

Traditional Knowledge: Barren-ground Caribou in the Northwest Territories

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Executive Summary

Names and classification

Barren-ground caribou are highly valued throughout the Northwest Territories (NWT) by the Inuvialuit, Gwich'in, Sahtú, Deh Cho, Tłı̨ Chọ, Yellowknives, Denesöliné and Métis peoples as well as by many non-Aboriginal peoples. The species is defined in local languages and dialects as Tuktu (Inuvialuitun), Ekwe (North Slavey), Vadzaih (Teetl'it Gwich'in), Etthën (Chipewyan) and ʔekwö (Tłı̨ Chọ).

Description

Caribou are large animals which have lived in the Northwest Territories for thousands of years. The name caribou in English is likely derived from the indigenous (Micmaq) word *xalibu* meaning one who paws. Some Dene legends say caribou, other animals and people are all related and in ancient times all spoke the same language. Barren-ground caribou adult males are larger and taller than females. The Gwich'in describe caribou and differentiate male/female, young/old caribou as follows:

- *Bulls and cows have light hair around their tail and belly;*
- *Cows are lighter in colour than bulls.*
- *Caribou look healthiest in fall when they are growing their winter coat;*
- *Older bulls have white throats which turn grey in spring;*
- *Cow caribou have smaller bodies, shorter necks and smaller antlers;*
- *Young caribou are darker and scruffier (because they are always playing);*
- *Bulls drop their antlers in December while cows retain them till March;*
- *All caribou talk to each other (like all animals); young caribou are noisier than other caribou;*
- *Vadzaih's feet make a unique clicking sound, so large herd makes a lot of noise when running.*

Distribution

Barren-ground caribou are found in the northern territories of the Yukon, Nunavut and the NWT, northern Quebec and Labrador as well as in Alaska and western Greenland. "Herd"¹ distribution varies seasonally, with summer ranges being located further north and the fall and winter ranges

¹ For the purposes of this report (and cross referencing to the scientific report), readers should note that Łutsël K'e Dene (Denesöliné) references to caribou refer to the Bathurst, Beverly and Ahiak herds. The Tłı̨ Chọ, Yellowknives Dene and Métis refer primarily to the Bathurst and to a lesser extent the Beverly/Ahiak and Bluenose East herds. Herd distribution varies seasonally, with summer ranges being located further north and the fall and winter ranges closer to the treeline.

generally being closer to the treeline. For most herds, the spring calving range (i.e., calving grounds) tends to be common from year to year; however, calving grounds can shift from year to year and fidelity to the calving range varies. Distribution within the fall and winter range also varies seasonally and inter-seasonally, driven by numerous factors including forage availability, predation and disturbance. Forage or “good caribou food” may be the most significant driver of distribution changes; locations of good caribou food are seen as very good predictors of fall and winter range.

Barren-ground caribou travel in groups of hundreds to thousands or in smaller groups depending on population density and habitat quality. Caribou are always moving; they will travel many hundreds of kilometers in both the spring and fall seasons. Some Traditional Knowledge and Community Knowledge studies assert the importance of caribou leaders that guide the herd in spring and fall migration. Although distribution in the calving grounds is dense, and calving ground locations are relatively fixed from year to year, their movements in fall and winter months are more uncertain. Movement patterns are interpretable to some extent by well-known crossing sites, passes, caribou trails and habitats. Well-worn caribou trails, eskers, and crossing sites (i.e. water crossings) are described as important indicators of where to locate caribou in any given season. This is also said to be true of the calving grounds by Inuit elders of the Kitikmeot region. The reciprocal relationship between people and caribou often factors into explanations about why the caribou migrate to certain places year after year and why suddenly they might avoid some areas.

Traditional Knowledge of Tłı̨ Chọ, Kitikmeot Inuit, and Łutsël K’e Dene suggest Bathurst barren-ground caribou ranges (including calving grounds) have shifted or contracted in recent decades (since early 1990s). For example, Łutsël K’e Dene have observed greater availability of caribou east of Һeda cho Kué (Artillery Lake) than in the past when they were more abundant west of this region. A west-east shift has also been noted in the Bluenose West and Bluenose East caribou ranges.

Habitat

Barren-ground caribou have different habitat preferences during spring calving and fall/winter months. According to the Gwich’in, caribou like to live where there is enough food, where it is safe from danger and where they can see for along distance. Their annual migration and seasonal movements above and below the treeline are largely driven by their search for food, protection from predators and relief from insects. Although caribou travel in many areas, there are critical areas of habitat (e.g. calving grounds, water crossings, mountain passes, eskers) that knowledge holders identify as important in seasonal migration.

Barren-ground caribou eat lichen in the winter and fresh tundra vegetation in the summer. Caribou will seek areas where the plants are lush and green, preferring the newest growth.

Willow, alder, Labrador tea, grasses, and mushrooms are also documented sources of food. Caribou are drawn to some muds as salt licks. The condition of barren-ground caribou habitat varies widely across the NWT but is declining in availability and quality as a result many factors including the combined impacts of resource development, climate change, forest fire and other human activity.

Biology

In Aboriginal languages, there is detailed terminology for all stages of the lifecycle. For example, there are distinct names for bulls and cows during the first, second, third and fourth years (which may correspond to size – translation unknown) as well as for mature and immature bulls and cows (e.g. young bulls, breeding bulls, young cow, pregnant cows, cows with calf). Barren-ground caribou calve in spring with dates ranging from May-June.

The condition of barren-ground caribou varies as a result of many different habitat factors. Although “fat” is a key indicator of health, elders and harvesters recognize the fatness of caribou varies by season, age and sex of the animal and changing habitat conditions. The summer months are important for “fattening up” particularly for new calves and nursing cows. During fall (August – October), caribou make their way to wintering areas with the rut (breeding) occurring sometime in late September-October. The return to the calving grounds begins in late March-April.

In addition to herds being interconnected (i.e. herd mixing), barren ground caribou are also said to mix with boreal woodland caribou in some regions (Allaire and Larter 2006). Barren-ground caribou also interact with other grazing animals (e.g. bison, moose, muskoxen and deer) and these interactions are sometimes believed to be bad for the caribou. Wolves and grizzly bears are the main predators of caribou and are important to the population dynamics of all herds. Wolves play a key role in ensuring the population is healthy; however, too many wolves can have a negative effect on caribou numbers.

Limits placed on hunting cows during recent periods of population decline have been of key concern to elders in some regions who see the preferential hunting of bulls as upsetting the balance between breeding bulls and cows.

Population

The stability and growth of barren-ground caribou populations are highly dependent on successful spring calving and the survival of calves during the first few months of life. Cows that are in good condition will calve each year after the age of maturity (i.e. three years); those in poor condition are less likely to become pregnant or more likely to produce calves that are unable to survive. Almost all Aboriginal peoples in the NWT have rich oral histories about the comings and goings of caribou. In some cases, these comings and goings reflect changes in distribution; in other cases, they are more about changes in population.

The absolute highs and lows of caribou population change are most commonly recorded. In the last decade, a decline has been reported for most of the barren-ground herds in the NWT. Changes in their organizational behaviour (i.e. size of groups) have also been seen by Denésoline harvesters in the last decade. Not all harvesters perceive a decline based on their own observations though. For those that do, many perceive it as part of a natural cycle, while others blame human activity including resource development, climate change and hunting.

Threats and Limiting Factors

There are an increasing number of threats to the health of caribou and their habitat noted in Traditional Knowledge and Community Knowledge sources. Among those of greatest concern are predation, forest fire, wildlife disease, invasive species, resource development, climate change and hunting.

The overarching concern is about cumulative effects, or “too much happening”, on the landscape. The Porcupine, Bluenose East and Bluenose West caribou ranges are increasingly pressured by oil and gas activity, which includes the proposed Mackenzie Valley Pipeline. Many Aboriginal elders characterize the fall and winter range of the Bathurst caribou as under threat from mining activity. The Kitikmeot Inuit, Denésoline and Tlį Chọ also speak about the threat of extreme weather events (e.g., late frost, ice on snow or freezing rain events, extreme heat in summer), drying trends (e.g. lakes and rivers drying up, lack of precipitation) and increased forest fire, all of which may be attributable to climate change. Although predators are described as important to the health of the caribou (and thus are not considered a threat), some Aboriginal peoples suggest there are currently too many bears and wolves (e.g. in the Bathurst range and Porcupine range) and this may be a cause of caribou population decline. Wildlife diseases such as the emergent issue of Chronic Wasting Disease (CWD) as well as invasive predator species are also concerns. Invasive research (i.e. caribou collaring) is also characterized as a threat by many Aboriginal peoples including those in the Beverly caribou range. Aboriginal people in the NWT have a relationship of reciprocity to caribou that is spiritual and cultural as well as physical. The life cycle of barren-ground caribou is seen as directly interrelated and in balance with other elements of the ecosystem including harvesters. Hunting by local harvesters is not seen as a threat but is considered part of a healthy and respectful relationship between Aboriginal people and their lands and resources. Harvest rates have been in steep decline across the NWT over the last several decades, particularly in the last 10 years, as a result of many socio-economic, cultural and ecological factors. The total harvest of caribou by Aboriginal peoples in the NWT is difficult to assess but based on available data may range between two-10 animals per household/annually in communities located within the fall/winter ranges. This is well below reported harvests in the 1950s, which were thought to be closer to 100 caribou per household/year.

Positive Influences

Respecting the caribou, including teaching younger generations of Dene, Inuvialuit, and Métis hunters how to hunt well, is seen as a positive influence across the north. Many elders and harvesters emphasize the continued importance of caribou harvest. Many elders believe that it is a sign of respect (value) if you continue to harvest the caribou and that the caribou will eventually come back.

Species Overview

Barren-ground caribou (*Rangifer tarandus groenlandicus*) are highly valued by Aboriginal peoples throughout the Northwest Territories including the Inuvialuit, Gwich'in, Sahtú, Deh Cho, Tłı̨ Cho, Denesóliné and Métis peoples. Their knowledge of caribou comes from generations of living with and depending on caribou as a source of food and livelihood. This long term history of observing and learning *about* and *from* caribou in their traditional territories, coupled with the unique socio-economic, cultural and spiritual connection to caribou, has facilitated an understanding of caribou ecology which is unique from that of western science. Other socio-cultural communities in the Northwest Territories (NWT) also hold important knowledge; however, little has been documented. For simplification, the term Traditional Knowledge will largely be used and Traditional Knowledge and Community Knowledge where relevant.

Unlike western science, Traditional Knowledge is based on an oral tradition. Consequently there are significant gaps in documented knowledge available for this report in almost every region and with respect to almost all of the criteria used by the Species at Risk Committee (SARC 2012) for assessing the biological status of the species. As well, much of the available Traditional Knowledge that has been documented does not correspond easily with the criteria for assessing status in this report.

Over fifty community and management board reports and academic works were found for the Porcupine, Bathurst and Beverly herds. Fewer were found for the Bluenose West, Bluenose East and Cape Bathurst herds. Accordingly, this report only includes excerpts from documented and available sources and furthermore includes only knowledge that corresponds with parameters of distribution, habitat, biology and behavior, population, threats/limiting factors and positive influences. Knowledge about the social-cultural value and significance of barren-ground caribou to the well-being, culture and economy of people of the NWT, although critical to the management of caribou, is not included in this report.

Table 1 - Names and classification (What names are used for caribou?)

English	Caribou (Webster)
French	Caribou (Webster)
Inuvialuitun	Tuktu (Community of Tuktoyaktuk 2008)
North Slavey	Ekwe (Senes Consulting 2010)
Teet'it and Gwichya Gwich'in	Vadzaih (Gwich'in Elders and Raygorodetsky 1997)
Tłı Chọ (Dogrib)	łekwö (Whaèhdoo Nàowoò Ko (Dogrib Treaty 11 Council) 2002)
Denesłiné (Chipewyan)	Etthên (Parlee <i>et al.</i> 2001)

Description (What are caribou?)

Caribou are large animals have lived in the Northwest Territories for thousands of years. The name caribou in English is likely derived from the Indigenous (Micmaq) word *xalibu* meaning one who paws (Nuttall 2005: 318). Some Dene legends say caribou, other animals and people are all related and in ancient times all spoke the same language. (Blondin 1990; Legat *et al.* 2001; Parlee *et al.* 2001). Barren-ground caribou adult males are larger and taller than females. According to the Gwich'in, Vadzaih tsal (cows) have smaller bodies (weigh about 150 lbs), have shorter necks, and smaller antlers [than bulls].... Vadzaih choo (bulls) weigh 200-300 pounds and have larger antlers (GRRB 1997: 20).

Figure 1 – Caribou Cows in the Sahtu Region

(Reproduced with Permission from Spectacular Northwest Territories 2012).



In addition to size, there are other characteristics of male/female and young/old caribou used by Aboriginal peoples to describe barren ground caribou.

“The colour of the coat varies seasonally. The old fur that has faded to very light beige over the long winter falls out [in spring] in large patches revealing a new chocolate brown coat. When the moult is complete, caribou are uniformly dark brown with a white belly and white mane. Adult males also sport a white flank stripe and white socks above their hooves. In the fall, as white tipped guard hairs grown out through the summer hair, caribou become more uniformly light brown (Auld and Kershaw 2005: 46).

Some additional descriptive characteristics are as follows:

- *Bulls and cows have light hair around their tail and belly;*
- *Cows are lighter in colour than bulls;*
- *Caribou look healthiest in fall when they are growing their winter coat;*
- *Older bulls have white throats which turn grey in spring;*
- *Cow caribou have smaller bodies, shorter necks and smaller antlers;*
- *Young caribou are darker and scruffier (because they are always playing);*
- *Bulls drop their antlers in December while cows retain them till March;*
- *All caribou talk to each other; young caribou are noisier than other caribou;*
- *Vadzaih’s feet make a unique clicking sound, large herds make a lot of noise when running.*

(See GRRB 1997: 20-21).

There are some examples of Traditional Knowledge and Community Knowledge that refer to differences in the size and colour of caribou from different herds. In the Gwich’in region, for example, some harvesters explain the differences between the Porcupine and Bluenose herds as follows:

“Mature caribou from the Bluenose Herd are bigger than Vadzaih from the Porcupine herd. It takes only two Vadzaih to fill up one sled but it takes four Porcupine Vadzaih to do the same,”

(Gwich’in Renewable Resources Board 2001:20).

Caribou have strong legs and sharp hooves, which enable them to travel quickly through uneven tundra landscapes and dig through ice and snow to find food during the winter months. The caribou have a thick coat, which is highly valued for warmth (e.g. clothes, blankets, sleigh rugs) by many Aboriginal people (Government of the Northwest Territories 2011).

Distribution (Where can you find caribou?)

Barren-ground caribou are found in the northern territories of the Yukon, Nunavut and the NWT, northern Quebec and Labrador as well as in Alaska and western Greenland. The barren-ground caribou populations of the Northwest Territories share range in Nunavut, Yukon and Alaska. Other populations exist in northern Quebec and Labrador. Caribou/reindeer found in Russia, Greenland and northern Europe are considered to be very different than those in the NWT. Woodland, Mountain and Boreal caribou are considered caribou and related to barren-ground caribou by most communities with key behavioural, physiological and habitat differences. For many elders, the caribou from other parts of the circumpolar north could not survive or reproduce in the NWT because they don't know the land (e.g. good habitat for calving etc.) (Parlee and Furgal 2010).

Herd distribution varies seasonally with summer ranges being located further north and the fall and winter range closer to the treeline. For most herds, the spring calving range (i.e., calving grounds) tends to be located with the same area from year to year; however, the location of the calving ground and fidelity to the calving range has varied over time (Thorpe *et al.* 2001, Thorpe 2000). Distribution within the fall and winter range tends to be more varied (Whaèhdòò Nàowòò Ko - Dogrib Treaty 11 Council 2002; Parlee *et al.* 2001). Changes in distribution within the fall and winter range are driven by numerous factors including availability/loss of forage, predation and disturbance (Parlee *et al.* 2013, 2001). Forage or “good caribou food” may be the most significant driver; locations of good caribou food are seen as very good predictors of fall and winter range. Locations of good caribou food are seen as the best predictors of caribou range by some elders (Whaèhdòò Nàowòò Ko - Dogrib Treaty 11 Council 2002). Although use of the range can vary widely, many Aboriginal people use critical habitats (e.g., key water crossings) as indicators of their location at various times of the year (Golder 2010; Whaèhdòò Nàowòò Ko - Dogrib Treaty 11 Council 2002; Parlee *et al.* 2001; Thorpe 2000).

Barren-ground caribou travel in groups of hundreds to thousands or in smaller groups depending on population density and habitat quality. Caribou are always moving; they will travel many hundreds of kilometers in both the spring and fall seasons. Some Traditional Knowledge and Community Knowledge studies assert the importance of caribou leaders that guide the herd in spring and fall migration.

NWT Distribution (Where can you find caribou in the NWT?)

Barren-ground caribou herds found in the Northwest Territories and considered for this report are the Porcupine, Cape Bathurst, Tuktoyaktuk Peninsula, Bluenose East, Bluenose West, Bathurst, Ahiak and Beverly caribou herds (Figure 2). The Traditional Knowledge/Community Knowledge found in this report is largely specific to the Inuvialuit, Gwich'in Sahtu Dene, Tłı̨

Chọ, North Slave Métis, Yellowknives Dene and Łutsël K'e Dene. For the purposes of comparability with the scientific report and cross-cultural communication, a reference table of how these general areas correspond with specific herds/ranges is provided (Table 2)

Table 2 – Aboriginal Groups and the Caribou Herds in their regions

(Whaèhdòd Nàowoò Ko - Dogrib Treaty 11 Council 2002
Lyver and Kendrick 2005; Parlee *et al.* 2001)

Aboriginal Group	Caribou Herds	References
Łutsël K'e	Beverly, Ahiak, Bathurst	Lyver and Kendrick 2005; Parlee <i>et al.</i> 2001
Deninu Kue, Yellowknives Dene	Beverly, Ahiak, Bathurst	Sangris 2012 Nesbitt and Adamczewski 2009
Tlì Chọ and North Slave Métis	Bathurst, Bluenose East, Beverly	Whaèhdòd Nàowoò Ko - Dogrib Treaty 11 Council 2002 Nesbitt and Jan Adamczewski 2009 Stevenson <i>et al.</i> 1999
Sahtú	Bluenose East/West, Cape Bathurst	Bayha 2012.
Gwich'in	Porcupine	GRRB 2001; 1997
Inuvialuit	Bluenose West, Cape Bathurst, Tuktoyaktuk Peninsula and Porcupine	Pokiak 2012; Morrison 1997 Hart 1997

The Denésoline of the NWT are primarily located in the communities of Łutsël K'e and Fort Resolution and historically have occupied the Akaitcho region. Their lands include areas north into the barrens and extend south into what has become northern Saskatchewan and northeastern Alberta. Described by early anthropologists as the “caribou eaters”, the people from these communities currently depend on the Bathurst, Beverly and Ahiak herds (Helm 2000).

The Tlì Chọ (Dogrib) peoples live in the region between Great Slave Lake and Great Bear Lake; Tlì Chọ communities today include Behchokò, Whati, Gamèti and Wekweèti. They also depend heavily on caribou, hunting the Bathurst, Ahiak and Bluenose East caribou herd during fall and winter months (Whaèhdòd Nàowoò Ko - Dogrib Treaty 11 Council 2002).

The Métis of the NWT are represented in many communities throughout the Mackenzie Valley. The Northwest Territory Métis Nation is composed of Métis peoples from the South Slave region. In the North Slave, they are described as the North Slave Métis who were signatories to the Treaty 11 agreement in 1920 and went on to form the North Slave Métis Alliance in 1996. Those in the North Slave and South Slave region are highly dependent on Bathurst caribou (Helm 2000; Stevenson *et al.* 1999).

The Yellowknives (T'atsaot'ine) people lived in the area to the north of Great Slave Lake, between Great Slave Lake and Contwoyto Lake to the northeast. They often travelled far into the

tundra to hunt. They were named from their use of copper knives, which appeared yellow. The population of Yellowknives Dene currently resides in the communities of N'dilo and Dettah and depends on the Bathurst caribou herd (Helm 2002).

The Slavey peoples of the Deh Cho (Deh Gah Got'ine) are known as river people. They continue to live and travel along the Mackenzie River (called the Deh Cho, or "Big River") to the south and west of Great Slave Lake, from the Slave River area to the Liard, and as far downriver as Fort Norman (Tulita). Moose and woodland caribou are a major basis of their livelihood; however, many hunters historically and currently hunt Bluenose West/East as well as Bathurst caribou (Helm 2001).

The Sahtú Dene (Sahtú' t'ine) include the Locheaux/Hareskin, Mountain (sometimes called Nahanni) and Bear Lake people. The Sahtú Dene spoke related dialects and lived in the southwestern NWT (Mackenzie Mountains) and along the Mackenzie and Bear Rivers. The Loucheux (or Hareskin people) lived further downriver, in the northern part of the Mackenzie Mountains and in the watersheds of the Arctic Red and Travaillant Rivers north to the Mackenzie Delta. The Sahtú Dene currently live in the communities of Fort Good Hope, Deline, Tulita and Colville Lake as well as in Hay River. They are most dependent on the Bluenose West and Bluenose East herds, as well as the Cape Bathurst herd.

Many Traditional Knowledge and Community Knowledge holders do not use scientific herd names in referring to barren ground caribou nor to fixed areas or distributions; many simply talk about caribou in more spiritual and holistic terms. For example, the statement that caribou are located “everywhere” suggests something about Dene beliefs in the omnipotence of caribou; they can hear and see when people need them are being disrespectful (See section on **Human Interactions**). The Inuit also refer to the caribou as being “everywhere” in physical distribution as told by these elders from the Kitikmeot region.

“Caribou are found “everywhere”, “anywhere” and “all over” the tundra. Caribou are not fussy about where they are although on a small scale caribou have preferences for certain areas, for example, where the tundra vegetation is especially healthy or green. On a large scale, caribou are found throughout the land and in many kinds of landscapes. Taking this view, there are predictable movements of caribou as they migrate northwards in the spring and southwards in the fall.” (Thorpe et al. 2001: 100).

“They do not always go in one direction; they are all over the land around here and here. The land is full of caribou. They would walk

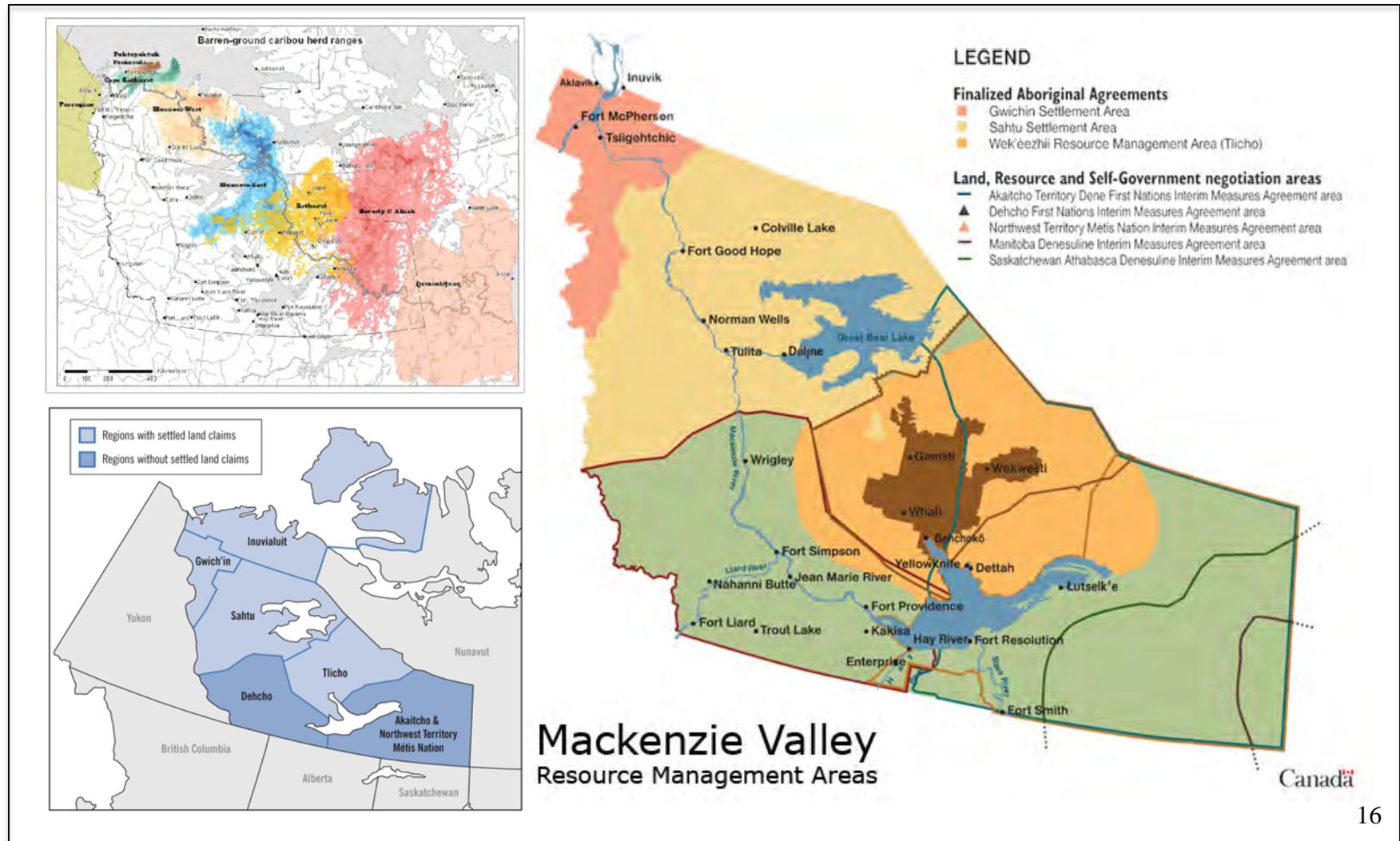
in all directions.” (May Algona from Kugluktuk in Thorpe *et al.* 2001: 100).

As a result of this assertion that caribou can be found “everywhere” and “anywhere”, it can be extremely difficult to rank certain areas of the NWT as more or less important for caribou.

Recognizing the uncertainties inherent in caribou distribution, elders more commonly use terms of probability such as ‘always’, ‘sometimes’, or ‘rarely’ to refer to where the caribou are located, or, in some cases, use seasonal or yearly terms (i.e. “always in late winter”, “once a year”, “once every few years”) (Parlee *et al.* 2001; Thorpe *et al.* 2001). A key focus is thus on the areas where caribou move, including core trails and caribou crossing points. Hunters have made distinctions between the areas where caribou “pass” versus “hang around” (staging areas and wintering areas) during fall and winter months (Kendrick and Lyver 2005). “Locations of good caribou food” are seen as the best predictors of caribou distribution within the range. The Tłı̨ Chò elders believe the caribou have a keen sense of smell and will migrate to places where the food is plentiful or lush (and fragrant) and away from pollution and areas burnt by forest fires (Legat *et al.* 2001:1). Some elders are more specific in talking about distribution. They refer to caribou of a certain direction, region or traditional land use area (e.g., our caribou).

Figure 2 – Map of the Caribou Herds of the NWT, Land Claim / Resource Management Areas

(Government of the Northwest Territories 2011; Office of the Auditor General of Canada 2010; Government of Canada 2012)



But in general there is not well documented Traditional Knowledge and Community Knowledge for all herds in the Northwest Territories. What information exists about distribution generally reflects key land use areas (i.e. people won't say there are caribou in areas where they do not travel or hunt). Reports such as the Tuktoyaktuk Community Conservation Plan (2008), Gwich'in Land Use Plan, and Sahtú Land Use Plan (2013) provide some general reference points for the geographic area where Traditional Knowledge might be found for future study.

Bathurst, Beverly and Ahlak Herds

The Bathurst, Beverly and Ahlak herds occupy large areas of the Northwest Territories, Nunavut with some areas of their seasonal winter range also being located in Saskatchewan and Manitoba. Although distribution in the calving grounds is dense, and calving ground locations are relatively fixed from year to year, distribution in fall and winter months are more uncertain. Elders in many areas of the Bathurst, Beverly and Ahlak range suggest caribou never use the same routes year after year.

“Caribou have a large range and do not migrate using the same routes year after year. They go where the food is...In some years they [travel] different routes to go south.” (Joe Desjarlais of Łutsël K'e in Kendrick and Lyver 2005: 180).

Traditional Knowledge holders of this region do not necessarily focus on the distribution according to specific herd ranges. There is significant range overlap and “intermixing” of caribou in these areas, particularly in fall and winter months. However, some elders do consider different characteristics of herds, even though they are intermixing.

“Accounts from Łutsël K'e hunters suggest that range overlap may not be an insurmountable problem when attempting to identify animals from particular herds. Well over half the hunters (23 of 39, or 59%) stated that they could recognize caribou from particular herds by an aspect of morphology, or by the direction the animals are coming from (or traveling toward) at particular places and times of the year.” (Kendrick and Lyver 2005: 180).

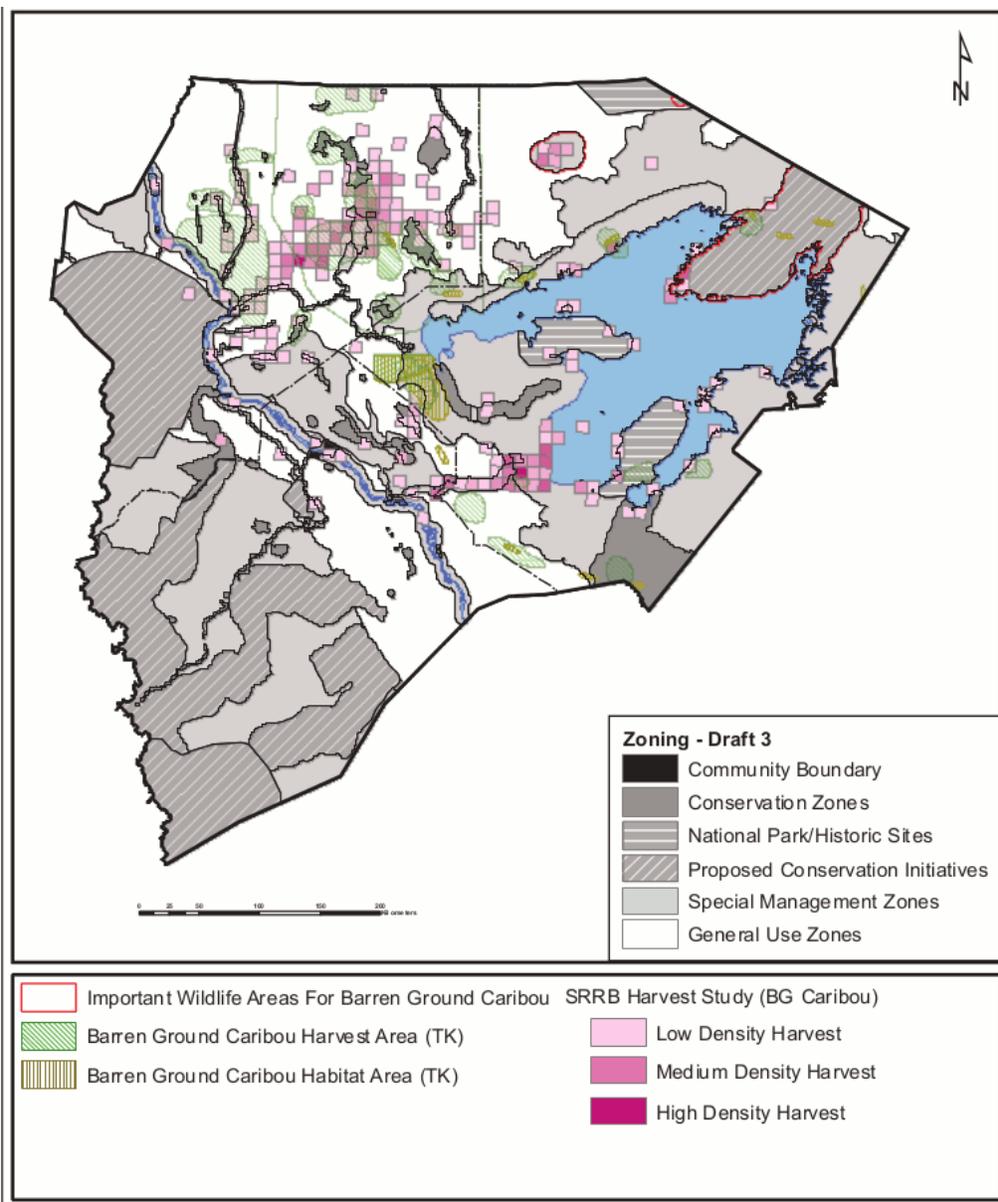
The Łutsël K'e Dene assertion of a mixing of the Bathurst and Beverly caribou (Kendrick and Lyver 2005) is echoed by Kitikmeot Inuit elders:

“Caribou would come from different areas and gather. They would go down to the shoreline from the west. Caribou would come and go from all directions, to Igloolik and other settlements like Hall Beach, Rankin Inlet. Caribou would migrate in the winter. They would

winter there. They would go and winter in the east, part of the Mainland. They do not always stay in one area. They would come from all directions and mix sometimes.” (Moses Koihok Cambridge Bay in Thorpe et al. 2001: 89).

Elders from Łutsël K’e and biologists have differentiated Beverly from Bathurst caribou by the taste of the meat and there are suggestions that caribou from different herds can vary in size (Lyver and Gunn 2004). The Łutsël K’e Dene also refer to the direction of their migration rather than their herd name (e.g., the caribou from the east) (Kendrick and Lyver 2005).

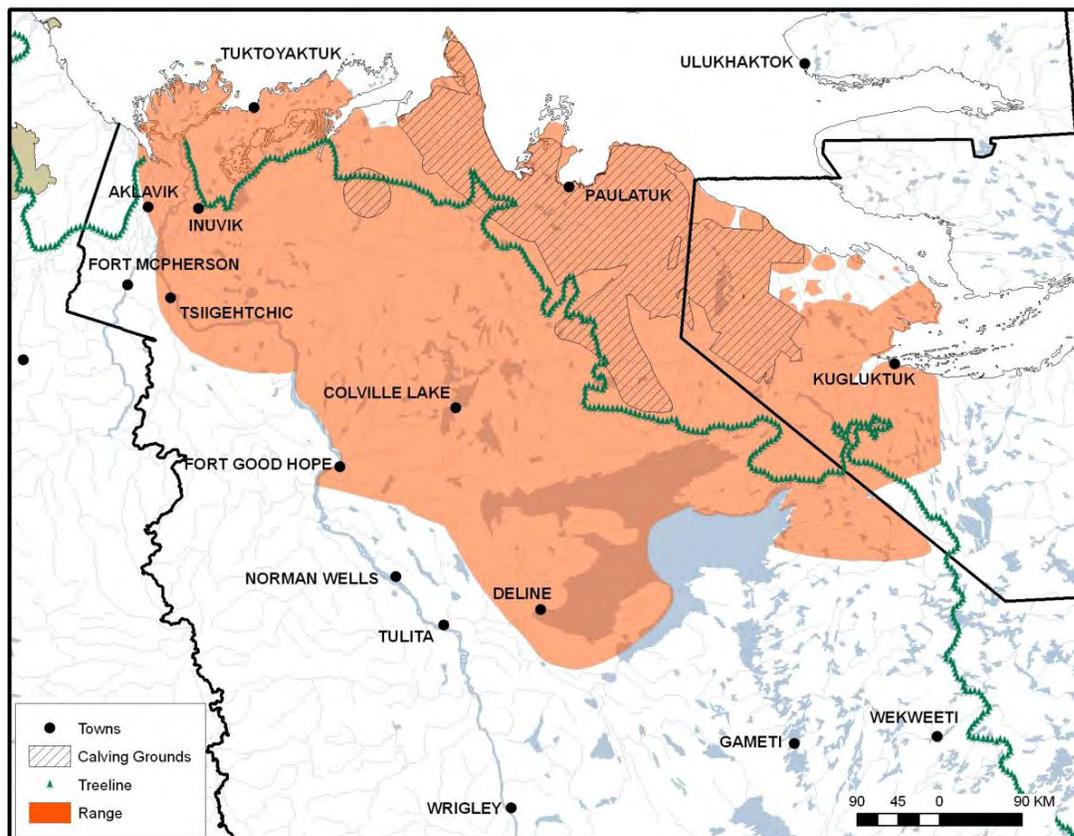
Figure 3 – Sahtú Land Use Plan – Important Areas for Caribou and Harvest (Sahtu Land Use Plan 2013: Online Appendices)



Bluenose West and Bluenose East and Cape Bathurst

The Cape Bathurst, Bluenose-West, and Bluenose-East herds are known to move between the Inuvialuit Settlement Region, Gwich'in Settlement Area and the Sahtu Settlement area as well as occupy areas of western Nunavut. These herds are often referred to as one group of caribou by Traditional Knowledge holders, which is more consistent with the historical management classification of biologists (See Fig. 4).

Figure 4 – Range of the Bluenose West, Bluenose East and Cape Bathurst Herds (ACCWM 2007: 6)



Calving occurs in June; the Bluenose-West and Bluenose-East herds reach the tree line for the rut in October (Nagy *et al.* 2005). The Cape Bathurst herd winters on the tundra. Documented Traditional Knowledge and Community Knowledge related to the Bluenose West, Bluenose East and Cape Bathurst herds is limited. However, Sahtu land use planning studies showing critical caribou harvesting areas may serve as a proxy for knowledge of caribou distribution (i.e. people hunt in areas where there is a strong likelihood of consistently seeing many caribou) (See Figure 3).

The Tuktoyaktuk Community Conservation Plan identifies areas at the southern edge of the Inuvialuit Settlement Region boundary to Tununuk, northeast to include the western portion of

the Tuktoyaktuk Peninsula, southeast to include the Anderson River, and south to the ISR boundary key areas where the Bluenose West Caribou are distributed (Hamlet of Tuktoyaktuk 2006: 51).

“Historically, the one you call the Bluenose herd now used to calve in the Caribou Hills, and around Parson’s Lake between Husky Lakes and the river, up on the high hills or close to a large body of water. You know where there is a breeze, and cooler – either edges of lakes or high hills – they used to come and spend their calving and that is why they call it Caribou Hills.” (TO19 in Inuvik Community Corporation *et al.* 2006: 6-11).

As in the case of the Bathurst, Beverly and Ahiak herds, problems of herd classification and affinity to range are discussed in the Sahtú region with respect to the Bluenose East and West herds; although they are classified as two separate herds by biologists, many Inuvialuit and Sahtú elders and harvesters do not make such rigid distinctions (Bayha 2011; Bechtel 2011; SRRB 2007). As described by a Sahtú elder, the Bluenose West and East herds alternately mix and separate at different points. One suggestion was there is a separation point around Horton Lake and Colville Lake:

“...when they come down to Colville Lake they kind of split up the herds.” (J. Martin Oudzi of Colville Lake in Sahtú Renewable Resources Board 2007:114, lines 13-14).

In addition to these sources, the Community Conservation Plans for Tuktoyaktuk and Paulatuk provide additional detail about critical distribution (Community of Tuktoyaktuk 2008; Community of Paulatuk 2008).

Porcupine Herd

The Porcupine caribou range spans parts of the Northwest Territories, Yukon and Alaska; although the range crosses two major political boundaries, the Aboriginal people who share the caribou herd are strongly interrelated and shared Traditional Knowledge about herd distribution. According to Gwich’in Traditional Knowledge, the winter range of the Porcupine caribou in the Northwest Territories is extensive.

“The caribou disperse during the winter, with animals scattered throughout the winter range. The reason for this is that in winter, there is not enough food for all the caribou if they congregate in a relatively small area. Correspondingly, there are references to different wintering areas in many of the interviews. There is a specific Gwich’in word for “a place where caribou settle down for the winter”, or “Caribou winter feeding place”: Vinijàa tan.

This is an important notion for Gwich'in, as the ability of people to sustain themselves through winter relied on finding these places (Vinijàa tan). If conditions changed, for example if winter was harsh, or there was a lot of snow, the caribou would change their Vinijàa tan, and this could cause hardship for the people.” (Percy Henry of Dawson City summarized in Katz 2010: 29).

Figure 5 – Old Crow Gwich'in Traditional Knowledge – Porcupine Caribou (Yukon Land Use Planning Council 2006: Map 14, Appendix A)

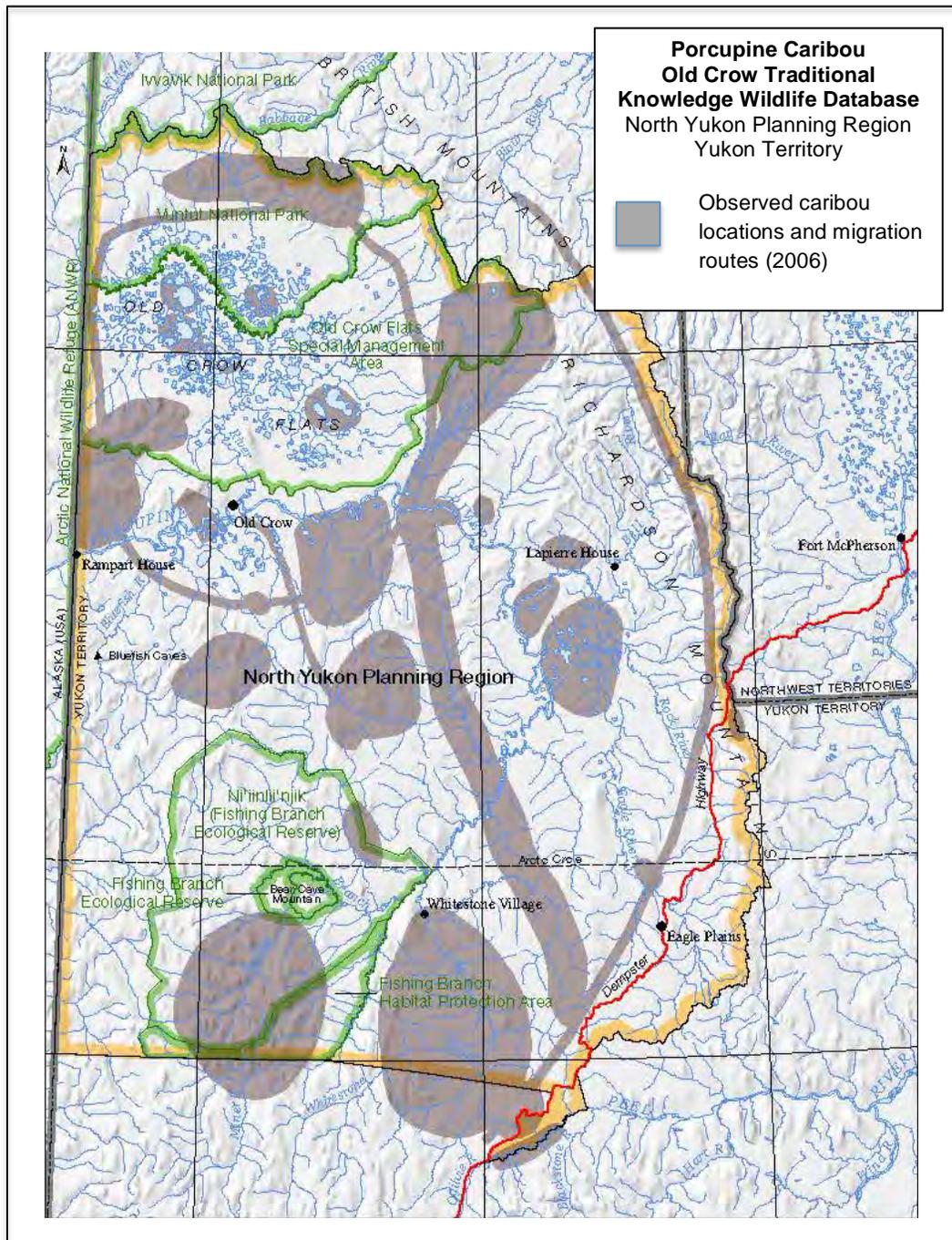
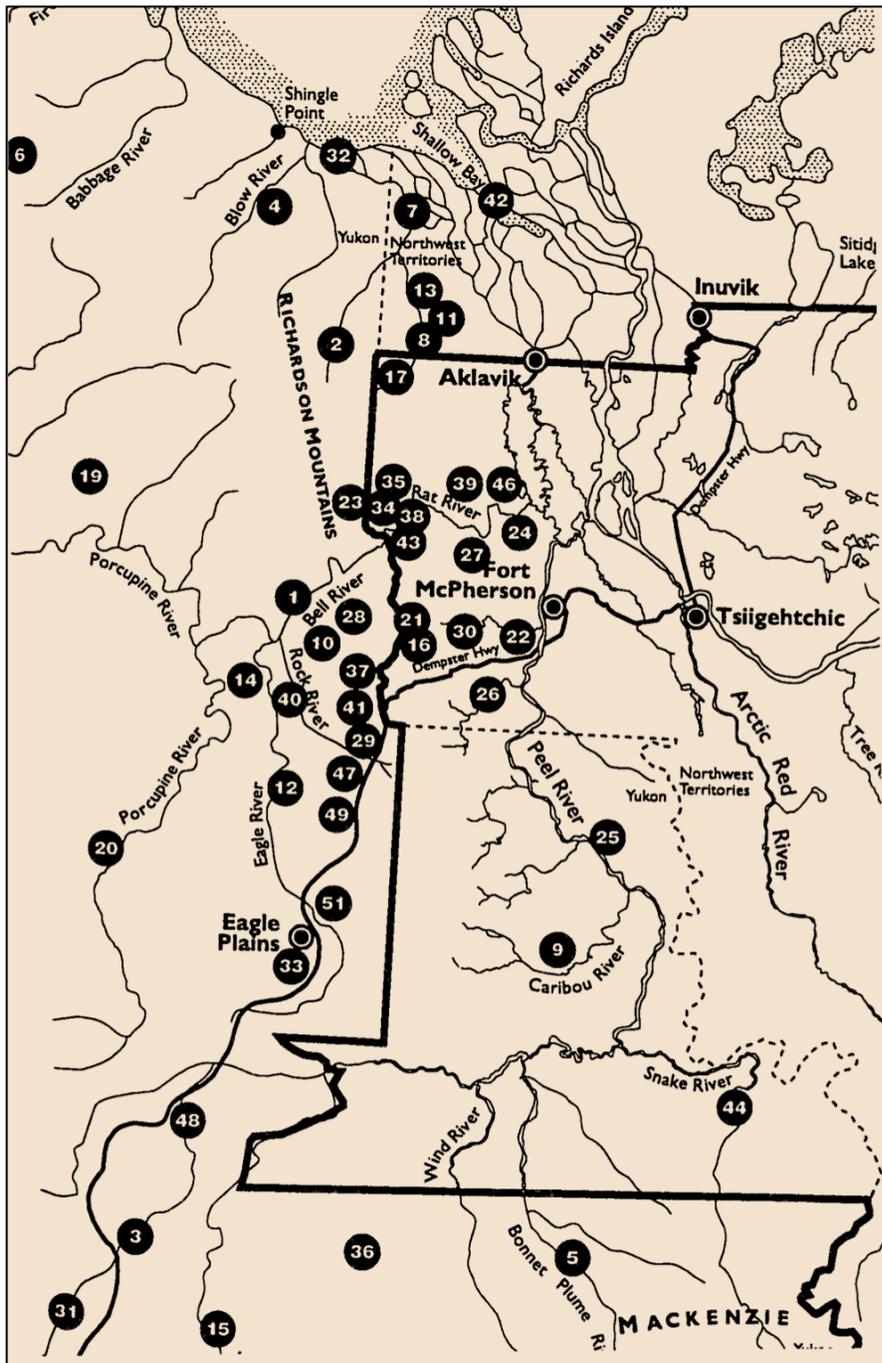


Figure 6 – Places we Hunt the Porcupine Vadzaih Herd

(GRRB 1997: 41)

Gwich'in Settlement Area of NWT and Yukon



1. Bell River
2. Big Fish River
3. Blackstone River
4. Blow River
5. Bonnet Plume River
6. Buckland Mtns.
7. Cache Creek
8. Canoe Lake
9. Caribou River
10. Curtain Mountains
11. Divide Lake
12. Eagle River
13. First Creek
14. Whitefish Lake
15. Hart River
16. James Creek
17. John Martin's Creek
18. Ogilvie River
19. Old Crow Flats
20. Porcupine River
21. Rat Pass
22. Stoney Creek
23. Summit Lake
24. Timber Creek
25. Trail Creek
26. Vittrekwa River
27. Bear Creek
28. Big Glacier Area
29. Black Sand
30. Brass House
31. Calico Town
32. Coal Mine Lake
33. Eagle Plains
34. Fish Creek
35. Horn Lake
36. Hungry Lake
37. La Chute Mtn.
38. Loon Lake
39. Rat River
40. Rock River
41. Scow Mtn.
42. Shallow Bay
43. Sheep Creek
44. Snake River
45. Stony Creek
46. Timber Creek
47. T'thal daii dha'aii
48. Ts'ok iitl'in
49. Vadzaiih Kan njik
50. Vihshraii nii vyaa
51. Vyah k'it gwinjik

The Porcupine caribou wintering ground thus varies from year to year but some core areas, such as Old Crow flats, are consistently important (Joel Peter of Old Crow in Katz 2010: 28). In the spring and summer, the caribou are further west. According to Robert Alexie Snr. (Fort McPherson) the calving ground has been consistently around “Caribou Mountain” for many many years; this area is called *Edigii Kak* which means young calf hill. According to Robert Alexie Snr., the reason it is the calving area is because there is usually a lot of wind [which keeps flies away] (Robert Alexie Snr. of Fort McPherson in Katz 2010: 28).

Some areas where the Gwich'in of Old Crow (Yukon) consistently have observed caribou in the Porcupine range are found in Figure 5. Areas where the Gwich'in communities of the Northwest Territories have commonly found and hunted caribou are found in Figure 6. These maps do not denote the seasonal nature of these observations.

The Gwich'in assert there is no mixing of the Porcupine and Bluenose West herds.

“It is well known that Vadzaih from the Porcupine herd never cross to the east of the Mackenzie River, nor do Vadzaih from the Bluenose ever cross to the west side.” (Gwich'in Renewable Resources Board 1997: 20).

In addition to these sources, the Community Conservation Plans for Tuktoyaktuk, Aklavik and Inuvik provide additional detail about critical distribution (Community of Tuktoyaktuk 2008; Community of Inuvik 2008; Community of Aklavik 2008).

Search Effort (How do people know about caribou?)

“Search effort” generally refers to how knowledge is generated. While the term generally refers to biophysical observation, Inuvialuit, Dene and Métis knowledge of caribou in the NWT also comes from generations of being closely connected to and dependent on caribou. Oral histories relay previous observations as well as beliefs and interpretations. Most Traditional Knowledge related to caribou corresponds with the traditional use areas of the Aboriginal communities². The state of barren ground caribou in other areas beyond traditional use areas are thus less known; the uncertainty of caribou existing in other areas is well accepted however, as elders commonly refer to caribou as coming and going to and from unknown areas (GRRB 1997; Thorpe 2001; Parlee *et al.* 2005; Legat 2012). No sources were identified that were specific about areas that the species is not found or should be “checked” (as per the Species at Risk Guidelines). See section on *Distribution Trends* for more information.

² Traditional land use data for most Aboriginal peoples in the Northwest Territories is proprietary, particularly in areas where there are unsettled claims. Spatial data delineating valued caribou harvesting locations is not available for analysis for this report.

Distribution Trends (Are the places caribou go changing?)

Bathurst, Beverly and Ahlak Herds

Many elders and hunters have good historical records (oral histories) about caribou distribution dating back to earlier in the century. Oral histories, coupled with contemporary observation, can reveal significant detail about the changes in distribution over time. In some cases more than 100 years of knowledge on distribution has been documented (Thorpe 2001; Parlee *et al.* 2005; Beaulieu 2012; Legat 2012).

A northerly shift in the fall/winter distribution of these three caribou herds has been noted over the last half century, such that there are fewer caribou now being observed in Saskatchewan and Manitoba than in earlier years (Spak *et al.* 2005). Specifically, Aboriginal peoples from northern Saskatchewan and northern Manitoba talk about shifts in the range of the Beverly and Qamanirjuaq herds, noting the range has shifted or contracted northward over the last several decades leaving them without caribou (Urquhart 2008).

Traditional Knowledge of Tłı̨ Ch̄, Kitikmeot Inuit, and Łutsël K'e Dene suggest Bathurst barren-ground caribou ranges (including calving grounds) have shifted or contracted in the last two decades (Golder 2010; Whaèhdòd Nàowòd Ko - Dogrib Treaty 11 Council 2002; Parlee *et al.* 2001; Thorpe 2001). For example, Łutsël K'e Dene have observed greater availability of caribou east of ƛeda cho Kué (Artillery Lake) than in the past when they were more abundant west of this region (Parlee *et al.* 2014).

Bluenose West, Bluenose East, Cape Bathurst Herds

There have been no trends identified in the Bluenose West, Bluenose East and Cape Bathurst region with the exception of the ups and downs in population (See section on ***Abundance***) and the impact of resource development and climate change as discussed in the section on ***Threats***.

Porcupine Herds

There have been no trends identified in the Bluenose West, Bluenose East and Cape Bathurst region with the exception of the ups and downs in population (See section on ***Abundance***) and the impact of resource development and climate change as discussed in the section on ***Threats***.

Habitat

Bathurst, Beverly and Ahiak Herds

There are many different concepts and translations for habitat in Aboriginal languages. Among these is the Tłı Chọ concept of dè:

“The closest Tłı Chọ concept to the scientific concept of habitat is dè, which is also similar to the scientific concept of ecosystem. Caribou dè includes everything that is in the space the caribou inhabit, including, among other things, the human spirit, predators, snow depth, ice cover, pests, vegetation on which they depend, humans and human behaviour, water, landscape, wind and temperature. Tłı Chọ harvesters have observed that changes to the habitat result in changes to caribou migration and distribution.” (Legat et al. 2001: 5).

As a result of harvesting caribou (i.e. cleaning the caribou guts, stomach), many Aboriginal peoples have detailed knowledge of caribou food.

“People know what caribou eat from the contents of the stomach and from how the meat tastes. When you are butchering a caribou, you look in the stomach and you can recognize pieces of tundra plants that are partly digested. This is one way to tell what kinds of vegetation caribou like to eat. Another way is to notice the changes in how the meat tastes during the different seasons. Caribou taste like grass in the summer.” (Allen Kapolak Bathurst Inlet in Thorpe et al. 2001: 132).

The taste of the caribou meat is a good indicator of the habitat that is valued by the herd.

“Other caribou doesn’t taste the same, you know, it tastes different in all different parts of the country. Around the treeline it tastes more woody. Where I come from it tastes more like the moss, the land.” (Harvester in Parlee and Furgal 2010: 24).

Caribou fat is used as an indicator of the quality of habitat in the Bathurst, Beverly and Ahiak range (Moller et al. 2004; Lyver 2004). Fat is used as an ecological indicator of caribou health and can be a signal of change in habitat condition. Using this indicator, habitat conditions are said to vary in areas northwest versus northeast of Great Slave Lake as described by an elder from the region (Lyver and Gunn 2004; Thorpe 2001; Parlee et al. 2005).

“On the north side of the lake (Great Slave Lake) by McKinley Point the caribou are really skinny. The caribou that travel down

south (around Nanacho Lake) and then come back up here (to Łutsël K'e) are fat because they spend all their time feeding.”
(Liza Casaway of Łutsël K'e in Lyver 2002: 47).

Łutsël K'e hunters have reported that quite often the caribou can over-winter in different geographic groups and that the groups vary quite considerably in body condition. Hunters suggested during late winter 2000 that cows harvested from the Nanacho Lake region (approx. 120 km.) southwest of Łutsël K'e were in better condition than the cows located around McKinley Point-Yellowknife region a distance of roughly 100 km. (Lyver and Gunn 2004:47). As noted by Lyver and Gunn, this perception (detailed above) is affirmed by preference for caribou hunting in this area (93%) (Lyver and Gunn 2004: 47).

Porcupine Caribou Herd

Habitat is understood as the home of the caribou or the environment in which the caribou depends for its life. The Gwich'in suggest, caribou (Vadzaih) “like to live where there is enough food, where it is safe from danger, and where they can see for a long distance” (GRRB 1997: 20).

“Most of the time they stay where their food grows, for example around muskeg, high timber and hills. Vadzaih sometimes stay on step ridges in the mountains to sleep at night and if there is any grass, to feed during the day. Vadzaih will also feed on grass around the lake edges and from the bottom of the lakes, just like moose. Vadzaih also look for places with salt... and do not like burnt places.... They like to travel in the bush, where the snow is soft compared to the tundra and therefor it is easier to dig for food.” (GRRB 1997: 20).

Bluenose West, Bluenose East and Cape Bathurst

There is no Traditional Knowledge / Community Knowledge on habitat documented for the Bluenose West, Bluenose East and Cape Bathurst Herds other than that related to the impacts of climate change and resource development as discussed in the section on ***Threats and Limiting Factors***.

Habitat Requirements (What kind of land and food do caribou need to survive?)

Barren-ground caribou depend on large areas of the NWT; as discussed in the section on ***Threats and Limiting Factors***, elders emphasize the lack of barriers to caribou going where they want to go suggesting their belief in the importance of contiguous habitat requirements (i.e., the summer, fall and winter range need to be interconnected). They have different habitat preferences during spring calving and fall/winter months. Many of the Aboriginal peoples who have talked about

habitat emphasize ecological diversity, alluding to the role that caribou play in a complex web (Legat *et al.* 2008; Parlee *et al.* 2001; Thorpe 2000, 1998). For example, an elder from Aklavik described the complexity of the habitats of the Mackenzie River Delta and Richardson Mountains, which are home to the Porcupine caribou:

“The Delta is not without natural resources and can support various animals on the Delta itself, and is an excellent habitat for muskrat and beaver, while the Richardson Mountains provide good pasture for caribou, and the area east of the Delta has supported reindeer for many years. Fish are plentiful, and the sea provides seals and Beluga whales. Muskrat, I guess, is our main resource here and caribou.” (F. Flanik of Aklavik in Aklavik Berger Commission Community Transcripts 1975: 20, lines 8-14.).

Given their knowledge of stomach contents, people in the Bathurst range (Kitikmeot Inuit) say that caribou eat lichen in the winter and fresh tundra vegetation in the summer.

“Caribou mostly eat lichen in the spring. Their stomachs are always full of lichen.” (Mary Kaniak Bay Chimo in Thorpe *et al.* 2001: 134).

Willow, alder, labrador tea, grasses, and mushrooms are also documented sources of food (Thorpe *et al.* 2001; Katz *et al.* 2010). In the winter time, the caribou are less picky as described by this Gwich'in elder:

“Sometimes in the winter, like this year [2009-2010] when there is deep snow... there is a bunch of caribou in the mountains.... And there is deep snow.... They'll eat those caribou leaves and stuff like that because there is hardly any food.” (Stanley Njootli from Old Crow in Katz 2010: 27).

According to studies on habitat and body condition of caribou in the Tlį Chọ and Łutsël K'e Dene regions, the health of the caribou is determined by several aspects of the habitat, as shared below. A variety of ecological factors were identified by elders as affecting body condition including distance traveled (migration), weather related variables, spring rain creating a crust over the snow, disturbance in the habitat and forest fire among others (Lyver and Łutsël K'e Dene First Nation 2005:48).

“When it rains or snows the caribou can continue to get really fat. When it rains, the food kwetsi [rock tripe] gets moist and swells.”

That's the caribou's best food because they get very fat on it". (A Wedawin of Gamet'i in Legat et al. 2008: 12).

Insect harassment is also cited as an important aspect of habitat selection by caribou.

"In the summer, Vadzaih travel down to the coast where it is cooler, windier and there are fewer mosquitoes to harass them. When the flies and mosquitoes are bad, Vadzaih will sometimes try and escape [them] in the shade of thick timber or they stay close to lakes so they can escape into the water." (Gwich'in Renewable Resources Board 1997: 21).

Calving grounds are critical areas of habitat, which are unique in terms of climate (good weather), and the availability of rich plant life necessary for the nutrition and development of young calves and nursing cows (Naikak Hakongak in Thorpe *et al.* 2001). Highly exposed areas where snowmelt and vegetation growth is early and well developed are important. Shady areas where cows and calves can escape from the sun are also important (Thorpe *et al.* 2001). Landscape features within the calving region also offer protection from predators including wolves, grizzly bears and wolverine (Golder 2010).

Habitat Availability (How much land is occupied by caribou?)

The question of how much suitable habitat is occupied is not well covered in the available Traditional Knowledge sources. Indications can be found in the section on *Distribution*. Changes in the availability of habitat are discussed under *Habitat Trends*.

Habitat Fragmentation (How is the land available to caribou being cut in pieces?)

Caribou have always been free to move wherever they needed to go in order to survive. Natural fragmentation or barriers to caribou movement include large areas of open water, steep mountain ranges or very rocky areas (Parlee *et al.* 2005; GRRB 1997; 2001). As a consequence, water crossings and mountain passes are critically important. In recent years, habitat fragmentation has increased in many areas of the NWT due to the increase in roads and road traffic, pipelines, mining and exploration activity. Habitat fragmentation is most well documented in the scientific literature for the Bathurst caribou range, but there are also concerns in other ranges. These concerns are discussed in the section on *Threats and Limiting Factors*.

Habitat Trends (How is the land and food important to caribou changing?)

Caribou habitat is affected by many interrelated influences including climate effects including forest fire impacts, competition from invasive species as well as human uses including natural resource development (See *Threats and Limiting Factors*). The main mechanism is the loss or

degradation of habitat which some elders perceive to be irreversible due to the sensitivity of many plant species such as reindeer lichen. Although some lichens may come back within 30-40 years, some elders argue that if lost, the lichen will never come back, or not come back for many generations (Pierre Marlowe in Parlee *et al.* 2005: 34). Such habitat losses create further risks of habitat fragmentation according to some elders and limiting freedom of movement and seasonal migration as described here by work in the Tłı̨ Chọ.

*“Tłı̨ Chọ elders and leaders recognized earlier when they discussed the problem in the mid 1990s. They considered the problem to be the result of shrinking caribou habitat caused by increased resource development restricting foraging possibilities for caribou, increased air pollution causing caribou to be confused as to the location of lush vegetation due to unfamiliar smells and noise;, and the destruction of several key water crossings due to pit and road locations. In the mid-1990s the elders with whom we worked also considered the shrinking caribou habitat was to be the result of increased air pollutants settling on plants and in the water, which, in their opinion, slowly destroys wildlife habitat. The elders were, and continue to be, concerned about the behaviour of humans, as they know humans are responsible for the loss of caribou habitat, air pollutants – including noise and smells – and the loss of viable water crossings.” (Legat *et al.* 2008:1).*

As further discussed in the section on ***Threats and Limiting Factors***, concerns about habitat loss and degradation are well described for the Bathurst range, through research by the Tłı̨ Chọ, Yellowknives Dene and Łutsël K’e Dene First Nation (Ellis 2005; Paci 2004; Parlee *et al.* 2001, Łutsël K’e Dene First Nation 2001; Parlee *et al.* 2000; Legat 1998) as well as the neighbouring Inuit (Golder 2010; Thorpe *et al.* 2001). Noise, fences, roads, dust on “caribou food” (e.g. lichen), coupled with the risks of long term contamination of water and lands surrounding diamond mining projects and mining exploration sites in the Bathurst range have been growing since the early 1990s (Legat *et al.* 2008: 1). As in other sections, there are fewer sources of documented Traditional Knowledge and Community Knowledge for other regions. There are some exceptions. A large body of Traditional Knowledge was gathered during the Berger Inquiry and the recent Joint Review Panel of the Mackenzie Gas Project covering almost all regions of the NWT, particularly from those peoples living west of Yellowknife (Imperial Oil *et al.* 2007). More details on these trends are found in the section on ***Threats and Limiting Factors***. However, the summary argument is that there is a trend toward too much activity on the landscape (in areas of caribou habitat).

“We are concerned about the cumulative effects of all activities - mines, hydro, roads, outfitters, and fishing lodges . . . We have to be sure we do not sacrifice our environment, as caribou is our food.” (Violet Camsell Blondin of Behchokò in Kofinas *et al.* 2000: 9).

Biology and Behaviour

Life cycle and Reproduction

Cows calve in spring with calving dates ranging from May-June (GRRB 1997; Thorpe 2001). The summer months are important for “fattening up” particularly for new calves, and nursing cows. During fall (late August – October) caribou make their way to wintering areas with the rut (breeding) occurring sometime in late September-October. The return to the calving grounds begins at the time of spring melt and the return to the fall and wintering grounds at the time of freeze up.

“Later, when it starts to freeze-up, they start to migrate into our land. It is said, the ekwo have a leader, who is the mother of a large bull. When many ekwo are migrating, she goes ahead of them and they follow her. That is the way they roam on the land. They feed on the land and go to wherever they remember a good feeding area. She goes ahead of them to these places. She goes ahead of the other ekwo. That is what they do and that is how they travel to places where it is good for feeding. They really know the land.” (Rosalie Drybones of Behchokò in Whaèhdôö Nàowoò Kö, and Dogrib Treaty 11 Council 2001: 33).

The life cycle of barren-ground caribou is described in different terms than is common among scientists; the availability of knowledge depends on the location of the community within the range. The Tlì Chò, for example, have specific names for caribou at various stages of their life cycle that more clearly speak to their experience of seeing and harvesting caribou during the fall and winter months (Table 3). The Denesøliné and Gwich'in also have different names for caribou with emphasis on their observations during fall and winter months (Tables 4, 5). Coupled with assessments of body condition (see Physiology and Adaptability), many harvesters and elders can anticipate changes in the health of the herd including successful calving and consequently rate of population growth (Lyver 2005).

The stability and growth of barren-ground caribou populations are highly dependent on successful spring calving and the survival of calves during the first few months of life. Cows that are in good condition will calve each year after the age of maturity (i.e. 3 years); those in

poor condition are less likely to become pregnant or more likely to produce calves that are unable to survive (Lyver 2005).

Table 3 - Tlį Chọ Taxonomies of Caribou Age
(Whaèhdôö Nàowòö Kö and Dogrib Treaty 11 Council 2001:26)

Tlį Chọ Taxonomies of Caribou Age	
dets'è	mature female caribou
dets'èa	young caribou cow
k'ôôtsia	recently born in summer, first winter
ts'idaa	immature female caribou
Wedziaa	small bull caribou
Wedzih	biggest bull caribou
Wezhàa	mother caribou
Whaàtsia	second year caribou calf
yaagoa	third year bull caribou / next in size to yaagoo
Yaagoo	bull caribou next in size to yaagoocho
Yaagoocho	fourth year bull caribou/next in size to wedzih

Table 4 – Denesłiné Names for Caribou Etthën ha ʎenalze: Knowing the animal
(Adapted from Parlee *et al.* 2001)

Table 5 - Gwich'in Names for Vadzaih
(Adapted from GRRB 1997: 19).

<p>Denesłiné Names for Caribou Etthën ha ʎenalze Knowing the animal</p> <ul style="list-style-type: none"> • Beàtsicho – old bull • Yalghus – younger bull • Ts'udâ - cow • Deyeth ʎaze - teenager • Tthaze – 2 year old • Betsiʎaze – less than a year 	<p>Gwich'in Names for Vadzaih</p> <p>Vadziah Choo – Bull Caribou</p> <p>Dazoo tsoo – Two Year Old Bull</p> <p>Dazoo – Young Bull (older than two years old)</p> <p>Vanagwahgwan – spring bull</p> <p>Khaints'an – a fall bull</p> <p>Atsanh – a rutting bull</p> <p>Vadzaih tsal – a cow caribou</p> <p>Vadzaih njoo – an old cow</p> <p>Egii – a very young calf</p> <p>Thehtsii – a lone caribou</p> <p>Shrii t'iyah'ii – caribou that stay in cool places</p>
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The nature and extent of knowledge held about the life cycle of caribou is determined by the location of the community within the range. Many of the Dene communities in the NWT for example, have detailed knowledge of caribou life cycle during the fall and winter months. There is less knowledge about the spring and calving period among these communities (See Table 4 and Table 5).

A key principle of harvest management by governments and co-management boards during low numbers is to “stop hunting cows” – essentially to preferentially hunt bulls. This is apparent from many of the reports and Harvest Management Plans developed for the Bathurst, Porcupine and Bluenose East and Bluenose West caribou herds. However, this practice is seen as problematic for reproduction of the herd according to many Dene hunters.

“Some Dene harvesters have made it known that they are concerned about such an approach. Their objection may be based on the fact that more cows than bulls have been harvested in winter for many generations without seriously affecting the herd size or productivity, and an increased harvest of bulls could remove prime breeding bulls that would otherwise maintain a high conception rate.” (Ruttan 2012: 100).

Physiology and Adaptability

There are numerous ways in which Traditional Knowledge holders describe the health of caribou with body condition (“fat”) being a primary reference point (Moller *et al.* 2004).

Bathurst Caribou

Body condition of the Bathurst caribou is said to highly dynamic - varying among animals and between years. Aboriginal languages provide valuable insights into the categories through which harvesters identify and assess these changes in body condition (e.g., Table 6).

Table 6 - Tlį Chọ Terminology for Caribou Parts (Whaèhdöö Nàowò Kö and Dogrib Treaty 11 Council 2001: 26)

Tlį Chọ Terminology for Caribou Parts			
Deghō	caribou hair	ʔenōhgō	long and fatty part of stomach
detā'ō	caribou hide with thick, bushy fur	ʔenōhgōwō	caribou intestine
ʔedza	hind legs	ʔekwōō	bones
ʔedzekw'ōō	cartilage inside the caribou heart	ʔenōkw'ōō	backbone
ʔedzets'ìì	tendons of the caribou heart	ʔet'ōōkwō	nose meat from around the eyes
ʔeghatsìì	stubble on caribou hide	ʔetsìhta	breast meat of caribou
ʔeghohkwō	meat from the thigh and buttocks	ʔewō	caribou hide
ʔekè	caribou hoof		

Healthy body condition is often referred to or is translated as “good looking” as described here by J.B. Rabesca:

“Good-looking caribou — their horns look nice and their fur is pretty white. By that you know the caribou is fat...during the [late] fall you don't shoot the male caribou because they are skinny. They

don't eat at that time because [of the rut] — they are chasing the female caribou.... When you shoot a caribou, the first thing you do is check if the caribou is fat by cutting in the middle of the stomach. If the caribou is fat, the hunter is happy.” (J.B. Rabesca of Łutsël K'e in Parlee *et al.* 2005: 32).

Interviews with elders and active harvesters from Łutsël K'e Dene First Nation (2002) concluded that, in the Bathurst and Beverly caribou range: brisket and back fat are the main indicators of body condition used; fat on back, kidneys and around the stomach were also used as indicators; body condition of female / bull caribou varies between years the amount of fat on caribou varies between years; and harvesters favour cows in later winter because of higher fat. Differences in body condition are noted with age of the caribou (Lyver and Gunn 2005).

Females have historically been prized as having the best meat, particularly during the fall period of the rut (Lyver *et al.* 2005). However, J.B. Rabesca indicated cows were also hunted all year.

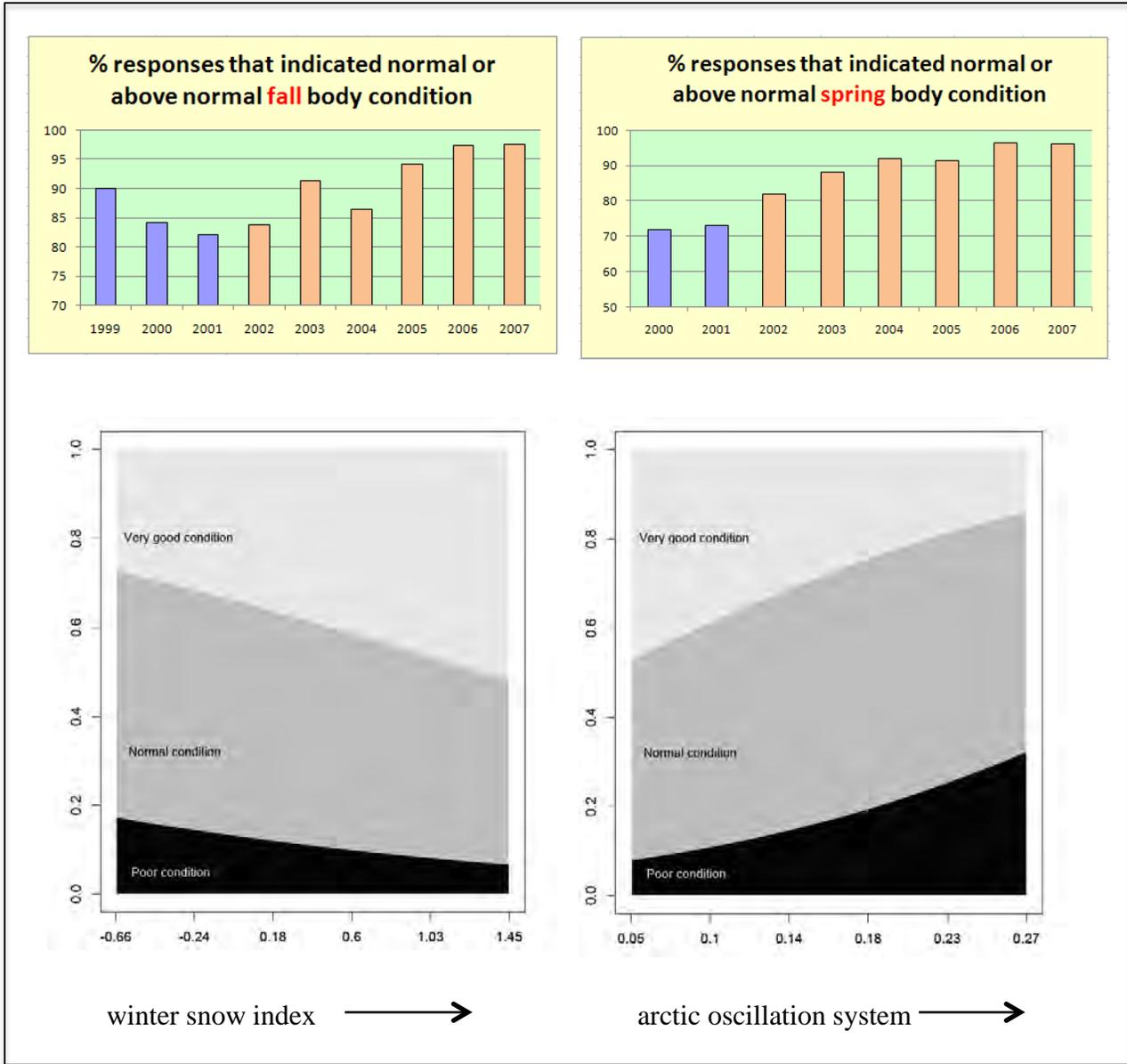
“We hunt females year round. They are hunted in winter, but the best time of all is in the spring (late winter).” (JB Rabesca of Łutsël K'e in Lyver 2005: 47).

Since late 1990s, elders from the Tlį Chọ communities have commented on caribou not being as fat as they used to be. “Today the caribou are not fat and tasty,” (Philip Chocolate in Legat *et al.* 2008: 26).

“There are hardly any fat caribou around now. Even their bone marrow has no more taste to it. A lot has changed. Could it be because of the wildlife management? It is because nobody does anything or says anything to those Wildlife, Economic Development, and Renewable Resource people. That's the reason why they still put radio collars on the caribou and other animals. And they use a tranquillizer to put animals to sleep that spreads throughout the animal's body, which does not make the meat tasty.” (Moise Martin of Behchokò in Legat *et al.* 2008: 27).

Body condition indicators monitored by community members involved in the Arctic Borderlands Knowledge Coop suggest the Porcupine caribou were improving in condition or health from 2001-2008 (Svoboda *et al.* 2013; AHTC 2009). Cross referencing this data with other community and scientific data on climate revealed a correlation between poor condition and snow depth (c in Figure 7) and improving body condition with fewer climatic events associated with the theorized North Atlantic Oscillation system (Svoboda *et al.* 2013).

Figure 7 – Body Condition of the Porcupine Caribou
 (Svoboda *et al.* 2013)



Interactions

Interactions with other Caribou

Due to the differences in views among and between scientists and Traditional Knowledge holders about the definition of “herds”, some Traditional Knowledge has been documented to defend the belief in herd interaction or intermixing. (see section on **Distribution**).

Mixing of barren-ground caribou with boreal woodland caribou has also been documented in some areas. Traditional Knowledge holders from northern Saskatchewan stated the following:

“There used to talk of barren ground caribou (60 years ago) reaching La Ronge, woodland caribou follow the small ones back up north, that is what the old people thought from this area; It is believed that the woodland caribou left with the barren land 50 years ago” (Carriere 2010: 108).

In the Sahtú region.

“[There] was the general agreement between communities of the relationship of boreal caribou with barren ground caribou. Several comments indicated that the two subspecies are seen traveling together and mixing together in the winter.” (Cluff *et al.* 2006: 7).

In the Tlį Chọ region, however, the two sub-species are perceived as “afraid of one another” as described by this elder from Behchokö:

“There is a rule not to wear any caribou hide clothing of woodland caribou when hunting towards the tundra. These two types of caribou are afraid of each other. Our parents used to tell us these sort of things, don’t wear woodland caribou moccasin or mitts or carry anything like gun case or shell bag that is made from woodland caribou when you go hunting. Barren ground caribou will know and it will take off so fast. You have to respect both. That’s the rule.” (Matton Mantla of Behchokò in Legat *et al.* 2008: 15).

Interactions with Other Grazing Wildlife

Barren-ground caribou can be found in many different areas of the NWT and share habitat with other grazing animals, including moose, muskoxen, wood bison and more recently white-tailed and mule deer populations. An elder from Behchokò suggests the caribou are fearful of bison.

“Hunters are not to wear bison clothing either, or the barren ground caribou will run off.” (R. Wetrade of Gameti in Legat *et al.* 2008: 22).

In some areas, Aboriginal people have raised concerns that muskoxen and caribou do not mix well and when the muskoxen population increases, caribou populations are in decline. Some perceive this as a causal relationship, blaming muskoxen for caribou going away (Parlee *et al.* 2001). This perspective is more common in the range of the Peary caribou.

Moose and caribou overlap in many parts of the NWT, including areas of the Bluenose West and Bluenose East caribou ranges and the Bathurst range. According to some elders, increasing moose populations can occur during periods of caribou population decline. The late elder Pierre Catholique reflected on his observations as well as oral histories about the Artillery Lake area (ᑭeda cho kué):

“Around Artillery Lake (ᑭeda cho kué), people lived only off caribou. Now there are lots of moose there too. It never used to be like that...” (Pierre Catholique of Łutsël K’e in Parlee *et al.* 2001: 50).

Interactions with Predators

Wolves and grizzly bears are the main predators of caribou and interactions with these animals are important to population dynamics of all barren-ground caribou herds. The number of animals taken by predators can vary depending on the number of wolves and bears in the range. Wolves depend heavily on caribou as their main source of food and are known to follow them during spring and fall migration.

Traditional Knowledge holders, however, do not usually frame wolves or grizzly bears as a “threat” to caribou. Wolves play a key role in ensuring the population is healthy. As is described by Gwich’in elders, the wolves are the “doctor” of the caribou herd (Padilla and Kofinas 2010: 17).

According to elders in Łutsël K’e for example, wolves are critical for taking the weaker and sicker animals in the herd. Traditional knowledge from both the Tłı Chọ and Łutsël K’e describe a symbiotic relationship between wolves and caribou (Parlee *et al.* 2001; Legat 2001). A similar perspective is visible in the Sahtu:

“... we can't blame the wolf... But the wolf is just like a doctor for caribou. If the wolf it doesn't bother caribou then he will die off. They kill only the one that are sick, they'd known that they're sick so they kill them; that's the -- that's the way the wolf are doing...”

(Jim Pierrot of Fort Good Hope in Sahtú Renewable Resources Board 2007: 82-83, lines 24-25).

At the same time, there are stories about too many wolves having a negative effect on caribou numbers. Some Tłı̨ Chọ elders raised concerns in 2007 that the ratio of wolves to caribou had increased (Legat *et al.* 2008). The changes in such population ratios depend on habitat as discussed in this quote.

“Sometimes the wolves are healthy because their habitat is lush, and sometimes the caribou are healthy because their habitat is lush – it balances out if you watch over a long time. That’s what my elders told me and that’s what I have observed.” (A. Arrowmaker of Behchokò in Legat *et al.* 2008: 30).

The decline in wolf hunting in the Tuktoyaktuk region is suggested as a cause of increasing numbers of wolves and the decline of caribou:

“As far as Tuktoyaktuk on the mainland here, that’s where I’m originally from, they have the Bluenose and they hunt in all the different herds from this area. And what I’m hearing is that they’re seeing a lot of large wolf packs and the people in that area aren’t hunting wolves as much as they used to, so that might be one reason why there is a decline because there’s too many wolves.” (Tuktoyaktuk Hunter in Parlee and Furgal 2010: Transcript Appendix).

Human Interactions

Aboriginal people in the NWT have a relationship to caribou that is spiritual and cultural as well as physical. Many people see people and caribou are familial relations. Some clear evidence of this perspective comes from Denesöliné and Slavey oral histories (Andrews *et al.* 2009; Andrews and Zoe 2005; Andrews 2000; Johnson and Ruttan 1995). For example, Zepp Casaway from Łutsël K’e tells a story of the “Caribou and the Tiny Tiny Man” about how a Dene man was born from a caribou hoof (Parlee *et al.* 2001). Other stories come from the Sahtu region (Blondin 1997; 1997). George Blondin tells of the connection between a boy and his friends the caribou:

“The boy had asked his caribou friends to come and get him. He was too strongly attached to them to stay human, and had decided to become a caribou.” (Blondin 1990: 70).

The Tłı̨ Chọ story published recently as “Legend of the Caribou Boy” tells of a similar physical and spiritual connection between Aboriginal people and the caribou (Blondin and Blondin 2009). Others describe this relationship as being similar to that of a family or relatives.

“My father and my grandfather they spoke about it, and they used to tell us like the habits and what was going on with the caribou. They also told us that the caribou knows Deline as people, our thoughts, how we want to, like what we want to do, like, with them as animals. Things like that, that's why they said it's no good as elders, they said it's no good to talk about it too much.” (Sarah Kochon of Colville Lake in Sahtú Renewable Resources Board 2007: 117-18, lines 1-9).

Many of the Dene oral histories speak to the time when caribou and the Dene people spoke the same language and could understand each other. In other oral histories caribou are referred to more like spiritual leaders who understand the future (Parlee *et al.* 2001).

“The ʔekwö are not human. They are not human, but like prophets they can foresee everything that's on this part of the land. They don't talk, they don't understand one another but still, that's the way they roam on the land... As for the ʔekwö leader who they follow, she was born with the grace of God and it is like she knows what is up ahead of them. That's the way it is with the ʔekwö. In the old timer's way, they're like our relatives and we depend on them, so we are really happy. In the same way, they know they will not live but they are happy too...” (Rosalie Drybones in Legat and Tlį Chọ 2012: 90).

The life cycle of barren-ground caribou is seen as directly interrelated and in balance with other elements of the ecosystem including harvesters. Part of the life cycle of the caribou may be to give itself to the hunter or know when people are in need. “One time Johnny fed the whole community by feeding all the people when they were starving... He called the caribou back to the community by rubbing two sticks together” (Dokis 2010: 51). Some Dene hunters emphasize that this is not a predator-prey relationship but is more spiritual in nature. Whether the hunter is successful depends on the degree of respect shown to the animal and other aspects of his/her relationship with the land, his/her community and the creator. Ultimately it is the caribou who decides to give itself as a gift to the hunter (Smith 1971).

“The land is a living thing. If you don't use the land, it's not alive. So the caribou knows that. He knows you have to live off it to survive out there.” (Wilbert Kochon of Colville Lake in Sahtú Renewable Resources Board 2007: 61, lines 6-10).

“We were taught how to respect the caribou and the moose. [It's] very important that we use every part on a moose and caribou.

Like when we used to move around like that, used to bring all of that, clean that and, guts and everything and bring it home. And that's what we go for. Nothing is wasted. The skin, mom used to cut the hair off. She tans the skin in the spring time. And then the caribou legs, she cleans them. She boiled the caribou hooves. The bone she used to pound it up and make bone grease too.” (Camilla Rabesca of Fort Good Hope in Parlee et al. forthcoming).

It is a well-established belief in numerous Dene Traditional Knowledge reports that caribou do not come back to the people if they are disrespected.

“It is generally believed by the Tlį Chọ that the ʔekwö migrate to people who live well and behave properly. When I was a young man I lived at What'i, there used to be a ʔekwö around there at the time. But someone had hit the ʔekwö with the stick, and the elders had said if you guys [the older elders] are right, next year there will be lots and lots of ʔekwö. Sure enough that next year there was ever lots of ʔekwö. But that next year after that, there was no more ʔekwö. Because the ʔekwö was hit, that's why. Now I'm over seventy years old. From then on [and] for the next thirty or forty years thereabout, only then will the animal return they say...” (Johnny Eyakfwo of Behchokò in Legat 2007: 25).

The availability of caribou has always varied significantly throughout the NWT and from year to year (Arnold 1989; Asch 1977; Petitot 1893); consequently Aboriginal harvesting practices and economies have had to become flexible and adaptive (Wesche and Armitage 2010; Nuttall *et al.* 2005; Ridington 1988; Smith 1978). Continued evidence of such adaptive capacity is evidenced in community responses to climate change (Wesche and Armitage 2012; Jolly and Berkes 2004). Recognizing the risk of overhunting, it is demonstrated that people hunt many other species when caribou are not available to ensure the sustainability of caribou and their communities (McMillan and Parlee, forthcoming; McMillan and Parlee 2013; Wray and Parlee 2013; Sangris 2012; Kofinas 1999; ABKC 2009). Although concerns about over-harvesting are raised in media reports, the meaning and context of “over-harvesting” is ambiguous given lack of research on the links between harvest and caribou population dynamics (Wray and Parlee 2013; Spak 2005; Sandlos 2004). The sustainability of harvest practices is more the norm (Wray and Parlee 2013; Senes Consulting 2010; Kofinas 1999; Madjaric 1999). Theories that there is very little impact from Aboriginal harvesting on caribou population dynamics is supported by harvest and consumption data from the past several decades which show caribou population numbers as stable while harvesting declines. Harvest levels are declining as a result of socio-economic and

cultural factors as younger generations become more integrated in the wage economy and have less time and skills for hunting (Stevenson 1999; Egeland *et al.* 2011; Kuhnlein and Freeman 1993; Brown and Burch 1992; Bone 1985; Duffy 1979). Data from the 1980s to 2011 suggest harvest ranges from two to 10 caribou per Aboriginal household on average per year (Parlee *et al.* 2012; PCMB 2010; Jingfors 1984). This is significantly lower than in previous decades for many communities that once relied almost entirely on fresh or dried caribou meat for six-eight months of the year (Helm 2000). As noted by one elder, in the 1970s, seven moose and 25 caribou would not last a month once shared with people in his community.

“He has been everywhere. He said he has killed many caribou. He has been on the North Shore hunting caribou. He has been hunting moose, fishing and whatever he gets he shares with the people of the community. He said this year he shot seven moose and 25 caribou and they didn't last him a month” (C. Neyelle in Fort Franklin Berger Commission Community Transcripts 1975: 704, lines 21-24).

“Our main diet is caribou and fish, muskrat, ducks and all that. When I am in the bush, nobody tells me what I can't kill. I kill to survive in the bush, so I guess everybody when they are in the bush there is no law, but in Aklavik, I think the main diet in Aklavik is mainly caribou, fish and rabbit and muskrat. I know my family eat about 30 caribou a year.” (F. Flanik of Aklavik in Aklavik Berger Commission Community Transcripts 1975: 24, lines 10-26).

The harvesting of caribou in the NWT is part of a system of resource management that is generations old. This system is based on the premise of respecting the caribou and is well detailed in many regional and community studies (Inuvialuit Regional Corporation 2006; Auld and Kershaw 2005; GRRB 1997; 2001).

“Dene Elders often point out that having respect for the animals is of paramount importance to the continued sustainable harvest.” (Morris Lockhart of Łutsël K'e in Spak 2005: 234).

“When I began talking to Dene hunters about their experience with the Beverly and Qamanirjuaq Caribou Management Board (BQCMB), many immediately stopped me in my tracks to point out that they did not see how one could manage caribou as if one

were God. One could only control one's own behaviour in order to ensure that it did not negatively impact on the caribou. An important aspect of this, they pointed out, consists of treating hunted animals with respect” (Spak 2005: 235).

Much of this resource management system is based on a conservation ethic (Treseder *et al.* 1999; Berkes 1998).

“You know, native people were self-government before white people. Before white people they were self-governing, they looked after everything - wildlife, fish, fur animals, their land, with respect for the land. They don't try to kill everything in one part of the country that -- on the land there. They – they know it's getting less, they go to the other part. They don't stay in one place for years and years 'til they kill everything. Even the fish Lakes too, they keep moving, they're like animals the native people.” (Charlie Barnaby of Fort Good Hope in Sahtu Renewable Resources Board 2007: 77, lines 19-25).

“Also we know the right time of the year to go hunting, either caribou, moose, or ducks, or muskrats. We follow these rules because our fathers and our grandfathers and their brothers and cousins, they all taught us since were small, to go by these unwritten rules. So that way we know that it's the right time of the year to get it, we don't go then when the bull is in, you know, and so we go from year to year following these rules. That was our unwritten law, like” (J. Archie of Aklavik in Aklavik Berger Commission Reports & Community Transcripts 1975: 3837, lines 5-20).

Limits placed on hunting cows during recent periods of population decline have been of key concern to elders in some regions who see the preferential hunting of bulls as upsetting the balance between breeding bulls and cows (Lyver and Gunn 2005; Legat *et al.* 2008). An elder from the Tlį Chọ explained the issues as follows:

*“Not too many caribou bulls should be taken. It is the law. If too many are taken there aren't enough to protect the females and the calves.” (Jimmy Martin of Behchokò in Legat *et al.* 2008: 20).*

Preferential hunting of mature bulls by sports hunters in the Bathurst range has similarly been a concern with some elders, who suggest that harvest of the oldest males is particularly

problematic as the herd depends on these animals as leaders and protectors of the herd (Legat et al. 2011). Traditional Knowledge research in the Sahtu region also suggests the importance of these leaders or old bulls which are called *bele yah* (William Sewi from Deline in the Auld and Kershaw 2005: 46). In the Gwich'in region the following are said about these caribou leaders:

“There's caribou leaders, there's a number of caribou leaders. Dazhoo tsoo is one of the leaders, he's a leader but yet he travels behind so dazhoo tsoo is a very important part of the caribou heard, vadzaih njoo' that's the older women vadzai njoo' is one of the main caribou leaders, it's like an old women wants the caribou start and all the caribou start moving. So, those are the two leaders that the Elders talk to me about a long time ago, so dazhoo tsoo and vadzai njoo' because they understand the migrate they go ahead, they go ahead of the heard and they just make trail. They know where to go according to the weather and the rain so those two are really important” (Old Crow elder in Padilla and Kofinas 2010: 15).

While in some areas, it is consistently the old bulls who are described as the leaders (who lead the migration), in the Gwich'in region, elders talked about caribou leaders in different ways. Large bulls are teachers who know the way; young bulls are the guards, trailbreakers and are “tricksters”; old cows are teachers, single cows with calves are scouts (Padilla and Kofinas 2010:15-17). In addition wolves are the doctors of the whole herd (Padilla and Kofinas 2010: 17). (See section on *Threats and Limiting Factors*).

Population

Structure and Rates

The available sources of traditional and community knowledge do not include estimates of the structure and rates associated with caribou population, but instead make observations of fluctuations in populations. (See section on *Fluctuations and Trends*).

Movements

Few harvesters and elders are comfortable predicting where and when the caribou are likely to travel, particularly in fall and winter months (Parlee *et al.* 2001; Thorpe *et al.* 2001). Movement patterns are interpretable to some extent by well-known crossing sites, passes, caribou trails and habitats. Well-worn caribou trails, eskers, and crossing sites (i.e. water crossings) being important indicators of where to locate caribou in any given season. This is also said to be true of the calving grounds by Inuit elders of the Kitikmeot region. The reciprocal relationship between people and caribou often factors into explanation about why the caribou migrate to

certain places year after year and why suddenly they might avoid some areas. The Denesöliné elder Alice Michel stated: “The caribou do whatever they want to do. You can’t know ahead of time what they are going to do (Alice Michel in Ellis *et al.* 2002: 70). Similarly a Sahtú elder stated the caribou have their own mind.

“They live the way they want to and they travel where they want to too and they don’t live by man.” (Sarah Kochon of Colville Lake in Sahtú Renewable Resources Board 2007: 117, lines 15-25).

The reciprocal relationship between people and caribou often factors into explanations about why the caribou migrate to certain places year after year and why they suddenly might avoid some areas. For example, the late Denesöliné elder Zepp Casaway said that the caribou come to his area because they know the people miss them and need them (Parlee *et al.* 1999). This seems consistent in other regions such as the Tłı̨ Chọ, as expressed eloquently by a Tłı̨ Chọ elder:

“..it is said that; when they see the people for the first time, they are really, really happy.” (R. Drybones in Legat *et al.* 2001: 21).

For some people the movements of caribou are the result of prayer; when people pray about the caribou to the Creator, they will come.

“...the caribou are like the creator, when they know you need them they will come to you; when you are alone and you pray to them they will come and you will have food and clothing. Like the creator they take care of us. When they know you are in need they will help you.” (Georgina Chocolate of Behchokò in Legat *et al.* 2001: 20).

Traditional Knowledge research however, does suggest harvesters know a great deal about distribution and movement patterns (e.g., Kendrick and Manseau 2008). Some Tłı̨ Chọ elders suggest the caribou movements are determined by factors such as the wind and the direction of the water flows.

“When caribou migrate they go by the wind (to help them decide which way to go), and at the water crossing, it depends on how the water flows.” (Jimmy Martin of Behchokò in Legat 2008: 11).

A study focused on Gwich’in Traditional Knowledge asserts the importance of caribou leaders who guide the herd in spring and fall (Padilla 2012). The Gwich’in Renewable Resources Board Traditional Knowledge study described the role of the caribou leaders as follows:

“Since Vadzaih are herd animals, there are usually at least two or three travelling together. A Vadzaih herd has one or several leaders, usually a large older bull or cow that everyone follows. If one leader is killed, another one immediately takes its place. Older Vadzaih know where to travel and where the food is so the rest of the herd follows them. The large herd also has up to six animals that are scouts. The scouts are usually young Vadzaih sent to look for food. They may travel long distances from the herd in search of a safe place with good food before returning to lead the rest of the herd back to that place. A hunter who finds the group of scouts should follow them because they will lead him to the main herd...” (Gwich’in Renewable Resources Board 1997: 20).

An elder from Aklavik highlighted the importance of caribou leaders many decades ago during the Berger Inquiry.

“From the time I could remember, the caribou came through there in the fall time and the springtime. Along the coastline they travel further inland. It has always been my observation, when there is a large herd of caribou travelling, if the first few, who are the leaders, turn in some direction, the others will follow, the herd. Ever since I was told by the Elders of my time, don't try to make noise or frighten the first herd leaders of the herd, because they are the ones very easy to scare away and very easy to turn. It has always been noticed by the people if you disturb the first leaders of the herd, the caribou, no matter how large a herd it is, they will, if the leaders of the herd turn any direction, all of the caribou that is coming behind will always follow, no matter what direction the leaders turn.” (Sam Arey of Aklavik in Aklavik Berger Commission Reports & Community Transcripts 1975: 21, lines 9-27).

Movement patterns are predicted by well-known crossing sites, passes or habitats. For example, studies with the Inuit of Arviat, the Denesöliné and Tłı̄ Chọ peoples reveal detailed knowledge of river crossings such as ʔeda cho at Artillery Lake (ʔeda cho kué) or Piqqaq, Akunni'tuaq, and Qavvavaujarvik on the lower Kazan River (Parlee *et al.* 2005; Stewart 2004; Charlebois 1999). Crossing sites on the Kazan River have been the most studied sites associated with the movements of the Beverly caribou (Chalmers 1989).

“Louie Whane’s father used to tell [him] a story. Louie’s father used to canoe to Kokeghotì with birch bark canoe. And to ʔekatì (Lac de Gras) where there is a mine today around that area there used to be lots of ʔekwö (barrenland caribou). Because there’s a place called Kwekaghotì (southern end of Point Lake) and that’s where there is a lot of ʔekwö, that’s where the water crossing is. That’s why there’s people living around that area.” (Eddie Lafferty in Legat and Tlì Chọ 2001: 20).

Major crossing sites such as “eda cho” or “Piqqaq” are known and well used - also many smaller sites the detail and use of which suggest the various intervals of use over time as in the case of the crossings on the lower Kazan used by the Baker Lake Inuit.

“Akunni’tuaq, the “big interval,” alludes to its relatively weak or subsidiary location between two powerful crossing sites... Qavvavaujarvik, the “place of ghosts,” also suggests a kind of transitional existence. ... Oral accounts simultaneously support the notion of permanence of crossings like Piqqiq and the unpredictable element—the awareness that caribou may pass over a certain crossing in a given year to use another one, or that they might not come at all.” (Stewart 2004: 205).

Tree root scars are an indicator of caribou activity at crossings and may be correlated to oral histories of old caribou trails as was the case in a previous study in the Tlì Chọ region and a more recent study with Łutsël K’e Dene First Nation (Zalatan *et al.* 2012; Festa-Bianchet *et al.* 2011; Boudreau *et al.* 2003). The Gwich’in have also highlighted key caribou trails as important predictors of barren-ground caribou movements in the Richardson Mountains near James Creek (e.g., Conservation Zone B in Figure 4 of Gwich’in Land Use Plan) (Gwich’in Land Use Planning Board 2003).

“Vadzaih have been following the same migration routes for thousands of years. There are old trails cut deep into the ground along these routes...Vadzaih never forget their old trails and come back to them after many many years of traveling through other places... the Vadzaih used to have a trail near James Creek but people do not see them use that country anymore.” (Gwich’in Renewable Resources Board 2001: 20).

Elders from the Łutsël K'e Dene First Nation refer to well-worn caribou trails which serve as indicators of where the caribou have been in the past and where they are likely to migrate in the future. Denesłiné elders such as Madeline Catholique talk about caribou trails (described in Chipewyan as etthën hutl'a and etthën kun) as important to their ability to track caribou in the fall and winter, as well as old caribou trails (etthën ekēlué) as the basis for understanding historical changes in caribou movements (Parlee and Łutsël K'e Dene First Nation 2012). Detailed Tłı Chọ classifications for different stages of the Bathurst caribou migration illustrate the specifics of movement at different seasons of the year (Table 7).

Table 7 – Tlį Chọ Terms Associated with Migration of ʔekwö (Legat *et al.* 2001: 16)

Terms Associated with Migration of ʔekwö	
Detsiilää ʔekwö	ʔekwö that winter in the boreal forest
Hozı ʔekwö	ʔekwö that winter in the barrenlands
Naèdaadii	ʔekwö that summer in the forest
Nade ʔà	Migrating ʔekwö
Niızaa	ʔekwö migrating towards the forest in the fall
Nadèezoô	ʔekwö migrating to the birthing grounds
ʔekwökeè	ʔekwö track

Elders in the 1970s talked about seasonal movements of the Porcupine caribou moving from the mountains near Aklavik towards Herschel Island.

“But up in there where it's not marked now is where the caribou is up there. It is very important, we are quite concerned about that ourselves because the caribou have their young ones there and once the caribou are big enough the caribou always come toward Herschel Island, you know, when I was staying at King Point three years I found out that the caribou always come right from the mountains and have their calves...” (I. Alonik in NWT Berger Commission Reports & Community Transcripts 1976: 796, lines 21-30).

The changes noted in movement and migration of the Porcupine caribou herd were noted in a Traditional Knowledge study.

Near Łutsël K’e, the way in which the herds move was beginning to change around the late 1990s with there being many smaller groups, rather than larger groups of caribou traveling together. These changes may reflect changes in the range of caribou (Łutsël K’e being on the edge of the fall/wintering grounds) or declines in population.

“The herd migration is changing very fast. Even on the barren lands the migration is changing. A while ago in the fall people seen caribou tracks and looked around and saw nothing. Before when people saw caribou tracks, they would see one or two caribou and then a couple of days later the whole herd arrives. It would just feel like the ground was moving. Nowadays it is not like that. It is very hard to keep track of the herd. My late grandfather

once said, in the near future the animals are going to change. I think this change has already started.” (Henry Catholique of Łutsël K’e in Parlee et al. 2001: 29).

Abundance

The abundance of barren ground caribou cannot easily be understood from the Traditional Knowledge documented and available for each of the regions.

Fluctuations and Trends

There are observed changes in the population of most of the barren-ground caribou herds across the NWT; many elders across the NWT have stories about when the caribou did not come. (Parlee and Furgal 2010). In most cases this is attributed to variability, the Creator or the ‘caribou having a mind of their own’. Despite observing and experiencing declines in the past, these fluctuations in abundance are largely viewed as part of a natural life cycle – the caribou will come back.

“The cycle of caribou, just like the human being. We die and there’s another person born, that’s what the elders were saying, with animals it’s the same thing. Just like rabbits, they disappear one year and they come back again. It’s a cycle thing, they said. And they say that’s the way for us, I mean, there’s nothing much we can do about it, it’s a cycle.” (Dene elder in Parlee and Furgal 2010: Transcript Appendix).

In the last ten years, reports of a decline in almost barren ground populations of the NWT have been communicated with communities; however, Traditional Knowledge reports are not necessarily in agreement.

Bathurst, Beverly and Ahiak

The most significant changes (declines) are reported in the Bathurst, Beverly and Ahiak ranges (BCMPC 2004; BCMPWG 2011). In this region, there is significant diversity of observation and perspective within and between Tlį Chọ, Denesoline, Yellowknives Dene, Kitikmeot Inuit and Métis communities.

Traditional Knowledge suggests significant oscillation in caribou numbers from periods of “so many caribou” as described by Henry Catholique of Łutsël K’e, recalling the stories of his grandfather Gahdële, to periods of starvation (when there were not caribou) as described by the late elder Morris Lockhart. The time periods of such oscillations have not been clearly identified to date.

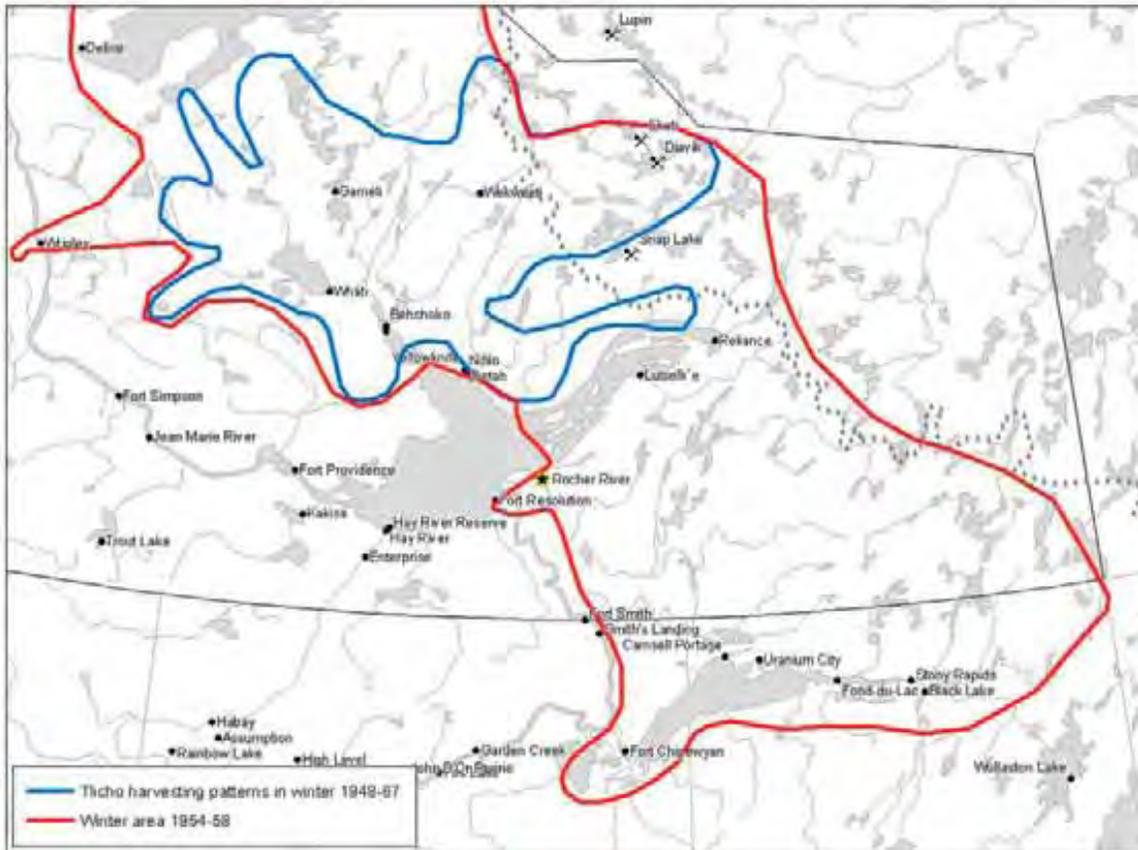
“...there were so many caribou, it would just feel like the ground was moving...” (Henry Catholique of Łutsël K’e in Parlee *et al.* 2005: 171).

There are also stories about the other extreme of few caribou, such as the story told by the late elder Maurice Lockhart, also of Łutsël K’e:

“Some people died here because of the meat shortage... it was tough when there was no caribou.” (M. Lockhart of Łutsël K’e in Parlee *et al.* 2001:53).

Beaulieu (2012) suggests a population cycle for the Bathurst herd based on his family’s oral histories from the Tlį Chọ, Łutsël K’e and Fort Resolution areas. They suggest peaks in population in the 1890s, very few caribou in the 1920s, and an increase in the 1950s. This oral history may be consistent with the historic patterns of harvesting, which were compiled by Tlį Chọ researchers who suggested an increase and contraction of the Bathurst caribou range as described by Beaulieu (2012) in Figure 5). Cross referencing of Tlį Chọ oral histories on harvesting with those of the Denésoline, Kitikmeot and Kivalliq Inuit would help to determine whether these changes reflect changes in numbers or changes in range.

**Figure 5 – Caribou Hunting regions of Tlį Cho
(Beaulieu 2012: 62)**



Kitikmeot Inuit recollections of caribou cycles suggest the caribou in the Kitikmeot region were increasing or peaking at the time when white men arrived in the region.

“I remember a long time ago when there were less caribou and musk-ox. When the caribou numbers were going up in the past, about the same time the white men started coming around . . . This was quite some time ago; the caribou numbers were going up after one winter.” (Archie Komak Cambridge Bay in Thorpe *et al.* 2001: 103).

“In the past there were hardly any caribou. The caribou started coming around since we have been in Bay Chimo (Umingmaktuuk). There are usually caribou at Tahikaffaaluk, on the other side of Bay

Chimo. . . --- probably in 1978. There were a lot of seals though,”
(Charlie Keyok of Bay Chimo in Thorpe *et al.* 2001: 104).

Today, there is still tremendous joy associated with the return of the caribou and fear associated with a population decline: “When there are a lot of caribou in areas where people commonly hunt, it is a good sign that the land is healthy and that the animals are being respected” (JB Rabesca in Parlee *et al.* 2005:171). While there are beliefs about “lack of respect” being a spiritual cause of caribou moving away, this is not necessarily imply “overhunting”. As described by an Inuit elder from the Kitikmeot region speaking here in likely defence against historical rhetoric on Aboriginal over-hunting.

“It is not the fault of the people.” (Bessie Omilgoitok
Cambridge Bay in Thorpe *et al.* 2001: 102).

There is evidence from Traditional Knowledge that the most recent decline began in the 1990s. Studies in this community and in the Kitikmeot region from early 2001 would suggest harvesters were starting to see a decline in the 1990s (Thorpe *et al.* 2002; Parlee *et al.* 2001; Whaèhdôö Nàowodö Kö 2001).

“It seems that the numbers in the Bathurst herd are declining. I do not know why. But here in Kingauk (Bathurst Inlet), there are always a lot of caribou in the springtime... lots in number. A couple of years ago there seemed to be lots in number as they were passing through.” (Jessie Hagialok Bathurst Inlet in Thorpe *et al.* 2001: 83).

“This year there were hardly any [caribou]. This year, this spring, [there have been] hardly any caribou since April. . . Less caribou compared to last year. Like the caribou never came from south. . . There were always caribou around in the springtime [in other years]... coming from south.” (Doris Kingnektak Cambridge Bay in Thorpe *et al.* 2001: 87).

Traditional Knowledge suggests a further decline in the availability of caribou in 2000-2010. In the Łutsël K’e Dene First Nation, a 2010 survey revealed that more than 60% of harvesters perceived the caribou numbers around the community were lower than in previous years (Parlee *et al.*, 2014). In addition to these harvester observations, harvest and caribou food consumption is shown to have declined by 30-40% in this community since 2000 (Parlee *et al.* 2014; Parlee *et al.* 2001).

In many cases it is difficult to differentiate between population decline and range shift as an explanation behind why the caribou do not come (See section on **Distribution and Movements**).

This is not only the view of local Aboriginal peoples but is similarly expressed by big game outfitters who have worked in the Bathurst Range.

“Over my life in the north, I’ve watched the caribou numbers cycle up and down. Several times they were perceived to be drastic and resident ration tags were reduced, only to be put back in place a couple of years later, due to newly found numbers each time the calving ground had shifted, or great numbers had moved where they don’t belong... The ‘60s and ‘70s had lower numbers available to hunters. They were definitely in a down cycle. Then came the ‘80s and vast numbers were everywhere. They came south in the winter. They went further around the lake and into the provinces. Everybody was happy and content; we had caribou, and nobody cared what they were called [Ahiak, Beverly or Bathurst].” (Barry Taylor in WRRB 2010: 186).

Cape Bathurst, Bluenose West, Bluenose East

The Arctic Borderlands Knowledge Coop reported somewhat ambiguous results of 129 harvesters in communities in the Porcupine range - caribou availability from 1996-2000 was reported as: “not declining (56%), declining (42%), not sure (2%)” (ABKC 2000). A synthesis of results from all community reports was not available after this date (Russell *et al.* 2007; Gordon *et al.* 2008). Arctic Borderlands Knowledge Coop research in Aklavik indicated that observations caribou availability was increasing from 2000-2008 (particularly observable in spring); this data is consistent with reports on the ability of community members to meet their needs for caribou meat (Robinson and Nguyen 2011: 7-8).

Two surveys in the Inuvialuit Settlement Region (ISR) and in Fort McPherson suggested that roughly half of harvesters perceived a population decline; the other half of participants reported seeing no decline. This would refer largely to the Porcupine and Cape Bathurst herds (Wray 2010; Salokangas 2010).

Bluenose East, West

Inuvialuit and Gwich’in communities also believe that caribou numbers go up and down, or caribou come and go (GRRB 1997; ABKC 2000; Padilla and Kofinas 2012; Wray and Parlee 2013). However, there are periods of history where caribou numbers declined for other reasons. The impact of white trappers and whalers on caribou were noted to be significant in the early part of the 20th century; Inuvialuit elders for example, note that by 1910 “the voracious practices

of the whalers had decimated both local whale populations as well as terrestrial caribou populations” (Lyon *et al.* 2010: 25).

In the Sahtú region, this diversity in perspective is also apparent with respect to the Bluenose East and Bluenose West caribou herds. Various accounts of elders from the region suggests a downward trend in numbers of caribou in addition to fluctuations (Elder in Rushforth 1994: 341). Based on transcripts from the Sahtu Renewable Resources Board (2007), many elders and harvesters are not observing a significant decline – some (as in the quote from Wilbert Kochon) believe they caribou are simply moving away.

“I don't believe that the caribou is declining; it's just that they're getting harder to find...” (Wilbert Kochon of Colville Lake in Sahtú Renewable Resources Board 2007: 63, lines 20-23).

Historically, there were periods when there were a lot of caribou around the Sahtu communities such as the area around Colville Lake. Similar to the Inuvialuit observations, there was very little caribou when the “white people first arrived” (John Blanco Snr. In Sahtu Renewable Resources Board 2007: 54, lines). A decline in caribou abundance seems to correspond (coincidentally, or due to adverse effects) with the increase in oil and gas exploration and development in the region which began in the 1950s-1980s and in the last decade.

“There used to be a lot of caribou. [We] used to go by dog team around halfway to Colville... [and] get a lot of caribou. But since the seismic and all this choppers and all that start coming around, caribou are getting kind of scarce.” (Jonas Kakfwi of Fort Good Hope in Sahtú Renewable Resources Board 2007: 97, lines 19-24).

Some Traditional Knowledge holders identified recent trends in the availability of caribou.

“The last three years, we had no caribou - like from 2000 -- or 2000 to 2005, there's a -- there's a drop of about forty thousand (40,000) caribou [he is reading the ENR graphs], and -- that we used to -- we hunt -- we hunted in those years, and like -- the last year is 2004 when they worked out in Colville Lake. In 2005, there was no caribou.” (R. Boniface of Fort Good Hope in Sahtu Renewable Resources Board 2007: lines 8-11).

Disrespectful behavior or harvesters is also determined to be a cause (Parlee and Wray 2014).

“A long time ago there was lots of caribou, at one time there was so much. It used to just come into the community. And people would just go out across the road and shoot a caribou. One day when the caribou came in, me and my husband said we would go and get a few caribou. We went down the side of the road and there was dead caribou lying everywhere with just their tongues cut out and their hind quarters taken. The rest they just left there. We went to the Renewable Resource Officer and we told him and showed him. [Later] my dad said, do you know what they did with those caribou; they brought them to the dump and burnt them... since that day the caribou never have gone back to Fort Good Hope...” (C. Rabesca of Fort Good Hope in Parlee et al. forthcoming).

Disagreements on Caribou Abundance

Although barren-ground caribou population cycles are natural, subsistence harvesting has historically be cited as one of the critical drivers of population change. At various points over the last 100 years, particularly in the 1950s-60s, efforts to shift northern Aboriginal peoples away from a land-based economy were unfortunately tied together with the process and institutions of conservation and “wildlife management”. Thus, for many elders it is difficult to disentangle caribou management from the “social engineering” that was simultaneously taking place.

“In the 1950s and '60s, the so-called ‘caribou crisis’ on the central barrens provided justification not only for imposing hunting restrictions, but also relocation, sedentarization and supervision, on both Inuit and Dene who lived on or near the range of the great barren-ground caribou herds, and for whom these herds were not only the staple food supply but also an important source of clothing. Governments saw these measures as critical requirements for both the modernization of the people and the conservation of caribou herds. Thus, caribou management became an integral part of a broad program of social engineering” (Usher 2003: 172).

Across the north there is consistent and considerable friction related to the question of harvest as a driver of population decline (Parlee and Furgal 2010). Little correlation can be made between harvest intensity and population cycles over the past 50-75 years (Wray and Parlee 2012; Sandlos 2002; Usher 2001). Although it would seem that modern technological advancements (such as skidoos, high power rifles, trucks and aerial surveys) have led to greater harvest efficiency and consequently increased harvest levels, to Aboriginal communities, such a theory is

contradictory to the growing social science and health data; northern Aboriginal people today consume a fraction of the caribou historically harvested, as estimated by biologists (A.W. Banfield in Sandlos 2002).

Although most caribou management plans focus on controlling harvest as the main strategy of conservation, this contradicts the views noted earlier that the caribou come back when the people need them.

“From the Inuit perspective, the animals have always come back when you harvest them more, it’s just a way of the world, of giving thanks...” (Inuit elder from Parlee and Furgal 2010: Transcript Appendix).

Counting caribou has historically been a point of conflict between scientists, Traditional Knowledge holders and more recently hunting outfitters (Fisher *et al.* 2009; Spak 2005; Kofinas 1999; Cizek 1990). For example, in the 1970s, population surveys of Beverly caribou indicated the Beverly herd had declined significantly but Aboriginal knowledge holders recognized the herd had merely moved to another location (Spak 2005; Cizek 1990).

“The Dene and Inuit who have depended on the caribou for countless generations disagreed vehemently with these census results, stating that the animal population density of part of the herd range is not necessarily a good indicator of the rest of the herd range. In that particular year, they pointed out, the caribou had moved further north than normal as a result of disturbances (e.g., noise of machinery and planes, tagging of caribou) from mining operations and biologists. Therefore, they said, biologists had missed the bulk of the herd population.” (Spak 2005: 236).

Some biologists critically dismiss such a viewpoint as it seems to contradict basic principles of reproduction (Ruttan 2012). However, the Aboriginal belief that “harvesting” is good for caribou populations may reflect more complex understandings of caribou population cycles and habitat carrying capacities. Hunting caribou more at close to peak periods of population may be a way of tempering the peaks and crashes of population dynamics.

In summary there is diversity in perspective among Traditional Knowledge holders about whether the lack of availability of caribou represents a population decline or a change in distribution. Such perspectives change depending on the location of communities within the range as well as local definition and delineation of both the “herd” and “herd range”. There is also debate within and between communities in the ranges of the Porcupine, Bluenose East/West

and Cape Bathurst about whether the absence of caribou near their communities is a function of population or changes in distribution.

Threats and Limiting Factors

Threats and limits on barren-ground caribou populations are both natural and human-induced. In Traditional Knowledge studies across the north, predation, forest fire effects on habitat, habitat degradation and loss due to resource development, and habitat effects of climate change are considered the most significant threats. Wildlife diseases and the effects of invasive species have also been raised as concerns. Harvesting is not viewed as a threat but respectful harvesting is important (see *Interactions*). Some elders and harvesters are concerned that there are currently too many bears and wolves (e.g., in the Bathurst range and Porcupine range) and this may be a cause of caribou population decline.

Habitat Degradation

Resource Development

Resource development is by far the threat to barren-ground caribou most discussed in Traditional Knowledge sources. The specific resource development issues of concern are oil and gas, mining and the effects of contaminants.

“The Tłı̄ Chọ elders know it is human behaviour [development] on the ̀ekwö dè (caribou territory) that is the most important factor affecting ̀ekwö migration patterns. The elders frequently mention the importance of human behaviour, while the biologists concentrate on other predators and pests such as the wolf, mosquitoes and black flies...” (Legat et al. 2001: 22).

“And if the pipe breaks and if the oil or gas flow on the land, all around how far the gas flows or oil flows, we don't think the animals will go to there and live there” (Isadore Tsetta in Dettah Berger Commission Reports & Community Transcripts 1976: 8372, lines 8-15).

The history of resource development in the NWT dates back to the early 1900s in the Yellowknife region and 1940s in the Sahtú region. Since that time, the body of knowledge related to the effects of resource development on barren-ground caribou has grown. As detailed in the excerpts below, there is a belief that resource development will “destroy” the caribou with catastrophic effects for the Aboriginal people of the territory.

“If this land is destroyed by oil, we will be destroyed too. Because, all of the wildlife on it, the fish and the moose and caribou, and the fur that we trap for will be all destroyed too.” (V. Menico in Brackett Lake Berger Commission Community Transcripts 1975: 886, lines 13-16)).

“You white people, you do not know what you are doing to us. You are going to destroy the animals like caribou, moose, ducks and fish” (C. Cardinal Arctic Red River Berger Commission Community Transcripts 1967: 4614, lines 3-20).

Part of this perspective stems from past experiences.

“Today, all we have to show for their decision making back then is their elaborate, executive offices down south --- scars of seismic lines, a Dempster and a half finished Mackenzie highway, more low rentals, seismic wires and on caribou heads yet; alcohol problems, family problems, the highway running through our land, our settlements, hunting area and trap-line. Did we ever tell the government we , wanted scarred up land with lines running all over, highways running every which-way, low rentals, wires around caribou heads, alcohol? Did we ever ask them for this?” (A. Andre in Arctic Red River Berger Commission Community Transcripts 1967: 605, lines 3-10)

Some elders are explicit in their beliefs that development is bad for caribou but are not clear on the mechanisms by which development has an effect.

“I do not want the pipeline to go through because we live off the land. The animals may die off such as moose, caribou and martin, and a lot of other animals” (G. Kochon name in Fort Good Hope Berger Commission Community Transcripts 1975:1836, lines 2-5).

Others speak generally in terms of damage created on the land.

“One of the thing they mentioned, I don't think that we are ever again going to kill [be able to harvest] caribou. Even right now part of our country is badly damaged”. (M. Firth in Fort McPherson Berger Commission Community Transcripts 1975: 1020, lines 8-12).

In the Bluenose West, Bluenose East, Porcupine and Cape Bathurst herds, oil and gas exploration and development is a major concern (Dana *et al.* 2009). Discussions about a proposed gas pipeline in the 1960s and 1970s and again in the 2000s brought many of these concerns to light. In 1975, landscape changes caused by development in the Mackenzie Valley were already evident, as described by this Fort Good Hope elder.

“The land out there most the time when you can see through the clouds, look like that checkerboard floor -- there ain't a darn place where a little rabbit can live or a chicken can lay their eggs, where can a caribou feed?” (N. Kakfwi in Fort Good Hope Berger Commission Community Transcripts 1975: 1923, lines 3-7).

Similar concerns were raised more recently during the Joint Review Panel hearings on the proposed Mackenzie Gas Project.

Five years ago, they going to make pipeline. White man took me on that line, chopper, every day. I tell them: Where is the old trail? Where is the old Indian camp? Where is fish lake? Where is place for caribou? Where is place for moose?” (Gabe Andre in Mackenzie Gas Project 2006, page unknown)

A pipeline would act as a barrier to movement for barren-ground caribou.

“The only thing that they really have to worry about is crossing the creeks and the rivers, but my main concern is probably the Natives and people in the Delta, maybe perhaps in the Yukon Territory, that these caribou, they migrate through this route, and it is also their calving ground, and if this pipeline is to be built, and if it is to come through this way, I believe it will have a great effect on the caribou”. (D. Gordon in Aklavik Berger Commission Reports & Community Transcripts 1975: 99, lines 23-30).

In addition to direct loss and fragmentation of habitat, the noises, smells and increased activity associated with pipeline development are perceived as being stressful on caribou.

“I know myself if caribou are five miles away and there is no wind, dead calm, you can't go near them just on account of the noise. If you happen to step on fresh snow and they are five miles away, laying down on the ground, then they hear you and they are gone. You can't shoot them. And we have got to wait for three days to catch up to them; that is going to happen to the pipeline. Another

thing when the pipeline is going to happen, then it's going to be noisy, they can't cross the pipeline because it is too noisy and they will be cut off a lot of feeding. Stop the feeding, you got to feed in certain places in the winter and every year. Some years they feed in some places and other years they feed other places in the wintertime, and then in the summertime another place, and that's the way they grow a crop for the caribou, and what is going to happen to that". (D. Itsi in Aklavik Berger Commission Reports & Community Transcripts 1975: pp. 1104, lines 9-25).

Some Traditional Knowledge sources reveal concerns that development will “drive the caribou away” as described here by Billy Stor of Aklavik.

“The pipeline route is on land my people use, land that they hunt and trap on. Caribou is our main source of food. We cannot survive on the white man's beef. Why, too damn expensive. Caribou are a nervous animal and shy away from noise, the pipeline will take three to five years to complete. Caribou will not keep on the pipeline route or near it because of the amount of noise that will come from the pipeline. They will move to another area, and will completely eat out the moss and lichen. Caribou food does not grow yearly, as most plants do, and caribou must eat, so they will move farther away from the original feeding grounds”. (Billy Stor in Aklavik Berger Commission Reports & Community Transcripts 1975: 115, lines 1-5).

In the range of the Bluenose Caribou herd, there is consistent perception and interpretation by numerous Sahtú elders of oil and gas exploration and development being stressful for caribou (Bechtel 2012; Sahtú Renewable Resources Board 2011; Parlee and Furgal 2010; Meis-Mason *et al.* 2009; Dokis 2008).

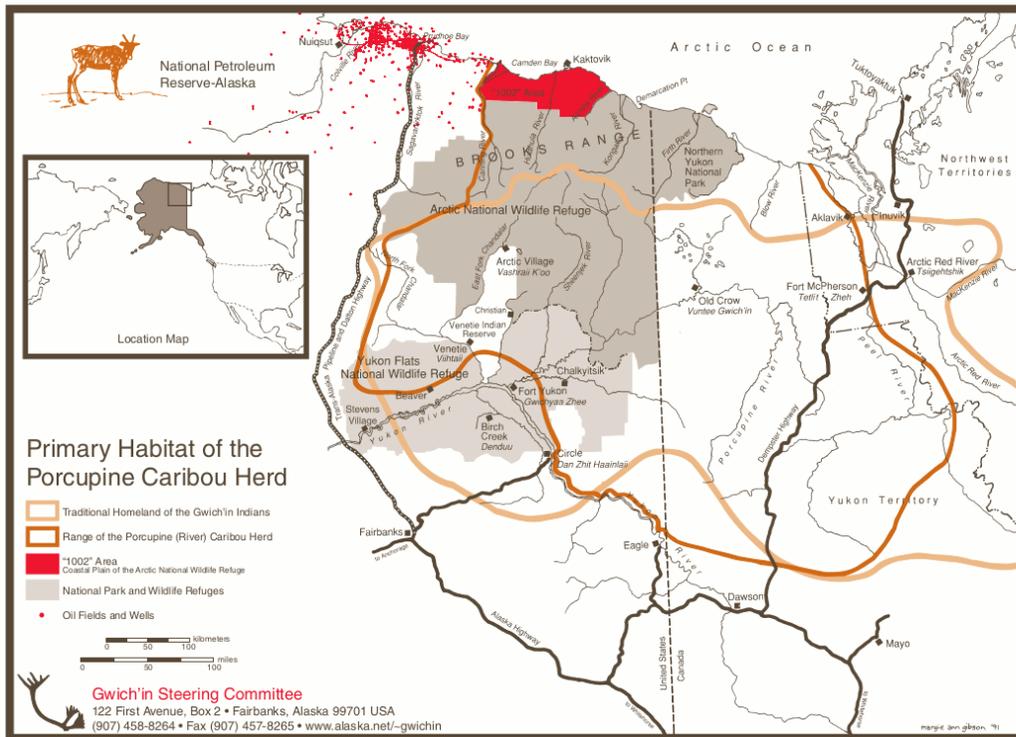
“Stress on the caribou - the main effects I guess are trauma and shock. It's [also] had a disastrous impact on the peoples across here. Just a few years ago, we had an oil and gas [exploration] camp right across... that's where our main [staging] area is for the migratory birds is, that's where they settle for a long time before freeze-up. Not only that, when they left their camp, that whole sector of land was just saturated with diesel fuel. Diesel fuel is dangerous, the stench of it was so heavy at that time... I was very unhappy about this... I went to the leaders. I said, 'Do something about that,' I said, 'the stench is still there.' And that oil is

dangerous for children and for the small wildlife, probably caribou too... it's a danger to the wildlife and the human being." (Harvester in Parlee and Furgal 2010:Appendix).

And in the last couple of years, there's been too much planes and things flying around. I think that's why we -- the caribou haven't been coming around that much." (B. Cotchilly in Sahtú Renewable Resources Board 2011: 80, lines 1-8).

Gwich'in elders have raised issues about the effects of oil and gas activity as well as mining in the Porcupine caribou range. The Porcupine caribou range parallels the traditional harvesting area of the Gwich'in. This area is described as under potential threat from proposed drilling in the "1002" area in the Arctic National Wildlife Refuge (which overlaps with a portion of the calving grounds of the Porcupine caribou herd) are a key concern (Figure 6).

Figure 6 - Primary Habitat of the Porcupine Caribou Herd (Gwich'in Steering Committee 2012).



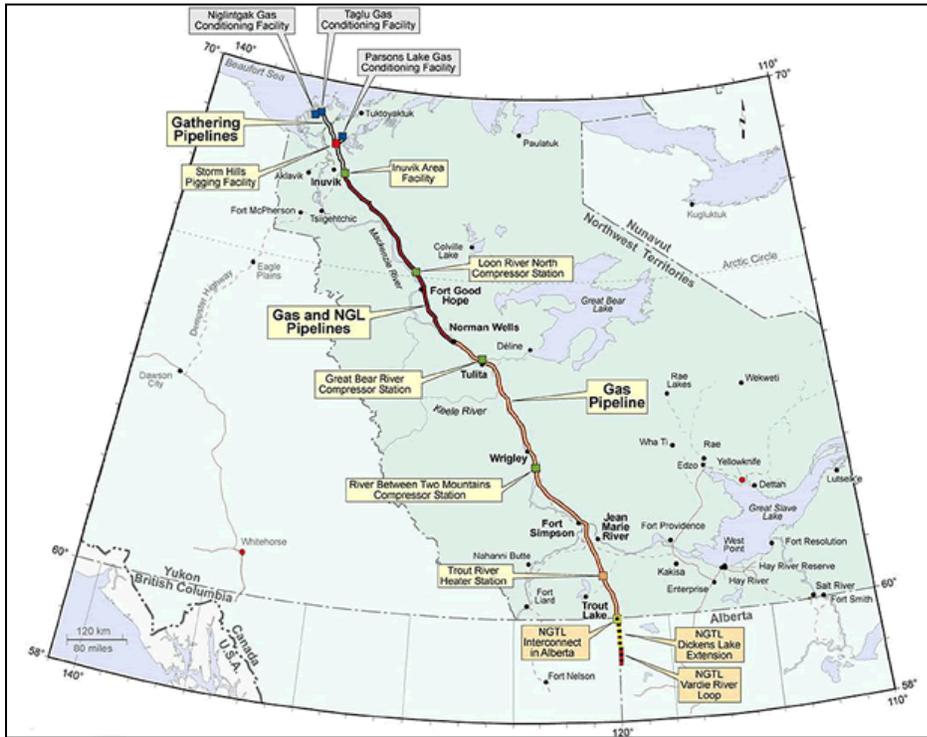
World Wildlife Fund (drawing on scientific studies) raised similar concerns about the effects of pipelines on caribou habitat.

“The activities associated with these structures have affected the behaviour of various species of animals on land. Very important among them are the caribou. And the central Arctic caribou herd had its calving grounds in what became the middle of the oil fields in the Kuparak area. The calving grounds of this herd have been displaced by the industrial activity. Caribou are particularly sensitive to disturbance during the calving time. As a result, there have been particularly when there's times of extensive insect harassment. So these effects, again, have extended for many, many kilometres away from any particular structures”. (WWF in Mackenzie Gas Project 2006, page unknown).

These concerns - that a Mackenzie Gas pipeline (Figure 7) would have irreversible effects - stand in contrast to the perspectives of industry proponents who do not acknowledge any effects on barren-ground caribou.

So the caribou will move away from our construction sites for a short period of time and not -- won't move that far; move a kilometre or two away. The moderate effect will then be that harvesters will need to go an extra couple of kilometres to find the animals. After construction is over, the animals will come back and the impact will be mitigated. So that's an example of the significance rating for caribou” (Imperial Oil in Mackenzie Gas Project 2006).

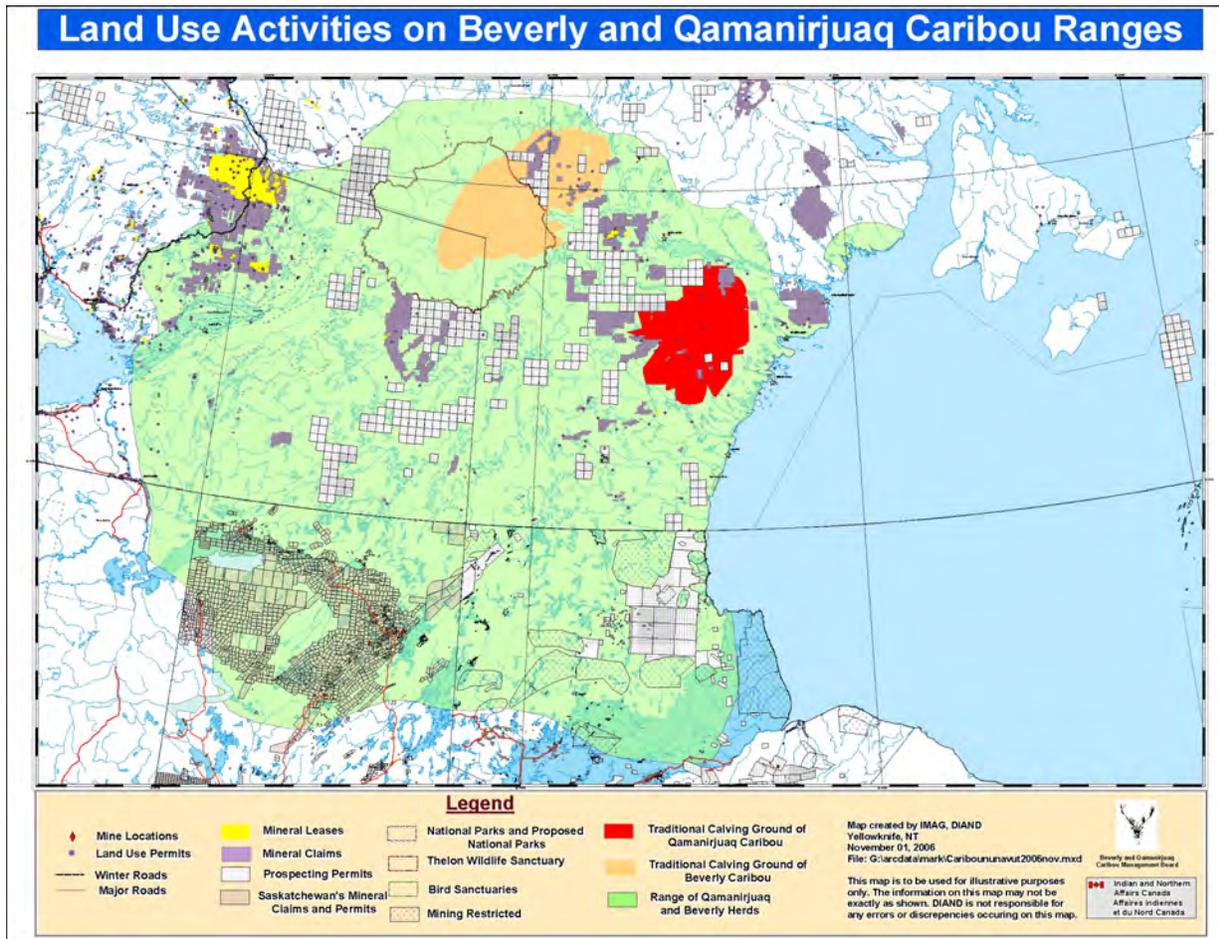
Figure 7 – Route of the proposed Mackenzie Gas Project (Imperial Oil *et al.* 2007).



Mineral Resource Development

Mineral resource development is a major focus in the range of the Bathurst, Ahiak and Beverly caribou herds (Figure 9), while mineral exploration is also increasing in the Porcupine and Cape Bathurst ranges. Traditional knowledge studies initiated during the environmental assessments of diamond mines reveal numerous issues associated with the impact of diamond mining on barren-ground caribou (Paci *et al.* 2004; Thorpe 2001; Legat *et al.* 2001; Parlee *et al.* 2001). Other research has focused on the effects of metal, rare earth minerals and uranium mining. Mining exploration in the Beverly range has increased significantly in recent years; such land use activity is perceived by some as the cause behind changes in caribou movements and/or population (Figure 8).

**Figure 8 – Land Use Activities in the Beverly and Qamanirjuaq Caribou Ranges
Beverly Qaminurjuq Caribou Management Board (2006).**



The impact of mining on the Bathurst calving grounds is a key concern for many communities (Boulanger *et al.* 2012; Golder 2010; CARC 2007; Thorpe *et al.* 2001). As described by Paul Omilgoitok of the Kitikmeot region, people have asked that there be no mining near the calving grounds because they are afraid it would diminish the number of caribou (Paul Omilgoitok in Thorpe *et al.* 2001).

Elders from the Kitikmeot region, the Tlį Cho, Yellowknives and the Denésoline have long highlighted concerns that dust from mining activity would negatively affect caribou habitat (EMAB 2002; Legat *et al.* 1998). These concerns have since been realized. The areas affected by the two oldest diamond mining projects (Ekati Diamond Mine and Diavik Diamond Mine), originally predicted to be between three-five km in radius around each mine site, have been expanded recently to a radius of between 40 and 70 km around each mine site (Diavik Diamond Mine 2011; EMAB 2001). The main concern leading to this change was the impact of dust on sensitive lichen habitat (EMAB 2001). The development of mines and mining exploration in the

Bathurst and Beverly caribou range have, according to Tlį Chọ and Denésoline elders, contributed to changes in caribou migration.

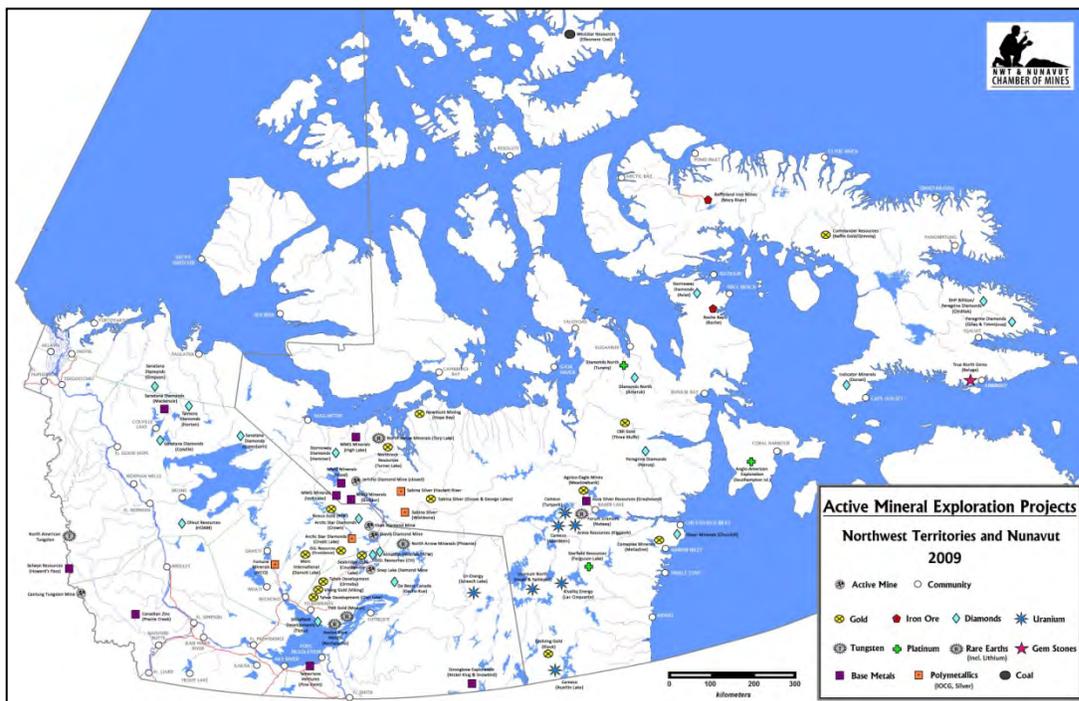
“The caribou used to migrate to our land. But now there are mines in the way of their major migration route. That’s the reason why caribou mind-spirit is weak – it is too weak to come toward our land now. The caribou feel like there is something in their path, so they turn the other way. The smell of fumes and smoke can blow far on the barren ground, and the caribou can sense that” (Caroline Beaulieu of Behchoko in Legat *et al.* 2008:28).

“Not too long ago [approximately 1997] two big herds used to come around Łutsël K’é, and people came from all over to hunt the caribou. In the years following, the herd began coming towards us, but then turned away. Now that there are mines with roads and high snow drifts on the sides, the caribou won’t cross and their migration route is disrupted. The old people said if you pile up snow into drifts, the caribou would not cross them. They just move alongside of it. This is what is happening with the winter roads. They don’t teach kids about this anymore. The white man does not know this. The way the caribou migrate has been disrupted. The roads bisect the migration routes and disrupt the natural behaviour of the caribou.” (Liza Enzoë of Łutsël K’e in Kendrick and Lyver 2005: 183).

“By observing the mines I’ve seen that they are not good for the caribou. In the past, the caribou used to migrate and stop in the Dathi Kué (Walmsley Lake) area. Very few caribou move through that area now. People also do not go up into that area now. You go to the mines to observe the caribou. I’ve been up to the mines three times and have observed the caribou there. You just see a few caribou here and there. For me the mines have changed the way caribou behave, although I am not all that sure how much they have changed. I know the main caribou migration trails are still there. In the past you could see caribou trails all along the landscape, even in the summer. You could see their tracks everywhere. Now you do not see them that much. Just some of the main migration routes remain. These are the only tracks you see.

*In the past you could see where the caribou have played when they've stopped, but now you do not see these signs of caribou playing. You only see the migration trails. After they put the mines up in the barrens the caribou have changed for me. The meat, however, still tastes the same. The way I hunt, I know how far the caribou are from my house. These days the caribou are much farther away than they used to be. In the past it was not like that” (Noel Drybones of Łutsël K'e in Kendrick *et al.* 2005:185).*

Figure 9 – Active Mines in the NWT in 2009 (NWT Chamber of Mines (2010))



As described by one Łutsël K'e Dene First Nation elder, when their paths are blocked, the caribou will not come through that way again.

“There’s roads and mines and all activities where all the caribou pass, I mean, that block the caribou...elders said that when something like that happens, caribou don’t go there again” (Harvester in Parlee and Furgal 2010: 37).

The impact of mines on migration is well understood by elders who recognize that the Diavik mine has been built over top of old caribou trails, as described here by an Inuit elder from the Kitikmeot region.

“Elders went to Diavik to look at the mine site and there were not many caribou there. We used to see a lot of caribou migrate through that area. We suspect the noise from the mine has made the caribou move away. A lot of the old caribou trails are now covered with moss. There is so much noise from the mine site; the caribou are migrating away from the site instead of going along the shores.” (Elder in EMAB 2004: 34).

One elder from the Sahtú region emphasized how they know when a caribou has been harassed.

“I guess you hear it too from the old peoples, not only that we live with it, we eat it so we know when a caribou or a moose is harassed. In our language, you know, we don’t eat it, we just feel a little bit because the texture of the meat, it gets in our Slavey language “tantii” affects the texture of the meat so you’re not encouraged to eat that...” (Person’s name in Parlee and Furgal 2010: 37).

Roads built to mine resources are interpreted as a significant problem for barren-ground caribou. Many elders have described the roads in the Bathurst and Beverly range as contributing to changes in caribou movement and migration. While some elders think there are ways of technically managing the impact (e.g., by limiting the height of roads), other elders perceive a negative effect on caribou as inevitable.

“In a few years, the caribou will change their route again. They will go a different way; they will be disturbed by the winter road, planes, and blasting. You will see [these changes] in three to five years from now.”(Louis Abel of Łutsël K'e in Parlee et al. 2005: 35).

“Regarding the winter road, if you make a road, you cannot make it too high. It’s too hard for the caribou to get over it. It should be lower. The caribou won’t just pass through a little pathway you make, they go all over. The road needs to be fixed.” (JB Rabesca in Parlee *et al.* 2005: 35).

“No matter what you do, caribou will be affected by these mines and roads. The only way to not affect the caribou is to have no mines and roads. If there is a mine, there will be roads. And if you have a road, there will be trucks on it. If they put it through, you can’t stop everything for the caribou. But maybe that is what the caribou need” (Pierre Catholique of Lutsël K’e in Parlee *et al.* 2005: 35)

Some elders suggest the impact may be seasonal; during peak periods of migration, the road may be less of a barrier than during other parts of the year.

“Although we have all seen ʔekwö in association with the ice road, the ʔekwö do not like to cross roads unless they are in the migration mode. They become very skittish when trying to cross roads, as they can smell the human scent. When they are not in migration mode and simply foraging during the winter, if the ʔekwö sniff our scent, they will turn back” (Romie Wetrade of Gameti in Legat and Tłı Chọ 2001: 13).

Some people who live within the Bathurst caribou range have raised concerns about the number of incidences of caribou mortality on haul roads (EMAB 2001). Elders have emphasized the importance of fencing as a means of dealing with some of the potential risks that mines pose to caribou, such as traffic accidents, injury and poisoning from tailings, fuels or explosives (EMAB 2004). A similar concern was raised by JB Rabesca:

“Caribou like to eat mud and if the tailings look like mud, they might eat it – especially if they’ve eaten there before. We need to put fencing around that area. There is a need for fencing. Anything that is dangerous for caribou requires a fence. It won’t be only Diavik but all mines coming into the North. We worry about migration of caribou and other animals. I am really worried about caribou and wildlife at Diavik diamond mine” (JB Rabesca of Lutsël K’e in EMAB 2004: 27).

The issue of fencing around the mine sites is complicated however, by the fact the Diavik area is a key travel route for barren-ground caribou. Workshops previously held by the Diavik Environmental Monitoring Advisory Board have led to numerous recommendations about what kind of fencing is needed, where and when to construct it, and the importance of ongoing monitoring (EMAB 2008). One incidence of a caribou being caught in the fencing around one of the diamond mines at Lac de Gras is used by elders as an illustration of the fencing problem (Figure 10).

Figure 10 – Caribou Caught in Wire Fencing at a Diamond Mine near Lac de Gras. (Anonymous)



Closed or abandoned mine sites can also have impacts on barren-ground caribou.

“We want to protect the environment, the terrain, and the caribou. Any abandoned mine site should be considered a hazard and should be fenced. Once we finish Diavik, we may need to look at other mine sites (especially abandoned ones) to see if fencing is needed. We, as Elders, are concerned about the caribou having to cross steep banks, having broken legs, or getting cornered by wolves.”
(Joe Migwi in EMAB 2004: 27).

Related to the question of reclamation, some people are concerned that the effects of resource development will persist or be irreversible due to the lack of enforcement of reclamation and lack of regulations.

“I guess we have to get after the oil and gas and the mining industries, put tough regulations around it because no matter what we say, they’re going to be there. But we have to get tough on reclamation ... cleaning up the lands is a priority right now.” (Harvester in Parlee and Furgal 2010: 37).

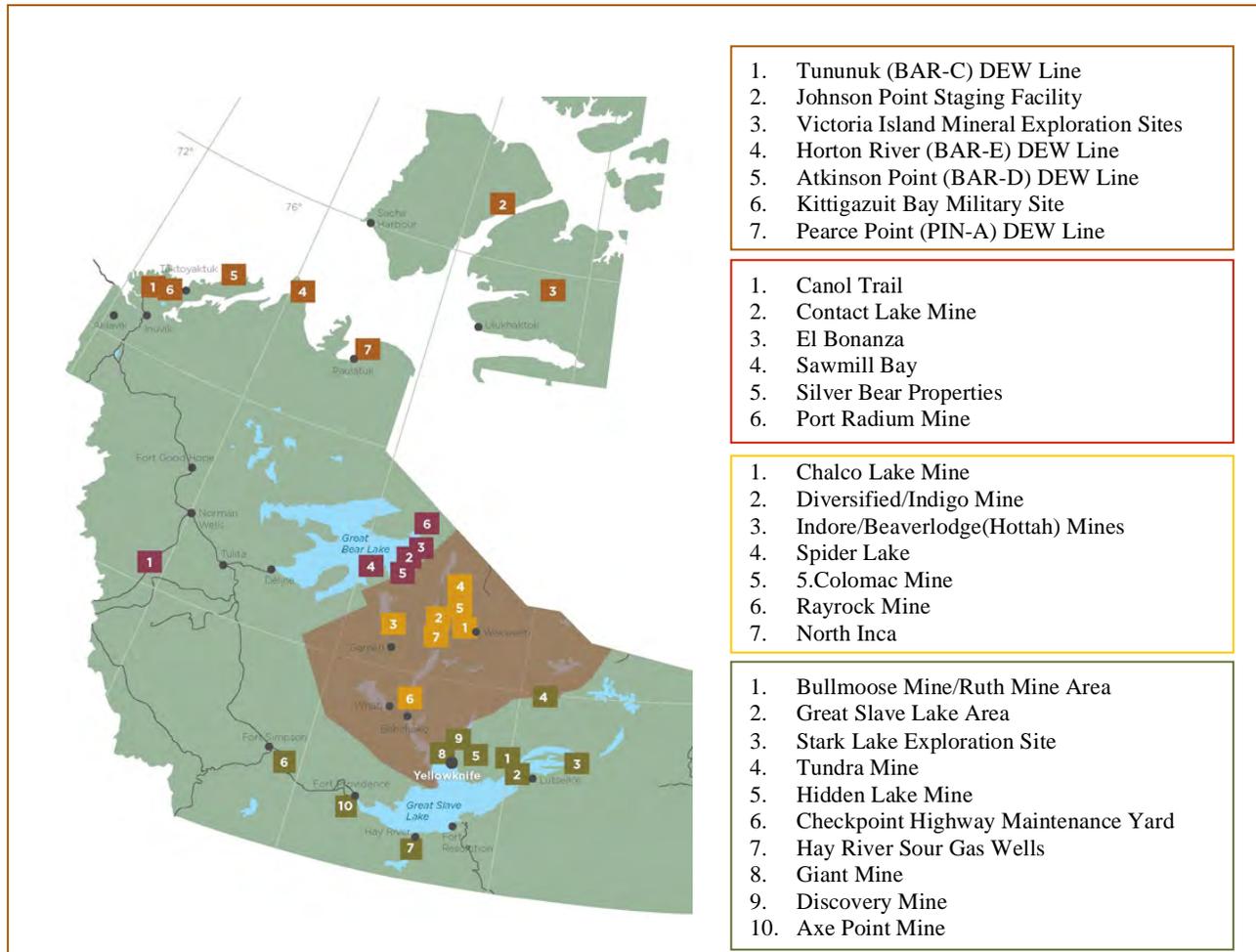
“They don’t have enough trained officers on our lands to enforce these companies to clean up the lands. And literally, we don’t have those mechanisms, those resource people to look after our lands for us because they’re not trained. We don’t have those resource people so on a short scale...anyway, I’ve listened to all this for years and years, and I’ve never been at a table. This is my first time and I’m glad and I’m blessed to be here. The phenomenal unkindness on our food chain, on our clothing chain, on the human beings and for the future generations...” (Harvester in Parlee and Furgal 2010: 38).

The poisoning – or contamination - of the land is another mechanism by which development is interpreted to be a threat to caribou (Downie and Fenge 2003). Contaminated sites are well documented through the Northern Contaminants Program.

“Aboriginal organizations across the Canadian North have done much to raise public awareness of the importance and urgency of the contaminants issue. They have emphasized the public health perspective—and the challenge they face in trying to balance the superior nutritional value of country foods with exposure to harmful contaminants” (Keith 1998: 15).

Some of the contaminants of note found in caribou organs have been mercury, cadmium, zinc, selenium and radionuclides (Gamberg 2006; Thomas and Gates 1999). As development continues the number of contaminated sites increases yearly (Figure 11).

Figure 11 – Contaminated Sites in Northern Canada (AANDC 2010)



Climate Change

In the last decade, a significant body of research has developed around the issue of climate change and a variety of Traditional Knowledge research has highlighted the current and potential effects on barren-ground caribou (Heinzman *et al.* 2005; Berman *et al.* 2004; Duerden 2004; Kruse *et al.* 2004; Burgess 1999; Duerden 1998; Gunn 1995; Bielawski and Mazazumi 1994; Aharonian 1994). Some of these effects have been discussed already in previous sections. Numerous kinds of climate change related effects have been documented, particularly in relation to the Bathurst caribou and Porcupine caribou (Thorpe 2001). The elders' observations of climate related changes in caribou in the Bathurst and Beverly caribou range, for example, corresponds with scientific evidence that impacts on the range and distribution of species (i.e., species turnover) is likely to be greatest in this area (Lindsay 2009).

Suitable habitat for calving is thought to be changing or diminishing as a result of climate change. Later freeze up, thinner ice, lower water levels, dryer conditions and unpredictable weather events are thought to be affecting the condition of the calving grounds. According to the Inuit elders, these changes have been seen only within the last decade and not observed or experienced previously (Thorpe 2001).

Observations of snow conditions are one way in which elders have tracked climate change related effects (ABKC 2000). Changes in snow conditions during late winter are among the most notable concerns. This includes changes in the depth of snow and freezing rain events before or after major snow fall. During 2000-2001, for example, elders from Łutsël K'e noted that the depth of snow in the 1990s had been less than they had previously remembered.

“The snow has been getting less and less over the years. In the old days when trapping, the snow used to be high – up to waist level. Now it is down around your thighs. It’s easier to move through the trees in winter these days” (Pete Enzoe in Ellis et al. 2002:56).

Studies from the Kitikmeot, Tlį Chọ and the Łutsël K'e Dene First Nation also suggest an increase in freezing rain events and/or snow crusting over (Lyver 2005; Thorpe 2001; Whaèhdôö Nàowòd Kö 2001; Parlee et al. 2001).

“Deep snow doesn’t necessarily mean the caribou will be skinny, but out on the barrens when the snow is really hard packed and in the forest when the snow is crusted; it is harder for the caribou to break through that for their food,” (Jim Fatte in Lyver and Łutsël K'e Dene First Nation 2005: 48).

“The snow was covered in ice and that is how the numbers [of caribou] dropped. The number of musk ox went down too. The land was covered in sleet and there was no place for them to eat. This was by Wellington Bay. . . I remember it well, but I cannot remember what year... The snow was covered in ice. It had rained after a big snowfall. That is when some of the caribou had starved to death, but in another area of the land where it is not so rough, they were fine. Some areas were fine where it did not rain. There are not so many caribou around this area, but when it rained during the cold weather some caribou froze to death. I have seen

that happen to a lot of caribou. There were musk ox frozen as well. There were a lot of dead caribou on an island. A lot of dead bulls. A lot of them had died at once. . . This was close to Ungahitak,” (Archie Komak Cambridge Bay in Thorpe et al. 2001: 99).

“[In the spring] when the snow is soft and deep, some of the caribou would get skinny. They would get skinny when there is too much soft snow during the spring. When that is how it is. Some of the caribou would be okay” (Archie Komak Cambridge Bay in Thorpe et al. 2001: 84).

“The snow was covered in ice. It had rained after a big snowfall. That is when some of the caribou had starved to death,” (Archie Komak Cambridge Bay in Thorpe et al. 2001: 101)

“[The caribou] had starved to death because of sleet. They had nowhere to eat. The ice was too thick. . . They could not dig through it,” (Moses Koihok Cambridge Bay in Thorpe et al. 2001: 86).

Climate change is also thought to be affecting caribou in terms of increased and variable temperatures. Sudden warming temperatures in winter create unsafe ice conditions for caribou crossings (Thorpe 2001).

“[The caribou] mainly come through there [across from Elliot Point in southern Bathurst Inlet] when they are calving on the east side. For some caribou, it is still the same...The caribou...come around through from Portage Bay off Kuadjuk Island. . . They come south then go around again. They cannot hit that open water down there...That open water has always been the same . . . [but] it opens earlier and way bigger [nowadays],” (Allen Kapolak Bathurst Inlet in Thorpe et al. 2001: 156).

Inuit elders in the summer range of the Bathurst herd note the dangerous effects of hot temperatures on barren-ground caribou.

During hot days, caribou have to try to keep cool otherwise they can overheat. It is likely that as climate generally warms and days of extreme heat and forest fires become more frequent, ways to prevent dehydration and overheating become more important for caribou. Caribou adapt to the heat by staying near the shorelines, lying on patches of snow, drinking water, wading and swimming in the water, eating moist plants, and sucking on mushrooms, (Thorpe et al. 2001: 150).

Hot and warm days have been recorded in the Kitikmeot region: there were more hot days and days with temperatures over 30°C in the 1990s than in previous decades (Doris Kingnektak BS/CB in Thorpe *et al.* 2001). This has led to worries about the health of the Bathurst caribou. People from this area describe the effects on barren-ground caribou in terms of heat exhaustion and suffocation.

“Caribou would die from the heat of the sun. When the weather gets too hot, a lot of them would suffocate side by side. My wife and I have seen that at Tahiluk. They suffocated from the heat of the sun,” (Mackie Kaosoni Cambridge Bay in Thorpe et al. 2001: 148)

“When it gets too hot, the caribou would suffocate. When it gets too hot in the summer, because they are used to the bitter cold. Those that have suffocated would look like they have been shot down,” (Annie Kaosoni Cambridge Bay in Thorpe et al. 2001: 148)

Inuit elders in the summer range of the Bathurst herd also note the dangerous effects of extended periods of mosquito infestations.

“When there are too many mosquitoes [the caribou] would gather and go in circles to get rid of the mosquitoes. Sometimes when they shook the flies off it would make the sound like thunder. There would be so many mosquitoes that they would look like snowflakes. You can see, even from a distance,” (Moses Koihok Cambridge Bay in Thorpe et al. 2001: 145).

During the summer when there are a lot of mosquitoes in the warm weather they would die of exhaustion [from running away from mosquitos] . . . when the weather is too hot for them” (Bessie Angulalik Cambridge Bay in Thorpe et al. 2001: 149).

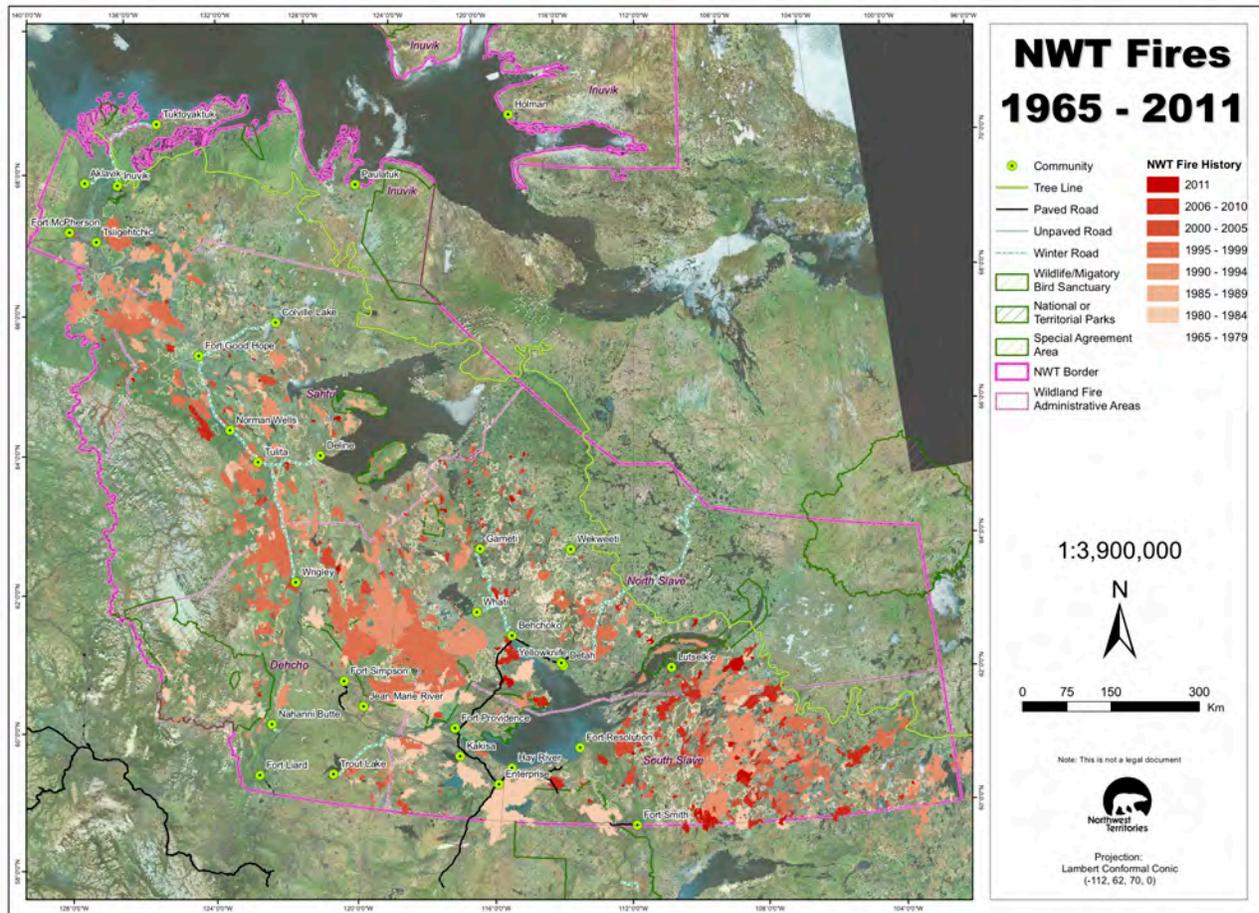
Some people have observed “drying out” of habitat including key areas of caribou food as well as increased risk of forest fires (See Section on Forest Fire in ***Threats and Limiting Factors*** below).

Forest Fire

Many elders in the Tlį Chọ and Denésoline region as well as in the Kitikmeot region of Nunavut are concerned about the number of forest fires that have occurred in the region and observe a change in the number, intensity and impact of fires (Legat *et al.* 2008; Parlee *et al.* 2001; Thorpe *et al.* 2001; BQCMB 1994).

In parts of northern Canada, large and intense fires can impact an area by changing the plant cover, and thereby limiting forage for caribou, for many years. Very little Traditional Knowledge has been documented on this theme; however, the extent of forest fire activity has been mapped for reference purposes (Figure 13).

Figure 13 – NWT Wildfire History from 1905-2011 (GNWT Centre for Geomatics 2011).



The following quote from the Yellowknives Dene explains the concern that fires lead to irreversible habitat damage:

The forest fire has been through the bush, we know for sure that the caribou doesn't go back there to feed, so once the bush is burned, then it's just as good as waste (I. Tsetta in Dettah Berger Commission Community Transcripts 1976:pp. 8372, lines 8-14)

According to the Denésoline elder Pierre Marlowe, the recovery period of caribou habitat affected by fire is over 100 years.

Regarding the forest fires, some scientists say it's good for new growth. But do you know what the caribou eat? If the lichen burns, it will take over 100 years for the plants to grow back. Some scientists say these forest fires are good, but it's not like that for us. There never used to be so many forest fires. I have never before seen a forest fire started by lightning" (Pierre Marlowe of Łutsël K'e in Parlee et al. 2005: 177).

Some elders have attributed the current decline in the Bathurst and Beverly caribou numbers to fires in fall and winter range of the caribou. The late elder Alice Michel, who began to notice a decline in caribou in the late 1990s, explains:

"The reason why there is less caribou now is because of the forest fires in the area. Caribou vegetation is all burnt around Nanacho Lake (Nanula Tué). On the north side of McLeod Bay (Tue Nedhe) it is also burnt. The south side is not so burnt. Caribou come to the south side because of that. We can't do anything about what has happened with these fires. We cannot help what happened, nor could we have stopped it. The land has to grow back by itself. It's all a part of Mother Nature's life" (Alice Michel of Łutsël K'e in Parlee et al. 200:34).

Disease and Contaminants

Disease is a limiting factor for barren-ground caribou. Although some kinds of sicknesses are considered a natural phenomenon recurring from time to time, other diseases are new and are considered a greater threat by some Traditional Knowledge holders (Brook *et al.* 2009; 2011; Parlee *et al.* 2014). Elders in the Bathurst range are aware of or have experience with brucellosis or bovine tuberculosis in wood bison and in the South Hampton caribou herd. Several key studies under the Northern Contaminants Program have highlighted the potential cancer-causing effects of long range contaminants (e.g., polycyclic aromatic hydrocarbons (PAHs)) and other local sources of contaminants (i.e., radio-nuclides and mercury). The presence of such contaminants in country food can create fear and concern about the health of caribou and many consequent effects on harvest behaviour (Parlee *et al.* 2014; McAuley and Knopper 2011).

There are also concerns about diseases, such as Chronic Wasting Disease, which have developed in Saskatchewan and Alberta (Parlee et al. forthcoming; Brook *et al.* 2009).

The potential for disease in caribou must be addressed quickly, according to elder Leo Modeste from the Sahtú region.

“If we cut our hand and don’t get it treated it will get infected. If we don’t take care of our wildlife, if t hey are sick it will spread and spread if we don’t take care of it. Not just wildlife, it’s our environment. We need our own people with Traditional Ecological Knowledge to work with you on these studies,” (Leo Modeste of Fort Good Hope in Brook et al. 2009: 3).

In the Gwich’in region there is concern that wildlife diseases will inevitably arrive as a result of the development of corridors like the Mackenzie Gas Project.

“Today elders are happy, they get a free meal; but they like to eat their own traditional food. And if the pipeline comes and we lose all that -- the fish, the birds, our caribou, moose. Today we hear about all kinds of animal disease that's down south; coming down this way slowly. Who they going to blame, you know? (Linda Andre-Blake of Tsiigehtchic in Mackenzie Gas Project 2006, page number unknown).

Invasive Species

Invasive species from southern Canada expanding their range in the NWT are perceived as a threat to barren-ground caribou by many Traditional Knowledge holders because of the potential for increased predation, increased habitat competition and/or introducing new diseases (Kutz *et al.* 2005; Carriere 2010; 2009; Brook *et al.* 2011; Curry *et al.* 2008). Experiences from the Yukon are thought of as an omen of what might happen, or is already happening, in parts of the Northwest Territories.

The other thing too we’re experiencing in the Yukon, they’re bringing in other species. There’s bison that’s been coming in, they brought them up from somewhere, they’re starting to come in. We’re starting to see elk, also they’re coming in and also with the warming, we’re starting to see the deer, mule deer started to come in those areas also too. So we’re starting to see these things are starting to impact how or where those caribou habitats are too (Harvester in Parlee and Furgal 2010: 18).

A key issue in the South Slave region (related to the Bathurst, Ahiak and Beverly herds) is the appearance of white-tailed deer from northern Alberta and Saskatchewan (Dawe and Boutin 2010). Sightings of white-tailed deer have been made by Yellowknives Dene and Łutsël K'e Dene harvesters (Parlee *et al.* forthcoming). This shift may however, not be entirely new. When asked if there were stories from the elders about deer being in the region in the past, Ernest Boucher recalled the late Joe Boucher's stories of seeing white-tailed deer just south of the community in the late 1930s and early 1940s (Parlee *et al.* forthcoming). Climate is noted as the probable driver behind these changes in range, with development in northern Alberta and Saskatchewan noted as an additional factor. One elder noted how fire disturbance south of the community has led to decreased use by caribou and appearance of deer (Parlee *et al.* 2014).

Invasive research and management

The view of caribou having sentient qualities or human / spiritual qualities significantly affects the way in which they are harvested and the ways in which people think they should be managed. For example, there has been concern in some regions about the use of caribou collars (Kendrick *et al.* 2005: 186; Spak 2005: 238). In some cases there have been concerns about tracking caribou in the same way that people might react to the surveillance of people. This view that caribou should be able to come and go as they please is similar to historical concerns and conflicts over reindeer herding near Tuktoyaktuk (Hart 2001; Reimers and Coleman 2006). Ensuring that the people and the land are managed in ways that enable caribou to “do as they please” (i.e. adapt) is a tenet of Traditional Knowledge that seems common in all regions.

A key issue in the Beverly range is the invasive nature of caribou collaring (Kendrick and Manseau 2008; Parlee *et al.* 2005; Spak 2005; BQCMB 1986). Related issues involve low flying helicopters and planes involved in aerial surveys, which some elders perceive as increasing stress, particularly during the calving period (Bechtel 2012).

Positive Influences

Although “harvesting” is considered a threat or predation effect on caribou according to scientists (Gunn *et al.* 2011), Traditional Knowledge holders have the opposite view (Bayha 2012; Blondin 1990; Gunn *et al.* 1988). Many elders believe if you continue to harvest the caribou it is a sign of respect (value) and that the caribou will come back (Gunn 2009; Sahtu Renewable Resources Board 2009; Legat *et al.* 2008; Parlee *et al.* 2001; Smith 1998; Smith 1976). Although the knowledge and skills of youth in northern communities are changing, rules for respecting caribou are still passed on to youth.

“In the past, people used to really watch things - respect. They knew not to chase the caribou too far. If they chased a caribou on one day - they knew they would have to shoot it on the next day. If people chase the caribou with the skidoo, they

become stressed; it affects their lungs. They become sick - like pneumonia. We should teach the young people these things. Our main source of food is the caribou. If we lose the caribou, we will be pitiful” (Noel Drybones of Łutsël K’e in Parlee et al. 2001:26).

Rules that were defined by elders and well understood by Gwich’in youth from Fort McPherson were documented in 2009 (Wray 2010):

- Take and use everything
- Take only what you need
- Hunt safely
- Respect caribou
- Use proper places to field dress meat
- Reduce waste
- Get wounded caribou
- Prepare meat properly
- No chasing with skidoos

These rules are seen as equally important to the regulations created by co-management boards and the territorial government. Although there are conflicts in some areas and communities, some Aboriginal leaders have stressed the importance of everyone working together.

“It’s going to be kind of difficult. In our region there are many families who depend on caribou for ceremonies, for sharing, for community, for gatherings. Caribou is the centre of our life. To ask our people to go on regulation to regulate themselves, to maybe even look at quotas so that the numbers will come back strongly, it’s going to affect them. We know that there will be some strong words exchanged, but we have to be understanding, we all have to try to do our part. If the herd is going to be there for the next generation, we have to think about that. Otherwise the next generation may not see caribou at all, so we have to do our part, and ask all people to work with us.” (Fred Sangris of Yellowknives Dene in Canadian Arctic Resources Committee, 2007:26).

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