

Traditional and Community Knowledge Literature Review
for the 2021 SRRB Public Listening:

*“Tłch’ádlı hé Gots’edı – Living with Wildlife:
Caribou Predators and Competitors”*

Prepared by:

Janet Winbourne

TK and Ecological Research Consulting

For the:

ʔehdzo Got’ıne Gots’é Nákedı (Sahtú Renewable Resources Board)

January 15, 2021

TKCK Literature Review for SRRB 2021 Public Listening: “Tjch’ádii hé Gots’edi – Living with Wildlife: Caribou Predators and Competitors”

Introduction	1
1. What are Sahtú Dene and Métis traditional understandings of healthy relationships between caribou and other wildlife?	1
The Importance of Interconnectedness, Harmony, Balance, Responsibility, and Stories.....	1
“We are not the boss of caribou” – Understanding Dene Law.....	3
Moving the Stories Forward – How to Find Balance in a Changing World.....	3
2. What do people in the Sahtú think about predators and predator control programs?.....	4
Traditional and Community Knowledge of Caribou Predators.....	4
Caribou relationships with predators	5
Trends: Current Observations about Predators in the NWT	8
It’s complicated – the influence of climate change, habitat change, new species, and human activities on caribou / predator relationships	10
Thoughts about Predator Control.....	11
Reflections on Sahtú Dene and Métis history, experience, and culture.....	11
Reactions to the ENR / Tjchq Government 2020 Joint Proposal	12
3. What do people in the Sahtú think about “competitors” and their relationships to caribou?.....	13
Traditional and Community Knowledge of Caribou “Competitors”	13
A background to muskox management in North America	15
Caribou relationships with muskoxen	16
Thoughts about Muskox Management in the Sahtú	21
4. What are Indigenous peoples doing today for ecosystem planning and caribou conservation?.....	22
Elements of Indigenous-led initiatives and caribou conservation planning.....	23
Community Conservation Planning in the NWT	25
4a. How are Indigenous Peoples Maintaining Healthy Caribou / Predator Relationships?	26
Considering the Yukon Wolf Conservation and Management Plan	27
Dene and Inuit thoughts on maintaining the wolf / caribou balance today	27
Case Studies:	29
4b. How are Indigenous Peoples Maintaining Healthy Caribou / “Competitor” Relationships?.....	32
Case Studies:	33
Conclusions	36
References	37

Introduction

In order to provide information that can support good decision-making in Sahtú communities, the best available Traditional and Community Knowledge (TKCK) relating to the central question of the Délı̨ne 2021 proceeding, “**What should people’s role be in maintaining healthy relationships between caribou and other wildlife?**” has been compiled, reviewed and summarized here.

The four main questions driving this search and review of information were:

1. *What are Sahtú Dene and Métis traditional understandings of healthy relationships between caribou and other wildlife?*
2. *What do people in the Sahtú Region think about caribou predators and predator control programs?*
3. *What do people in the Sahtú Region think about caribou “competitors” and their relationships to caribou?*
4. *What are Indigenous peoples doing today for ecosystem planning and caribou conservation?*

Key sources that informed this literature review have also been shared on the ʔehdzo Got’ı̨ne Gots’é Nákedı̨ (Sahtú Renewable Resources Board, SRRB) public registry; materials are sorted into four corresponding collections.

Due to current community concerns centering on wolves and muskoxen, there is a focus on those two species throughout this review. Information from the Sahtú Region was prioritized for this review, however, in cases where few Sahtú-specific sources of information were found, relevant information from nearby regions was included.

1. What are Sahtú Dene and Métis traditional understandings of healthy relationships between caribou and other wildlife?

Dene stories tell that in the beginning of time, everything was equal, and people shared a universal language with the natural world around them. This increasingly caused chaos and conflict, so the Creator sent down Yamózha to establish order and respectful relationships on this earth. They assigned ʔeʔa (laws or codes of ethics), roles and responsibilities. People were given the role of land stewards, tasked with looking after everything on the land for future generations. To this day, Sahtú Dene and Métis feel a responsibility in land governance according to Dene ʔeʔa (laws) and Dene ts’ı̨l (ways of life) (SRRB 2020a:12).

The Importance of Interconnectedness, Harmony, Balance, Responsibility, and Stories

The elders of Délı̨ne stress that the interconnectedness of all things includes all people — Dene and non-Dene alike; this is a ‘universal law’ of interconnectedness, from which flows the responsibility of people to care for the world in which they live. Sustaining the land, the water, and the relationships between all things is done through treating the world and other beings with the utmost respect (Great Bear Lake Working Group 2005). These teachings are handing down from generation to generation through stories.

In Sahtú Dene and Métis Traditional Knowledge – or Dene náowerá¹ – all parts of the environment, living or not, are part of this interconnectedness and each has an important role to play in maintaining balance or harmony – this includes human beings. Some of the traditional roles in maintaining balance or harmony are described in “*Remember the Promise – a story of how Dene learned to take care of the land, water and animals*” (Sahtú Elders et al. 2014). This book explains that relationships between Dene and all the things in their environment are based on a mutual understanding of respect and a responsibility to take care of each other and the land so that all parts of the environment stay healthy. This traditional concept remains strong today, and was underscored recently by Délı̄nę elder Leon Modeste when he spoke about the meaning of Ɂełehé Ɂeghálats’eda (collaboration/working together) for Dene peoples, and the continued importance of embracing the principles and practices of Ɂełehé Ɂeghálats’eda – which includes dialogue and collaboration with t̄ch’áđı̄ (wildlife) and as̄ı̄ godı̄ (all living things) in the context of the Bluenose-East caribou hearing (SRRB 2016).

Stories continue to teach today’s generations of Sahtú Dene and Métis how to sustain relationships with living things. Caribou figure prominently in the stories because they are a ‘cultural keystone species’ – central to Dene survival and well-being.² A well-known Sahtú story tells of a meeting and agreement between caribou and wolves; the Sahtú Land Use Plan includes this condensed version of the story:

When the earth was created, the wolves and the caribou held a big meeting around the Aklavik area. The wolves said to the caribou "Caribou should not be on earth any longer". The caribou responded: "As long as we've been here, we've been good and we've eaten well. We've done nothing to you. We've not destroyed your food. You have lived well off us. So what's wrong with us?" The wolves said: "That's right. There's nothing wrong with them. They don't get in anybody's way. So we shouldn't tell them what to do. Let them graze, and feed, and wander around. Let's not destroy them completely, because in the future we will need them," from Ɂekwé Gúlı̄ (The Fate of Caribou), as told by William Sewi (In: SLUP 2013).

Dene náowerá and law are rooted in this type of complex narrative that weaves together cultural beliefs, spirituality, language, geography, and ecology (Cruikshank 1998; Michell 2015). Stories encourage people to think deeply while connecting with underlying messages about Indigenous origins, worldviews, and ways of knowing. They are used to teach history, values, natural laws and life skills, but they also guide people in how to think, how to relate to one another and how to take care of one’s self, others and the natural world; in essence, they provide guidelines for living a good life (*Ibid.*). Indigenous stories form the backbone of cultural knowledge and are widely recognized as a profoundly important mechanism for passing on knowledge about animals like caribou (Wray and Parlee 2013).

¹ The term Dene náowerá is used throughout this document to be inclusive of Sahtú Dene and Métis Knowledge. Rather than standardize terms and spellings, this review adopts the dialect or dialects of the speaker, authors, or communities contributing in each context where possible.

² Cultural Keystone Species are defined as: “Iconic species that have helped shape the traditions, beliefs and knowledge systems of Indigenous Peoples over time. Because of their association with the lands and waters of Indigenous territories, these species have played (and continue to play) essential roles in diet, livelihood, traditional medicines, and materials used for clothing, shelter and tools, and have been featured in the languages, ceremonies, stories and narratives that have shaped Indigenous natural laws,” (Indigenous Circle of Experts 2018:102).

“We are not the boss of caribou” – Understanding Dene Law

In effect, stories teach people ‘how to be Dene’ and live according to natural law – a type of governance that is deeply rooted in the land, traditional values, knowledge, and beliefs (Bezha pers. comm. 2018). There is increasing recognition that interpreting and accommodating Indigenous law through stories can be a critical component of wildlife conservation in Indigenous traditional territory (Borrows 2016; Napoleon and Friedland 2016). Many stories communicate this law by emphasizing individual responsibility, autonomy, and appropriate behaviour as key to maintaining respectful relationships with those that share their environment.

Indigenous peoples feel a deep-seated responsibility to ensure our lands and waters remain healthy and abundant for future generations. We inherited this land and will also pass it on. We are thankful that animals like caribou have been provided for us and have a responsibility to ensure their continued well-being in a manner that is respectful to our spiritual and cultural understandings. We acknowledge that caribou live according to their own free will, so our responsibility includes a need to look after their home so that they can continue to live freely. We have a further responsibility to ensure that our original stories and teachings are not left behind. This means that our duty as stewards encompasses not just the caribou, but extends to the ecosystem and to our cultures, languages and lifeways.³

Understandings of an animal’s spirit and autonomy strongly influence Indigenous stewardship choices, meaning that responsible and appropriate behaviour towards caribou is traditionally less about active management interventions and more about supporting the caribou’s ability to look after itself. This perspective is shared by many Indigenous peoples⁴ that maintain relationships with caribou all across Canada. The concept of an individual’s responsibility to maintain respectful relationships can be more powerful and have greater effect than asserting government restrictions and regulations in Indigenous Knowledge and governance systems; colonial and institutional management jargon, concepts, policies, and actions can disassociate Indigenous peoples from this profound sense of connection and responsibility; from this perspective, a decline in caribou abundance can be understood as the decline of a relationship between persons (human and non-human) rather than simply the decline in abundance of a natural resource (Winbourne et al. In prep.).

In its hearing report regarding Bluenose-East caribou, the ʔehdzo Got’ɲę Gots’ę Nákedı (Sahtú Renewable Resources Board, SRRB) accepted the principle that caribou are their own bosses – “ʔekwé ʔedets’ę k’áokerewe” (caribou self-regulation) – as the best foundation for caribou conservation today (SRRB 2016).

Moving the Stories Forward – How to Find Balance in a Changing World

Today, in many parts of the NWT – including the Sahtú – things have changed. Elders say it is harder to know what ‘balance’ is and how to maintain it, as climate change and human activities are making the world less ‘predictable’ (Dedats’eetsaa 2019). People from many regions of the north talk about changes they are seeing in the landscape, the weather, and the animals that they usually encounter (Krupnik and Jolly 2002). Nonetheless, traditional teachings can still be used to find a way forward.

³ From “WORKING TOGETHER: Indigenous Involvement in Caribou Stewardship – A Discussion Paper developed for the Indigenous Talking Circle at the 17th North American Caribou Workshop 2018. In: Winbourne et al. (In prep.).

⁴ In this review, the term ‘Indigenous Peoples’ is used to be inclusive of First Nations, Métis and Inuit peoples.

Our history is written on the land, in the placenames and stories, in the language. ...And unless you speak the language, you will not fully understand the stories. I'm always searching for stories. That's where our knowledge comes from. That's how knowledge in my area is passed on (Bayha 2012:26).

In the past, people didn't need to write things down to live according to Dene law. Now writing down the stories, and using them as the basis for stewardship or management planning, can be a powerful tool to advance and uphold traditional principles and practices, as well as provide guidance towards sustaining balance in a changing world. The Délı̨nę ʔekwé Working Group's "*Belare Wile Gots'é ʔekwé – Caribou for All Time*" plan is just one example of how traditional stories can guide people in maintaining ecological balance today.

Faced with the challenge of communicating the complexity and importance of the relationship between the Dene of Great Bear Lake and ʔekwé (barren-ground caribou), Sahtúgot'ı̨nę elders and leaders began drafting a community-based caribou conservation plan in 2015. The resulting *Belare Wile Gots'é ʔekwé – Caribou for All Time* plan is based on traditional ʔeʔa (the laws or principles) and godı̨ kehtsı̨ (agreements) that guide these relationships. It relies on Sahtúgot'ı̨nę stories, language, and concepts as its cultural foundation, and uses a broad approach to conservation, with program areas that include hunting, habitat, governance, and knowledge. The objective of the plan is to keep both ʔekwé and Dene healthy; it is seen as finding a way forward that honours cultural understandings of how to live with ʔekwé, through a reliance on traditional teachings. Délı̨nę's plan is based on the vision that Dene and ʔekwé are free to maintain their relationships through their own ʔeʔa (laws); the plan takes as its starting point two keystone stories that highlight the ecological relationships and sharing protocols that are key for the survival of people and caribou (Délı̨nę First Nation et al. 2016).

The topic of how Indigenous peoples are finding ways forward based on Traditional Knowledge, governance and stories in stewardship planning today is discussed in much greater detail in **Section 4**.

2. What do people in the Sahtú think about predators and predator control programs?

We have to take care of our wildlife, our caribou, and it's okay for the wolf to be in amongst them. Sometimes they catch or they get the caribou that are not healthy, and that's how it keeps it balanced.⁵

Traditional and Community Knowledge of Caribou Predators

Because Dene náowerá teaches that all things are connected, predators such as wolves and grizzlies are generally seen to be part of a working, healthy system that sustains caribou. Humans are also seen as part of this natural system; in fact, in many cases, Traditional Knowledge teaches that harvesters and other predators 'keep the herds healthy' by hunting, and in the absence of respectful harvesting, the populations may go away (ACCWM 2014a).

⁵ Chief Wilbert Kochon speaking for the Colville Lake Panel at the Colville 2020 Public Listening: Sahtú Ragóʔa (Hunting Laws) and Approaches to Wildlife Harvesting. Jan. 21, 2020.

Dene náoweré also teaches that animals like díga (wolf), sahcho (grizzly bear), and nógha (wolverine) are spiritually powerful animals that must be treated with respect or there can be dire consequences. In the past, spiritual teachers were often ‘mystically tied’ to different parts of the environment; some individuals or families had special ties to the caribou, some the wolf, some the northern lights and some the willow (Great Bear Lake Working Group 2005). There are many stories that tell of family members getting sick or hurt if animals like díga and sahcho are treated with disrespect.

Dene náoweré teachings are one of the reasons that not very many people in the Sahtú harvest caribou predators; during the Sahtú Harvest Study, very few predator harvests were recorded. **Table 1** presents the estimated average annual harvest of three main caribou predators, 1998-2005.

Table 1: Estimated average annual harvests of three main caribou predators based on Sahtú Harvest Study results, 1998-2003.

Community	Wolf	Grizzly Bear	Wolverine
Colville	<1	0	1
Déłıne	4	0	1
Fort Good Hope	5	<1	5
Norman Wells	1	0	1
Tulít’a	2	0	1
Sahtú totals, 1998-2005	13	1	9

During a community review of the harvest study results, some knowledge-holders felt that the estimated annual wolf harvest is too low to represent today’s harvest levels, as more wolves are harvested now due to financial incentives being offered by Environment and Natural Resources, Government of the Northwest Territories (ENR-GNWT). Harvesters had the following additional comments about harvesting powerful animals like díga, sahcho and nógha:

- Generally, trappers don’t like working with wolf pelts, and there are other cultural reasons/Dene laws and beliefs about trapping wolves that mean people don’t harvest very many. (Déłıne)
- There are protocols for certain families and individuals, who aren’t supposed to harvest certain things, like wolf and wolverine for example. (Fort Good Hope)
- It seems like people don’t like killing wolves. There are about 12-14 wolves right around town and nobody bothers them. (Tulít’a)
- Traditionally women wouldn’t wear wolf or wolverine because he’s a dominant being. I would never shoot one. They’re very respected and very wise. (Norman Wells)
- People here don’t get wolverine much, they’re more in the mountains. (Norman Wells)
- Wolverine – people go for them, but don’t get many. People get one if they’re lucky; you’d expect to see maybe three or four harvested for the whole community in a year. (Colville)
- People don’t tend to shoot bears unless they are coming into their camp. (Déłıne)⁶

Caribou relationships with predators

Several *Species At Risk* (SARC) status reports have compiled the best available Traditional and Community Knowledge about caribou interactions with predators in the NWT over the last ten years. Wolves and grizzly bears tend to be the caribou predators most commonly noted in the TKCK literature,

⁶ Community results reports containing Sahtú Harvest Study data are available from the ʔehdzo Got’ıne Gots’é Nákedı (Sahtú Renewable Resources Board) and ʔehdzo Got’ıne (Renewable Resources Councils).

but wolverines, lynx, eagles, and new species such as cougars may also hunt caribou (SARC 2012, 2013 and 2017a; ACCWM 2014b).

The SARC reports indicate that relationships between caribou and their predators are complex – there are interactions not just between caribou and their predators, but also between caribou predators and other prey – such as moose, muskoxen, white-tailed deer, wood bison, and other types of caribou. While Traditional Knowledge can tell us a lot about these interactions in the past, there are some suggestions that these complex systems are less predictable today, as climate change and human activities are increasingly impacting caribou and their habitat (Krupnik and Jolly 2002; Dedats'eetsaa 2019). Nonetheless, the SARC reports provide TKCK evidence that predation can be an important influence on caribou survival, and predator avoidance is a major factor influencing caribou habitat choice (SARC 2012, 2013, 2017a and 2020). Key themes documented in TKCK sources about caribou relationships with predators are summarized below.

Wolves – Díga

Díga have a spirit and their own world where they live. In Dene history, we had some people that knew more about certain animals than others. We don't own wildlife; we are just part of the ecosystem. Go back to the stories. Each family has certain things about how they have to behave. Somebody that loves his land, laws and wildlife? That's stronger than any rules we can make. So education and spirituality are key (Bezha pers. comm. 2020)

In the “ʔekwé́ Gulí (The Fate of Caribou)” story, the meeting between wolves and caribou results in an agreement about their relationship that if honored, will result in both animals being able to live in harmony – that is, balance will be maintained. Numerous Sahtú Dene and Métis knowledge-holders have noted that wolves tend to take the sick, wounded or old caribou, and so have a practical function in keeping the herds healthy as ‘doctors’ of the herd (SRRB 2016).

Wolves have been identified as the main predators of barren-ground caribou in the NWT (SARC 2013 and 2017a). They are also known to be important predators of boreal caribou in the Inuvialuit, Gwich'in, Sahtú, Tłı̄chǫ, and Dehcho regions (SARC 2012). Barren-ground caribou have different predator avoidance strategies than mountain caribou and boreal caribou however, and are observed to avoid wolves by travelling through deep snow, staying out on frozen lakes and other areas where they can be spotted/smelled over long distances, and by calving in large groups (SARC 2017a). Northern mountain caribou are also known to adapt their distribution, habitat use, behaviour, and/or group size in response to predation pressure; the main predators identified for mountain caribou include wolves and grizzly bears (SARC 2020).

There are observations that wolves don't just hunt caribou, but may rely on moose, sheep, rabbits, fish, mice and other animals (Katz 2010). Some wolves or packs may also become specialized and hunt quite differently than wolves in other areas. Due to a lack of previously-documented TKCK about wolf/caribou interactions in the Sahtú Region, the relevance of this topic to the 2021 public listening, and an interest amongst Sahtú knowledge-holders to share information and learn from other regions, a short summary of information recorded by Gwich'in knowledge-holders about these relationships is included below.

Gwich'in Traditional Knowledge about Porcupine caribou and wolves

In a TK study about Porcupine caribou and wolves, a distinction is made between 'migratory' and 'territorial' wolves, with knowledge-holders noting that wolves associated with the barren-ground herds migrate with those caribou and are willing to travel much longer distances than territorial wolves. Participants in the study came from Dawson (Tr'ondëk Hwëch'in), Fort McPherson (Teetl'it Gwich'in), and Old Crow (Vuntut Gwitchin), with on-the-land experiences dating back to the 1940s. Several participants shared TK about very large or 'mega-packs' with up to 150 migratory wolves – this could be several packs that temporarily merge. It was suggested that packs of this size are likely too big to be stable, and may adopt unusual prey habits (e.g., cannibalism) to try to sustain the pack (Katz 2010).

Tr'ondëk Hwëch'in knowledge-holders generally supported the idea that wolves take caribou that are old and sick, but some Gwich'in participants refuted the notion that wolves are the 'doctors' of the caribou, instead saying that if there is a strong pack, they also go after healthy caribou. The author suggested that migratory and territorial wolves may differ in this behaviour. Knowledge-holders also talked about lone wolves, reporting that they are older individuals that the pack has left behind. Some suggested that these lone wolves are the source of the belief that wolves hunt sick animals – that is, because lone wolves can't hunt healthy animals, they need to employ other hunting strategies (*Ibid.*).

Bears – sahcho and sahzene

Although few documented sources are available, grizzly bears figure prominently in the history of the Sahtú Dene culture and landscape – important features are named for sahcho, stories about encounters with sahcho have given rise to Dene laws, and the theme of human / grizzly bear transformations make the distinction between bear and human blurry. Sahcho are known to be powerful animals and there is much concern that talking about them, especially in winter (SARC 2017b).

Overall, bears are identified second only to wolves as being a top caribou predator (SARC 2012). Grizzly bears come into contact with barren-ground caribou in their late spring, summer and early fall ranges, but grizzly predation is thought to be mostly during the post-calving and calving periods (SARC 2017a). Because it is not common for Sahtú Dene to hunt at calving grounds, they have few to no observations of predation on calves. However, grizzly predation on calves and at calving grounds has been noted by other knowledge-holders and in other areas; for example, some Sahtú outfitters, Inuvialuit, and Gwich'in observers say that they see grizzly bears following caribou and feeding at calving grounds (ACCWM 2014b; SARC 2020).

Research documenting Gwich'in TK about grizzly bears indicates that grizzlies use several styles of hunting – they can ambush prey, including caribou, at locations such as water crossings. Because caribou can outrun a grizzly, bears will focus on sick or young animals at times, but they are capable of hunting healthy adult caribou. Although they are usually alone, grizzlies can share a carcass or eat in proximity to each other; sometimes grizzlies may even hunt together. Like wolves, there may be two types of grizzlies: those that follow the caribou herds at least part of the time, and those that make their home in one area. Participants emphasized the complexity of the relationship between caribou and moose and their predators, saying it is a system which must be in balance to function well (Benson 2019).

Other predators – wolverine, lynx, eagles, cougars

Other predators such as lynx, wolverine, eagles, and potentially cougars may also prey on caribou, but are generally seen to have less impact than wolves and bears. Wolverine and lynx have been witnessed killing both barren-ground and boreal caribou, as well as scavenging carcasses and eating carrion, but they are thought to likely have success mainly with calves (SARC 2012 and 2017a).

Wolverine tend to be found wherever there are many barren-ground caribou, and their numbers are impacted by increases or decreases in caribou abundance; they can take barren-ground caribou when they have been injured by other predators, but they also prey on healthy caribou by running them down or ambushing them. While wolverines share the same habitat as boreal caribou, there were no reported instances of wolverine preying on boreal caribou in the SARC TKCK report (SARC 2014).

Several guides and outfitters have seen golden eagles preying on mature northern mountain caribou cows. The eagles may attack singly or in pairs, striking the loins in the center of the caribou's back repeatedly until the animal is weakened and falls (SARC 2020). Eagles may also be a predator of barren-ground caribou, particularly calves (SARC 2017a). First observed in 2005 by a local resident on Kokèti, bald eagles are a new predator of Bathurst caribou calves in the Wek'èezhii. In three years of a Tłıçhǫ monitoring program, field workers observed an increasing presence of bald eagles near calves and calving grounds. While no direct predation on caribou was observed, eagles were seen in close proximity to caribou herds, and one eagle was seen attempting to chase a calf. Overall, more eagles were observed that summer than in the previous two years (Dedats'eetsaa 2019).

Cougars represent another potential new caribou predator. By 2007 there were reports of cougars between Fort Resolution and Hay River, and cougars are suspected of preying on boreal caribou in the South Slave and Dehcho regions (SARC 2012).

Trends: Current Observations about Predators in the NWT

Increases in predator populations have been noted by many TKCK studies in the NWT; some key themes emerging across multiple regions include:

- People are seeing big packs of wolves, with up to 25 animals.
- There are a lot more wolves, grizzlies, wolverines, and eagles in some regions than there were in the 1960s and 1970s.
- The distribution of grizzly bears has expanded further north, as well as further south, meaning that grizzly bears appear to be expanding their range on both fronts in the NWT.
- Grizzly bear densities are at an all-time high in some areas, and grizzly predation is a problem.
- Predator numbers are increasing in some areas due to a decrease in hunting / trapping pressure and the influx of alternate prey species such as muskoxen.
- While predation is normal and important, populations of wolves and bears are thought to be rising and possibly presenting a threat to boreal caribou today. In addition, climate change can increase predation risks as 'new' predators such as cougars expand their range northward.
- There may be a need to consider management interventions such as incentives, bounties, or predator control, but there is a need for more knowledge about how predators impact caribou.⁷

Knowledge-holders note that trying to compare predator populations between different time periods is difficult because observations are affected by how and when people use the land. In the past, people travelled over long distances very slowly, and moved around more seasonally. Today people can travel very quickly, and may not be on the land as frequently or use it in the same way (SARC 2017b). As part of its work to develop a management plan for the Cape Bathurst, Bluenose-West and Bluenose-East caribou, the Advisory Committee for Cooperation on Wildlife Management (ACCWM) undertook

⁷ Sources include: ACCWM 2014b; Alfred Taniton speaking for the Délı̄nǫ Panel at the Colville 2020 Public Listening: Sahtú Ragóʔa (Hunting Laws) and Approaches to Wildlife Harvesting. Jan. 21, 2020; SARC 2012, 2017a, 2017b and 2020; Benson 2019; SRRB 2020a.

community engagement work in the NWT and Kitikmeot Region of Nunavut (NU); this included public meetings held in Sahtú communities between 2007 and 2009. Meetings were also held with the Northwest Territories Métis Nation, the North Slave Métis Alliance, as well as engagement of the public. During the community engagements, people in all regions commented on predators and how they might be impacting these three herds of barren-ground caribou (ACCWM 2014b). **Table 2** shows the themes that were documented about trends in predators by region during the engagements.

Table 2: Trends in predators noted during community engagements for Bluenose-East, Bluenose-West and Cape Bathurst caribou, 2007-2013 (ACCWM 2014b).

Region	Main themes from ACCWM regional public engagements (2007-2013)
Inuvialuit Settlement Region	<ol style="list-style-type: none"> 1. Impacts of predation on caribou populations need to be better understood and considered in management. 2. Most people said there were more predators than before, including wolves, wolverines, bears and eagles. There were mixed impressions of the effectiveness of bounties and incentives for harvesting predators. 3. Harvesters took fewer predators once caribou hunting was restricted.
Inuvialuit and Gwich'in Shared Meetings	<ol style="list-style-type: none"> 1. There were more wolves, bears and wolverines in some areas. 2. More bears and eagles were preying on caribou. 3. Impacts of predation on caribou numbers need to be better understood and considered in management. 4. Wolves were in the delta in the 1980s and returned in recent years.
Gwich'in Settlement Area	<ol style="list-style-type: none"> 1. Wolf numbers increased, also wolverine and grizzlies. 2. With fewer trappers, may need to consider predator bounties or incentives.
Sahtú Settlement Area	<ol style="list-style-type: none"> 1. Wolf numbers increased and pack sizes were large. 2. Wolf predation was the biggest issue for caribou. 3. May need to consider predator bounties and incentives.
Wek' èezhii (Tłı̄chǫ Region)	<ol style="list-style-type: none"> 1. Impacts of predation on caribou populations needs to be better understood. 2. Some form of predator control may need to be considered. 3. Wolves have a role in keeping caribou healthy. 4. People did things to reduce wolf numbers and/or pack sizes in the past.
Dehcho Region*	<ul style="list-style-type: none"> • I've been trapping out there [Spruce Lake] all my life; there is hardly any wolves out there. There are a lot of wolves along the Mackenzie River. (Wrigley) • Grizzly bears, and to a lesser extent black bears, were pushed into the Mackenzie Delta by extensive fires in Alaska and the Yukon. There is more predation on barren-ground caribou in the northern part of the range by bears than is accounted for. (Wrigley) • Predator control should occur in the red zone if considered but not acted upon in the orange zone. (Wrigley)
North Slave Métis Alliance*	<ul style="list-style-type: none"> • There is concern about the wolf population status as it appears to be low. • The payments for wolves are not needed. Call it what it is, a bounty. • The wolf bounty should be abolished. It is outrageous and disgraceful.
Kugluktuk, NU	<ol style="list-style-type: none"> 1. Predator numbers have increased (wolves and grizzlies), partly because few people harvest them now. 2. Wolves have a role in keeping caribou healthy, but can kill indiscriminately when pack sizes are large. 3. Pack sizes were large and causing caribou declines. 4. Bounties and other measures were used to control wolf numbers in the past 5. Impacts of predation on caribou populations need to be studied. 6. Some form of predator control may need to be considered.

*Less engagement occurred in Dehcho Region and with the North Slave Métis Alliance. While comments documented from those areas have been included here, their representivity is not known.

In summary, of all caribou predators, wolves were mentioned most often as playing a role in caribou declines, however, there were different observations regarding changes in wolf abundance. People reported very large wolf packs in some areas; in the Sahtú it was noted that since muskoxen have come into the area, there had been more wolves and no caribou; in the Dehcho hunters pointed out that the increase in wolves is restricted to specific areas; and in Tuktoyaktuk it was reported that people used to see more wolves when caribou were more plentiful, and they were actually seeing fewer wolves recently. It was also noted that wolf populations naturally go up and down like caribou populations. In many regions, people suggested that increases in predator numbers may in part be due to the fact that there are fewer people out on the land hunting and trapping these days (ACCWM 2014b).

It's complicated – the influence of climate change, habitat change, new species, and human activities on caribou / predator relationships

It is clear that inter-relationships between caribou, other ungulates, and their predators are complex; they can also be impacted by weather (e.g., heavy snowfall or icing events), as well as human disturbance and landscape change (e.g., roads and harvesting pressure). Caribou movement patterns may also shift when large scale events such as wildfires change habitat suitability and/or availability (SARC 2017a and 2020), or in response to the presence of other species like predators or muskoxen (Tyson and Heinemeyer 2017).

Complicating things further is the fact that each of these variables may have a different effect on the different types of caribou. For example, we know that linear disturbances, such as roads and seismic lines, can cause predation of boreal caribou to increase by opening up travel corridors and making it easier for predators to hunt (SARC 2012). Habitat fragmentation and degradation is also occurring in barren-ground caribou range as a result of numerous factors such as forest fires, climate change, access roads, pipelines, mining and mineral exploration projects, hydroelectric developments, disturbances from vehicles and machines, seismic lines, and utility corridors. Available TKCK sources have highlighted an overall decline in the amount of suitable barren-ground caribou habitat in the NWT (SARC 2017a).

For mountain caribou, earlier spring weather can bring bears out of hibernation earlier, creating greater predation pressure during the calving period. However, outfitters in the Mackenzie Mountains stressed that predation is not considered a threat as long as things are in balance; it becomes a problem when the ecosystem has been disturbed in some other way or when other stressors are added and the caribou can no longer handle the predation; examples given were mining activities and overhunting (SARC 2020).

Species like moose, muskoxen, wood bison, barren-ground caribou, and others can impact the interactions between woodland caribou and their predators (SARC 2012). Ecological changes may already be altering the distribution of animals like muskoxen and moose; there is TKCK evidence that some 'new' species are expanding their range northward into northern mountain caribou habitat. For example, climate change resulting in more willows at higher altitudes may result in moose shifting their distribution, with a corresponding shift in wolf distribution. These observations are shared by outfitters in some areas of the Mackenzie Mountains, where it is reported that wolf densities and pack sizes have increased at the same time as moose densities, and there are now more, large, moose-hunting wolf packs than before (SARC 2020).

Prior to 1983, wolf sightings near the community of Déljne were relatively rare, but today wolves are regularly sighted and there are wolf dens near the community; this increase in wolf numbers coincides with the return of both the Bluenose-East and Bluenose-West herds of barren-ground caribou to the

Déljne area (SARC 2012). Participants in a Sahtú TK study said that along with the increase in wolf populations in recent years, they have also observed increases in the abundance of alternate prey species like moose, muskoxen, and beavers. These participants indicated that increases in prey species like muskoxen and moose can result in fewer boreal caribou being taken by predators, but if there is a decrease in the other prey, then predators will hunt boreal caribou (McDonald 2010). Still other knowledge-holders report that there does not appear to be a relationship between increasing observations of muskoxen in recent decades and the abundance of caribou, bears or wolves (Nguyen 2016).

It has been noted that when the wood bison population increased in the Mackenzie Bison Sanctuary, predator populations also increased, and large wolf packs seen in the Fort Providence area could be due to an increase in the wood bison population; it is not known to what extent these large packs have impacted boreal caribou (Dehcho First Nations 2011).

The topic of specific interactions between caribou, muskoxen, and their predators is considered in greater detail in the **Competitors** section.

Thoughts about Predator Control

We've got to make sure that we're always thinking about what we're doing... the government made a lot of decisions in the past that we're living with right now. They outlaw muskox. Now there's really lots and they're getting in the way. They stopped fighting fire here all over the place and they're just concentrated on certain ones. There was a bunch of trapping in the past that no longer happens, so there's all these animals already. So when you overdo killing some certain animal, they're going to come back more. Like what they're doing with the wolves now, they're going to come back more.⁸

Reflections on Sahtú Dene and Métis history, experience, and culture

For many Sahtú Dene, spiritual and cultural understandings continue to shape feelings about predators and predator control today. Management actions, such as poisoning predators or shooting wolves from helicopters, can be seen as inhumane and disrespectful, and go against Dene náowerá teachings about a shared responsibility to take care of all the animals, the land and the water. The Déljne *Belare Wíle Gots'ę ?ekwę* plan states that not much can be done about predators because they need to achieve their own balance (Déljne First Nation et al. 2016).

Strong feelings about predator control may be additionally shaped by knowledge of or direct experiences with government programs dating back many years. In the 1950s and 1960s, after aerial surveys indicated barren-ground caribou herds were declining, GNWT control of wolves included the use of strychnine poison baits on almost all barren-ground caribou winter ranges, despite uncertainties in the cause of the decline. At the peak of the program, approximately 1,000 wolves were killed annually, including many other animals, and overall, the program was considered a 'success', yet there were no monitoring studies to confirm this. The program ended in 1964 and the wolf population recovered quickly thereafter (McLaren 2016).

⁸ Chief Wilbert Kochon speaking for the Colville Lake Panel at the Colville 2020 Public Listening: Sahtú Ragó?a (Hunting Laws) and Approaches to Wildlife Harvesting. Jan. 21, 2020.

During the Mackenzie Valley Pipeline Inquiry, Délı̨nę representatives spoke about the toll the poison took not just on wolves, but on many other furbearers and types of animals, saying thousands of animals died as a result of the poisoning. Outrage was expressed that people were not consulted on this management action and that it was done 'behind their backs'.

... the government decided that the wolves were killing off a lot of animals. So they decided to put poison on our lands and they can kill off the wolves... since then the fur has been decreasing. And now it is really hard to get any fur around here.⁹

Around 1921, the Treaty, there was a lot of fur around here. You know people went trapping and there was a lot of fur. But then the government decided that the wolf was killing off a lot of caribou and it was sort of a menace to the animals itself. So they decided to put a lot of poison on our areas of the land... when the government laid out those poisons, they forgot that the wolf is not the only one that eats... the beaver and the rabbits are the only ones that don't eat animals... they forgot that the wolf is not the ones that eat, you know, meat and stuff like that. So when they put that poison down, it killed off a lot of animals. And especially a lot of [furbearers].¹⁰

Reactions to the ENR / Tłı̨chǫ Government 2020 Joint Proposal

Early in 2020, ENR and the Tłı̨chǫ Government (TG) submitted a “*Joint Proposal on Management Actions for Wolves (dı̨ga) on the Bathurst and Bluenose-East Barren-ground Caribou (ǰekwǫ) Herd Winter Ranges: 2020-2025*” to the Wek'èezhı̨ Renewable Resources Board (WRRB). Many Sahtú Dene, as well as Indigenous representatives from neighbouring regions that share these herds, spoke out against the actions. In a letter responding to the proposal, the Délı̨nę Renewable Resources Council (DRRC) reiterated concerns that Sahtú communities have repeatedly expressed to ENR, the SRRB and the WRRB, stating that elders from all five communities recognize the important relationship between dı̨ga and caribou, that dı̨ga help keep caribou populations healthy, and how killing dı̨ga might actually wipe out caribou. The letter called for dı̨ga to be respected, clearly stating that aerial shooting of dı̨ga is not respectful, and that there should be a full public hearing to look into this important issue (SRRB 2016; DRRC 2020). Similarly, some Norman Wells representatives also spoke out strongly against the ENR/TG joint proposal during the 2020 Public Listening in Colville. Nonetheless, the voices speaking out against management actions to control predator populations were not unanimous at that hearing, with other Indigenous representatives presenting evidence regarding very high levels of wolves, in proximity to towns, and the need for increased harvest incentives (SRRB 2020a).

At the 2016 hearing on Bluenose-East caribou, Colville Chief Wilbert Kochon explained why programs of dı̨ga control are not considered appropriate; he stressed that the best form of 'control' is for people to exercise their traditional harvesting practices on the land.

Wolves are important for us, because they keep the caribou healthy. Always keeping the caribou moving. When you get rid of that balance, what happens then? When the caribou get sick, the wolves will kill it right away, and that sickness will never spread. If the caribou got sick and spread that sickness, the caribou will die faster in big numbers. So those kind of things you should really look at before you start killing so many wolves, or start putting bounties on it The way to control that is to be on the land. When you're on the land, the

⁹ Victor Dolphus speaking to the Berger Inquiry, V09, Fort Franklin, 1975.

¹⁰ Isadore Modeste speaking to the Berger Inquiry, V07 Fort Franklin, 1975.

caribou comes around where you are, and the wolves stay away. Right now the wolves are just having a field day because there's nobody out there ... Maybe we have to work together more to try to control that. Not to wipe out the wolves, but control it more. And maybe try to get people out there more (Chief Wilbert Kochon *In: SRRB 2016:68*).

The idea that the the relationship between wolves and caribou is important to maintain was echoed by several representatives of Tulít'a and Fort Good Hope. The SRRB concluded in its 2016 hearing report that the balance of evidence points to a consistent desire amongst Sahtú Got'jne to carry forward the teachings of the elders about ɬekwé hé díga ts'ı́ lı́ (sustaining caribou-wolf relationships).

Neighbouring regions have expressed similar views to those heard in the Sahtú– for example, the Łutsel K'e Dene First Nation, who share use of these herds with Sahtú Dene and Métis, submitted a statement of opposition to the ENR/TG proposal, calling it 'inhumane and unnecessary, and describing the proposed cull as 'a management tool drawn from another time, saying it is the wrong approach for Bathurst Caribou in the 21st century, who face complex threats to their recovery (Van Dusen 2020).

The Kugluktuk Hunters and Trappers Organization submission to the Nunavut Wildlife Management Board (NWMB) provided insights into a Kitikmeot Inuit perspective on relationships with both díga and sahcho (grizzly bears), suggesting that based on their knowledge and experience, Inuit are the best positioned to ensure that caribou-predator relationships remain in balance today (see SRRB 2016).

Finally, in January 2021, the Wek'èezhii Renewable Resources Board issued their final recommendations regarding the pilot wolf cull, recommending that the territorial government end the controversial program in favour of more grassroots investment in local hunters. Part of the WRRB reasoning included a lack of information – specifically, the inadequacy of the territorial government's baseline and monitoring data that can indicate whether the cull is effective. The WRRB urged the territorial and Tłı̄chq governments to proceed with ground-based wolf harvesting activities, with the addition of harvesters supports (WRRB 2021). The cost of the aerial cull has been high — more than \$320,000 to kill just 36 wolves last year, compared to just \$58,400 spent on the ground harvest incentives and support recommended by the WRRB (Last 2021).

3. What do people in the Sahtú think about “competitors” and their relationships to caribou?

Because muskoxen haven't been available to Sahtúot'jne for several generations, people are no longer accustomed to eating them or have much TK because they haven't been part of the landscape for so long. I didn't hear about muskox from my grandfather... ¹¹

Traditional and Community Knowledge of Caribou “Competitors”¹²

The idea of caribou 'competitors' may not be one that fits well within a traditional Dene framework that describes ası́ı́ godı́ (all living things) as living in harmony (Sahtú Elders *et al.* 2014). Nonetheless, in recent

¹¹ Walter Bezha – personal communications based on a telephone interview conducted Mar. 9, 2018 for ENR *In: Winbourne and Benson 2020:24*.

¹² This section relies heavily on information compiled for an ENR status report on muskoxen by J. Winbourne and K. Benson in 2020. Because that report was not yet publically available at the time of writing, primary sources acquired and used while under contract to ENR have been referenced here for the information in this section as

years, community members are raising concerns that factors such as new and invasive species, shifts in range and distribution of existing species, and habitat change are influencing this harmony and having a negative impact on caribou. This literature review is limited to a consideration of ungulates that compete with caribou in some way – that is, species like muskoxen, moose, wood bison, and deer. It also includes some information on interactions between different types of caribou. General information on interactions between caribou, their ‘competitors’, and their predators is included in the predator section; this section includes more details on caribou / muskoxen interactions specifically.

The TKCK literature indicates that there is mixing and movement among neighbouring herds of barren-ground caribou as well as interactions with other types of caribou, such as boreal woodland caribou (SARC 2017a). There are differing views regarding the nature of interactions between boreal woodland caribou and barren-ground caribou. In some areas, they are observed to mix in their fall and winter ranges – sharing habitat but using it differently (SARC 2012 and 2017a). Woodland and barren-ground caribou usually separate again when it is time to migrate, but small numbers of boreal caribou sometimes follow barren-ground caribou back to the tundra; barren-ground caribou sometimes also remain with boreal caribou (*Ibid.*). Gwich’in knowledge-holders have observed the same ‘mixing’ of boreal and barren-ground caribou (Katz 2010; Benson 2019). Boreal caribou also interact with northern mountain caribou along the eastern edges of the Mackenzie Mountains (SARC 2012 and 2020).

Many TKCK sources indicate that boreal caribou interact with moose, muskoxen, wood bison, and white-tailed deer and in some cases the interactions are described as competition. For example, muskoxen and wood bison can compete with and negatively impact boreal caribou (SARC 2012). However, participants in a Dehcho TK study indicated that moose and caribou generally do not share areas as they have different habitat requirements, and for predator avoidance (Dehcho First Nations 2011).

In the Sahtú, moose and muskoxen frequently occur with boreal caribou; a 2002 TK study about boreal caribou interactions listed the following species as those that occur with boreal caribou: moose, muskox, grizzly bear, black bear, wolf, wolverine, lynx, and eagle (Zimmer *et al.* 2002). Community members report that in some areas, the presence of muskoxen may be influencing barren-ground caribou mortality and survival through: direct competition for food; destruction of caribou food; avoidance behaviour; and attracting / supporting wolf predation (SARC 2017a).

There is little information available in the TKCK literature regarding interactions between caribou and moose. Observations from Tuli't'a and Norman Wells around the year 2000 indicated that there were already more moose in the Mackenzie valley than previously (Olsen *et al.* 2001). This observation was reiterated in several Sahtú communities during a recent review of the Sahtú Harvest Study data (2016-2019) and during the 2020 public listening in Colville. Community members from Norman Wells said that they are starting to see more moose, and see them in places that they did not used to see them; they are also harvesting a lot more moose and boreal woodland caribou than they did in the past, and a lot fewer barren-ground caribou. Elders in Fort Good Hope said that there are more moose than when they were young, and Colville representatives reported that they are seeing not only more moose, but also more woodland caribou (SRRB 2020a).

much as possible. In some cases, original research was conducted as part of that work, and is cited here as Winbourne and Benson 2020. In all cases, the author would like to acknowledge the significant contribution that the ENR report has and will make to the body of TKCK sources regarding muskoxen. It is expected that the ENR Manuscript report will be available by April 2021.

It has been suggested that forest fires in the 1990s reduced suitable boreal caribou habitat, and the burned areas have now been taken over by new and expanded moose populations (McDonald 2010). Zimmer *et al.* (2002) documented observations of interactions between boreal caribou and moose in the Sahtú Region, although the results were inconclusive. Some interviewees said that their food plants differ; some said they feed on the same species. It was frequently said that moose and boreal caribou are found in the same general locations, but at different times, or that they do not interact with each other. Over-all, Sahtú knowledge-holders do not appear to have significant concerns about increasing numbers of moose; this topic is not usually raised in research studies or public meetings in the same way that people raise concerns about muskoxen.

Because of community concerns about muskoxen being a potential caribou competitor, caribou relationships with muskoxen are examined in detail here. Before more details are provided on caribou / muskoxen relationships however, it is important to consider the history influencing human / muskoxen relationships in the Sahtú since the late-1800s.

[A background to muskox management in North America](#)

Prior to 1900, muskoxen were found in many areas of what are now the Northwest Territories, Nunavut, and the Arctic Archipelago, and were traditionally harvested for food, clothing, and tools in many regions. With increasing commercial activities starting in the mid-1800s, muskoxen were gone from many parts of their former range by the early 20th century; this was mostly due to over-hunting – driven by trade with fur traders and whalers (Barr 1991; Lent 1999). Thousands of muskox hides were traded at fur trade posts in the region of the Mackenzie River, far from the tundra where the animals were probably being hunted (Barr 1991). The number of muskoxen taken for meat for whaler's ships is not known but is probably also in the thousands (Tener 1965; Barr 1991).

With heavy harvesting depleting bison numbers, the demand for muskox hides in the south of Canada increased (Barr 1991). These factors (and possibly others, including weather events) led to the loss of muskoxen from the mainland portions of the NWT and Nunavut around the late 1800s and up to about 1915 (Tener 1965; Berger Inquiry Volume 41 Holman Island; Barr 1991). The ease of harvesting muskoxen, and their similarity in taste to beef, made them a favourite of explorers, whalers, and non-Inuit migrants into the Arctic Archipelago (Tener 1965; Lent 1999), so that muskox abundance on many of the Arctic Islands, including Banks Island, was also low in the early 1900s (Tener 1965; Lent 1999). It is important to note that even in the earliest federal correspondence about muskox conservation, declines in the mainland populations were not blamed upon Indigenous subsistence, but rather the export of their hides by non-Indigenous northerners (Sandlos 2011).

The decline in muskoxen across the north prompted various regulations and laws to prevent further decline starting in the 1890s. These actions were not seen as successful, and harvesting continued (Barr 1991). Increasing concern about the declining population led to a 1917 ban of all muskox hunting by Indigenous, Inuit, and Métis, except in cases of starvation, through the *Northwest Game Act* (Barr 1991; Lent 1999; Taylor 2005). In 1924, the regulations were amended based on reports that the 'starvation clause' was being misused by northerners who continued to hunt muskoxen. At this point, hunting muskoxen, and possessing meat or hides, was made illegal (Barr 1991). The hunting ban was in place until the Government of the NWT took responsibility for the management of game in 1967. At that time, it was felt that muskoxen had re-colonized much of their previous range, and soon after, the GNWT began considering proposals for muskox hunting (Barr 1991).

By the 1920s, muskox populations were either recovering or had persisted in the Thelon-Hanbury watersheds, and a small population existed north of Great Bear Lake. While sightings were initially rare between Sahtú and Paulatuk (Inuvialuit Settlement Region, ISR), the population was estimated to be in the hundreds by the 1970s, and between 4,000 and 5,000 animals by the mid-1980s (Barr 1991).

In the mid-1930s muskoxen were re-introduced to Alaska after over-hunting caused their disappearance there in the late 1800s, and one of these re-introduced populations later spread into the western portion of the NWT. These muskoxen were first reported in the NWT by Gwich'in hunters in the late 1980s. A small herd seen along the NWT/Yukon border grew into a larger herd and eventually dispersed (McLeod pers. comm. 2018). Both the Yukon and NWT governments enacted protections for this small population of muskoxen with little consultation with Fort McPherson and Aklavik (Wishart 2004). On at least one occasion, a Gwich'in harvester who hunted a muskox had the meat taken away by the Yukon government. The competition between caribou and muskoxen, along with the government's position on protecting muskoxen for non-Indigenous values (tourism and guided hunts), may be exacerbating the negative perception of muskoxen among the Gwich'in (Benson 2019).

The politics and history of muskox conservation in Canada have strongly influenced current perceptions and use in most Indigenous communities in the NWT, and continue to shape Traditional and Community Knowledge of the species today. Walter Bezha described how the management history of muskoxen in the Sahtú has had long term effects on Dene relationships with and knowledge of the animal. He stresses that the population declines had a huge impact on Sahtú Dene practices, and it continues to be a challenge to remind hunters that muskoxen are a traditionally-harvested animal.

It's been a huge challenge to get people to harvest muskox again. Colonization affected all of it, including myself – as a wildlife officer I used to promote almost everything the government wanted and didn't spend much time reading about my own history... we haven't done a great job with muskox, in fact we've separated Dene people from muskox. My own sons would never come to me and ask how grandfather hunted muskox; they don't even seem to appreciate it. But what about the meat, the hide, the Dene people and the ecosystem of Great Bear Lake? Our Dene history, our knowledge of food and harvesting, animal biology and ecology – those are all a big part of the Dene way of life... But there aren't many people in Déłjñę that want to harvest muskox because we lost that part of our hunting traditions.¹³

Nonetheless, muskoxen continue to be considered an integral component of northern ecosystems and emblematic of the Arctic in many regions; they also continue to play a valuable role as a source of income and jobs, as food, and as a link to the land for practicing and preserving traditional skills and intergenerational knowledge (Kutz *et al.* 2017).

Caribou relationships with muskoxen

TKCK sources indicate several locations within the Sahtú where people would traditionally go to hunt muskoxen – this includes areas identified as muskox habitat, or otherwise important for muskox or muskox harvesting. Observations in the Sahtú region indicate that muskoxen don't move around as much as caribou and tend to stick to a smaller area of habitat – this is perhaps because they are able to eat a more varied diet (Winbourne and Benson 2020). This has also been suggested in the High Arctic,

¹³ Walter Bezha – personal communications based on a telephone interview conducted Mar. 9, 2018 for ENR *In*: Winbourne and Benson 2020:3.

where muskoxen are known to eat a wider variety of vegetation, and caribou have been described as 'picky eaters' (Taylor 2005). However, muskoxen will move seasonally or for other reasons, and herds will also disperse (Winbourne and Benson 2020).

Muskoxen are found in relatively high numbers in two types of habitat of the Sahtú in particular: upland areas such as ridgelines and eskers, and the easternmost areas of the region, near Horton Lake, where muskoxen have historically been present the longest (Wilson and Haas 2012). Muskoxen will expand their range as their population grows, and while they previously were only known in the barren lands, they are south of the treeline in recent years (ACCWM 2014b).

Muskoxen are recently reported to be expanding their range in two places: eastward from Yukon Territory into NWT, and south within NWT from existing populations (SARC 2017a). Mixed views have been reported in the Sahtú Region for muskox interactions with boreal woodland caribou. Many TKCK sources provide evidence that boreal caribou avoid muskoxen, generally moving away from areas where muskoxen may be found (SARC 2012). Some feel that muskoxen may cause boreal caribou to leave an area due to hair, noise or parasites. Others report that they have seen boreal caribou and muskoxen feeding on the same plants, in the same places, without evidence of competition or exclusion (Zimmer *et al.* 2002).

Because the expansion of muskoxen into some areas of the Sahtú is relatively recent, few Sahtú-specific TKCK sources were available for this literature review. Where relevant, information from neighbouring regions is included in this section.

Muskox interactions with caribou in the NWT and Nunavut

Available information about TKCK of caribou / muskoxen interactions falls into four main themes:

- In some cases caribou and muskoxen compete for feed and space.
- Caribou are threatened by muskox presence.
- In some cases caribou and muskoxen may not compete for food and space.
- There are complex interactions with caribou, muskoxen, and their shared predators (Winbourne and Benson 2020).

The dual themes of caribou and muskoxen compete / do *not* compete may even be found in the same studies. For example, one TK study with Gwich'in, Sahtú, and Inuvialuit participants found the following:

Some people claimed that muskox cause boreal caribou to abandon areas because of their hair, the noise they make, or because of parasites they transmit in their feces. Other people said they have seen boreal woodland caribou and muskox feeding on the same plants in the same places without competition or exclusion (Auriat *et al.* 2002:16).

The four main themes regarding caribou / muskoxen interactions are explored in greater detail below.

i. Caribou and muskoxen compete for feed and / or space

Indigenous knowledge-holders often indicate that muskoxen compete with caribou for food; this theme is found in many written sources and heard in meetings in numerous parts of the NWT.

Generally, TKCK sources report direct competition – that is, muskoxen will move into an area and eat all the food that caribou eat; this causes the caribou to move to other areas to feed. Reports from the Inuvialuit Settlement Region include observations that muskoxen have driven caribou off islands by eating all the caribou food (Inuvik Community Corporation et al. 2006; Nagy 1999). In the Gwich'in Settlement Area, muskoxen are identified as competing for food resources with caribou in general. In particular, this relates to how muskoxen will pull an entire plant, roots and all, from the ground when grazing; this impacts the caribou's ability to feed in the area (Benson 2011). The mountains to the west of Aklavik are another location where interactions between muskoxen and caribou are observed to impact caribou negatively; this is also reported in areas of the NWT where the endemic muskox population is expanding its range and caribou numbers are declining or caribou are moving to other parts of their range (e.g., Mahoney Lake in the Sahtú) (ACCWM 2014b; Winbourne and Benson 2020).

Muskoxen have a feeding habit that tends to dislodge some plants at the root, or they may paw the lichen into the ground, disturbing the soil and causing damage to delicate caribou habitat. A decrease in habitat quality for caribou, can result after an area is used by muskoxen (Nagy 1999; Wishart 2004; Tyson and Heinemeyer 2017; Winbourne and Benson 2020). When muskoxen first expand into new areas, they may use habitat which is not preferred by caribou, such as valley bottoms and grassy, lower slopes but as their population grows, they may start to use areas which are preferred by caribou, such as further up valley slopes. This can increase caribou/muskoxen interactions and cause caribou to move or decline (Nagy 1999).

When representatives of the Aklavik Hunters and Trapper Committee (HTC) travelled to Kaktovik, Alaska to talk to community members there about their experience with muskoxen, they learned that it was only five years after the muskoxen re-introduction that people began to see a change in caribou migration routes; it was suggested that the Aklavik HTC develop a plan to do something about the muskoxen in order to protect the caribou. However, the Kaktovik community members specified that the issue was not that the muskoxen were affecting the caribou population numbers, but that they were disturbing the caribou migration (WMAC(NS) 2001). Many Aklavik community members feel that the Porcupine Caribou Herd overwintering in Alaska in 2014 may have related to increasing numbers of muskoxen in the eastern part of the herd's range, or that the migration routes of caribou more generally are being affected by muskoxen (Tyson and Heinemeyer 2017; Winbourne and Benson 2020).

Some NWT communities within the range of the North Slope muskox population are concerned about the potential negative effects of muskoxen on the Porcupine Caribou Herd; the two main stated concerns are that muskoxen will displace caribou from their preferred habitats and divert caribou from migration routes that have historically provided hunters with good access to caribou – an important traditional food for users of the herd (WMAC(NS) 2017). This concern was expressed in a 2006 Muskox Management Workshop in Aklavik; it was noted that the caribou avoid muskoxen and move onto ridges when there are muskoxen in valleys (WMAC(NS) 2006). Numerous other management concerns were recorded during that workshop.

There just two accounts found in TKCK sources in which muskoxen were observed to avoid interactions with barren-ground caribou when their numbers are high; "Of course the musk-ox disappear because they know that the caribou are there, that means the wolves are there. After the caribou have gone through the musk-ox shows up again," (D'Arcy Mercredi *In* NSMA 2001:106-107). Walter Bezha also had this observation from the Sahtú Region; "I think the saying is true – that muskox prefer to be away from caribou – and I think it has to do with the food. When caribou numbers are that high, I don't think the muskox can compete for food," (*In*: Winbourne and Benson 2020:57).

ii. Muskoxen scare caribou away due to their shape, behaviour, and / or scent

Some knowledge-holders state that muskoxen scare caribou away due to their shape, which caribou find threatening; it may be that muskoxen look like a grizzly bear to caribou (ICC *et al.* 2006; Tyson and Heinemeyer 2017). At least one person has seen a muskox charge a caribou (ACCWM 2014b). On the Yukon North Slope, knowledge-holders also observe that muskoxen can frighten and displace caribou; many hunters report that they have seen caribou run from muskoxen (WMAC(NS) 2006).

Many people feel that part of the reason caribou avoid muskoxen and the areas where muskoxen have been feeding relates to the strong scent of muskoxen and their urine (Nagy 1999; Wishart 2004; Taylor 2005; WMAC(NS) 2006; Benson 2011; Tyson and Heinemeyer 2017). The scent they leave on the landscape is persistent; people say you can smell them even a week after they have gone by, so maybe that keeps caribou away (ACCWM 2014b). This effect is compounded by caribou's powerful sense of smell (ACCWM 2014b; Benson 2015; SARC 2017a).

iii. Caribou and muskoxen do not compete for feed and / or space but 'cycle'

Ulukhaktuk harvesters have indicated that caribou and muskoxen do not compete for food or habitat; instead, they have observed trends that suggest standard population cycles in caribou and muskoxen populations (Gunn 2005; SARC 2013). Similar information has been recorded on the Yukon North Slope, where some Inuvialuit have observed that good muskox habitat can also be good caribou habitat and, as the population has recovered, muskoxen are increasingly spotted foraging in places people would expect to see caribou, like Herschel Island (WMAC(NS) 2018).

Nonetheless, knowledge-holders in the High Arctic of Nunavut have observed that a large presence of muskoxen often results in a decline in the numbers of caribou in a specific area (Taylor 2005). Participants in an Inuvialuit Traditional Knowledge study observed that muskoxen were 'taking over' grazing areas from caribou and moose on Parry Peninsula at one point in time (Inuvik Community Corporation *et al.* 2006). Yet some Somerset Island hunters became concerned with the growing number of caribou on that island in the 1980s, saying that there were 'too many' caribou in some areas. Conversely, by the late 1980s, hunters around Resolute Bay and Grise Fiord observed a decrease in the abundance of caribou, saying that some areas of Somerset Island previously occupied by caribou were now occupied by muskoxen. Knowledge-holders did not cite competition as a factor, but described a cycling of abundances in which muskox and caribou 'take turns' in abundance. This means that for some period of time muskoxen will multiply, and then when they begin to die-off or disappear the caribou begin to increase in number, but muskoxen and caribou never multiply in large numbers at the same time (Taylor 2005).

Inuit Knowledge of this 'cycling' trend on Somerset and Prince of Wales islands say it may be so extreme that the growth of muskox populations has been accompanied by the complete disappearance of caribou in some places. Yet some Inuit knowledge-holders have observed that caribou and muskoxen feed on different vegetation and therefore do not compete directly for food. The study's author concluded that this could suggest indirect competition through displacement or avoidance, however, also noted that the animals tend to inhabit different habitats, with caribou generally foraging in higher areas and muskoxen in lower valleys (Taylor 2005). While some participants quoted in Nagy 1999 said they felt muskoxen and caribou compete for foraging habitat, at least one person mentioned that the decline of caribou on Banks Island might not be due to competition, but to natural population cycles.

The people figure that muskox are probably chasing the caribou away. But I don't think it's that way. I think it's probably what they call a 30 years cycle that they have the caribou. Because, eventually I think they'd probably going to come back. Maybe it's just a downfall.¹⁴

Recent work in Nunavut supports this theme, describing a correlative relationship between caribou and muskox cycles of abundance and distribution in which the populations have peaked and declined similarly or even simultaneously over time (Tomaselli et al. 2018b).

The sole outfitter who guides commercial muskox hunts in the Sahtú has observed that for the most part, muskoxen and barren-ground caribou do not share habitat or seem to compete for resources. He has experienced the following around the north shore of Great Bear Lake:

... they don't seem to be damaging the habitat because you can see muskox in the same area at the same time as caribou. As far as hunting and guiding go, we used to have hunts for both muskox and caribou at the same time; we wouldn't hunt them as if they were found in different zones.¹⁵

Based on these observations, it was suggested that there is no correlation between what has been observed as steady but small numbers of muskoxen over the last 12-13 years in this area, and the declining numbers of caribou in the Sahtú region; "The caribou numbers have changed but muskox numbers haven't, so I don't think they're correlated."¹⁶

Other interviewees in the Nagy 1999 study suggested that the disappearance of some caribou on Banks Island could be linked to weather conditions instead of muskox presence. A fall weather pattern of freezing temperatures, followed by a warm-up and rain, covered the animal's forage with ice in the 1970s; this caused the caribou to try and leave the island, and affected the numbers of calves (Nagy 1999).

iv. Muskoxen, caribou, and their predators interact in complex ways

As mentioned in the **Predators** section above, wolves are an important predator of muskoxen and can influence muskox population numbers; it is said that a pack of wolves can 'easily' hunt an adult muskox (Golder 2003). Banks Island Inuvialuit suggest that part of the reason muskoxen increased so dramatically there during the last half of the 20th century was that wolves had been nearly extirpated (Nagy 2004). In the High Arctic, some Inuit knowledge-holders state that wolves follow muskoxen when they shift their range, and that wolves prefer muskoxen over caribou (Taylor 2005). Other sources indicate that wolves switch to muskoxen when caribou numbers are low.

Those muskox now, even on our land (Victoria Island), there's too many of them now. Then the caribou there's fewer of them now. And then there's the wolves, there's lots of them now. Lots of them would get together and kill a caribou and eat it. That's why the caribou are depleting. Maybe it is because they don't have much to eat. So they are now killing muskox now too (Sam Oliktoak *In* Nagy 1999:163).

¹⁴ John Lucas in Nagy 1999:165.

¹⁵ Chuk Coulter – personal communications based on a telephone interview conducted Mar. 29, 2018 for ENR *In*: Winbourne and Benson 2020:49.

¹⁶ *Ibid.*

A possible consequence of higher numbers of muskoxen is that they provide alternate prey for wolves and therefore could maintain high numbers of wolves even while caribou are declining; Cambridge Bay residents indicated that interactions with muskoxen could be the reason caribou migrate so soon, that is to avoid a high density of muskoxen on Victoria Island (SARC 2013).

Iqaluktutiaq (NU) interviewees also noted that an increase in the presence of wolves had added another hunting pressure for muskoxen (Fawcett *et al.* 2018). A representative of the North Slave Métis Alliance observed that if wolves are hanging around an area after the caribou have left, then it is likely they are feeding on muskoxen (NSMA 2001).

The idea that increasing muskox populations are to be blamed for an increased presence of wolves and bears is further complicated by reduced furbearer harvesting and changing moose populations. A similar effect has been noted in the Inuvialuit, Gwich'in, and Sahtú regions (ACCWM 2014b; SARC 2017a). It has been suggested that an increase of wolf numbers associated with the presence of muskoxen may deter caribou from using areas they used in the past (ACCWM 2014b). Muskoxen may also be influencing the normal predator-prey relationship typically found in barren-ground caribou population fluctuations; an influx of muskoxen into an area allows for the wolf population to survive and possibly grow even during a shortage of caribou. In the past, low caribou numbers would lead to a decrease in the number of wolves (*Ibid.*).

Several Aklavik Inuvialuit have suggested that grizzly bears follow muskox herds, especially when the muskoxen have calves (Tyson and Heinemeyer 2017). Several interviewees told of grizzly bears traveling to areas with large muskox populations in the spring, when access to and from Herschel Island is easier and muskoxen are having their young. While grizzly-muskox interactions on Herschel Island were not known in the past, one interviewee suggested that this might be becoming more common as the muskox population increases (*Ibid.*).

Similarly, Inuvialuit Traditional Knowledge on the Yukon North Slope indicates that grizzlies have been increasingly following muskoxen – particularly in spring, when muskoxen have young (WMAC(NS) 2018). Aklavik harvesters said that both grizzly bears and wolves eat muskoxen in the Richardson Mountains (Lambert-Koizumi 2012).

Nunavut interviewees on Victoria Island have reported observations of kill sites where it is believed a grizzly killed several muskoxen but only ate specific pieces of select animals (Fawcett *et al.* 2018). Iqaluktutiaq harvesters indicated that grizzlies have learned to chase muskoxen long enough that they'll leave their calves behind (Dumond 2007). Kugluktuk harvesters noted that both muskox and caribou calves were the main food source for grizzlies (Golder 2003).

A Gwich'in TK study about Porcupine caribou reports that moose do not like being around Porcupine caribou due to the noise. An example was given for the area around Hart River, which had supported a large population of moose during the time when the caribou were migrating further to the east. When the caribou returned, the moose disappeared (Benson 2019).

Thoughts about Muskox Management in the Sahtú

During the community engagement work conducted for Bluenose-East, Bluenose-West and Cape Bathurst caribou management planning (2007-2013), communities in the Inuvialuit, Gwich'in, and Sahtú

regions, as well as Kugluktuk (NU) commented on how changes in the abundance of competitors like muskoxen may be influencing caribou and should be addressed (ACCWM 2014b). People from Aklavik, Tulít'a, Fort Good Hope, and Déljñę reported expansion of muskox range into new areas or increases in numbers of muskoxen. In the Sahtú, the comments recorded about muskoxen during 2009-2011 community engagements were:

- One of the principles of the plan is to protect the lands important for caribou. A few years ago, you were protecting the muskox and now the muskox are everywhere. How are you going to protect the caribou? Muskox are really overpopulated. They are in Colville Lake, they have come inland, they are all over the place. (Fort Good Hope)
- We are told by the elders that the muskox are supposed to be on the tundra. The caribou eat the food, the lichen, down to the ground. But the muskox they paw it right through to the ground so nothing grows back. Maybe you should be paying for muskox like you do for wolves. (Tulít'a) (ACCWM 2014b:55).

Little other TKCK regarding muskox management has been documented in the Sahtú. Management plans, frameworks and lessons learned from neighbouring regions are included in **Section 4b** below.

4. What are Indigenous peoples doing today for ecosystem planning and caribou conservation?

Dene people are part of the environment; they don't manage it, they learn from it – that's why the name for wolf is basically 'doctor'. We should be focused on the knowledge of the land. People are not going to tell the environment or ecosystem how to function. We need to see the Aboriginal history and bring it forward, as people have got away from the traditional way of doing things.¹⁷

Over the last twenty years there have been considerable shifts in how governments, courts, and the public perceive their relationships with Indigenous peoples. Encouraging steps are being taken towards reconciliation in Canada, and important developments like Article 8(j) of the Convention on Biological Diversity (Secretariat of the Convention on Biological Diversity 2005), the recommendations of the Truth and Reconciliation Commission (Truth and Reconciliation Commission of Canada 2015), and the work of the Indigenous Circle of Experts (ICE 2018) acknowledge, uphold, and advance understandings of the unique role that Indigenous peoples play in conserving life on earth (Winbourne et al. In Prep.).

Nonetheless, in most cases natural resource management institutions have been slow to adapt to this political evolution, and remain embedded in Western scientific frameworks. As a result, Indigenous Knowledge, governance systems, lifeways, stewardship beliefs, and practices are still poorly accommodated in most management systems. While co-management arrangements were intended to facilitate and improve Indigenous participation and inputs, they have also often continued to operate within a Western scientific knowledge and governance system (Natcher et al. 2005; Suluk and Blakney 2008; Urquhart 2010; Armitage et al. 2011).

¹⁷ Walter Bezha – personal communications based on a conversation during a Nę K'ə Dene Ts'ı̄l̄ Forum meeting, November 20, 2020.

In response to this situation, there is a growing momentum towards Indigenous-led stewardship initiatives, both in Canada and around the world. These initiatives tend to include a holistic vision, with objectives that encompass the health and well-being of human as well as non-human animals, and they rely on the use of several complementary conservation tools. This is a key differentiation from Western science-based approaches that generally have a more narrow focus on the welfare of an individual species or one part of a system, and use a more limited set of tools (Winbourne *et al.* In prep.).

In a nation-wide analysis of Indigenous-led caribou stewardship initiatives, seven common elements of conservation planning were consistently identified:

- Stewardship Planning – Turning Story into Policy.
- Boots on the Ground Monitoring Programs.
- Land Protection – Indigenous Protected and Conserved Areas.
- Research / Gaining and Sharing Knowledge.
- Management and Recovery Actions.
- Better Collaboration.
- Remembering and Re-asserting Traditions (*Ibid.*).

Each of these complementary tools or types of actions are described briefly below. It is important to note that this literature review has been restricted to stewardship initiatives that are focused on caribou. Nonetheless, the elements identified here are not species-specific, but found in many Indigenous-led initiatives, in many parts of Canada, for many different cultural keystone species.

Elements of Indigenous-led initiatives and caribou conservation planning¹⁸

Stewardship Planning: Turning Story into Policy – Many Indigenous organizations are finding strength in choosing to prepare conservation or stewardship plans for their regions and/or communities that are based in traditional stories and teachings. These plans are more firmly rooted in the stewardship perspectives, principles, and practices of the cultures and societies that sustain relationships with caribou. In addition to having a strong focus on conservation targets, Indigenous-led plans usually incorporate objectives related to important aspects of culture, well-being, governance, local economies, and knowledge transmission in ways that non-Indigenous stewardship plans do not. The resulting plans are a useful tool for nation to nation negotiations and collaborative work with governments and industry.

Boots on the Ground Monitoring Programs – These initiatives support and facilitate the continued and increased presence of Indigenous peoples on their traditional lands using an approach to monitoring that spans ecological, social, cultural, and economic aspects of stewardship (ICE 2018). Programs are taking place at the regional level (e.g., the Ekwò Nàxoède K'è (Boots on the Ground) Bathurst caribou monitoring program – Dedats'eetsaa 2019), the national level (e.g., Guardian programs – Indigenous Leadership Initiative 2020), and around the world, empowering communities to steward their ancestral lands according to traditional laws and values. They are quickly becoming a symbol of Indigenous peoples' governance and an important tool in caribou conservation. Resulting benefits span governance, culture, biodiversity, and health (Gunn *et al.* 2010).

¹⁸ These ideas are currently being developed more fully in Winbourne, J., Manseau M., Simmons, D., Bezha, W., and J.B. Zoe. (In preparation). Indigenous-led Caribou Stewardship in Canada: An Emerging Paradigm.

Land Protection: IPAs / IPCAs / ICCAs – Many Indigenous-led initiatives are tightly linked to land protection. Worldwide, there is growing recognition of the significant role Indigenous Protected and Conserved Areas (IPCAs) and Indigenous peoples’ and Community Conservation Areas (ICCAs) can play in the conservation of biodiversity and cultural heritage. In 2018, the Indigenous Circle of Experts called on all levels of government to work together to develop on-the-land programs for the development and management of IPCAs in Canada (ICE 2018). Many stewardship plans include proposals for large protected areas as part of their work – such as the collaborative NWT/YT Shúhta Dene *Nío Neᑕ P’ęneᑕ* plan (Nío Neᑕ P’ęneᑕ Working Group 2019). Other Indigenous-led initiatives are also gaining conservation success through parks and protected areas (e.g., the Edézhíe Protected Area, Government of Canada 2020).

Research / Gaining and Sharing Knowledge – Indigenous ways of knowing and relating to cultural keystone species such as caribou often embrace a spiritual or sacred aspect that is not accommodated well by Western science research approaches and methods, and Indigenous Knowledge was often “fit into” Western science frameworks, leaving behind many important elements such as culture, well-being, spirituality and governance (Winbourne et al. In prep.). Indigenous-led stewardship initiatives tend to demonstrate a broader approach to gaining knowledge that encompasses research, education, advocacy and communication in a way that pays respect to traditional understandings of important species and relationships).

Better Collaboration: Nation to Nation governance and creating ethical space – There is a strong need for and movement toward respectful partnerships and improved collaboration, based on a foundation of equality and an acknowledgement of inherent Indigenous governance. Imported governance regimes have failed to understand and make space for Indigenous law, and so have limited the ways in which Indigenous peoples are able to be involved in the decision-making that affects them. To address this, the ICE called for the adoption of an ‘ethical space’ approach, placing a focus on all level of government to create “... a place for knowledge systems to interact with mutual respect, kindness, generosity and other basic values and principles” in which “all knowledge systems are equal; no single system has more weight or legitimacy than another (ICE 2018:7).

Management and Recovery Actions / Interventions – Indigenous-led stewardship and conservation planning includes taking management actions or interventions when necessary – this is increasingly the case for caribou conservation planning in many areas to the south, where caribou numbers have declined sharply. In these cases, First Nations have partnered with government and / or industry to initiate what is often a suite of recovery actions, often including interventions such as predator management using traditional measures, maternity penning, translocations, and habitat restoration. Actions are usually selected on the basis of both Aboriginal and technical information (Willson et al. 2018).

Remembering and Re-asserting Traditions – Because stories convey the importance of relationships and connections to place, cultures, languages, governance, and laws, when they form the basis for stewardship planning, many aspects of Indigenous traditions are brought forward in conservation activities. The plans and actions themselves can become a tool not just for negotiation / collaboration, but for maintaining traditional lifeways, knowledge and governance. The Déljneᑕ plan provided one example of how stories can shape planning for caribou; there are other exciting examples of Indigenous peoples making strong links between traditional activities and contemporary caribou information and stewardship needs taking place in many parts of Canada (Déljneᑕ First Nation et al. 2016).

Depending on things such as scope, needs, capacity, resources, location, etc. individual Indigenous-led initiatives may choose some or all of the elements described above in stewardship planning activities.

Community Conservation Planning in the NWT

Since the settlement of the Inuvialuit Final Agreement in 1984, Community Conservation Plans (CCPs) have been guiding planning activities in that region since the 1990s. CCPs exist for each of the six communities in the Inuvialuit Settlement Region (ISR). These plans have involved Inuvialuit and non-Inuvialuit bodies with an interest in the area in consultation and planning for the conservation and management of natural resources and lands within the region, and have been a critical step for impact assessment, research, and project planning. The plans involve representatives of organizations like Hunters and Trappers Committees, Community Corporations, and Elders Committees, as well as the Wildlife Management Advisory Council (NWT), the Fisheries Joint Management Committee, and the Joint Secretariat, among others.¹⁹

The ISR CCPs express each Inuvialuit community's goals and objectives with respect to the conservation of lands, waters and living resources in a specific planning area. They make recommendations and describe activities to be undertaken by individuals and organizations at the local, regional and national level that are intended to help protect the environment and to ensure cultural survival of the Inuvialuit community. The plans span all species of importance to Inuvialuit people, and include descriptions of important sites – both to wildlife species as well as community members – including habitat, harvest seasons and areas, and the traditional use of various species.

Over the last several years, community planning processes have been initiated in all five Sahtú communities. In many ways, the starting point for this work was the development of Délı̨ne's *Belare Wı̨le Gots'ę ʔekwé – Caribou for All Time* plan, mentioned above in **Section 1** (Délı̨ne First Nation et al. 2016). At its July 2017 Board meeting, the SRRB formally adopted an approach rooted in Dene ts'ı̨ı (Dene ways of life)²⁰ and community conservation planning as a basis for its strategic plan, and as guidance moving forward. The approach is not only intended to better accommodate Dene ts'ı̨ı, but to achieve local priorities in planning as well as broader land claim objectives in biocultural conservation. The decision to adopt this approach reflects the Board's response to shifts in ecological conservation standards and legislative frameworks; an expanding recognition and inclusion of Indigenous title, rights, and knowledge in management and planning; and the movement towards self-government in Sahtú communities (SRRB 2020b).

Since that time, other communities – such as Colville – have also been moving forward with community-based planning approaches to stewarding caribou and caribou habitat in their traditional areas. The Behdızı Ahda First Nation has developed a draft *Dela Got'ı̨ne Caribou Management Plan and Harvest Law*

¹⁹ More information on Community Conservation Plans in the ISR is available at:

<https://www.jointsecretariat.ca/community-conservation-plan>.

²⁰ The phrase “Dene ts'ı̨ı” can be interpreted as Dene ways of life. It refers to what it means to be Dene, our identity, and our ways of being – the whole concept of what being Dene (our identity) means to our grandparents – as well as more diverse lifestyles that reflect aspects of our current reality. Dene ts'ı̨ı also encompasses unique Indigenous aspects of Métis identities and ways of life, with great respect for the historical and ongoing relationships between Dene and Métis in our communities. See SRRB 2020b.

to move their objectives forward.²¹ Shúhta (Mountain) Dene spanning the YT/NWT in the range of the Mackenzie Mountains have also been working hard to create a plan that will benefit caribou (Nío Nę P'ęné Working Group 2019). Because Shúhta Dene traditionally share an area with Dena who are now located in the Yukon, planning has involved three communities in two territories – Tulít'a and Norman Wells (NWT), and Tu Łidlini (Ross River, YT). While Northern Mountain Caribou are the focal species for this plan, the objectives encompass a wholistic approach to the conservation of all nature, including the vitality of Shúhta Dene ways of life. The planning process is adapted from an approach developed by Australian Indigenous communities,²² and is guided by Dene principles of *bets'erjchá* (respect) for the caribou, *ęęets'erjchá* (respect) for each other, and *ęęexę ęęgháats'eda* (working together). Program areas include an Indigenous Guardian and Wellness Program, establishment of an Indigenous Protected and Conserved Area, promotion of Indigenous laws and agreements, reducing disturbance, education/communication, and a strong evaluation component to support progress (Nío Nę P'ęné Working Group 2019).

Community conservation planning in the Sahtú Region differs from that in the ISR in that each of the plans developed in the Sahtú are centered on caribou as a focal species; they also demonstrate the type of approach and elements commonly found in many Indigenous-led stewardship initiatives across Canada today. Similar relevant work is underway in neighbouring regions of the NWT and Nunavut, as well as Alaska. To further explore how Indigenous-led initiatives are addressing specific emerging management issues such as predator control and caribou competitors, we can look to these neighbouring regions to learn from their approaches.

4a. How are Indigenous Peoples Maintaining Healthy Caribou / Predator Relationships?

In “Taking Care of Caribou” – the ACCWM management plan for the Bluenose-East, Bluenose-West and Cape Bathurst herds – predator control programs are described as a ‘hot topic’ in the NWT.

... the question of whether to ‘manage’ or control predator populations in order to benefit caribou can be a sensitive one. Science is beginning to show that this is not a straight-forward issue – sometimes the populations do not respond as expected. Amongst the public, there is both support and opposition to the idea. Because the issue is so complex, there is currently no formal wolf control program in the NWT or Nunavut (ACCWM 2014a:41).

During the ACCWM engagements, people emphasized the need for better information before any management actions be taken, including increased monitoring of predator populations, measurements of predation, and assessments of the impact of predation on caribou herds (*Ibid.*).

In order to provide the best information possible, a Wolf Feasibility Assessment Technical Working Group (WFATWG) was formed to compile information about wolf management options for the NWT. The Working Group considered 12 management options to support the Bathurst caribou herd by reducing wolf predation through lethal and non-lethal removal, including: no specific management actions; diversionary feeding; relocation to remote areas, zoos or captive facilities; neutering; aerial shooting; ground-based shooting; snaring; and poisoning. Each option was reviewed using four criteria:

²¹ Colville Lake Renewable Resources Council, *Dehlá Got'ine ęęada Plan* (October 21, 2019), available on the public registry for the SRRB 2020 Colville Public Listening Session, online: SRRB <<https://www.srb.nt.ca/>>.

²² For background on the Healthy Country Planning approach, see www.ccneglobal.com/resource/healthy-country-planning.

humaneness, cost efficiency, likely effectiveness, and risks / uncertainties. The resulting report concluded that removing about 124 wolves in the first year and maintaining low wolf numbers for five years after, would give the highest likelihood of halting the Bathurst herd's decline and starting it toward recovery (WFATWG 2017).

Considering the Yukon Wolf Conservation and Management Plan

To date, a territorial plan for managing predators like wolves has not been developed in the NWT, so management issues have been considered as they arise in different regions and in regards to specific herds of caribou. In contrast, Yukon Territory has had a wolf conservation and management plan in place since 1992; earlier versions of the plan were focused mostly on ungulate recovery, and placed a lot of emphasis on large-scale, scientifically-based, government-sponsored wolf control programs (see Yukon Wolf Management Planning Team 1992). A review of the plan began in 2010, including compilation and review of documentation on wolf conservation, status and management; public meetings in 14 communities; workshops with First Nation governments and wildlife management boards and councils; as well as soliciting and receiving written submissions (Government of Yukon 2012).

The review concluded that much has been learned about the impacts, long term effectiveness, and costs / benefits of lethal wolf control programs, and there is little public interest to focus so much effort on this as a management approach. The resulting 2012 plan reflects a more complete range of tools to conserve and manage wolves, including a stronger role for local involvement in wolf management. Some key lessons learned during the development of the revised plan were:

- While reducing wolf numbers in defined areas did result in an increase in prey numbers, in order to maintain higher prey densities predator reduction would have to be sustained over the long term.
- Aerial control is no longer a recommended management tool. Strong public opposition, high financial costs, short-term impacts, and the lack of community involvement weigh against this approach. Other management tools with broader public support are recommended.

The revised Yukon Wolf Conservation and Management Plan relies heavily on collaboration and communication between the Yukon government, First Nation, Inuvialuit, and wildlife management boards and councils. Equal consideration and the importance of local, traditional, and scientific knowledge is recognized throughout the revised plan. The plan recommends seven management goals:

- Conserve wolf populations in recognition of their role in ecosystems and biodiversity maintenance.
- Manage the harvest of wolves in recognition of their social, cultural and economic importance.
- Manage wolf populations in recognition of the enjoyment and appreciation that Yukoners and visitors have in experiencing wolves in Yukon wilderness.
- Use wolf harvest as a tool to reduce predation rates of moose and caribou in local areas.
- Integrate ungulate management with wolf management goals.
- Manage wolves to address human-wildlife conflict.
- Promote research, education programs, and information sharing to enhance understanding of wolf behaviour, ecology, and management decisions affecting wolves (Government of Yukon 2012).

Dene and Inuit thoughts on maintaining the wolf / caribou balance today

While collaborative work regarding how to address the balance between wolves and caribou today has not taken place throughout the NWT, community work has been conducted with representatives of First Nations in some regions. Due to its relevance, a summary of those findings is presented here.

Summary of a TK Technical Session related to the 2020 ENR / TG joint management proposal

In October 2020 a Traditional Knowledge session was held in Yellowknife to consider the way in which balance has been maintained within ecosystems involving caribou, wolves, and people in the past, and how that can be used to inform the present. Participants included representatives of the Tłı̄chǫ Government, ENR, the North Slave Métis Alliance, the Łutsel K'è Dene First Nation, and the WRRB (Author unknown 2020).

Elders participating in the TK session agreed that overall, a balance between wolves and caribou was maintained in the past in that when caribou numbers were low, wolf numbers usually went down. Today however, forest fires are destroying caribou habitat, which is causing hardship for the caribou, and climate change seems to be bringing more moose into the area – meaning wolves can hunt both moose and caribou, and this helps them remain strong. Participants acknowledged that how to maintain a population balance between caribou and wolves in nature, currently, is difficult to understand. They also noted that it would be helpful to know how many wolves are throughout the caribou range, as it is difficult to talk about balance when people do not know the situation of the wolves (*Ibid.*).

The topic of maintaining a balance between wolves, caribou, and people was discussed from two perspectives: i) people had and showed respect for both wolves and caribou, and ii) over time, the encroachment of non-indigenous cultures and practises has weakened the natural balance between wolves, caribou, and people.

In the past, wolves harvested caribou and other animals, and people harvested a variety of animals, including wolves – both adults and pups. Currently, all people harvest caribou, but few harvest wolves; and most people have forgotten the importance of harvesting, preserving, and using animals in a respectful and appropriate manner for the well-being of people as well as animals (Author unknown 2020:2).

Elders at the TK session referred to the 'bigger picture' in relation to the decline of caribou, focusing not just on wolves, but referring to the ongoing reduction of caribou over time as more people are using resources that were once only used by Indigenous peoples. They also discussed changes associated with alternative forms of decision-making and behaviours that result in changes to caribou range. Tłı̄chǫ elders at the session suggested that there should be a TK research project over several years to really understand the complexity of the current situation (*Ibid.*).

Ekwò Nàxoède K'è (Boots on the Ground) monitoring results and recommendations

Recommendations of the Ekwò Nàxoède K'è (Boots on the Ground) Bathurst caribou monitoring program support some of the evidence elders provided at the 2020 TK session. After three years of monitoring, the program recommended support for the continuation of land-based activities such as wolf harvesting on the barren-ground caribou core use area as a means to achieve two key objectives:

- 1) From a socio-ecological perspective, re-establish traditional harvesting practices promotes respect for the land in order to restore a balance between species, and ensure that the traditional knowledge and cultural practices are transferred between generations.
- 2) The harvesting of fish, plants and medicine gathering, subsistence hunting of local animal species, fur trapping and an increased wolf harvesting on the Bathurst caribou core range can

directly help the land and specifically recover the caribou herds declining in numbers (Dedats'eetsaa 2019).

The 2019 Dedats'eetsaa report goes on to explain this recommendation as follows:

The attempt in recent decades by colonial government policies to remove the permanent presence of people from the land has altered established sustainable balances in the social-environmental system in which people and animals coexisted for millennia. The Dene and Inuit harvesters lived as a part of the ecosystem since time immemorial, and, as harvesters, have a central role in creating a balance in the relationship between people, wolves and caribou. In the last century, significant shifts have been altering the northern social-environmental system. Because of numerous current and historical policies forcing assimilation of indigenous peoples into non-indigenous society, the permanent presence of peoples on the land has declined. A consequence of the colonial government's attempt to remove the people from the land is imbalances in the complex social-environmental system.

One of the effects is an alteration of the balance that predators (humans included) have maintained with caribou populations. The local harvesters described the resulting situation as 'the wolves took over after the hunters left.' Furthermore, 'people kept wolf population in balance and the caribou population in balance.' The unknown and indirect consequence of colonial government policies by removing the permanent presence of indigenous peoples—the apex hunter—off the land, is more available space and less harvesting of predators, such as wolves (Dedats'eetsaa 2019:74).

According to local Inuit residents at Kokètì, who hunt wolves around their camp, fewer people on the land means more wolves preying on caribou. Supporting the traditional harvest of predators is consistent with both objectives described above; as a result, the Ekwò Nàxoède K'è program supports incentives to harvest wolves as a way to support the traditional economy and generate income. Supporting on the land activities is also a way to maintain cultural transmission of knowledge and cultural practices between generations (Dedats'eetsaa 2019).

Case Studies:

Several case studies are introduced here as examples of how different Indigenous stewardship initiatives are choosing to address the question of how to maintain healthy relationships between caribou, wolves, and people today. It is important to keep in the mind the following points:

- Many community members in the NWT are saying that they feel like they need to know more about caribou/wolf/human ecosystems today before management interventions should be taken.
- The specific context of each situation is important to consider, including the type of caribou, the number of caribou and wolves, impacts of predation, costs, risks, etc.
- Loss of forest habitat is thought to be the primary driver of woodland caribou decline. Numerous Indigenous-led research projects are focused on dismantling roads and to monitoring the behavior of caribou, their predators, and alternate prey in response to habitat restoration

There are numerous examples available in the literature from Yukon, BC, and Alaska in which a combination of caribou protection and non-lethal wolf control measures have been successful at

increasing caribou abundance. Some of the non-lethal and alternative methods described include: diversionary feeding, relocation or sterilization of predators, caribou maternity pens, alternate prey reductions, and prescribed burning. It can be difficult to assess the effectiveness of a non-lethal option such as sterilization on its own, as each program has involved additional management strategies. It is also noted that wolf populations tend to rebound to pre-treatment densities within three years when sterilization is not continued. Nonetheless, with periodic treatment of wolves in the area, sterilization may have the same effect on wolf population growth as lethal removals. Authors note that in First Nations cultures, where a high degree of value and respect is placed on wildlife, there may be local cultural sensitivity to treatments like sterilization (McLaren 2016).

i. West Moberly and Sauteau First Nations: Spearheading a suite of actions for woodland caribou

Where/what caribou: Northern BC, Klinse-Za herd (Southern Mountain Caribou)

Status: 16 animals remaining in 2013

Actions: Predator management using traditional measures, maternity penning including supplemental feeding, and habitat restoration.

Spearheaded by two First Nations in northeastern British Columbia (BC), this initiative brings together First Nations, government, and industry in an effort to restore the Klinse-Za caribou herd. In 2013, after caribou numbers had dropped to a low of 16 animals, the West Moberly and Sauteau First Nations came together to collaboratively initiate a full suite of recovery actions for this herd of Southern Mountain Caribou. The two communities formalized their agreement to work together by forming the Nikanese Wah Tzee Stewardship Society – a not-for-profit group focused on the recovery of caribou populations within the territory of Treaty No. 8. Selected on the basis of both Aboriginal and technical information, recovery actions including predator management using traditional measures, maternity penning, and habitat restoration. Actions were initially enabled by a broad spectrum of industrial partners. Both provincial and federal governments have since joined in the collaborative recovery effort with an ambitious goal to create one of the first fully recovered caribou herds in BC. This working collaboration has led to numerous positive outcomes, including conservation of caribou and restoration of caribou habitat, protection of treaty rights and livelihoods, and increased capacity and education within the First Nations communities (Willson et al. 2018).

ii. Combining lethal and non-lethal methods of wolf control: Rebuilding the Fortymile caribou herd

Where/what caribou: Alaska and Yukon, Fortymile caribou herd (Barren-ground Caribou)

Status: formerly the largest herd in Alaska, declined to an estimated 5,700-8,600 animals by the 1970s

Actions: Predator management using traditional measures, maternity penning including supplemental feeding, and habitat restoration.

Recent, collaborative planning efforts for the Fortymile caribou herd started with the formation of a grassroots coalition in early 1990s – a process led by the chief of the Dawson First Nation (YT), that eventually involved representatives from Yukon and Alaska federal, state, and territorial agencies, First Nations, Alaska Native organizations, and other interest groups and individuals. The group decided early on there was a need to develop a full management plan for the herd in order to address the complex harvest regulatory structure in Alaska, and develop acceptable methods for managing predation and habitat. The common vision developed for the Fortymile caribou herd and its ecosystem was:

- To restore the abundance and diversity of wildlife in the ecosystem, of which the Fortymile Herd is the most important indicator species.
- To promote healthy wildlife populations for their intrinsic value, as well as consumptive and nonconsumptive uses (Gronquist et al. 2005).

The team realized that if the goal of herd recovery was to be met, a new direction in predator management had to be found that was more socially acceptable than lethal control. A sterilization program was conducted for five years on dominant wolves from 15 packs with territories on the calving range of the herd. Plan recommendations also included: maintaining habitat quality, reducing the harvest of caribou, decreasing predation on calves by wolves and grizzly bears, public involvement and awareness, implementation and monitoring. Studies concluded that combined with relocation of subordinate wolves and a reduction in human harvest, this led to a rapid increase in the size of the herd.

The experiences of the Fortymile caribou herd planning team indicate that for controversial resource management issues such as predator reduction, a process involving diverse public interests, identifying a common vision, and working within a consensus framework can provide management recommendations that are endorsable by decision makers and can be implemented successfully. In this case, involving environmental, animal welfare, and outdoor recreation and ecotourism groups in the planning process, along with harvesters and managers, diffused contentiousness and minimized controversy. Factors identified as key to success of the initiative include:

- Diverse composition of planning team
- Strong facilitators
- Adequate financial support and information
- Continuing public awareness (Gronquist et al. 2005).

iii. Tahltan Nation predator management policy

Where/what caribou: Northwestern BC, multiple ungulate populations, including caribou and moose

Status: Overall decreases in ungulate populations and increases in predator populations being seen.

Actions: Incentives for hunting wolves, grizzly and black bears.

In response to dwindling ungulate populations and increased conflict between community members and predators, the Tahltan Central Government (TCG) introduced a Predator Management Policy in the fall of 2020. The policy encourages Tahltan members to exercise their Aboriginal hunting rights to harvest black bears, grizzly bears, and wolves through the use of incentives. The policy requires members to harvest predators in compliance with Tahltan cultural practices and provincial regulations, and members are required to utilize each species to the extent possible for cultural purposes such as food, clothing, regalia, tools, medicine, and/or ceremony (Tahltan Central Government 2020).

The policy is intended to restore balance between predators and ungulates. Hunters are encouraged to target areas that have high concentrations of caribou / ungulates, particularly around the calving season. It was decided that TCG would incentivize two grizzly bears, two black bears, and four wolves for a Tahltan hunter each year. Representatives of the TCG stress that they did not take the decision lightly, but felt action was necessary to halt the trends their members were witnessing on the land and reverse it, so that there will be more wildlife on the landscape, more ungulates, fewer predators, and an overall better balance.

We take the position that our Elders and our culture always made it a priority to harvest wolves and bears on purpose for predator management. And obviously when they harvested these animals, they also utilized them to the best of their ability. So wolves were never eaten, but their furs were certainly utilized, and some of the bones were utilized. And then with black bears, they were heavily utilized — the fur, the bones, the meat was eaten. And then with grizzly bears the same thing, but in the modern day not as many people will eat grizzly bears but it's certainly possible if they wanted to.²³

The TCG Wildlife Department will be responsible for implementing the Tahltan Predator Management Policy and will record harvest numbers from the Tahltan people. The TCG initiative will help stabilize wildlife populations, protect local communities, encourage culturally important Tahltan practices, and aims to set a strong foundation for future wildlife management practices and initiatives (Tahltan Central Government 2020).

iv. Tribal wolf management plans

Though not within range of northern caribou herds, there are many examples south of the Canada/U.S. border that may also provide a model for how Indigenous people are showing leadership in predator management planning. One example has been taking shape in Wisconsin, where Ojibwe are involved in state wolf management through several means. Significantly, Ojibwe have influenced wolf policy in the non-Indigenous community by demanding higher population goals and restricted use of lethal control. In addition, tribal wolf management plans, which are developed by individual reservations, provide Ojibwe the opportunity to manage wolves on their reservation lands separately from state government. This allows the cultural values of the wolf to be a driving goal, without being impacted by the values or beliefs of non-tribal members. Tribal wildlife management policies tend to support higher wolf populations and use lethal control only in extreme situations, because of the cultural importance of the wolf. The wolf is perceived with similar respect and cultural significance in other Native American tribes of Wisconsin, including the Ho Chunk, Potawatomie, Oneida, Mohican, and Menominee. All of these tribes assist with funding for wolf management in the state and several of these tribes already have or are developing tribal wolf management plans for their reservations (Williamson 2011).

4b. How are Indigenous Peoples Maintaining Healthy Caribou / “Competitor” Relationships?

Muskoxen are used by Inuit communities in the Yukon North Slope area, the Inuvialuit Settlement Region, and several regions of Nunavut. They also have a long history of use in Alaska and Nordic regions of Europe. There is evidence that historically, Inuit in both the eastern and western Arctic would manage local populations of muskoxen in order to for caribou numbers to increase, and that some Inuvialuit knowledge-holders recognized that the 1917 ban on muskox harvesting would affect caribou populations (Winbourne and Benson 2020). Due to their long history with muskoxen and experiences with managing for muskoxen, some Inuit knowledge is included here.

In the ISR, muskoxen are included in numerous Community Conservation Plans (see for example, Sachs Harbour Hunters and Trappers Committee *et al.* 2016; Olohaktomiut Hunters and Trappers Committee *et al.* 2016), with areas of habitat that are important to muskoxen and areas that are important to Inuvialuit hunters identified for conservation and planning purposes. Muskoxen have been hunted by Inuit for generations, but have also been the target of guided hunts, sport hunting, and tourism in the

²³ Tahltan Central Government President Chad Day *In*: Simmons 2020.

far north of Canada (Nagy 1999; Wishart 2004; Kutz et al. 2017; Fawcett et al. 2018). A commercial harvest of muskoxen operated on Banks Island for at least 20 years; both meat and hides were used and sold, and in 2012 the harvest target was for 2,000 animals (Inuvialuit Communications Society n.d.; ICC et al. 2006). The community of Iqaluktutiaq (formerly Cambridge Bay) (NU), has been harvesting muskoxen for commercial purposes since at least the 1980s as well as conducting sport hunting (Kutz et al. 2017; Fawcett et al. 2018; Tomaselli et al. 2018b). In more recent years, declines in muskox abundance and proximity to Sachs Harbour and have led to a decline in harvest levels; the annual commercial muskox harvest was also suspended in Iqaluktutiaq in 2012 because of local declines of muskoxen in the permitted hunting area (Tomaselli et al. 2018b).

Case Studies:

i. Nunavut: Muskoxen management planning in the Qikiqtaaluk and Kivalliq Regions

A quota for harvesting muskoxen in the Kitikmeot Region of Nunavut opened in 1969; today, harvest levels are set through a Total Allowable Harvest by NWMB recommendations and local knowledge (Dumond 2006).

In the Kivalliq Region, a muskox management plan was developed by the Kivalliq Wildlife Board (KWB) in response to a growing demand by harvesters to access muskoxen closer to their communities, as they were experiencing increased sightings closer to the communities, larger groups of animals, and expansion of the herd throughout the region. The plan was developed in collaboration with the Government of Nunavut-Department of Environment (GN-DOE) and Nunavut Tunngavik Incorporated (NTI) Wildlife; Inuit Qaujimagatuqangit (knowledge) is used in conjunction with Western science in muskox management (KWB 2010). The goals of the Kivalliq Musk Ox Management Plan are to provide guidance and direction to the co-management partners and are as follows:

- 1.1 To manage the Musk ox in a co-operative manner that involves the full participation of communities and government.
- 1.2 To include local knowledge, Inuit Qaujimagatuqangit and scientific knowledge equally in the management process.
- 1.3 To promote local and regional involvement in decision making.
- 1.4 To protect, conserve and manage the Kivalliq Musk ox in a sustainable manner (KWB 2010:6).

Action plans outline essential tasks that must be conducted to allow communities to make appropriate decisions to ensure that herds and ranges are maintained.

After lengthily consultations with community Hunters and Trappers Organizations, harvesters, stakeholders and GN, three main changes were proposed to the Wildlife Regulations:

- 1) Re-zoning to allow harvesters to access muskoxen close to their communities,
- 2) Removal of the season, and
- 3) Increasing harvesting from 3% to 5% of the population pending a complete survey (KWB 2010).

After a full aerial survey in 2010 confirmed that the muskox population had indeed expanded their range, the herd was healthy, and an increase in harvesting from 3% to 5% was sustainable, GN-DOE approved the increase in harvesting and allocated tags to communities.

In the Qikiqtaaluk (Baffin) Region of Nunavut, the Government of Nunavut (Department of Environment) and its co-management partners released a draft “Qikiqtaaluk Muskoxen Management Plan” in 2013, outlining the purpose of the plan as follows:

- Establish principles and goals for taking care of muskoxen.
- Identify the need for a plan and the importance of working together.
- Provide current population estimates and trends.
- Define roles and responsibilities of the stakeholders.
- Define the information required to effectively manage the herds.
- Describe how to make decisions on managing the herds.
- Provide a framework for determining when management actions should be taken.
- Ensure full involvement of Inuit in the future monitoring and management of muskoxen.
- To provide NWMB with a management plan ready for implementation (Hale and Hotson 2013).

The planning process involves consulting with communities; a final draft of the plan will then be submitted to NWMB for approval and to form the basis for new regulations under the *Wildlife Act*.

ii. Yukon North Slope: muskox co-management plan and framework

The Wildlife Management Advisory Council (North Slope) is a co-management body made up of equal numbers of Inuvialuit and government representatives that works with its partners to conserve and protect wildlife, habitat, and traditional Inuvialuit use within the Yukon North Slope area.

Sightings of muskoxen on the Yukon North Slope were first reported in the early 1970s. In 1994, the Aklavik Hunters and Trappers Committee (HTC) expressed an interest to hunt North Slope muskoxen. In response to a request to recommend a quota for North Slope muskoxen from the Inuvialuit Game Council, the Wildlife Management Advisory Council (North Slope) (WMAC (NS)), the Aklavik HTC, Parks Canada and the Yukon Department of Environment began a research program to determine the status of the North Slope muskoxen in preparation for the development of a management plan (WMAC (NS) 2017). A series of studies were conducted on the Canadian portion of the range that included the knowledge of biologists, hunters, and community members who have experience with muskoxen. The WMAC (NS) took on a facilitating and coordinating role in the development a muskox management framework which establishes the following goals for the management of muskoxen on the North Slope:

- Provide opportunities for Inuvialuit hunters to harvest muskoxen while maintaining a healthy, productive, and sustainable population.
- Minimize any detrimental effects that muskoxen may have on caribou and caribou habitat and harvesting.
- Cooperate and share information about muskoxen among users to develop and implement management and research programs (WMAC (NS) 2017).

Currently no quotas have been recommended or established and it remains legal for the beneficiaries of the Inuvialuit Final Agreement to harvest North Slope muskoxen in the Yukon and NWT.

iii. Alaska: Management of the Seward Peninsula muskox population

As numbers of muskoxen increased near Seward Peninsula (Alaska), local residents and managers came together to form the ‘Seward Peninsula Muskox Cooperators Group’ as a means of helping to guide muskox management and avoid user conflicts. Member groups include the Bureau of Land Management

(BLM), Alaska Department of Fish and Game (ADF&G), National Park Service (NPS), U.S. Fish and Wildlife Service (FWS), Bering Straits Native Corporation, Kawerak Inc., Reindeer Herders Association, Northwest Alaska Native Association, residents of the Seward Peninsula, and representatives of other interested groups, such as nonlocal resident hunters (BLM 2005; ADF&G 2009).

In the early 1990's this group developed a muskox management plan that considered multiple uses of muskoxen (including the possibility of allowing limited muskox harvests while still providing for viewing, as well as further growth and expansion of the local muskox population), and since that time the group has provided a number of regulatory proposals to the State Board of Game and Federal Subsistence Board. The 'Seward Peninsula Cooperative Muskox Management Plan' was finalized in 1994; it outlines management objectives and goals developed by the Group (Nelson 1994). A more recent report on Alaskan muskox management include the following management goals:

- To allow for growth and expansion of muskox into historic ranges;
- To provide for subsistence and recreational hunting on a sustained yield basis;
- Minimize detrimental effects muskoxen may have on caribou and caribou hunting;
- Cooperate and share info about muskoxen among users to develop and implement harvest, management and research programs;
- To provide for non-consumptive uses; e.g., viewing and photography (ADF&G 2001).

One of the management goals highlighted in the plan is to conduct a complete census of the entire Seward Peninsula. This census has been conducted in spring by the Cooperators every two years.

The Alaskan Muskox Management Report may be a useful and relevant source of information in regards to how planning for muskoxen could take place in the future in the Sahtú, providing clear examples of management challenges, successes, and lessons learned. There are many parallels between the situation in Alaska 20 years ago and the situation in the Sahtú today; some that may be of interest include:

- At the time the Alaska Muskox Management Report was written (2001), the Seward Peninsula muskox population was growing at rate close to 14% a year since reintroduction in the 1970s and range expansion was continuing eastward. Because the majority of Muskox Cooperators Group participants and other members of the public support muskox population growth and range extension, they supported management policies that favoured conservative harvest rates to ensure future population growth and increased harvest.
- Since hunting has been allowed, more people have come to value muskoxen as a subsistence resource, and negative attitudes toward muskoxen have decreased. However, resentment lingers over the reintroduction of muskoxen to the Seward Peninsula without consultation and awareness of local people. Some residents favour capping or reducing the population in their areas.
- The Management Plan includes commitment and protection of opportunities for muskox viewing for local residents, tourists, photographers, etc. as a high priority.
- TK about muskoxen has long been lost and fear of muskoxen and lack of understanding of their behaviour are partly responsible for current negative attitudes. Education may help, but hunting has been the best antidote for resentment toward muskoxen. Now that hunting is allowed, more people are learning to value muskoxen for their meat and qiviut.
- Challenge: there is little baseline composition data and it's important to collect before the population composition is skewed by harvesting (Alaska Department of Fish and Game 2001).

iv. Greenland: Using local knowledge in community-led muskox harvest plans

The history of Greenland's muskox population shares some similarities with that of Canada – that is, once abundant populations were reduced during a period of over-harvesting that correlates with an increase in commercial whaling and trapping activities (Jørgensen 2013). Muskox populations went through a sharp decline and were even extirpated from some areas. Today, muskoxen continue to be an important source of meat and income, yet there is limited understanding of the status of most of the sub-populations, and the government has minimal ability to undertake population assessments. As a result, a decision was made to share responsibility for managing muskox sub-populations with local users, while co-developing and testing strategies and tools with communities for incorporating local knowledge into decision-making (Cuyler et al. 2019).

Researchers investigated a collaborative approach in which a muskox demographic model based on the community-members' observations and knowledge was used to predict future muskox abundance, which in turn informed government decisions regarding harvest management. The project team developed a 'harvest calculator', using a combination of local and scientific knowledge throughout the process. The community did three years of post-calving surveys by boat and on foot to census the muskox population; they were also integrally involved in planning meetings, setting objectives, jointly agreeing on work, discussing trends in muskox and environmental conditions, and management actions. Community members then piloted the harvest calculator that was developed, monitored the herd, identified suitable harvest scenarios, and parameterized model with their knowledge (*Ibid.*).

Conclusions

Many sources available in the TKCK literature indicate that Sahtú Dene and Métis traditional systems of knowledge, belief, spirituality, governance, and stewardship remain highly significant today. There are efforts, on many fronts, to find novel ways to ensure that Dene náoweré and Dene ts'ı̨ı̨ continue to shape the future for younger generations of Dene. Even in times of unprecedented conditions of environmental and societal change, ancient teachings about balance and harmony, respect and responsibility, carried through Dene stories, provide a source of wisdom that can be a relevant and useful foundation for moving forward.

Many voices, in many regions of the NWT, are expressing a need for more information to better understand the world we live in today. People are cautious to intervene when things are changing so quickly. With new or returning species, a changing climate, and increasing pressure on resources, our understandings of ecosystem balance likely also need to shift and adapt. Having a deeper understanding of current relationships and interactions between caribou, their competitors, and their predators will be key to finding ways to support an appropriate balance today.

This need for information is paralleled by an increasing interest in and movement towards returning to the land to watch, listen, and learn from it. Exciting research and stewardship initiatives are underway all across the range of caribou – many with a strong guardian or 'boots on the ground' component, and many guided by the knowledge of elders, meaning that Indigenous Knowledge remains a vital, growing body of information that is passed from generation to generation.

References

- Advisory Committee for Cooperation on Wildlife Management. 2014a. Taking Care of Caribou: the Cape Bathurst, Bluenose-West, and Bluenose-East barren-ground caribou herds management plan. Yellowknife, NT.
- Advisory Committee for Cooperation on Wildlife Management. 2014b. We have been Living with the Caribou all our Lives: a report on information recorded during community meetings for 'Taking Care of Caribou – the Cape Bathurst, Bluenose-West, and Bluenose-East Barren-ground Caribou Herds Management Plan'. Yellowknife, NT.
- Alaska Department of Fish and Game. 2009. "Seward Peninsula Muskoxen Making a comeback," by Sue Steinacher and Region V Staff. Juneau, Alaska.
http://www.adfg.alaska.gov/index.cfm?adfg=wildlifeneews.view_article&articles_id=430. Accessed Dec. 14, 2020.
- Alaska Department of Fish and Game. 2001. Muskox management report of survey-inventory activities, 1 July 1998-30 June 2000. M.V. Hicks, editor. Juneau, Alaska.
- Armitage, D., F. Berks, A. Dale, E. Kocho-Schellenberg, and E. Patton. 2011. Co-management and the co-production of knowledge: Learning to adapt in Canada's Arctic. *Global Environmental Change* 21 (2011) 995–1004.
- Auriat, D., J. Nagy, A. Zimmer, R. Popko and A. Veitch. 2002. Historic and current movements and distribution of boreal woodland caribou below treeline in the Sahtú, Gwich'in, and Inuvialuit Settlement Areas. Draft report prepared for RWED and GRRB. Inuvik, NT.
- Barr, W. 1991. Back from the Brink: The Road to Muskox Conservation in the Northwest Territories. Komatik Series, No. 3. The Arctic Institute of North America, University of Calgary.
- Bayha, W. 2012. Using indigenous stories in caribou co-management. *Rangifer*, Special Issue No. 20: 25-29.
- Benson, K. 2019. Gwich'in Knowledge of Porcupine caribou: State of current knowledge and gaps assessment, March 2019. Department of Cultural Heritage, Gwich'in Tribal Council. Fort McPherson, NT.
- Benson K. 2015. Gwich'in Knowledge of Bluenose West Caribou. Gwich'in Social and Cultural Institute, Fort McPherson, NT.
- Benson K. 2011. Gwich'in Traditional Knowledge: Woodland Caribou, Boreal Population. Gwich'in Social and Cultural Institute Fort McPherson NT.
- Berger, T. 1976. Transcripts of the Proceedings at the Community Hearing of the Mackenzie Valley Pipeline Inquiry before the Honourable Mr. Justice Berger, Commissioner. Allwest Reporting Ltd. Vancouver, BC.

- Bezha, W. 2018. Personal communications based on a telephone interview with the author conducted March 9, 2018, *In*: Winbourne, J. and K. Benson. 2020. Species Status Report (Traditional and Community Knowledge Component) for Muskoxen (*Ovibos moschatus*) in the Northwest Territories [Manuscript submitted for publication]. Environment and Natural Resources, Government of the Northwest Territories. Manuscript Report No. 296.
- Bezha, W. 2020. Personal communications based on a conversation during a Nę K'ə Dene Ts'ı̄ Forum meeting, November 20, 2020.
- Borrows, J. 2016. "Outsider education: Indigenous law and land-based learning," *Windsor Yearbook of Access to Justice*, 33 (2016).
- Cruikshank, J. 1998. *The social life of stories: Narrative and knowledge in the Yukon Territory*. Vancouver: UBC Press.
- Cuyler C., C.J. Daniel, M. Enghoff, et al. 2019. Using local ecological knowledge as evidence to guide management: A community-led harvest calculator for muskoxen in Greenland. *Conservation Science and Practice*. 2020;2:e159. <https://doi.org/10.1111/csp2.159>.
- Dehcho First Nations. 2011. *Traditional Knowledge Assessment of Boreal Caribou (Mbedzih) in the Dehcho Region*. Prepared by Dehcho First Nations for the Canadian Wildlife Service. Dehcho First Nations. Fort Simpson, NT.
- Dedats'eetsaa: Tłı̄chq Research and Training Institute. 2019. *Ekwò Nàxoède K'è (Boots on the Ground) 2018 Results*. Tłı̄chq Traditional Knowledge and Land Use Study published by the Dedats'eetsaa: Tłı̄chq Research and Training Institute, of the Department of Culture and Lands Protection of the Tłı̄chq Government. Behchokò, NT.
- Déłı̄nq First Nation, Déłı̄nq ʔehdzo Got'ı̄nq (Renewable Resources Council), and Déłı̄nq Land Corporation. 2016. *Belare Wı̄le Gots'ė ʔekwė / Caribou for All Time: A Déłı̄nq Got'ı̄nq Plan of Action*, January 8, 2016. Déłı̄nq, NT.
- Dumond, M. 2007. *Western Kitikmeot caribou workshop*. Government of Nunavut, Department of Environment, Final Wildlife Report: 19. Iqaluit, NU.
- Dumond, M. 2006. *Review of muskox population status in the Kitikmeot region of Nunavut*. Government of Nunavut, Department of Environment, Interim Wildlife Report: 6, Iqaluit, NU.
- Fawcett, D, T. Pearce, R. Notaina, J.D. Ford, and P. Collings. 2018. *Inuit adaptability to changing environmental conditions over an 11-year period in Ulukhaktok, Northwest Territories*. Polar Record. Cambridge University Press.
- Golder Associates. 2003. *Report on Inuit qaujimajatuqangit literature review, gap analysis and workshop results related to the Doris North project, Hope Bay Belt, Nunavut*. Report prepared for Miramar Hope Bay Ltd. Vancouver, BC.
- Government of Canada. 2020. *Edézhı̄e Protected Area*. <https://www.canada.ca/en/environment-climate-change/services/national-wildlife-areas/locations/edehzhie.html>. Accessed Jan. 13, 2021.

- Government of Yukon. 2012. Yukon Wolf Conservation and Management Plan. Environment Yukon. Whitehorse, YT.
- Great Bear Lake Working Group. May 31, 2005 with Caveat of February 7, 2006. "The Water Heart": A Management Plan for Great Bear Lake and its Watershed. Directed by the Great Bear Lake Working Group and facilitated and drafted by Tom Nesbitt. Délı̄ne, NT.
- Gronquist, R.M., T.L. Haynes, and C.L. Gardner. 2005. Rebuilding the Fortymile caribou herd: A model of cooperative management planning. Rangifer Special Issue No. 16: 163-175.
- Gunn, R., B.D. Hardesty, and J. Butler. 2010. Tackling 'ghost nets': Local solutions to a global issue in northern Australia. Ecological Management & Restoration 11: 88-98. [doi: 10.1111/j.1442-8903.2010.00525.x](https://doi.org/10.1111/j.1442-8903.2010.00525.x).
- Hale, P. and C. Hotson. 2013. Draft Muskox Management Plan for a NWMB hearing: <https://www.nwmb.com/inu/public-hearings/2013-1/written-hearing-concerning-the-management-plan-for-high-arctic-muskoxen-of-the-qikiqtaaluk-region/proposal-for-nwmb-decision-and-supporting-evidence-2/3040-muskox-management-plan-mx-deck/file>. Accessed: Jan. 15, 2021.
- Indigenous Circle of Experts. 2018. We Rise Together: Achieving Pathway to Canada Target 1 through the creation of Indigenous Protected and Conserved Areas in the spirit and practice of reconciliation. Government of Canada. Ottawa, ON.
- Indigenous Leadership Initiative. 2020. "Indigenous Guardians". <https://www.ilinationhood.ca/guardians>. Accessed: Jan. 13, 2021.
- Inuvik Community Corporation, Tuktuuyaqtuuq Community Corporation, and Aklarvik Community Corporation. 2006. Inuvialuit Settlement Region Traditional Knowledge Report. Mackenzie Project Environmental Group. Inuvik, NT.
- Inuvialuit Communications Society. n.d. 04 01 T Sachs Harbour history and Muskox Harvest pt1-H. Inuvialuit Cultural Centre Digital Library. <https://inuvialuitdigitallibrary.ca/items/show/620>. Accessed: Jan. 15, 2021.
- Jørgensen, D. 2013. The great Greenland hunt. <https://dolly.jorgensenweb.net/nordicnature/?p=1034>. Accessed: Jan. 13, 2021.
- Katz, S. 2010. Traditional Knowledge on Caribou Ecology: Vegetation -> Caribou -> Wolf -> Food Chain. Aurora Research Institute, Inuvik, NT.
- Kivalliq Wildlife Board. 2010. Kivalliq Musk Ox Management Plan, 2010 – 2015. Prepared by the Kivalliq Wildlife Board in collaboration with Government of Nunavut Department of Environment / NTI Wildlife. Rankin Inlet, NU.
- Krupnik, Igor, and Jolly, Dyanna (eds.). 2002. The Earth is Faster Now: Indigenous Observations of Arctic Environmental Change. Arctic Research Consortium of the United States. Fairbanks, Alaska.

- Kutz, S., J. Rowell, J. Adamczewski, A. Gunn, C.e Cuyler, O. A. Aleuy, M. Austin, J. Berger, J. Blake, K. Bondo, C. Dalton, A. Dobson, J. Di Francesco, C. Gerlach, P. Kafle, F. Mavrot, J. Mosbacher, M. Murray, A. Nascou, K. Orsel, F. Rossouw, N. Schmidt, M. Sutor, M. Tomaselli and B. Ytrehus. 2017. Gathering to Share Knowledge on Umingmak in a Time of Rapid Change. *Arctic* 70 (2): 225-236.
- Lambert-Koizumi, C. 2012. Dall sheep (*Ovis dalli dalli*), grizzly bear (*Ursus arctos*) and wolf (*Canis lupus*) interactions in the Northern Richardson Mountains, Canada. A thesis submitted to the Faculty of Graduate Studies and Research in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Ecology, Department of Biological Sciences, University of Alberta.
- Last, J. 2021. Resource board calls on N.W.T. to end controversial aerial wolf cull. CBC News North, Jan. 11, 2021. <https://www.cbc.ca/news/canada/north/wolf-cull-stop-wrrb-1.5869074>. Accessed Jan. 14, 2021.
- Lent, P.C. 1999. *Muskoxen and Their Hunters: A History*. Norman: University of Oklahoma Press.
- McDonald, R. 2010. Edited by Andrea Hrynkiw and Glen Guthrie. Boreal caribou traditional knowledge collection study: Sahtu Settlement Area. A report prepared by the Sahtu Renewable Resources Board for Environment Canada. Tulita, NT.
- Michell, H. 2015. "Bush Cree Storytelling Methodology: Northern Stories That Teach, Heal, and Transform." <https://ineducation.ca/ineducation/article/view/213/815>. Accessed Jan. 13, 2021.
- Nagy, M. 1999. Aulavik Oral History Project on Banks Island, NWT: Final Report. Presented to Parks Canada - Western District for the Inuvialuit Social Development Program. Inuvik, NT.
- Nagy, M. 2004. 'We did not want the muskox to increase': Inuvialuit Knowledge about Muskox and Caribou Populations on Banks Island, Canada. In: *Cultivating Arctic landscapes: knowing and managing animals in the circumpolar north*. Anderson, D. G., Nuttall, M., (Eds.). Berghahn Books, New York NY, 93-109 pp.
- Napoleon, V. and H. Friedland. 2016. "An inside job: engaging with indigenous legal traditions through stories," *McGill Law Journal/Revue de droit de McGill* 61, no. 4 (2016).
- Natcher, D.C., S. Davis, and C.G. Hickey. 2005. "Co-management: Managing Relationships, not Resources," *Human Organization* 64, no. 3 (2005).
- Nelson, R. 1994. Seward Peninsula Cooperative Muskox Management Plan [unpublished agency document]. Alaska Department of Fish and Game, Division of Wildlife Conservation, Nome, Alaska.
- Nguyen, L.P. 2016. *The Use of Local Ecological Knowledge for Analyzing Changes in Muskox*. Arctic Borderlands Ecological Knowledge Society. Whitehorse, YT.
- Nío Nę P'ęné Working Group. 2019. *Nío Nę P'ęné Begháré Shúhta Goṛepe' Narehṛá / Trails of the Mountain Caribou Plan*, compiled by Janet Winbourne, for the Sahtú Renewable Resources Board (Ṕehdzo Got'JneṔ Gots'ḗ Nákedı). Tulit'a, NT.

North Slave Métis Alliance. 2001. Can't Live Without Work: North Slave Métis Alliance Environmental, Social, Economic and Cultural Concerns: A Companion to the Comprehensive Study Report on the Diavik Diamonds Project.

Olohaktomiut Hunters and Trappers Committee, Ulukhaktok Community Corporation, and The Wildlife Management Advisory Council (NWT), The Fisheries Joint Management Committee and the Joint Secretariat. 2016. Olohaktomiut Community Conservation Plan – Ulukhaqtuum Angalatchivingit Niryutiniik: A plan for the conservation and management of renewable resources and lands within The Inuvialuit Settlement Region in the vicinity of Ulukhaktok, Northwest Territories. Joint Secretariat. Inuvik, NT.

Olsen, B., M. MacDonald and A. Zimmer. 2001. Co-management of woodland caribou in the Sahtu settlement area: workshop on research, traditional knowledge, conservation and cumulative impacts. Special Publication No. 1. Sahtu Renewable Resources Board. Tulít'a, NT.

Sachs Harbour Hunters and Trappers Committee, Sachs Harbour Community Corporation, and The Wildlife Management Advisory Council (NWT), The Fisheries Joint Management Committee and the Joint Secretariat. 2016. Sachs Harbour Community Conservation Plan – Sachs Harbour Angalatchivingit Niryutiniik: A plan for the conservation and management of renewable resources and lands within the Inuvialuit Settlement Region in the vicinity of Banksland, Northwest Territories. Joint Secretariat. Inuvik, NT.

Sahtú Elders, Betty Harnum, Deborah Simmons, and Jean Polfus. 2014. Kədə Nit'q Benats'adí - Xədə Rihət'q Herats'ádi - Remember the Promise. ʔehdzo Got'jñę Gots'ę Nákedı (Sahtú Renewable Resources Board). Tulít'a, NT.

Sahtú Land Use Planning Board. 2013. Sahtú Land Use Plan, August 8, 2013. Fort Good Hope, NT.

ʔehdzo Got'jñę Gots'ę Nákedı (Sahtú Renewable Resources Board). (In prep.) Final Report of the Sahtu Harvest Study. Consultant's report prepared by Janet Winbourne for the ʔehdzo Got'jñę Gots'ę Nákedı (Sahtú Renewable Resources Board). Tulít'a, NT.

ʔehdzo Got'jñę Gots'ę Nákedı (Sahtú Renewable Resources Board). 2020a. Sahtú Ragóʔa (Hunting Law) and Approaches to Wildlife Harvesting: Report on the Colville 2020 Public Listening (Hearing) Session Report and Reasons for Decision. Tulít'a, NT.

ʔehdzo Got'jñę Gots'ę Nákedı (Sahtú Renewable Resources Board). 2020b. Beyond Co-Management: Finding Our Way in Changing Times, DRAFT Strategic Plan and Action Plan, 2020-2025. September 3, 2020. Tulít'a, NT.

Sahtú Renewable Resources Board (ʔehdzo Got'jñę Gots'ę Nákedı). 2016 ʔekwé hé Dene Ts'ııı - Sustaining Relationships. Final Report of the ʔehdzo Got'jñę Gots'ę Nákedı (Sahtú Renewable Resources Board) Bluenose East ʔekwé (Caribou) Hearing 2016. Tulít'a, NT: Nákedı (Sahtú Renewable Resources Board), July 28, 2016. Tulít'a, NT.

Sandlos, J. 2011. Hunters at the margin: Native people and wildlife conservation in the Northwest Territories. UBC Press.

Secretariat of the Convention on Biological Diversity. 2005. Handbook of the Convention on Biological Diversity Including its Cartagena Protocol on Biosafety, 3rd edition. Montreal, QU.

Simmons, M. 2020. "Tahltan president explains why his nation is paying members to hunt bears and wolves in northwest B.C." The Narwhal. <https://thenarwhal.ca/tahltan-bc-bears-wolves-wildlife-management/>. Accessed Jan. 13, 2021.

Species at Risk Committee. 2020. Species Status Report for Northern Mountain Caribou (Woodland Caribou [Northern Mountain Population]) (*Rangifer tarandus caribou*) in the Northwest Territories. Species at Risk Committee, Yellowknife, NT.

Species at Risk Committee. 2017a. Species Status Report for Porcupine Caribou and Barren-ground Caribou (Tuktoyaktuk Peninsula, Cape Bathurst, Bluenose-West, Bluenose-East, Bathurst, Beverly, Ahiak, and Qamanirjuaq herds) (*Rangifer tarandus groenlandicus*) in the Northwest Territories. Species at Risk Committee, Yellowknife, NT.

Species at Risk Committee. 2017b. Species Status Report for Grizzly Bear (*Ursus arctos*) in the Northwest Territories. Species at Risk Committee, Yellowknife, NT.

Species at Risk Committee. 2014. Species Status Report for Wolverine (*Gulo gulo*) in the Northwest Territories. Species at Risk Committee, Yellowknife, NT.

Species at Risk Committee. 2013. Species Status Report for Dolphin and Union Caribou (*Rangifer tarandus groenlandicus x pearyi*) in the Northwest Territories. Species at Risk Committee, Yellowknife, NT.

Species at Risk Committee. 2012. Species Status Report for Boreal Caribou (*Rangifer tarandus caribou*) in the Northwest Territories. Species at Risk Committee, Yellowknife, NT. 176 pp.

Suluk, T. K., and S.L. Blakney. 2008. Land Claims and Resistance to the Management of Harvester Activities in Nunavut. *Arctic* 61(1): 62-70.

Tahltan Central Government. 2020. Tahltan Nation Introduces Predator Management Policy. Accessed Jan. 13, 2021. <https://tahtlan.org/wp-content/uploads/2020/09/Tahltan-Nation-Introduces-Predator-Management-Policy-September-15-2020.pdf>.

Taylor, A.D.M. 2005. Inuit Qaujimagatuqangit about population changes and ecology of Peary caribou and muskoxen on the high Arctic islands of Nunavut. Thesis. Queen's University.

Tener, J.S. 1965. Muskoxen in Canada: a biological and taxonomic review. Department of Northern Affairs and National Resources, Natural and Historic Resources Branch, Canadian Wildlife Service.

Tomaselli, M. Kutz, S., Gerlach, C. and S. Checkleya. 2018a. Local knowledge to enhance wildlife population health surveillance: Conserving muskoxen and caribou in the Canadian Arctic. *Biological Conservation* 217 (2018): 337-348.

- Tomaselli, M. Kutz, S., Gerlach, C., Checkleya S., and the Community of Iqaluktuiaq. 2018b. Iqaluktuiaq Voices: Local Perspectives about the Importance of Muskoxen, Contemporary and Traditional Use and Practices. *Arctic* 71 (2):1-14.
- Truth and Reconciliation Commission of Canada. 2015. *What We Have Learned and Calls to Action*. Ottawa: Government of Canada. Ottawa, ON.
- Tyson, W. and K. Heinemeyer. 2017. Inuvialuit Traditional Knowledge of Fish and Wildlife Habitats on the Yukon North Slope. Final Report, July 12, 2017. Prepared for the Wildlife Management Advisory Council (North Slope). Round River Conservation Studies.
- U.S. Department of the Interior Bureau of Land Management. 2005. Seward Peninsula Muskox Census, 2005. <https://www.blm.gov/documents/national-office/blm-library/report/seward-peninsula-muskox-census-2005>. Accessed Dec. 14, 2020.
- Urquhart, D. 2010. "The Null Hypothesis: Co-management doesn't Work," *Rangifer*, Special Issue 20 (25-28 October, 2010).
- Van Dusen, J. 2020. N.W.T. wolf cull 'inhumane and unnecessary,' says Łutsel K'e Dene First Nation. CBC News North. <https://www.cbc.ca/news/canada/north/nwt-wolf-cull-inhumane-unnecessary-says-first-nation-1.5802026#:~:text=N.W.T.,wolf%20cull%20'inhumane%20and%20unnecessary%2C'%20says%20%C5%81utsel%20K',%22bot h%20inhumane%20and%20unnecessary.%22>. Accessed Jan. 15, 2021.
- Wek'èezhìi Renewable Resources Board. 2021. Reasons for Decisions Related to a Joint Proposal for Diga (Wolf) Management in Wek'èezhìi. A report submitted to Tłı̄chq̄ Government and Department of Environment & Natural Resources, Government of the Northwest Territories, January 8, 2021. Wek'èezhìi Renewable Resources Board, Yellowknife, NT.
- Wolf Feasibility Assessment Technical Working Group. 2017. Wolf Technical Feasibility Assessment – Options for managing wolves on the range of the Bathurst barren-ground caribou herd. Unpublished Report. Government of the Northwest Territories, North Slave Métis Alliance, Tłı̄chq̄ Government, Wek'èezhìi Renewable Resources Board. Yellowknife, NT.
- Wildlife Management Advisory Council (North Slope). 2018. Omingmak (Muskox). <https://wmacns.ca/yukon-north-slope/wildlife/muskox/>. Accessed: Jan. 14, 2021.
- Wildlife Management Advisory Council (North Slope). 2017. Framework for the Management of Yukon North Slope Muskox. December 2017. Inuvik, NT.
- Wildlife Management Advisory Council (North Slope). 2006. Muskox Management Workshop, Muskox Management Workshop Summary Report Aklavik, Northwest Territories, November 21, 2006.
- Wildlife Management Advisory Council (North Slope). 2001. Workshop report: Yukon North Slope Muskox Management Workshop, Aklavik, Northwest Territories, October 24-26, 2001.

- Williamson, Caitlin, "Ojibwe and Canis Lupus : cultural, historical, and political influences on contemporary wolf management in the Great Lakes region" (2011). Lawrence University Honors Projects. 32. <https://lux.lawrence.edu/luhp/32>.
- Willson, R., and S. McNay. 2018. "Collaboration in action – averting extirpation of the Klinse-Za caribou herd and the hope for full recovery." Presentation to the 2018 North American Caribou Workshop. Ottawa, ON.
- Wilson, J.M. and C.A. Haas. 2012. Important Wildlife Areas in the Western Northwest Territories. Environment and Natural Resources, Government of the Northwest Territories. Manuscript Report No. 221.
- Winbourne, J. and K. Benson. 2020. Species Status Report (Traditional and Community Knowledge Component) for Muskoxen (*Ovibos moschatus*) in the Northwest Territories [Manuscript submitted for publication]. Environment and Natural Resources, Government of the Northwest Territories. Manuscript Report No. 296.
- Winbourne, J., Manseau M., Simmons, D., Bezha, W., and J.B. Zoe. (In preparation). Indigenous-led Caribou Stewardship in Canada: An Emerging Paradigm. Ecology and Society.
- Wishart, R.P. 2004. A story about a muskox: some implications of Tetlit Gwich'in human-animal relationships. In: Cultivating Arctic landscapes: knowing and managing animals in the circumpolar north. Anderson, D. G., Nuttall, M., (Eds.). Berghahn Books. New York, NY.
- Wray, K. and B. Parlee. 2013. Ways we respect caribou: Teetl'it Gwich'in rules. *Arctic* 66 (1): 68–78.
- Zimmer, A., A. Veitch, and R. Popko. 2002. Historic and current movements and distribution of boreal caribou below treeline in the Sahtu Settlement Area. A report prepared for the Department of Resources, Wildlife and Economic Development. Norman Wells, NT.