

Northwest Territories

Wildlife Research Permit Application Form

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Sponsor(s): Environment and Natural Resources, GNWT

Funding Sources: Environment and Natural Resources, GNWT
Department of Infrastructure, GNWT

Additional Licenses Required: NWT Wildlife Care Committee Permit

Project Title: **Boreal caribou and wolf monitoring program for the Tłıchq All-Season Road Project 2023-24**

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 Tłıchq 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 Tłıchq Highway (Highway 9) on November 30, 2021. The Tłıchq 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, 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).

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. Recent GPS-collar data and classification surveys of caribou are providing information on distribution, habitat use, movements, population composition, calf recruitment, and survival (collected under Wildlife Research Permits WL5005580, WL500818, WL500585 and WL501017-active to Feb 3, 2023). 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 km² (collected under Wildlife Research Permit WL500813). Trends from collar-based monitoring and

the results of the 2020 population survey are assisting in determining the self-sustainability of caribou in the North Slave region, are providing valuable information for the development of the Wek'èezhìi Range Plan, and are helping 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).

Wolves: Measure 6-1, Part 2 of the Report of Environmental Assessment for the TASR project (MVEIRB 2018) requires GNWT to monitor predator populations including densities, movements and predation rates. Wolf abundance surveys were completed in 2020 (under WL500813) and 2022 (under WL501017) to estimate wolf densities in the TASR study area, and adjacent “control” areas in the Mackenzie study area. In the TASR study area wolf density was estimated to be 2.2 wolves/ 1000 km² in 2020 and 2.4 wolves/ 1000 km² in 2022. In 2020 the Mackenzie South block yielded a wolf density of 1.8 wolves/ 1000 km² and in 2022 the Mackenzie North block yielded a wolf density of 1.4 wolves/ 1000 km². In 2022, GPS collars were deployed on 4 wolves in the TASR area between Feb 24 and March 3. One male wolf (collared Feb 24) died on March 1, 2022. It was found on the shoulder of Highway 3 and cause of death was assessed by the wildlife veterinarian to be blunt force trauma, likely due to a vehicle collision. Its female packmate dispersed west to near Blackwater Lake, and likely slipped out of its collar in July 2022. That collar was recovered in November 2022. Two wolf collars are still active in the TASR area. Deploying additional GPS collars onto wolves will allow for further monitoring of the movements and distribution of this predator, and may provide insights into predation rates on boreal caribou, moose and bison. Wolf collar data will also allow us to evaluate their use or avoidance of the TASR corridor and other linear features.

Collar data from this initiative will also be used in a parallel project entitled “Interdisciplinary research to understand changes in the food-web dynamics and threats to food security in the northern boreal forest” which is a collaboration with Laval University funded by the Sentinel North program. The goal of this project is to build on existing ENR research and monitoring activities, and collect additional data to learn more about how the five species (wood bison, boreal caribou, moose, wolf, and black bear) interact with and affect each other in the boreal forest.

GPS-Collar Deployments:

Caribou: GPS-collars are being used to monitor boreal caribou population trend, and response to construction and operation of the Tł̨chq̨ Highway. 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 development of the Wek'èezhìi Range Plan.

There are currently 35 active collars on boreal caribou in the TASR area, 6 of which are scheduled to release on March 1, 2022. This year, ENR is proposing to deploy a few more collars than necessary to meet the 30 collar sample size goal, in order to have more regular, smaller deployment years in the future. This will also help to reduce the potential long-term bias of survival estimates. 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. These additional collars will also allow researchers to ensure that there continue to be 10 collars in the vicinity of the TASR road, and to deploy up to 5 collars north of Lac La Martre to cover more of the North Slave portion of the boreal caribou range, as discussed at the Wek'èezhìi boreal caribou range plan working group meeting in April 2021. This will result in up to 39 cows collared in the study area in the short term (1 year), but the number will decrease back to 30 animals in the coming years with smaller deployments each year.

In addition, ENR 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. This area was identified as an Intensive management area in the interim Wek'èezhìi range plan based on local and Traditional Knowledge, but currently we have little collar data in that area. The number of collars deployed in this area will depend on the distribution of existing collars in late winter.

Wolves: Based on the 2020 and 2022 wolf abundance surveys and similar surveys in adjacent habitats, 1-3 wolf packs are estimated to occur within the study area, with additional pack(s) north of Lac La Martre. Additional Only 4 of 5 collars were able to be deployed in 2022. In winter 2023 the 5th collar will be deployed and a 2nd collar will be redeployed. If additional wolf collars are available from Sentinel North project collaborators, up to 5 collars may be deployed on wolves. The objective is for 1 or 2 collars per to be deployed in each wolf pack, assuming that wolf packs are located during the capture time frame.

Collaring an adult member of the pack ensures better collar fit (growth of neck not an issue) and meets the objectives of our program by ensuring we obtain location information on a resident pack member. At this time in our program, we will not be collaring juveniles so that we avoid potential issues with proper collar fit and movement of the wolf out of the study area (e.g. juveniles are more likely to disperse than adult pack members).

Collaring the alpha wolves is highly preferred as they are less likely to become transient and more likely to provide robust data on pack territory size and home range use, and den location.

Location data from GPS collars will be used to determine home range sizes of wolves and habitat use. Such data can be used in combination with collared caribou data to analyze predator-mediated habitat selection throughout the year and/or as a result of landscape disturbances. Frequent location fixes from collared wolves may be used to determine localized movement, indicating a predation event or location of dens (in the spring). In addition, collared

wolves can be relocated by aerial telemetry to determine pack size and pup recruitment, which can be used to determine population trends and density estimates.

Aerial classification survey (recruitment survey)

Aerial classification surveys 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). Collared wolves may also be relocated during this survey to provide information on pack size.

Time Period:

Collaring will be conducted as much as possible in February and March 2022. It is estimated that 5-6 days (approximately 30 helicopter hours) will be required to complete the deployments. The boreal caribou recruitment survey will be conducted in February or March 2022 and is expected to take approximately 3 days. Monitoring GPS collar data, investigating stationary collars and other program work may occur throughout the year.

Location and Nearest Community: All collar deployments would occur in the North Slave region. The nearest communities are Whatì, Behchokò and Gamètì.

The TASR study area boundary changed slightly from the program's start in 2017. Based on discussions with the ENR South Slave regional biologist, it was decided to combine the area south and east of HWY3 in the North Slave region with the South Slave's "Mackenzie" study area, and to designate the area west and north of HWY3 as the TASR study area. The revised study area boundaries are presented in Figure 1. This adjustment to the study area boundaries was made because the collar data indicates that crossings of HWY3 are infrequent. The study area will be expanded north of Lac La Martre in 2022 to cover more of the North Slave portion of boreal caribou range. This potential expansion is in response to discussion at the Wek'eezhi boreal caribou range plan working group meeting in spring 2021 that it would be helpful to have more information on boreal caribou distribution in that area to support range planning.

Figure 1 shows the boreal caribou study areas.

Species Studied: Boreal caribou and wolves are the target species. Sightings of moose, bison, and other wildlife will be recorded during collar deployment and spring classification surveys.

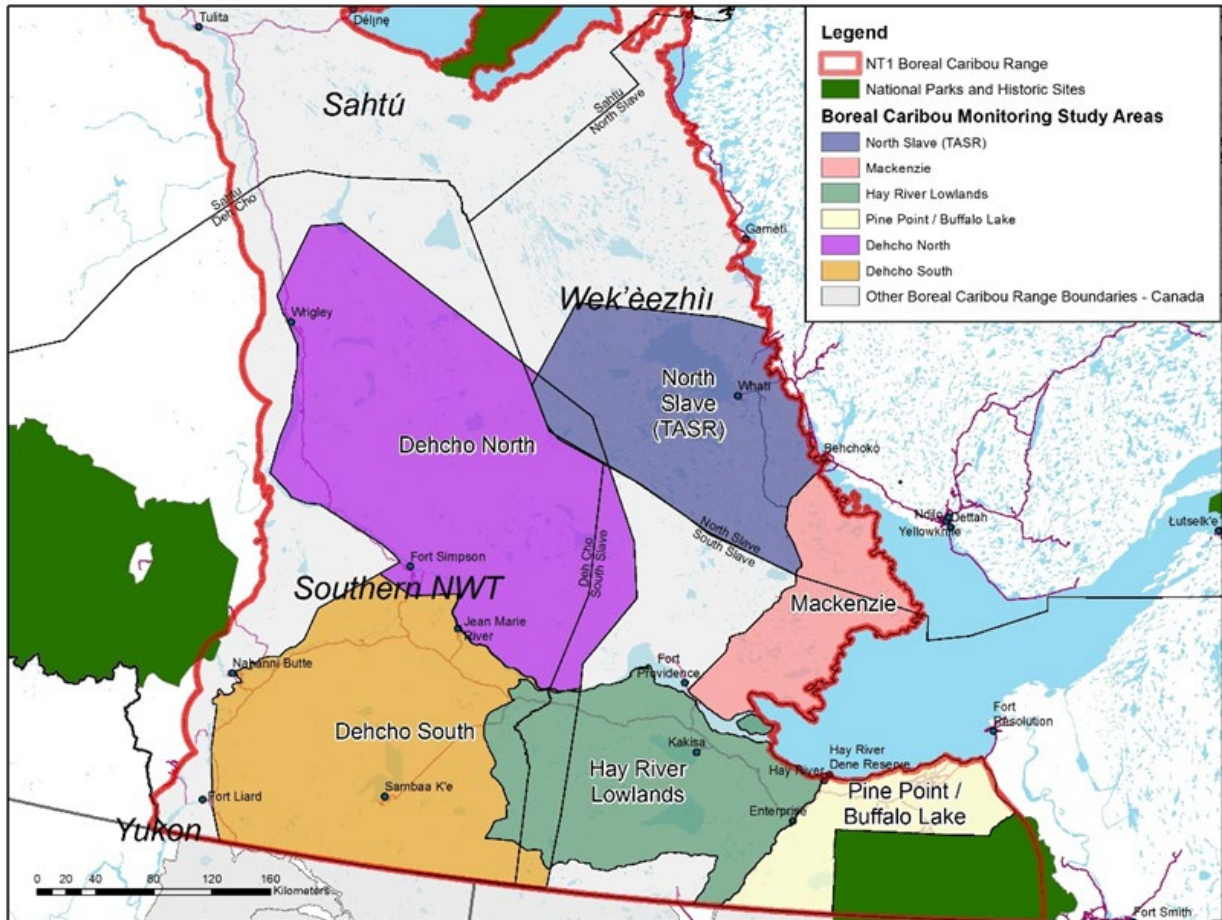


Figure 1. Boreal caribou study areas.

Project Leader: Alicia Kelly

Project Personnel: Alicia Kelly, GNWT-ENR
 Kathy Unger, GNWT-ENR
 Dean Cluff, GNWT-ENR
 Stefan Goodman, GNWT-ENR
 Judy Williams, GNWT-ENR
 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 and up to 3 GPS collars on boreal caribou in the northern portion of the Mackenzie study area.
2. Deploy up to 5 GPS collars on wolves in the North Slave portion of the boreal caribou range.
3. Conduct an aerial caribou classification survey in late winter 2022.
4. Investigate mortalities of collared animals to determine cause of death, and opportunistically collect and analyze biological specimens.

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 Tłıchq 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.
- For wolves, evaluate movements, distribution, pack size, home range size, den site selection, and use of linear features as movement corridors.
- If feasible, investigate diet of wolves in caribou ranges to determine prevalence of predation on caribou and to determine wolf diets in different areas (e.g. kill cluster investigations of collared packs and/or stable isotope analysis, and/or scat analysis)
- Contribute to the Sentinel North-funded project entitled “Interdisciplinary research to understand changes in the food-web dynamics and threats to food security in the northern boreal forest”; evaluate fine-scale habitat use and compare wolf and caribou habitat use to habitat use by other species (e.g. boreal caribou, wolves, bison, black bears) monitored with GPS collars.

Methods:

Caribou: GPS collars (TGW-4677-4s GPS Iridium collars; weight ~1100 grams) 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, particularly in the area west of Gamèti.

The collars used in this study 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. This will allow for a finer scale assessment of the behavioural response of boreal caribou to the construction and 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 years) so caribou do not need to be recaptured to remove the collar.

ENR 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 sternally 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 GPS reading using NAD83), 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. 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 generally lasts 18 minutes or less. 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. In the event that 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.

Ten-month calf recruitment will be determined from aerial classification surveys in late winter 2023. 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 ($\lambda = \text{adult female survival} / (1 - \text{female calf recruitment})$) following Latham et al. (2010). The stochastic version of λ is the mean of 10,000 iterations calculating λ .

Wolves: Up to 5 GPS collars (2 Telonics model TGW-4577-4, and up to 3 similar collars provided by collaborators) will be deployed on wolves. These collars are designed with a timed drop-off mechanism that will release the collar off the wolf on a predetermined date. Location data will be collected for approximately 2 years on each wolf (assuming no mortality or collar failure) depending on the frequency of GPS locations collected. Some collars may have cameras installed.

Wolf collars will be mostly deployed at the same time as boreal caribou captures in February, although wolf-targeted deployment flights may occur. The alpha female and male in each pack will be targeted (February) but any adult wolf may be collared. Two collars will be deployed in each pack when possible. During gestation (if any collaring is delayed to March) non-alpha adult wolves will be targeted, however, collars are anticipated to be deployed in February.

To increase the likelihood of successfully locating packs of wolves, baiting stations (with unusable meat from road kills or other sources and scent lures) may be used to attract wolves to target areas. These areas will then be searched by helicopter and adult wolves present near the baiting stations will be captured by net gun.

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

Wolf capture and handling methods will adhere to ENR's Standard Operating Procedures for wolf captures and to the conditions of the Wildlife Care Committee permit for the capture and handling of wolves during deployment. A professional capture crew with an experienced helicopter pilot will be employed to conduct this operation. The net-gunner will have extensive and current experience net-gunning wolves. The handler(s) will receive training prior to handling. The capture team will be experienced in safe, humane, and stress-minimizing animal handling techniques.

Once a wolf pack is located, an adult will be selected for collaring and pursued, ideally into an open space (pursuit of individual wolves will be terminated if the target animal show signs of fatigue (stumbling, open mouth breathing)). Determination of a breeding/adult member of the pack is done from the air by assessing the size of the wolf and behaviour (dominance, leading pack if walking or running). Pups (young of the year) will not be selected for collaring. Wolves will be captured using a net gun fired from a helicopter. Usually two nets are fired onto a wolf because a wolf can chew through a single net.

Once on the ground the net-gunner and handler(s) ensure they are clear of the helicopter rotor blades (main and tail) before engaging with the entangled animal. The net-gunner must engage the entangled animal with a Y-pole and securely push the wolf to the ground by positioning the Y-pole behind its head. The Y-poles are designed to "lock" in the neck area to prevent the wolf

from rolling out. Once control has been established, the handler then places a snare around the muzzle of the wolf and securely tightens the cable. The crew then uses a muzzle (preferred) or tape to secure the mouth and snare in a closed position. The net is then untangled and a blindfold is placed over the eyes and the legs are hobbled. The capture crew minimizes noise (including talking) to reduce sound disturbance.

In some situations, immobilization drugs may be administered by remote injection (darting) after the wolf is netted or by hand injection (once on the ground and wolf is manually restrained using a modified fork stick) on a case-by-case basis. All drug delivery will be done by a team member with current training and experience in wildlife immobilization, or under the direct supervision of experienced personnel. Drugs used will be approved by the Wildlife Care Committee (e.g. Telazol (Teletamine/ Zolazepam) alone or a combination of Medetomidine/Telazol (MZT) reversed with Atipamezole). If immobilization drugs are used, the induction time will be monitored and vital signs will be assessed throughout the handling period (capillary refill, heart rate, breathing rate, body temperature, pupillary reflex) to determine plane of sedation. The recovery of the wolf will be monitored from a distance until it is moving (e.g. lifting head, standing, etc.) and the capture crew will leave the area in the helicopter.

Once captured and restrained, the following will be done for each wolf:

- Record the radio collar identification number, ear tag number, capture location (latitude and longitude), duration of chase and handling time, sex, body condition rating, body weight and measurements, estimated age, animal stress rating, average snow depth and snow condition, and any pertinent information pertaining to observations of the health (signs of disease, mange, previous injury, etc.).
- Record the number of wolves in pack.
- Collect guard hair (in coin envelope, pulled from between shoulders), whiskers (1-2 pulled), and blood samples.
- Fasten the radio collar around the neck (wolf collars are fitted fairly tightly to ensure the wolf cannot slip them off) and place the ear tag in the ear
- Take digital images of (1) the head of the wolf with the attached collar with the collar number displayed in the image for each wolf collared and (2) the full body of the wolf.

Collared wolves will be released in the immediate area after all data have been recorded. For release, restraints are removed in the reverse order as applied. The wolf is positioned with its head pointing in a safe direction (i.e. away from the crew or helicopter). The crew will then apply the Y-pole and secure the snare pole. The tape will be removed from the mouth, followed by the blind fold and hobbles. The snare pole is released while the wolf remains pinned using the Y-pole. When safe to do so the Y-pole is removed and the animal released.

Contingencies include injuries during the net-gunning. The handler and net-gunner will assess the injuries. A broken leg or other broken bones will require that the animal be shot (helicopter will carry a shot-gun; a head shot will be used). The animal carcass will be returned to Yellowknife. The fur may be offered to a local trapper for fur processing, if the fur is deemed of high quality, and ENR will conduct a detailed necropsy. Samples collected from collared wolves will be stored for future use and analysis.

Current Consultation:

The Wildlife Management and Monitoring Plan (WMMP) for the Tłıchq 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 Tłıchq̓ Government, Wek'èezhì 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 ENR. The WMMP underwent its first annual review in September 2020, and comments on the WMMP have been submitted by the WRRB and Tłıchq̓ Government, as well as by the Wek'èezhì 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 5.2 of the WMMP was approved on March 21, 2022.

Copies of this wildlife research permit application will be provided to the Tłıchq̓ Government, Wek'èezhì Renewable Resources Board (WRRB), Yellowknives Dene First Nation, and North Slave Metis Alliance for review. ENR has been provided updates on implementation of the WMMP programs at the bi-annual TASR corridor working group meetings, and has presented to the Tłıchq̓ Government's TASR wildlife monitoring committee (April 14, 2021; May 11, 2022; Nov 8, 2022).

Future Community Consultation:

GNWT-ENR and INF will include the results of the 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 Behchokq̓ 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 first TASR WMMP comprehensive report at the end of the construction phase (March 2023).

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.

Management or Recovery Plans:

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

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