

Mr. Michael Neyelle  
Chair  
Sahtú Renewable Resources Board  
PO BOX 134  
TULÍ'A NT X0E 0K0

JAN 29 2015

Dear Mr. Neyelle:

**Responses to Information Requests – Bluenose-East Management Proposal**

The Department of Environment and Natural Resources (ENR), Government of the Northwest Territories (GNWT) received a list of information requests from the Sahtú Renewable Resources Board (SRRB) on January 18, 2016 in regards to the "Government of the Northwest Territories Proposal on Management Actions for Bluenose-East Caribou 2016-2019".

ENR would like to provide the attached response to the SRRB's information request, which includes a number of documents cited in the response.

Sincerely,



Ernie Campbell  
Deputy Minister

**Attachments**

- c. Ms. Deborah Simmons, Executive Director, SRRB
- Ms. Lynda Yonge, Director of Wildlife, ENR, GNWT
- Mr. Jeff Walker, Superintendent, Sahtú Region, ENR, GNWT
- Mr. Fred Mandeville, Superintendent, North Slave Region, ENR, GNWT



**Responses to Bluenose-East Caribou Herd Management Proposal  
Sahtu Renewable Resource Board Information Requests Round 1**

## **1. Aboriginal Consultation**

Please provide copies of the meeting summaries for the five meetings with Aboriginal leaders and technical meetings referred to on page 4, including tracking of ENR responses to Aboriginal inputs.

**Response:** We are attaching copies of the following:

- Minutes of the August 27, 2014 Meeting with Aboriginal Political Leaders & Co-Management Boards;
- Notes from the October 9-10, 2014 1<sup>st</sup> Technical Working Group Meeting;
- Notes from the October 22-23, 2014 2<sup>nd</sup> Technical Working Group Meeting;
- Minutes of the November 7, 2014 Second meeting with Aboriginal Political Leaders and Co-Management Boards;
- Minutes of the November 28, 2014 Meeting with Aboriginal Political Leaders & Co-Management Board
- Revised list of recommendations for Bathurst and Bluenose-East herds.

Meeting summaries for the leaders meetings in August and November 2014 and technical meetings in Oct. 2014 were provided to all participants after these meetings. ENR will provide a summary of responses to Aboriginal inputs under separate cover.

We are also attaching the chronology of consultation which was Schedule “A” to Minister Miltenberger’s letter of February 2015. This Chronology lists ENR’s consultation for the 2014-2015 harvest season up to the date of the letter.

## **2. Herd Definition**

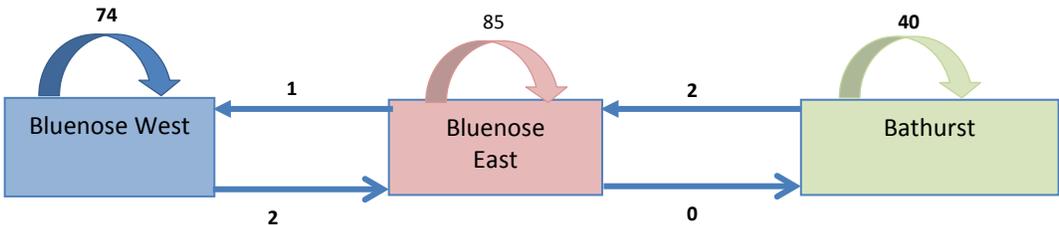
ENR’s management proposal assumes that the BNE and Bluenose West (BNW) caribou that travel through the Sahtú Region are distinct populations and thus separate management units. This is consistent with the distinction made in the *Taking Care of Caribou* plan. The plan’s technical companion report cites Nagy et al (2005), noting “The use of different seasonal ranges throughout each year and especially of different calving grounds led to the designation of these caribou as three herds: the Cape Bathurst, Bluenose-West and Bluenose-East caribou herds.” However, the plan also recognizes that defining caribou herds and exchange or movement between herds are “hot topics” (ACCWM 17 and 26). The technical report recognizes that overlap in areas outside calving grounds is an issue in defining herds by calving grounds. Genetic evidence indicates lack of differences among barren-ground caribou in the Sahtú Region, and some literature recommends managing “metapopulations.” This reflects views often expressed in the Sahtú Region, where a single Dene term is used for all barren-ground caribou. Please provide any available information about risks and benefits of managing BNE and BNW caribou as a single population.

Wildlife management agencies across North America monitor and manage migratory barren-ground caribou on a herd by herd basis. Herds are defined on the basis of the return of cows to distinct calving grounds. In their review of the GNWT barren-ground caribou program in 2009, Fisher et al. (2009) confirmed the use of herds defined by calving grounds as standard and appropriate practice.

A “meta-population” is not simply all the animals in a large area (e.g. all caribou in the NWT); a meta-population is an association of individual populations that are more closely related to each other than to other populations. The metapopulation approach, where multiple related herds are managed as one unit, has not been adopted by any North American wildlife agencies.

Based on the Alberta Research Council Review in 2009, as long as migratory herds continue to display high fidelity to individual calving grounds, herds will be the appropriate unit for management (Fisher et al. 2009). There is some evidence that some of the widely recognized herds have existed for a long time. For example, Russell et al. (1993) wrote of the Porcupine herd “We are relatively certain that the herd has acted as an entity for several thousand years”. Bergerud et al. (2008) wrote in a parallel manner “We believe that the George River herd has traditionally summered northeast of Indian House Lake for the past 7,500-4,000 years. The historic record is not continuous enough to definitively say that these herds have existed for thousands of years, but these observations suggest that herds may exist for long periods, and sound conservation suggests they are thus deserving of management that attempts to maintain them on the landscape.

The figure below shows the frequency of caribou cows moving from one calving ground to another from 2010 to 2015. Each data point represents a pair of consecutive June calving locations for a collared cow. The arrows above the boxes indicate the number of times a caribou returned to each calving ground for successive years. The horizontal arrows indicate movement of caribou to other calving grounds. Overall, fidelity to calving grounds by collared cows has generally been shown to be 96-98% in the NWT, with about 3% of cows switching to neighbouring calving grounds in the Bathurst, Beverly/Ahiak, BNE, Bluenose-West (BNW), and Cape Bathurst (CB) herds (Adamczewski et al. 2009, Davison et al. 2014). Several years of collar data indicate that the BNE and BNW herds show the same high rate of fidelity to their calving grounds that herds to the east and west show. They are thus considered to be distinct herds.



At the present time, 2015 surveys and other monitoring have shown that both the BNW and BNE herds are declining, with the rate of decline in the BNE herd particularly alarming. The estimate of BNE breeding females declined by 50% between 2013 and 2015, which indicates a halving time of 2 years. If this trend continues, the herd estimated at 38,600 in 2015 would number 19,300 in

2017 and 9,650 in 2019. A substantial harvest, particularly with a large cow component, could exacerbate the herd's decline. Population modeling for the Bathurst herd in 2009 suggested that if all trend indicators, including harvest, continued as they were, the Bathurst herd could be extirpated in 5-6 years (Adamczewski et al. 2009). If the BNE and BNW herds (and possibly other herds) are managed as one population, the potential exists that harvest disproportionately applied to one herd could accelerate and increase a decline to a very low herd size or to extirpation. Alternatively, if the BNE and BNW are managed as one population and a conservative approach is taken to conserve the BNE animals, the harvest limitation would be applied to both herds and harvesting could be restricted unnecessarily on the BNW herd.

Over a long time-scale of hundreds of years in Alaska, there is evidence that some herds may disappear and then re-establish when conditions are more favourable (Skoog 1968), and this has also been recognized through Traditional Knowledge. However, allowing a herd to reach very low numbers or disappear and then to wait decades or longer for re-establishment would leave nearby communities without caribou to harvest for an unknown period of time. It could mean the loss of a herd that may have been on the landscape for decades, centuries or longer. It is in everyone's interests to manage each caribou herd in such a way as to allow the best opportunity to recover and to grow to the point at which sustainable harvesting that meets community needs levels is possible, in all NWT communities that depend on caribou.

Each herd has individual demographics and sometimes neighbouring herds have opposite trends: for a number of years the George River herd in Quebec/Labrador was declining while the neighbouring Leaf River herd was increasing. The Porcupine herd, for example, is the exception among four migratory tundra herds in Alaska. It is increasing and was estimated at nearly 200,000 caribou in 2014. The neighbouring Western Arctic, Central Arctic and Teshekpuk herds are all declining, and the closest neighboring herds in the NWT, the Tuktoyaktuk Peninsula and Cape Bathurst herds, were estimated in 2015 as about 1700 and 2300 caribou (Lincoln-Petersen estimates). A harvest of 5000 caribou from the Porcupine herd is likely sustainable, but this scale of harvest from the much smaller TP and CB herds would lead to their extirpation. Reduction of wolves on some NWT caribou ranges is under discussion in 2016 (e.g. Bathurst, BNE) to help stabilize these herds and promote recovery; the same discussion is likely to be unnecessary in the range of the Porcupine herd. Management of each herd should be tailored to that herd's size, trend and conditions, and to the needs of the communities associated with that herd.

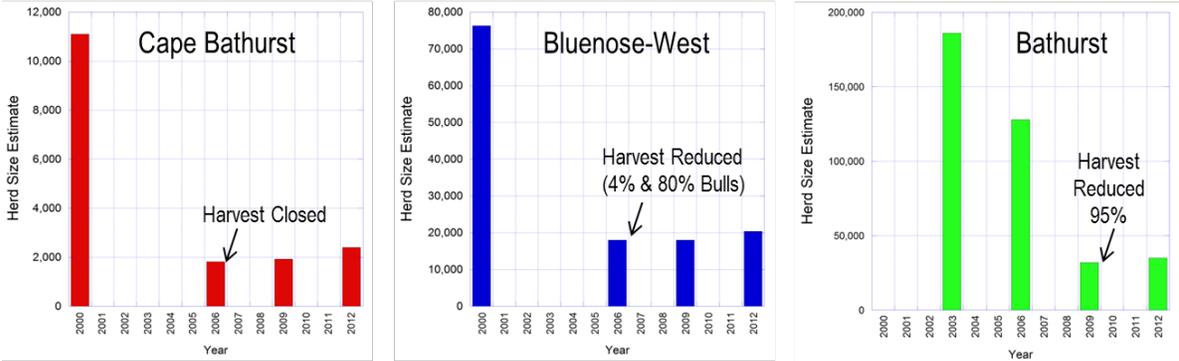
### 3. Harvest Management Impacts

The Sahtú Dene and Métis Comprehensive Land Claim Agreement provides for limitation of aboriginal harvest if there is a conservation concern. Limiting aboriginal subsistence harvest is also envisioned in the *Taking Care of Caribou* plan when the herds are in the orange or red zones. However, harvesting and harvest monitoring are recognized as a "hot topic" in the plan (ACCWM 33).

- a) Please provide recent evidence of the benefits of harvest restrictions in caribou management.

The graphs below show the practical experience that has been gained since 2007-2009 with three caribou herds in the NWT (Cape Bathurst, Bluenose-West and Bathurst) where harvest was either eliminated or reduced substantially in herds that had been declining rapidly. All three herds shifted to a stable trend. It is important to note that in each case, calf recruitment that had been low for the three herds increased substantially at about the same time that harvest was reduced. It is possible that natural adult survival rates also increased when calf recruitment increased, which would also have contributed substantially to a stabilizing trend in these herds. As noted earlier, population modeling for the Bathurst herd in 2009 suggested that if all trend indicators, including a harvest of about 5000/year, had continued as they were, the Bathurst herd could be extirpated in 5-6 years (Adamczewski et al. 2009).

### Cape Bathurst, Bluenose-West & Bathurst Herds 2000-2012



- b) Please provide a projection for how long it would take the BNE herd to recover to the highest count under the harvest numbers currently proposed, assuming for heuristic purposes that all other factors remain relatively constant (e.g., predation, habitat condition).

With current demographic indicators, including low calf recruitment, a low natural cow survival rate, and at least some years with a low pregnancy rate, the BNE herd is likely to be declining without any harvest. In a herd declining naturally, any harvest (including a bull harvest) carries the risk of increasing the rate of decline (Boulanger and Adamczewski 2014), and a conservative approach to harvest is recommended (ENR 2014): a relatively low % of the herd and a high proportion of bulls. In this case, the proposed harvest is 2.5% of the herd and includes a 100% bull harvest recommendation due the very rapid rate of decline in the herd’s breeding cows. The estimate of breeding females declined by 50% between 2013 and 2015 (Boulanger et al. 2016), which indicates a halving time of 2 years. If this trend continues, the herd estimated at 38,600 in 2015 would number 19,300 in 2017 and 9,650 in 2019. Until natural survival and productivity improve, forecasting a recovery would be premature.

Evidence from the George River herd in Quebec/Labrador indicates that an annual rate of increase of 14% is possible when all conditions (low predation, low harvest, high calf productivity, high calf survival and high adult survival) are optimal. This is the highest sustained growth rate documented for a North American migratory caribou herd (Bergerud et al. 2008). If all conditions for the BNE herd were optimal, at a maximal annual growth rate of 14%, the herd estimated at 38,600 in 2015 would grow to 110,000 in 2023 (8 years), or about the herd size estimated in 2010. At a more modest annual growth rate of 5%, the herd would grow to 107,000 in 2036, a period of 21 years. These projections, however, would only apply if the herd's demographic indicators were much better than at present, and with a very low harvest rate.

#### **4. Proposal for Bull-Only Harvest**

ENR recommends a 100% bull harvest (page 5). Cow versus bull harvests is identified as a “hot topic” in the *Taking Care of Caribou* plan (ACCWM 49), and has been much discussed in the Sahtú Region. The “Orange Zone” harvest actions in *Taking Care of Caribou* recommend a majority-bulls harvest. Please provide information about known or anticipated risks and benefits of a bull-only harvest.

The proposed harvest by ENR is 2.5% of the herd and includes a 100% bull harvest recommendation due the very rapid rate of decline in the herd's breeding cows (a 50% decline in just two years). The breeding cows are the single most important segment of the herd in possible recovery. Assuming a bull:cow ratio of 43:100 (last fall sex ratio for the BNE herd in 2015), there are approximately 27,000 cows and 11,600 bulls in the herd. A harvest of 950 bulls would represent 8.2% of the bulls in one year, leaving 91.8% of the bulls. Aboriginal elders have expressed concerns in the past that the harvesting of too many prime bulls in any barren-ground caribou herd is not a healthy practice and that it can ultimately affect the number of females becoming pregnant from strong and healthy males. ENR agrees with the ACCWM plan's recommendation that the prime bulls be spared to do most of the breeding and that the harvest should focus on younger and smaller bulls. If harvest emphasizes small bulls and spares the large bulls, then well over 90% of the prime bulls will remain in the herd. Although one bull can breed many cows, a balanced social structure within the herd is desirable, and depletion of the bull:cow ratio is not desirable. Monitoring of the sex ratio via annual or bi-annual fall surveys will allow the possible effects of a bull-focused harvest to be assessed. Fall classification surveys conducted during the rut of the Bluenose-East caribou herd in 2009, 2013, and 2015 suggest that the sex ratio for that herd has remained stable at around 42 bulls to 100 cows. Bull:cow ratios of about 50:100 are common in caribou (Bergerud et al. 2008). Although the sex ratio at birth in caribou is usually close to 50:50, mortality rates of bulls at all ages are consistently higher (Bergerud et al. 2008).

#### **5. Evidence of Underreporting of Harvesting**

ENR notes that reported BNE harvests were about 2,700 caribou/year in the winters of 2009 to

2013 but that ENR estimates “true” harvest to have been at least 4,000/year.

a) Please provide more information about the basis for the 4,000/year estimate of the “true” harvest rate for BNE.

Wildlife officers and community monitors in the field estimated that the reported harvest of about 2700/year was likely underestimated by 25% to 50%, based on experience in several years in the North Slave region where a combination of check-stations, community monitors, wildlife officer patrols and observations of experienced wildlife staff (e.g. Kugluktuk) have been used to come up with the estimated total harvest levels.

Previously, annual reported harvest of 2500-3500 Bathurst caribou in 2007-2008 and 2008-2009 gathered from check-stations, community monitors and community interviews was seen as under-estimated by up to half (i.e. true harvest was closer to 5000-7000) by wildlife staff in the field, based on the factors including wounding losses, not reporting, under-reporting, etc. as reported by Adamczewski et al.(2009). An evaluation using a population model that used all demographic information about the herd included simulations of a constant harvest of 3000, 5000 and 8000 cows from the declining Bathurst herd; these simulations suggested that a constant harvest of 5000 cows/year from a declining herd was a reasonable fit to the herd’s accelerated decline 2006-2009 (Boulanger et al. 2011). While a population model cannot provide an estimate of harvest, the simulations suggested that harvest of 5000 cows/year was a reasonable fit with all other information about the herd at that time. This provided partial support for the substantial under-estimation of Bathurst harvest up to 2009.

Consistent, complete reporting by all caribou hunters can only happen if harvesters, leaders, communities and boards commit fully to accurate reporting. It is difficult to assess the likely impacts of harvesting on declining caribou herds when the actual size of the harvest is unknown.

ENR notes that the recent Délı̄nę community caribou conservation plan is a strong positive step towards caribou conservation and includes reliable harvest reporting and mechanisms to ensure harvest does not exceed agreed-on limits.

b) Please provide evidence of known situations of under-reporting of BNE harvests in the past three winters.

ENR will provide a response to this question as part of the 2<sup>nd</sup> round of Information Requests.

## 6. Basis for Suggested Allocation

The proposal indicates that an appropriate allocation was determined by ENR for BNE for 2014/2015, based in part on document harvest “but also on several other criteria including access to other caribou” (page 4).

a) With respect to the 2014/2015, please provide more detail about the grounds used by ENR to determine the allocation for the harvest in 2014/15 and specifically the other criteria used by ENR to arrive at allocation numbers.

Prior to determining an allocation for the BNE herd in early Feb. 2015, ENR, on a request from the ACCWM convened a conference call on BNE allocation to which all user groups and co-management boards were invited, on Feb. 2, 2015. Unfortunately some groups were not available and the parties on the conference call were unable to come to agreement at that time. Participants on the call indicated that it would not be appropriate for them to make a decision on allocation without all the necessary parties present.

ENR made an interim allocation on the basis of criteria described in a letter from ENR to all parties on Feb. 6, 2015. As set out in the letter, the Minister considered the following:

- The principles set out in the draft Management Plan, Taking Care of Caribou: The Cape Bathurst, Bluenose-West, and Bluenose-East Barren Ground Caribou Herds Management Plan.
- The desire to make a decision which reflects the long-term commitment to co-operative wildlife management recognizes the need for communities to be involved in management, the need to strike a balance so that the needs of all users with rights to harvest are met, and the need to think about the future of the caribou and manage actions accordingly.
- Past harvesting patterns based on reported harvests from the Bluenose-East herd on both a regional and community level for the 2011-2014 harvesting seasons;
- In considering prior year harvests, a recognition that there are some user groups who did not harvest and who have asserted rights to harvest caribou and had to be taken into account in the allocation;
- The draft BNE allocation discussed by the ACCWM in late 2010-2011 but recognizing and accepting its limitations as a draft document which did not proceed further and which did not include all users who have to be considered at the present time; the draft allocation was compared against three years of past harvesting patterns to come to an average. These calculations are shown in the chart below.
- The management actions set out in the Taking Care of Caribou: The Cape Bathurst, Bluenose-West, and Bluenose-East Barren Ground Caribou Herds Management Plan when the herd is in the orange zone;
- The Taking Care of Caribou: The Cape Bathurst, Bluenose-West, and Bluenose-East Barren Ground Caribou Herds Management Plan notes that the BNE herd usually migrates through settlement areas/regions in the NWT and that the herd is typically harvested by nine communities: Wrigley, Norman Wells, Tulita, Délı̄nę, Whati, Gameti, Behchokö, Paulatuk and Kugluktuk.
- The comments and recommendations contained in the community consultation report on the Taking Care of Caribou: The Cape Bathurst, Bluenose-West, and Bluenose-East Barren Ground Caribou Herds Management Plan;
- That the reported harvest as of February 2n, 2015 was 593 Bluenose-East caribou and 308 of those animals are cows;
- Consideration of traditional harvesting patterns and practices;
- The migration patterns of the BNE herd and their typical availability within traditional harvesting areas of each Aboriginal organization;
- The proximity and access to the BNE caribou herd in 2014-2015 in relation to the

- location of communities and the distance to be traveled in order to harvest;
- The provisions of settled land claim agreements, along with obligations to groups who have asserted rights and the obligations created by the findings of courts as set out in the case law;
- The availability of other barren ground caribou herds including the Beverly Ahiak barren ground caribou herds, which have no limits on Aboriginal harvesting for the 2014-2015 harvesting season and the availability of Bluenose-West caribou herd or some users;
- The availability of other populations of wildlife that can be readily accessed to meet the need for subsistence food;
- The populations of each user group based on statistics maintained by government and in some cases provided by user groups, including the report from the NWT Bureau of Statistics entitled Community Population by Ethnicity, 2001-2014;
- Statistical information on the number of Aboriginal persons who Hunt & Fished During 2008 on a Community Basis as published by the NWT Bureau of Statistics;
- Personal consumption needs for people who have harvesting rights in these areas.
- During the October 2014 Technical Meeting and the November 2014 Leaders Meetings on caribou, there were a few concrete suggestions put forward:
  - Mr. Bailey on behalf of the NWT Métis Nation indicated that they could hunt from the herds in the south and that it was important that the Tłjcho, YK Dene and the Métis north of the lake could hunt this winter.
- It was noted that one community had muskox which could be shared.
- At the Technical Working Meeting in October, there was an indication that the Sahtú were willing to limit their harvesting in the Hottah Lake area to reduce pressure on BNE and Bathurst.
- The ability of ENR to assist with and facilitate community hunts;
- The impact of earlier harvest restrictions on the Bathurst herd and other wildlife populations on Aboriginal harvesters;
- The input received during the course of our in-person meetings on November 7th, 2014, November 28th, 2014, the information received from our in-person meetings with users in December 2014 and January 2015, the information and input received through the written exchange of correspondence and the input received during a conference call on February 2nd, 2015 between Deputy Minister Campbell and affected Aboriginal organizations and co-management boards.

The precedent for this approach was the method used by the GRRB, WMAC-NWT and SRRB in 2006 to determine a sharing formula for the Bluenose-West harvest when a Total Allowable Harvest was being considered for that herd. Past harvest was the main criterion used. A similar approach was also taken for the sharing formula in the Porcupine Caribou Harvest Management Plan in 2010, also relying primarily on estimates of harvest from that herd from user groups.

b) ENR proposes an allocation formula for the next three years (page 5) “based primarily on recent harvest information.” Please advise what other factors specifically, if any, were used to determine the proposed allocation level.

As detailed in ENR's letter on BNE allocation on Feb. 6, 2015, recent harvest information was the primary basis for the allocation determined by ENR. Other factors considered were listed in the ENR letter of Feb. 6 and reiterated above. These same factors were considered in proposing an allocation in the management proposal. ENR has proposed that this allocation be used until an allocation formula accepted by all traditional users is available. To that end, a meeting of all users, including parties from Nunavut, was held January 20, 2016 in Yellowknife. The results may form the basis of future allocations for this herd.

**Bluenose-East Caribou Interim NWT Harvest Allocation for Winter 2014-2015:**

**Numbers from ACCWM proposed allocation 2011 for Bluenose-East herd**

**(based on winter 2009-2010 harvest data & related information)**

**& ENR Bluenose-East harvest data (recorded via community monitors, check-stations and wildlife patrols, based on winters 2010-2011, 2011-2012, 2012-2013, 2013-2014)**

	<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>
<b>Aboriginal Group</b>	<b>ACCWM 2011 Draft Proposed Allocation as %</b>	<b>Four winters (2010-2014) Harvest as %</b>	<b>Average of A &amp; B</b>	<b>Proposed Interim Allocation as %</b>	<b>Proposed Interim Allocation as share of 1800</b>
Tlicho	61	76.2	68.6	61.1	1100
Sahtu	31	18.4	24.7	26.7	480
Dehcho	3	0.9	1.9	2.5	45
Inuvialuit	2	0*	1.0	1.4	25
NWTMN	2	1.0	1.6	2.2	40
Akaitcho (YKDFN)	1	3.5	2.2	3.3	60
NSMA	0*	0*	0*	2.8	50
<b>Total</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>100</b>	<b>1800</b>

\*No harvest recorded

**Approach Used:**

- ACCWM Draft Proposed Bluenose-East Allocation from 2011 and 4 last winters of harvest data (2010-2014) given equal weight (used average of % values).
- Percentages translated to share of 1800 harvest limit recommended by ACCWM in Jan. 2015.
- Assume harvest reported for Hay River, Ft Smith and Ft Resolution is NWTMN.

**ENR Bluenose-East harvest data in NWT (recorded via community monitors, check-stations and wildlife patrols), based on winters 2010-2011, 2011-2012, 2012-2013, 2013-2014**

Aboriginal Group	2010-2011		2011-2012		2012-2013		2013-2014		Ave Last 3 winters as %	Ave Last 4 winters as %
	Caribou taken	% of total								
Tlicho	1103	86.8	1150	71.1	1406	75.7	1450	71.3	72.7	76.2
Sahtu	123	9.7	300	18.6	365	19.7	517	25.5	21.3	18.4
Dehcho	0*	0*	34	2.1	7	0.4	25	1.2	1.2	0.9
Inuvialuit	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*
NWTMN**	0*	0*	0*	0*	53	2.8	24	1.2	1.2	1.0
Akaiicho (YKDFN)	44	3.5	132	8.2	26	1.4	17	0.8	3.5	3.5
NSMA	0*	0*	0*	0*	0*	0*	0*	0*	0*	0*
<b>Total</b>	<b>1270</b>	<b>100</b>	<b>1616</b>	<b>100</b>	<b>1857</b>	<b>100</b>	<b>2033</b>	<b>100</b>	<b>100</b>	<b>100</b>

\* No harvest recorded

\*\*Assume harvest reported for Hay River, Ft Smith and Ft Resolution is NWTMN.

## 7. Habitat Changes and Other Environmental Factors

Traditional harvesters are reporting significant changes to caribou habitat. This may be leading to a decline in the total amount of habitat available for BNE caribou overall. In its proposal, ENR mentions environmental factors known to affect the condition of the caribou and indicates that adverse environmental conditions likely contributed to the BNE's recent decline. The technical companion to the *Taking Care of Caribou* plan notes that relatively little research has been done on the habitat of the Bluenose caribou herds.

a) Please provide information about habitat protection initiatives that ENR is considering to address these factors.

The preamble above references both environmental trends (such as weather patterns and possibly global warming), some of which appear to be adverse for caribou, and concerns over caribou habitat protection, which would be focused more on the impacts of mines, roads and cumulative effects. Possible adverse environmental trends can be monitored and ENR is working to improve understanding of these trends for all NWT herds. These initiatives are described more fully in the answer to 7(f). Weather-related trends, like a high drought index, are not subject to management in the short-term, particularly if they reflect global warming that can only be addressed at a planet-wide scale. Generally speaking, industrial development on the range of the BNE herd has to date been limited; however ENR is engaged in all environmental assessment processes and related programs that may affect this herd's range. Examples include:

- Guidelines for industry: GNWT is the process of developing guidelines to support industrial operators in preparing Wildlife Management and Monitoring Plans required under Section 95 of the Wildlife Act for proposed development projects that may result in significant disturbance or harm to big game or other prescribed wildlife or cause substantial damage to wildlife habitat. Adherence to the guidelines will help industrial operators minimize the impacts of their development on wildlife and wildlife habitat throughout the NWT, including the range of the Bluenose East herd.
- Participation in regulatory processes: GNWT actively reviews and provides comments to support protection of caribou and caribou habitat on authorization applications submitted through the land and water boards in the NWT and the Nunavut Impact Review Board. As a recent example, GNWT was engaged in the Nunavut Impact Review Board (NIRB) review of an application for mineral exploration in the calving range of the Bluenose East herd by Tundra Copper (GNWT comments can be found on the NIRB registry - <http://www.nirb.ca/>).
- Engagement in the Nunavut Land Use Planning Commission (NLUPC) process: GNWT has provided submissions in support of protection of key caribou habitats, including calving

and post-calving range, into the NLUPC process. GNWT staff biologists have participated in caribou protection technical sessions as part of the process Draft Nunavut Land Use Plan Technical Session in Iqaluit June 23-26, 2015, the supporting Protecting Caribou and their Habitat workshop hosted by the Nunavut Wildlife Management Board in November 2015, and will be participating in the upcoming caribou technical session in March in Iqaluit.

b) Traditional harvesters have been providing oral evidence to the Board of uncontrolled forest fires of a geographic scope and intensity not previously encountered according to traditional knowledge, and has raised concerns about the impacts of these fires on caribou habitat. Please advise on studies of, and plans for, fire control in caribou habitat areas in the BNE range area.

In general, the largest fires in 2014 occurred in the southern NWT and fires in the main BNE winter range were limited. The occurrence of large fire years remains a concern for ENR. Fire modeling in Alaska has suggested that a greater frequency of large fire years may, over time, have adverse effects on caribou winter ranges.

There are no studies that have looked specifically on the effect of fire on caribou on the BNE caribou range, however there has been work done more generally on the impact of fire on barren ground caribou and caribou habitat and the results can provide valuable insights for the BNE herd. The best source of information pertaining to forest fires on the wintering range of barren-ground caribou comes from Don Thomas from research conducted in the 1980s on the caribou range east of Fort Smith. The reports are listed below. Thomas concluded in the end that, although there had been large fires on the Beverly herd's range, the herd was not limited at that time by the availability of healthy lichen-rich caribou range.

Don C. Thomas, Prairie and Northern Region. 1998. Canadian Wildlife Service. Environmental Conservation Branch.

- Fire-caribou relationship: (I) Physical characteristics of the Beverly herd, 1980-87.
- Fire-caribou relationship: (II) Fecundity and physical condition of the Beverly herd, 1980-87.
- Fire-caribou relationship: (III) Movement patterns of the Beverly herd in relation to burns and snow, 1980-87.
- Fire-caribou relationship: (IV) Recovery of habitat after fires on the winter range of the Beverly herd, 1980-87.
- Fire-caribou relationship: (V) Winter diet of the Beverly herd in northern Canada, 1980-87.
- Fire-caribou relationship: (VI) Fire history of the winter range of the Beverly herd, 1980-87.
- Fire-caribou relationship: (VII) Fire management on the winter range of the Beverly herd: Final conclusions and recommendations, 1980-87.

More recently, Tara Barrier, a graduate student with the University of Northern British Columbia, looked at the factors influencing the distribution of Bathurst barren-ground caribou during the winter, 2011. Barrier looked at the use of burned and unburned areas by barren

ground caribou and concluded at the time that in spite of large scale fires over time throughout the range, the Bathurst herd overall had a healthy winter range with adequate supplies of lichen-rich areas.

Another graduate student of UNBC, Petter Jacobsen interviewed Whati elders in 2009 and 2010 to document Tli Cho Traditional Knowledge on climate change and forest fires and their implications for barren-ground caribou hunting.

A large-scale study was initiated in 2015 and led by Jennifer Baltzer at Wilfrid Laurier University to assess the effects of the 2014 fires and to monitor vegetation recovery.

In the past two years, the north has experienced unusually and exceptionally high fire weather indices which resulted in forest fires getting out of control quickly after initial ignition and continuing to burn throughout the summer. It is unclear if climate change is already affecting the severity and frequency of forest fires but the cost of the level of fire suppression in the past two years is not sustainable. ENR will continue to listen to community elders and leaders to explore options to protect some key caribou habitat corridors but the reality is that potential for fire control is limited in big fire years like 2014. Forest fires are necessary to bring older and less productive forest types to a younger successional stage to maintain a mosaic of different forest growth required to insure a healthy balance of habitat types for all northern wildlife. Finally, we need to remind ourselves that GNWT's primary objective in fighting wildlife fires is the protection of life and property.

- c) Please provide details regarding the workshop in Nunavut in November 2015, in which ENR participated, focused on protection of caribou habitat, including any workshop outcomes and suggestions for alternatives for habitat protection.

The Nunavut Wildlife Management Board (NWMB) hosted a workshop in Iqaluit in November 2015 which focused on discussions of human caused disturbance to caribou and caribou habitat and how to manage those disturbances. All presentations made at the workshop are posted on the NWMB website. The NWMB produced a summary of workshop points of agreement (Appendix 1; details can be found on the NWMB web-site at <http://www.nwmb.com/en/>).

- d) Please provide information about relevant plans for climate change responses that ENR and the GNWT are considering as part of a caribou habitat protection plans.

At present, the focus with respect to climate change and caribou is to develop a better understanding of how climate change and related changes in habitat quality and quantity may be affecting caribou. This understanding is critical to being able to account for it in decision making around other, manageable factors affecting caribou (harvest, fire etc.). Weather-related effects like an increasing drought index are not readily subject to active management in the short-term. Improved understanding is being developed through modeling work being conducted primarily on the Bathurst herd to understand how cumulative effects, weather and

other factors may interact and affect the herd's likely future trend.

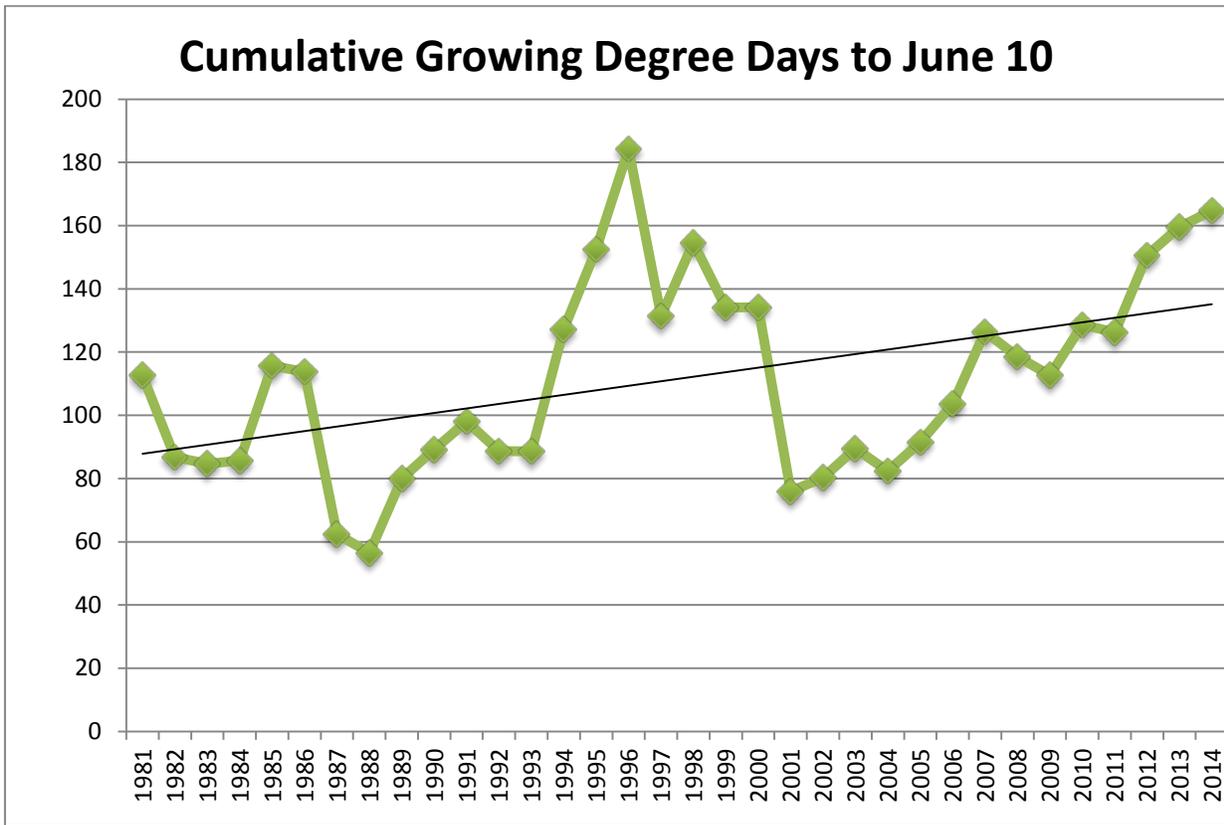
e) Please provide an overview of current research initiatives on changes in available BNE habitat and modelling of sustainable populations for the available habitat.

GNWT has partnered with Don Russell in a CIMP (Cumulative Impact Monitoring Program) proposal to further develop the CircumArctic Rangifer Monitoring and Assessment (CARMA) Caribou Cumulative Effects Integrative Model to address the impact of changes in wintering habitat due to fire and to make the model more accessible to a variety of resources managers. We will also be submitting a proposal to the World Wildlife Fund to support this work with the objective of initializing the model for all herds in the NWT. This model would allow the examination of cumulative impacts related to changing climate, fire regimes, insect harassment, snow depths, harvest and industrial development on the Bluenose East caribou herd.

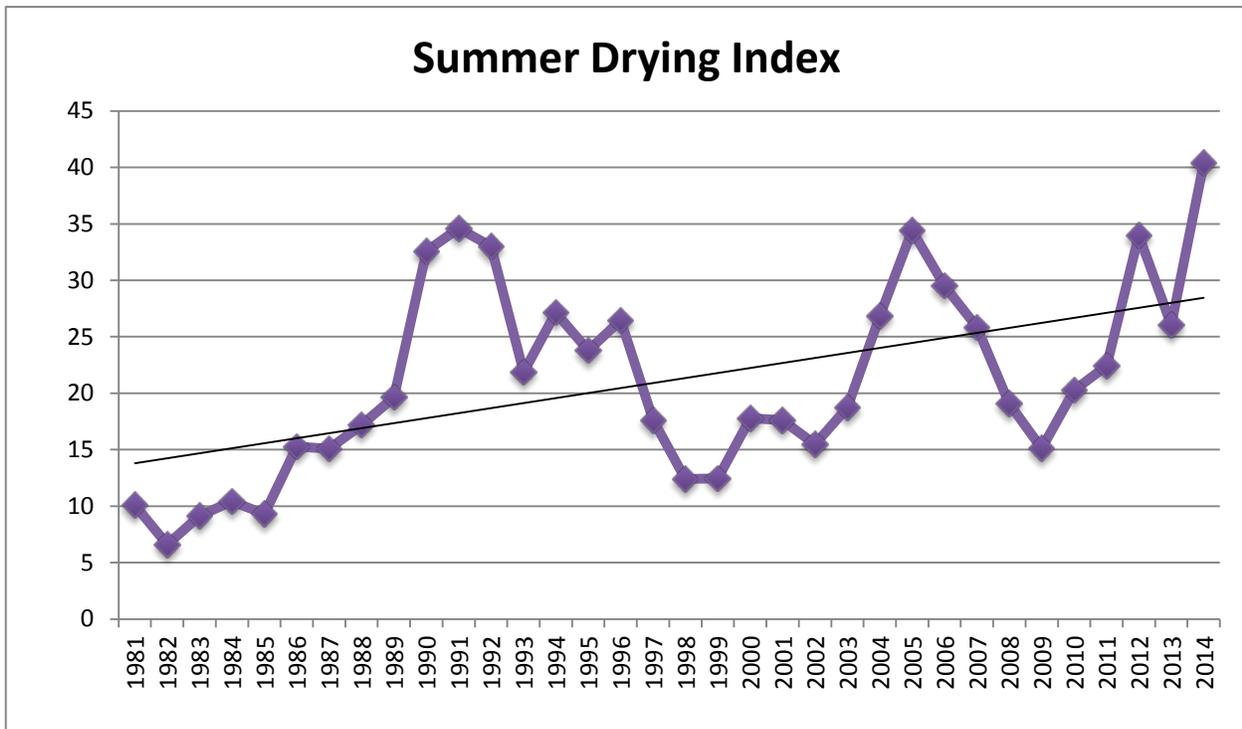
f) Please provide information, including any preliminary information, from D. Russell's review of environmental trend data linked to trends in caribou herd declines (referred to on page 10-11).

While the climate/environmental trends analysis has not yet been completed by Don Russell, he has provided some data available for the range of the Bluenose East caribou herd based on a dataset compiled by the CARMA network. CARMA has developed an approach to summarizing climate/environmental trends on the ranges of barren-ground caribou using NASA's Modern Era Retrospective Analysis for Research and Applications (MERRA) dataset (<http://gmao.gsfc.nasa.gov/research/merra/>). The MERRA dataset is grid based, has reasonable coverage north of 60° and encompasses the time period 1979 – present. CARMA utilizes thirty-six of the MERRA climate variables and uses them to derive 25 indices relevant to caribou (derivations can be found in Russell et al 2013). We present a small subset of these indices below which are indicative of changes on the range of the Bluenose East caribou herd (Figure 1–4). These figures show collectively an increase in spring temperatures, increase in summer drought, increase in oestrid fly abundance and decrease in mushroom availability on the Bluenose East caribou range. Effects of changing weather on the herd are likely to be complex and may be both positive and negative. An earlier spring may mean greater availability of green growth for cows in early lactation, while drought conditions in July may mean poor summer feeding conditions and a high warble fly index may mean substantial interference with summer feeding of caribou.

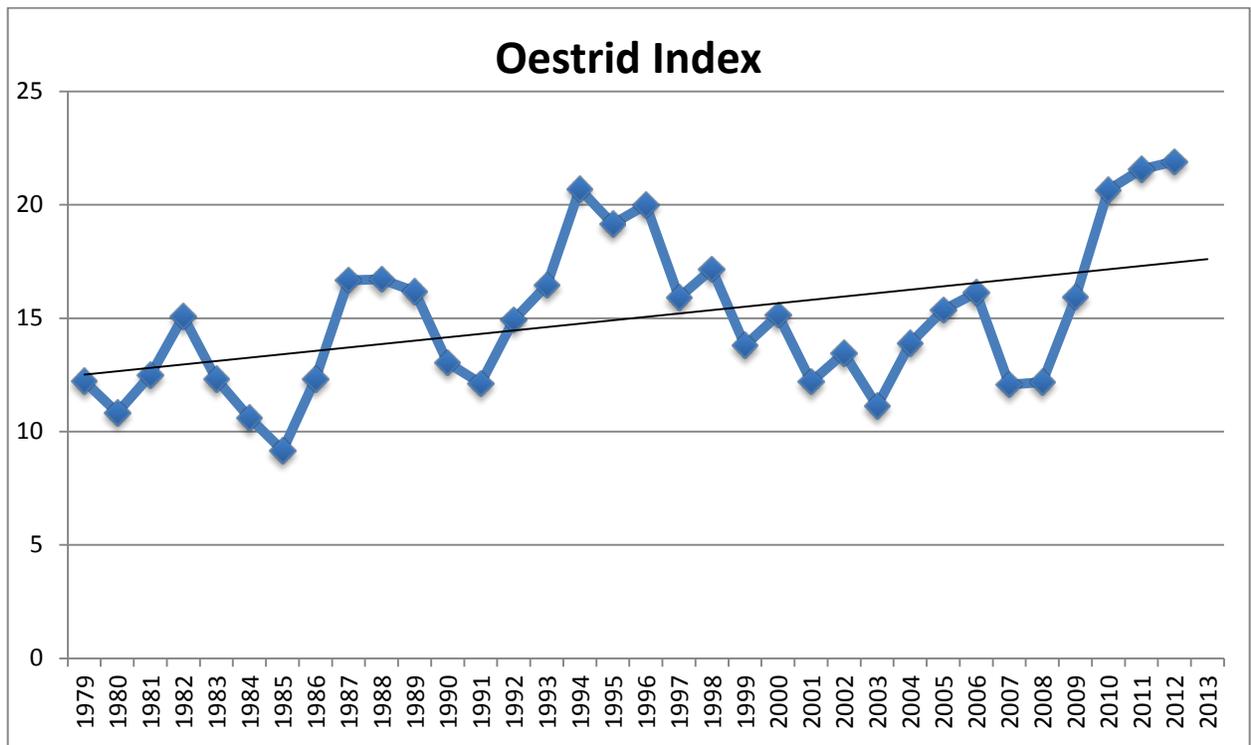
In addition, a recent paper by Chen et al. (2014) found a correlation between spring calf:cow ratios in the Bathurst herd and a composite index of summer range productivity, with a time lag, with the suggested mechanism being poor summer feeding conditions leading to poor cow condition and low pregnancy rates the following winter and reduced calf ratios the following year.



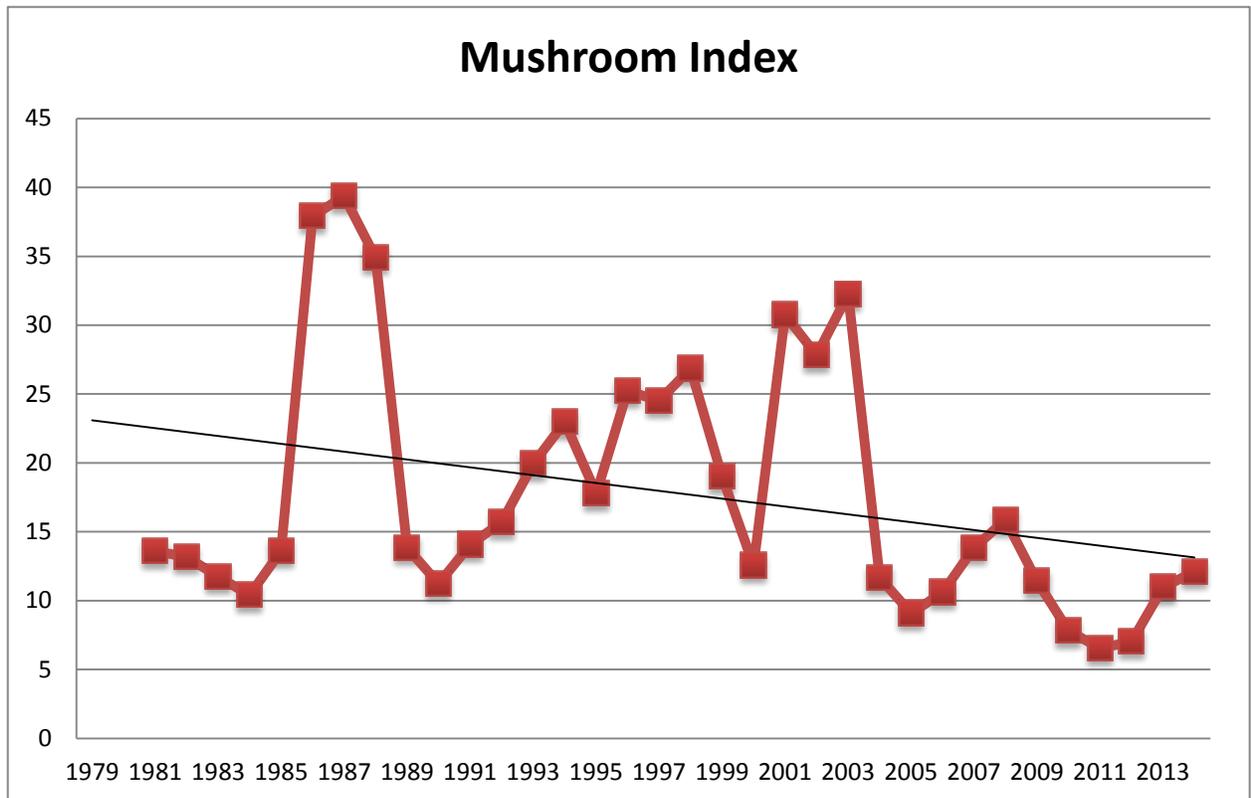
**Figure 1 – Growing Degree Days three year running average. Growing degree days is a temperature sum that indicates the amount of degrees above zero (or heat accumulated) that is available for plant growth.**



**Figure 2 – Summer drying index three year running average. Summer drying index is derived from temperature and precipitation and is indicative of range condition – drying being less advantageous for plant growth.**



**Figure 3 – Oestrid index three year running average. Oestrid index is derived from temperature and wind speed, and is a measure of the abundance of warbles and indicative of insect harassment of caribou.**



**Figure 4 – Mushroom index three year running average. Mushroom index is derived from previous and current year precipitation and is a measure of mushrooms available for forage in the fall. Mushrooms are an important**

## source of protein for caribou.

g) Please provide additional information about how ENR specifically proposes to support increased research into “underlying changes in herd abundance” (page 11).

ENR’s approach to supporting research into underlying changes in herd abundance relies first upon providing robust monitoring of population trends for barren-ground caribou herds, which is at the core of ENR programming. ENR also supports programs that monitor factors that may affect caribou populations, such as harvest and condition monitoring. To stimulate additional research into underlying changes in herd abundance, ENR relies on partnerships and collaboration (e.g. the recent study by Chen et al. 2014 and the request to Don Russell to summarize environmental trends 1979-2014 for all NWT caribou herds). ENR’s Cumulative Impact Monitoring Program has a Caribou Blueprint which provides funding for priority information gaps with respect to caribou. Through the regional wildlife monitoring workshops, such as the Cumulative Effects Monitoring Program for Wildlife in the Slave Geological Province, Wildlife Division is working with industry to develop standardized monitoring protocols for monitoring impacts such as zone of influence or caribou behaviour that can provide model inputs into cumulative effects modeling and assessment first on the Bathurst herd, but eventually to other herds. Two graduate students, one at UBC and one at McGill University are in the early stages of PhD study programs with a focus on NWT barren-ground caribou ecology. In recent years two MSc students carried out studies of Bathurst caribou ecology, one on the winter range and one during the insect season.

## 8. Proposal for Sustained or Increased Collar Use

ENR recommends using 50 collars on BNE caribou, and provides a copy of the technical rationale used by ENR to propose an increase in the number of collars used for Bathurst caribou. ENR also proposes that an increase in number of collars would lead to greater certainty in understanding trends in herd size, movement and condition. In order to better conduct a “need for and alternative to” analysis regarding the need to increase or keep existing collar numbers, please provide

a) Information on known risks and harms that arise from the use of collars on caribou, including statistics related to mortality, condition of collared caribou, and other impacts.

Radio-collars are an important tool that provide critical information for caribou management that currently cannot be obtained in any other manner. Among the key uses of caribou collar information that ENR has made in recent years are the following:

- Assessing seasonal and annual ranges, and changes from year to year;
- monitoring rates of exchange between neighbouring herds;
- designing population surveys and composition surveys (i.e. where to survey and areas of

relative herd densities);

- verifying during calving and post-calving surveys that caribou are where they should be;
- determining which herd winter harvest in particular areas is from;
- assessing seasonal and spatial locations of caribou mortalities;
- monitoring adult survival rates at a population level;
- assessing changes in herd range use as herd change in number (generally smaller herds use smaller ranges);
- defining calving grounds in years when there are no surveys;
- analysing responses of caribou to mines, roads and other disturbed sites;
- determining whether cows have calved in June and when the peak of calving occurs (there is a pronounced dip in cow movement rates at birth);
- assessing areas of habitat used repeatedly or more heavily (e.g. core winter ranges, key water crossings) and peripheral areas used less often.

The process of deploying radio-collars does have some inherent risks, and physical injuries or mortalities do occur in a very small proportion of collared caribou. ENR follows very stringent protocols and best practices to mitigate the risk of harm to caribou. Any project involving caribou capture must be approved in advance by the NWT Wildlife Care Committee (which includes both ENR and external members), and must follow strict guidelines on outlined in a caribou capture Standard Operating Procedure (SOP).

ENR staff monitors the impact of collaring during and after the capture process as part of the SOP, including health, condition and stress. A variety of measurements, assessments and blood tests are done to ensure the health of captured caribou. In the infrequent event of a capture related mortality, a full assessment is done to document what happened and why; if a second incident occurs, further collaring is discontinued. The caribou is butchered, and the meat distributed to aboriginal families.

Collared caribou are also monitored for up to two months after capture to look for evidence of potential short term stressful impact on the caribou. Radio-collar data is used to identify any mortalities (natural or potentially capture related), and any mortality within one month of capture (though rare) is investigated.

Capture related mortalities occur very infrequently in caribou. As an example, a total of 185 Bathurst caribou were collared between 1996 and 2014 (24 years), with 2 capture related mortalities during this time (2%). In winter 2012, a total of 208 caribou from 5 different herds including the Bluenose-East were collared, with 3 mortalities during collar deployment.

Aboriginal Elders and community hunters have in the past reported seeing collar-related damage done to the hair around the neck on animals shot in the winter. GNWT conducted a pilot project on 17 re-captured collared caribou and 15 muskoxen. Results showed that matted hair was a common occurrence but that broken hair was rare. Results also showed no presence of visible lesions on the skin, with only very minor histological (cell level) changes within the skin that were not apparent to the naked eye.

To minimize any potential effects on caribou and respect community concerns about handling wildlife, all caribou collars used by ENR have a remote drop-off feature that allows the collar to

fall off the caribou without it having to be recaptured a second time. As a result, ENR is not able to assess the body condition of caribou that have been collared. However, cow survival and reproduction rates (which are influenced by body condition) in collared caribou appear to be consistent with levels seen in the overall herd.

b) Information on whether and what alternatives are being considered, in addition to or instead of collars, which could achieve the goals of understanding herd range, movement and overall condition.

ENR regularly monitors new developments in available approaches and techniques to obtain key information needed to monitor and manage caribou, including advances in fecal monitoring and remote sensing techniques. ENR has embraced a number of new non-invasive techniques that have been demonstrated to be able to answer some specific questions, like fecal hormone sampling to determine pregnancy status.

However, at this time, ENR is not aware of any other tool or method that could be used to reliably monitor movement and distribution of barren-ground caribou for management purposes at the scale of the annual home range. Collars also remain a vital tool to be able to conduct calving ground and post-calving surveys, an essential tool for tracking herd size and trends. Remote sensing has future potential for use in estimating the size of caribou populations but the resolution of satellite imagery is still not adequate. ENR will continue to monitor changes in remote sensing as the technology continues to improve. The vast majority of the information acquired and shared by ENR to monitor caribou is directly or indirectly related to the use of collars.

c) Information on steps being taken to address concerns raised by Aboriginal harvesters in the Sahtú (and across Canada) about the use of collars on caribou.

ENR has listened to concerns expressed by community people about the use of the satellite collars on caribou, and taken proactive steps to address these concerns. ENR recognizes that some people object to any handling or collaring of wildlife, while others want to ensure that any collaring is done in a safe, humane and respectful manner. ENR has strived to ensure that all collaring done on caribou is done with the highest standards of care and respect, using best available practices. Oversight is provided through the NWT Wildlife Care Committee, mandatory Standard Operating Procedures, and strict monitoring.

In response to community concerns and advances in collar technology, ENR has been very active in reducing the size and weight of radio-collars used on caribou. The Department has requested the manufacturing company focus on developing smaller and lighter collars. Just a few years ago, ENR was deploying standard sized collars that weight 1100 g. In the spring of 2015, the Department put out lighter collars weighing 800 g. Moving forward in the spring of 2016, the plan is to start using the next generation of collars which will weight 600 g, almost half the weight of the collars used only 5 years ago.

ENR will continue to listen to communities, use collars only when critical to effectively monitor and manage caribou herds, use best practices for the safe handling of wildlife, and conduct

collaring in the most respectful manner possible.

d) More information on the “geo-fencing” study process referred to on page9.

Geofencing allows researchers to program collars to recognize a virtual boundary around a physical geographical space. For example, collars can be programmed to recognize a boundary around a road or mine site and change the way they transmit data depending on whether they are inside or outside that boundary. Iridium/GPS collars can now be programmed with geofencing features which allow one or more geographical areas to be defined. This allows researchers to obtain more frequent data when an animal approaches certain landscape features. The purpose of the increased numbers of caribou locations near developed areas is to allow for a more detailed analysis of how caribou respond to mines, roads or other developed areas.

ENR plans to deploy collars with geofencing capability on the Bathurst herd as a pilot project in spring 2016. These units are Telonics TGW-4577-4 GPS/Iridium units which weigh ~600 grams. These are the smallest and lightest GPS units ever deployed on barren-ground caribou in the NWT. Collars with the geo-fence option will be considered in future for BNE caribou.

Although not finalized ENR has discussed including the following areas within the geofence area:

30km buffers around Diavik, Ekati, Snap Lake, Gahcho Kue mine footprints.

30 km buffers around Sabina’s Goose and George Lake camps and around the NICO project.

10 kms buffers along the Tibbit to Contwoyoto Winter Road. As well as spur roads to Snap Lake and Gahcho Kue.

10 kms buffers along the winter roads to Gameti, Wha Ti and Wekweti

The collars will be programmed to collect more locations and transmit these locations more frequently when the animal is within one of these geographic areas.

The programming will be as follows:

GPS schedule: collect 3 fixes a day all year.

Inside the fence collect 1 fix per hour.

Iridium schedule outside fence:

Transmit data daily btw:

18-30 October (fall rut survey)

20-30 March (spring survey)

1-15 June (calving survey)

Rest of the year transmit data every other day.

Iridium schedule inside the fence:

Transmit every other day.

With this programming we expect the battery on the collar to last about 2.5 years

## **Appendix 1. Points of Agreement summary from Nunavut Wildlife Management Board (Nov. 2015)**

<http://www.nwmb.com/en/public-hearings-a-meetings/workshops/november-2015-protecting-caribou-and-their-habitat-workshop>

November 5th 2015 Caribou and Caribou Habitat Protection Page 1

(DRAFT) POINTS OF AGREEMENT AMONG  
PARTICIPANTS AT THE NOVEMBER 4th AND  
5th 2015 PROTECTING CARIBOU AND THEIR HABITAT WORKSHOP

1. Both Inuit Qaujimajatuqangit and science provide useful information and guidance concerning caribou and caribou habitat protection issues.
2. It is necessary to include Inuit Qaujimajatuqangit information on maps addressing caribou and caribou habitat protection.
3. Inuit Qaujimajatuqangit and science are essentially in agreement – based upon reliable and persuasive evidence – with respect to core 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.
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 deserve careful examination and consideration – for example, within buffer zones in the vicinity of a protected area.

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.

