

NORTH SLAVE MÉTIS ALLIANCE

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January 25, 2019

Sharon Ehaloak
Executive Director
Nunavut Planning Commission

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Dear Ms. Ehaloak,

RE: North Slave Metis Alliance's Follow-up Comments on the 2016 Draft Nunavut Land Use Plan

The North Slave Metis Alliance (NSMA) is an Indigenous organization that represents s.35 Aboriginal right-bearing Metis of people of the Great Slave Lake area. We have been engaged in the Nunavut Land Use Plan process since February 2016. On January 13, 2017, the NSMA submitted our Final Written Submission (FWS) on the draft 2016 Nunavut Land Use Plan (2016 DNLUP). The NSMA also made an oral presentation at the March 2017 Public Hearing for the 2016 DNLUP in Iqaluit, NT.

Our main interest was and remains to be protection of key habitats for the barren ground caribou herds who migrate across the Nunavut-NWT boarder, including the Bathurst, Beverly-Ahiak, and Qamanirjuaq caribou herds. The NSMA members, for many generations, have relied on these migratory caribou herds for nutritional and spiritual well-being.

In our 2017 FWS and oral presentation, we provided our support for the protective provisions in the 2016 DNLUP that included the identification of the following areas as the critical habitat for caribou:

- Core caribou calving areas
- Key access corridors
- Post-calving areas
- Freshwater caribou crossings; and
- Caribou sea ice crossings.

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Specifically, we supported the application of “Option 1” on the core calving areas, key access corridors, post-calving areas, and freshwater crossings; and recommended applying the “Option 2” zoning for the rutting areas and migration corridors. Our view on the above five key caribou habitat types remain the same.

New Recommendations

Since our 2017 review, we have learned more about barren ground caribou ecology, and new population and environmental data have become available. Based on the new information, we have the following four new recommendations to the 2016 DNLUP.

Detailed, evidence-based rationale are presented in our supporting document, prepared by the Zoetica Wildlife Research Services (Appendix A).

1. Application of “Option 2” Special Management Area Status on Key Caribou Wintering Habitat

Based on recent studies and environmental trends, we now believe that the reproductive success of barren ground caribou is strongly linked to the favourability of the overwintering conditions. Because caribou are likely to experience stressful physiological conditions through winter, we believe it is imperative to minimize added human disturbance during this period. For that reason, we recommend application of “Option 2”, Special Management Area status to the core wintering habitat. To that end, we also recommend the NPC to identify core wintering habitat, using the method described below.

2. Inclusion of Traditional Knowledge and Multiple Data Sources for Defining Caribou Habitat

In the 2016 DNLUP, the Government of Nunavut (GN) used telemetry to identify important caribou habitats, including calving areas, post-calving areas, key access corridors, rutting areas, migration corridors, summer range, late summer range, and winter range. However, several limitations were identified for this type of monitoring (notably if collaring was insufficient):

- Low density/sensitivity areas do not solely equate to areas of low importance or use, but can also indicate areas of low to no surveying;
- Data is limited to the movement of collared animals; and,
- Telemetry inadequately identifies small, isolated calving areas without taking into consideration the evolution of location.

In that respect, we recommend inclusion of Traditional Knowledge (TK) and Inuit Qaujimajatuqangit (IQ), which will provide long term perspectives on core winter ranges and migration routes. We further recommend frequent updates to caribou

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habitats, inclusion of other scientific methods such as resource selection function modelling (RSF), and surveying individual herds, which will help provide a better dataset to determine, more accurately, important caribou habitats.

3. Clarity on NPC's Position on the Freshwater Crossing Between Baker Lake and Chesterfield Inlet

We recommend the Nunavut Planning Commission's (NPC) to clarify its rationale for stating that the Protected Area status for freshwater caribou crossings as not "intended to affect shipping between Baker Lake and Chesterfield Inlet during open water seasons". Baker Lake, notably the eastern portion of the watercourse/passage (between Baker Lake and Chesterfield Inlet) comprises protected and important caribou freshwater crossing and ranges, but the 2016 DNLUP does not reflect data from the *Kivalliq Ecological Land Classification Map Atlas*. In other words, unrestricted shipping between Baker Lake and Chesterfield Inlet may impact sensitive caribou area. Furthermore, NPC should ensure conditions are in place for shipping-related activities. They are not currently taken into account for the prohibitions to protect freshwater caribou.

4. Responses to NPC's Inquires Following the 2016 DLUP Review:

Q1. Where and when do caribou habitat areas need to be protected or closely managed?

**A. New data and studies (2015-2019) exist that would properly update the 2016 dNLUP (see Appendix A, section 2.2).
New potential question: identification for disturbance thresholds within core winter range**

Q2. What impact would proposed new roadways have on harvest patterns?

A. The Russell and Gunn (2017, see Appendix A for the reference) study could help answer this question: harvest increased disproportionately in the small local study area while harvesting trends decreased in the large regional study area.

Q3. Are there areal, linear, and/or temporal thresholds that can be established in areas of heavy development in order to control cumulative effects? If not, what are the factors that must be understood to develop an efficient and effective adaptive management system?

A. Integrating sensitive seasons for caribou into land use planning and conditions, in addition to critical areas designated for protection, could address part of question #3 and #4 (e.g., minimum land use setback

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distances proposed in the Northern Land Use Guide [GNWT 2015], see Appendix A for the reference).

In regards to the section questioning potential areas of suitable animal husbandry (6.8.13), a cautious approach is necessary to prevent negative consequences to caribou populations (e.g., for interbreeding of wild and semi-domesticated herds)

Q4. Identify acceptable noise levels to minimize disturbance on caribou from industrial Projects/Project Proposals and low flying aircraft during calving and post-calving, and regular activities.

A. See answer to Q3.

I appreciate this additional opportunity to review the draft Nunavut Land Use Plan the NPC has given us. Protection of the barren ground caribou herds is our members' key concern, and NSMA will continue to actively engage in the Nunavut Land Use Planning process in the future.

Should you have any questions about this submission, please do not hesitate to contact the undersigned at: shin.shiga@nsma.net.

Sincerely,

Shin Shiga
Manager, Environment

CC: Andrew Nakashuk, NPC Chairperson
Jonathan Savoy, Manager of Planning and Implementation



Appendix A: Supporting Material



Memorandum

COMMENTS ON 2016 DRAFT NUNAVUT LAND USE PLAN

SUBMITTED TO

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Comments on Draft Nunavut Land Use Plan – 2016

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1.0 OVERVIEW

Zoetica Wildlife Research Services Inc. was retained by the North Slave Métis Alliance (NSMA) to review and provide comments on the *2016 Draft Nunavut Land Use Plan* (dNLUP; NPC 2016a) and supporting documents, with examination of ways in which the plan may affect their rights and interests. In this review, we have highlighted issues that may compromise the success of the plan, in terms of transboundary effects and wide-ranging species recovery goals. These comments are provided for contemplation by the NSMA when preparing their official comments on the dNLUP.

Technical comments are provided, which focus on several issues, including:

- Importance of caribou winter range
- Use of telemetry data alone to identify important caribou habitats
- Freshwater caribou crossings and shipping activities
- Additional research and studies on caribou

1.1 Identified Goals within the dNLUP

The dNLUP identifies five major goals, *“intended to be read together and interpreted as a whole”*:

1. Strengthening partnership and institutions
2. Protecting and sustaining the environment
3. Encouraging conservation planning
4. Building healthier communities
5. Encouraging sustainable economic development

Shared responsibility and management will be required to successfully achieve goal 2: protecting and sustaining the environment. Section 2.7 of the dNLUP states that the NPC’s objective for Transboundary Considerations is *“to encourage the interjurisdictional management of land, air, and water resources, including marine and fresh water”*. One of the examples presented in this section is that the Great Bear Lake Watershed is located between the Sahtu region of the Northwest Territories (NWT), where it has ecological and cultural significance, and the Nunavut Settlement Area (NSA). Other important NWT-NU transboundary considerations that are not explicitly identified in the dNLUP are the seasonal ranges of barren-ground caribou, including the Bluenose East, Bathurst, and Beverly and Qamanirjuaq herds. The NSMA has interest in the levels of protection offered to important caribou habitats within the dNLUP, which are described in the following sections.

2.0 KEY ISSUES

2.1 Designations on Caribou Habitat Overlook the Importance of Key Winter Range

Section 2.2 of the dNLUP identifies critical habitat for caribou, which includes:

- Core caribou calving areas
- Key access corridors
- Post-calving areas
- Freshwater caribou crossings
- Caribou sea ice crossings
- Other seasonal ranges (including rutting areas and migration corridors) important for the survival and success of caribou herds, except winter ranges.

Caribou winter range was considered within the 2016 Draft Nunavut Land Use Plan Options and Recommendations (NPC 2016b). However, the NPC recommended the most lenient “Mixed Use” designation (Option 3), which allows for all uses except highways and railways. While most project types are allowable in mixed use designation areas, VCs may be considered in the design and regulatory review of projects and project proposals. The only explanation provided by the NPC for the mixed use designation of winter caribou habitat is: *“the large geographic extent of the areas, and the relatively low impacts that disturbance can have (as compared to calving areas).”* This rationale is not strongly supported by the current scientific evidence on the importance of winter habitat for caribou, and the way in which anthropogenic influences can disturb animals within winter habitat. Therefore, it is difficult to conclude that disturbance within winter habitat would be less impactful, except perhaps due to the lower density of individuals, due to generally lower densities distributed over winter range. However, projects with a wider geographic scale of impact could impact caribou in winter habitat greatly, and those impacts could manifest in population demographics measured in more northern calving and post-calving habitats.

Winter habitat, hosting necessary attributes for survival, is vital to the health and stability of caribou populations. In determining habitat that is of relatively lesser or greater importance to caribou populations, we must ensure that we consider more than simply the habitat within which important life history events (e.g., calving, post-calving) occur. Instead, we must also consider what proportion of energy is coming directly from: 1. the habitat occupied during these important events, versus 2. body stores that are built up in prior seasonal ranges during a previous time period, and that must be maintained during energy-limiting periods. Such considerations may render a more complicated view of population limiting and critical habitats, and the ways in which development can affect animals in various seasons.

The seasonal period within which animals breed, and the way in which energy is allocated to offspring production and maternal care, are important life-history traits that are subject to natural selection (Roff 1993, Stearns 1992). The timing and location of reproduction may evolve to match peaks in resource availability, and a disruption of this synchrony, which is occurring due to climate change in some areas, may cause population declines or limit population growth (e.g., Durant *et al.* 2007). Long-lived organisms with many opportunities/years in which to breed, however, tend to evolve such that they prioritize their own survival at the cost of offspring production, when needed (Festa-Bianchet and Jorgenson 1998, Gaillard and Yoccoz 2003). This type of reproductive strategy can be seen as evolutionarily favourable, as animals that survive have the potential to reproduce for many more years, compared to those that attempt to reproduce in unfavourable conditions and at the expense of their own lives and future reproductive opportunities.

Given the typical reproductive strategies of long-lived species, such animals tend to evolve complicated physiological processes needed to store energy, and use it later for survival, or for a combination of survival and reproduction when conditions are favourable for both to occur. Caribou females can live over 15 years and breed for many years, and hence are one such species with complicated physiologies to trade off reproduction and survival. The breeding strategy employed by caribou falls closer to a “capital” breeding strategy, wherein there is a large degree of reliance and use of body stores (built up prior to their use) in reproduction. A capital breeding strategy is distinguished from an “income” breeding strategy, wherein energy for breeding is drawn from the immediate environment, as needed. Breeding strategies can be understood as existing on a spectrum from purely capital to purely income breeding; caribou can be viewed as falling within different portions of this spectrum at different times of the year, but as utilizing more of a capital strategy during the calving and early weaning periods.

For caribou, there is a great deal of evidence that energy needed for early reproduction must be stored in the body and maintained through the winter rather than gained in the early spring on the calving grounds. Recent studies on *Rangifer tarandus* (caribou and reindeer) suggest that nutrients needed for foetal growth and early lactation is predominantly drawn from stored energy built up well before spring calving, and sufficiently maintained through oft harsh winter conditions. Caribou calving *generally* occurs prior to vegetation green-up in Arctic environments (Reimers *et al.* 1983, Crête and Huot 1993, Tveraa *et al.* 2013), and the body condition of reproducing females is typically at its lowest 2-3 weeks after giving birth (Parker *et al.* 2009). This pattern of weight loss and deteriorating body condition in lactating cows supports the idea that early reproductive investment and success is largely fuelled by stored energy (Fauchald *et al.* 2004, Bårdsen *et al.* 2008). In other words, calories needed for foetal development and early lactation is largely drawn from maternal body stores (Chan-McLeod *et al.* 1999, Barboza and Parker 2008, Taillon *et al.* 2013). In relying heavily on stored resources during this period, this capital breeding strategy provides some insurance for unpredictable environmental conditions in late gestation and enables caribou to breed ahead of the spring green-up, such that calves can benefit directly from grazing on plentiful, high-quality plants (Jönsson 1997, Parker *et al.* 2009, Stephens *et al.* 2009).

Several other studies conducted on ungulates support the vital importance of building up and maintaining maternal body stores prior to and throughout the winter for reproductive success. Multiple studies have demonstrated that conditions in the previous summer, and autumn/winter body mass, have a strong influence on the probability that a female will conceive and carry a foetus to term (e.g., caribou/reindeer: Cameron *et al.* 1993, Fauchald *et al.* 2004). Pregnancy rates themselves in caribou are largely a factor of fall weight and body condition (Cameron *et al.* 1993, Cameron and ver Hoef 1994). Following pregnancy, a female's ability to carry a foetus to term successfully has been shown to increase strongly with a greater late winter maternal body mass (Lenvik and Aune 1988, Bårdsen and Tveraa 2012, Veiberg *et al.* 2017). After the female caribou becomes pregnant, she must then contend with winter conditions and foraging with a foetus growing inside of her, partitioning resources away from self-investing in her own body health. Although the costs of gestation are minimal in early pregnancy, they increase substantially by the third trimester (Barboza and Parker 2008, Robbins and Robbins 1979). A study by Joly *et al.* (2015) also showed that stress hormones in barren-ground caribou were highest in the late winter period for pregnant cows compared to non-pregnant females and males, potentially making them more susceptible to disturbances and stressors during this period.

Most of the seasonal variation in the body mass of caribou has been shown to be associated with changes in body fat reserves (Reimers *et al.* 1982, Chan-McLeod *et al.* 1999, Barboza and Parker 2008). *Rangifer tarandus* have been shown to accumulate extensive fat stores over the summer to meet energy requirements during the nutrient-limiting, oft unpredictable winter (Reimers *et al.* 1982). As an example of unpredictable winter conditions, rain or thawing and refreezing at the wrong time of year can cause impenetrable ice layers below the snow-pack, which may reduce the ability of caribou to access ground lichen, and reduce over-winter survival (Hansen *et al.* 2011, 2013). With the exception of studies on West Greenland caribou (Post and Forchhammer 2008, Kerby and Post 2013), the bulk of scientific literature suggests that reproduction should be mediated through late winter maternal condition, and to a lesser degree, positively correlated with an advanced timing of spring (Helle and Kojola 2008, Tveraa *et al.* 2013). Any positive effect of an advanced spring is typically interpreted as due to animals having to go for a shorter period with limited food, and having earlier access to fresh, nutrient-rich vegetation (Cebrian *et al.* 2008). However, a recent study by Veiberg *et al.* (2017) found that conditions affecting maternal body mass during the winter explained close to **all** variation in reindeer recruitment, even when considering the timing of spring over a 20-year period. Given these collective considerations, the importance of winter range must be considered, both in terms of allowing for large suitable areas to be accessible if some are

affected by unpredictable conditions (e.g., snow icing, fire) and ensuring minimal disturbance (e.g., loud noises that cause running), as harsh winters or high levels of human disturbance can draw down body condition, and leave fewer stored body resources, for successful gestation, migration, calving, and lactation.

It is important to understand the energy limiting nature of winter and how it affects reproductive success, because studies have found important negative interaction between anthropogenic disturbances and the energetics of caribou in the winter period. For example, in a study on the effects of sensory disturbance due to petroleum exploration on woodland caribou in northeastern Alberta, Bradshaw *et al.* (1997) found that disturbed caribou increased their movements and switched habitat types for cover or escape, which reduced foraging opportunities. The authors also found that deeper snow inhibited these physical reactions (although similar stress responses were likely occurring). Based on the evidence that noise disturbance affects the behaviour and perhaps the energetic balance of woodland caribou in the winter, and the possibility that repeated encounters with noise disturbance may alter the use of traditional winter range, Bradshaw *et al.* (1997) recommended that wildlife and land use managers focus on reducing cumulative (total) disturbance in winter range.

In summary, there is a well-established pattern whereby winter weather severity (temperature, snow depth, icing, etc.) negatively affects the body condition and reproductive success of caribou. The caribou calving and weaning period in the spring is largely fueled by stored body reserves that must be built up in the preceding summer and last through the more severe winter period. If the body condition of female caribou becomes too depleted of stored nutrition because of a very harsh winter, she cannot maintain a developing foetus through late pregnancy, or produce sufficient milk to wean her calf and survive herself. While winter weather is clearly not within the control of a land use plan, it is important to recognize that caribou are already physiologically stressed, to lesser and greater degrees, during this critical winter period. The more stressed caribou become, the more likely (or more often) they will be to exceed the energetic demand thresholds that allow them to emerge from the winter with intact pregnancies, and the ability to wean their young. For these reasons, anthropogenic disturbances in core caribou wintering grounds should be minimized so as not to push animals over the threshold in body condition that would result in missed reproductive opportunities.

2.2 Important Caribou Habitats Defined Only by Telemetry of Collared Cows

The *Draft Options and Recommendations* document explains that the Government of Nunavut (GN) used telemetry to identify the following important caribou habitats: calving areas, post-calving areas, key access corridors, rutting areas, migration corridors, summer range, late summer range, and winter range. Calving areas, post-calving areas, and key access corridors are designated as Protected Areas (Option 1) in the dNLUP and are presented in Schedule A (NPC 2016c). Rutting areas, migration corridors, summer range, and late summer range are identified as Valued Ecosystem Components (VECs; Option 4) and are presented in Schedule B (NPC 2016d). As discussed above, caribou winter range is currently designated as Mixed Use (Option 3); a map showing the winter core range is available for review as part of the *Draft Options and Recommendations* package, but this is not included in either Schedule.

There are inherent limitations regarding the use of telemetry data to define important wildlife habitats, especially if collaring effort is insufficient. Some of the caribou habitat data used for the dNLUP are presumably derived from the same source(s) as the *Kivalliq Ecological Land Classification Map Atlas* (Campbell *et al.* 2012). Although this map atlas used a compilation of data gathered from satellite and GPS collars, systematic surveys, wildlife harvest and capture activities, and incidental observations, the

authors were still cognizant of the data limitations associated with wildlife seasonal distribution, density, and sensitivity mapping; as well as mapping caribou spring and fall migration corridors, as they note:

“Data deficiencies exist for all species and, as a result, an area of low density/sensitivity does not necessarily indicate it is unimportant to, or uninhabited by, a species. It could simply be an area where no surveys have been conducted (i.e., it could potentially be an area of high density).” (Section 5.1.1); and,

“It is important to note that the data are limited to the movement of animals that have been collared. Data deficiencies exist, and as a result, an area outside of a migration corridor does not necessarily indicate it is unimportant to, or uninhabited by, caribou. It could simple be an area where collared animals have not been located (i.e., it could potentially be an area of high use for non-collared animals).” (Section 5.2.1)

Therefore, using only telemetry data to identify important caribou habitats would have additional deficiencies. Some of the resulting limitations may be apparent in Schedule A of the dNUP. For example, there are several isolated polygons showing calving and post-calving areas, especially in the eastern portion of the Kitikmeot region. These polygons seem to correspond with areas of higher collared caribou density as shown in the Kivalliq ELC map atlas (Maps 5-3 and 5-4). However, the protection of small, isolated calving and post-calving areas is inadequate to protect caribou populations, as this approach 1) Fails to recognize that calving and post-calving areas undergo often large scale movements over the landscape, including consolidation/densification and budding off, depending on population densities (some of these changes occur over a longer time frame than radio-collar have been used); 2) is subject to the collar data limitations described above; and 3) neglects the importance of other seasonal caribou habitats.

During the Qikiqtani Regional Public Hearing in March 2017 (NPC 2017), one of the pre-submitted comments requested the NPC’s rationale for including mapping of caribou seasonal ranges from a single source (i.e., data from radio-collared caribou cows) rather than integrating Inuit Qaujimagatuqangit (IQ), scientific surveys, and collared data “in a timely, transparent, and collaborative manner”. The NPC responded that at the time the 2016 dNUP was prepared, GN collaring data were the most widely accepted dataset. The NPC did not comment on whether IQ and scientific survey data will subsequently be incorporated into the next revision of the dNUP. We suggest that IQ will provide a longer-term lens for understanding calving, post-calving areas, and migratory routes, particularly the ways in which they have moved over longer periods of time. Traditional Knowledge (TK) from First Nations and Métis in the south will also provide longer-term perspectives on core winter ranges, and migration routes to and from winter habitat.

The boundaries of important caribou habitats mapped in Schedules A and B should be regularly reviewed and updated based on new information from collar data, other scientific surveys, IQ and TK that can inform on winter ranges. An example of another scientific method that could help to inform the designation of important habitats is resource selection function (RSF) modelling, which estimate the likelihood that caribou will select different areas of the range based on a combination of habitat attributes, such as land cover type (including water) and human disturbance. Caribou RSF is listed as one of the current research projects supported by the GN’s Department of Environment (GN 2018). Other current research projects, including surveying and monitoring of individual herds, would also provide invaluable data to help better delineate important caribou habitats for land use planning.

There are provisions in the dNLUP review and monitoring process to make necessary amendments to ensure comprehensive and continued protections for caribou. Section 1.4.1 of the dNLUP states that the Commissioners of the NPC will consider undertaking a full review of the plan every five (5) years minimum. Periodic reviews are also proposed for the dNLUP; and reviews can also be triggered by both IQ and community feedback (Section 6.3.5). Regular reviews of the plan with respect to the most up-to-date information available for caribou distribution, abundance, and movement patterns would help to answer the following review questions proposed by the NPC in Section 6.3.5:

- e) Is the NLUP effectively providing for the conservation and use of land?
- f) Have Plan Amendments incorporated the results from research and additional planning studies to improve decision making?

2.3 Freshwater Caribou Crossings between Baker Lake and Chesterfield Inlet

Section 2.2.1.4 of the dNLUP states that the Protected Area status for freshwater caribou crossings “*is not intended to affect shipping between Baker Lake and Chesterfield Inlet during open water seasons*” (Aujaq and Ukiaksaq, Aug 1–Nov 30 for Kivalliq region, according to Figure 4). The NPC’s rationale for this statement is unclear and additional details are needed. Schedule A shows that the eastern portion of Baker Lake is designated as a protected caribou freshwater crossing. Schedule B shows that the watercourse/passage between Baker Lake and Chesterfield Inlet comprises important caribou rutting areas, late summer range, and summer range. Although the mapped caribou migration corridors shown in Schedule B do not overlap with this watercourse/passage, these data appear to be inconsistent with the caribou maps presented in the *Kivalliq Ecological Land Classification Map Atlas* (Campbell *et al.* 2012): Map 5-12 indicates some use of the area between Baker Lake and Chesterfield Inlet during fall migration in September to November, which overlaps with the open water season. Furthermore, Map 5-10 shows some hotspots of very high caribou sensitivity immediately north of this area. Unrestricted shipping between Baker Lake and Chesterfield Inlet may, therefore, impact sensitive caribou in this area.

To protect freshwater caribou crossings, the dNLUP proposes a 10 km buffer and prohibitions for the following uses (Table 1, p. 79):

- Mineral exploration and production;
- Oil and gas exploration and production;
- Quarries;
- Hydro-electrical and related infrastructure;
- Permanent tourism-related infrastructure;
- Linear infrastructure; and
- Related research except Non-exploitive Scientific Research.

These prohibitions do not include shipping-related activities, which may form the basis of the NPC’s statement above. However, the exemption of restrictions for shipping between Baker Lake and Chesterfield Inlet would promote goal 5 of the dNLUP, supporting sustainable economic development, at the expense of goal 2, protecting and sustaining the environment. Although an equivalent prohibition is likely unreasonable, given the relatively short time window available for shipping activities, Option 1 (Protected Area), as presented in the dNLUP, “may include conditions to guide land use.” The NPC should, therefore, ensure that conditions are in place for shipping activities when sensitive caribou are in the area. For example, caribou presence could be monitored prior to vessels entering/proceeding through the

shipping route, and adaptive management could be applied (e.g., delay activities until caribou have moved >10 km away).

2.4 Additional Considerations

Section 6.8.2 (p. 53) of the dNLUP, which makes recommendations for additional research and studies on caribou, highlights four key, general questions pertaining to caribou:

1. Where and when do caribou habitat areas need to be protected or closely managed?
2. What impact would proposed new roadways have on harvest patterns?
3. Are there areal, linear, and/or temporal thresholds that can be established in areas of heavy development in order to control cumulative effects? If not, what are the factors that must be understood to develop an efficient and effective adaptive management system?
4. Identify acceptable noise levels to minimize disturbance on caribou from industrial Projects/Project Proposals and low flying aircraft during calving and post-calving, and regular seasonal activities.

The 2016 dNLUP would benefit from an update that includes new data and studies that have been conducted since the time of drafting the plan (2015-2019). Readers will then be able to determine which of these questions have had efforts to address them, and which still represent large data gaps. The review materials provided in Section 2.2 above may help to address the large and multifaceted answers to question #1 (areas and timing requiring close management). We suggest that the identification for disturbance thresholds within core winter range may be a question of significant population-level importance that should be added to this list of questions.

Since the timing of the drafting of the dNLUP, one study has been conducted that can help answer question #2. Russell and Gunn (2017) analyzed 10 years of harvest monitoring data collected by Agnico Eagle for the Baker Lake Hunter Harvest Study, to determine whether construction of the Meadowbank All-Weather Access Road had an impact on caribou harvest patterns. The authors found that within the local study area (a 2 km zone around the road), harvest increased disproportionately from 7% to 34%, while harvesting trends within the regional study area (a 25 km zone around the road) decreased from 60% to 50%. These changes were attributed to the public access designation of the road, as well as lack of enforcement of hunting restrictions. The Baker Lake Hunter Harvest Study highlights one of the potentially significant impacts that new roadways could have on caribou in Nunavut.

In terms of temporal thresholds to address part of question #3, revisions to the 2016 dNLUP could integrate sensitive seasons for caribou into land use planning and conditions, in addition to critical areas designated for protection. For example, the Northern Land Use Guidelines (GNWT 2015) recommend minimum setback distances for activities at caribou water crossings between May 15 and Oct 15. In addition, GNWT (2015) identifies the “snow period” as a sensitive period when snowmobiles should maintain a minimum setback distance of 0.25 km.

The dNLUP also notes the potential future use of Animal Husbandry, presumably as an answer to the maintenance of caribou populations despite the challenges of climate change and development. Section 6.8.13 asks: “Are there areas of Nunavut that are potentially suitable for animal husbandry? If so where, and what land arrangements would be most suitable? What mitigating factors would need to be considered?”. While the merits are worth examining, , any such activity would need to be designed such that wild caribou are still able to move between Nunavut and the NWT, and such that the land

arrangements made for such an undertaking would not create transboundary impacts. There are also some conservation concerns regarding potential interactions and interbreeding between wild and semi-domesticated *Rangifer tarandus*, including disease transmission (e.g., Larska 2015, Kautto *et al.* 2012) and reduction of genetic diversity (e.g., Anderson *et al.* 2017, Mager *et al.* 2013). As caribou herds and subpopulations in Nunavut and NWT are already at risk, a cautious approach to animal husbandry is necessary to prevent unintended negative consequences to the health and fitness of wild caribou populations.

3.0 CONCLUSIONS

The next iteration of the dNLUP would benefit from a greater consideration of the population-limiting effects of core winter habitat; data and methodologies used to define core calving, post-calving and migration routes for protection; a greater rationale for freshwater crossing exemptions (such as at Baker Lake and Chesterfield Inlet; and, more recent studies that serve to address, in part, questions posed in Section 6.8.2. Once the draft is updated, the NSMA may be in a better position to comment on the methodologies that will ultimately be employed for caribou protection within the dNLUP.

4.0 REFERENCES

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