WOLF (DÌGA) MANAGEMENT PILOT PROGRAM TECHNICAL REPORT 2020

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EXECUTIVE SUMMARY

The Bathurst and Bluenose-East barren-ground caribou (ekwǫ̀) herds have declined significantly in recent years. Traditional and scientific knowledge have shown that ekwǫ̀ experience population cycles that are between 30-60 years long. What drives these cycles in ekwǫ̀ is not fully understood but it is likely linked to many factors including harvest, habitat, predators, climate and disease. The current population estimates for the Bathurst and Bluenose-East herds are the lowest estimates on record from surveys going back to the 1980s. Harvest restrictions have been put in place for both herds. Harvest of the Bathurst caribou herd has been restricted to zero since 2016 and the Bluenose-East herd has a total allowable harvest of 193 bulls. It is in this context of unprecedented harvest restrictions that wolf management has been put forward by Indigenous governments and organizations, and communities and recommended by the Wek'èezhìı Renewable Resources Board (WRRB) as a viable option for reducing mortality of caribou to support herd stability and recovery.

After a thorough review of predator management approaches in other jurisdictions and a technical feasibility assessment of wolf management options, the Government of the Northwest Territories (GNWT), Department of Environment and Natural Resources and the Tłı̨chǫ Government developed a proposal for wolf management in January 2020. The WRRB approved a wolf management pilot program for the winter of 2020, and requested that a revised joint management proposal be submitted in August 2020.

The 2020 Wolf Management Pilot Program (Pilot Program) consisted of a coordinated approach to wolf management actions aimed at reducing wolf abundance on the Bluenose-East and Bathurst winter range areas. The Pilot Program advanced three main approaches to wolf management:

1. Enhanced support for wolf harvesters and the traditional economy
2. Aerial wolf reduction actions
3. Monitoring, research and assessment

In 2010, the GNWT initiated a wolf harvest incentive program in the North Slave Region to increase wolf removal to support recovery of caribou. In 2018-2019, the North Slave Wolf Harvest Incentive Area was defined encompassing the winter ranges of the Bathurst and Bluenose-East caribou herds to further encourage harvest of wolves associated with these caribou. In 2019-2020, the incentive was $1,200/wolf (unskinned carcass) and an additional $400 advance payment for shipping a wolf pelt to auction and a prime fur bonus of $350. Nunavut wolf harvesters also received a payment of $900 from GNWT and $300 from Government of Nunavut when their harvest was within their traditional harvesting and rights area and GNWT's North Slave Wolf Harvest Incentive Area.

ENR hosted a wolf harvester training workshop with Yellowknives Dene First Nation in December 2019 and supported Tłı̨chǫ Government in hosting a workshop in Wekweètì in January 2020 to increase harvest success and enhance skinning skills specifically for wolves. The Tłı̨chǫ Government held four wolf (dìga) harvest field camps between January 31, 2020 and March 20, 2020, each ten to 14 days in length. The participants traveled up to 80 km a day searching for dìga and harvested four dìga in total. The number of dìga harvested by Northwest Territories (NWT) harvesters in the North Slave Region in 2019/2020 was 68 (included the four from the Tłı̨chǫ camp), 18 of which were harvested within the North Slave Wolf Harvest Incentive Area. Nunavut harvesters took 57 dìga within their traditional use area; 35 of which were eligible for the enhanced incentive payments. Harvest attributed to the Bathurst and Bluenose-East winter ranges was 15 and 29 dìga respectively.

Harvester questionnaires were distributed to collect harvest effort information as an index of dìga abundance. The questionnaire asked for information on location of harvest, hunting conditions and other factors of hunting success, such as presence of other animals in the area and weather. Unfortunately, response rates were poor and only a relatively small subset of harvesters submitted completed questionnaires in the NWT. From the completed questionnaires that were submitted it was found that NWT hunters traveled approximately 14,230 km and spent 515 hours searching for dìga and hunters from Kugluktuk traveled approximately 11,335 km and spent 1,221 hours searching for dìga. In 2019-2020, catch per unit effort was 0.07/1,000 km for NWT harvesters and 7 dìga /1,000 km for Nunavut harvesters.

In March 2020, harvesters had not met reduction targets for the Bathurst and Bluenose-East winter ranges and aerial removals were undertaken. As the Pilot Program is aimed to improve survival and population growth rates on the Bathurst and Bluenose-East caribou herds, we used the distribution of caribou collar locations during the 2020 winter period to delineate areas for aerial dìga removals.

The overall approach for conducting aerial wolf removals was based on the following operational strategies:

1. define management areas for searching and removing wolves based on collar distribution of Bluenose-East and Bathurst caribou;
2. conduct fixed-wing aerial reconnaissance surveys in advance of helicopter-based removals to determine relative distribution and abundance of dìga;
3. direct and coordinate initial search effort of helicopter-based removal crew based on reconnaissance survey results and an additional spotter aircraft;
4. undertake removals of wolves by an experienced professional crew (i.e., pilot, marksman, and handler) through aerial shooting from a helicopter; and
5. document all occurrences of aerial shooting, retrieve dìga carcasses from the field, and conduct post-mortem examinations to learn more about the wolves and assess humaneness of aerial shooting.

Two fixed wing strip-transect surveys were flown on the Bluenose-East and Bathurst winter ranges, respectively, in March and late April to provide estimates of caribou density and associated abundance of dìga. The average observed caribou density for the Bluenose-East winter ranges (1.57 caribou/km^2) was approximately five times greater than caribou densities observed in the Bathurst winter ranges (0.32 caribou/km^2).

The strip-transect surveys showed low overall dìga densities on the winter ranges, although densities were higher on the Bluenose-East winter range areas than the Bathurst range areas. Abundance of dìga and dìga tracks were highest in the Bluenose-East March survey (0.0084 dìga/km^2, or 8.4 dìga/1,000 km^2). Observed differences between sightings of dìga tracks in the first versus second Bluenose-East surveys may have been due to fewer observers, observer experience, or more likely that dìga had moved out of the survey area.

The aerial removal program used a shooter with previous extensive experience in conducting dìga removals, ensured that dìga were killed quickly and humanely, documented procedures used, and ensured that the field efforts were conducted safely. Aerial removal crews were available from April 14 – May 15. During that time there were 21 bad weather or mechanical days when flights could not take place, resulting in a total of ten days for flying and aerial shooting. Thirty-six dìga removals were done during that time period; 15 removals on the Bathurst caribou winter range and 21 on the Bluenose-East winter range. In addition, there were five capture and post-capture related mortalities of collared dìga bringing total removals to 41.

Overall, the coordinated approach of supporting harvesters through incentives associated with the traditional economy and a targeted aerial removal program were successful in removing 30 dìga from the Bathurst winter range and 50 dìga from the Bluenose-East winter range.

Capture and post-capture related mortalities during the dìga collaring program resulted in five additional mortalities bringing totals to 31 dìga on the Bathurst winter range and 54 on the Bluenose-East winter range.

As is the case in many jurisdictions, the GNWT does not have reliable estimates of dìga abundance across the NWT, or for populations of dìga associated with specific ekwǫ̀ herds. Challenges in estimating dìga abundance include their clumped distribution, lack of territoriality, and tendency to be elusive and difficult to see from aircraft. In the absence of empirical dìga population estimates, we used an Ungulate Biomass Index (UBI) to derive dìga abundance estimates.

Dìga have high reproductive potential (large litters and a potential for more than one litter per pack) and can disperse long distances (immigrating into areas of recent removals). These characteristics also allow dìga populations to quickly rebound once management actions are no longer applied. Experience elsewhere suggests wolves need to be reduced by 60-80% of their pre-control abundance levels and maintained at low densities over at least a five-year period to illicit a response in caribou survival and population growth rates. Using UBI methods, wolf abundance associated with the Bathurst caribou herd on its winter range was estimated at 49 dìga, and 121 dìga on the Bluenose-East herd's winter range. The 60-80% target removal levels for these two herds were 29-39 on the Bathurst and 73-97 on the Bluenose-East range.

Range use patterns of collared caribou were used to demonstrate an initial approach for assigning dìga removals to one of the three caribou herds. We compiled the most recent four years of caribou collar data to assess patterns of winter range use by ekwǫ̀ from the Bluenose-East, Bathurst, and Beverly herds. Utilization distribution maps were derived on a monthly time step from collar data using kernel density estimators. The maps provide smoothed probability surfaces of spatial usage by caribou (and wolves by association) that is intuitively understandable and provides map products that can be used to transparently inform and evaluate dìga management actions. Figure 1 shows monthly utilization distribution maps of caribou for the Pilot Program duration with wolf harvest and aerial removal locations.

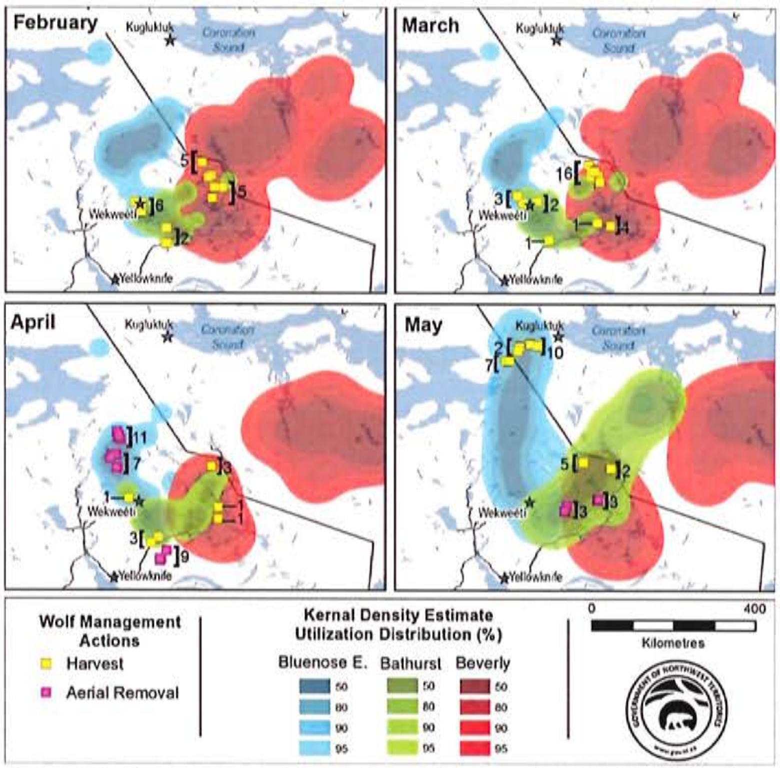

Figure 1. Harvest and aerial dìga removal locations during the 2020 Pilot Program.

Key lessons learned from the Pilot Program include the following:

1. The Pilot Program was hampered significantly by the territory-wide public health emergency initiated on 18 March 2020 in response to the COVID-19 coronavirus pandemic.
    - Aerial removal crews and aircraft were based out of Yellowknife rather than NWT communities closer to the dìga and caribou winter ranges. This led to a large amount of time and effort spent traveling to the winter ranges before any removals could take place. For example, 44% (~42) of the total hours flown (~96) for the strip-transect surveys were spent on ferrying flights to and from the survey area.
    - Necropsies were delayed because the lab facilities could not be accessed immediately, so assessment of diet, dìga condition and humaneness of removals were not completed at the time of writing this report (summer 2020).
2. Analysis of hunter questionnaires identified the need to spend more effort in supporting harvesters through trapper training, locating dìga, and documenting information related to their harvest efforts and success rates.

Despite the challenges, the 2020 Pilot Program did result in several successes and key insights.

1. We saw participation of many harvesters (in NWT and Nunavut) in the Enhanced North Slave Wolf Harvest Incentive Program, with many receiving training and support to access dìga (in the case of the Tłı̨chǫ in particular).
2. The removal of dìga on the Bathurst caribou winter range was within the UBI-based target levels for meaningfully reducing dìga predation rates on this herd.
3. While the UBI-based target for the Bluenose-East winter range was not met, removals of 45% of the estimated dìga population occurred, which likely exceeds an annual sustainable rate of harvest and sufficient to meaningfully reduce dìga abundance.
4. The experience with ground-based harvesting and aerial removals highlighted the importance of facilitating, implementing, and coordinating harvester-based dìga management actions and aerial dìga removals in combination. Experienced dìga harvesters rely on expert knowledge of the landscape and caribou-dìga movement patterns and are also highly efficient at finding and removing dìga. If and when required, aerial removal effort can be directed to specific areas and is an efficient method.

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INTRODUCTION

The Bathurst and Bluenose-East caribou herds have both declined significantly in recent years. The decline of the Bathurst herd was first documented in 1996 when the population was estimated at 349,000 animals, down from 472,000 in 1986. Harvest management actions were first implemented after results of a calving ground survey in 2009 (Table 1; see WRRB 2010).

Table 1. Summary of management actions on Bathurst and Bluenose-East caribou herds in Wek'èezhìı and the Northwest Territories, 2009-2020.

Bathurst Herd	2009[a]	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Harvest Management (allowable harvest)		Interim Emergency Measures (0)	Harvest Target (300 8M:1F)[b] →				MCBCCA[c] & Ceremonial Harvest (15 M only)	TAH[d] (0) →				
Wolf Management		• NSR[e] Wolf Harvest Incentive Program					• Added $200 per wolf carcass to incentive program		• Wolf Technical Feasibility Assessment	• Enhanced Wolf Harvest Incentive Area & Program	• Joint Wolf Management Proposal	• Wolf Mgmt Pilot Project (winter) • Revised Proposal
Range (disturbance) Management							• Develop Bathurst Caribou Range Plan (BCRP)	→			BCRP (approved by GNWT Cabinet & WRRB)	Implement BCRP

Bluenose East Herd	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Harvest Management (allowable harvest)								• TAH (750 M only) →			• TAH (193 M only)	
Wolf Management		• NSR Wolf Harvest Incentive Program					• Added $200 per wolf carcass to incentive program		• Wolf Technical Feasibility Assessment	• Enhanced Wolf Harvest Incentive Area & Program	• Joint Wolf Management Proposal	• Wolf Mgmt Pilot Project (winter) • Revised Proposal

[a] Yellow shading indicates years when calving ground photographic surveys were conducted.
[b] M = Male; F = Female
[c] MCBCCA = Mobile Core Bathurst Caribou Conservation Area implemented in 2015/16
[d] TAH = Total Allowable Harvest
[e] North Slave Region

To date, management actions for the Bathurst herd included harvest restrictions (WRRB 2010, 2016a, 2019a) and implementing wolf harvest incentives starting in 2010 (Table 1; see GNWT 2019a). These actions have failed to halt the decline, and the herd was estimated at 8,200 animals in 2018 (Adamczewski et al. 2019). The decline of the Bluenose-East herd was first documented in 2013 when it was estimated at 68,000 animals, down from 121,000 in 2010 (Boulanger et al. 2014). In 2018, the Bluenose-East herd was estimated at 19,300 animals (Boulanger et al. 2019). While calving-ground photographic surveys were scheduled in June 2020 for both these herds, they were postponed to 2021 due to restrictions put in place through COVID-19 public health orders in Nunavut (NU).

Both traditional and scientific knowledge have shown that barren-ground caribou (ekwǫ̀) experience population cycles that are between 30-60 years long. These cycles can be hard to predict and at times do not follow the same pattern. What drives these cycles in ekwǫ̀ is not well understood but it is likely linked to many factors including harvest, habitat, predators, climate, and health-disease. Previous low points in the cycle for the Bathurst herd occurred in the 1920s, and again during the period 1950-1970 based on Tłı̨chǫ knowledge and spruce root scar frequency at treeline (Zalatan et al. 2006).

The recent population estimates in 2018 for the Bathurst and Bluenose-East herds are the lowest estimates on record from aerial survey results going back to the 1980s. In 2016, the Wek'èezhìı Renewable Resources Board (WRRB) determined that a total allowable harvest (TAH) of zero be implemented for all users of the Bathurst herd within Wek'èezhìı (WRRB 2016a). The TAH of zero will continue until at least the 2020/2021 harvest season (WRRB 2019a). In 2016, a TAH of 750, bulls only, was established for all users of the Bluenose-East herd within Wek'èezhìı (WRRB 2016b). In 2019, the WRRB determined that the TAH for Bluenose-East caribou in Wek'èezhìı be further reduced to 193 bulls (WRRB 2019b). The NU Wildlife Management Board is currently considering proposals from Government of NU (GN) to reduce harvest of Bathurst caribou in the Kitikmeot region, to zero from 30 and for the Bluenose-East to 107, bulls only, from 340.

Previous joint management proposals for the Bathurst herd submitted by the Tłı̨chǫ Government (TG) and the Government of the Northwest Territories (GNWT) resulted in the WRRB holding public hearings in 2010 and again in 2016. Public hearings were also held to address management proposals for the Bluenose-East herd in 2016 and 2019. During the 2016 and 2019 public hearings, through consultation conducted from January 21-23, 2019, and more recent engagements (GNWT, GN and Indigenous leaders meeting, February 2020; Tłı̨chǫ community engagement February 2020) the WRRB, GNWT and TG heard concerns from community members that wolves continued to put pressure on ekwǫ̀ populations. As the WRRB expressed at the public hearings for the Bluenose-East herd in April 2019, the 20% rate of annual decline for the Bathurst and Bluenose-East herds is so serious that waiting any longer to implement wolf (dìga) management would make recovery of the herds even more difficult (WRRB 2019b).

Extensive reviews of dìga management programs in other jurisdictions such as Alaska, British Columbia, Alberta and Yukon (Orians et al. 1997, McLaren 2016, Russell 2010) in combination with a collaborative assessment of dìga management options by the WRRB, GNWT and TG (WFATWG 2017) formed the basis of a Joint Proposal for Wolf (dìga) Management on the Bathurst and Bluenose-East Herd Ranges. The Joint Proposal presented a coordinated approach to dìga management actions aimed at reducing predation by dìga on ekwǫ̀. It consisted of three main approaches to dìga management:

1. Enhanced support for dìga harvesters and the traditional economy
2. Aerial shooting to remove and reduce dìga on caribou winter ranges
3. Monitoring, research and assessment

While WRRB deemed that a level two proceeding was required for the dìga management project, it gave approval for a Pilot Program in 2020 following a presentation by the GNWT and TG (Appendix 1). The WRRB further requested a revised proposal for dìga management based on the experience and lessons learned from the Pilot Program, be submitted in August 2020 for WRRB review and recommendation. Operation of the Pilot Program was to be completed by April 30 but WRRB accepted a Joint letter of extension from GNWT and TG to operate until May 15 due to delays experienced related to COVID-19 public health orders influencing air charter tenders, aircraft positioning and availability of aircraft survey crews (Appendix 2).

This technical report (written in summer 2020) presents the dìga management actions undertaken as the 2020 Wolf Removal Pilot Program from January - May 2020 as requested by the WRRB and informs a revised Joint Proposal for Wolf (dìga) Management Actions submitted to the WRRB in August of 2020.

DÌGA GROUND-BASED HARVEST

GNWT's Enhanced North Slave Wolf Harvest Incentive Program

Background

Since 2010, GNWT Department of Environment and Natural Resources (ENR) North Slave Region has implemented a region-wide dìga harvest incentive program to increase dìga removal and support recovery of caribou (GNWT 2019a). The incentive program began with a reward of $100/carcass (skinned) for any dìga harvested within the region. ENR increased the incentive to $200/carcass (skinned or unskinned) in the 2015-2016 harvest season. The incentive was increased in response to ekwǫ̀ survey results in June 2015 that showed continued declines of the Bathurst (Boulanger et al. 2017) and Bluenose-East herds (Boulanger et al. 2016).

Throughout the ongoing decline of the Bathurst and Bluenose-East ekwǫ̀ herds, the TG and ENR have been collaborating with the WRRB and other co-management partners to implement co-management actions to support ekwǫ̀ recovery. A key recommended action (Recommendation #1-2019 (Predator), WRRB 2019a - Appendix G and H) included continuing TG's Community-based Dìga Harvest Training Program and ENR's Enhanced North Slave Wolf Harvest Incentive Program.

For the 2018-2019 harvest year, ENR established a harvest incentive area for dìga as a result of discussions at a gathering of Indigenous leaders/representatives with ENR staff at François Lake in August 2018 (GNWT 2019a). ENR established the new North Slave Wolf Harvest Incentive Area in the area where the Bathurst and Bluenose-East caribou herds were expected to winter in 2018-2019. Boundary delineation for the North Slave Wolf Harvest Incentive Area follows the minimum convex polygon (MCP) method outlined in Caslys Consulting Ltd (2016). A 60 km buffer is used to create the MCP with Bathurst and Bluenose-East collar locations from early January when it is assumed that caribou have settled in their winter distribution. The 60 km buffer is judged to be wide enough to include all the dìga associated with the two wintering herds and small enough not to harvest boreal dìga unnecessarily. The incentive for harvesting a dìga (skinned or unskinned) in the North Slave Wolf Harvest Incentive Area in 2018/2019 was $900/dìga for both Indigenous and resident hunters (GNWT 2019a).

Program Description

For the 2019-2020 dìga harvest season, the harvest incentive area (Figure 2) was again based on locations of collared female and male Bathurst and Bluenose-East caribou. ENR increased the financial incentive to $1,200/dìga (unskinned carcass) and dropped the fee for the tag (for non-general hunting licence (GHL) holders) (Cluff 2020). For Indigenous hunters and GHL licence holders, two additional financial payments were potentially available (i.e., a $400 advance payment for shipping a dìga pelt to auction and a prime fur bonus of $350, see Appendix 3).

Hunters entering the harvest incentive area were encouraged to stop at a ENR check station at Gordon Lake on the Tibbitt-Contwoyto winter road where ENR officers gave them the harvester questionnaires (Appendix 4). Harvesters were advised to stop on the way back to hand in the completed questionnaires in exchange for a $25 gas card. The questionnaire was designed to establish the harvester's "effort" to find and harvest a dìga ("catch per unit effort, or CPUE"). Units of effort are kilometres traveled and hours spent harvesting a dìga.

The questionnaire also includes questions about hunting conditions and other factors related to hunting success, such as presence of other animals including caribou in the area and weather conditions. The harvesters were also asked to record the GPS location of harvested wolves and mark the locations of dìga harvest/sightings on a map.

Harvester Training in the North Slave Region

The GNWT regularly provides trapper training workshops to support participation of harvesters in the traditional economy. Dìga harvester training workshops are hosted in the fall to provide harvesters and trappers in the North Slave Region with training opportunities to increase harvest success and enhance skinning skills specifically for dìga. In the 2019-2020 harvest season, ENR hosted a dìga harvester training workshop with Yellowknives Dene First Nation (YKDFN) in December 2019 and supported the TG in hosting a workshop in Wekweètì in January 2020.

The areas of focus of the training workshops included:

- Drawing on the skills, expertise and techniques used by experienced and successful dìga harvesters;
- Offering training on the use of snares;
- Improving skinning techniques to maximize pelt value for harvesters;
- Teaching best practices for humane harvesting and trapping of dìga;
- Reviewing questionnaires, particularly on how to collect CPUE information; and
- Reviewing the dìga carcass sampling program and the biological data being collected, and explaining how it is used.

Workshop trainers have included representatives from the Fur Harvesters Auction, experienced northern dìga harvesters, experienced southern dìga trapper(s) and GNWT staff who discussed the Enhanced North Slave Wolf Harvest Incentive Program. At the December

2019 training workshop with the YKDFN, the GNWT invited skilled Inuit harvesters to share their dìga harvesting techniques and experiences on the central barrens.

Harvest Summary in the North Slave Region - 2019/2020

There were 68 dìga harvested within the North Slave Region during the 2019-2020 season; 64 dìga were killed by North Slave Region harvesters (Table 2) and four by non-resident sport hunters. An additional dìga was killed in a vehicle collision at the Ekati Diamond Mine.

Table 2. Dìga harvest numbers in the North Slave Region 2019-2020.

Month	Wolf Harvest
September	1
October	10
November	4
December	10
January	15
February	8
March	11
April	5
Total	**64**

**four harvests with unknown dates

There were 44 payments of $200 for dìga harvested within the North Slave Region but outside the North Slave Wolf Harvest Incentive Area. Only ten payments of $1,200 were made for dìga harvested within the North Slave Wolf Harvest Incentive Area, not including the four dìga from the Tłı̨chǫ dìga harvesting camps. The relatively low number of wolves harvested in the incentive area likely reflected the distribution of caribou during the winter of 2019-2020 as most caribou (and therefore dìga) were not along the Tibbitt-Contwoyto winter road, which greatly assists harvesting by the access it provides (Cluff 2019) (Figure 2).

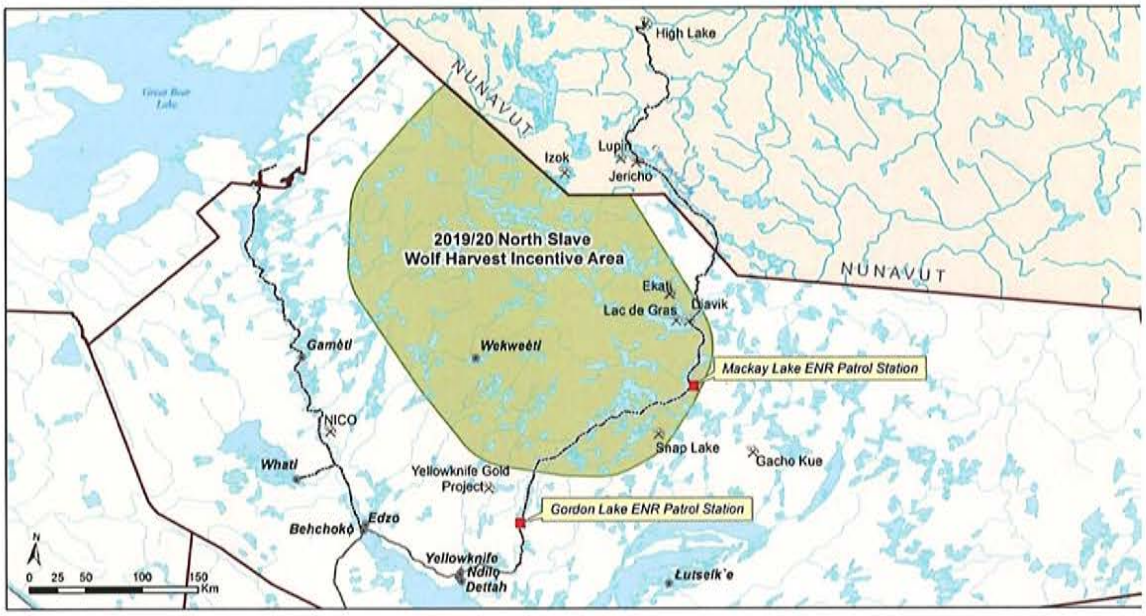


Figure 2. North Slave dìga harvest incentive area 2019-2020.

Dìga harvest levels have been variable since the incentive program was first put in place.

Figure 3 shows harvest levels in the North Slave Region since the start of the program indicating the amount of harvest within and outside the North Slave Wolf Harvest Incentive Area (established in 2018-2019). The distribution of harvest within the North Slave Region and North Slave Wolf Harvest Incentive Area likely depends primarily on distribution of caribou relative to the Tibbitt-Contwoyto winter road (Figure 4).

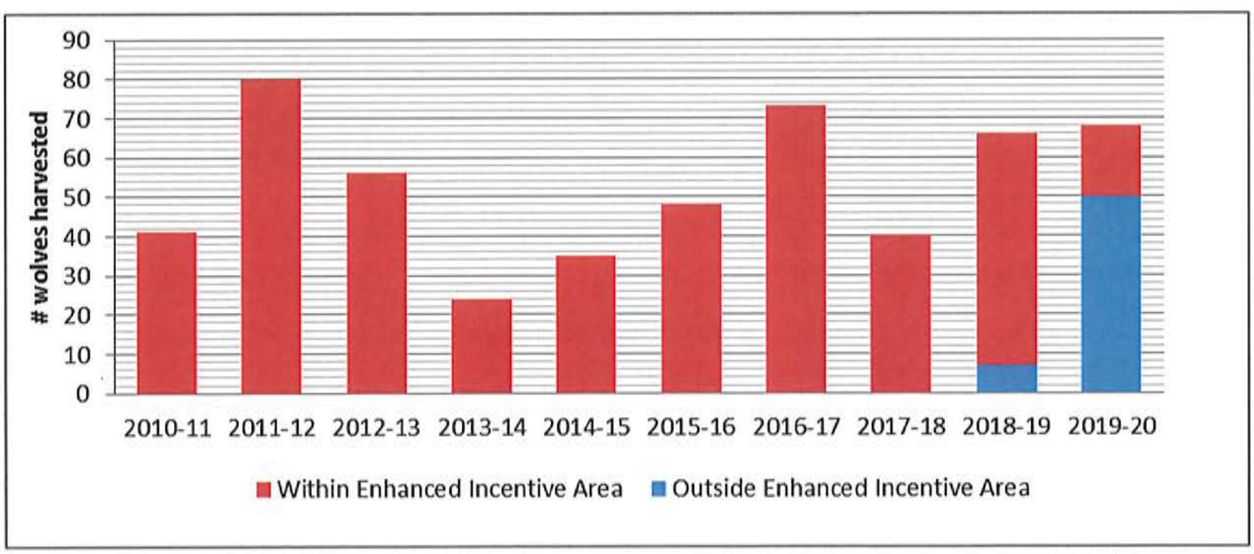
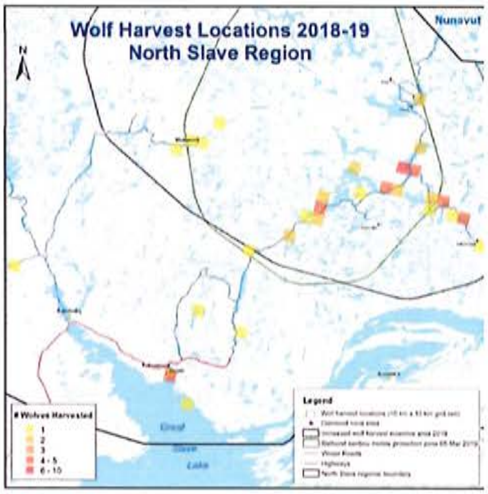


Figure 3. North Slave Region dìga harvest levels, 2010-2020.



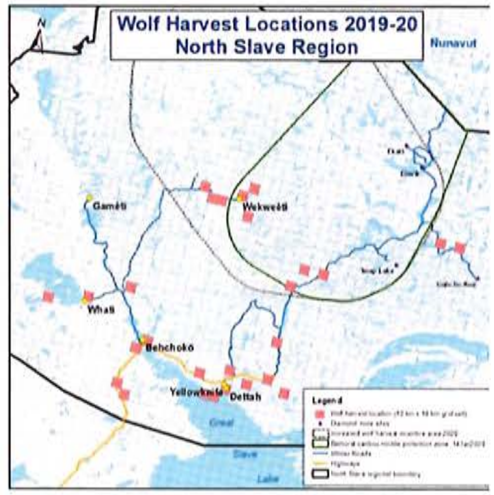


Figure 4. Location of dìga harvested in the North Slave Region, a) 2018-2019 and b) 2019-2020. CPUE

CPUE is a commonly used technique to estimate stock density in fisheries. CPUE is derived by dividing the total catch by a unit of effort. In this report, we used two units of effort, which were kilometers and hours traveled for locating and harvesting a dìga.

To express CPUE as an index of density, all the operations need to be expressed in standard units (i.e., variabilities among harvesters need to be considered). A simple measure of harvesting operation is a day on the land in a vehicle or a snowmobile, so that a simple measure of effort is the number of days on the land, and of catch per unit effort, the catch per day on the land.

Standardization of harvesting effort data depends on whether there are appreciable variations (especially trends) in effective harvesting time/distance, hunting power (e.g. more hunters/group, better snowmobiles, better visibility), or distribution of the harvesters relative to dìga density, and if so, making the necessary standardization of the appropriate component of the total harvesting effort.

Harvesting Effort

Harvesters were asked to record on the questionnaires the hours spent and kilometers traveled on harvesting. This should include:

a) Time spent/distance traveled on the hunting grounds, searching for dìga.
b) Time of occurrence when dìga were harvest occurred.

The following should not be included in the tally of hours/kilometres traveled during harvesting:

a) Time lost through bad weather.
b) Time/distance traveling to and from the hunting grounds.

c) Time during which the hunters are preparing for hunting, but are not actually hunting (mobilizing, getting vehicles/snowmobiles ready etc.).
d) Time spent handling the dìga, after it has been harvested.

Harvesting Power

The harvesting power of a particular party, i.e., the harvest it takes from a given density of dìga per unit harvesting time/distance, can be thought of in two parts:

a) The extent (area) over which the influence of the party extends, and within which dìga may be harvested.
b) The proportion of dìga within this area which are in fact harvested.

In this report, the number of harvesters in each group are documented as having impacts on the proportion of the dìga within the area which are liable to be (and are in fact) harvested.

North Slave Region Harvester Questionnaire Summary

Harvester questionnaires were designed to document the location of harvest, establish the harvester's "effort" to find and harvest a dìga (time and distance spent hunting) and included questions that relate to hunting conditions and other factors related to hunting success, such as presence of other animals including caribou in the area and the weather conditions (Appendix 5). Harvesters were provided $25 gas cards in exchange for submission of completed questionnaires.

Twenty-nine completed questionnaires were returned to the ENR office, reflecting twenty-nine harvesting trips in the North Slave Region. In total, one dìga was harvested in the North Slave Region by those harvesters that submitted questionnaires between January 18 and March 15, 2020. The successful harvest took place between February 7 and 9, 2020. Collectively, the total kilometers traveled by the harvesting parties were 14,230 km, and the total hours spent, were 515 hours.

CPUE: Distance

In aggregate, harvesters that submitted questionnaires traveled 14,230 km to catch one dìga in the North Slave Region, resulting in the CPUE of 1 dìga/14,230 km, or 0.07 dìga/1,000 km. On average, harvesters traveled 663 km per 24 hours, and most stayed on the Tibbit-Contwoyto winter road. In total, four dìga were seen by two harvesters, resulting in an encounter rate of 0.28 dìga/1,000 km (Table 3).

Table 3. CPUE: distance for North Slave Region harvesters that submitted questionnaires.

	Harvest/1,000 km	**Seen/1,000 km**
Average CPUE (km)	0.07	0.28

CPUE: Time

In aggregate, harvesters that submitted questionnaires spent 515 hours to search and harvest one dìga in the North Slave Region, resulting in a CPUE of one dìga/515 hours, or 0.047 dìga/24 hours. On average, harvesters spent 8.73 hours per day searching/harvesting, and most stayed on the Tibbit-Contwoyto winter road. In total, four wolves were seen by two harvesters, resulting in an encounter rate of 0.008 dìga/hour or 0.19 dìga/24 hours (Table 4).

Table 4. CPUE: time for North Slave Region harvesters that submitted questionnaires.

	Harvest/24 hours	Seen/24 hours
Average CPUE (Hours)	0.047	0.19

Harvesting Effort

The questionnaire specifically asked harvesters to record the "estimated number of hours spent hunting each day." Therefore, it was assumed that (a) time lost because of bad weather, (b) time spent traveling to and from the hunting grounds, or (c) time during which the hunters were preparing for hunting, but were not actually hunting (mobilizing, getting vehicles/snowmobiles ready etc.), were excluded from the reported hours. Time spent handling a dìga after it was harvested may have been included in the reported hours by the one successful hunter. For future questionnaires, this exclusion should be clarified in the survey question. Given the extremely low number of harvest (one dìga) compared to the hours spent, the potential overestimation of harvesting hours spent is insignificant for this analysis.

The questionnaire asked harvesters to record the "estimated number of kilometres traveled each day." This question did not specify whether the distance traveled was specifically for hunting or if it included traveling to and from the hunting area. Three harvesting parties reported zero hours spent but reported traveling 40 km, 200 km, and 250 km respectively on one day. For future questionnaires, the question should clarify that the kilometre traveled should only include the distance covered for hunting. Given the extremely low level of harvest (one dìga) and large total distance traveled by the harvesters (14,230 km), this potential error is likely low.

Harvest Power

Based on maps/locations provided, we assumed that all North Slave harvesters primarily traveled in a vehicle on Tibbit-Contwoyto winter road and conducted the search and hunt primarily from the winter road. Therefore, we assumed that all harvesters had equal extent over which their effective hunting range extended.

Of the twenty-nine harvesting parties, twelve were solo harvesters, thirteen were groups of two harvesters, and four were groups of three harvesters. The average size of a harvesting party was 1.72 harvesters/group. The addition of harvesters in a party is assumed to increase the party's harvesting power. Additional harvesters would increase the chance of spotting dìga and the number of dìga that could be harvested from a single pack. However, due to the limited number of harvested wolves (n=1) by North Slave harvesters, we were not able to reliably estimate encounter and harvest rates, nor a potential influence of size of a harvesting party.

Weather

The questionnaire included a question about weather: "what was the weather like during your hunt? Did it make hunting harder?" Some qualitative descriptions of hunting conditions were obtained through this question. However, the question did not elicit enough information to quantify the weather-related variability in the CPUE.

Qualitative descriptions provided by the harvesters include good, fair, clear, scattered flurries, blizzard, cloudy, poor, windy, blizzard, foggy, and whiteout. Harvesters' descriptions were categorized into "good" (no description of adverse weather conditions), "moderate" (mixed good and adverse weather conditions), and "poor" (only adverse conditions described). Eighteen harvest trips were in "good" weather conditions, four were in "moderate" conditions and seven were conducted in "poor" conditions. The one successful harvest was conducted in "good" weather conditions (Table 5).

Table 5. Summary of weather conditions reported on harvest questionnaires.

	Good	Moderate	Poor
# of reported weather conditions	18	4	7
# wolves harvested under weather conditions	1	0	0

Caribou Sightings

In total, harvesters reported sighting between 994 and 4,920 caribou in fourteen groups. Twelve harvesting parties sighted 0 caribou, one party sighted 1-20 caribou, and four parties sighted 101-500 caribou (Figure 5). Three parties saw caribou remains.

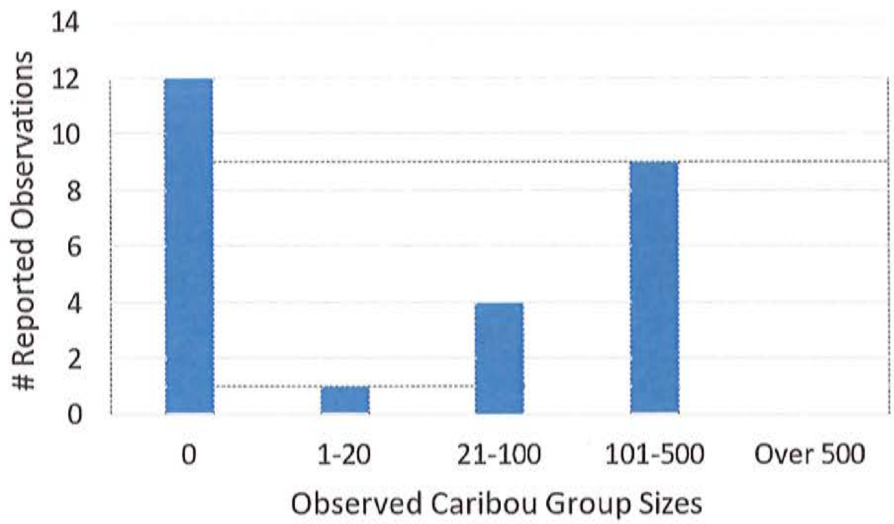


Figure 5. Estimated number of caribou seen by North Slave harvesters in 2020.

Distribution of Harvesting

Figure 6 shows the distribution of harvesting parties throughout January through March with most parties active in mid to late February.

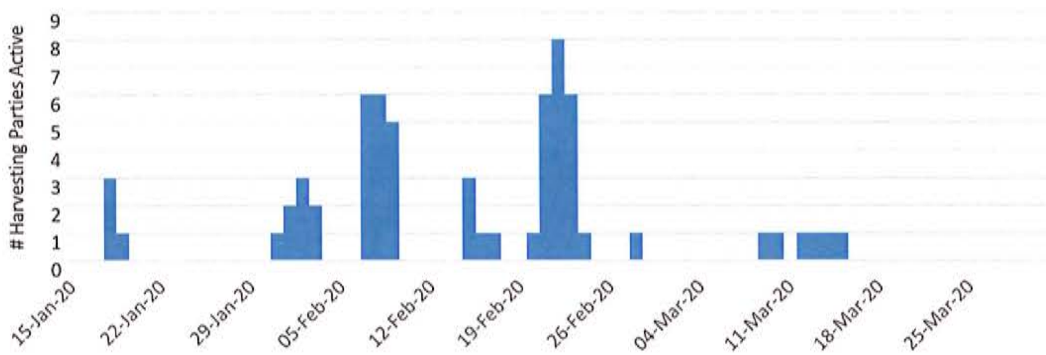


Figure 6. Number of harvesting parties active between January and March 2020 based on submitted harvester questionnaires.

Lessons Learned

Harvester success was poor likely due to low densities of caribou and in turn dìga along the primary travel corridor along the Tibbitt-Contwoyto winter road. More effort is needed to direct harvesters to areas of high dìga abundance when caribou are distributed away from winter road corridors.

Despite time spent at training workshops discussing the concept of CPUE and the importance of completing harvester questionnaires, completion and submission rates were poor. Perhaps working with a core group of harvesters and supporting them more fully to document and record their travel routes, time spent harvesting, along with the other types of observations would help obtain data that can be used for CPUE analyses. It could also help with the timeliness of submission if a more substantial relationship existed between the harvester and ENR staff.

Specific recommendations for harvester questionnaire revisions:

- The question on the estimated number of hours spent harvesting should specify that the following is excluded:
    - Time lost through bad weather;
    - Time spent traveling to and from the harvesting grounds; or
    - Time during which the harvesters are preparing for harvesting, but are not actually harvesting (mobilizing, getting vehicles/snowmobiles ready etc.).
- The question on kilometers traveled should clarify that the kilometers traveled should only include the distance covered for harvesting and not include traveling to and from the harvesting area.
- The question about the weather did not elicit enough information to quantify the weather-related variability in the CPUE. More specific descriptions of the weather such as wind, snow and visibility could help.

Summary of TG's Community-based Dìga Harvest Training Program (2019/2020)

Throughout the ongoing decline of the Bathurst and Bluenose-East ekwǫ̀ herds, TG and ENR have been collaborating with the WRRB and other co-management partners to implement co-management actions to support ekwǫ̀ recovery. A key recommended action (Recommendation #1-2019 (Predator), WRRB 2019 - Appendices G and H) included continuing the TG Community-based Dìga Harvest Training Program and GNWT ENR's Enhanced North Slave Wolf Harvest Incentive Program. This summary focuses on implementation of the Community-based Dìga Harvest Training Program in winter 2019/2020.

Dìga Harvest Training Program

The TG initiated its Community-based Dìga Harvest Training Program for the 2019/2020 harvest season in three phases:

1. TG staff held a community consultation meeting with Tłı̨chǫ harvesters and elders to ensure the program followed and respected Tłı̨chǫ protocols of harvesting dìga and planned logistics for the harvesting camps;
2. TG staff conducted a training workshop for local Tłı̨chǫ harvesters with an instructor from the Alberta Trappers Association; and
3. TG staff established harvester camps to further support training and dìga harvesting by Tłı̨chǫ on a rotational basis.

A one-day meeting was held in Wekweètì in December 2019 with approximately 30 people that included Tłı̨chǫ harvesters, two elders from each Tłı̨chǫ community, TG Lands

Department staff and ENR staff. The objective of the meeting was to gain and share knowledge on how to harvest dìga following Tłı̨chǫ cultural practices and to use this knowledge in planning the dìga harvest training program.

Since Tłı̨chǫ people have strong spiritual connections with dìga, it has been uncommon for Tłı̨chǫ to trap and snare dìga. Through this meeting, it was decided that Tłı̨chǫ harvesters should get training in these methods. A four-day trapper training workshop was held in early January with 18 Tłı̨chǫ harvesters, a TG staff member, an ENR staff member and an instructor (R. Roy) from the Alberta Trappers Association. A well-known trapper from Kugluktuk was invited to the workshop but was unable to attend. The workshop included snare making, snare setting, trap setting, prepping of snares and traps, dìga behaviour and biology and skinning of a dìga.

The dìga harvest field camps were established from January 31, 2020 to March 20, 2020. There were four crew rotations of about ten to 14 days for each crew. The participants established a base camp and traveled up to 80 km a day searching for dìga, depending on snow and weather conditions. Traps and snares were used with bait stations (fresh whitefish and rotten lake trout collected from Whatì). Although, traps and snares were used, the dìga harvested during the program were all shot (Table 6). There were three dìga harvested during the program and one harvested during the workshop (this one was snared). The snared dìga was harvested at the dump in Wekweètì. The snare was set the evening of January 11 along with 17 other snares; which were checked once in the morning on January 12 and again in the afternoon (the dìga was seen in the snare at the second check). Bait or traps were not used when the snares were set.

Table 6. Summary of dìga harvested during Tłı̨chǫ Community-based Harvest Training Program, 2019-2020 season.

Number of Dìga Harvested	Harvested from Tłı̨chǫ Dìga Camp?	Harvest Date	Harvest Location	Coordinates	Dìga Information
1	No	January 12, 2020	Wekweètì dump	64°11'23.18"N 114°12'42.95"W	Female, young adult; snared. Snare set for one night during trapper training workshop; carcass disposed of after it was skinned during training.
1	Yes	February 18, 2020	Long Portage on Winter Road near 2nd camp site	64°11'8.79"N 114°28'41.84"W	Male; shot Was tracked for about 20 minutes after hunter seen the tracks. Trapper from Behchokǫ skinned the dìga and the carcass was picked up by ENR.
2	Yes	February 22, 2020	Between Kwekáahtì and Wekweètì	64° 0'39.80"N 114° 0'43.00"W	One male and one female; both shot near a snare that had captured an ekwǫ̀ (ekwǫ̀ was alive and released) Trapper from Behchokǫ skinned the dìga and the carcasses were picked up by ENR.

Ideally, training will occur every year prior to the program starting for as long as the TG organizes a dìga harvesting program. Although, the anticipated number of dìga was not harvested through the dìga harvesting program, there were other species harvested from January 31 - March 20, 2020 which includes: three wolverines, six marten, four foxes and one moose.

Based on the meeting with harvesters and elders in December 2019, a location for the base camp was suggested across from the community of Wekweètì on the other side of Snare Lake (about ten to 15 km south from town). During the trapper training workshop, a second location was recommended based on the collared ekwǫ̀ maps provided by ENR (Figure 7). The recommended location was Wecho Lake (Kwekáahtì). After watching the movement of Bluenose-East and Bathurst ekwǫ̀ through the collar distribution maps (Figure 7), Reindeer Lake (K'aıtı) was considered to be a better location because most collared ekwǫ̀ were near this area and people thought most dìga would be close. Staff from TG and ENR, along with harvesters from Wekweètì discussed whether K'aıtı would be a suitable location for the base camp. ENR staff conducted an aerial reconnaissance survey to confirm if K'aıtı should be used for the base camp location. During the reconnaissance survey (Figure 8), seven wolves were observed just northwest of K'aıtı and nearly 1,300 ekwǫ̀. Based on survey observations of dìga and subsequent discussions with local residents of Wekweètì, it was determined that K'aıtı was suitable for a base camp location, and that local residents of Wekweètì would set up camp.

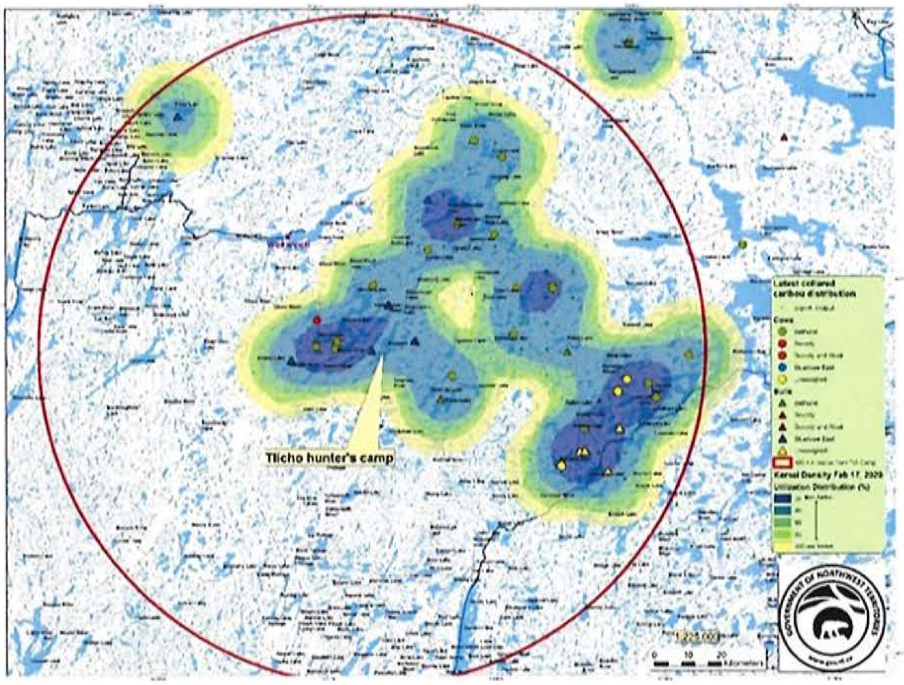


Figure 7. Ekwǫ̀ distribution map provided to TG from ENR. Darker blue polygons show the highest density of ekwǫ̀.

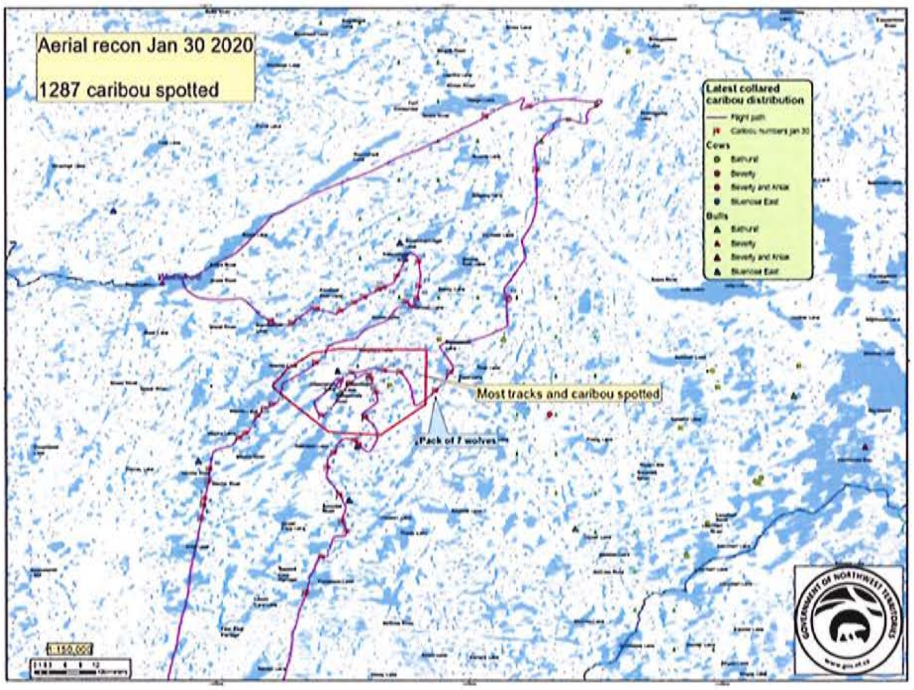


Figure 8. Reconnaissance survey completed by ENR on January 30, 2020. Map provided by GNWT/ENR.

The first crew established base camp at K'aıtı on February 1, 2020. After one week of traveling and familiarizing themselves with the area (Figure 9), they did not see any signs of dìga (no tracks or kill sites). ENR conducted another fixed-wing reconnaissance survey with two participants from camp to see if there were any dìga in the area. No tracks or sign of dìga were identified in the area surrounding K'aıtı. The harvesting crew wanted to leave and set up camp elsewhere, but it was suggested by the TG and ENR staff to stay out for another week considering that a large amount ekwǫ̀ were still in that area and that there should be a high likelihood of harvesting dìga. The harvester crew continued to search for any sign of dìga, and set snares and traps, but did not have any success. Although they did not see any dìga, they did see approximately ten to 15 ekwǫ̀ on a daily basis.

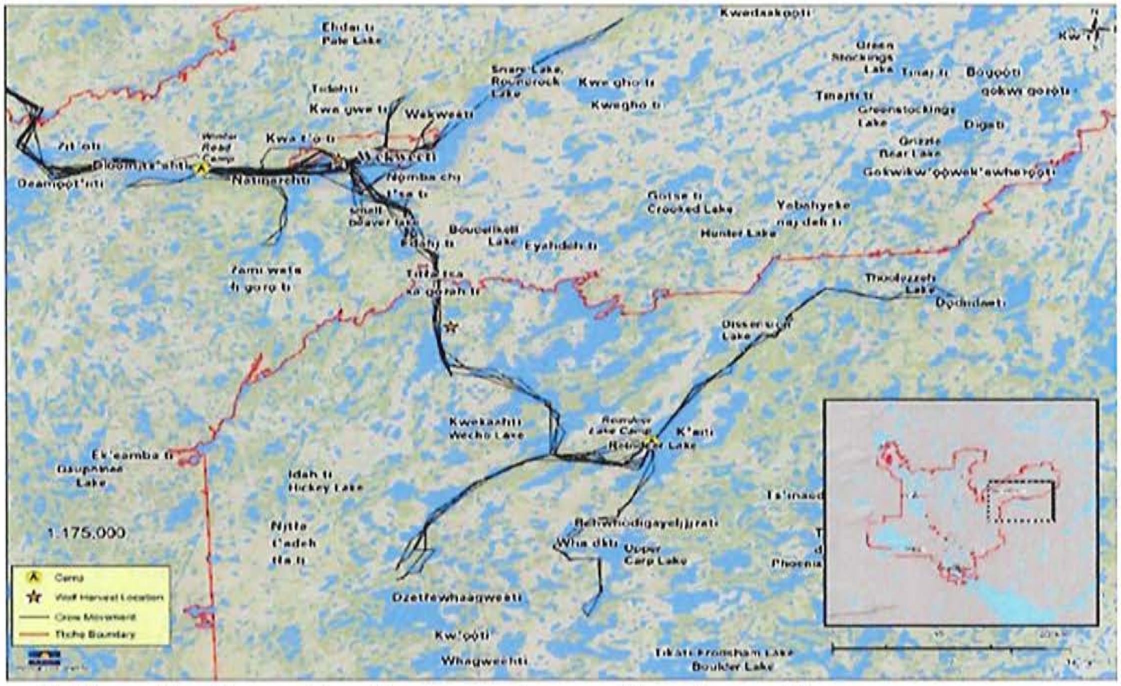


Figure 9. Map of trails used by dìga harvesters and locations of base camps.

The first crew switched out with the second crew on February 13. The second crew did not see any signs of dìga but did see a lot of ekwǫ̀. Given the lack of dìga sightings, the field crews decided to move camp near a cabin located between Wekweètì and Indin Lake (K'àątì). This decision was made after consulting with local residents of Wekweètì and with the winter road construction crew near K'àątì as they had seen signs of dìga.

The second crew moved and established the 'winter road camp' on February 18 (Figure 9).The crew noticed more dìga activity in the area and harvested three dìga. This base camp was used until the program was done on March 20. The instructor from the Alberta Trappers Association was invited to join the harvesters to continue training, which included half a week with the second crew and the other half with the third crew. The third and fourth crews did not have any success harvesting dìga, however, the fourth crew did trap a wolverine.

Lessons Learned

Phase 1 (Community Meeting):

The meeting held with local harvesters and elders was not long enough and was felt to be rushed. More preparation would have been helpful, and a two-day meeting will be planned for next time.

Phase 2 (Trapper Training Workshop):

The trapper training workshop was well attended and perceived very well by all participants (Figure 10). This type of training should be done more frequently. One main concern from a couple of the participants was that it should have been taught by someone local, as they felt that someone from Alberta would have differing beliefs and experiences with different ecosystems. Nevertheless, collaboration and sharing of knowledge between Tłı̨chǫ and dìga harvesters from across the north and other parts of Canada should continue to be an important outcome of TG trapper training workshop.

Figure 10. Tłı̨chǫ hunters and instructor from Alberta Trappers Association with a harvested dìga pelt at the winter road camp, February 2020.

Phase 3 (Harvester Camps):

Further training on trapping and snaring techniques for harvesters would be helpful. Training on the use of GPS and inReach devices and field note taking is also needed. Developing and preparing effective baits for dìga is essential, including prepping bait prior to the season and using the best bait combination (i.e., rotting fish and meat). Preparation work should be done well in advance from when trapping season starts. Other preparatory work should include: cleaning and de-scenting traps and snares, identifying suitable base camp locations, continued training of participants, and ensuring all equipment, such as snowmobiles, sleds, chainsaws, are serviced and maintained.

A survey was done with some of the participants to get feedback and to identify ways to improve the program (Appendix 5). All the participants surveyed thought the program was well planned and organized, and some suggestions were provided including: making rotations longer (three weeks), having two base camps set up (one North of Snare Lake and one South of Snare Lake), each participant should have their own rifle, dìga carcasses should be kept in the ENR sea-can near the community airport, and crew members should come from the same community rather than mixing them up (people who work better with each other).

Kitikmeot Region, NU

Background

Beneficiaries of the NU Final Agreement have overlapping harvesting rights in parts of the NWT (Figure 11).The GNWT is coordinating with the GN to support NU harvesters to exercise their rights in the NWT by harvesting dìga on the winter ranges of the Bathurst and Bluenose-East caribou herds. When that harvest is within the GNWT's North Slave Wolf Harvest Incentive Area, NU dìga harvesters receive a payment of $900 from GNWT and $300 from GN. In 2020 NU harvesters took 57 dìga within their traditional use area. Thirty-eight of those harvests are represented in harvester questionnaires and thirty-five of those harvests received payment under the Enhanced North Slave Wolf Harvest Incentive Program.

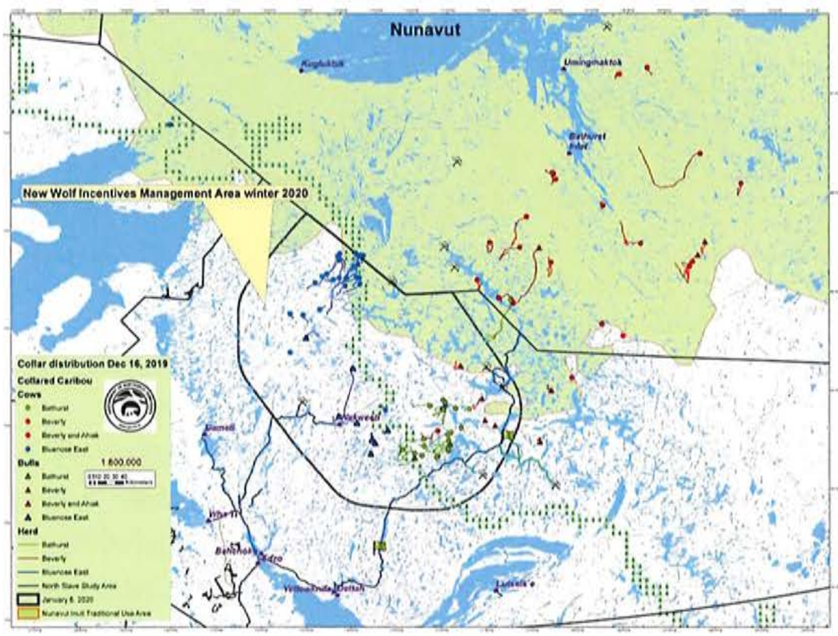


Figure 11. NU Inuit traditional use area within the North Slave Region.

Harvester Questionnaire Summary

Thirty-eight completed questionnaires (see Appendix 6) were submitted to ENR from the regional GN Department of Environment office in Kugluktuk, reflecting ten harvesting trips. The thirty-eight harvested dìga were taken by ten harvesters from Kugluktuk between February 24 and May 12, 2020. Most of those harvests took place near Contwoyto Lake just south of the NU-NWT boarder (Figure 12).

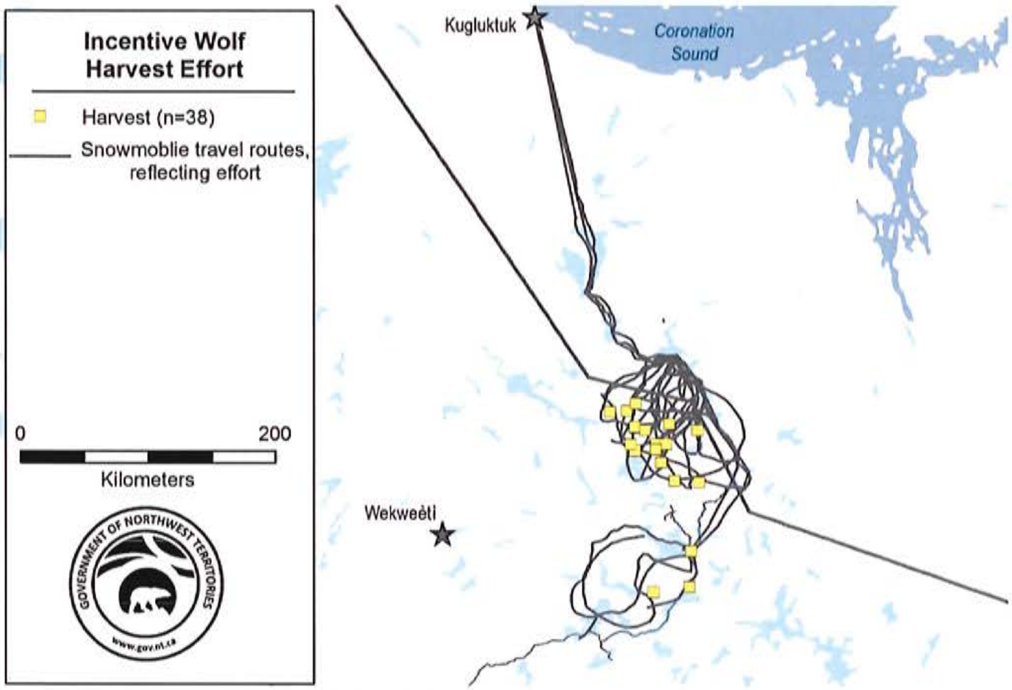


Figure 12. Travel routes of Kugluktuk harvesters February through May 2020.

Six to ten groups recorded their harvesting efforts only up to the seventh day of their harvesting trip (with trips ranging from eight to 33 days). One group recorded up to their tenth day of the trip (of 15 days), and one group did not report effort data (but reported three harvests). Based on reported travel start and end dates, in total, effort data are missing from 68 travel days. The collective total travel days based on the trip start and end dates, is 140 days.

Given this limitation, CPUE in km is calculated based on extrapolated travel distance based on reported travel routes. For CPUE in hours, extrapolated effort hours based on average reported harvesting hours are used for each group. Collectively, 88 dìga were seen by ten hunting groups comprising forty harvesters over 140 days.

CPUE: Distance

In aggregate, harvesters traveled at least 11,336 km to harvest 38 dìga in the Kitikmeot and North Slave Region, resulting in the CPUE of one dìga/298 km, or 3.35 dìga/1,000 km. On average, harvesters traveled at least 81 km/day (24 hours), and all traveled from Kugluktuk and hunted on snowmachines. In total, 88 dìga were seen by 40 harvesters, resulting in the encounter rate of 7.06 dìga/1,000 km (Table 7).

Table 7. CPUE: distance for NU harvesters that submitted questionnaires.

	Harvest/1,000 km	Seen/1,000 km
Min. estimated average CPUE (km)	3.35	7.06

CPUE: Time

The estimated total hours spent harvesting was 1,221 hours. This estimate was based on average reported hours spent per day extrapolated to unreported harvesting days. The estimated CPUE (hours) was one dìga/38 hours, or 0.75 dìga/24 hours. On average based on reported travel days, harvesters spent 8.72 hours per day searching/harvesting, and most stayed in the area near Contwoyto Lake across NWT-NU border. In total, 88 dìga were seen by 40 harvesters, resulting in an encounter rate of 0.08 dìga/hour or 1.88 dìga/24 hours (Table 8).

Table 8. CPUE: time for NU harvesters that submitted questionnaires.

	Harvest/24 hours	Seen/24 hours
Min. estimated Average CPUE (Hours)	0.75	1.88

Harvest Power

Based on maps/locations provided, we assumed that all Kugluktuk harvesters primarily traveled on snowmobiles from Kugluktuk to the Contwoyto Lake camp, which many used as a base camp. Search and hunt was done primarily from the snowmobiles. Therefore, we assumed that all harvesters had equal extent over which their effective hunting range extended.

Of the ten harvesting parties, one was a solo harvester, two were groups of two harvesters, one was a group of three harvesters, three were groups of five harvesters, one was a group of six harvesters, and one was a group of ten harvesters. The average size of a harvesting party was four harvesters/group. Addition of harvesters in a party is assumed to increase the party's harvesting power. Additional harvesters would increase the chance of spotting dìga and the number of dìga that could be harvested from a single pack. Estimating harvest power will require additional data from future surveys because encounter and harvest rates from this season's questionnaires were too low to conduct a reliable analysis.

Weather

The questionnaire includes a question about weather: "what was the weather like during your hunt? Did it make hunting harder?" Some qualitative descriptions of hunting conditions were obtained through responses to this question. However, the question did not elicit enough information to quantify the weather-related variability in the CPUE.

Qualitative descriptions provided by the harvesters include good, fair, clear, blizzard, overcast, flat light, rock snow, difficult to track, drifting snow, and whiteout. Harvesters' descriptions were categorized into "good" (no description of adverse weather conditions), "moderate" (mixed good and adverse weather conditions), and "poor" (only adverse conditions described). Two harvest trips occurred in "good" weather conditions, six in "moderate" conditions, and three occurred in conducted in "poor" conditions (Table 9).

Table 9. Summary of weather conditions report on questionnaires from NU harvesters.

	Good	Moderate	Poor
# of reported weather conditions	18	4	7
# of dìga harvested under weather conditions	7	25	6

Caribou Sightings

In total, harvesters reported sightings of between 2,307 and 3,500+ caribou. No harvesting party sighted zero caribou, none sighted one to 20 caribou, five parties sighted 101-500 caribou, two parties sighted 101-500 caribou, and four sighted over 500 caribou (Figure 13). All ten groups saw caribou remains.

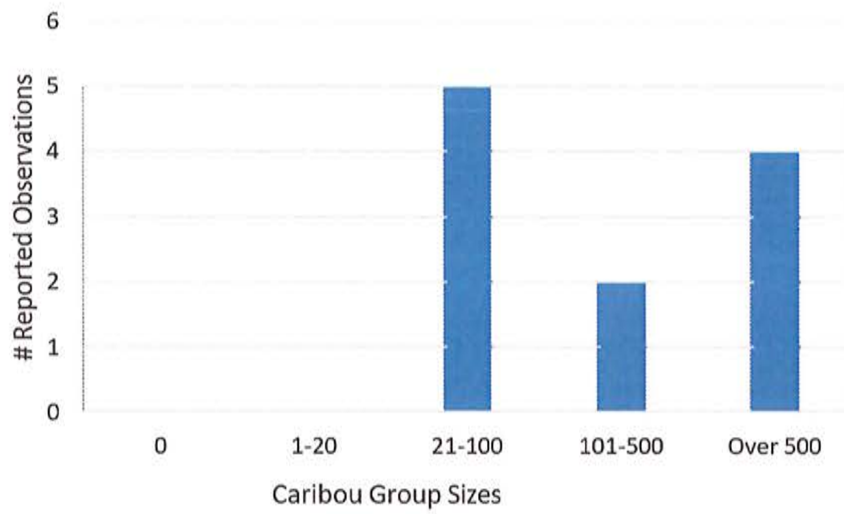


Figure 13. Estimated number of caribou seen by Kugluktuk harvesters in 2020.

Sightings of Other Animals

Six groups reported harvesting a total of eleven wolverines. Five groups reported harvesting a total of thirteen caribou. Over 50 muskoxen were observed by two groups. One group saw foxes.

Distribution of Harvesting

Figure 14 shows the number of harvesting parties active between January to March 2020, with most occurring in February. Some harvest in the Kitikmeot region occurred through to mid-May but questionnaires were not received. Overall, North Slave Region harvesters tended to hunt earlier in the season and Kitikmeot harvesters later perhaps reflecting the latitudinal difference and associated weather and snow condition differences in the Tibbitt-Contwoyto winter road area compared to Kugluktuk (Figure 14).

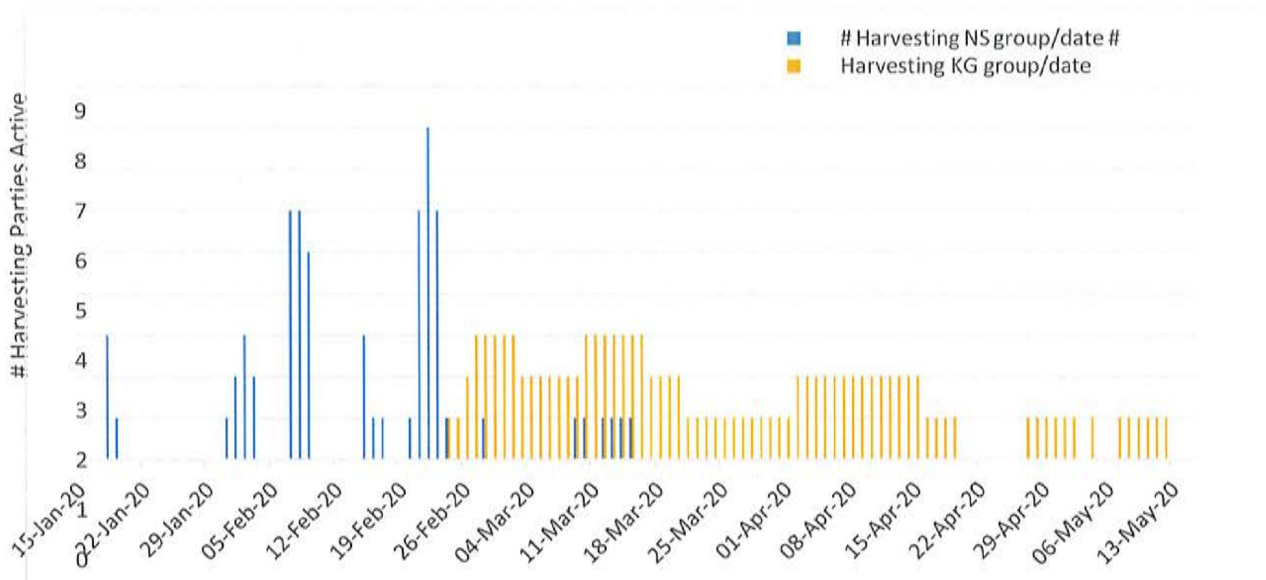


Figure 14. Number of North Slave (NS) and Kugluktuk (KG) harvesting parties active by dates.

Lessons Learned

See Lessons Learned in dìga ground-based harvest as most also apply to NU harvesters, although harvester return rates for questionnaires were far higher for Kugluktuk harvesters. An assessment of the approach taken by the GN Department of Environment Kitikmeot regional office may provide insights and guidance for how to overcome some of the apparent challenges in the North Slave Region in achieving higher completion and return rates.

Summary of Ground-based Removals

Total ground harvest of dìga within the North Slave Region in 2019-2020 consisted of 68 dìga harvested by NWT harvesters including the four Tłı̨chǫ harvests and 57 dìga harvested by NU harvesters from Kugluktuk for a total of 125 (Table 10). Harvest within the North Slave Wolf Harvest Incentive Area was only 18 dìga by NWT harvesters, largely reflecting the distribution of caribou away from the Tibbitt-Contwoyto winter road. Thirty-five dìga harvested by NU harvesters were within the North Slave Wolf Harvest Incentive Area and were largely accessed by snowmachine near a base camp at Contwoyto Lake.

Table 10. Total dìga harvest in North Slave Region by NWT and NU harvesters 2019-2020.

Regional Harvesters	Harvest within North Slave Wolf Harvest Incentive Area	Harvest Outside North Slave Wolf Harvest Incentive Area	Total Number Dìga Harvested
North Slave Region, NWT	18	50	68
Kugluktuk , NU	35	22	57
Total	53	72	125

Only a subset of harvesters submitted surveys in the North Slave Region and many of those from Kitikmeot harvesters provide a complete record of time and distance traveled. CPUE calculations were therefore of limited value this season. Lessons learned include revisions needed to the questionnaires to more accurately capture:

- effort (distance and time); and,
- more specifics on weather descriptors.

The Tłı̨chǫ trapper training workshop was well attended and perceived very well by participants. Recommendations included conducting harvester training frequently and perhaps by someone local, that might be more familiar with cultural sensitivities and the surrounding natural environment.

More engagement with a core group of harvesters and additional support may help them to more fully document and record their travel routes, time spent harvesting, along with the other types of observations that can be used for CUPE analyses. Increased interactions between harvesters and program staff may also help increase the timeliness of information submission. Lastly, more effort could be made to direct harvesters to areas of high dìga abundance when caribou are distributed away from winter road corridors.

WOLF REMOVALS – AERIAL SHOOTING

The overall approach for conducting aerial dìga removals was based on the following operational strategies:

1) define management areas for searching and removing dìga based on collar distribution of Bluenose-East and Bathurst caribou;
2) conduct fixed-wing aerial reconnaissance surveys of management areas in advance of helicopter-based removals to determine relative distribution and abundance of dìga;
3) direct and coordinate initial search effort of helicopter-based removal crew based on reconnaissance survey results and an additional spotter aircraft;
4) undertake removals of dìga with an experienced professional crew (i.e., pilot, marksman and handler) through aerial shooting from a helicopter; and
5) document all occurrences of aerial shooting, retrieve dìga carcasses from the field, and conduct post-mortem examinations to learn more about the dìga and assess humaneness.

Implementation of the first two strategies during the Pilot Program are described and results discussed in Aerial Surveys. The third and fourth strategies are described and discussed in Aerial Removals through an overview and assessment of search effort and dìga removed from the helicopter-based aerial shooting. With a focus on the humaneness and effectiveness of aerial shooting, the fifth strategy is described and discussed in section Dìga Necropsies.

Aerial Surveys

A main goal of dìga management is to improve survival and population growth rates for the Bluenose-East and Bathurst caribou herds. As such, we used the distribution of caribou collar locations during the 2020 winter period to delineate and prioritize areas for aerial removal of dìga. Our underlying assumption was that distribution and abundance of dìga during the winter period would be related to that of caribou. Secondly, we presumed that aerial removal of dìga within the main winter range distributions of collared Bluenose-East and Bathurst caribou would increase likelihood of a targeted and beneficial effect of improved survival for the respective herds.

Based on the landscape-level distributions of collared Beverly caribou relative to collared Bathurst caribou in early and mid-winter, i.e., November 2019 - February 2020 (Figure 15), we anticipated that a low proportion (<25%) of collared Beverly caribou would occur within the distribution of the Bathurst herd for the aerial dìga removal period (i.e., March 15 - April 31, and subsequently extended to May 15).

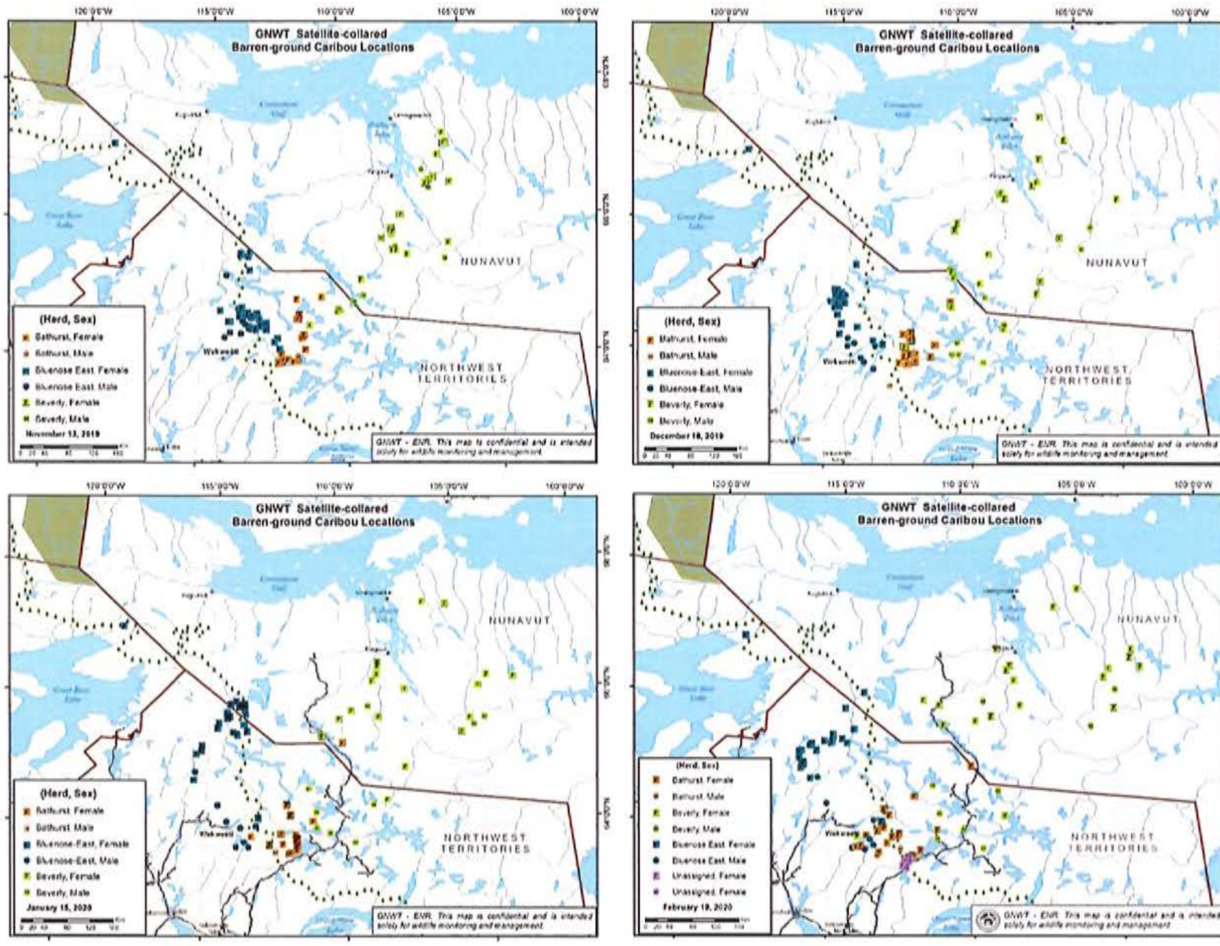


Figure 15. Mid-month distributions of collared caribou from Bluenose-East, Bathurst and Beverly herds, November 2019 - February 2020.

Aerial removal areas were delineated based on the distribution of collared Bluenose-East and Bathurst caribou respectively, which in turn represented the areas of highest expected relative densities of caribou and dìga to occur. For each of the Bluenose-East and Bathurst winter ranges, survey areas were delineated in March based on buffered minimum convex polygons of collared caribou to establish focal areas prior to deploying aerial shooting of dìga.

The goal of fixed-wing aerial surveys in winter was to provide information on caribou densities and associated dìga, which in turn would be used to plan aerial removal effort. We conducted systematic fixed-wing surveys to estimate relative abundance, distribution, and density of caribou and dìga, which were then used to plan search areas for the aerial shooting crew. All fixed-wing surveys were flown in a de Havilland turbo (DHC-2) Beaver, with a pilot, navigator, and one or two rear-seat observers (depending on staff availability). On and off-transect wildlife observations were directly entered into a computer tablet by the navigator; GPS locations and aircraft speed were recorded simultaneously when observations were entered into the tablet. Survey design was for a total strip width of 1 km (500 m per side), with a targeted aircraft speed of ~160 km/h, and an altitude of 150 m above-ground-level. Fixed-wing surveys were repeated in April to update information on relative caribou and dìga abundance.

Bluenose-East - Survey 1

We delineated the initial survey areas for the Bluenose-East winter range based on collar locations of known[2] Bluenose-East caribou on March 13, 2020. Survey strata A and B were identified based on the distribution of eight and 13 Bluenose-East collared caribou respectively (Figure 16). A 15 km buffer was added to a MCP that enclosed the respective locations of collared caribou. Survey transects were distributed within the respective survey strata to achieve coverages of ~35% and ~20% respectively (Figure 17).

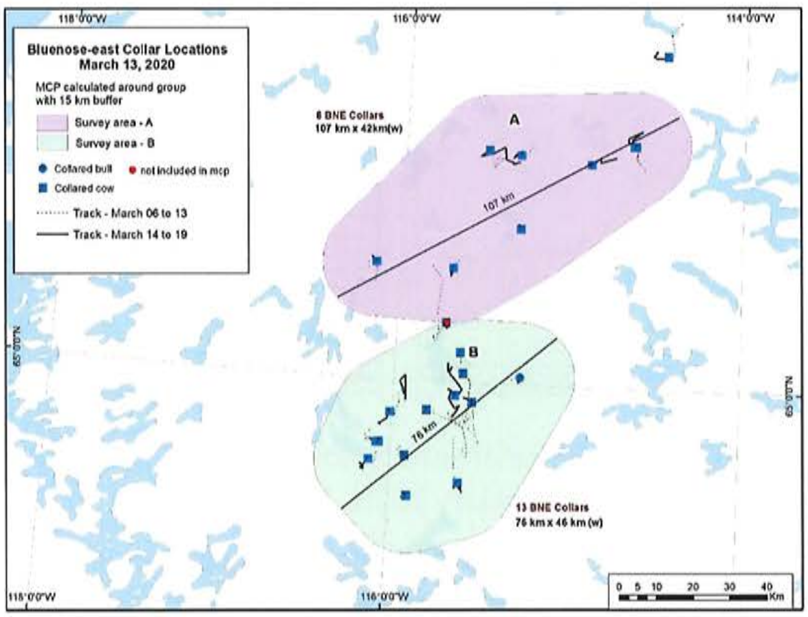


Figure 16. Locations of collared Bluenose-East caribou collars used to delineate an aerial survey of Bluenose-East caribou winter range, March 2020.

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[2] Collared caribou described as "known" refers to caribou that have been assigned to one of the three herds (Bluenose-East, Bathurst or Beverly) based on their distribution during a previous June calving period (cows) or fall rutting period (bulls). Caribou that were recently collared in winter 2020 had an "unknown" herd designation until their locations were observed during the subsequent calving or rutting period.

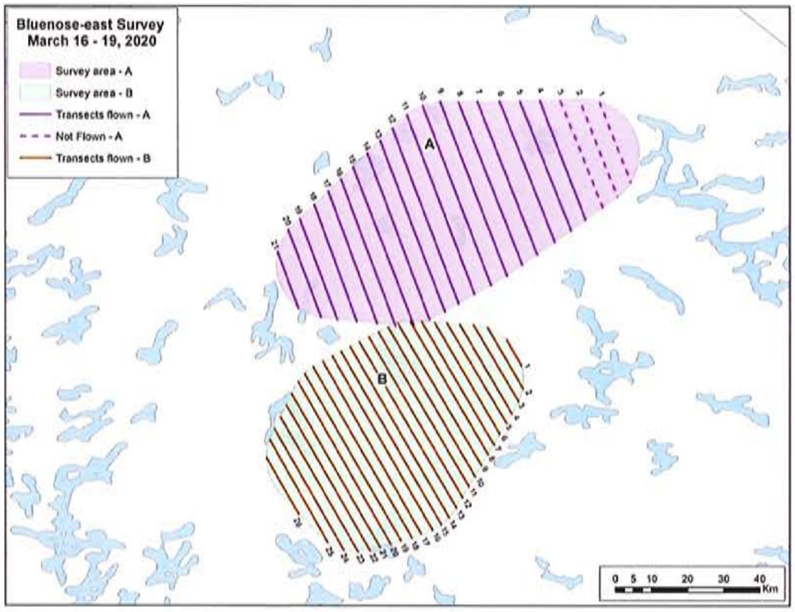

Figure 17. Transects allocated to systematic survey strata in Bluenose-East caribou winter range, March 2020.

The first Bluenose-East aerial survey was flown from the March 16-19, 2020, with 18 and 25 transects flown in strata A and B respectively (Figure 18). The survey crew included a pilot, navigator and two observers. Based on counts of 889 and 2,048 caribou on-transect observations (Figure 19), a total of 10,357 (±1,788 SE) caribou were estimated within the two strata, with a corresponding 95% confidence interval ranging from 6,706-14,008 caribou, and a coefficient of variation of 17.3% (Table 11).

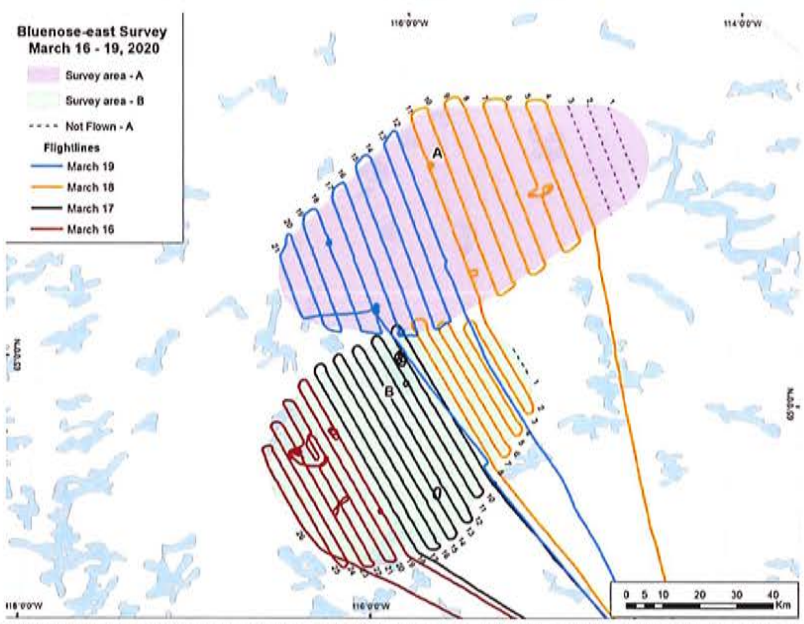

Figure 18. Flight lines in survey strata of Bluenose-East caribou winter range, March 16-19, 2020.

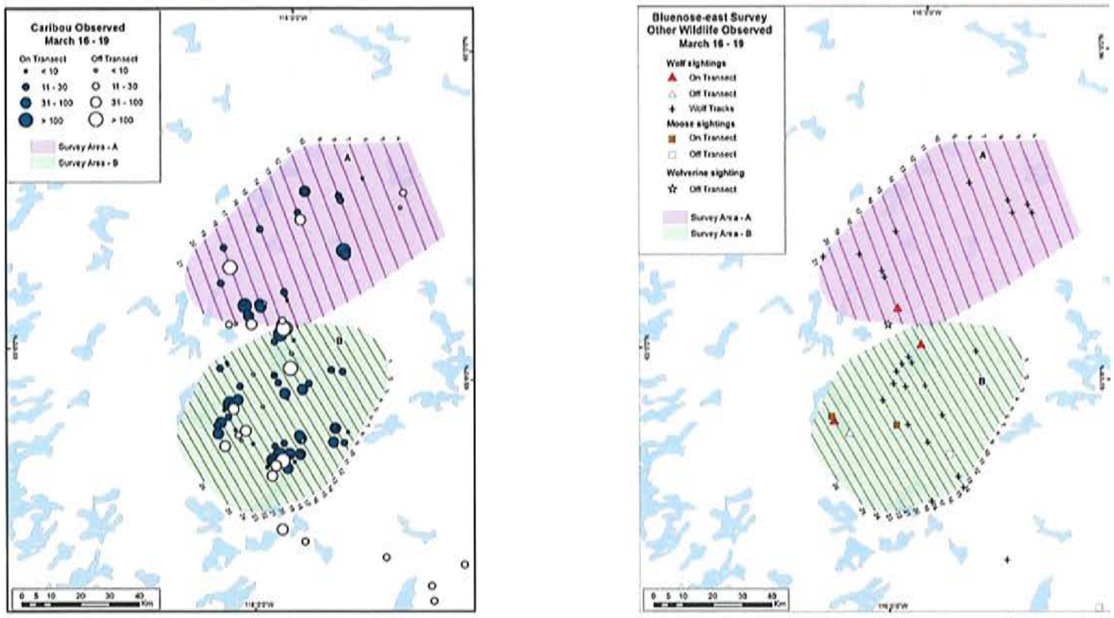

Figure 19. Caribou and other wildlife observations from systematic survey in Bluenose-East caribou winter range, March 16-19, 2020.

Table 11. Estimates of caribou and dìga in Bluenose-East winter survey area, March 16-20, 2020.

	Caribou			Dìga		
Stratum	Stratum A	Stratum B	Total Area	Stratum A	Stratum B	Total Area
Area (km²)	3,709	3,207	6,916	3,709	3,207	6,916
Transects	18	25	43	18	25	43
% Coverage	20.6%	34.0%	26.8%	20.6%	34.0%	26.8%
Total Animals Observed	889	2,048	2,937	7	8	15
Density (#/km²)	1.1662	1.8808	1.4976	0.0092	0.0073	0.0084
Estimate	**4,325**	**6,032**	**10,357**	**34**	**24**	**58**
Lower 95% CI	1,371	3,736	6,706	0	0	0
Upper 95% CI	7,280	8,327	14,008	99	55	129
Variance	1,960,133	1,236,886	3,197,019	942	233	1175
SE	1,400	1,112	1,788	31	15	34
CV	32.4%	18.4%	17.3%	90.3%	63.6%	59.1%

A total of seven and eight dìga were observed on-transect in strata A and B respectively, and one dìga off-transect in stratum B (Figure 19). On-transect dìga observations included three groups of two, six and seven animals respectively. The estimate of 58 (±34 SE) dìga was highly imprecise with a coefficient of variation of 59.1% (Table 11). The minimum count was 16 dìga and the estimate had an upper 95% confidence interval of 129 (Table 11).

The two observers in the survey aircraft identified a dìga-kill site, and total sightings of 25 dìga tracks in the two survey strata with two of the observed tracks noted to be off-transect

(Figure 19). Other wildlife observed included one wolverine and six moose (Figure 19, Table 12).

Table 12. Summary of wildlife observations in Bluenose-East (BNE) and Bathurst (BAH) winter survey areas, March – May 2020.

Survey Area (Date)	Transect (On/Off)	Caribou	Dìga	Dìga (Tracks)	Dìga (Kill Site)	Grizzly Bear	Grizzly Bear (Tracks)	Wolverine	Moose	Muskox
BNE 1	On	2,937	15	23	1	0	0	0	2	0
6,934 km²	Off	1,419	1	2	0	0	0	1	4	0
(16-19 Mar)	Sum	4,356	16	25	1	0	0	1	6	0
BNE 2	On	2,199	1	3	4	0	2	1	1	0
3,514 km²	Off	1,533	1	1	0	0	0	0	1	0
(20-26 Apr)	Sum	3,732	2	4	4	0	2	1	2	0
BAH 1	On	664	2	1	0	0	0	0	9	46
10,025 km²	Off	932	0	0	0	0	0	0	1	0
(28-31 Mar)	Sum	1,596	2	1	0	0	0	0	10	46
BAH 2	On	567	0	1	1	1	1	0	0	12
5,506 km²	Off	931	0	0	0	0	0	0	1	0
(29 Apr & 4 May)	Sum	1,498	0	1	1	1	1	0	1	12

Bluenose-East - Survey 2

A second survey area of the Bluenose-East caribou winter range was delineated based on locations of 12 known Bluenose-East collared caribou and 19 recently collared caribou on April 6, 2020 (Figure 20). A 2 km buffer was applied to the MCP around the collar locations. Survey transects were distributed to provide coverage at ~40%.

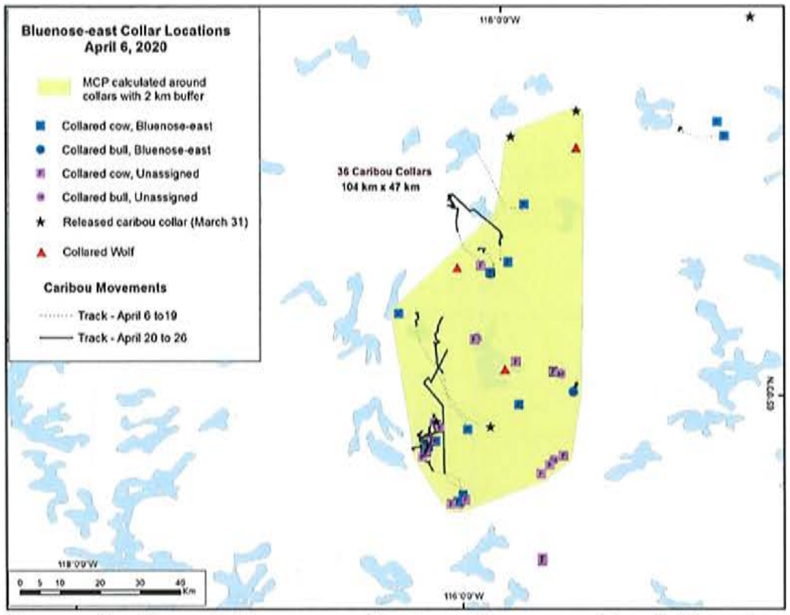

Figure 20. Locations of collared Bluenose-East caribou used to delineate an aerial survey of Bluenose-East caribou winter range, April 20-26, 2020.

The second Bluenose-East aerial survey was flown from the April 20-26, 2020. The survey crew comprised a pilot, navigator and one observer. Since two weeks had elapsed since the survey strata was delineated based on collar locations, four transects (#6-9) were extended to the west and east, seven transects (#25-31) were extended to the west to include recent collar movements. The five southernmost transects were not flown (Figure 21). Also, a small area (stratum 2) to the northeast of the main survey area (stratum 1) was delineated around two collared Bluenose-East caribou, and four transects were flown to search the stratum (Figure 21).

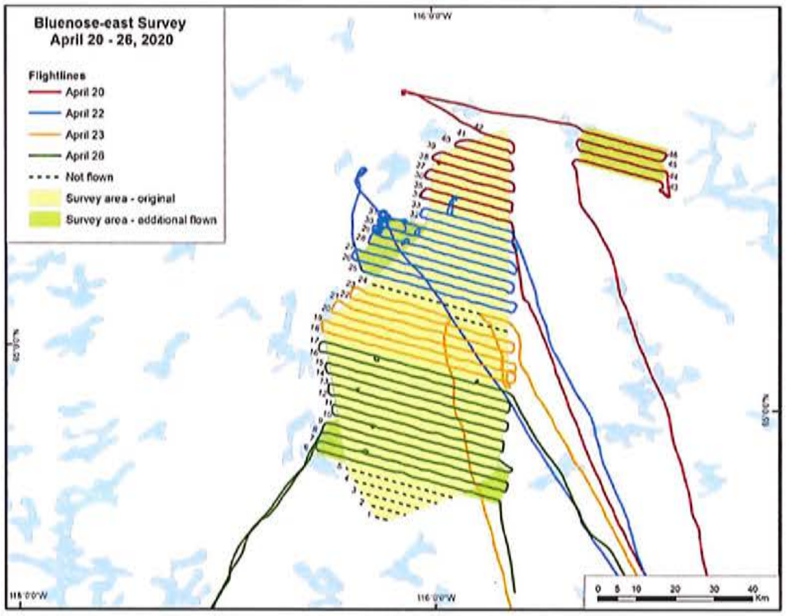

Figure 21. Flight lines in survey strata of Bluenose-East caribou winter range, April 20-26, 2020.

A total of 2,104 caribou were observed on 37 transects in stratum 1, and an additional 95 caribou were counted on the four transects in stratum 2 (Figure 22, Table 12). The total estimate of caribou for the two strata was 5,532 (±1,892 SE), which had a 95% confidence interval ranging from 1,692-9,373, with a coefficient of variation of 34.2% (Table 12).

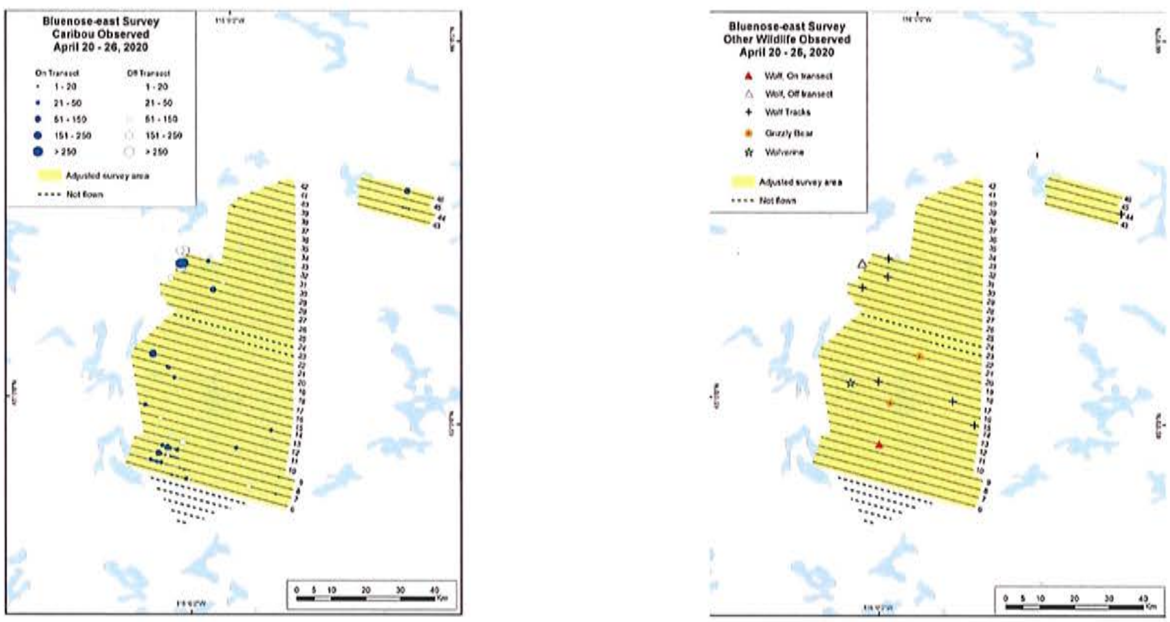

Figure 22. Wildlife observations from systematic survey in Bluenose-East caribou winter range, March 20-26, 2020.

Table 13. Estimates of caribou and dìga in Bluenose-East winter survey area, April 20-26, 2020.

	Caribou			Dìga		
Stratum	Stratum 1	Stratum 2	Total Area	Stratum 1	Stratum 2	Total Area
Area (km²)	3,300	214	3,514	3,300	214	3,514
Transects	36	4	40	36	4	40
% Coverage	38.0%	41.0%	38.2%	38.0%	41.0%	38.2%
Total Animals Observed	2,104	95	2,199	1	-	1
Density (#/km²)	1.6765	1.0820	1.6403	0.0008	-	0.0008
Estimate	**5,532**	**232**	**5,764**	**3**	-	**3**
Lower 95% CI	1,692	-	1,921	-	-	-
Upper 95% CI	9,373	590	9,607	7	-	7
Variance	3,578,559	12,662	3,591,221	4	-	4
SE	1,892	113	1,895	2	-	2
CV	34.2%	48.5%	32.9%	67.1%		67.1%

Only one on-transect dìga observation was reported in stratum 1, which resulted in an imprecise estimate of 3 (±2 SE) dìga, and a coefficient of variation of 67.1%. Other dìga sightings included one dìga off-transect, four dìga tracks and four kill sites. Other wildlife seen included one wolverine, two moose and two sets of grizzly bear tracks (Figure 22 and see Table 12).

Bathurst - Survey 1

The first survey area for the Bathurst winter range was delineated based on the locations of 16 known collared Bathurst caribou and nine newly collared and unassigned caribou on March 19, 2020 (Figure 23). The delineated stratum also included five Bluenose-East caribou. Survey transects were allocated to sample the strata with a coverage of ~30%, which reflected available aircraft hours for the survey.

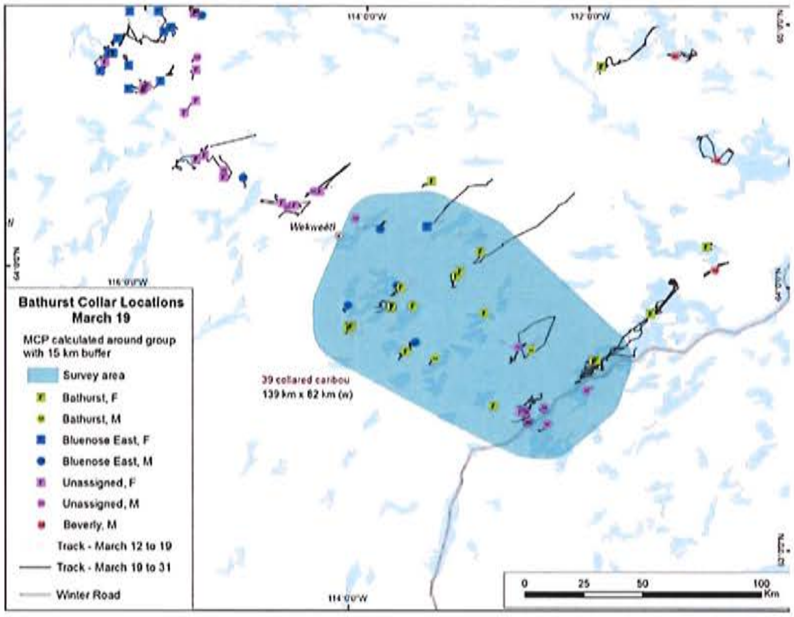

Figure 23. Locations of collared Bathurst caribou collars (March 19, 2020) used to delineate an aerial survey of Bathurst caribou winter range, March 28-31, 2020.

The first Bathurst aerial survey was flown from March 28-31, 2020. The survey crew (pilot, navigator and two observers) sampled 42 transects within a stratum area of 10,025 km² to achieve coverage of 29.7% (Figure 24). Observers counted 664 caribou on-transect, which resulted in an estimate of 2,235 (±478 SE) caribou (Table 15, Figure 25). The estimate had a corresponding 95% confidence interval ranging from 1,270-3,200 caribou, and a coefficient of variation of 21.4% (Table 14).

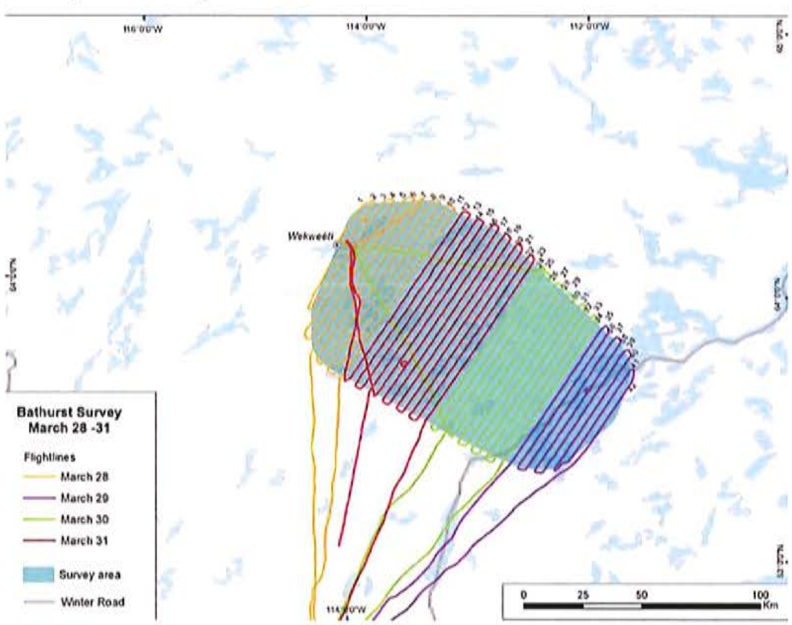

Figure 24. Flight lines in survey strata of Bathurst caribou winter range, March 28-31, 2020.

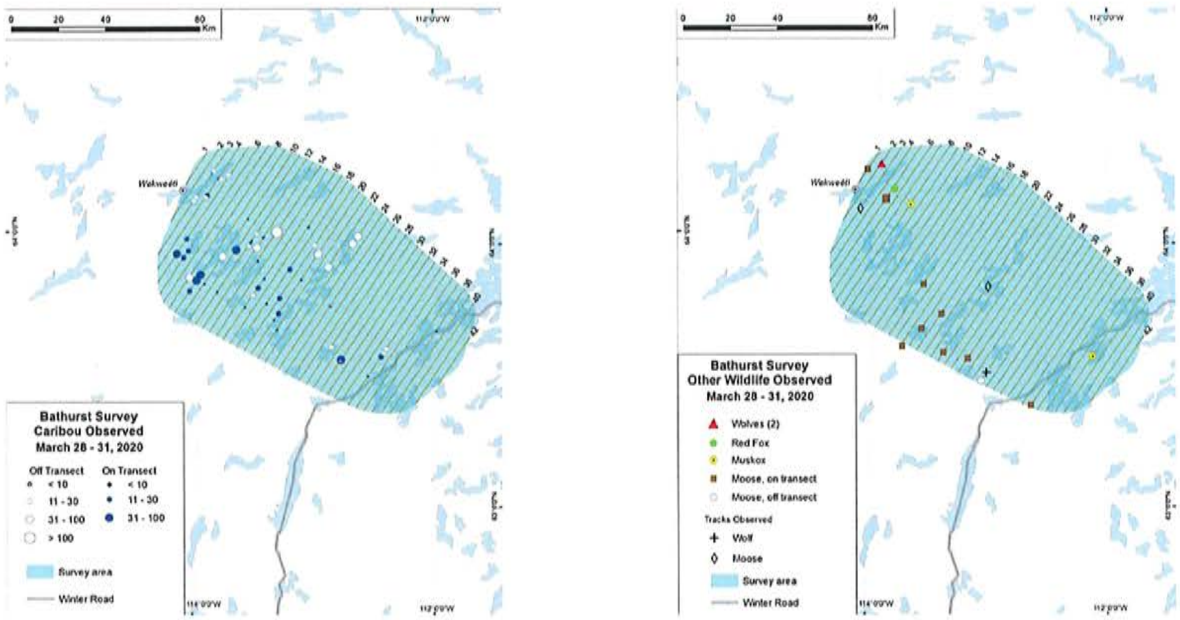

Figure 25. Wildlife observations from systematic survey of Bathurst caribou winter range, March 28-31, 2020.

Table 14. Estimates of caribou in Bathurst winter survey area (March 28-31, 2020).

Stratum	Caribou Stratum	Dìga Stratum
Area (km²)	10,025	10,025
Transects	42	42
% Coverage	29.7%	29.7%
Total Animals Observed	664	2
Density (#/km²)	0.2230	0.0007
Estimate	**2,235**	**7**
Lower 95% CI	1,270	-
Upper 95% CI	3,200	18
Variance	228,243	31
SE	478	6
CV	21.4%	79.5%

Table 15. Estimates of caribou in Bathurst winter survey area, April 29 and May 4, 2020.

Stratum	Caribou Stratum	Dìga Stratum
Area (km²)	5,506	5,506
Transects	27	27
% Coverage	25.2%	25.2%
Total Animals Observed	567	0
Density (#/km²)	0.4080	0
Estimate	**2,246**	**0**
Lower 95% CI	1,766	-
Upper 95% CI	6,415	-
Variance	672,574	-
SE	820	-
CV	36.5%	-

Observers saw a group of two dìga on-transect, which resulted in an estimate of seven (±6 SE) dìga. The estimate had an upper 95% confidence interval of 18 and was highly imprecise with a coefficient of variation of 79.5% (Table 14).

Other wildlife sightings included ten moose (seven singles and one pair on-transect and one single off-transect) and 46 muskoxen (on-transect groups of six and 40 respectively) (Figure 25 and see Table 12). The survey crew reported one set of dìga tracks but no kill sites from dìga, nor did they observe any sign of wolverine or grizzly bear.

Bathurst - Survey 2

The survey area for the second Bathurst winter range survey was delineated from collar locations of known Bathurst caribou on April 27, 2020. One survey stratum was delineated based on the distribution of ten known collared Bathurst caribou and 24 newly collared caribou respectively (Figure 26). A 10 km buffer was added to a MCP that enclosed the respective locations of those collared caribou. There was one collared Beverly female caribou and two collared Bathurst bulls within the delineated area (Figure 26). Survey transects were distributed within the respective survey strata to achieve ~25% cover (Figure 27).

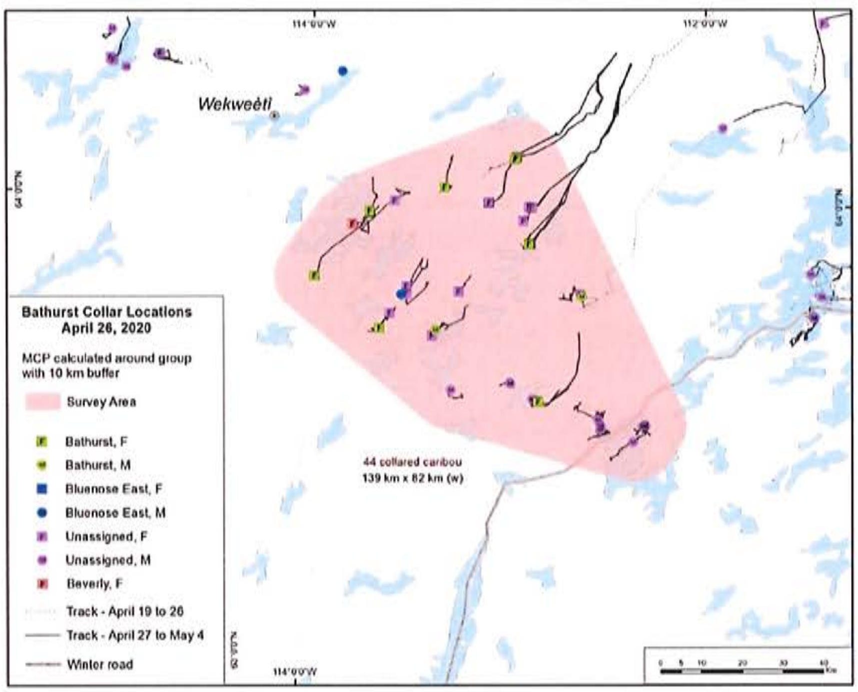

Figure 26. Locations of collared Bathurst caribou collars used to delineate an aerial survey of Bathurst caribou winter range, April 29 and May 4, 2020.

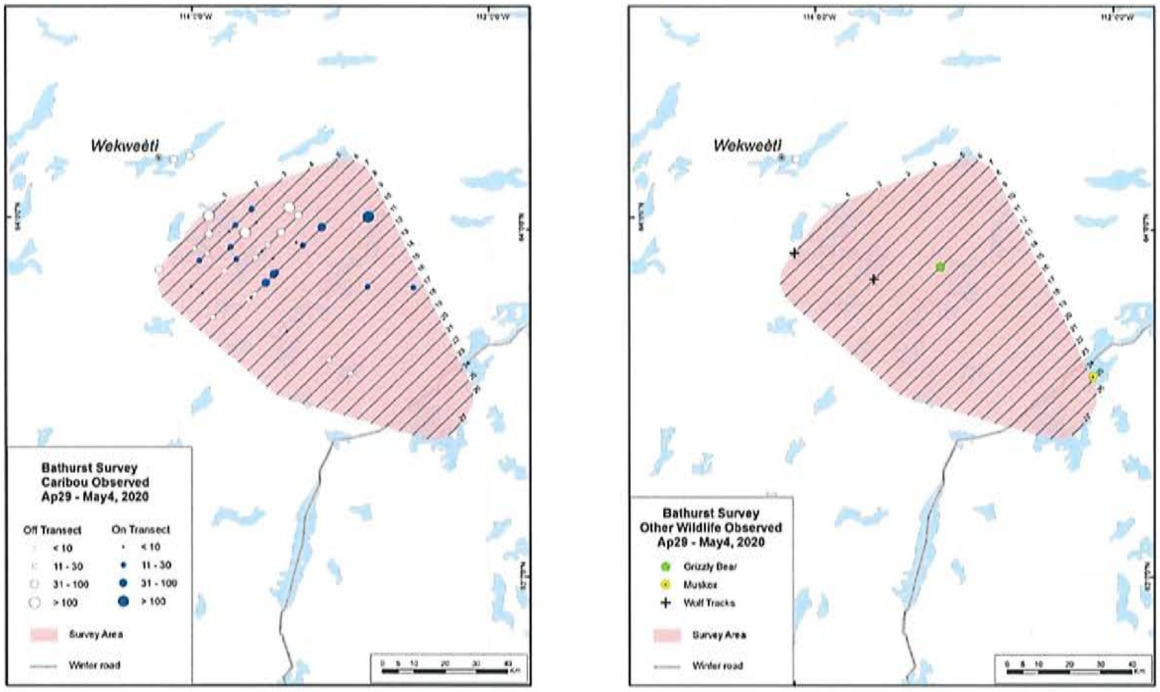

Figure 27. Wildlife observations from systematic survey in Bathurst caribou winter range, April 29 and May 4, 2020.

The second aerial survey of the Bathurst winter range area was flown on April 29 and May 7, 2020, with a pilot, navigator and one observer. Inclement weather caused a four-day delay between the start and completion of the two-day survey. A total of 567 caribou were observed on 27 transects resulting in an estimate of 567 (±820 SE) caribou (Table 15, Figure 28). The estimate had a coefficient of variation of 36.5%, with a 95% confidence interval ranging from 1,766-6,415 caribou (Table 15).

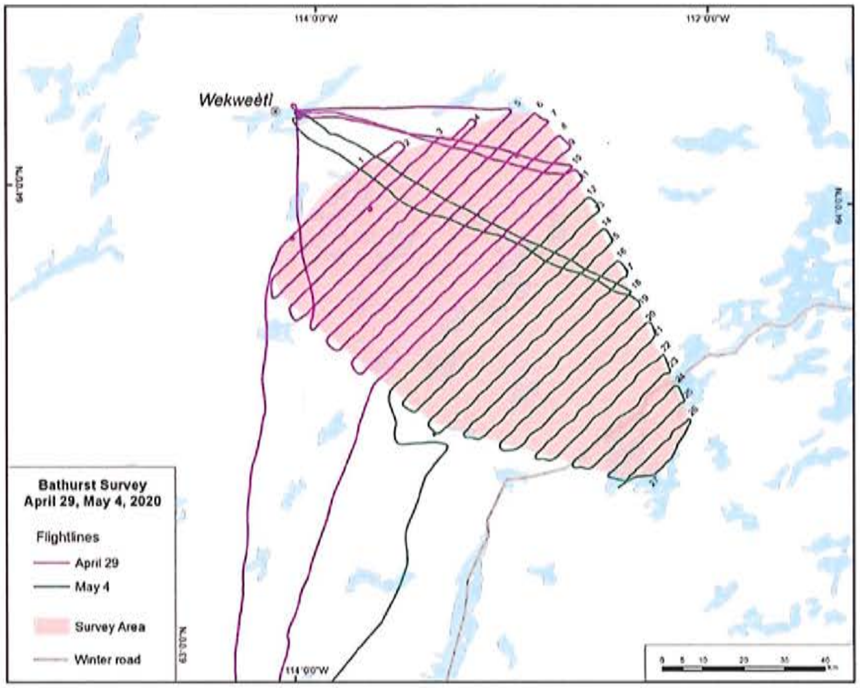

Figure 28. Wildlife observations from systematic survey of Bathurst caribou winter range, April 29 and May 4, 2020.

No dìga were observed during the survey, although a set of dìga tracks and a kill-site likely from dìga was reported. Other wildlife observations included a grizzly bear, a set of grizzly bear tracks and 12 muskoxen (Figure 28 and see Table 12).

Caribou Winter Range Surveys in March and April/May 2020 and Dìga Observations

Two fixed-wing aerial surveys were flown for the Bluenose-East and Bathurst winter range areas respectively in winter and early spring 2020, for a total of four surveys. The first surveys occurred in mid-late March, and the second surveys were flown in late April; an exception was the second Bathurst survey that was initiated in late April but due to poor weather conditions, the second and final day of flying occurred four days later in early May.

Caribou were the most abundant ungulate observed during the surveys, with more caribou observed in the Bluenose-East survey areas than in the Bathurst areas (Table 12). Low numbers of moose were observed in all surveys of Bluenose-East and Bathurst winter range areas and muskoxen were seen only during the Bathurst surveys. The March Bluenose-East survey estimated 10,357 caribou, which was almost twice the estimate of caribou compared to the late April Bluenose-East survey estimate of 5,532. The difference in estimates was largely due to the smaller survey area in April, which was ~53% the size of the March survey area. Caribou densities between the two Bluenose-East survey areas were similar with the average density being ~1.57 caribou/km^2. Average density of caribou in the two Bluenose-

East surveys were approximately five times greater than the average density of ~0.32 caribou/km^2 observed in the Bathurst survey area.

There were low occurrences of dìga observed during the surveys, with total dìga observations (on and off-transect) ranging from one to 16. Dìga tracks were consistently observed, with the greatest number observed during the first Bluenose-East survey (25 on and off-transect sightings). Across all four surveys sightings of grizzly bears, grizzly bear tracks and wolverine were rare (i.e., one to two) or absent (Table 12).

Sightability of wildlife is a key source of bias in aerial surveys. The strip-transect surveys conducted in winter 2020 were primarily designed for caribou, and so the results are relatively reliable for interpreting abundance estimates of caribou in winter at the densities observed. In contrast, interpreting dìga counts and estimates from strip transect surveys is difficult due to the inherent low densities of dìga on the landscape and the challenge of consistently seeing dìga, especially if they are stationary, bedded or occur in partially treed habitats.

Thus, rather than interpreting the dìga observations and derived estimates from the transect surveys as accurate empirical estimates of population density, it is instructive to consider the relative occurrence of dìga and dìga sign, and the sighting rates of dìga from the surveys as a relative index of abundance. In this context, there are two apparent patterns in the data worth noting. The first is that there were more dìga in the Bluenose-East winter range survey areas than in the Bathurst areas. The second is that there were more dìga observed during the first surveys in mid-late March, than the second surveys conducted in late April.

Several non-independent patterns exist or are suggested in the survey data that support an assertion that there were more dìga on the Bluenose-East winter range than on the Bathurst. In addition to the higher total numbers of dìga and dìga sign seen on and off-transect for the Bluenose-East (Table 16), the sighting rate of dìga observed per hour of survey effort was higher for the two Bluenose-East surveys than the Bathurst surveys. On average, the dìga sighting rate was ~13 times higher in the Bluenose-East surveys compared to the Bathurst surveys (i.e., 0.67 versus 0.05 dìga/h in Table 17). The higher sighting rate of dìga for the two Bluenose-East surveys occurred despite a comparatively lower survey effort for the two Bluenose-East (24.6 hours) versus the two Bathurst surveys (29.1 hours) (Table 17).

Table 16. Dìga sighting rates (dìga/h) from fixed-wing aerial surveys of Bluenose-East (BNE) and Bathurst (BAH) winter survey areas, March -May 2020.

Aircraft: de Havilland Turbo Beaver

		Aircraft Velocity* (km/h)			Aircraft Time (h)			Dìga Observations‡		
Survey	Observer(s)†	Mean	SD	n	Ferry	Survey	Total	Total	Wolf/h	Mean (Wolf/h)
BNE 1	2	172	14.8	117	8.8	13.8	22.6	16	1.2	0.67
BNE 2	1	158	14.5	88	18.2	10.8	29.0	2	0.2	
BAH 1	2	169	11.3	88	9.0	19.8	28.8	2	0.1	0.05
BAH 2	1	166	19.2	58	6.2	9.3	15.5	0	0.0	
				Sum	42.2	53.7	95.9	BNE / BAH ratio		13.3
				Percent of Total Time	44%	56%	100%			

† Surveys with a single observer were due to limited availability of personnel

* Aircraft velocity was recorded by a Global Positioning System (GPS) for wildlife observations

SD = standard deviation; n = sample size

‡ Total wolves observed on and off transect within survey area; Wolf/h = Total wolves / Survey time (h)

Table 17. Caribou and dìga densities from Bluenose-East (BNE) and Bathurst (BAH) surveys.

Survey	Survey Dates	Area (km²)	Caribou Estimate	Caribou / km²	Dìga Estimate	Dìga / km²	Dìga / 1000 km²
BNE 1	16-19 Mar	6,916	10,357	1.4976	58	0.0084	8.39
BNE 2	20-26 Apr	3,514	5,532	1.6403	3	0.0008	0.80
average				**1.5689**		0.0046	**4.59**
BAH 1	28-31 Mar	10,025	2,235	0.2230	7	0.0007	0.70
BAH 2	29 Apr & 4 May	5,506	2,246	0.4080	0	0.0000	0.00
average				**0.3155**		0.0004	**0.35**
BNE/BAH observed density ratio				**5.0**			**13.1**

Like the pattern of higher dìga sighting rates, the density estimates of dìga in the winter areas were ~13 times greater for the Bluenose-East compared to the Bathurst surveys (Table 18). The higher apparent density of dìga on the Bluenose-East survey areas corresponds with a fivefold higher density of caribou observed in the Bluenose-East areas compared to the Bathurst. The observed differences in caribou densities from the winter range surveys likely reflect differences in population sizes – the June 2018 populations estimates were 19,294 (±1,475 SE) (Boulanger et al. 2019) and 8,207 (±1,079 SE) (Adamczewski et al. 2019) for the Bluenose-East and Bathurst herds respectively. As highlighted by Klaczek et al. (2016), tundra dìga that primarily prey on migratory ekwǫ̀ will decline numerically in association with caribou abundance. Therefore, the density of dìga on the Bluenose-East range should be comparably higher than on the Bathurst range. Despite the low sightability of dìga on strip-transect surveys, the lower number of dìga sightings on the Bathurst surveys was consistent with the numerical decline in caribou abundance.

Table 18. Number of dìga removed by aerial shooting by herd and month, 2020.

Winter Range	April	May	Totals	Female	Male
Bluenose-East	21	-	**21**	8	13
Bathurst	9	6	**15**	8	7
Totals	**30**	**6**	**36**	**16**	**20**

Notwithstanding the low number of dìga sightings across the four surveys, the other notable pattern in the dìga sighting data was that there were fewer dìga and dìga sign seen in the late April survey in both the Bluenose-East and Bathurst winter range areas. However, this interpretation is weakened by the low number of dìga sightings and confounded by the number of observers on the survey crew because the first surveys had two observers and the second surveys had one observer (Table 17).

Nevertheless, a broader temporal-spatial pattern of caribou distribution and movement indicated that the mid-late March surveys occurred when caribou distribution was relatively stable (Figure 29). In comparison, the timing of the late April surveys occurred at the initiation of the spring migration of Bluenose-East and Bathurst caribou (Nagy 2011, Gunn et al. 2013). Previous studies and knowledge from experienced harvesters (A. Niptanatiak, Kugluktuk, NU) have described tundra dìga initiating their spring movements to denning areas in advance of the caribou spring migration (Kelsall 1968), and the direction of movement to denning areas may not correspond to caribou movements (Hansen et al. 2013). It is likely that the reduced sightings of dìga in the survey areas in late April – early May was partly a result of dìga moving out of the survey area. Indeed, Walton et al. (2001) monitored 23 collared dìga on the Bathurst caribou range in the late 1990s and reported median dates (range) of arrival for collared dìga to their denning areas and summer ranges as May 1 (April 8 – May 11) in 1998, and April 18 (March 31 – May 12) in 1999.

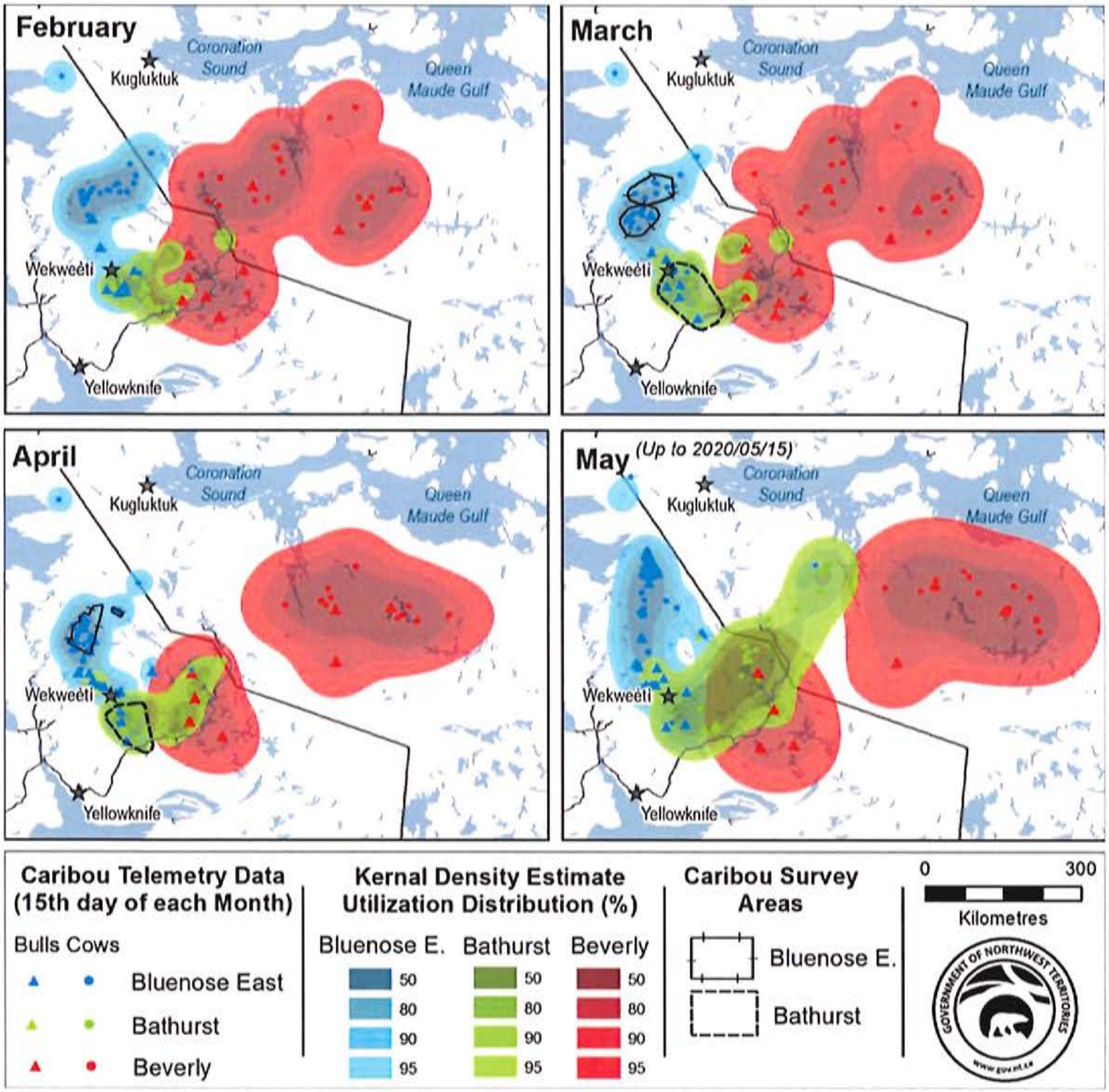

Figure 29. Aerial survey areas relative to distribution of Bluenose-East, Bathurst and Beverly caribou herds in winter and early spring 2020.

Discussion

As part of the 2020 Pilot Program, two strip-transect surveys were flown on the Bluenose-East and Bathurst winter ranges, respectively, in March and late April, to provide estimates of caribou density and associated abundance of dìga. The average observed caribou density for the Bluenose-East winter ranges (1.57 caribou/km^2) was approximately five times greater than caribou densities observed in the Bathurst winter ranges (0.32 caribou/km^2). These observed caribou densities are similar to the range reported by Mattson et al. (2009) who conducted a stratified random survey of Bathurst caribou winter range in February and March 2006 and estimated average densities of 1.81 caribou/km^2 and 0.51 caribou/km^2 in high and low caribou concentration survey cells respectively. Strip-transect surveys of ekwǫ̀ from the northeast mainland of the NWT in May 1983 and 1995 reported average densities of 0.35 caribou/km^2 (Heard et al. 1986) and 0.23 caribou/km^2 (Buckland et al. 2000). In contrast, Parker (1973) reported an average of 18.1 caribou/km^2 from strip-transect surveys of the Qamanirjuaq caribou winter range in northwestern Manitoba and northeastern Saskatchewan.

The winter 2020 strip-transect surveys showed low overall dìga densities on the winter ranges, although densities were higher on the Bluenose-East winter range areas than the Bathurst range areas. Abundance of dìga and dìga tracks was highest during the March Bluenose-East survey (0.0084 dìga/km^2, or 8.4 dìga/100 km^2). Observed differences between sightings of dìga tracks in the March Bluenose-East versus the April Bluenose-East surveys could have been due to fewer observers, observer experience, or more likely that wolves have moved out of survey area. Dìga movements out of a survey area are a potential source of bias for late winter surveys; survey timing relative to dìga movement patterns (i.e., collared dìga) and large survey areas should be considered and assessed to understand observed changes in dìga abundance.

Aerial strip transect surveys are generally well suited for estimating caribou densities and were unsurprisingly found to have poor application for estimating dìga abundance. Results of the four surveys showed that dìga estimates from strip-transect surveys had poor precision and low power to detect change. Estimates from strip transect surveys are based on seeing animals on transect. Thus, the behaviour and distribution of dìga contributes to high variation and low precision in strip-transect surveys: dìga are easily missed especially if they are not moving and occur within a treed environment, they occur at low density, and are aggregated in their distribution, i.e., individuals occurs in packs. Based on strip-transect survey results, we suggest that dìga survey methodologies should be developed and adopted that emphasize searching for dìga tracks and dìga after recent snow to reduce bias and improve reliability of results.

Aerial Removals

Dìga removal actions were undertaken with two helicopters, with a shooting crew in one aircraft (helicopter 1) and a spotter/processing crew in the other (helicopter 2). The two aircraft worked as a team and coordinated their search effort throughout the day to optimize the search time for the shooting crew. Search areas were generally defined by the locations of collared dìga and the survey strata delineated for the fixed-wing surveys (see Aerial Surveys).

On the Bluenose-East winter range area, initial search patterns of the two helicopter crews used locations of 15 bait-camera stations set out on April 22 (Figure 41). Each helicopter would opportunistically check the bait-camera stations for signs of dìga activity. The helicopters were flown at low level (~25-75 m above ground level) in meandering patterns based on topography and tree cover and personnel would look for dìga and dìga sign – fresh tracks and kill sites. When fresh dìga tracks were seen, the helicopter crew would follow the tracks until they caught up to the dìga.

Over a 19-day period, extending from April 22 – May 10, a total of 36 dìga were removed: 21 from the Bluenose-East range, and 15 from the Bathurst winter range area (Figure 30).

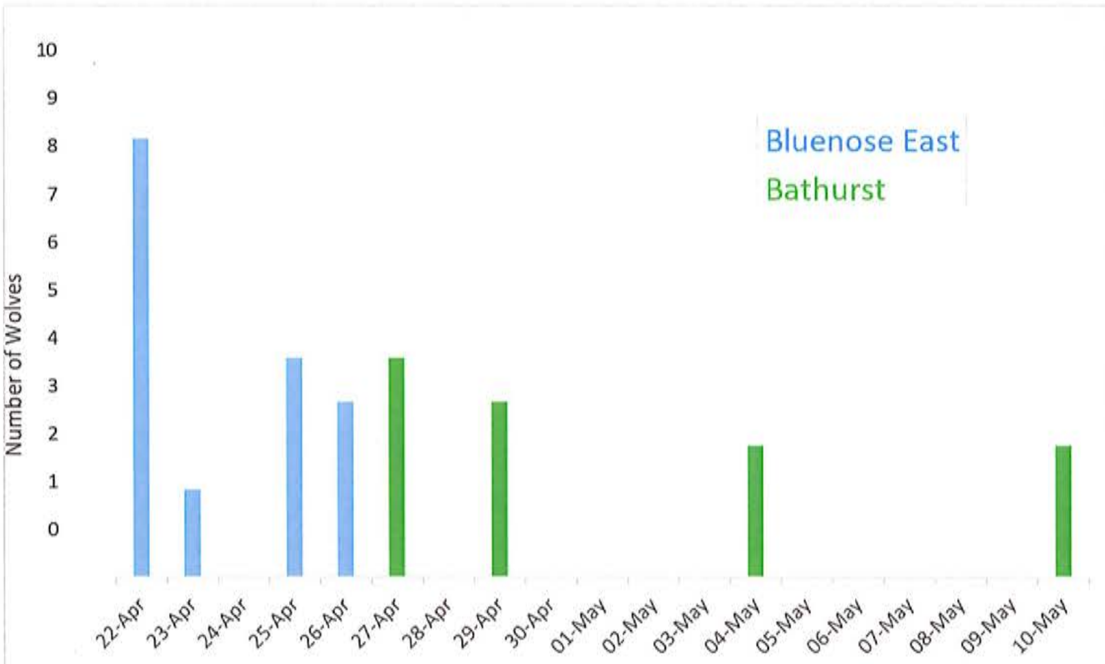

Figure 30. Number of dìga removed by aerial shooting on the Bluenose-East and Bathurst ranges in April and May.

Aerial Shooting of Dìga

Dìga in a pack were shot by the marksmen in helicopter 1. After shooting the dìga, the helicopter 1 crew would pick up carcasses and place them at a central location and provide the coordinates to the crew in helicopter 2; the helicopter 1 crew would then continue on its search pattern for dìga and dìga sign. Upon landing at the kill location, the helicopter 2 crew processed the dìga carcasses; dìga were tagged, field samples and photographs were taken, and then carcasses were individually placed in separate heavy plastic bags to avoid any leakage of blood or body fluids on to personnel or equipment.

This general approach was also applied on the Bathurst winter range, but since there were no bait stations set out, the two helicopter crews used search patterns based initially on expected caribou densities but then quickly updated based on field conditions, observed caribou densities, and sightings of dìga sign and dìga.

During field operations, the shooting crew documented the operational details of the removal process. The navigator/handler recorded details on pack size, chase times, number of shots fired, time until death, kill location, and other wildlife in area. This information was recorded on a data form (Appendix 7). When packs were encountered, efforts were made to ensure that all dìga were removed. All dìga removed were brought back to Yellowknife and immediately frozen. Tłı̨chǫ and Yellowknife trappers subsequently skinned the carcasses and utilized the pelts.

Chase times were recorded by the field crew, with wolves typically dispatched within a minute of the initiation of each pursuit. For the 30 chase times where the "time to death" classification was ranked, the designation of "Immediate" was selected 22 times, and "0-2" minutes selected eight times. None of the categories involving more than two minutes were selected.

During the subsequent necropsy of these dìga, an independent assessment of the shooting injuries and was led and conducted by an independent Wildlife Pathologist (see Assessing Humaneness of Dìga Removals Based on Post-mortem Examinations).

The specific terms and conditions on how the field operations were to be carried out, were outlined under an ENR Wildlife Management Permit.

Aerial Search Effort

The search effort in the Bluenose-East range was primarily guided by our understanding of current caribou distribution obtained from collar location data and from fixed-wing systematic surveys. Figures 31 and 32 show flight lines for helicopter 1 (shooting crew) on the left, and helicopter 2 (support crew) on the right, for the Bluenose-East and Bathurst winter range areas respectively. As shown, most flight lines occurred within the winter range utilization distribution areas for April.

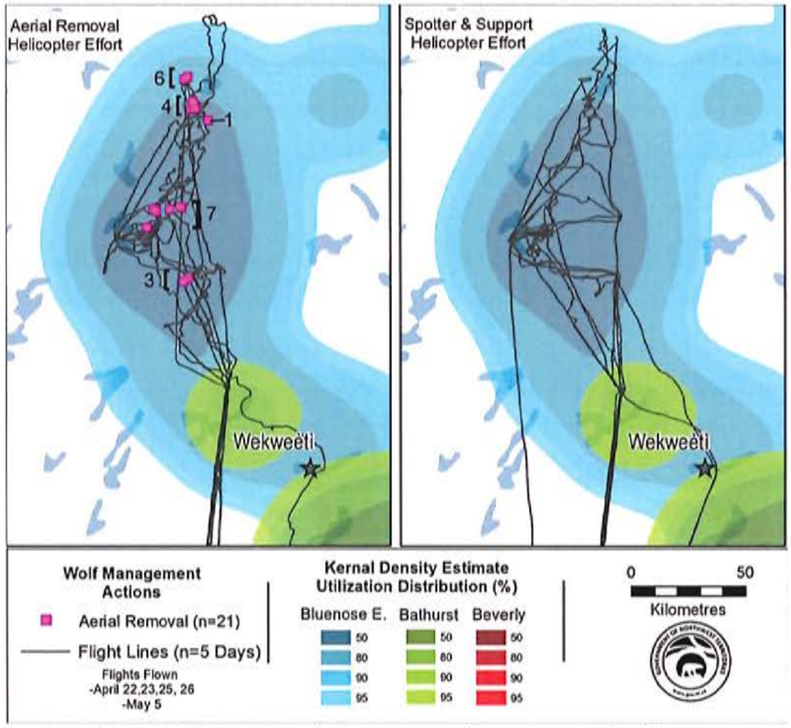

Figure 31. Flight paths of aerial removal crews and support helicopter on Bluenose-East winter range area, April - May 2020.

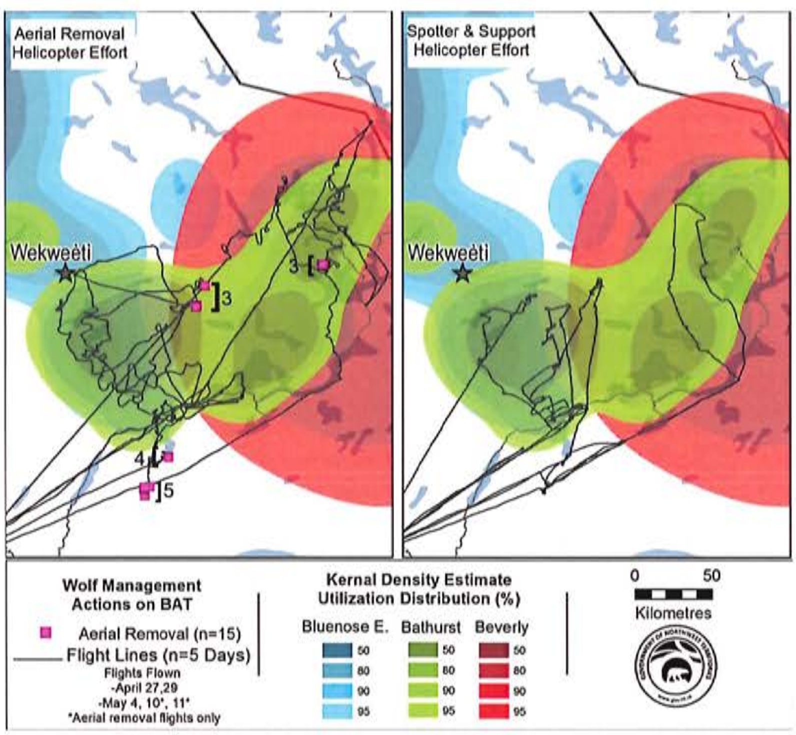

Figure 32. Flight paths of aerial removal crews and support helicopter on Bathurst winter range area, April - May 2020.

Helicopter coverage on the Bathurst range primarily focused on the core wintering area. An area to the south of the Bathurst winter range was searched during daily ferrying flights from Yellowknife. As well, a brief flight to the north was undertaken to check for dìga and dìga sign that may be associated with caribou trails and cows at the leading edge of the spring migration (Figure 32).

Out of a possible 31 days, the aerial removal crew was unable to fly due to weather on 19.5 days and due to mechanical issues on one day which resulted in a total of ten days of flying. The location of the dìga aerial removals in April and May are shown in Figure 33.

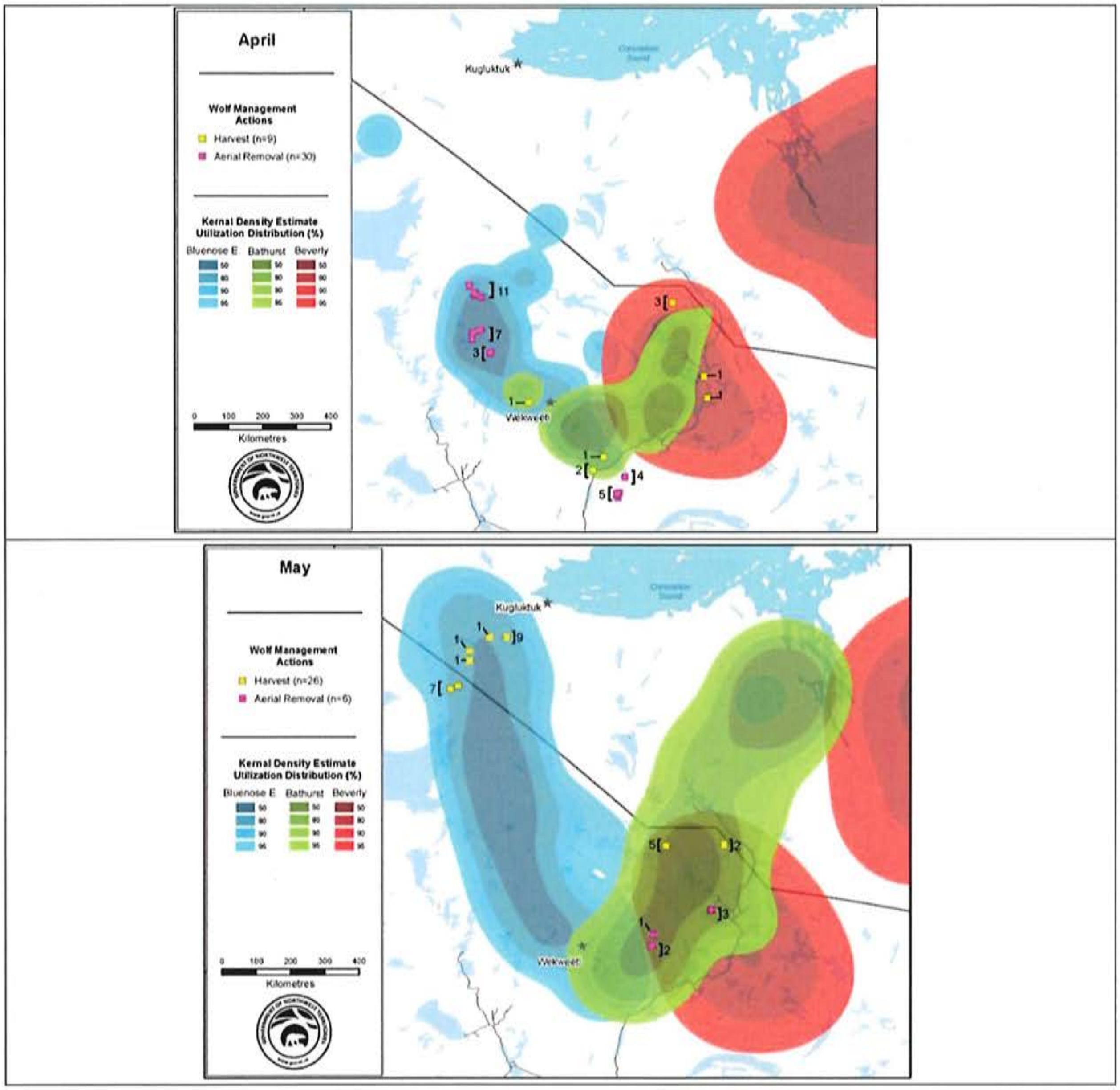

Figure 33. Location of aerial dìga removals on the Bluenose-East and Bathurst ranges in April and May.

During the aerial removal effort from April 22 - May 17, four days of helicopter time was largely devoted to checking out previously documented dìga den locations (circa 1996-2019) for current signs of activity. The den locations and flight lines flown on May 10, 11, 12 and 17 are represented in Figure 34. No active dìga dens, or dìga, were observed during this survey effort. On May 10 during a brief northern flight that was not part of the survey of dìga dens, the helicopter 1 shooting crew located and removed three dìga.

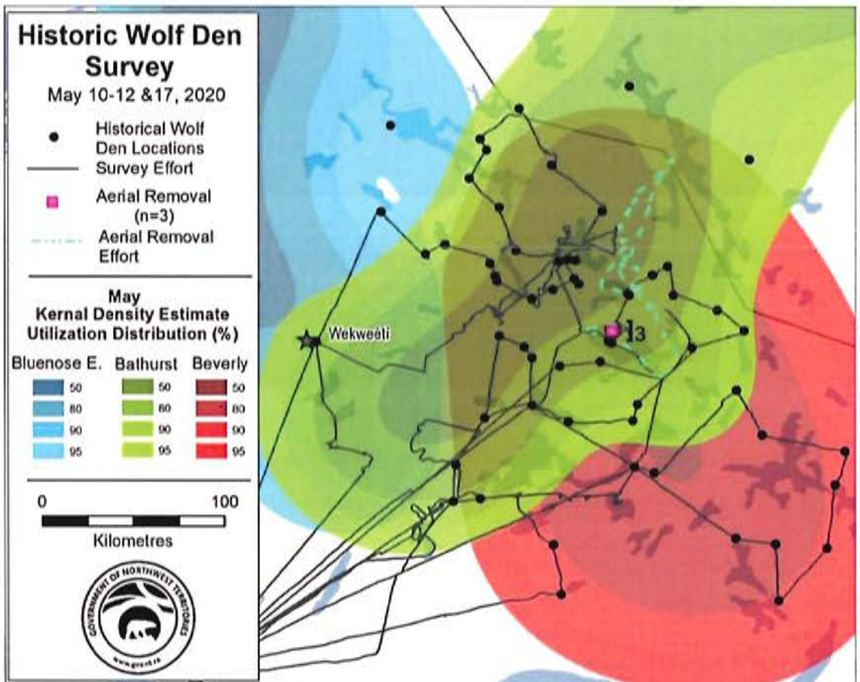

Figure 34. Dìga dens on the Bathurst caribou range visited during aerial dìga removal.

On the Bluenose-East winter range area, the two helicopter crews actively searched for dìga on April 22, 23, 25 and 26, as well as on May 5 (see Table 19). Dìga were observed and aerial shooting occurred on four of the five days of flying. A total of 21 dìga were removed by aerial shooting. The total time spent searching by helicopter 1 was 20.1 hours, which resulted in an average kill rate of 1.05 dìga/hour. For those same days, helicopter 2 flew a total of 21.0 hours, which when added to the effort of helicopter 1, resulted in an average kill rate between the two aircraft of 0.51 dìga/hour.

Table 19. Summary of aerial removal effort on the Bluenose-East and Bathurst caribou winter range areas.

Winter Range Area	Hours of Search Effort[a]	# Dìga Removed	Dìga per Hour flown
Bluenose-East[b]			
Helicopter 1 (Shooting crew)	20.1	21	**1.05**
Helicopter 2 (Support)	21.0		
Combined effort	41.1		0.51
***Bathurst*[c]**			
Helicopter 1 (Shooting crew)	21.5	15	**0.70**
Helicopter 2 (Support)	15.7		
Combined effort	37.2		0.40
Both Helicopters - Den Survey[d] (Check historical dìga den sites)	16.6	0	0

Notes:

[a] Search time on winter range; Excludes ferrying time, positioning to and from Yellowknife

[b] Bluenose-East - dates flown: April 22, 23, 25, 26 and May 5

[c] Bathurst - Conventional search effort: April 27, 29, May 4 and on May 10

[d] Bathurst - Survey of older dìga dens; flown on May 10-12, 17

On the Bathurst winter range area, the helicopters flew on six separate days from the April 27 to the May 12. A total of 15 dìga were removed. The average kill rate based on the cumulative search effort (21.5 h) of helicopter 1 was 0.70 dìga/hour. When the cumulative search effort of helicopter 2 (15.7 h) was added to the shooting crew's effort, the average kill rate was 0.40 dìga/hour.

From Table 18 it is worth noting that search effort for helicopter 1 and 2 crews in the Bluenose-East area was similar (20.1 h and 21.0 h respectively), whereas in the Bathurst area search effort by the shooting crew was 1.4 times that of the spotter/processing crew (21.5 h and 15.7 h respectively). Despite the difference in hours searched by the two aircraft, the main trends in the data were that the aerial removal kill rates were ~1.3-1.5 times higher on the Bluenose-East winter range areas than in the Bathurst areas; the lower rate in the range is a comparison of the combined effort, and the higher rates is based on comparing helicopter 1 rates only.

Another result from this preliminary assessment was that aerial search time allocated to routes based on historic den sites did not result in any dìga seen or killed. This may have been a result of poor conditions, i.e., flat light (overcast) and blowing snow reduced sightability of dìga and dìga tracks, or that there were fewer dìga in the search area.

Further assessment of these data on helicopter search times and dìga kill rates is ongoing to explore additional trends and uncertainties.

During aerial shooting flights through April and May, a total of 36 dìga were removed from Bluenose-East and Bathurst winter ranges; 16 females and 20 males (Table 18). Over a 19 day period, from April 22 – May 10, 36 dìga were removed on the Bluenose-East and Bathurst caribou winter ranges. Twenty-one dìga were removed on the Bluenose-East range between April 22 and April 26. Fifteen dìga were removed on the Bathurst range between April 27 and May 10.

DÌGA NECROPSIES

ENR conducted necropsies of dìga carcasses submitted by harvesters at the end of every harvest season to compile baseline data on the general health and condition of dìga. The same process was used for conducting necropsies on the dìga harvested under the Enhanced North Slave Wolf Harvest Inventive Program and the 2020 Pilot Program.

A standard wildlife necropsy form (Appendix 8) outlines the biological data collected from each dìga. Information collected includes whole and skinned body weights, contour length, tail length, neck girth, chest girth, femur length, and rump fat thickness. Skull measurements taken included zygomatic width, condylobasal length and total skull length. Approximate age was assessed based on the appearance of tooth wear according to Gipson et al. 2000, as well as additional corresponding features such as presence of thymic tissue and size of the uterus if present. A premolar tooth was collected for laboratory aging by cementum analysis. Body condition was assessed on a semi-quantitative ranking scale (0-4) of subcutaneous and visceral fat stores. Biological samples were also collected for analysis and archiving, including tongue, hair, muscle, femur, spleen, stomach contents, liver, kidney and fat samples.

For the 2019/2020 harvest season, dìga carcasses were received from several sources in the North Slave Region. Carcasses were catalogued as they were submitted to ENR and kept frozen until necropsy. Due to the COVID-19 pandemic in mid-March, processing of carcasses was delayed, and some analyses are ongoing.

Based on available information, 64 dìga were harvested by community members in the North Slave Region (Cluff 2020). The sex ratio of these 64 dìga was 32 males, 32 females, and two unknown sex. An additional four dìga (sex unknown) were harvested by non-resident sport hunters, and one female dìga was road-killed at the Ekati™ Diamond Mine, resulting in a total of 69 dìga removed via ground-based harvesting in 2019-2020 - across the North Slave Region.

Carcasses and harvest information were not obtained for the four dìga harvested by two non-resident sport hunters near the end of March in the North Slave Wolf Harvest Incentive Area. Efforts are underway to contact these hunters to obtain the gender of these dìga.

Biological Characteristics and Condition of Dìga

Due to NWT COVID-19 public health orders, some laboratory analyses were delayed and the compiled necropsy data were not available at time of writing. Key priorities for lab analysis included completion of stomach content analyses and tooth aging. Closer review and analysis of this data set were to be carried out in the fall of 2020.

Assessing Humaneness of Aerial Shooting Dìga Based on Post-mortem Examinations

In carrying out aerial removal actions, it was important they be carried out using best practices to ensure dìga were harvested in an effective and humane manner. It was also important to conduct full post-mortem examinations using established process and protocols. Full necropsies of dìga carcasses from the Pilot Program were conducted by an independent board-certified wildlife pathologist (H. Fenton). A complete report of post-mortem results was completed, peer-reviewed and was available in the fall of 2020[3].

In addition to compiling routine morphological and condition data, information was collected to document and assess animal injuries to help assess the humaneness of dìga removals (Appendix 8). Carcasses were examined following approaches used by Urquhart and McKenzie 2003, with bullet wounds identified based upon criteria outlined by Hollerman et al. 1990. This included an examination of the skull, neck, spine, pelvis, limbs thoracic cavity, and abdomen for evidence of fractures, hemorrhage, bruising and edema.

A total of 36 skinned dìga carcasses from the aerial removal dìga management program were necropsied, including 21 males and 15 females. Nine females (60%) were pregnant and six (40%) females were not pregnant. One pregnant female had evidence of mammary development and near-term fetuses. A total of 35 dìga had been shot with a shotgun and one was dispatched with a rifle. All dìga that were shot at were killed, and all carcasses were recovered from the field. The majority (n=31; 86%) of dìga examined were determined to be in adequate body condition with average (combination of external and internal) rank scores ≥2.

No parasites were detected within the lungs or hearts. A small number of nematodes were recovered from the esophagus, stomach, and within the abdominal cavity from animals with punctures through the intestines (possibly *Toxocara* sp.) that were considered incidental findings. A small number of dìga had evidence of previous injuries (e.g. healed bony calluses, particularly on the ribs) and pathologies (e.g. evidence of degenerative joint disease and marked tooth wear) that were considered to be unrelated to aerial shooting and interpreted to be related to intra- or interspecific aggression, other causes of blunt trauma and normal age-related findings. Some dìga (n=17 or 47%) had evidence of tooth lesions where the dentin (pink layer of the tooth) was visible. These lesions could be related to normal wear or improper development of the outer (enamel) layers of the teeth, which suggests potential exposure to canine distemper virus during tooth development (Dubielzig et al. 1981).

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3 https://wrrb.ca/sites/default/files/Final%20Wolf%20Aerial%20Removal%20Vet%20Assessment%201Oct20.pdf

We anticipate that further investigation of the skulls and evidence of previous exposure to viruses from the blood strips (i.e., serology) will help assess overall health of the dìga examined.

At least one presumed fatal permanent wound tract (i.e., killing shot) was documented in 35/36 (97%) of cases. In four cases, two fatal permanent wound tracts were observed with a primary tract interpreted to have caused unconsciousness the fastest. Most animals (n=21 or 58.3%) had chest wounds, followed by neck (n=12 or 33.3%) and head injuries (n=2 or 5.6%). Of the chest injuries, a puncture wound in the heart was detected in 12/21 (43%) cases, while only lung injuries were detected in 9/21 (57%) cases. The results of the presumed fatal permanent wound tract are summarized in Table 20.

Table 20. Presumed fatal permanent wound tract in aerial dìga removal carcasses.

Chest	Head	Neck	Unknown	Total
(21) 58.3% (9 lung; 12 heart)	(2) 5.6%	(12) 33.3%	(1) 2.8%	(36) 100%

DÌGA REMOVAL TARGETS

The main goal of dìga management actions on the winter ranges of the Bluenose-East and Bathurst caribou ranges is to reduce dìga abundance sufficiently over multiple years so that predation of caribou by dìga is reduced enough to increase survival, stabilize herd trend and subsequently stimulate measurable herd growth. To achieve this goal, specific and measurable objectives are needed that define the number of dìga that should be removed. This section highlights work that was undertaken through the Pilot Program to refine these dìga removal targets.

A key uncertainty in defining dìga removal targets was that there are no available direct estimates of dìga populations that are associated with either the Bluenose-East or Bathurst herds. Thus, in the absence of empirical dìga population estimates, we derived dìga estimates based on ungulate biomass indices (UBI).

Using Caribou Biomass to Estimate Dìga Abundance

In his review of eight dìga population studies in North America, Keith (1983) initially reported that rates of increase in dìga populations are primarily determined by the per-capita biomass of the ungulate food supply. Subsequent reviews by Fuller (1989) and Fuller et al. (2003) included additional studies (n=24, and n=32 respectively) and reaffirmed that most of the variation in dìga abundance was related to ungulate biomass. To estimate dìga abundance at regional and provincial scales in British Columbia, Kuzyk and Hatter (2014) modified Fuller et al.'s (2003) ungulate biomass regression model by applying a curvilinear equation (with an intercept of zero) and removed six data points where dìga densities were independent of ungulate biomass (see Appendix 10). Kuzyk and Hatter (2014) suggested that because of the inherent challenge and expense of estimating dìga abundance over large areas (>20,000 km^2), applying an indirect method to estimate dìga based on a widely accepted relationship between ungulate biomass and density of dìga (i.e., the ungulate biomass regression model) may be adequate for most management purposes at a regional scale.

Direct methods to derive empirical estimates of dìga across seasonal or annual ranges of ekwǫ̀ herds have not been established in either the NWT or NU (see WFATWG 2017), so we applied Kuzyk and Hatter's (2014) ungulate biomass regression model to achieve two objectives:

1) estimate an "expected" number of dìga within the Bluenose-East and Bathurst winter range areas based on observed caribou densities from the respective March 2020 aerial surveys, when caribou movements and distribution were relatively stationary; and

2) develop a range of plausible dìga population estimates based on empirical (2018) and projected (2020) estimates for the Bluenose-East, Bathurst and Beverly caribou herds respectively.

For the first objective, the estimated number of caribou was converted to a UBI for the two March survey areas. The ungulate biomass regression equation was applied to estimate dìga density (Kuzyk and Hatter 2014):

$$y = 5.4x - 0.166x^2$$

where y = dìga density (dìga/1,000 km^2) and x = ungulate biomass index/km^2. Ekwǫ̀ were assigned a relative biomass value of 2 (*sensu* Keith 1983), so survey estimates of caribou density (caribou/km^2) were multiplied by a factor of two to generate the ungulate biomass index. The resulting dìga density estimates were then applied to the respective March survey areas to calculate dìga abundance (i.e., a UBI dìga estimate).

For the second objective, the 2018 caribou herd estimates from respective calving ground surveys (Adamczewski et al. 2019, Boulanger et al. 2019, Campbell et al. 2019) and a projected 2020 population estimate to derive dìga population estimates were used. The 2020 population projection assumed that the observed average rate of change from the previous survey interval (2015-2018), would apply to the 2018 population estimate and projected forward two years. For the Bluenose-East and Bathurst herds, the 2020 March winter survey estimates were subtracted from the respective 2018 or projected 2020 population estimates to provide a net estimate of the number of caribou that were not in the March 2020 survey areas. The net caribou estimate was used and applied to the rest of the herd's winter range areas to approximate caribou density outside the survey areas.

Annual ranges were similar to the MCP analysis, telemetry locations were pooled across the five life cycle years and annual boundaries generated for each herd. In contrast to the MCP approach, the kernel density estimation (KDE) range boundaries were defined using the 95% utilization distribution (UD) boundary generated using the href bandwidth estimator.

The herds' winter range boundaries were based on 95% UD areas that were from a KDE of Bluenose-East and Bathurst caribou collar locations for March 2020 (see Figure 35 and Winter Range Delineation for description of methodology). The caribou densities outside the survey areas were used to estimate dìga densities, and subsequently the dìga density estimates were converted to abundance by multiplying the dìga density (dìga/km^2) by the area (km^2) of remaining area of the 95% UD area. For the dìga estimate associated with the Beverly herd, the 2018 herd estimate and 2020 project population size were applied to a March 2020 winter range distribution based on a 95% UD of collared Beverly caribou to estimate a UBI. The UBI value was used to calculate the dìga density and the density value was multiplied by the area of the 95% UD to estimate dìga abundance.

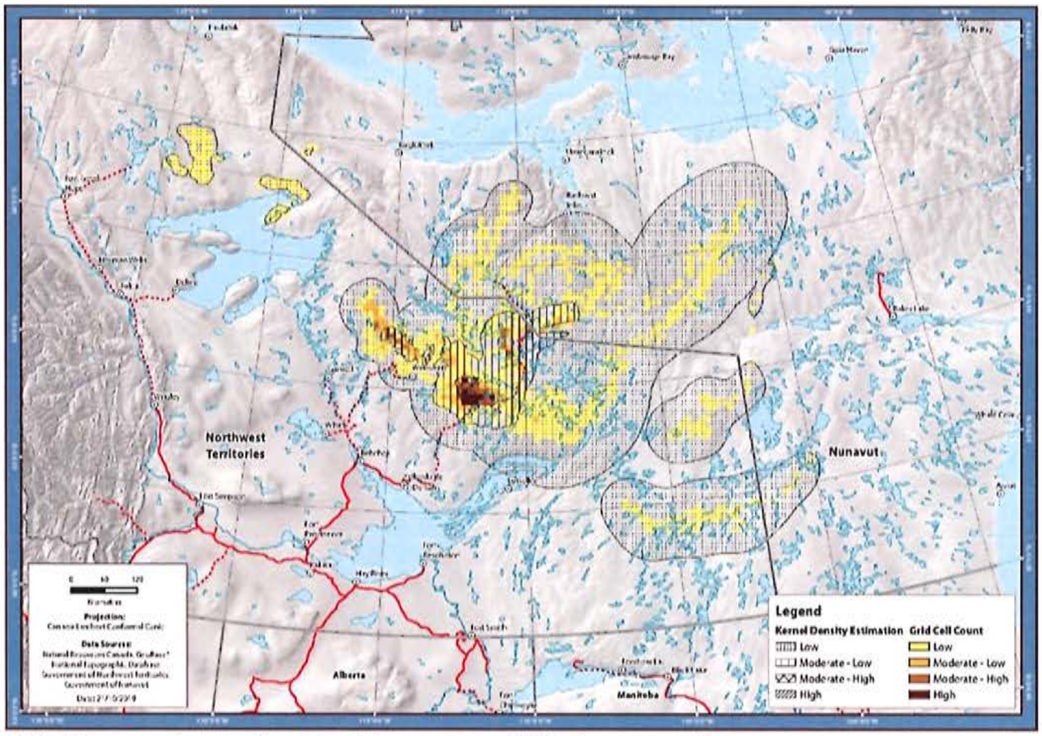

Figure 35. Comparison of grid cell count and KDE approaches.

Caribou Biomass and Dìga Estimates Inside Caribou Winter Range Survey Areas, March 2020 – Bluenose-East and Bathurst Herds

UBI values were based on observed caribou densities from the March 2020 transect surveys of the Bluenose-East and Bathurst winter range areas, and were estimated to be 3.00 (Table 21) and 0.45 (Table 22) respectively.

Table 21. Estimate of dìga within Bluenose-East March 2020 survey area based on caribou biomass.

Extrapolated Wolf Estimate within Surveyed Area based on UBI (caribou only)						
From Kuzyk et al. 2014: $y=5.4x-0.166x^2$	**UBI**			**UBI Wolf Estimate**		
	Stratum A	Stratum B	Total Area	Stratum A	Stratum B	Total Area
x: UBI (2x caribou density estimate)	2.33	3.76	3.00			
y: Wolves/1,000 km^2				11.69	17.96	14.68
Density (Wolves/km^2)				0.0117	0.0180	0.0147
UBI Wolf Estimate				43	58	**102**
Ratio of UBI Estimate: Survey Estimate				1.3	2.4	1.8
UBI (Lower 95% Caribou Estimate)	0.74	2.33	1.94			
Wolves/1,000 km^2				3.90	11.68	9.85
Wolves/km^2				0.0039	0.0117	0.0098
UBI Wolf Estimate				14	37	68
UBI (Upper 95% Caribou Estimate)	3.93	5.19	4.05			
Wolves/1,000 km^2				18.64	23.57	19.15
Wolves/km^2				0.0186	0.0236	0.0192
UBI Wolf Estimate				69	76	132

Table 22. Estimate of dìga within Bathurst March 2020 survey area based on caribou biomass.

Extrapolated Wolf Estimate within Surveyed Area based on UBI (caribou only)		
From Kuzyk et al. 2014: $y=5.4x-0.166x^2$	**UBI**	**UBI Wolf Estimate**
	Stratum	Stratum
x: UBI (2x caribou density estimate)	0.45	
y: Wolves/1,000 km^2		2.38
Density (Wolves/km^2)		0.0024
UBI Wolf Estimate		**24**
Ratio of UBI Estimate: Survey Estimate		3.4
UBI (Lower 95% Caribou Estimate)	0.25	
Wolves/1,000 km^2		1.36
Wolves/km^2		0.0014
UBI Wolf Estimate		14
UBI (Upper 95% Caribou Estimate)	0.64	
Wolves/1,000 km^2		3.38
Wolves/km^2		0.0034
UBI Wolf Estimate		34

For the Bluenose-East area the resulting UBI dìga estimate was 102, with a range from 68-138 based on lower and upper 95% confidence levels of the caribou survey estimate (Table 21). The UBI estimate of 102 dìga was 1.8 times greater than the estimate of 58 that was derived from sixteen on-transect dìga observations (Table 11). For the Bathurst survey area, the UBI dìga estimate was 24, with a range of 14-34 (Table 22). The UBI estimate of 24 dìga was 3.4 times greater than the estimate of 7 that was derived from the two on-transect dìga observations (Table 14). In addition to the imprecision in dìga estimates from transect surveys, the simple comparison with UBI estimates suggests that the visual surveys likely underestimate dìga abundance, potentially on the order of two to three times. Since UBI derived dìga estimates are not based on direct sampling of dìga and the comparison is only based on two pairs of estimates, the suggested magnitude of bias is preliminary.

Caribou Biomass and Dìga Estimates in Caribou Winter Range Areas, March 2020 – Bluenose-East, Bathurst and Beverly Herds

Winter range areas defined as 95% UD based on collared caribou locations in March 2020 for the Bluenose-East, Bathurst and Beverly herds were 37,244 km^2, 24,754 km^2 and 153,944 km^2 respectively (Figure 37); these respective winter range areas were the common denominator values for estimating and comparing caribou densities for the three herds.

Based on the two most recent surveys, the average annual rates of change (*r*) for Bluenose-East, Bathurst and Beverly herds were -0.231, -0.293 and -0.040 respectively (Table 23).

Table 23. Projected population sizes of ekwǫ̀ herds based on average annual rates of change (*r*) from recent surveys.

	2015 Population Estimate*			2018 Population Estimate*				Projected Population Size	
Herd	Herd Size	Lower 95% CI	Upper 95% CI	Herd Size	Lower 95% CI	Upper 95% CI	*r*	2019	2020
Bluenose East	38,592	33,859	43,325	19,294	16,527	22,524	-0.231	15,313	12,154
Bathurst†	19,769	12,349	27,189	8,207	6,218	10,831	-0.293	6,122	4,567
Beverly‡	136,608	124,102	150,373	103,372	93,684	114,061	-0.040	99,336	95,458

*Adamczewski et al. 2019, Boulanger et al. 2016, 2017, and 2019, Campbell et al. 2012 and 2019

†Rate of change (*r*) includes movement of collared Bathurst cows (3 of 11) to Beverly calving area in 2018 (Adamczewski et al. 2019)

‡First estimate shown for Beverly survey was from 2011 not 2015

Correspondingly, the projected population for 2020 were 12,154, 4,567 and 95,458 caribou (Table 23).

For the Bluenose-East winter range area, the UBI estimate of dìga ranged from 196-121, which corresponded to the 2018 calving ground survey estimate and the 2020 projected caribou population respectively (Table 24). Relative to 2018 and 2020 dìga estimates for the overall Bluenose-East winter range, the 102 dìga estimated inside the March 2020 survey area accounted for 52-84% of dìga in the winter range.

Table 24. Estimate of dìga based on UBI of Bluenose-East caribou.

	March 2020		Caribou Population (2018 Estimate)				Caribou Population (2020 Projection)			
	Inside BNE Survey Area		Outside Survey Area		Winter Range (95% UD)		Outside Survey Area		Winter Range (95% UD)	
	Caribou	Wolves	Caribou	Wolves	Caribou	Wolves	Caribou	Wolves	Caribou	Wolves
Area (km^2)	6,916		30,328		37,244		30,328		37,244	
Density (#/km^2)	1.4976	0.0147	0.2947	0.0031	0.5180	0.0053	0.0592	0.0006	0.3263	0.0032
Estimate	10,357	102	8,937	95	**19,294**	**196**	1,797	19	**12,154**	**121**

For the Bathurst winter range, the UBI dìga estimate ranged from 87 to 49, which corresponded to the 2018 calving ground survey estimate and the 2020 projected caribou population size respectively (Table 25). Relative to 2018 and 2020 wolf estimates for the overall Bathurst winter range, the 24 dìga estimated inside the March 2020 survey area accounted for 28% and 49% of dìga in the winter range.

Table 25. Estimate of dìga based on UBI of Bathurst caribou herd.

	March 2020		Caribou Population (2018 Estimate)				Caribou Population (2020 Projection)			
	Inside BAH Survey Area		Outside Survey Area		Winter Range (95% UD)		Outside Survey Area		Winter Range (95% UD)	
	UBI		UBI				UBI			
	Caribou	Wolves	Caribou	Wolves	Caribou	Wolves	Caribou	Wolves	Caribou	Wolves
Area (km^2)	10,025		14,729		24,754		14,729		24,754	
Density (#/km^2)	0.2230	0.0024	0.4055	0.0043	0.3315	0.0035	0.1583	0.0017	0.1845	0.0020
Estimate	2,235	24	5,972	63	**8,207**	**87**	2,332	25	**4,567**	**49**

For the Beverly winter range, the UBI dìga estimate ranged from 1,070 to 992, which corresponded to the 2018 calving ground survey estimate and the 2020 projected caribou population respectively (Table 26).

Table 26. Estimate of dìga based on UBIof Beverly caribou herd.

	Caribou Population (2018 Estimate)		Caribou Population (2020 Projection)	
	Winter Range (95% UD)		Winter Range (95% UD)	
	Caribou	Wolves	Caribou	Wolves
Area (km^2)	153,944		153,944	
Density (#/km^2)	0.6715	0.0070	0.6201	0.0064
Estimate	**103,372**	**1,070**	**95,458**	**992**

Discussion

Using the most recent caribou herd estimates from 2018 and projecting herd sizes to 2020, we used the UBI (Kuzyk and Hatter 2014) to estimate dìga populations associated with the Bluenose-East, Bathurst and Beverly caribou herds respectively (Table 27). Key assumptions were a) that the 95% UD polygons in March for collared caribou of the respective herds were a good representation of herd distribution, b) the 2018 and 2020 caribou estimates provided a basis for plausible ranges of dìga populations and c) the primary ungulate prey of dìga in the system was ekwǫ̀. Because the UBI dìga estimates were linked to caribou herd size and density, the fewest number of dìga were estimated on the Bathurst winter range (49-87 dìga), an intermediate number was estimated on the Bluenose-East winter range (121-196 dìga) and the highest number was associated with the Beverly herd winter range (992-1,070).

Table 27. Deterministic summary of empirical (2018) and projected (2020) caribou herd sizes and associated dìga populations that were estimated from an ungulate biomass regression model (*sensu* Kuzyk and Hatter 2014). Estimates or projections of caribou herd size were assumed to occur within a winter range area delineated as a 95% UD from a KDE of collared caribou locations from Bluenose-East, Bathurst and Beverly herds in March 2020.

Population / Winter Range	Bluenose-East 37,244 km²				Bathurst 24,754 km²				Beverly 153,944 km²			
Caribou Population Assumption	2018 Estimate		2020 Projection		2018 Estimate		2020 Projection		2018 Estimate		2020 Projection	
Species	Caribou	Dìga	Caribou	Dìga	Caribou	Dìga	Caribou	Dìga	Caribou	Dìga	Caribou	Dìga
Estimate	19,294	196	12,154	121	8,207	87	4,567	49	103,372	1,070	95,458	992
Density	0.5180	0.0053	0.3263	0.0032	0.3315	0.0035	0.1845	0.0020	0.6715	0.0070	0.6201	0.0064
Removal (55%)		108		67		48		27				
Removal (60%)		118		73		52		29				
Removal (80%)		157		97		70		39				

As discussed earlier in Aerial Surveys, dìga estimates from strip transect surveys were highly variable and imprecise likely due to low sightability and inherent low densities and clumped distributions of dìga on the landscape. Low and variable sightability of dìga also contributes to survey bias, which for strip transect surveys of dìga results in abundance being underestimated. A preliminary comparison with the UBI dìga estimates suggests that dìga abundance may be up to two to three times greater than what is estimated from strip transect surveys. It is worth noting that UBI dìga estimates are not based on direct sampling of dìga abundance and that application of UBI estimates is generally applied at broader regional scales.

Use of strip transect survey designs have limited value for assessing relative dìga densities when it comes to planning and monitoring dìga removals on areas of ekwǫ̀ winter range. Trends in relative dìga density within caribou winter range areas will likely be an important indicator for determining whether magnitude of annual dìga removals over successive years are enough to keep dìga densities low. Thus, monitoring designs that can achieve consistently high detectability of dìga in winter range areas are needed to determine relative changes in abundance. In this regard, designs that do not rely only on dìga sightings and use dìga track survey methods (Stephenson 1978, Becker et al. 1998, Gardner and Pamperin 2014) are worth considering. Depending on specific objectives, size of the area to be monitored and available resources, dìga track survey methods may stratify search efforts or aim for complete systematic coverage. For ekwǫ̀ winter ranges, an initial step may be to start at a smaller scale to build confidence, gain experience, and document and adapt to changing conditions that may influence detectability of dìga tracks and dìga. In years where aerial removals are required, another option is to directly develop and apply dìga tracking survey methods as part of the implementation of helicopter-based aerial removals. This approach would incorporate thorough planning, allocation and documentation of aerial search effort and systematic recording of dìga tracks and dìga observed, and subsequently removed.

Consistent with Stephenson (1978) and Gardner and Pamperin's (2014) recommended operational procedures, Mattson et al. (2009) outlined several practical considerations that could improve dìga tracking survey methods on the Bathurst caribou winter range including: a) timing of surveys should occur after fresh snowfall, b) an aircraft that is capable of safe flying at low airspeed (i.e., ~120-135 km/h) should be used to consistently see dìga tracks, and c) the aircraft should be capable of occasional landings in the field so the survey team can verify tracks.

In the absence of a robust, "tried and true" survey methodology for tundra dìga on winter ranges of ekwǫ̀, by default the UBI dìga estimate method should be used to help inform management options. For example, application of UBI-based dìga estimates helped establish a dìga management framework and defined a plausible range of numerical targets for dìga removal. However, use of UBI dìga estimates in no way diminishes the need for refining and scaling-up robust and repeatable direct dìga survey methodologies (*sensu* Stephenson 1978, Becker et al. 1998, Patterson et al. 2004, Gardner and Pamperin 2014) that are applicable to tundra dìga and migratory ekwǫ̀ systems.

Winter Distribution Patterns of Ekwǫ̀ Herds

Migratory dìga that primarily prey upon ekwǫ̀ are not territorial throughout the year and their ecology is inextricably tied to the dynamic seasonal movement patterns of the migratory caribou herds (Kelsall 1968, Kuyt 1972, Parker 1973, Musiani et al. 2007). From late April through early summer during the denning and whelping periods when breeding pairs (and pack mates) are raising young pups, dìga are relatively sedentary, and their daily movements are generally limited and tied to a focal area around the den site(s) (Heard and Williams 1992, Frame et al. 2004). By late August, once young dìga are large and strong enough to travel with the pack, dìga movement distances increase. In late October dìga packs resume their close association with the migratory caribou and maintain it throughout winter (Musiani et al. 2007).

Since dìga harvesting and management actions focused on Bluenose-East and Bathurst herds are primarily undertaken in winter, it is important to understand the movement and distribution patterns of dìga through the winter months. However, since there is a dearth of data on migratory dìga, we evaluated available data from collared caribou in winter as a proxy indicator for patterns in movement and distribution of dìga. Given the underlying assumptions that dìga feed primarily on ekwǫ̀ and their winter movements and distributions are based on caribou, our objectives for analyzing caribou collar data were to:

1) document spatial-temporal patterns of winter range use by Bluenose-East, Bathurst and Beverly caribou herds;
2) define areas where dìga management actions should occur; and
3) develop an initial approach for assigning known dìga removals to a specific caribou herd.

Data

Telemetry data collected by ENR between 2011-2019 were available for the Bathurst, Bluenose-East and Beverly herds. Only telemetry locations for December to April were used, as space-time changes in winter space use were of primary interest. To account for differences in collection frequencies between collars, all data were resampled to daily locations and collars with collection frequencies greater than 24 hours were excluded. Data were further restricted to include only collars that collected data during at least three out of the five months for a given winter season and had at least ten locations per month. These restrictions ensure that only collars that had a representative sample of locations for a given season were used to characterize winter range use patterns.

As herd designations were based on calving location, separate designations were present in the collar data for the Beverly and Ahiak caribou herds. Collars that were designated as Ahiak represented caribou that calved at the Queen Maud Gulf coastal calving area including Adelaide Peninsula and the adjacent southern mainland area between McNaughton Lake in the west and Chantrey Inlet to the east and identified as part of the Ahiak calving range boundaries as described by Campbell et al. (2012). Collars designated as Beverly were caribou that spent most of their calving season within the Beverly calving range boundaries described by Campbell et al. (2012), and generally included the Queen Maud Gulf coastal calving area to the east of Bathurst Inlet and west of McNaughton Lake. For the analyses, the Beverly and Ahiak collars have been combined and are identified in this section (and associated figures) as Beverly/Ahiak to reflect the database designations. It is important to note that Beverly/Ahiak and Beverly are synonymous in this section and is consistent with the recent description of the Beverly herd calving ground by Campbell et al. (2019).

Data for each collar were subdivided into unique annual winter seasons to capture variation in winter range use between years. For example, collar BGCA12401 collected data from 2012-2015 and had sufficient data during the winter months to generate three annual winter season datasets - Winter: 2012-2013, Winter: 2013-2014 and Winter: 2014-2015. Table 28 summarizes the sample sizes for each subpopulation. All analyses were completed for the time periods 2015/2016, 2016/2017, 2017/2018 and 2018/2019 as they represented the winter seasons with the most available data. Additionally, the range delineation analyses were done for 2011/2012, 2012/2013, 2013/2014 and 2014/2015 to further explore variation in winter range use patterns through time.

Table 28. Sample sizes of collared caribou by winter season and subpopulation (herd).

Winter Season	Bluenose-East	Bathurst	Beverly/Ahiak	Total
2011/2012	7	9	6	22
2012/2013	21	13	17	51
2013/2014	12	6	7	25
2014/2015	11	14	10	35
2015/2016	20	23	27	70
2016/2017	27	20	21	68
2017/2018	18	20	32	70
2018/2019	26	18	18	62

Data from each collar were also subdivided into unique monthly datasets to examine monthly winter range use patterns for a given winter season. For example, Winter 2015/2016 was comprised of five monthly datasets: December 2015, January 2016, February 2016, March 2016, and April 2016 (Table 29). For the monthly datasets, any data collected by recently deployed collars was excluded. For example, collar data collected in March 2016 and April 2016 by collars deployed in either of those two months were excluded to account for any variation in winter range use arising from the collaring process. This restriction affected data for March and April when most of the collar deployments took place.

Table 29. Sample sizes of collared caribou by month, winter season, and subpopulation (herd).

Winter Season	Month	Bluenose-East	Bathurst	Beverly/Ahiak	Total
2015/2016	December	19	24	7	50
	January	19	23	24	66
	February	20	22	23	65
	March	19	21	23	63
	April	31	25	24	88
2016/2017	December	23	20	16	59
	January	25	20	17	62
	February	26	20	18	64
	March	31	24	36	81
	April	31	28	29	82
2017/2018	December	18	17	24	59
	January	18	16	23	57
	February	18	15	24	57
	March	30	20	30	80
	April	31	19	32	82
2018/2019	December	26	18	18	62
	January	26	18	18	62
	February	26	17	18	61
	March	25	17	16	58
	April	24	18	15	57

Winter Range Delineation

To examine winter range use patterns at the herd level, telemetry data were pooled according to their herd designations and seasonal range boundaries were generated using two approaches: MCP and UD (KDE).

MCP

Winter ranges were delineated using MCP at two-time scales: annual winter range use and monthly winter range use (i.e., range use boundary for winter months between December and April). Telemetry locations were pooled according to time period and herd. The 100% MCP boundary was used to define the extent of the winter range for each grouping. A complete set of maps showing the results of MCP analysis can be found in Appendix 9-A. All MCP polygons were generated using the adehabitatHR (Calenge 2006) package within R.

KDE

Winter ranges were also delineated using KDE for both the annual and monthly time scales. Similar to the MCP analysis, telemetry locations were pooled by time period and herd and winter range use boundaries generated for each. In contrast to the MCP approach, the KDE range boundaries were defined using the 95% utilization boundary generated using the href bandwidth estimator. Individual href values were calculated for each group to ensure that the winter range use boundaries were representative of the spatial use patterns for the given annual or monthly time period. While the href bandwidth selector has been reported to overestimate the true bandwidth size, a large bandwidth provides a more generalized estimate of winter range use appropriate to wide-ranging gregarious ungulates like ekwǫ̀. The annual href values ranged from 32-56 kilometres (mean href = 50 kilometres); while monthly href values ranged from 29-67 kilometres (mean href= 49 kilometres). A complete set of maps showing the results of KDE analysis can be found in Appendix 9-B. All KDE polygons were generated using the adehabitatHR (Calenge 2006) package within R.

Aggregated Analysis

To examine winter range use at the individual level, winter range extents were defined for each collared caribou using two different methods: grid cell counts and UD.

Analyses were completed at two-time scales for the grid cell count: annually and monthly. For the UD approach, analyses were only completed at the monthly scale as a comparison for the grid cell count results.

For the aggregated analyses at the monthly scale, any data collected by recently deployed collars was excluded. For example, collar data collected in March 2016 and April 2016 by collars deployed in either of those two months were excluded. These data were excluded to provide a consistent representation of monthly range use for a given season. This restriction affected data for March and April when the majority of the collar deployments took place. Table 30 summarizes the number of collars included for the monthly analyses.

Table 30. Sample sizes of collared caribou included in monthly aggregated analyses.

Winter Season	Month	Bluenose-East	Bathurst	Beverly/Ahiak	Total
2015/2016	December	19	24	7	50
	January	19	23	24	66
	February	20	22	23	65
	March	19	21	23	63
	April	19	19	23	61
2016/2017	December	23	20	16	59
	January	25	20	17	62
	February	26	20	18	64
	March	31	24	36	81
	April	26	18	17	61
2017/2018	December	18	17	24	59
	January	18	16	23	57
	February	18	15	24	57
	March	18	15	25	58
	April	17	8	22	47
2018/2019	December	26	18	18	62
	January	26	18	18	62
	February	26	17	18	61
	March	25	17	16	58
	April	24	18	15	57

Grid Cell Count

Intensity of Use

For the grid cell count approach, binary range use rasters were generated for each annual winter season, for each collared caribou. For example, three binary rasters were generated for collar BGCA12401: Winter: 2012-2013, Winter: 2013-2014, and Winter: 2014-2015. A one-kilometre fishnet raster was created for the study area to act as a baseline surface. The one-kilometre resolution was too fine to be a useful analysis unit; however, it provided an appropriate base resolution that could be aggregated across a variety of spatial scales. The baseline fishnet raster was iteratively intersected with each of the individual collar datasets. If a cell intersected with a telemetry location it was assigned a value of one, cells that did not intersect with any locations were assigned a value of zero. If multiple locations fell within the same cell, the cell was still assigned a value of one; intensity of use within each cell was not considered.

A 10-kilometre cell size was selected as the optimal spatial scale based on a sensitivity analysis that compared grid cell count results across a range of resolutions: 5 kilometres, 10 kilometres, 15 kilometres and 20 kilometres. Once aggregated, 10-kilometre raster cells with a value greater than zero were reclassified to a value of one to convert them back into binary surfaces. Cells with a value equal to zero remained unchanged. The binary rasters were combined to generate a cumulative surface of winter range use. Based on the cumulative winter range use values for each spatial scale, intensity of use was defined using 25% quantiles. The top 25% corresponded to high use areas and the bottom 25% to low use areas. A complete set of maps is available in Appendix 9 C-1.

The same workflow was applied to the monthly analyses, with intensity of use rasters generated for each month in the winter season (i.e., December through April). A complete set of monthly intensity of use maps is available in Appendix 9 D-1.

Relative Herd Distributions

To provide insight into the relative winter distribution of the three herds, binary rasters were combined according to their herd designation resulting in a cumulative winter range use surface for each herd. The cumulative herd values were reclassified back to a binary surface with values greater than zero assigned a value of one. A classification scheme was applied to the cumulative herd rasters to identify areas of use common to all herds: Beverly-Ahiak received a value of 1, Bathurst a value of 10 and Bluenose-East a value of 100. The cumulative classified values are summarized in Table 31. A complete set of maps is available in Appendix 9 C-2.

Table 31. Relative distribution classes used to identify areas of common use by collared caribou.

Weighted Cumulative Value	Winter Range Use
0	No recorded use
1	Beverly-Ahiak only
10	Bathurst only
11	Beverly/Ahiak and Bathurst
100	Bluenose-East only
101	Beverly/Ahiak and Bluenose-East
110	Bluenose-East and Bathurst
111	All three herds

The same workflow was applied to the monthly analyses, with intensity of use rasters being generated for each month in the winter season (i.e., December through April). A complete set of monthly intensity of use maps is available in Appendix 9 D-2.

KDE Intensity of Use

For the kernel density approach, annual individual winter range polygons were defined as the 95% UD boundary. UD were generated using the KDE function provided in the R package adehabitatHR. KDE parameters included: individual href bandwidth distances and a one-kilometre cell size. Href values ranged from 1.6-60 kilometres (mean href = 17 kilometres). To ensure that only stable 95% UD polygons were included in the analysis, any annual winter season that had fewer than 30 locations was excluded. The resulting winter range polygons were unioned together and the number of individual overlapping winter range polygons calculated. Based on the cumulative winter range use values calculated from the UD polygons, intensity of use was defined using 25% quantiles: the top 25% corresponding to high use areas and the bottom 25% to low use areas. A complete set of maps is available in Appendix 9 E-1.

Relative Distributions

As with the grid cell count approach, the individual KDE polygons were combined according to their herd designation to provide insight into the relative winter distribution of the three herds. The 95% polygons for each herd were unioned together generating a cumulative winter range boundary. The three cumulative ranges were subsequently intersected to determine areas used by only one herd, all herds, or some combination thereof. A complete set of maps is available in Appendix 9 E-2.

Method Comparison

The intensity of use surfaces produced by the grid cell count and KDE approaches were compared to determine which was more effective at capturing space-time variation in winter range use patterns. Both methods produced similar results spatially, meaning both identified roughly the same areas as high use, etc. However, the KDE results were much more generalized when compared to the grid cell counts (Figure 35). This generalization is a direct result of using the 95% UD boundary to define the extent of an individual's winter space use. From a management perspective, the KDE approach is better suited to characterizing seasonal winter range use as the generalized boundaries are more appropriate to larger scale management concerns. The grid cell count approach provides finer scale results that can be used for management planning at a more local scale.

Expected Relative Abundance

To estimate expected relative caribou abundance, the intensity of use and relative distribution rasters were combined and weighted based on the herd population. The weighting factors reflect the relationship between the population sizes of the three herds to provide an estimate of relative caribou abundance based on the spatial distribution of the herds during the winter season. The weighting factors applied were a ratio of 10:2:1 based on population estimates of 100,000 for Beverly, 18,000 for Bluenose-East, and 9,000 for Bathurst.

To generate the relative expected abundance values, the population weighting factor was applied as a multiplier for the intensity of use raster. For example, Table 32 summarizes how the weighting scheme would be applied to a raster cell that had intensity of use values for all three herds for a given time period.

Table 32. Examples of coefficients to weight raster cells in a GIS for illustrating relative intensity of use by caribou.

Herd	Example Intensity of Use Values	Population Ratio Weighting Factor	Example Expected Relative Abundance Values
Bathurst	1	1	1
Bluenose-East	1	2	2
Beverly/Ahiak	4	10	40

The weighted intensity values were combined, and the resulting surface was classified using 25% quantiles: the top 25% corresponding to high expected relative caribou abundance and the bottom 25% to low expected relative abundance. A complete set of maps is available in Appendix 9-F.

The same workflow was applied to the monthly analyses, with expected relative abundance rasters being generated for each month in the winter season (i.e., December through April). A complete set of monthly expected relative abundance maps is available in Appendix 9 G.

Discussion

We compiled four years (i.e., 2015/2016 – 2018/2019) of caribou collar data to assess patterns of winter range use by ekwǫ̀ from the Bluenose-East, Bathurst and Beverly herds. We used various approaches for analyzing the data at different spatial and temporal scales including MCP, KDE and grid-cell analyses.

Based on this initial work, caribou collar datasets should be analyzed using a KDE to delineate UD on a monthly time step because the outputs seem to provide the best combination of utilizing empirical data, displaying complex and scale-dependant temporal-spatial dynamics, and providing decision-makers with understandable and biologically relevant mapping products.

UD derived from collar data using KDEs provide smoothed probability surfaces of spatial usage by caribou (and wolves by inference) that are intuitively understandable and also provide map products that can be used to transparently inform and evaluate dìga management actions. However, additional work should be done to refine and test this recommended approach.

Further work is also needed to better understand and test the biological basis for associating and/or assigning areas for dìga management and point locations of dìga removals, to the movement and population ecology of ekwǫ̀ herds. Movement data from collared dìga over time will be a first step that should provide key information to further define and test our current understanding of caribou and dìga population ecology.

Caribou Herd Affiliation of Dìga Mortalities

In this section, we describe an initial approach for assigning dìga mortalities to one of three ekwǫ̀ herds (i.e., Bluenose-East, Bathurst or Beverly).

Using the methodology described in Winter Distribution Patterns of Ekwǫ̀ Herds, we applied a KDE to estimate UD for each of the three caribou herds by month from February - May 2020. For each month we used available caribou collar data to map the 50%, 80%, 90% and 95% UD isopleths.

The monthly UD isopleth maps were then used to define caribou herd assignments for each recorded dìga mortality through the following steps:

- Dìga mortality occurrences were aggregated by month so that the mortality locations would be compared to the appropriate monthly UD isopleth map.
- Using ArcMap, which herd-specific UD isopleths the dìga mortality occurrences were located in was determined. Each dìga mortality location was scored on a scale of 1-4 depending on the herd-specific UD isopleth within which it occurred.
- The 95%, 90%, 80% and 50% UD isopleths had scores of 1, 2, 3 and 4 respectively.
- Dìga locations were assigned based on its highest herd-specific isopleth score.
- For dìga locations that had the same UD isopleth score from two overlapping herd ranges, the herd assignment was based on closest distance to a higher scoring isopleth.
- Closest distance to an isopleth was also used as a criteria to assign dìga mortalities that just fell outside a caribou herd's monthly range UD map.

Table 33 summarizes 121 recorded dìga mortalities that occurred from February - May 2020. Of the total dìga mortalities described, 79 (65%) were from harvesting, and 36 (30%) were from aerial removals. The other six (5%) dìga mortalities were related to capture and collaring (3), post-capture mortalities (2) and a road kill (1) at an industrial site. Table 33 also summarizes the herd assignments made for each of the dìga mortalities based on the steps described above. The monthly UD isopleth maps and monthly dìga mortalities that occurred as a result of harvesting or aerial removals are shown for February (Figure 36), March (Figure 37), April (Figure 38) and May (Figure 39).

Table 33. Summary of dìga mortalities within caribou winter range areas, February – May 2020.

Wolf Mortality	Bluenose East				Bathurst				Beverly				Sum
	Feb	Mar	Apr	May	Feb	Mar	Apr	May	Feb	Mar	Apr	May	
NWT Harvesters (N. Slave)	4	5	1		4	1	3						18
Sport Hunt										4			4
Road Kill									1				1
Kugluktuk Harvesters (N. Slave)								7	9	17	5		38
Kugluktuk Harvesters				19									19
Aerial Removal			21				9	6					36
Capture*		2					1						3
Post-capture		1	1										2
Sum	4	8	23	19	4	1	13	13	10	21	5	0	121
Totals		BNE =	54			BA =	31			BEV =	36		

* One wolf (highlighted in red font) was euthanized in the field due to its poor health at time of capture

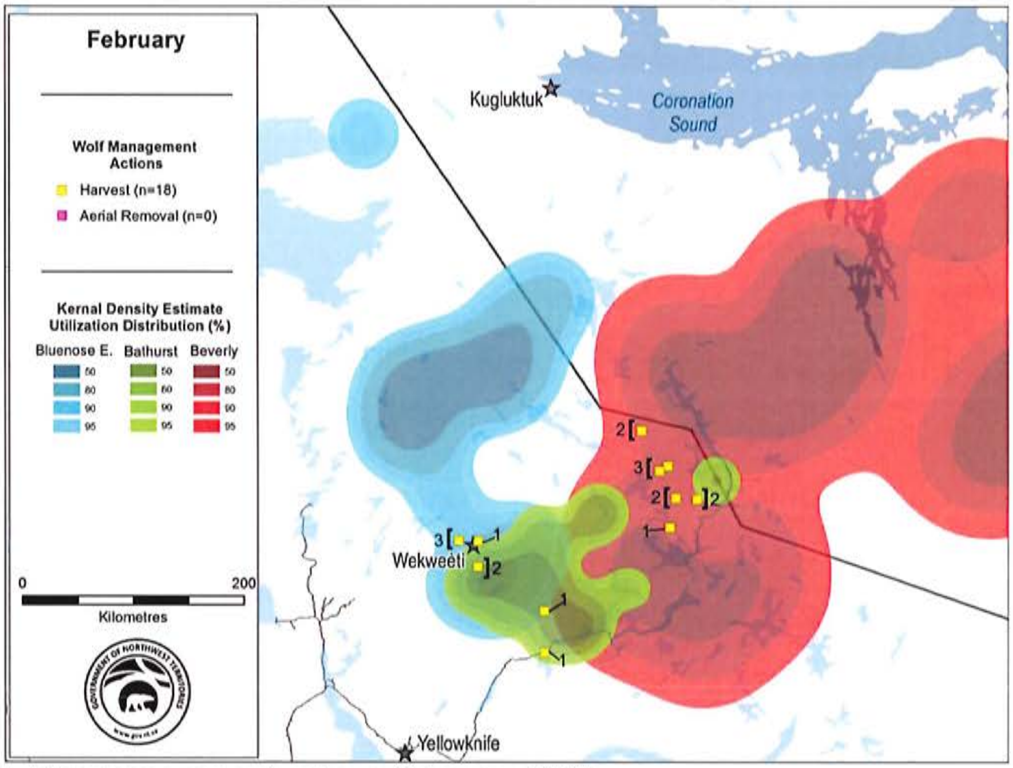

Figure 36. Dìga management actions, February 2020.

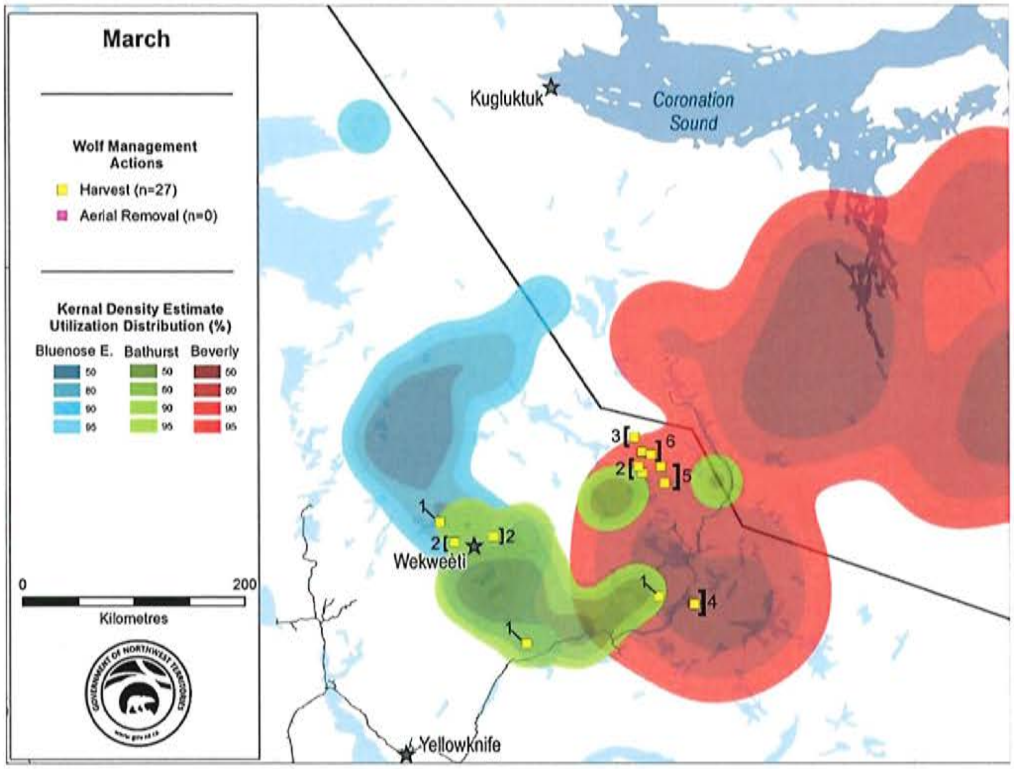

Figure 37. Dìga management actions, March 2020.

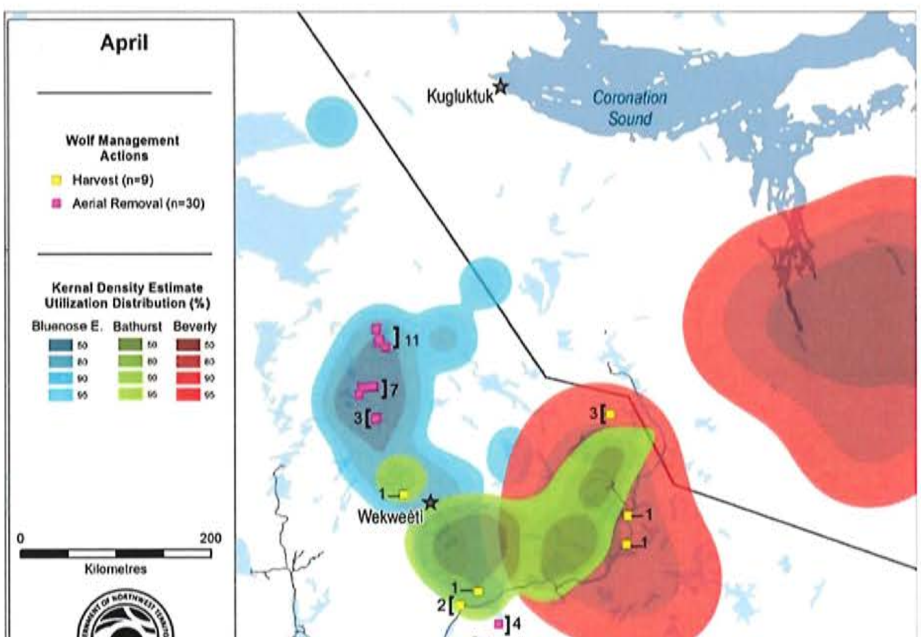

Figure 38. Dìga management actions, April 2020.

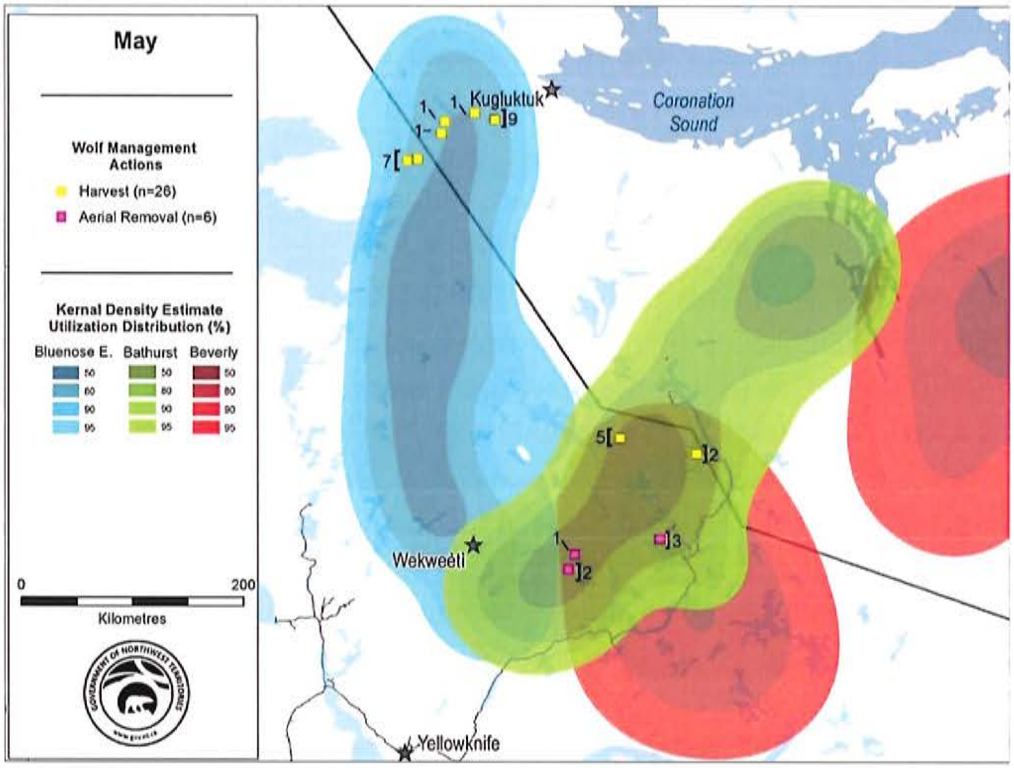

Figure 39. Dìga management actions, May 2020.

Discussion

In this section we described an approach for assigning caribou herd designations to dìga mortalities that occurred within caribou winter range areas. The approach was based on matching the monthly locations of recorded dìga mortalities to monthly UD patterns of collared caribou. The reason for assigning or matching dìga kill locations with caribou herd winter ranges is to define the magnitude of the dìga management action (i.e., a treatment effect based on the number of dìga removed) that can be attributed to respective caribou herds.

Inherent in this method of assigning a caribou herd to a dìga kill is uncertainty in the accuracy of herd designation for the dìga removals. Additional work is needed to better describe and address this uncertainty.

When caribou winter range use patterns are relatively discrete, uncertainty is low (and relative confidence is high) in assigning herd designations to dìga kills. This was the case for assigning dìga kills to the Bluenose-East herd in winter 2020. In comparison, when there is sympatric winter range use by collared caribou from different herds then there is a pattern of overlap in UD derived from collar data, which results in greater uncertainty in assigning herd designation to dìga kill locations. This was the case for the Bathurst and Beverly herds in winter 2020.

In the context of this key source of uncertainty, we suggest that our initial approach is appropriately conservative and useful because it objectively bases caribou herd assignments for dìga on the UD of collared caribou. We assert that assessments at coarser spatial-temporal grains are less prone to error and likely more reliable; comparisons of locations and movement patterns at monthly scales are conservative but require fewer assumptions than assessing collar data at weekly or daily scales.

However, we recognize that this approach is based on a statistical inference of collared caribou data, and that herd-level inference is dependent on sample size of collars. We also recognize that the statistical inference needs to be matched with an ecological understanding of caribou and dìga interactions that should be verified by other lines of empirical data (i.e., dìga movement and spatial use patterns from collars, genetic variability). For example, it is primarily the distribution and movement of four collared Beverly bulls that establish the southwest lobe of the Beverly herd's UD that is evident in February (Figure 36), which pinches off after March (Figure 37) and maintains a separate area of use through April (Figure 38) and May (Figure 39). Our ecological interpretation of this monthly pattern in UDs is that through the winter and early spring period, those collared Beverly bulls represent a lower density trailing end of the Beverly herd that has progressively moved toward its coastal calving area in the northeast. Thus, although the southwesterly portion of the Beverly herd UD overlaps with the Bathurst UD, we think it likely that most of the caribou in the area were from the Bathurst herd. By inference, this provides additional rationale for assigning wolves to the Bathurst herd that is not represented in the UD patterns.

In applying this approach for assigning caribou herd designations to wolf removals, an important case example on the Bluenose-East range emerged that supports the assertion that ground-based hunting and aerial removal are complementary ways to implement dìga management actions.

Figure 40 shows the locations of 20 and 15 aerial dìga removals from the Bluenose-East and Bathurst ranges that occurred between the April 22 and the May 10, 2020; the figure also highlights the harvest of 19 dìga by a hunter based out of Kugluktuk in May. By illustrating the timing and location of dìga removed on the Bluenose-East range through aerial shooting and ground-based hunting methods, Figure 40 shows how both approaches contributed to dìga removals on the Bluenose-East winter range areas.

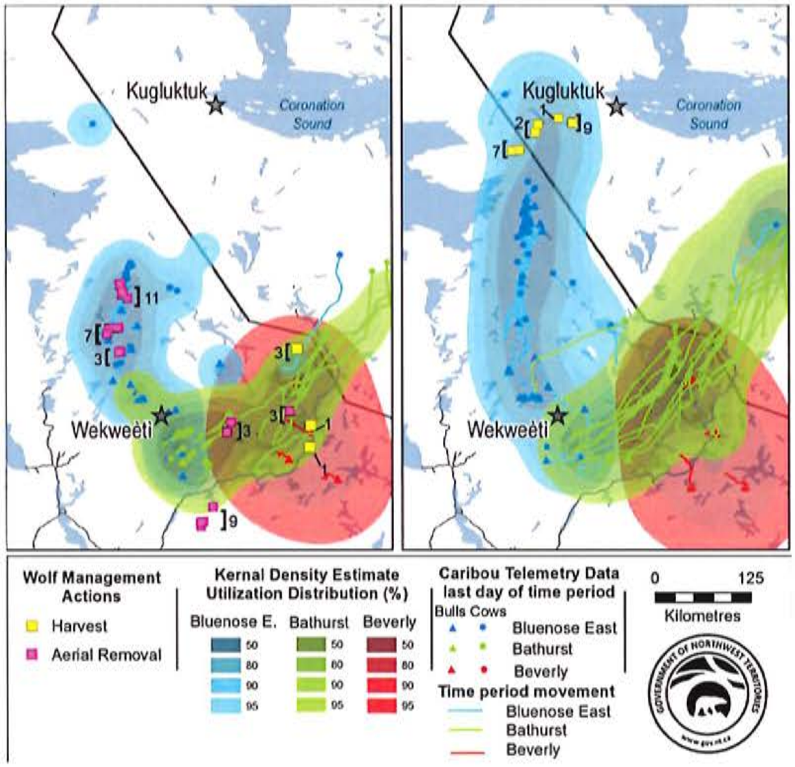

Figure 40. Dìga removals on Bluenose-East and Bathurst caribou ranges.

Depending on suitable weather and flying conditions, we suggest that aerial removals may be conducted relatively quickly as aerial removal crews are able to search large areas and remove dìga efficiently. In areas where dìga and caribou are accessible by snowmachine, efficient rates of dìga removals may be achievable by local hunters using their expert knowledge of the landscape and caribou-dìga movements. We suggest that case example on the Bluenose-East range in April – May 2020, highlights the importance of facilitating, implementing, and coordinating harvester-based dìga management actions and aerial dìga removals in combination.

REMOTE CAMERAS AND BAIT STATIONS

On April 22, 15 Reconyx trail camera were deployed on lakes at the centre of the Bluenose-East winter range. A block of frozen fish scraps, along with a couple of commercial scent lures, were set up about 15 meters from each camera. The primary objective in setting up these cameras was to see if dìga would be attracted to these camera stations, and potentially leave tracks which the aerial removal crews could spot and follow. During the subsequent four days (April 23-27) these bait stations were periodically checked for signs of activity. Although two wolverines were spotted from the air, there were no active signs of dìga tracks at these camera stations.

A second objective in setting up these cameras was to conduct a pilot project to see how much local wildlife might be attracted to the baited sites. Since the aerial removal effort subsequently shifted to the Bathurst range, retrieval of the cameras was delayed until May 16. A review of the camera images indicated that these sites were more active than expected. Over the 24 days that the cameras were operating, the following wildlife species were detected (Table 34).

Table 34. Wildlife visits to bait stations.

Species	Detection Frequency	Comments
Dìga	At 8 stations	1 med. gray, 2 black, and 5 light gray dìga
Wolverine	At 7 stations	
Grizzly Bear	At 6 stations	
Red Fox	At 5 stations	
Marten	At 5 stations	
Bald Eagle	At 7 stations	
Golden Eagle	At 6 stations	
Rough L. Hawk	At 2 stations	
Gull spp.	At 3 stations	
Ravens	At all 15 stations	
Canada Jay	At 1 station	

The detection of dìga at eight of the cameras (Figure 41), suggests that this non-invasive technique of taking wildlife images holds promise as a tool for detecting, and perhaps assessing the relative abundance of wildlife species. However, such an approach will likely require more intensive sampling effort (number of cameras), and carefully consideration of study design.

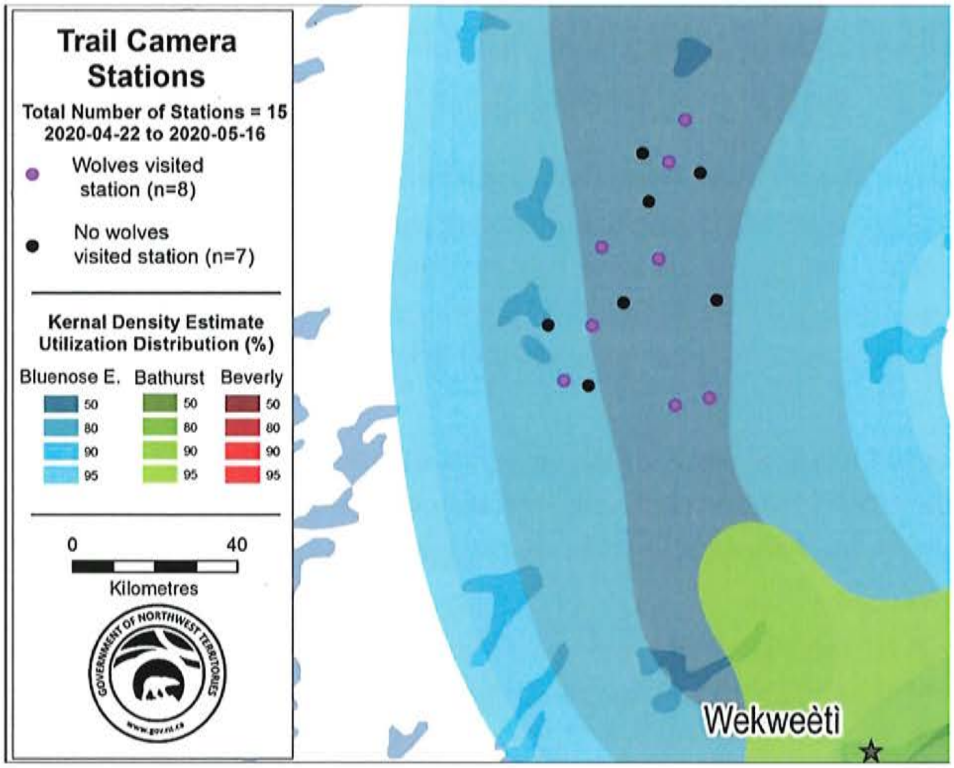

Figure 41. Location of trail cameras on the Bluenose-East winter range and visits by dìga.

Additional data analyses are being done to summarize trends in this camera-trap dataset.

COMMUNICATIONS AND CONSERVATION EDUCATION MATERIALS

The GNWT and TG recognize that ekwǫ̀ management and related dìga reduction actions are of significant interest to NWT residents, communities, Indigenous governments and organizations and co-management partners. Communications on dìga management activities must provide clear explanation of what we are doing and why, and ensure harvesters have the information they need to take part in wolf harvest incentives and the traditional economy.

The 2020 Enhanced North Slave Wolf Harvest Incentive Program launched on January 24, 2020. Communications included radio advertising, posters in regional and local offices, an updated field guide, harvester questionnaires, and an update Frequently Asked Questions (FAQ) on the program.

On January 31, 2020, the 2020-2025 Joint Wolf Management Proposal was submitted to the WRRB. The GNWT and TG held a media briefing the same day to explain the proposal and answer questions.

Public communications products associated with the release of the Joint Wolf Management Proposal included:

- PowerPoint presentation - media briefing
- News release
- Summary of proposal (fact sheet)
- Social media post
- Updates to ENR website

Aerial removals began in April 2020, and included additional communications on our approach to removals and notification to nearby communities, including:

- FAQ (Appendix 13)
- Open letter to communities (Appendix 12)
- Poster for Tłı̨chǫ communities (Appendix 11)
- Radio advertising (in English and Tłı̨chǫ)

The GNWT and TG responded to numerous media requests and conducted several interviews on dìga management actions in 2020. Media coverage included stories on the release of the Joint Wolf Management Proposal (in February) and associated research and monitoring, as well as coverage of aerial reductions (March-May).

DISCUSSION AND LESSONS LEARNED

From January through May 2020, the GNWT and TG implemented the 2020 Pilot Program that supported dìga harvesting and the traditional economy and utilized aerial removals which were required because at the end of March ground-based harvest had not achieved target removal levels from the Bathurst and Bluenose-East caribou herd winter range areas. The Pilot Program advanced three main approaches to dìga management:

1. enhanced financial support and training for dìga harvesters and the traditional economy;
2. aerial shooting to remove dìga in caribou winter range areas; and
3. monitoring, research and assessment

In areas where dìga and caribou are accessible by snowmachine, efficient rates of dìga removals are achievable by experienced hunters with expert knowledge of the landscape and caribou- dìga movements. Where harvesters are primarily utilizing winter roads to access and hunt dìga, hunters' kill rates of dìga are likely determined primarily by distribution and distance of caribou and dìga to roads. However, in both cases traveling conditions (i.e., deep snow in the taiga, and shallow snow on the tundra) is likely another important factor that influences search effort (i.e., km traveled) and encounter rates of hunters with dìga. These two examples provide rationale to an assertion that experienced dìga hunters may contribute meaningfully to dìga management actions on ekwǫ̀ winter range depending on access and distribution of dìga and caribou. Given these examples and initial experiences, we suggest that training, engagement and collaboration with hunters needs to be increased over the duration of the dìga management program to improve and support hunters' collective ability to harvest dìga and for individual hunters to consistently provide detailed information and self-monitoring data on their efforts and successes. Engagement strategies should likely be considered at two scales:

1. the dìga hunters from a region or a community (i.e., workshops and fur incentives), and
2. individual dìga hunters (or hunting parties) within respective regions or communities that have demonstrated effort and success. In addition to increasing and monitoring hunters' effectiveness on harvesting wolves on caribou ranges, training, collaboration, and engagement with hunters will be fundamental to minimize and manage unintended negative consequences to caribou such as illegal harvest activities and disturbance.

Although deployment of an aerial removal crew is dependent on suitable weather and flying conditions, aerial shooting of dìga may be conducted relatively quickly because an aerial crew is able to search large areas and remove dìga efficiently. Aerial removal effort can be directed to specific areas and is an efficient method of finding and removing dìga. Based on flight hours of the helicopter shooting crew, average aerial removal kill rates in the Bluenose-East and Bathurst winter range areas were 1.05 dìga/hour and 0.70 dìga/hour respectively, which indicated that kill rates were ~1.3-1.5 times higher on the Bluenose-East winter range areas than in the Bathurst areas. The trend of higher kill rates on the Bluenose-East range was consistent with the observed differences in caribou and dìga densities.

Considering the results of fixed-wing aerial surveys and search and/or removal efforts by helicopter, it is recommended that dìga track survey methods (sensu Stephenson 1978, Becker et al. 1998, Gardner and Pamperin 2014) be incorporated directly into future aerial removal efforts, if they are implemented. This approach will require delineation of search areas with detailed and standardized data collection on dìga tracks and dìga observed (and removed); it should provide a useful database to assess and track relative dìga densities within the aerial removal areas.

The effectiveness and humaneness of dìga killed by aerial shooting may be evaluated objectively based on standardized data collection for shooting occurrences and post-mortem examinations (Hampton et al. 2014 and 2020). Our approach was to engage an independent wildlife veterinary pathologist to conduct the wolf necropsies thereby establishing independent oversight and transparency. Once the veterinarian's final report is completed, this aspect of aerial removals will be reviewed and assessed with the goal of incorporating her key recommendations into specific operational guidelines.

Key lessons learned and experiences from the Pilot Program include the following:

1. Operations and logistic aspects of the program were hampered significantly by COVID-19 public health orders.
    - Aerial removal crews and aircraft were based out of Yellowknife rather than NWT communities closer to the dìga and caribou winter ranges. This led to a large amount of time and effort spent traveling to the winter ranges before any removals could take place. For example, 44% (~42) of the total hours flown (~96 h) for the strip-transect surveys were due to ferrying flights to and from the survey area. For the helicopters (aerial removals, denning area surveys), ferrying flights accounted for 35% (~27) of the total hours flown (~ 77 h).
    - There were considerable logistic challenges with wolf carcass storage, management, and processing. Necropsies were delayed because the lab facilities could not be accessed immediately, so assessment of diet, wolf condition and humaneness of removals are not complete at this time.
2. Analysis of hunter questionnaires indicates that more effort is needed to support harvesters through trapper training, locating dìga, and documenting information related to harvest efforts and success rates.

Despite the challenges, the 2020 Pilot Program did result in significant learning and key insights.

1. Many harvesters (in NWT and NU) participated in the Enhanced North Slave Wolf Harvest Incentive Program, with many receiving training and support to access dìga.
2. There was a concerted and unprecedented effort by TG to implement dìga training workshops and field camps for dìga harvesters. We anticipate that the TG's commitment to maintaining and improving this training effort should result in measurable increases in dìga harvest rates from Tłįchǫ hunters.
3. The removal of dìga on the Bathurst caribou winter range was within the target levels for meaningfully reducing dìga predation rates on this herd.
4. While the target on the Bluenose-East winter range was not met, removals of 45% were achieved which is considered to exceed a sustainable harvest rate and should be sufficient to reduce the level at which dìga populations are able to recover the following year.
5. Implementation of the 2020 Pilot Program highlights the importance of facilitating, implementing, and coordinating harvester-based dìga management actions and aerial dìga removals in combination. Experienced dìga hunters rely on expert knowledge of the landscape and caribou- dìga movement patterns and can be highly efficient at finding and removing dìga. Aerial removal effort can be directed to specific areas and is an efficient and humane method.

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LITERATURE CITED

Adamczewski, J.Z., J. Boulanger, H. Sayine-Crawford, J. Nishi, D. Cluff, J. Williams and L.-M. Leclerc. 2019. Estimates of breeding females and adult herd size and analyses of demographics for the Bathurst herd of barren-ground caribou: 2018 calving ground photographic survey. Environment and Natural Resources, Government of the Northwest Territories. Manuscript Report No. 279.

Becker, E.F., M.A. Spindler and T.O. Osborne. 1998. A population estimator based on network sampling of tracks in the snow. Journal of Wildlife Management 62: 968-977.

Boulanger, J., B. Croft and J.Z. Adamczewski. 2014. An estimate of breeding females and analyses of demographics for the Bluenose-East herd of barren-ground caribou: 2013 calving ground photographic survey. Environment and Natural Resources, Government of Northwest Territories. File Report No. 143.

Boulanger, J., B. Croft, J.Z. Adamczewski, D.S. Lee, N.C. Larter and L.-M. Leclerc. 2016. An estimate of breeding females and analyses of demographics for the Bluenose-East herd of barren-ground caribou: 2015 calving ground photographic survey. Environment and Natural Resources, Government of the Northwest Territories. Manuscript Report No. 260.

Boulanger, J., B. Croft, J.Z. Adamczewski, H.D. Cluff, M. Campbell, D.S. Lee and N.C. Larter. 2017. An estimate of breeding females and analyses of demographics for the Bathurst herd of barren-ground caribou: 2015 calving ground photographic survey. Environment and Natural Resources, Government of the Northwest Territories. Manuscript Report No. 267.

Boulanger, J., J.Z. Adamczewski, J.S. Nishi, H.D. Cluff, J. Williams, H. Sayine-Crawford and L.-M. Leclerc. 2019. Estimates of breeding females and adult herd size and analyses of demographics for the Bluenose-East herd of barren-ground caribou: 2018 calving ground photographic survey. Environment and Natural Resources, Government of the Northwest Territories. Manuscript Report No. 278.

Buckland, L., J. Dragon, A. Gunn, J. Nishi and D. Abernethy. 2000. Distribution and abundance of caribou on the northeast mainland, NWT in May 1995. Resources, Wildlife and Economic Development, Government of the Northwest Territories. Manuscript Report No. 125.

Calenge, C. 2006. The package "adehabitat" for the R software: A tool for the analysis of space and habitat use by animals. Ecological Modeling 197: 516-519.

Campbell, M., J. Boulanger, D.S. Lee, M. Dumond and J. McPherson. 2012. Calving ground abundance estimates of the Beverly and Ahiak subpopulations of barren-ground caribou (*Rangifer tarandus groenlandicus*) population - June 2011 Technical Summary to be replaced by: Technical Report Series - No. 03-2012, Government of Nunavut, Iqaluit. 111pp.

Campbell, M., D.S. Lee and J. Boulanger. 2019. Abundance trends of the Beverly mainland migratory subpopulation of barren-ground caribou (*Rangifer tarandus groenlandicus*): June 2011 – June 2018. Technical Report Series – No: 01-2018, Government of Nunavut Department of Environment, Iqaluit, NU.

Campbell, M., J. Boulanger, D.S. Lee, M. Dumond and J. McPherson. 2012. Calving ground abundance estimates of the Beverly and Ahiak subpopulations of barren-ground caribou (*Rangifer tarandus groenlandicus*) population - June 2011 Technical Summary to be replaced by: Technical Report Series - No. 03-2012, Government of Nunavut, Iqaluit.

Caslys Consulting Ltd. 2016. Mobile Conservation Zone Generation Spatial Tool. Unpublished report prepared for Environment and Natural Resources, Government of the Northwest Territories. 21pp.

Cluff, D. 2019. Wolf Harvest Report 2018-2019, North Slave Region, Unpublished Report, Environment and Natural Resources, Government of the Northwest Territories. 10pp.

Cluff, D. 2020. Wolf Harvest Report 2019-2020, North Slave Region, Unpublished Report, Environment and Natural Resources, Government of the Northwest Territories. 7pp.

Dubielzig R.R., R.J. Higgins and S. Krakowka. 1981. Lesions of the enamel organ of developing dog teeth following experimental inoculation of gnotobiotic puppies with canine distemper virus. Veterinary Pathology 18: 684-689.

Frame, P.F., D.S. Hik, H.D. Cluff and P.C. Paquet. 2004. Long foraging movement of a denning tundra wolf. Arctic 57:196-203.

Fuller, T.K. 1989. Population dynamics of wolves in northcentral Minnesota. Wildlife Monographs 105: 3–41.

Fuller, T.K., L.D. Mech and J.F. Cochrane. 2003. Wolf population dynamics. Pages 161–191 in L.D. Mech and L. Boitani, editors. Wolves: behaviour, ecology, and conservation. University of Chicago Press, Chicago, IL.

Gardner, C.L. and N.J. Pamperin. 2014. Intensive aerial wolf survey operations manual for interior Alaska. Wildlife Special Publication ADF&G/DWC/WSP-2014-01, Alaska Department of Fish and Game, Division of Wildlife Conservation, Fairbanks, Alaska. 31pp.

Gipson, P.S., W.B. Ballard, R.M. Nowak and L.D. Mech. 2000. Accuracy and Precision of Estimating Age of Gray Wolves by Tooth Wear. The Journal of Wildlife Management 64: 752-758.

Government of the Northwest Territories. 2019a. 2018-2019 North Slave Region Operations Report - Barren-ground caribou collaring, Enhanced North Slave Wolf Harvest Incentive Program and the 2019 wildfire season. Fall 2019, Government of the Northwest Territories, Yellowknife, NWT. [Online] URL: www.enr.gov.nt.ca/sites/enr/files/resources/128-ns_operations_report_proof.pdf

Gunn, A., A. D'Hont, J. Williams and J. Boulanger. 2013. Satellite collaring in the Bathurst herd of barren-ground caribou, 1996-2005. Environment and Natural Resources, Government of the Northwest Territories. Manuscript Report No. 225.

Hampton, J.O., B.D. Cowled, A.L. Perry, C.J. Miller, B. Jones and Q. Hart. 2014. Quantitative analysis of animal welfare outcomes in helicopter shooting: a case study of feral dromedary camels (*Camelus dromedarius*). Wildlife Research http://dx.doi.org/10.1071/WR13216

Hampton, J.O., P.M. Fisher and B. Warburton. 2020. Reconsidering humaneness. Conservation Biology doi.org/10.1111/cobi.13489

Hansen, I.J., C.J. Johnson and H.D. Cluff. 2013. Synchronicity of movement paths of barren-ground caribou and tundra wolves. Polar Biology 36: 1,363-1,371.

Heard, D.C. and T.M. Williams. 1992. Distribution of wolf dens on migratory caribou ranges in the Northwest Territories, Canada. Canadian Journal of Zoology 70: 1,504-1,510.

Heard, D.C., T.M. Williams and K. Jingfors. 1986. Precalving distribution and abundance of barren-ground caribou on the Northeastern Mainland of the Northwest Territories. Arctic 39: 24-28.

Hollerman, J.J., M.M. Fackler, D.M. Coldwell and Y. Ben-Menachem. 1990. Gunshot wounds: 1. Bullets, ballistics, and mechanisms of injury. American Journal of Roentgenalogy 155, 685-690.

Keith, L.B. 1983. Population dynamics of wolves. Pp.66-77. In L. Carbyn (ed.). Wolves: their biology, status, and management in Canada and Alaska. Proceedings of the Wolf Symposium, Edmonton, Alberta. Canadian Wildlife Service Rep. No. 45.

Kelsall, J.P. 1968. The migratory barren-ground caribou of Canada. Canadian Wildlife Service Monograph, 3: 1-340.

Klaczek, M.R., C.J. Johnson and H.D. Cluff. 2016. Wolf–caribou dynamics within the central Canadian Arctic. Journal of Wildlife Management 80: 837-849.

Kuyt, E. 1972. Food habits and ecology of wolves on barren-ground caribou range in the Northwest Territories. Report Series - Number 21, Canadian Wildlife Service, Ottawa, ON.

Kuzyk, G.W. and I.W. Hatter. 2014. Using ungulate biomass to estimate abundance of wolves in British Columbia. Wildlife Society Bulletin 38: 878-883.

Mattson, I.J.K., C.J. Johnson and H.D. Cluff. 2009. Winter survey of Bathurst caribou and associated wolf distribution and abundance. Environment and Natural Resources, Government of the Northwest Territories. Manuscript Report No. 185.

McLaren, A. 2016. Wolf (dìga) Management Programs in Northwest Territories, Alaska, Yukon, British Columbia, and Alberta: A Review of Options for Management on the Bathurst Caribou Herd Range in the Northwest Territories. Report prepared for the Department of Environment and Natural Resources, Government of the Northwest Territories. 32pp.

Musiani, M., J.A. Leonard, H.D. Cluff, C.C. Gates, S. Mariani, P.C. Paquet, C. Vilas and R.K. Wayne. 2007. Differentiation of tundra/taiga and boreal coniferous forest wolves: genetics, coat colour and association with migratory caribou. Molecular Ecology 16: 4,149-4,170.

Nagy, J.A.S. 2011. Use of space by caribou in northern Canada. PhD Thesis. University of Alberta, Edmonton, AB. 164pp.

Orians, G.H., P.A. Cochran, J.W. Duffield, T.K. Fuller, R.J. Gutierrez, W.M. Hanemann, F.C. James, P.M. Kareiva, S.R. Kellert, D.R. Klein, B.N. McLellan, P.D. Olson and G. Yaska. 1997. Wolves, Bears, and Their Prey in Alaska: Biological and Social Challenges in Wildlife Management. The National Academies Press.

Parker, G.R. 1973. Distribution and densities of wolves within barren-ground caribou range in northern mainland Canada. Journal of Mammalogy 54: 341-348.

Patterson, B.R., N.W.S. Quinn, E.F. Becker and D.B. Meier. 2004. Estimating wolf densities in forested areas using network sampling of tracks in snow. Wildlife Society Bulletin 32: 938-947.

Russell, D. 2010. A review of wolf management programs in Alaska, Yukon, British Columbia, Alberta and Northwest Territories. Unpublished Report, Whitehorse, YT. 47pp.

Stephenson, R.O. 1978. Characteristics of exploited wolf populations. Final Report Federal Aid in Wildlife Restoration Projects W-17-3 through W-17-9, Job 14.3R, Alaska Department of Fish and Game, Juneau, AK. 21pp.

Urquhart K.A. and I.J. MacKendrik. 2003. Survey of permanent wound tracks in the carcasses of culled wild red deer in Scotland. Veterinary Record 152: 497-501.

Walton, L.R., H.D. Cluff, P.C. Paquet and M.A. Ramsay. 2001. Movement Patterns of barren-ground wolves in the Central Canadian Arctic. Journal of Mammalogy, 82(3): 867–876. https://academic.oup.com/jmammal/article/82/3/867/2372883

Wek'èezhìı Renewable Resources Board. 2010. Report on a Public Hearing held by the Wek'èezhìı Renewable Resources Board, 22-26 March 2010, 5-6 August 2010, Behchokǫ, NWT. and Reasons for decisions related to a joint proposal for the management of the Bathurst caribou herd. Wek'èezhìı Renewable Resources Board, Yellowknife, NWT.

Wek'èezhìı Renewable Resources Board. 2016a. Report on a Public Hearing Held by the Wek'èezhìı Renewable Resources Board, 23-24 February 2016, Yellowknife, NWT & Reasons for Decisions Related to a Joint Proposal for the Management of the Bathurst ekwò (Barren-ground caribou) Herd - PART A. Wek'èezhìı Renewable Resources Board, Yellowknife, NWT.

Wek'èezhìı Renewable Resources Board. 2016b. Report on a Public Hearing Held by the Wek'èezhìı Renewable Resources Board, 6-8 April 2016, Behchokǫ, NWT, & Reasons for Decisions Related to a Joint Proposal for the Management of the Bluenose-East ?ekwo (Barren-ground caribou) Herd - PART A. Wek'èezhìı Renewable Resources Board, Yellowknife, NWT.

Wek'èezhìı Renewable Resources Board. 2019a. Reasons for Decisions Related to a Joint Proposal for the Management of the Kǫk'èetì Ekwǫ̀ (Bathurst caribou) Herd. Wek'èezhìı Renewable Resources Board, Yellowknife, NWT. 53pp. + Appendices

Wek'èezhìı Renewable Resources Board. 2019b. Report on a Public Hearing Held by the Wek'èezhìı Renewable Resources Board 9-11 April 2019 Behchokǫ̀, NWT & Reasons for Decisions Related to a Joint Proposal for the Management of the Sahtì Ekwǫ̀ (Bluenose-East Caribou) Herd. Wek'èezhìı Renewable Resources Board, Yellowknife, NWT. 66pp. + Appendices

Wolf Feasibility Assessment Technical Working Group (WFATWG). 2017. Wolf Technical Feasibility Assessment – Options for managing wolves on the range of the Bathurst barren- ground caribou herd. Government of the Northwest Territories, Environment & Natural Resources, Łutsel K'e Dene First Nation, North Slave Métis Alliance, Tłı̨chǫ Government, Department of Culture & Lands Protection, Wek'èezhìı Renewable Resources Board, Yellowknives Dene First Nation, Yellowknife, NWT. 15pp + 17 Appendices

Zalatan, B., A. Gunn and G.H.R. Henry. 2006. Long-term abundance patterns of barren-ground caribou using trampling scars on roots of *Picea mariania* in the Northwest Territories, Canada. Arctic, Antarctic and Alpine Research 38(4): 624-630.

APPENDICES

Appendix 1: Presentation to Wek'èezhìı Renewable Resources Board (March 9, 2020)

Technical discussion with WRRB

How will aerial "shooting" of wolves be carried out in 2020?

March 9, 2020

Related ENR activities

- Caribou classification - this week
- Collaring of 130 caribou and 30 wolves - 3 weeks
- Aerial removal of wolves - 6 weeks

When

Deploy wolf collars in NWT: March 6 - April 15

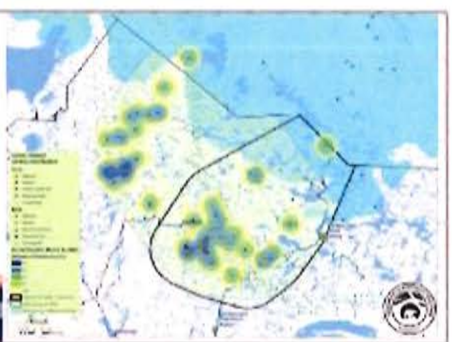
If required, deploy in NU: March 23 - April 15

Aerial wolf removals: March 15 - April 30 (NWT only)

Where

BNE and BA winter ranges

Will focus on caribou high density areas



How

- Aerial reconnaissance flights
- Aerial removal of wolves (shooting)
- Monitoring and assessment

Reconnaisance flights

- Fixed wing aircraft support to locate wolf packs and to assess abundance and density
- Provides cost efficiency and a more systematic coverage of BNE and BA winter ranges

Aerial Removal

- A-Star, with pilot, marksman and handler
- Shot placement - head and base of skull
- Brief field assessment and tag carcass
- Retrieval with A-Star if under 5 wolves by ground or Beaver aircraft if 5 or more wolves
- Daily debrief by shooter and handler with ENR
- ENR will provide weekly updates to TG and WRRB

Monitoring and Assessment

- Local trappers work with ENR to remove pelts.
- Examine carcasses to assess bullet wound injuries and address any concerns
- Standard carcass examination, to assess age/sex, health and condition, diet, & reproductive status
- At the end of the season, ENR will meet with TG and WRRB to discuss and evaluate these field efforts.

Appendix 2: Joint Letter to Wek'èezhìı Renewable Resources Board (April 28, 2020)

Tłıchǫ Ndek'àowo

Tłıchǫ Government

Government of Northwest Territories / Gouvernement des Territoires du Nord-Ouest

Ms. Jody Pellissey, Executive Director
Wek'èezhìi Renewable Resources Board
4504 49TH AVENUE
YELLOWKNIFE NT X1A 1A7

Dear Ms. Pellissey:

<u>Wolf (Diga) Management Pilot Project – Notice of Extension</u>

The Tłıchǫ Government and Department of Environment and Natural Resources, Government of the Northwest Territories would like to inform you of our intent to extend the wolf (diga) management pilot project into May, ending at the latest on May 15th, 2020. To date, we have directed four days of removal effort on the Bluenose-East caribou winter range for a total of 25 removals and have recently turned our efforts to the Bathurst winter range where we have 5 removals. The extension is needed to allow for more opportunity to direct removal effort towards both winter ranges thereby increasing potential to reach appropriate removal levels.

The operational challenges we have faced with respect to implementing the pilot have resulted from a combination of factors. First, because of the Covid restrictions on travel into the Northwest Territories we were delayed at getting an aerial removal crew in place to conduct the work. Second, we have experienced significant weather delays in April that have resulted in our crew unable to fly. Lastly, removal activities have also been affected by reduced hours available for searching and removing wolves due to our inability to stage out of Wekweètì (in adherence to Covid restrictions) resulting in 3-4 hours of ferrying time a day.

As we proceed with the pilot project, the removal crews will continue to keep humaneness of removals paramount and minimize disturbance of caribou by spotting and removing wolves on the periphery of large groups.

…/2

-2-

We appreciate your understanding of these matters and appreciate your ongoing support of this project. We look forward to providing you with a report on the pilot for consideration alongside a revised proposal for Wolf (Diga) Management in August 2020.

If you have any questions on the responses, please do not hesitate to contact either of the undersigned.

Sincerely,

Ms.Tammy Steinwand
Director, Culture and Lands Protection
Tłıchǫ Government
Behchokǫ̀, NT
TammySteinwand@tlicho.com

Karin Clark
A/Director, Wildlife and Fish
Environment and Natural Resources
Yellowknife, NT
Karin_Clark@gov.nt.ca

c. Michael Birlea
Manager, Lands Protection and Renewable Resources
Tłıchǫ Government

Robert Mulders, Wildlife Biologist-Carnivores
Environment and Natural Resources

Bruno Croft, Superintendent, North Slave Region
Environment and Natural Resources

Brett Elkin, A/Assistant Deputy Minister
Environment and Natural Resources

Appendix 3: Enhanced North Slave Wolf Harvest Incentive Program - Field Guide

Enhanced North Slave
Wolf Harvest Incentive Program

Field Guide for Harvesters

Updated 2019/20

Government of
Northwest Territories

This updated guide includes information for harvesters on the 2019/20 North Slave Wolf Harvest Incentive Area and associated increased incentives for wolf harvesting in the North Slave Region.

To help ENR evaluate this program, all wolf hunters, whether or not they harvested a wolf, are asked to fill out a short survey at the end of their trip. The survey will be available at ENR patrol stations. It will ask questions like:

- How many wolves, wolverines or caribou did you see?
- How far did you travel?
- How did weather affect your trip?

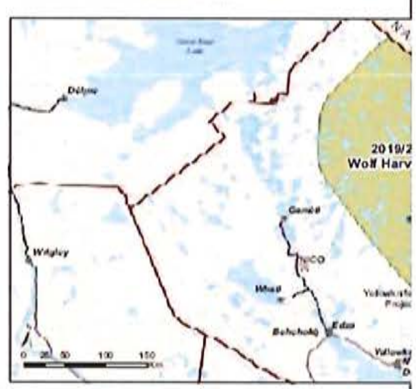
Return your completed survey to a patrol station for a $25 gift card.

Contents

North Slave Wolf Harvest Incentive Area

The North Slave Wolf Harvest Incentive Area has been updated for the 2019/20 winter season.

This area overlaps with the current wintering range of the Bathurst and Bluenose-East caribou herds.



North Slave Wolf Harvest Incentive Area

Increased incentives will be offered for wolves harvested within this area.

3

How do I participate?

Wolf harvesters going into the Wolf Harvest Incentive Area need to register at the patrol station at Gordon Lake or Wekweètì prior to hunting. Wolf tags are now available at no cost to all hunters.

Hunters who successfully harvest a wolf in the Wolf Harvest Incentive Area will be required to bring the carcass back to a patrol station, where the carcass will be uniquely marked and the harvester will receive a receipt from patrol station staff.

The harvester will then have the option of either taking the carcass (skinned or unskinned) home for pelt preparation or leaving it with patrol station staff, who will arrange for skilled skinners to prepare the pelt and securely store the carcass until it can be transported for necropsy and scientific analysis.

4

How do I participate?

The harvester will be able to cash the carcass receipt at North Slave Regional ENR offices in Yellowknife or Behchokǫ̀.

Satellite collars help ENR track wildlife migration. Do not shoot collared wolves. If you accidentally shoot a collared wolf, return the collar to your local or regional ENR office.

5

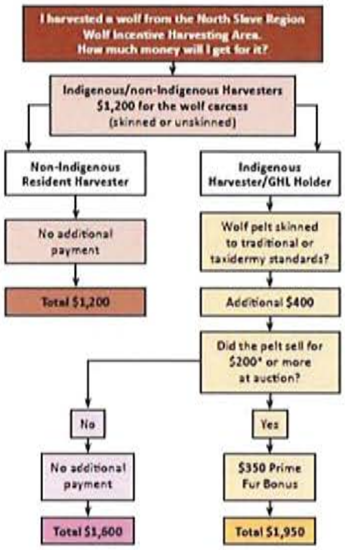
What are the enhanced wolf harvesting incentives?

Indigenous and resident hunters may receive a payment of $1,200 per carcass for wolves harvested in the Wolf Harvest Incentive Area.

Indigenous harvesters and harvesters with a General Hunting Licence are eligible for an additional $400 if the pelt is prepared to traditional standards, and $350 more if the pelt meets the requirement of the prime fur bonus as part of the Genuine Mackenzie Valley Fur Program.

6

What are the enhanced wolf harvesting incentives?



* If the pelt sells for more than $400 at auction, you will get the difference above the $400 advance.

Traditional vs. taxidermy standard

Traditional standard:

For trim:

- Pelt is split or cased.
- Feet can be cut off, head can be cut off, tail left on.
- Pelt must be properly fleshed, stretched, dried and cleaned.

For rug:

- Important to skin wolf as soon as possible to avoid taints and hair slippage.
- Pelt is split or cased.
- Pay close attention to leave enough material around, eyes, ears and lips.
- Skin down to the last knuckle on the feet, leaving intact.
- Wash out any blood or dirt before drying the pelt.
- Pelt must be properly fleshed, stretched, dried and cleaned.

Traditional vs. taxidermy standard

Taxidermy standard:

- Important to skin wolf as soon as possible to avoid taints and hair slippage.
- Pelt is split or cased.
- Pay close attention to leave enough material around, eyes, ears, lips and anal opening.
- Nose must be carefully skinned and complete, and the lips must be carefully skinned close to the jawline and split to allow the complete lip to dry properly.

Traditional vs. taxidermy standard

- Skin down to the last knuckle on the each toe, leaving pads and claws intact. The main pads on each foot must be cleaned of all the fat. Best to make a pouch with the claws and pads.
- Allow the paws one day of drying and then turn out and fill it with borax or sawdust until dry. You can stuff the foot with paper towels to keep the shape, but remove when dry.
- Flesh, stretch and board pelt to dry, and pay attention to remove any raw materials in ears and paws.

Traditional vs. taxidermy standard

- Ears must be complete, with the ear cartilage separated.
- Wash out any blood or dirt before drying the pelt.
- Pelt must be properly fleshed, stretched, dried and cleaned.

Know the law:

Illegal caribou harvesting and harassment

The North Slave Wolf Harvest Incentive Area overlaps with the Mobile Core Bathurst Caribou Management Zone (Mobile Zone).

It is illegal to hunt caribou inside the Mobile Zone.

It is also illegal to unnecessarily chase, fatigue, disturb, torment or otherwise harass wildlife, including caribou, under the NWT *Wildlife Act*.

ENR officers will be increasing the frequency of aerial and ground enforcement patrols to minimize the risk of illegal caribou hunting or harassment in the Mobile Zone.

Know the law:

Illegal caribou harvesting and harassment

Documented cases of illegally harvesting or harassing caribou will be prosecuted under the *Wildlife Act*.

The location of the Mobile Zone is updated weekly. It is your responsibility to be aware of the most up-to-date coordinates and ensure you are not hunting in the Mobile Zone.

To view the current Mobile Zone, visit www.enr.gov.nt.ca.

For More Information...

For more information, contact:
Environment and Natural Resources
North Slave Regional Office
3803 Bretzlaff Drive
Yellowknife, NT
1-867-767-9238

Une version française de ce document est disponible.

Appendix 4: Dìga Harvester Survey Form – North Slave Region (Winter 2020)

Wolf Harvester Survey - North Slave Region

Name of hunter: ______________________

E-mail: ______________ Phone: __________

Type of Licence/Hunter Residency: __________

1. Hunting trip started on Month: Day: approx. time:
   ended on Month: Day: approx. time:
2. In total, how many wolves did you see on your trip? [ ]
3. Number of wolves seen in each wolf pack? __________
4. In total, how many wolves did you harvest on your trip? [ ]
5. If available, please include GPS location of your wolf harvests:
   Lat: Long: General area:
   Lat: Long: General area:
6. Number of other wolf hunters travelling with you: [ ]
7. Estimated number of hours spent hunting each day:

Day 1	2	3	4	5	6	7

8. Estimated number of kilometres travelled each day:

Day 1	2	3	4	5	6	7

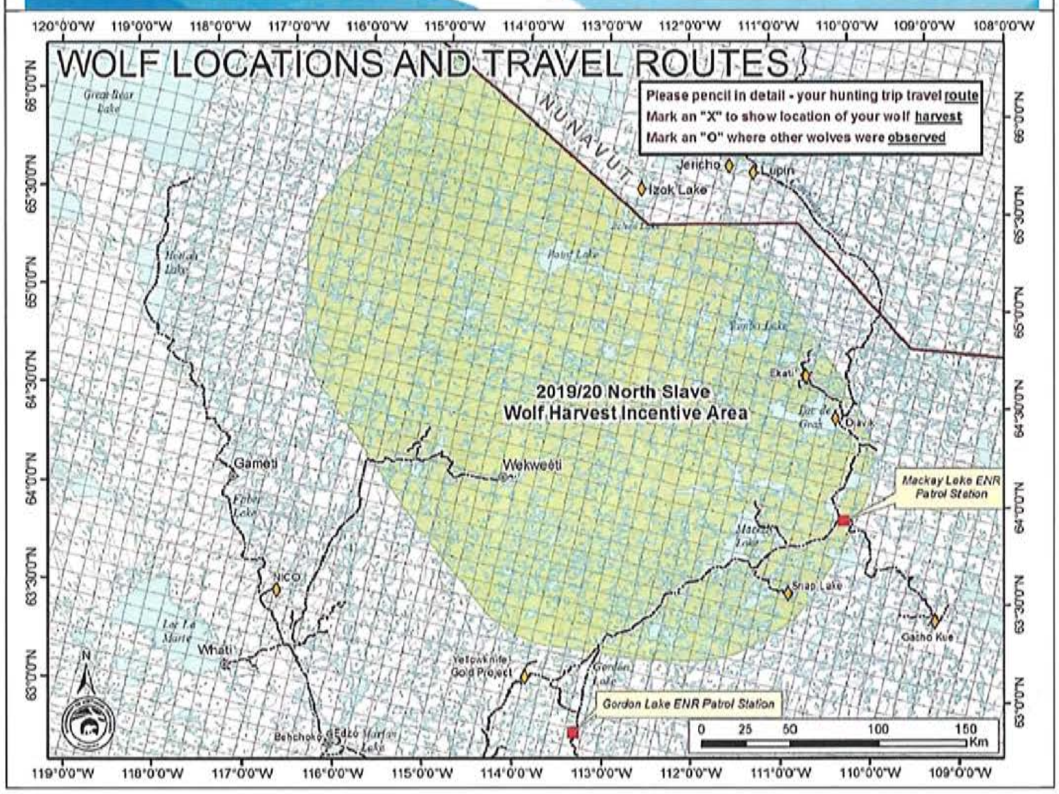
9. How many wolverines did you see during your trip? [ ]
10. How many wolverines did you harvest on this trip? [ ]
11. Other species harvested during your trip? __________
12. Estimated number of caribou seen while hunting wolves.
    Check one: None [ ] 1-20 [ ] 21-100 [ ] 101-500 [ ] Over 500 [ ]
13. Did you see any sign of caribou remains; likely killed by wolves?
    Yes or No? [ ]
14. What was the weather like during your hunt? Did it make hunting harder? __________
15. Do you have any other comments or wildlife observations about your trip? __________
16. On the back of this sheet is a MAP of the winter roads in the North Slave Region. Please mark down your travel route, wolf harvest & wolf observation locations.

Thank you for participating! Survey data will help ENR document wolf hunting efforts and support caribou recovery. Any information you provide will remain confidential.

Questions? Contact the North Slave Regional Office at 1-867-767-9238.

Please return this completed survey at an ENR office or check station for a $25 gift card!

Government of Northwest Territories / Gouvernement des Territoires du Nord-Ouest



Appendix 5: Tłı̨chǫ Dìga Harvester Questionnaire (Winter 2020)

1. When were you at the Tłı̨chǫ dìga harvester camp?
2. What were travel (snow) conditions like?
3. How often did you see dìga or dìga sign? If you saw dìga, were they in packs or by themselves?
4. Did you see caribou every day? If so, how many caribou would you usually see in a day?
5. Did you see kill sites of dìga?
6. How far from camp did you travel to look for dìga?
7. What did you do to find and harvest dìga in the area?
8. Were you satisfied with how the travel arrangements were made? Or would you have preferred to have been picked up at your home community?
9. Do you think the gear and equipment was good enough? What would you recommend that we have for the camp?
10. Who do you think we should keep for next year? Who did a good job out there?
11. Do you think the rotations were long enough? Not long enough? Or the right amount of time?
12. Were there any traditional practices taken place at camp? Passing on traditional knowledge, doing prayers at camp and feeding of the fire?
13. What went well?
14. What didn't go well, or what were some important challenges you experienced?
15. What improvements need to be made for next year?
16. Is there any additional training or preparation you recommend for next year?
17. What was a highlight for you?

Appendix 6: Dìga Harvester Survey Form – NU (Winter 2020)

Wolf Survey for Nunavut wolf harvesters in the North Slave Region

Name of hunter: ______________________

E-mail: ______________________ Phone: ______________

Type of Licence/Hunter Residency: ______________________

1. Hunting trip started on Month: Day: approx. time:

   ended on Month: Day: approx. time:

2. In total, how many wolves did you see on your trip? ☐

3. Number of wolves seen in each wolf pack? ______________

4. In total, how many wolves did you harvest on your trip? ☐

5. If available, please include GPS location of your wolf harvests:

   Lat: Long: General area:

   Lat: Long: General area:

6. Number of other wolf hunters travelling with you: ☐

7. Estimated number of hours spent hunting each day:

Day 1	2	3	4	5	6	7

8. Estimated number of kilometres travelled each day:

Day 1	2	3	4	5	6	7

9. Other species (number) harvested during your trip?

   Muskox ☐ Wolverine ☐

   Other species: ______________________

10. Estimated number of caribou seen while hunting wolves.

    Check one: None ☐ 1-20 ☐ 21-100 ☐ 101-500 ☐ Over 500 ☐

11. Did you see any sign of caribou remains; likely killed by wolves?

    Yes ☐ No ☐

12. What was the weather like during your hunt? Did it make hunting harder? ______________________

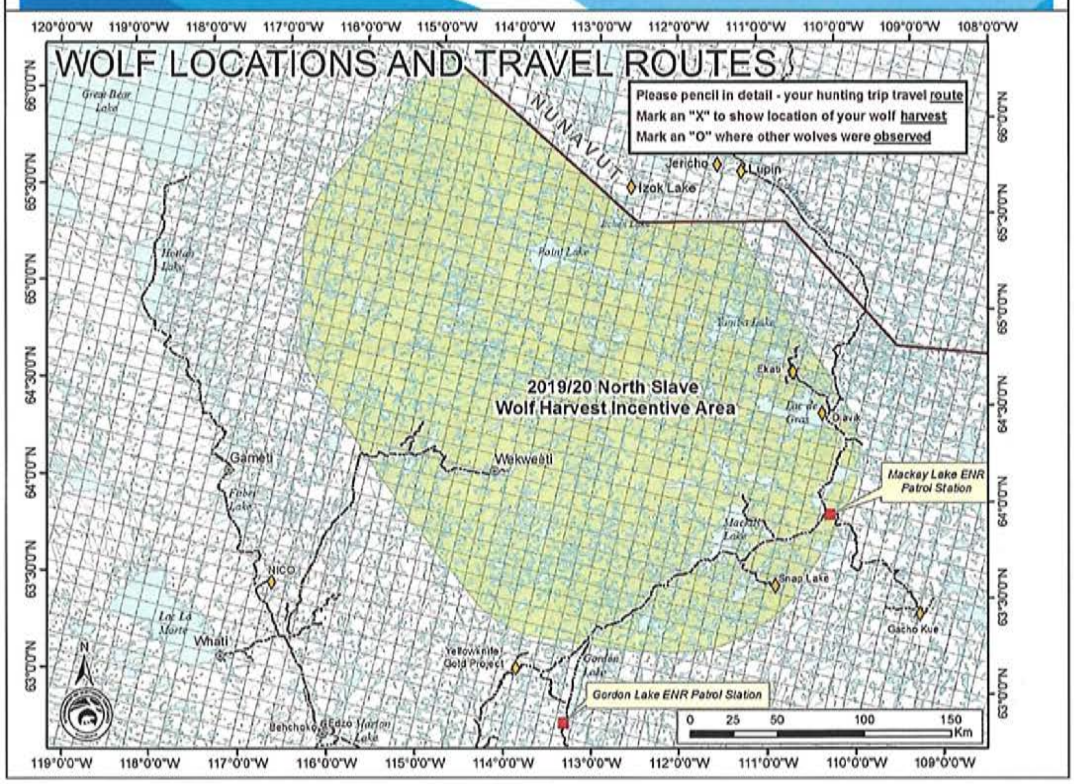
13. Do you have any other comments or wildlife observations about your trip? ______________________

14. On the back of this sheet is a MAP of the winter roads in the North Slave Region. Please mark down your travel route, wolf harvest & wolf observation locations. ______________________

Thank you for participating! Survey data will help ENR document wolf hunting efforts and support caribou recovery. Any information you provide will remain confidential.

Questions? Contact: Allen Niptanatiak, Conservation Officer III, Kugluktuk Office at 1-867-982-7451.

Government of Northwest Territories / Gouvernement des Territoires du Nord-Ouest



Appendix 7: Aerial Removal Data Forms

WOLF PACK - AERIAL REMOVAL FORM - Central Barrens

Date: ____________ Temp: ______°C	Aircraft: ___________ Call Sign: ____________
Navigator/Handler: ____________________ Other: ___________________________	Pilot: ___________________________ Shooter: _________________________
Deployment Area: (Herd + General location)	GPS Location (NAD83):
Wolf pack sighting time (24 h): ____________ Wolf Pack ID #: ______________ Time pursuit initiated (24 h): __________	Observed wolf pack size: ________ Initial behavior of wolves (circle one): Running Standing Bedded Feeding @ kill site Other ____________ Were other wildlife observed in close association with wolf pack? (write estimated number below species) Caribou Raven Fox Wolverine Other ____ ____ ____ ____ ________
Were all wolves in pack removed (circle answer)? Yes / No	If No, how many individual wolves from pack escaped and were not killed? ______

Individual Wolf Shot from Pack	Firearm Type Rifle Shotgun	GPS Waypoint #	Time 1st shot (eg. 13:31)	# shots fired	Time last shot (eg. 13:35)	Wolf Immobile? Y / N
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						
13						
14						
15						
16						
17						
18						

WOLF CARCASS - AERIAL REMOVAL FORM - Central Barrens

Wolf Pack ID #: ____________________

Individual wolf shot from pack # __________ Handler Initials ______

Tag Colour: _____________	Tag Number: ________	Tag: Males on Left front paw Females - Right front paw
Photos of head? Yes No	Photos of Left Side Y N	Photos of Right Side Y N
Tongue sample collected? Yes No		

Number of gun-shot wound(s):	
Location of gun-shots wounds:	
Body Condition: 1=Skinny, 3=Average, 5=Fat (1 - 5)	Other Injuries

Welfare index (time to death after shot) Circle:

1	2	3	4	5
Immediate	0 - 2 mins	2 - 5 mins	5 - 10 mins	> 10 mins

Note: If bagged carcasses are being left for pick-up later, single pile must be also *TARPED*, and edges packed with snow.

Appendix 8: Necropsy Forms

Location	H.	B.	Fractures	Puncture wounds (ex; en)	Other
Head					
Neck					
L Shoulder					
R Shoulder					
L Forelimb					
R Forelimb					
L Flank (external)					
R Flank (external)					
Chest/thorax (internal)					
Abdomen (internal)					
L Hindlimb					
R Hindlimb					
Tail					

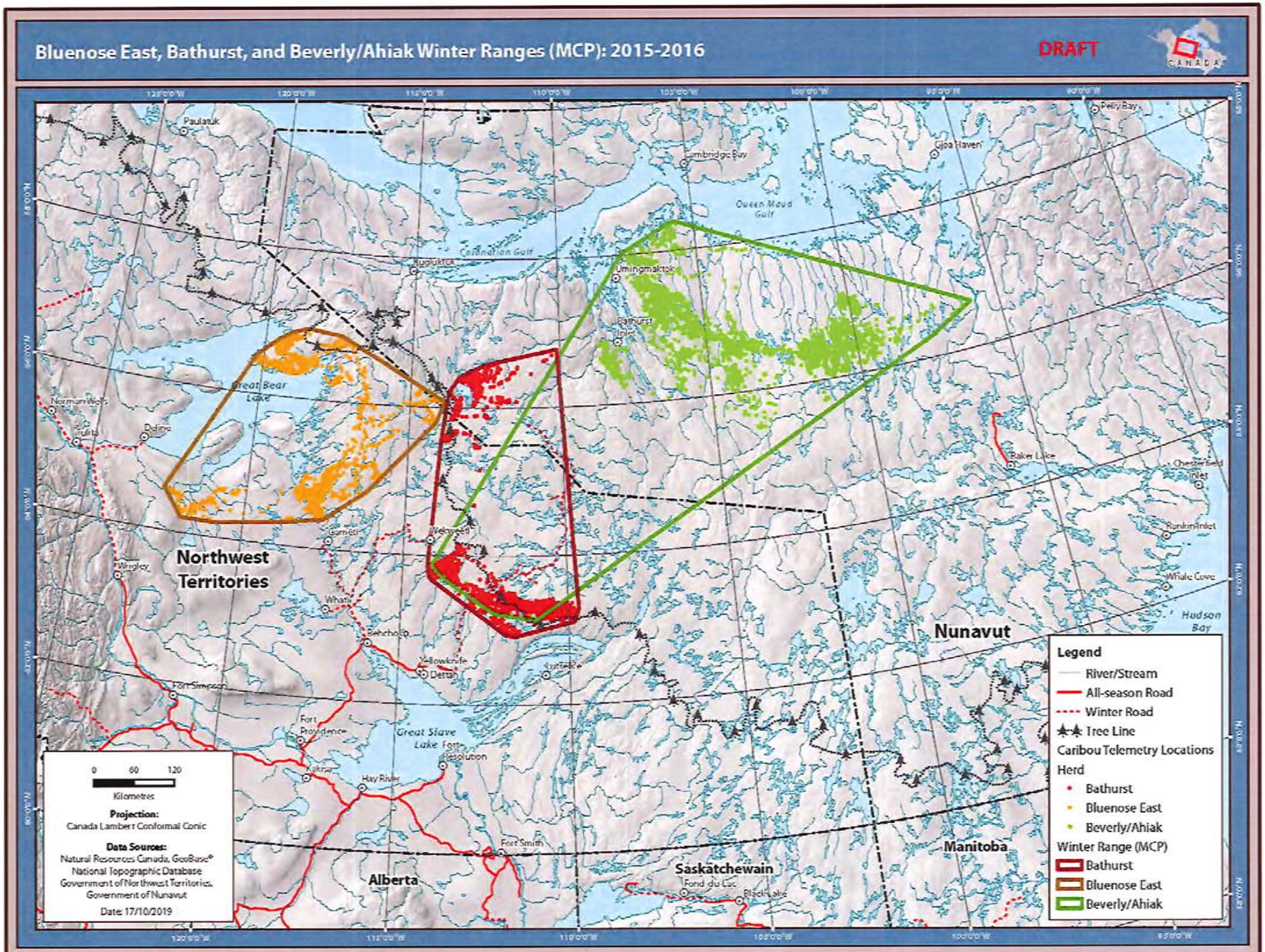
WILDLIFE NECROPSY SAMPLING

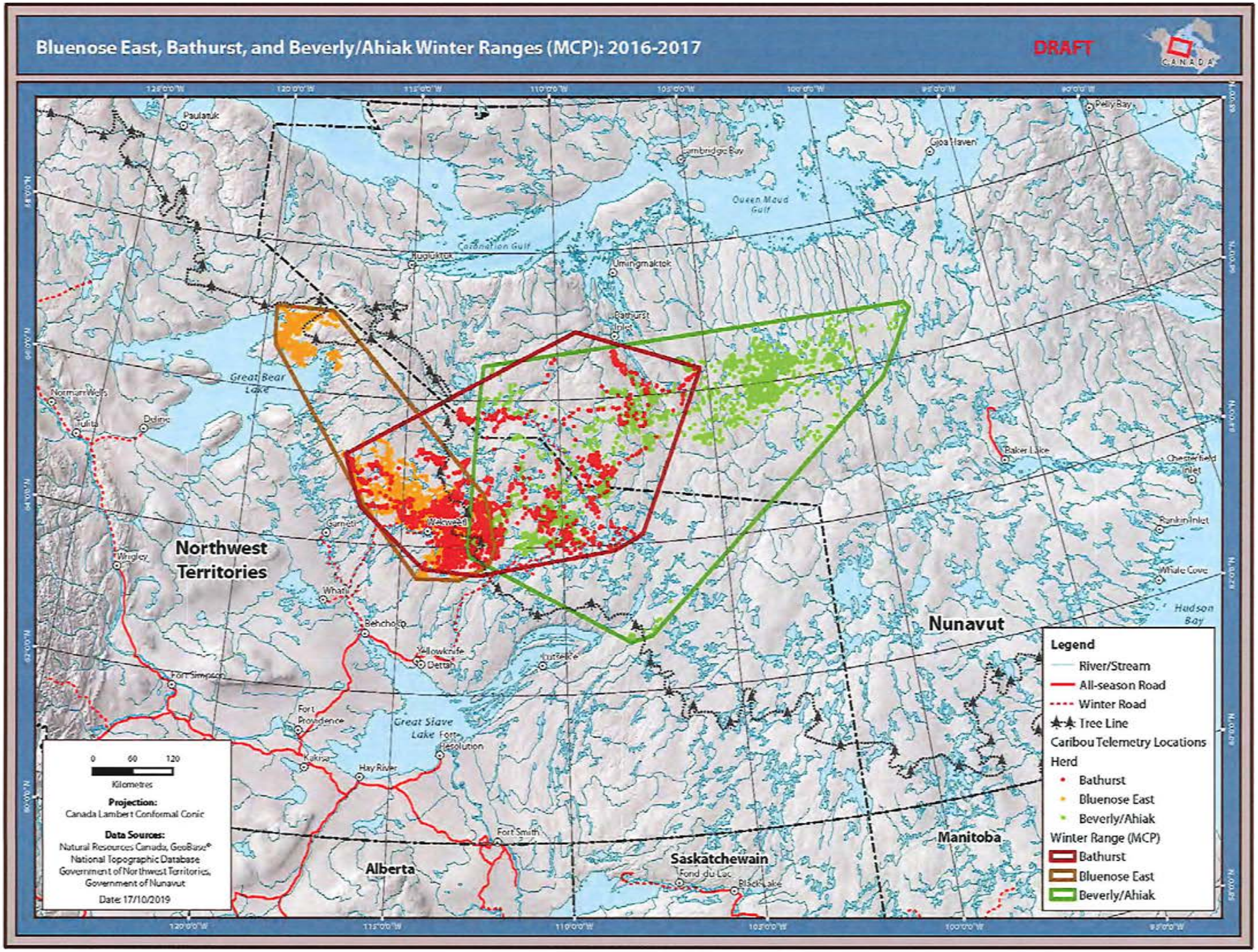
Necropsy id: NSR		Species:
Parameter	*Value*	*Comments*
necropsy date (dd/mm/yyyy)		
sex (Male / Female / Unknown)		
location of kill/death		
grid cell		
date received or found		
when killed?		
age class		
age (estimated)		
carcass submitted by		
how killed / died?		
injuries? (specify injury area)		
tag comments		
MEASUREMENTS		
unskinned carcass		
body weight (kg) - unskinned		
neck girth - unskinned (cm)		
chest girth - unskinned (cm)		
contour - nose to tail base (cm)		
tail length (cm)		
skinned carcass		
body weight (kg) - skinned		
pelt weight (kg)		
contour - nose to tail base (cm)		
tail length (cm)		
neck girth - skinned (cm)		
chest girth - skinned (cm)		
rump fat (mm)		
total external rank (0-4 max)		
EXTERNAL SAMPLES		
tongue		
hair		
skull - includes jaw and tooth		
hind leg muscle - DNA		
- stable isotopes		
- contaminants		
femur		
feces		
INTERNAL SAMPLES		
diaphragm		
lung		
liver (contaminants)		
spleen		
kidney (with fat)	left right	
blood filter tabs		
blood vacutainer		
entire stomach (with contents) (g)		
- empty stomach weight (g)		
stomach contents wt (g)		
stomach contents sampled?		
description of contents		
intestinal tract		
uterine scars?		
other samples?		
total internal fat rank (0-4 max)		
pictures of teeth?		
other pictures?		
personnel		
comments:		

Appendix 9: Bathurst, Bluenose-East and Beverly Caribou Winter Range Analysis – Figures (R. Kite and J. Shaw, Caslys Consulting Ltd., Saanichton, BC)

Contents

Appendix 9-A1: MCP Ranges Winter Season


Bluenose East, Bathurst, and Beverly/Ahiak Winter Ranges (MCP): 2015-2016
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Wrigley
Gameti
Wekweeti
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Fond du Lac
Black Lake
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Northwest Territories
Nunavut
Alberta
Saskatchewain
Manitoba
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 17/10/2019
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Caribou Telemetry Locations
Herd
Bathurst
Bluenose East
Beverly/Ahiak
Winter Range (MCP)
Bathurst
Bluenose East
Beverly/Ahiak



Bluenose East, Bathurst, and Beverly/Ahiak Winter Ranges (MCP): 2016-2017
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Gameti
Wekweeti
Northwest Territories
Wrigley
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Nunavut
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Alberta
Saskatchewain
Fond du Lac
Black Lake
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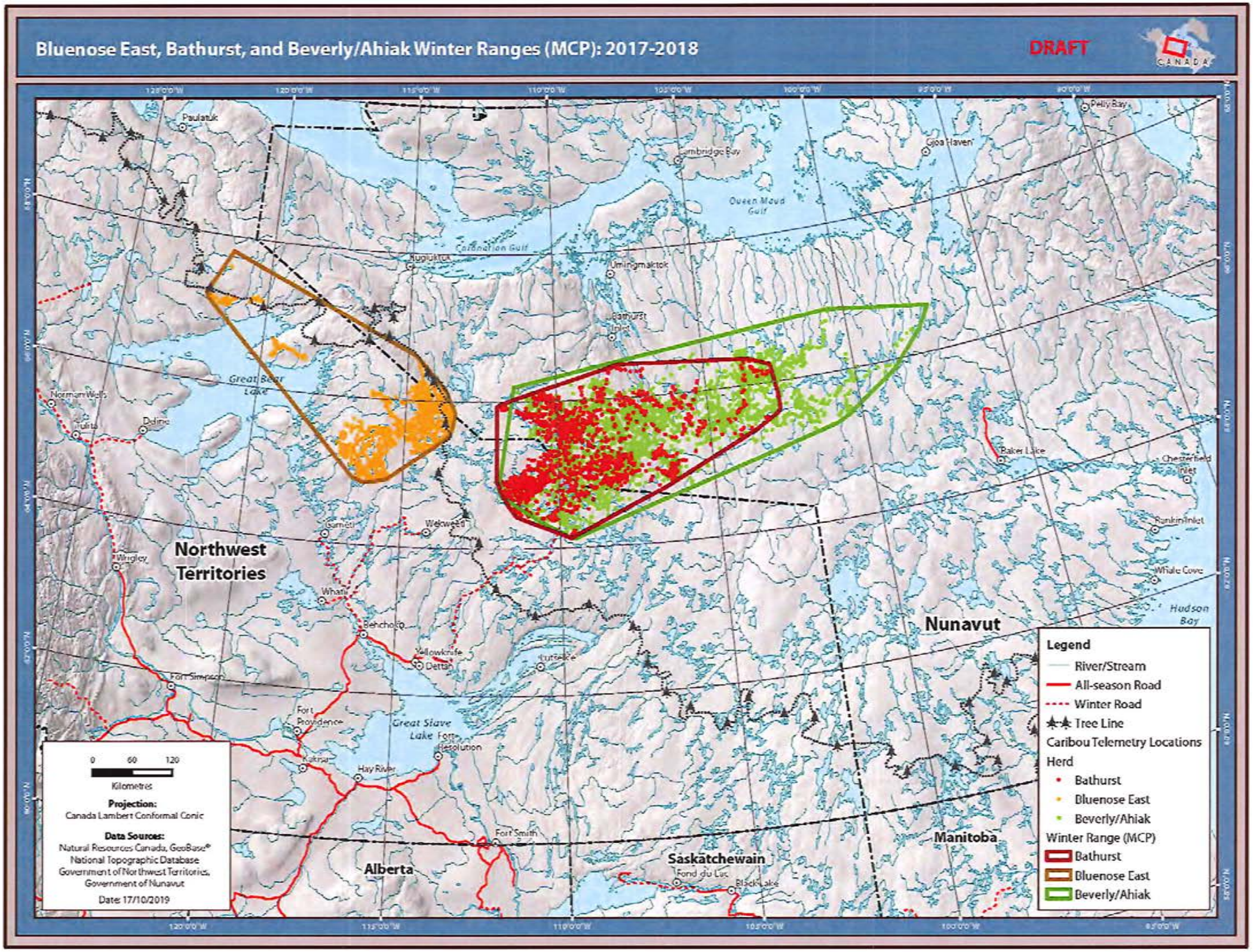
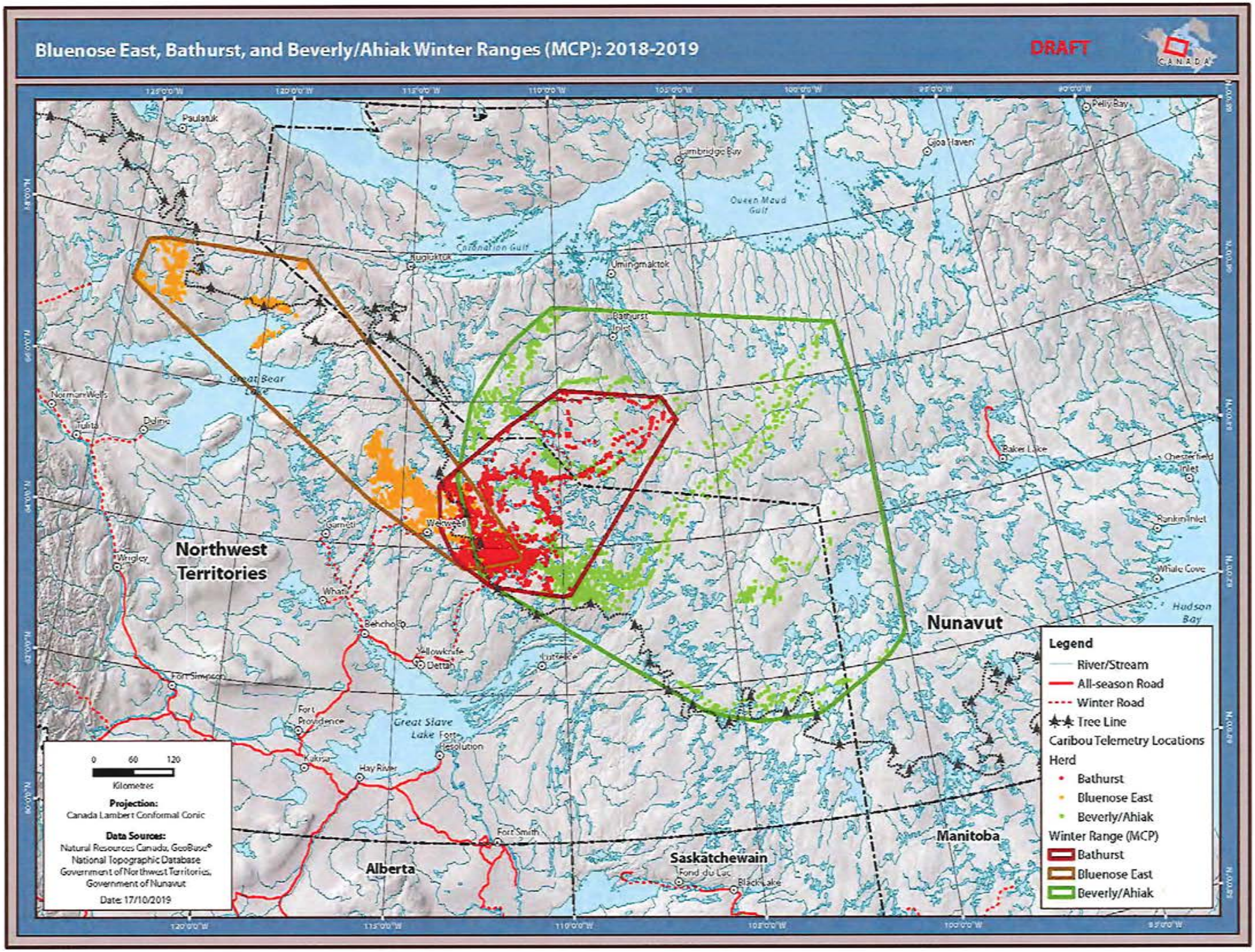
Herd
Bathurst
Bluenose East
Beverly/Ahiak
Winter Range (MCP)
Bathurst
Bluenose East
Beverly/Ahiak
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 17/10/2019


Bluenose East, Bathurst, and Beverly/Ahiak Winter Ranges (MCP): 2017-2018
DRAFT
CANADA
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Caribou Telemetry Locations
Herd
Bathurst
Bluenose East
Beverly/Ahiak
Winter Range (MCP)
Bathurst
Bluenose East
Beverly/Ahiak
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 17/10/2019
Northwest Territories
Nunavut
Alberta
Saskatchewain
Manitoba
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Wrigley
Gameti
Wekweeti
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Fond du Lac
Black Lake
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay



Bluenose East, Bathurst, and Beverly/Ahiak Winter Ranges (MCP): 2018-2019
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Wekweeti
Gameti
Wrigley
Northwest Territories
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Nunavut
Manitoba
Saskatchewan
Fond du Lac
Black Lake
Alberta
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
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Government of Northwest Territories,
Government of Nunavut
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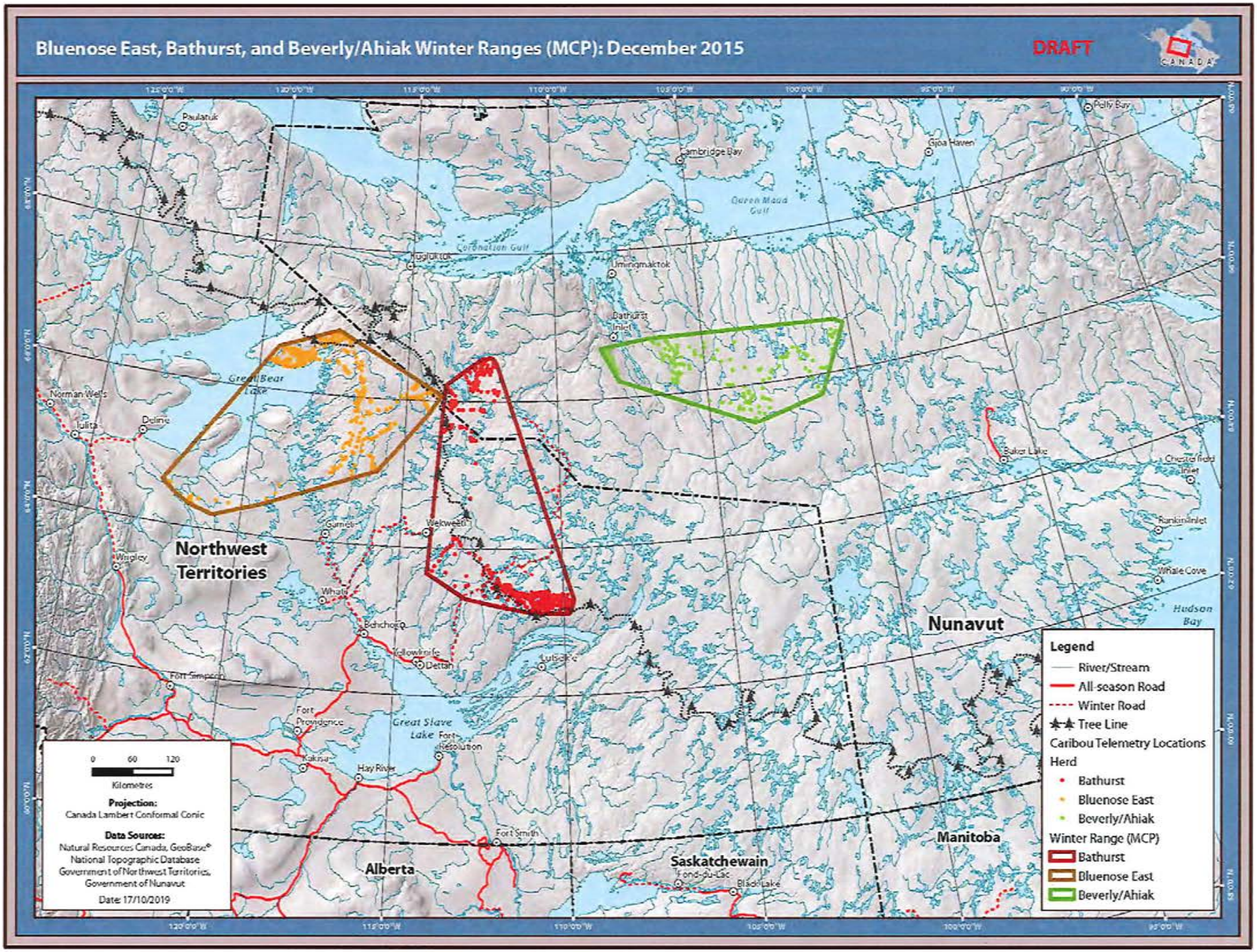
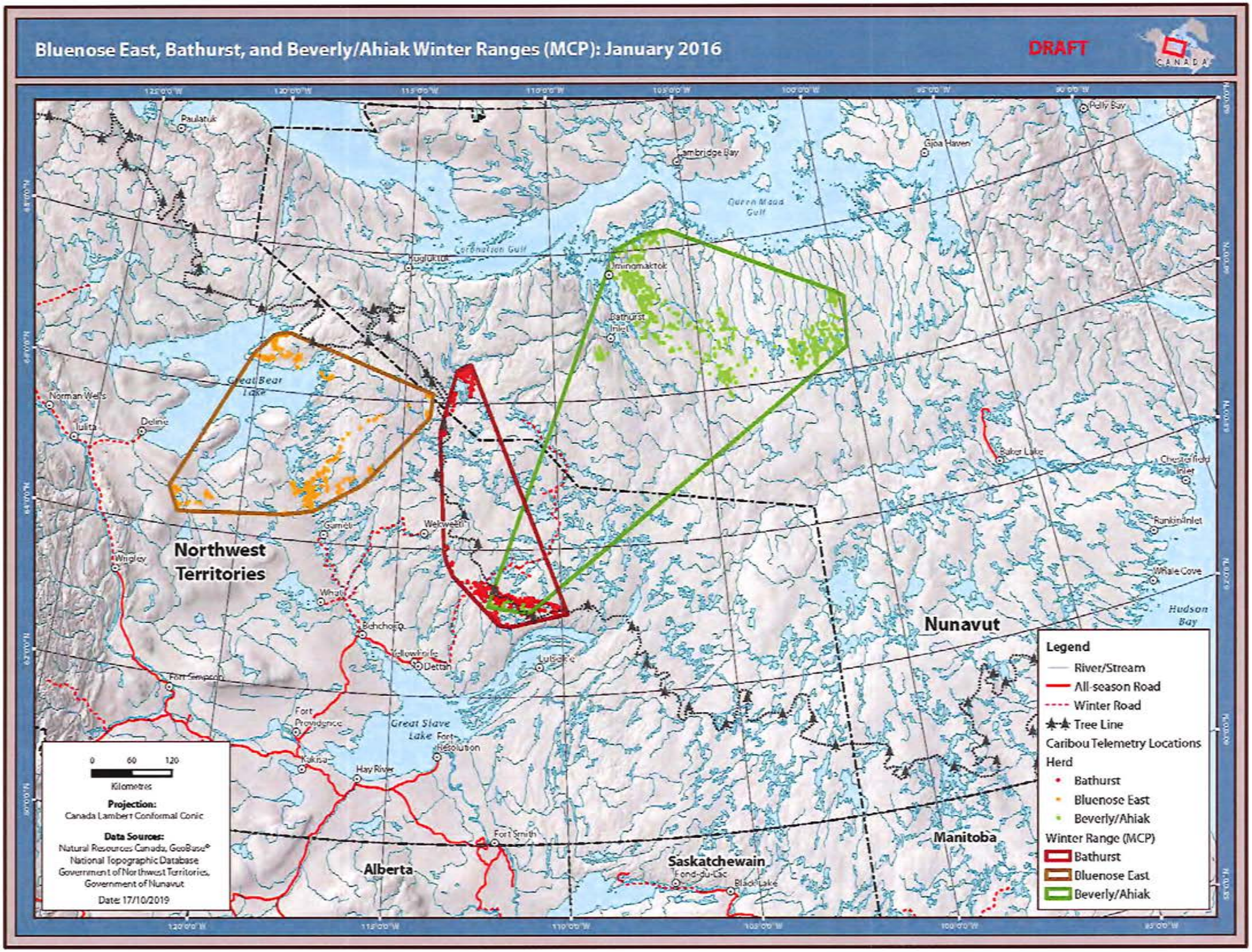
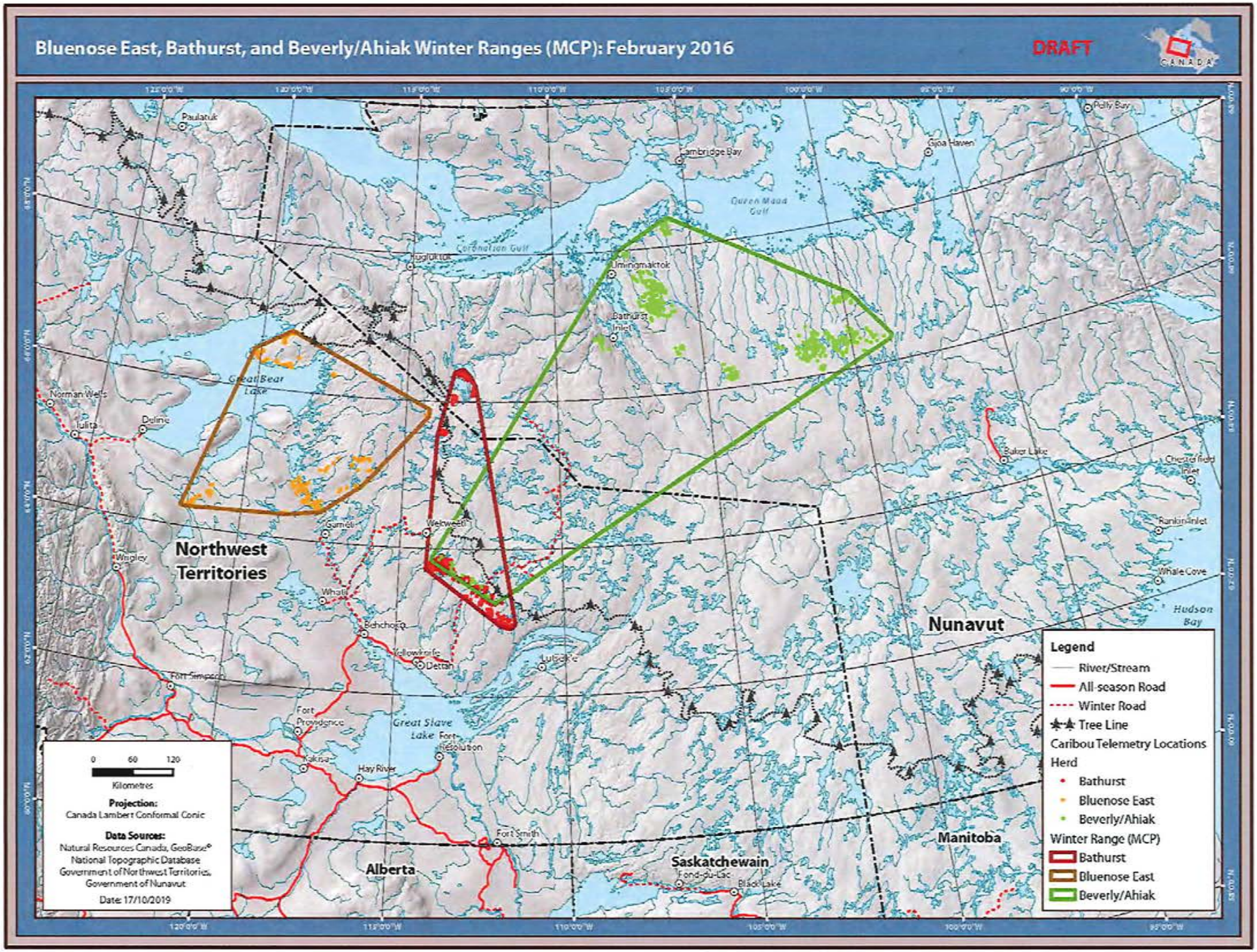
Winter Road
Tree Line
Caribou Telemetry Locations
Herd
Bathurst
Bluenose East
Beverly/Ahiak
Winter Range (MCP)
Bathurst
Bluenose East
Beverly/Ahiak

Appendix 9-A2: MCP Ranges Monthly



Bluenose East, Bathurst, and Beverly/Ahiak Winter Ranges (MCP): December 2015
DRAFT
CANADA
Northwest Territories
Nunavut
Alberta
Saskatchewain
Manitoba
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Gameti
Wekweeti
Wrigley
Whati
Behchoko
Yellowknife
Dettah
Lutsel'k'e
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Fond-du-Lac
Black Lake
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Caribou Telemetry Locations
Herd
Bathurst
Bluenose East
Beverly/Ahiak
Winter Range (MCP)
Bathurst
Bluenose East
Beverly/Ahiak
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 17/10/2019


Bluenose East, Bathurst, and Beverly/Ahiak Winter Ranges (MCP): January 2016
DRAFT
CANADA
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Caribou Telemetry Locations
Herd
Bathurst
Bluenose East
Beverly/Ahiak
Winter Range (MCP)
Bathurst
Bluenose East
Beverly/Ahiak
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 17/10/2019
Northwest Territories
Nunavut
Manitoba
Saskatchewan
Alberta
Hudson Bay
Great Slave Lake
Great Bear Lake
Coronation Gulf
Queen Maud Gulf
Paulatuk
Norman Wells
Tulita
Deline
Wrigley
Fort Simpson
Fort Providence
Kakisa
Hay River
Fort Resolution
Fort Smith
Yellowknife
Dettah
Behchoko
Whati
Gameti
Wekweeti
Lutselk'e
Kugluktuk
Umingmaktok
Bathurst Inlet
Cambridge Bay
Gjoa Haven
Polly Bay
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Fond-du-Lac
Black Lake



Bluenose East, Bathurst, and Beverly/Ahiak Winter Ranges (MCP): February 2016
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Gamèti
Wekweètì
Northwest Territories
Wrigley
Whatì
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Alberta
Saskatchewan
Fond-du-Lac
Black Lake
Nunavut
Manitoba
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Caribou Telemetry Locations
Herd
Bathurst
Bluenose East
Beverly/Ahiak
Winter Range (MCP)
Bathurst
Bluenose East
Beverly/Ahiak
0 60 120
Kilometres
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Data Sources:
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National Topographic Database
Government of Northwest Territories,
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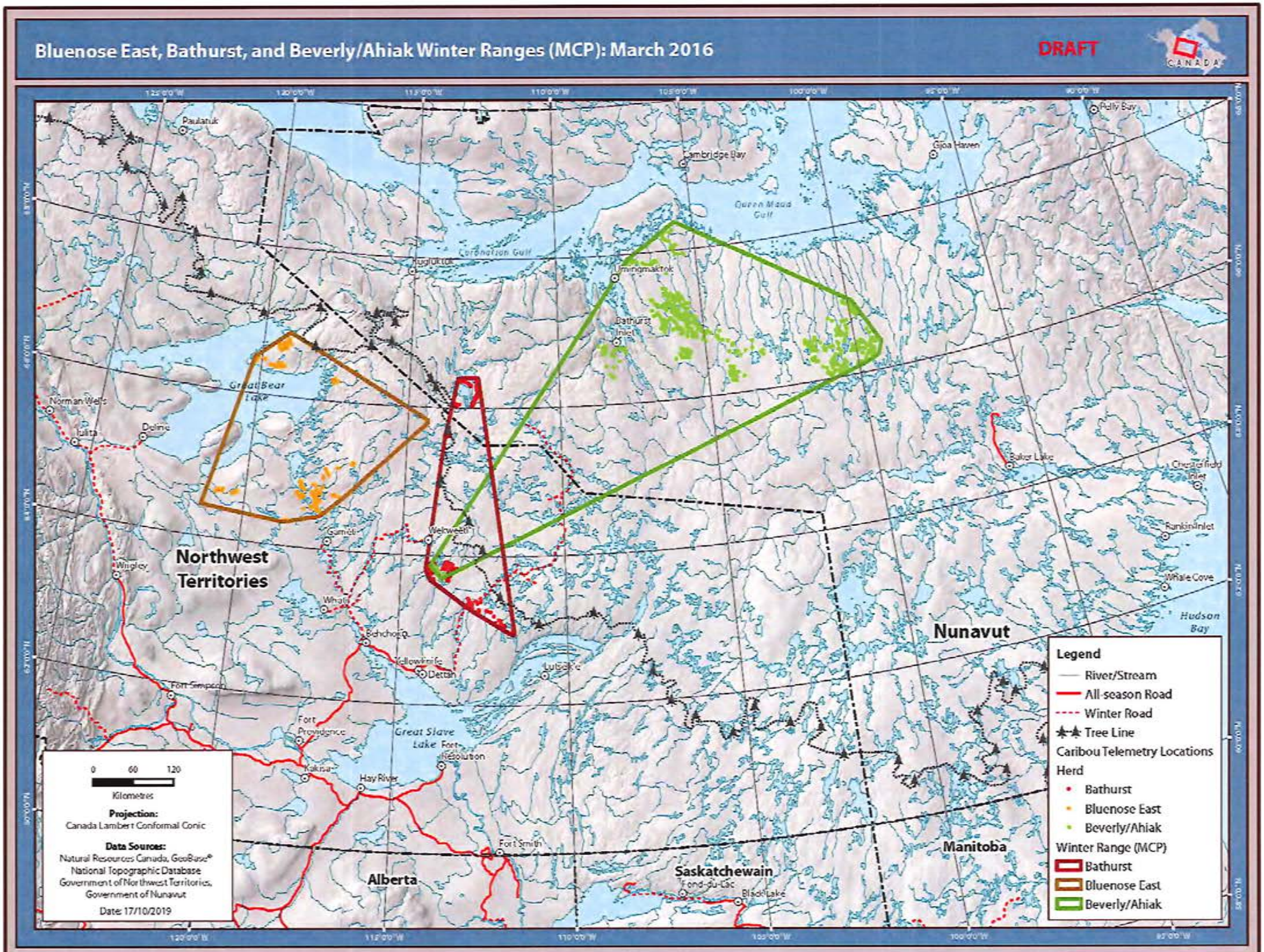
Date: 17/10/2019


Bluenose East, Bathurst, and Beverly/Ahiak Winter Ranges (MCP): March 2016
DRAFT
CANADA
Northwest Territories
Nunavut
Alberta
Saskatchewain
Manitoba
Great Bear Lake
Great Slave Lake
Coronation Gulf
Queen Maud Gulf
Hudson Bay
Paulatuk
Norman Wells
Tulita
Deline
Wrigley
Fort Simpson
Fort Providence
Kakisa
Hay River
Fort Resolution
Fort Smith
Yellowknife
Dettah
Behchoko
Whati
Gameti
Wekweeti
Lutselk'e
Kugluktuk
Umingmaktok
Bathurst Inlet
Cambridge Bay
Gjoa Haven
Pelly Bay
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Fond-du-Lac
Black Lake
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Caribou Telemetry Locations
Herd
Bathurst
Bluenose East
Beverly/Ahiak
Winter Range (MCP)
Bathurst
Bluenose East
Beverly/Ahiak
0 60 120
Kilometres
Projection:
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Data Sources:
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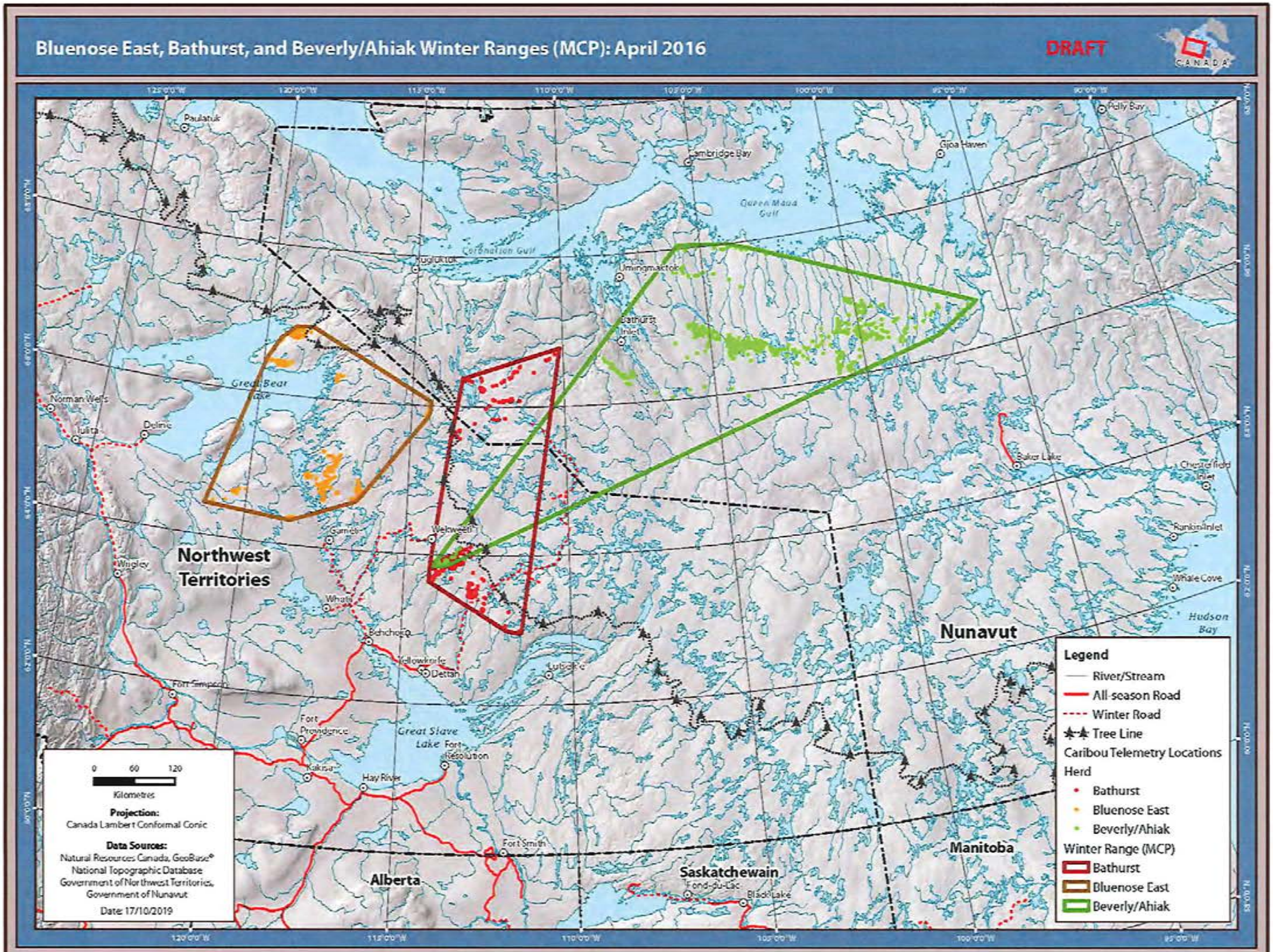
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 17/10/2019


Bluenose East, Bathurst, and Beverly/Ahiak Winter Ranges (MCP): April 2016
DRAFT
CANADA
Northwest Territories
Nunavut
Alberta
Saskatchewain
Manitoba
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Gameti
Wekweeti
Wrigley
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Kakisa
Hay River
Great Slave Lake
Fort Resolution
Fort Smith
Fond-du-Lac
Black Lake
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Caribou Telemetry Locations
Herd
Bathurst
Bluenose East
Beverly/Ahiak
Winter Range (MCP)
Bathurst
Bluenose East
Beverly/Ahiak
0 60 120
Kilometres
Projection:
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Data Sources:
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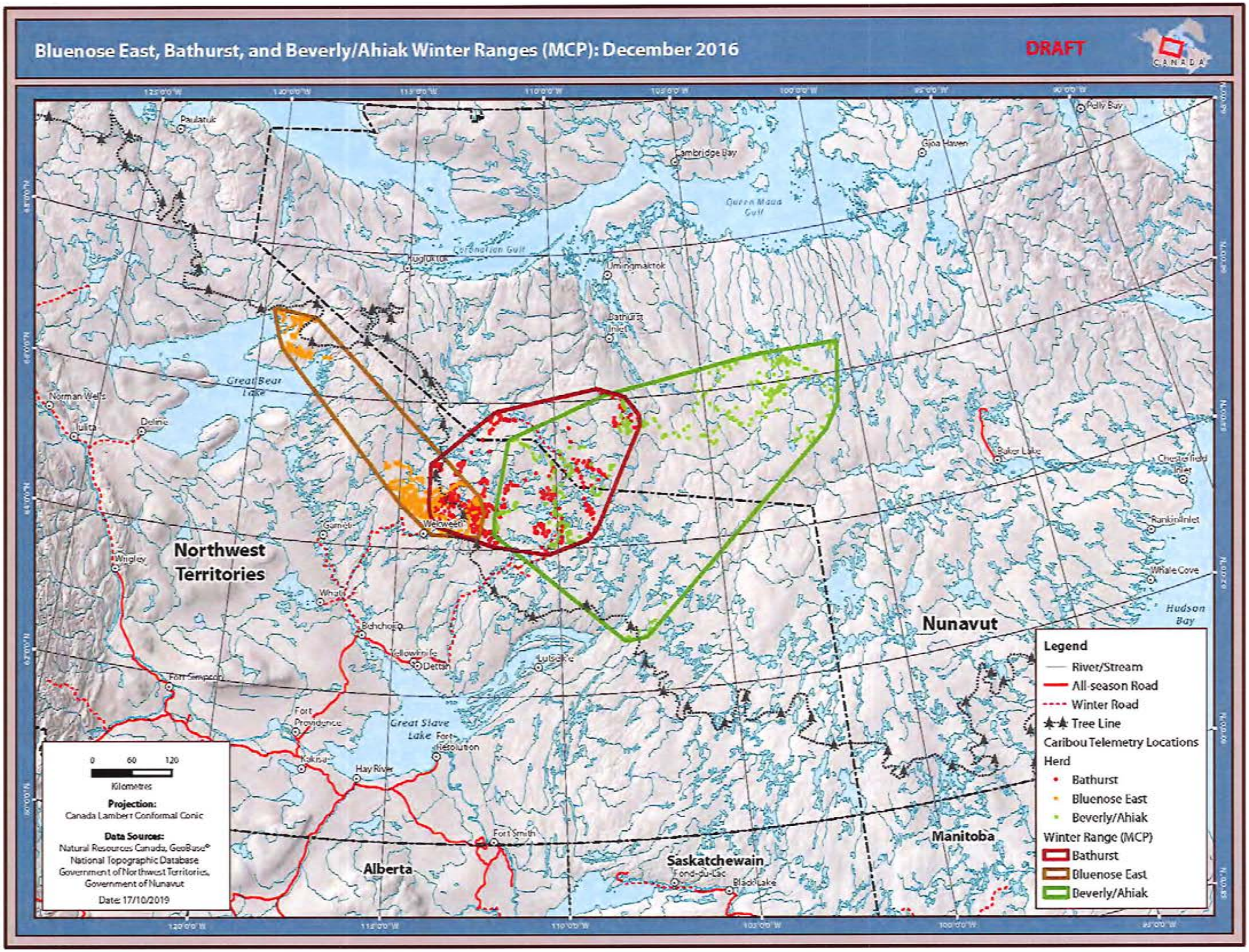
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 17/10/2019



Bluenose East, Bathurst, and Beverly/Ahiak Winter Ranges (MCP): December 2016
DRAFT
CANADA
Northwest Territories
Nunavut
Alberta
Saskatchewain
Manitoba
Great Bear Lake
Great Slave Lake
Queen Maud Gulf
Coronation Gulf
Hudson Bay
Paulatuk
Cambridge Bay
Gjoa Haven
Kugluktuk
Umingmaktok
Bathurst Inlet
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Norman Wells
Tulita
Deline
Wrigley
Gameti
Wekweeti
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Kakisa
Hay River
Fort Resolution
Fort Smith
Fond-du-Lac
Black Lake
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Caribou Telemetry Locations
Herd
Bathurst
Bluenose East
Beverly/Ahiak
Winter Range (MCP)
Bathurst
Bluenose East
Beverly/Ahiak
0 60 120
Kilometres
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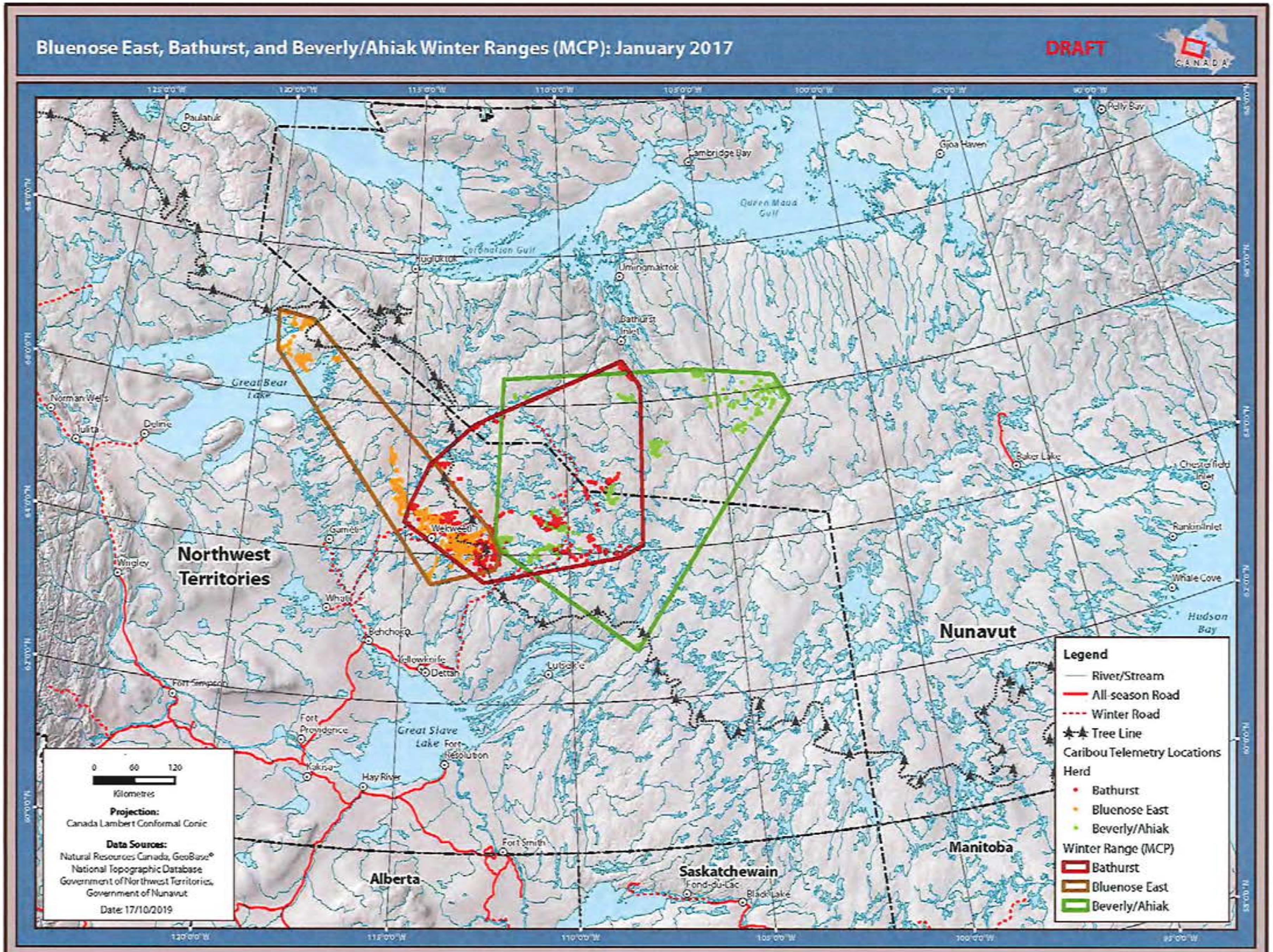
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 17/10/2019



Bluenose East, Bathurst, and Beverly/Ahiak Winter Ranges (MCP): January 2017
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Gamèti
Wekweètì
Northwest Territories
Wrigley
Whatì
Behchokǫ̀
Yellowknife
Dettah
Lutselk'e
Nunavut
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Alberta
Saskatchewan
Fond-du-Lac
Black Lake
Manitoba
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Caribou Telemetry Locations
Herd
Bathurst
Bluenose East
Beverly/Ahiak
Winter Range (MCP)
Bathurst
Bluenose East
Beverly/Ahiak
0 60 120
Kilometres
Projection:
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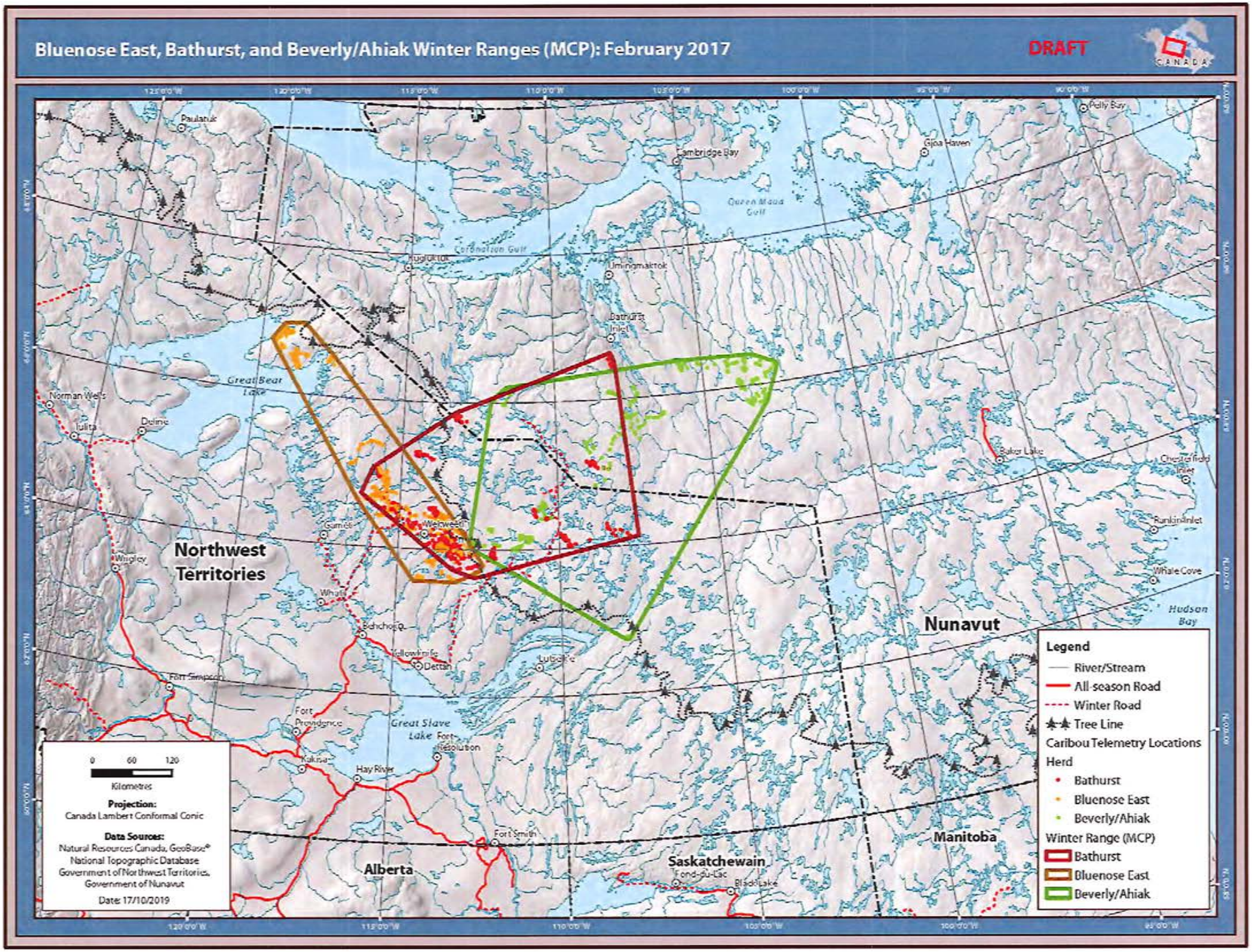
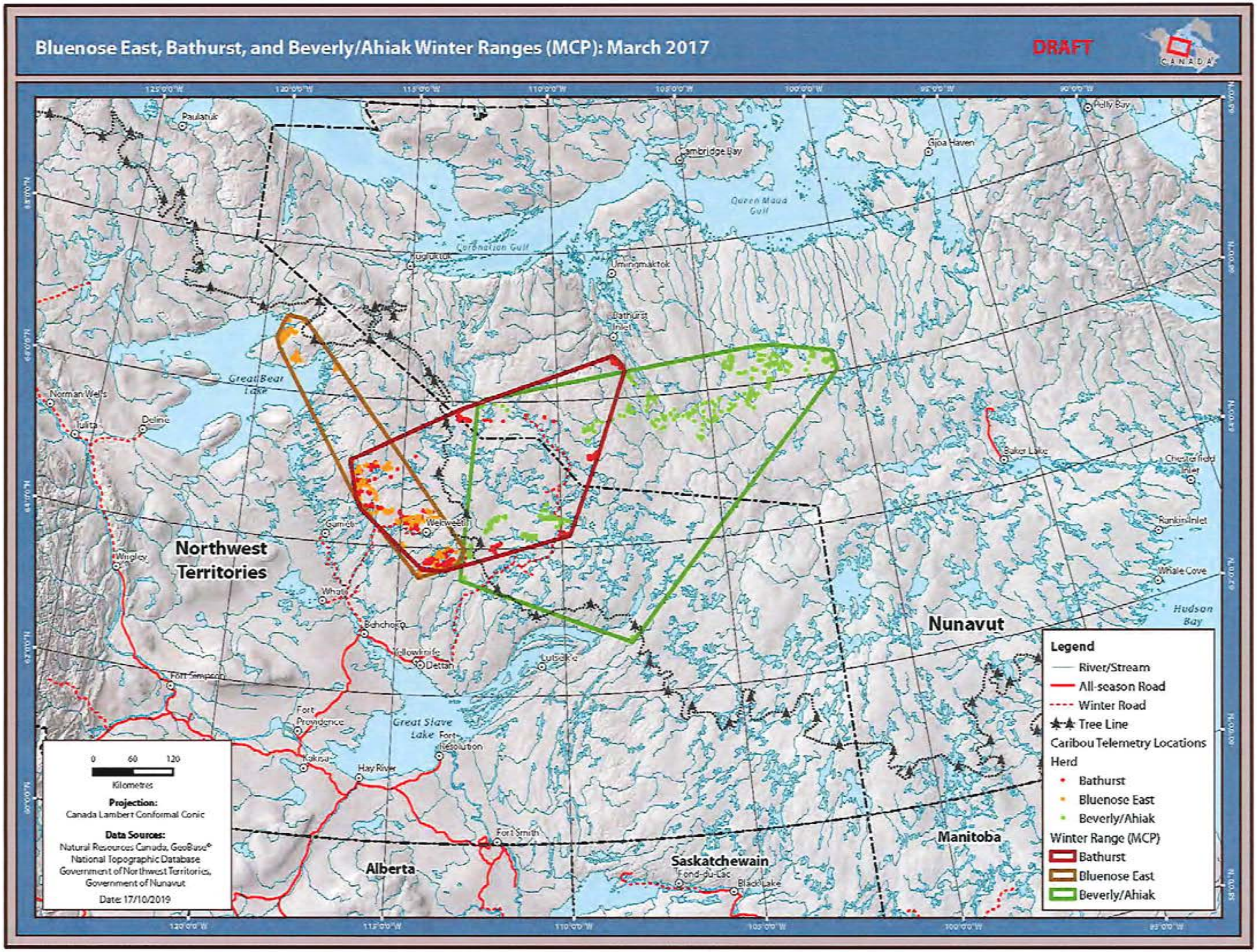
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 17/10/2019


Bluenose East, Bathurst, and Beverly/Ahiak Winter Ranges (MCP): February 2017
DRAFT
CANADA
Northwest Territories
Nunavut
Alberta
Saskatchewain
Manitoba
Great Bear Lake
Great Slave Lake
Coronation Gulf
Queen Maud Gulf
Hudson Bay
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Kugluktuk
Umingmaktok
Bathurst Inlet
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Norman Wells
Tulita
Deline
Wrigley
Gameti
Wekweeti
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Fort Resolution
Kakisa
Hay River
Fort Smith
Fond-du-Lac
Black Lake
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Caribou Telemetry Locations
Herd
Bathurst
Bluenose East
Beverly/Ahiak
Winter Range (MCP)
Bathurst
Bluenose East
Beverly/Ahiak
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 17/10/2019


Bluenose East, Bathurst, and Beverly/Ahiak Winter Ranges (MCP): March 2017
DRAFT
CANADA
Northwest Territories
Nunavut
Alberta
Saskatchewain
Manitoba
Great Bear Lake
Great Slave Lake
Coronation Gulf
Queen Maud Gulf
Hudson Bay
Paulatuk
Norman Wells
Tulita
Deline
Wrigley
Fort Simpson
Kugluktuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Umingmaktok
Bathurst Inlet
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Gameti
Wekweeti
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Providence
Kakisa
Hay River
Fort Resolution
Fort Smith
Fond-du-Lac
Black Lake
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Caribou Telemetry Locations
Herd
Bathurst
Bluenose East
Beverly/Ahiak
Winter Range (MCP)
Bathurst
Bluenose East
Beverly/Ahiak
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
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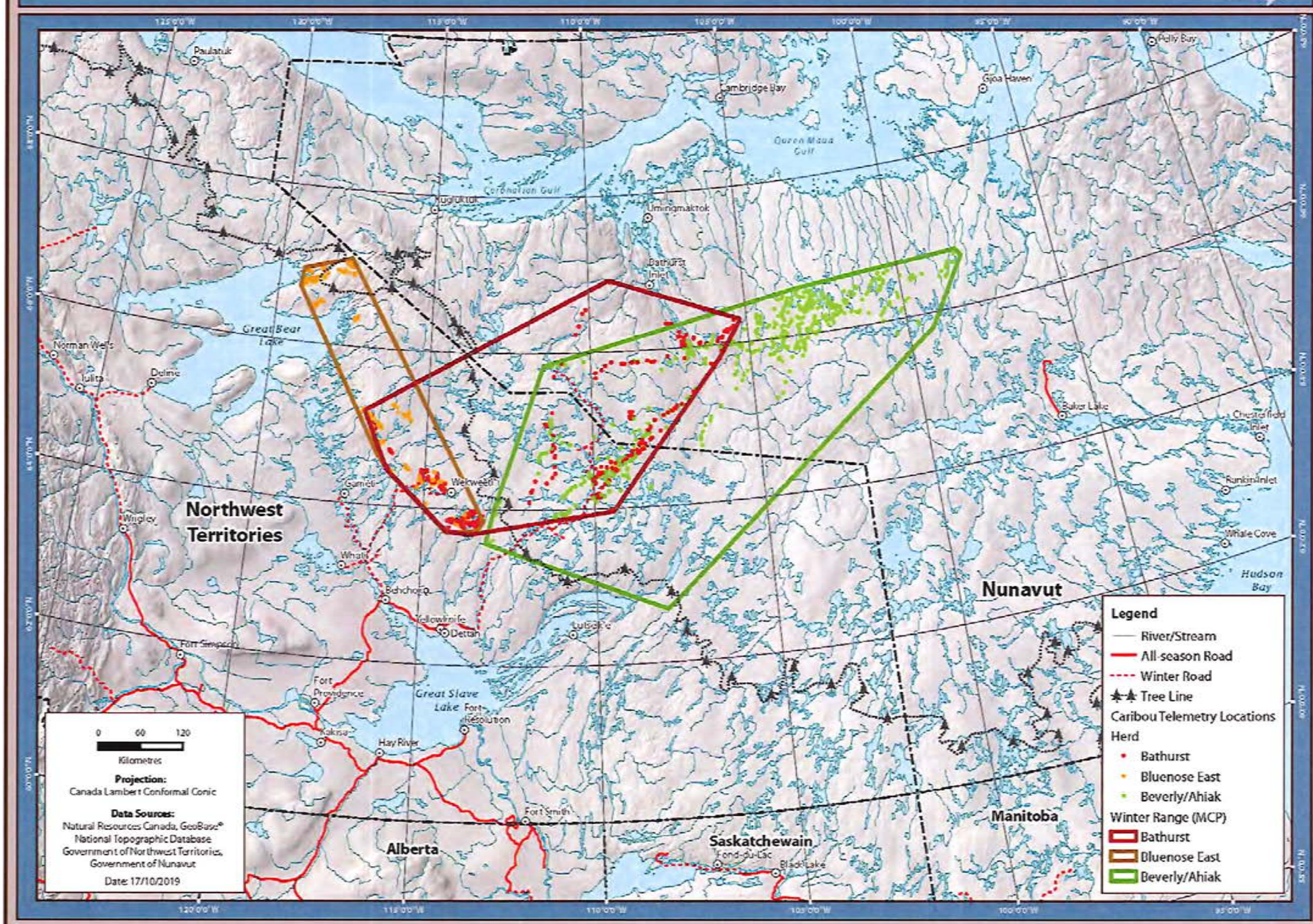
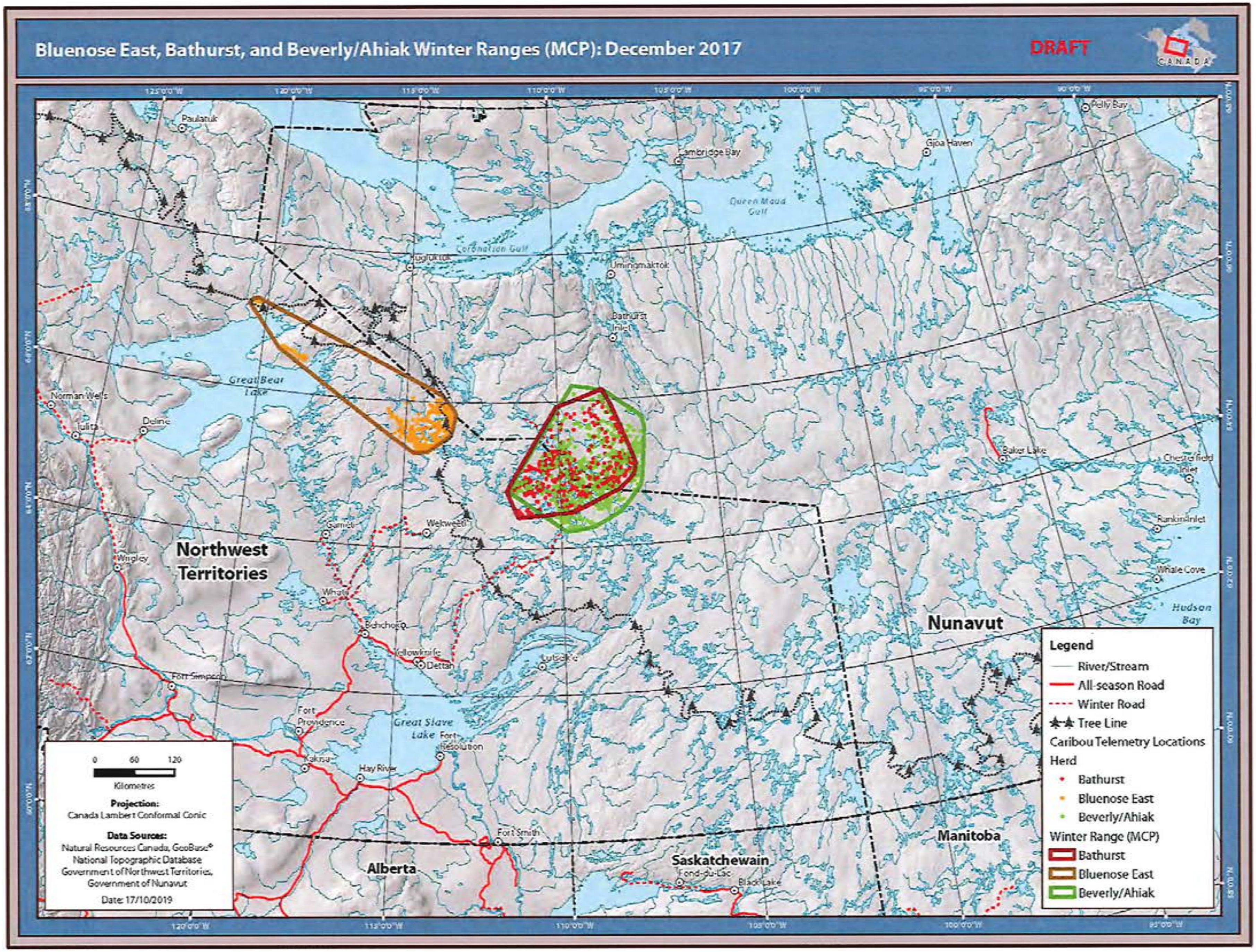
Government of Northwest Territories,
Government of Nunavut
Date: 17/10/2019

Bluenose East, Bathurst, and Beverly/Ahiak Winter Ranges (MCP): April 2017




Bluenose East, Bathurst, and Beverly/Ahiak Winter Ranges (MCP): December 2017
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Gamèti
Wekweètì
Northwest Territories
Wrigley
Whatì
Behchokǫ̀
Yellowknife
Dettah
Fort Simpson
Lutselk'e
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Alberta
Saskatchewain
Fond-du-Lac
Black Lake
Manitoba
Nunavut
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Caribou Telemetry Locations
Herd
Bathurst
Bluenose East
Beverly/Ahiak
Winter Range (MCP)
Bathurst
Bluenose East
Beverly/Ahiak
0 60 120
Kilometres
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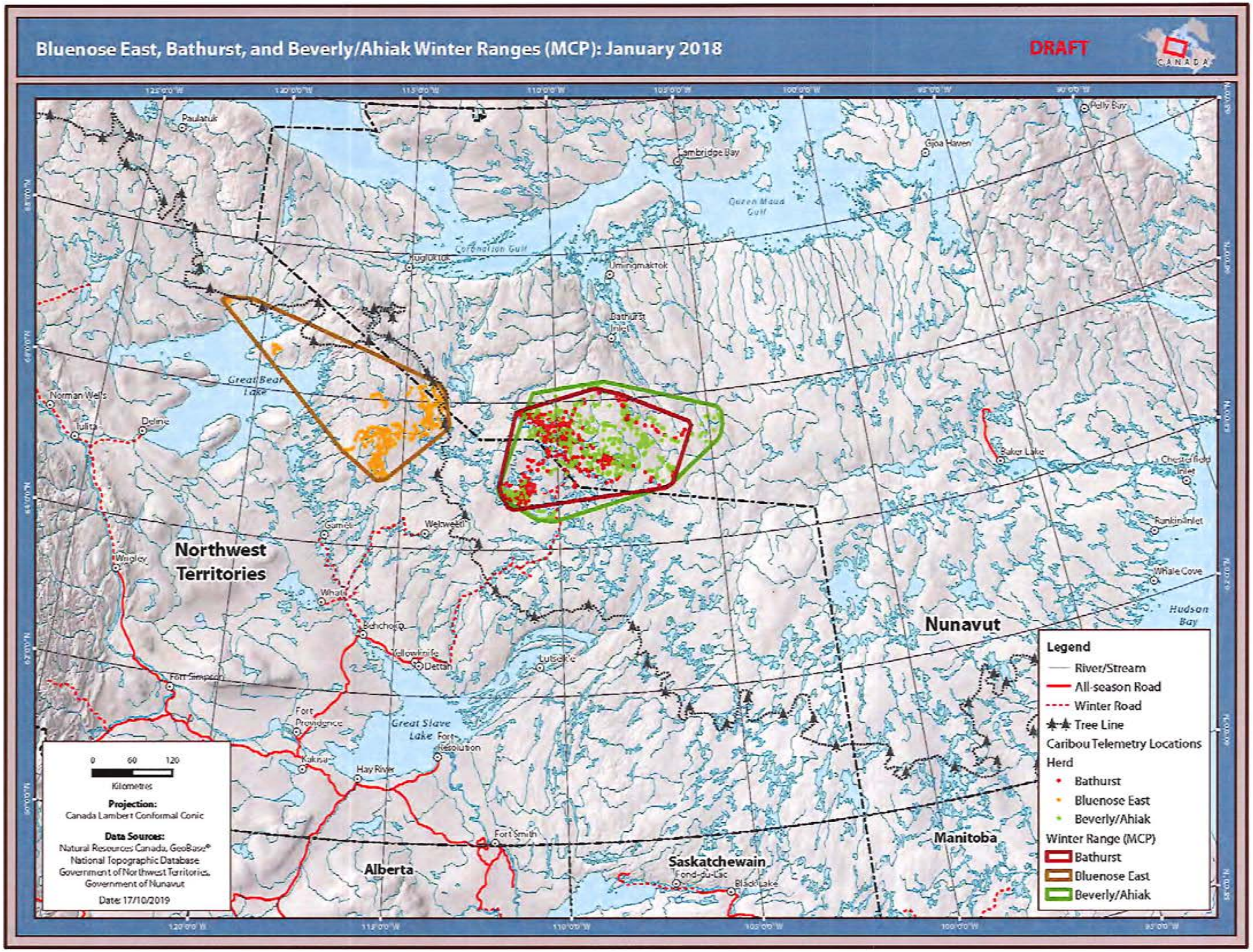
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 17/10/2019


Bluenose East, Bathurst, and Beverly/Ahiak Winter Ranges (MCP): January 2018
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Wekweeti
Gameti
Wrigley
Northwest Territories
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Alberta
Saskatchewain
Fond-du-Lac
Black Lake
Manitoba
Nunavut
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Caribou Telemetry Locations
Herd
Bathurst
Bluenose East
Beverly/Ahiak
Winter Range (MCP)
Bathurst
Bluenose East
Beverly/Ahiak
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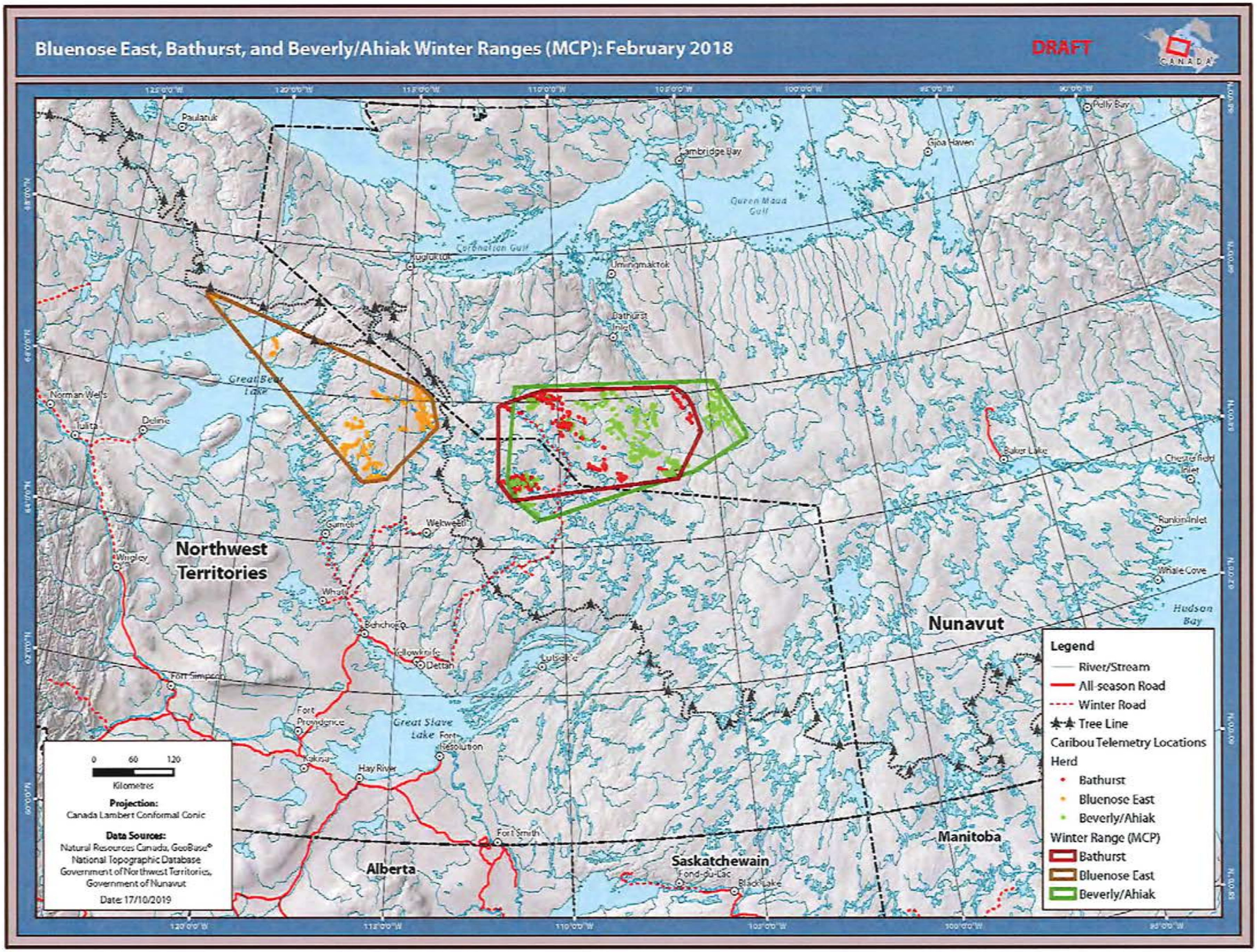
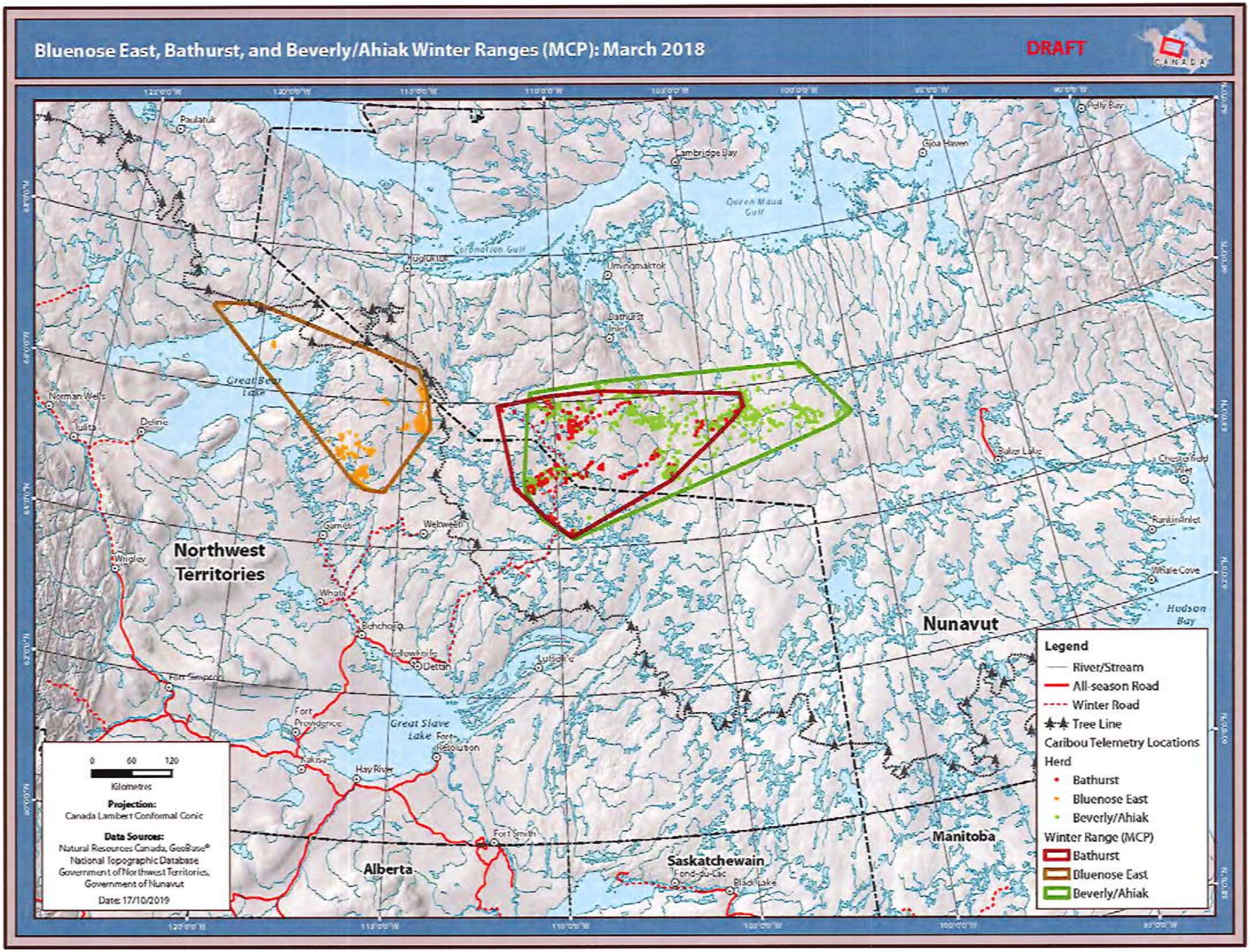
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 17/10/2019

Bluenose East, Bathurst, and Beverly/Ahiak Winter Ranges (MCP): February 2018




Bluenose East, Bathurst, and Beverly/Ahiak Winter Ranges (MCP): March 2018
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Gameti
Wekweeti
Northwest Territories
Wrigley
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Alberta
Saskatchewain
Fond-du-Lac
Black Lake
Nunavut
Manitoba
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Caribou Telemetry Locations
Herd
Bathurst
Bluenose East
Beverly/Ahiak
Winter Range (MCP)
Bathurst
Bluenose East
Beverly/Ahiak
0 60 120
Kilometres
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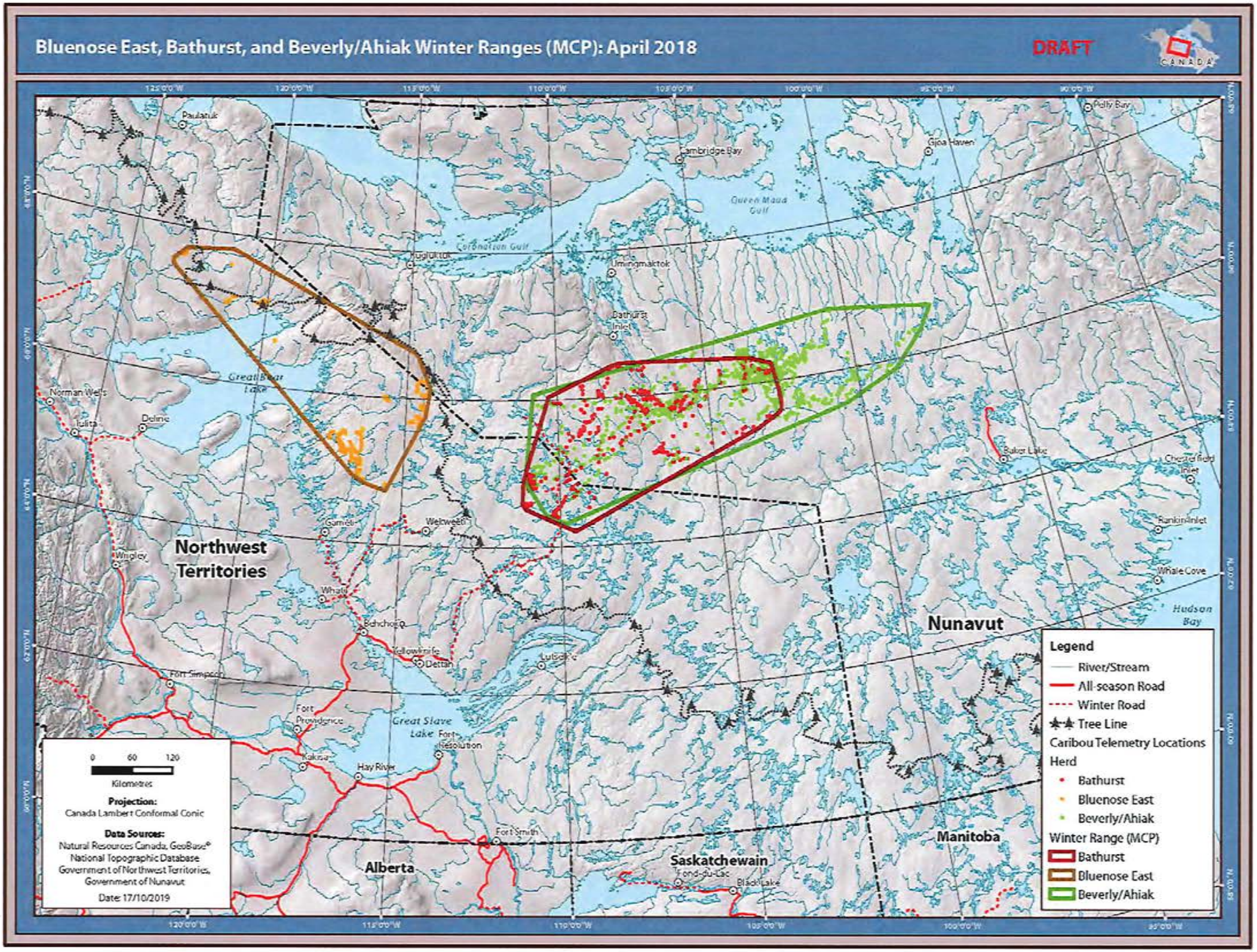
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 17/10/2019


Bluenose East, Bathurst, and Beverly/Ahiak Winter Ranges (MCP): April 2018
DRAFT
CANADA
Northwest Territories
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Alberta
Saskatchewan
Manitoba
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Gameti
Wekweeti
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Wrigley
Fort Simpson
Fort Providence
Kakisa
Hay River
Great Slave Lake
Fort Resolution
Fort Smith
Fond-du-Lac
Black Lake
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Caribou Telemetry Locations
Herd
Bathurst
Bluenose East
Beverly/Ahiak
Winter Range (MCP)
Bathurst
Bluenose East
Beverly/Ahiak
0 60 120
Kilometres
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Data Sources:
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National Topographic Database
Government of Northwest Territories,
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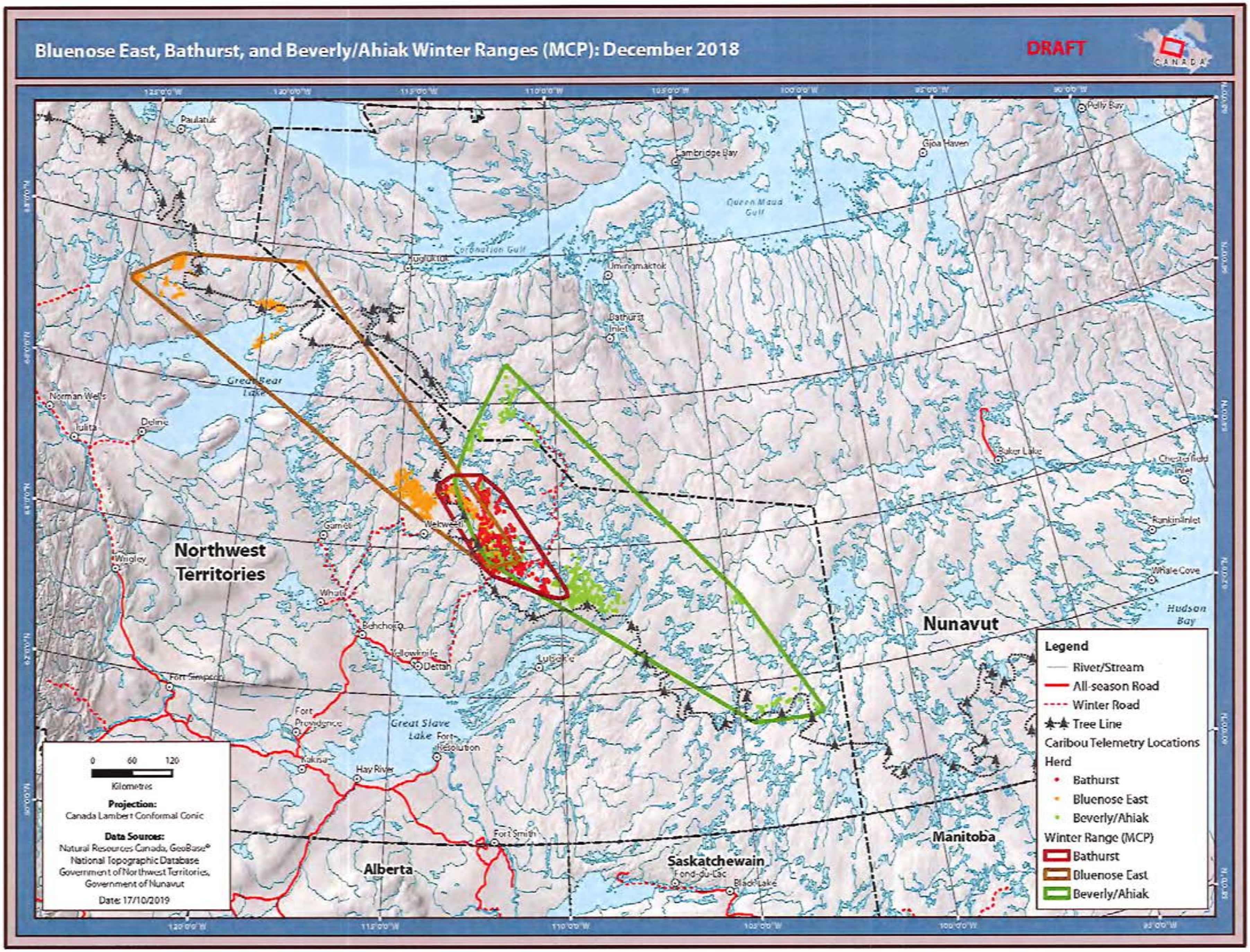
Date: 17/10/2019


Bluenose East, Bathurst, and Beverly/Ahiak Winter Ranges (MCP): December 2018
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Polly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Gameti
Wekweeti
Northwest Territories
Wrigley
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Nunavut
Manitoba
Alberta
Saskatchewan
Fond-du-Lac
Black Lake
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 17/10/2019
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Caribou Telemetry Locations
Herd
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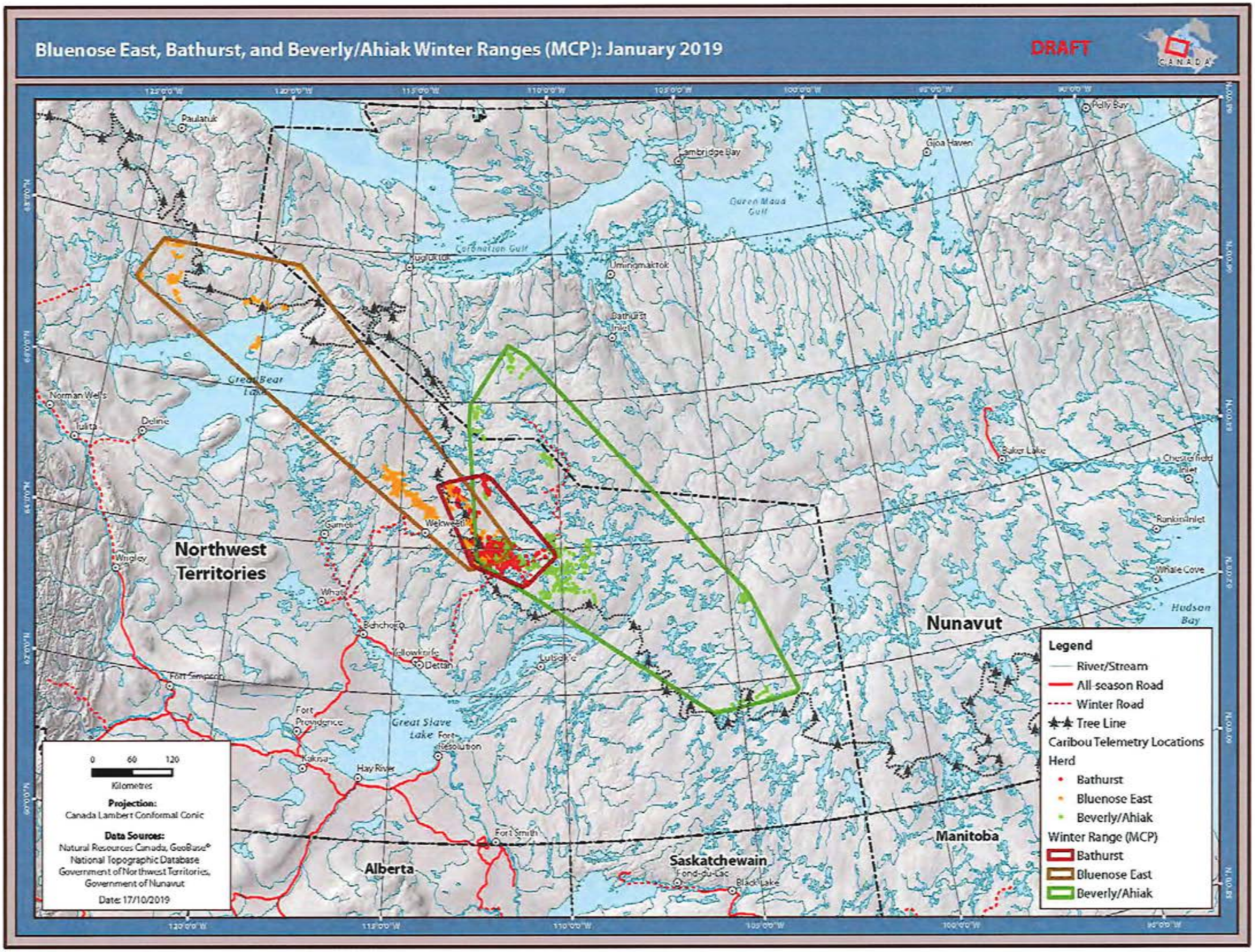
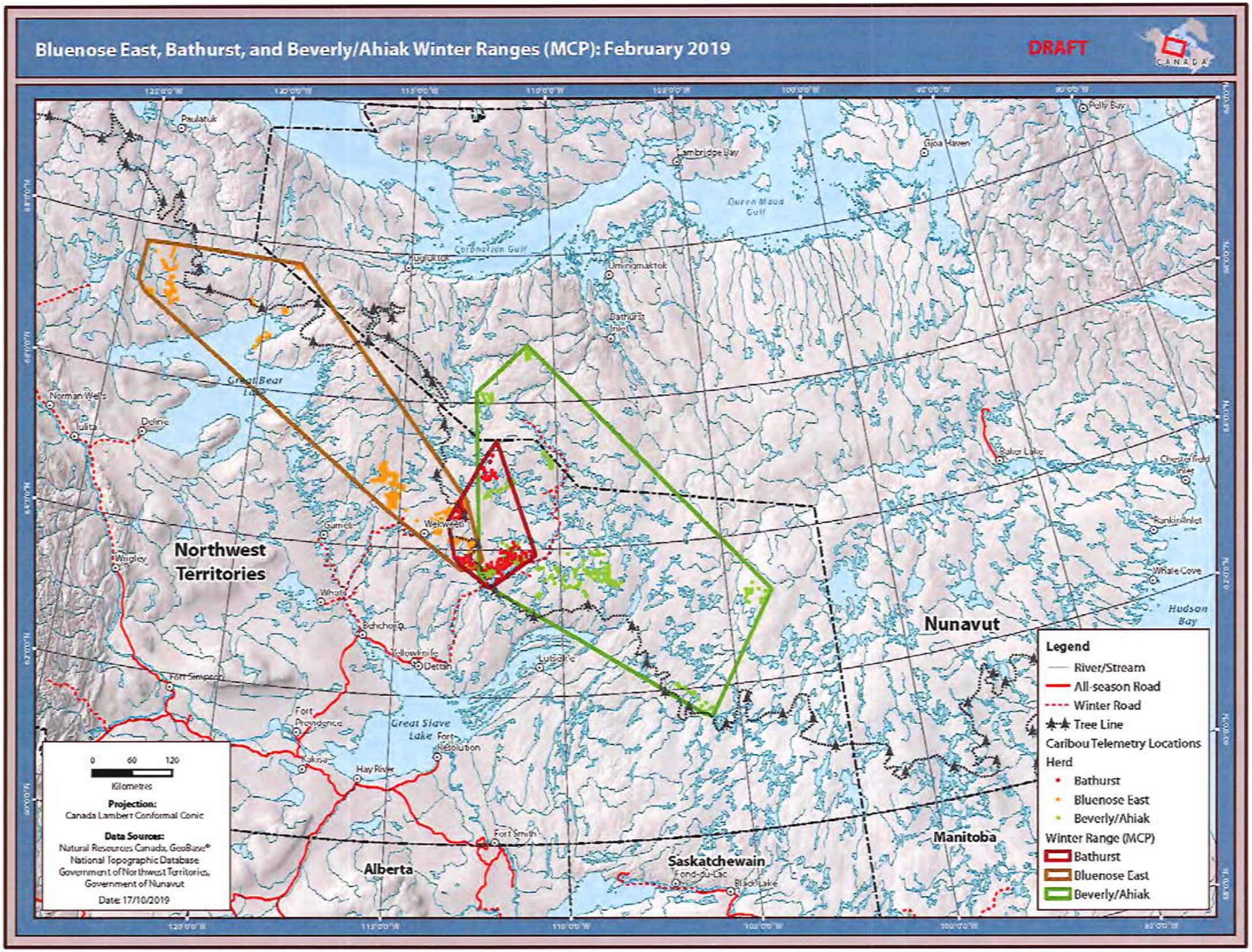
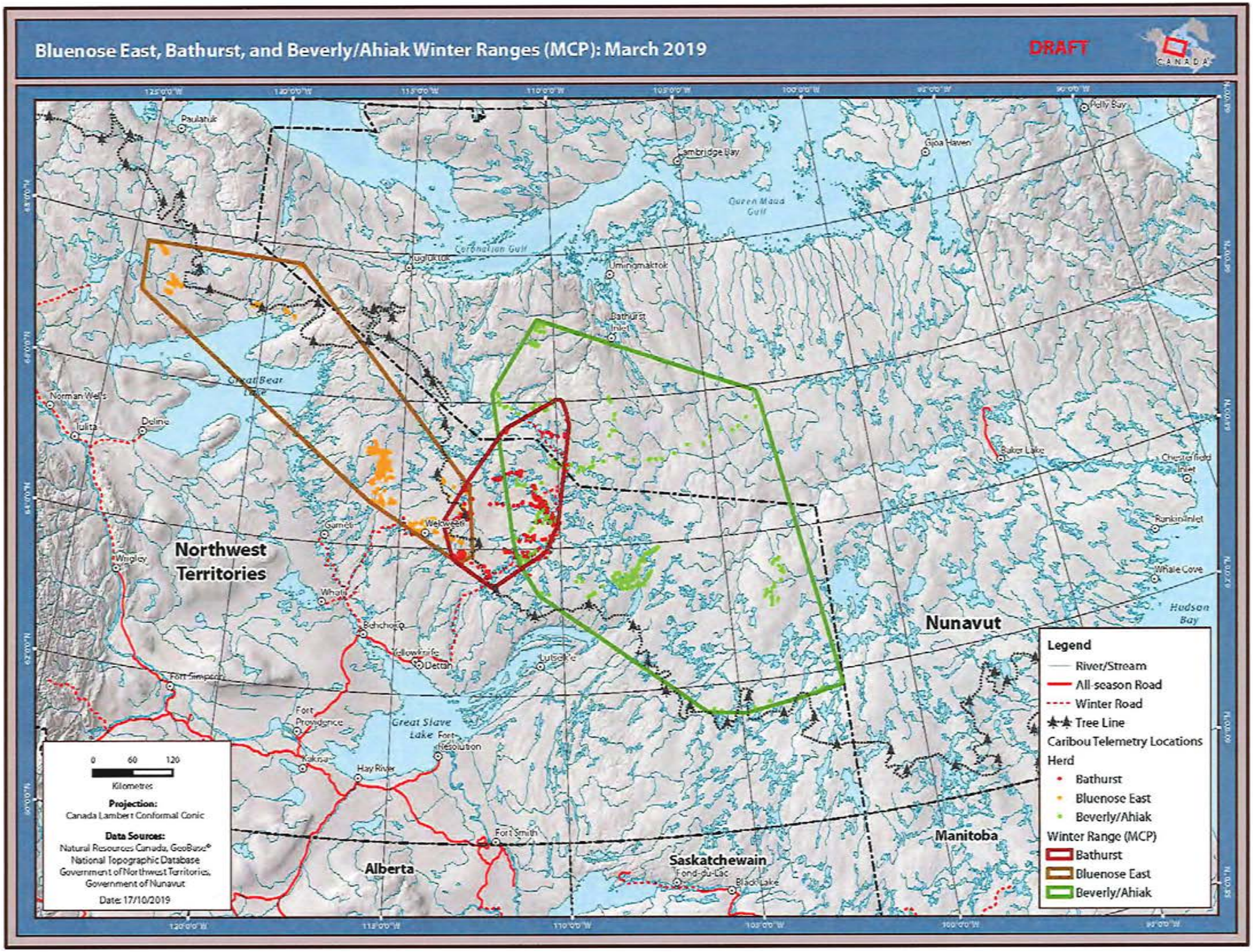
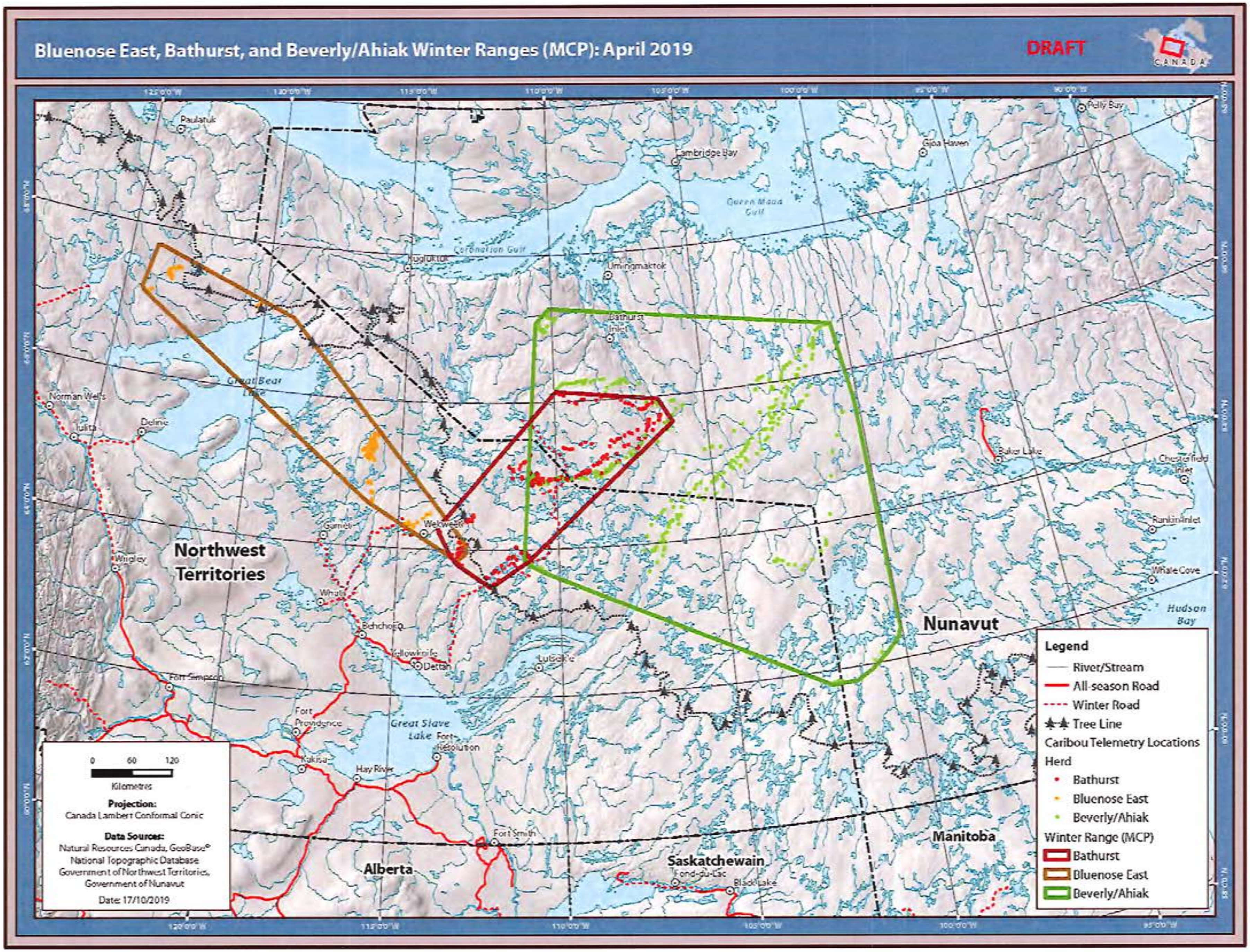
Bluenose East
Beverly/Ahiak
Winter Range (MCP)
Bathurst
Bluenose East
Beverly/Ahiak


Bluenose East, Bathurst, and Beverly/Ahiak Winter Ranges (MCP): January 2019
DRAFT
CANADA
Northwest Territories
Nunavut
Manitoba
Saskatchewan
Alberta
Paulatuk
Cambridge Bay
Gjoa Haven
Kugluktuk
Umingmaktok
Bathurst Inlet
Coronation Gulf
Queen Maud Gulf
Great Bear Lake
Norman Wells
Tulita
Deline
Wrigley
Gamèti
Wekweètì
Whatì
Behchokǫ̀
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Fond-du-Lac
Black Lake
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Pelly Bay
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Caribou Telemetry Locations
Herd
Bathurst
Bluenose East
Beverly/Ahiak
Winter Range (MCP)
Bathurst
Bluenose East
Beverly/Ahiak
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 17/10/2019

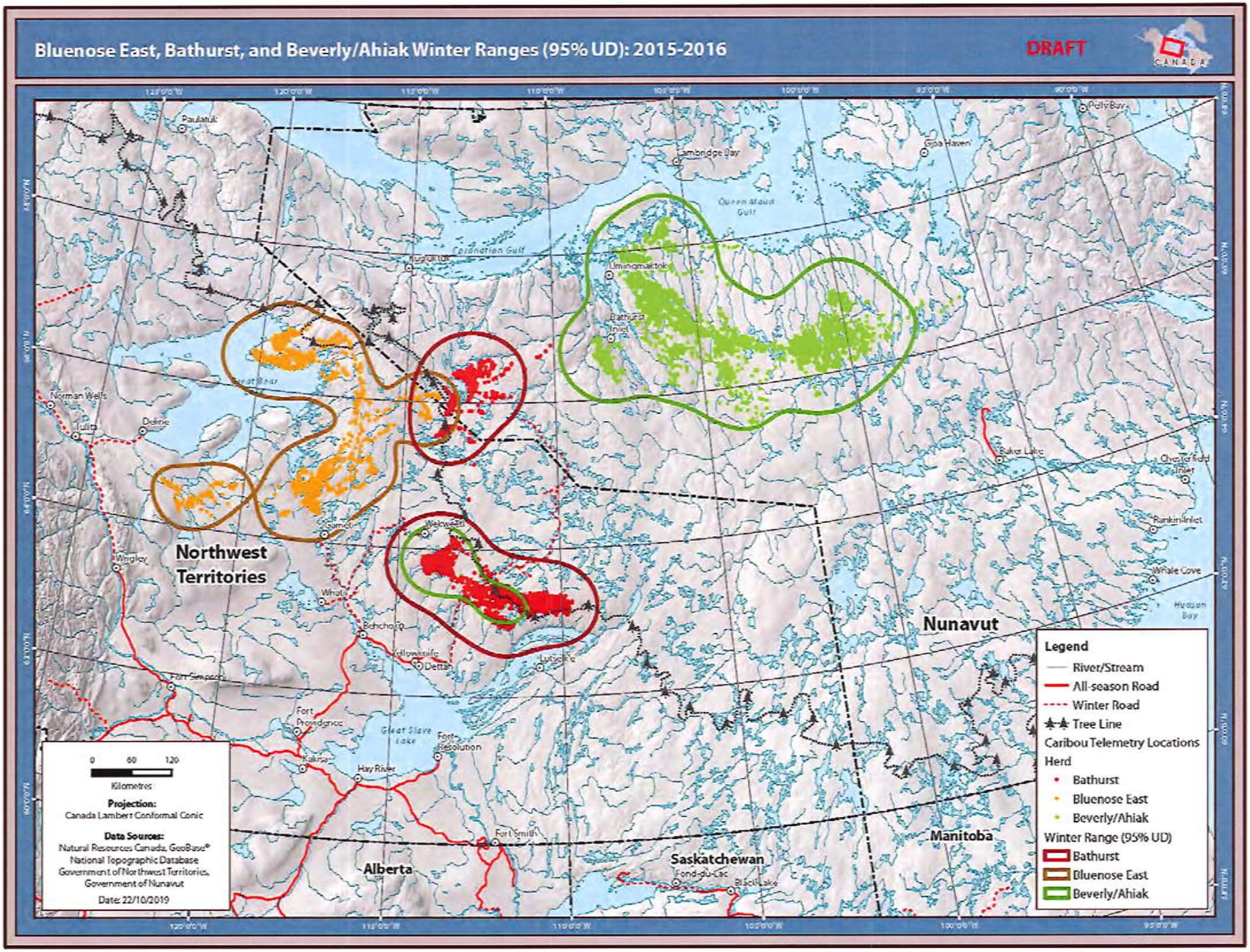
Bluenose East, Bathurst, and Beverly/Ahiak Winter Ranges (MCP): February 2019



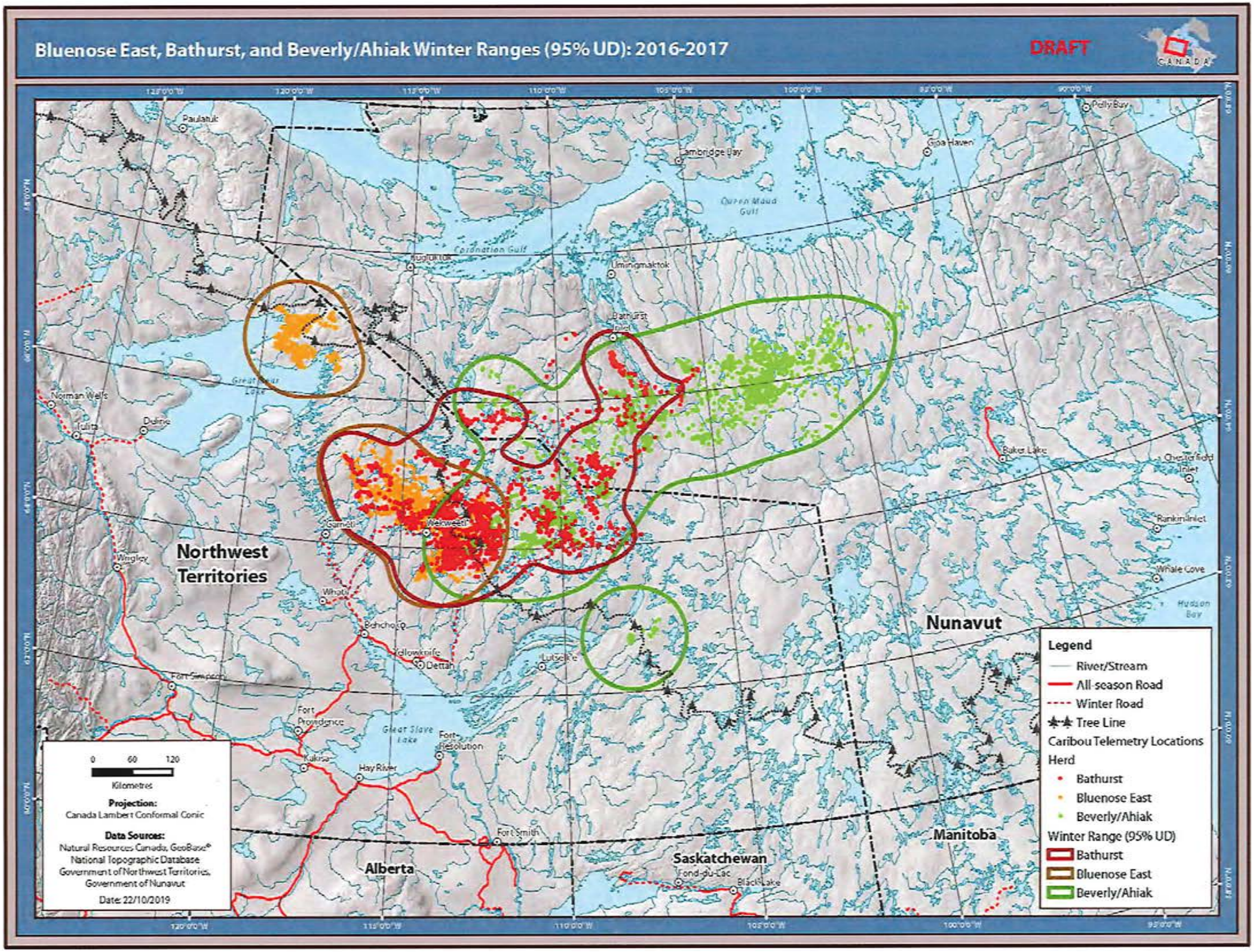

Bluenose East, Bathurst, and Beverly/Ahiak Winter Ranges (MCP): March 2019
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Iqaluktuuttiaq
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Gameti
Wekweeti
Northwest Territories
Wrigley
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Alberta
Saskatchewain
Fond-du-Lac
Black Lake
Manitoba
Nunavut
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Caribou Telemetry Locations
Herd
Bathurst
Bluenose East
Beverly/Ahiak
Winter Range (MCP)
Bathurst
Bluenose East
Beverly/Ahiak
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 17/10/2019


Bluenose East, Bathurst, and Beverly/Ahiak Winter Ranges (MCP): April 2019
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Wekweeti
Gameti
Wrigley
Northwest Territories
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Nunavut
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Alberta
Saskatchewan
Fond-du-Lac
Black Lake
Manitoba
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Caribou Telemetry Locations
Herd
Bathurst
Bluenose East
Beverly/Ahiak
Winter Range (MCP)
Bathurst
Bluenose East
Beverly/Ahiak
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 17/10/2019

Appendix 9-B1: KDE Ranges Winter Season



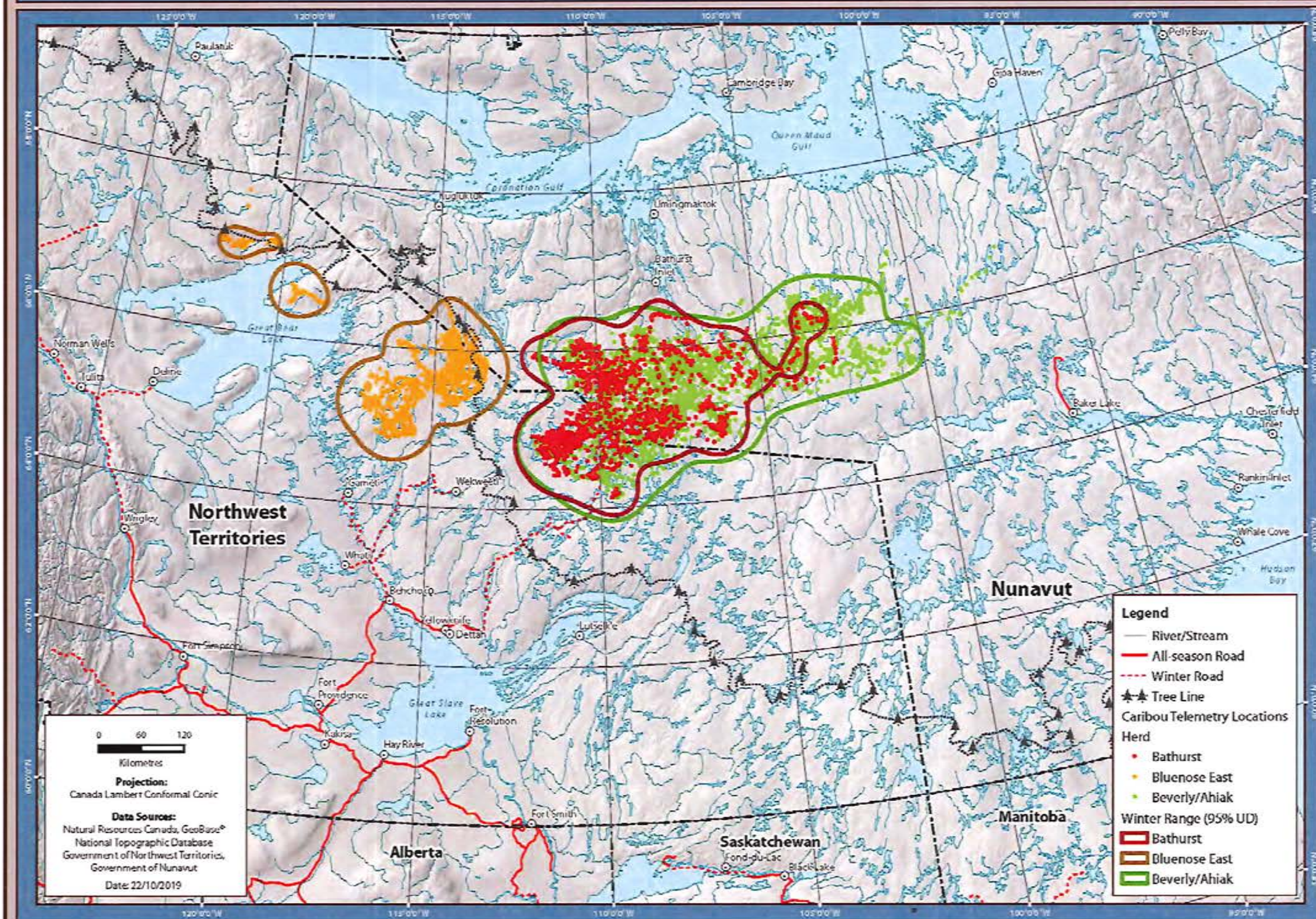
Bluenose East, Bathurst, and Beverly/Ahiak Winter Ranges (95% UD): 2015-2016
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Gameti
Wekweeti
Wrigley
Northwest Territories
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Nunavut
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Alberta
Saskatchewan
Fond-du-Lac
Black Lake
Manitoba
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Caribou Telemetry Locations
Herd
Bathurst
Bluenose East
Beverly/Ahiak
Winter Range (95% UD)
Bathurst
Bluenose East
Beverly/Ahiak
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 22/10/2019

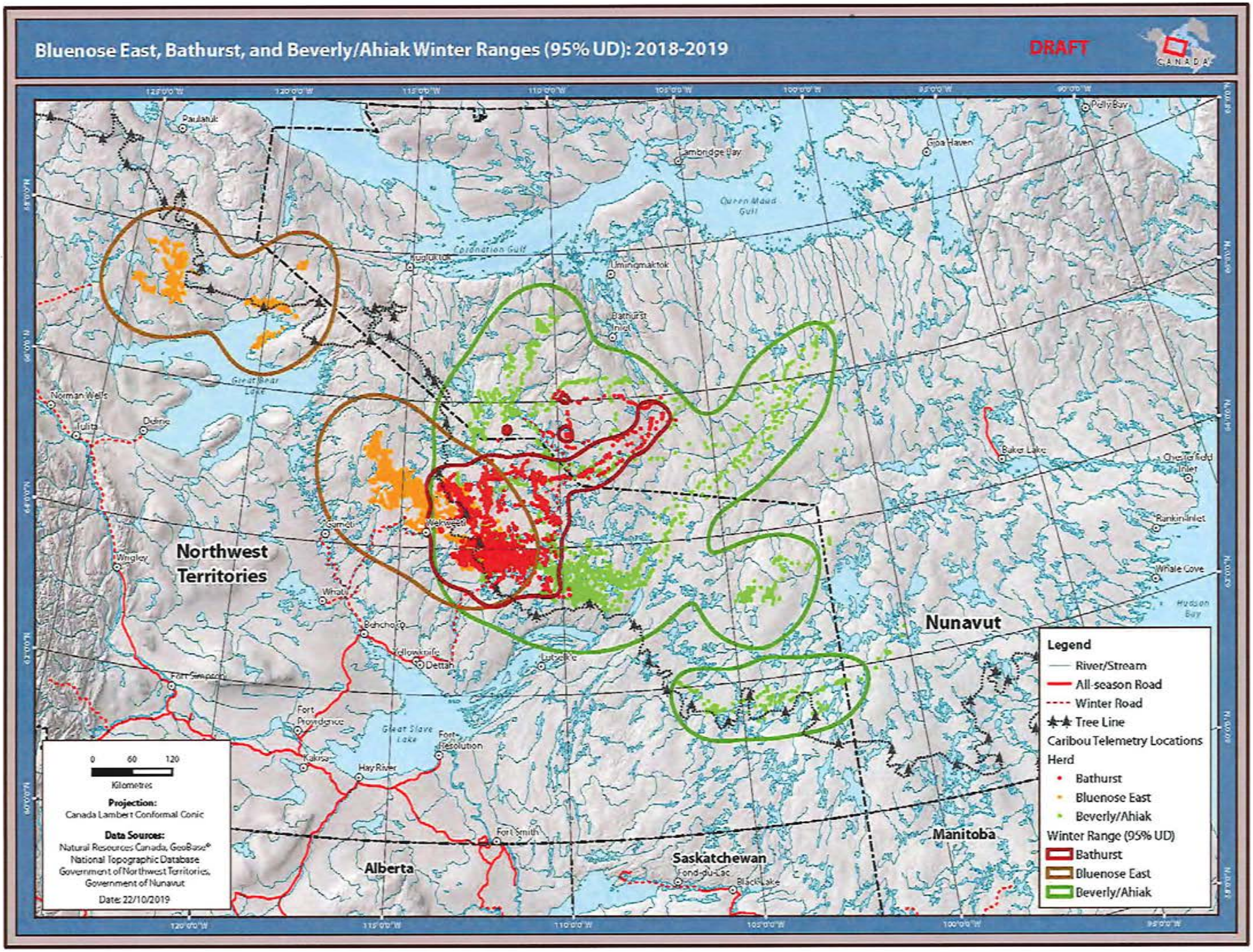


Bluenose East, Bathurst, and Beverly/Ahiak Winter Ranges (95% UD): 2016-2017
DRAFT
CANADA
Northwest
Territories
Nunavut
Alberta
Saskatchewan
Manitoba
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Norman Wells
Tulita
Deline
Wrigley
Gameti
Wekweeti
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Kakisa
Hay River
Great Slave Lake
Fort Resolution
Fort Smith
Fond-du-Lac
Black Lake
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 22/10/2019
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Caribou Telemetry Locations
Herd
Bathurst
Bluenose East
Beverly/Ahiak
Winter Range (95% UD)
Bathurst
Bluenose East
Beverly/Ahiak

Bluenose East, Bathurst, and Beverly/Ahiak Winter Ranges (95% UD): 2017-2018

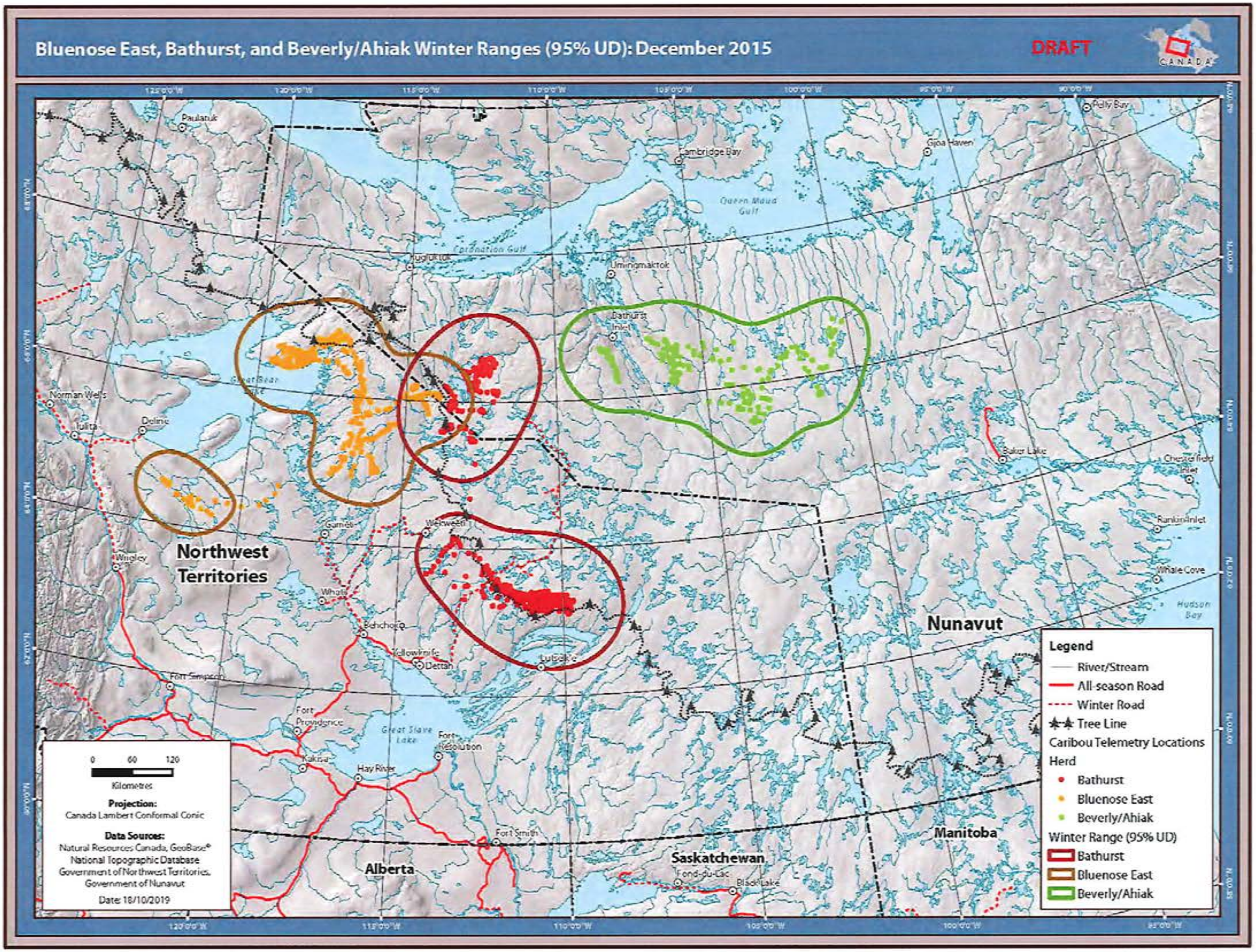
DRAFT

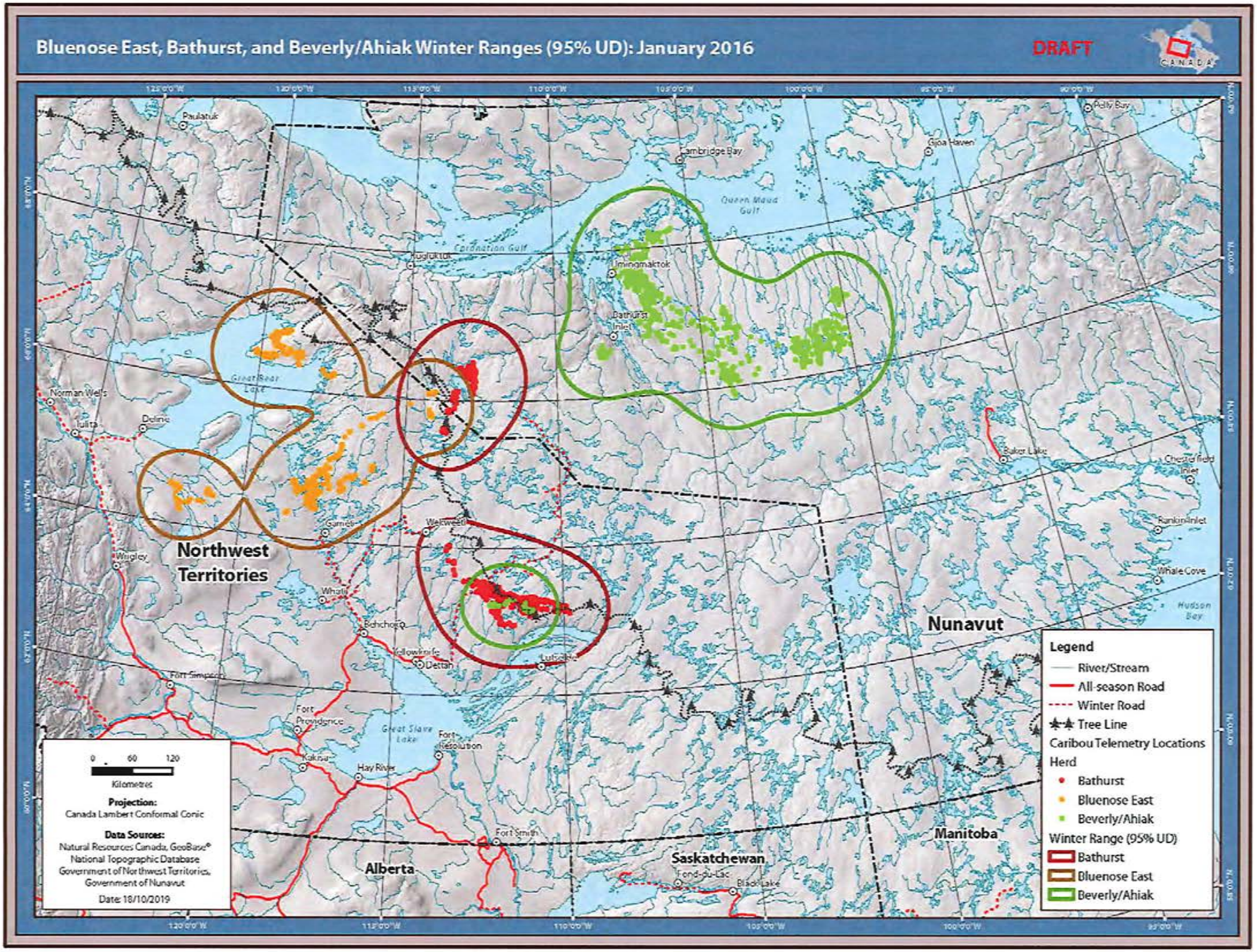




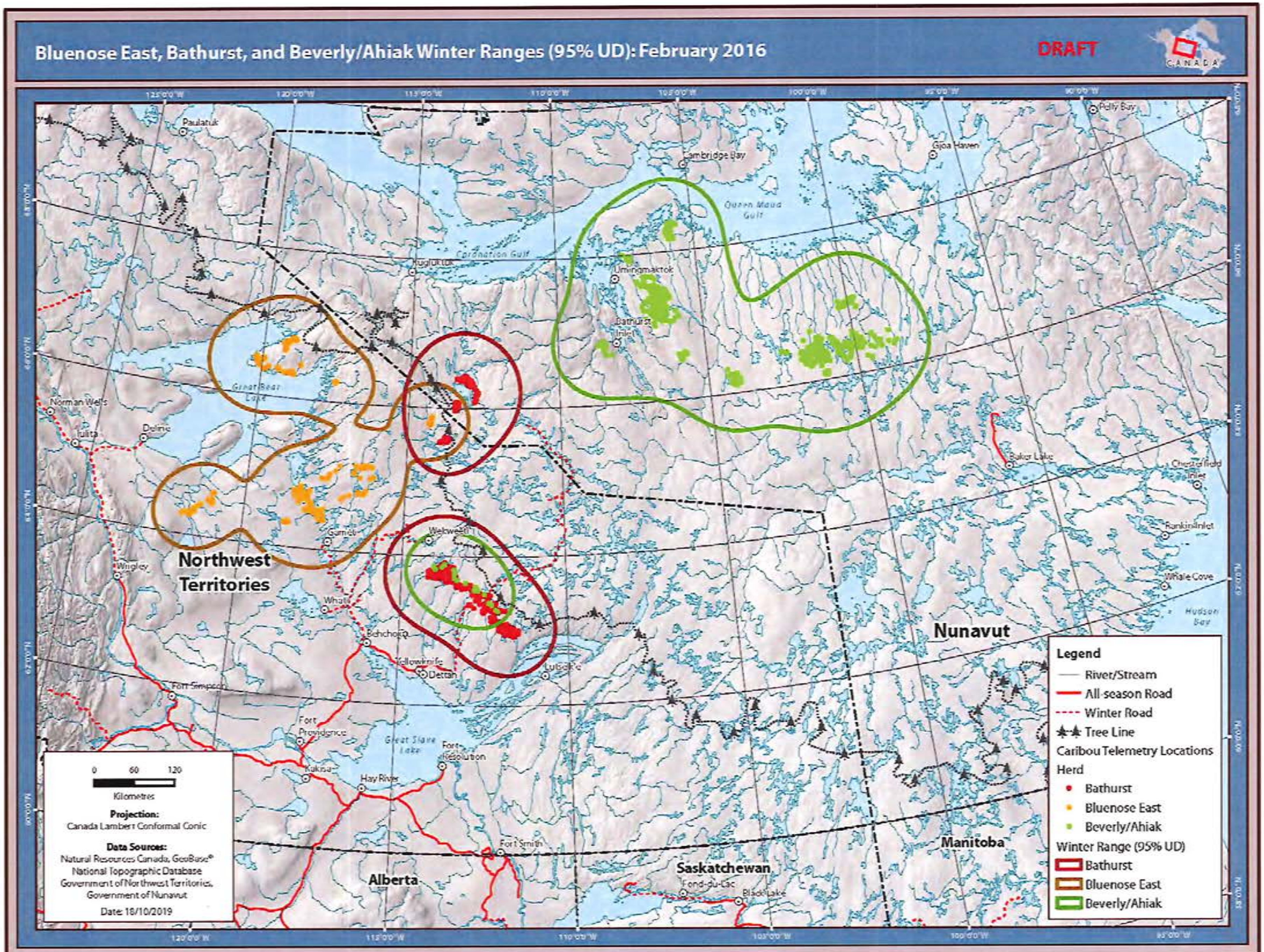
Bluenose East, Bathurst, and Beverly/Ahiak Winter Ranges (95% UD): 2018-2019
DRAFT
CANADA
Northwest Territories
Nunavut
Alberta
Saskatchewan
Manitoba
Paulatuk
Norman Wells
Tulita
Deline
Wrigley
Fort Simpson
Fort Providence
Kakisa
Hay River
Fort Resolution
Fort Smith
Great Slave Lake
Great Bear Lake
Coronation Gulf
Queen Maud Gulf
Kugluktuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Umingmaktok
Bathurst Inlet
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Gameti
Wekweeti
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fond-du-Lac
Black Lake
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Caribou Telemetry Locations
Herd
Bathurst
Bluenose East
Beverly/Ahiak
Winter Range (95% UD)
Bathurst
Bluenose East
Beverly/Ahiak
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 22/10/2019

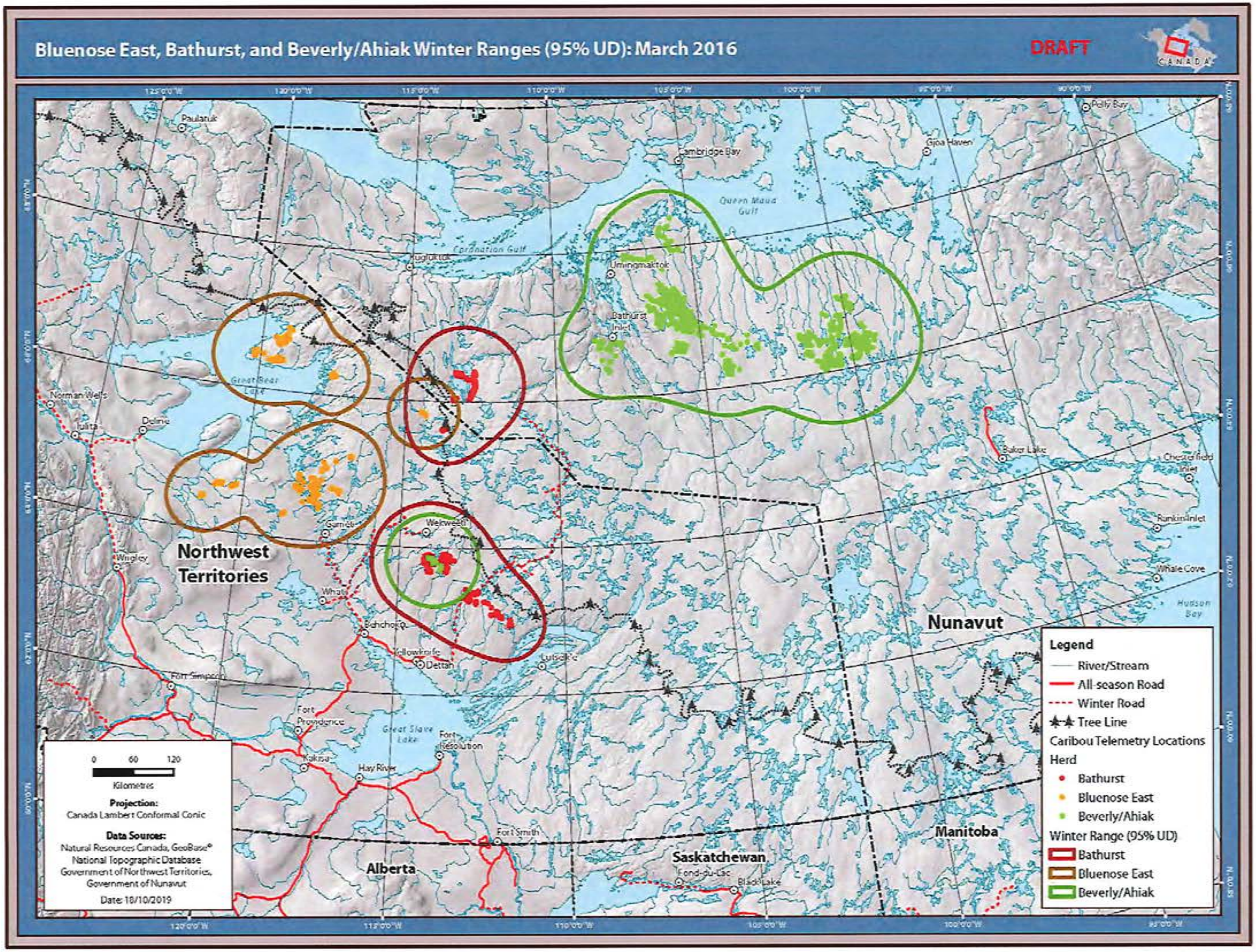
Appendix 9-B2: KDE Ranges Monthly

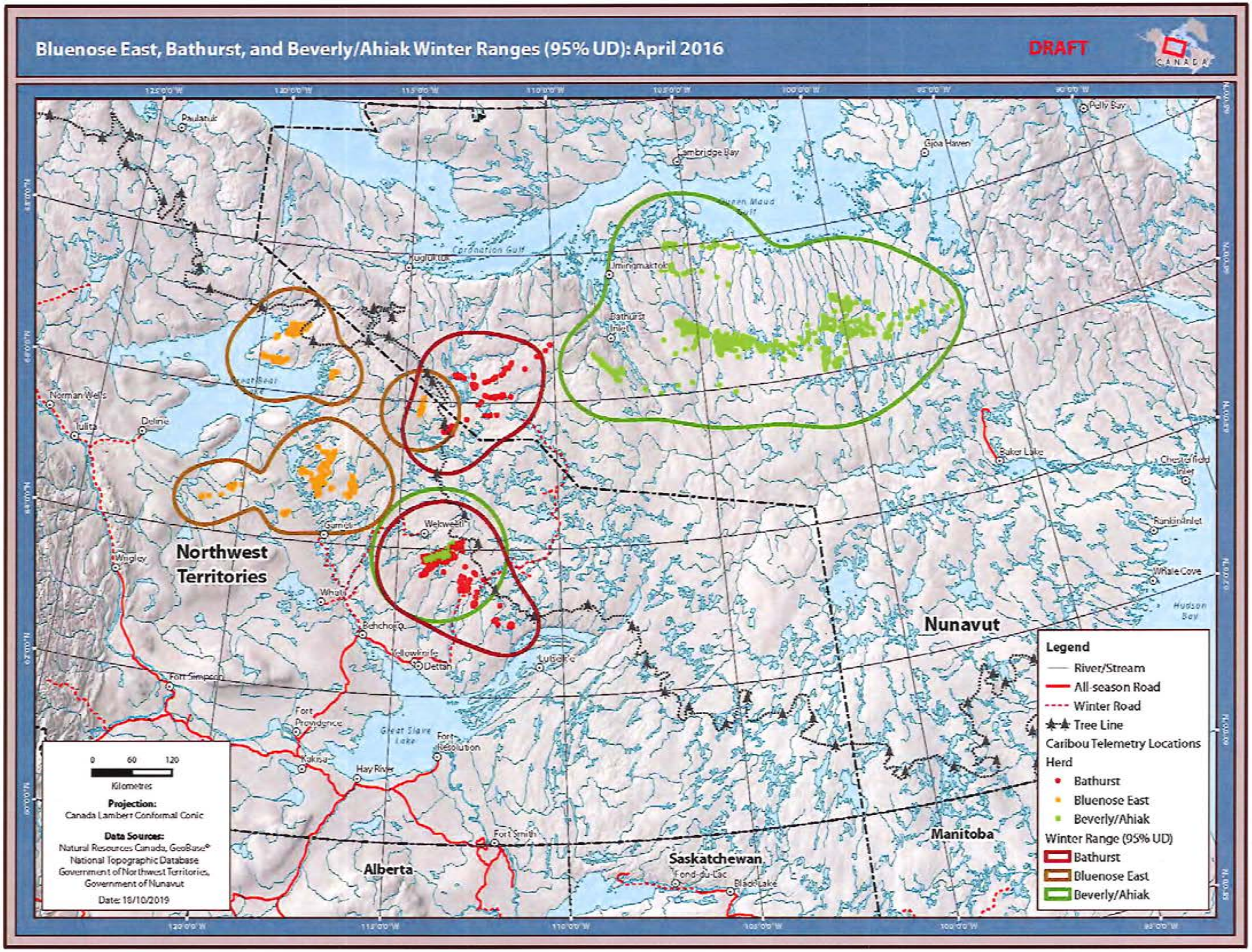

Bluenose East, Bathurst, and Beverly/Ahiak Winter Ranges (95% UD): December 2015
DRAFT
CANADA
Northwest Territories
Nunavut
Alberta
Saskatchewan
Manitoba
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Norman Wells
Tulita
Deline
Great Bear Lake
Wrigley
Gamèti
Wekweeti
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Kakisa
Hay River
Great Slave Lake
Fort Resolution
Fort Smith
Fond-du-Lac
Black Lake
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Caribou Telemetry Locations
Herd
Bathurst
Bluenose East
Beverly/Ahiak
Winter Range (95% UD)
Bathurst
Bluenose East
Beverly/Ahiak
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 18/10/2019

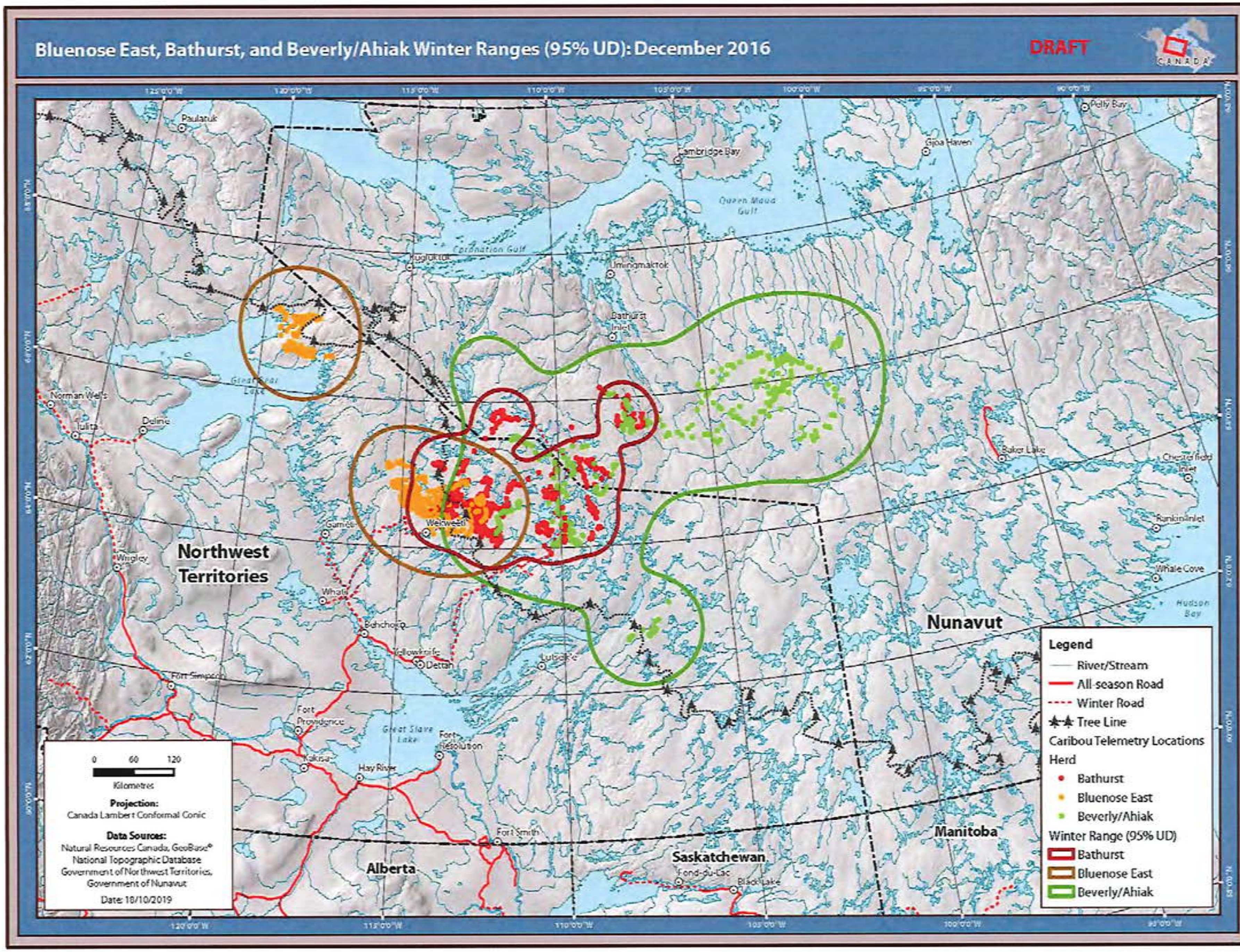


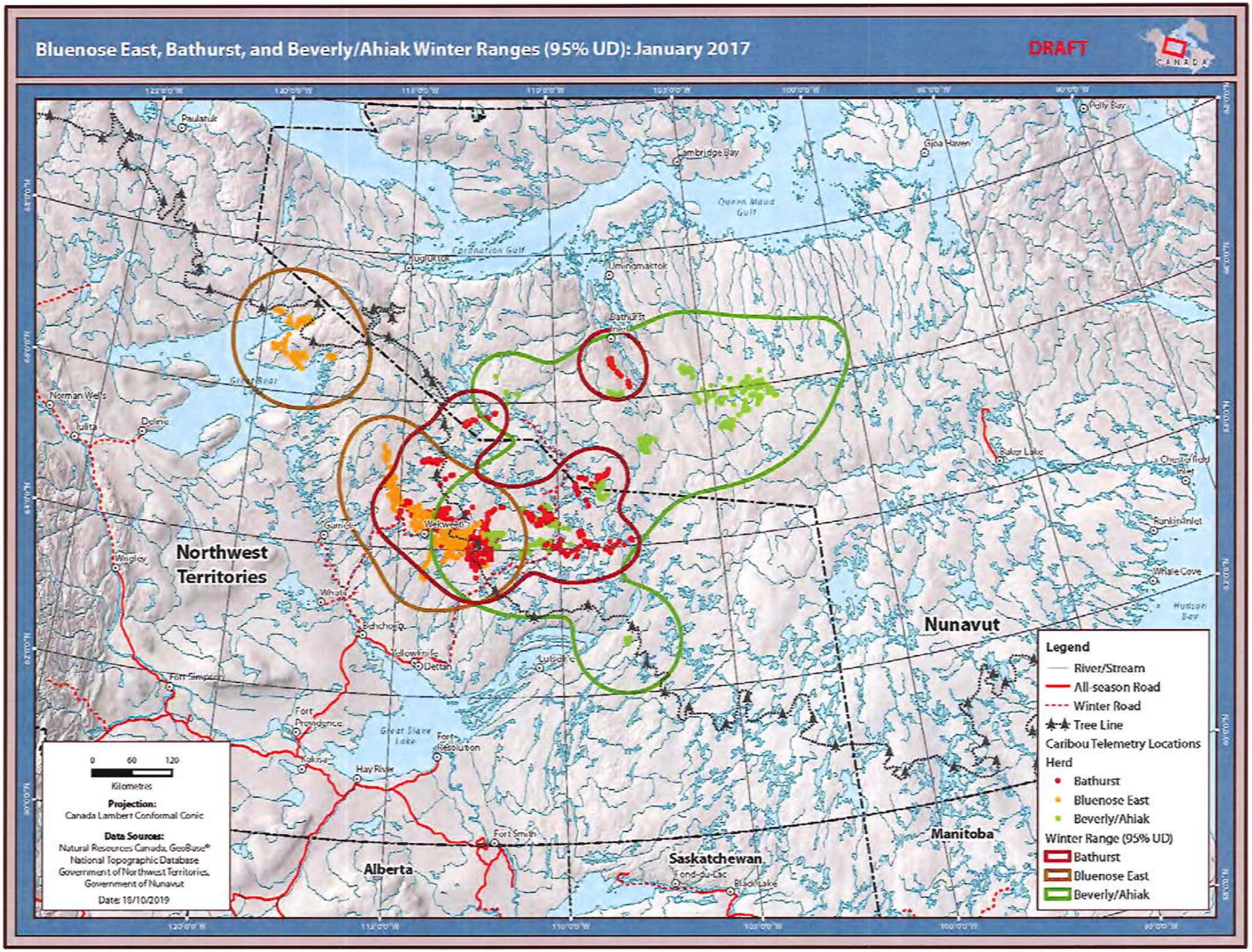
Bluenose East, Bathurst, and Beverly/Ahiak Winter Ranges (95% UD): January 2016
DRAFT
CANADA
Northwest Territories
Nunavut
Alberta
Saskatchewan
Manitoba
Paulatuk
Kugluktuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Iningmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Deline
Tulita
Wrigley
Gameti
Wekweeti
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Kakisa
Hay River
Great Slave Lake
Fort Resolution
Fort Smith
Fond-du-Lac
Black Lake
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Caribou Telemetry Locations
Herd
Bathurst
Bluenose East
Beverly/Ahiak
Winter Range (95% UD)
Bathurst
Bluenose East
Beverly/Ahiak
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 18/10/2019


Bluenose East, Bathurst, and Beverly/Ahiak Winter Ranges (95% UD): February 2016
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Polly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Gameti
Wekweeti
Wrigley
Northwest Territories
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Alberta
Saskatchewan
Fond-du-Lac
Black Lake
Manitoba
Nunavut
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Caribou Telemetry Locations
Herd
Bathurst
Bluenose East
Beverly/Ahiak
Winter Range (95% UD)
Bathurst
Bluenose East
Beverly/Ahiak
0
60
120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 18/10/2019

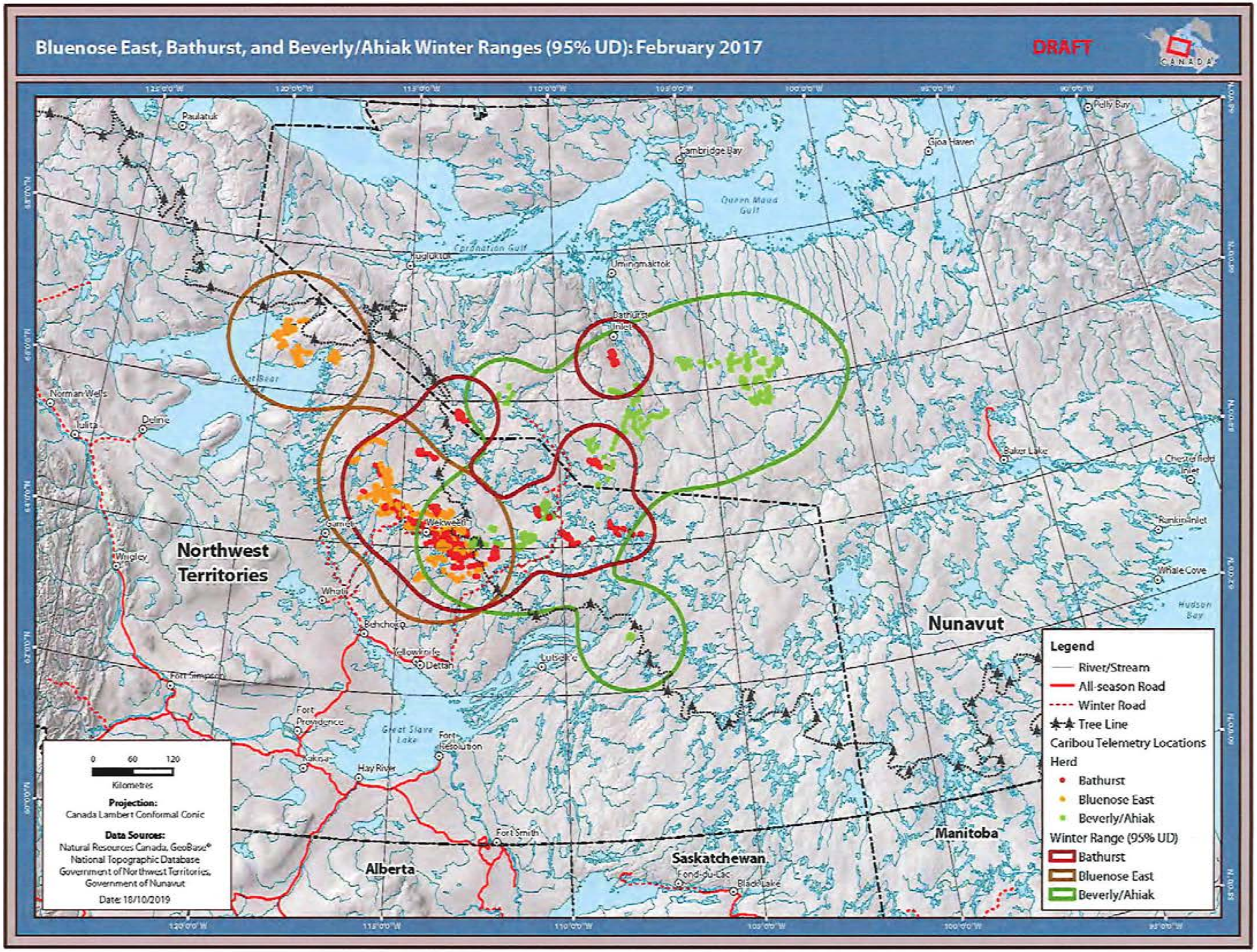

Bluenose East, Bathurst, and Beverly/Ahiak Winter Ranges (95% UD): March 2016
DRAFT
CANADA
Northwest Territories
Nunavut
Alberta
Saskatchewan
Manitoba
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Wekweeti
Gameti
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Wrigley
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Fond-du-Lac
Black Lake
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Caribou Telemetry Locations
Herd
Bathurst
Bluenose East
Beverly/Ahiak
Winter Range (95% UD)
Bathurst
Bluenose East
Beverly/Ahiak
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 18/10/2019

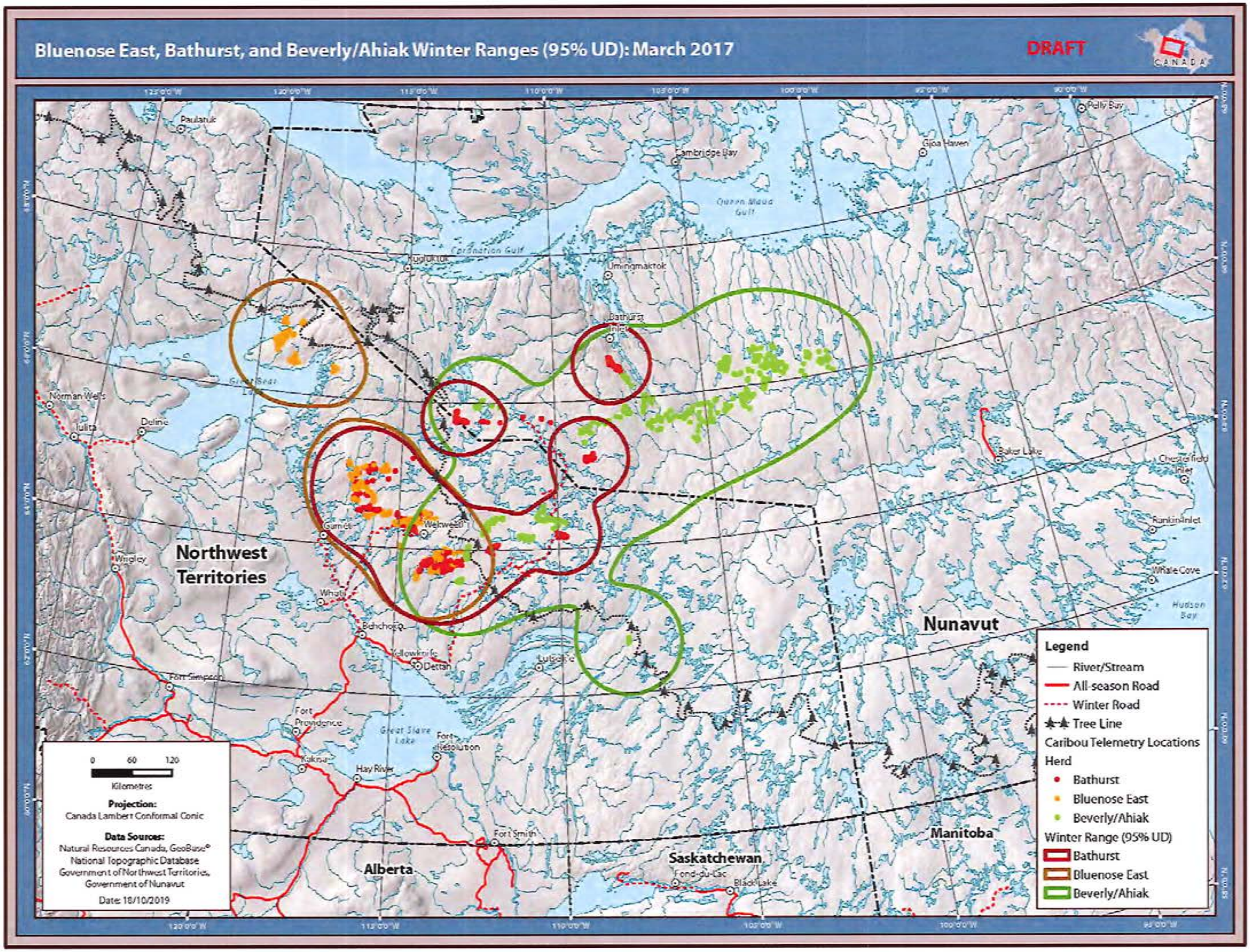

Bluenose East, Bathurst, and Beverly/Ahiak Winter Ranges (95% UD): April 2016
DRAFT
CANADA
Northwest Territories
Nunavut
Alberta
Saskatchewan
Manitoba
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Kugluktuk
Coronation Gulf
Umingmaktok
Bathurst Inlet
Norman Wells
Tulita
Deline
Wrigley
Gameti
Wekweeti
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Kakisa
Hay River
Great Slave Lake
Fort Resolution
Fort Smith
Fond-du-Lac
Black Lake
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Caribou Telemetry Locations
Herd
Bathurst
Bluenose East
Beverly/Ahiak
Winter Range (95% UD)
Bathurst
Bluenose East
Beverly/Ahiak
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 18/10/2019

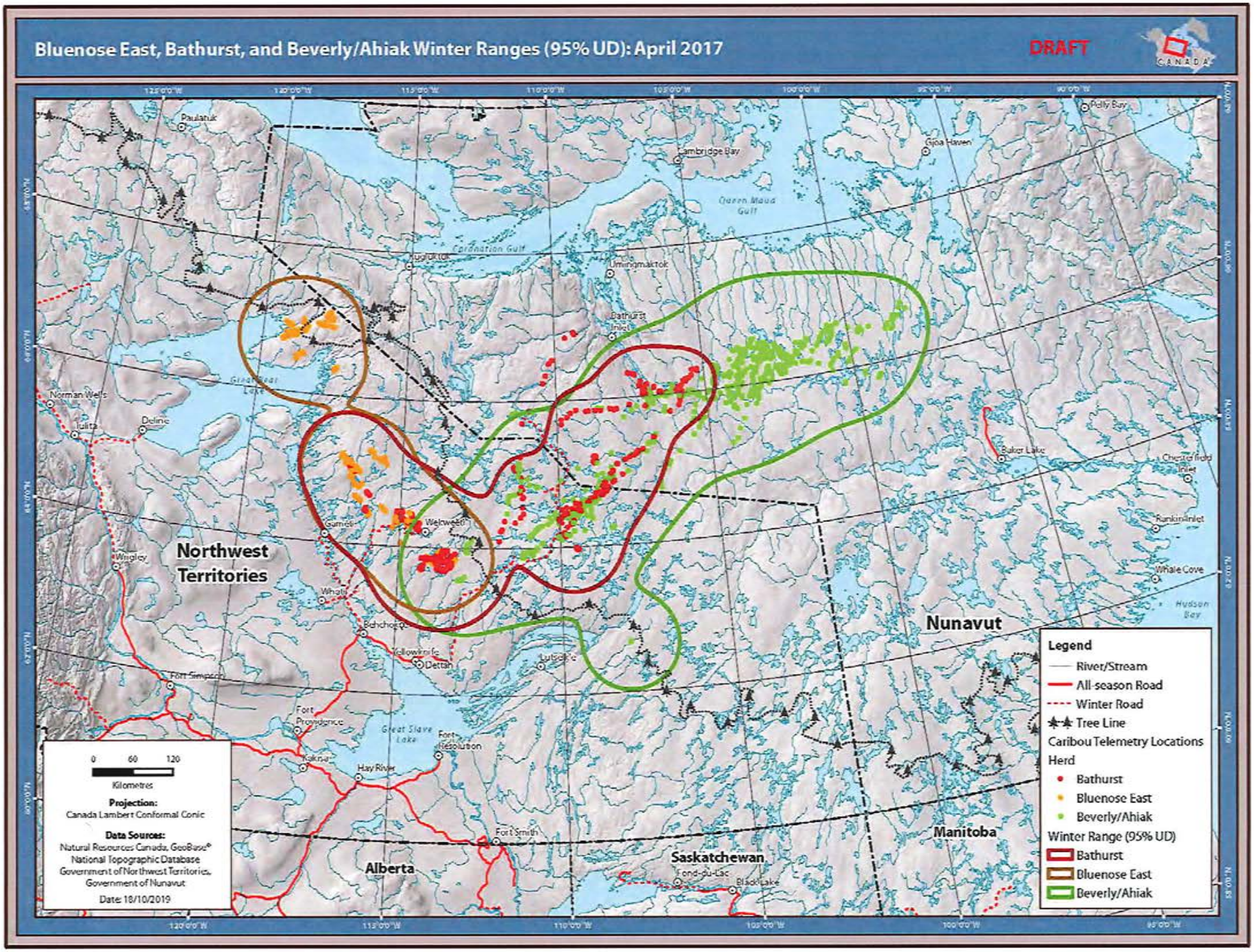

Bluenose East, Bathurst, and Beverly/Ahiak Winter Ranges (95% UD): December 2016
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Norman Wells
Tulita
Deline
Gamèti
Wekweètì
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Northwest Territories
Nunavut
Wrigley
Whatì
Behchokǫ̀
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Alberta
Saskatchewan
Fond-du-Lac
Black Lake
Manitoba
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Caribou Telemetry Locations
Herd
Bathurst
Bluenose East
Beverly/Ahiak
Winter Range (95% UD)
Bathurst
Bluenose East
Beverly/Ahiak
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 18/10/2019

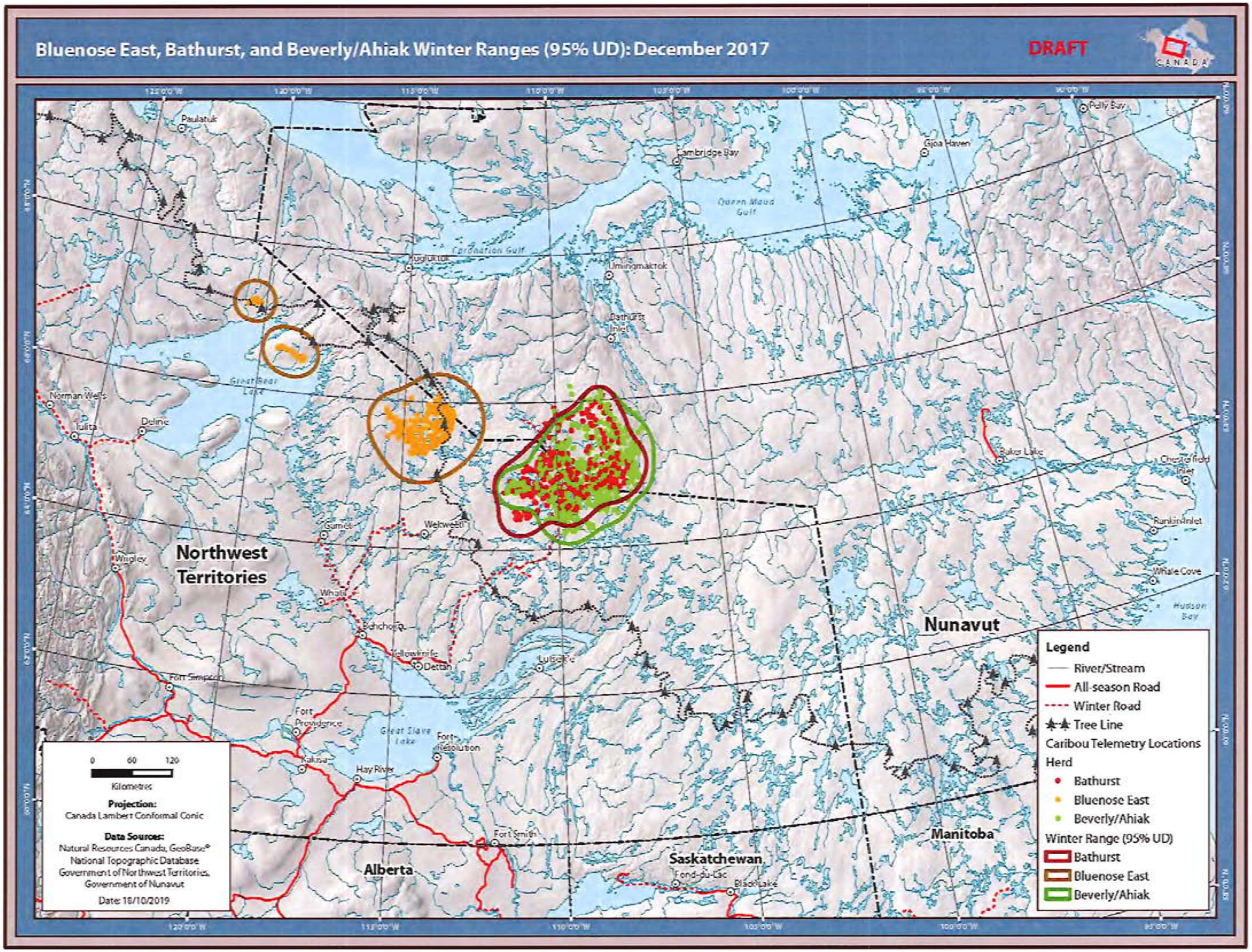

Bluenose East, Bathurst, and Beverly/Ahiak Winter Ranges (95% UD): January 2017
DRAFT
CANADA
Northwest Territories
Nunavut
Alberta
Saskatchewan
Manitoba
Paulatuk
Cambridge Bay
Queen Maud Gulf
Gjoa Haven
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Norman Wells
Tulita
Deline
Great Bear
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Gamèti
Wekweeti
Wrigley
Whati
Behchokǫ̀
Yellowknife
Dettah
Lutsel'ke
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Fond-du-Lac
Black Lake
Polly Bay
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Caribou Telemetry Locations
Herd
Bathurst
Bluenose East
Beverly/Ahiak
Winter Range (95% UD)
Bathurst
Bluenose East
Beverly/Ahiak
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 18/10/2019

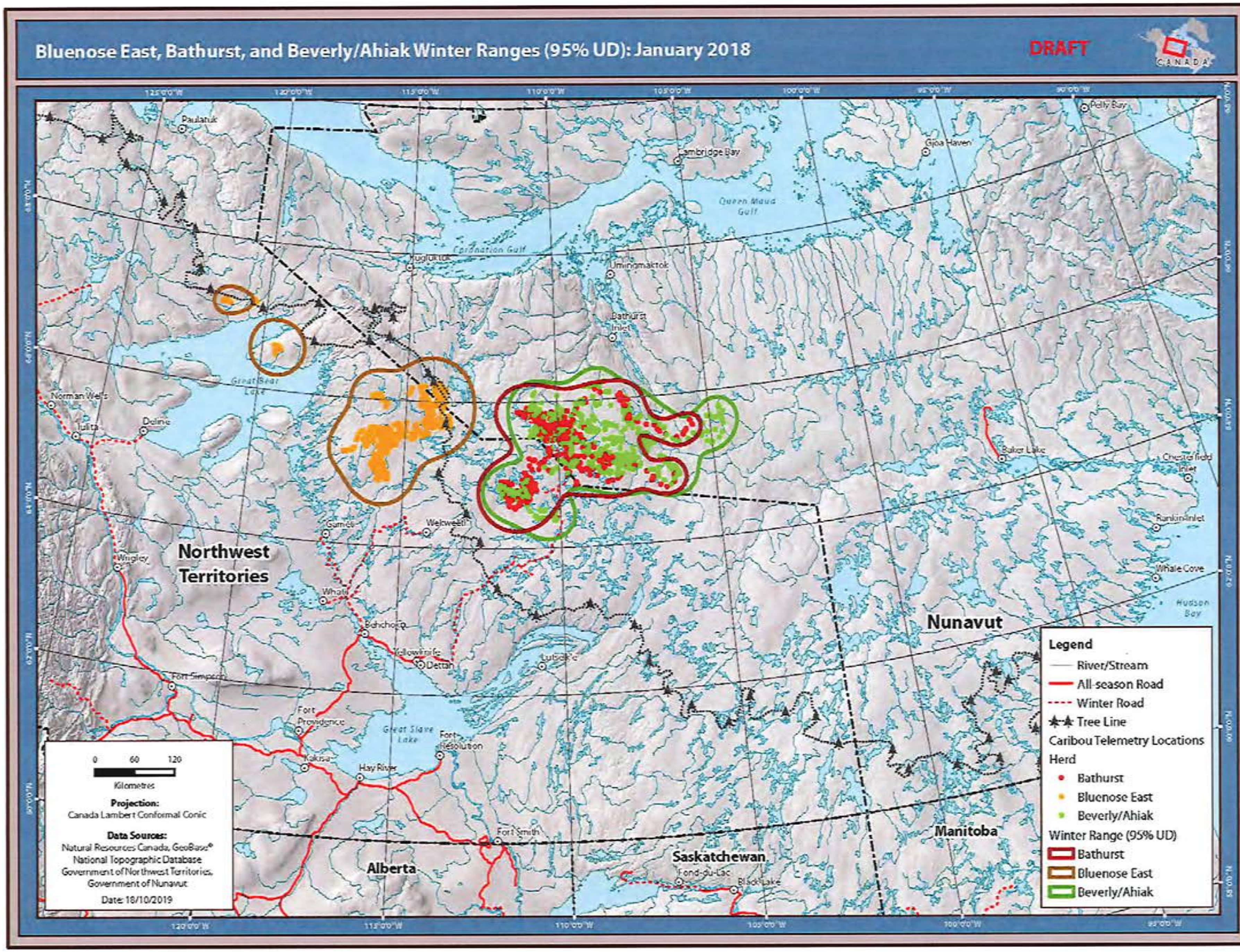
Bluenose East, Bathurst, and Beverly/Ahiak Winter Ranges (95% UD): February 2017

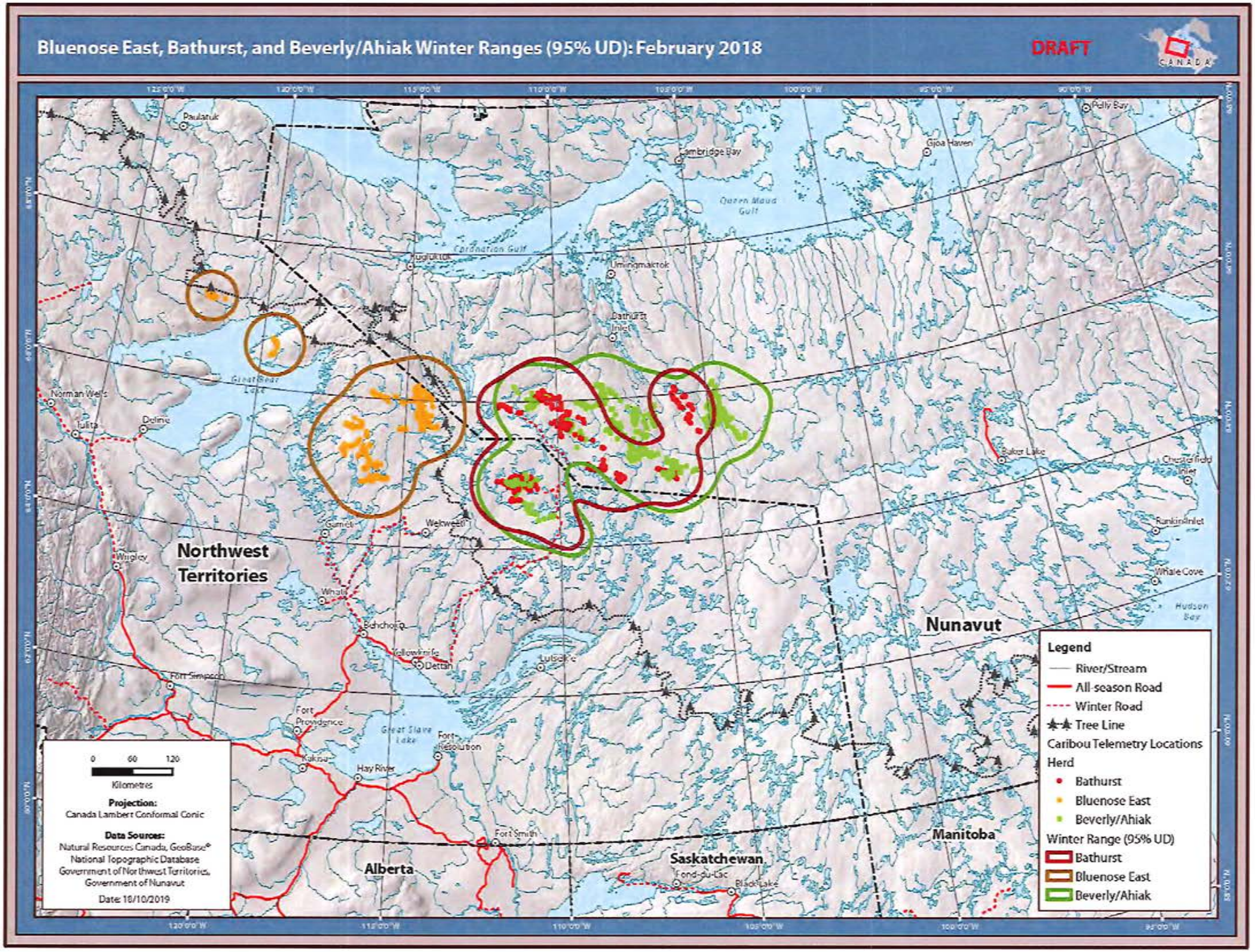


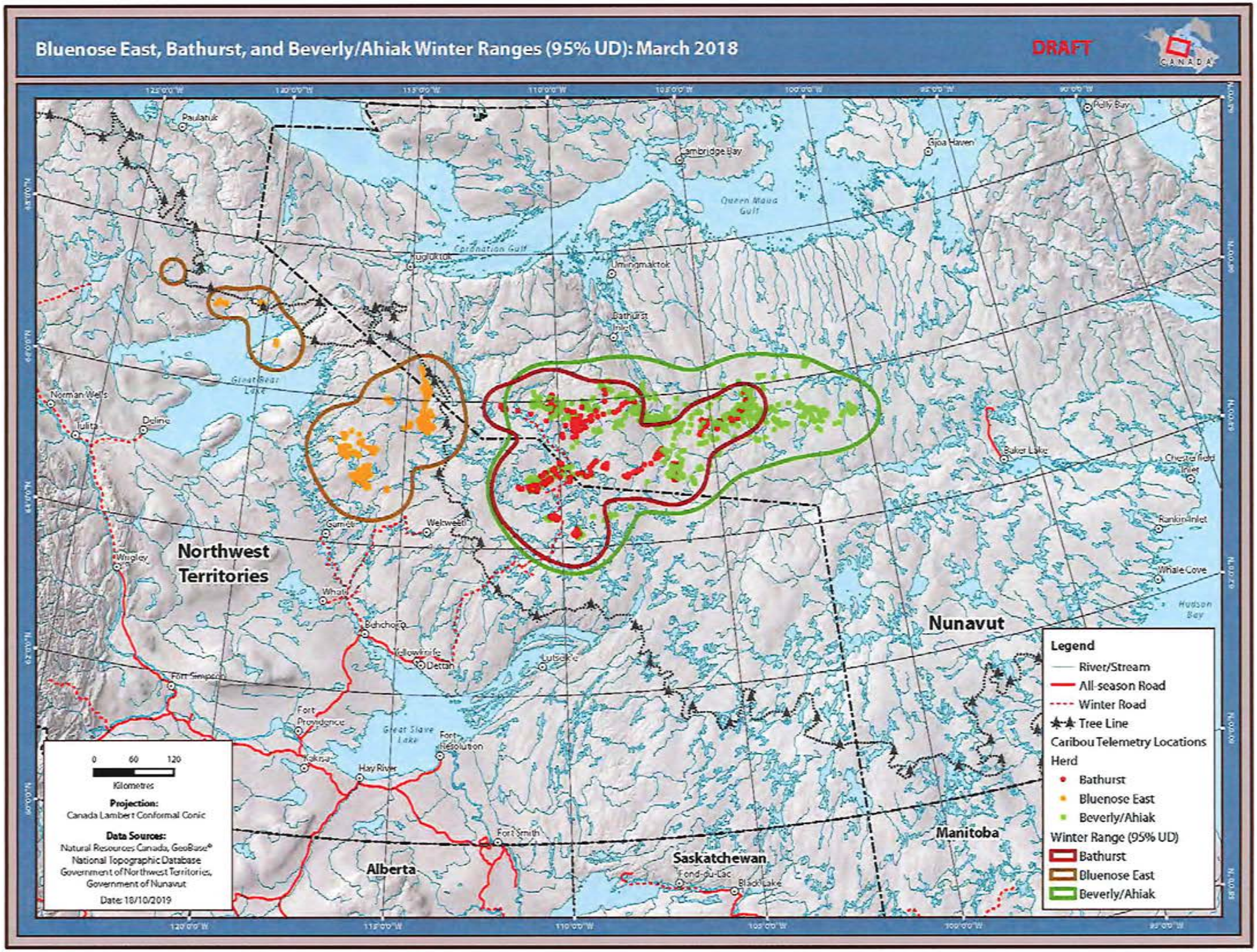

Bluenose East, Bathurst, and Beverly/Ahiak Winter Ranges (95% UD): March 2017
DRAFT
CANADA
Northwest Territories
Nunavut
Manitoba
Saskatchewan
Alberta
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Norman Wells
Tulita
Deline
Gamètì
Wekweètì
Whatì
Behchoko
Yellowknife
Dettah
Lutselk'e
Wrigley
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Fond-du-Lac
Black Lake
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Caribou Telemetry Locations
Herd
Bathurst
Bluenose East
Beverly/Ahiak
Winter Range (95% UD)
Bathurst
Bluenose East
Beverly/Ahiak
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 18/10/2019

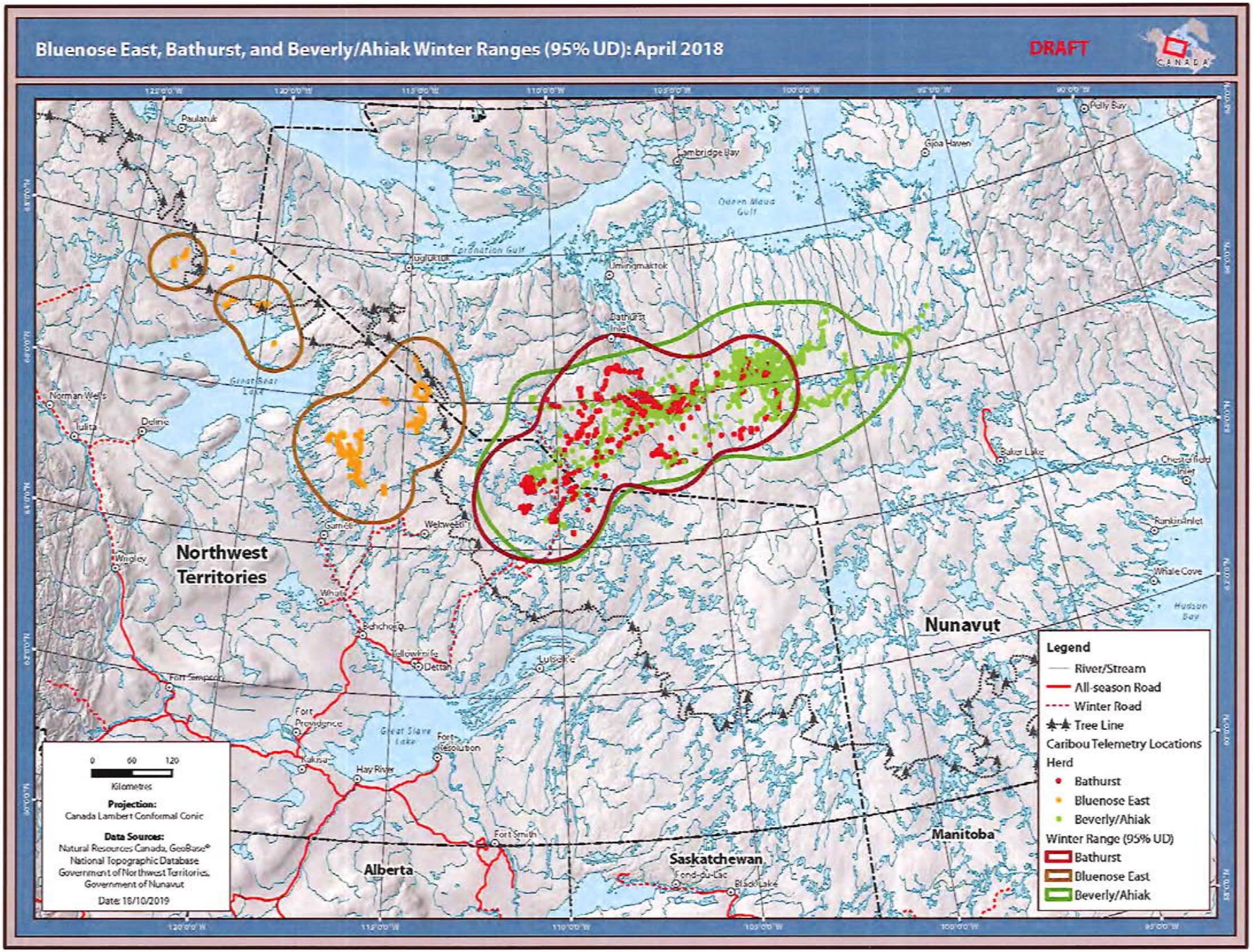

Bluenose East, Bathurst, and Beverly/Ahiak Winter Ranges (95% UD): April 2017
DRAFT
CANADA
Northwest Territories
Nunavut
Alberta
Saskatchewan
Manitoba
Paulatuk
Norman Wells
Tulita
Deline
Wrigley
Fort Simpson
Fort Providence
Kakisa
Hay River
Great Slave Lake
Fort Resolution
Fort Smith
Yellowknife
Dettah
Behchoko
Whati
Gameti
Wekweeti
Lutselk'e
Kugluktuk
Coronation Gulf
Umingmaktok
Bathurst Inlet
Cambridge Bay
Queen Maud Gulf
Gjoa Haven
Pelly Bay
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Fond-du-Lac
Black Lake
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Caribou Telemetry Locations
Herd
Bathurst
Bluenose East
Beverly/Ahiak
Winter Range (95% UD)
Bathurst
Bluenose East
Beverly/Ahiak
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 18/10/2019

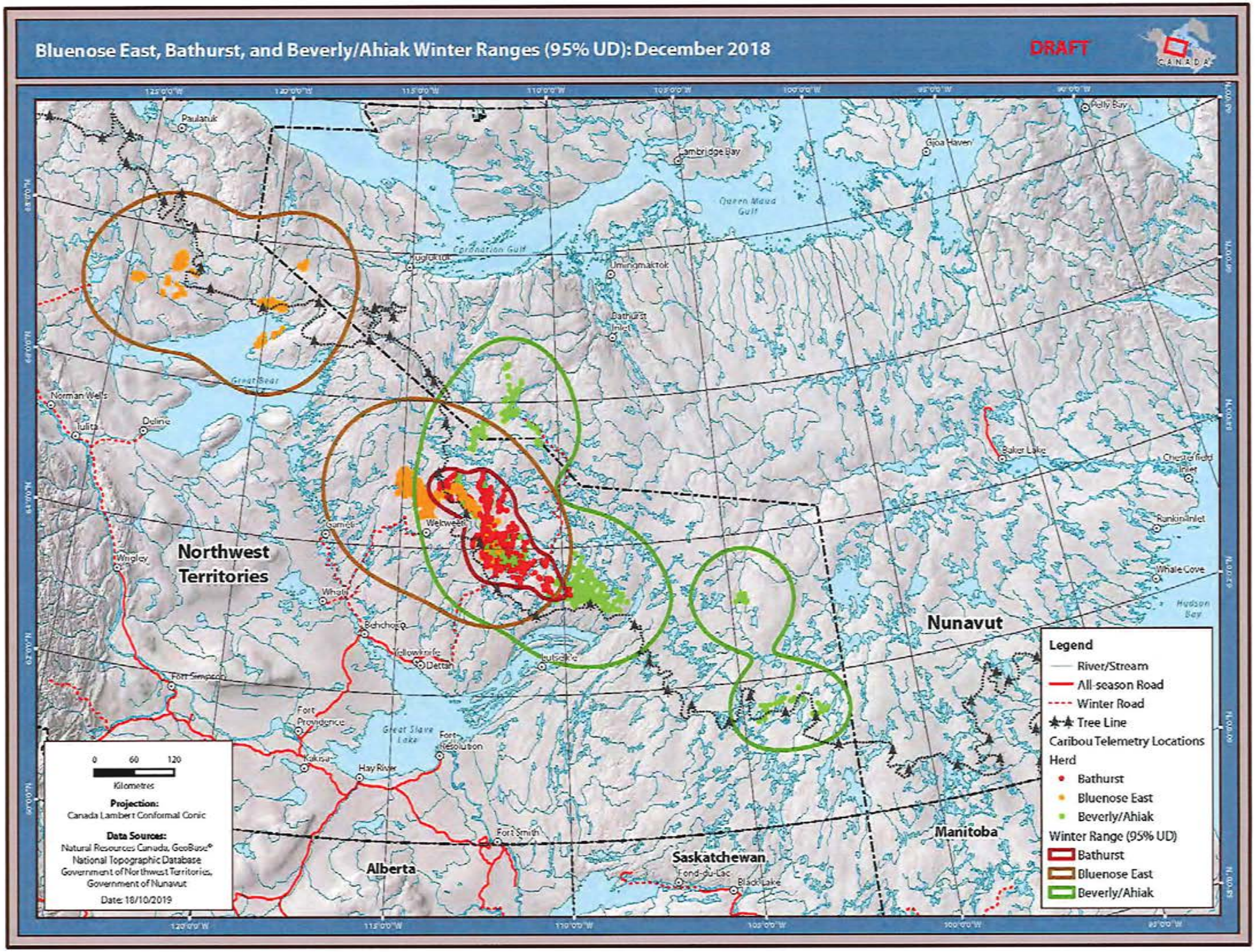

Bluenose East, Bathurst, and Beverly/Ahiak Winter Ranges (95% UD): December 2017
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Wrigley
Northwest Territories
Gameti
Wekweeti
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Alberta
Saskatchewan
Fond-du-Lac
Black Lake
Manitoba
Nunavut
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Caribou Telemetry Locations
Herd
Bathurst
Bluenose East
Beverly/Ahiak
Winter Range (95% UD)
Bathurst
Bluenose East
Beverly/Ahiak
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 18/10/2019

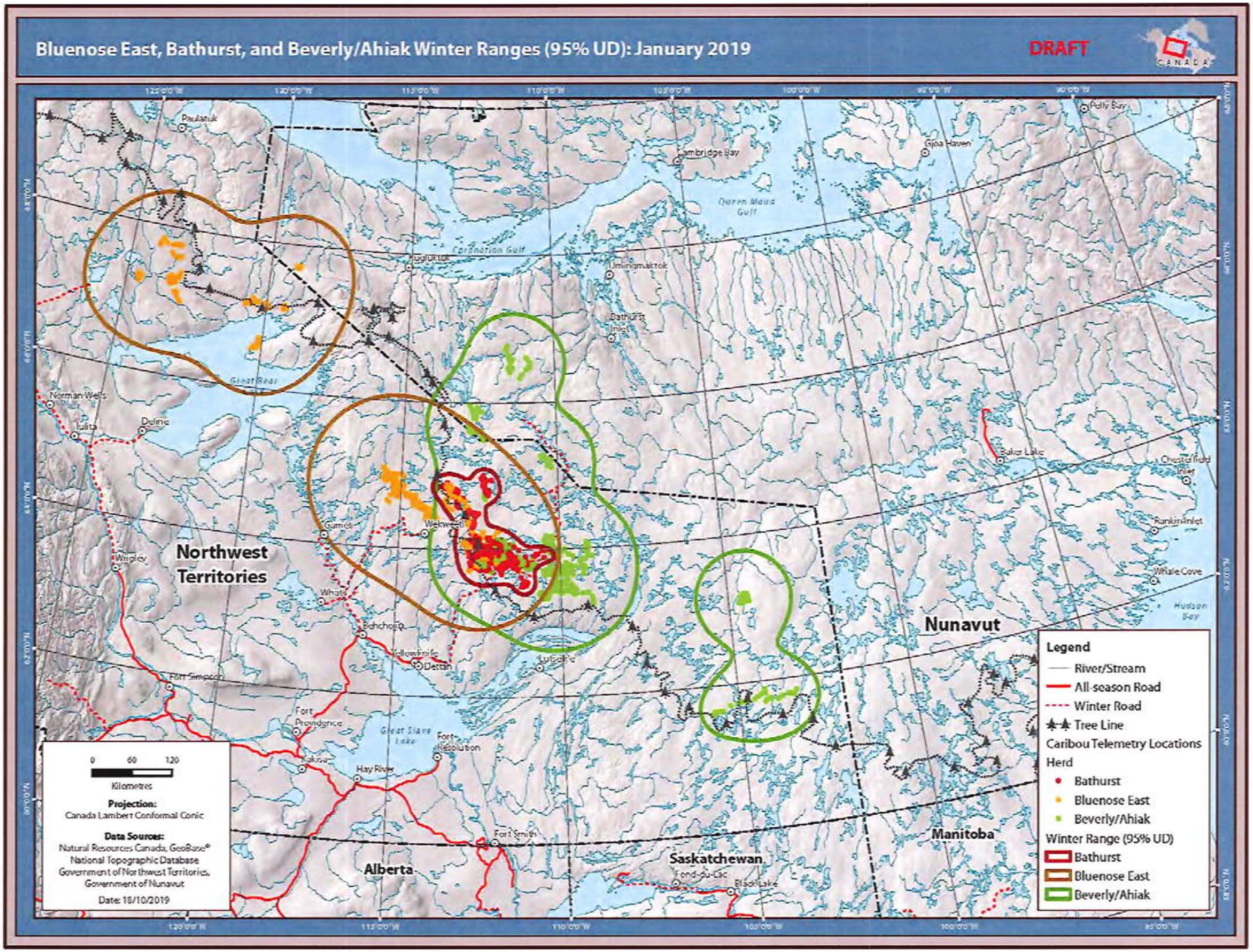

Bluenose East, Bathurst, and Beverly/Ahiak Winter Ranges (95% UD): January 2018
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Gameti
Wekweeti
Wrigley
Northwest Territories
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Nunavut
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Alberta
Saskatchewan
Fond-du-Lac
Black Lake
Manitoba
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Caribou Telemetry Locations
Herd
Bathurst
Bluenose East
Beverly/Ahiak
Winter Range (95% UD)
Bathurst
Bluenose East
Beverly/Ahiak
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 18/10/2019

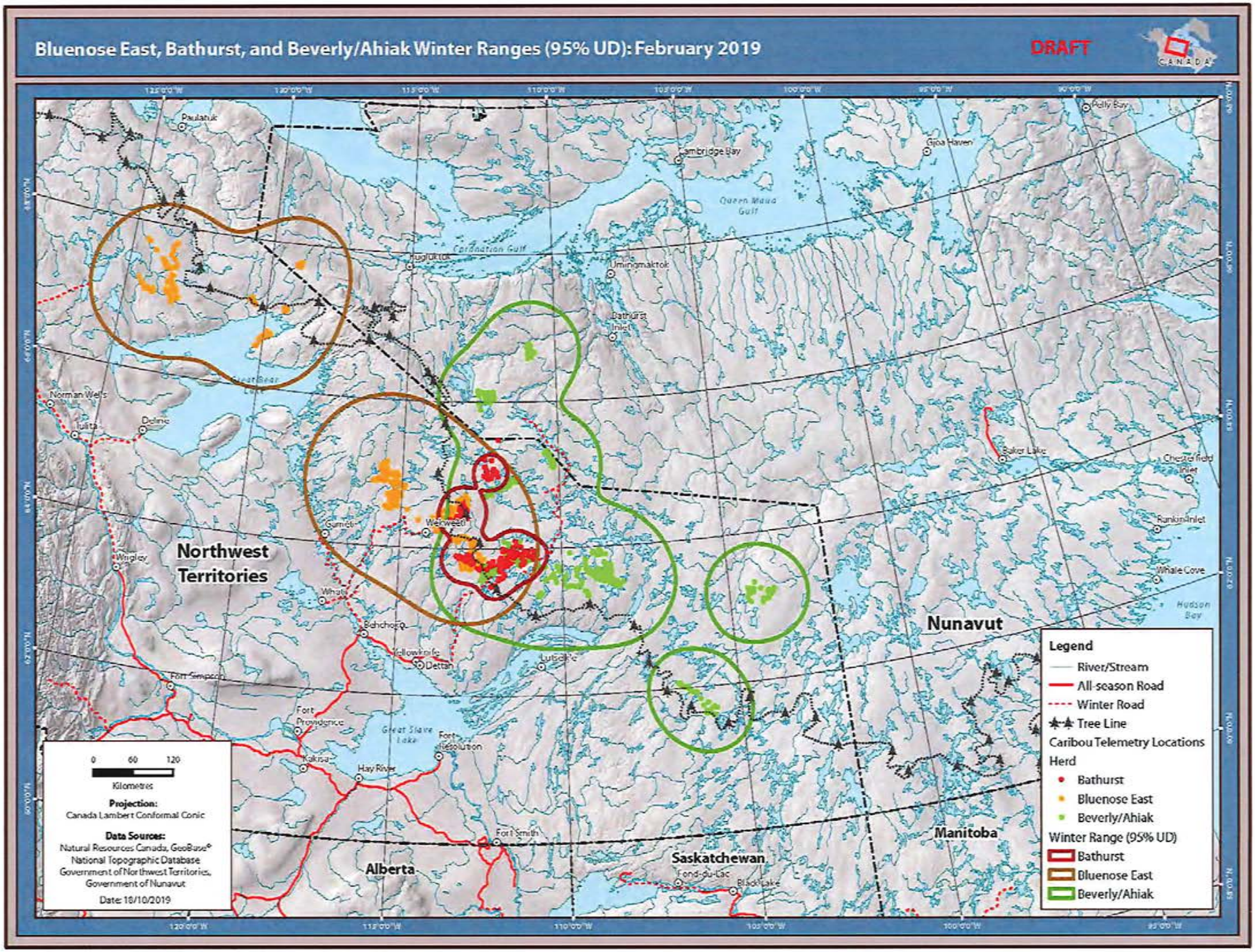

Bluenose East, Bathurst, and Beverly/Ahiak Winter Ranges (95% UD): February 2018
DRAFT
CANADA
Northwest Territories
Nunavut
Alberta
Saskatchewan
Manitoba
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Wrigley
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Gameti
Wekweeti
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Fond-du-Lac
Black Lake
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Caribou Telemetry Locations
Herd
Bathurst
Bluenose East
Beverly/Ahiak
Winter Range (95% UD)
Bathurst
Bluenose East
Beverly/Ahiak
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 18/10/2019


Bluenose East, Bathurst, and Beverly/Ahiak Winter Ranges (95% UD): March 2018
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Gameti
Wekweeti
Wrigley
Northwest Territories
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Nunavut
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Alberta
Saskatchewan
Fond-du-Lac
Black Lake
Manitoba
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 18/10/2019
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Caribou Telemetry Locations
Herd
Bathurst
Bluenose East
Beverly/Ahiak
Winter Range (95% UD)
Bathurst
Bluenose East
Beverly/Ahiak

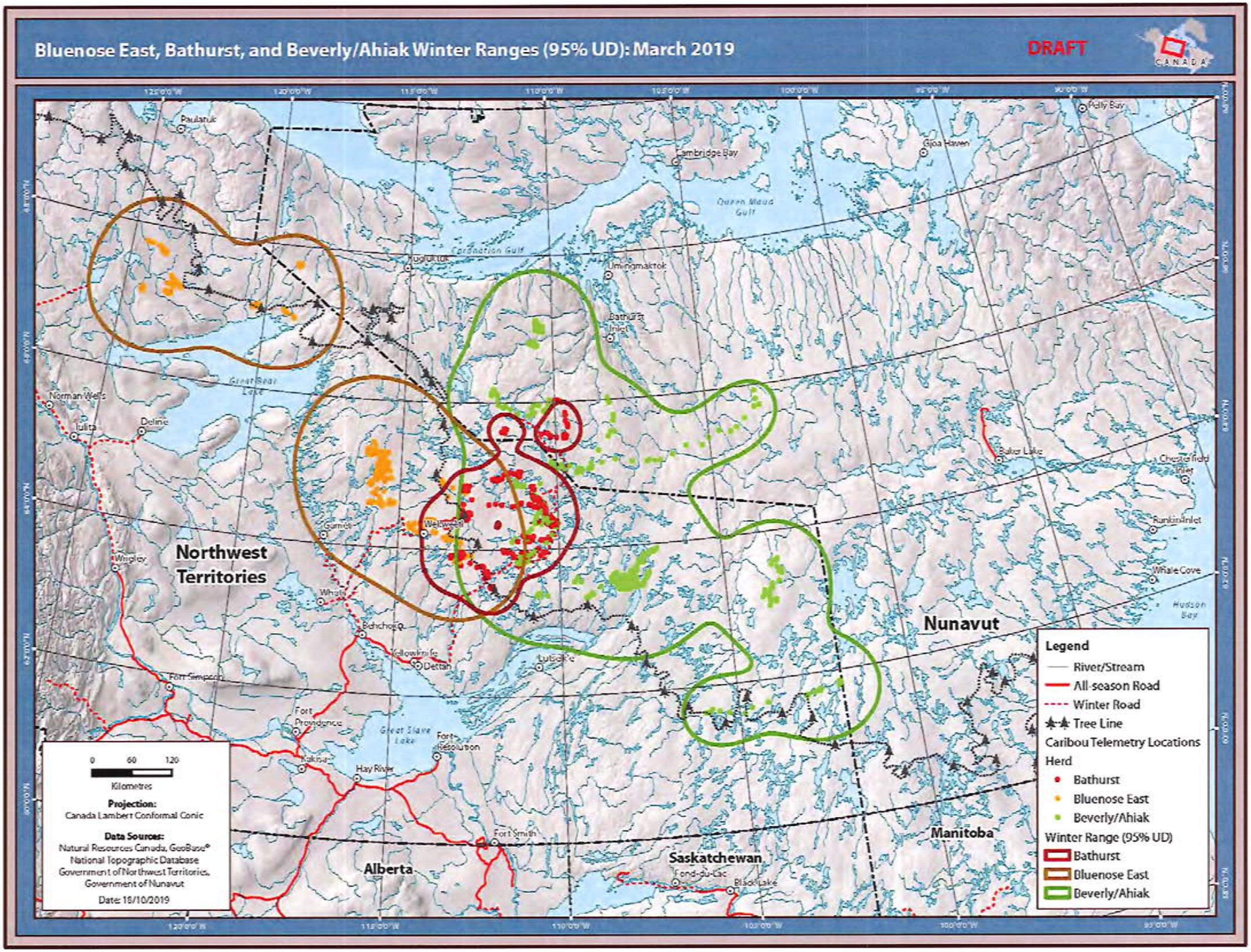

Bluenose East, Bathurst, and Beverly/Ahiak Winter Ranges (95% UD): April 2018
DRAFT
CANADA
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Caribou Telemetry Locations
Herd
Bathurst
Bluenose East
Beverly/Ahiak
Winter Range (95% UD)
Bathurst
Bluenose East
Beverly/Ahiak
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 18/10/2019
Northwest Territories
Nunavut
Alberta
Saskatchewan
Manitoba
Paulatuk
Norman Wells
Tulita
Deline
Wrigley
Fort Simpson
Kugluktuk
Cambridge Bay
Queen Maud Gulf
Coronation Gulf
Umingmaktok
Bathurst Inlet
Gjoa Haven
Pelly Bay
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Great Bear Lake
Great Slave Lake
Gameti
Wekweeti
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Providence
Fort Resolution
Kakisa
Hay River
Fort Smith
Fond-du-Lac
Black Lake

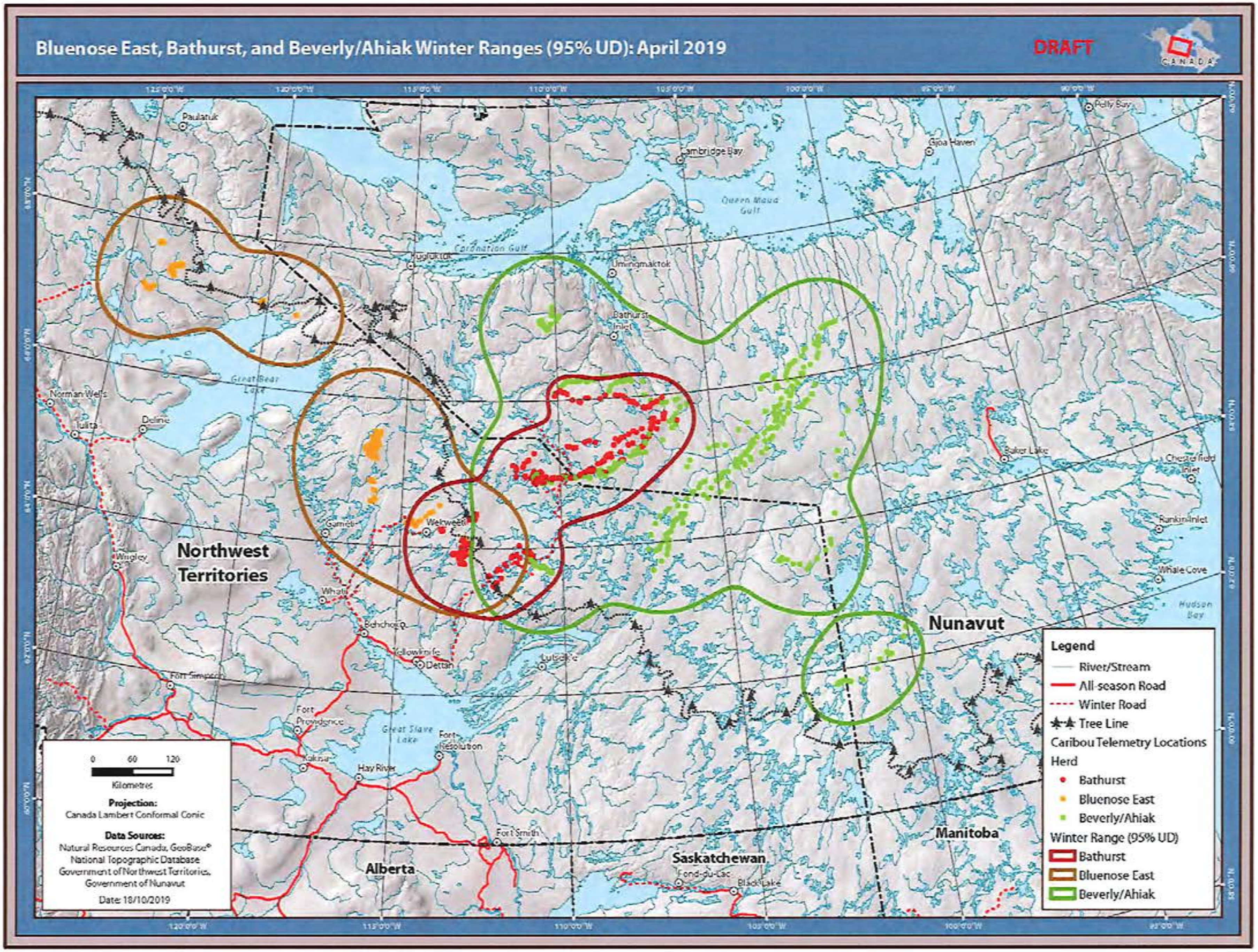

Bluenose East, Bathurst, and Beverly/Ahiak Winter Ranges (95% UD): December 2018
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear
Norman Wells
Tulita
Deline
Wrigley
Northwest Territories
Gameti
Wekweeti
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Alberta
Saskatchewan
Fond-du-Lac
Black Lake
Manitoba
Nunavut
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Caribou Telemetry Locations
Herd
Bathurst
Bluenose East
Beverly/Ahiak
Winter Range (95% UD)
Bathurst
Bluenose East
Beverly/Ahiak
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 18/10/2019


Bluenose East, Bathurst, and Beverly/Ahiak Winter Ranges (95% UD): January 2019
DRAFT
CANADA
Northwest Territories
Nunavut
Alberta
Saskatchewan
Manitoba
Paulatuk
Norman Wells
Tulita
Deline
Wrigley
Fort Simpson
Gameti
Whati
Behchoko
Yellowknife
Dettah
Wekweeti
Lutselk'e
Fort Providence
Kakisa
Hay River
Fort Resolution
Fort Smith
Fond-du-Lac
Black Lake
Kugluktuk
Coronation Gulf
Umingmaktok
Bathurst Inlet
Cambridge Bay
Queen Maud Gulf
Gjoa Haven
Pelly Bay
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Great Slave Lake
Great Bear
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Caribou Telemetry Locations
Herd
Bathurst
Bluenose East
Beverly/Ahiak
Winter Range (95% UD)
Bathurst
Bluenose East
Beverly/Ahiak
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 18/10/2019

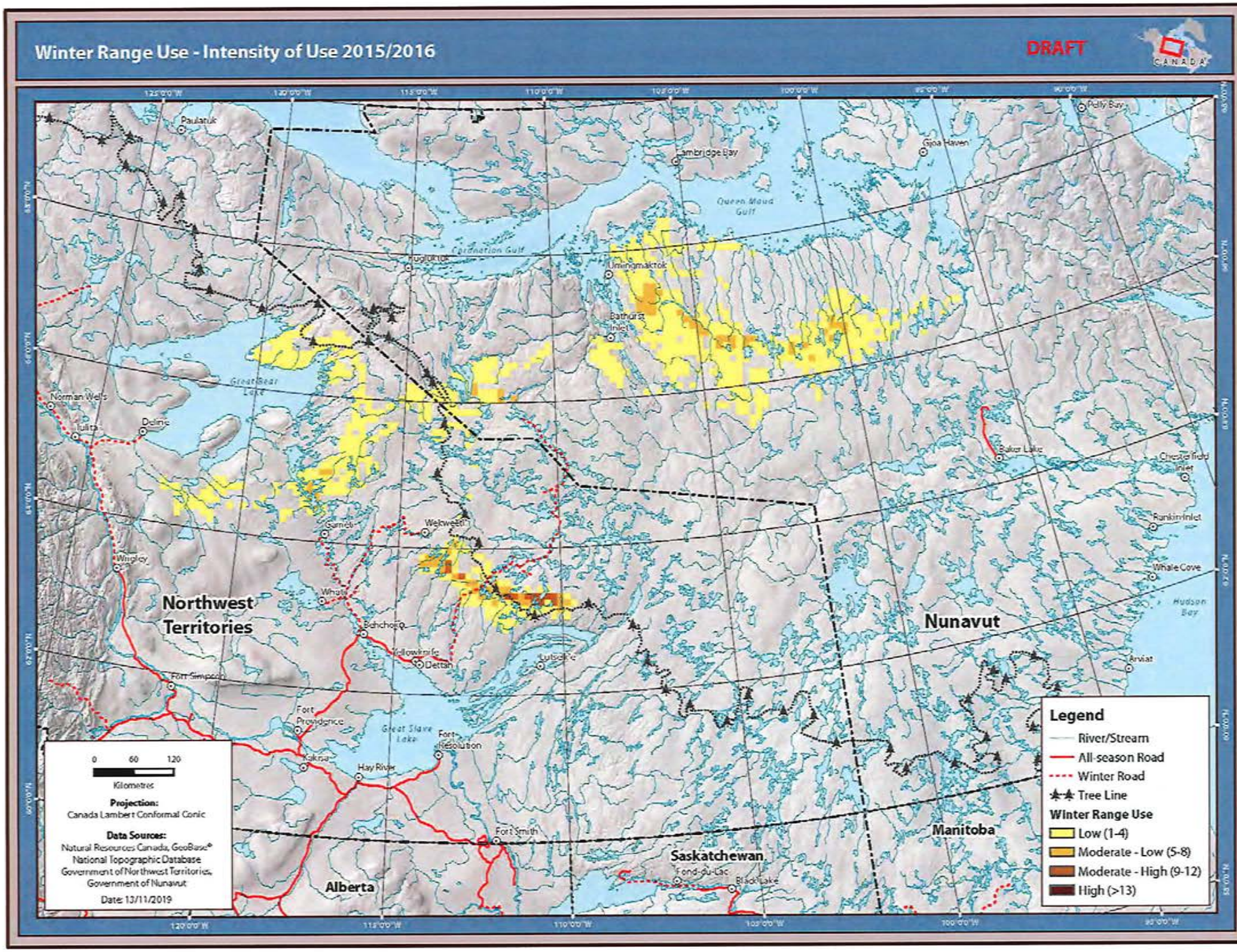


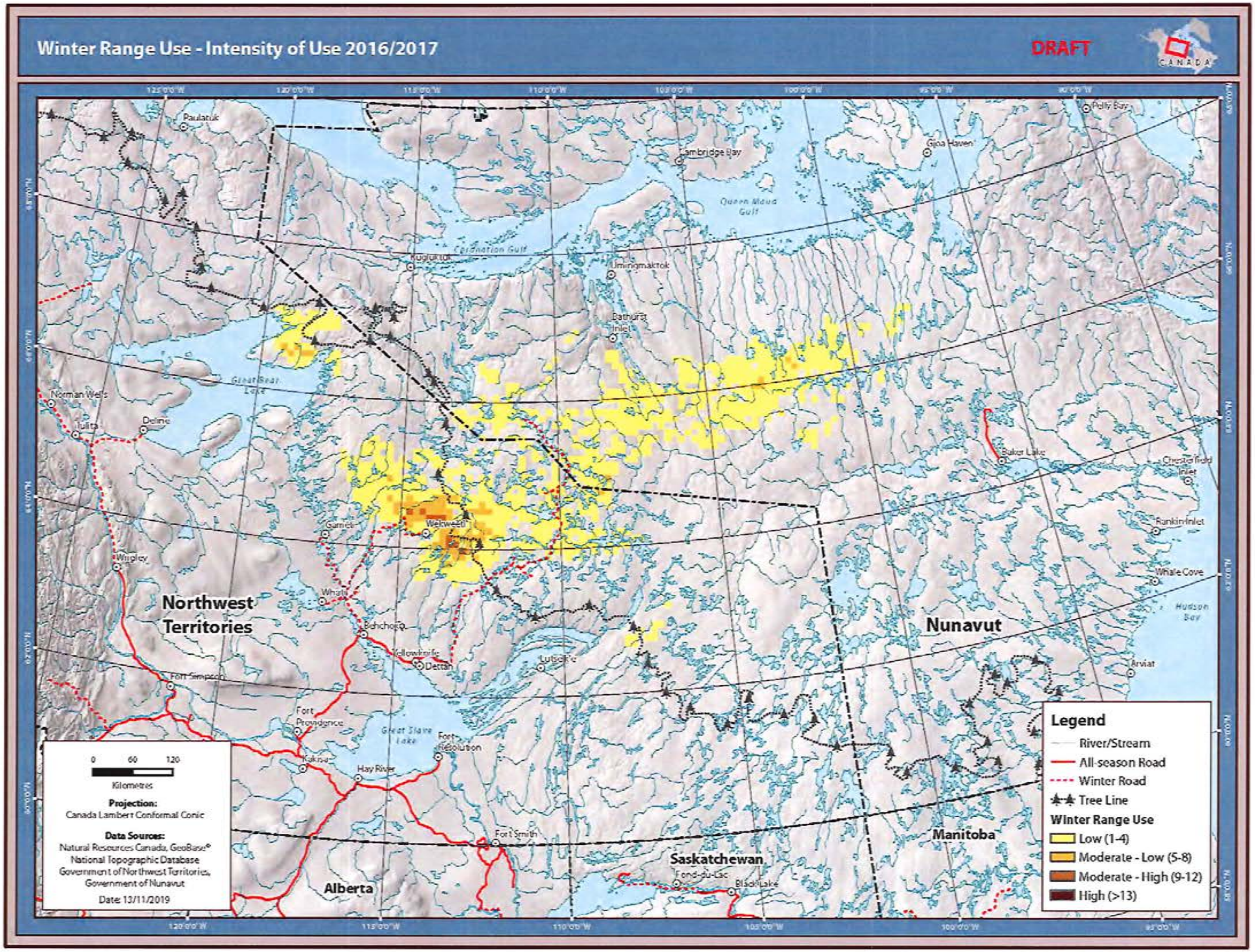
Bluenose East, Bathurst, and Beverly/Ahiak Winter Ranges (95% UD): February 2019
DRAFT
CANADA
Northwest Territories
Nunavut
Alberta
Saskatchewan
Manitoba
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Norman Wells
Tulita
Deline
Gameti
Wekweeti
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Kakisa
Hay River
Great Slave Lake
Fort Resolution
Fort Smith
Fond-du-Lac
Black Lake
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Caribou Telemetry Locations
Herd
Bathurst
Bluenose East
Beverly/Ahiak
Winter Range (95% UD)
Bathurst
Bluenose East
Beverly/Ahiak
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 18/10/2019


Bluenose East, Bathurst, and Beverly/Ahiak Winter Ranges (95% UD): March 2019
DRAFT
CANADA
Northwest Territories
Nunavut
Manitoba
Saskatchewan
Alberta
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Wrigley
Gameti
Wekweeti
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Fond-du-Lac
Black Lake
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Caribou Telemetry Locations
Herd
Bathurst
Bluenose East
Beverly/Ahiak
Winter Range (95% UD)
Bathurst
Bluenose East
Beverly/Ahiak
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 18/10/2019

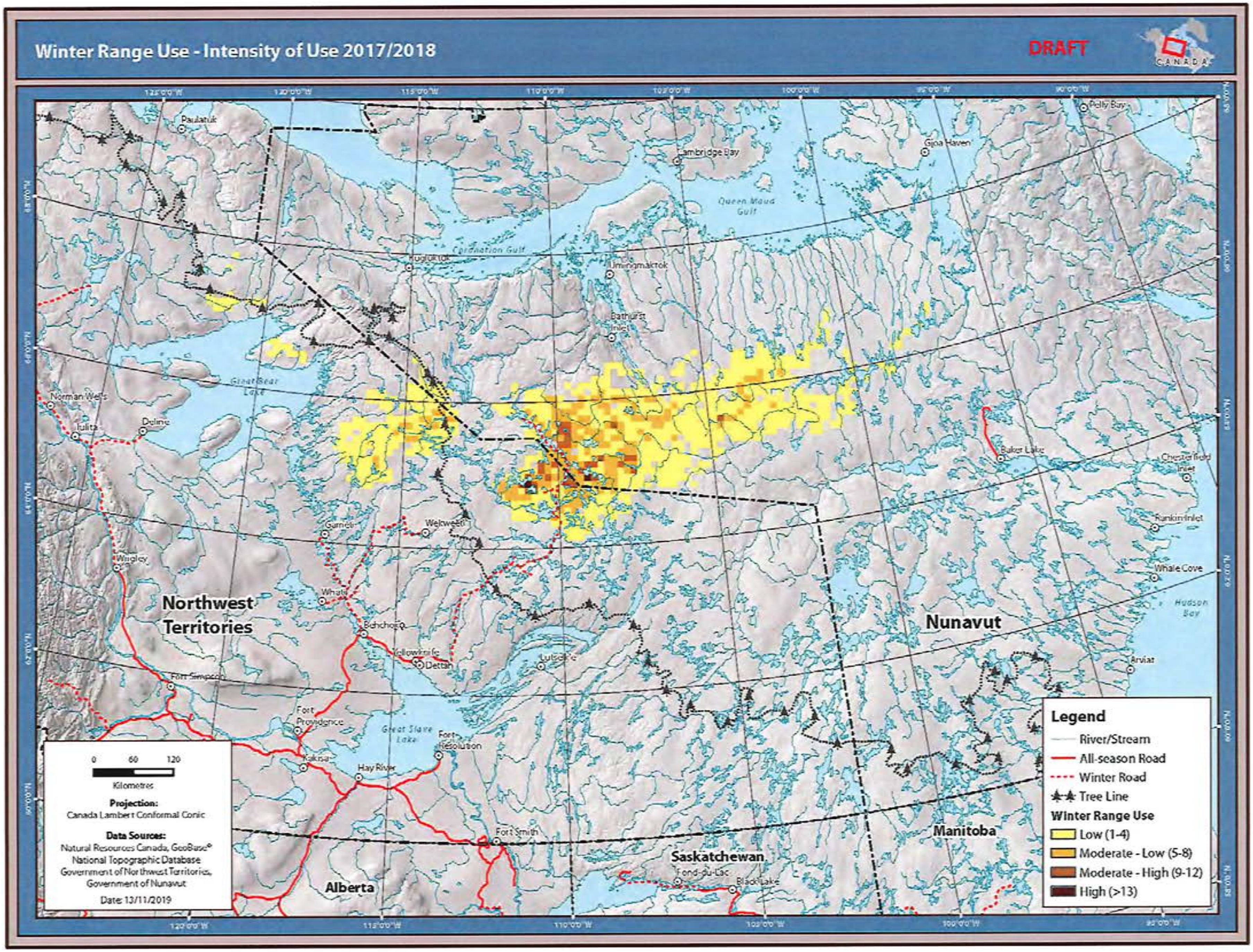

Bluenose East, Bathurst, and Beverly/Ahiak Winter Ranges (95% UD): April 2019
DRAFT
CANADA
Northwest Territories
Nunavut
Alberta
Saskatchewan
Manitoba
Paulatuk
Norman Wells
Tulita
Deline
Wrigley
Great Bear Lake
Kugluktuk
Coronation Gulf
Cambridge Bay
Queen Maud Gulf
Gjoa Haven
Pelly Bay
Umingmaktok
Bathurst Inlet
Gamèti
Wekweètì
Whatì
Behchoko
Yellowknife
Dettah
Lutsel k'e
Fort Simpson
Fort Providence
Kakisa
Hay River
Great Slave Lake
Fort Resolution
Fort Smith
Fond-du-Lac
Black Lake
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Caribou Telemetry Locations
Herd
Bathurst
Bluenose East
Beverly/Ahiak
Winter Range (95% UD)
Bathurst
Bluenose East
Beverly/Ahiak
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 18/10/2019

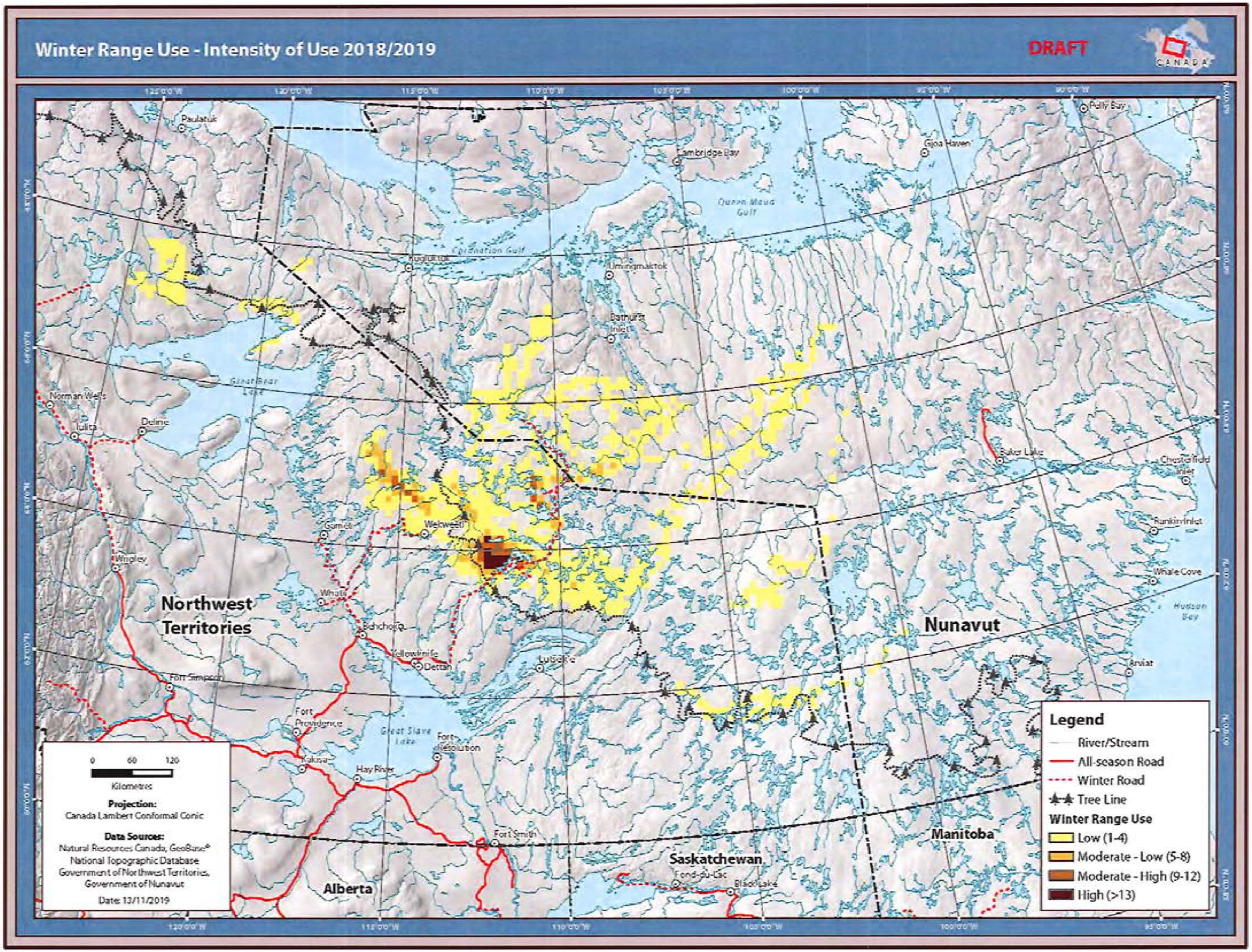
Appendix 9-C1: Annual Intensity of Use


Winter Range Use - Intensity of Use 2015/2016
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Arviat
Gameti
Wekweeti
Wrigley
Whati
Northwest Territories
Behchoko
Yellowknife
Dettah
Lutselk'e
Nunavut
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Alberta
Saskatchewan
Fond-du-Lac
Black Lake
Manitoba
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 13/11/2019
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Winter Range Use
Low (1-4)
Moderate - Low (5-8)
Moderate - High (9-12)
High (>13)



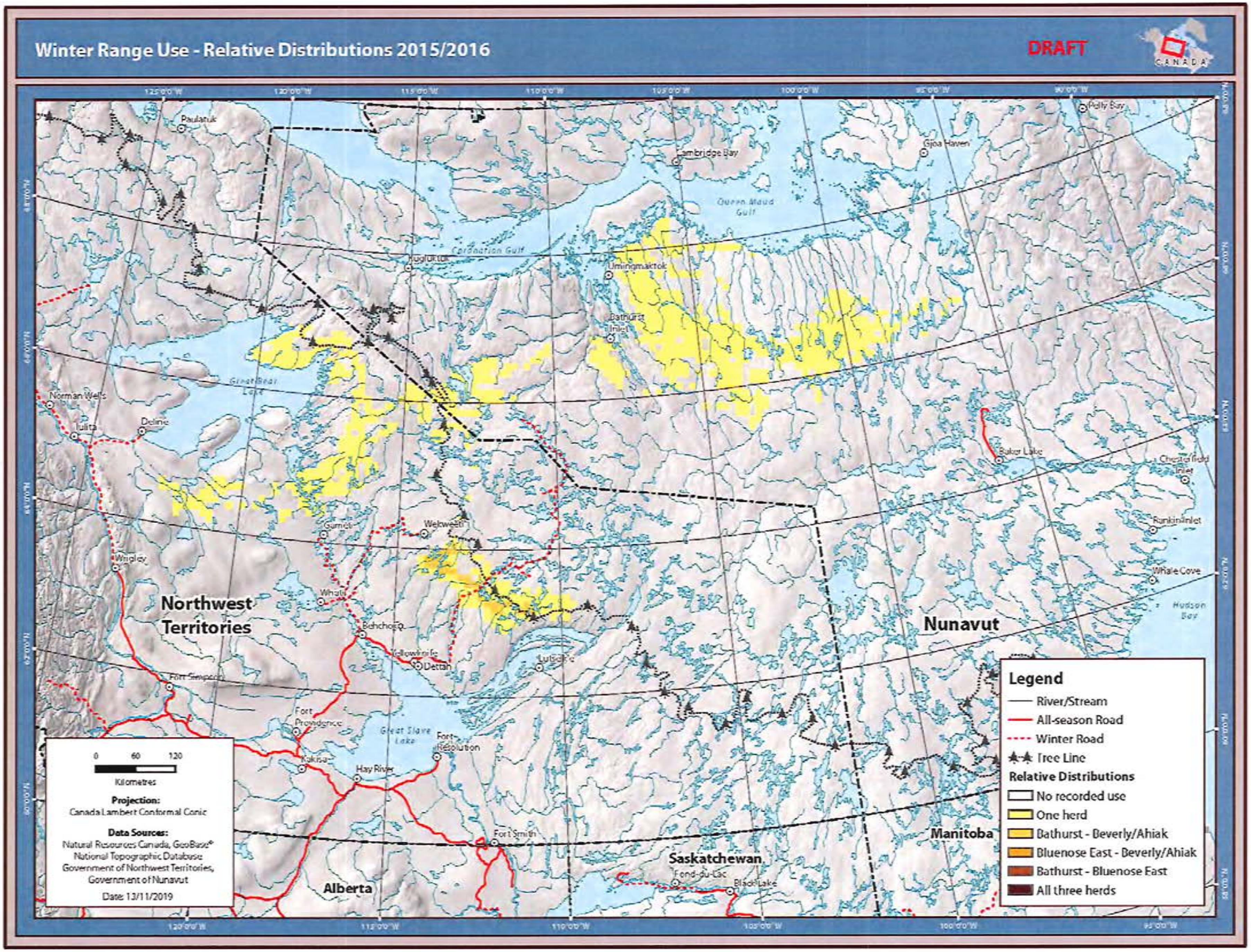
Winter Range Use - Intensity of Use 2016/2017
DRAFT
CANADA
Northwest Territories
Nunavut
Alberta
Saskatchewan
Manitoba
Paulatuk
Norman Wells
Tulita
Deline
Great Bear Lake
Kugluktuk
Coronation Gulf
Cambridge Bay
Queen Maud Gulf
Umingmaktok
Bathurst Inlet
Gjoa Haven
Pelly Bay
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Arviat
Wekweeti
Gameti
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Wrigley
Fort Simpson
Fort Providence
Kakisa
Hay River
Great Slave Lake
Fort Resolution
Fort Smith
Fond-du-Lac
Black Lake
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 13/11/2019
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Winter Range Use
Low (1-4)
Moderate - Low (5-8)
Moderate - High (9-12)
High (>13)


Winter Range Use - Intensity of Use 2017/2018
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Arviat
Gameti
Wekweeti
Wrigley
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Fond-du-Lac
Black Lake
Northwest Territories
Nunavut
Manitoba
Saskatchewan
Alberta
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 13/11/2019
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Winter Range Use
Low (1-4)
Moderate - Low (5-8)
Moderate - High (9-12)
High (>13)

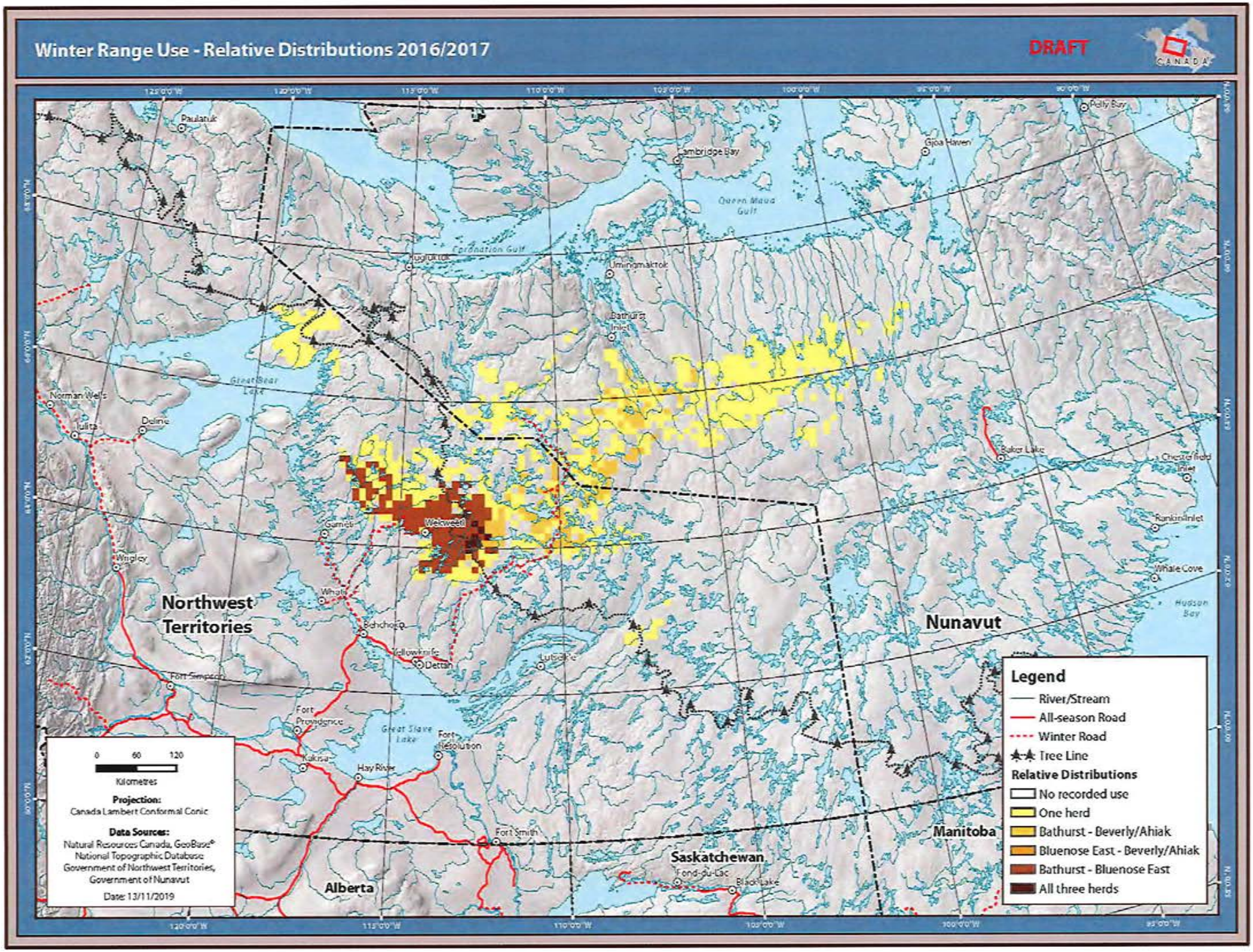


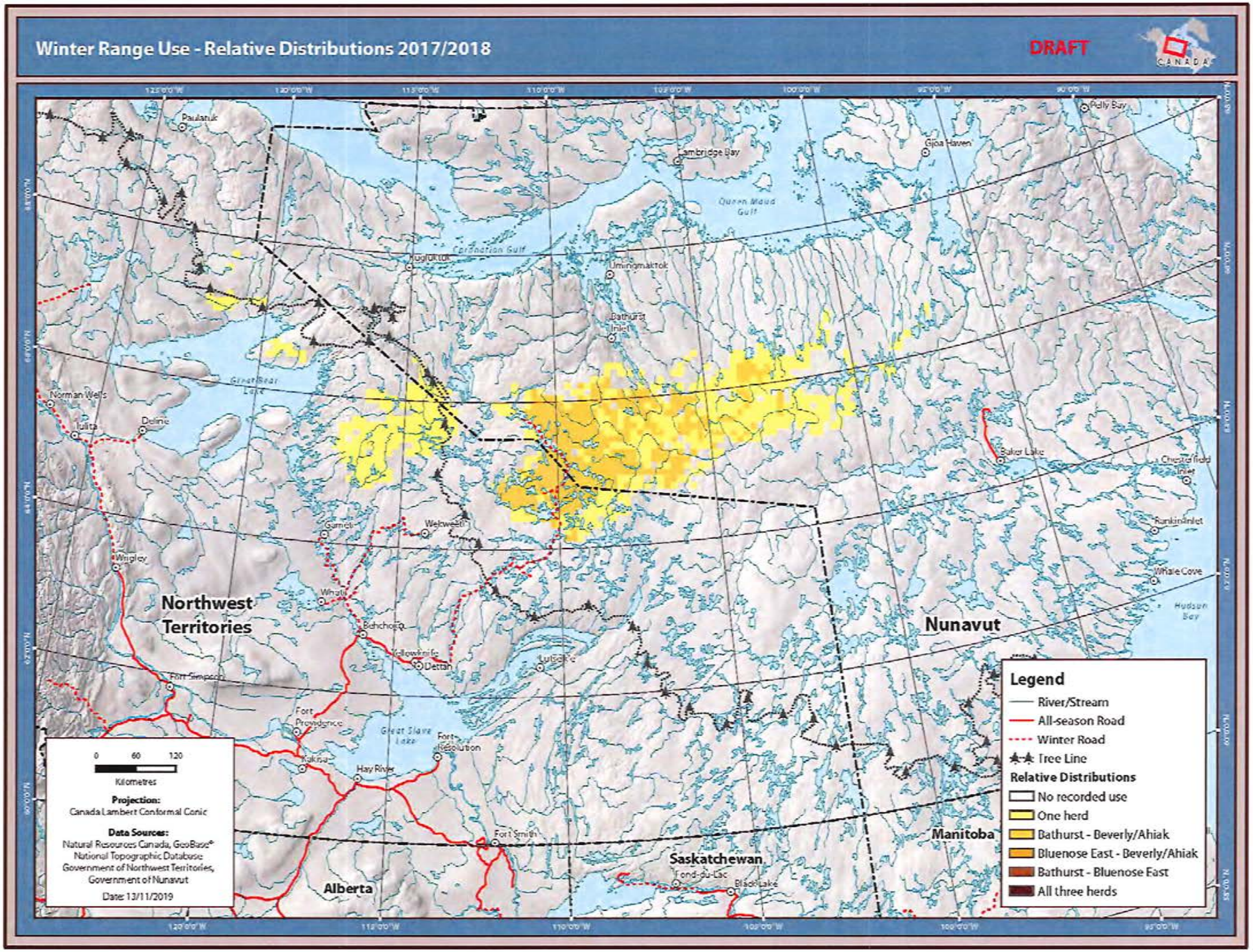
Winter Range Use - Intensity of Use 2018/2019
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Arviat
Gameti
Wekweeti
Wrigley
Whati
Northwest Territories
Behchoko
Yellowknife
Dettah
Lutselk'e
Nunavut
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Alberta
Saskatchewan
Fond-du-Lac
Black Lake
Manitoba
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 13/11/2019
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Winter Range Use
Low (1-4)
Moderate - Low (5-8)
Moderate - High (9-12)
High (>13)

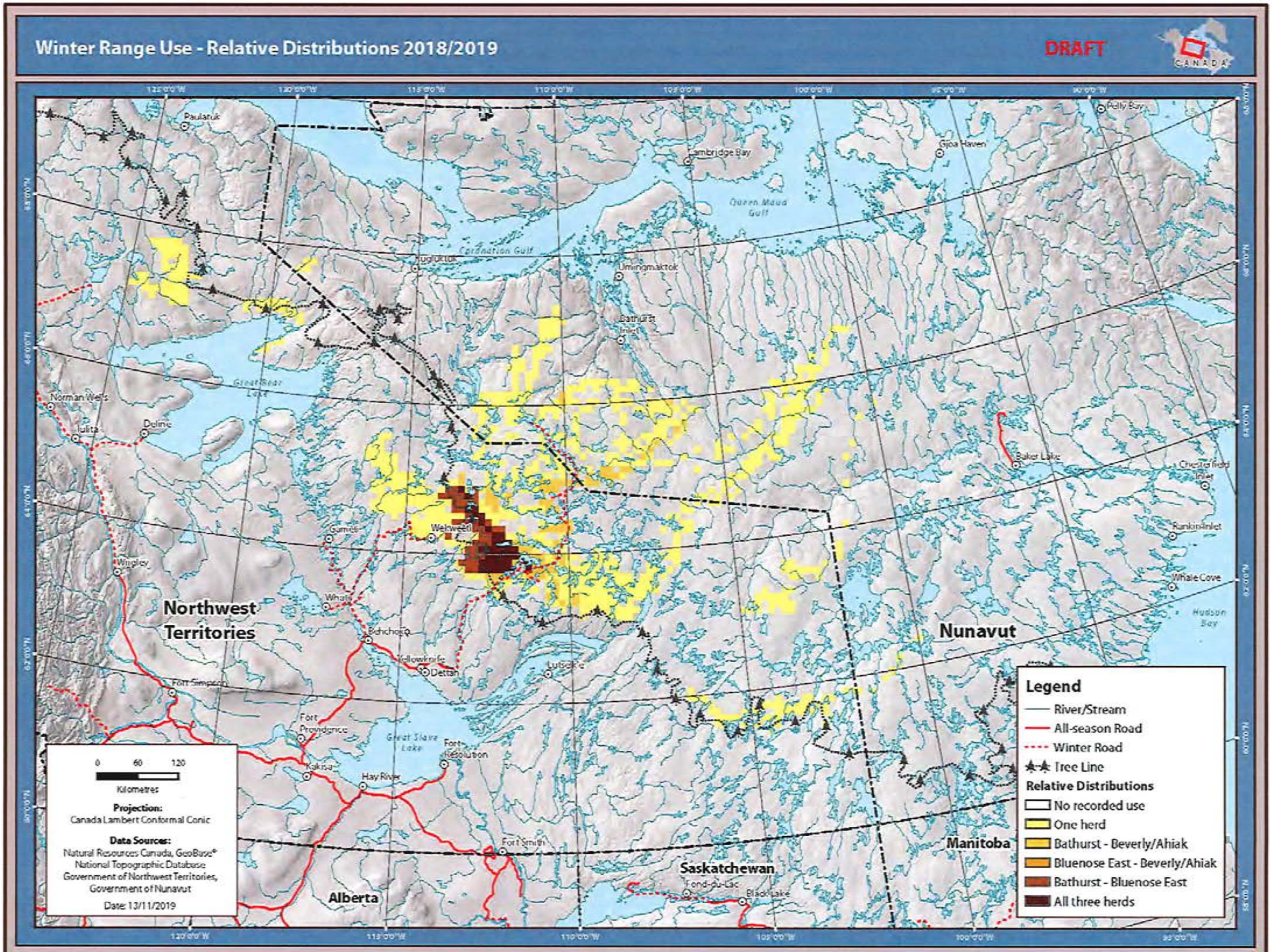
Appendix 9-C2: Annual Relative Distributions



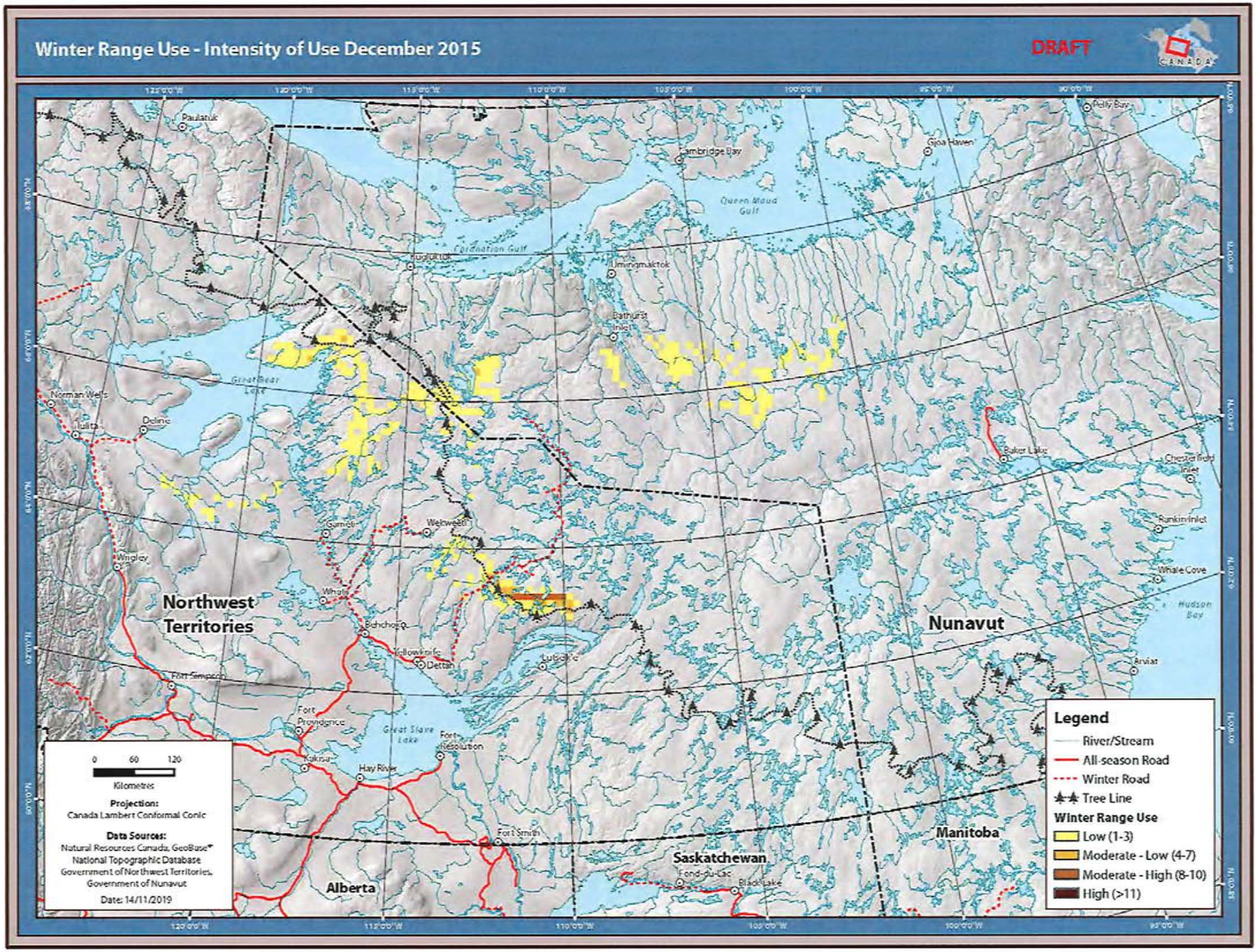
Winter Range Use - Relative Distributions 2015/2016
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Wrigley
Gameti
Wekweeti
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Northwest Territories
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Alberta
Saskatchewan
Fond-du-Lac
Black Lake
Manitoba
Nunavut
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Relative Distributions
No recorded use
One herd
Bathurst - Beverly/Ahiak
Bluenose East - Beverly/Ahiak
Bathurst - Bluenose East
All three herds
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 13/11/2019


Winter Range Use - Relative Distributions 2016/2017
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Gameti
Wekweeti
Wrigley
Whati
Northwest Territories
Behchoko
Yellowknife
Dettah
Lutselk'e
Nunavut
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Manitoba
Saskatchewan
Fond-du-Lac
Black Lake
Alberta
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 13/11/2019
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Relative Distributions
No recorded use
One herd
Bathurst - Beverly/Ahiak
Bluenose East - Beverly/Ahiak
Bathurst - Bluenose East
All three herds

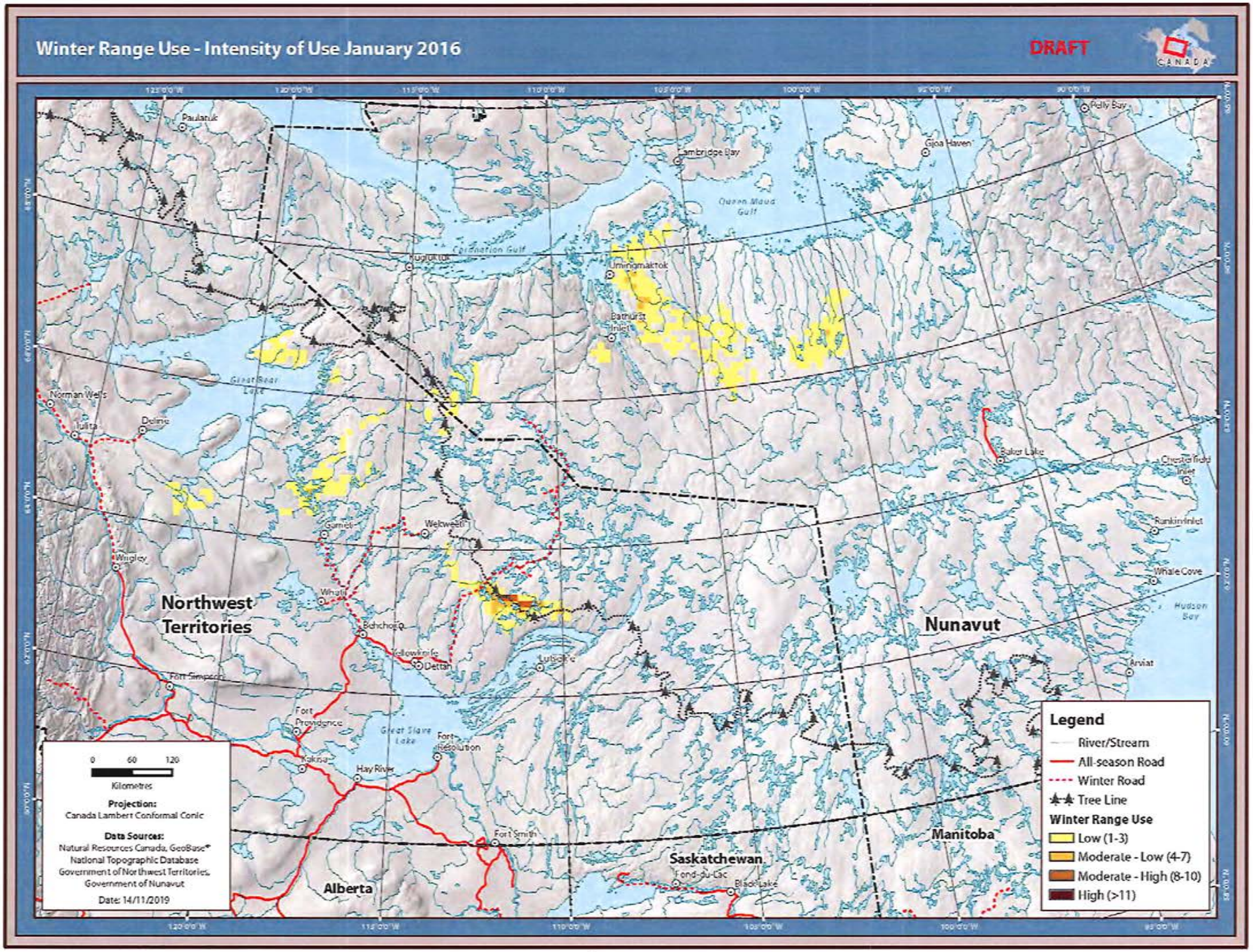

Winter Range Use - Relative Distributions 2017/2018
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Gameti
Wekweeti
Wrigley
Whati
Northwest Territories
Behchoko
Yellowknife
Dettah
Lutselk'e
Nunavut
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Alberta
Saskatchewan
Fond-du-Lac
Black Lake
Manitoba
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Relative Distributions
No recorded use
One herd
Bathurst - Beverly/Ahiak
Bluenose East - Beverly/Ahiak
Bathurst - Bluenose East
All three herds
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 13/11/2019

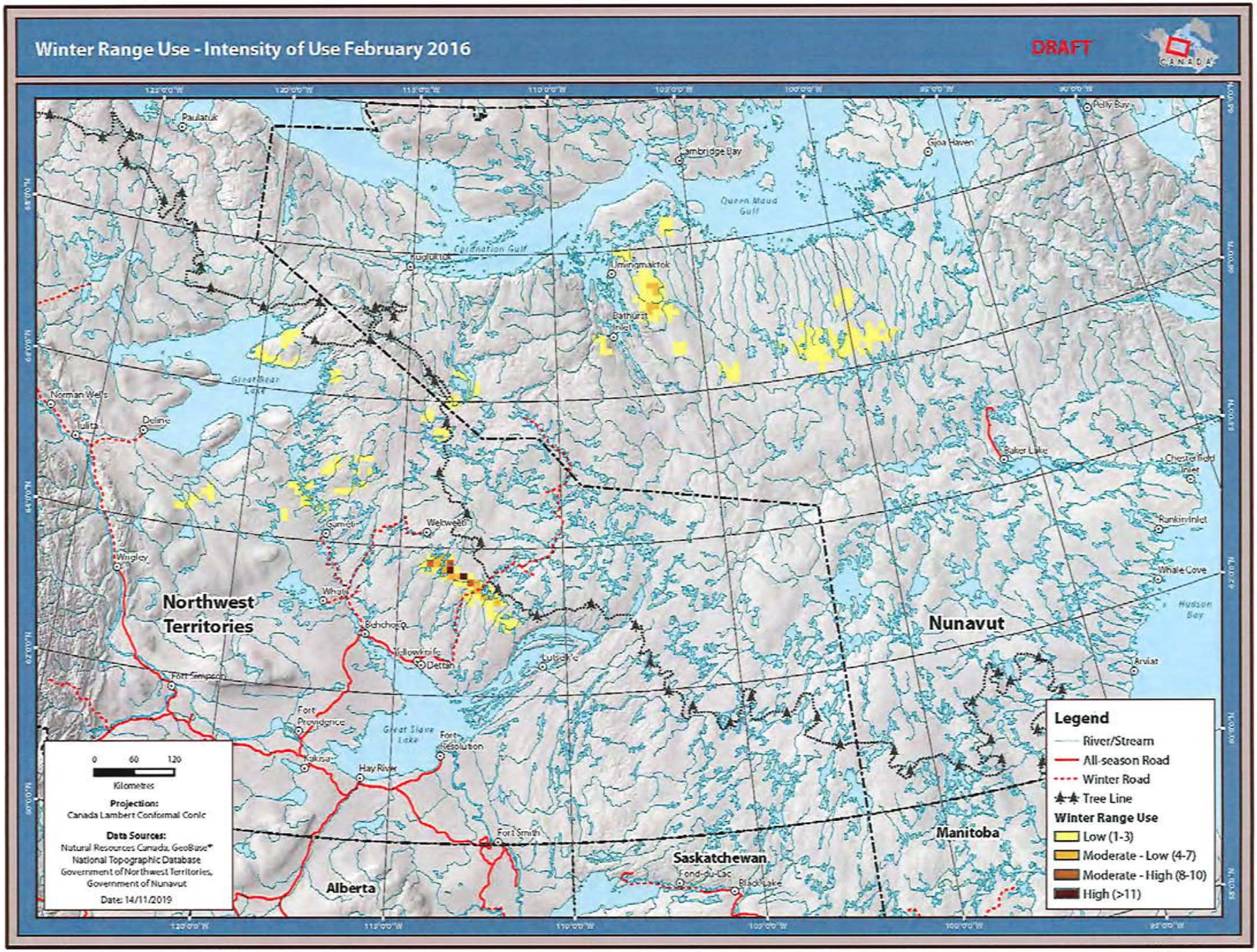

Winter Range Use - Relative Distributions 2018/2019
DRAFT
CANADA
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Relative Distributions
No recorded use
One herd
Bathurst - Beverly/Ahiak
Bluenose East - Beverly/Ahiak
Bathurst - Bluenose East
All three herds
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 13/11/2019
Northwest Territories
Nunavut
Manitoba
Saskatchewan
Alberta
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Deline
Tulita
Wrigley
Gameti
Wekweeti
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Fond-du-Lac
Black Lake
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay

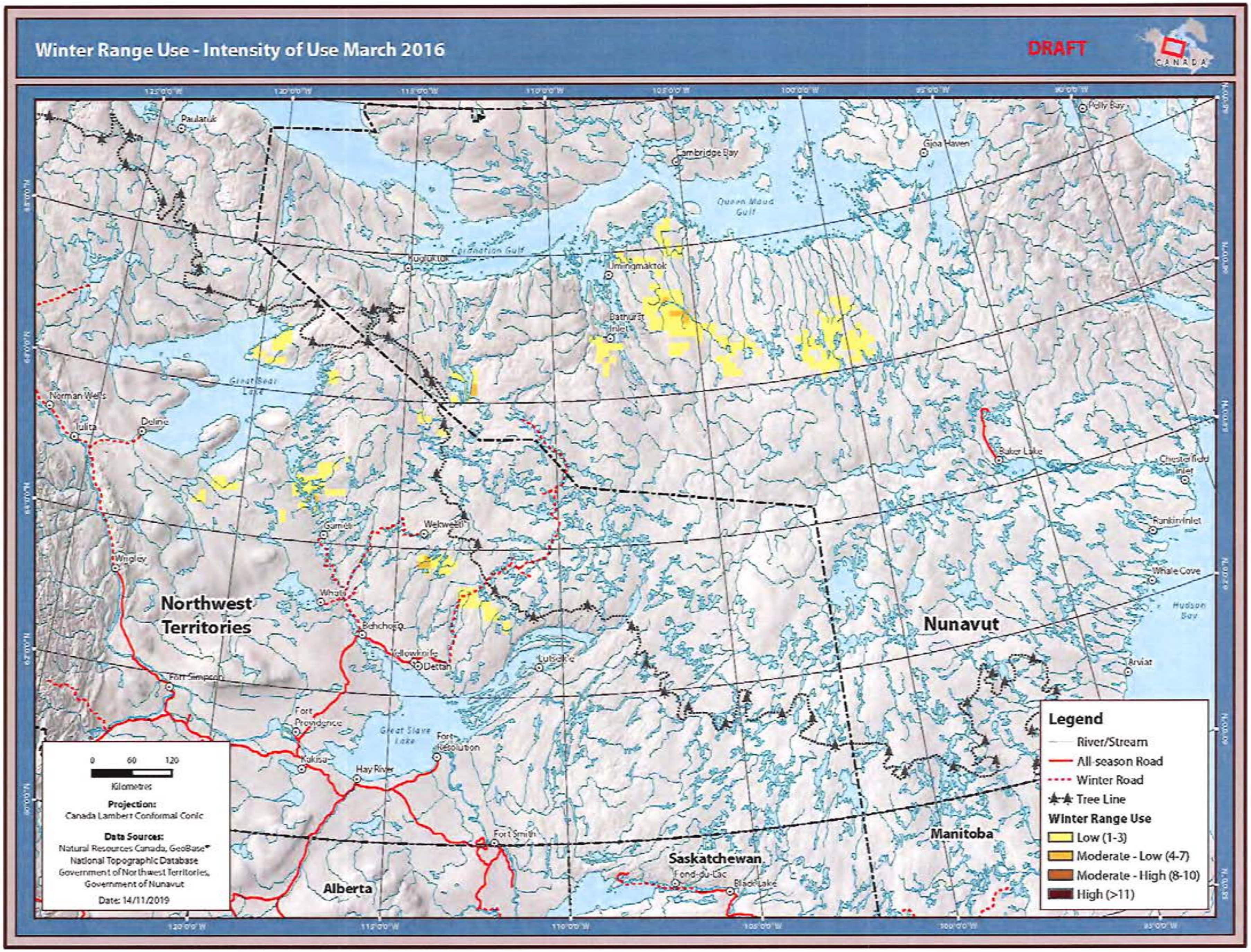
Appendix 9-D1: Monthly Intensity of Use

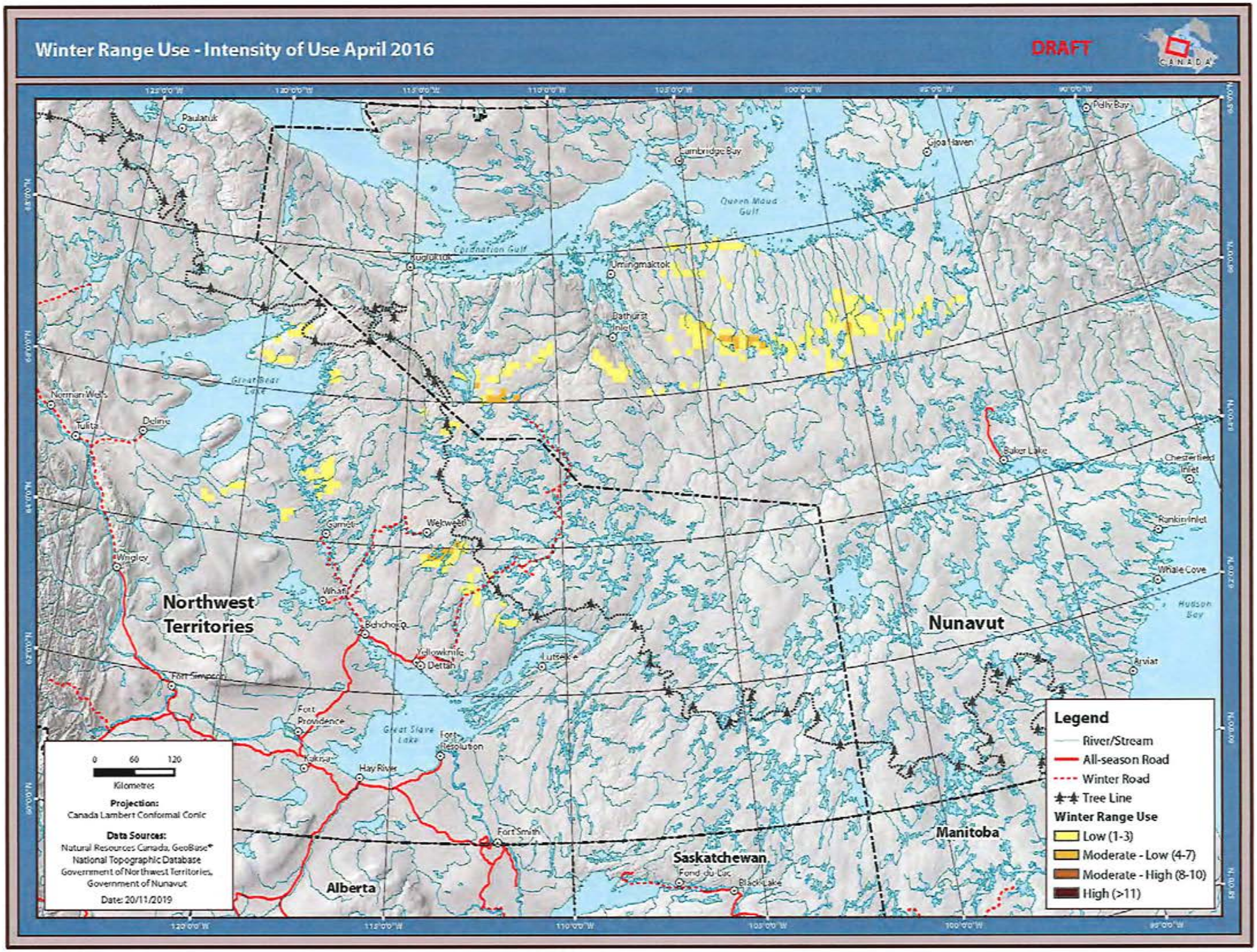


Winter Range Use - Intensity of Use December 2015
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Arviat
Gameti
Wekweeti
Whati
Wrigley
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Fond-du-Lac
Black Lake
Northwest Territories
Nunavut
Manitoba
Saskatchewan
Alberta
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Winter Range Use
Low (1-3)
Moderate - Low (4-7)
Moderate - High (8-10)
High (>11)
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 14/11/2019

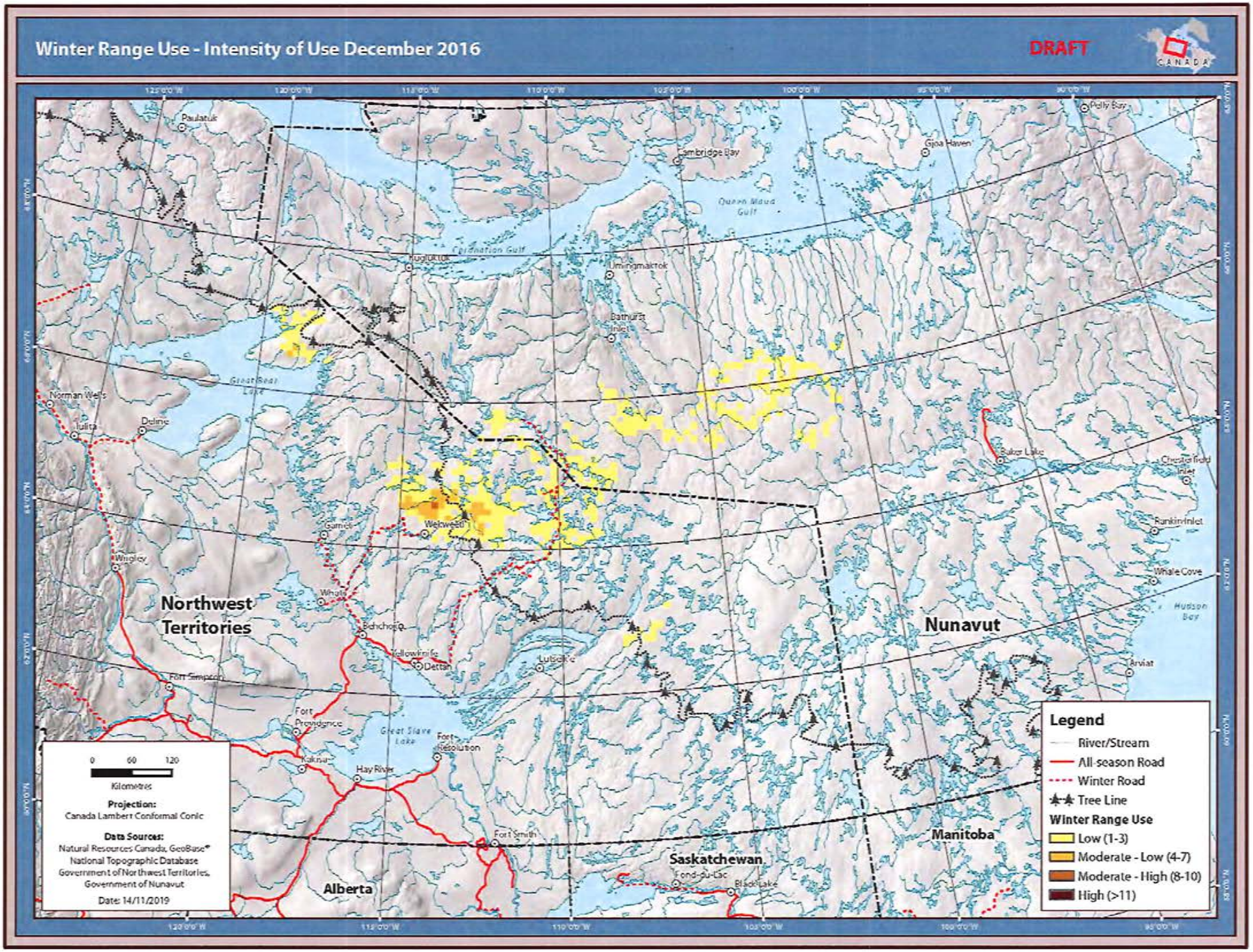

Winter Range Use - Intensity of Use January 2016
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Gameti
Wekweeti
Wrigley
Whati
Northwest Territories
Behchoko
Yellowknife
Dettah
Lutselk'e
Nunavut
Arviat
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Alberta
Saskatchewan
Fond-du-Lac
Black Lake
Manitoba
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Winter Range Use
Low (1-3)
Moderate - Low (4-7)
Moderate - High (8-10)
High (>11)
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 14/11/2019


Winter Range Use - Intensity of Use February 2016
DRAFT
CANADA
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Winter Range Use
Low (1-3)
Moderate - Low (4-7)
Moderate - High (8-10)
High (>11)
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 14/11/2019
Northwest Territories
Nunavut
Manitoba
Saskatchewan
Alberta
Great Bear Lake
Great Slave Lake
Coronation Gulf
Queen Maud Gulf
Hudson Bay
Paulatuk
Norman Wells
Tulita
Deline
Wrigley
Fort Simpson
Kugluktuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Umingmaktok
Bathurst Inlet
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Arviat
Gameti
Wekweeti
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Providence
Kakisa
Hay River
Fort Resolution
Fort Smith
Fond-du-Lac
Black Lake


Winter Range Use - Intensity of Use March 2016
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Polly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Arviat
Gameti
Wekweeti
Wrigley
Whati
Northwest Territories
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Nunavut
Manitoba
Saskatchewan
Fond-du-Lac
Black Lake
Alberta
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 14/11/2019
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Winter Range Use
Low (1-3)
Moderate - Low (4-7)
Moderate - High (8-10)
High (>11)



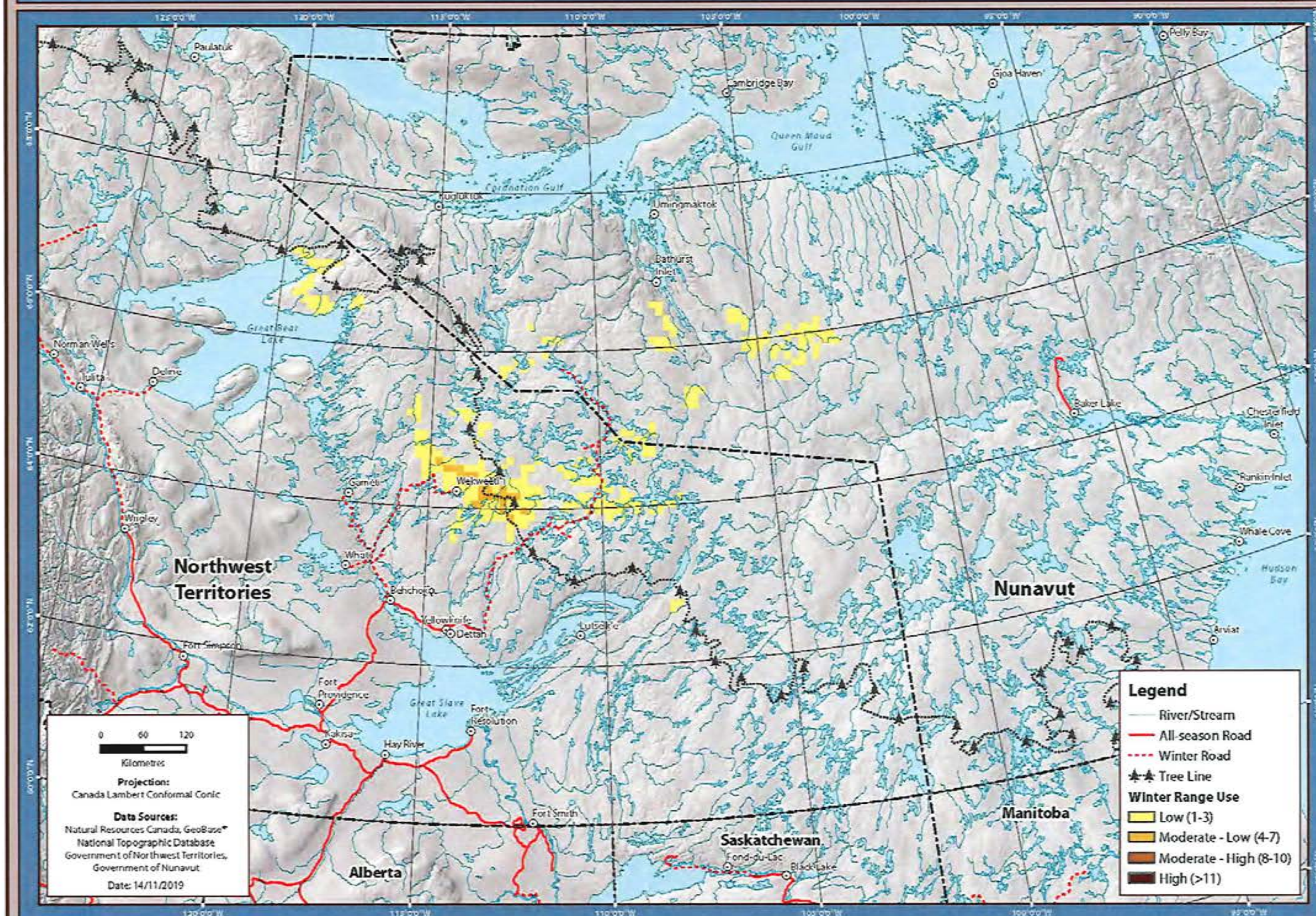
Winter Range Use - Intensity of Use April 2016
DRAFT
CANADA
Northwest Territories
Nunavut
Alberta
Saskatchewan
Manitoba
Paulatuk
Kugluktuk
Coronation Gulf
Cambridge Bay
Queen Maud Gulf
Gjoa Haven
Pelly Bay
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Gameti
Wekweeti
Whati
Wrigley
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Fond-du-Lac
Black Lake
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Arviat
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Winter Range Use
Low (1-3)
Moderate - Low (4-7)
Moderate - High (8-10)
High (>11)
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 20/11/2019

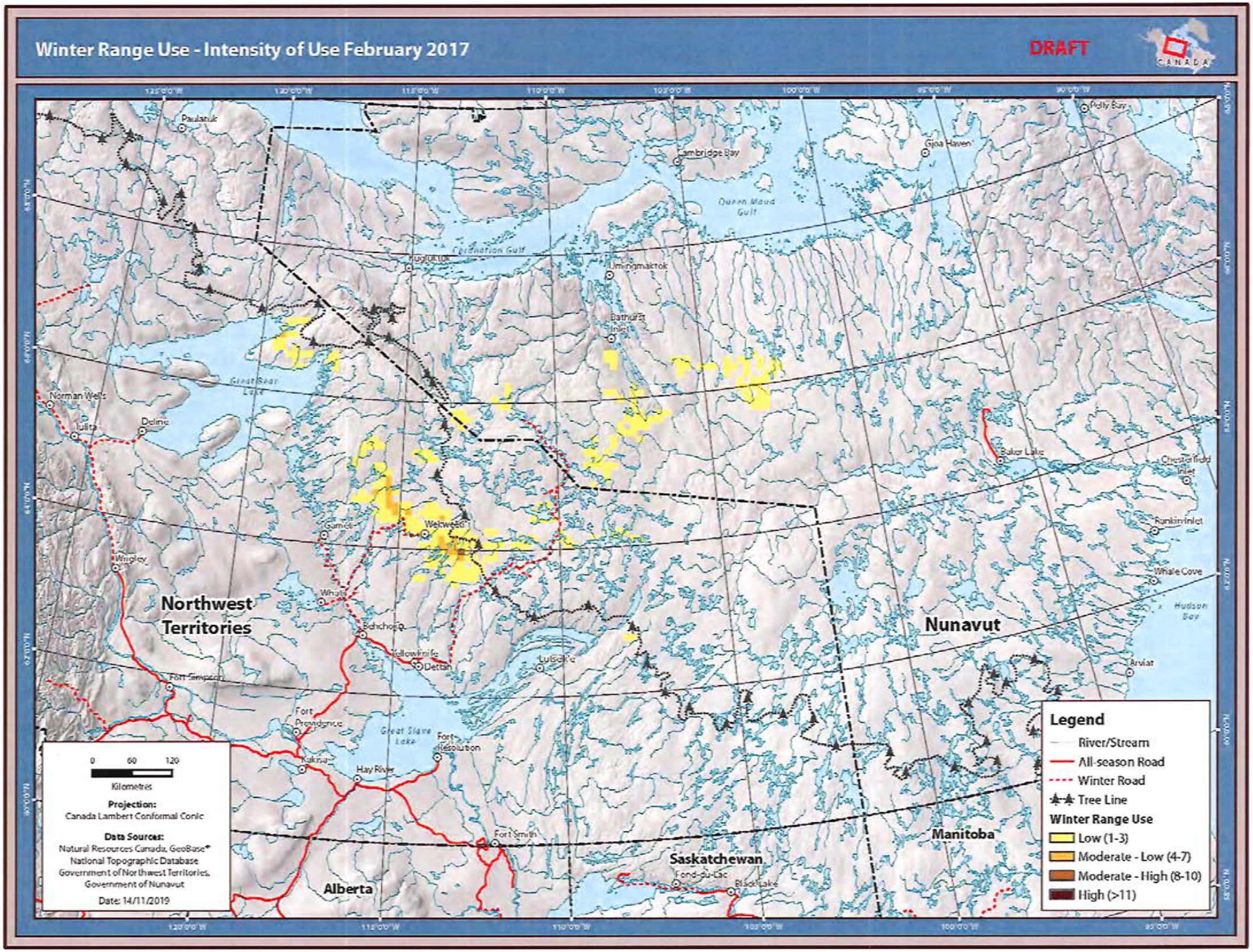


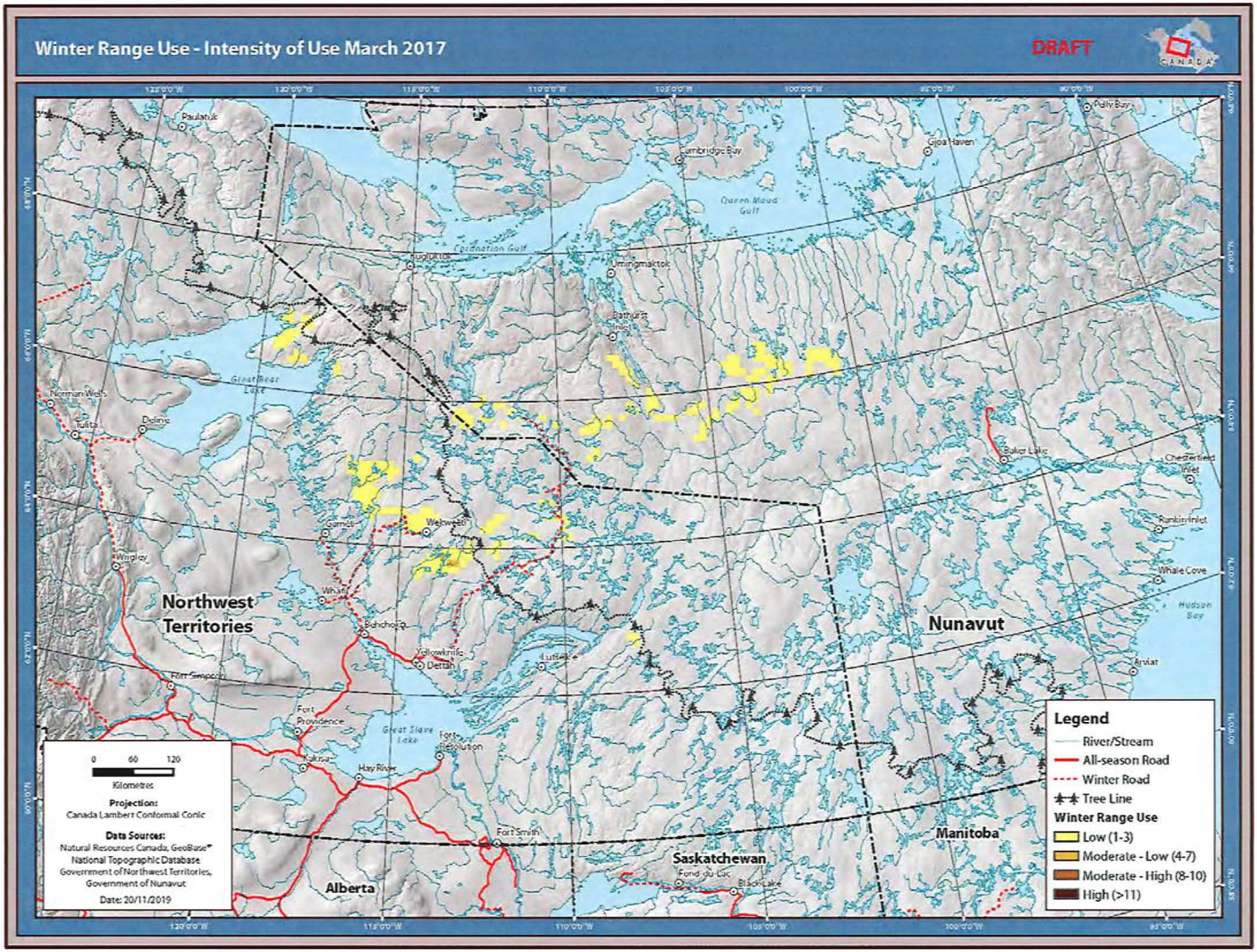
Winter Range Use - Intensity of Use December 2016
DRAFT
CANADA
Paulatuk
Norman Wells
Tulita
Deline
Wrigley
Fort Simpson
Northwest Territories
Great Bear Lake
Kugluktuk
Coronation Gulf
Cambridge Bay
Queen Maud Gulf
Gjoa Haven
Polly Bay
Umingmaktok
Bathurst Inlet
Gameti
Wekweeti
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Providence
Kakisa
Hay River
Great Slave Lake
Fort Resolution
Fort Smith
Alberta
Saskatchewan
Fond-du-Lac
Black Lake
Manitoba
Nunavut
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Arviat
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Winter Range Use
Low (1-3)
Moderate - Low (4-7)
Moderate - High (8-10)
High (>11)
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 14/11/2019

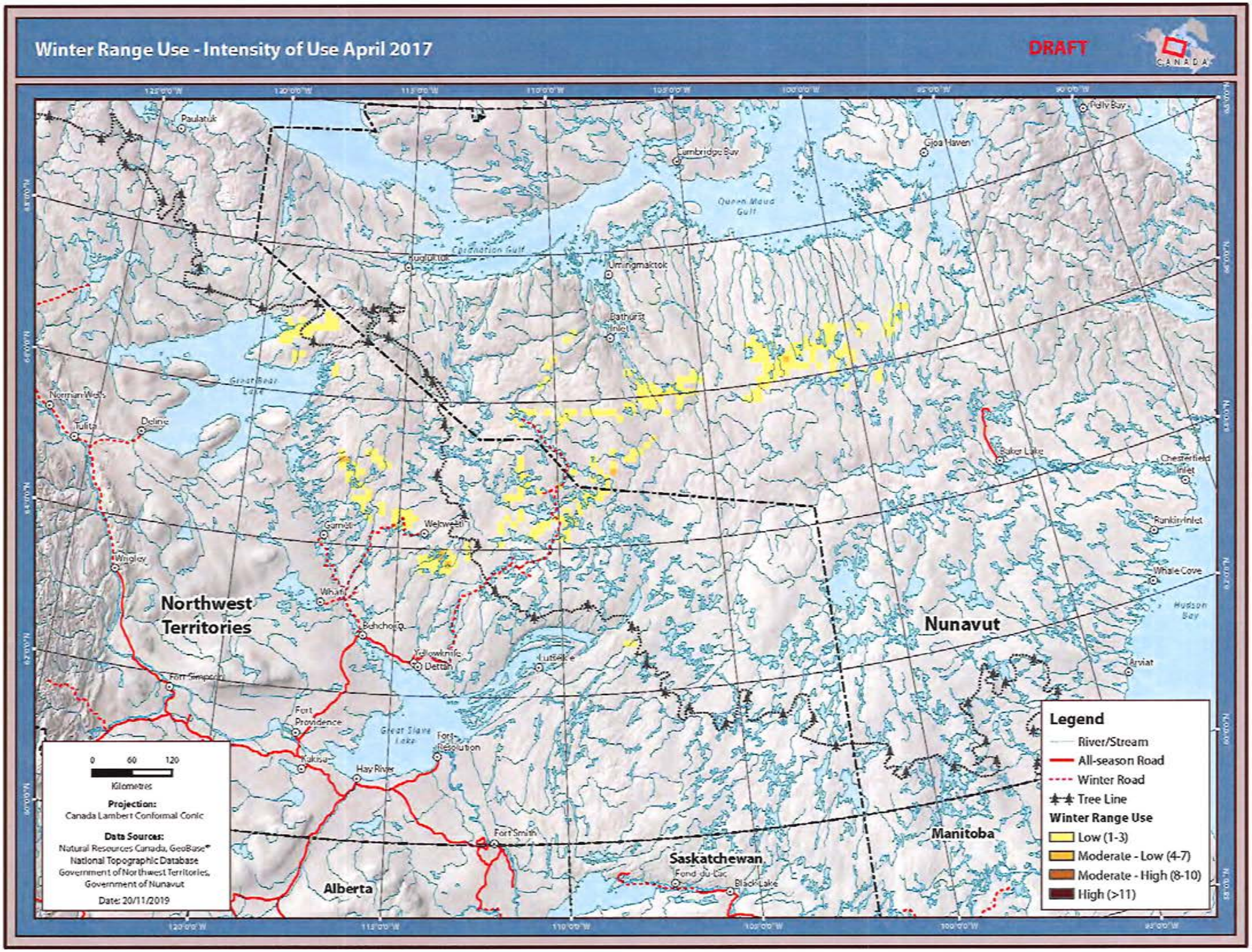
Winter Range Use - Intensity of Use January 2017

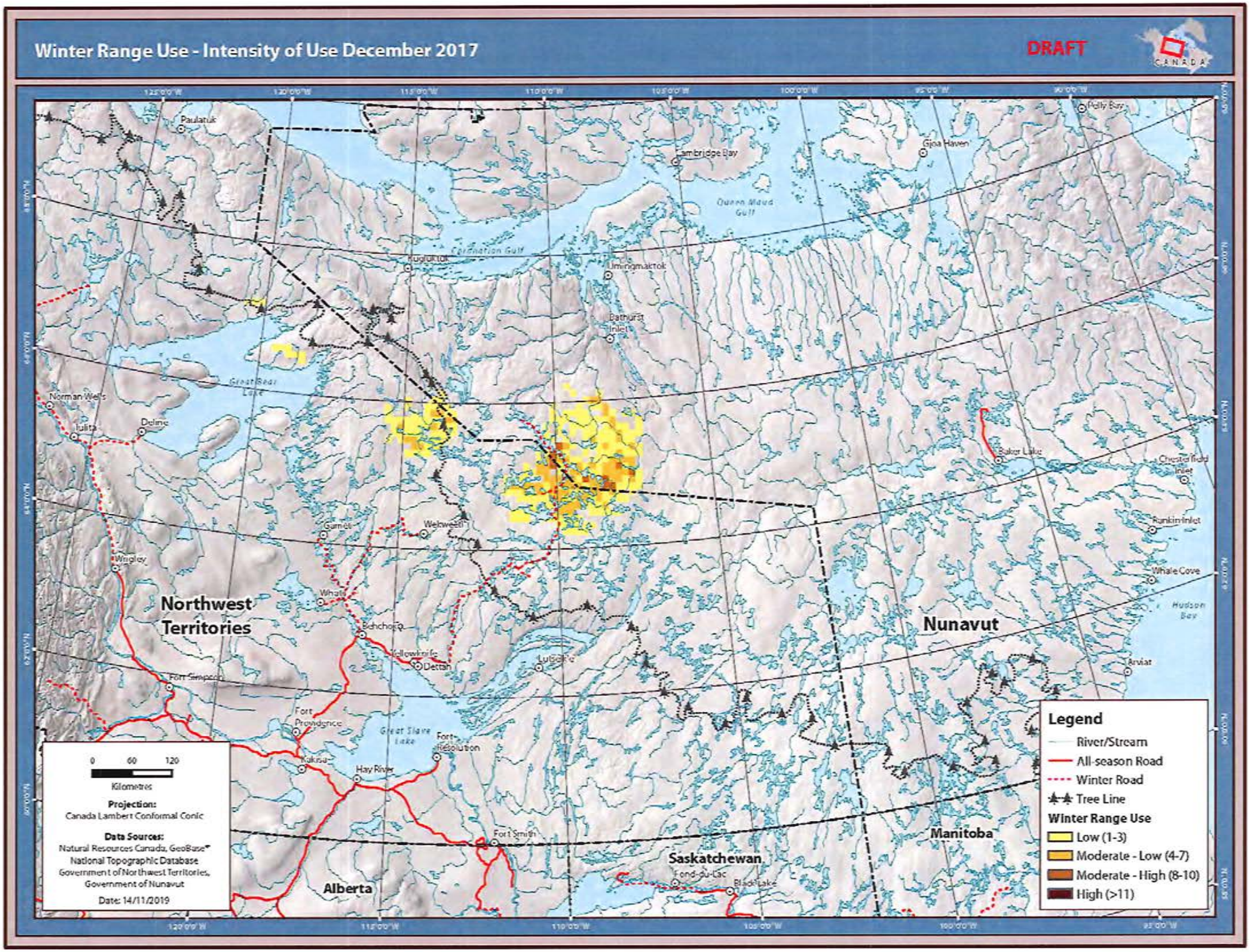
DRAFT



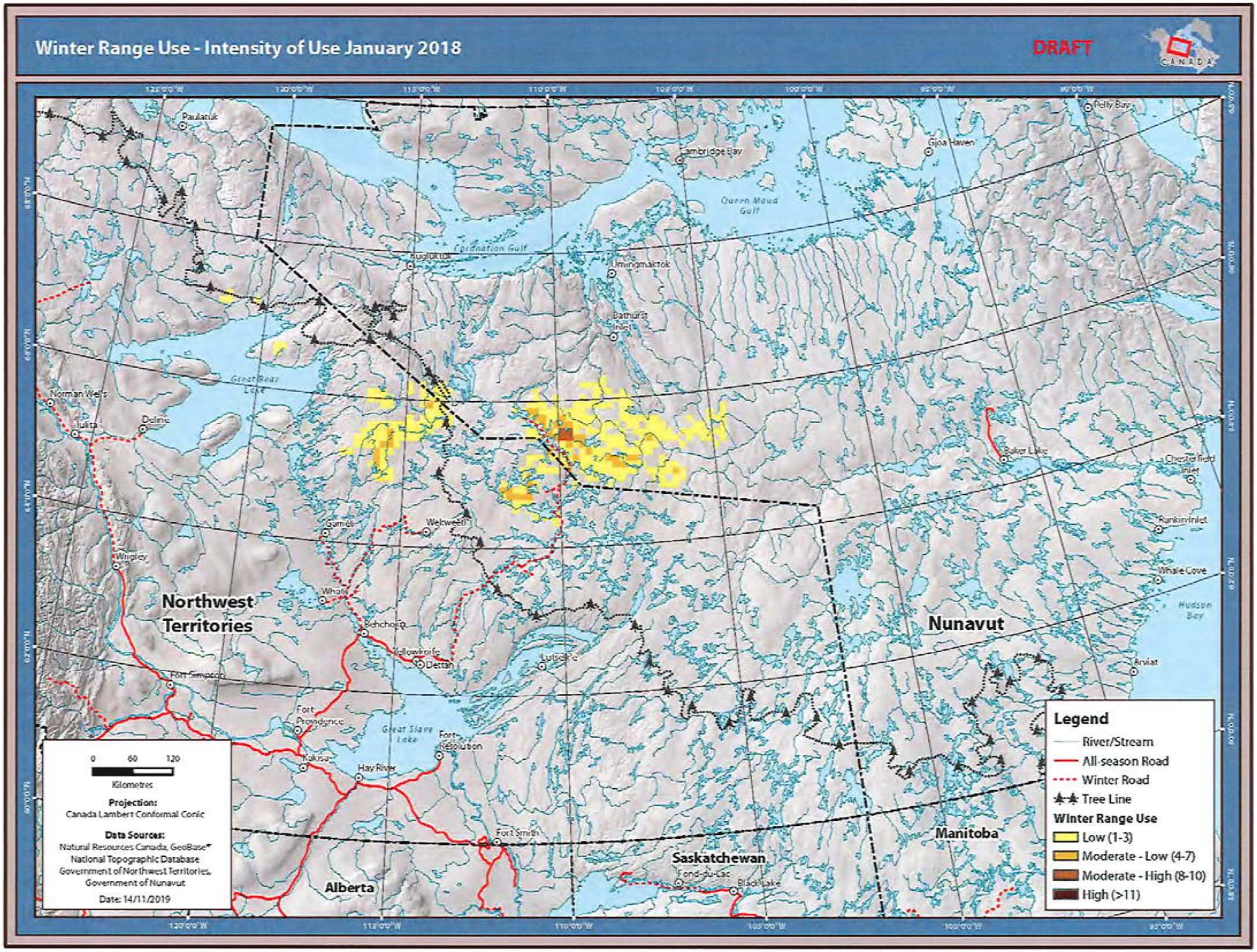

Winter Range Use - Intensity of Use February 2017
DRAFT
CANADA
Northwest Territories
Nunavut
Alberta
Saskatchewan
Manitoba
Paulatuk
Norman Wells
Tulita
Deline
Wrigley
Fort Simpson
Kugluktuk
Coronation Gulf
Great Bear Lake
Gameti
Wekweeti
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Providence
Kakisa
Hay River
Great Slave Lake
Fort Resolution
Fort Smith
Fond-du-Lac
Black Lake
Cambridge Bay
Queen Maud Gulf
Umingmaktok
Bathurst Inlet
Gjoa Haven
Polly Bay
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Arviat
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Winter Range Use
Low (1-3)
Moderate - Low (4-7)
Moderate - High (8-10)
High (>11)
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 14/11/2019

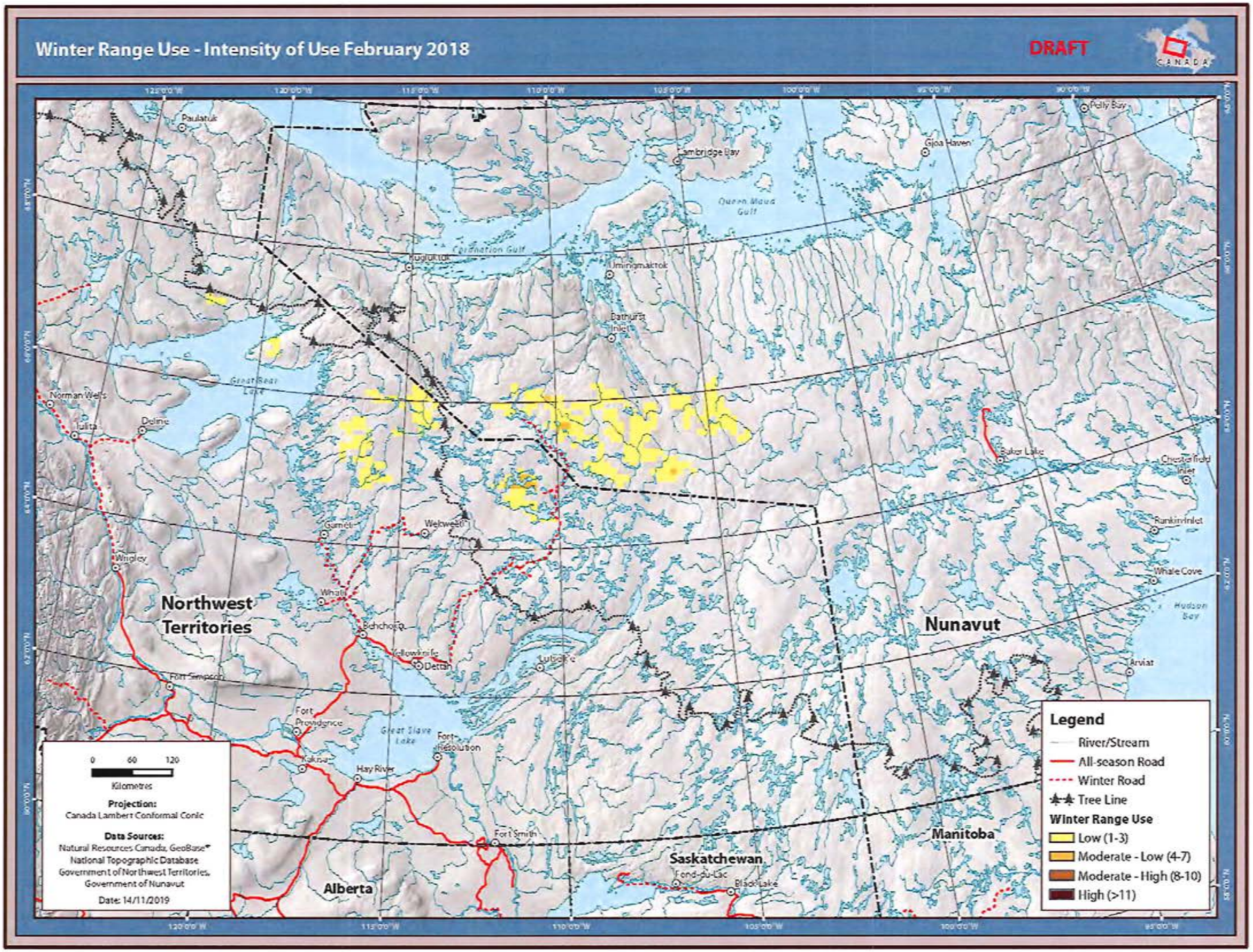

Winter Range Use - Intensity of Use March 2017
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Arviat
Gameti
Wekweeti
Wrigley
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Fond-du-Lac
Black Lake
Northwest Territories
Nunavut
Manitoba
Saskatchewan
Alberta
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Winter Range Use
Low (1-3)
Moderate - Low (4-7)
Moderate - High (8-10)
High (>11)
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 20/11/2019

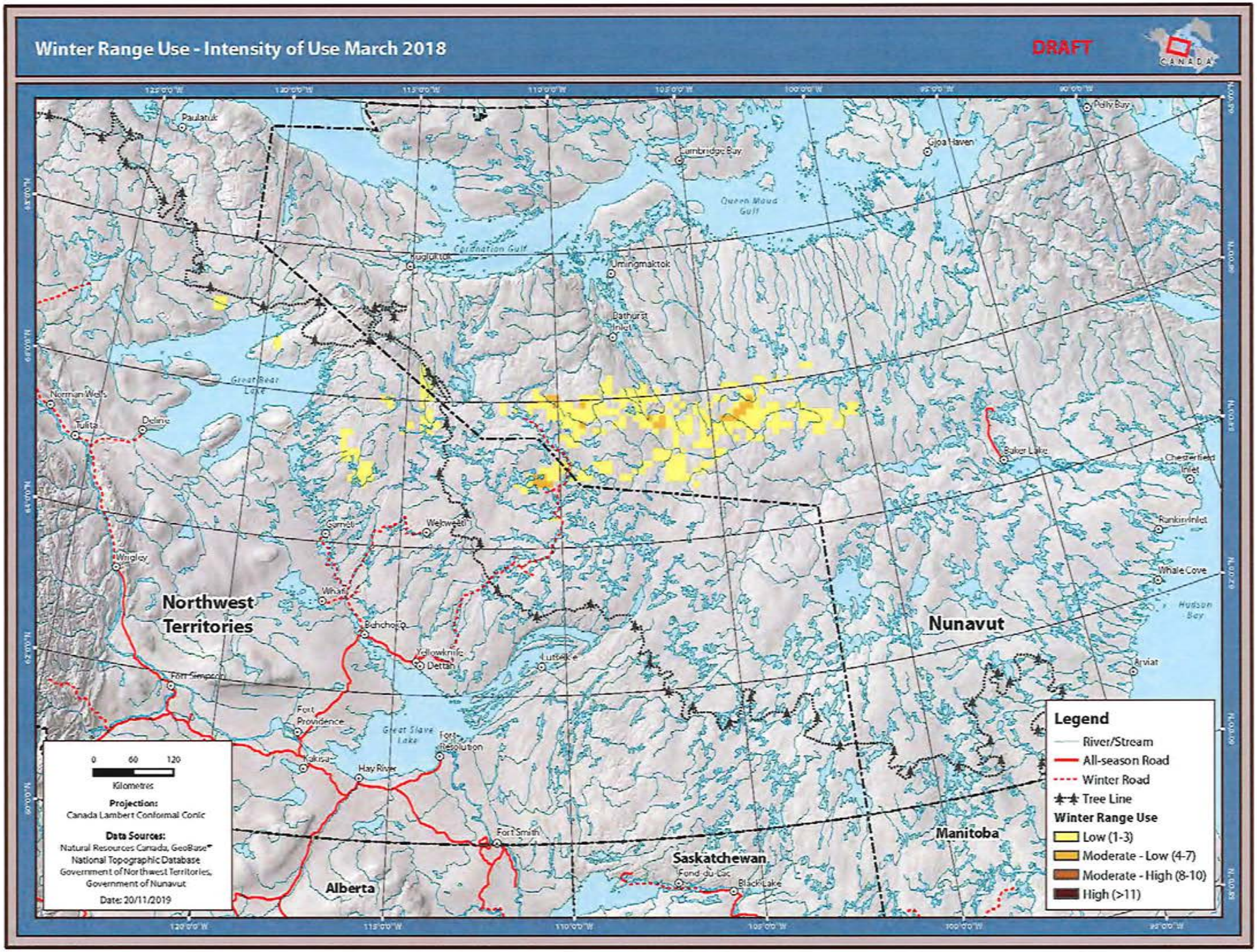

Winter Range Use - Intensity of Use April 2017
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Arviat
Wrigley
Gamèti
Wekweètì
Whatì
Behchokǫ̀
Yellowknife
Dettah
Lutselk'e
Northwest Territories
Nunavut
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Alberta
Saskatchewan
Fond du Lac
Black Lake
Manitoba
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Winter Range Use
Low (1-3)
Moderate - Low (4-7)
Moderate - High (8-10)
High (>11)
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 20/11/2019



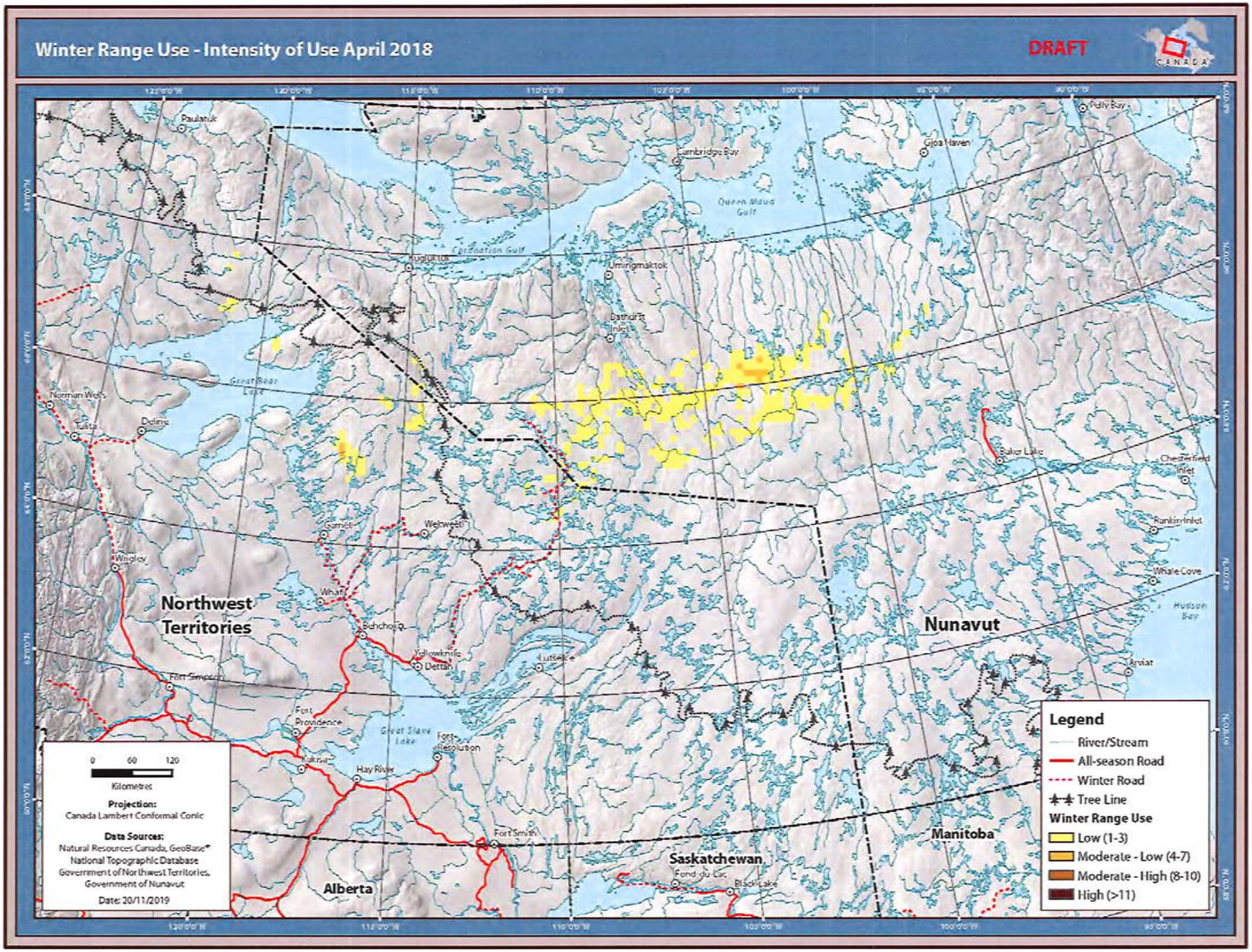
Winter Range Use - Intensity of Use December 2017
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Polly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Arviat
Wrigley
Gameti
Wekweeti
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Kakisa
Hay River
Great Slave Lake
Fort Resolution
Fort Smith
Fond-du-Lac
Black Lake
Northwest Territories
Nunavut
Manitoba
Saskatchewan
Alberta
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 14/11/2019
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Winter Range Use
Low (1-3)
Moderate - Low (4-7)
Moderate - High (8-10)
High (>11)

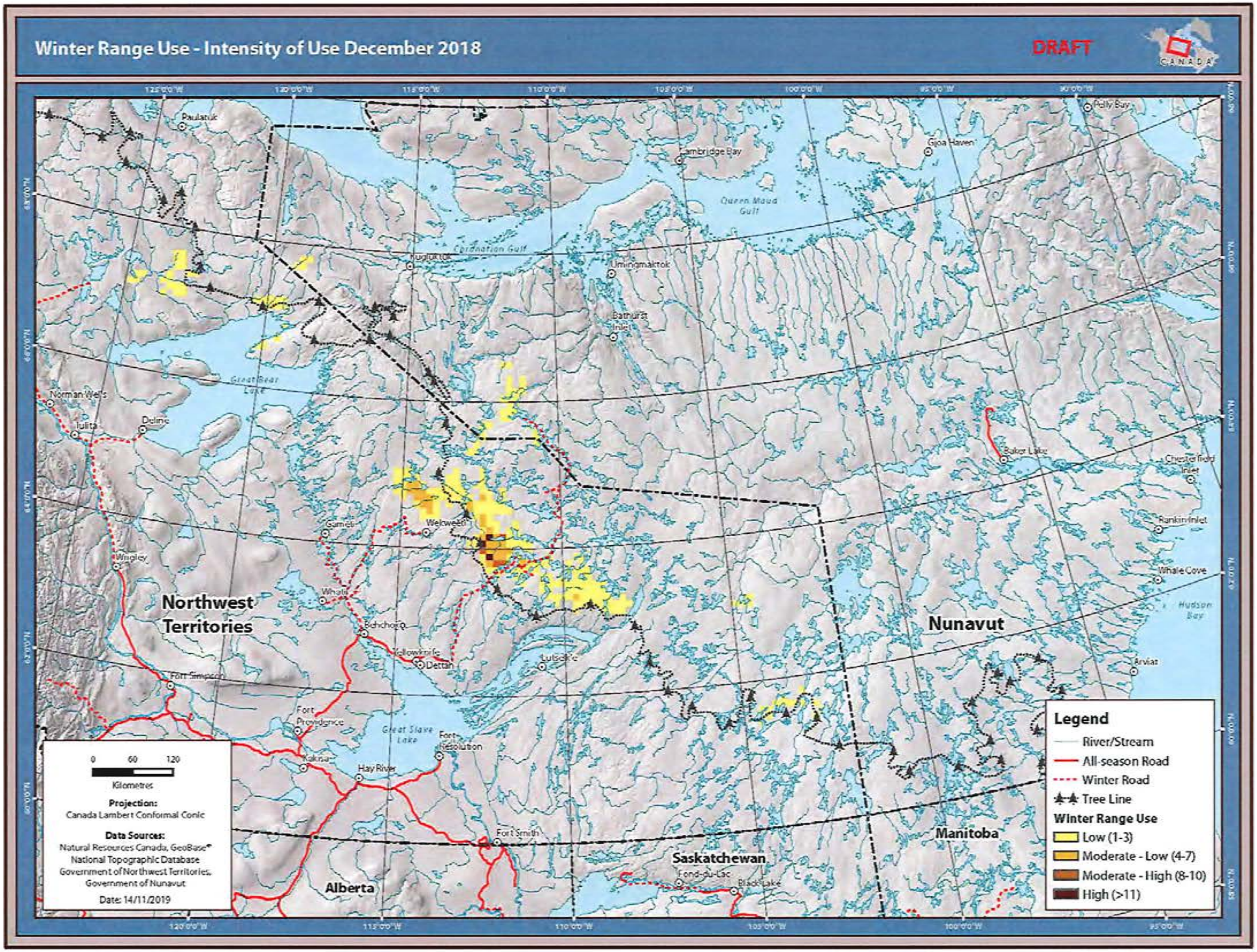

Winter Range Use - Intensity of Use January 2018
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Arviat
Gameti
Wekweeti
Wrigley
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Fond-du-Lac
Black Lake
Northwest Territories
Nunavut
Manitoba
Saskatchewan
Alberta
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Winter Range Use
Low (1-3)
Moderate - Low (4-7)
Moderate - High (8-10)
High (>11)
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 14/11/2019

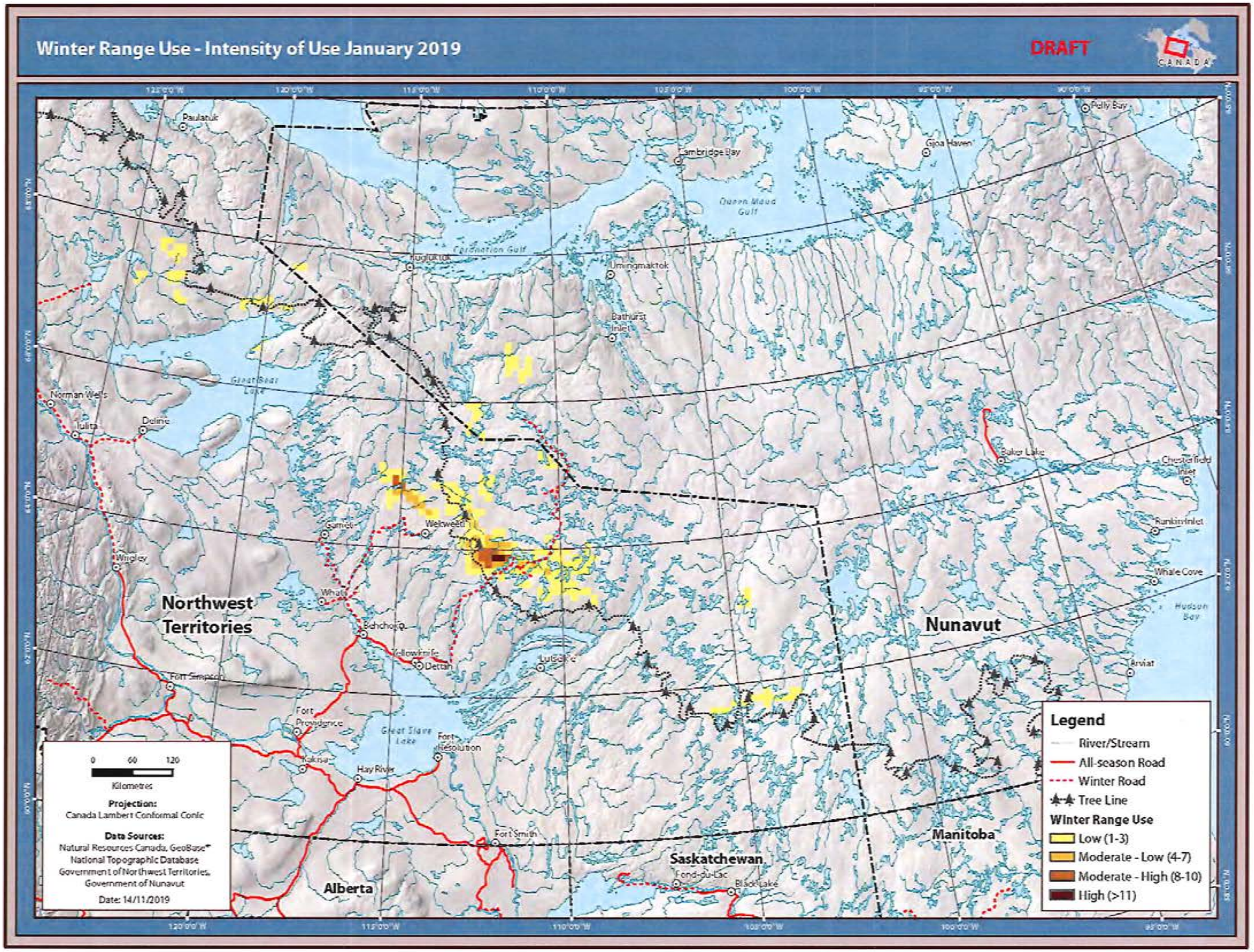

Winter Range Use - Intensity of Use February 2018
DRAFT
CANADA
Northwest Territories
Nunavut
Manitoba
Saskatchewan
Alberta
Paulatuk
Kugluktuk
Coronation Gulf
Cambridge Bay
Queen Maud Gulf
Gjoa Haven
Pelly Bay
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Wrigley
Gameti
Wekweeti
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Fond-du-Lac
Black Lake
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Arviat
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Winter Range Use
Low (1-3)
Moderate - Low (4-7)
Moderate - High (8-10)
High (>11)
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 14/11/2019

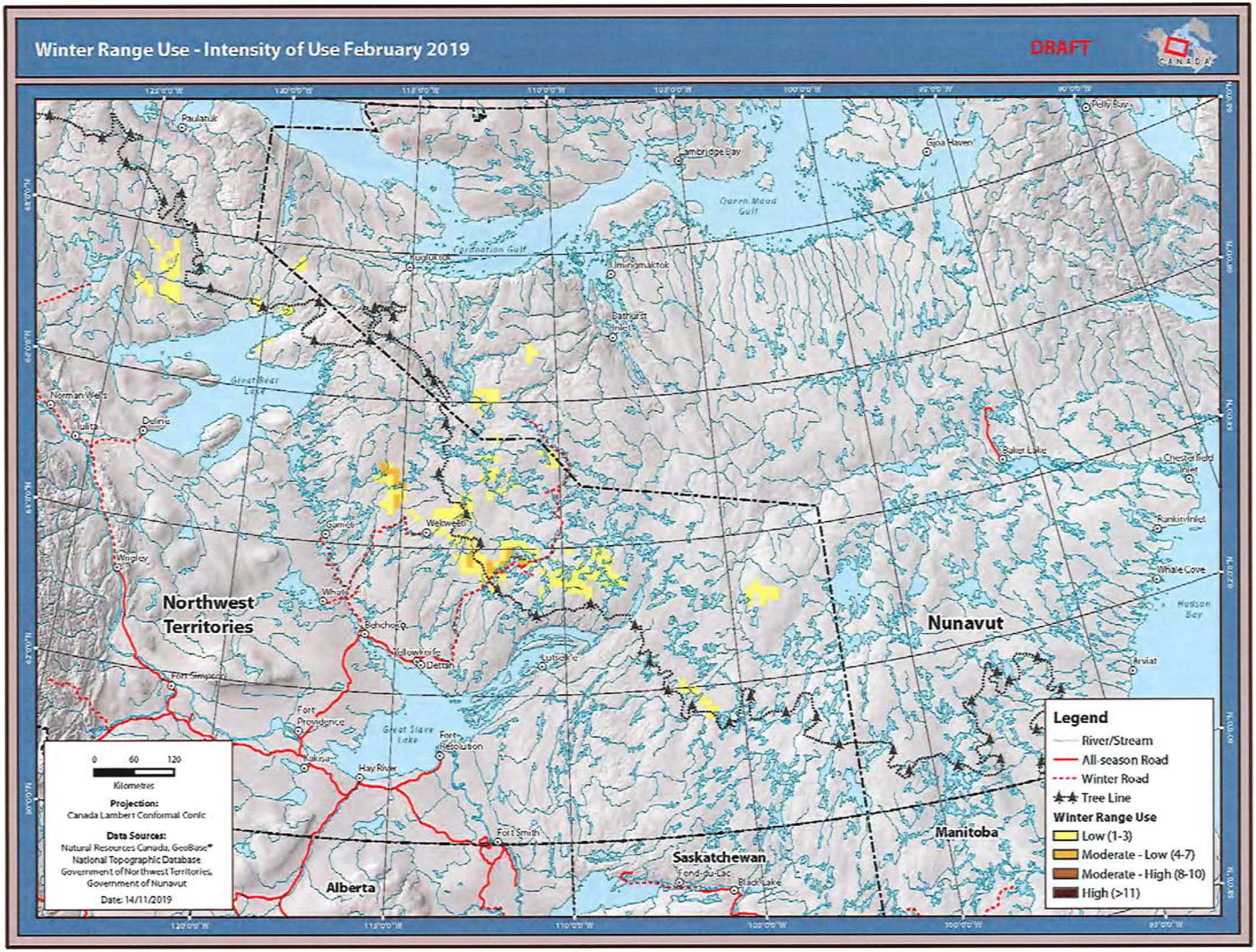


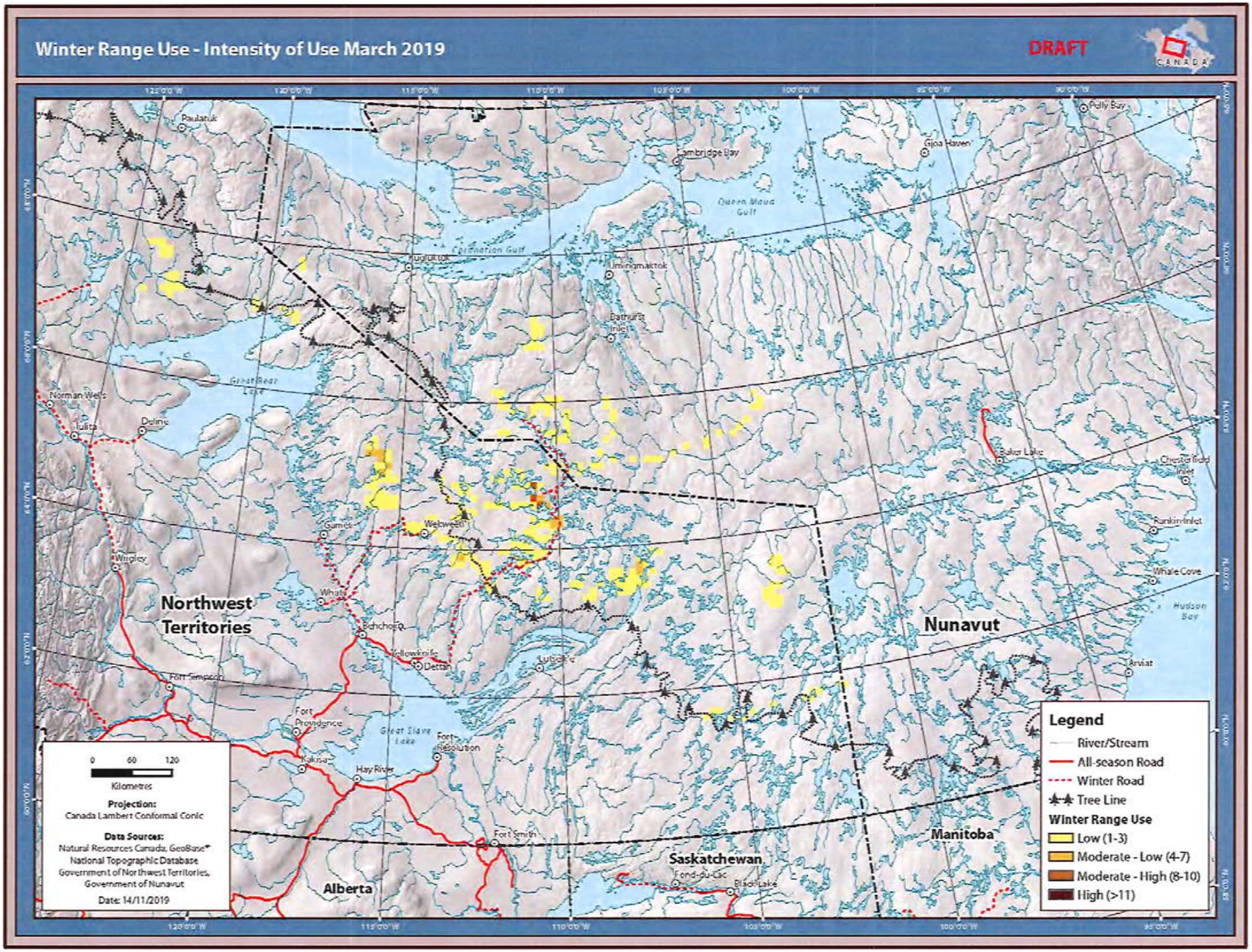
Winter Range Use - Intensity of Use March 2018
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Arviat
Gamèti
Wekweètì
Whatì
Behchokǫ̀
Yellowknife
Dettah
Lutselk'e
Wrigley
Fort Simpson
Fort Providence
Kakisa
Great Slave Lake
Fort Resolution
Hay River
Fort Smith
Fond-du-Lac
Black Lake
Northwest Territories
Nunavut
Manitoba
Saskatchewan
Alberta
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Winter Range Use
Low (1-3)
Moderate - Low (4-7)
Moderate - High (8-10)
High (>11)
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 20/11/2019

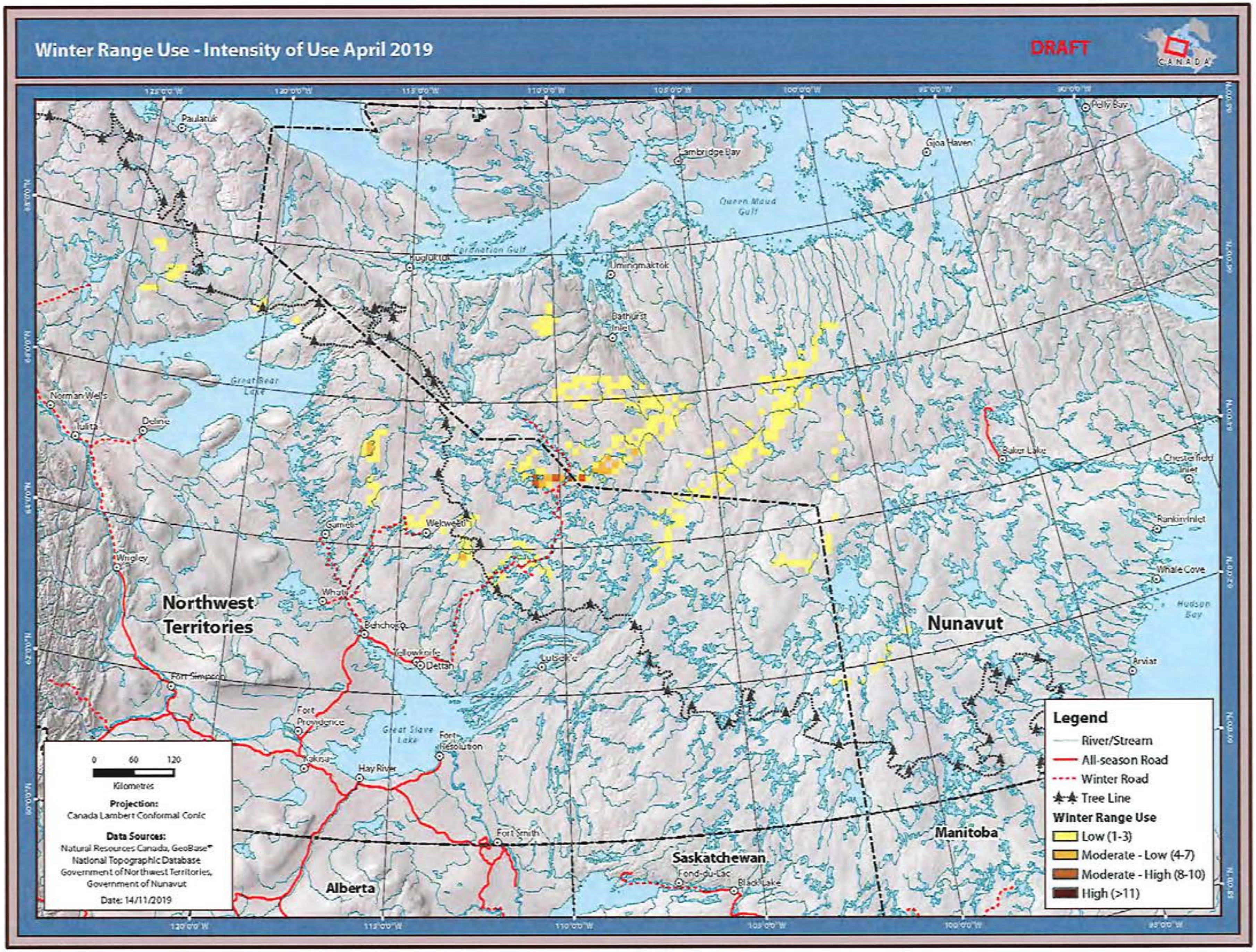

Winter Range Use - Intensity of Use April 2018
DRAFT
CANADA
Northwest Territories
Nunavut
Alberta
Saskatchewan
Manitoba
Paulatuk
Kugluktuk
Cambridge Bay
Gjoa Haven
Umingmaktok
Bathurst Inlet
Norman Wells
Tulita
Deline
Wrigley
Gameti
Wekweeti
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Kakisa
Hay River
Fort Resolution
Fort Smith
Fond du Lac
Black Lake
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Arviat
Pelly Bay
Great Bear Lake
Great Slave Lake
Coronation Gulf
Queen Maud Gulf
Hudson Bay
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 20/11/2019
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Winter Range Use
Low (1-3)
Moderate - Low (4-7)
Moderate - High (8-10)
High (>11)


Winter Range Use - Intensity of Use December 2018
DRAFT
CANADA
Northwest Territories
Nunavut
Alberta
Saskatchewan
Manitoba
Paulatuk
Norman Wells
Tulita
Deline
Great Bear Lake
Kugluktuk
Coronation Gulf
Umingmaktok
Bathurst Inlet
Cambridge Bay
Queen Maud Gulf
Gjoa Haven
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Arviat
Wekweeti
Gameti
Whati
Wrigley
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Kakisa
Hay River
Great Slave Lake
Fort Resolution
Fort Smith
Fond-du-Lac
Black Lake
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Winter Range Use
Low (1-3)
Moderate - Low (4-7)
Moderate - High (8-10)
High (>11)
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 14/11/2019

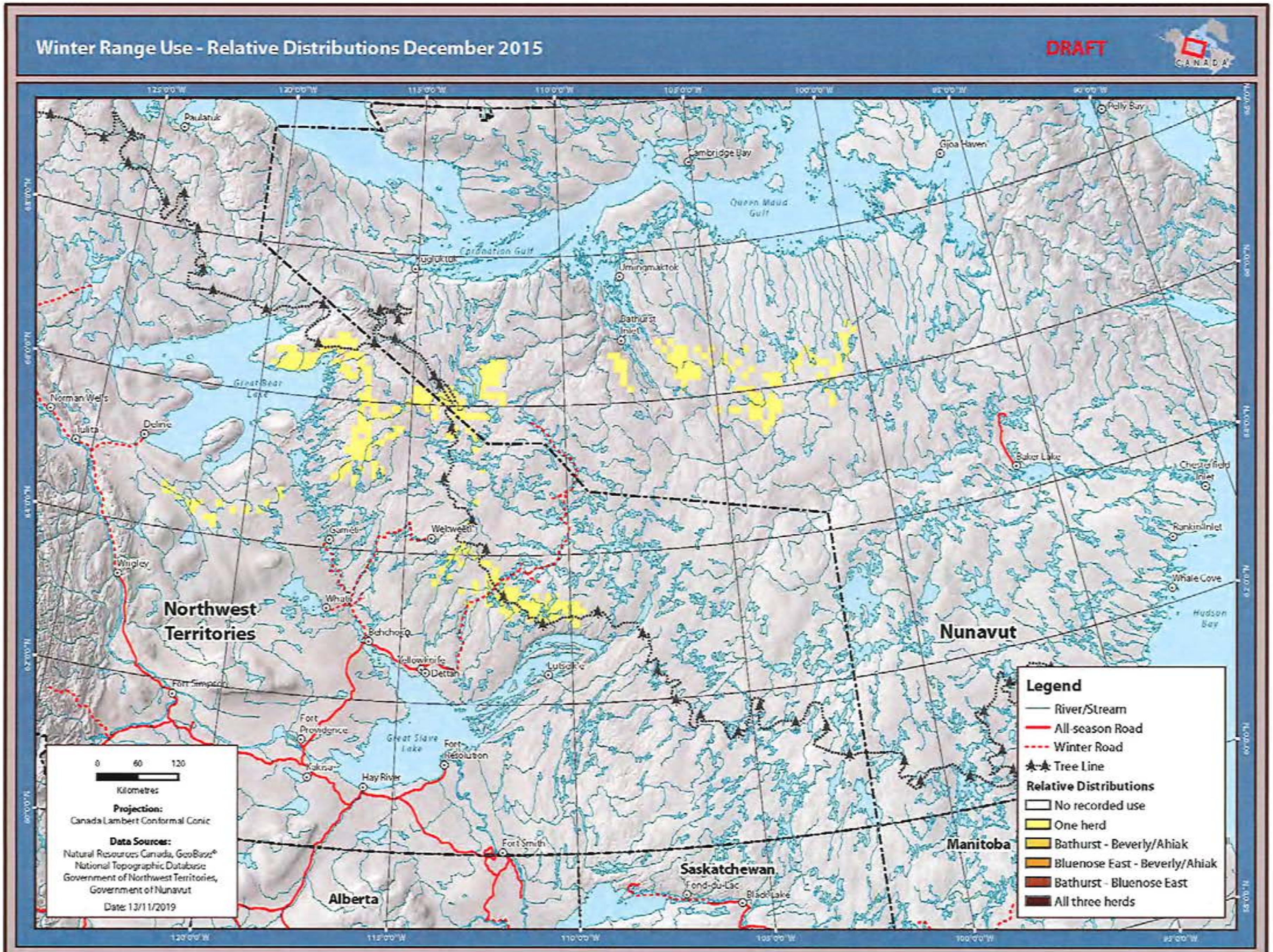

Winter Range Use - Intensity of Use January 2019
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Arviat
Gameti
Wekweeti
Whati
Wrigley
Northwest Territories
Nunavut
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Saskatchewan
Fond-du-Lac
Black Lake
Manitoba
Alberta
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 14/11/2019
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Winter Range Use
Low (1-3)
Moderate - Low (4-7)
Moderate - High (8-10)
High (>11)

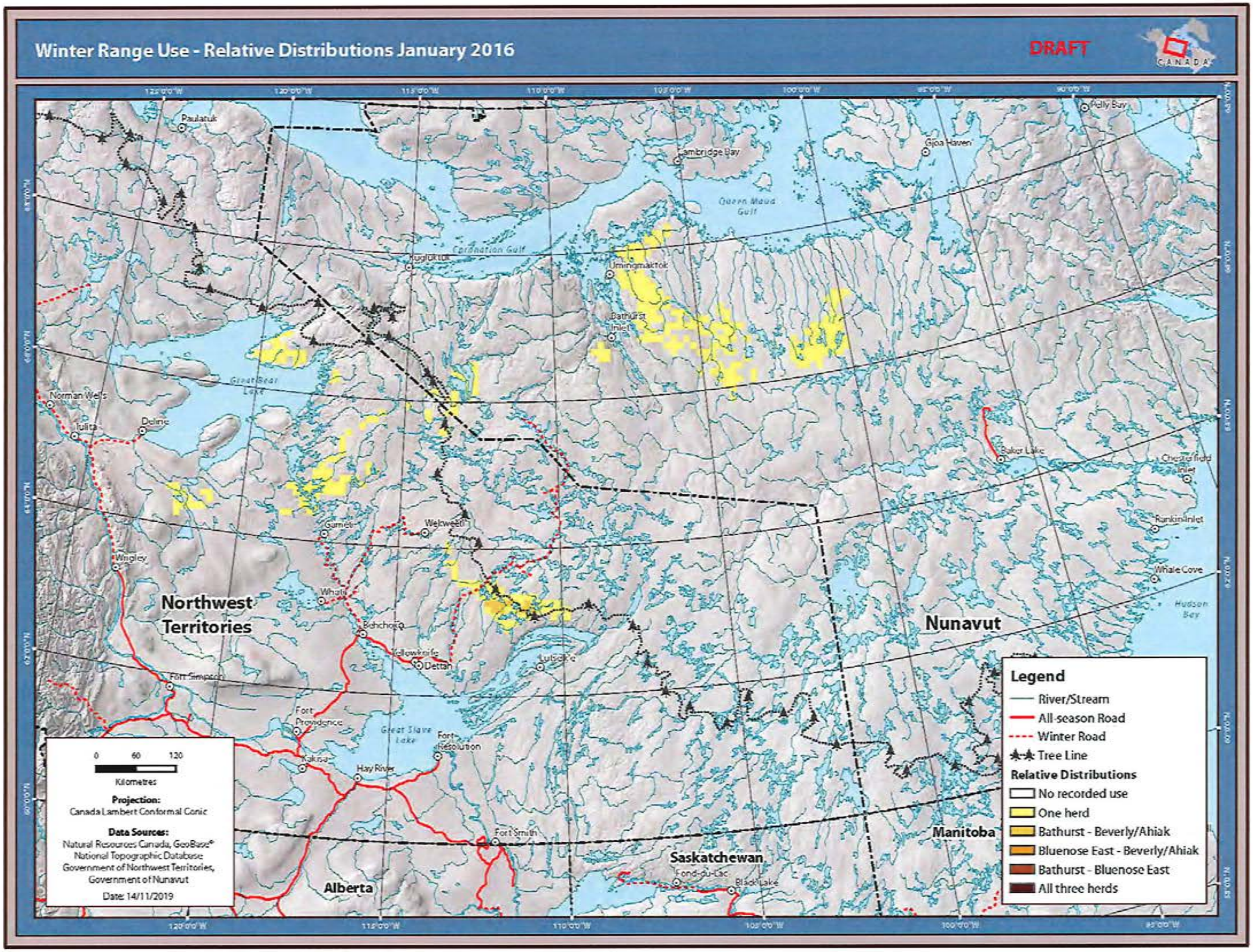

Winter Range Use - Intensity of Use February 2019
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Arviat
Wekweeti
Gameti
Wrigley
Whati
Northwest Territories
Nunavut
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Alberta
Saskatchewan
Fond-du-Lac
Black Lake
Manitoba
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 14/11/2019
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Winter Range Use
Low (1-3)
Moderate - Low (4-7)
Moderate - High (8-10)
High (>11)

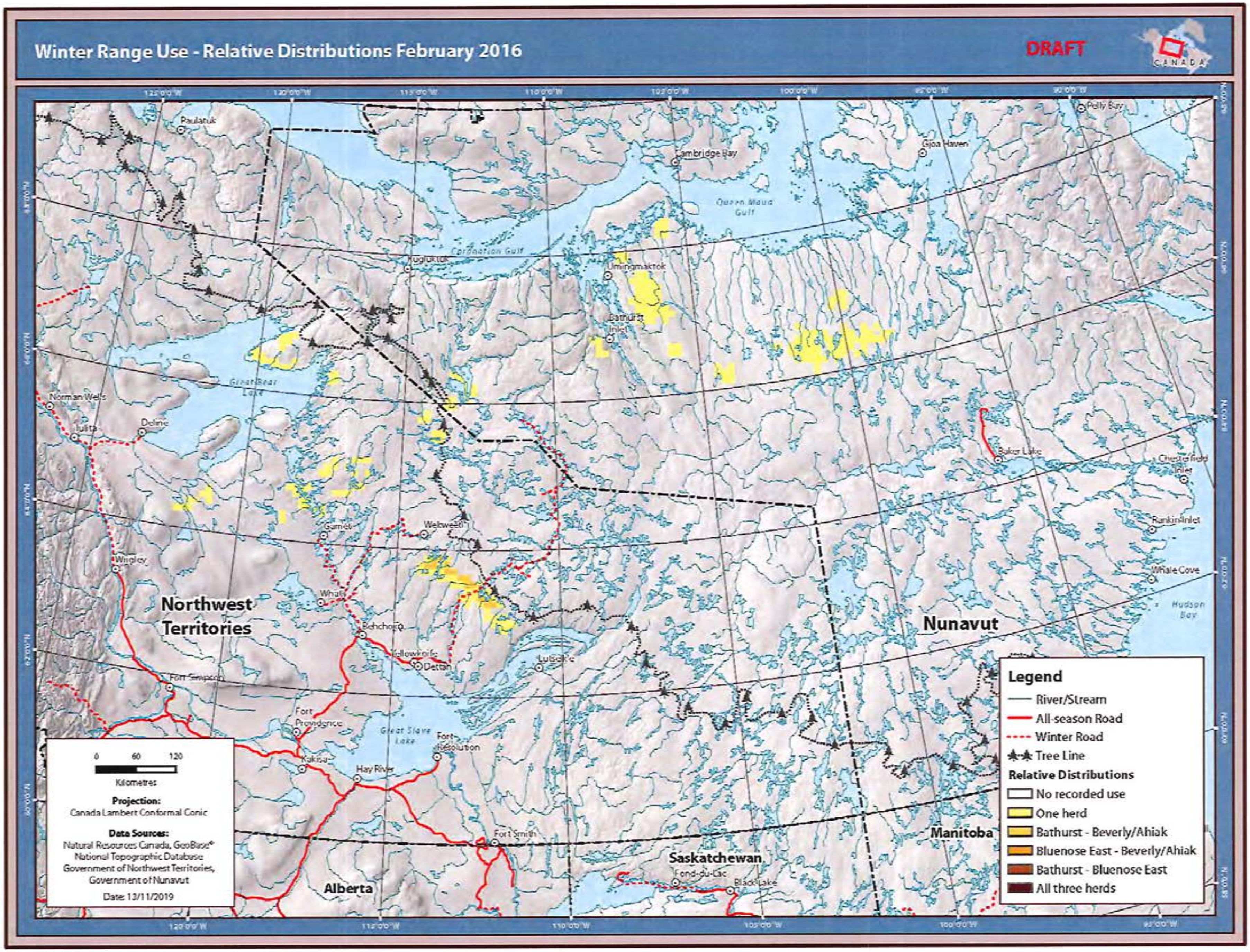

Winter Range Use - Intensity of Use March 2019
DRAFT
CANADA
Paulatuk
Norman Wells
Tulita
Deline
Great Bear Lake
Kugluktuk
Coronation Gulf
Umingmaktok
Bathurst Inlet
Cambridge Bay
Queen Maud Gulf
Gjoa Haven
Pelly Bay
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Arviat
Gameti
Wekweeti
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Wrigley
Fort Simpson
Fort Providence
Kakisa
Great Slave Lake
Fort Resolution
Hay River
Fort Smith
Fond-du-Lac
Black Lake
Northwest Territories
Nunavut
Alberta
Saskatchewan
Manitoba
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 14/11/2019
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Winter Range Use
Low (1-3)
Moderate - Low (4-7)
Moderate - High (8-10)
High (>11)

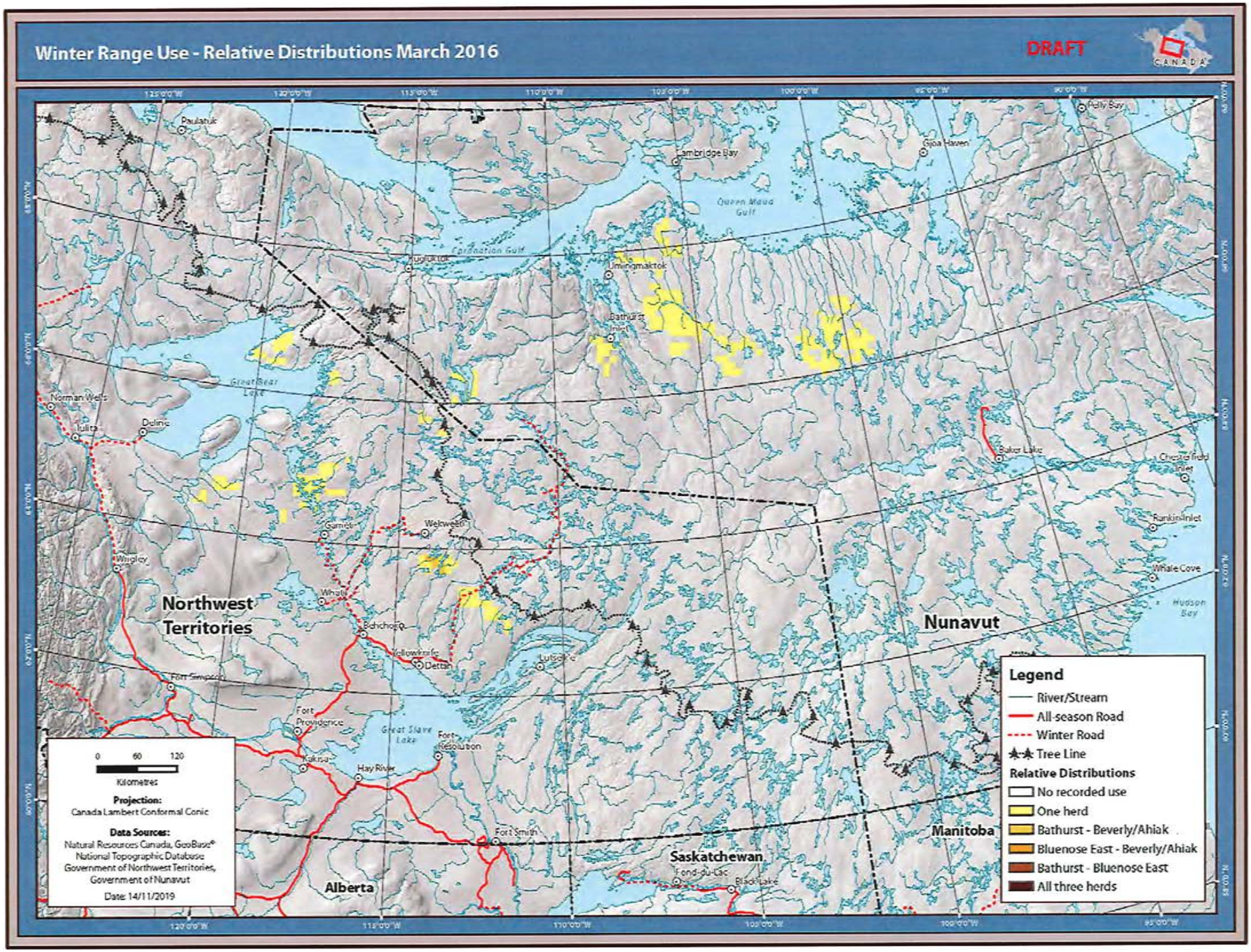

Winter Range Use - Intensity of Use April 2019
DRAFT
CANADA
Northwest Territories
Nunavut
Manitoba
Saskatchewan
Alberta
Paulatuk
Kugluktuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Iqaluktuuttiaq
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Arviat
Gameti
Wekweeti
Wrigley
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Fond-du-Lac
Black Lake
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Winter Range Use
Low (1-3)
Moderate - Low (4-7)
Moderate - High (8-10)
High (>11)
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 14/11/2019

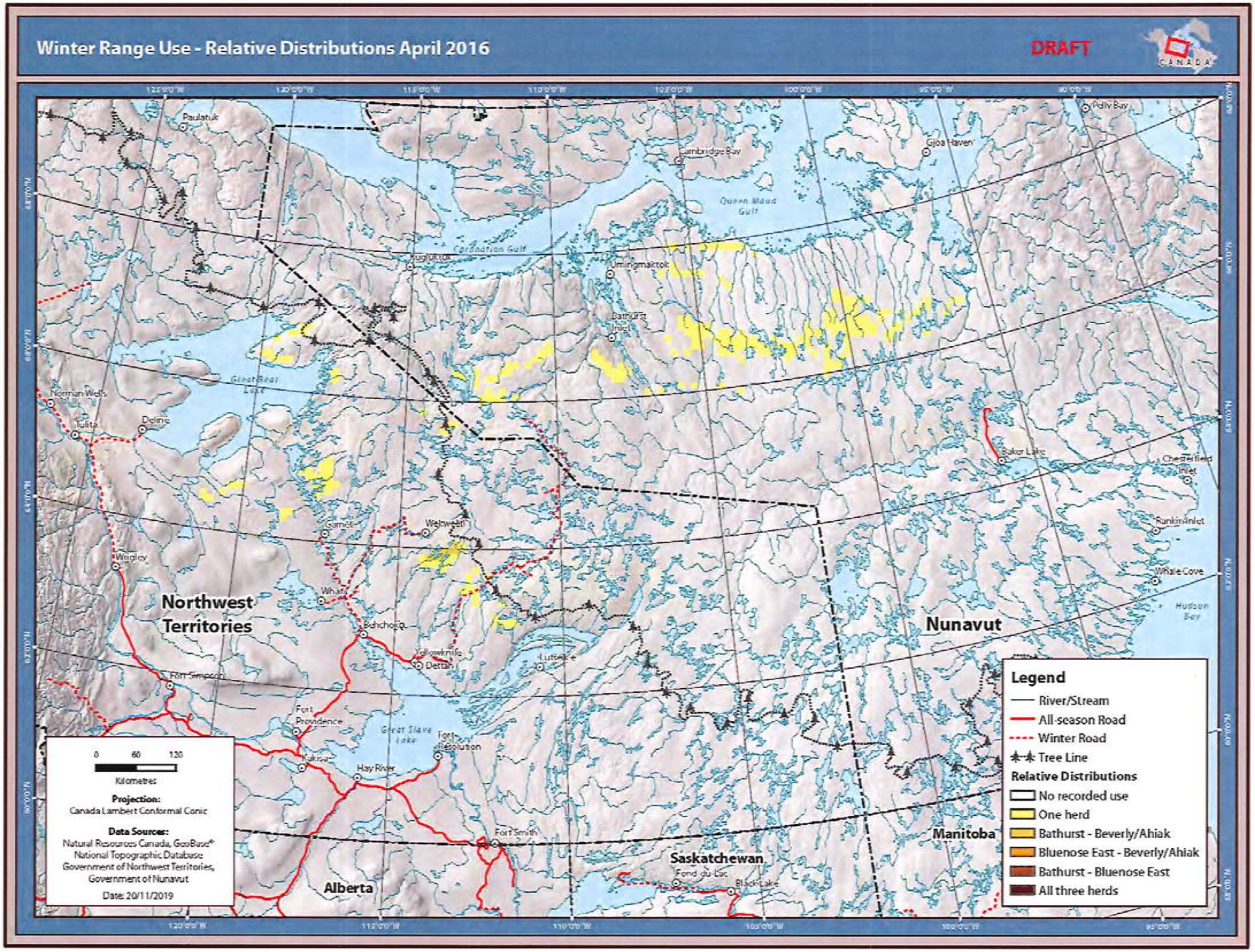
Appendix 9-D2: Monthly Relative Distributions


Winter Range Use - Relative Distributions December 2015
DRAFT
CANADA
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Relative Distributions
No recorded use
One herd
Bathurst - Beverly/Ahiak
Bluenose East - Beverly/Ahiak
Bathurst - Bluenose East
All three herds
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 13/11/2019
Northwest Territories
Nunavut
Manitoba
Saskatchewan
Alberta
Paulatuk
Cambridge Bay
Gjoa Haven
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Wrigley
Gameti
Wekweeti
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Fond-du-Lac
Black Lake

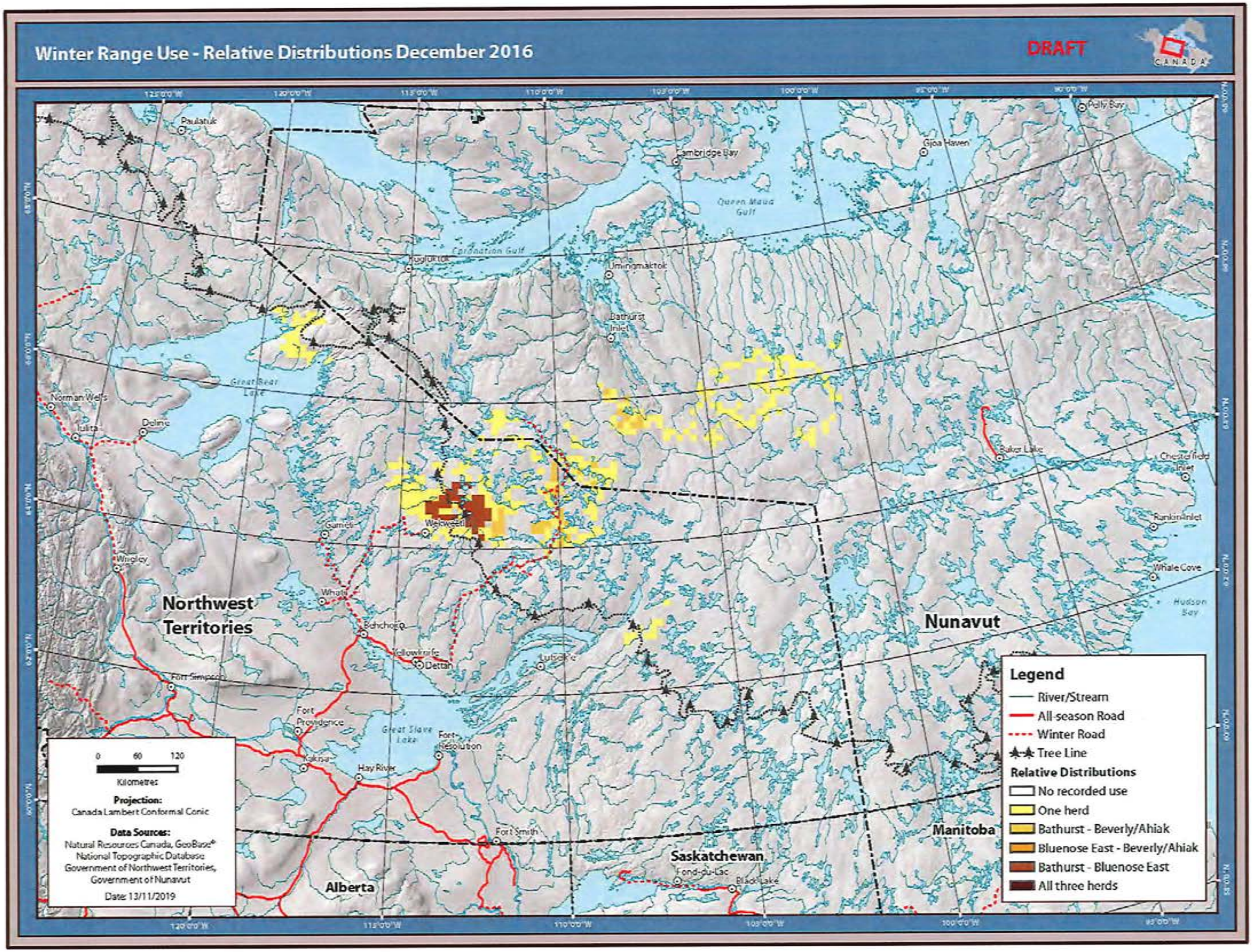

Winter Range Use - Relative Distributions January 2016
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Gameti
Wekweeti
Wrigley
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Northwest Territories
Nunavut
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Alberta
Saskatchewan
Fond-du-Lac
Black Lake
Manitoba
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Relative Distributions
No recorded use
One herd
Bathurst - Beverly/Ahiak
Bluenose East - Beverly/Ahiak
Bathurst - Bluenose East
All three herds
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 14/11/2019

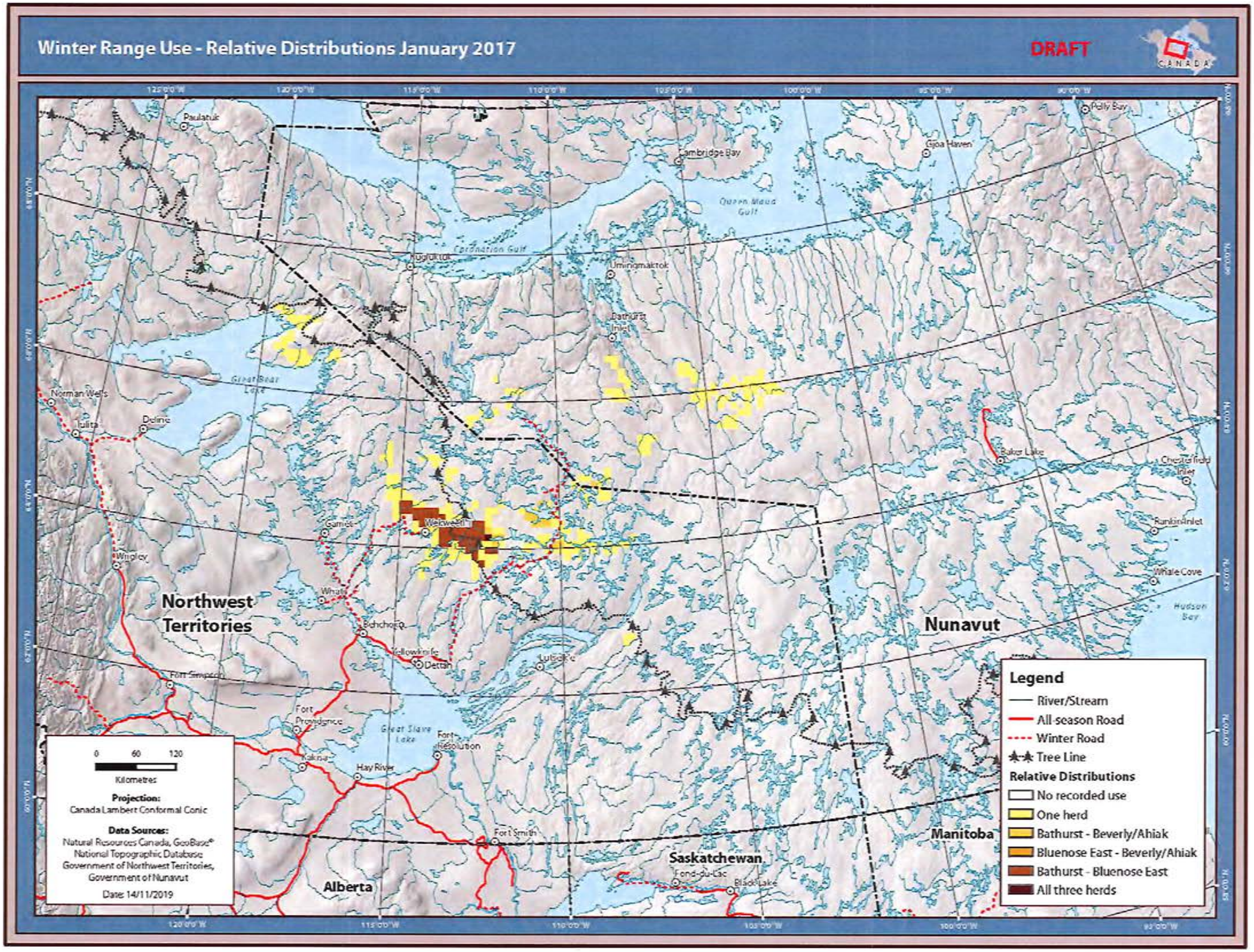

Winter Range Use - Relative Distributions February 2016
DRAFT
CANADA
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Relative Distributions
No recorded use
One herd
Bathurst - Beverly/Ahiak
Bluenose East - Beverly/Ahiak
Bathurst - Bluenose East
All three herds
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 13/11/2019
Northwest Territories
Nunavut
Manitoba
Saskatchewan
Alberta
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Gameti
Wekweeti
Wrigley
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Fond-du-Lac
Black Lake


Winter Range Use - Relative Distributions March 2016
DRAFT
CANADA
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Relative Distributions
No recorded use
One herd
Bathurst - Beverly/Ahiak
Bluenose East - Beverly/Ahiak
Bathurst - Bluenose East
All three herds
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 14/11/2019
Northwest Territories
Nunavut
Alberta
Saskatchewan
Manitoba
Paulatuk
Cambridge Bay
Gjoa Haven
Kugluktuk
Coronation Gulf
Queen Maud Gulf
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Gameti
Wekweeti
Wrigley
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Fond-du-Lac
Black Lake

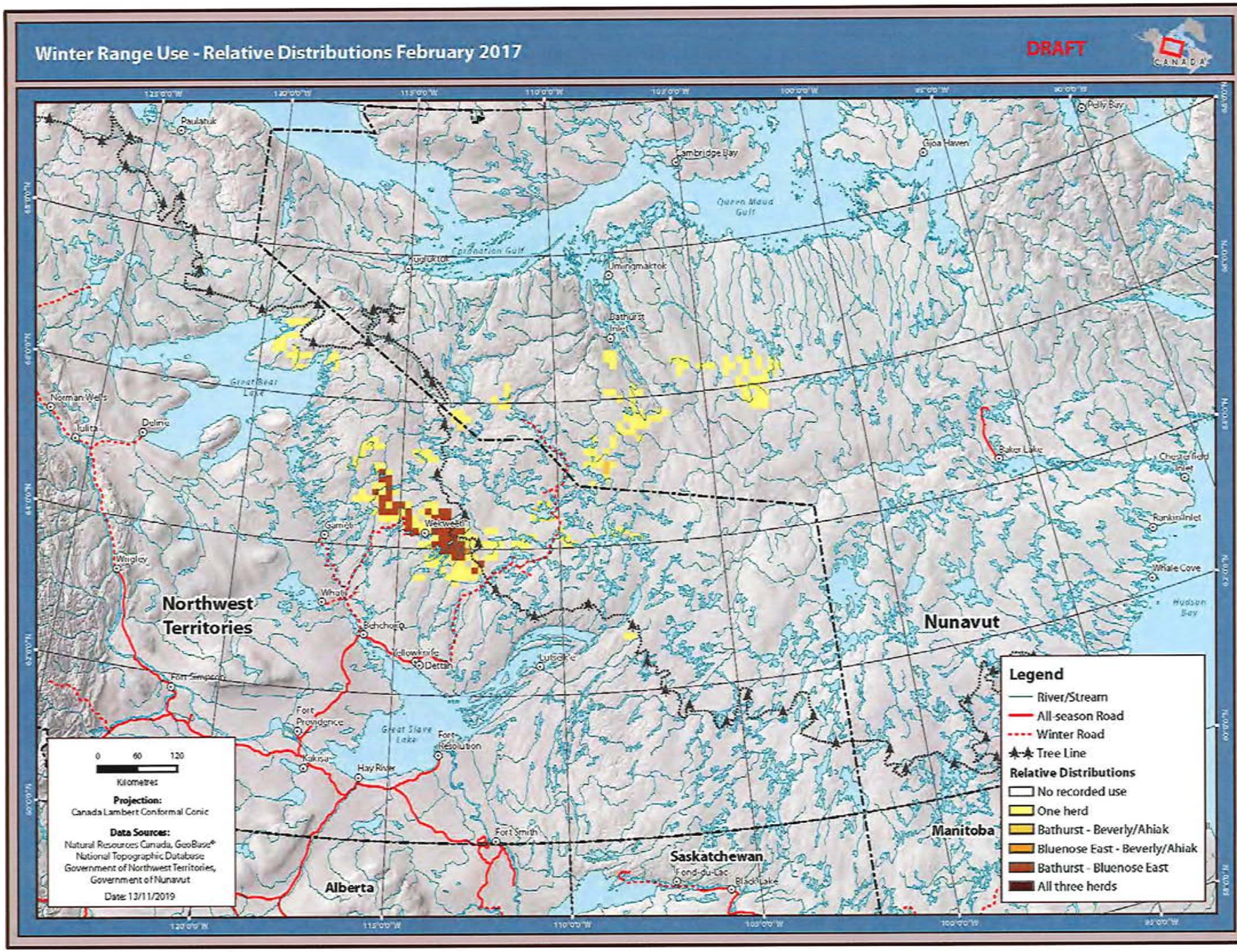


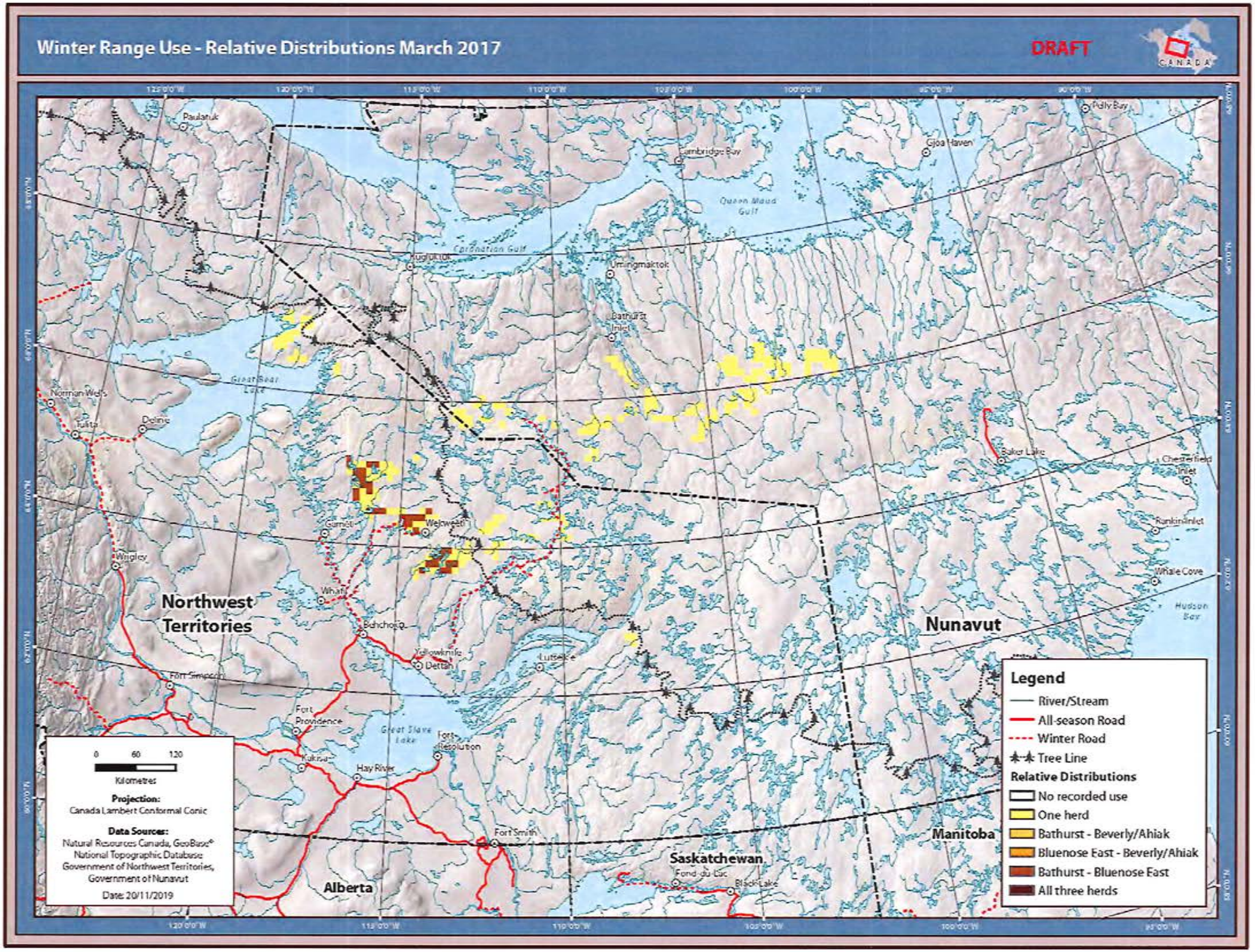
Winter Range Use - Relative Distributions April 2016
DRAFT
CANADA
Paulatuk
Cambridge Bay
Queen Maud Gulf
Gjoa Haven
Pelly Bay
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Gameti
Wekweeti
Wrigley
Whati
Northwest Territories
Behchoko
Yellowknife
Dettah
Lutselk'e
Nunavut
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Alberta
Saskatchewan
Fond du Lac
Black Lake
Manitoba
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 20/11/2019
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Relative Distributions
No recorded use
One herd
Bathurst - Beverly/Ahiak
Bluenose East - Beverly/Ahiak
Bathurst - Bluenose East
All three herds

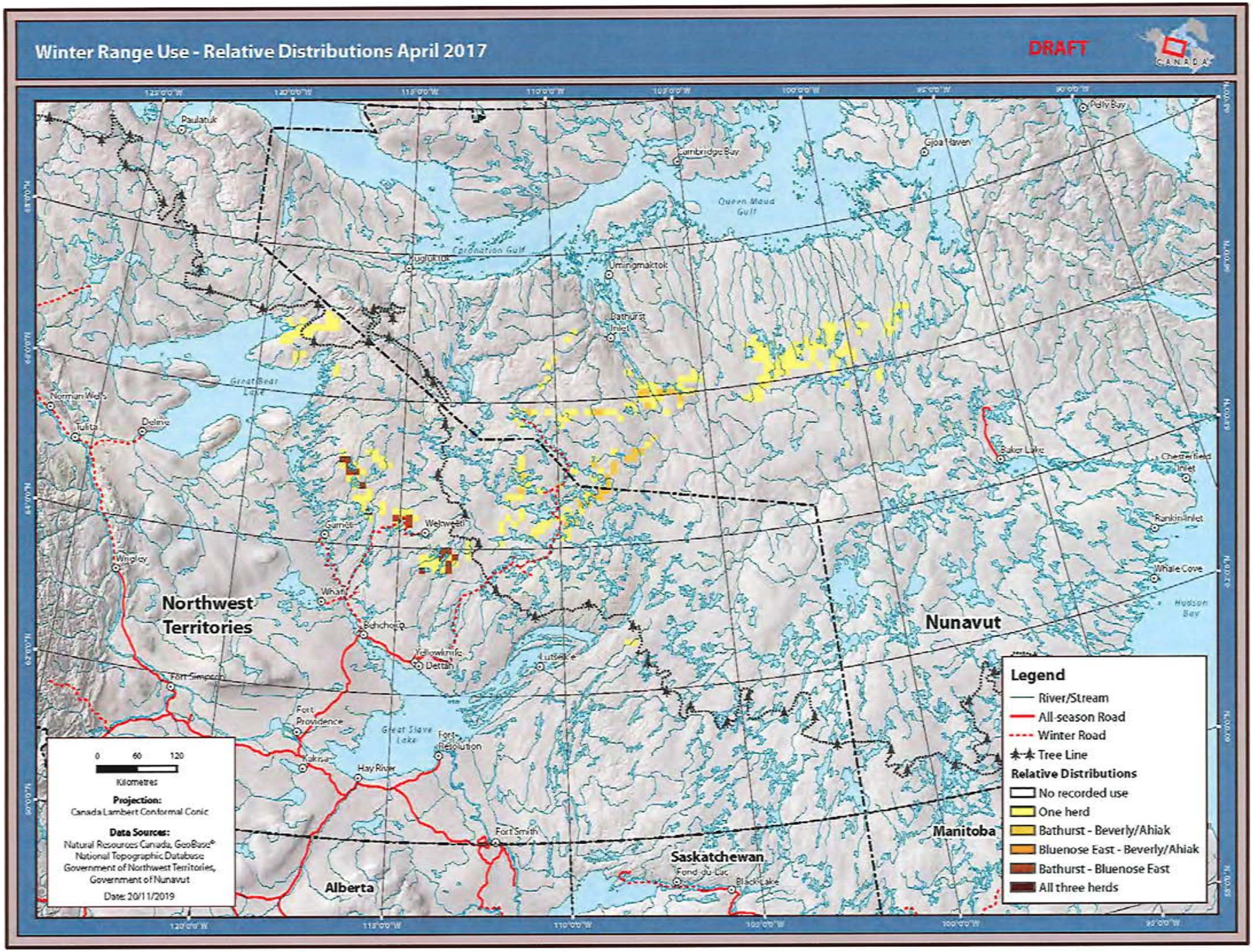

Winter Range Use - Relative Distributions December 2016
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Wekweeti
Gameti
Wrigley
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Fond-du-Lac
Black Lake
Northwest Territories
Nunavut
Manitoba
Saskatchewan
Alberta
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Relative Distributions
No recorded use
One herd
Bathurst - Beverly/Ahiak
Bluenose East - Beverly/Ahiak
Bathurst - Bluenose East
All three herds
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 13/11/2019



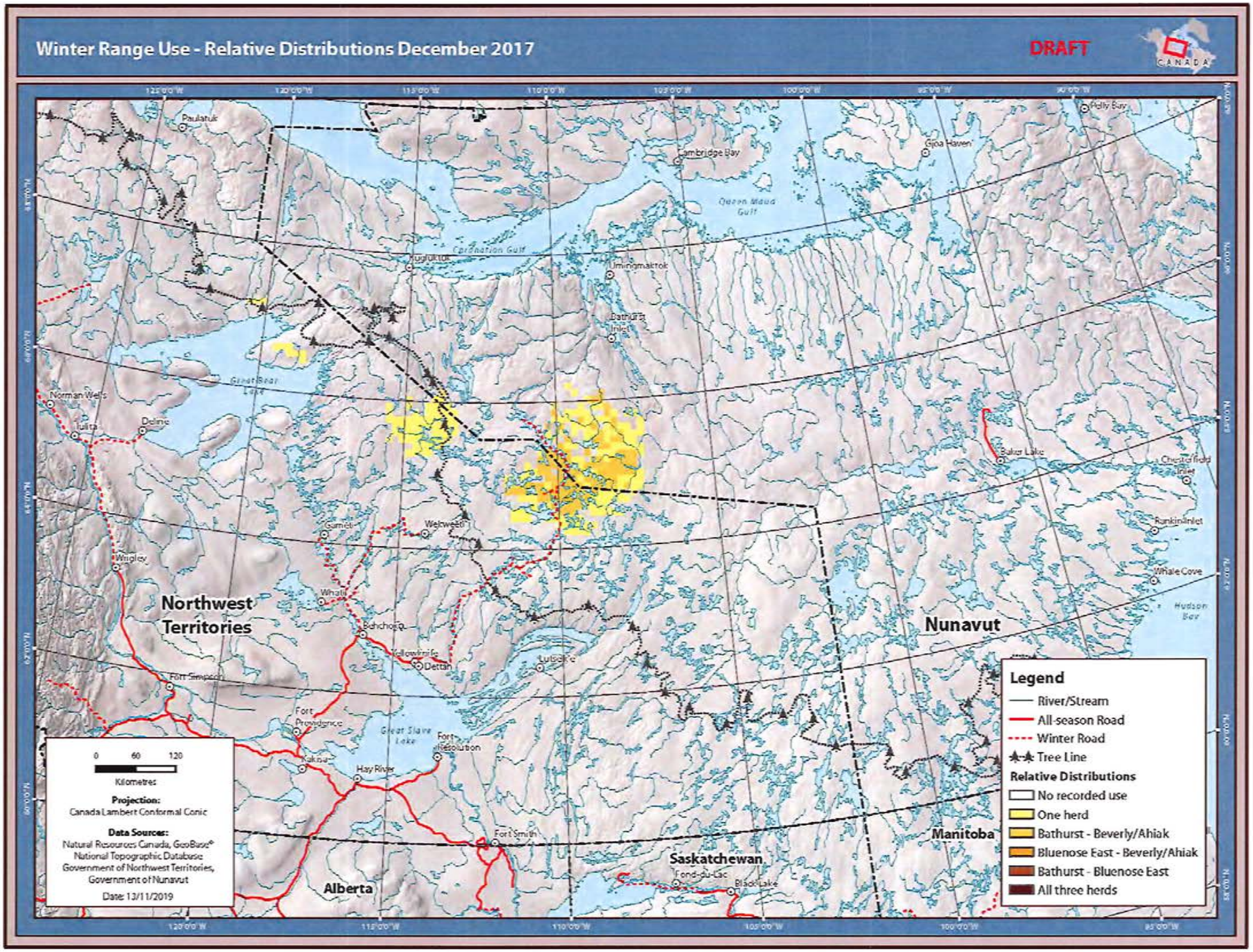
Winter Range Use - Relative Distributions January 2017
DRAFT
CANADA
Paulatuk
Norman Wells
Tulita
Deline
Great Bear Lake
Kugluktuk
Coronation Gulf
Cambridge Bay
Queen Maud Gulf
Gjoa Haven
Polly Bay
Umingmaktok
Bathurst Inlet
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Gameti
Wekweeti
Wrigley
Whati
Behchoko
Yellowknife
Dettah
Lutsel'ke
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Fond-du-Lac
Black Lake
Northwest Territories
Nunavut
Manitoba
Saskatchewan
Alberta
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 14/11/2019
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Relative Distributions
No recorded use
One herd
Bathurst - Beverly/Ahiak
Bluenose East - Beverly/Ahiak
Bathurst - Bluenose East
All three herds

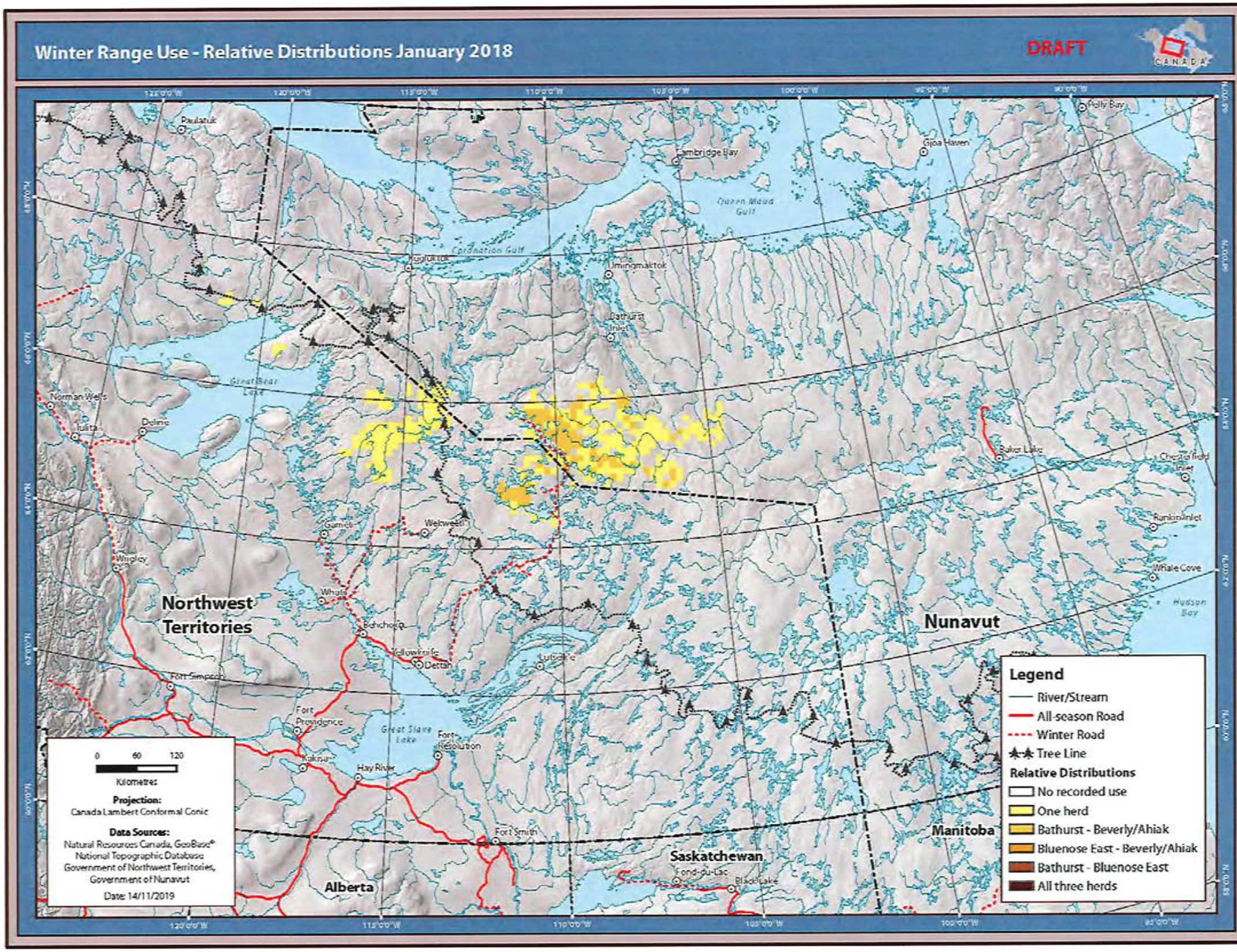

Winter Range Use - Relative Distributions February 2017
DRAFT
CANADA
Northwest Territories
Nunavut
Alberta
Saskatchewan
Manitoba
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Gameti
Wekweeti
Wrigley
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Fond-du-Lac
Black Lake
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Relative Distributions
No recorded use
One herd
Bathurst - Beverly/Ahiak
Bluenose East - Beverly/Ahiak
Bathurst - Bluenose East
All three herds
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 13/11/2019

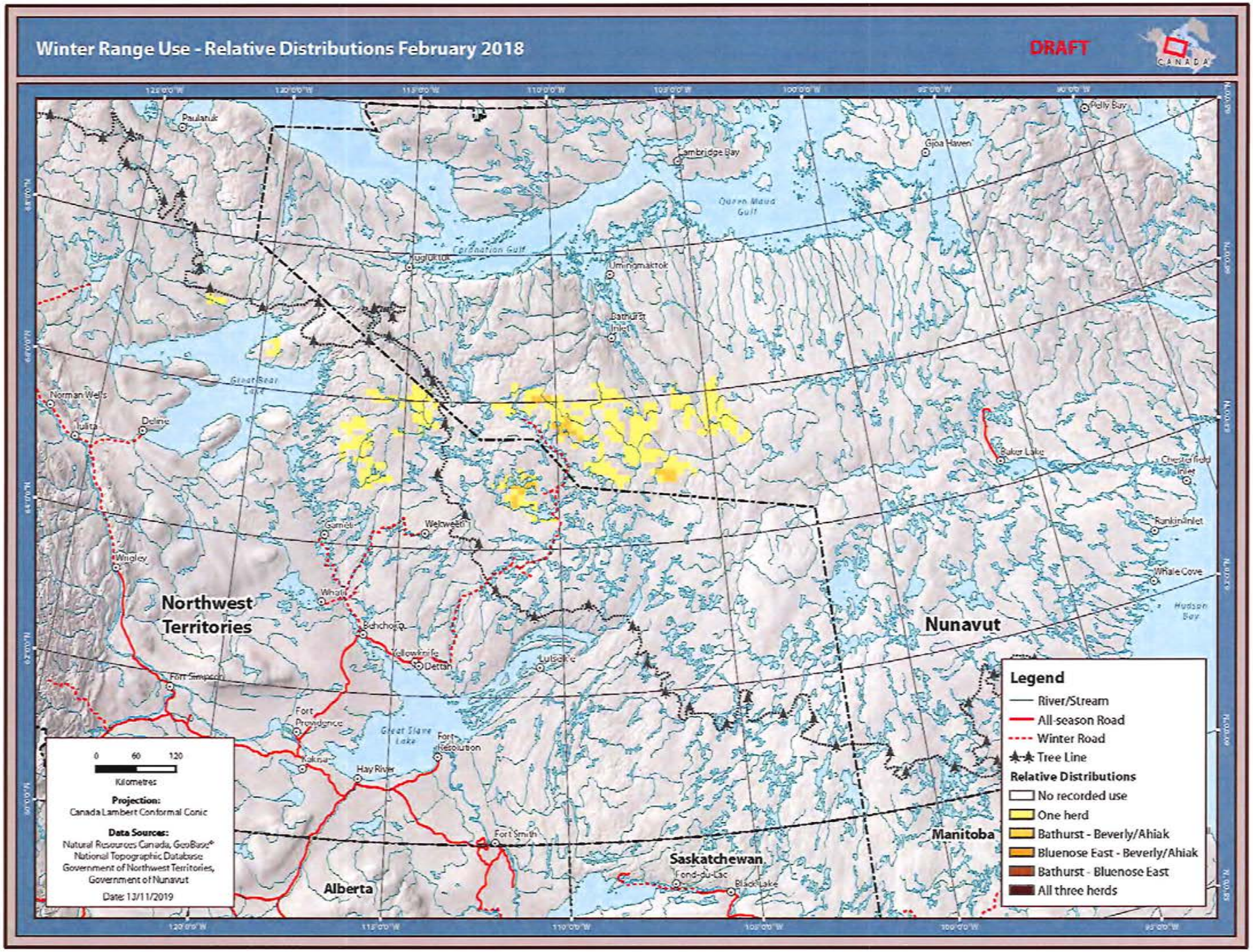

Winter Range Use - Relative Distributions March 2017
DRAFT
CANADA
Northwest Territories
Nunavut
Manitoba
Saskatchewan
Alberta
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Gameti
Wekweeti
Wrigley
Whati
Behchoko
Yellowknife
Dettah
Lutselke
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Fond-du-Lac
Black Lake
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Relative Distributions
No recorded use
One herd
Bathurst - Beverly/Ahiak
Bluenose East - Beverly/Ahiak
Bathurst - Bluenose East
All three herds
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 20/11/2019



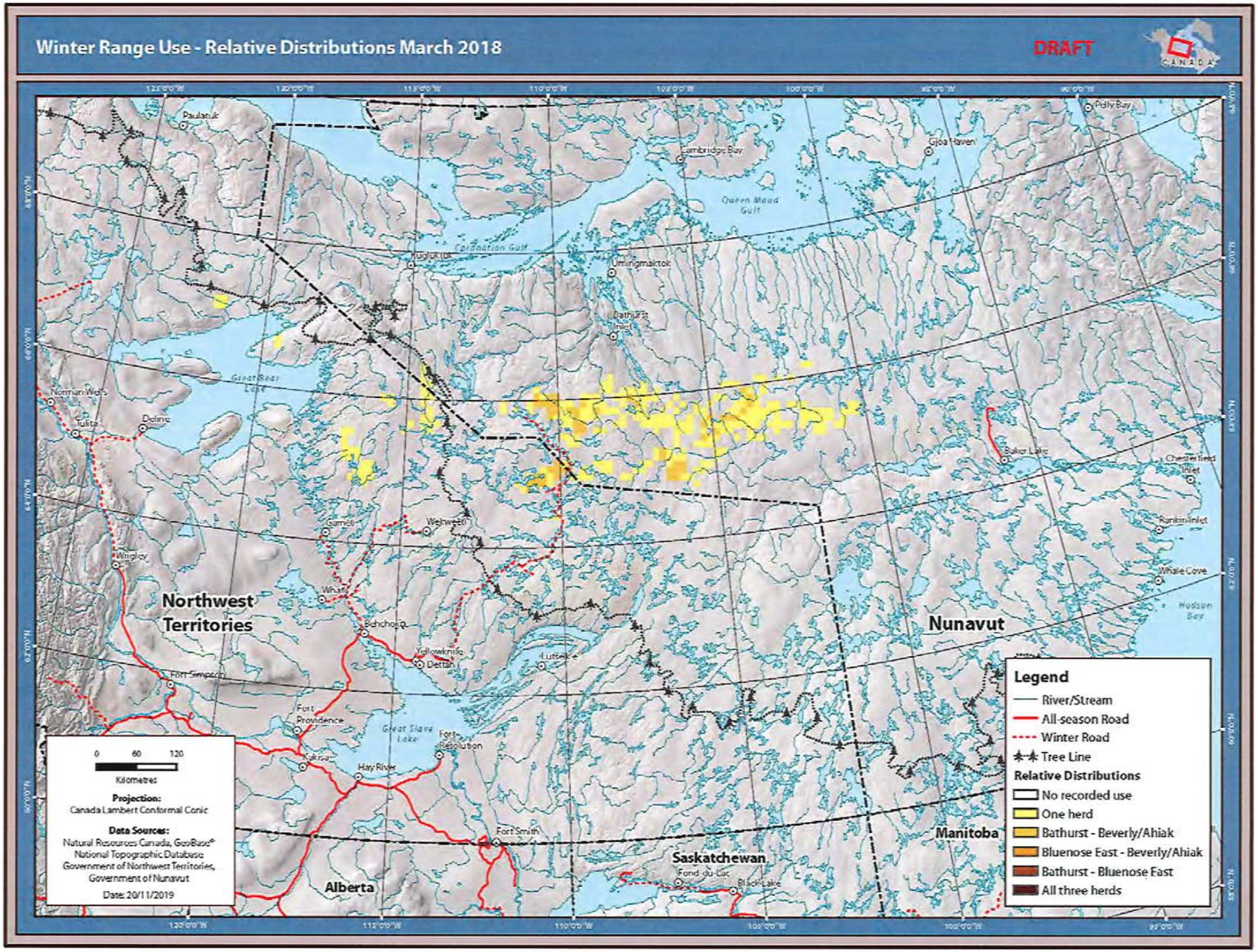
Winter Range Use - Relative Distributions April 2017
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Gameti
Wekweeti
Wrigley
Whati
Northwest Territories
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Alberta
Saskatchewan
Fond-du-Lac
Black Lake
Manitoba
Nunavut
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Relative Distributions
No recorded use
One herd
Bathurst - Beverly/Ahiak
Bluenose East - Beverly/Ahiak
Bathurst - Bluenose East
All three herds
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 20/11/2019


Winter Range Use - Relative Distributions December 2017
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Polly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Gameti
Wekweeti
Wrigley
Whati
Northwest Territories
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Nunavut
Manitoba
Saskatchewan
Fond-du-Lac
Black Lake
Alberta
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Relative Distributions
No recorded use
One herd
Bathurst - Beverly/Ahiak
Bluenose East - Beverly/Ahiak
Bathurst - Bluenose East
All three herds
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 13/11/2019

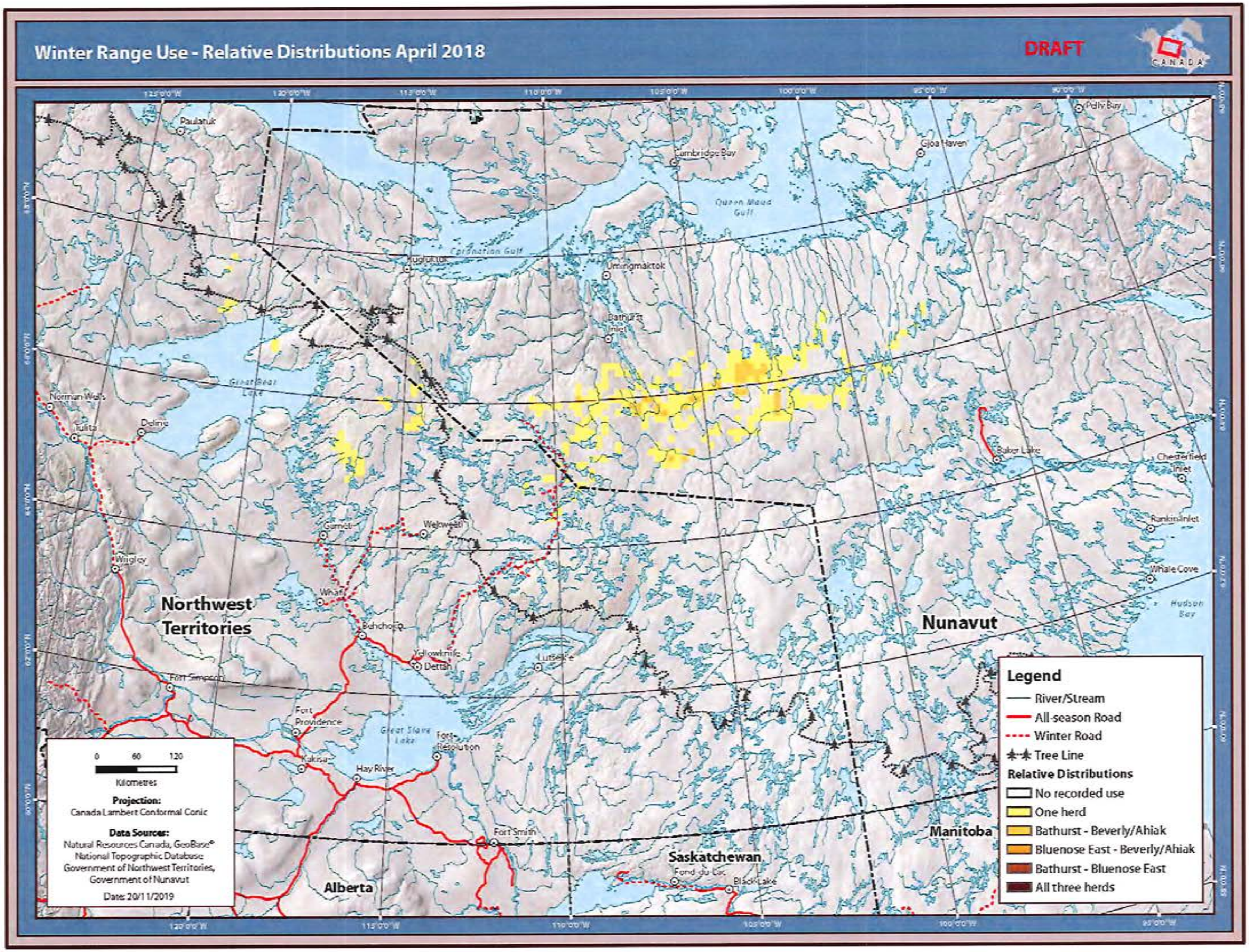

Winter Range Use - Relative Distributions January 2018
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Gameti
Wekweeti
Wrigley
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Fond-du-Lac
Black Lake
Northwest Territories
Nunavut
Manitoba
Saskatchewan
Alberta
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Relative Distributions
No recorded use
One herd
Bathurst - Beverly/Ahiak
Bluenose East - Beverly/Ahiak
Bathurst - Bluenose East
All three herds
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 14/11/2019

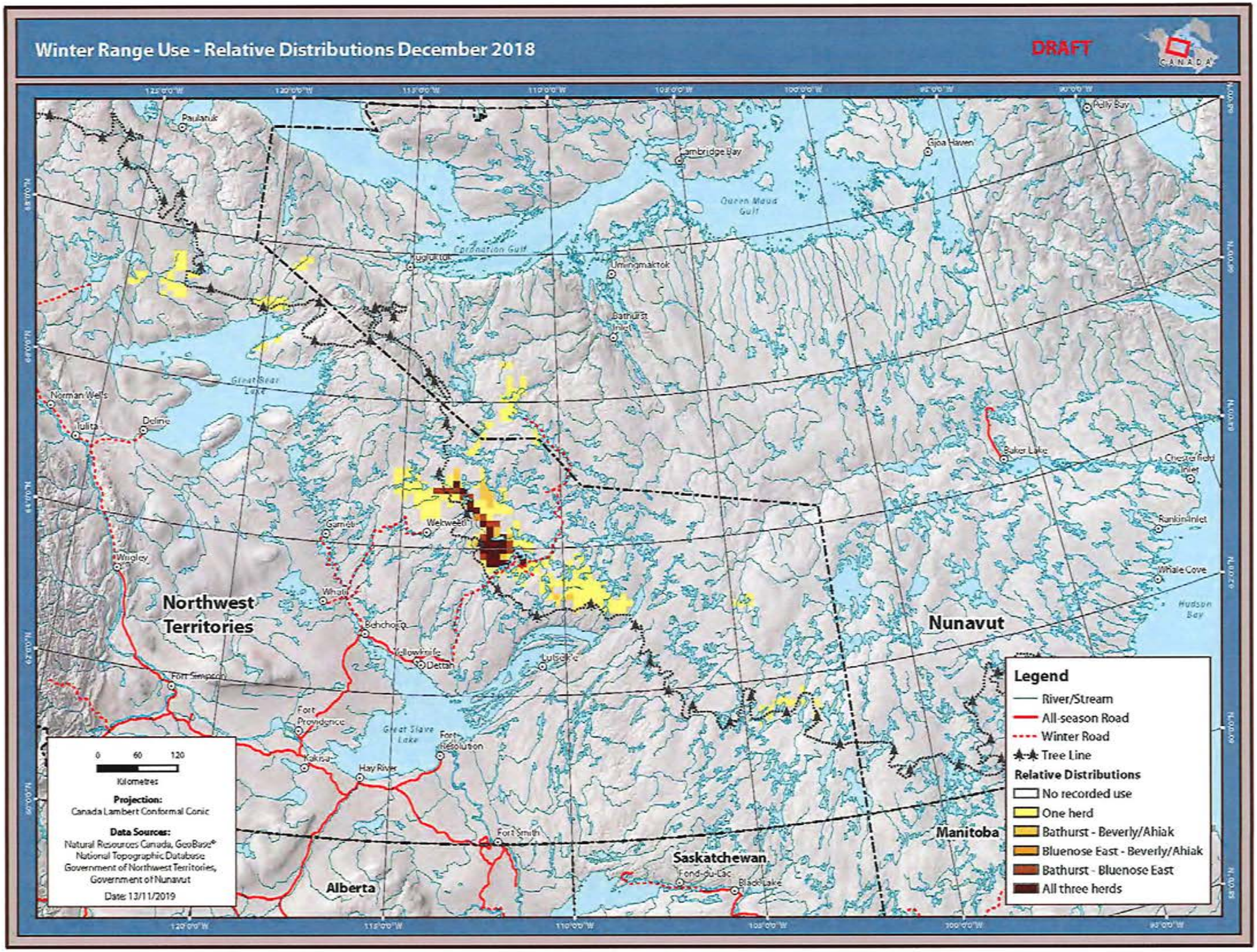


Winter Range Use - Relative Distributions February 2018
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Gameti
Wekweeti
Wrigley
Whati
Northwest Territories
Behchoko
Yellowknife
Dettah
Lutselk'e
Nunavut
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Manitoba
Saskatchewan
Fond-du-Lac
Black Lake
Alberta
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 13/11/2019
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Relative Distributions
No recorded use
One herd
Bathurst - Beverly/Ahiak
Bluenose East - Beverly/Ahiak
Bathurst - Bluenose East
All three herds

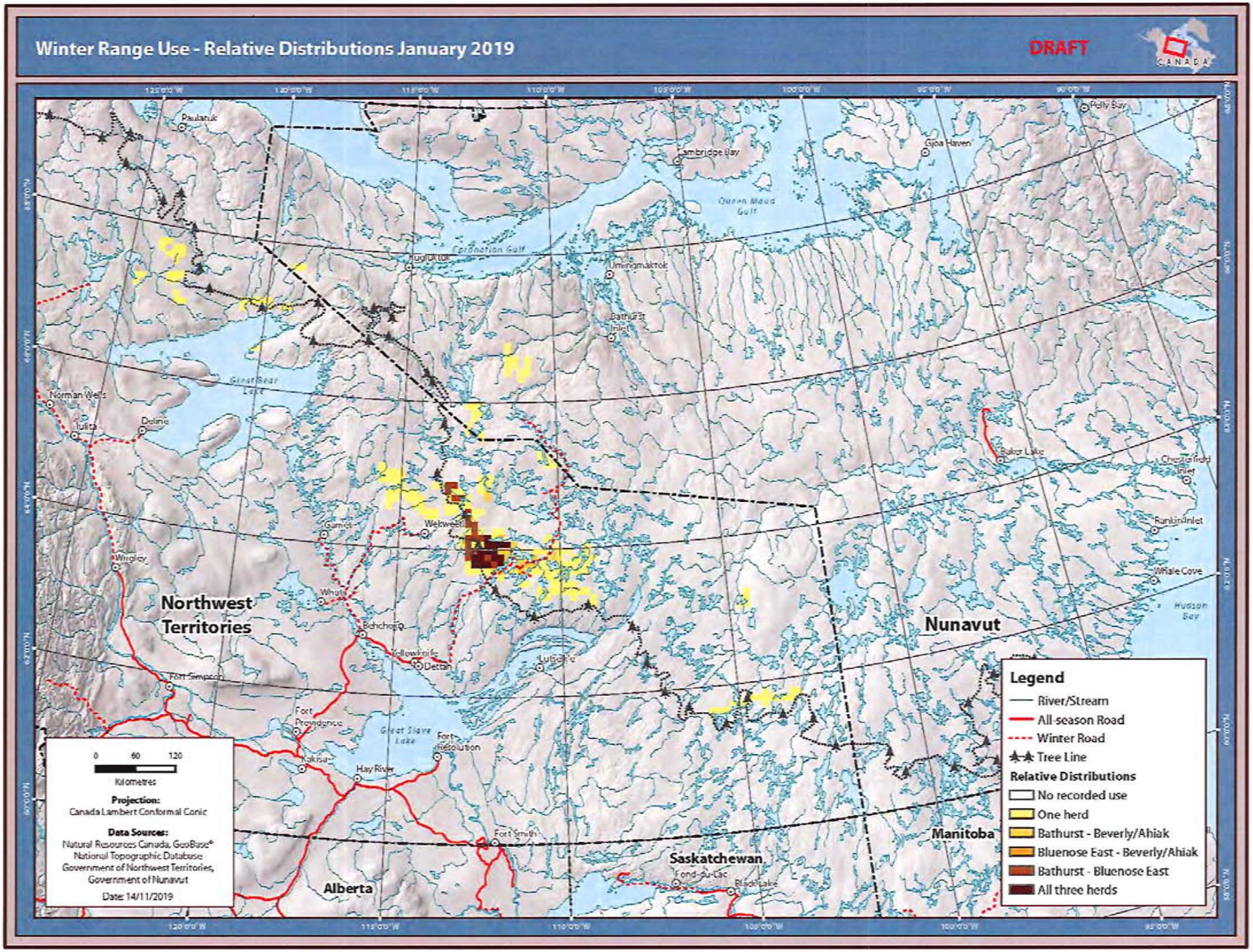


Winter Range Use - Relative Distributions March 2018
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Gameti
Wekweeti
Wrigley
Whati
Behchokǫ̀
Northwest Territories
Nunavut
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Manitoba
Saskatchewan
Fond-du-Lac
Black Lake
Alberta
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 20/11/2019
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Relative Distributions
No recorded use
One herd
Bathurst - Beverly/Ahiak
Bluenose East - Beverly/Ahiak
Bathurst - Bluenose East
All three herds

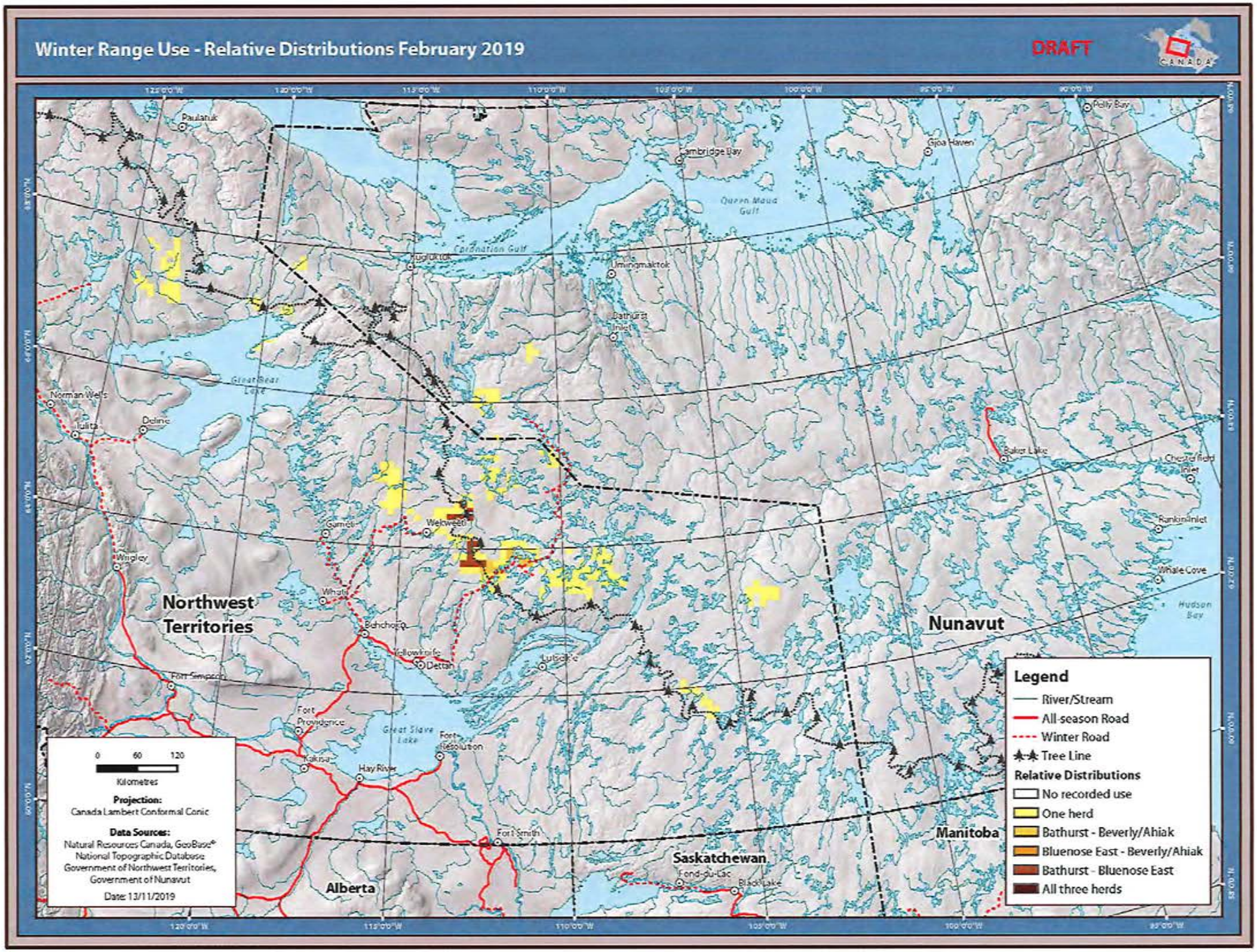

Winter Range Use - Relative Distributions April 2018
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Gameti
Wekweeti
Wrigley
Whati
Northwest Territories
Behchoko
Yellowknife
Dettah
Lutselk'e
Nunavut
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Manitoba
Saskatchewan
Fond du Lac
Black Lake
Alberta
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 20/11/2019
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Relative Distributions
No recorded use
One herd
Bathurst - Beverly/Ahiak
Bluenose East - Beverly/Ahiak
Bathurst - Bluenose East
All three herds



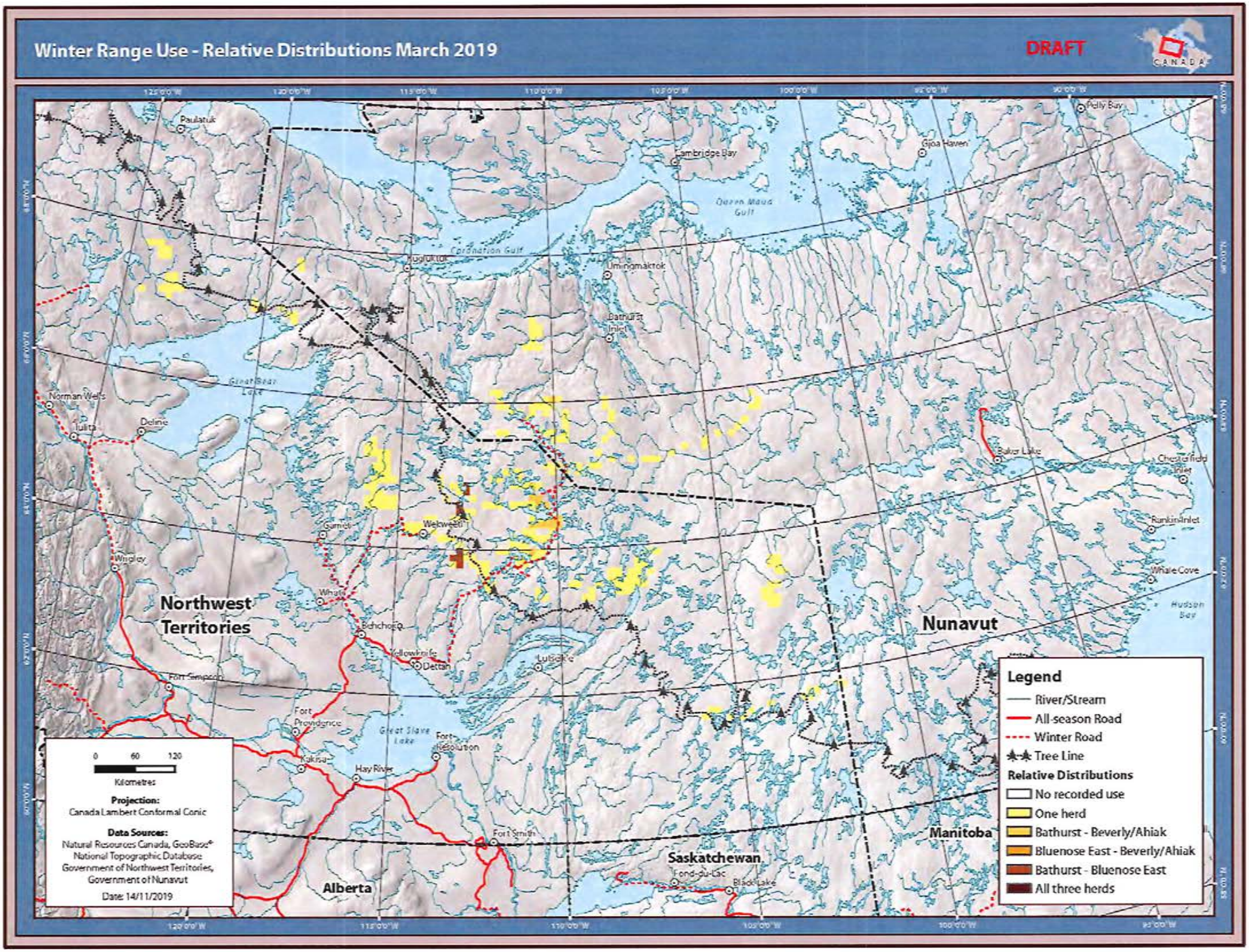
Winter Range Use - Relative Distributions December 2018
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Gameti
Wekweeti
Wrigley
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Fond-du-Lac
Black Lake
Northwest Territories
Nunavut
Manitoba
Saskatchewan
Alberta
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 13/11/2019
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Relative Distributions
No recorded use
One herd
Bathurst - Beverly/Ahiak
Bluenose East - Beverly/Ahiak
Bathurst - Bluenose East
All three herds

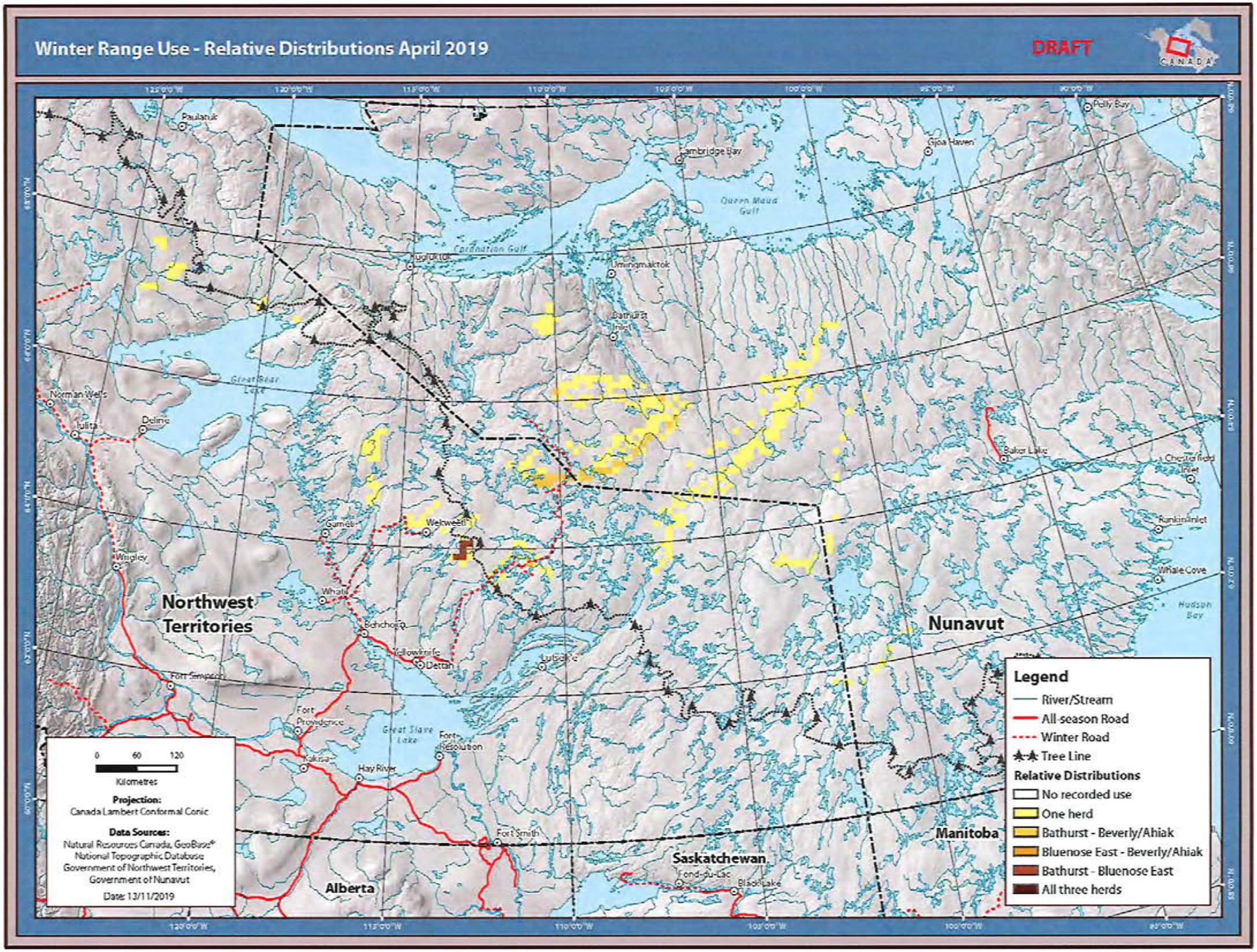


Winter Range Use - Relative Distributions January 2019
DRAFT
CANADA
Paulatuk
Norman Wells
Tulita
Deline
Wrigley
Great Bear Lake
Coronation Gulf
Kugluktuk
Cambridge Bay
Queen Maud Gulf
Umingmaktok
Bathurst Inlet
Gjoa Haven
Pelly Bay
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Gameti
Wekweeti
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Kakisa
Hay River
Great Slave Lake
Fort Resolution
Fort Smith
Fond-du-Lac
Black Lake
Northwest Territories
Nunavut
Manitoba
Saskatchewan
Alberta
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Relative Distributions
No recorded use
One herd
Bathurst - Beverly/Ahiak
Bluenose East - Beverly/Ahiak
Bathurst - Bluenose East
All three herds
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 14/11/2019



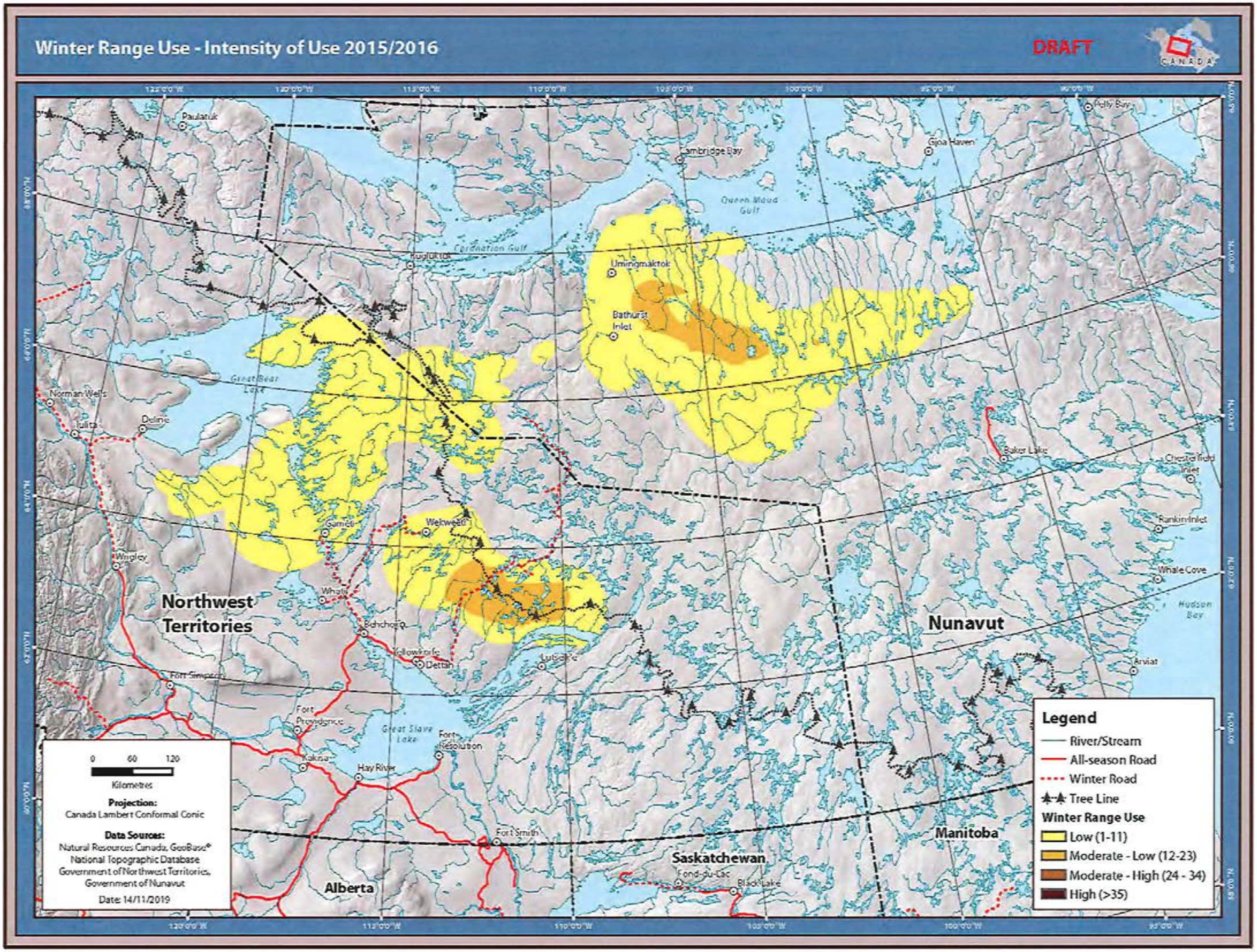
Winter Range Use - Relative Distributions February 2019
DRAFT
CANADA
Northwest Territories
Nunavut
Manitoba
Saskatchewan
Alberta
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Wekweeti
Gameti
Whati
Wrigley
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Fond-du-Lac
Black Lake
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 13/11/2019
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Relative Distributions
No recorded use
One herd
Bathurst - Beverly/Ahiak
Bluenose East - Beverly/Ahiak
Bathurst - Bluenose East
All three herds

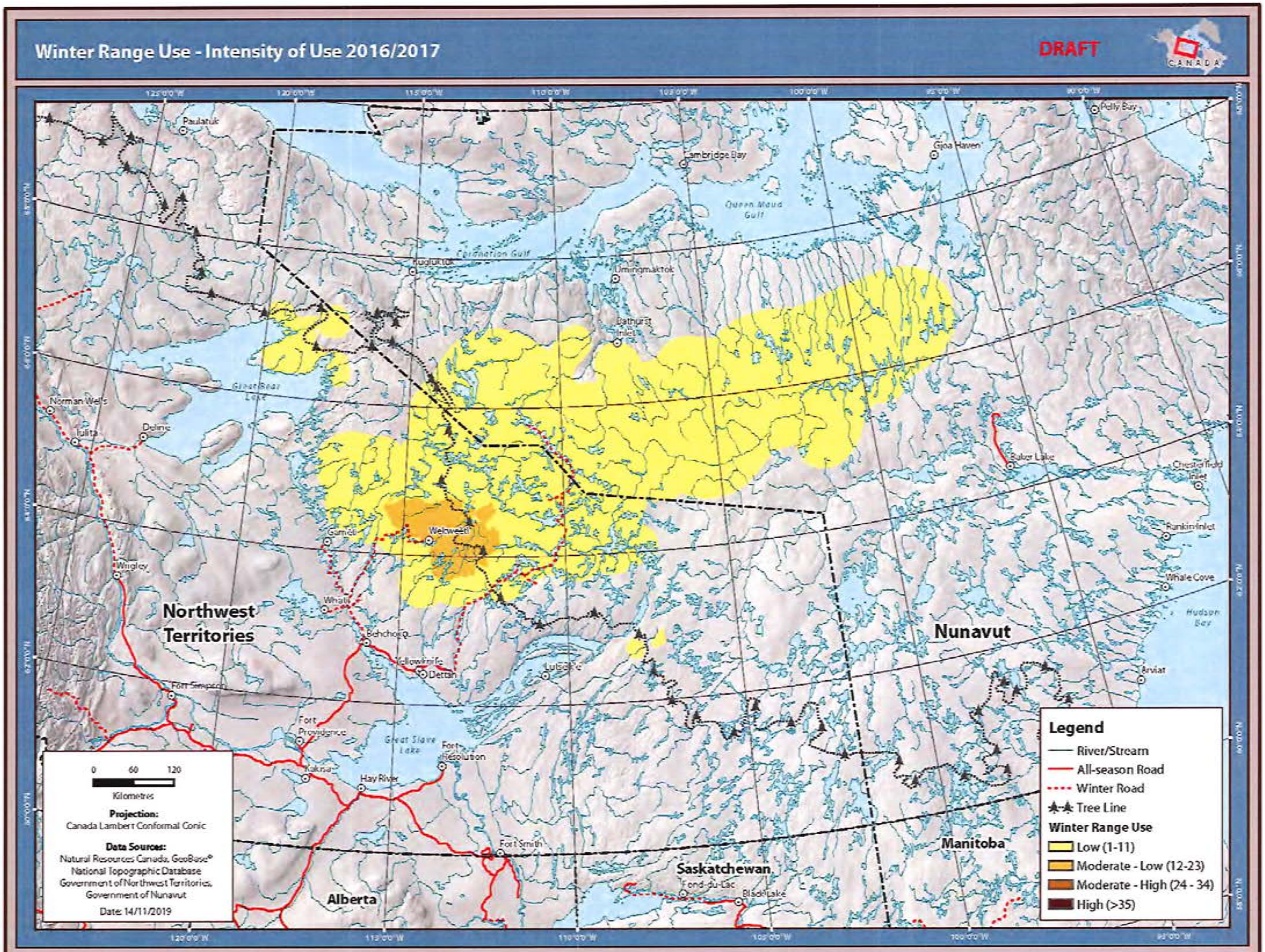

Winter Range Use - Relative Distributions March 2019
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Wrigley
Gameti
Wekweeti
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Fond-du-Lac
Black Lake
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Northwest Territories
Nunavut
Manitoba
Saskatchewan
Alberta
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Relative Distributions
No recorded use
One herd
Bathurst - Beverly/Ahiak
Bluenose East - Beverly/Ahiak
Bathurst - Bluenose East
All three herds
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 14/11/2019



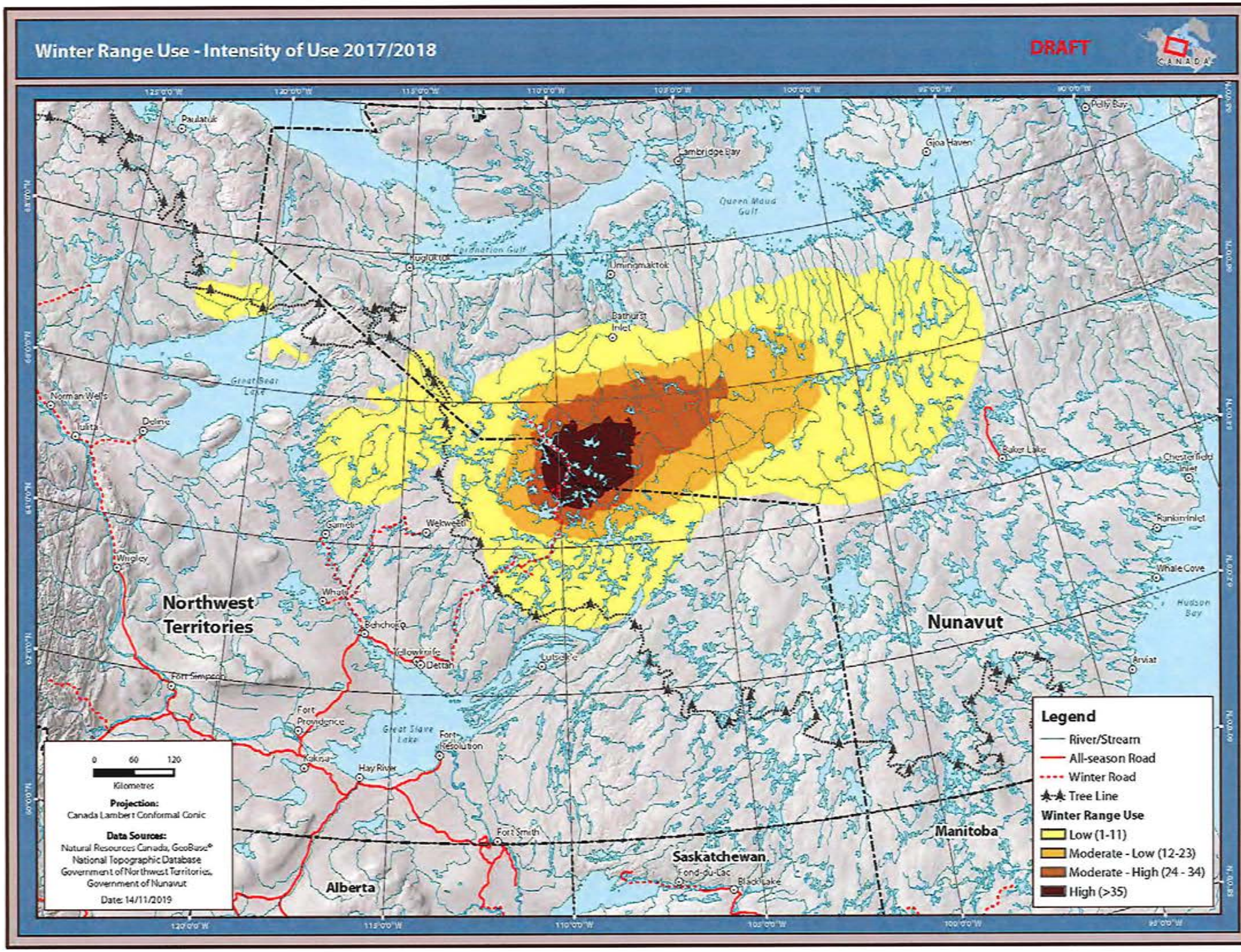
Winter Range Use - Relative Distributions April 2019
DRAFT
CANADA
Northwest Territories
Nunavut
Alberta
Saskatchewan
Manitoba
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Gameti
Wekweeti
Wrigley
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Fond-du-Lac
Black Lake
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 13/11/2019
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Relative Distributions
No recorded use
One herd
Bathurst - Beverly/Ahiak
Bluenose East - Beverly/Ahiak
Bathurst - Bluenose East
All three herds

Appendix 9-E1: Annual KDEs

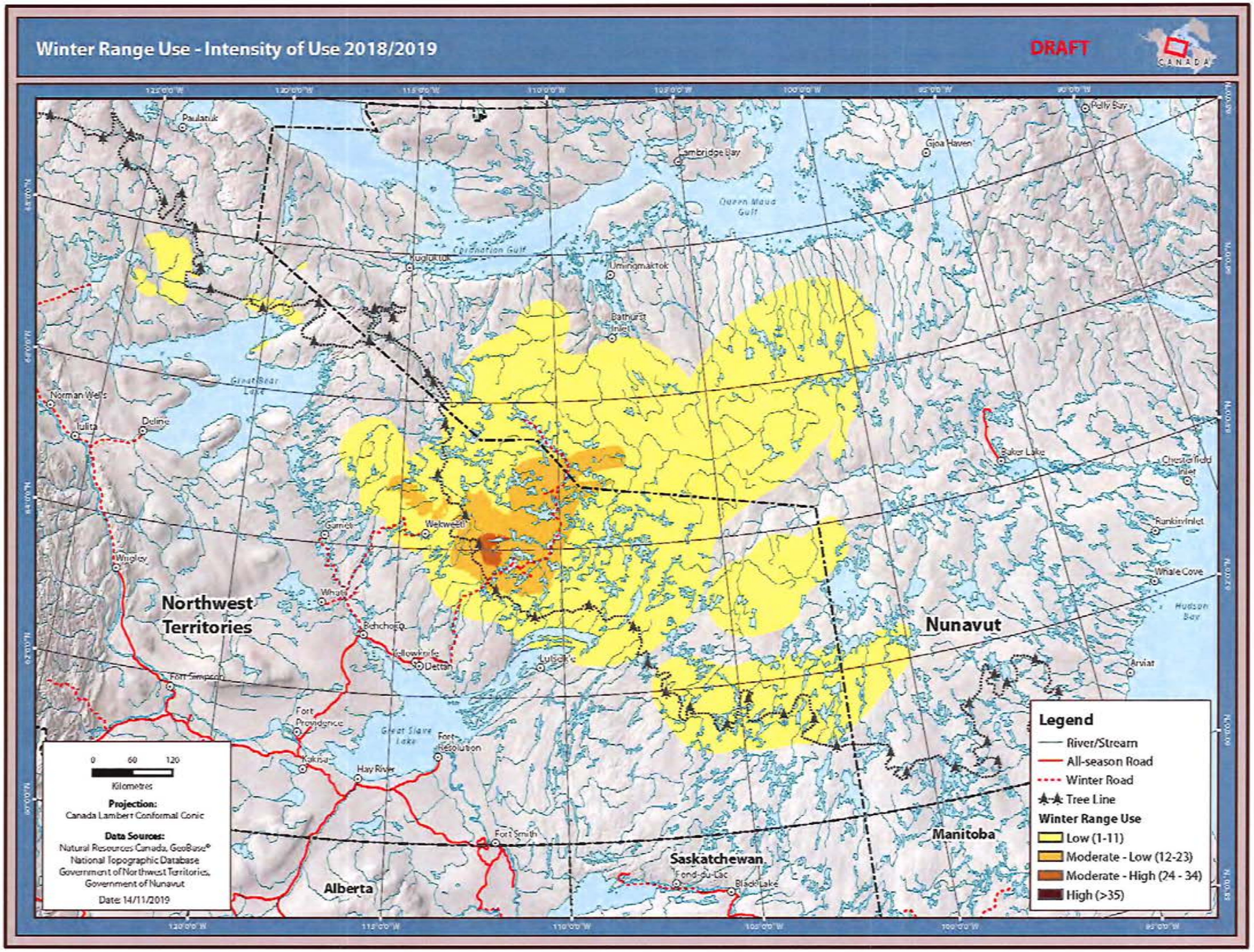

Winter Range Use - Intensity of Use 2015/2016
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Arviat
Gameti
Wekweeti
Wrigley
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Kakisa
Great Slave Lake
Fort Resolution
Hay River
Fort Smith
Fond-du-Lac
Black Lake
Northwest Territories
Nunavut
Manitoba
Saskatchewan
Alberta
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 14/11/2019
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Winter Range Use
Low (1-11)
Moderate - Low (12-23)
Moderate - High (24 - 34)
High (>35)



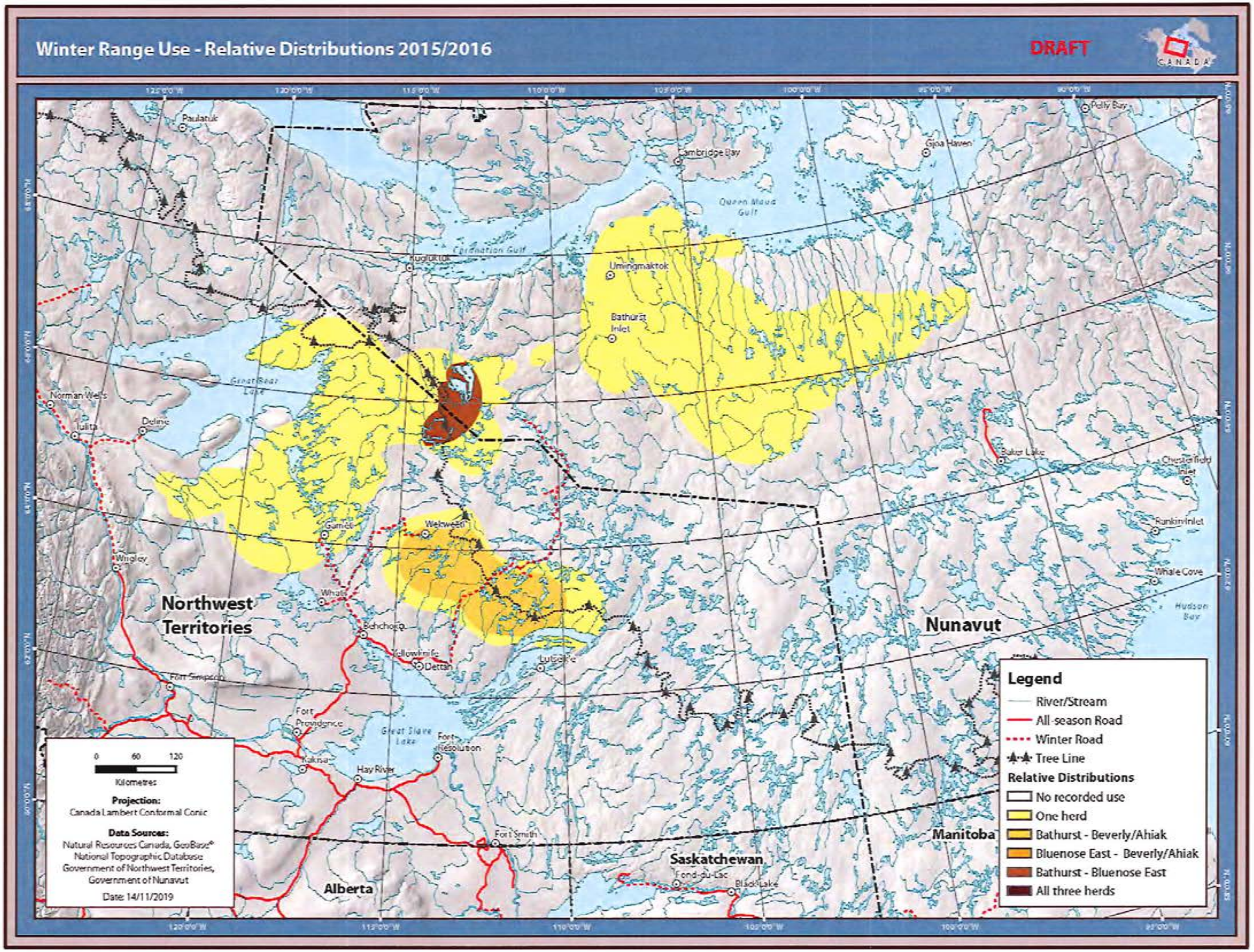
Winter Range Use - Intensity of Use 2016/2017
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Polly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Wrigley
Gameti
Wekweeti
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Arviat
Northwest Territories
Nunavut
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Alberta
Saskatchewan
Fond-du-Lac
Black Lake
Manitoba
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 14/11/2019
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Winter Range Use
Low (1-11)
Moderate - Low (12-23)
Moderate - High (24 - 34)
High (>35)

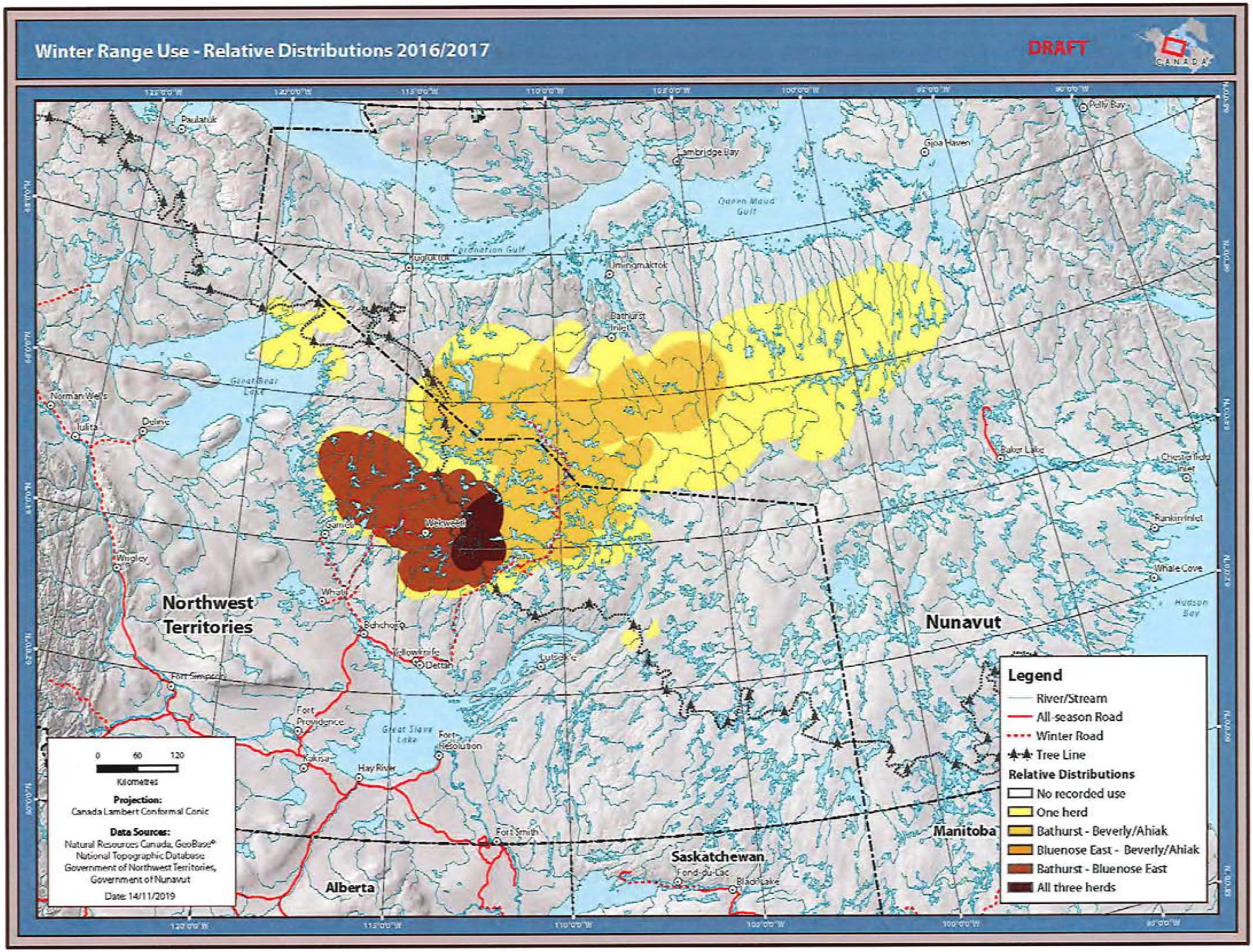


Winter Range Use - Intensity of Use 2017/2018
DRAFT
CANADA
Northwest Territories
Nunavut
Manitoba
Saskatchewan
Alberta
Paulatuk
Kugluktuk
Cambridge Bay
Gjoa Haven
Umingmaktok
Bathurst Inlet
Queen Maud Gulf
Coronation Gulf
Great Bear Lake
Norman Wells
Tulita
Deline
Wrigley
Gamèti
Wekweètì
Whatì
Behchokǫ̀
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Kakisa
Hay River
Great Slave Lake
Fort Resolution
Fort Smith
Fond-du-Lac
Black Lake
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Arviat
Polly Bay
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Winter Range Use
Low (1-11)
Moderate - Low (12-23)
Moderate - High (24 - 34)
High (>35)
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 14/11/2019

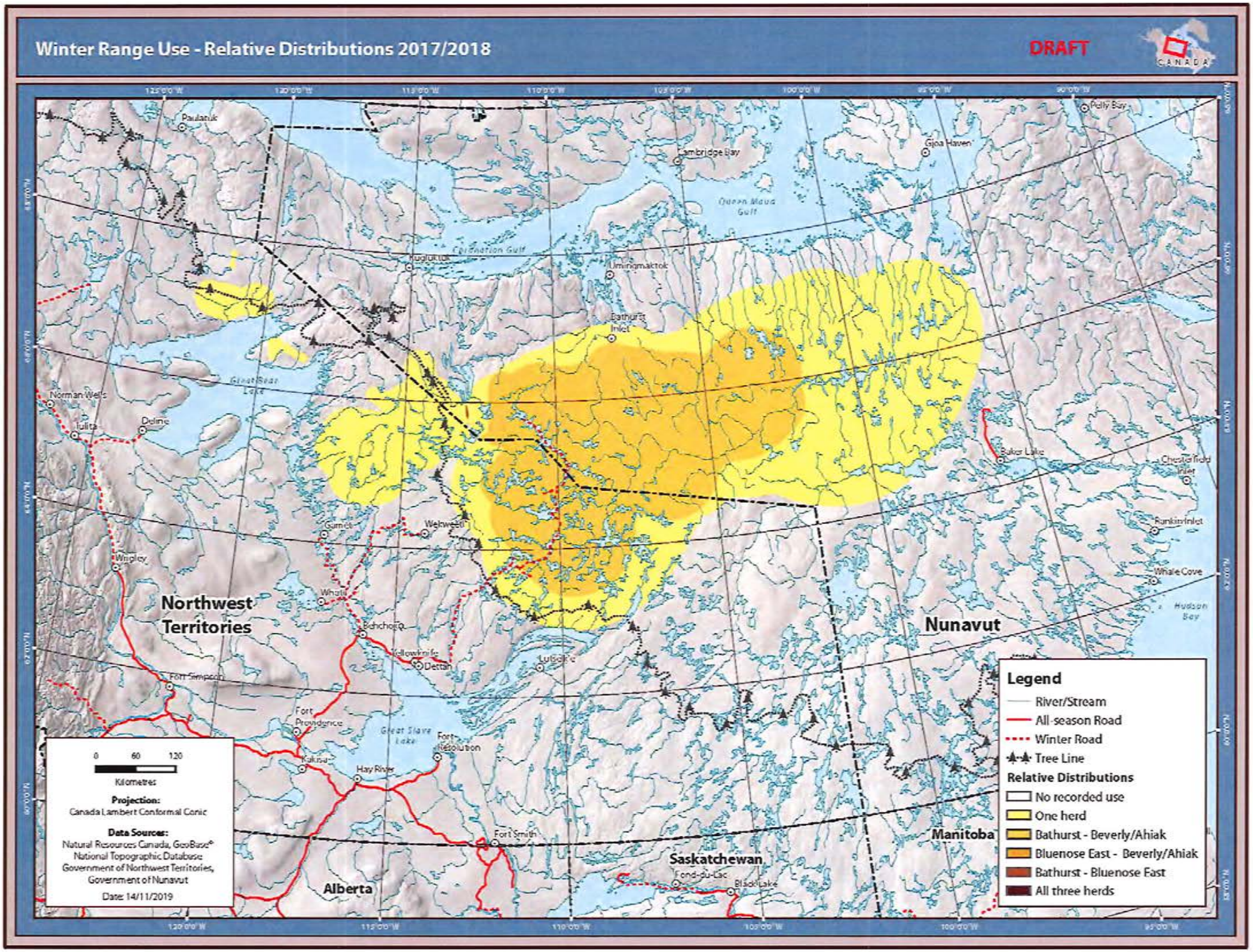

Winter Range Use - Intensity of Use 2018/2019
DRAFT
CANADA
Northwest Territories
Nunavut
Manitoba
Saskatchewan
Alberta
Paulatuk
Norman Wells
Tulita
Deline
Wrigley
Fort Simpson
Fort Providence
Kakisa
Hay River
Fort Resolution
Fort Smith
Behchoko
Whati
Gameti
Wekweeti
Yellowknife
Dettah
Lutselk'e
Kugluktuk
Coronation Gulf
Umingmaktok
Bathurst Inlet
Cambridge Bay
Queen Maud Gulf
Gjoa Haven
Pelly Bay
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Arviat
Great Bear Lake
Great Slave Lake
Fond-du-Lac
Black Lake
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Winter Range Use
Low (1-11)
Moderate - Low (12-23)
Moderate - High (24 - 34)
High (>35)
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 14/11/2019

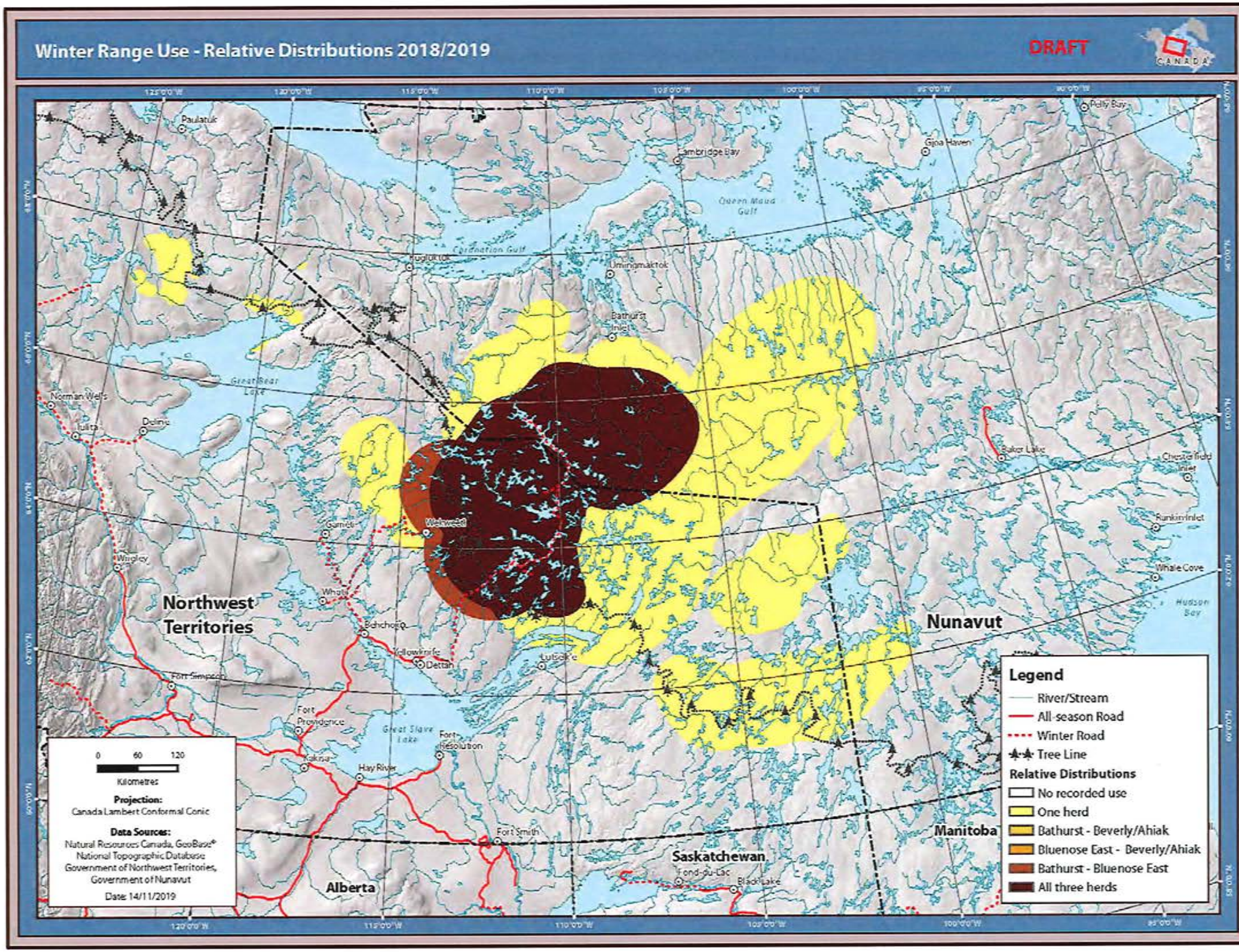
Appendix 9-E2: Annual Relative Distribution KDEs


Winter Range Use - Relative Distributions 2015/2016
DRAFT
CANADA
Paulatuk
Norman Wells
Tulita
Deline
Wrigley
Great Bear Lake
Kugluktuk
Coronation Gulf
Cambridge Bay
Queen Maud Gulf
Gjoa Haven
Polly Bay
Umingmaktok
Bathurst Inlet
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Gameti
Wekweeti
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Fond-du-Lac
Black Lake
Northwest Territories
Nunavut
Alberta
Saskatchewan
Manitoba
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 14/11/2019
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Relative Distributions
No recorded use
One herd
Bathurst - Beverly/Ahiak
Bluenose East - Beverly/Ahiak
Bathurst - Bluenose East
All three herds

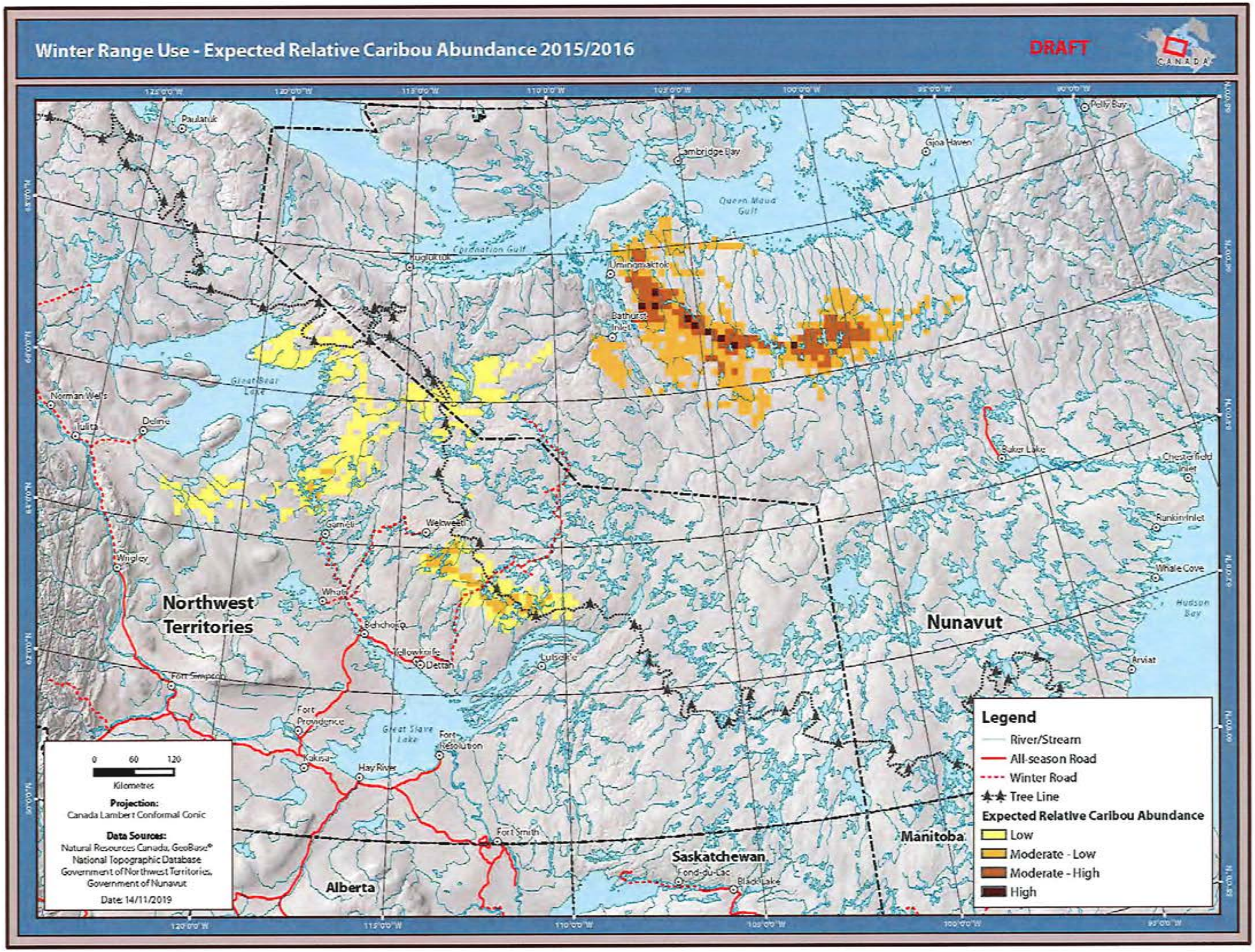


Winter Range Use - Relative Distributions 2016/2017
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Gameti
Wekweeti
Wrigley
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Fond-du-Lac
Black Lake
Northwest Territories
Nunavut
Manitoba
Saskatchewan
Alberta
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Relative Distributions
No recorded use
One herd
Bathurst - Beverly/Ahiak
Bluenose East - Beverly/Ahiak
Bathurst - Bluenose East
All three herds
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 14/11/2019


Winter Range Use - Relative Distributions 2017/2018
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Wrigley
Gameti
Wekweeti
Whati
Northwest Territories
Behchoko
Yellowknife
Dettah
Lutselk'e
Nunavut
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Alberta
Saskatchewan
Fond-du-Lac
Black Lake
Manitoba
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 14/11/2019
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Relative Distributions
No recorded use
One herd
Bathurst - Beverly/Ahiak
Bluenose East - Beverly/Ahiak
Bathurst - Bluenose East
All three herds

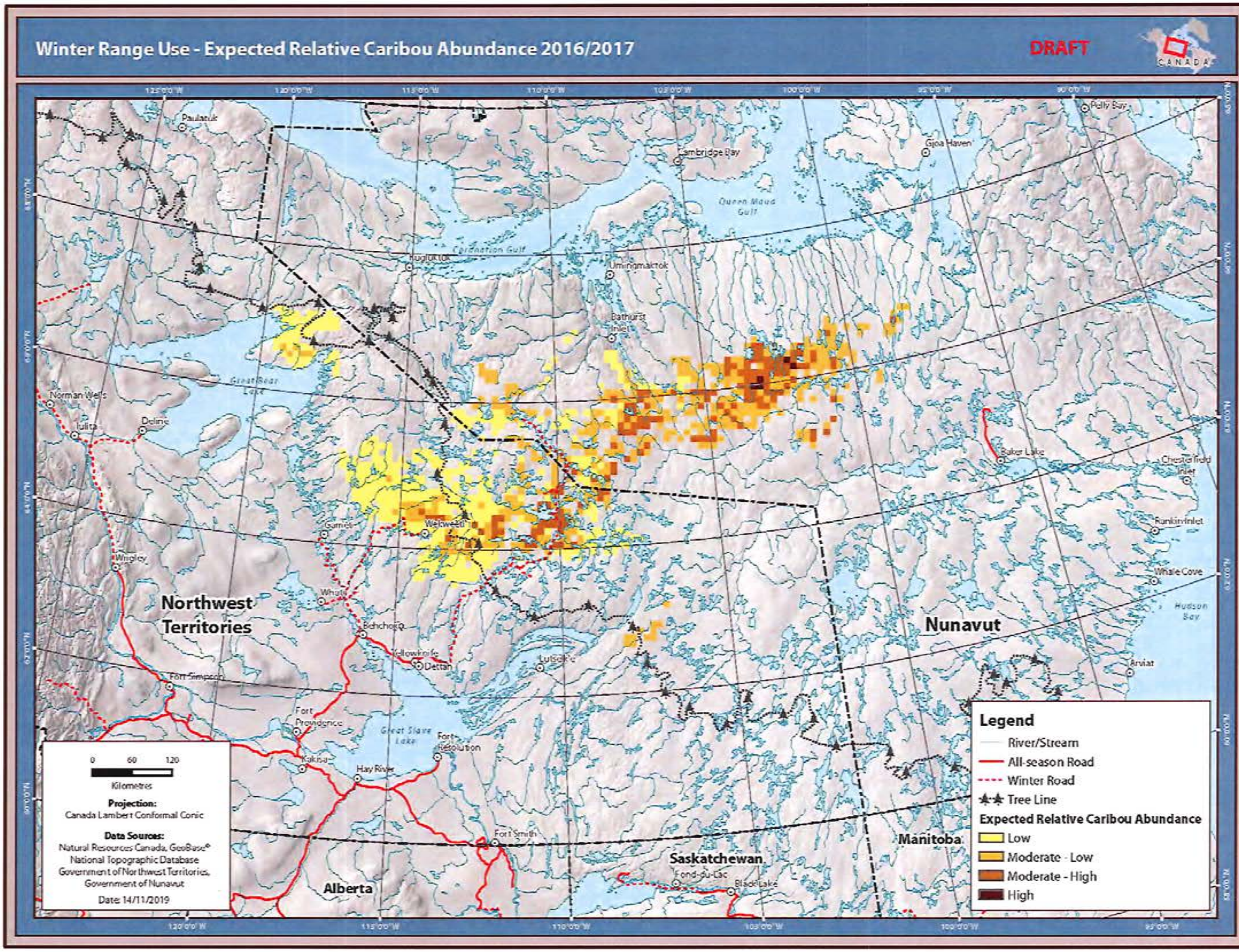

Winter Range Use - Relative Distributions 2018/2019
DRAFT
CANADA
Northwest Territories
Nunavut
Alberta
Saskatchewan
Manitoba
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Gameti
Wekweeti
Wrigley
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Fond-du-Lac
Black Lake
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Relative Distributions
No recorded use
One herd
Bathurst - Beverly/Ahiak
Bluenose East - Beverly/Ahiak
Bathurst - Bluenose East
All three herds
0
60
120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 14/11/2019

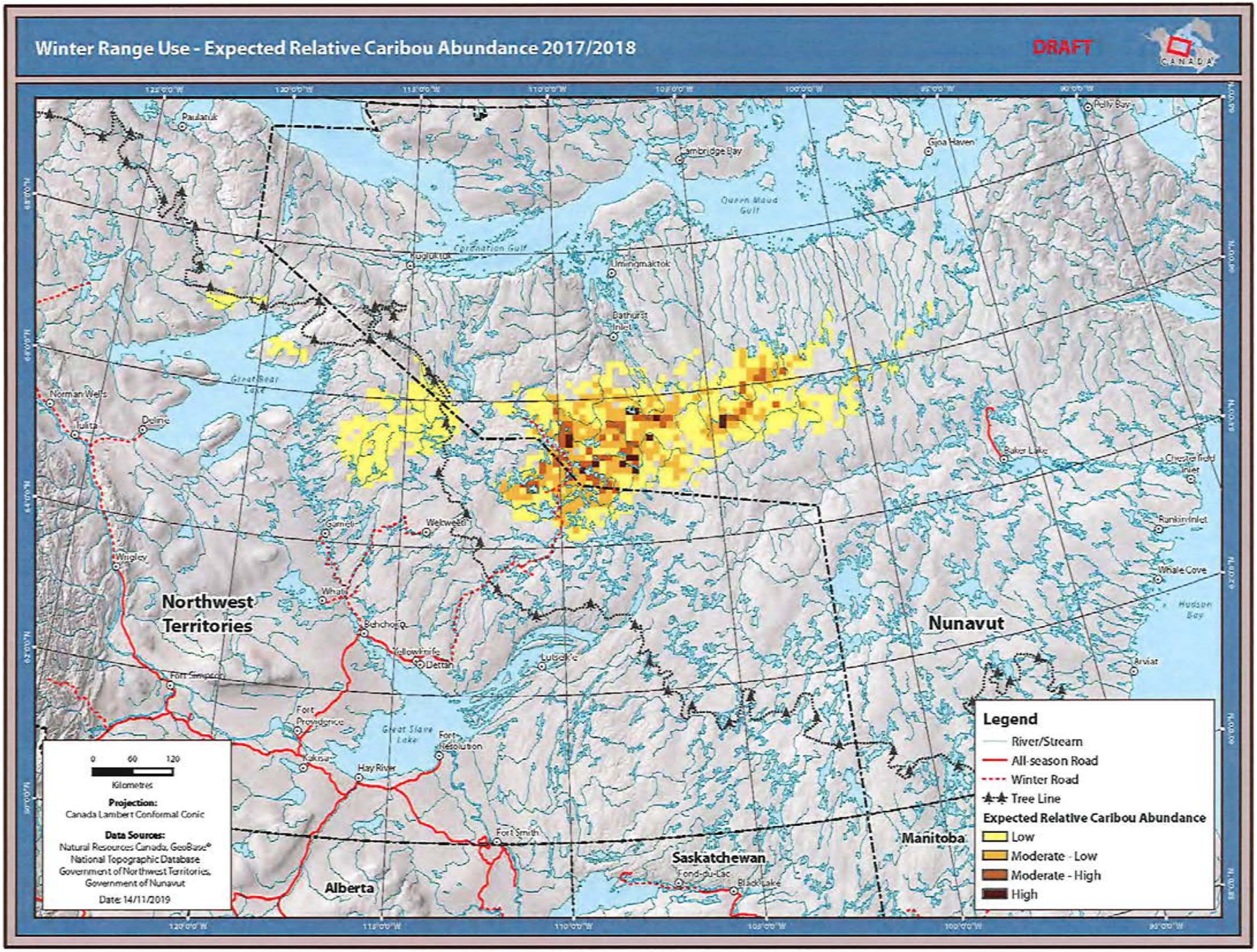
Appendix 9-F: Annual Expected Relative Abundance

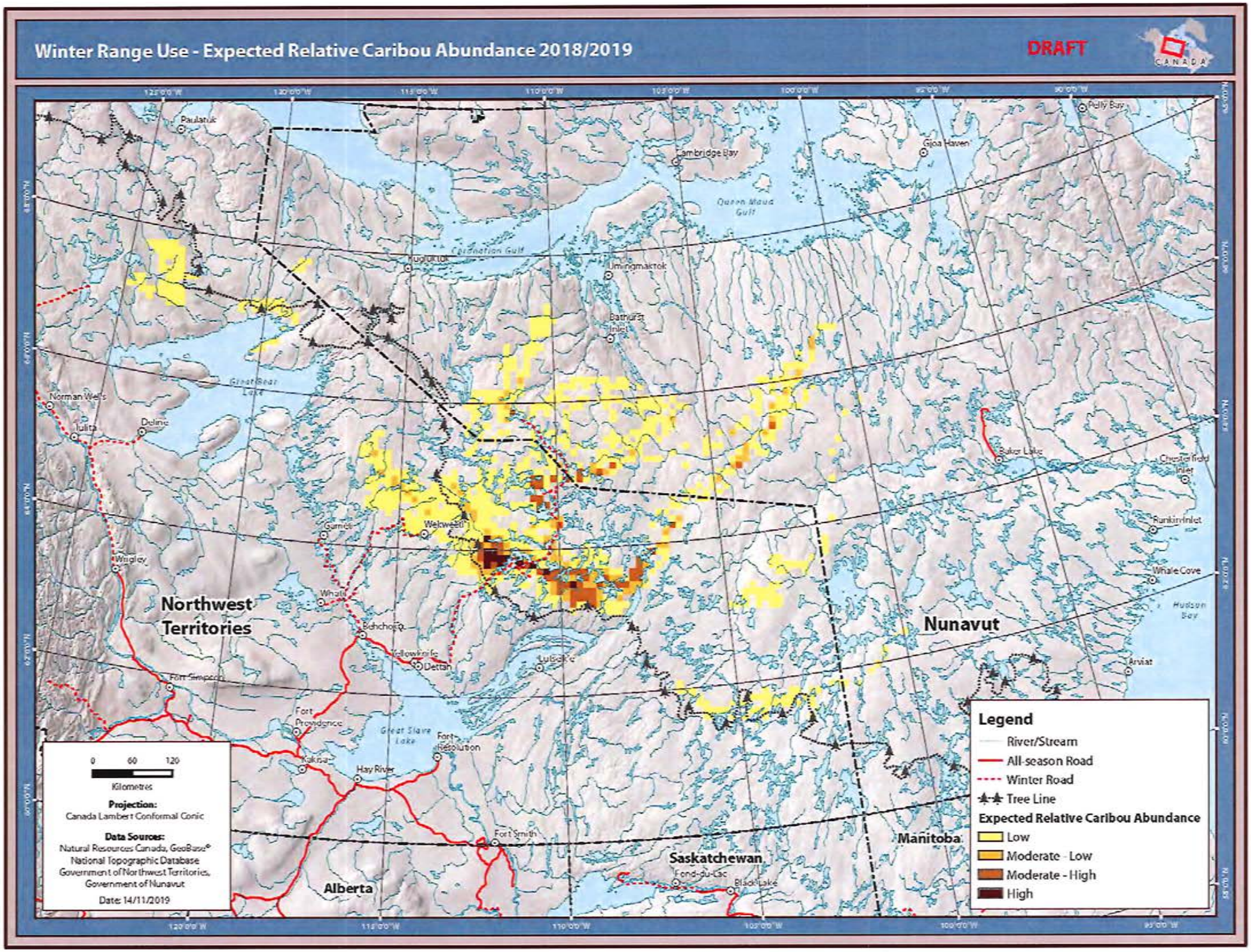


Winter Range Use - Expected Relative Caribou Abundance 2015/2016
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Wrigley
Gameti
Wekweeti
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Kakisa
Hay River
Great Slave Lake
Fort Resolution
Fort Smith
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Arviat
Northwest Territories
Nunavut
Manitoba
Saskatchewan
Alberta
Fond-du-Lac
Black Lake
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 14/11/2019
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Expected Relative Caribou Abundance
Low
Moderate - Low
Moderate - High
High

Winter Range Use - Expected Relative Caribou Abundance 2016/2017

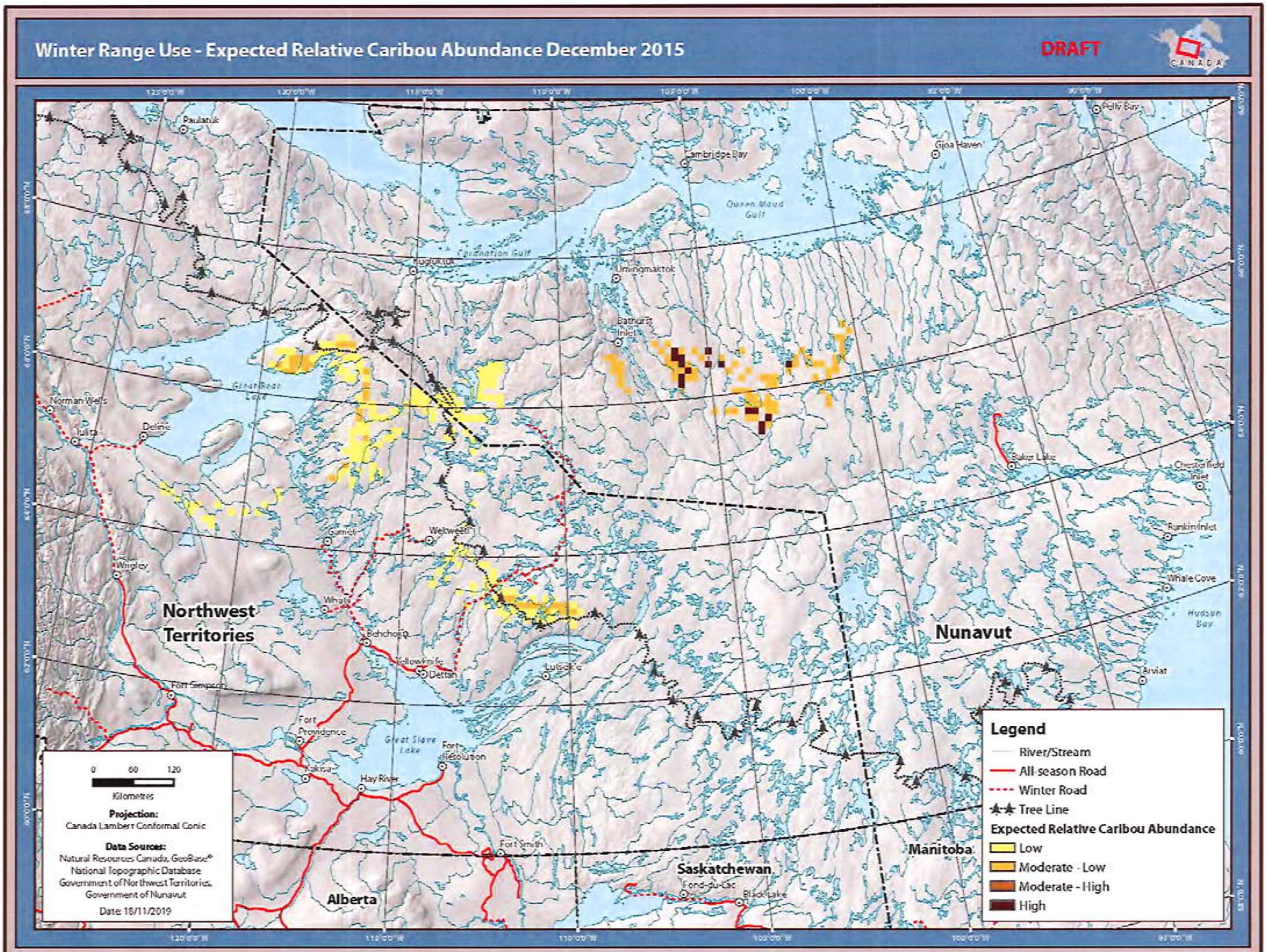



Winter Range Use - Expected Relative Caribou Abundance 2017/2018
DRAFT
CANADA
Paulatuk
Norman Wells
Tulita
Deline
Wrigley
Great Bear Lake
Kugluktuk
Coronation Gulf
Cambridge Bay
Queen Maud Gulf
Gjoa Haven
Pelly Bay
Umingmaktok
Bathurst Inlet
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Arviat
Gameti
Wekweeti
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Kakisa
Hay River
Great Slave Lake
Fort Resolution
Fort Smith
Fond-du-Lac
Black Lake
Northwest Territories
Nunavut
Alberta
Saskatchewan
Manitoba
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 14/11/2019
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Expected Relative Caribou Abundance
Low
Moderate - Low
Moderate - High
High

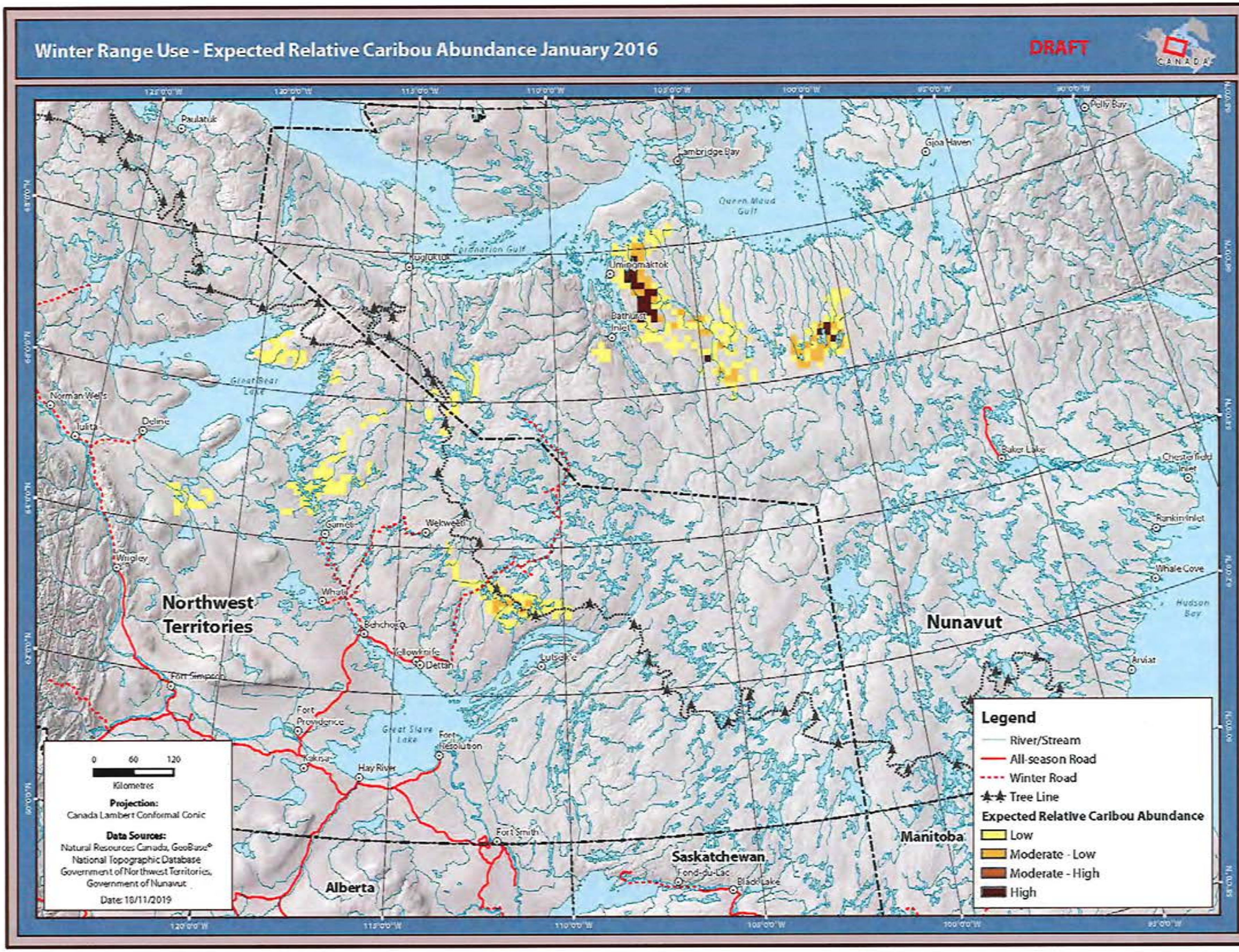


Winter Range Use - Expected Relative Caribou Abundance 2018/2019
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Wrigley
Gameti
Wekweeti
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Kakisa
Hay River
Great Slave Lake
Fort Resolution
Fort Smith
Fond-du-Lac
Black Lake
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Arviat
Northwest Territories
Nunavut
Manitoba
Saskatchewan
Alberta
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 14/11/2019
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Expected Relative Caribou Abundance
Low
Moderate - Low
Moderate - High
High

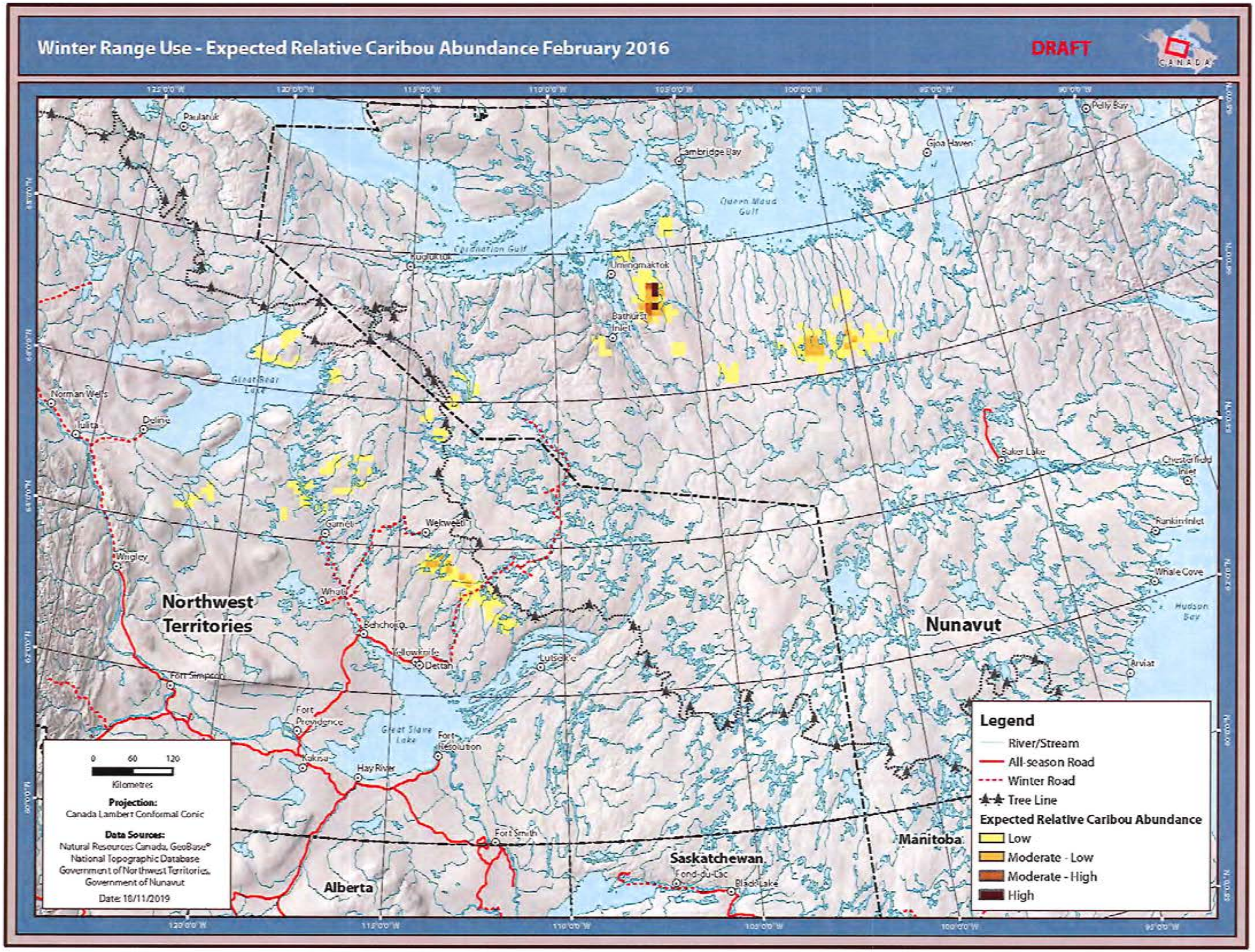
Appendix 9-G: Monthly Expected Relative Abundance

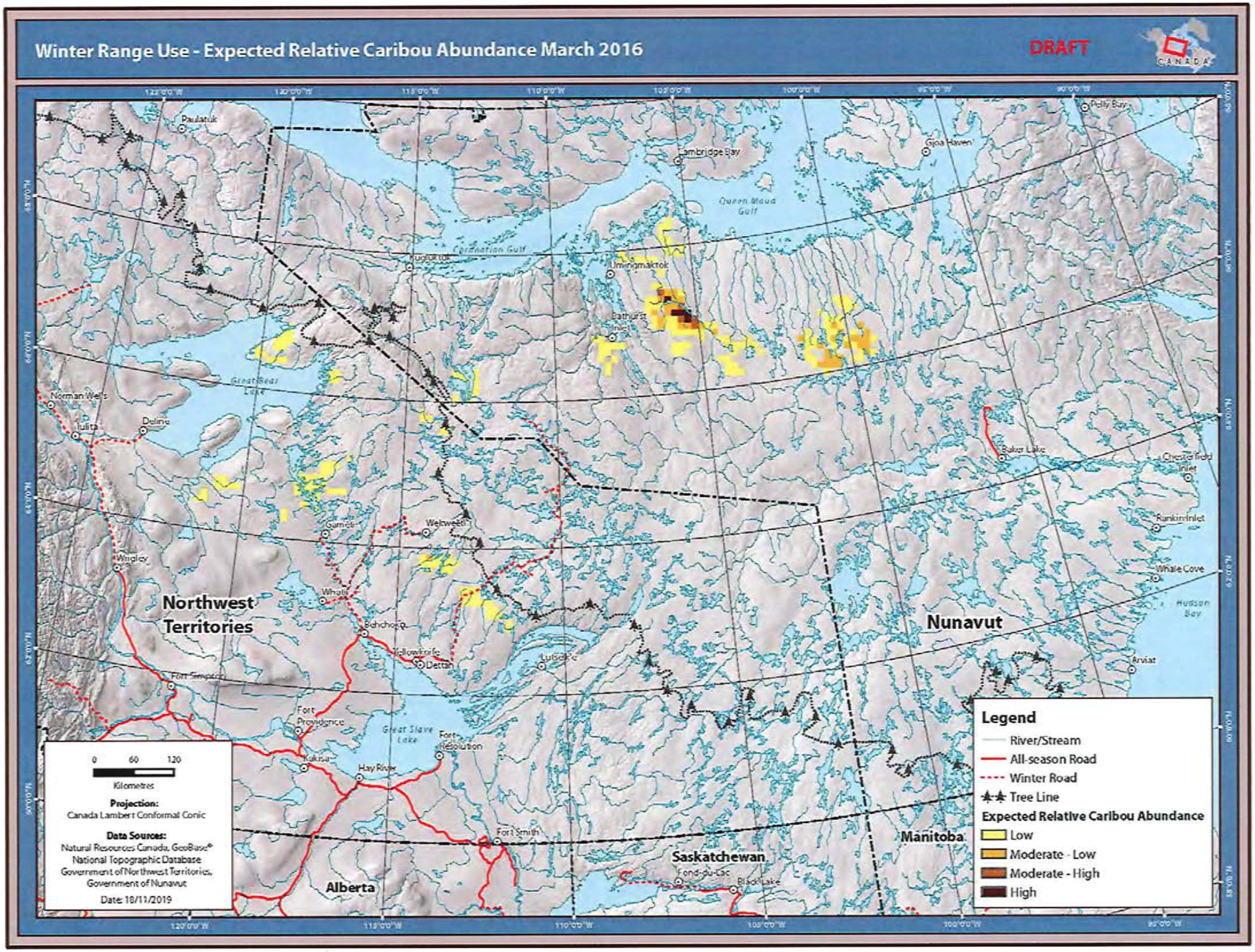


Winter Range Use - Expected Relative Caribou Abundance December 2015
DRAFT
CANADA
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Expected Relative Caribou Abundance
Low
Moderate - Low
Moderate - High
High
0
60
120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 18/11/2019
Northwest
Territories
Nunavut
Alberta
Saskatchewan
Manitoba
Paulatuk
Norman Wells
Tulita
Deline
Wrigley
Fort Simpson
Fort Providence
Kakisa
Hay River
Fort Resolution
Great Slave Lake
Great Bear Lake
Behchoko
Yellowknife
Dettah
Whati
Gameti
Wekweeti
Lutselk'e
Fort Smith
Fond-du-Lac
Black Lake
Kugluktuk
Coronation Gulf
Cambridge Bay
Queen Maud Gulf
Umingmaktok
Bathurst Inlet
Gjoa Haven
Pelly Bay
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Arviat
Hudson Bay

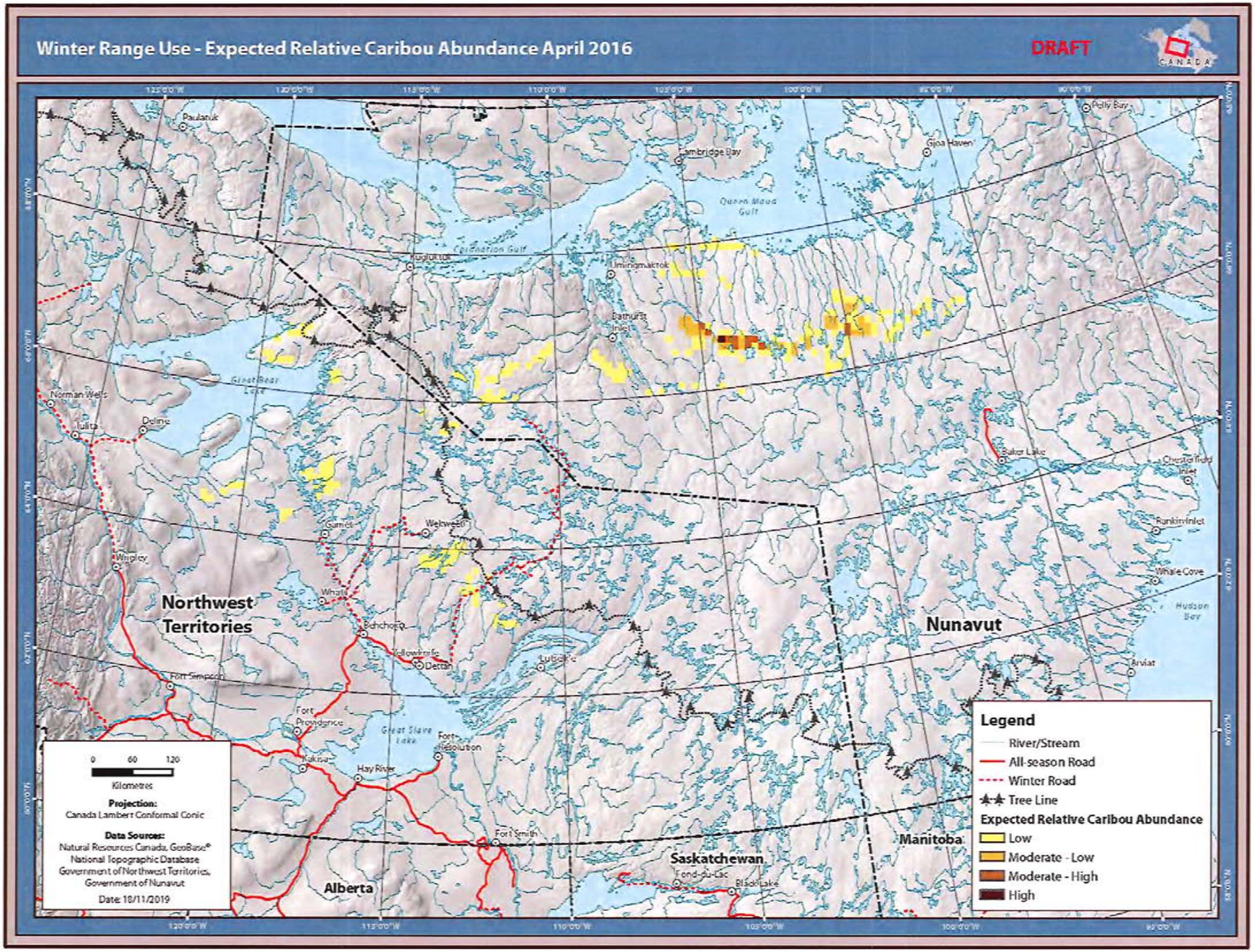


Winter Range Use - Expected Relative Caribou Abundance January 2016
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Arviat
Gamètì
Wekweètì
Wrigley
Whatì
Behchokǫ̀
Yellowknife
Dettah
Lutselk'e
Northwest Territories
Nunavut
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Alberta
Saskatchewan
Manitoba
Fond-du-Lac
Black Lake
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 18/11/2019
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Expected Relative Caribou Abundance
Low
Moderate - Low
Moderate - High
High

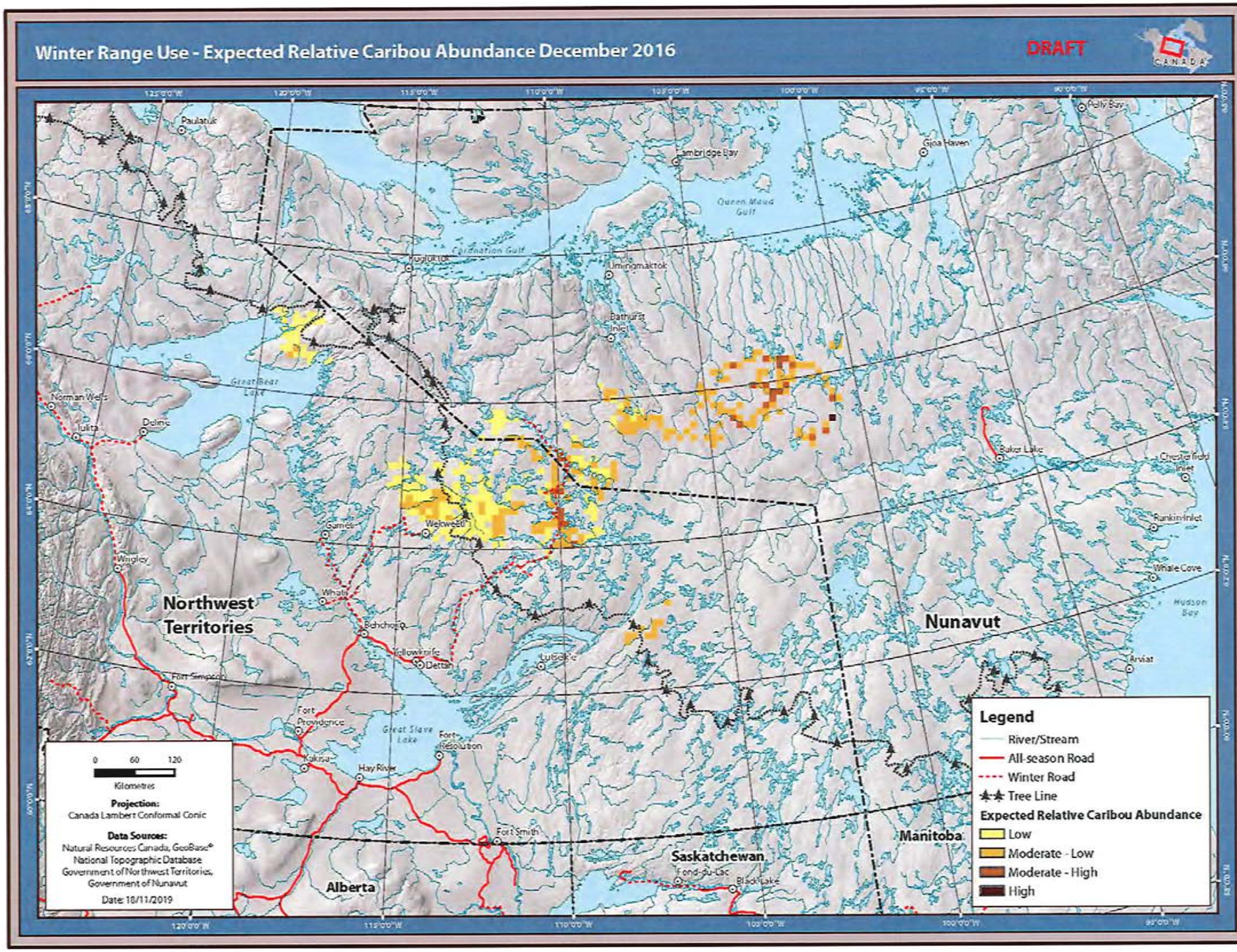

Winter Range Use - Expected Relative Caribou Abundance February 2016
DRAFT
CANADA
Northwest Territories
Nunavut
Alberta
Saskatchewan
Manitoba
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Wrigley
Gameti
Wekweeti
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Kakisa
Hay River
Great Slave Lake
Fort Resolution
Fort Smith
Fond-du-Lac
Black Lake
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Arviat
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 18/11/2019
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Expected Relative Caribou Abundance
Low
Moderate - Low
Moderate - High
High



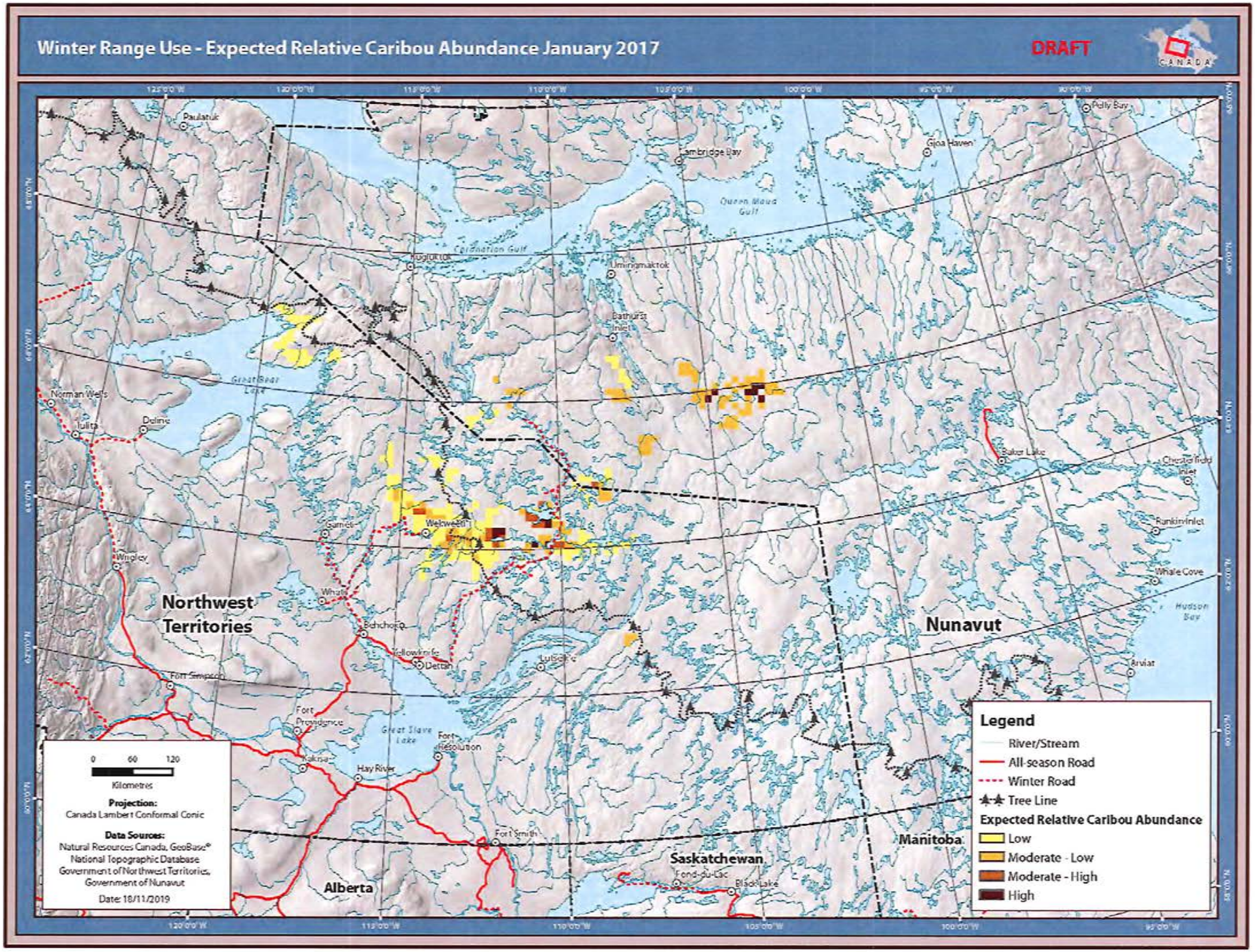
Winter Range Use - Expected Relative Caribou Abundance March 2016
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Arviat
Gameti
Wekweeti
Whati
Wrigley
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Fond-du-Lac
Black Lake
Northwest Territories
Nunavut
Manitoba
Saskatchewan
Alberta
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Expected Relative Caribou Abundance
Low
Moderate - Low
Moderate - High
High
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 18/11/2019

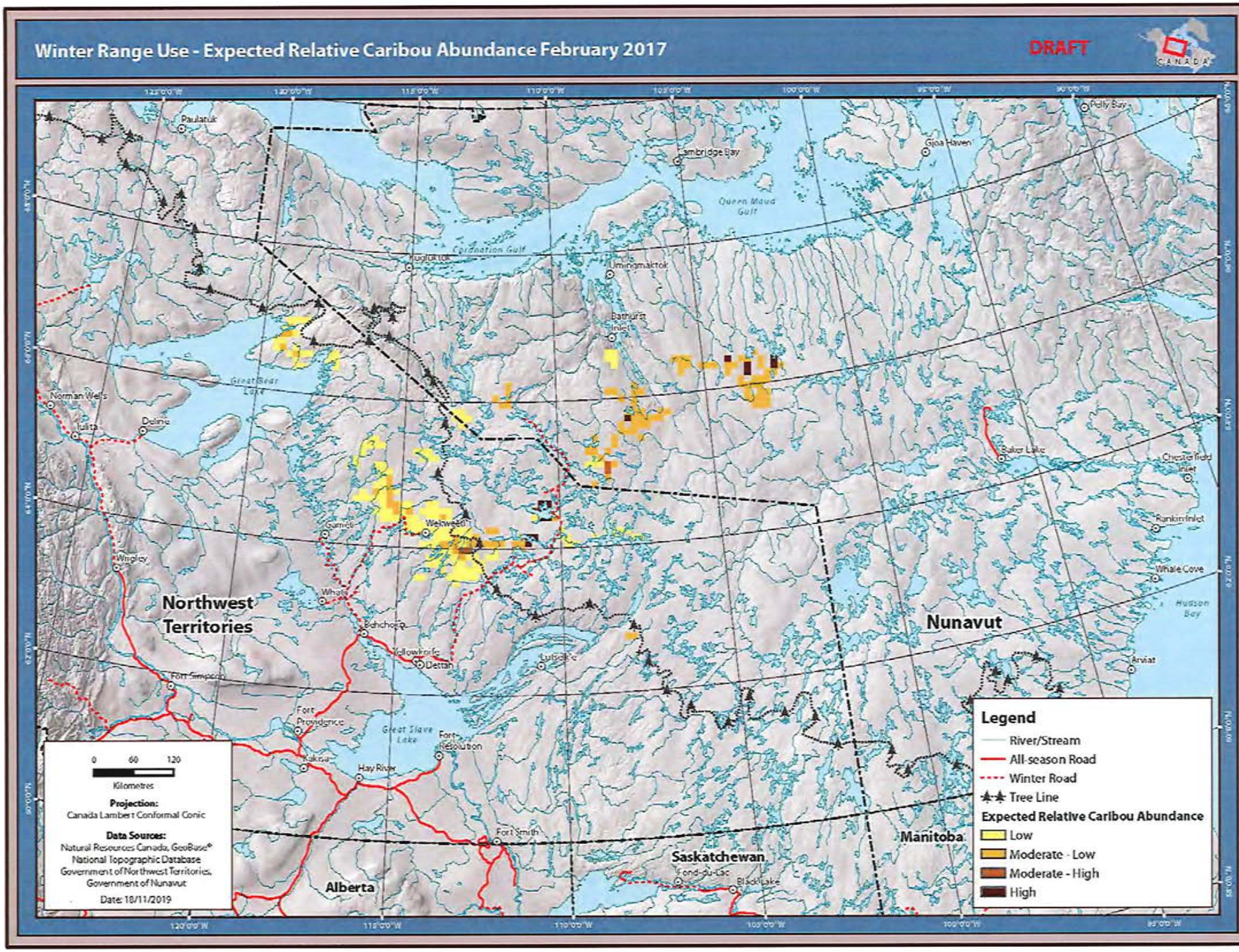


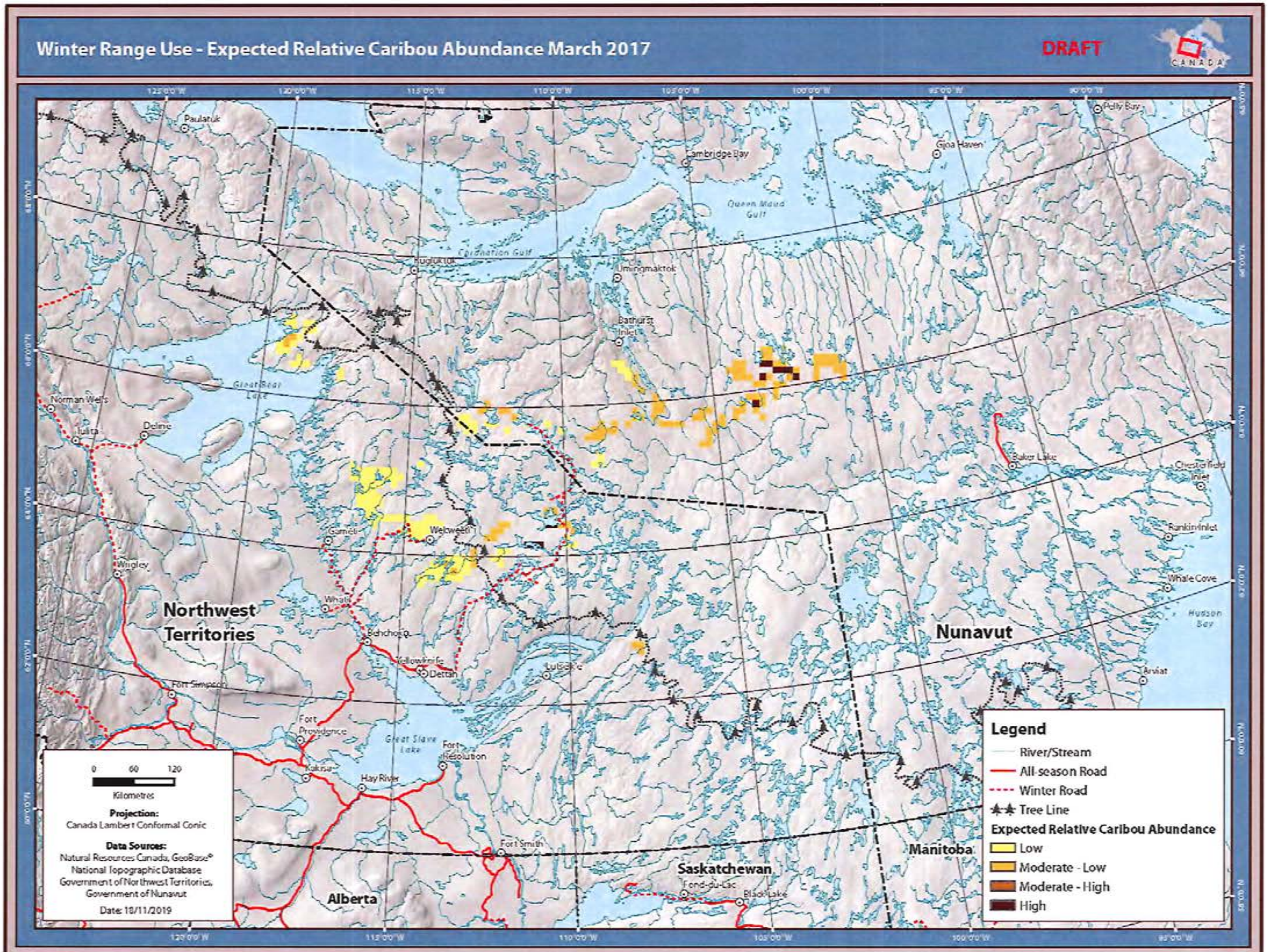
Winter Range Use - Expected Relative Caribou Abundance April 2016
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Gamètì
Wekweètì
Wrigley
Whatì
Northwest Territories
Behchokǫ̀
Yellowknife
Dettah
Lutselk'e
Nunavut
Arviat
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Saskatchewan
Fond-du-Lac
Black Lake
Alberta
Manitoba
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 18/11/2019
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Expected Relative Caribou Abundance
Low
Moderate - Low
Moderate - High
High

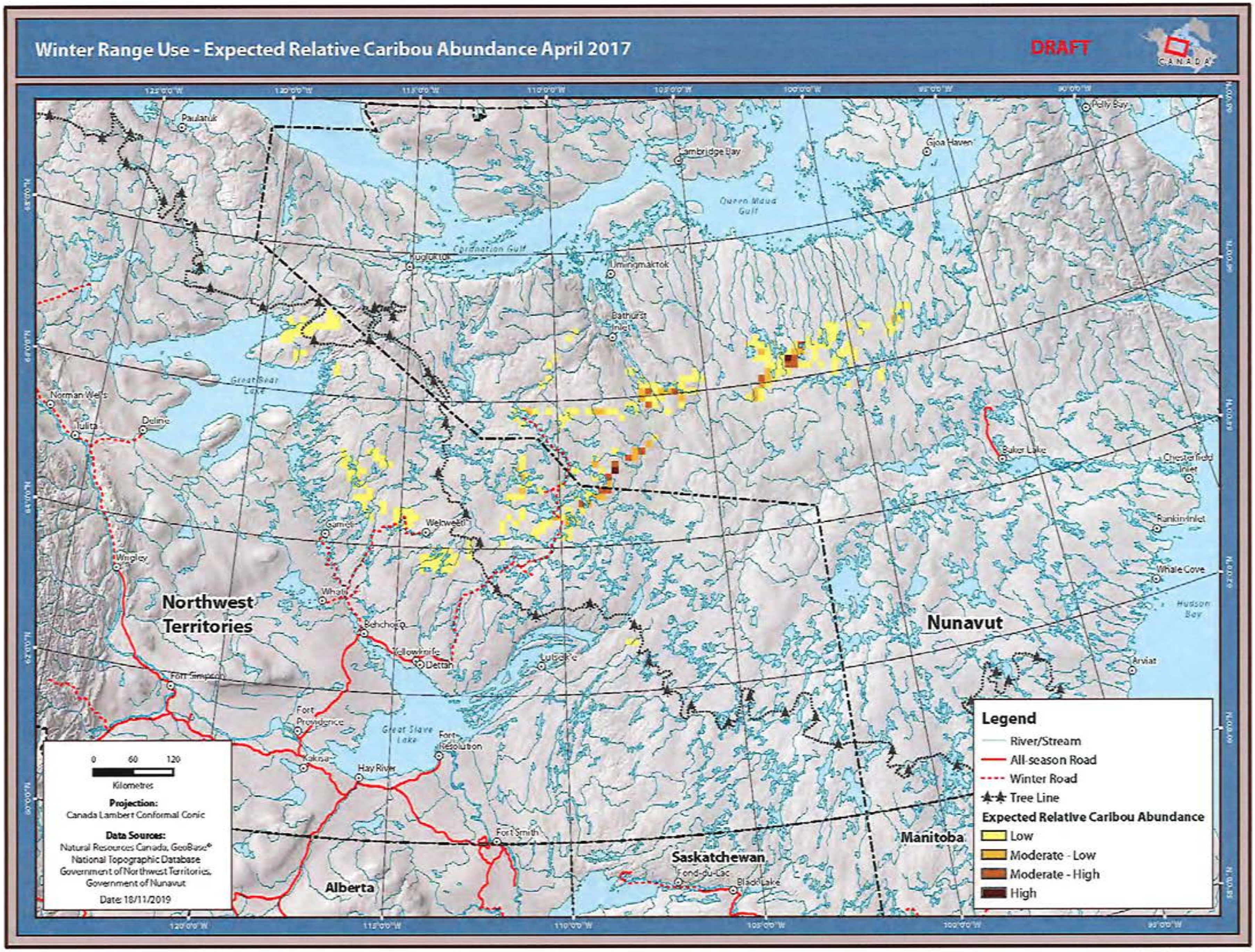


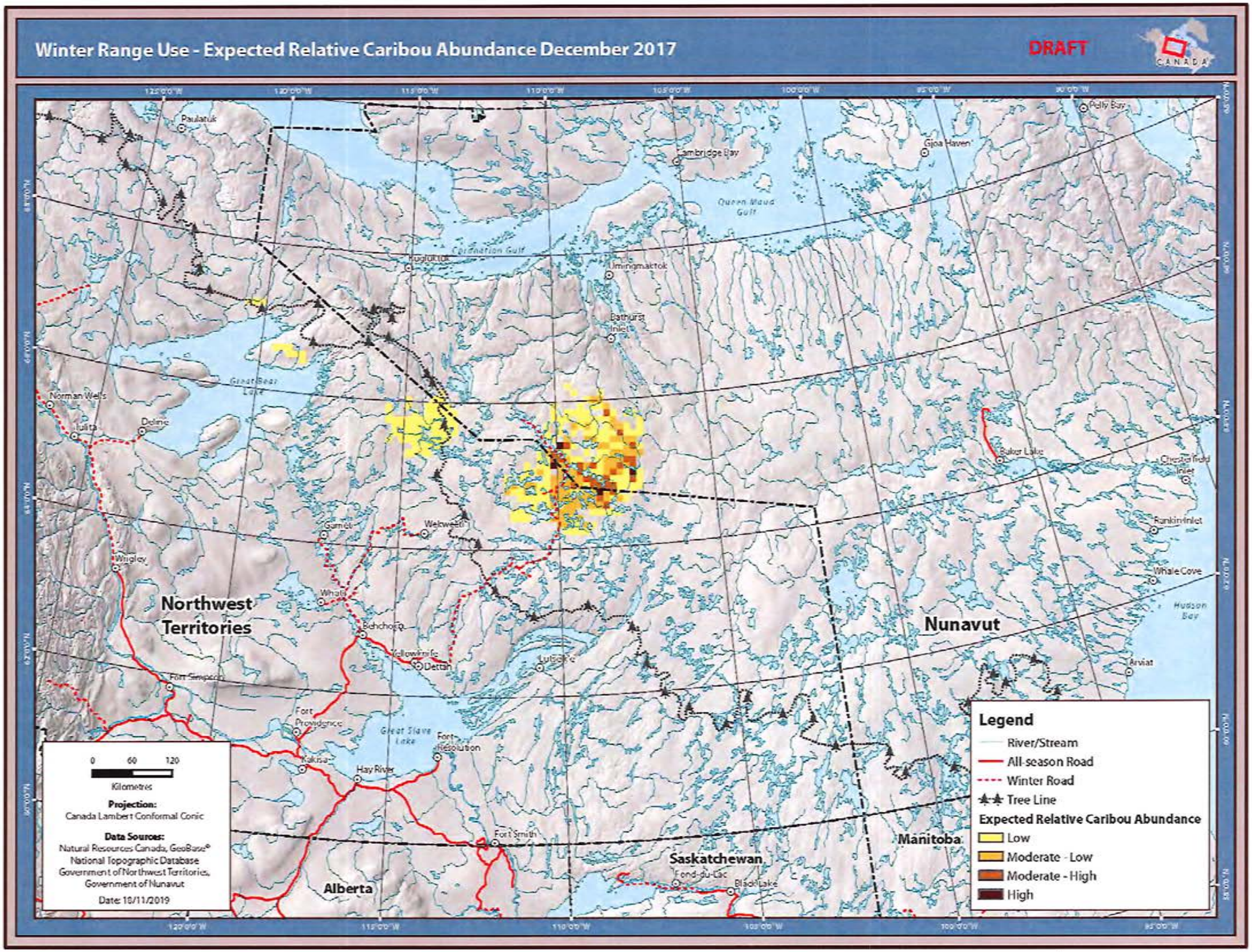
Winter Range Use - Expected Relative Caribou Abundance December 2016
DRAFT
CANADA
Northwest Territories
Nunavut
Manitoba
Saskatchewan
Alberta
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Arviat
Wekweeti
Gameti
Wrigley
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Fond-du-Lac
Black Lake
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Expected Relative Caribou Abundance
Low
Moderate - Low
Moderate - High
High
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 18/11/2019

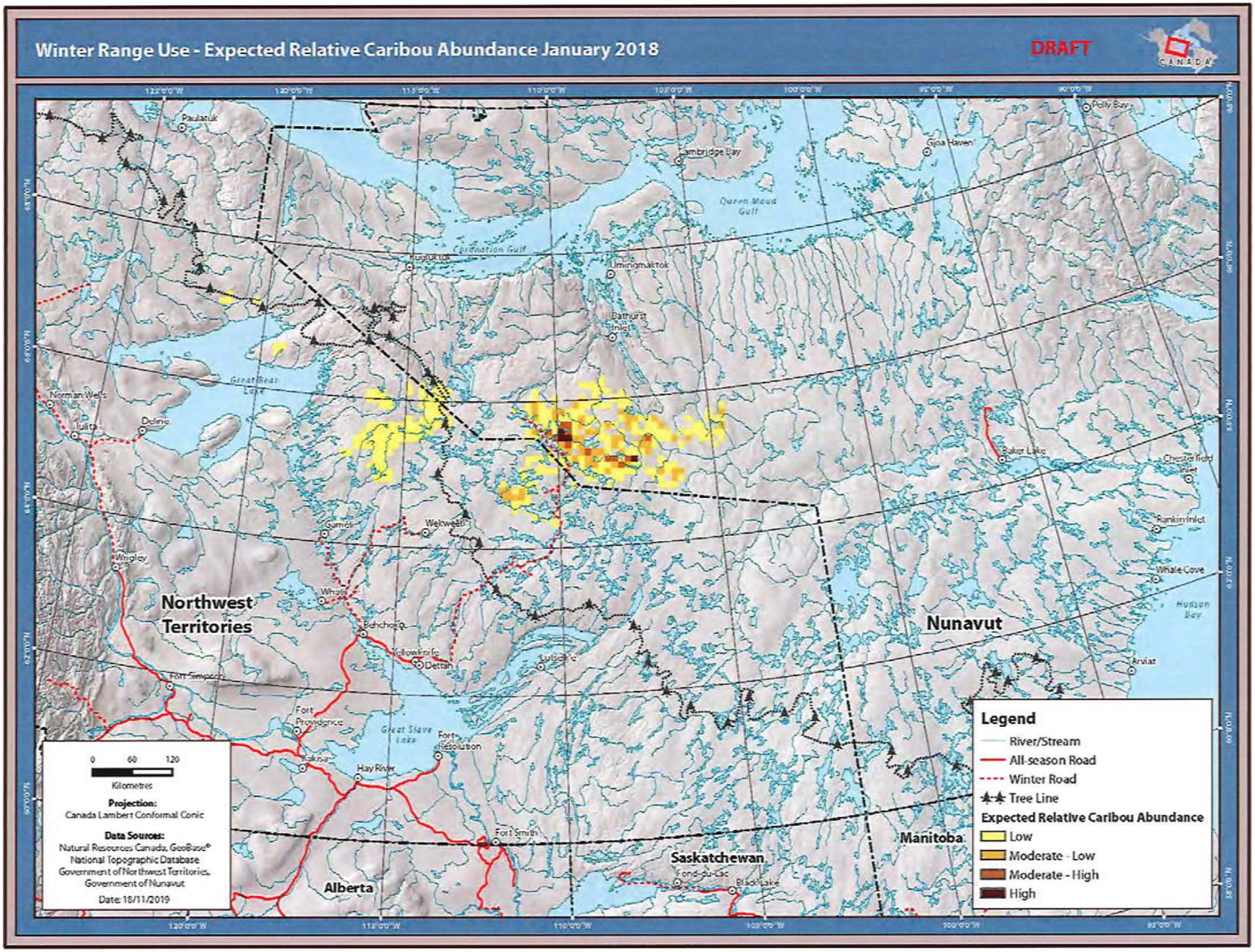

Winter Range Use - Expected Relative Caribou Abundance January 2017
DRAFT
CANADA
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Expected Relative Caribou Abundance
Low
Moderate - Low
Moderate - High
High
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 18/11/2019
Northwest Territories
Nunavut
Alberta
Saskatchewan
Manitoba
Paulatuk
Cambridge Bay
Gjoa Haven
Polly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Arviat
Gameti
Wekweeti
Wrigley
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Fond-du-Lac
Black Lake

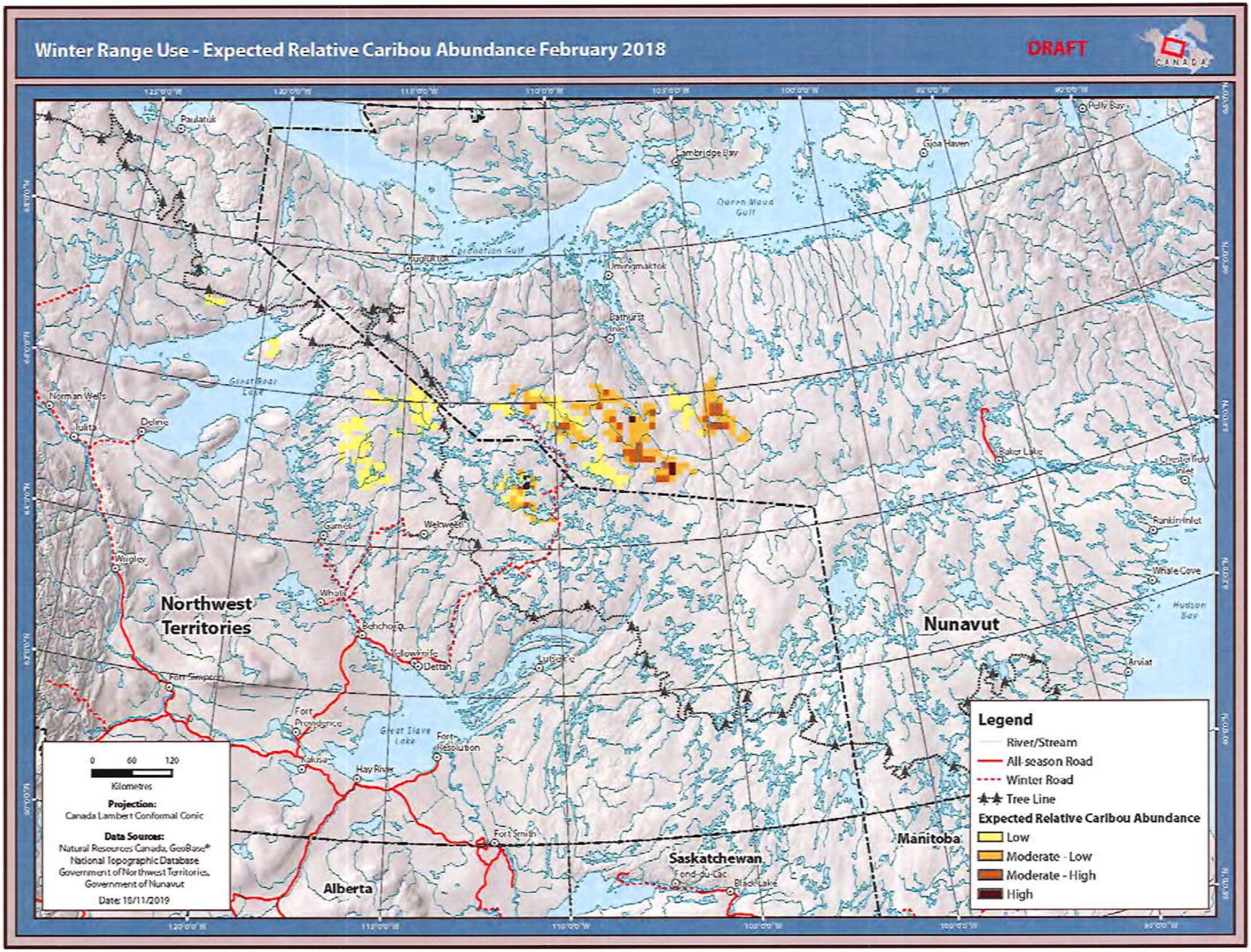

Winter Range Use - Expected Relative Caribou Abundance February 2017
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Arviat
Wekweeti
Gameti
Whati
Wrigley
Northwest Territories
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Nunavut
Manitoba
Saskatchewan
Fond-du-Lac
Black Lake
Alberta
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 18/11/2019
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Expected Relative Caribou Abundance
Low
Moderate - Low
Moderate - High
High


Winter Range Use - Expected Relative Caribou Abundance March 2017
DRAFT
CANADA
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Expected Relative Caribou Abundance
Low
Moderate - Low
Moderate - High
High
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 18/11/2019
Northwest Territories
Nunavut
Alberta
Saskatchewan
Manitoba
Paulatuk
Cambridge Bay
Gjoa Haven
Polly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Arviat
Wrigley
Gameti
Wekweeti
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Kakisa
Great Slave Lake
Fort Resolution
Hay River
Fort Smith
Fond-du-Lac
Black Lake

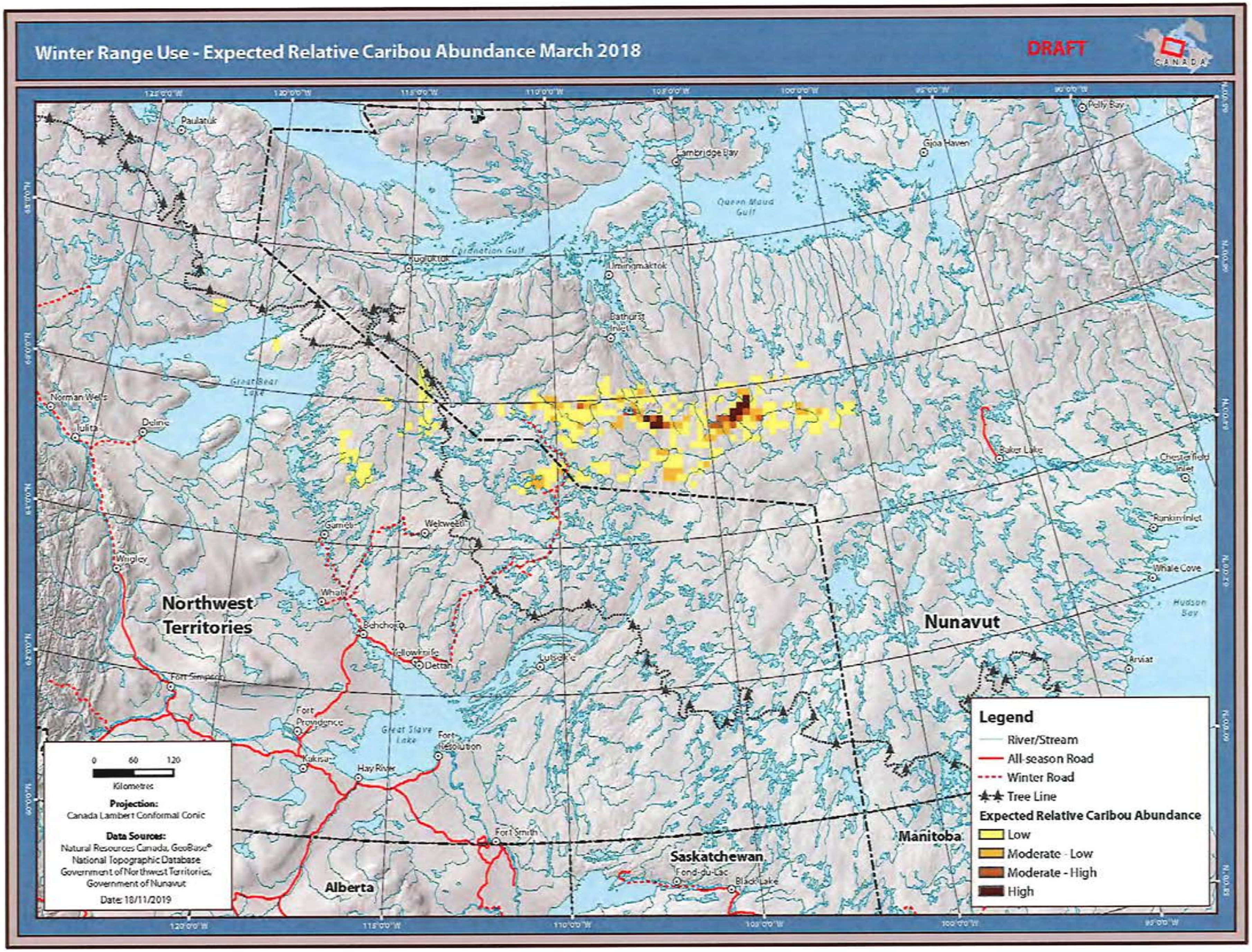

Winter Range Use - Expected Relative Caribou Abundance April 2017
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Arviat
Gameti
Wekweeti
Whati
Wrigley
Northwest Territories
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Nunavut
Manitoba
Saskatchewan
Fond-du-Lac
Black Lake
Alberta
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 18/11/2019
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Expected Relative Caribou Abundance
Low
Moderate - Low
Moderate - High
High

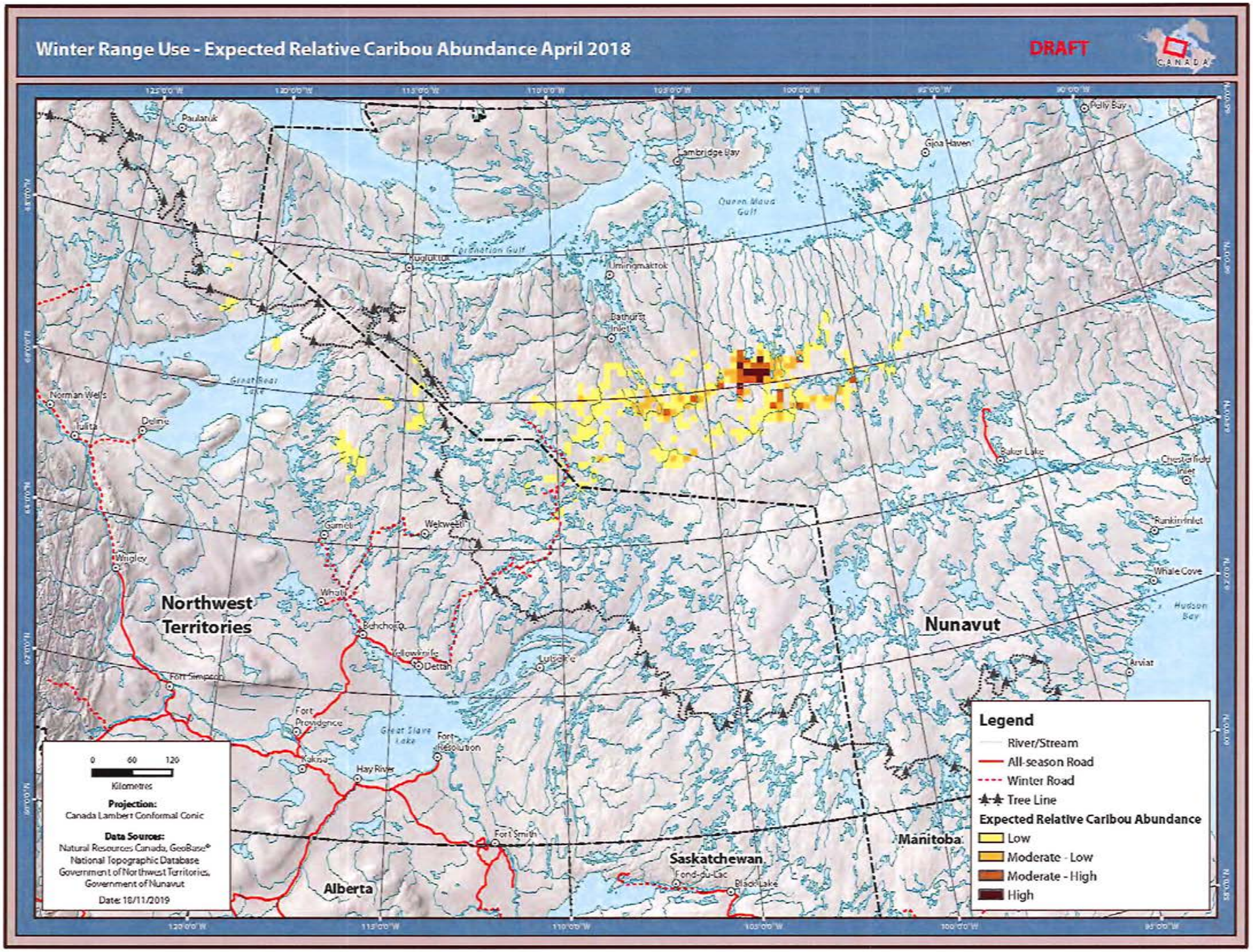

Winter Range Use - Expected Relative Caribou Abundance December 2017
DRAFT
CANADA
Northwest Territories
Nunavut
Alberta
Saskatchewan
Manitoba
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Arviat
Gameti
Wekweeti
Wrigley
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Fond-du-Lac
Black Lake
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 18/11/2019
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Expected Relative Caribou Abundance
Low
Moderate - Low
Moderate - High
High


Winter Range Use - Expected Relative Caribou Abundance January 2018
DRAFT
CANADA
Northwest Territories
Nunavut
Alberta
Saskatchewan
Manitoba
Paulatuk
Norman Wells
Tulita
Deline
Wrigley
Fort Simpson
Fort Providence
Kakisa
Hay River
Fort Resolution
Fort Smith
Great Slave Lake
Great Bear Lake
Whati
Gameti
Behchoko
Yellowknife
Dettah
Wekweeti
Lutselk'e
Kugluktuk
Coronation Gulf
Umingmaktok
Bathurst Inlet
Cambridge Bay
Queen Maud Gulf
Gjoa Haven
Polly Bay
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Arviat
Fond-du-Lac
Black Lake
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Expected Relative Caribou Abundance
Low
Moderate - Low
Moderate - High
High
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 18/11/2019

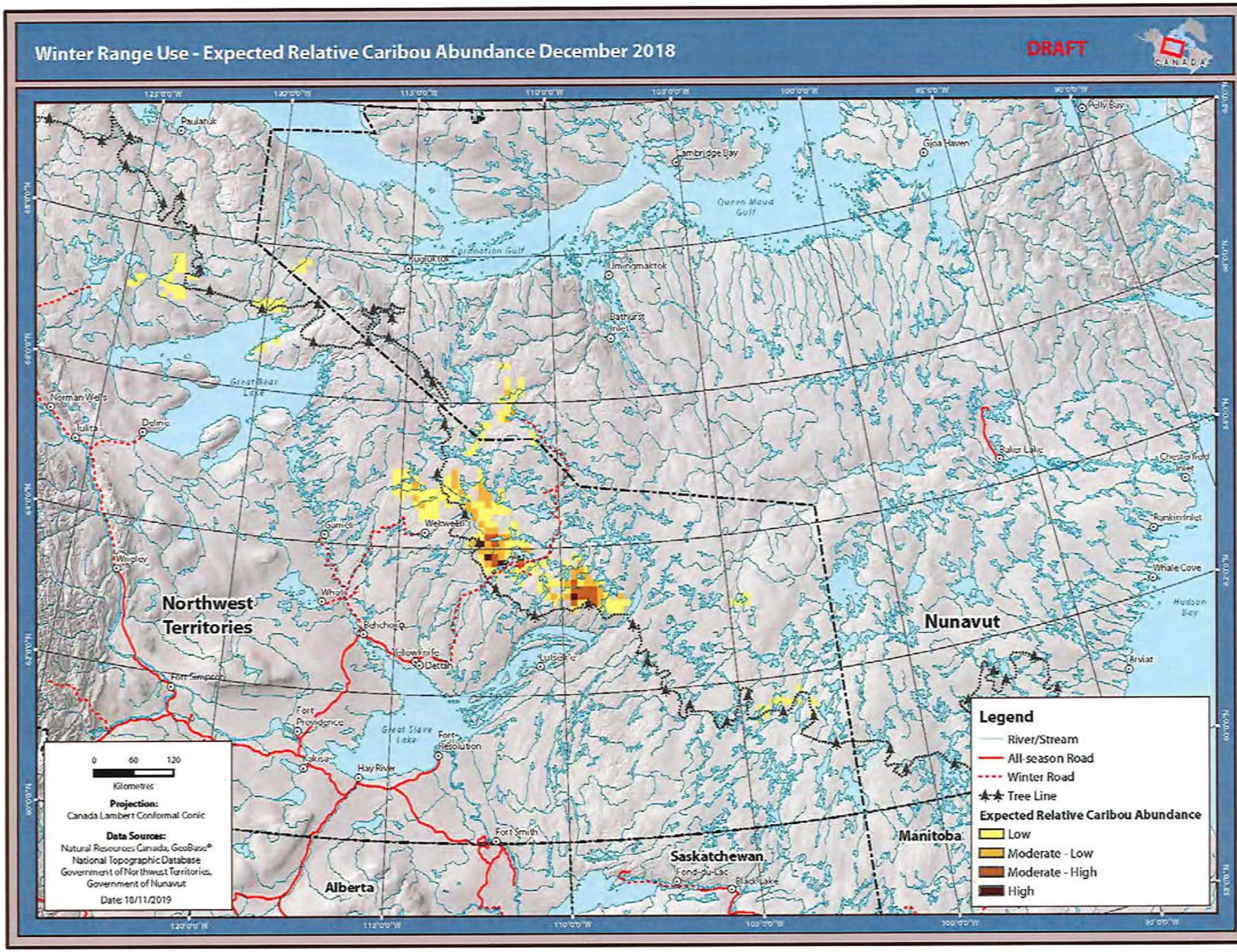


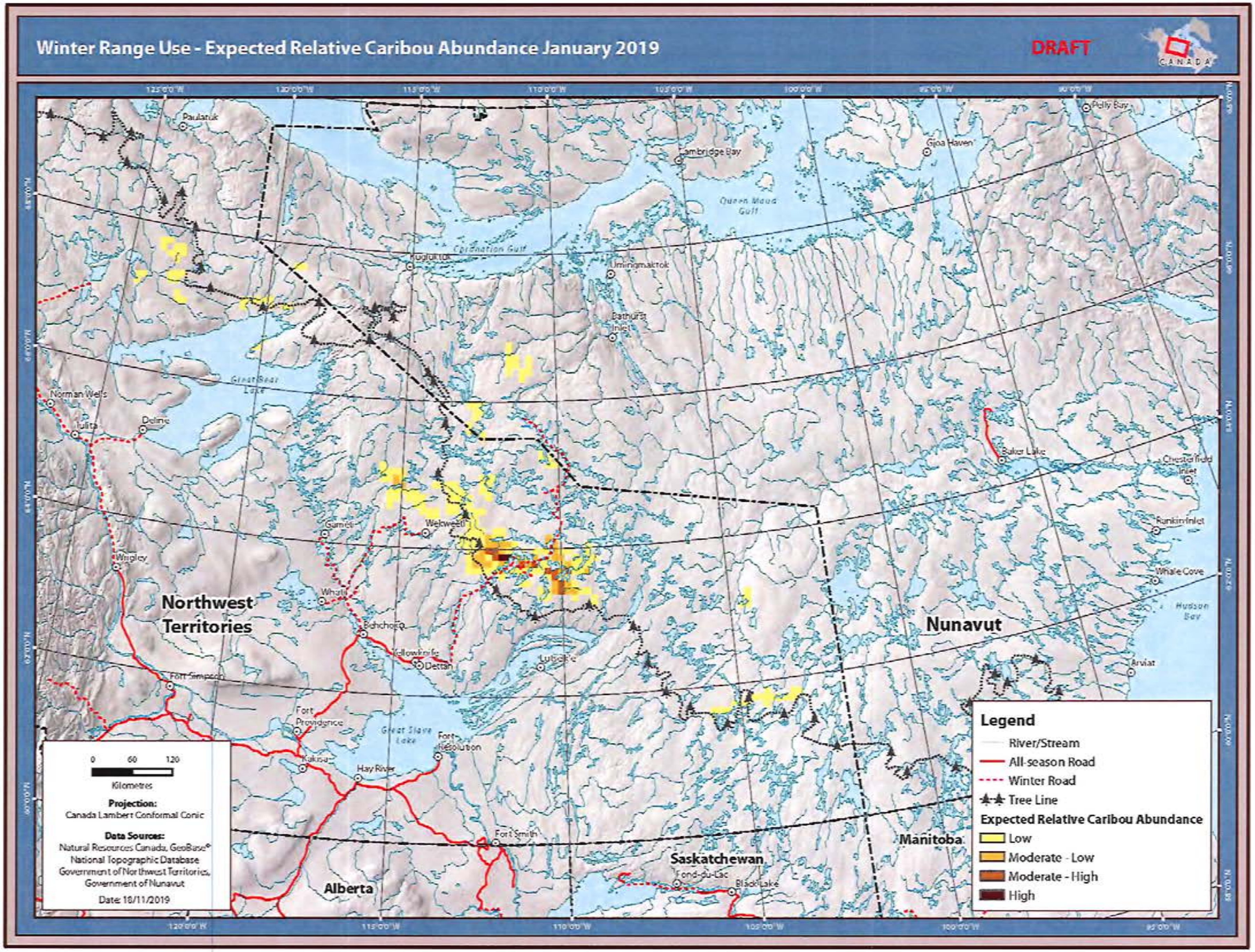
Winter Range Use - Expected Relative Caribou Abundance February 2018
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Wrigley
Gameti
Wekweeti
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Kakisa
Hay River
Great Slave Lake
Fort Resolution
Fort Smith
Fond-du-Lac
Black Lake
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Arviat
Hudson Bay
Northwest Territories
Nunavut
Alberta
Saskatchewan
Manitoba
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Expected Relative Caribou Abundance
Low
Moderate - Low
Moderate - High
High
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 18/11/2019

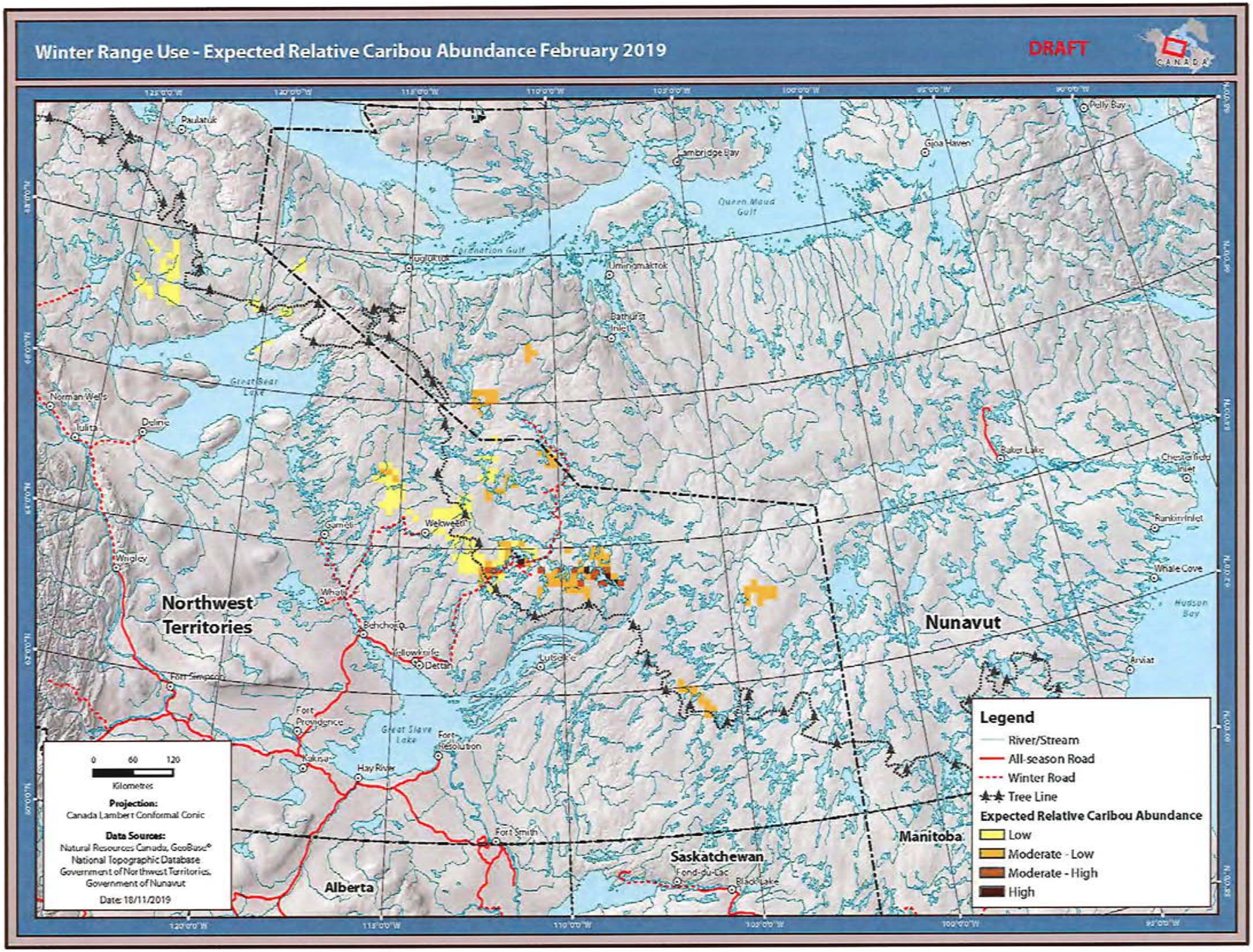

Winter Range Use - Expected Relative Caribou Abundance March 2018
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Polly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Arviat
Gameti
Wekweeti
Wrigley
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Kakisa
Hay River
Great Slave Lake
Fort Resolution
Fort Smith
Fond-du-Lac
Black Lake
Northwest Territories
Nunavut
Manitoba
Saskatchewan
Alberta
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Expected Relative Caribou Abundance
Low
Moderate - Low
Moderate - High
High
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 18/11/2019

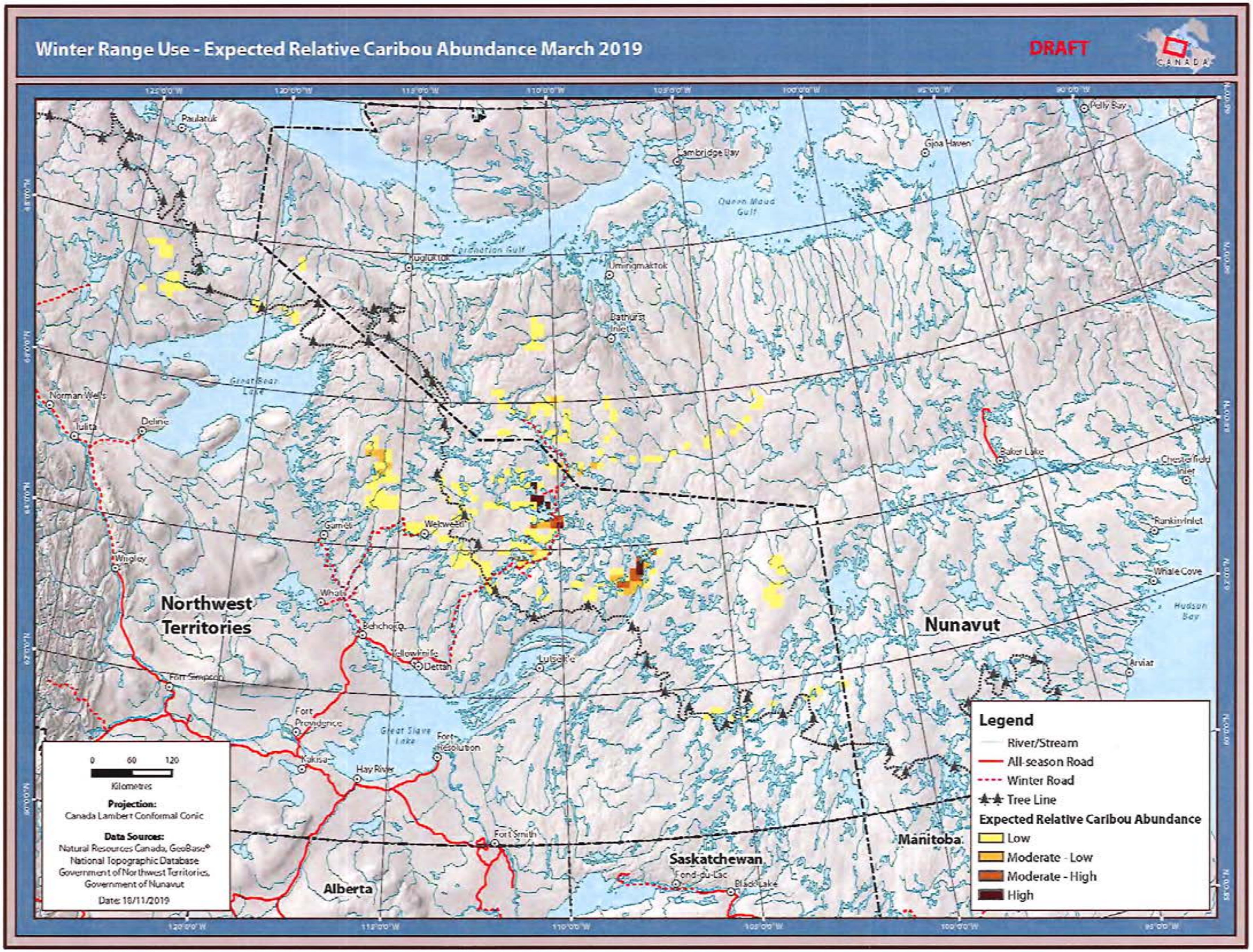


Winter Range Use - Expected Relative Caribou Abundance April 2018
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Arviat
Gameti
Wekweeti
Wrigley
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Kakisa
Great Slave Lake
Fort Resolution
Hay River
Fort Smith
Fond-du-Lac
Black Lake
Northwest Territories
Nunavut
Manitoba
Saskatchewan
Alberta
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 18/11/2019
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Expected Relative Caribou Abundance
Low
Moderate - Low
Moderate - High
High

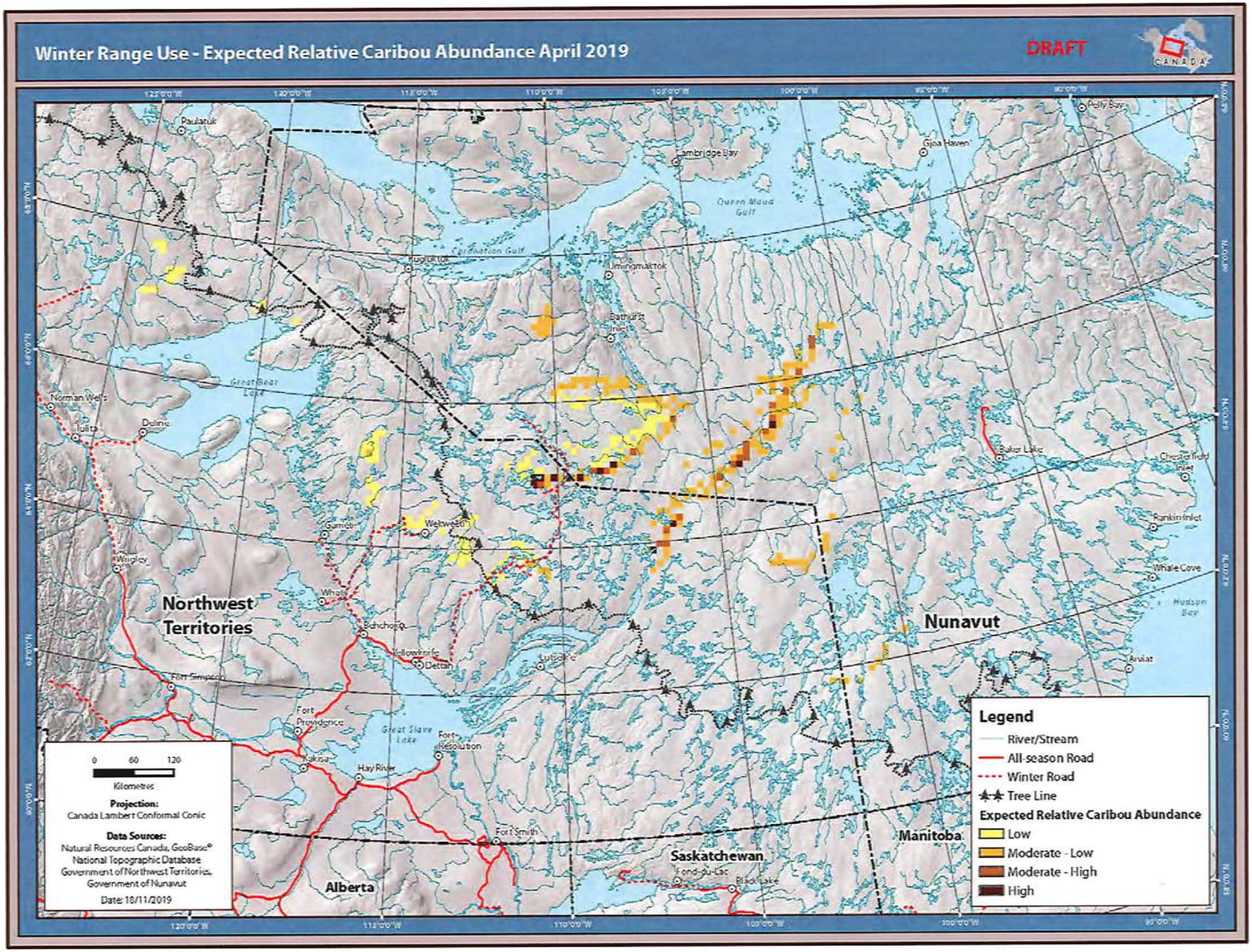

Winter Range Use - Expected Relative Caribou Abundance December 2018
DRAFT
CANADA
Northwest Territories
Nunavut
Alberta
Saskatchewan
Manitoba
Paulatuk
Kugluktuk
Coronation Gulf
Umingmaktok
Bathurst Inlet
Cambridge Bay
Queen Maud Gulf
Gjoa Haven
Pelly Bay
Great Bear Lake
Norman Wells
Tulita
Deline
Wrigley
Wekweeti
Gamete
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Kakisa
Hay River
Great Slave Lake
Fort Resolution
Fort Smith
Fond-du-Lac
Black Lake
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Arviat
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Expected Relative Caribou Abundance
Low
Moderate - Low
Moderate - High
High
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 18/11/2019


Winter Range Use - Expected Relative Caribou Abundance January 2019
DRAFT
CANADA
Northwest Territories
Nunavut
Alberta
Saskatchewan
Manitoba
Paulatuk
Cambridge Bay
Gjoa Haven
Queen Maud Gulf
Coronation Gulf
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Arviat
Gameti
Wekweeti
Wrigley
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Fond-du-Lac
Black Lake
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 18/11/2019
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Expected Relative Caribou Abundance
Low
Moderate - Low
Moderate - High
High


Winter Range Use - Expected Relative Caribou Abundance February 2019
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Arviat
Gameti
Wekweeti
Wrigley
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Northwest Territories
Nunavut
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Saskatchewan
Fond-du-Lac
Black Lake
Manitoba
Alberta
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 18/11/2019
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Expected Relative Caribou Abundance
Low
Moderate - Low
Moderate - High
High

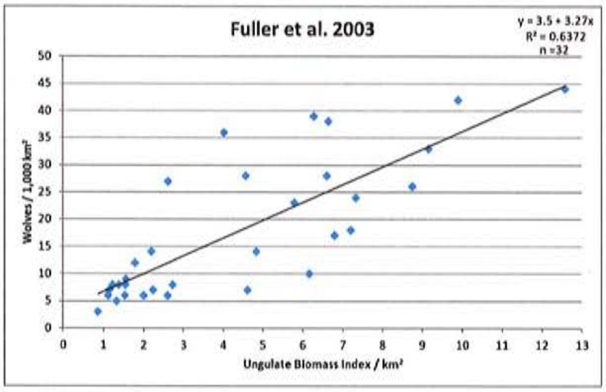


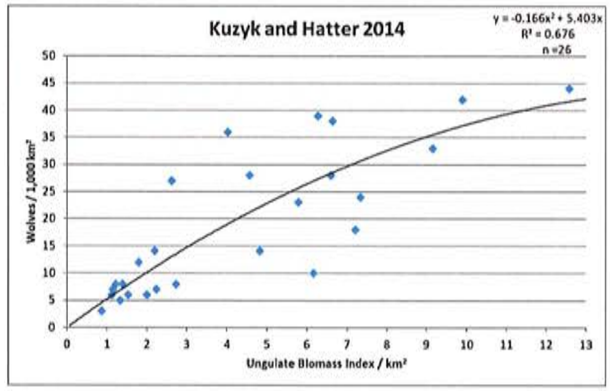
Winter Range Use - Expected Relative Caribou Abundance March 2019
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Polly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Arviat
Gameti
Wekweeti
Wrigley
Whati
Northwest Territories
Nunavut
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Saskatchewan
Fond-du-Lac
Black Lake
Alberta
Manitoba
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 18/11/2019
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Expected Relative Caribou Abundance
Low
Moderate - Low
Moderate - High
High



Winter Range Use - Expected Relative Caribou Abundance April 2019
DRAFT
CANADA
Paulatuk
Cambridge Bay
Gjoa Haven
Pelly Bay
Queen Maud Gulf
Coronation Gulf
Kugluktuk
Umingmaktok
Bathurst Inlet
Great Bear Lake
Norman Wells
Tulita
Deline
Baker Lake
Chesterfield Inlet
Rankin Inlet
Whale Cove
Hudson Bay
Arviat
Wekweeti
Gameti
Wrigley
Whati
Behchoko
Yellowknife
Dettah
Lutselk'e
Fort Simpson
Northwest Territories
Nunavut
Fort Providence
Great Slave Lake
Fort Resolution
Kakisa
Hay River
Fort Smith
Saskatchewan
Fond-du-Lac
Black Lake
Manitoba
Alberta
0 60 120
Kilometres
Projection:
Canada Lambert Conformal Conic
Data Sources:
Natural Resources Canada, GeoBase®
National Topographic Database
Government of Northwest Territories,
Government of Nunavut
Date: 18/11/2019
Legend
River/Stream
All-season Road
Winter Road
Tree Line
Expected Relative Caribou Abundance
Low
Moderate - Low
Moderate - High
High

Appendix 10: Ungulate Biomass Regression Model to Estimate Dìga Abundance





Kuzyk & Hatter 2014, p. 880:

We modified the ungulate biomass regression model used by Fuller et al. (2003) in two ways to improve its utility to predict wolf abundance in British Columbia. First, we used a quadratic, rather than linear, equation to recognize the curvilinear relationship in the data and fixed the ordinate intercept to 0 (Cariappa et al. 2011). Secondly, we removed six data points (Fuller et al. 2003: table 6.8) where wolf densities were considered to be independent of ungulate biomass. Adams et al. (2008) reviewed 41 wolf studies in North America and provided evidence that wolf populations compensate for human exploitation rates of <30%. We therefore removed four studies (southwestern MB; south-central AK; interior AK; southern YT) from Fuller et al. (2003) where exploitation rates exceeded 30%. Similarly, we removed two studies (northwestern MN; east-central YT) where wolves were still recolonizing and thus may not have had time to adjust to ungulate biomass.

References

Adams, L.G., R.O. Stephenson, B.W. Dale, R.T. Ahgook and D.J. Demma. 2008. Population dynamics and harvest characteristics of wolves in the Central Brooks Range, Alaska. Wildlife Monographs 170: 1-25.

Cariappa, C.A., J.K. Oakleaf, W.B. Ballard and S.W. Breck. 2011. A reappraisal of the evidence for regulation of wolf populations. Journal of Wildlife Management 75: 726-730.

Fuller, T.K., L.D. Mech and J.F. Cochrane. 2003. Wolf population dynamics. Pages 161–191 in L.D. Mech and L. Boitani, editors. Wolves: behaviour, ecology, and conservation. University of Chicago Press, Chicago, IL.

Kuzyk, G.W. and I.W. Hatter. 2014. Using ungulate biomass to estimate abundance of wolves in British Columbia. Wildlife Society Bulletin 38: 878-883.

Appendix 11: Information Poster (April 28, 2020)

Wolf Management in the North Slave Region

The Department of Environment and Natural Resources (ENR) is conducting aerial wolf removals in April 2020.

This activity is part of a coordinated management approach by ENR and Tłı̨chǫ Government to support the recovery of Bathurst and Bluenose-East caribou.

Aerial wolf removal will be carried out **safely and respectfully.** Wolf removals will not take place near camps, communities or winter roads while they are open.

Wolves and caribou

Wolves are the main predators of barren-ground caribou. Reducing wolf numbers can help give the herds a chance to recover.

Respectful wolf management

- **All wolves targeted for aerial removal will be handled respectfully.**
- **Wolf carcasses will be stored individually and transported to Yellowknife for examination and pelt preparation.**
- **Indigenous harvesters will be involved in preparing wolf pelts as part of the traditional economy.**
- **Wolf carcasses will not enter any Tłı̨chǫ community and the helicopter will not fly over the community while transporting carcasses.**

To learn more about how the Government of the Northwest Territories and the Tłı̨chǫ Government are working to support our barren-ground caribou, contact your local or regional ENR or Tłı̨chǫ Government office.

Tłı̨chǫ Ndek'àowo
Tłı̨chǫ Government
www.tlicho.ca

Government of Northwest Territories
www.enr.gov.nt.ca

Appendix 12: Open Letter to Communities (April 2020)

NOTICE TO COMMUNITIES:

The Bathurst and Bluenose-East barren-ground caribou herds have declined significantly in recent years, despite efforts to reduce hunting pressure and manage disturbance to caribou.

Wolf management is one part of our larger approach to barren-ground caribou recovery, which includes implementation of the Bathurst Caribou Range Plan to ensure the wise management of caribou habitat.

This week, targeted wolf removal will begin on the winter ranges of the Bathurst and Bluenose-East caribou.

This work is part of a coordinated effort with the Tłı̨chǫ Government to reduce the number of wolves that prey on the herds and give the caribou a chance to recover.

All wolves targeted for aerial removal will be handled respectfully. Wolf carcasses will be stored individually and transported directly to Yellowknife for examination and pelt preparation.

Indigenous harvesters have been involved in all our wolf management actions and will continue to be involved in preparing these wolf pelts as part of the traditional economy.

To learn more about how the Government of the Northwest Territories and the Tłı̨chǫ Government are working to support our barren-ground caribou, visit www.enr.gov.nt.ca/barren-ground-caribou.

For more on current wolf management actions: www.enr.gov.nt.ca/en/faq-wolf-management.

Appendix 13: Wolf Management – Frequently Asked Questions (April 2020)

1. Why are the GNWT and Tłı̨chǫ Government taking steps to reduce the number of wolves in the North Slave Region?

The Bathurst and Bluenose-East barren-ground caribou (ekwò) herds have declined significantly in recent years, despite sustained efforts to reduce harvest pressure on the herds, manage development, and protect important habitat. There is an immediate need for additional action to support the herds, and our co-management partners, harvesters and residents have told us that increased wolf management is needed to help the herds recover.

Wolves are the main predator of ekwǫ̀. On average, a single wolf can eat 23-29 caribou per year. Given the current low numbers of Bathurst and Bluenose-East caribou, this level of predation is believed to be a significant contributor to caribou mortality. However, decisions on wolf management must be considered with care. It is important to note that wolf reduction actions are never carried out in isolation, but as part of a larger, coordinated management approach for ekwǫ̀ recovery, which includes implementation of the Bathurst Caribou Range Plan.

2. What actions have been taken so far this winter to reduce wolves on the caribou winter ranges?

The GNWT and Tłı̨chǫ Government approach to wolf management focuses on reducing the number of wolves on the Bathurst and Bluenose-East caribou winter ranges through enhanced support for harvesters. This winter, the GNWT increased incentives under the Enhanced North Slave Wolf Harvest Incentive Program, eliminated fees for wolf tags, and has been offering workshops on wolf harvesting and pelt preparation to further support harvesting efforts. In collaboration with the Government of Nunavut, we are also offering enhanced incentives to Nunavut hunters harvesting in their traditional area within the North Slave Wolf Harvest Incentive Area.

3. How many wolves will be removed this year from the caribou winter ranges?

The goal of wolf reduction actions is to remove 60% to 80% of wolves from the winter ranges of the Bathurst and Bluenose-East caribou herds over a period of five years. Experience elsewhere shows this level of sustained removal is necessary to support an increase in caribou cow and calf survival rates, as wolf populations can rebound quickly once management actions are no longer applied.

The GNWT has updated its initial targets for wolf removals based on new information from harvesters and aerial surveys and other field work carried out in March. As the Bathurst and Bluenose-East caribou herds were separated on their winter ranges this year with limited mixing, we were able to set separate targets for the wolves associated with each herd.

Based on our analysis of the latest scientific, traditional and local knowledge, the GNWT has determined that removing 27-37 wolves from the winter range of Bathurst herd and 66-90 wolves from the Bluenose-East winter range would give these herds the best chance to recover. These ranges reflect our goal of 60-80% wolf reduction. However, it is important to remember these are estimates, and may need to be adjusted as new information becomes available.

4. **How will these wolves be removed?**
Wolf harvesters from both the Northwest Territories and Nunavut have been harvesting wolves since January, supported by increased incentives from the GNWT and the Government of Nunavut. However, fewer wolves have been harvested than expected this year on the winter ranges of the Bathurst and Bluenose-East herds. To achieve 60-80% removal rates, aerial removal will be required this year.

5. **Where and when will aerial removals take place?**
The goal of the wolf reduction actions proposed by the GNWT and Tłįchǫ Government is to remove wolves on the winter ranges of the Bathurst and Bluenose-East caribou to promote caribou recovery. This is the same area where hunters have been receiving increased incentives: the North Slave Wolf Harvest Incentive Area (see map below).

   Aerial removal will take place in April, while the wolves are still in the NWT. Once spring migration begins in early May, Bathurst and Bluenose-East caribou and the wolves that travel with them will move into Nunavut, where they remain until late fall. As a result, the GNWT will not be carrying out any wolf reduction activities through the spring and summer.

6. **Is this activity safe? What about communities and people traveling in the area?**
Aerial wolf removal will be carried out safely and respectfully, with consideration of nearby communities and other activities in the area. *Wolf removals will not take place near camps, communities or the winter road while it is open.*

7. **What happens to the wolf carcasses and pelts?**
Wolves removed from the winter ranges of Bathurst and Bluenose-East caribou will be stored individually and transported to Yellowknife for examination and pelt preparation. The carcasses will be studied to learn more about the diet and life history of wolf populations. Indigenous harvesters will be involved in preparing the wolf pelts as part of the traditional economy.

8. **How can the GNWT and Tłįchǫ Government be sure these measures will be effective?**
There are many complicated factors that contribute to population decline among ekwǫ̀ herds, including natural fluctuations in population. These proposed wolf reduction actions are one part of a larger approach being taken by the GNWT, Tłįchǫ Government and our co-management partners to support recovery of our ekwǫ̀ herds.

Experience from other jurisdictions shows that sustained pressure on wolf populations can help increase caribou survival rates. However, it is important to remember that determining the success of this initiative will take time. Information collected from harvesters and satellite collars, along with scientific analysis, will help us learn more about wolves and assess the effectiveness of our management actions over the next five years.

These actions will be adjusted within and between seasons using the latest scientific, traditional and local knowledge—and will be carefully reviewed every year to determine whether actions should continue.

Appendix 14: Tłı̨chǫ Knowledge

The traditional territory of the Tłıçhǫ is vast, and the network of hunting trails extends far into every corner of their lands. The four Tłıçhǫ communities of Behchokǫ̀, Whatì, Gamètì and Wekweètì are located in the boreal forest, and the land stretches far north of the treeline into the tundra, where many ekwǫ̀ hunting grounds are located. The traditional land use areas of the Tłıçhǫ lie within the boundary known as "*Mǫwhì Gogha Dè N ıı̨ łèè,*" which was outlined by Chief Mǫhwhıì during the negotiations of Treaty 11 in 1921 (Helm 1994). The modern treaty area of *Mǫwhì Gogha Dè N ıı̨ łèè* is described in an illustrative map to the Tłıçhǫ Agreement (Tłı̨chǫ Government 2003). The traditional land consists of the area between Great Slave Lake and Great Bear Lake, from the Horn Plateau in the southwest, and as far north as the Coppermine River and Contwoyto Lake (Tłıçhǫ Government 2017 and 2018).

From time immemorial, the barrenland was populated with Inuit and Dene families. Several Inuit families lived and hunted along Contwoyto Lake as well as the large lakes further south to the treeline. From the treeline and north, Dene families lived and hunted as far north as Contwoyto Lake, and some harvested further north towards the Arctic coast. On numerous occasions, Inuit and Dene families met on the barrenlands. The Tłıçhǫ families traveled by canoe and canvas boat to the barrenlands in the fall to hunt caribou. They camped in certain locations with a secure wood supply, such as Ts'iedaa on Ewaànıt'ııtì (Courageous Lake). While the women and children remained in camp, the trappers ran their dog teams along the shoreline of the large lakes further north towards Contwoyto Lake (Kǫ̀k'èetı). These harvesters hunted caribou and trapped dìga, white fox and wolverine throughout the winter months. When spring arrived with warmer temperatures and sunlight, the Tłıçhǫ trappers and their families returned south while the ice was still strong enough to hold the dog teams (Tłı̨chǫ Government 2018).

Times have changed from when Tłıçhǫ families used to travel on the barrenlands to hunt ekwǫ̀. Ekwǫ̀ are not as plentiful as they used to be back then. Ekwǫ̀ being a staple to the Tłıçhǫ diet and a key species that connects them to their cultural way of life, the Tłıçhǫ have taken it amongst themselves to be stewards of their lands by managing and monitoring the resources within their lands. The Ekwǫ̀ Nàxoèhdee Kè (Boots on the Ground) program (initiated in 2016) and the Community-based Diga harvesting program (initiated in winter 2019/2020) are two programs that have been implemented by Tłıçhǫ Government to help conserve the ekwǫ̀ populations.

Ekwǫ̀ Nàxoède K'è

Ekwǫ̀ Nàxoèhdee Kè (Boots on the Ground) is a *Kǫ̀k'èetì ekwǫ̀* (Bathurst caribou) monitoring program based upon the traditional knowledge (TK) of Tłıçhǫ and Inuit indigenous elders and harvesters. The objectives are to monitor the conditions of *Kǫ̀k'èetì ekwǫ̀* on the summer range, focusing on four key indicators: (1) habitat, (2) *ekwǫ̀* health, (3) predators and (4) industrial development.

Ekwǫ̀ Nàxoèhdee Kè adopts a biocultural approach to emphasize the Tłı̨chǫ as well as Inuit knowledge of the ecosystem in which they live. Biocultural approaches explore the link between biological and cultural diversity, and their interdependency with one another. Our framework of research is based upon two methodologies developed over the course of the program named "We Watch Everything" and "Do as Hunters Do." Tłı̨chǫ learned that the success of the program is dependent on following exactly what local harvesters and elders have always done on the lake: travel similar routes; set camp at the same historical campsites and walk the same trails. The act of monitoring became an act of trying to position oneself at places where one anticipates Ekwǫ̀ will move through. In Tłı̨chǫ, *Kǫ̀k'èetì* literally means empty campsite lake, and refers to the many old campsites that have been made at the lake over time. These campsites were chosen for a purpose; namely, for protection from wind or proximity to hunting locations. The program used the same sites for the same reasons (Tłı̨chǫ Government 2019).

Ekwǫ̀ are a keystones species because of their ecological influence as a herbivore on the plant communities and as a key source of food for predators and scavengers including Dıga̜, Sahcho (grizzly bear), Nǫ̀gha (wolverine), Ets'imbaa (Arctic fox) and Det'ǫcho (eagle). As their primary predator, dıga̜ rely on ekwǫ̀ for food and have a powerful influence on their daily behaviour, and seasonal patterns of migration and habitat use. Dıga are often seen denning or traveling near a water crossing, knowing that ekwǫ̀ will, at one point, enter the narrow funnel. There, a kill can be made with less effort than attempting to hunt one down on open ground.

Over the past four years, observations of dìga activity on the summer range has increased. Tłı̨chǫ monitoring efforts have increased yearly, which has improved the chances of wildlife encounters. The frequency of dìga observations during summer months has increased greatly throughout the years (table 1).

Table 35. Results from Ekwǫ̀ Nàxoèhdee Kè since the program has been established in 2016.

Year	Total Dìga Seen	Pups of the Year	Active Dens
2016	1		
2017	19	4	1
2018	16	*might have been in den	1
2019	31	7	2

Observations have been made of ekwǫ̀ kill sites most likely from dıga̜, attempted chases on ekwǫ̀ as well as successful attacks by dıga̜. However, there have not been any chases by nǫ̀gha or sahcho observed on ekwǫ̀, except for one unsuccessful attempt by det'ǫcho. Nonetheless, there have been many observations of said predator species and they all typically appeared healthy. Another observation noticed over the years is that monitors have seen more dìga dens and that when pups were observed, they appeared healthy, well-fed and had "lots of muscles". The dìga observations occurred all around Kǫ̀k'èetı` and Kwıdlıà chı̨ ̀ where the teams walked.

Concurrent to these observations, many groups of ekwǫ̀ were migrating through these locations.

Results from 2018 and 2019 show a low ekwǫ̀ calf abundance (Tłı̨chǫ Government 2018 and 2019). The monitors stated that a contributing factor to the low calf abundance was the high dìga activity observed around Kǫ̀k'èetı. It was clear to them that the high dìga activity had an impact on the ability of calves to survive their first few months, while they were still unable to outrun the chase of a dìga. According to harvesters, barren-ground ekwǫ̀ herds (Bluenose-East, Bathurst and Beverly/Ahiak herds) provide a steady and secure supply of meat for dìga throughout the year, as they remain near to and north of the treeline on the central barrens year-round. Although the herds have declined, there are still thousands of ekwǫ̀ on the land that the dìga can hunt (Tłı̨chǫ Government 2019).

In recent winters, the ekwǫ̀ herds (Bathurst, Bluenose-east and Beverly-Ahiak herds) stayed within, or north of, the treeline on the barrenland for most of the year, including winter. The presence of the ekwǫ̀ on the central barrenland throughout summer and winter creates a steady supply of meat for the dìga. Dìga can travel far distances in days, and the ready availability of herds on the barrenland provides caribou meat in relatively close proximity throughout the year. "*Dìga hang around caribou all the time. They follow the herds all winter, all the time,*" said one elder. Furthermore, during summer when dìga pups are growing, they prefer to eat the meat from calves. Reflecting on his past observations the elder explained, "*for dìga pups, it is good to eat the soft meat from calves*" (Tłı̨chǫ Government 2019).

Wolf hunting in particular is an important conservation measure for the rapidly declining Bathurst caribou herd. The Ekwǫ̀ Nàxoèhdee Kè program supports the traditional harvesting of predators as well as the Enhanced North Slave Wolf Harvest Incentive program by ENR. The incentive is a way to support the traditional economy and generate income through dìga harvesting, which may help offset some of their financial costs. By increasing dìga and fur trapping on the herd range, we can help harvesters develop and maintain their knowledge and on-the-land skills.

Community-Based Dìga Harvesting Program

Through the ongoing decline of the Bathurst and Bluenose-East ekwǫ̀ herds, the TG and GNWT ENR have been collaborating with the WRRB to implement co-management actions to support ekwǫ̀ recovery. A key recommended action from the Ekwǫ̀ Nàxoèhdee Kè program and from the 2019 WRRB hearing was that the TG implement a Community-Based Dìga Harvest Program.

The TG initiated its Community-based Dìga Harvest Program for the 2019/2020 harvest season in three phases:

1. Held a community consultation meeting with Tłı̨chǫ harvesters and elders to ensure the program followed and respected Tłı̨chǫ protocols of harvesting dìga and planned logistics for the harvesting camps;

2. Conducted a training workshop for local Tłı̨chǫ harvesters with an instructor from the Alberta Trappers Association; and
3. Established harvester camps to further support training and dìga harvesting by Tłı̨chǫ on a rotational basis.

There is a strong spiritual connection between the Tłı̨chǫ people and dìga. Archie Wetrade of Gamètì, when he gave evidence to the WRRB at its 2019 Public Hearings concerning the Bluenose-East ekwǫ̀, had this to say on the subject:

> I mentioned that we have to really focus in and work with – because this wolf, it's a spiritual to – to Aboriginal people. We just – they just don't go out there and start shooting wolf. Wolf and the caribou been among the people from the beginning and it – and they're still here. Wolf are not in our way of system. We don't play with – with the wolf. The wolf, they don't play with us. When they take serious against people, there could be a very bad association into – association into – in that system. Wolf have their own technique to take down animals. But in my lifetime, I have never ever heard wolf attack Aboriginal people at all, never, because they respect us and we – we respect them. But also we have to understand that it's out training level in the community, each community, that we just have to work how we're going to do it for the safety of the public and the children.[4]

Joe Mantla of Behchokǫ̀ also provided information on the connection to dìga:

> Yes, that – I know that the caribou, I guess, you know, that we've heard enough of it and now for the wolf wise says I – I do harvest some wolf from time to time when I have to, but somehow you got to be , you know, careful and you have some technique to do it.
>
> And I do have. And then the – at the same time I was taught on the land with my – my dad. He was a great hunter and a great trapper and then the – so although there are some spiritual manner that – that has with the wildlife such as the wolf, that the – that the – some of the people kind of I don't want to handle the wolf because of the – some spiritual nature it has. You've got to be careful how you hand their – their carcass and then it that's including their – their blood. And the – to date they feel kind of reluctant to – to handle them the way as professional people would do. I don't see anything wrong with it if you do it right, because to date, its not like before, you got rubber gloves and all that. You got disinfectant, you know, substance that you could always clean your hand with once you're completed.[5]

A very important process in implementing the Community-based Dìga Harvest Program was having the meeting with the Tłı̨chǫ elders and harvesters, this meeting occurred in Wekweètì on December 17. Having this meeting allowed for the program to be run following and respecting

[4] WRRB Transcript of Bluenose East Herd Public Hearing. Behchokǫ̀, NWT. April 9, 2019. Day 2 of 3. P. 97-8.
[5] WRRB Transcript of Bluenose East Herd Public Hearing. Behchokǫ̀, NWT. April 11, 2019. Day 3 of 3. P. 164-5.

Tłı̨chǫ protocols based on the traditional knowledge gained. Many participants of the meeting voiced the importance of harvesting dìga for the sake of conserving the ekwǫ̀ populations as well as for the safety of the communities. There were many concerns about the increase of dìga surrounding all the Tłı̨chǫ communities. Not many Tłı̨chǫ hunters currently have experience in harvesting dìga and so through the meeting it was suggested that Tłı̨chǫ hold a "trapper training" type of course for the participants of the harvesting program. There was a clear objective that came out of the meeting, it was important that for the recovery of ekwǫ̀ and for the Tłı̨chǫ people to continue to live their traditional way of life, the dìga population would have to be managed through increasing harvesting efforts.

The training was done at the beginning of January and was very well received by all participants. After completion of the training, the harvesting program was initiated. The program ran from January - March 2020 with little success - only four wolves were harvested through the program. After the program was done, surveys were done to identify ways to improve the program for future harvesting seasons. Based on those surveys, the main elements that need improvement were to start preparations for the program much earlier. Preparations would include starting to get bait ready in the fall, ensure the snares and traps are ready to be used, start planning the logistics of the program and meet with participants of the program to start strategizing snaring and trapping techniques so that participants can effectively and efficiently harvest dìga. As was mentioned in the meeting with the elders and harvesters, dìga are very smart, strong and powerful animals, they will know when they are being hunted and so Tłı̨chǫ need to carefully observe their behaviour and thoroughly strategize trapping and snaring them. While the objective is to harvest dìga, Tłı̨chǫ choose to do so in the most respectful manner so that dìga are not disrespected.

References

Helm, J. 1994. Prophecy and Power among the Dogrib Indians: Studies in the Anthropology of North American Indians Series. University of Nebraska Press.

Tłı̨chǫ Government. 2003. Tłı̨chǫ Agreement: Land claims and self-government agreement among the Tłı̨chǫ and the Government of the Northwest Territories and the Government of Canada. Queen's Printer for Canada, ISBN 0-662-34971-7 https://tlicho.ca/sites/default/files/documents/government/T%C5%82%C4%B1%CC%A8cho%CC%A8%20Agreement%20-%20English.pdf

Tłı̨chǫ Government. 2017. Ekwǫ̀ Nàxoèhdee Kè- Boots on the Ground 2017 Results. https://research.tlicho.ca/sites/default/files/2017bootsonthegroundresults.pdf

Tłı̨chǫ Government. 2018. Ekwǫ̀ Nàxoèhdee Kè- Boots on the Ground 2018 Results. https://research.tlicho.ca/sites/default/files/2018_results_ekwo_naxoede_ke_1.pdf

Tłı̨chǫ Government. 2019. Ekwǫ̀ Nàxoèhdee Kè- Boots on the Ground 2019 Results. https://research.tlicho.ca/sites/default/files/2019_ekwo_naxoede_ke_results_report_1.pdf

Wek'èezhìi Renewable Resources Board. 2019. Transcript of Bluenose-East Herd Public Hearing., (pp. 97-98, 164-165). Behchokǫ, NT.