

November 2015

NWMB Workshop Report: “Protecting Caribou and their Habitat”



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Introduction

In November 2015, the Nunavut Wildlife Management Board (NWMB or Board) hosted a two-day workshop titled *“Protecting Caribou and their Habitat”* in Iqaluit, Nunavut. The workshop was attended by representatives from the NWMB, Government of Nunavut – Department of Environment, Nunavut Tunngavik Incorporated, Nunavut’s three Regional Wildlife Organizations, Government of Northwest Territories – Department of Environment and Natural Resources, World Wildlife Fund Canada, the Beverly and Qamanirjuaq Caribou Management Board, the Nunavut Planning Commission and invited specialists with expertise in caribou and Inuit Qaujimajatuqangit.

This report provides detailed summaries of presentations delivered by workshop participants, as well as the results of break-out group and plenary discussions. This report also describes points of agreement among workshop participants, key findings and recommendations, and next steps for the NWMB and its co-management partners to help manage and protect caribou and caribou habitat in Nunavut. Copies of the presentations delivered at the workshop, as well as additional workshop materials, are available electronically on the NWMB’s website (<http://www.nwmb.com/en/public-hearings-a-meetings/workshops>) or by contacting the NWMB.



Background

In January 2014, the NWMB hosted a two-day Habitat Management and Protection Workshop with co-management partners to help guide the NWMB in the development of its new Habitat Management and Protection Program. During that workshop, the need for an effective management system that protects important habitat for Nunavut's barren-ground caribou herds was emphasized. Participants at that workshop expressed concerns with the ineffectiveness of the current Caribou Protection Measures that are in place in Nunavut and the lack of a Nunavut-wide Land Use Plan that offers appropriate protection for caribou and caribou habitat.

Nunavut is home to the majority of Canada's largest populations of mainland migratory barren-ground caribou herds. In total, there are at least nineteen subpopulations of caribou with ranges either wholly or partially within the Nunavut Settlement Area. These herds are socially, culturally and economically important to Inuit and are harvested by community members for subsistence and commercial purposes. However, across the territory, many of these herds are experiencing significant population declines. Although these population declines are related to many factors, including natural fluctuations, environmental change and harvest, disturbance from human land use activities has also been recognized as a potential threat.

Pursuant to Article 5 of the *Nunavut Land Claims Agreement*, the NWMB is a quasi-judicial tribunal with decision-making responsibility, acting as the main instrument of wildlife management and the main regulator of access to wildlife in the Nunavut Settlement Area (NLCA Section 5.2.33). There are a number of provisions in the *Nunavut Land Claims Agreement* that give the NWMB authority to play an active role in the management and protection of Nunavut's habitat. These include: the provision of advice on mitigation measures to be required from developers who damage wildlife habitat (S. 5.2.34 (e)); the approval of the establishment, disestablishment and changes to boundaries of conservation areas related to management and protection of wildlife and wildlife habitat (S. 5.2.34 (a)); the approval of plans for management and protection of particular wildlife habitats (S. 5.2.34 (c)); and identification of wildlife management zones and areas of high biological productivity and the provision of recommendations to the Nunavut Planning Commission with respect to planning in those areas (S. 5.2.34 (b)).

Nunavut is known to host a number of significant mineral deposits and is recognized as one of Canada's leading jurisdictions in terms of mineral potential. The NWMB recognizes the need for economic development in the territory, and is not against industrial development; however, with the increased interest in developing the north, it is becoming more important that we have an accurate understanding of how human activities such as resource exploration and development, all-weather roads and aircraft over-flights can influence caribou behaviour and energy use in order to ensure an appropriate balance between development and protection of wildlife and wildlife habitat. Therefore, to address the concerns raised at the NWMB's January 2014 Habitat Management and Protection Workshop, and in accordance with the Board's mandate under Article 5 of the *Nunavut*

Land Claims Agreement to secure – to the extent reasonably possible – the conservation of wildlife, the NWMB decided to host a co-management partner workshop that specifically addresses the impacts and management of human land-use activities on caribou.

Workshop Purpose and Objectives

The Purpose of the NWMB's workshop "*Protecting Caribou and their Habitat*" was to bring together Inuit hunters and organizations, community members, wildlife scientists and wildlife managers to share and discuss current scientific and traditional knowledge on the effects of disturbance caused by human land-use activities on barren-ground caribou and suggest recommendations on how to effectively manage and/or protect caribou and caribou habitat in Nunavut for the long-term sustainability of the species.

Specifically, the objectives of the workshop were to:

- 1) Share and discuss current scientific and traditional knowledge on the effects of disturbance caused by human land-use activities on barren-ground caribou;
- 2) Understand the roles played by federal, territorial and *Nunavut Land Claims Agreement* agencies in the legal protection, within the Nunavut Settlement Area, of caribou and caribou habitat from disturbance caused by human land-use activities;
- 3) Discuss and evaluate the existing Nunavut Caribou Protection Measures including their development, rationale and effectiveness, and better understand factors of success in their implementation;
- 4) Discuss possible guidelines and/or seasonal mitigation measures and their effectiveness in protecting caribou and caribou habitat from the impacts of human land-use activities in Nunavut, building on lessons learned in other jurisdictions; and
- 5) Suggest recommendations on how to effectively manage and/or protect caribou and caribou habitat in Nunavut.

The workshop was not intended to lead to one or more specific NWMB decisions or recommendations for the protection of caribou and caribou habitat. Therefore, the workshop was not a forum for promoting or advancing a formal party/departmental/organizational political position on this issue. Instead, the intention was to provide an opportunity for those with expertise and interest in caribou to share their experience and knowledge about the effects of disturbance caused by human land-use activities on barren-ground caribou and to foster open and innovative discussion on how to remove and/or mitigate these effects. However, the information heard at the workshop may be used by the NWMB to assist the Board in performing its functions related to the management and protection of caribou and caribou habitat. In performing those functions, additional and more specific steps, such as holding a public hearing to carefully consider evidence and arguments from affected parties, would need to be taken by the NWMB and co-management partners. Therefore, the hope was that the workshop would be an important step along the road to better protection for caribou and caribou habitat (figure 1).

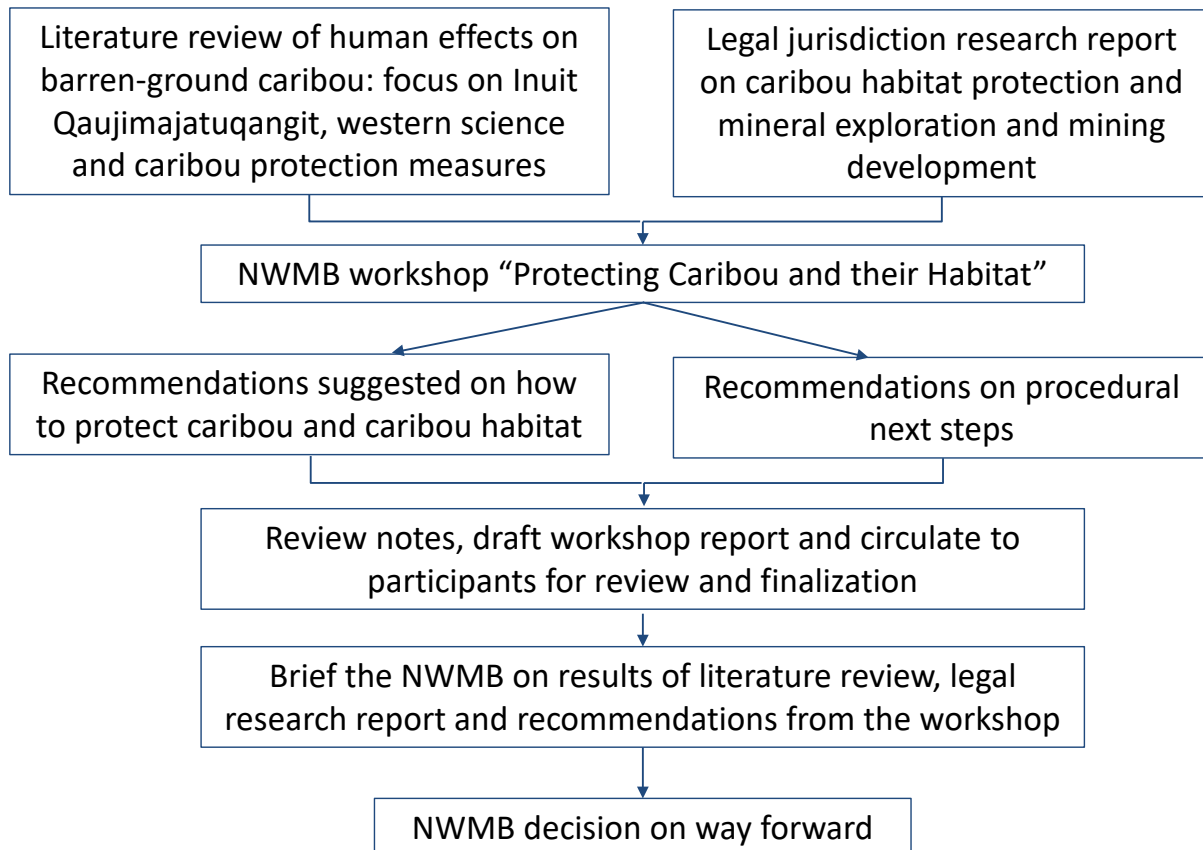


Figure 1. Flow chart depicting the proposed timeline of actions to be taken by the NWMB for reviewing management measures for the protection of caribou and caribou habitat from human land-use activities.

Presentations

Literature Review of Human Effects on Barren-ground Caribou: Inuit Qaujimajatuqangit, Traditional Knowledge and Western Science

Presenter: Natasha Thorpe, Trailmark Systems Incorporated

The NWMB contracted Trailmark Systems Incorporated to conduct a literature review on the most current scientific research, Inuit Qaujimajatuqangit and traditional knowledge of human disturbance on barren-ground caribou. In order to avoid duplicating efforts, the focus of the literature review was post-2010, as the Government of Nunavut recently commissioned an extensive literature review of sources prior to 2010 (EBA Engineering Consultants Ltd. 2011). The review also included an evaluation of the effectiveness of current Nunavut Caribou Protection Measures and a summary of how other jurisdictions are mitigating impacts of human disturbance on caribou (see below presentation summary for this section of the literature review). The literature review is publically available and can be obtained from the NWMB's website (www.nwmb.com) or by contacting the NWMB.

It is important to note that due to time and budget constraints, this was not an exhaustive literature review. The focus of references was on post-2010 publications on barren-ground caribou in Arctic Canada, and did not include other geographical areas. As well, one of the biggest challenges with reviewing Inuit Qaujimajatuqangit is that it is an oral tradition; a lot of what is shared is not written down or publically accessible.

For the purpose of the literature review, human disturbance was broken into six general categories including: linear features, resource development infrastructure, vehicles and aircrafts, local scale effects, regional scale effects and cumulative effects. In total, the literature review summarized findings from seventy-two (72) scientific articles, fifty-two (52) traditional knowledge reports and thirty (30) reports on caribou protection measures in Nunavut and other jurisdictions.

From both the scientific literature and traditional knowledge, there is a clear understanding that population declines in barren-ground caribou are linked with human disturbance. From traditional knowledge we know that caribou are smart, have powerful memories, possess a strong sense of smell, and honed internal guiding instincts that together help them migrate along traditional routes. They are known to be particularly sensitive at different times of year, especially during the calving and post-calving season, and are quick to show signs of stress.

Elders, hunters, and other community members report that barren-ground caribou habitat is degrading and fragmenting owing to wildfire, climate change, access roads, pipelines, mining and mineral exploration projects, disturbances from vehicles and machines, seismic lines, utility corridors and more. The cumulative impact of these activities on caribou habitat has not gone unnoticed by people who share their lands, waters, and world with barren-ground caribou.

With respect to roads, both science and traditional knowledge literature show that roads can affect caribou by increasing disturbance, fragment habitat creating partial barriers to movement, alter migration and increase access for harvest. However, the degree of these impacts vary according to season and caribou activity/behaviour, as well as the size of the road and its traffic level. Pipelines and power lines are believed to cause a minor disturbance compared to roads, but may still result in fragmentation, habitat loss and increased stress.

Overall, traditional knowledge and science are also in agreement about the effects of resource development infrastructure on caribou. Noise, dust, pollution, physical structures, and cumulative effects, among others, are reported to cause disturbances, area avoidance, shifts in migration patterns, habitat destruction, injuries, contamination, and changes in the overall health of barren-ground caribou. Caribou may show behavioural response to disturbances from resource development in all seasons, although the impact seems to be most prominent in the pre-calving and calving seasons. Some scientific studies have shown a decrease in caribou abundance in the vicinity of resource development infrastructure, with the “zone of influence” dependent on the season. Traditional knowledge literature also supports area avoidance and even abandonment as a result of disturbance:

If you disturb the calving ground, they'll go elsewhere. (Fred Sangris).

The elders suspect that ekwò have probably gone east because there's been too much exploration or drilling going on in the calving grounds (Fred Sangris).

Similarly, the traditional knowledge and science literature is in agreement that disturbances such as low level aircraft flights and vehicles (e.g. All-terrain Vehicles, snow machines) can increase caribou energetic costs if those activities interrupt foraging or cause the caribou to move away in response to the disturbance. The magnitude of these effects varies with herd size and composition (e.g., presence of calves), time of year/season and habitat.

The literature review also tried to distinguish between local and regional scale human disturbance effects. The majority of studies looked at local effects since population level effects are difficult to study due to the longer time spans involved and overlapping cumulative effects. The study of local scale effects often focuses on an individual-based response such as fright and flight behaviour triggered by human disturbance. Fright and flight behaviour can result in elevated glucocorticoid levels which are an indicator of physiological stress. Similarly, harvesters have often stated that the texture and taste of meat from stressed caribou is different, further showing physiological differences. Local scale effects resulting from disturbance can potentially lead to longer term demographic consequences such as malnutrition and reduced reproduction.

Although the majority of studies were at a local scale, a large number of scientific studies have reported negative impacts of human infrastructure on *Rangifer* space use at the regional scale, including displacement, changes in the location of calving grounds,

decreased abundance and shifts in migration routes. A general conclusion from the scientific literature was that the degree of changes in the location of calving grounds plays an important role in how susceptible barren-ground caribou may be to potential population-level effects (as a result of human disturbance).

The traditional knowledge literature reviewed describes cumulative effects as a significant threat to barren-ground caribou, with exploration and development activities cited as the main contributors, and recommends greater coordination of research and monitoring across ranges.

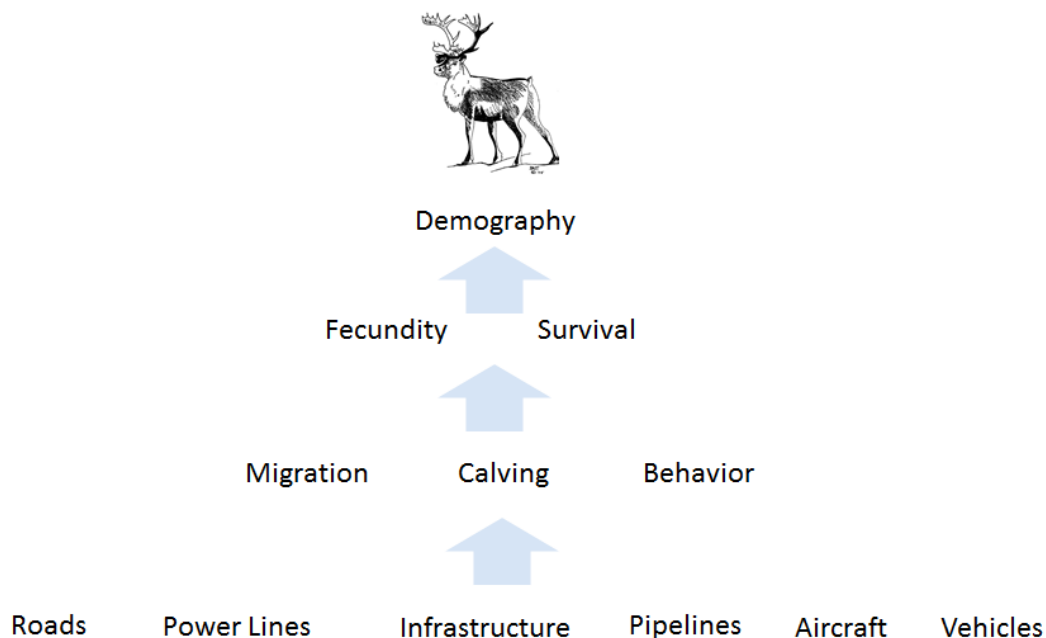


Figure 2. Human disturbance agents and their effects on caribou population demography.

Reference:

Trailmark Systems Inc. (2015). Review of post-2010 Literature on Human Effects on Barren-ground Caribou: Focus on Traditional Knowledge, Western Science and Caribou Protection Measures. Unpublished report for the Nunavut Wildlife Management Board, NU.

Inuit Qaujimajatuqangit of Caribou Habitat

Presenters: Basil Quinangnaq, Baker Lake Hunters and Trappers Organization, and Warren Bernauer, Kivalliq Wildlife Board

In September 2015, the Baker Lake Hunters and Trappers Organization held a workshop with hunters and elders to discuss and share knowledge about sensitive caribou areas around Baker Lake. In preparation for the workshop, Warren Bernauer, a consultant working with the Kivalliq Wildlife Board, conducted background research and provided a

summary of documented knowledge of these areas, their importance to Inuit, and the long history of Baker Lake hunters working for their protection. Together, Basil and Warren presented the major findings from the workshop and the background research reports. Both documents are publically available and can be obtained from the NWMB's website (www.nwmb.com) or by contacting the NWMB.

The presentation focused on Inuit Qaujimajatuqangit of caribou water crossings and calving grounds. According to Inuit Qaujimajatuqangit, caribou are extremely sensitive to disturbance at water crossings. It is because of this sensitivity, that Inuit have developed traditional rules on how water crossings should be respectfully and properly treated. These rules continue to be passed on to younger generations of Inuit hunters, and include:

- Do not walk, hunt, skin animals, cache meat or camp on the side of the river where caribou enter the water;
- Camp upstream from water crossings;
- Clean up all animal remains near a crossing (even blood on the ground should be buried);
- Dogs and people should be silent at water crossings;
- Do not hunt the first group of caribou that cross the water. The rest of the herd follows this leading group, and if the leaders are hunted, the others may not follow across the water at the crossing;
- Do not hunt the first caribou in the group (the leaders of the group). This will disorient the other caribou who follow. The leaders should be allowed to pass, and the followers can be hunted.

It was stressed that human land use activities, specifically mining exploration and development, in the vicinity of caribou water crossings is inconsistent with these traditional Inuit rules and values. During the presentation and group discussion, two possible management recommendations were suggested: 1) marking all known caribou water crossings with inuksuit so people and industry will know not to disturb these areas; and 2) creating a 25km (minimum) buffer zone around water crossings where mining exploration and development should be prohibited.



Similar to water crossings, caribou are sensitive to disturbance when on their calving grounds. Elders teach hunters to not disturb caribou during calving and to stay out of the calving grounds during the calving season. Although the background research and

workshop did not generate a list of traditional rules pertaining to calving grounds, it was agreed that the rules for water crossings should help inform the discussion about calving grounds. Inuit Qaujimajatuqangit shows that sensitive caribou habitat like water crossings and calving grounds should not be disturbed or altered. Elders repeatedly recommended that human land-use activities such as mining exploration and development should not take place in calving grounds and predicted that doing so will result in the herds scattering and declining.

Resource Development and Caribou in Nunavut – Finding a Balance

Presenters: Mitch Campbell, Government of Nunavut and David Lee, Nunavut Tunngavik Inc.

There are an estimated nineteen populations and/or subpopulations of caribou either wholly or partially within the Nunavut Settlement Area. This presentation provided information on eight of these mainland populations/subpopulations: 1) Bluenose-east, 2) Dolphin and Union, 3) Bathurst, 4) Beverly, 5) Ahiak, 6) Qamanirjuaq, 7) Lorillard, and 8) Wager Bay. All of these populations/sub-populations are classified as either mainland migratory or tundra wintering, and their annual core calving areas are either entirely or mostly within the Nunavut Settlement Area (figure 3).

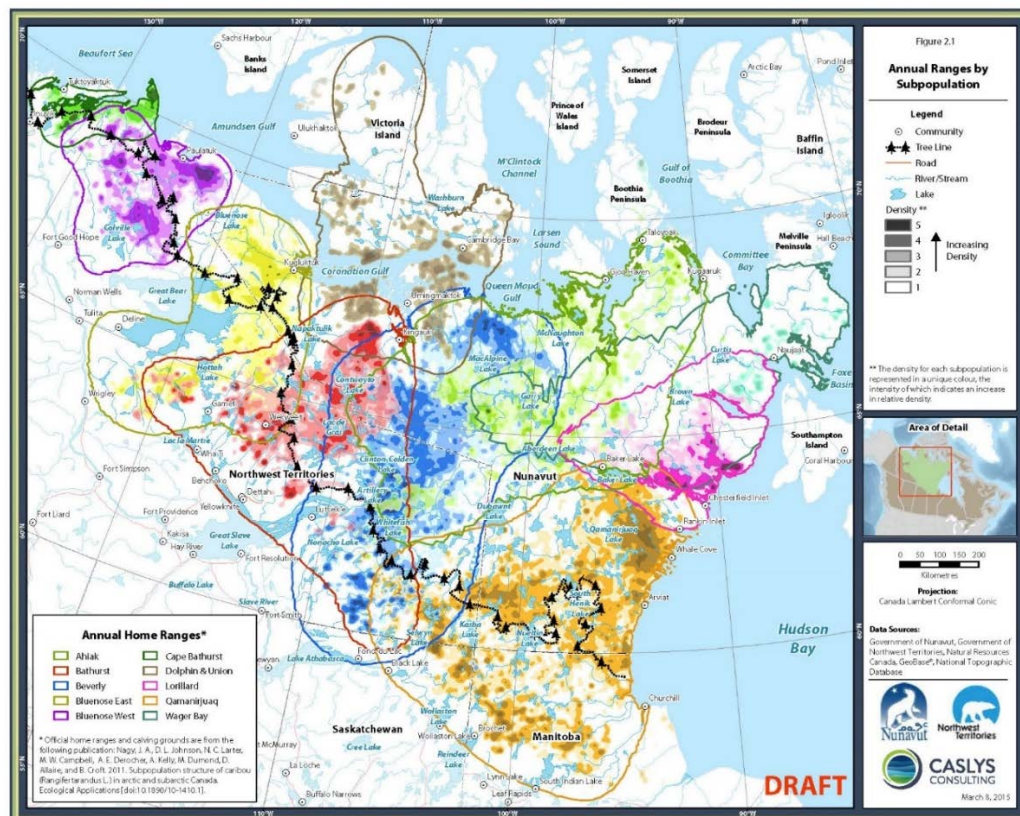


Figure 3. Annual home ranges of ten caribou populations/subpopulations determined by kernel density analysis of collared cows from 1993 – 2007.

The presentation described some of the key characteristics of the two ecotypes of mainland caribou: mainland migratory and tundra wintering. In general, mainland migratory caribou display more extensive migratory behaviour than the tundra wintering ecotype, and migrate across the tundra range in spring, returning south to the forested areas in early to late fall. In contrast, the tundra wintering ecotype rarely migrate to the treeline, spending the entire year within tundra habitat. Due to their extensive seasonal movements, it is thought that mainland migratory caribou are less able to adapt to disturbance than tundra wintering caribou. Although both ecotypes are considered sensitive to disturbance, especially during vulnerable seasons such as calving.

The presentation gave an overview of nine distinct seasonal ranges of importance to caribou based on collar-derived caribou movement rates and described the main sensitivities during that season. Seasonal ranges include: calving, post-calving, summer, late summer, fall migration (pre-breeding), rut, fall migration (post-breeding), winter, and spring migration (figure 4). These seasonal ranges and their definitions were used throughout the workshop.

See Appendix A for a full description of each seasonal range as provided by the Government of Nunavut – Department of Environment.

The presenter defined disturbance as “*Human activity resulting in the altering of an animal’s behaviour that would increase energy expenditure and/or risk of injury, while lowering overall condition and/or health*”. Caribou are more vulnerable to the impacts of disturbance and/or habitat modification when their resilience (i.e., ability to cope with stress) is low. Highly resilient caribou are healthy and productive and better able to cope with environmental stress. Resilience decreases with decreasing population size. Therefore, caribou are more sensitive to disturbance at the lower end of their population cycle. Currently, many of Nunavut’s mainland caribou populations/subpopulations are experiencing a population decline or are data deficient (figure 5). Therefore, many of the herds are considered more vulnerable to disturbance at this time.

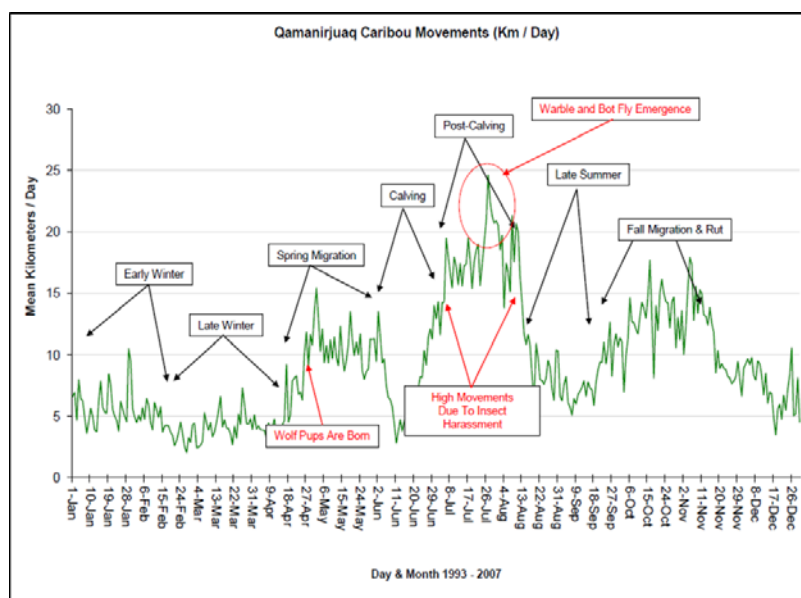


Figure 4. Seasons of importance to caribou based on collar derived caribou movement rates.

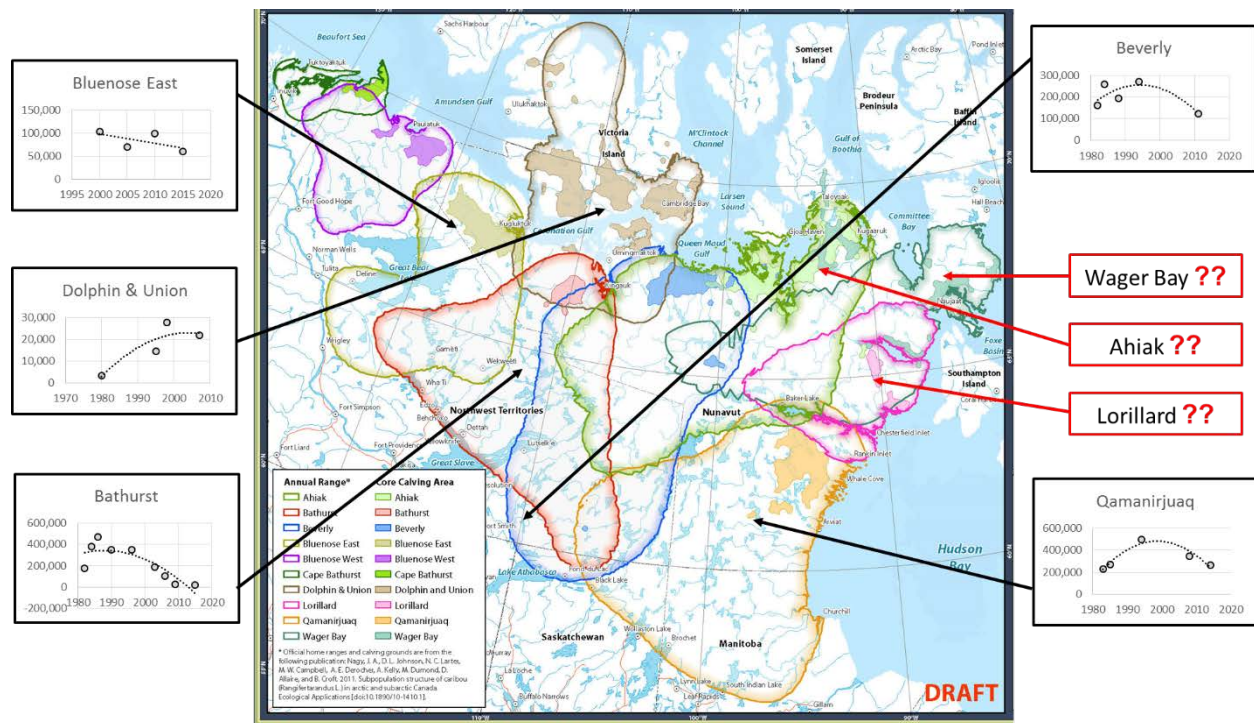


Figure 5. Trends in abundance of mainland migratory barren-ground caribou herds in Nunavut.

The presentation concluded with a discussion on finding the balance between protected areas and protection measures as a means of removing and/or mitigating the effects of disturbance caused by industrial development on caribou. Protected areas exclude industrial development and associated infrastructure within sensitive seasonal caribou habitat. In contrast, protection measures allow industrial development and associated infrastructure within sensitive seasonal caribou habitat, but attempts to minimize its disturbance impacts. It was argued that complete protection of seasonally sensitive caribou range is 100% effective and requires few resources to monitor and enforce. In contrast, due to data deficiencies, there is little information on the effectiveness of protection measures. For example, it is unknown whether or not industrial infrastructure and associated habitat modification will evoke an avoidance response by caribou even during operational shutdowns. As well, protection measures that require aerial monitoring are only as effective as the weather is predictable. Often, aircraft require operation well below the threshold altitudes for days or weeks at a time. Therefore, considering the social, cultural and economic importance of caribou to Nunavummiut, the precautionary principle should be considered when applying protection measures to sensitive seasonal ranges, such as calving and post-calving grounds.

Caribou Zone of Influence and Diamond Mines

Presenter: Kim Poole, Aurora Wildlife Research

This presentation provided an overview of a study that estimated the zone of influence of industrial developments on migratory caribou (Boulanger et al. 2012). Specifically, the study looked at estimating the zone of influence of the Ekati and Diavik diamond mines in the Northwest Territories. The Ekati and Diavik mines are located within the summer range of the Bathurst caribou herd. Since the 1990s, Tlicho elders have said that Bathurst caribou have changed their migration route to avoid encountering the mines. This study used scientific methods to support this traditional knowledge.

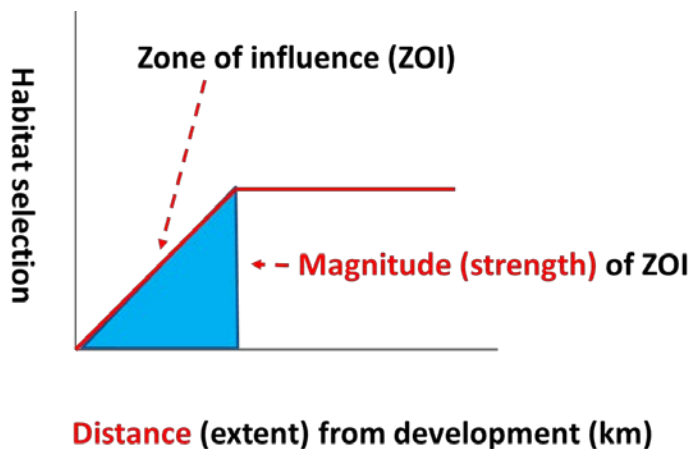


Figure 6. Graphical depiction of the zone of influence.

influence (i.e., the distance from the disturbance where you can no longer tell the difference in abundance or distribution based on the habitat alone). The magnitude component measures the strength of the zone of influence.

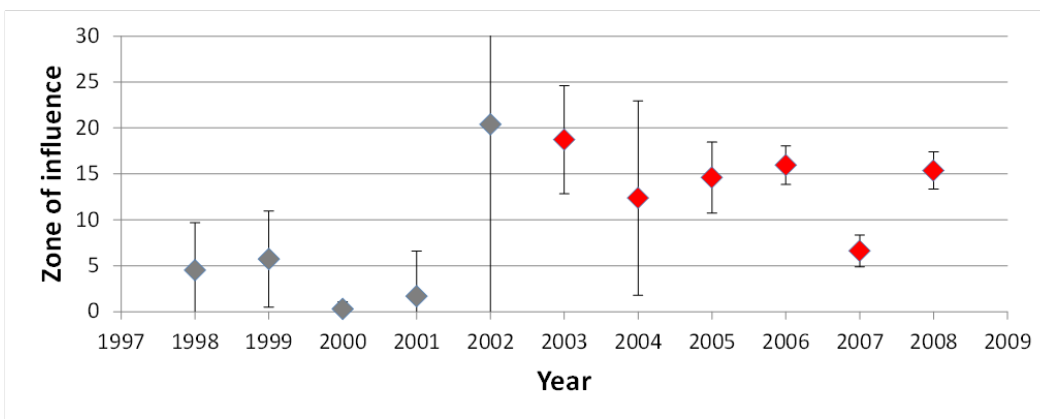
Using aerial survey data, the researchers were able to estimate a 14 km zone of influence during the operation period for the two open pit mines. This is equivalent to approximately 2400 km² of habitat being influenced and affecting caribou abundance and distribution.

It is not entirely clear what causes the zone of influence. Possible reasons include sensory disturbance (e.g., noise and vibration from vehicles and blasting), memory and learned behaviour (i.e., caribou learn to avoid the mine and others follow) and dust accumulation on lichen. Looking more directly at fine particle dust as a possible cause of the zone of influence, the presenter showed modelled dust projections from the Ekati and Diavik mines. These models have detected dust that is higher than background levels up to 15-18 km from the mine site, a range that correlates with the 14 km zone of influence detected by the aerial surveys.

New research by lead author John Boulanger using new modelling techniques is now allowing for the detection of annual zones of influence, which allows for the examination

of trend over time. Looking at data from 1997 to 2009, a significant zone of influence was detected for the first time around the Ekati mine in 2003 (figure 7). This coincides with the opening of the 27 km Misery Road between Ekati mine and the Misery Operation. Between 2003 and 2009, the zone of influence stayed relatively constant at 14 km. In

Distance



Magnitude

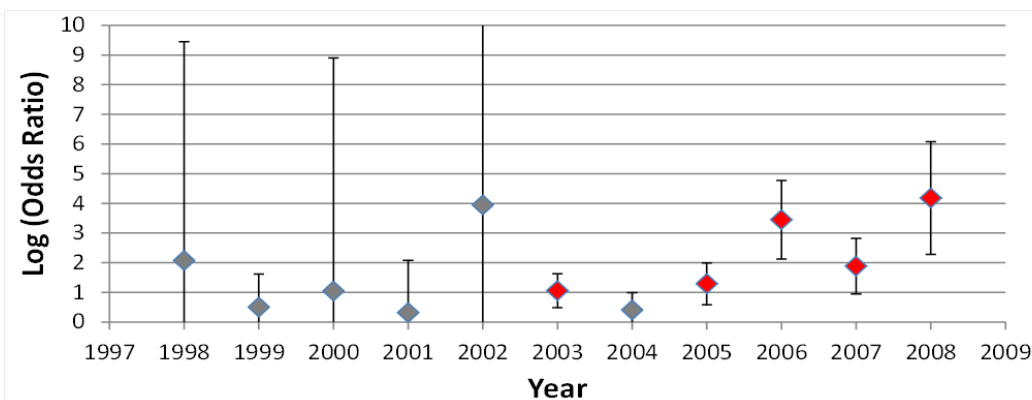


Figure 7. Annual zone of influence estimates for the Ekati mine.

addition, since 2003, the strength of the zone of influence increased. During this time, the mine claimed that they were doing everything they could to mitigate the impacts of dust from the Misery Road.

In addition to reducing the amount of available habitat, and affecting the abundance and distribution of caribou, the zone of influence can also change caribou behaviour. Some studies have shown that caribou feed less within the zone of influence and show increased signs of stress and alertness. Together, this change in energy intake and expenditure impacts the caribou's activity budget, which ultimately affects reproduction and survival and is a key measure in cumulative effects.

In conclusion, the presenter stressed that the zone of influence extent and strength will vary among seasons and ranges. This particular study looked at measuring the zone of influence on the Bathurst caribou summer range. Other studies examining the zone of influence during other seasons and on other ranges, would add valuable information.

Reference:

Boulanger, J., K. G. Poole, A. Gunne, and J. Wierzchowski. 2012. Estimating the zone of influence of industrial developments on wildlife: a migratory caribou *Rangifer tarandus groenlandicus* and diamond mine case study. *Wildlife Biology* 18(2): 164 – 179.

Mobile Caribou Conservation Measures

Presenter: Kim Poole, Aurora Wildlife Research

This presentation provided an overview of proposed mobile caribou conservation measures that were developed for the Kivalliq Inuit Association for potential implementation in the Kivalliq region. At the time of this presentation, the report on the proposed mobile caribou conservation measures was in a draft phase and was not yet endorsed by the Kivalliq Inuit Association.

Mobile Caribou Conservation Measures link monitoring and site-specific mitigation with the susceptibility of caribou to disturbance. The susceptibility of caribou to disturbance varies seasonally depending on, for example, presence of calves, group size, degree of aggregation and dispersal and insect harassment. This seasonal variation in susceptibility and caribou behaviour coupled with period of exposure and the habitat area's relative size and location predictability is used to identify "least risk timing windows" which identify when monitoring and mitigation should be intensified. Three different risk categories were developed: crucial, cautionary and least risk. Calving and post-calving seasons were identified as crucial, spring-migration (pre-calving), summer and fall-migration (pre-rut) as cautionary, and rut, fall-migration (post-rut) and winter as least risk.

The main benefit of mobile caribou conservation measures is that they "travel with" the caribou, therefore providing greater adaptability for protection of caribou without causing unnecessary restrictions on land-use activities. However, they do not offer protection for important caribou habitat. They are designed to be flexible, predictable for both operators and land use regulators and adaptable to the susceptibility of caribou. The proposed mobile measures can be implemented in concert with protected areas, and can provide a level of protection to caribou regardless of distribution or season.

The proposed mobile caribou conservation measures has three main components:

1. A mapped area where the likelihood of encountering caribou is presented;
2. Site monitoring, which provides more detailed information on caribou distribution and movements; and
3. Mitigation to reduce effects on caribou.

The mapped areas are seasonal Caribou Conservation Areas that are identified through a collaborative mapping exercise that incorporates both Inuit Qaujimajatuqangit and scientific data. These Caribou Conservation Areas are used for information purposes and identify seasons and areas where caribou are likely to occur, thus providing predictability to both the operators and the regulators. Unlike the 1978 DIAND Caribou Protection Measures, which are area-based and focused on mapped Caribou Protection Areas with fixed boundaries for calving grounds only, the Caribou Conservation Areas can be applied to any seasonal habitat type or activity. As well, since the Mobile Caribou Conservation Measures travel with the caribou, they offer protection for caribou that are present outside of the Caribou Conservation Area that are detected through monitoring.

Monitoring is the second component of Mobile Caribou Conservation Measures and is required to know when to trigger mitigation. Monitoring is achieved through surveillance around an exploration site. In the past, mobile protection measures have been criticized because government and Regional Inuit Associations lacked the required resources for effective monitoring. To address this, the proposed Mobile Caribou Conservation Measures place the responsibility of conducting and financing monitoring on the land use permit operator, leaving land managers responsible for compliance only. The monitoring is conducted within three concentric zones, as a hierarchy of increasing surveillance effort (figure 8). The size of the zones is based on the season and daily rates of movements from satellite-collared caribou (least-risk timing window). The two outer zones, termed the “early warning zone” and the “buffer zone” operate as information zones to indicate the possibility of caribou moving into the third most inner zone, termed the “zone of influence”.

The zone of influence in this context is the area around a site of human activity where the behaviour and relative abundance of caribou may change in response to the site and its associated activities. The presence or absence of caribou in the early warning zone would mainly be informed by tracking collared caribou or based on local or scientific knowledge. Inside the early warning zone is the buffer zone, where various monitoring techniques such as collars, aerial surveys and/or ground surveys are used to assess the presence of caribou. Presence of caribou in the buffer

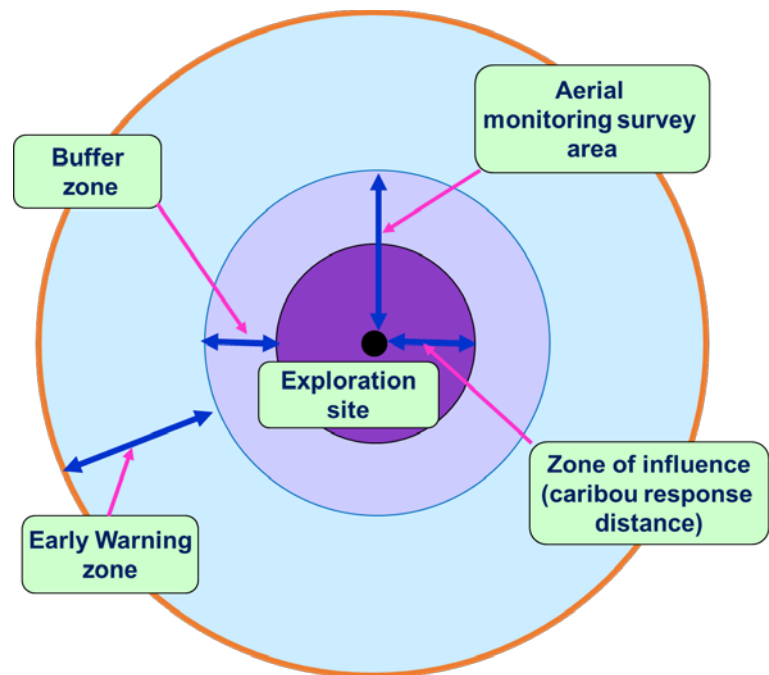


Figure 8. Schematic relationship between an exploration site and the three zones of monitoring proposed in the Mobile Caribou Conservation Measures.

The presence or absence of caribou in the early warning zone would mainly be informed by tracking collared caribou or based on local or scientific knowledge. Inside the early warning zone is the buffer zone, where various monitoring techniques such as collars, aerial surveys and/or ground surveys are used to assess the presence of caribou. Presence of caribou in the buffer

zone would indicate to the exploration manager and the land use inspector of a potential requirement for mitigation should caribou enter the zone of influence. Presence of caribou within the zone of influence would initiate mitigation. The seasonal timing and the number of caribou within the zone of influence would trigger increased or reduced mitigation for that site. Operational details on the appropriate mitigation measures would have to be developed in a collaborative approach with government, industry, Regional Inuit Associations, etc.

The presentation concluded with an overview of a pilot project conducted by Kim Poole and Anne Gunn in 2009 in the Sahtu region for the Sahtu Renewable Resource Council. The Pilot Study examined how Mobile Caribou Conservation Measures would work on an operational scale. The Pilot Study was conducted in March on the winter range of the Bluenose-east caribou herd south of Great Bear Lake. The objective was to field test operations for mobile measures. Seven test sites were developed with the three zones of monitoring (early warning zone, buffer zone and zone of influence). Aerial surveys were initiated if collared caribou were present in the early warning zone. If a certain threshold number of caribou in the buffer zone were observed by aerial survey, this would have justified notice to the exploration manager of a potential suspension. If the threshold number of caribou in the zone of influence were exceeded, then mitigation would be applied. Overall, the mobile measures seemed to be a viable option that the Dene could use to monitor and apply mitigation if development was proposed in the area. It was determined that within the scale of the project area at that time the collars were relatively predictive of the overall number of caribou within the buffer zone and zone of influence; however, the use of collars alone without aerial surveys could have resulted in either unnecessary restrictions on development or loss of protection for the caribou.

Reference:

Poole, K. and A. Gunn. 2015. Mobile Caribou Conservation Measures for the Kivalliq Region, Nunavut. Unpublished final report for the Kivalliq Inuit Association. Available online: [http://www.nunavut.ca/files/Poole%20and%20Gunn%20KivIA%20Caribou%20Protection%20Measures%2012Nov15%20\(2\).pdf](http://www.nunavut.ca/files/Poole%20and%20Gunn%20KivIA%20Caribou%20Protection%20Measures%2012Nov15%20(2).pdf)

Jurisdictions Involved in Caribou Protection

Presenter: Michael d'Eça, Nunavut Wildlife Management Board

The NWMB's legal counsel, Michael d'Eça, gave a presentation on the jurisdictions/authorities involved in caribou protection in Nunavut. Specifically, the presentation discussed: the Crown and the legal hierarchy that applies to the various jurisdictional players involved in caribou protection and mining development; the federal and territorial jurisdiction; the general rules that apply to Inuit Owned Lands; the jurisdiction of the Institutions of Public Government, including the Nunavut Planning Commission, Nunavut Impact Review Board, Nunavut Water Board and the NWMB; and

some potential ways forward. This presentation was based on a legal review that was contracted by the NWMB.

The primary law governing all the jurisdictions is the *Nunavut Land Claims Agreement*. The *Nunavut Land Claims Agreement* is protected by the constitution, which is the supreme law of Canada. Various federal and territorial statutes and regulations also apply, as long as they are not inconsistent or in conflict with the *Nunavut Land Claims Agreement*.

All Nunavut lands are either Crown lands (82%) or Inuit Owned Lands (18%). There are two types of Inuit Owned Lands: surface and subsurface. Inuit own the surface rights to all Inuit Owned Lands, which are administered by the Regional Inuit Associations, and a portion of the subsurface rights, which are administered by Nunavut Tunngavik Incorporated. However, subsurface Inuit Owned Lands are shared by the Crown, third parties (acquired from the Crown before the Nunavut Land Claims Agreement was signed and implemented) and Nunavut Tunngavik Incorporated, and are administered by Nunavut Tunngavik Incorporated or Indigenous and Northern Affairs Canada.

The federal government controls access to and mineral rights on Crown lands and mineral rights on surface Inuit Owned Lands. In addition, the federal government also has approval of land use plans (shared with the Government of Nunavut) and federal project proposals. In addition to sharing the approval of land use plans with the federal government, the territorial government has final approval over territorial project proposals and has authority under environmental protection and wildlife legislation.

With respect to the Institutions of Public Government, the Nunavut Planning Commission is responsible for establishing a land use plan for the Nunavut Settlement Area. An approved land use plan can establish binding rules for mining development and caribou habitat protection. Upon final approval by the Minister of Indigenous and Northern Affairs Canada, Government of Nunavut Minister of Environment and Nunavut Tunngavik Incorporated, the land use plan is in effect (including within Inuit Owned Lands) and all projects, licences, permits and authorizations must comply. The Nunavut Impact Review Board is responsible for screening and reviewing projects in conformity with the final approved land use plan and submits its decision, along with any terms and conditions, to the responsible Minister. The responsible Minister may accept or reject the Nunavut Impact Review Board's decision. If the Minister rejects those terms and conditions, or if the Minister rejects a decision that the project not proceed, the Nunavut Impact Review Board must submit a public report with final recommended terms and conditions. When the Nunavut Impact Review Board submits a public report with final terms and conditions, the Minister may reject or vary any term or condition related to socio-economic impacts, and not related to ecosystemic impacts. Therefore, a term or condition recommended to limit negative impacts on a caribou calving ground cannot be rejected or varied by the Minister.

The NWMB is the main instrument of wildlife management and the main regulator of access to wildlife in the Nunavut Settlement Area. The NWMB can provide essential advice on land use planning to the Nunavut Planning Commission and on project approvals to the Nunavut Impact Review Board. The NWMB and the appropriate Minister shares decision-making authority with respect to: wildlife harvesting restrictions; species at risk designations; the approval of plans for the management, protection and/or recovery of wildlife and habitat; and approval of conservation areas, including critical habitats and special management areas. Subject to limited exceptions, it is prohibited to engage in any exploration, prospecting or claims-staking on critical habitat.

The establishment of special management areas is also an effective tool for the protection of particular wildlife. The NWMB may approve a special management area in order to: benefit particular wildlife or habitat; preserve the ecological integrity of the area; or preserve biodiversity. Once the NWMB and the Government of Nunavut have approved a critical habitat or a special management area, the Commissioner in Executive Council may establish regulations respecting: a) the preservation, restoration, management, use and control of habitats in those places; (b) the regulation or prohibition of access to those places; and (c) any activity in or use of those places, including the exploration prospecting, claims staking and production of metals, minerals, oils or gas and the construction, operation and maintenance of any building, structure or thing. The *Conservation Areas Regulations* of the *Nunavut Wildlife Act* (approved July 1st, 2015) includes the continuation of eight caribou calving areas in Nunavut as Special Management Areas.

In conclusion, the presentation covered potential ways forward for the NWMB and its co-management partners, which include: 1) consider whether new or modified harvesting limitation need to be considered for any vulnerable caribou populations; 2) consider further submissions to the Nunavut Planning Commission Land Use Plan hearing, focusing on the purpose of the plan to “protect... the environmental integrity of the designated area”; 3) consider submissions to relevant Nunavut Impact Review Board hearings, focusing on the Nunavut Impact Review Board’s primary objective to “protect the ecosystemic integrity of the designated area”; 4) consider whether to list specific caribou populations as threatened or endangered, which will lead to subsequent legal steps such as the identification of critical habitat and approval of a recovery policy; 5) review current special management areas and accompanying protection for caribou calving grounds, and consider whether the area boundaries and/or protections require modification; and 6) consider whether to approve additional special management areas, and if so, consider the need to make decisions or provide advice regarding appropriate protections.

Literature Review of Human Effects on Barren-ground Caribou: Caribou Protection Measures in Nunavut and Other Jurisdictions

Presenter: Rebecca Jeppesen, NovaSila Wildlife Consulting

Rebecca Jeppesen gave a presentation via teleconference on the existing Caribou Protection Measures in Nunavut, including their origin, rationale and assessment, as well as a summary of guidelines for the protection of caribou and caribou habitat in other jurisdictions. This presentation was based on information from the literature review contracted out by the NWMB on the impacts of human activities on barren-ground caribou.

Two versions of Caribou Protection Measures are currently in place in Nunavut; these are included as Appendices in the Keewatin and North Baffin Regional Land Use Plans. These measures were originally drafted by Indigenous and Northern Affairs Canada in the 1970s, specifically to provide protection for caribou in the Beverly and Qamanirjuaq herds. This was in response to exploration and development activities in the vicinity of Baker Lake. The Keewatin regulations were included as examples of caribou protection measures for land use planning in the north Baffin. However, modifications needed to customize these measures for the Baffin Island caribou herd were never completed.

The caribou protection measures were intended to provide protection when the caribou were thought to be most vulnerable, during the calving season and at water crossings, and applies to all lands (i.e., Crown lands and Inuit Owned Lands). Caribou Protected Areas were developed based on the traditional calving areas of the herds. Between 1979 and 1990, there was a monitoring program in place which generated annual reports on the actual location of caribou, which was used to modify the boundaries of the Caribou Protected Areas. However, due to a lack of funding, this monitoring program was discontinued in 1990. The boundaries currently included in the Keewatin Regional Land Use Plan reflect the last time these boundaries were modified. Within the Caribou Protected Areas, industrial activity is halted between May 15 and July 15 (calving season). The monitoring program provided decision-makers with information on the distribution of caribou, which allowed for flexibility. Based on the results of the monitoring, land use inspectors could lift restrictions if caribou were outside the vicinity of the operations. Outside of the Caribou Protected Areas, land use activities could proceed unless caribou were present. This flexibility was intended to minimize the impact to industry while still maintaining protection for calving caribou. However, the practicality of this approach was lost when the monitoring was discontinued.

In 2000, consultants were hired by Indigenous and Northern Affairs Canada to assess the effectiveness of the Caribou Protection Measures. The consultants conducted interviews with land users and wildlife managers in Nunavut and the Northwest Territories. The report concluded that the discontinuation of monitoring made it impossible to assess the effectiveness of the Caribou Protection Measures or compliance with them, and the lack of annual survey data meant that the Caribou Protected Areas were outdated, so the amount of protection given to caribou by these boundaries is unknown. As well, it was

concluded that the caribou protection measures provide protection to caribou, but not to caribou habitat. In contrast to this consultant report, the Nunavut Planning Commission stated in the 2000 Keewatin Regional Land Use Plan that "...the existing regulatory structure provides sufficient protection for these areas at this time". In 2007, another comprehensive review and assessment of the caribou protection measures was conducted. This review compared the Caribou Protected Areas with actual locations of calving based on monitoring and telemetry data between 1978 and 2005. It was found that an average of 68% of the annual calving grounds were within Caribou Protected Areas. The report also found that the timing of caribou calving is variable; in some years they entered the Caribou Protected Area before May 15 and after May 15 in others. Based on information from land use permits, calving time and caribou location data, it was found that between 1980 and 2006, if there had been no caribou protection measures in place the calving Beverly and Qamanirjuaq caribou would have been exposed to 83 projects. Between 1993 and 2005, they found that 14 permits issued may have had caribou in the vicinity that would have prompted suspension if the monitoring had been available.

In addition to the Caribou Protection Measures, there are additional protection offered through existing land use plans in the form of conformity requirements, terms and a code of good conduct for land users. As well, specific caribou protection measures were developed in 2014 for the Baffinland Mary River Project.

Habitat Management Initiatives in the Northwest Territories

Presenters: Karin Clark and Jan Adamczewski, Government of Northwest Territories

The annual ranges of many of Nunavut's barren-ground caribou herds is shared with other jurisdictions. Therefore, it is important to consider what these other jurisdictions are doing to manage and protect caribou and caribou habitat. This presentation gave an overview of habitat management initiatives in the Northwest Territories.

The Government of Northwest Territories' has several approaches to habitat management, including: 1) range plans; 2) environmental assessment and regulatory recommendations; and 3) involvement in land use planning.

Range Planning is an attempt to set clear rules and expectations for habitat management outside of the project specific review. Unlike a land use plan, a range plan does not have authority; therefore, it must rely on the authority of regulatory agencies and other legislated tools to implement the recommendations in the range plan. However, range planning is a tool government can use to start building consensus on habitat management which can then feed into the land use planning process. In particular, the Government of Northwest Territories is working with co-management partners, including renewable resource boards, industry and Nunavut participants, to develop a range plan for the Bathurst caribou herd. The range planning process will involve identifying areas of important caribou habitat for the Bathurst caribou and include recommendations for habitat management approaches to reduce risks to caribou. Types of recommendations

that are being considered for the range plan include seasonal restrictions to protect caribou during sensitive time periods, access management (e.g., vehicles and roads), conservation areas and disturbance thresholds. Disturbance thresholds is a relatively new method being used to help assess and manage cumulative effects on the Bathurst caribou's range. The range planning process also considers the economic implications of habitat management by estimating the cost of different habitat management strategies to industry. Once complete, the Bathurst Range Plan will guide the Government of Northwest Territories input into environmental assessments and include recommendations to management authorities on how to make balanced land-use decisions.

In addition to developing range plans, the Government of Northwest Territories also provides comments on land use permits and water licence applications. Typical recommendations include seasonal timing restrictions, setback distances, and operational shutdowns when caribou groups come within a certain distance. Some of the challenges with these recommendations is that they require detailed mapping of caribou ranges and intensive monitoring and enforcement. In November 2014, a new *Wildlife Act* for the Northwest Territories was passed into law. Section 95 of the *Wildlife Act* requires a developer to prepare a wildlife management and monitoring plan for approval by the Minister if the Minister feels that the development or activity may result in significant disturbance to wildlife, alteration or damage to wildlife habitat or contribute to cumulative impacts on wildlife or wildlife habitat. The wildlife management and monitoring plan addresses site specific impacts of a project and must include monitoring plans and a description of measures to be implemented for the mitigation of potential impacts.

Finally, the Government of Northwest Territories is involved in land use planning, and will use range plans to feed into land use planning processes. The Government of Northwest Territories is also a participant in the draft Nunavut Land Use Plan hearing and has put forward a formal department position recommending the prohibition of development on caribou calving grounds.

Regional Perspectives

During fall 2015, Nunavut Tunngavik Incorporated facilitated regional caribou workshops in conjunction with the three Regional Wildlife Board's Annual General Meetings. At the time of the "Protecting Caribou and their Habitat" workshop, both the Kivalliq Wildlife Board and Kitikmeot Regional Wildlife Board had their regional workshops. The Qikiqtaaluk Wildlife Board was planning on holding their workshop the following week during their Annual General Meeting. The below sub-sections provide information on each Regional Wildlife Board's perspective on caribou and caribou habitat protection.

Kivalliq

Presenter: Warren Bernauer on behalf of Stanley Adjuk, Kivalliq Wildlife Board

During the fall 2015, Kivalliq Wildlife Board staff conducted visits with the Hunters and Trappers Organizations in the Kivalliq region to collect knowledge and recommendations from each community on caribou habitat protection. In addition, the Kivalliq Wildlife Board held a regional caribou workshop at their Annual General Meeting in Rankin Inlet on October 30th, 2015. The presentation by the Kivalliq Wildlife Board shared the perspectives, knowledge, concerns and recommendations of the Board's directors on habitat protection and was based on information collected during the community visits and regional caribou workshop.

In the opinion of the Kivalliq Wildlife Board, caribou and caribou habitat in Nunavut is not sufficiently protected at this time. Most large herds in Nunavut are currently declining and the herds are changing their migration routes. Hunters often see exploration activity, especially low flying aircraft disturbing the caribou herds and areas that Inuit Qaujimagatuqangit tells us to protect, like calving grounds and water crossings, are currently open to mineral exploration and mining. Community members recognized that the decline and changes in caribou migration patterns are a result of multiple stressors on caribou. Based on the knowledge and memory of elders, it is evident that there is natural variability in the number of caribou and in their migration routes. In addition, hunters have also observed an increase in the number of predators, including wolves, grizzly bears and wolverines. As well as an increase in the number of insects harassing caribou, which could possibly be due to climate change. Due to community growth, harvest pressure has also increased. It was noted that younger generations do not always follow the traditional rules for protecting and respecting caribou and their habitat. Finally, it was stressed that mining, mineral exploration and other land use activities are also playing a role. Caribou hunters throughout the Kivalliq region have observed helicopters disturbing caribou migrations and caribou hunting. Helicopters often fly very low, and this causes herds to scatter and alter their migration routes. Elders have stated that caribou will change their migration routes to avoid disturbance on the land. They say that this may be a delayed response, and that it may take several years of disturbance before the routes really change. For example, community members from Baker Lake have observed changes in caribou migration near their community as a result of the Meadowbank gold mine all weather road and marine shipping. The noise and dust from the mine and all-weather road disturb caribou and impact the quality of the forage vegetation. The marine shipping through Chesterfield Inlet creates noise and that also disturbs the caribou. The all-weather road has also increased access to the area by caribou hunters, and caribou now migrate further north during the summer. The Beverly caribou herds calving grounds has also changed. Many hunters think this was at least partially due to the amount of exploration activity that was approved in the original calving grounds between 2005 and 2007. Traditionally, Inuit would herd caribou with inuksuit. Inuksuits were built in rows to encourage the caribou to migrate towards preferred hunting areas, like water crossings. This shows that even small changes to the landscape can cause disturbance.

To address these concerns, the Kivalliq Wildlife Board has developed a set of recommendations. First and foremost, the Kivalliq Wildlife Board recommends that mining and mineral exploration activity should not be permitted in caribou calving grounds. Elders have always taught us to respect caribou calving and caribou calving grounds. During calving season hunters stay out of the calving grounds and carefully avoid making changes to these areas, such as building cabins or leaving behind tent rings. Traditionally, hunters do not hunt cows and calves during the calving season, and instead focus on hunting bulls. All the Hunters and Trappers Organizations on the mainland of the Kivalliq have recommended banning mining and exploration activity in the calving grounds. This recommendation was based on the advice of elders, who predict that herds will scatter and slowly decline if mining and mineral exploration is permitted in these areas. The Kivalliq Wildlife Board has long held the recommendation that mining and mineral exploration should not be permitted on calving grounds, and have repeatedly passed resolutions affirming and reaffirming this position. This opinion is also shared by the Dene and Metis communities who share herds with Nunavut. The Kivalliq Wildlife Board would also like to see more resources provided to Hunters and Trappers Organizations to help them make pertinent decisions related to caribou and caribou habitat. In the absence of up to date land use plans for the territory, decisions about caribou habitat have been made through the Nunavut Impact Review Board. The Nunavut Impact Review Board's screening process is brief with strict timelines, making it very difficult for Hunters and Trappers Organizations to consider proposals for development and submit comments. Screenings and reviews are also highly technical, and Hunters and Trappers Organizations lack the staff and technical expertise to participate in a meaningful way. In addition, more resources should also be provided to Hunters and Trappers Organizations to teach and encourage traditional rules, values and wisdom about caribou and caribou habitat to younger generations. If these teachings were better respected, there would be less pressure on caribou. Finally, a predator harvest incentive program was recommended to help control the predator population and take some pressure off of the caribou.

The presentation concluded with a discussion on how to address existing mineral claims in important caribou habitat. The Kivalliq Wildlife Board passed two resolutions at their annual general meeting related to this issue. The first resolution was to encourage all parties to explore ways to deal with these existing mineral claims that do not undermine the purpose of the proposed protected areas. The other is requesting that all land management authorities immediately impose a temporary moratorium on the issuance of mineral claims, permits and licences to all areas that the Kivalliq Wildlife Board would like protected under the new land use plan. It was stressed that if regulators keep issuing permits in the interim, the issue will inevitably become more complicated and it will become harder to get these important areas protected.

Kitikmeot

Presenter: Simon Qingnaqtuq, Kitikmeot Regional Wildlife Board

The Kitikmeot Regional Wildlife Board held their regional caribou workshop in Yellowknife on October 16th, 2015. This presentation gave a summary of the most important observations, knowledge and recommendations discussed at the workshop.

The Kitikmeot Regional Wildlife Board focused on four general topics at their regional caribou workshop, including: 1) predators, disease and interspecific interactions; 2) harvest; 3) identification of critical habitat; and 4) Inuit values and views on caribou calving grounds and migration.

Communities from the Kitikmeot are seeing an increase in the number of predators, specifically grizzly bears and wolves, in the caribou range. Inuit are also observing larger packs of wolves than previous years, sometimes in groups of 12-16 animals. It was noted that the muskox population is also increasing in the region, and that caribou and muskox do not inhabit the same areas. This displacement may also be impacting the caribou population. Finally, it was recommended that more funding and resources should be put towards educating young hunters on what they should do if they harvest or observe a caribou that appears to have a disease, such as brucellosis, or parasites.

With respect to harvest, representatives from the Kitikmeot stressed the importance of communicating the principles of Inuit Qaujimajatuqangit. For example, elders emphasize that if an animal is wounded, you should make sure that you kill the wounded animal as long as doing so does not put your life in danger.

During the regional workshop, participants identified specific areas in the region that are important habitat for caribou. For example, King William Island is valued as an important calving ground, the Coppermine River area is recognized as a water crossing and the Boothia Peninsula was identified as an area that should be protected from mining and mineral exploration. The Kitikmeot Inuit Association was identified as a source for additional information on important caribou habitat.

The majority of recommendations for the protection of caribou habitat focused on calving grounds and migration routes. It was noted that the calving grounds and migration routes are the most sensitive and should not be disturbed by mineral exploration and development activities. As well, it is important to not disturb the leaders of the migrating herd. In some areas, calving grounds and migration routes have changed as a result of disturbance. Finally, it was noted that all sources of habitat damage and disturbance should be considered, this includes all-terrain vehicles and noise pollution from low-flying aircraft.

Qikiqtaaluk

Presenter: James Qillaq and Jackie Price, Qikiqtaaluk Wildlife Board

The Qikiqtaaluk Wildlife Board was planning on holding their regional caribou workshop on November 7th, 2015, following the NWMB's "Protecting Caribou and their Habitat" Workshop. The current draft Nunavut Land Use Plan does not identify protected areas or special management areas on Baffin Island for the protection of Baffin Island caribou and their habitat. This is mainly due to a lack of information on Baffin Island caribou movement patterns. Therefore, the Qikiqtaaluk Wildlife Board planned on conducting mapping sessions during their regional caribou workshop to identify important caribou habitat. As well, the Qikiqtaaluk Wildlife Board hoped to discuss a plan and schedule to conduct community visits with community members and Hunters and Trappers Organizations to hear each communities' knowledge, concerns and recommendations on caribou habitat protection.

In addition, Qikiqtaaluk Wildlife Board Chairperson, James Qillaq, shared his own perspective on caribou and caribou habitat protection in the Qikiqtaaluk region. The Qikiqtaaluk region has Baffin Island caribou, Peary caribou in the high arctic and reindeer on the Belcher Islands. In addition, caribou sometimes migrate into the region from Nunavik. Last winter, the Government of Nunavut issued a moratorium on the harvest of Baffin Island caribou which was replaced with a total allowable harvest in spring 2015. The moratorium and limited total allowable harvest has been hard on community members. Prior to the moratorium, the Government of Nunavut – Department of Environment held a Baffin Island Caribou Workshop to discuss management options. During that workshop, many representatives expressed concerns about development in calving grounds and expressed the importance of including Inuit Qaujimajatuqangit in the management system. It was also noted that Hunters and Trappers Organizations were not always informed about Nunavut Impact Review Board screenings and reviews, and that more resources and financial support is needed to help Hunters and Trappers Organizations participate in Nunavut Impact Review Board processes.

Break-out Group Discussions

On day two of the workshop, participants were randomly divided into four break-out groups (Appendix D). Each group had 7-8 participants, including a discussion leader/facilitator. The first break-out group session was 30 minutes while the second was 45 minutes. After discussing the questions within individual groups, the four groups came together to report their results to all workshop participants. The following sections outline the key points raised during the break-out group discussions.

Break-out Session #1

Discussion Question: What are the key values and/or factors of success required for the protection of caribou and the implementation of caribou protection measures in Nunavut?

1. Principles of Inuit Qaujimajatuqangit and Conservation

All groups recognized that to successfully protect caribou and caribou habitat in Nunavut, it is important to make decisions that are guided by the principles of Inuit Qaujimajatuqangit and conservation, as defined in the *Nunavut Land Claims Agreement*. Specifically, the following principles of Inuit Qaujimajatuqangit were mentioned by workshop participants:

Piliriqatigiingniq – people must work together in harmony to achieve a common purpose;

Qanuqtuurnarniq – the ability to be creative and flexible and to improvise with whatever is at hand to achieve a purpose or solve a problem; and

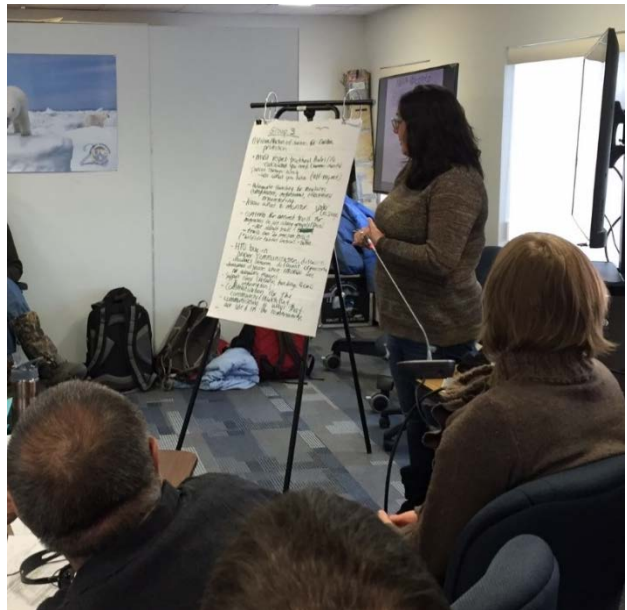
Surattittailimaniq / *Iksinnaittailimaniq* – hunters should hunt only what is necessary for their needs and not waste the wildlife they hunt.

In addition, Section 5.1.5 of the *Nunavut Land Claims Agreement* defines the principles of conservation as: (a) the maintenance of the natural balance of ecological systems within the Nunavut Settlement Area; (b) the protection of wildlife habitat; (c) the maintenance of vital, healthy, wildlife populations capable of sustaining harvesting needs as defined in Article 5; and (d) the restoration and revitalization of depleted populations of wildlife and wildlife habitat. All parties agreed to these principles when signing the *Nunavut Land Claims Agreement* as values for the conservation of wildlife and should help guide management decisions.

2. Integration of both science and Inuit Qaujimajatuqangit

All four break-out groups expressed the value of integrating both western science and Inuit Qaujimajatuqangit in caribou management decisions and identified this as a key factor of success. In particular, there was substantial discussion regarding the current

lack of Inuit Qaujimajatuqangit in caribou distribution mapping exercises. These maps, produced by the Government of Nunavut and under consideration by the Nunavut Planning Commission for designations in the draft Nunavut Land Use Plan, are based on scientific information (mainly collar and survey data) only. It was stressed by many participants that Inuit Qaujimajatuqangit had to be integrated into these maps. Inuit Qaujimajatuqangit is an accumulation of knowledge dating back hundreds of years and passed down through generations. In contrast, many scientific studies look at smaller snapshots of animal distribution. Therefore, Inuit Qaujimajatuqangit can provide information that may not be captured by science alone. For example, workshop participants expressed the importance of protecting caribou water crossings but recognized that many of these are not mapped. However, traditional place names, such as “Nallurjuaq”, “Aggiriaq” and “Nallu’naaq”, which translate to “caribou crossings”, are included on many maps and can offer insight into areas that should be protected. Similarly, when defining the boundaries of protected areas or special management areas, it is important to include both Inuit Qaujimajatuqangit and scientific information on caribou distribution.



Although all groups highlighted the need of incorporating both science and Inuit Qaujimajatuqangit, the question on how to effectively merge the two bodies of knowledge was harder to answer. One of the challenges with incorporating Inuit Qaujimajatuqangit is the lack of documented literature, as Inuit Qaujimajatuqangit typically isn't something that has been recorded; rather, it is a body of living knowledge, experiences, values and beliefs.

A factor of success moving forward is the common understanding between science and Inuit Qaujimajatuqangit, that particular habitat types, such as calving grounds and water crossings, are extremely important. Respect and protection of these areas has been an important value of Inuit for generations and are included as traditional Inuit rules. One group suggested that more focus should be placed on turning Inuit Qaujimajatuqangit and traditional rules into policies or strategies for managing and protecting wildlife and the land.

3. Combination of Different Protection Strategies

It was expressed that, in order to be successful, managers must consider all available strategies for protecting caribou and caribou habitat. When dealing with caribou conservation, it is necessary to consider some level of protection for all critical caribou habitat and for all caribou life history stages (i.e. calving, post-calving, migration routes, water crossings, etc.). It is clear that there isn't a "one size fits all solution" and that co-management partners will have to rely on a combination of strategies, such as combining protected areas and protection measures, to effectively protect these areas. It was recommended that decisions on which strategies to use should be based on caribou vulnerability, both in terms of vulnerable life history stages/times of year and specific herd vulnerability. For example, some groups recommended using protected areas (full closures) to protect core calving grounds and water crossings, while using protection measures as a buffer around these areas. In addition, further research on determining zones of influence or disturbance thresholds could add value to these strategies and inform managers on which strategy would be most appropriate. Concerns were raised about using new strategies that have not been fully tested and expressed the value in following the precautionary principle.

4. Protection of Both Caribou and Caribou Habitat

There was discussion on the importance of protecting both caribou and caribou habitat; to provide successful protection, both factors must be considered. For example, the best strategy/strategies to protect calving caribou are sometimes different than the best strategy/strategies to protect caribou calving grounds. One group stated that a key value is taking responsibility for the land and its stewardship; maintaining and ensuring that the environment is kept clean and its ecological integrity maintained, especially in areas important to caribou.

5. Effective Monitoring

Participants also agreed that regardless of the protection strategy, effective monitoring is necessary for its successful implementation. For example, the success of mobile caribou conservation measures is dependent on monitoring the movements of caribou around a site of activity in order to inform industry when to shut down operations. Similarly, protected areas for calving grounds require monitoring of caribou distribution to ensure that the caribou continue to use the same calving ground over time. In addition to monitoring caribou movements and distribution for the purpose of protecting caribou from human land-use activities, groups also highlighted the value in monitoring other variables such as trends in population size and structure, growth rate, health, habitat use and harvest levels. Furthermore, there was a discussion on climate change and the value in

monitoring environmental variables, such as vegetation, snow accumulation and ice, and how these impact annual caribou migration patterns and population level.

6. Legislation and Regulations

Many of the workshop participants felt that currently there isn't adequate protection of caribou and caribou habitat in Nunavut. For example, there are no regulations prohibiting mineral exploration and development in caribou calving grounds. It was stated that this is inconsistent with Inuit traditional rules and should be remedied. Therefore, strengthening legislation and regulations through various mechanisms in the *Nunavut Land Claims Agreement* was identified as a factor of success. Most participants pointed to a finalized Nunavut Land Use Plan that provides an overall starting point for proper caribou protection as a key factor of success. However, other strategies through the *Nunavut Land Claims Agreement*, such as identification of critical habitat and the establishment of non-quota limitations and special management areas under the *Wildlife Regulations*, could further strengthen that protection.

One group discussed the challenge of addressing land ownership and suggested that treating all lands, both Crown and Inuit Owned Lands, as equal was another key factor of success. It was pointed out that caribou don't care who owns the land; therefore, all lands need the same standards. However, participants recognized that this was a challenging and highly political issue that would require further consultation and agreement between Inuit, government and Industry.

7. Effective Communication

Effective communication between communities, organizations, government and industry was identified as a key factor of success. There is immense value in information that community members can provide to help manage caribou and caribou habitat in Nunavut. For example, hunters and other people who spend significant time on the land know where caribou trails and water crossings are located. However, without proper communication and engagement, this information is not always made available to wildlife and land-use managers for incorporation into regulations. For communication between communities and managers to be effective, more emphasis should be placed on using modes of communication that work at a community level (e.g. radio, telephone and in-person meetings). Similarly, there needs to be more meaningful communication between scientists and community members on research protocols, such as caribou collaring programs, and the reporting of results. Developing this conversation can lead to more community support and development of less intrusive research methods, as well as help with interpretation of the results and incorporation of Inuit Qaujimajatuqangit.

As well, effective communication and cooperation between jurisdictions was identified as a factor of success. Of the eight subpopulations of mainland migratory and tundra

wintering caribou in Nunavut, the annual ranges of five of these subpopulations are shared with other jurisdictions such as Northwest Territories, Saskatchewan and Manitoba. The value in inter-jurisdictional communication is especially relevant for joint-management actions and considering cumulative impacts across jurisdictional boundaries.

8. Education on Traditional Rules

It was agreed that respect for traditional rules, Inuit Qaujimajatuqangit and wildlife are all important values for the protection of caribou and caribou habitat. Two of the four groups highlighted education on traditional rules as a factor of success. Normally, traditional rules and Inuit Qaujimajatuqangit on respect for wildlife and the land are passed down between family members; however, some questioned whether this is happening as often as it had in the past. Participants agreed that it is important to educate younger generations on traditional rules and questioned if this is something that can be engaged at the school level or through other avenues in the community. As well, participants discussed the value in developing training modules or an orientation of Inuit practices for hunting and engaging with the land and animals.

Another group discussed the value in educating industry on traditional rules to increase awareness and respect for important habitat types, such as water crossings. Frustration was expressed that there is no law preventing exploration or drilling in a calving ground, yet from Inuit Qaujimajatuqangit we know that you shouldn't even camp in a calving ground. One participant stated: *"Are there two separate sets of rules for an Inuk and a mining company?"*

9. Adequate Resources

Finally, all groups recognized that more resources are required for the successful protection of caribou and caribou habitat. On-going research, monitoring and enforcement activities all require extensive financial and personnel resources that is not always available. When discussing protection measures that rely heavily on monitoring and enforcement, such as mobile measures, the lack of adequate resources was highlighted as one of the biggest challenges for their successful implementation. As well, the necessity for adequate support, resources, funding and access to information for Hunters and Trappers Organizations were identified as another factor of success required for the protection of caribou. It is challenging for Hunters and Trappers Organizations to effectively participate in land-use issues, such as reviews of Nunavut Impact Review Board screenings and reviews. Therefore, valuable information from the community perspective may be left out of these management decisions. In addition, one group raised concerns about the lack of funding for community-based research and monitoring.

Break-out Session #2

Discussion Question: Building on the factors of success from the first break-out group discussion, what are the advantages and disadvantages of various guidelines, options and practices for managing and protecting caribou and caribou habitat in Nunavut? Are there recommendations to be made?

1. Area Protection

Table 1 highlights the advantages and disadvantages of area protection as suggested by the four break-out groups. Two of the four groups had a more detailed discussion on area protection by comparing (1) area protection through the Nunavut Land Use Plan process with (2) area protection through the establishment of Special Management Areas under the *Conservation Areas Regulations* of the *Nunavut Wildlife Act*. Findings from this more detailed discussion are summarized in Table 2.

Table 1. A comparison of the advantages and disadvantages of using area protection as a strategy for protecting caribou and caribou habitat from the impacts of human land-use activities.

Advantages	Disadvantages
- Consistent with the Principles of Inuit Qaujimajatuqangit and advice from elders	- Calving grounds may shift between years, therefore runs the risk of not protecting the area in certain years
- Provides certainty for industry; they will know in advance if an area can or cannot be developed	- Lost potential for immediate industrial development and the benefits associated with development (e.g., employment, infrastructure, etc.)
- Cost-effective	- Due to the issue of grandfathering rights, may be difficult to implement in some areas
- Offers protection for other wildlife species, especially non-migratory species in the area	- Has caused conflict between co-management partners who have different views on the issue
- Will be guaranteed protection of caribou and important caribou habitat	- Cannot protect all areas, therefore protected area approach alone may not be enough to sustain the population
- Conservative approach – certain that it won't impact caribou abundance and should allow caribou to rebound more quickly after a low point in the natural fluctuation	
- Enforceable by current regulatory bodies	
- Conserve caribou and other wildlife over the long term, which will indirectly maximize harvesting opportunities and increase related economic opportunities such as ecotourism and sport hunting	

Table 2. A comparison of the advantages and disadvantages between area protection implemented through the Nunavut Land Use Plan and the establishment of Special Management Areas through the *Conservation Areas Regulations*.

Nunavut Land Use Plan	Special Management Areas under the <i>Conservation Areas Regulations</i>
Advantages	
- Flexible; can easily be amended if there is a change in caribou distribution or community values.	- Protects sensitive habitat for the long-term
- Protection at a single entry point to the regulatory process	- Cannot be easily overturned
- Clear process for how co-management / planning partners will be involved	
Disadvantages	
- Through the Ministerial exemption process, protection is limited and not guaranteed (e.g., icebreaking in Milne Inlet)	- Have to reach agreement for the establishment and likely have to develop an Inuit Impact and Benefit Agreement
- Any organization can request an amendment to the Nunavut Land Use Plan, therefore may only offer protection for the short-term (i.e., will be an on-going issue)	- Permanent boundaries that may be difficult to change if critical habitat shifts
	- Uncertainty in the process for establishment
	- Existing rights issues likely more complicated in a legislated area versus a land use plan - Long legal process to establish

2. Mobile Caribou Conservation Measures

Table 3. A comparison of the advantages and disadvantages of using mobile caribou conservation measures as a strategy for the management and protection of caribou and caribou habitat from the impacts of human land-use activities.

Advantages	Disadvantages
- Flexible (i.e., follows the caribou)	- Expensive
- Offers protection to caribou during all seasonal ranges	- Difficult to enforce
- Opportunity for enhanced research on testing mitigation measures and developing ways to reduce disturbance on caribou	- To gain certainty in their effectiveness, extensive research requiring increased funding and human resources is needed
- Greater balance between protection and industry; which is especially important for Inuit Owned Lands	- Have not been fully tested, therefore uncertainty in its effectiveness (especially in sensitive habitats)
- Could provide an effective buffer around a year-round protected area	- Uncertainty for industry since they may not know how often or how long operations will need to be suspended
	- Currently, regulators do not have the budget or human resource capacity necessary for the level of monitoring and enforcement required to make this strategy effective/feasible
	- Does not protect habitat (i.e., inappropriately making habitat available for development)
	- Unresolved monitoring issues (e.g., who is responsible, some communities are against collaring, etc.)
	- If proponent is responsible for monitoring, who is responsible for monitoring their compliance?
	- Open a sensitive habitat type to exploration and therefore evokes the grandfathering clause which could lead to mine development

3. Nunavut Impact Review Board Process¹

Table 4. A comparison of the advantages and disadvantages of relying on the Nunavut Impact Review Board process for the management and protection of caribou and caribou habitat from the impacts of human land-use activities.

Advantages	Disadvantages
<ul style="list-style-type: none">- Allows assessment and provision of recommendations on a case-by-case basis (i.e., project specific)	<ul style="list-style-type: none">- Dependent on if Type A or Type B review required is; therefore may allow exploration to occur without screening
	<ul style="list-style-type: none">- Too technical for communities to participate meaningfully
	<ul style="list-style-type: none">- Hard to enforce permit terms and conditions. E.g., Meadowbank Gold Mine term and condition regarding dust suppression is not being followed effectively
	<ul style="list-style-type: none">- Often allows small scale exploration into calving grounds which evokes the “grandfathering clause” (e.g., Tundra Copper Coppermine project in Bluenose-east calving ground)

¹ The majority of the break-out group discussion centered on protected areas and mobile caribou conservation areas. Therefore, the list of pros and cons discussed for the Nunavut Impact Review Board process was limited.

Points of Agreement

At the conclusion of the workshop, NWMB legal counsel presented eleven points of agreement among workshop participants. Following the workshop, the points of agreement were circulated to workshop participants for their review. The following eleven points of agreement incorporate (to the best of our ability) the feedback received:

1. Both Inuit Qaujimajatuqangit and science provide useful information and guidance concerning caribou and caribou habitat protection issues.
2. It is necessary to incorporate both Inuit Qaujimajatuqangit and western science information into maps addressing caribou and caribou habitat protection. Boundaries of protected or conservation areas should be reviewed and revised periodically to reflect changes in caribou distribution or knowledge.
3. Inuit Qaujimajatuqangit and science are essentially in agreement – based upon reliable and persuasive evidence – with respect to caribou and caribou habitat protection issues, particularly regarding the vital importance of:
 - (a) Caribou calving areas;
 - (b) Caribou post-calving areas;
 - (c) Caribou water crossings; and
 - (d) Caribou access corridors.
4. Currently, there appears to be no reasonable legal or policy balance between “*development*” and “*protection*” in core caribou habitat.
5. Establishing protected areas is generally a more effective conservation action for the protection of core caribou habitat and vulnerable caribou populations than simply establishing protection measures; however, constraints on economic development may occur.
6. Particularly considering the presently low caribou population numbers in Nunavut, the high economic, social and cultural value of caribou and caribou habitat to Inuit, and ongoing exploration and development activities throughout the territory, it is urgent that prompt and effective steps be taken by management authorities to ensure the protection of this irreplaceable natural resource.
7. The establishment under Nunavut’s *Wildlife Act* of “*Special Management Areas*” and accompanying regulatory safeguards appears to be an effective and appropriate legal action for the protection of caribou and caribou habitat.
8. A caribou “*Zone of Influence*” is a useful concept to apply in considering overall caribou and caribou habitat protection.
9. Mobile caribou conservation measures – designed to conserve caribou use of seasonal ranges as opposed to conservation of caribou habitat – deserve further

careful examination and consideration – for example, within buffer zones in the vicinity of a protected area or within other seasonal ranges where concerns exist about disturbance to caribou but do not warrant full area protection.

10. Caribou and caribou habitat protected areas and protection measures – once decided upon – must be clearly expressed and conveyed to all those affected.
11. To help ensure effective caribou and caribou habitat protection, adequate funding is required for communications, implementation, monitoring and enforcement.

Key Findings and Recommendations

The workshop provided an opportunity for wildlife scientists, managers and traditional knowledge holders to share information and openly discuss caribou protection, independent of industry. Although many ideas were discussed, the workshop concluded with the recognition that more work was needed to resolve many of the outstanding issues. The nine key values/factors of success generated from the first break-out group discussion, as well as the eleven points of agreement among workshop participants, helped form the basis of the following list of recommendations and next steps for co-management partners and interested stakeholders (Table 5). It is recommended that participants from the workshop meet annually to share new information and continue working on the development of an effective strategy for protecting caribou and caribou habitat.

Table 5. Recommendations based on the identified factors of success for the protection of caribou and caribou habitat in Nunavut.

Value / Factor of Success	Recommendations
1. Following the Principles of Inuit Qaujimajatuqangit and Conservation	<ul style="list-style-type: none"> - In recognition of the Inuit Qaujimajatuqangit principle <i>Piliriqatigiingniq</i>, establish working group(s) that will meet regularly (and at least annually) to address issues related to the protection of caribou and caribou habitat. - Following the principle of <i>Qanuqtuurunnarniq</i>, work on the development of a dynamic management system. For example, a system that requires different levels of protection based on resiliency.
2. Integration of both science and Inuit Qaujimajatuqangit	<ul style="list-style-type: none"> - Work on incorporating Inuit Qaujimajatuqangit / Traditional knowledge into current caribou distribution maps: <ul style="list-style-type: none"> o Conduct a review of caribou distribution and habitat use mapping exercises that have been conducted in Nunavut; o Utilize traditional place names projects, such as the Inuit Heritage Trust Place Names Program, as a source of information regarding the location of caribou water crossings and other habitats; o Hold mapping workshops in each region to update information; o Investigate new methodology for mapping traditional knowledge (e.g., fuzzy logic approach);

	<ul style="list-style-type: none"> ○ Make information accessible by developing an online mapping program that includes both scientific and traditional knowledge spatial data that can be used by researchers, managers, industry and public.
3. Combination of different protection strategies	<ul style="list-style-type: none"> - Mark known caribou water crossings with inuksuit. - Establish working group(s) that will continue working on the development of an effective management system that incorporates various protection strategies for caribou and caribou habitat; specific recommendations to consider include: <ul style="list-style-type: none"> ○ Establish separate working groups based on ecotype or region; ○ Establish protected areas for sensitive habitats including calving grounds and water crossings; ○ Implement mobile caribou conservation measures as a buffer zone around protected areas to account for variability in movement and distribution; ○ Consider seasonal restrictions/area closures and mobile caribou conservation measures in less sensitive habitat types; and ○ Consider a dynamic system that tailors the protection strategy to the herd's resiliency. - Develop a plan and timeline for reviewing the boundaries of protected areas. - Develop clear definitions of each habitat type and methods for delineation including the type and extent of data to be incorporated. - Conduct further research on determining herd and/or site specific zones of influence. - Conduct further research on determining herd specific disturbance thresholds. - Work on developing caribou range plans for each herd with co-management / co-planning partners, including Industry.
4. Protection of both caribou and caribou habitat	<ul style="list-style-type: none"> - Take a landscape approach that considers different scales when developing a caribou and caribou habitat protection strategy. - Work on increasing the amount of protected areas in Nunavut, while also helping Canada meet its national commitment to protect at least 17% of its land and freshwater by 2020, by establishing protected areas for caribou calving grounds.

5. Effective monitoring	<ul style="list-style-type: none"> - Provide education on the benefits of caribou collaring programs to Hunters and Trappers Organizations and community members. - Work on developing less invasive methods for collaring caribou that incorporates the concerns heard from Inuit. - Increase emphasis on community-based monitoring programs including monitoring environmental variables related to climate. - Continue with the caribou monitoring program outlined in the Government of Nunavut's "Working Together for Caribou: Nunavut Caribou Strategy".
6. Legislation and regulations	<ul style="list-style-type: none"> - Recommend that Indigenous and Northern Affairs Canada and the Regional Inuit Associations implement a temporary moratorium on issuing land use permits, claims and leases within caribou calving grounds until a Nunavut Land Use Plan is approved. - Work with the Nunavut Impact Review Board and industry on what constitutes adequate consultation on project proposals. - Work with the Nunavut Impact Review Board to raise awareness about the concerns regarding mineral exploration in caribou calving grounds, issues surrounding "grandfathering rights" and the "triggers" used by the Nunavut Impact Review Board to determine when a screening and/or review is or isn't required. - Consider drafting further submissions to the Nunavut Planning Commission's Nunavut Land Use Plan hearing focusing on the purpose of the plan to "protect... the environmental integrity of the designated area". - Provide submissions to relevant Nunavut Impact Review Board screenings, reviews and hearings, including recommendations on project approval and terms and conditions, focusing on the Nunavut Impact Review Board's primary objective to "protect the ecosystemic integrity of the designated area". - Consider identifying and protecting "critical habitat" for caribou populations listed as threatened or endangered (e.g., Peary caribou). - Review current Special Management Areas and accompanying protections for caribou calving grounds under the <i>Wildlife Act</i>, and consider whether the area boundaries and/or protections require modification.

	<ul style="list-style-type: none"> - Consider whether to approve additional Special Management Areas with accompanying protections under the <i>Wildlife Act</i>. - Conduct a review on how Inuit Owned Lands were selected and the reasons for why parcels containing sensitive caribou habitat were selected so as to ensure that areas selected for the conservation and preservation of caribou are being managed in a manner that the <i>Nunavut Land Claims Agreement</i> intended.
7. Effective communication	<ul style="list-style-type: none"> - Develop a communication plan(s) <ul style="list-style-type: none"> o For sharing information between working groups. o For decision-making and the sharing information between Regional Wildlife Boards, Regional Inuit Associations, Hunters and Trappers Organizations and Regulatory Agencies. o For sharing information and strategies, and decision-making between Nunavut and other jurisdictions with shared caribou herds.
8. Education on traditional rules	<ul style="list-style-type: none"> - Educate industry on traditional Inuit rules, practices and values regarding respect for the land and wildlife. - Develop educational materials on traditional rules for distribution to schools, industry, hunters, etc.
9. Adequate resources	<ul style="list-style-type: none"> - Increase funding for community-based research (e.g., increase annual allocation to NWMB's Nunavut Wildlife Studies Fund). - Encourage the Nunavut Impact Review Board to provide training on project screening and review processes to community Hunters and Trappers Organizations. - Ensure that new policies for the protection of caribou and caribou habitat are accompanied with a detailed budget for effective implementation.

Conclusion

During the two days of the workshop, an immense amount of information was shared and ideas generated. A concluding message that participants repeatedly stated is that “the time to take action is now”. The discussion on how to protect caribou and caribou habitat from human land-use activities has been going on in Nunavut since the 1970s, frustrating some participants by how long it is taking for decision-makers to implement a sound protection strategy. It is clear that Nunavut’s caribou subpopulations are at, or nearing, the low end of their population cycles, thus exhibiting low resilience and increased susceptibility to stress and disturbance. Although, participants recognized that there must be an appropriate balance between development and protection of caribou and sensitive caribou habitat, the current state of caribou warrants undertaking a precautionary approach to ensure the long term sustainability of this important natural resource.

In terms of resolving the significant issues surrounding human land-use activities and the protection of caribou and caribou habitat, the workshop was only able to scratch the surface. It is apparent that more co-management workshops similar to the “*Protecting Caribou and their Habitat Workshop*”, as well as consultations with Inuit and meetings between Nunavut co-management partners and neighbouring jurisdictions are needed before any significant policy changes can be considered. The formation of smaller working groups to tackle each of the major issues highlighted during the workshop was recommended as a potential way forward.

Appendix A: Seasonal Ranges

The Government of Nunavut – Department of Environment has defined nine seasonal ranges of importance to caribou based on collar derived caribou movement rates. During his presentation, Mitch Campbell, Kivalliq Regional Biologist, described the main characteristics of each seasonal range and sensitivities during that time of year. The below information is taken from the Government of Nunavut's presentation "Resource Development and Caribou in Nunavut: Finding a Balance". Throughout the workshop, participants used these definitions for each seasonal range.

Calving (Late May – Early June)

Characteristics:

- Spatially the most concentrated and predictable seasonal range with the lowest daily movement rates.
- Predominantly occupied by breeding and non-breeding females and newborn calves.
- Spatial extents are exclusively within tundra habitats offering limited cover to visual and/or audible disturbance.
- Characterized by low densities of predators and little to no human harvest.
- Commonly areas with few foraging opportunities but adjacent to areas that will offer foraging opportunities.

Sensitivities:

- Vulnerability to all disturbance effects are at their greatest throughout this period.
- Energy demands reach a peak throughout this period while forage opportunities remain low.
- Flight responses to any form of visual and/or sound disturbance is at its greatest during this period.
- Susceptibility to the disruption of the cow/calf bond is at a peak throughout this period.
- The high densities of cows and calves within a small geographic area warn of the high potential for disturbance related spatial and population level impacts during this period.

Post-calving and Early Summer (Late June – Mid-August)

Characteristics:

- A time of year when the energy demands on cows nursing calves are extremely high.
- Calf survival depends on intact cow-calf bonds and continuous milk production.
- Generally occurs within and directly adjacent to calving grounds.

- Primarily cow/calf and yearling groups moving together in search of high quality forage to sustain milk production and build fat reserves.
- More extensive than calving grounds but similarly used in a temporally and spatially predictive manner.
- Biting insect emergence begins and increases through the latter half of this period.
- The most extensive daily movement rates occur during the latter half of this period.

Sensitivities:

- Biting insects can significantly increase energy expenditures impacting forage intake and milk production.
- There are high energetic costs associated with the displacement of caribou from insect avoidance habitat.
- Displacement of cow-calf pairs into marginal habitats will reduce energy intake and in turn milk production.
- Susceptibility to calf abandonment throughout this period.
- Environmental stressors are generally low early in this period allowing for extensive foraging.
- Mechanized transport, aircraft, roads and their effects on increasing disturbance and human harvesting are of the greatest concern within these areas.
- General disruption of foraging behaviour of cow-calf groups will negatively affect cow health and calf survival.

Late Summer (Mid-August – Mid-September)

Characteristics:

- Biting insects steadily decline during this period.
- Forage intake is maximized during this period, while forage quality declines.
- A time of year when environmental stressors are low, allowing caribou to focus on forage intake and the storage of excess energy as fat.
- Geographically extensive though foraging caribou are often selecting for small patches of higher quality forage.
- Uninterrupted foraging during this period is critical to reproductive success and overwinter survival.
- Movement rates are generally low during this period.

Sensitivities:

- High sensitivity to forage disruption with the potential to strongly impact energy uptake and fat production.
- Low movement rates make caribou on their late summer range particularly susceptible to roads and their characteristic of increasing hunting pressure and general disturbance.

- When disturbed forage patches can take considerable time and energy to re-locate.
- Cumulative effects, particularly centered around roads, aerial disturbance, harvesting pressure and predation, are of the greatest concern during this period.

Fall Migration and the Rut (Mid-September – Mid-December)

Characteristics:

- A time of year when breeding occurs.
- All ages and sexes come together.
- Generally occurs in the vicinity of the treeline for MM herds.
- Primarily cow/calf groups migrate from the tundra environment into the forested environment (MM) or into the more southerly extents of their annual range (TW).
- Cow-calf groups join up with mature and young bulls generally in the vicinity of the treeline (MM).
- Though geographically extensive, caribou generally utilize these areas in a predictable manner.

Sensitivities:

- Migration and breeding are energetically demanding primarily to mature bulls.
- Disruption of the breeding process will increase energy demands and impact breeding success.
- Occurs just prior to the winter season when the amount stored energy will directly affect overwinter survival/productivity.
- These ranges are generally extensive.
- Obstruction and/or diversion of pre-rut migrating caribou can substantially disrupt the breeding process.
- Cumulative effects as they apply to the disruption of migrating caribou and the breeding process are of the greatest concern within these seasonal ranges.

Winter (Mid-December – Mid-April)

Characteristics:

- A time of year when energetic stressors are at their greatest.
- Forage quality, quantity, and accessibility can be highly variable from year to year, but is generally low.
- Generally occurs within the treeline for MM herds.
- Movement is generally low though can vary with levels of predation, harvesting and snow conditions.
- Spatial use of winter range is highly dependent on fire history, weather, roads, and harvesting pressure.
- The most geographically extensive range.

Sensitivities:

- Caribou are particularly susceptible to roads and associated harvesting pressure.
- Snow thickness, icing, forest fires and harvesting pressure can heavily impact caribou condition and survival.
- Severe winters can push caribou past stored energy thresholds reducing overall survival and/or productivity.
- Late winter yarding behaviour can concentrate caribou into small areas. Disturbing caribou within these areas can reduce survival.
- Cumulative effects, particularly centered around roads and associated harvesting pressure and disturbance are of the greatest concern.

Spring Migration (Mid-April – Late-May)

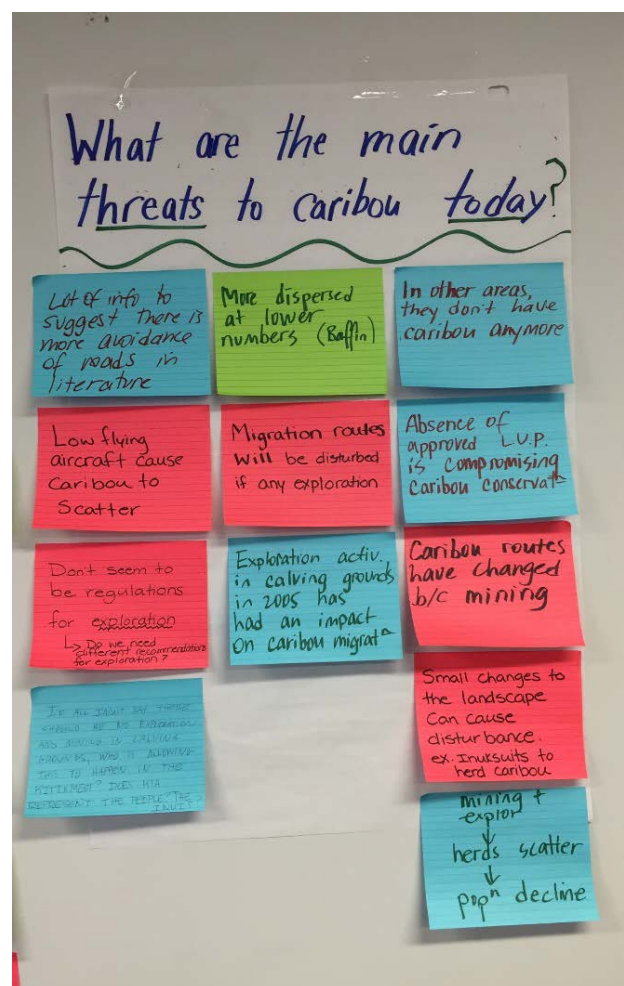
Characteristics:

- Begins following wolf denning and pupping, restricting a packs ability to follow migrating caribou.
- A time of year characterized by declining energy reserves and increasing energetic demands for parturient cows.
- Forage quality and accessibility along migratory corridors is generally very low.
- Primarily cow/calf and yearling groups migrate from winter grounds to calving grounds.
- Migratory corridors are generally linear and used annually in a spatially predictable manner.
- Daily movement rates are high during this period, often covering hundreds of km.

Sensitivities:

- Disruption and/or diversion of migrating caribou can have serious energetic consequences.
- High susceptibility to predation during this period.
- Diversion of spring migrating caribou could delay arrival times onto calving grounds leading to calving outside of these areas and corresponding increases in predation, and reduced calving success.
- Disturbance of migrating caribou can modify spring migratory corridors and calving extents.
- Linear features, obstructions, and/or disturbance during migration can disrupt and/or divert caribou.

Throughout the workshop, participants were invited to share additional information by posting comments, thoughts or questions on large post-it notes around the meeting room. Prior to the workshop, NWMB staff put up general questions or categories related to caribou and caribou habitat to help stimulate participation in this activity. As the workshop progressed, additional categories were added. In addition, the workshop facilitators and NWMB staff captured relevant comments from the presentations and their following question/comment period, and added them to the post-it note categories. Below are images of comments received from this activity.



Challenges

compliance
w protection
measures is
underfunded

CHALLENGE
Existing mineral
claims in areas
that should be
protected

challenge to
demonstrate
cause → effect
(see Cameron et al)

HTOs lack
staff & technical
expertise to
participate in
screenings, etc.

How can we best
integrate results from
collar data with IQ?

How can we bring
both together?

not 'one size'
fits all - need
some flexibility
adaptability

How to access
IQ/TEK

↳ not always
written down
(oral tradition)

Conflict: Inuit
want to protect
but also may want
to develop on
I.O.L.s

correlation
vs.
cause

healthy habitat =
healthy populat^{ns}
BUT
interactions w spp
changing env
changing human land use

-enforcement

Youth not
following trad.
rules about
caribou.

What gives?
Are there 2
Set of rules:
one for Inuit
one for Industry
re calving grounds

How can calving grounds be protected?

GN fully
supports protectⁿ
on calving grounds
(core)
(but econ vs. env
important)

How can we protect
caribou?
A: Exclude development
on calving grounds
complete develop

DPM mobile
do not protect
calving grounds

If you allow
explorⁿ on calving
grounds, you are
saying 'yes' to
development.

What happens
when development
happens on dist^{nt}
calving grounds → see
Griffiths et al.

How do we
accommodate
changes in
calving grounds?

need to define
and decide
on calving vs.
post calving
workshop

Q. Did you find
any scientific
studies of physical
displacement for
mining dev on calv.
grounds

How can key caribou habitat be protected?

Rules re crossings
can inform rules
re calving grounds

water crossings
Imp^t.
→ needs
updating

What habitat
protection is in
place in
special areas?

Is it possible to
use results of
historical surveys
and/or TK to
delineate calving
grounds? or only
use collar data?

Two main ecotypes:
1) Mainland migratory
2) Tundra wintering

→ Can some recommendations
apply to both?

Good fathering:
Need to stop exploration
in calving grounds
If you let exploration:
How can you say
that the company
can't develop??

What actions need to be taken to better manage caribou?

Are there inuksuit marking all areas?

proposals must be risk sensitive

Approved Non-impact land use plan
(with appropriate provision for caribou habitat)

Need to consider what is happening in other areas/jurisdictions.

We have to do something → doing nothing is still a decision

seems like our own organizations are not doing our job → need somebody to blame
→ nobody to monitor

Caribou need shared management → cross boundary

duty to consult
- w.r.t. development on calving grounds
- judicial review

Disconnect between RWOs/HTOs and RIAs
↳ Need a Communications Plan

Triggers for review (via NRB) re permit applicat's not necessarily relevant to caribou (ie. man hrs, fuel storage)

- inadequate notice
- proper disclosure
- adequate time to respond

How are we going to turn these good intentions into something real??

How should caribou be monitored? By who?

monitoring co dvlpmnt is responsibility of company (w/ regulator & comm.)

Lots of inuksuits along migration route & at water crossings. Can we incorporate into monitoring?

measures need to be monitored regularly
- are they effective?

Monitor 3 zones
- 20% buffer
- 20% ewz
surveillance
- outer 2 zones are info.

follow decision tree

monitoring

When antles fall they should be left alone. Lets younger generation know caribou were here.

- popn size
- popn structure
- growth rate
- health
- distrib + hab. use

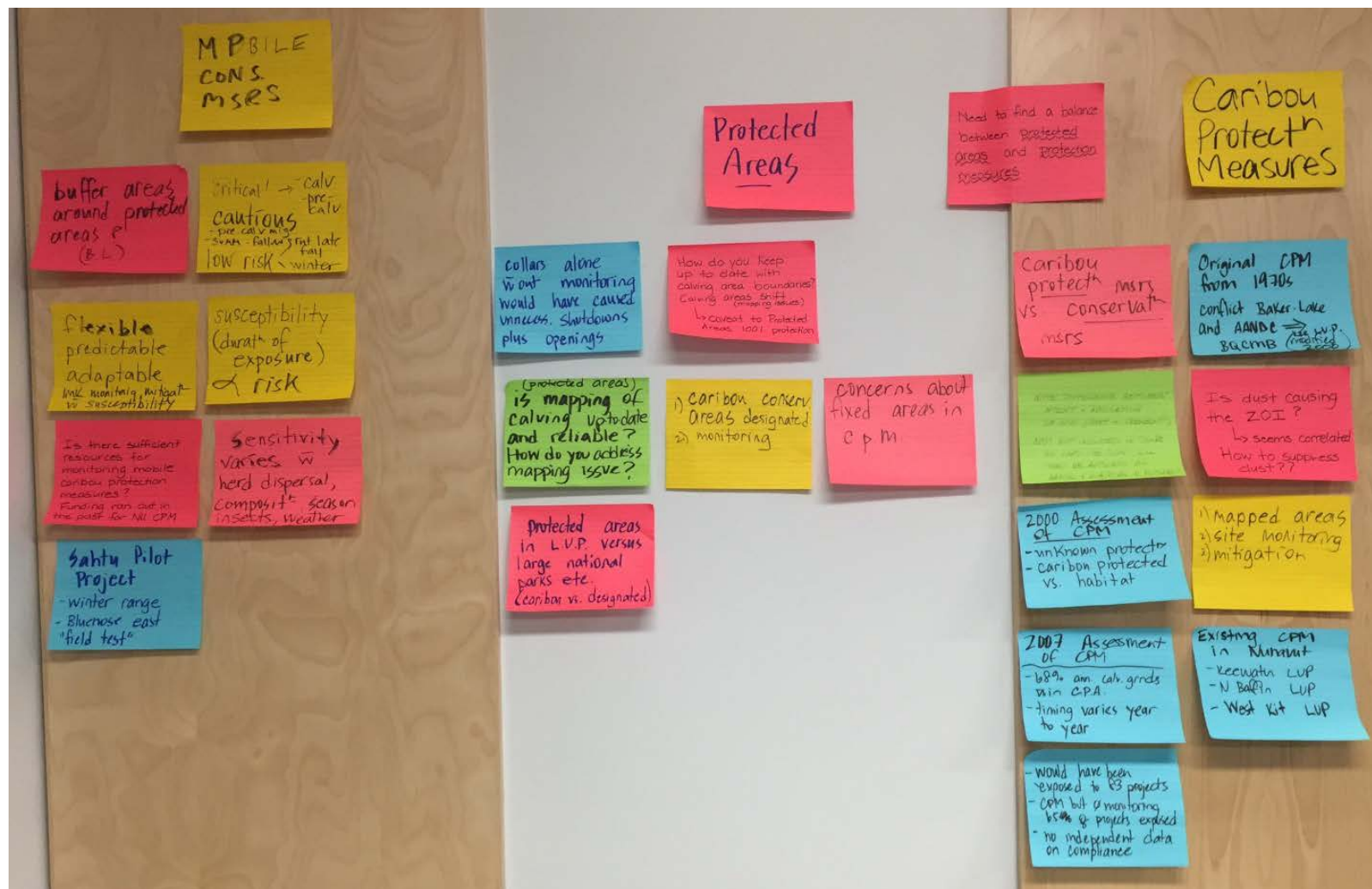
Whose responsibility is it for monitoring of CPM?

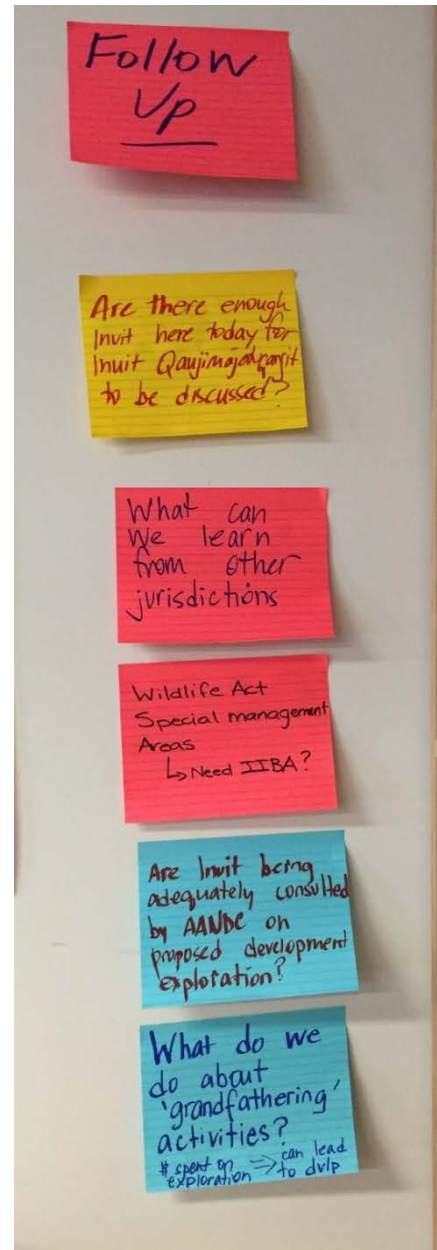
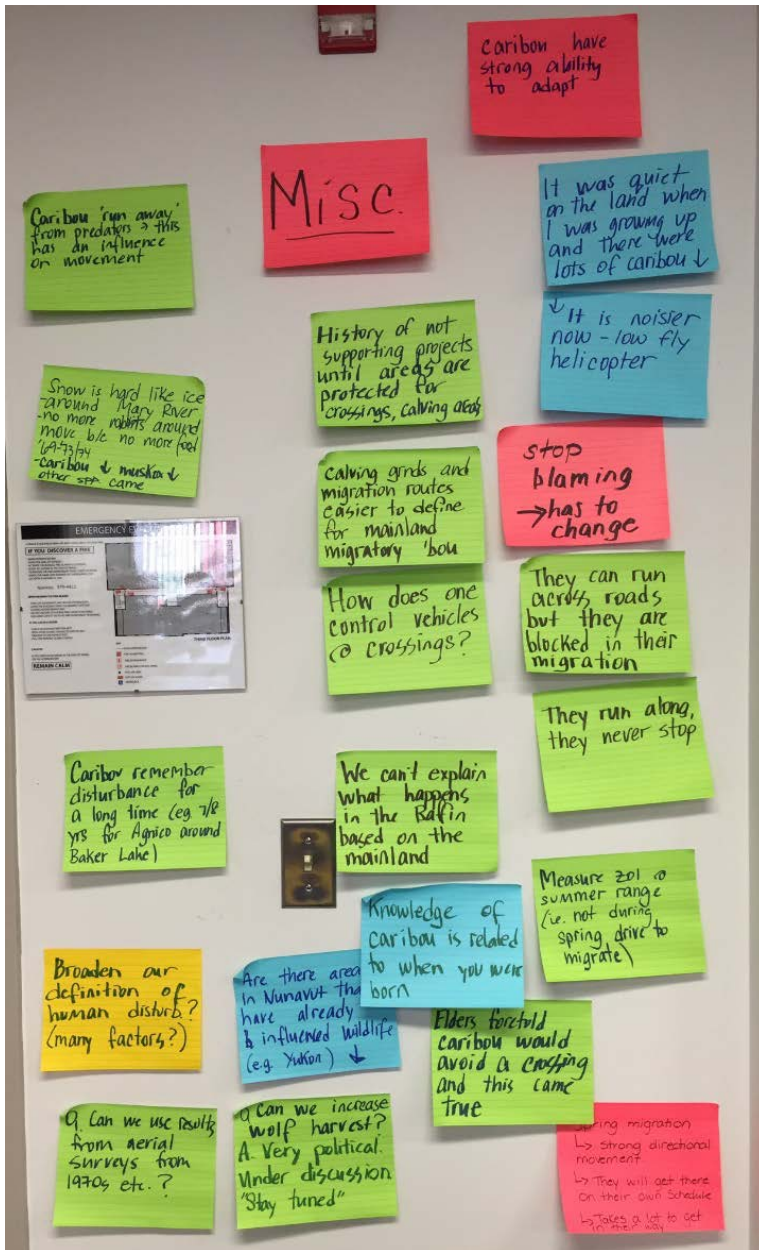
Collars give you current info. Need IQ for trend over 100's years.

AANDC and DIOs checks for permit compliance

Q. How is harvest monitored in the NWT?
A- Land claim harvest studies, monitoring comm. estimates







Appendix C: Workshop Participants

Name	Organization/Community	Title
Ben Kovic	NWMB	Chairperson / Workshop co-facilitator
Karla Letto	NWMB	Wildlife Management Biologist
Peter Kydd	NWMB	Director of Wildlife Management
Sarah Spencer	NWMB	Wildlife Management Biologist
Sheila Oolayou	NWMB	Inuit Qaujimajatuqangit Coordinator
Michael d'Eça	NWMB	Legal Counsel
Natasha Thorpe	Trailmark Systems	Co-facilitator
Kim Poole	Aurora Wildlife Research (NWMB - invited specialist)	Wildlife Research Biologist
Mitch Campbell	GN	Kivalliq Regional Wildlife Biologist
Melanie Wilson	GN	Ecosystems Biologist
Lynda Orman	GN	Manager Wildlife Research
Drikus Gissing	GN	Director of Wildlife
Jennifer Pye	GN	Senior Project Manager: Land Use Planning
Lew Phillips	GN Advisory Committee	Qaujimaniliit
Gabriel Nirlungayuk	GN	Deputy Minister of Environment
Troy Pretzlaw	GN	Regional Biologist – Baffin Island
Brandon Laforest	WWF	Senior Specialist, Arctic Species and Ecosystems
David Lee	NTI	Wildlife Biologist
Paul Irngaut	NTI	Director of Wildlife
Miguel Chenier	NTI	A/Senior Advisor Lands Administration, Planning and Management
James Qillaq	QWB	Chairperson
Jacobie Iqalukjuaq	QWB	Executive Member
Jackie Price	QWB	Coordinator, Research and Planning
Jason Mikki	QWB	Qikiqtaaluk Regional Coordinator
Leslie Wakelyn	BQCMB	Biologist
Karin Clark	GNWT	Wildlife Biologist
Jan Adamczewski	GNWT	Wildlife Biologist
Basil Quinangnaq	KWB - Baker Lake HTO	Qaujimaniliit
Warren Bernauer	KWB - Baker Lake HTO	Consultant
Simon Qingnaqtuq	KRWB	Chairperson
Peter Kapolak	KRWB	Vice-Chairperson
Jared Fraser	NPC	GIS Technician
Rebecca Jeppesen ²	NovaSila Wildlife Consulting	Consultant

² Ms. Jeppesen attended the workshop by teleconference to deliver two presentations during Day 1.

Appendix D: Break-out Group Participants

Group 1

Sarah Spencer
Mitch Campbell
Gabriel Nirlungayuk
Paul Irngaut
Miguel Chenier
Jan Adamczewski
Peter Kapolak
Jared Fraser

Group 2

Peter Kydd
Lynda Orman
Jennifer Pye
Troy Pretzlaw
Jason Mikki
Karin Clark
Warren Bernauer

Group 3

Natasha Thorpe
Melanie Wilson
Brandon Laforest
David Lee
James Qillaq
Jackie Price
Basil Quinangnaq

Group 4

Karla Letto
Michael d'Eça
Kim Poole
Lew Phillips
Jacobie Iqalukjuaq
Leslie Wakelyn
Simon Qingnaqtuq

Appendix E: Workshop Agenda

Protecting Caribou and their Habitat

Workshop Agenda – Day 1

November 4th, 2015

Time	Agenda Item	Presenter(s)	Objective/Goal
8:30 – 8:45	Opening Prayer, Welcoming and Circle of Introductions	TBA, NWMB	
8:45 – 9:00	Review of workshop purpose and ground rules. Approval of agenda.	NWMB, Facilitator	
9:00 – 9:25	Summary of a literature review of scientific and traditional ecological knowledge of the effects of human land-use activities on barren-ground caribou	Natasha Thorpe	Objective 1
9:25 – 9:40	Discussion and questions to the presentation		
9:40 – 10:00	Inuit Qaujimajatuqangit of Caribou Habitat	Basil Quinangnaq and Warren Bernauer	
10:00 – 10:15	Discussion and questions to the presentation		
10:15 – 10:30	Mid-morning Break (provided)		
10:30 – 11:20	Resource Development and Caribou - Finding a Balance An overview of the annual (seasonal range) and cyclic susceptibility of Nunavut's barren-ground caribou to disturbance	Mitch Campbell and David Lee	Objective 1
11:20 – 11:45	Discussion and questions to the presentation		
11:45 – 1:00	Lunch (not provided)		

1:00 – 1:25	Estimating the “zone of influence” of industrial development on migratory barren-ground caribou	Kim Poole	Objective 1
1:25 – 1:40	Discussion and questions to the presentation		
1:40 – 2:05	Mobile caribou protection measures	Kim Poole	Objective 1
2:05 – 2:20	Discussion and questions to the presentation		
2:20 – 2:40	The roles played by federal, territorial and <i>Nunavut Land Claims Agreement</i> agencies in the legal protection of caribou and caribou habitat from human-caused disturbance, and recommendations for the way forward	Michael d'Eça	Objective 2
2:40 – 2:55	Discussion and questions to the presentation		
2:55 – 3:10	Mid-afternoon Break (provided)		
3:10 – 3:30	Overview of the DIAND (AANDC) Nunavut Caribou Protection Measures (development, rationale and effectiveness)	Rebecca Jeppesen	Objective 3
3:30 – 3:45	Discussion and questions to the presentation		
3:45 – 4:15	Review of what other jurisdictions are doing to protect caribou and caribou habitat from human-caused disturbance <ul style="list-style-type: none"> - Results of literature review - Overview from Northwest Territories government representatives 	Rebecca Jeppesen and GNWT	Objective 4
4:15 – 4:35	Discussion and questions to the presentations		
4:35 – 5:00	Summary discussion on presentations and information gaps and review of agenda for Day 2	Facilitator	

Protecting Caribou and their Habitat

Workshop Agenda – Day 2

November 5th, 2015

Time	Agenda Item	Presenter(s)	Objective/Goal
8:30 – 8:35	Overview of Day 2	Facilitator	
8:35 – 8:50	Regional perspective: Kivalliq	KWB and NTI	Integrate findings from regional discussions (RWO AGM workshops) into current discussions around caribou protection.
8:50 – 9:05	Regional perspective: Kitikmeot	KRWB and NTI	
9:05 – 9:20	Regional perspective: Qikiqtaaluk	QWB and NTI	
9:20 – 10:00	Discussion		
10:00 – 10:15	Mid-morning Break (provided)		
10:15 – 10:45	Break-out Group Session 1 Discuss: What are the key values and/or factors of success required for the protection of caribou and the implementation of caribou protection measures in Nunavut?		Objectives 4 and 5
10:45 – 11:30	Report back to plenary		
11:30 – 12:45	Lunch (not provided)		
12:45 – 1:30	Break-out Group Session 2 Question: Building on these factors of success, what are the pros and cons of various guidelines,		Objectives 4 and 5

	options and practices for managing and protecting caribou and caribou habitat in Nunavut? Are there recommendations to be made?		
1:30 – 2:30	Report back to plenary		
2:30 – 2:45	Mid-afternoon Break (provided)		
2:45 – 3:50	Group discussion on recommendations		Objective 5
3:50 – 4:00	Points of agreement and disagreement	Facilitator	
4:00 – 4:25	Next Steps and Closing Remarks	NWMB, Facilitator	
4:25 – 4:30	Closing Prayer	TBA	