cysts in the folds of the meat. Maybe that is why the meat was not juicy. Maybe it is because the caribou are not feeding well. There were cysts in the folds of the meat that was cut up that I brought here. We didn't eat it because of the cysts. I saw after we cut up the meat it was the same under the armpits. There were big ones in there, they were big, lumpy and hard. I didn't know what they were so I cut them out. I put them with the ribs because it seemed to be mostly on the ribs and I threw out half of the ribs.

Now there are lots of cysts in the meat, we don't know if we should tear open the cysts on the meat. I have torn open some of those cysts but I brought the meat home anyway and washed it. We kept all the meat. We ate it after washing it. We threw out some meat that has lots of cysts in it. We fed that to the dogs.

It used to be easy to put our hands in the folds between the hides and meat. For these ones the flesh sticks to the hide so we can't take hold of the meat because the lining and hair sticks to the meat. It didn't used to be that way.

Johnny Boline, May 6th, 2015

The tainted meat and the smell have almost become regular occurrences. The hunters and women use different words, such as blisters, spots or cysts, to describe the observations they had never experienced until recently. The concern is that unknown contamination in the meat will have health effects for the people who consume the meat. As in Johnny's case, he was afraid to eat the meat himself, and threw it to his dogs. After the interview, he reassured the researchers that his dog was still alive. He was joking, but his concern for himself and his family's health is real. The elders are concerned that the meat does not have the same flavourful taste, is drier and contains less juice than was normal in earlier times. Women say that when they cook soup, it does not have the same strong taste and the meat does not create as much broth.

3.1.3. Bone Marrow

The bone marrow of the caribou is most often taken from the lower front legs of the caribou (see Photos 3 and 4). The lower leg, from the knee to the hoof, is thrown in the fire to burn off the hair. The remaining hair is then scraped off and skin removed. On the back side of the leg, there is a long thin sinew, which is cut off and eaten. The hunter uses a long knife to hack up the string as it is very chewy and hard. Once the skin and strings are removed, only the leg bone itself remains. The hunter uses the sharp edge of the knife to make a circular mark around the bone, then with the opposite blunt side of the blade makes a quick hard knock to split the bone in half and expose the bone marrow. The dark pink marrow then runs out of the core of the bone and can be eaten raw or accompanied by dried meat as a meal in itself, or as a delicious evening snack. The marrow contains fat and protein, and is a rich source of omega-3 fatty acids, minerals and vitamins. The elders often talk about the richness and strength one gets from eating the marrow.

In the past the caribou marrow was rich and healthy. When we ate it with the dry meat we could hunt on the strength of it, even if we didn't eat again all day.

Phillip Dryneck, April 2013

The Tłı̨ch̨ use of all parts of the animal. The marrow from the core of the bones is considered a delicacy by many. On long trips, hunters often pack a few front legs, in order to have bone marrow while waiting. The bone marrow is usually a dark pink color. The consistency is greasy, fat and often runs through the bone core in one continuous string. In recent years, community members have observed an altered colour and consistency of the marrow. Hunters describe the bone marrow of some animals as either too pale—nearly white—or too red. Furthermore, the marrow is often watery and contains less fat than normal.

The bone marrow too. In those times when we were [at Beɔaiti] the bone marrow was good to eat with the dry meat. The bone marrow at time were ever big, huge inside and kind of greasy. Because the caribou were on their own and they can travel wherever they want and stop to eat, they are not worried about anything. But today the bone marrow is different, because everything it is there and they always rush around, always walk all the time.

Joseph Judas, April 2013

William Quitte, an active hunter from Wekweèti has made similar observations of the bone marrow.

Before, I see some of them when you cut the bone, it used to be really thick, bone marrow, and it was really thick. Now when you shoot the caribou, when you look, it's

like water inside. It's not like before. Some of them when you try to eat it with dry meat it's like water. It wasn't thick; it's all changing.

William Quitte, May 6th, 2015

The two hunters make the same observation: altered consistency and colour. The elders explain how the bone marrow, legs and hooves are impacted by how far the animals travel and the type of terrain the animals walk through. The herds travel long distances, and walk every day. It is important for the animals to adequately rest for a period, when they are not being chased by hunters, predators, or human activities—for recovery and to regain their strength. Therefore, if the caribou are unable to properly rest after walking long distances it will affect the bone marrow.



Photo 3: Left: Cutting skin of a front leg to access the bone marrow.

Photo 4: Right: Dark pink bone marrow served with dry meat.

3.1.4. Ribs and Lungs

Once the skin and head are removed from an animal that has been hunted, the hunter will continue butchering by first cutting the legs off one side of the animal. When the front and hind legs are removed on one side, he can access the back strap on the upper back, and cut out its entire length. Then the legs on the opposite side will be removed, followed by the second back strap. Once the stomach skin is pierced and cleared, the hunter will cut a small hole in the lower part of the ribcage on one side, so he can grip the rib and lift it up from the remaining carcass. Holding the ribcage in one hand, he chops each rib bone from the spine (see Photo 5). It is during this process that some hunters have noticed something unusual: the lungs have grown attached to the ribcage. Normally the lungs are not attached to the rib cage, but in several recent instances they have been lungs have been connected to the ribs. Furthermore, in these instances, a yellow-green fluid, like mucous, covers the lungs. During a hunt in 2013, the hunter Bruce Football, observed the lungs stuck to the ribs while butchering the animal.

The lungs is stuck to the ribcage, [and] you can see this yellow-green stuff stuck to it.

Bruce Football, April 2013

Also, in 2015 Bruce observed the same abnormal occurrence.

When I shoot caribou sometimes, one out of five, I'll see a caribou with the lungs sticking to the ribs... Sometimes you have to cut it off. It's stuck to the lungs, and not only that sometimes you see green stuff on the lungs too.

Bruce Football, May 6th, 2015

Another young hunter, Gilbert Blondin observed a similar phenomenon while hunting on the Barrenlands northeast of Wekweèti.

On Tsòti (Little Marten Lake), I saw a sick caribou. When I cut it up, it was green on both sides of the lungs—light green. The caribou had hard time to breath. And it was all by himself.

Gilbert Blondin, February 12th 2015

The hunters report similar observations; green or light green color and a liquid substance on the lungs, which are attached or grown to the ribcage. The experiences are explained by using different words and descriptions to explain occurrences they have never seen before.



Photo 5: Harry Rabesca cutting out the ribcage. Ɂewaànit'ııı (Courageous Lake) August 24th, 2012.

Photo 6: Caribou rug stretched to dry. Ɂewaànit'ııı (Courageous Lake) August 24th, 2012.

3.1.5. Livers

Hunters have also observed abnormalities in livers. Some livers are covered in a white, pus-like substance. At other times, livers have white spots on or in them. When the hunters cut them open there are small, hard 'rocks' inside. Hunter Roy Judas described what he saw:

Right now...I'm a hunter myself... sometimes we see around the liver kind of like white spots. Some of them got one, some of them got two, like a rock, small, inside the liver.

Roy Judas, April 2013

The liver is a vital organ: it removes waste products from the food the animal has consumed. The hunters expressed concerns about the quality of the feeding grounds in vicinity of the large-scale mines, due to accumulation of pus on the liver tissue and spots on/in the livers.

3.1.6. Caribou Fat and Skinny Animals

In the late summer and fall months—August, September and October—the caribou feed heavily and build up a fat reserve. The fat usually accumulates on the back of the animals. Once the fur hide is removed, the hunter carves off large wide strips of white fat running from the lower to upper back of the animal. The strips can be as long as the entire animal and up to 10 centimeters thick (see Photo 7). The fat dries instantly when removed from the heat of the body and can be eaten raw when hardened. The fat is highly valued by Tłı̨chǫ, and is usually eaten in combination with dry meat. Fat is also mixed with pounded caribou meat to make pemmican.

In recent years, Wekweèti hunters have observed that numerous animals of the Bathurst herd are skinny. They appear not to accumulate normal amounts of fat on their bodies. Normally, caribou spend the summer and fall months building fat—they roam the Barrenlands, foraging on the readily-available lichen, grasses, bushes, sedges and plants. Proper feeding during these months is important to build up enough fat to last them through the winter months when food sources are harder to get to (WKSS 2001). (In winter, the animals need to dig through the snow to get to their forage, a process that requires much energy.) Yet some caribou are lacking some of that stored energy supply. William Quitte shared his observations:

Some caribou are not healthy or fat. When you look at the caribou some caribou look really nice, fat and healthy. When you shoot them they're not like that. They are just bone. They're like skinny.

Right now when you see Bathurst caribou over here, when you shoot big caribou it's not that fat. Last year we shot caribou in that same spot, right here (Winter Lake). We shot about four or five caribou, big ones. Some of them took the fat out, some of them didn't take the fat. It's really changing! The caribou are changing over there.

William Quitte, April 2013

There is also body fat in the intestines. In the stomach, a netting of fat surrounds the intestines and organs. This netting is highly valued by hunters. Once dried, the stomach fat is eaten raw. But as the fat reserves on the back of the animals diminish, so too do the fat reserves in the intestines.

There used to be lots of fat in the intestines, but not these days. The caribou are also not as fat and there are no soft fat in the stomach. There used to be thick fat in the large intestine but that too is not there.

Johnny Boline, May 6th, 2015

The decrease of fat reserves can make animals vulnerable to starvation, especially during periods of freeze and thaw, in late fall and spring, when lichen can be covered in ice or crust for prolonged periods, and animals can be prevented from accessing their forage.



Photo 7: Caribou fat hanging to dry at a hunting camp on Tatsòti (Grenville Lake) September 2012.

3.1.7. Hides

The community members reported seeing changes in the texture and quality of Bathurst caribou hides. Normally, caribou hides have unique characteristics depending on the season. The people know what time of the year hides are best to produce a variety of products. Hunters skin the hides of the animal on the land and deliver them to women in the community who prepare them. Currently, caribou hides are used mainly for moccasins, gloves and drums. In earlier times, the hides were used daily for clothing, pants, jackets, a variety of bags, and to make hide tipis. The hide was also made into babiche, a thin string or rope—it is used in snowshoe webbing, for example. The hides go through a lengthy and complex process from their raw state to become a jacket or moccasins. It is hard work, and women spend days in the smoke shack cleaning, drying and smoking the hides into a wearable condition, ready to be made into clothing. As the women go through this detailed process, they become attuned to notice the fine details of hides and how those details change depending on the season. The elder Noella Kodzin has worked with hides all her life. Her hands can tell the difference when something is not right. In recent years, she has detected changes in the texture of the hides.

If we look at some of the hides, there are many infections in the hides and in the lining of the hides. The inner surface of the hides is abrasive with needle-like rough areas. These areas are very hard to scrape.

Some hides are also in the same condition. When we scrape the hides, the surface feels pointy like needles or rough like salt is on it.

Noella Kodzin, May 6th, 2015

In contrast to earlier years, the hides are tougher, and instead of smooth the hides feel like sandpaper against the skin. The hunters who skin and butcher the animal on the land also report the same conditions with the hide.

Sometimes we put our hand into it and it is just like sand paper, small little lumps, tiny ones, lumps all over the place, sometimes around the back, sometimes it's hard to, like when we rip the hide of the caribou, sometimes it is just stuck to it and we have to force real hard. I don't know why they are like that. Probably they are sick from the mine-site.

Roy Judas, April 2013

3.1.8. Deceased Animals

Several Wekweètì hunters have been employed by nearby outfitting businesses, such as Adventure Northwest operations located near Tsòtì (Little Marten Lake). The lake is located on the Barrenlands northeast of Wekweètì. Working as tour guides gives young hunters the opportunity to search the Barrenlands for caribou and observe their habitat. From 1999 to present, the hunters have found numerous dead animals lying on the ground. The guides have reported seeing over a hundred deceased animals scattered on the land. Most of the animals had no physical injuries; they had simply bedded down. Bruce Football described his observations while guiding in the late 1990s:

I guided with Boyd Werner at Tsòtì (Little Marten Lake), he was the owner, Ventures Northwest. I was working with them at Tsòtì (Little Marten Lake). In 1997, 98, 96. These were good years, like heaven, successful. 1999 was my last year and we hardly had any caribou. It dropped and that's when we saw a lot of dead caribou on that lake in that area. Not only that, caribou are just dying by itself. We saw one caribou right in front of us in that area there. There is a little island right in front of us. We saw one caribou slowly make it to the island, bedded down and it just died.

Bruce Football, April 2013

Roy Judas also worked as an outfitting guide for Adventure Northwest and reported similar observations:

I saw a lot of caribou at that time in 1999. After 2000, everything just went down, down the drain. In the year 2000, we saw a lot of dead caribou. I don't know what caused it, but we saw a lot of dead caribou... 2000 to 2003. We have seen a lot of caribou die around Tsòtì (Little Marten Lake).

On the land. Wherever we went right around the Tsòtì (Little Marten Lake) area. We saw over a hundred caribou dead, not in one spot, but separate. Wherever we parked the boat we saw one caribou, two caribou like that. But I just don't want to touch it because of disease and stuff like that so I never bothered to touch it.

Roy Judas, April 2013

These are the observations of two guides in one small area. Johnny Bolin reported similar observations of deceased animals in the winter of 2015.

When I went to the end of the Lake (Wekweètì) in this area to go trapping I came to the end of the lake here beside the river. There was a caribou lying on the ice of the frozen lake. There were no wolves around or any other animal that killed it. It died by itself but there was a white substance like foam on the mouth. I pulled it beside the land because

it was on the ice. I didn't touch it or take it or butcher it, and I drove back home. I told Roy, the renewable officer in the community, about it so he said he would go there and check on it. I told him about it and I left it at that. The next day I wanted to check my traps so I went back there. The caribou was still in the place where I had pulled it. Nothing had touched the caribou, even the wolves didn't pay attention to it.

It stayed on its own and wolves didn't kill it. If the wolves killed it they would have ate it but nothing ate it. The whole carcass was just there. The way I looked at it, it was there when I got there the next day to see the carcass, but all around the carcass there were wolf tracks that went around it, like about five wolves, they took off, like they never catch it. It probably died of something else, like sick. There was like white foam on its mouth.

Johnny Boline, May 6th, 2015

3.1.9. Decline of the Bathurst Caribou Herd

The observations of dead caribou on the ground are part of a larger trend. Every year, the caribou herds migrate along Wekweèti. The long, narrow lake stretches from northeast to southwest from the Barrenlands into the tree line. The lake provides a perfect corridor for the herd to easily travel from the Barrenlands to their wintering grounds, where they can access the shelter of the trees. Since the early 1970s, when the community of Wekweèti was built, large herds of caribou have migrated steadily along the lake in long single files every year. The annual migration along the lake was so secure that the people selected the northern shore of the lake to build their homes; there they would have secure access to their main resource for several months of the year.

In recent years, the people do not see the same large groups of animals moving along the lake. Now, only a fraction of the herd migrates past Wekweèti. The hunter Bobby Pea explained his experience from early 1970s:

When we first came here, toward the end of traveling by dog team in 1973-74. When I started working well with dogs, caribou were migrating to this lake. When the caribou migrated, there were lots of caribou. Back then we saw a large herd of caribou. Today we see a fraction of what it used to be.

As I said, when we look at the caribou now it does not look like there are lots and lots of caribou, compared to the past, when we used to travel by dog teams. This lake is a fairly long lake, and the caribou used to look like a long line to the middle of the lake. It isn't like that today.

Bobby Pea, April 2013

Large herds of caribou were seen every year up until the late 1990s. Hunters say that 1996 and 1997 were good years when lots of caribou came through Wekweèti. But from 1998 and '99, changes in the population started to occur. The caribou were still numerous, but not so much as in 1996 and '97. During the following years into 2000, the population consistently decreased, up until 2003 and 2005, when caribou started to become hard to find on the Barrenlands northeast of Wekweèti.

1996 there was a lot of caribou. We see it on the island like probably fifty, sixty caribou at one time, probably a thousand, at one time. There used to be a lot of caribou. And then in '98 it stopped. There used to be a little bit but not like '96 though, but a little bit lesser than '98. 1998 was a little bit lesser than '96. So there used to be caribou but we see caribou around that Tsòtì (Little Marten Lake). And then, in the year 2000 it went down. We don't see thousands and thousands, just only a few.

In 2000, hardly nothing. We just shot a few but it was hard to hunt for it. We have to walk and walk and walk. Back in '96 and '98 we shoot caribou; we don't have to walk far. In a really short distance we see a caribou...right on the edge of the shore line. The two cows are the leaders. Wherever the cow goes all the caribou go that same direction all day. That's what it was like. We were watching the cows; they were leading; that's where we stood all the time. We saw hundreds and hundreds and hundreds of caribou in one day.

So, in the year 2000 we saw not much caribou and then in 2003 it's getting worse and worse and then in 2005 the last guide went in with Boyd Warner, we didn't see nothing at all on Tsòtì (Little Marten Lake). In 2005, nothing. We saw only five muskox on this one. No caribou...no nothing.

Roy Judas, April 2013

Hunters saw a decrease in the amount of animals on the Barrenlands in the fall and around Wekweètì in the winter months. The decrease in population was continuous every year, and in 2010 the Minister of Environment declared a ban on resident hunters. All outfitting businesses in the Northwest Territories were restricted from hunting caribou. Aboriginal people were still allowed to hunt a limited amount of animals for a few years, but under a quota system implemented by the territorial government. In January 2015, a mobile conservation zone was implemented by ENR, a no-hunting zone that moved when the collared caribou moved. Aboriginal hunters were not allowed to hunt within the zone. As the population of the herd continued to decline, the Tłı̨chų government itself chose to stop hunting as a measure to try to stop further decline, in fall 2015.

3.1.10. Summary of Caribou Health Issues

The physiological abnormalities found in caribou, identified above, were recorded from 2013 to 2015. They were observed mostly in meat, liver, bone marrow, lungs, fat content and hides. During numerous workshops and interviews over the years of this research, nearly every community member had something to add: a new observation, and/or understanding of the issue. People in Wekweètì have lived with caribou; they understand caribou. They depend on the caribou as their main source of income, and they are deeply aware of any changes to caribou migration, behaviour and health.

After living long here in Wekweètì you know how caribou looks, you know how it tastes, and all that, you know if it is healthy and not healthy. Even my husband knows it because he is a hunter. Last year he shot one or two caribou and it was sick. He knows it. He knows it when the caribou is sick. They took no meat. They just cut the meat all apart and just threw the meat away.

Virginia Lamouelle, May 6th, 2015

The abnormalities described above can be detected in the taste of the meat. The elders say the meat from the animals is not the same as it was in earlier times. The taste is different and not as flavourful.

The meat is not the same as in the past. It tastes different. When we used to work with caribou meat it was delicious. Now when we cook it doesn't seem to taste like it was in the past. After frying the meat in the lard and lay it aside for a while, it dries. When we cook it on coals it used to be delicious but now it seems not to be like that. It tastes different now.

Virginia Lamouelle, May 6th, 2015

Most Tłı̄chq̄ in Wekweètì, such as Virginia, are raised on country foods, like caribou. When people have not had caribou meat in a while, they often say that they crave it. Many Tłı̄chq̄ say the worst thing about living somewhere else is the insatiable craving for caribou meat. But the observation of numerous changes in the caribou health has left many community members concerned about potential contamination and health effect to the people in the community. The hunters say they try not to touch the livers with white spots, or the green mucous on the lungs, for fear of contamination. But caribou meat is life, and hunting caribou is practice of culture.



Photo 8: Joseph and Madeline Judas preparing caribou meat on their kitchen floor. February, 2015.

3.2. Factors of Disturbance

The caribou's abnormal physiological and health conditions, altered behaviour and migration routes and population decline, as described above, are the consequence of cumulative impacts from newly introduced changes to the caribou habitat and to the caribou-human relationship. The elders relate the environmental changes to the many social and economic changes that have occurred on Tłı̄chq territory in recent decades. The activities of the resource extraction industry on the caribou habitat, along with the stressors from the outfitting hunting camps may have significant cumulative impacts on the caribou. A Tłı̄chq elder explained:

I know that, I never say it or I never talk about it, but I know these two mines since these two mines [Diavik and Ekati] have been established we have had problems. Plus all these [outfitter] camps that they put in there for hunters, plus all these staking and all these exploration camps, hardly any [caribou].

Tłı̄chq Elder, February 6th, 2013

The new activities on caribou habitat have impacted the caribou. The caribou have learned to encounter and deal with human activities in a very different manner than was normal in an earlier relationship between the Tłı̄chq and the caribou. Furthermore, as Tłı̄chq culture has undergone socio-economic changes during the last decades, brought about by colonial policies such as the residential school system, many young hunters are unfamiliar with the cultural codes surrounding hunting and interaction with the *ndè* and caribou. These social changes have also impacted the dynamic relationship between caribou and people. This section deals with the factors of disturbance, or stressors, on caribou habitat and the cumulative impacts from these disturbances on caribou health, migration patterns and on caribou hunting.

3.2.1. The Resource Extraction Industry

During the past ten to fifteen years, from end of 1990s, the Dechı̄ Laagot'ı̄, the people of the edge of the woods, have experienced changes to the land, the caribou habitat and to the herds themselves. The people correlate the advent of these changes to the establishment of the large-scale mining activities, which occurred approximately in the same timeframe. The resource extraction industry started its large-scale operations at Ek'atı̄ (Lac de Gras) in the 1990s and into 2000. At the Ekati mine site, extensive exploration and development was done since 1981, until construction was completed and the mine officially opened in October 1998. At Diavik, the kimberlite pipes (the diamond bearing deposits) were discovered in 1994 and 1995. The construction of the open-pit mines on the large island Ek'adı̄ started the following years until mining production started at Diavik in 2003. Additionally, there are numerous other mining operations in the vicinity, such as DeBeers at Snap Lake, Seabridge Gold exploration camp and the old Tundra mine by ʔewaànit'ı̄ıtı̄ (Courageous Lake). The elders do not see these as separate projects because combined, the sites and the associated activities form a "wall" surrounding the Ek'atı̄ area that blocks *ek'atı̄ tataa*, the Bathurst caribou herd's main migration route (TRTI 2013). Hence, the elders prefer to view the resource extraction industry as one activity that cumulatively impacts caribou health, behaviour, population dynamics and migration patterns.

The Tłı̄chq elders described in detail how development of large-scale mines on the caribou habitat, and specifically on the main caribou migration route at Ek'atı̄ might impact the Bathurst caribou herd. The predictions were specific to alterations of the caribou feeding grounds, and resulting impacts to caribou

health, and the herds' migration patterns across the land. The combination of impacts directly hinders Tłıchq access to the main resource in their hunting economy and culture.

At that time there was no mine at Ek'atı, so the meat of the animals and the water was very good around there at Ek'atı. I went hunting there twice by plane with some people. The berries grew well and the water was good. Since the mine opened at ʔewaànit'ıııı (Courageous Lake) the water has changed and the land is polluted. The smoke and fumes go up into the air and the wind blows it down onto the ground. It affects the animals that eat from it. So now when the young men go hunting they find white things in the meat and the hide linings are not so good. In my opinion they are reporting the truth because in my experience it was not like that in the past.

Phillip Dryneck, April 2013

The young hunters' observations of current environmental conditions confirm the elders' predictions. The caribou's physiological abnormalities, described above, and changes in their migration routes, coincide with the introduction of large-scale mining activity in the area. The West Kitikmeot Study (2001: 51) states that strong smells from large machinery during construction creates fear among the caribou. The smell weakens the scent of vegetation and the fear weakens the caribou's mind, subsequently creating difficulties for finding forage areas around mining activities. The caribou actively remember the quality of their feeding grounds and areas with noise and pollution. These impacted areas with low-quality feeding will be avoided. As caribou communicate, these memories are shared and areas avoided by other herds. In consequence, they alter their yearly migration patterns. The following sections outlines impacts from mining activities for caribou health and migration.

3.2.2. Impacts from the Resource Extraction Industry: Caribou Health

The caribou follow migration routes from their calving grounds towards the Ek'atı area (see Figure 1). The herds normally spend the months from July to October on the Barrenlands, walking, feeding and resting. The Barrenlands are covered in forage for caribou, lichen, grasses, sedges, bushes and other plants, and the late-summer and early fall period is essential for feeding on lichen and vegetation to build up fat reserves for the winter months. Elders say caribou like to alternate the vegetation they feed on, as they get 'tired' of eating the same plants every day. Lichen, grasses and sedges are their main food, but they also eat other plants, such as bushes and reeds along the shore line.

Since the establishment of large-scale mining, dust and fumes from mine sites are spread out over the landscape surrounding the open pit operations. As there are no trees to prevent the spread of dust and fumes on the Barrenlands, the strong winds carry dust particles far away from the mine sites. The particles settle on the lichen and vegetation and get absorbed into the caribou forage. The caribou herds then follow their migration routes through the polluted areas around the mines and consume the polluted vegetation.

The Bathurst caribou coming this way... There used to be nothing wrong with them before the mine was open. All the helicopters, all the [oil] drums they left there, maybe in the water. Maybe that's why. Maybe their food is not growing like before. When the mine is open everything is floating in the air. When it rains it comes down. The food is just not the same as before. Maybe it gets sick. Some of them gets sick. That's why the caribou is all changing and gets sick.

William Quite, April 2013

Dust and chemicals are being absorbed into the vegetation and waters where the caribou forage and drink, and this is likely connected to the physiological changes experienced by Tł̨chq̨ in recent years. Hunters have observed numerous cases of a white pus-like substance and spots on organs and liver, blisters and cysts in the meat, lungs coated in green mucous/fluids, and attached to the rib cage, altered color and consistency of the bone marrow, and a hardened texture of the hides. None of these phenomena were observed before large-scale mines were developed on the caribou feeding grounds.

The caribou used to be really healthy, and it was fine meat too. It really had no scars, nothing like that inside the lungs or inside their stomachs. We didn't hardly see things like that before. But after all these [development] happening, people start to see things like that.

Joseph Judas, April 2013

The elder Joseph Judas described an increase of abnormal health issues not seen by the people prior to the establishment of the mines. Joseph has been trapping and hunting from Wekweèti towards the Barrenlands for most of his life. During a trip to caribou foraging areas around the Diavik mine site, he said travelling through the forage areas around the mines was like "walking on potato chips", (February 12th, 2015). The vegetation was that dry and dusty. The area in close proximity to the mines are thus of poor quality as caribou forage. The elder Jimmy Kodzin added to Joseph's explanations:

All of those mines on the land have people working on them searching among the rocks and driving vehicles. There are usually good feeding areas for the caribou in the Barrenlands but if they are blasting rocks in the Barrenlands, it is on flat land where there are no trees. So if there's blasting, the wind blows the dust from the north, south and from all over for many miles and all that dust settles among the caribou food. The caribou ingest all that with their food. That is why when we talk about the caribou these days we say the caribou look like this and like that.

So today this is the situation with the caribou. If this is the behaviour of the caribou now, what will it be like in the future if there are more mine developments? By our observation of caribou behaviour, development may cause the caribou to no longer migrate toward us. They will go further north or go somewhere else. It seems possible that will happen.

Jimmy Kodzin, February 12th, 2015

Every fall, the hunters travel to the north end of Wekweèti and onto the Barrenlands at Beᶱaiti to look for caribou. But in recent years, the caribou have not migrated through to Beᶱaiti, as the herds usually do. Joseph described caribou behaviour in relation to mining activities:

Ever since the caribou migration stopped coming to this area caribou no longer swim across from Nàgotsaà to the water flow which goes into Beati (Winter Lake). So now the caribou come from over there to Weyburn Lake going north and they retrace their trails this way. The migration seems to be going further north so the caribou do not come close to us anymore. Because there are so many mines, the caribou are frightened so they don't eat. They don't like their feeding areas because of the dust from explosions. Maybe they have gone somewhere else, no one knows. So they say the caribou have declined. They do not like their feeding areas and have gone somewhere else.

Joseph Judas, February 12th, 2015

After the mines were established, the people started to observe other changes to the caribou. Elder Joseph Judas travels on the land in the springtime to hunt and monitor the conditions of the animals. During spring, the cows are pregnant and are moving from the forest to the Barrenlands, and towards their calving grounds where the cows give birth in June. The annual migration from the forest back north to the Barrenlands is begun by the cows who travel in groups with the yearlings, while the bulls follow after. A significant change can be seen in the pregnancy rates among the cows travelling north to the Barrenlands in the spring:

All the females are supposed to be having a baby but some of them are not like that, they have no babies! They are supposed to have it but it didn't happen. But before those [mines] being established, almost all the females used to have babies to go back to the Barrenlands. So in that case it's a really big change from those times till today.

Joseph Judas, April 2013

The elders emphasize the connection between migration routes, forage areas and caribou health. They reminds us that caribou are not much different than people—we are all impacted by the quality of the food we eat, the air we breathe and the water we drink.



Photo 9: Caribou migrating through a channel of water, Tatsòtì (Grenville Lake) September 14th, 2012.

3.2.3. Impacts from the Resource Extraction Industry: Caribou Migration

The Dechj Laagot'ji have lived in the exact same area, walked the same hills, and paddled the same lakes and rivers for millennia, while studying the exact same phenomenon: the yearly movement of the barren-ground caribou. Since knowledge of the movement is passed between the generations, modern-day Tł̨chq know the exact locations where they most likely will meet the caribou during their fall and spring migrations.

Every year, the Bathurst caribou herd migrates from its calving grounds near Bathurst Inlet, on the Arctic Ocean, south toward the tree line. There are several different routes the caribou choose between when they migrate across this large territory. One of the main migration routes is called Ek'ati *tataa*. Elders explain that this route goes south from Kòk'èeti (Contwoyto Lake), towards Ek'ati and onwards southwest to ʔezq̨ti (Jolly Lake), BeɁaiti and Wekweèti. The caribou do not go in a straight line from Barrenlands to the forest. From August to October, the herds usually go back and forth between Nq̨diikahti (Mackay Lake) and Tatsq̨ti (Grenville Lake), along the northern extent of the tree line. They usually travel back and forth in that area about three to four times before they finally start to descend below the tree line.

Hunters can see the direction of the caribou movement by studying the tracks in the mud on the north side of BeɁaiti (Winter Lake). When the tracks go in a northwest direction, hunters know that the caribou will travel northwest towards ɁetsaàɁj̨ti (Rawalpindi Lake) and the Tatsq̨ti area, but will soon return. When the tracks go in a southeast direction, they know that the herds will travel towards Nq̨diikahti and will be gone for a longer time, as it takes longer to travel in that direction. Then, from October to November, as winter approaches, the herds start to move below the tree line at various locations.

The reason the caribou wait until October to enter the tree line is because of insects—namely, blackflies. The herds wait until it starts to get cold near the end of September, and that's when they slowly start moving among the trees. By October, there are no flies as everything starts to freeze. Then the herds start to move south, deeper into the tree line, at various locations. Elder Joseph Judas used to look for tracks at BeɁaiti every year:

There used to be lots of caribou here, like lots of tracks around BeɁaiti (Winter lake), either going this way or going that way. That's how we know that the caribou are coming back from the north. If it goes this way (northwest), we know that it's going to come back right away because Barrenlands is not that far, but if its goes this way (southwest) the Barrenlands are pretty far that's why it doesn't come back right away. Always the elders was saying that.

That's why if there are caribou going by BeɁaiti that's good, and we are so happy if we see caribou tracks here, like a whole bunch of them. *Etle hagoo to*, means the mud that caribou step their foot inside and make the trail. If there is a whole bunch of them like that on the channel here, between BeɁaiti and the river there.

Since a number of years, maybe five years or maybe more, we have never seen that, it's strange, and then we go on to Winter Lake, we walk the distance of the winter lake. But there are [no caribou], hardly anything, hardly nothing.

Joseph Judas, February 6th, 2013

vegetation smells and tastes different, due to dust and pollution spread by winds over the forage areas. Noise pollution, industrial activity and mine site infrastructure also play a role in caribou avoidance of the area. The elders describe how the large-scale, open-pit mines and their associated infrastructure, including a 30-kilometer all-season road from Ekati to the open pit at Misery, has established a "wall" around the Ek'atì area and, thus blocked the main migration route.

The caribou go around all those mines. They don't go through there by that mine, because if there were no mine that's where it goes through, right there before. Now it's a mine and all the buildings and all the noise and all the explosions happening and also all these [poor quality] food that they eat. The caribou can't use it no more, so they got to move somewhere. They got to move somewhere else.

Joseph Judas, February 6th, 2013

Other hunters use the concept of *eʔe`gehtsj*: a dam, to describe the current situation.

The migration goes far north [of us], to the tree line right now. For me, for the elders who tell the story. Everything [the mines] are blocking, they are making a "dam" so hardly any caribou go across. So that's why they call it *eʔe`gehtsj*. They extended a "dam" so the caribou can't go over it. The caribou don't go come to us.

Just imagine all the mines. If there was no mines you would see a lot of caribou right here by now. There's hardly anything. So if the [caribou] go over here [Wekweèti] and come this way, just quite a few like, five, four, and three [animals].

We talk about protecting our land but our land is suffering around us. We have thirty-nine [square kilometer] of land and there are many mines on it. They are building dams for us, so that no caribou can come to us. It is like we are blocked in. It is very bad.

Joe Dryneck, April 16th, 2013

Describing the current situation of caribou interaction with the land area surrounding Ek'atì (Lac de Gras), the elders use the concept *inò dè ʔògoèhshì*. The Tłı̨chq̓ language has several words and concepts to describe caribou interaction with the land. The Tłı̨chq̓ language is traditionally oral, and new concepts emerge as Tłı̨chq̓ study and understand the changing environmental conditions around them.

inò dè ʔògoèhshì means the caribou have "thrown the land/area away". The caribou choose not to travel to and use that area because the vegetation and their feeding grounds are of poor quality. *inò dè ʔògoèhshì* attempts to explain the caribou's reaction to the changing conditions of their habitat, in this case due to the establishment of large-scale mines. The concept of *inò dè ʔògoèhshì* is related to the concept of *ekwò winì itè zq̓ lanì*: to the wisdom of caribou.

ekwò winì itè zq̓ lanì means that "all caribou have one mind", and refers to the wisdom of caribou. The elders repeatedly emphasize that caribou are smart animals; that they know every detail of their land and their environment. The caribou can predict weather changes and know what will approach them on their migration route. The caribou have good memories of their land and of all their migration routes, and the animals know what happens on their land. Sometimes when a herd of caribou is travelling 50 km in front of another herd, the herd in the back will know when the first herd has changed direction to their migration route, although the herds are 50 km apart. The concept also refers to the sensory capacity of

caribou. The animals know how the weather will be and when the weather will change. The caribou know when the weather will become colder and warmer, and based on this knowledge they plan to travel south into the forest or stay on the Barrenlands.

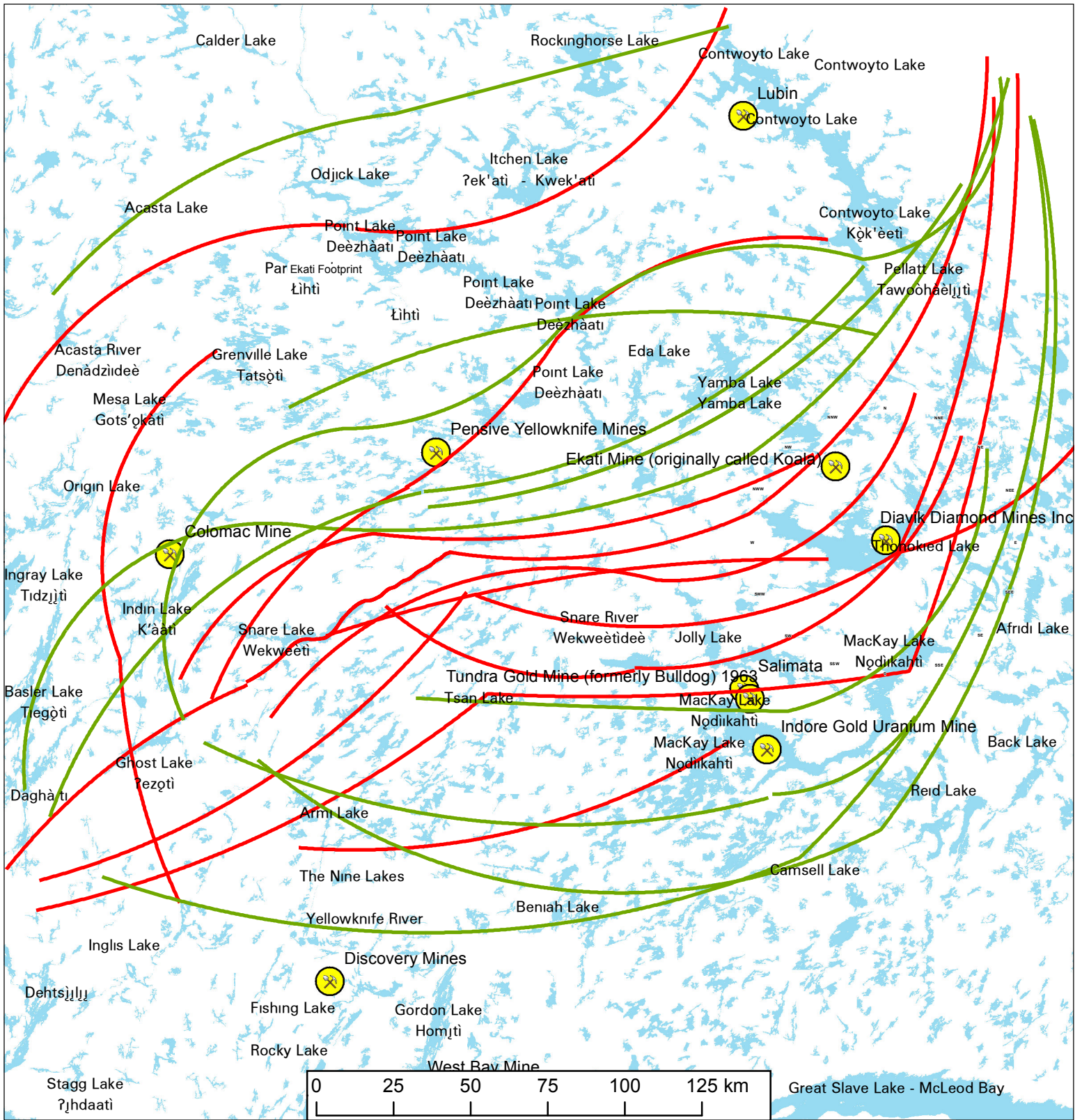


Photo 10: *Tataa* between Ek'atì (Lac de Gras) and Łiwets'aᓃᓄats'ahtì (Lac de Sauvage). Notice the numerous caribou trails bottom right corner, and the Ekati mine site—Misery Pit on upper left side.

The elders explain how the caribou has a different way of knowing, and that all caribou have “one mind.” As explained above, the caribou have a good memory of their land and of their migration routes. The herds know which *tataa* they must travel on to reach certain locations. *Tataa* are important corridors for them to follow on their way to better feeding grounds. Thus, the herds know the conditions on their migration routes and on their feeding grounds. Consequently, this means they also know that they have to change their migration patterns to avoid the centres of mining activities. The “wall” created by the mines has been recorded in the memory of the caribou. So the herds chose to move away from these areas.




The long term consequence of *inò dè ᓃᓄgoèhshì* is that the Bathurst caribou migration routes have divided. During the fall migration, the herds travel from their calving grounds to the area around Kᓄketì, and from there they choose to either travel west towards Deèzàati (Point Lake) and Tatsᓄtì, and at times all the way to Itseetì (Hottah Lake). Or, they choose to travel in a southeast direction towards ʔedaàtsotì (Artillery Lake) area. Thus, the migration route has become divided at Ek'atì. Subsequently caribou herds have decreased their use of Ek'atì *tataa*, which normally leads the herds towards Beᓃaitì and Wekweèti.

During the workshops for this study, it quickly became clear that one of the major issues that people in Wekweèti wanted to discuss was the significant change of current caribou migration routes compared to before the establishment of large-scale mines. Therefore, the research team decided to try to map out these changes in migration routes. During individual interviews, each hunter and elder drew the migration routes of the herds in recent years and compared them to the routes used before the establishment of the large-scale mines. Once we compiled the maps, it became apparent that a significant change was happening to the migration of the herds. Figure 5: demonstrates the changes in migration before construction of the mines, compared to the effects of operating large-scale mining activity on their habitat. The lines indicated the general direction of the migration routes.



Bathurst Caribou Migration Trails

Tłıchq Traditional Knowledge

-  After the mines
-  Prior to the mines
-  Mine Sites



The change in migration routes has directly impacted the Tłı̨chǫ ability to successfully track and hunt Bathurst caribou at their usual hunting locations. Consequently, it has hindered the ability of hunters to bring meat home to their families and communities.

3.2.4 Abandoned Exploration Camps

Caribou are sensitive to irregularities in their environment. In addition to large-scale mining activity, there is a lot of refuse left over from old exploration camps and mining activities in their habitat. The Tłı̨chǫ have found leftover debris, tents, cabins and numerous old oil drums left to decay in the elements. The owners of various abandoned exploration camps finished the exploration activities and left their possessions without removing them or cleaning up. No one knows how many abandoned exploration camps exist on the summer and winter ranges of the Bathurst caribou—Tłı̨chǫ hunters often find abandoned camps of all sizes on their travels through the land. At some sites, bears have ravaged the structures and rolled oil barrels into the water where the contents spill into the water streams.

There is one here and in it is an abandoned camp with the tent frames and all. They just threw everything away. Because it was an exploration camp they didn't care and they just left the frames behind and left. They were just left lying there and nobody does anything to clean it up.

From Winter Lake there used to be muddy trails going north and again going south. That was how it was for us but since then that doesn't happen anymore. Since then mines have been developed and conditions that were not there then, are now here: abandoned camps, empty barrels, tents and everything else that have been left behind. And if there is something white like tents in view, the caribou will not go near it but may go somewhere else, past that area.

Joseph Judas, February 12th, 2015

Consequently, the visual noise also scares the caribou away from their normal migration routes. The Tłı̨chǫ have long pointed out the leftover debris, tents, cabins and numerous old oil barrels left to decay in the elements need to be mapped out and cleaned up.

Where there are abandoned mines where things are scattered around, they should go in an eighty or a hundred kilometer wide area around the abandoned mines and just clean up all the mess they made. That is how they should be cleaning up after themselves. So, maybe that is why the caribou have gone somewhere else because of the messy conditions. The caribou don't want to go through the mess. I told them to haul away all those things or put them in storage close to one of the mines.

Harry Apples and I have seen that debris. There are almost a thousand oil barrels there and big camp tents [on the southwest shore of Ek'atı]. Many of them were still set up like people were going to live there, but there is no one there, just debris scattered all over. They were not removed. I told them to take the stuff out of those abandoned camps. It is terrible. "Why is it like that along the caribou trail? You are the ones who built mines in this area, you have made a big mess along the caribou trail. No one likes to walk among debris, it is the same with the caribou so they may have migrated somewhere else.

Joseph Judas, February 12th 2015

A large abandoned exploration camp is located on southwest shore of Ek'atì (see Photo 11). Joseph used to hunt and trap in the area during winter months, and his forefathers have hunted caribou through the area for generations. During a trip there in the summer of 2013, Joseph observed no fresh tracks indicating that caribou had not been on the old caribou migration route for several years; they would not pass the abandoned exploration camp. The numerous abandoned camps have scared the caribou and consequently the herds avoid the area.



Photo 11: Abandoned exploration camp on a *tataa*, southwest shore of Ek'atì (Lac de Gras).

3.2.5 Outfitter Hunting

The ability to rest and eat during the fall is important for caribou. The time period prior to winter is important for proper feeding to build up fat reserves for the winter months. During August and September, the herds need to properly feed before the winter approaches and need time to rest from the long travels from their calving grounds. Before the Minister of Environment instituted the 2010 ban on hunting for resident hunters and outfitters, there were numerous outfitter camps on the Barrenlands. The camps brought in tourists from around the world, and gave them the opportunity to shoot big game animals on the Barrenlands. Accompanied by a guide—often a local Tłıchǫ person, the tourist would track and shoot a caribou, most often a bull with large antlers. The tourist industry was a thriving business, which provided employment for local Tłıchǫ people in the communities, until the 2010 hunting ban came into effect.

The elders in Wekweètì noticed the effects from the outfitting industry on the Bathurst caribou. The many camps were located on migration routes for the caribou. Traveling from the calving grounds north on the Barrenlands, the herds would pass outfitting camps on the way to their wintering range in the boreal forest. As soon as the herds approached the outfitting camps, the hunters started to track and shoot the animals. The hunting caused a stress effect on the herds—the tourist hunters prohibited the caribou from settling in an area for several days, or up to a week, to feed and rest, before they started moving again. The elder Joseph Judas explained the effects from outfitting camps on the caribou.

Outfitters are the same thing as a mine, because before the outfitters, the animals loved to use that area, and that country. But since the outfitters have been established,

the camps, on all the migration routes area, the caribou start to know that. So they don't go near there or close to it. They go close to it sometime but the outfitters start attacking the caribou, so they are chasing the caribou, and it goes away from there.

Because of all these outfitter camps right in front of the caribou, they don't settle down and don't move for a while. But before it wasn't like that. There were no camps, so whatever spot that is good for food they stop and then eat and hang around for a while. Not for a day, but for a week or maybe half a week and then they start moving to next spot. It goes like that.

But the [outfitter] camps are there so the caribou can't stop, they have to keep on going going going, until there is an area that's hardly anything happening, no noise no nothing. They stop and hang around a little bit and then start moving again.

Joseph Judas, February 6th, 2013

The outfitting camps created a stress effect: caribou were being constantly hunted, and so were unable to settle down to properly rest for several days. The elders can tell the difference in caribou health based on the stress. They say that constantly being hunted and not being able to rest and feed changes the texture and consistency of caribou meat and bone marrow.

In those times when we were here (at Beṛaiti), then the bone marrow was good to eat with the dry meat. The bone marrow at times were ever big, huge inside and kind of greasy. Because the [caribou] were on their own and they can travel wherever they want and stop to eat, they are not worried about anything.

But today the bone marrow is different, because everything is there and they always rush around, always walk all the time. The bone marrow is not the way it tasted. It's kind of not greasy. It's kind of red. Because of the running and walking all the time. By chasing them all the time.

Joseph Judas, February 6th, 2013

The outfitting camps are reported as a stressor for the caribou, during the time period when the animals need to build their fat reserves. The outfitters consequently restricted the herds from settling in a particular area to feed. Hunters have observed many caribou who are skinny in winter, or who do not have proper fat reserves on their backs. Elders have observed changes to the bone marrow and meat, when the animals have not been able to rest and feed properly, and instead are forced to move.

3.2.6 Disrespectful Harvesting

The Tł̨chq̨ interact with caribou as social beings. Engagement between Tł̨chq̨ hunters and caribou herds should be interpreted similarly to a person-to-person social interaction. Caribou are very smart animals, and acting with respect is essential to maintain the balance within the relationship. The elders often talk about this respectful attitude towards caribou. The various body parts have their own special protocols for how they are treated or processed, and the animal must be hunted in a respectful way—not hit or chased, for example. A Tł̨chq̨ elder explained this historical attitude as follows:

So the history story, if you point or hit with the paddle on a caribou, the caribou is not going to be back until at least seven years. If you hit the caribou with a stick, then probably maximum seven years the caribou is not going to go back to that area. That's what the history story says.

Joseph Judas, February 6th, 2013

Some hunters and elders refer to recent disrespectful treatment of caribou as an explanation for why caribou have altered their migration routes and do not travel towards the people living in Wekweètì. Elder Joseph Judas emphasized the necessity for younger hunters to follow the traditional rules surrounding hunting and dealing with caribou:

So me, I have been a hunter, I know what I am doing with the animals. I watch and I know what my history stories are. I have been watching all those things. But now younger people they don't know anything. They are all going back and forth, I don't know what they doing, maybe they shoot caribou, on the lake maybe and then tried to pull it to the shore, and they probably point at it with the paddle, who knows. They didn't hit it, but probably touched it with the paddle maybe.

Joseph Judas, February 6th, 2013

Respectful harvesting includes caring for the bones and remains of the caribou during the processing of the meat and after it is consumed. The remains should be discarded in a respectful manner at special locations on the land. Appropriate harvesting is essential in order to maintain the spiritual connection that upholds the balance of the relationship between the Tł̨chq̨ and the caribou. The elder Robert Mackenzie shared the necessary procedures for maintaining this special relationship:

Our people, like my father, lived a good life. When they go hunting they are very lucky. Like my uncle Madzi, they were all like that in trapping furs and hunting caribou and even in bad times they lived well. When we went out for caribou we stayed out there all winter. When they chopped the bones to feed the dogs meat, they would collect all the bones after the dogs had eaten. The women would pound the bones and gather up the bits of fur from the leg bones. They would make a rack in the bush and put all the bones on the rack. They don't throw bones just anywhere on the land. They were careful with the bones.

Robert Mackenzie, February 5th, 2013

If you throw the bones away, a caribou talks about how they treated his remains. When the world was new it was believed that all the animals had supernatural spirits. That is why it is said that the caribou said, "Those people do not take good care of our bones. They just walk all over our bones." That is what they communicate to their spirits. The animals said, "If [people] don't take care of your bones, don't go to them." That is what the animals say to each other, they say. That is why they would not throw away caribou bones just anywhere. They would take good care of the remains. It is true that they have to be discarded but still they would make a rack for it. Even the hairs on the hide are collected and discarded together. In the past the old people do not want their campsite left littered with scraps of caribou.

Robert Mackenzie, February 5th, 2013

Another elder, Johnny Smallgeese, continued to explain proper harvesting behaviour in the socio-natural relationship:

You always respect the animal, bones and stuff like that. Even a young girl there... even the blood, you can't walk over it. Those kind of stuff...now today people not respectful, even drop blood on the floor stuff like that, people walk over it. That kind of stuff you had to watch. Long time ago, people really, really, watched that stuff.

Us we respect the animal, even the bones and stuff like that we watch. I grew up like that and it makes me have more respect for the animal like the skull and all that. I used to bring all the bones in the bush. Even moose, caribou, whatever. I take it in the bush, respect it, put it away, put it out in the bush where nobody goes. Even the moose skull, woodland caribou skull, hang it up on the tree on a branch, hang it up. Today nobody does that. Go out in the dump there's whole bunch of animal wastes.

Johnny Smallgeese, Wekweèti, February 6th, 2013

Behaving in accordance with cultural practices is important to uphold the respectful relationship between Tłı̄ch̄q and the land; a tradition which has been sustaining its hunting economy since time immemorial. Behaving respectfully also includes having the right knowledge regarding the caribou. Disrespectful treatment of the animals is seen as an underlying reason for changes in caribou behaviour. Teaching the younger generations of hunters the correct respectful behaviour towards caribou and land is essential to restore the balance and the relationship between the people and caribou, and in order for the caribou to continue to migrate towards the people.

3.3. Caribou Hunting and Changing Migration Routes

A part of successfully maintaining a harvesting economy in the sub-Arctic environment requires accurate knowledge of the animals' activities in minute detail, their habitat and feeding preferences. An economy based on hunting requires intimate knowledge of the changes in the animals' seasonal movement, their appearance, breeding cycles and especially their sensory capacity for human approach. Such knowledge is based on an intimate relationship between the hunter and the animals. The caribou is of central importance to the Tłı̄ch̄q economy and knowledge of the seasonal movement and habitat preference for caribou is vital for successfully securing meat.

The movement of the herds is never completely predictable. Nonetheless, the elders have a sense of where and when they can encounter the herds based on their traditional knowledge passed on from their ancestors who have hunted in the exact same locations every year. Studying the weather patterns and movements of other animals on the Barrenlands, such as wolves, ravens and ptarmigans, gives indications of the herds' movements. The hunters must cultivate a detailed knowledge of the animals' activities during the day, their preference for habitat and elevation, and their movement on the land in relation to each season and weather patterns. The hunters must also know their preference for use of elevation. The best time for hunting in the low-lying areas and valleys is in the morning and evening when the animals are resting. When hunting during mid-day or on warm days, the best location to look for animals is at higher elevations, where caribou go to get away from flies and the heat. If it is colder and there are not too many flies, the hunters will look for caribou in low-lying areas and valleys. At lower elevations, the caribou prefer to walk through valleys and lie down to rest and forage in the muskeg at the valley bottom.

The best way to find low-lying caribou is to travel the higher areas around the valleys, where it's possible to look down on the animals. From this location one can securely shoot the caribou in the muskeg.

The movement patterns of the caribou herds directly impact the Tłı̄chq's access to caribou. The movements of all caribou herds have become increasingly hard to understand in recent years, and currently the Tłı̄chq most often rely on the information from collars on caribou cows, collected by the GNWT Environment and Natural Resource Department (ENR). The changes in migration routes are primarily a response to anthropogenic industrial activities on the caribou habitat, rather than a response to the other components of nature, such as seasonal or weather patterns. These changes are not reactions in flux with natural rhythms, like the rest of the natural environment. Hunters from Wekweètì would normally travel to Beçaitì at the end of August and September to meet the caribou herds. That has not occurred during the last five to ten years. Instead Wekweètì hunters have had to fly to other northern locations, such as in 2012 when hunters flew northwest of Wekweètì to çetsaàçłtì (Rawalpindi Lake) and harvested the Bluenose East herd. This decreased ability to hunt close to their own community directly impacts the practice of the hunting culture and the ability for hunters to bring caribou meat back home to their families and communities.

It's not like before when we traveled over here, it's not the same. Before caribou had their way of travel but when the mines were built they went a different way. It's not like they go straight through but now they go around [the mines]. Before when we travel for the caribou hunting season we usually go to a certain place, now we go to a different place cause of the mines. From çek'atì to Wekweètì the caribou migrates, but now we don't see any caribou in Wekweètì.

Now when we go hunting we have to go to a different place because the mine is built. If they keep building mines on the caribou trail we won't be able to know where the caribou migrate. Because of the white people building mines, the caribou migrate to a different location. Because they built mines on the caribou trail, caribou migrate to different locations. When they open the mines, it might last for fifty years. It's going to be hard for us to go hunting because now the caribou migrates differently.

Joseph Judas, November 8th, 2012

Because of a continual decline of the Bathurst caribou population, the GNWT imposed a hunting ban for resident and outfitter hunters in 2010. The people of Wekweètì were still allowed to hunt a total of 150 animals, until the winter of 2015 when GNWT imposed a total hunting ban for all hunters. As the population continued to decline, the Tłı̄chq Government responded by introducing its own ban on hunting the Bathurst herd in October 2015. Caribou hunting is an important channel for the practice of Tłı̄chq culture and way of life on the land. The ban on hunting has created much hardship for families who usually rely on caribou as the main food source. Now they need to rely on the monetary system and financial support to buy store bought food.

4. A Balanced Relationship: Caribou and People

4.1. *Ndè* as a Socio-Natural Landscape

Hunting as an economy and culture, is based on a balanced relationship between the *ndè* and the people. The land and all beings within it are part of a social landscape. In Tłı̨ch̨ culture, inanimate beings, such as the wind or lakes, are sentient beings with the ability to act and choose based on personal agency. Similarly, all animate beings, such as caribou, birds and fish, are also intelligent individuals with the ability to make conscious choices based on personal agency. The land is a social network with whom one can communicate and develop long-lasting social relationships. Animals are beings with personality and knowledge; they are not solely biological objects acting on instinct. This understanding makes the land more inclusive because all beings act socially towards each other, and to humans, in similar ways as humans relate to other humans. The concept of nature, then becomes a socio-natural landscape.

The Tłı̨ch̨ harvesters live in active relationships with the land, and thus act towards the land and animals in similar ways as one would towards another human. The key ways Tłı̨ch̨ acquire knowledge about the land is to be actively involved in intimate relationships with animals and the land itself, and to spend time with the animals on the land to observe and learn from them. Spirituality is also a source of knowledge, but rather than existing as a complex hierarchical religion, spirituality is simply a way of behaving. A way of communicating with the surrounding world in the same way one does to other humans in one's society. When actively living in the natural environment, one simply behaves towards the water or animals in same way one would behave towards another human being. Spiritual communication then becomes simple acts towards other social beings to maintain balanced relationships. For example, paying the water at every new water body one approaches on a canoe trip is a way of spirituality communicating to ones surroundings—the *ndè*. It is a simple act that maintains the balance in the relationship between humans and the beings we interact with; a balance maintained by following the cultural rules, set forth by the ancient Dene lawmaker Yamozha and maintained through the elders' teachings.

The numerous Tłı̨ch̨ social rules surrounding hunting, fishing and harvesting exist to ensure renewal. Upholding the social rules surrounding caribou helps maintain the balance in the relationship between people and the caribou. Some of these rules include: have right knowledge of the animals; discard bones and other remains in their proper manner; and care properly for the meat and blood. Numerous other rules and rituals exist, and it is not within the scope of this report to outline them all. However, the common principle of these rules and rituals points back to the 'understanding' that developed between animals and people when the two were the same. The acts of Yamozha set examples for how humans and animals should live together. Upholding these and many other cultural rules is a gesture of respect towards the caribou and animals, and maintains renewal sustainability in the relationship, ensuring that caribou continue to migrate to the people.

The caribou act in the same manner every year. Year after year, the herds usually walk directly to the area where they know the people will be waiting for them. The leader of the herds know the routes and consequently, they know that every year, some of them will be hunted by the people. Nevertheless, the herds walk to the people, because "by giving themselves to the Tłı̨ch̨ the *ekwo* (caribou) spirit will be reborn and the *ekwo* population will remain strong" (West Kitikmeot Slave Study Society 2001: 19). Some animals are hunted by the people, and by upholding the cultural rules, there is balance and renewal in the relationship between the people and the caribou. The TK study, "Caribou Migration and the State of their Habitat" (West Kitikmeot Slave Study Society 2001) echoes the same findings that interaction between

humans and caribou are based on a social relationship and that the caribou come to people who behave respectfully towards the land and animals.

On the contrary when social rules are not upheld and either an individual animal or a herd is treated with disrespect, caribou behaviour and migration will alter. If a hunter disrespects the rule that caribou should never be abused, for example, and hits an animal with a stick, the caribou will avoid all humans in that area for a number of years. The West Kitikmeot Slave Study Society (2001) describes one such incident in Whatì as explained by the elder Johnny Eyakfwo:

When I was a young man I lived in Whatì, there used to be *ekwo* around there at that time. But someone had hit the *ekwo* with the stick, and the elders said "if you guys [the older elders] are right, next year there will be lots and lots of *ekwo*" sure enough that next year there was ever lots of *ekwo*. But that next year after that, there was no more *ekwo*. Because the *ekwo* was hit, that why. Now I'm over seventy years old...From then on [and] for the next 30-40 years thereabouts, only then will the animals return they say.

Johnny Eyakfwo, April 17th, 1997 (West Kitikmeot Slave Study Society 2001: 27)

The elder explains the social consequences when a person mistreats an animal and upsets the relationship between humans and caribou. In reaction, caribou chooses to avoid the area around Whatì for numerous years. Numerous other cultural rules exist that need to be followed to maintain the relationship. Proper handling of body parts, such as meat, blood and bones, is extremely important in order to have "good luck" with caribou.

There are many ways misfortune can be caused when handling caribou: perhaps a person has his tent set up while the men are bringing in the meat. If there happens to be a young woman in the tent, the men will not bring the meat into the entrance of the tent. They will go to the back of the tent called *kwèelq* (the head end) and will lift up the bottom of the tent and bring in the meat that way. Those kinds of details we teach each other, how to be careful when handling the caribou. That was the way our elders used to handle caribou meat. If we don't teach each other those stories we will not know about them. Teaching each other how to respect the caribou to have good luck regarding the caribou. Today they handled the caribou in all the ways that causes trouble. They must take care of the caribou and its bones and they must be careful as to how the caribou are handled.

Joseph Judas, February 12th, 2015

The key message within traditional knowledge is the details of the social nature of caribou. Joseph Judas explained caribou have a different "vision of knowledge," a different way of knowing (personal communication, February 10th, 2015). This correlates to the concept of *ekwò winì itè zq lanì*, that all caribou have one collective mind. The animals can see and experience the conditions that affect them and thus make conscious choices of how to react.

It is said that animals can see themselves. Many elders have talked about that. If people don't take proper care of the animals' bones the animals think that they shouldn't go there [to the people]. The caribou say that between themselves. When

they tell that to their leader then they don't go there that year, they go to some other place. They say that is what the caribou say among themselves.

Jimmy Kodzin, May 6th, 2015

Caribou obviously react to how people treat their habitat and their remains. Elder Noella Kodzin adds to her husband Jimmy's words, explaining how people should behave respectfully and follow the cultural rules shared by the elders.

Animals are like people. They know how people treat them. They migrate back among us from far, so to do the right thing, we should take care of their bones properly after we kill them. But some people do not do that.

Even the blood should be handled the right way. We put the blood in a pail and pour it out somewhere on the land. But toilet wastes and waste water all get mixed together, so I told my family not to pour blood down the sewer. Sometimes even when they used paper towels to wipe their hands I make them discard them separately from the other wastes.

Noella Kodzin, May 6th, 2015

These rules of behaviour have existed for centuries and are central in maintaining a balanced relationship between people and caribou. As human activities are the most active factor on the *ndè*, it is clear that caribou pays utmost attention to our behaviour. The West Kitikmeot Slave Study Society's study on caribou migration states that "it is human behaviour on the *ekwo dè* (caribou habitat) that is the most important factor affecting *ekwo* migration patterns (2001:29).

4.2. *Inò dè ʔògoèhshì* - or - Zone of Influence

Having the right knowledge and displaying correct behaviour also includes the activities of mining operations, outfitting hunters and the conduct of biologists, as they become a part of the *ndè* when they venture out on the caribou habitat. The elders emphasize an understanding of the ecosystem as a whole and it is thus clear that "the mines are the product of human behaviour and humans are an aspect of *ekwo dè*" (West Kitikmeot Slave Study Society 2001:29). The mining activity affects the state of the caribou habitat, both by construction of infrastructure and by creating dust and noise pollution. This negatively affects the state of their food and their habitat. This type of activity is seen as disrespectful towards the caribou and contributes to caribou avoidance of areas of mining.

Caribou avoidance of mining activities is documented in scientific sources. Scientific studies conducted using aerial surveys have estimated a zone of influence around Ekati and Diavik mines sites at 14 kilometres (Boulanger *et al.* 2012). Another study using information from collared caribou estimate a zone of influence up to 30 kilometers (Johnson *et al.* 2014). Additionally, a zone of influence surrounds the numerous haul roads between the open pit and the mines. The caribou avoidance zone from these roads is estimated to be between four and six kilometres (Wolfe *et al.* 2000).

The concepts *inò dè ʔògoèhshì* (the caribou have thrown that land away) is translatable to the zone of influence. The forage conditions surrounding the mines are of poor quality and caribou chose to avoid the area and instead walk in a different direction, towards areas with no noise and better feeding grounds. The TK study for the Diavik Lichen and Soil Sampling Program (TRTI 2013) concluded that the lichen and vegetation, thus forage areas, were of poor quality for a radius of up to 15 kilometres around the mine

site of Diavik. Extending from 15 to 30 kilometres, the quality of forage improved, but some locations were still impacted by mining activities. The amount of caribou activity, such as walking and feeding, increased with further distance away from the mine site. The increase in caribou activity correlates with improved caribou forage further away from the mine.

The long-term implications of the zone of influence and *inò dè ɔ̀goèhshì* is a change of migration routes. The elders emphasize the caribou's vision of knowledge. When, for example, the caribou know something has interrupted their trail, or that something simply is not right on the trail, they will act cautiously and chose a different trail. That is the reason caribou avoid the Ek'atì area, and have discontinued their use of Ek'atì *tataa*. According to Jacobsen (2011), an elder from Whatì explained caribou behaviour and obstructions on their trail:

Ever since the mine was built, seems like they are forced and chased away. And the places where they lived are different, it changes with them. They don't seem to stay longer or something seems to chase them away. When your trail is not healthy and you don't feel comfortable with it then you don't stay in one place, but right away you keep moving on, that's how its seem to be with the caribou. Because their traditional path is not good, it's blocked up so the caribou don't stay that long. Because of the mining. When you travel somewhere and your ski-doo trail is nice and clear, but as soon as you know that something is bothering you on your trail, like mining, you don't feel comfortable with it and you turn away.

Francis Simpson, February 2010 (Jacobsen 2011:88)

As the caribou leader chooses to avoid poor feeding areas around the mine, and instead travels on a different migration route, the following herds also take the same route. The TK study for the Diavik Lichen and Soil Sampling Program (TRTI 2013) demonstrated that use of forage areas on the south side of Ek'atì was discontinued as the caribou herds were diverted away from the north side of Ek'atì. The study states that the areas "30-40 kilometres away from the mine, contains intact vegetation and are preferred forage areas. But the use of the locations southeast, south and southwest of Ek'atì is dependent on the use of the areas around Ek'adiì" [island on ek'atì, location of Diavik] (TRTI 2013: 40). Consequently, the avoidance of the Ek'atì area affects migration to areas further away, such as towards Beɔaitì.

4.3. *Whék'òò wekw'qò wheɔq. Freezer is Empty*

When we think seriously about it and when we see this land with the animals on it, we realize that, even if we should have no money, [the land] is like having meat in our storage freezer. When we shoot an animal we put the meat in our freezer and we keep it for our own use. So the land itself is like having a freezer. Even if we have no money, the land and animals are a precious resource.

Jimmy Kodzin, February 12th, 2015

Elder Jimmy Kodzin refers to the economy of hunting. There are not many available wage-paying jobs in the small community of Wekweèti. But even though people do not have money, they have the land. The land and animals are right outside their doorstep. With the right knowledge of the animals and geography, skills and equipment, they can travel on their land, acquiring meat for sustenance, fur that can be traded and resources that can be fashioned into tools, clothing and shelter. With the right knowledge, the land is an open store and a freezer that provides comfortable living conditions in the northern environment.

Seeing the land as a freezer means that animals are readily available to harvest. But, as the people have explained, the availability of animals has decreased. Thus, people use the concept *Whek'òo wekw'qò wheᓃq* to refer to the current state of the Tłı̨chq relationship to animals and the animals' availability to a hunter. The term literally means "the freezer is empty." The concept refers to the availability of animals, particularly caribou, for the people. A healthy environment is comparable to having a freezer full of meat. When the freezer is empty it means that the environment on the Barrenlands is deteriorating, and that caribou are not as healthy and available to the Tłı̨chq hunters as they used to be.

Referring to the land as a freezer full of meat implies that the people live in a dynamic relationship with the land and animals. It is a relationship in which they are inherently a function within the ecosystem. As any part of the ecosystem, they are dependent on a healthy habitat, for caribou and other animals to stay healthy and migrate to the people. The concepts *inò dè ᓃqòèhshì* and *whek'òo wekw'qò wheᓃq* imply changing conditions to caribou habitat and the caribou's reactions to such changing conditions. When the freezer is empty, the land is not healthy and country food is not as accessible as it once was.

Before all these [mining and outfitting activities] happening, there used to be, over there used to be lots. With Chief Jimmy Bruneau, when I was boy seven or ten years old, at Beᓃaitì, where we camp, somewhere around September that's when we got there, then October, November and all to December. That's the time when the big herd came through by there. Ever lots of caribou. So everybody start to go hunting and bring lots of meat to survive for the whole year, make a lot of dry meat.

That was really tasty meat and really fine meat that people eat, even the small animals or the big bulls, because it's the fall time so the big bulls are all fat. That's what they have been using all these big bulls they got fat about this big sometimes, maybe bigger than that sometimes, all the way from the back, on the backstrap. There was a whole bunch like that and the caribou was really healthy, and it was fine meat too. It wasn't no scars, nothing like that inside the lungs or inside their stomachs. But we don't hardly see things like that before.

But since after all these [developments] happening, people start to see things like that, plus all the meat and less fat. All the females are supposed to be having a baby but some of them are not like that, they have no babies. They are supposed to have it but it didn't happen. But before those [mines] being established, almost all the females used to have babies to go back to the Barrenlands. So in that case it's a really big change from those times till today.

Joseph Judas, February 6th, 2013

The new type of human activity on caribou habitat has altered the relationship between caribou and humans. The animals have chosen to throw the land away, and no longer use it. Animals are thus less available to Tłı̨chq hunters and families who rely on their resource. Their freezer has become empty. Elders emphasize the importance of a balanced relationship and of teaching newcomers to their lands that human behaviour and activities are intrinsically part of the socio-natural landscape that surrounds us. Although many newcomers to the land might refuse such knowledge of the caribou-human relationship as outdated and superstitious, it is the way of the land, and the way animals interact with each other and to humans. Newcomers to Denendeh—the land of the people—either choose to believe it or they don't. The inclusion of Tłı̨chq cosmology, as laid down by the lawmaker Yamozha, in studies and management of caribou, can enhance ones understanding of the issues surrounding caribou.

5. Conclusion and Next Steps

This report has identified numerous physiological abnormalities and health issues that have recently presented in caribou. Tłıchq hunters and harvesters have noticed tainted meat, bone marrow and liver, as well as skinny animals, diseased and deceased animals and changes to caribou population dynamics. Tłıchq harvesters have outlined several underlying factors behind these health issues. Cumulatively, they are (1) the resource extraction industry, (2) the commercial outfitting and hunting camps, and (3) disrespectful behaviour towards individual caribou and the animal as a species. The report also outlines a few facets of the caribou-human relationship—an evolving relationship, which incorporates new activities, of industrial development, outfitter hunting and disrespectful harvesting, as it has become part of the *ndè*—the caribou habitat.

Relying on Tłıchq concepts of the human-caribou relationship, the study has showed how human activities on caribou habitat have negatively affected the herds. In response, caribou have chosen to avoid centers of mining activities, due to poor quality forage and noise and dust pollution. The activities of the resource extraction industry around Ek'atì (Lac de Gras) area, have established a "wall" along the main caribou migration route, the Ek'atì *tataa*. Since there are now obstructions on their trail, the caribou have chosen to migrate to other areas, thus the migration routes have divided at Ek'atì. The elders name this avoidance as *inò dè ɔ̀goèhshì* which correlates to the 14 kilometers zone of influence, as documented in scientific studies (Boulanger *et al.* 2012).

Due to *inò dè ɔ̀goèhshì*, caribou have become less available to Tłıchq hunters. Since the migration route now avoids Ek'atì *tataa*, fewer animals approach Beɔaitì and Wekweètì, as was common in the years prior to establishment of large-scale mining activities around Ek'atì. The caribou are smart animals. The leaders know where to go for good forage and to avoid noise, dust and human activities from the mining activities. Tłıchq elders thus say *whék'òo wekw'òò wheɔo*—"the freezer is now empty"—because the caribou forage is poor, their habitat is deteriorating and caribou migration is changing. Hunters have not seen caribou tracks at the northeast side of Beɔaitì for years. The elders know that caribou first come through that area, and by studying the direction of the tracks the elders know where and when to find caribou. But this has not taken place in recent years.

As the population of caribou has continued to decline, hunting is now banned for Tłıchq hunters. This means people's economy—which was built around hunting the Bathurst caribou population in spring and fall—has entered a full recession. Whereas before, Tłıchq freezers were full of caribou meat, and most community members were occupied with the many activities necessary to secure a living from hunting, the freezers are now empty, and people are increasingly dependent on the monetary system to buy groceries at the local store or in Yellowknife.

Contributors to the report unanimously identify the establishment of large-scale mines and associated industrial activities on the Bathurst caribou migration route and feeding grounds as the main factor behind caribou health defects and changes to their behaviour and migration. The study correlates mining activities to health issues, however it cannot include a biochemical investigation to link the abnormal health issues and pollution from mines. The hunters emphasize they are not veterinarians, doctors or biologists, and they cannot pinpoint the chemical links between pollutants, forage and disease. Also, the study does not demonstrate that the impacts of mining activities relate directly to population decline.

However, the descriptions of physiological abnormalities revealed in the report are certainly detrimental to a community whose livelihood relies on caribou. The next step in research on this subject is to identify the biochemical pathways between pollutants from mines on caribou forage with caribou health and behaviour. Specific studies are need to determine:

- the direct effects from dust and pollutants on lichen and caribou forage;
- the biodegradation and/or bioaccumulation of dust and pollutants in vegetation,
- bio-magnification as pollutants passes through the food chain,
- Direct effects of digested pollutant on health and physiology of caribou,
- Indirect effects of noise, air traffic, winter roads, and other industrial activities on caribou.

This TK study has documented the anecdotal information on recent changes to caribou physiology, behaviour and migration. The next step is to combine the strengths of TK and science, where TK can provide the current conditions of caribou and habitat, and science can establish the biochemical pathways that connect the demonstrated physiological abnormalities to their source; thus, link biology and testimony to the main factors of disturbance.

Meanwhile, caribou still remain of central importance to the Tłı̨chǫ. The elders still need to teach the younger generations how to live in a respectful relationship with the caribou. Traditional knowledge, language, stories and the hunting culture still need to be transmitted between generations for the Tłı̨chǫ culture to thrive. During a workshop in Wekweètì, elder Joseph Judas ended by stating the importance of sharing this culture:

Those of us living here [in Wekweètì] are thought of as the people living among the caribou. But not everyone who lives here in town has that experience, so we must teach each other by the stories. We collect and use them as a guide to teach each other how the caribou should be handled.

For our people in the future, even though the coming children are not yet with us they will use our knowledge in the future. We are teaching it to each other. If we don't teach it to ourselves, it will one day be hard to understand it completely.

Joseph Judas, February 12th, 2015

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