Northwest Territories

Wildlife Research Permit Application Form

Applicant: Amanda Weltman, Environmental Assessment Biologist, Tłı̨chǫ All-Season Road

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Sponsor(s): Environment and Climate Change, GNWT

Funding Sources: Environment and Climate Change, GNWT Department of Infrastructure, GNWT

Additional Licenses Required: NWT Wildlife Care Committee Permit

Project Title: **Boreal caribou monitoring program for the Tłı̨chǫ All-Season Road (TASR) Project 2027-31**

Rationale:

Caribou: Boreal caribou are listed as Threatened under the Federal and Territorial Species at Risk Acts (SARA), and are a culturally and ecologically important species in the North Slave region. Maintaining a self-sustaining population is a goal of the national and territorial boreal caribou recovery strategies (Environment Canada 2012, Conference of Management Authorities 2017).

The Tłı̨chǫ All-Season Road (TASR) is a large linear development within the North Slave portion of the boreal caribou range. This road was constructed from September 2019 to November 2021 and opened as the Tłı̨chǫ Highway (Highway 9) on November 30, 2021. The Tłı̨chǫ Highway may have negative effects on boreal caribou such as: direct habitat loss, sensory disturbance and related behavioral impacts, barriers to movement and habitat fragmentation, increased predation success, potential for wildlife-vehicle collisions, and increased hunting pressure resulting from increased access (MVEIRB 2018). Measure 6-1, Part 2 from the Report of Environmental Assessment for the TASR project directed the GNWT to conduct monitoring to determine population trends, abundance and distribution of boreal caribou in the North Slave region (MVEIRB 2018). Monitoring the impact of the Tłı̨chǫ Highway is required for (at least) the first five years after the road opened to the public. This multi-year wildlife research permit application is to continue monitoring boreal

caribou for an additional 5 years beyond the required monitoring period, subject to availability of funding. Annual summaries of work completed under this multi-year permit would be shared back to Indigenous Government Organizations (IGOs) each year.

GPS-Collar Deployments:

GPS-collars are being used to monitor boreal caribou population trend, and response to construction and operation of the Tłı̨chǫ Highway (collected under Wildlife Research Permits WL5005580, WL500818, WL500585, WL501017, WL501123, and WL501238 - expires Feb 28, 2027). Collars provide information on location, habitat use, movements, and cow survival, and allow caribou to be located for composition/recruitment surveys. It is necessary to maintain a sample of 25-30 collared adult females in each study area to generate reliable estimates of adult female survival, calf recruitment and population trend (Rettie 2017). At least 10 collared females with home ranges in the vicinity of the road are needed in order to monitor the effects of construction and operation of the road. Maintaining an adequate number of functional collars is important to the quantity and quality of information obtained and data that will be used to inform mitigation and management of caribou in relation to the TASR and the Wek'èezhìı Range Plan.

There are currently 31 active collars on boreal caribou in the TASR area, five of which are scheduled to release on Sept 15, 2026. Taking into consideration additional loss of collared caribou due to mortalities from predation, hunting and natural causes, ECC is proposing to deploy up to 10 collars each year to maintain the 25-30-collar sample size goal. Estimating survival of a population assumes a random sample of animals being tracked. If all animals are captured at the same time, the entire cohort ages older at the same time over the period tracked (e.g., 4 years) which can result in biased, lower survival rates in later years as **all** animals are older than they were at time of capture (with the assumption that survival decreases in old animals). To address this, it is better to add a portion of new collars that are randomly selected from the population each year, so that the age distribution of the sample of tracked animals more closely matches a random sample of the population. Collaring efforts will ensure that there continues to be at least 10 collars in the vicinity of the TASR road, and at least 10 collars west and north of Lac La Martre to cover more of the North Slave portion of the boreal caribou range, as discussed at the Wek'èezhìı boreal caribou range plan working group meeting in April 2021.

ECC plans to deploy up to 10 collars on adult female caribou every year for the next five years to maintain a sample size of 25-30 collared females.

In addition, each year ECC may deploy up to 3 collars in the North Slave Region portion of the Mackenzie boreal caribou study area (see Figure 1), which is led by the South Slave

Region. The number of collars deployed in this area will depend on the distribution of existing collars in late winter in the Mackenzie area.

Aerial classification survey of boreal caribou (recruitment survey):

Aerial classification surveys are conducted in late winter of each year to provide information on the proportion of calves that have survived their first year (until 10 months of age). After the first year of life, caribou survival is much higher. This information, along with annual adult female survival rates obtained from the collar data, is needed to estimate the population trend of boreal caribou in the North Slave region (increasing, decreasing, or stable).

Abundance survey

There was limited baseline information on boreal caribou abundance and demographics in the North Slave region at the time of the environmental assessment of the TASR project. A boreal caribou abundance survey conducted in 2020 yielded observations of a total of 577 individual boreal caribou and a minimum density estimate of 2.74 caribou/100 km^2 (collected under Wildlife Research Permit WL500813). The Wildlife Management and Monitoring Plan for the TASR project recommended conducting a second boreal caribou abundance survey to be completed by the end of the first five years of operations of the road. Results will help to corroborate annual estimates of population change ('lambda') between the two surveys, as well as to determine sustainable harvest levels for boreal caribou in the region (as required by Measure 6-2 of the Report of Environmental Assessment for the TASR project; MVEIRB 2018).

Time Period:

January 1, 2027 – December 31, 2031.

Collaring will be conducted in February and March each year from 2027-2031.

The boreal caribou classification survey will be conducted in February or March each year, following collar deployment, and is expected to take approximately 3-4 days. Monitoring GPS collar data, investigating stationary collars and other program work may occur throughout the year each year.

The DNA-based abundance survey will occur from January-March 2027. Up to three fecal pellet collections sessions will be conducted 2-3 weeks apart.

Location and Nearest Community: All collar deployments, surveys and data collection under this permit will occur in the North Slave region within the North Slave (TASR) and Mackenzie study areas (Figure 1). The nearest communities are Whatì, Behchokǫ and

Gamètì. Figure 2 shows the locations of caribou collar deployments in this program since 2017.

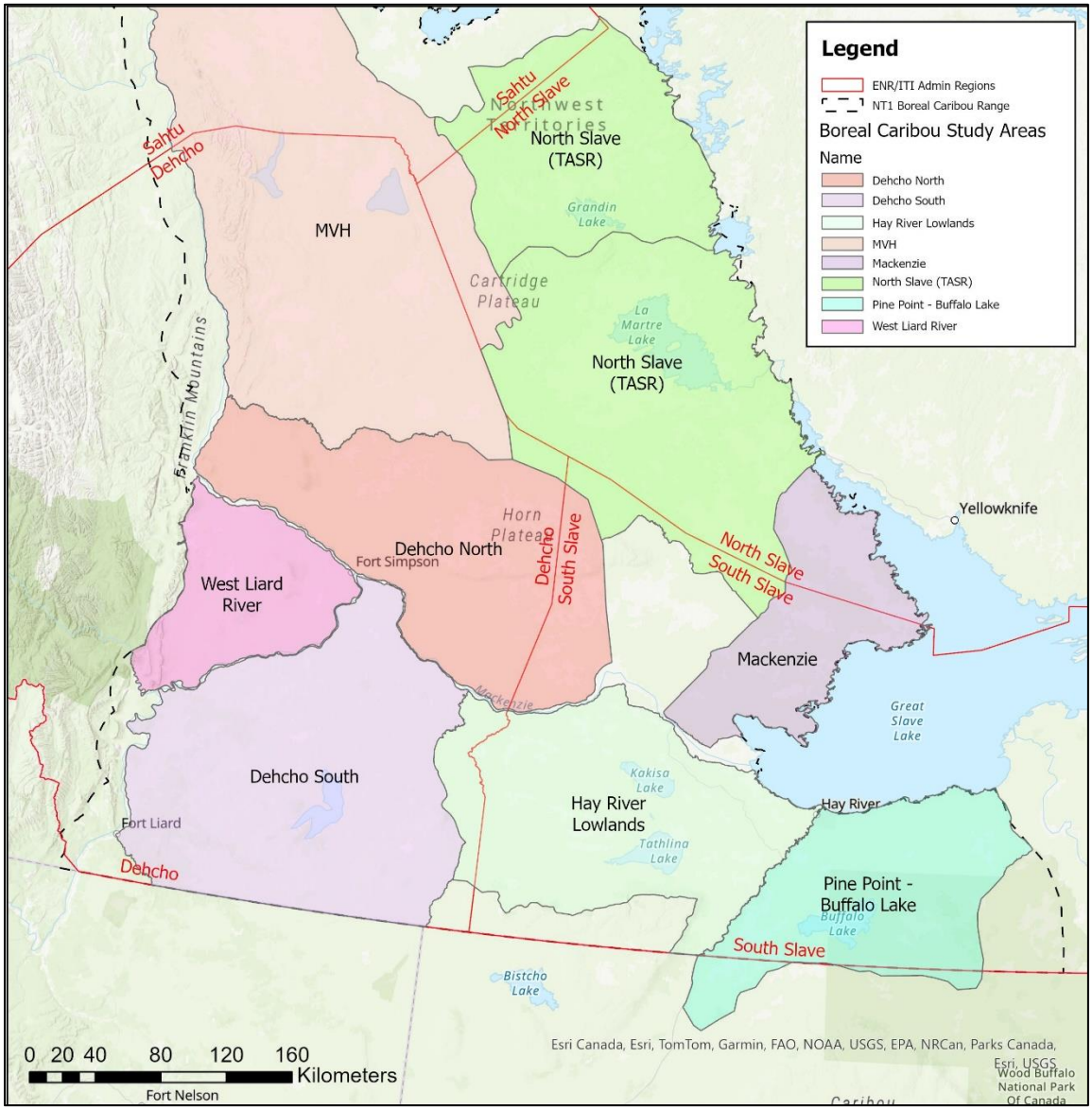

Figure 1. Boreal caribou study areas in the southern NWT.

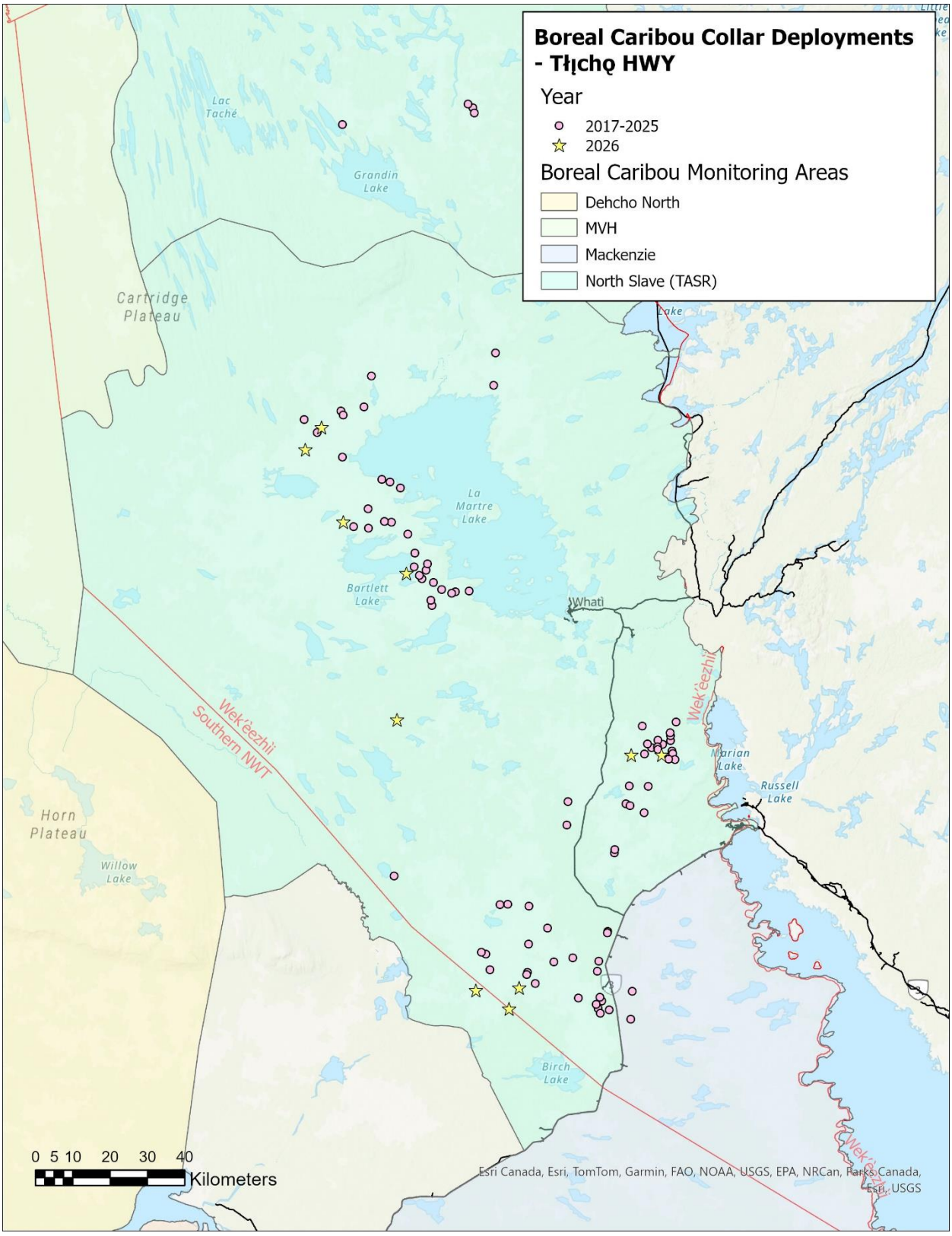

Figure 2. Locations of boreal caribou collar deployments in the TASR study area from 2017-2026.

Species Studied: Boreal caribou are the target species. Moose collared under WRP# 501134 in 2023, will also be located during classification surveys to determine calf-at-heel status. The remaining moose collars are scheduled to release in late March 2027. Additional sightings of moose, bison, wolves and other wildlife will be recorded during collar deployment, spring classification surveys and the boreal caribou abundance survey.

Project Leader: Amanda Weltman

Project Personnel: Amanda Weltman, GNWT-ECC
James Hodson, GNWT-ECC
Stefan Goodman, GNWT-ECC
Professional collaring crew (GNWT Tender Process)
Other staff as required.

Objectives:

1. Deploy up to 10 GPS collars on boreal caribou in the TASR study area in February or March each year in the TASR study area from 2027 to 2031.
2. Deploy up to 3 GPS collars on boreal caribou in the northern portion of the Mackenzie study area, each year (2027-2031), depending on the current distribution and sample size of collared cows in that area.
3. Conduct an aerial caribou classification survey each year in late winter (February or March). Collared moose will also be classified in 2027.
4. Investigate mortalities of collared animals to determine cause of death, and opportunistically collect and analyze biological specimens.
5. For some (up to 5 per year) collared caribou in the vicinity of the Tłı̨chǫ Highway, use acoustic and accelerometer data to determine calving dates, calf survival (by presence/absence of vocalizations between cow and calf), patterns of feeding, nursing, resting and rumination (via hearing burps), and compare how these behaviours change near roads or human activities. This data will also be used to train models with data from both sensors together. This data will come from small devices that will attach to the collar for approximately 5 months and release from the collar using a self-contained drop off mechanism. Data will be analyzed by Megan Perra (PhD student, Gurarie Lab, SUNY College of Environmental Science and Forestry).
6. Conduct aerial transects for the 2027 abundance survey to identify locations of boreal caribou tracks and cratering sites.
7. Collect boreal caribou fecal pellets. Using helicopter, we aim to land and collect 1.4 times more samples than the number of boreal caribou thought to have been

present at each track network/cratering site identified on the aerial transects. Up to three pellet collection sessions may be carried out.

8. Fecal pellets will be swabbed for DNA in the North Slave lab and will be sent for analysis and individual identification at a wildlife genetics lab (TBD).

The data collected through these field efforts will support the following monitoring objectives:

- Long term monitoring of boreal caribou adult female survival and calf recruitment to track population trends in the TASR study area.
- Assess the impact of the Tłı̨chǫ Highway on boreal caribou habitat use and movement.
- Monitor the distribution of caribou and their seasonally preferred habitats and responses to fire and human disturbance.
- Relate demographic information (adult female survival, calf production, calf recruitment) to patterns of resource selection, caribou survival, and long-term environmental changes.
- Pilot a non-invasive capture-mark-recapture DNA survey to estimate boreal caribou abundance in the TASR study area. Evaluate these methods for viability in long-term population monitoring.

Methods:

Collaring: GPS collars (TGW-4677-4s GPS Iridium collars and TGW-4670-5 GPS Iridium collars; weight ~1100 grams; up to 5 collars each year may have a <150 g acoustic and accelerometer recorder attached for the first 5 months of deployment) will be deployed on adult female caribou to monitor the movements, habitat use, survival and responses of these caribou to disturbance in two study areas.

Reconnaissance flights prior to, or concurrent with, collar deployments may be used to provide boreal caribou observations to the collaring crew.

The TGW-4677-4 collars are equipped with a “geofencing” function that allows increased frequency of locations to be collected within a previously defined area programmed into the collar. In this study, collars are programmed to generate six locations per day, however, if a collar enters the area within a buffer of 10 km from the TASR and along HWY 3, this will increase to hourly locations. The TGW-4670-5 collars can collect hourly locations regardless of location and can be programmed to collect locations every 15min during a set time period, such as when paired with an audiologger. The programming will allow for a finer scale assessment of the behavioural response of boreal caribou to the operation of the TASR, and to traffic along the existing highway. Collar data is retrieved via satellite daily

or every 4 days depending on time of year. All collars have a breakaway device that drops the collar on the ground at a pre-determined time (4.5 years) so caribou do not need to be recaptured to remove the collar.

ECC will follow established protocols and the conditions of the Wildlife Care Committee permit for capture and handling of boreal caribou during collar deployment. For the collaring, a professional capture crew with an experienced helicopter pilot and net gunner will be employed to conduct the collaring operation. The capture crew (net-gunner and animal handler) will have extensive and current experience net-gunning caribou, collecting biological data and deploying collars. Pursuit of individual caribou will be kept short (≤1 min of running), and will be terminated when the target animal show signs of fatigue (stumbling, open mouth breathing). The net is fired over the caribou, which then usually tangles itself and falls to the ground.

The helicopter lands immediately and two people approach the animal. The legs are hobbled to minimize struggling; the eyes are covered to reduce visual stress; and the pulse and breathing rate are visually monitored throughout the handling. The animal is positioned on their left side, and the head and neck are positioned so that the animal can breathe normally and belch gas from its belly. The capture crew minimizes noise to reduce stress. Information that will be recorded during capture includes the collar identification number, capture location (latitude and longitude), group composition and size, duration of chase and handling time, body condition rating, estimated age, presence of a calf, lactation status, animal stress rating, average snow depth and snow condition, and any pertinent information pertaining to observations of the health (check eyes for Besnoitia, other signs of disease, presence of ticks and related hair loss score, previous injury, etc.) of the captured animal, or welfare of other members of the herd from which the caribou is captured. Body condition of individual caribou may be measured using a portable ultrasound to study the influences of body condition on animal performance (body size, reproduction, and survival). If these body condition measurements are taken, they will be done by an experienced professional and the process would involve plucking two small (1.5cm x 5cm) sections of hair on the caribou (rump and back) to allow skin contact with the ultrasound's sensor. Where possible, samples collected from each animal will include approximately 25 mL of blood from the cephalic vein in the foreleg, approximately 50 g of feces (a handful) from the rectum or deposited on the snow, and a sample of hair with roots taken from the shoulder. Winter tick hair loss will be documented and associated ticks collected.

The collar is fastened around the animal's neck (fit to allow for an open-palmed hand to move freely between the neck and the collar material), and the animal is released.

Handling times aim to last 15 minutes or less but can be up to 20 minutes. Once released, the caribou usually springs to its feet and runs off. Post-capture monitoring of the GPS collared animals will be done using satellite-transmitted location data.

There is inherent risk associated with capturing and handling wildlife. In general, mortalities of caribou can occur at a low rate during net-gunning captures. If an animal is injured during the net-gunning, the handler and net-gunner will assess the injuries. A broken antler would be re-cut with a hand saw to smooth the broken edge. A broken leg or other broken bones will require that the caribou be shot (helicopter will carry a shot-gun). The animal will be dressed in the field and transported to the nearest community so that the meat can be used. If boreal caribou die or need to be euthanized during collaring, additional samples to evaluate age, body condition, and parasites/disease will be collected for analysis.

Calf production will be determined by assessing pregnancy rates collected from blood serum during the capture of cows each year of the study and by assessing the movement rates of GPS-collared cows.

Classification survey: Ten-month calf recruitment will be determined from aerial classification surveys in late winter. The survey will be conducted by helicopter with a crew consisting of a pilot, a navigator and a classifier who will count and classify the number of calves and adults associated with collared caribou and other caribou observed during the survey. Animals will be classified as calves or adults (≥ 12 months) on the basis of body size. Females will be identified by the presence of a black vulva patch and males by lack thereof. Recruitment will be expressed as the ratio of calves per 100 adult cows.

Pollock et al's (1989) staggered-entry modification of Kaplan and Meier's (1958) survivorship model and collared cow data will be used to estimate adult cow survival. For each year, the finite rate of population increase will be estimated from annual recruitment of females (assuming a 50:50 sex ratio in calf production and equal survival of sexes to time of census) and annual adult female survival using the formula outlined by Hatter and Bergerud (1991). The finite rate of population increase (λ) will be determined using a stochastic version of Hatter and Bergerud's 1991 equation (λ =adult female survival/(1-female calf recruitment) following Latham et al. (2010). The stochastic version of λ is the mean of 10,000 iterations calculating λ.

During the boreal caribou classification survey, the crew will also locate and classify collared female moose in the TASR and Mackenzie study areas (WRP 501134) to determine calf-at-heel status.

Abundance survey: Boreal caribou abundance will be assessed using a non-invasive capture-mark-recapture DNA survey following survey methodology in Hettinga et al. (2012), which will be the first for this region. The survey area will be similar to that used in 2020 (Figure 3), to allow for comparison between the two abundance estimates. A fixed-wing aircraft will fly predetermined transects up to 10km apart through portions of the TASR and Mackenzie study areas (Figure 3). The aircraft will fly 150-250m above ground so that visual observers are able to distinguish between wildlife signs and identify boreal caribou tracks and cratering sites. Ideal sites will consist of recent cratering sites (areas where caribou dig under the snow to get to lichen) to collect fresh fecal pellets. When a caribou site has been identified, a wildlife observer on board will mark the location on GPS. Observers will also record incidental sightings of boreal caribou and other wildlife including moose, wolves and bison. The aerial survey is estimated to take 4-5 days to complete not including weather disruptions.

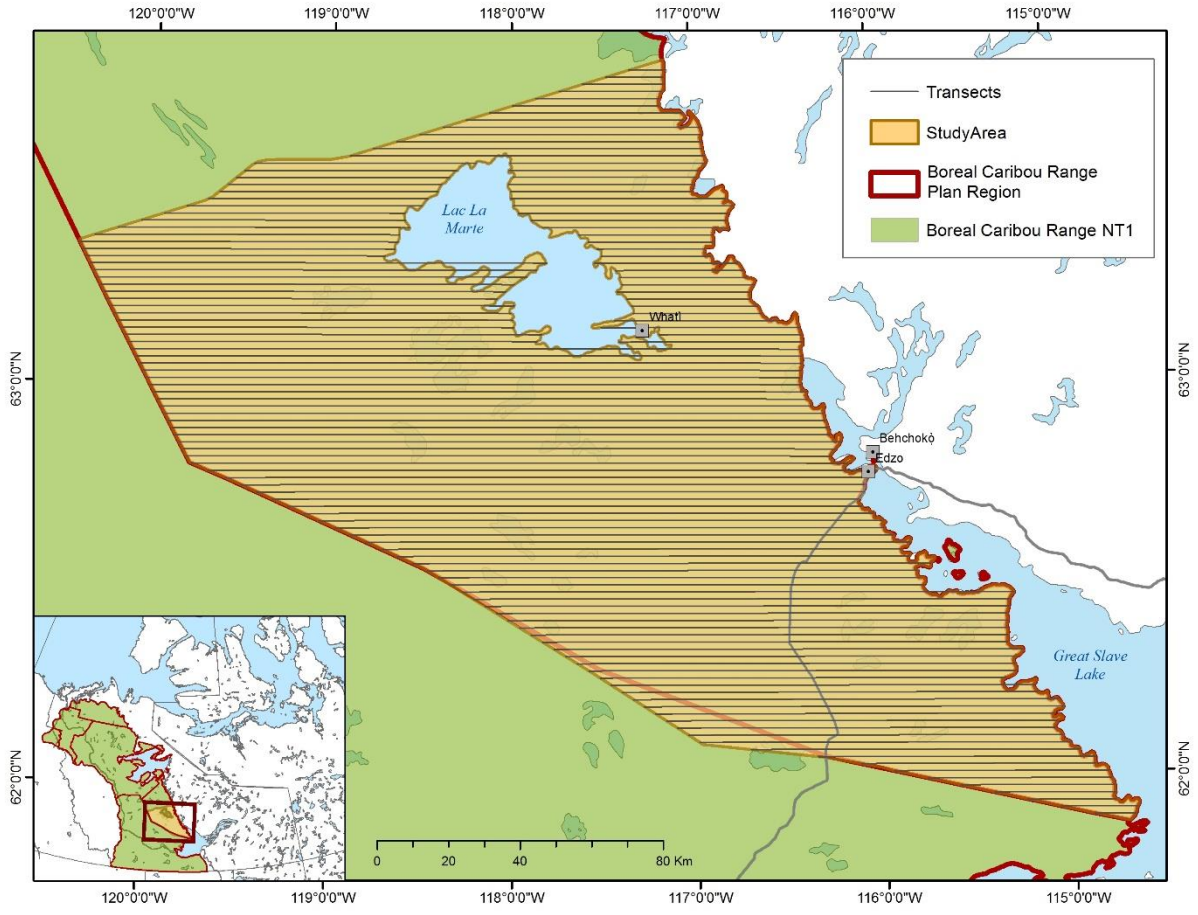

Figure 3. Map of the planned boreal caribou abundance survey area from 2020. A similar study area will be surveyed in 2027.

Following the aerial survey, a helicopter will land at as many sites as possible identified from the aerial survey. Fecal pellets will be collected at each site using wooden sticks and placed in sterile whirlpak bags. The field crew will aim to collect 1.4 times more samples than the number of boreal caribou thought to have been present at the site to allow for the identification of as many individuals that were present at the site as possible. Pellet samples will be kept frozen at -20°C until DNA extraction is performed. Fecal collection is estimated to take around 7-8 days to complete, depending on the number of sites identified.

The aerial survey and fecal pellet collection will be repeated up to three times, with surveys spaced 2-3 weeks apart from January to March 2027. Following field work, fecal pellets will be swabbed in the lab, and swabs will be sent to a wildlife genetics lab (to be determined) to be genotyped for individual genetic profiles. Individuals identified during two or more sampling events will be considered "recaptured".

The final design (transect spacing and study area boundary) for the abundance survey will be contingent on budgetary constraints. Currently we are in the planning stages and doing cost analysis. If the budget does not allow for a sufficient sampling intensity to ensure a reliable abundance estimate, then we will not do the DNA capture-mark-recapture abundance survey. Instead, we will propose an alternative method (such as repeating the survey method used in 2020) to complete the abundance survey for boreal caribou in the TASR survey area and we will apply for a separate wildlife research permit.

Current Consultation:

The Wildlife Management and Monitoring Plan (WMMP) for the Tłı̨chǫ All-Season Road Project (TASR) underwent several rounds of public review and comment during the Environmental Assessment (EA) and post-EA land use permitting and water licencing phase. Comments were submitted by the Tłı̨chǫ Government, Wek'èezhìı Renewable Resources Board (WRRB), Yellowknives Dene First Nation, and North Slave Metis Alliance (NSMA). The WRRB completed a final review of the WMMP before it was approved by the Minister of ECC. The WMMP underwent its first annual review in September 2020, and comments on the WMMP have been submitted by the WRRB and Tłı̨chǫ Government, as well as by the Wek'èezhìı Land and Water Board (WLWB) and Environment and Climate Change Canada (ECCC). The second annual review of the WMMP was held in September 2021, and comments were submitted by NSMA and Environment and Climate Change Canada. Version 6.2 of the WMMP was approved on February 19, 2024.

Copies of this wildlife research permit application will be provided to the Tłı̨chǫ Government, Wek'èezhìı Renewable Resources Board (WRRB), Yellowknives Dene First

Nation, and North Slave Metis Alliance for review. ECC has been providing updates on implementation of the WMMP programs at the bi-annual TASR corridor working group meetings, and has presented to the Tłı̨chǫ Government's Tłı̨chǫ Tı̨lìì Deè Committee on several occasions (April 14, 2021; May 11, 2022; Nov 8, 2022; Oct 19, 2023, Dec 5, 2024, Dec 4, 2025).

Future Community Consultation:

GNWT-ECC and INF will include the results of the abundance survey, composition surveys and GPS-collar deployment in the annual WMMP report which is included in the annual Water Licence Reports, and will present the results of the surveys to community representatives from Whatì and Behchokǫ at a future meeting of the TASR corridor working group. There will be a field summary report submitted as a requirement of the research permit, and the results will also be summarized in the TASR WMMP comprehensive report at the end of the 5-year operations phase.

Opportunities for Local Participation:

Due to the nature of collaring work, only experienced collaring crews will be used for the collaring.

Community observers will be invited to participate in the aerial composition survey, if the crew is able to use an A-Star helicopter, which is a larger machine.

Community observers will be invited to participate in the boreal caribou abundance survey including aerial transects, fecal pellet collection and fecal pellet processing.

Management or Recovery Plans:

This project is part of the approved Wildlife Management and Monitoring Plan for the TASR.

References

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