WILDLIFE RESEARCH PERMIT APPLICATION FORM

Check One Please: [ ] **New Project** [X] Ongoing Project

APPLICANTS: Allicia Kelly, Environmental Assessment biologist (Tłı̨chǫ All-Season Road), GNWT-ENR

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SPONSOR(S): Environment and Natural Resources (ENR) - GNWT
Laval University

FUNDING SOURCE(S): ENR-GNWT
Laval University – Sentinelle Nord funding

ADDITIONAL LICENCES REQUIRED: NWT Wildlife Care Committee Permit
Comités de protection des animaux de l'Université Laval

PROJECT TITLE: **Black Bear Research and Monitoring 2022-2024**

Note: this permit application is an extension of the work planned and permitted under WRP 500001 (Black Bear Research and Monitoring 2021-22) because not all collars were deployed as planned by spring 2022. This permit is to deploy the remaining collars and to monitor all the collars for this project.

RATIONALE:

Community members have regularly raised concerns about black bear predation on ungulate (boreal caribou, moose, and bison) calves, and highlighted this as a research gap ENR should address. While wolves are considered the primary predator of these species, black bears have been observed to be a source of boreal caribou calf mortality in other jurisdictions in Canada. Fire is the primary disturbance in the NWT, and bears may benefit from vegetation re-growth following fires, allowing for increases in bear density. We do not currently have data from the NWT on the impact black bears have on boreal caribou calf recruitment. Similarly we know little about the degree to which black bears are predators of wood bison and moose calves.

Deployment of camera and GPS collars on black bears in this project will allow us to determine the frequency of calf predation events. Depending on the findings of this study, population management of black bears (e.g. through incentivized harvesting) could provide a means of improving calf recruitment rates for boreal caribou, moose, and wood bison.

Collar data from black bears will also provide valuable data on movement behavior, habitat selection,

and timing of denning in the fall and emergence from dens in the spring. This information is useful from an EA perspective to inform mitigation measures to protect black bear dens from disturbance from development activities such as construction and maintenance of the Tłı̨chǫ All-Season Road. This project will also help to address Measure 6-1, Part 2 of the Tłı̨chǫ All-Season Road report of EA, which requires the GNWT to "monitor predator populations, including densities, movements and predation rates".

Additionally, black bear collaring will contribute an important piece to a larger academic research partnership where the objective is to gain a more holistic understanding of food web dynamics and species interactions between boreal caribou, wood bison, moose, wolves, and black bears. Simultaneous movement data from these species in the same study area(s) will allow researchers to ask questions about how species interact with and influence each other, and how that changes depending on which species are present in an area. Ultimately this information should provide insights into how a given species can influence the mortality risk and spatial distribution of another species. Collar location data will be used to identify fine-scale movement rules of individual species, and these rules will be used to make larger-scale predictions about the distribution dynamics of interacting large mammals. This research will also provide basic information on habitat selection, identify areas prone to human-wildlife conflicts (e.g., collisions), and identify areas where management actions should be most effective.

Finally, project findings may also help GNWT evaluate whether the current national definition of boreal caribou critical habitat, based on the idea of disturbance-mediated apparent competition, is appropriate for the NWT. Habitat disturbance-mediated apparent competition is thought to be the primary cause of boreal caribou declines across Canada. Natural and human disturbances can improve habitat conditions for herbivores like moose and bison, as well as omnivores such as black bears. Increases in these species can lead to increases in predators such as wolves, in turn leading to increased predation on boreal caribou. However, we do not necessarily see significant increases in moose or bison density following wildfires, which are the primary disturbance in the NWT, and whether this apparent competition process is at play in the NWT remains an open question.

TIME PERIOD: September 1, 2022 to December 31, 2024
Nine collars were deployed in 2021-22 with 11 collars left to deploy. Target deployment is fall 2022 (e.g. September – October) but any remaining collars may be deployed in 2023. Collars are programmed to be on the bear for 60 weeks (~ 14 months) and then release, but may be remotely released sooner.

LOCATION AND NEAREST COMMUNITY:
Collars will be deployed within the North Slave and South Slave Regions. The study area includes the Mackenzie Bison range and the Mackenzie and North Slave (Tłı̨chǫ All-Season Road) boreal caribou study areas (see map). The nearest communities are Fort Providence and Behchokǫ.

SPECIES STUDIED: American Black Bear (*Ursus americanus*)

PROJECT LEADER:
Allicia Kelly, Environmental Assessment biologist (Tłı̨chǫ All-Season Road), GNWT-ENR

PROJECT PERSONNEL:

Dean Cluff, Biologist, Wildlife and Environment, ENR, North Slave Region
Naima Jutha, Wildlife Veterinarian, ENR, Wildlife Division
Stefan Goodman, Wildlife Technician, ENR, North Slave Region
Community-based observers
Additional ENR staff as required

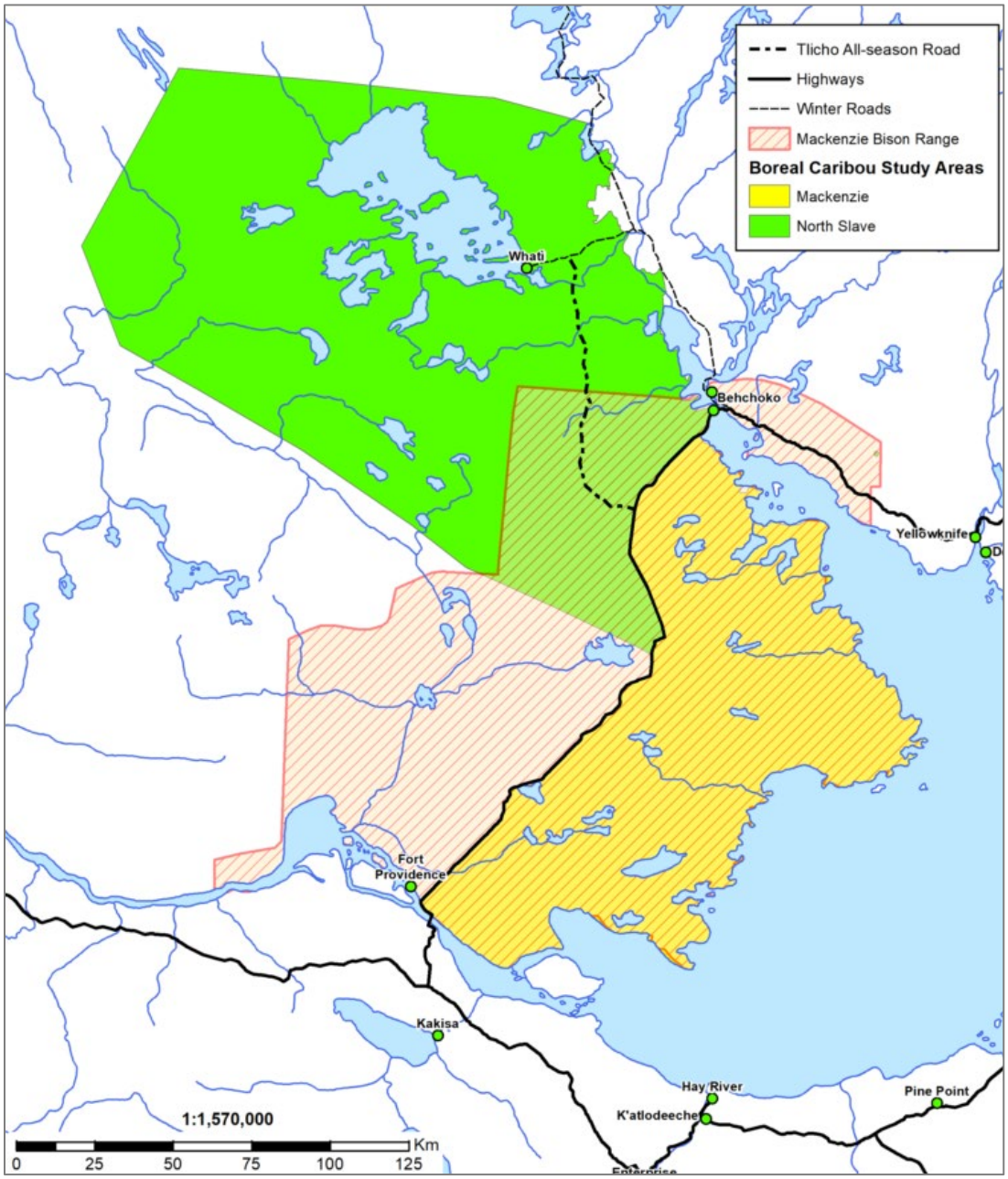

Figure 1. Map of the proposed study area (Mackenzie bison range and boreal caribou Mackenzie and North Slave (Tłı̨chǫ All-Season Road) study areas.

OBJECTIVES (SUMMARY):

- Investigate impacts of black bears on boreal caribou calf recruitment, as well as predation of wood bison and moose calves
- Collect baseline information to determine black bear home range sizes, habitat use and selection, and seasonal movements; this addresses Measure 6-1, Part 2 of the Tłı̨chǫ All-Season Road report of EA, which requires the GNWT to "monitor predator populations, including densities, movements and predation rates".
- Compare black bear habitat use to habitat use by other species (e.g. boreal caribou, bison) monitored with GPS collars
- Contribute to a holistic understanding of food web dynamics and species interactions between boreal caribou, wood bison, moose, wolves, and black bears. For example, how do black bears influence other species' movements, habitat use, and mortality rates?
- Provide information to support the GNWT to evaluate whether the current national definition of boreal caribou critical habitat, based on the idea of disturbance-mediated apparent competition, is appropriate for the NWT
- Collect biological samples during capture (e.g. serum, whole blood, hair) for broader-scale or future genetic, hormone (e.g. stress), diet and other analyses. Collect black bear biological samples opportunistically (e.g. scats), during mortality investigations, or where feasible during other surveys. Samples may also be collected in cooperation with harvesters. Some samples will be banked for broader-scale or future analyses (e.g. DNA, diseases, parasites, contaminants).
- Document and monitor black bear den sites, den site characteristics, and spring emergence

METHODS:

<u>Black bear collaring and location data</u>

Collar deployments are planned for autumn (e.g. September), and spring (after den emergence). Autumn captures will most likely focus on road-based culvert traps, whereas spring captures will likely also include helicopter-based captures in remote areas, when bears may be more visible foraging on early green vegetation prior to tree leaf-out.

Collars were purchased and provided by Laval University. They are Lotek LiteTrack Iridium HED collars with InSight S video cameras. In addition to stored-on-board video clips, collars will provide a GPS location every 2 hours for most of the active bear season (April 15-Nov 16), decreasing to every 1 hour during ungulate calving (May 1-July 15) and reducing to maintenance mode of 1 location per week from Nov 16-April 14. Collar sizes were based on data from previous neck circumference measurements from 42 black bears from the North Slave Region. Collars have release mechanisms that can be triggered remotely when in line of sight, and are otherwise programmed to release 60 weeks after deployment (i.e. magnet removal). Collars also include a rot-off section. Ideally each bear collar will provide data through 14 months from deployment including 2 ungulate calving seasons.

Up to 20 GPS camera collars will be deployed on black bears. Adult bears of either sex will be targeted for collaring. Cubs of the year (COY) will not be immobilized or collared. This project may use multiple capture and immobilization methods (remote drug delivery from helicopter or vehicle; drug delivery via pole-syringe in culvert traps) as a way to determine and use the best way to capture black bears given the habitat type and road-access constraints in the study area. All methods will be focused on the safety

of both personnel and the bear(s). Captures will occur within temperatures of -20 to + 20 C. GNWT's Standard operating procedure for capturing and handling black bears (the SOP) will be followed.

Baited (e.g. sardine bait) culvert traps will be used in areas with road or trail-access, primarily along highway 3 (north of the Mackenzie River) and the Tłı̨chǫ All-Season Road, and their associated side roads and trails. Scent lures may be used to increase attraction of the traps. Culvert traps will be checked at minimum twice daily to reduce the probability of capture-related injury and stress. Traps will be set by a trained wildlife officer or a trained project team member. Vehicle-based trap checks will include road patrols for free-ranging bears that could be darted from the roadside. Bait stations with tree stands or other observation posts may also be used to attract and dart bears. ENR has a culvert trap that can be moved by quad or slung by helicopter that may be used in remote areas. In remote areas, bait stations may be deployed to attract bears to a local area and increase the probability of locating bears by helicopter. Fixed-wing reconnaissance flights may also be used to locate bears.

All drug delivery will be done by a team member with current training and experience in chemical immobilization of this species, or under the direct supervision of experienced personnel, per the standard operating procedure. A pole syringe will be used to deliver drugs to bears captured in culvert traps. A dart gun (e.g. a Pneu Dart, Inc. 0.22 calibre cartridge-powered dart rifle) will be used to deliver drugs from a helicopter or other vehicle. Bears will be immobilized using Telazol (Teletamine/Zolazepam; 6-8 mg/kg) alone or a combination of Medetomidine/Telazol (MZT) (50 µg/kg M, 2.5 mg/kg TZ) reversed with atipamezole (0.25 mg/kg), for remote (helicopter-based) captures.

For culvert-trapped bears: During the initial approach a handler will evaluate the security of the restraint and the approximate size of the animal. If the captured bear is a dependent or female possibly accompanied by a consorting male, the capture crew will establish that no free-ranging bears are in the vicinity before processing the bear. An experienced team member will assess the bear's response to noise and touch (i.e. weakened/absent cranial nerve reflexes, tongue movement) and once safely immobilized, the bear will be pulled out of the culvert trap.

For free-ranging bears, the bear will be observed after drug delivery and if necessary, guided away from hazardous terrain. Chemical immobilization will not be attempted where the team is likely to lose sight of the darted bear, or near a hazardous location (e.g., cliff or deep water).

For helicopter-based captures, remote-drug delivery will be done by trained, experienced personnel. Chase times will be minimized to reduce the development of thermal stress (e.g., < 1 min of strenuous running) and the capture team will have a thermometer to monitor rectal temperature as well as materials to facilitate cooling or warming of the animal. Chase times will be terminated if the target animal shows signs of fatigue (panting, loss of coordination).
If more than one dart is needed, the capture team will allow time after the first injection for drug effects to occur (e.g. 10-15 min). During this time stimulation will be minimized (e.g. the helicopter will move as far away as possible while maintaining visual contact). After darting, the helicopter will land a safe distance away while maintaining a clear view of the animal. The bear will be approached quietly and slowly by two people (one to assess the animal and the other with a firearm to provide safety for the approach person). Its response to noise and touch will be assessed and once safely immobilized, the pilot will shut down the helicopter and other handling team members will approach the bear.

Once a bear is safely immobilized, it will be positioned in sternal recumbency with its nose pointing downwards to avoid aspiration. Lubricant will be applied to the eyes and a blindfold applied. Darts (if

used) will be removed at the onset of handling and if there is any debris, the site will be flushed with sterile water and treated with a topical antibiotic. The bear's respiration, cardiovascular function and temperature will be monitored throughout and recorded every 10 minutes. A rectal thermometer and pulse oximeter will be used and supplementary oxygen will be available if required. Bears will be measured (straight body length, chest girth, neck circumference, head circumference, head width) and field-aged based on tooth wear and body and skull size. A sterile ear punch will be used prior to ear tagging and ear biopsy punches will be collected (frozen or dried). An ear tag will be placed in an ear using an ear tag applicator; ear tags will be marked with a unique animal ID number, contact phone number and information about drugged meat. Hair will be plucked from between shoulders (for DNA, stable isotopes, cortisol) and stored in 2x paper envelopes and blood will be collected from (principally) from the cephalic or femoral vein (1x EDTA tube, 2 x 10-ml tubes without EDTA; whole blood will later be frozen for DNA and serum will be collected for analyses and archived). We will not extract a tooth but teeth will be examined to estimate age class, photographed for future reference, and efforts will be made to retrieve teeth from future mortalities and age captured bears at that time. Where possible (with vehicle access) bears will be weighed using a gurney and tripod system, and where access to that equipment is limited, bear weight will be estimated based on body measurements above and the index in Cattet et al. 2002 Can J Zool.

Collars will be fitted tightly enough to not be shed while still able to rotate on the bear's neck. A finger's width between the collar and zygomatic arch on either side will generally be used to ensure the collar is loose enough to accommodate seasonal changes in body mass. Collars may be fit more tightly in autumn than in spring because bears are more likely to be in better shape in autumn.

Bears will be assessed for normal recovery from chemical immobilization. Key indicators will be when the bear is able to lift and move its head. Bears far from roads will be left to recover without additional stress. Bears captured near roads will be monitored longer for advanced recovery to avoid potential accidents.

Biological samples

Samples (e.g. serum, whole blood, hair) will be collected during capture for broader-scale or future genetic, hormone (e.g. stress) and diet analyses. Other black bear biological samples may be collected opportunistically (e.g. scats), during mortality investigations, or where feasible during other surveys. Samples may also be collected in cooperation with harvesters. Some samples will be banked for broader-scale or future analyses (e.g. DNA, diseases, parasites, contaminants).

Den monitoring

The location of bear dens will be determined using the movements of collared bears. Remote cameras may be set up near dens before den season or prior to den emergence, and dens may be visited after the bears have left the area to document site characteristics.

Data analysis

GPS collar data will be used to obtain descriptive information about black bear distribution, such home range size and configuration during and after the calving seasons of moose and caribou. Statistical models of habitat selection and movements by black bears will also be developed from GPS data. For

example, we will use Step Selection Functions (SSFs) to better understand bear movements. SSFs compare observed and random steps (i.e., the linear segment between successive locations at 1-h intervals) based on their characteristics, such as land cover type (e.g., meadow, open conifer forest, closed conifer forest), where they end, distance to the nearest road, and the distance and direction relative to areas heavily used by moose, caribou or bison. Our previous research shows that such movement analysis can reveal how different species interact with one another, how they move with respect to human infrastructure, and how habitat characteristics determine their distribution. Models will thus inform on areas prone to human-wildlife conflicts, such as vehicle collisions. Moreover, Step Selection Functions will provide the basic information needed to develop predictive models of animal distribution.

Graduate students at Laval University, under the supervision of Dr. Daniel Fortin and Dr. Jerome Simon-Morin, will use GPS and camera collar data collected in this project to develop and test models that predict spatial patterns that arise from plant-prey-predator-human interactions. They will build mechanistic models that account for fine-scale movement decisions leading to animal distribution on the landscape, and use these fine-scale models to predict larger-scale observed patterns of distribution and abundance. To achieve this, the researchers involved will develop and implement new techniques in quantitative applied ecology related to space use, food-web dynamics, network theory and statistical methods. These models will be used to evaluate and compare areas of different food-web complexity across the boreal forest, including in the NWT, Saskatchewan, and Quebec.

CURRENT CONSULTATION:

Ongoing consultation will continue with communities (Deh Gáh Got'îê First Nation, Fort Providence Métis Council, Tłı̨chǫ Government, Wek'èezhìı Renewable Resources Board, North Slave Métis Alliance and Yellowknives Dene First Nation) through the application for a wildlife research permit. Information is also shared at the South Slave biennial regional wildlife workshops. The need for black bear research and monitoring has been raised to ENR by community members and organizations for several years.

An information sheet regarding the larger Boreal Forest Food Web Dynamics project funded by the Sentinel North (Sentinelle Nord) project, referred to above, has been sent to the above communities/ Indigenous Government Organizations. ENR met with a portion of the Fort Providence Tri-Council to share information on the Sentinel North project on July 30, 2021. We look forward to further discussions about this broader collaboration and adding additional components to this research project.

An update on the black bear monitoring project was provided to the Tłı̨chǫ Tı̨lıì Deè Committee on May 1, 2022 (in Behchokǫ) and to the TASR Corridor Working Group on June 13, 2022 (in Whatì).

FUTURE COMMUNITY CONSULTATION PLAN:

Communities will be consulted and kept informed via future reports and presentations. We look forward to additional meetings with IGOs to discuss some of the broader projects that this black bear project will contribute to.

OPPORTUNITIES FOR LOCAL PARTICIPATION:

It may be possible to use local participation in deploying/retrieving trap stations and checking culvert

traps. Community monitors from Behchokǫ, Whatì (Tłı̨chǫ All-Season Road monitors) and Fort Providence participated in checking traps and observing the capture team during the 2021-22 field work.

MANAGEMENT OR RECOVERY PLANS:

This project will address Measure 6-1, Part 2 of the Tłı̨chǫ All-Season Road report of Environmental Assessment, which requires the GNWT to "monitor predator populations, including densities, movements and predation rates".

Data collected as part of this program support action items in the Mackenzie Bison Management Plan, the Federal Recovery Strategy for Boreal Caribou, the GNWT Framework for Boreal Caribou Range Planning, and ENR's Action Plan and Implementation Plan for Boreal Caribou (e.g. understanding predation on caribou by bears, habitat use by bears). Bear abundance data will also contribute information to the development of moose management plans in the NWT. Information about the timing of black bear denning, black bear den site selection and den site characteristics will assist with development of guidelines for protecting dens from disturbance during industrial land use activities.