OVERVIEW - Boreal caribou habitat and habitat use in Wek'èezhìi

Introduction

A parallel process used and advocated by the Wek'eezhii Renewable Resources Board was followed in this project. This process allows both science and traditional knowledge research to use the most appropriate method for their disciplines therefore maximizing the amount of information gathered and used for decision making. The report has three sections: 1) an Overview and Recommendations, 2) the traditional knowledge report, and 3) the scientific report.

Tłı̨chǫ Knowledge Summary

Tłı̨chǫ knowledge of tǫdzı shows the interaction and vulnerability the boreal caribou have to their surrounding habitat. Tłı̨chǫ knowledge also shows the importance of understanding the character of boreal caribou when thinking about habitat requirements within a region. Boreal caribou camouflage themselves within thick bush, cover themselves with mud to protect themselves from insects, travel in circles, have the ability to run quickly if the terrain is hard, and use both high plateaus (uplands) and islands, depending on the season; their movements and terrain use protects both adults and calves from predators such as wolves, lynx, and bears.

Their diet varies with the season, grazing on various types of lichen in the fall and winter, and foraging on various plants such as sedges, grasses, leaves, berries, and mushrooms in the spring and summer. Within Wek'èezhìı the main threat to caribou is the loss of prime habitat through forest fires.

Tłı̨chǫ have always depended on boreal caribou, and want to continue to harvest this resource. Boreal caribou are particularly important to the Tłı̨chǫ when barren ground caribou are unavailable, which is currently the case. They continue to use the hides and meat, and the bones and antlers for tools. Boreal caribou are part of the Tłı̨chǫ oral narrative, the language and culture; and help maintain their relationship with the land and the place of their ancestors.

Tłı̨chǫ elders highlight the diverse behaviour of boreal caribou and the complexities of knowing this animal. Additional traditional knowledge research and monitoring is needed to fill in the gaps. Such as when do boreal caribou move back into a burn area: when they can forage or when the bush is thick enough for them to be camouflaged? What are the potential cumulative impacts from the threat of increased forest fires due to climate change, and other habitat stress such as increased mineral exploration and development? What factors may affect hunting practices – now and in the future? Management boards and decision-making agencies need more complete information to make realistic decisions about the most effective way to protect boreal caribou populations and their preferred habitat.

Wek'èezhìi Renewable Resources Board

Science Summary

Boreal caribou range in Wek'èezhìi largely coincides with the Taiga Plains Ecoregion. The density of boreal caribou in the region is low, 1.38 caribou/ 100km^2, for an estimated 650 caribou within Wek'èezhìi. The predominant disturbance factor on the range is fire, accounting for 99% of all disturbances (natural and human). Human disturbance in Wek'èezhìi is minimal, an estimated 1% of the boreal caribou range while fire in the last 40 years has burned 34% of the range. Boreal caribou habitat within Wek'èezhìi is right at the threshold of disturbance for self-sustaining and not self-sustaining populations, as presented in the *Scientific Assessment to inform the identification of Critical Habitat for Woodland Caribou, Boreal Population*. Any further disturbance, whether through natural or human processes, could put boreal caribou populations in Wek'èezhìi in jeopardy. However, given the large home range size of boreal caribou in the southern subpopulations of boreal caribou in the NWT and the large patch size of the remaining secure, unburned habitat within Wek'èezhìi, boreal caribou may be able to continue to use their strategies of spacing out to sufficiently reduce their vulnerability to predation and other mortality factors in the region. Further research on boreal caribou in Wek'èezhìi is needed to more fully understand abundance, distribution and behavioural strategies and how they might be influenced by habitat disturbance.

Conclusions

The goals of this project were to further our understanding of boreal caribou habitat and habitat use in Wek'èezhìi through gathering existing scientific and traditional knowledge.

Both Tłı̨chǫ knowledge and science have shown that there is a great amount of disturbance to boreal caribou habitat due to large fires in the mid-1990s onward. While caribou seem to be resilient to these kinds of habitat changes either through distribution changes or utilizing areas of less fire severity, it is unclear whether caribou can maintain this type of resiliency when faced with long-term changes in habitat due to increased fires or industrial development.

Upland areas are important to boreal caribou for calving and islands are important for post-calving and rearing. Neither study addressed the impacts that may arise from climate change with respect to the ability of caribou to reach these key habitat sites. The consideration of such issues should be the topic of future research.

Recommendations

1. Both Tłı̨chǫ knowledge and science continue to be utilized in boreal caribou monitoring and management.
2. More in depth science and traditional knowledge research be conducted especially examining areas of fire of differing severity, how it is utilized by boreal caribou and how burned areas regenerate back to areas of preferred habitat.

3. More in depth science and traditional knowledge research be conducted to understand the relationship between predators and the boreal caribou especially with respect to predator and prey efficiencies and how that might change with habitat disturbance.
4. More in depth science and traditional knowledge research be conducted on the impacts of climate change on habitat quality, quantity, connectivity and mobility.

Boreal Caribou Habitat and Habitat Use in Wek'èezhìı

- Tłı̨chǫ Knowledge Component -

Prepared by Allice Legat, PhD
Gagos Social Analysts, Inc.

In Collaboration with
Georgina Chocolate, Senior Traditional Knowledge Researcher,
Lands Protection Department, Tłı̨chǫ Government

Dedication

To the memory of Madelaine Arrowmaker, from Gamètì, who was willing to share her stories with those who were willing to listen. We will always remember her as an elder who wanted people to know the true version of a story; the true version of how it was experienced and lived so others could 'follow in their footsteps'. She often told the story of how the log cabins were first built in Gamètì so young people would know the history of the region and their community.

Contents

Introduction

Throughout the circumpolar north, woodland boreal caribou (*Rangifer tarandus caribou)* are in varying degrees of risk due to loss or fragmentation of habitat. According to Natural Resources Canada, boreal caribou have decreased by 40 to 50% since the mid-1800s in parts of eastern Canada (2011). They are listed as threatened under the federal Species at Risk Act overseen by the Committee on the Status of Endangered Wildlife in Canada. Boreal caribou in the Northwest Territories (NWT) -according to the Gwich'in and Sahtu Dene- seem to have fared better than in other parts of the country. Nevertheless there is concern for their habitat (Bensen 2011; McDonald 2010). Increased development and associated infrastructure create potential for increased impacts on boreal caribou and their habitat in the NWT. Currently it appears that in the NWT forest fires are the main cause of lost habitat.

In 2011, Environment Canada initiated a draft recovery strategy for boreal caribou. Scientific and traditional knowledge projects are now part of that strategy. The remuneration plan for First Nations hunters across Canada, and the associated monitoring and management, will be based on the information collected from these studies.

The Tłı̨chǫ Dene have knowledge of the boreal caribou - *tǫdzı* as they refer to them - that reside in the area between Great Bear and Great Slave Lakes, west to the Mackenzie River and east to the Canadian Shield.

This study was undertaken by the Wek'èezhìı Renewable Resources Board (WRRB) and the Land Protection Department (LPD), Tłı̨chǫ Government (TG). The purpose was to document Tłı̨chǫ knowledge of tǫdzı within Wek'èezhìı, as defined in the Tłı̨chǫ Land Claim and Self-government Agreement. There are four Tłı̨chǫ communities within Wek'èezhìı, however due to respect for *whaèhdǫò* - the senior elders who have always lived on the land, and in this case live the closest to the tǫdzı - only those from Behchokǫ̀ and Whatì participated in the study.

Methodology

The research team consisted of Georgina Chocolate, Senior TK Researcher, LPD and Allice Legat, Gagos Social Analysts. We gathered information on the following:

- How do Tłı̨chǫ show respect to tǫdzı?
- How do Tłı̨chǫ know tǫdzi within Wek'èezhìı?
- What characterizes tǫdzı from barren ground caribou (*hozıı?ekwǫ̀*)?
- What breeding and birthing behaviour do tǫdzı display?
- What predators, besides humans, do tǫdzı have?
- What is the distribution and favoured location of tǫdzı within Wek'èezhìı?
- What is the preferred habitat of tǫdzi within Wek'èezhìı?
- How has their preferred habitat been altered or destroyed?
- Terminology associated with tǫdzı.

The research team took several steps to ensure they documented the knowledge of the elders with a reliable method and followed a process in which Tłı̨chǫ pass information to one another. First, Georgina Chocolate consulted with senior elders in the communities to select four elders from Whatì and four from Behchokǫ̀, who have knowledge of tǫdzı. These elders provided nine, rather than eight names. Elizabeth Michel, Dora Migwi, Francis Williah, Mary Adele Apple, and Robert Mackenzie represented the elders from Behchoko; Dora Nitsiza, Jimmy Rabesca, Pierre Beaverho, and Sophie Williah represented the elders from Whati. At the request of the selected elders, they were interviewed in a group setting as they wished to build on what each had to say.

The selected elders came together on three separate occasions for a total of nine days: i) February 13th to 15th 2012, ii) March 6th to 8th 2012, and iii) March 27th to 29th 2012. During the first two sessions, the elders explained characteristics of tǫdzı and their habitat, and where they expected to locate tǫdzı. First, we asked the elders to tell stories of their experiences with tǫdzı, as a way of understanding how they know tǫdzı, and to familiarize ourselves with what the elders thought was important to know about tǫdzı within Wek'èezhìı. During this oral narrative session, we noted place names on maps, digitally recorded the narratives, and made summaries of information. When appropriate we also asked more specific questions about habitat, birthing locales, importance of islands, and vegetation on which tǫdzı foraged. At the end of the first session, each of the nine elders noted on a map the places they remembered seeing or harvesting tǫdzı. During the second session, we asked them to explain the information noted on their maps. We wrote down place names of locations where tǫdzı were sighted or harvested, trapping cabins or campsites, burial sites, and activities that took place in their camps. We also verified what we had heard during the first session to ensure we understood them correctly. During the

final session, we verified the information through a professional interpreter, and documented the language elders use to discuss tǫdzı.

Documenting information contained in oral narratives is the first step of TK research. The second step entails fieldwork at locations that the elders select. For the fieldwork portion the elders suggested K'ıshìtì, ʔıhdaàtì, and Gòt'ǫǫtı[1] as good places for plants, fish, and waterfowl, as well as documenting more of their knowledge on tǫdzı.

Research Results

Knowing and Respecting Tǫdzı

For the Tłıchǫ, knowledge is essential to understanding how to show respect while harvesting and using resources. To gain knowledge, people observe the relationships between all that interacts within the environment. Knowledge is gained though listening to oral narratives, observing behaviour, and experiencing what others have shared (cf. Legat 2012). The elders explained that people are not to 'talk' all the time about any animal – including tǫdzı. Rather humans are meant to observe and experience. In this way, people are able to learn how animals live, and then know how to respect them. Knowledge includes understanding their character and habitat, the terminology associated with them, how they taste, and the narratives that members of the community know and share.

Tłıchǫ know tǫdzı, just as they know the character and behavioural traits of all that dwell within Mǫwhì Gogha Dè Nıı̨tłèè (see appendices for maps: *Tǫdzı Distribution* and *Forest Fire*). They know by observing, experiencing, harvesting, and using tǫdzı, which they do because tǫdzı were and continue to be an important resource to the Tłıchǫ. Pierre Beaverho explained, "Wherever you see burials west of the Marian-Camsell River system we know our ancestors understood the behaviour of tǫdzı as they watched them and harvested them." Tǫdzı are harvested year round, but particularly during trapping season. Tǫdzı are significant to the people from Whatì and Behchokǫ̀ because hozıı?ekwǫ̀ rarely migrate to these communities. Tǫdzı are valued food when hozıı?ekwǫ̀ are not available. As one harvester explained to Allice Legat while in Gameti in February 2012, "I saw and took one tǫdzı. I had not travelled far enough north to find hozıı?ekwǫ̀" (personal communication February 2012).

Tǫdzı are "cut-up" in the same manner as other caribou, but its hide is much larger and more difficult to tan. Women know different aspects of the tǫdzı as they work on the hides, the meat, and prepare fat and bone grease. Most women want tǫdzı hides because they are

[1] Officially known asLac Levis, Hornell Lake, Windflower Lake

very large and good for clothing. But they are hard to tan because they are large, like a moose, and therefore take a lot of work.

The elder Robert Mackenzie told the following story about how it is important to know what and when to wear articles of clothing made from tǫdzı. Just before telling his story the other elders had been discussing how clothing made from tǫdzı is not to be worn while hunting hozıı?ekwǫ̀ (barren ground caribou), but rather only to be worn at home, around their home community, or when hunting tǫdzı. After listening, Robert said:

> At one time, a whole group of hunters went out to the tundra to hunt. We went to one place where we saw herds of hozıı?ekwǫ̀, but the next day they had disappeared and we didn't know what happened. We noticed one young man was wearing tǫdzı moccasins and mitts. That was the reason why hozıı?ekwǫ̀ disappear so fast. Hozıı?ekwǫ̀ do not like being around clothing made from tǫdzı, so the elders asked this young man to throw his tǫdzı moccasins and mitts into the fire. He did this. The next day there were many hozıı?ekwǫ̀ on the whole lake – it was full of hozıı?ekwǫ̀. This happened back in the dog-team days. This is the reason, we know the relationship between those two caribou. This story first came from our ancestors. We know it is true, because it happened with us out in barren ground. We, hunters, witnessed this. (February 13th 2012).

Wearing clothing made from tǫdzı hides should be avoided when hunting hozıı?ekwǫ̀. Wearing inappropriate clothing is disrespectful to these animals "who do not like each other". As Sophia Williah explained, "Tǫdzı is a living animal. We would never use tǫdzı for just anything. Just three items. Tǫdzı hair is used to stuff the dog collars; not the harness, just the collars. We use tǫdzı hides for clothing. Tǫdzı hides make extremely good footwear, and we use its leg bones for scrapers*" (*March 27, 2012).

The elders say that tǫdzı love their legs, especially the ankle bone (*wedzawaa*) and hooves (*wekè*), and for this reason they should never be placed in the fire. If they are, it shows a lack of gratitude for the spirit of the animal. As Robert Mackenzie explained,

> We love eating the bone marrow. But the tǫdzı love their bones so we cannot just throw them into the fire so we can eat the marrow. So cut open the upper part; cut through the hair and pull the marrow out. We can break or split the bone for bone marrow. Because they love their hooves, is why they do not walk on the rough sharp ice. It is the best time to look for tǫdzı – when there is ice is rough because they do not like to move around – they do not like the ice - they protect their hooves.

Tǫdzı are respected - just as all animals are respected - by hunting them and using what tǫdzı have to offer in the appropriate way. This characteristic is not unique to the Tłı̨chǫ;

several indigenous people have similar ways. Elders from the Pikangikum First Nations in northern Ontario state that the decline is partly due to the Pikangikum people not accepting the gift when the boreal caribou present themselves - meaning they are no longer participating in the reciprocal relationship with the land and the Creator. They have taken action by challenging the centralized planning process suggested by the Ontario Ministry, and suggesting, instead, a more decentralized land-use planning process. The Pikangikum First Nation has the desire to apply their knowledge of woodland caribou into the forest management planning process, but Pikangikum elders stated that they could not engage in discussions or planning for caribou in the territory of other First Nations. Their level of planning could only proceed on their territory, in the Whitefeather forest, on the premise that if they maintained woodland caribou forest habitat then the caribou were welcome to use the forest, if they wanted to. This would demonstrate to the woodland caribou their respect and willingness to use them. (O'Flaherty et al 2008).

Terminology

As stated above, knowing an animal is key to respecting it. This includes knowing the language associated with sharing narratives about observing the animals and it's habitat, about harvesting resources, and about the fitness of animals. Appendix III shows key terms for discussing the anatomy of the Tǫdzı, and Table I lists vegetation on which tǫdzı forage. Some – not all – important places associate with tǫdzı and Tłı̨chǫ have been used throughout the report and on the map. Also important is knowledge of the sex, size and/or age of an animal, including tǫdzı, when discussing observations when harvesting. Examples of these are: tǫdzı wedzıcho (largest bull), tǫdzı yaagoo (second largest bull), tǫdzı dets'è (female), and tǫdzı tsıa (calf).

Tǫdzı Characteristics

Tǫdzı and hozıı?ekwǫ̀ are both similar and different. Tǫdzı are secretive whereas hozıı?ekwǫ̀ are curious (see also Benson 2011 on differences between boreal and barren ground caribou in the Gwich'in region; and McDonald 2010 on differences between the boreal, mountain and barren ground caribous in the Sahtu region). Tǫdzı are taller and have longer legs and larger hooves that can be damaged more easily than those of hozıı?ekwǫ̀. Their hide is larger and thicker, and their antler rack larger and heavier. Both male and female tǫdzı grow antlers; male have larger antlers, but female antlers are relatively thick and broad. Tǫdzı are the darkest and largest caribou of any caribou the elders have seen. And, they have a white patch around their throat area. Their colour and hair density changes more than hozıı?ekwǫ̀; in the summer tǫdzı are brown with thinner hair than in winter when they are darker grey with thıck hair.

After several elders spoke Jimmy Rabesca went on to say,

> Long ago, we elders used to hunt tǫdzı. They look different from hozıı?ekwǫ̀. Tǫdzı head is different [longer than hozıı?ekwǫ̀], and its legs and hooves are different too [longer and bigger], so when we hunt both tǫdzı and hozıı?ekwǫ̀ we don't need to compare every little thing, we just know. When we follow their tracks the tǫdzı is the fastest caribou, they are faster because they have longer legs, that is why, that is how that tǫdzı is. (February 13th 2012)

The elders noted that tǫdzı are difficult to locate. They have long sensitive ears so they can hear when predators - including humans - approach them. Elizabeth Michel explained that their ears twitch when they hear something, even when they are asleep; and they, like hozıı?ekwǫ̀, have sensitive noses. As Pierre Beaverho (Feb 15, 2012) said, "We never approach them if the wind is blowing toward them as they will take off. Once I approached around them, and watched them sniffing my foot path – that was very amazing to watch". Furthermore, they cover their own tracks. Both make it difficult for most predators to track and hunt them. Tłı̨chǫ hunters know that tǫdzı travel in circles; they keep coming back around by covering their tracks. The elders explained that their ancestors first observed this behaviour and have passed this information down to them.

Predators

Wolves, lynx, and bears are known to prey on tǫdzı. During the discussion, Pierre Beaverho said,

> My brother, Zǫ̀ǫ̀zeh, spotted lynx tracks, and since it was their prime fur season, he decided to follow the track. He came to where the lynx was and noticed that the lynx had pushed all the snow together – banking it to watch the area for caribou. Suddenly the lynx jumped into the air and attacked one caribou by ripping its throat (February 13, 2012).

All elders agreed that wolves are known to bite on the hind leg of tǫdzı, holding on until they down the tǫdzı. If escaping, they are often crippled and may die if the bite is too severe. Francis Williah (February 13th 2012) added, "Even though people say wolves kill a lots of tǫdzı, it is hard for the wolves because tǫdzı are very fast". He went on to say, "Tǫdzı will take off fast if they hear or smell you, however if you come across them by accident they will just stand very still. But, because they are secretive and difficult to find, and when disturbed they usually disappear quickly into the forest."

Distribution and Habitat of Tǫdzı within Wek'èezhìı

The elders at the workshop explained that "the place where tǫdzı belong" is known in the scientific community as the Taiga Plain (see attached scientific component), the eco-region

west of the ʔɻhdaatılı, an important ancestral trail that parallels the Camsell-Marion River system that runs between Great Bear and Great Slave Lake. It includes plateaus, muskeg, and upland slopes. The area is often referred to by Tłı̨chǫ as Nǫdìı, referring to the number of plateaus in the area. The map entitled '*Tǫdzı Distribution'* (Appendix I) shows where the elders in the workshop harvested and observed tǫdzı, and where they have been told of their distribution through oral narratives. As is displayed on the map tǫdzı are most often found on the following plateaus: ʔedèezhìì, Shìıgǫǫ̀làala,[2] Gokw'ahshìì,[3] Gohdlı̨ı̨shìì,[4] and Kwechoozhìì[5] and mountaın rıdge Whojıhchìì.[6] They are also in the bush in the lowland, but prefer the area when the muskeg dries out and becomes hard.

Tǫdzı stay within the boreal forest where in the winter hozıı?ekwǫ̀ and tǫdzı may share space. The elders explained, they respect the place of the other and usually avoid each other. But there are times when hozıı?ekwǫ̀ stay among tǫdzı for a year and then migrate back to the tundra the following spring, and when tǫdzı follow the hozıı?ekwǫ̀ north to the tundra in the spring returning in the fall. Jimmy Rabesca told us of a time such as this. We had been discussing whether or not tǫdzı are found around the Fortune Minerals claim block, and how a few tǫdzı have been seen on the east side of the North Arm of Great Slave Lake. The elders explained that tǫdzı do wander outside of their preferred area, with Jimmy Rabesca telling about the time he saw a tǫdzı on the barren grounds:

> We all know where tǫdzı lives around this whole area. When hozıı?ekwǫ̀ migrate back to us, then the two kinds of caribou live near each other in the winter, but sometimes during spring migration maybe one or two tǫdzı will follow them back to the tundra. A few years ago we went for a trip to hozıı?ekwǫ̀ birthing ground. We saw a whole herd of hozıı?ekwǫ̀. There were so many hozıı?ekwǫ̀. We were using a helicopter. We landed on top of an esker where we could see. I saw a caribou that was bigger than the others in the herd. I suggested we take a closer look at the one bigger caribou, so when we got closer I looked at its head and the legs, it was a tǫdzı. That is how the animals roam on this land not lots but maybe one or two will follow hozıı?ekwǫ̀ (February 13th 2012).

Similarly, the Sahtu harvesters have observed boreal caribou in the company of the barren ground caribou on both the north and east sides of Great Bear Lake (McDonald 2010).

Within this environment tǫdzı prefer habitat that includes thick bush in which they can hide, especially during the winter, and hard ground that will not harm their hooves or legs

[2] Spelled Shìgola on *Tǫdzı Distribution* map.
[3] Spelled Gokw'ahshìh on *Tǫdzı Distribution* map.
[4] Spelled Gotłı̨shìh on *Tǫdzı Distribution* map.
[5] Spelled Kwejodzı on *Tǫdzı Distribution* map.
[6] Spelled Whojıchıon on *Tǫdzı Distribution* map.

and where they can travel quickly. In the spring and summer, they travel to islands to protect their calves to some degree from predators. They like plateaus year round, but especially in the spring and summer where they can find dry ground. In general, tǫdzı stay around water in the summer as there is more abundant food and they can avoid wolves - a comment also made by harvesters from the Little Red Cree River and Tallcree First Nations in Alberta. (Schramm and Krognman 2001). Based on McDonald's (2010) work it appears that the boreal caribou in the Sahtu region have similar seasonal movement patterns as in the Tłı̨chǫ region; whereas the boreal caribou used by the Little Red Cree River Nation and the Tallcree First Nations in Alberta seem to prefer the plateaus in both the summer and winter, and large lakes in the summer (Schramm and Krogman 2001).

The elders at the workshop explained that tǫdzı rut in late September or early October, and give birth to a single calf in May. They prefer high ground, but they rut and calf throughout the bush. They also explained how tǫdzı travel over the thin ice or swim to islands in the spring and summer with their calves. Islands such as Tàdłaadıì on the lake known as Whatì[7] and Dınàgà in the North Arm of Great Slave Lake have both been mentioned as important habitat for tǫdzı when calves are young, and in the summer.

Elders explained that tǫdzı spend most of their time in very bushy areas as it camouflages them from potential predators such as humans, wolves, lynx, and bears. Moreover, the elders stressed that in spite of seeing their tracks, tǫdzı travel in circles covering their tracks. They are very difficult to spot because they hide, stand still, and stay quiet. They rarely stand in the open. For these reasons, hunters in the past used dogs to find them, and hunters learned to track their circular movements, and to spot them through small cracks in thick bushes.

According to the elders, tǫdzı are known to have strong knowledge of themselves, meaning they are usually by themselves or with one other tǫdzı; you rarely see them in a larger group. Nevertheless, there were several stories when more than two were harvested. Robert Mackenzie told of a time when he and Jimmy Nitsiza shot four at one time (February 13th 2012). A few days later Pierre Beaverho told the following narrative:

> During a trip when I followed tǫdzı, I had to build a small hut, with willows and branches. I covered the small hut with snow and then crawled in to sleep, with a fire burning. It burned out by morning. I knew not to rush over to the tǫdzı or they will take off. I remember my father telling me that. I then saw something behind the bushes, so I approached ahead of them, then I followed them. There were five. They circled around, and they were sniffing my tracks – that was amazing. I then went around them and shot four tǫdzı; I hadn't eaten for a day so I kicked snow over them and covered them with their hides. I remember

[7] Traditionally known as Tsǫ̀tì as is shown on *Tǫdzı Distribution* map.

> my father saying that when you don't want any other animals to get your kill, you should put some matches on it, so no other animal will come after it. This happened at Gòt'ǫǫtì[8] where there are a lot of Tǫdzı. (February 15th 2012).

Vegetation on which Tǫdzı Forage

During the workshops, the elders mentioned key vegetation tǫdzı foraged on. The following table lists the plants mentioned.

Table I: Vegetation mentioned by Elders[9]

Tłı̨chǫ	English translation
ʔadzìì	lichen
Daàghoo	tree lichen
Dloodìì	mushroom
Gooh	unknown translation
K'ıʔ ı̨tǫ̀a	birch leaves
K'òòʔı̨t'ǫ̀	willow leaves
Tł'o	grasses and sedges
Tł'odzı	water grass or sedge
Tł'oghǫa	type of sedge
Tł'ot'aà	type of sedge

According to the elders, in the summer tǫdzı browse on leaves of bushes on which berries grow, and grasses and sedges. Whereas, in the winter they dig for and forage on lichen, and forage on tree lichen, both of which ensure they have sufficient fat to survive the winter. Both tǫdzı and hozıı?ekwǫ̀ roll in mud to protect themselves from insects. But the tǫdzı prefer a habitat with thicker bush as they are known to be much more secretive and more difficult to find. Elders agreed that tǫdzı like hard ground and although they will walk in muskeg in the spring they do not like it as it is too soft. During the workshop, Francis Williah explained the tǫdzı are rarely seen around open sandy areas.

[8] See map entitled, *Tǫdzi Distribution* for locations

[9] This list is not conclusive as the elders agreed that tǫdzı and hozıı?ekwǫ̀ have a similar diet. See *Caribou Migration and the State of Their Habitat* (Legat et al 2001) for a more extensive list of vegetation on which hozıı?ekwǫ̀ forage.

Most tǫdzı are found on a plateau, with fewer in the low lands, and even fewer on the east side of Whatì. Tǫdzı like islands, and accordıng to Dora Nıtsıza there are always tǫdzı on Tàdłaadıì – they lıve there year round, and there are always tǫdzı on the big island in Whati.

Destruction of Habitat

During discussions with the elders at the workshop, it became apparent that due to the number of fires that have destroyed important habitat since the mid-1990s, the tǫdzı distribution has moved north and west toward the Mackenzie River Basin. (see *Forest Fire Map*). As Jimmy Rabesca said, "Forest fires are our main concern because most often they burn all the animals' food on the land" (February 13th 2012). Change in boreal caribou distribution has been noticed by other First Nations. The harvesters in the Sahtu region explained that the habitat and boreal caribou population have remained relatively stable, except in the 1990s when there were massive fires and moose took over the resulting habitat (McDonald 2010). The Cree trappers who hunt boreal caribou around James Bay have noted that boreal caribou in their region have moved south to areas of thicker bush, and in doing so avoid the disruption from large-scale logging and forest fires (Herrman et al 2012).

Summary and Conclusion

Tłı̨chǫ knowledge of tǫdzı shows the interaction and vulnerability the boreal caribou have to their surrounding habitat. Tłı̨chǫ knowledge also shows the importance of understanding the character of boreal caribou when thinking about habitat requirements within a region. Boreal caribou camouflage themselves within thick bush, cover themselves with mud to protect themselves from insects, travel in circles, have the ability to run quickly if the terrain is hard, and use both high plateaus (uplands) and islands, depending on the season; their movements and terrain use protects both adults and calves from predators such as wolves, lynx, and bears.

Their diet varies with the season, grazing on various types of lichen in the fall and winter, and foraging on various plants such as sedges, grasses, leaves, berries, and mushrooms in the spring and summer. Within Wek'èezhìı the main threat to caribou is the loss of prime habitat through forest fires.

Tłı̨chǫ have always depended on boreal caribou, and want to continue to harvest this resource. Boreal caribou are particularly important to the Tłı̨chǫ when barren ground caribou are unavailable, which is currently the case. They continue to use the hides and meat, and the bones and antlers for tools. Boreal caribou are part of the Tłı̨chǫ oral

narrative, the language and culture; and help maintain their relationship with the land and the place of their ancestors.

Tłı̨chǫ elders highlight the diverse behaviour of boreal caribou and the complexities of knowing this animal. Additional traditional knowledge research and monitoring is needed to fill in the gaps. Such as when do boreal caribou move back into a burn area: when they can forage or when the bush is thick enough for them to be camouflaged? What are the potential cumulative impacts from the threat of increased forest fires due to climate change, and other habitat stress such as increased mineral exploration and development? What factors may affect hunting practices – now and in the future? Management boards and decision-making agencies need more complete information to make realistic decisions about the most effective way to protect boreal caribou populations and their preferred habitat.

References

2011 Benson, Kristi. *Gwich'in Traditional Knowledge: Caribou, Boreal Population*. Gwich'in Social and Cultural Institute.

1997 Bradshaw, Corey J. A, Stan Boutin and Daryll M. Hebert. 'Effects of Petroleum Exploration on Caribou in Northeastern Alberta'. *The Journal of Wildlife Management* 61 (4): 1127-1133.

2012 Herrmann, Thora, Marie-Jeanna S. Royer and Rick Cuciurean. 'Understanding subarctic wildlife in Eastern James Bay under changing climatic and socio-environmental conditions: bringing together Cree hunters' ecological knowledge and scientific observations'. *Polar Record*: 1-26, First Article.

2012 Legat, Allice. *Walking the Land, Feeding the Fire: Knowledge and Stewardship among the Tłı̨chǫ Dene.* (release date June 1 2012). Tuscon: University of Arizona Press.

2001 Legat, Allice, Georgina Chocolate, Bobby Gon, Sally Anne Zoe, and Madelaine Chocolate. *Caribou Migration and the State of Their Habitat.* Submitted by Whaèhdǫò Nàowo Kǫ̀, Dogrıb Treaty 11 Council to West Kitikmeot Slave Study Society (WKSS). Yellowknife: WKSS.

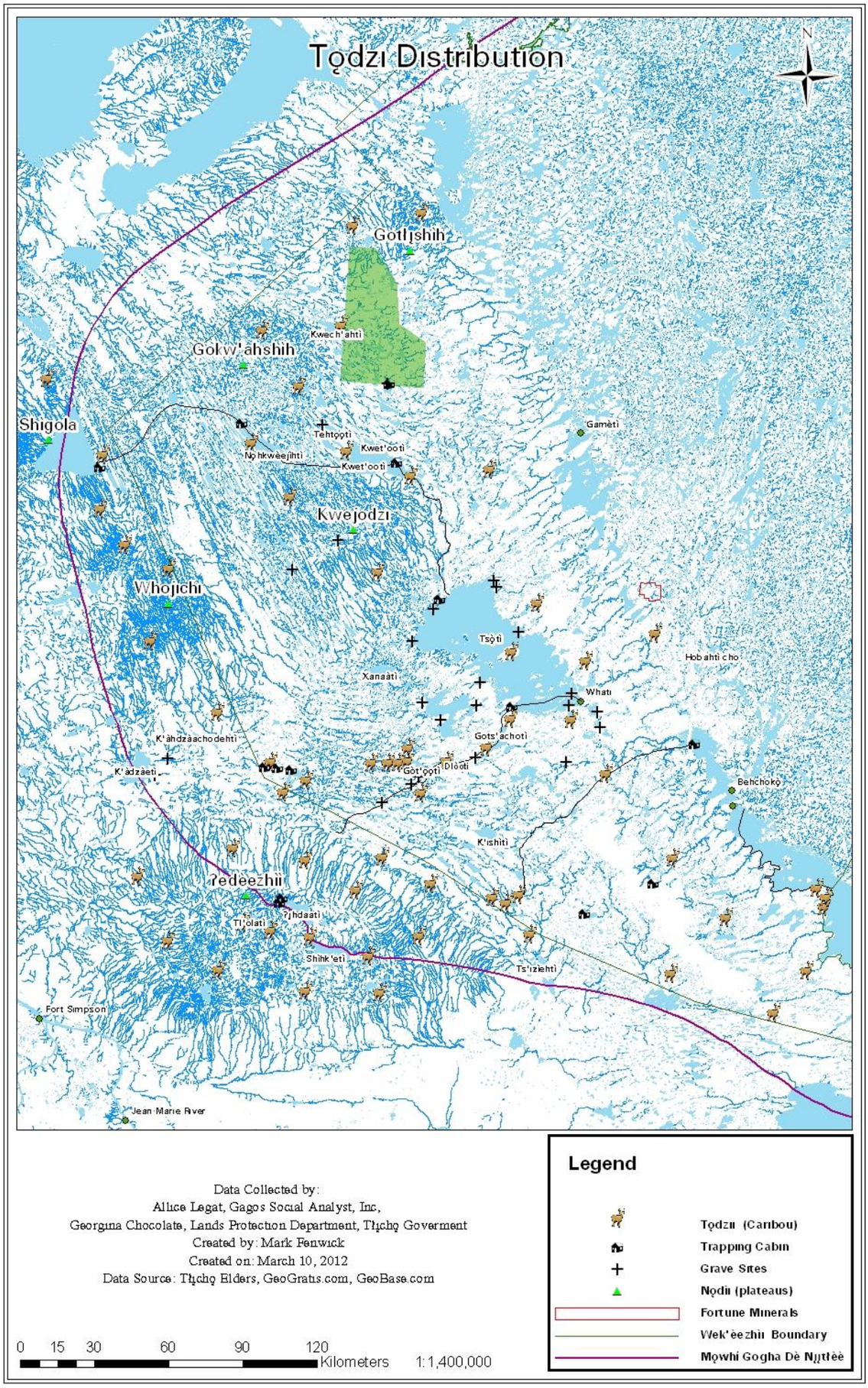
2010 McDonald, Reha. *Boreal Caribou Traditional Knowledge Collection Study: The Sahtu Settlement Area.* The Sahtu Renewable Resource Board. Report for the Canadian Wildlife Service, Environment Canada.

2008 O'Flaherty, R. Michael, Iain J. Davidson-Hunt, and Micheline Manseau. Indigenous Knowledge and Values in Planning for Sustainable Forestry:
Pikangikum First Nation and the Whitefeather Forest Initiative. Ecology and Society13(1): 6.

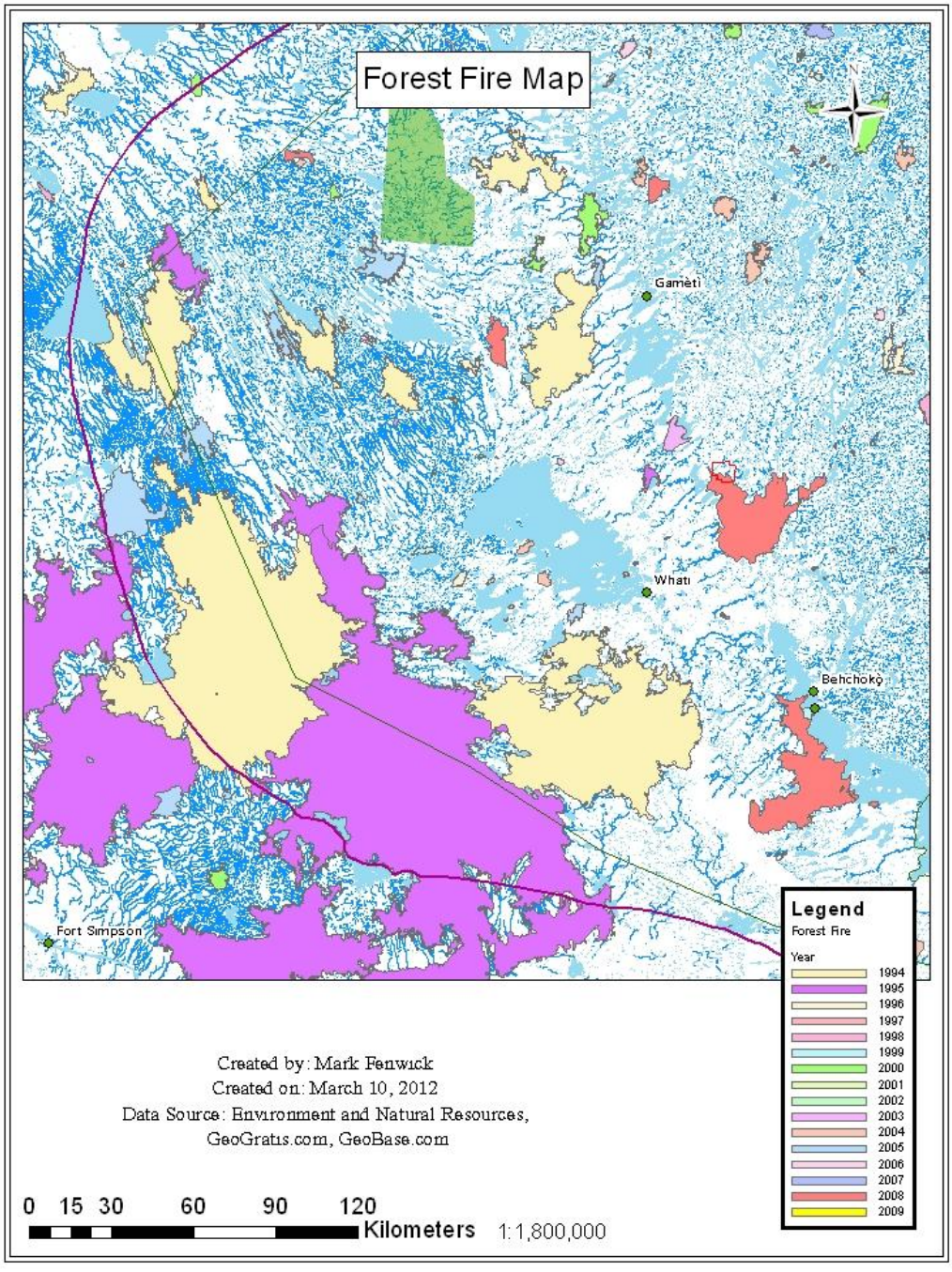
2003 McLoughlin, Philip D, Elston Dzus, Bob Wynes and Stan Boutin. Declines in Populations of Caribou. The Journal of Wildlife Management 67 (4): 755-761.

2001 Schramm, Tanja and Naomi Krogman. Final Project Report 2001-8:Caribou Mountains Critical Wildlife Habitat and Traditional Ecological Knowledge Study. Sustainable Forest Management Network.

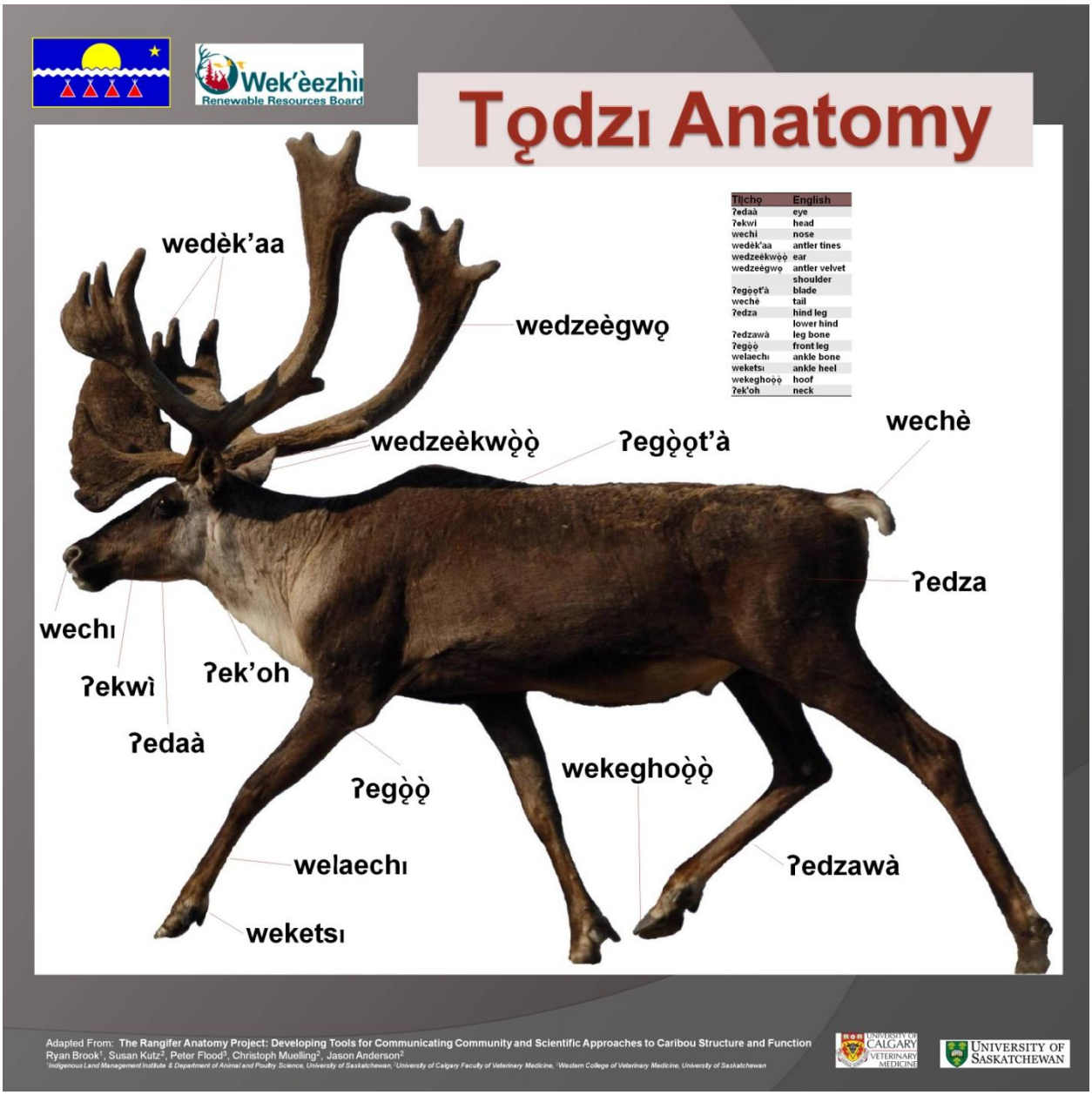
Appendix I: Tǫdzı Distribution



Appendix II: Forest Fires



Appendix III: Tǫdzı Anatomy



Boreal Caribou Habitat and Habitat Use in Wek'èezhìi

- Scientific Component –

April 30, 2012

Wek'èezhìi Renewable Resources Board

Acknowledgements

We'd like to acknowledge the time and effort taken by Bonnie Fournier, Suzanne Carriere and Dean Cluff of Government of the Northwest Territories, Department of Environment and Natural Resources for providing survey and harvest data on boreal caribou in the NWT. Also a special thanks to John Nagy for sharing his datasets on boreal woodland caribou habitat which were the result of much work undertaken as part of his PhD studies. We are very appreciative of the funding provided by Aboriginal Funds for Species at Risk and NWT Stewardship Fund that allowed us to undertake this project.

Contents

Figures

Tables

Introduction

Boreal woodland caribou (*Rangifer tarandus caribou*) are in decline across the circumpolar north (Vors and Boyce 2010) and the situation is no different in Canada. Boreal caribou were listed as Threatened under the federal Species at Risk Act (SARA) in 2003 due to population declines of more than 30% in 3 generations. Currently, of 57 boreal caribou ranges in Canada, 58% were identified as not sustaining viable populations (Environment Canada 2011). Declines in boreal caribou populations are thought to be the result of habitat loss and fragmentation due to changing land use, resource development and increased predation facilitated by these changes (Environment Canada 2008).

The Northwest Territories (NWT) boreal caribou population may be fairing slightly better. The NWT General Status Ranking Program ranks boreal caribou in the NWT to be "sensitive", requiring special attention, but not in danger of becoming extinct or extirpated. Recent analyses suggest Northern sub-populations are self-sustaining while Southern sub-populations are not self-sustaining (i.e. in decline) (Environment Canada 2011). Boreal caribou have not been designated under the NWT Species at Risk Act, which came into force in 2010, but are on the schedule to be assessed in fall 2012.

The Government of Northwest Territories (GNWT) developed an NWT Boreal Woodland Caribou Conservation Action Plan in 2009 as a requirement of the federal SARA and in support of a National Recovery Strategy. Habitat planning and management is recommended in the Conservation Action Plan as a tool to help address threats to boreal caribou. The Wek'èezhìi Renewable Resources Board has responsibility under the Tłı̨chǫ Agreement (s. 12.11.2) for developing a Comprehensive Proposal for the management of boreal caribou in Wek'èezhìi.

The work described herein along with a companion document based on traditional knowledge research, provides much needed background information on boreal caribou habitat in Wek'èezhìi that is necessary for the support of such management planning processes.

Methods

The approach taken for the scientific component of this project was to assemble and review the existing boreal caribou datasets available for the Wek'èezhìi area. The primary agencies that collect data on boreal caribou are the GNWT, Department of Environment and Natural Resources (ENR) as the primary wildlife management authority in the Territory. The other is Environment Canada, Canadian Wildlife Service through their responsibility of preparing a Boreal Caribou Recovery Strategy. Data were also obtained from John Nagy, a recent PhD graduate from the University of Alberta, who conducted extensive analyses of GNWT radio, satellite and GPS collar location data collected from 2002-2009. Table 1 lists the datasets that were obtained and their source.

Table 1- Available datasets for Wek'èezhìi

Agency	Dataset
Government of Northwest Territories	Boreal caribou range
	Ecosystem Classification
	Fire History
	Boreal caribou density
	Aerial survey observations
	Resident harvest survey 2000-2011
	Tłı̨chǫ community observations and habitat
Canadian Wildlife Service	Natural and Human Disturbance in Boreal Caribou Habitat
John Nagy	Boreal caribou habitat- Risk, Secure-burned, Secure-unburned
	Seasonal activity periods

Results

The datasets collected fall into the general categories of range, habitat disturbance, abundance, distribution and seasonal life history patterns. These are discussed below.

Boreal Caribou Range

The range of boreal caribou in Wek'èezhìi generally coincides with the Taiga Plains ecoregion (figure 1). This ecoregion is characterized by: in upland areas, open black and white spruce forests with shrubby understories of dwarf birch, Labrador tea, mosses and lichen; in lowland areas, bogs, fens, lichen-labrador tea-peat moss communities; and, in areas regenerating from fire, mixed stands of dwarf birch and spruce (Ecosystem Classification Group 2007).

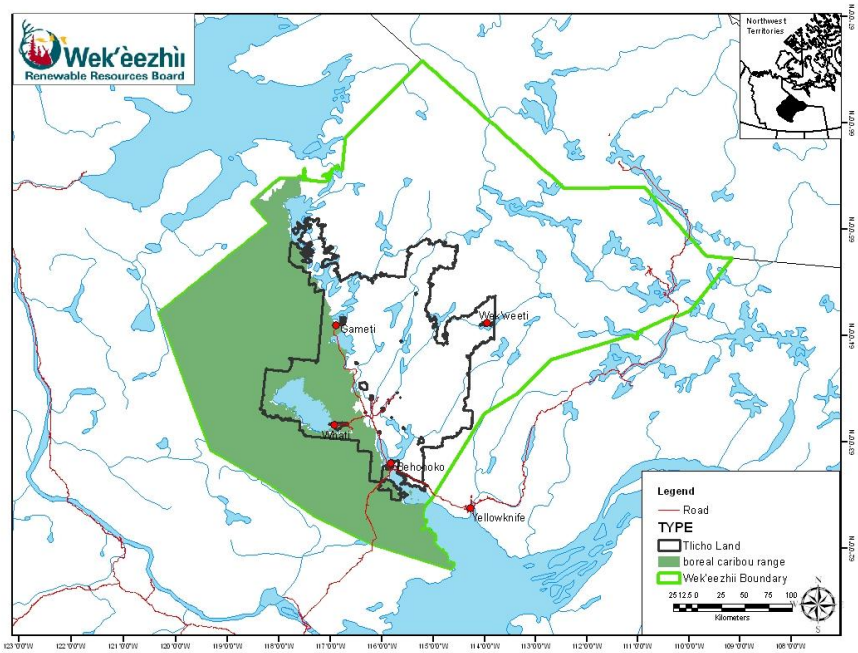


Figure 1 - Boreal caribou range in Wek'èezhìi

The boreal caribou range within Wek'èezhìi comprises 47 098 km^2 or 31% of the total area encompassed by Wek'èezhìi. The boreal caribou range within Tłı̨chǫ lands is 7 739 km^2 or 16% of the total range.

The ecosystem classification work done by ENR (Ecosystem Classification Group 2007) collected much information on wildlife species expected or present in the various defined ecoregions. In addition to the boreal caribou range that coincides with the Taiga Plains ecoregion, transient, occasional or nomadic presence of boreal caribou is predicted in regions within the Taiga Shield. These regions with their predicted presence categories are show in figure 2.

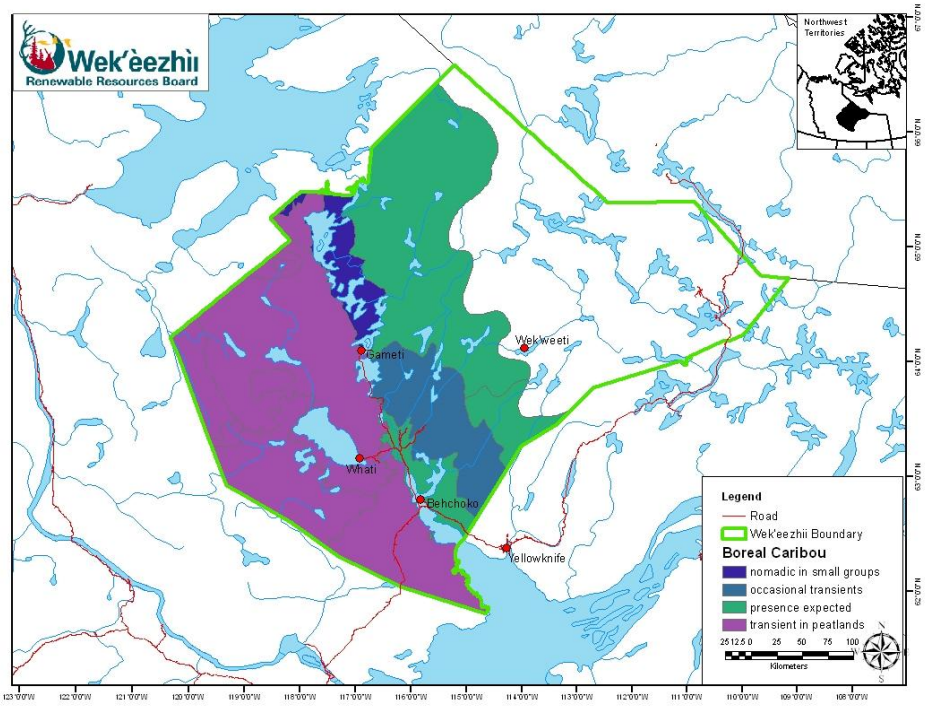


Figure 2 - Potential habitat (expected distribution) by ecozone within Wek'èezhìi (purple – Taiga Plains, Blue to Green – Taiga Shield)

The area of each of the regions that may have occasional use value for boreal caribou is given in table 2. An additional 52 401km^2 of habitat is predicted to be used by boreal caribou on a transient, occasional or nomadic basis.

Table 2- Area of potential / predicted occasional use habitat

Ecoregion	Predicted use	Area of predicted habitat
Taiga Plains	Transient in peatlands	49 626 km^2
Taiga Shield	Presence expected	36 309 km^2
	Occasional transients	10 495 km^2
	Nomadic in small groups	5 597 km^2
Total		102 027 km^2

Habitat Disturbance

Habitat disturbance data relate to both natural and man induced change. Fire is the predominant natural disturbance phenomenon while forest clearing associated with settlements, exploration and resource extraction are the predominant man-induced change.

Fire History

ENR has tracked and mapped the extent of all forest fires in the NWT on an annual basis from 1965 onward. Figure 3 shows the extent and location of fires grouped by decade that fall within boreal caribou range in Wek'èezhìi. In the decades since 1965, the largest amount of the range burned (20%) in the 1990's. The 1980's and 2000's were decades with the least amount of the range burned (4%) (table 3). The 1960's were discounted as data were not available for 1961-1965. It is not known what kind of forest fire management policies were in place during these decades that may have influenced the extent of forest fire.

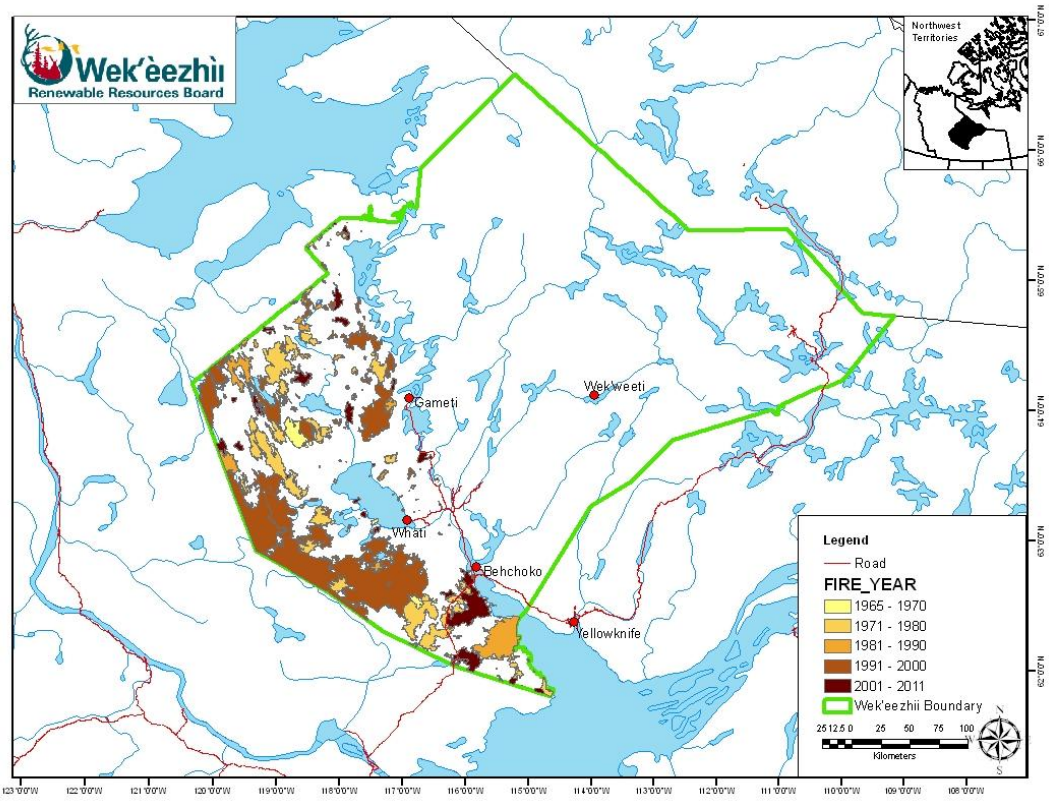


Figure 3- Location and extent of fires categorized by decade within boreal caribou range in Wek'èezhìi

Table 3- Area of fires in each decade within boreal caribou range in Wek'èezhìi

Decade	Area of Fire	% of range
1965-1970	438 km^2	1
1971-1980	4443 km^2	10
1981-1990	1962 km^2	4
1991-2000	9445 km^2	20
2001-2011	1887 km^2	4
Total	18 175 km^2	39

Secure vs. At Risk Habitat

The amount of disturbance on boreal caribou range has been calculated and mapped by Nagy 2011. He grouped habitat into 3 categories:

- risk habitat - within 400m of any human disturbance feature[1]
- secure, burned – areas that have been burned in the past 50 years
- secure, unburned – areas that have not been burned in the past 50 years

Figure 4 shows these habitat categories for boreal caribou range in Wek'èezhìi. The range remains predominantly secure and unburned (64%) with essentially no risk habitat (table 4).

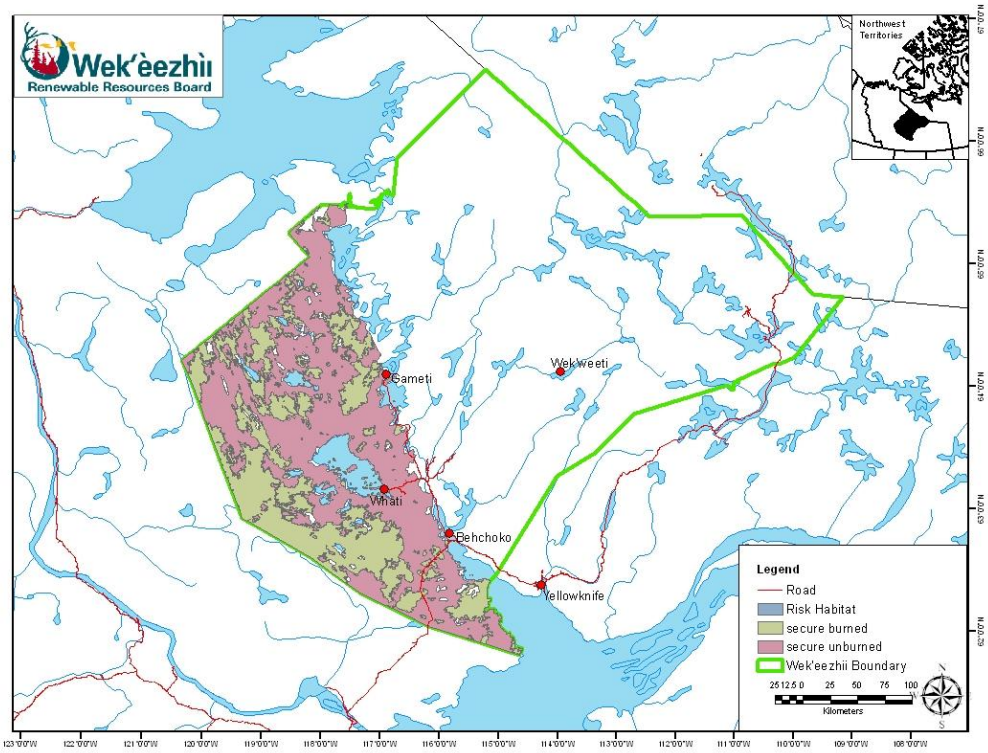


Figure 4 - Risk, Secure-burned, Secure-unburned boreal caribou habitat in Wek'èezhìi

[1] Linear features were identified using digital data from National Energy Board, Canada, the NTS map database, Dehcho Land Use Planning Board and Government of Alberta.

Table 4 - Area of Risk, Secure-burned and Secure-unburned boreal caribou habitat in Wek'èezhìi

Habitat category	Area	Percent of range	Percent patches >/= 500km^2
Secure, burned	16 535 km^2	36%	97%
Secure, unburned	28 897 km^2	64%	
At risk	11 km^2	0%	
Total	45 443 km^2	100%	

Disturbance Footprint

Environment Canada (2011) mapped human disturbance in boreal caribou ranges across Canada including the NWT using LandSat 5 and 7 imagery from 2009/2010. Linear features such as roads, cutlines, power line and pipelines were mapped as well as polygonal features such as wellsites, mines, agricultural areas and settlements. Figure 5 shows the human disturbance in Wek'èezhìi mapped by Environment Canada. The total area of human disturbance in Wek'èezhìi is 274 km^2 (table 5). Total polygonal disturbance across the range of southern boreal caribou sub-populations in the NWT is 13 292 km^2. Therefore Wek'èezhìi contains two percent of total polygonal human disturbance across the range of the Southern subpopulations of boreal caribou.

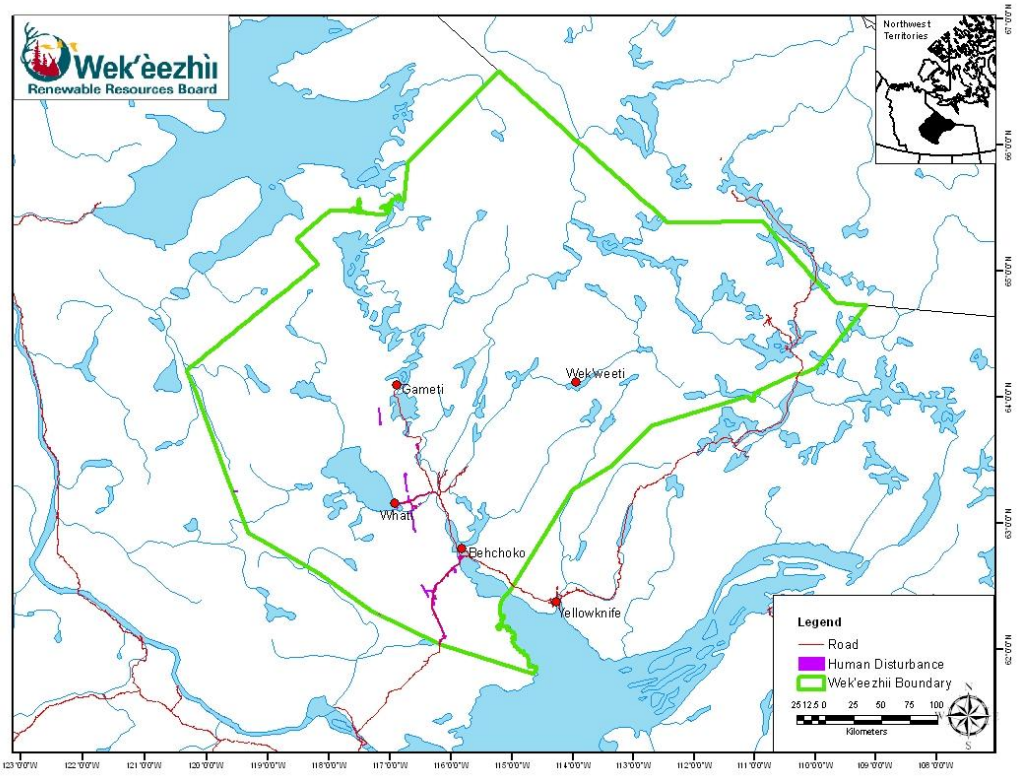


Figure 5 - Human induced disturbance in Wek'èezhìi

Environment Canada used the past 40 years of fire to indicate areas of naturally disturbed habitat that is not suitable for boreal caribou; in Wek'èezhìi this covers 16 103 km^2.

Together with human disturbance this accounts for 35% of the boreal caribou range in Wek'èezhìi (figure 6).

Table 5 - Natural and human disturbance of boreal caribou range in Wek'èezhìi

Disturbance	Area	% of range
Human	274 km^2	0.6%
Fire	16 103 km^2	34.2%
Total	16 377km^2	34.8%

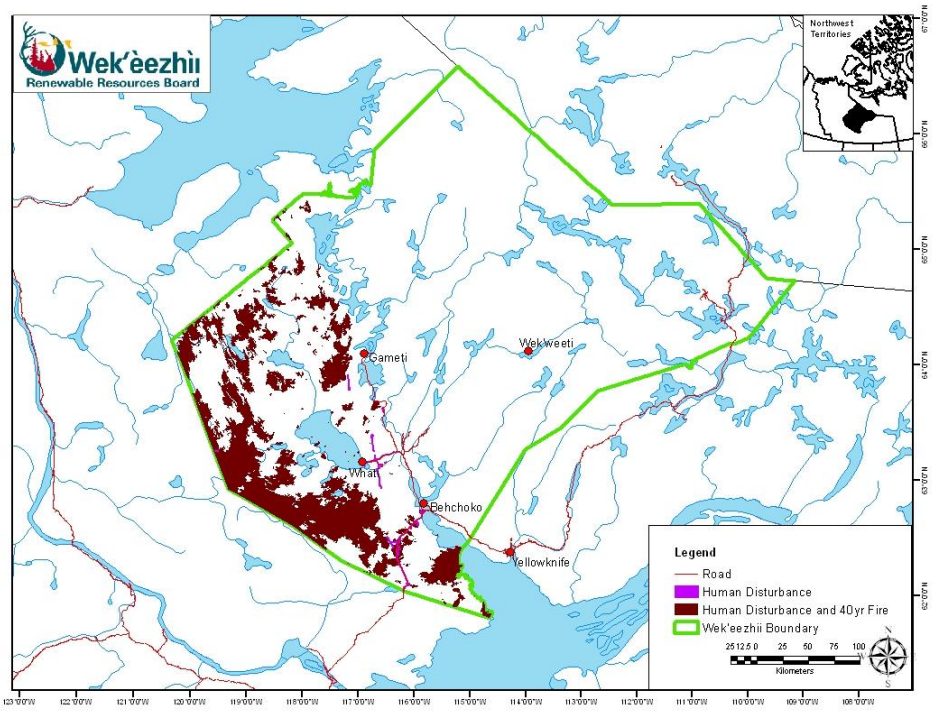


Figure 6 - Human disturbance and 40 year fire on boreal caribou range in Wek'èezhìi

Abundance

A survey to assess abundance of boreal caribou in Wek'èezhìi was conducted by ENR in November 2004 (Hillis and Cluff 2005). They undertook an aerial survey of the Taiga Plains area in the GNWT North Slave administrative region. They reported observing 19 boreal caribou in a study area of 726km^2 to give a density estimate of 2.62 caribou/100km^2. Mean group size was 3 (table 6). Incidental observations of boreal caribou during surveys of other species such as moose and bison have also been recorded by ENR since 1998. Results of these surveys are presented in table 6 and figure 7.

Mean density of boreal caribou derived from all surveys is 1.38 caribou/ 100km^2. It must be noted that because the surveys of other species were not designed specifically to detect caribou, the density estimates should be interpreted cautiously. Using the density estimate

and the range in Wek'èezhìi (47 098 km2) there are an estimated 650 boreal caribou in Wek'èezhìi. Hillis and Cluff (2005) reported that boreal caribou were most often sighted in Spruce-lichen forest habitat (32.3% of the time). But they were also observed in open Jack Pine and Shoreline habitats (18% and 15 % respectively). Six percent of the observations had boreal caribou within Fire Regenerated Low Shrub and Deciduous habitat.

Table 6 - Caribou observations from ENR surveys for caribou, mosse and bison from 1998 – 2005

Month	Year	Survey species	Number Observed	Number /100 km^2	Study Area (km^2)	Mean Group Size
March	1998	Bison	20	0.17	11848	4
March	2000	Bison	51	0.42	12209	7
March	2004	Moose	33	3.44	960	3
November	2004	Caribou	19	2.62	726	6
March	2005	Moose	28	0.25	11300	7
Mean			30	1.38	7409	5

According to ENR's Resident Harvest Survey, boreal caribou are harvested occasionally in the NWT with reported numbers ranging from 11 to 25 from 2000 to 2011. In Wek'èezhìi, harvest of boreal caribou is infrequent with only 2 caribou being reported as harvested between 2000 and 2010. However, there may be a slight increasing trend in the harvest of boreal caribou in Wek'èezhìi as in 2011, 2 boreal caribou were reported as harvested in that year alone. Numbers of boreal caribou harvested by Tłı̨chǫ citizens are unknown. There is no commercial harvest of boreal caribou in Wek'èezhìi.

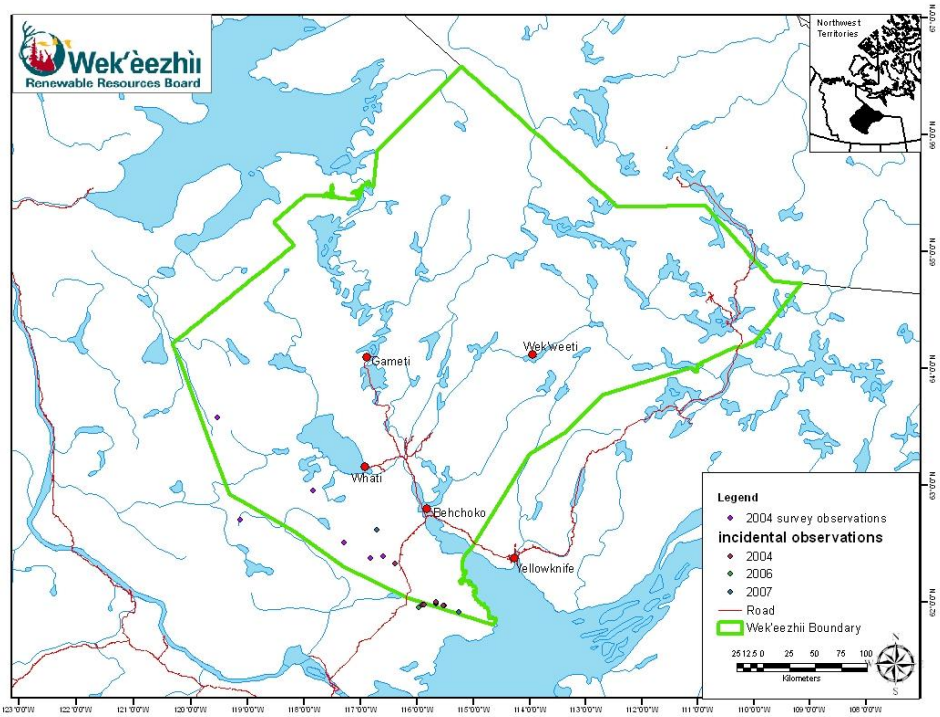


Figure 7- Boreal caribou observations made during caribou survey (2004), surveys of moose (2004, 2005) and bison (1998, 2000)

Cluff and Hillis (2006, 2006a, 2006b) also documented boreal caribou observations, traditional harvesting areas and areas of important habitat based on community workshops held in Behchokǫ̀, Gamètì and Whatì in 2006. Unfortunately, the original data were not available so they were recreated from hard copy maps. Descriptions of the areas of important habitat and their use were sometimes not given. However, islands in the North Arm of Great Slave Lake and islands in Whatì (Lac Le Martre) were indicated as calving/post-calving habitat. Some areas were indicated as insect relief habitat and other areas were observations of tracks (figure 8). Of all recorded observations caribou group size varied from 1 to 6 but was predominantly 1 or 2 individuals.

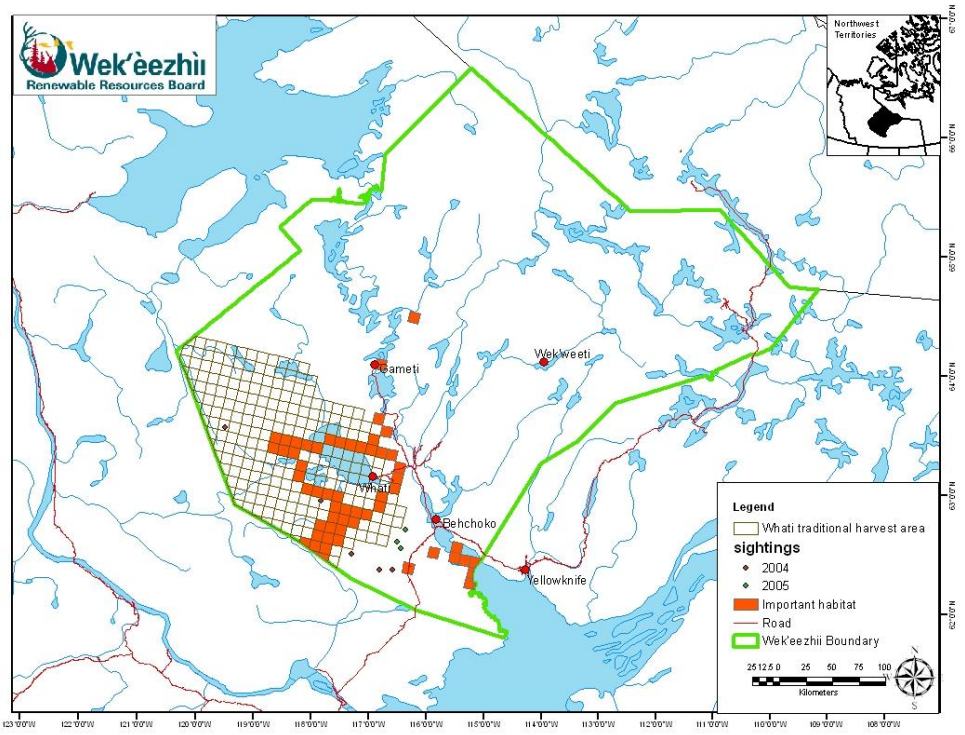


Figure 8 - Areas of important boreal caribou habitat and boreal caribou sightings as identified at TłĮchǫ community workshops in 2005 (adapted from Hillis and Cluff 2005)

Seasonal Activity Periods

Nagy (2011) calculated seasonal activity periods for boreal caribou based on satellite collar locations and movement rates. For southern populations of boreal caribou, Nagy identified 8 activity periods (table 7). These activity periods show that calving of boreal caribou is less synchronous than barren ground caribou and breeding takes place a month earlier. Nagy (2011) reports 95 – 100% of female collared caribou were pregnant and of those 71 to 89% produced calves. Calving sites of boreal caribou were dispersed and not in any specific habitat type but rather in areas where density of other females is low. There were no

collars placed on boreal caribou within the Wek'èezhìi area but it is reasonable to assume the timing of seasonal events is consistent with that of the southern sub-population.

Table 7 - Activity periods for Southern sub-populations of boreal caribou in the NWT, taken from Nagy 2001.

Activity Period	Sub category	Dates
Pre-calving, calving, post-calving		5 Apr – 6 Jun
	Calving	30 Apr – 6 Jun
	Peak calving	7 May – 21 May
Early/mid summer		7 Jun – 12 Aug
Mid/late summer		13 Aug – 12 Sept
Breeding		13 Sept – 20 Oct
	Peak breeding	20 Sept – 4 Oct
Late fall		21 Oct – 30 Nov
Early winter		1 Dec – 25 Jan
Midwinter		26 Jan – 15 Mar
Late winter		16 Mar – 4 Apr

Discussion

Depending on the source, boreal caribou range in Wek'èezhìi varies from 45 443 km^2 (Nagy 2011) to 47 098 km^2 (ENR). The range generally coincides with the Taiga Plains Ecoregion. The Ecosystem classification also predicts potential habitat in areas of the Taiga Shield that is not normally considered part of boreal caribou range in the NWT. It speculates limited use of these areas and categorizes it as "transient", "occasional" and "nomadic".

Community observations, areas of important habitat and traditional harvesting areas largely coincide with the Taiga Plains ecozone and typical boreal caribou range as identified by ENR. One exception is an area of Taiga Shield just northeast of Gamètì. This is within the region identified in the Ecoregion dataset as nomadic caribou being present in small groups.

Mean density of boreal caribou is estimated at 1.38 caribou/ 100km^2. It must be noted density estimates should be interpreted cautiously as some of the data were derived from surveys of other species were not designed specifically to detect caribou. Using the density estimate and the range in Wek'èezhìi (47 098 km2) there are an estimated 650 boreal caribou in Wek'èezhìi. Resident harvest is very low but may be increasing. Aboriginal harvest is unknown.

The amount of human disturbance in Wek'èezhìi is minimal, an estimated 274 km^2 (Environment Canada 2011). Nagy (2011) estimated only 11 km^2 was "Risk" habitat which he defines as within 400m of a seismic line, road or other human disturbance. The "Risk" habitat is along the western and southern edge of the boundary with Dehcho. The difference between Environment Canada and Nagy's estimates may be due to Nagy's study area not including Wek'èezhìi and therefore disturbance datasets having limited coverage for

Wek'èezhìi. Also Environment Canada completed a more recent analysis of satellite data which may simply be a more accurate reflection of disturbance in the region.

The predominant disturbance factor in the Wek'èezhìi area of boreal caribou range is fire. It accounts for 99% of all disturbances (natural and human) on the range. As boreal caribou prefer mature forest stands, fire has the potential to affect forage availability and range use. The primary strategy for boreal caribou to obtain habitat requirements and to avoid predation is to space out or distribute themselves across large expanses of area. The key to providing caribou with the habitat requirements they need therefore is to have large areas of habitat such that when fire affects one area caribou can adjust by moving into other areas of suitable habitat.

Environment Canada (2011) claims less than 35% of habitat should be disturbed either from natural processes such as fire or human disturbances such as roads or seismic lines to maintain self-sustaining populations of boreal caribou on the landscape. There are no requirements for the remaining 65% of the land in terms of its configuration. According to the Environment Canada data the boreal caribou habitat within Wek'èezhìi is right at that threshold – 35% of it has been disturbed, virtually all of it by fire in the last 40 years.

Nagy (2011) defines critical boreal caribou habitat as secure, unburned habitat. Secure, he defines as greater than 400m from an anthropogenic disturbance and unburned as in the last 50 years. Boreal caribou populations remain viable in areas with more than 46% secure, unburned habitat and where 54% of that secure habitat is in patches larger than 500km^2. The range within Wek'èezhìi meets these criteria in that it has 64% of the boreal caribou range as secure and unburned with 97% of that area in patch sizes larger than 500km^2.

The boreal caribou population within Wek'èezhìi would be considered viable using Nagy's criteria however the disturbance dataset was not as comprehensive for Wek'èezhìi as that used for Environment Canada's analysis. Based on Environment Canada's analysis and criteria, boreal caribou populations in Wek'èezhìi would be right on the boundary between self-sustaining and non-sustaining. In a study of how fire affects boreal caribou range use, Dalerum et al (2007) found that neither caribou mortality nor fecundity were affected by substantial amounts of fire within boreal caribou home ranges (14 – 26%). They attribute large home range size and the patchiness of fire severity as reasons for this. Home range size of boreal caribou in the NWT is 2478km^2 (Nagy 2011) and the home ranges reported in Dalerum et al (2007) are between 400 and 1500km^2. The home range size of boreal caribou in the NWT is much larger than that reported for 3 populations in Alberta and the amount of fire within the range in Wek'èezhìi is also substantially higher (35% compared to 14 – 26%). It is unclear whether mortality or fecundity of boreal caribou in the region are being affected.

Conclusion

Boreal caribou range in Wek'èezhìi largely coincides with the Taiga Plains Ecoregion. The density of boreal caribou in the region is low, 1.38 caribou/ 100km^2, for an estimated 650 caribou within Wek'èezhìi. The predominant disturbance factor on the range is fire, accounting for 99% of all disturbances (natural and human). Human disturbance in Wek'èezhìi is minimal, an estimated 1% of the boreal caribou range while fire in the last 40 years has burned 34% of the range. Boreal caribou habitat within Wek'èezhìi is right at the threshold of disturbance for self-sustaining and not self-sustaining populations, as presented in the *Scientific Assessment to inform the identification of Critical Habitat for Woodland Caribou, Boreal Population*. Any further disturbance, whether through natural or human processes, could put boreal caribou populations in Wek'èezhìi in jeopardy. However, given the large home range size of boreal caribou in the southern subpopulations of boreal caribou in the NWT and the large patch size of the remaining secure, unburned habitat within Wek'èezhìi, boreal caribou may be able to continue to use their strategies of spacing out to sufficiently reduce their vulnerability to predation and other mortality factors in the region. Further research on boreal caribou in Wek'èezhìi is needed to more fully understand abundance, distribution and behavioural strategies and how they might be influenced by habitat disturbance.

References

Ecosystem Classification Group. 2007 (rev. 2009). Ecological Regions of the Northwest Territories – Taiga Plains. Department of Environment and Natural Resources, Government of the Northwest Territories, Yellowknife, NT, Canada. viii + 173 pp. + folded insert map.

Environment Canada (2008). Scientific Review for the Identification of Critical Habitat for Woodland Caribou (*Rangifer tarandus caribou*), Boreal Population, in Canada. August 2008. Ottawa: Environment Canada. 72 pp. plus 180 pp. Appendices.

Environment Canada (2011). Scientific Assessment to Inform the Identification of Critical Habitat for Woodland Caribou (*Rangifer tarandus caribou*), Boreal Population, in Canada: 2011 update. Ottawa, Ontario, Canada. 102 pp. plus appendices.

Dalerum, F., S. Boutin, and J.S. Dunford. (2007). "Wildfire effects on home range size and fidelity of boreal caribou in Alberta, Canada." Canadian Journal of Zoology **85**: 26-32.

Hillis, T. and D. Cluff (2005). Status of Boreal Caribou, *Rangifer tarandus caribou*, in the North Slave Region, Northwest Territories, Canada. Yellowknife, Department of Environment and Natural Resources, Government of the Northwest Territories**:** 6 pp.

Cluff, D. and T. Hillis (2006). Boreal Woodland Caribou Workshop in Behchoko, 2006. Yellowknife, Department of Environment and Natural Resources, Government of the Northwest Territories**:** 10 pp.

Cluff, D. and T. Hillis (2006a). Boreal Woodland Caribou Workshop in Gameti, 2006. Yellowknife, Department of Environment and Natural Resources, Government of the Northwest Territories**:** 9 pp.

Cluff, D. and T. Hillis (2006b). Boreal Woodland Caribou Workshop in Whati, 2006. Yellowknife, Department of Environment and Natural Resources, Government of the Northwest Territories**:** 9 pp.

Nagy, J. (2011) Use of Space by Caribou in Northern Canada. PhD Thesis. University of Alberta, Edmonton: 164 pp.

Vors, L. S. and M. S. Boyce (2009). "Global declines of caribou and reindeer." Global Change Biology **15**(11): 2626-2633.