Supporting information for Wildlife Research Permit Amendment – Methodology

Wolf collaring: Wolves will be primarily captured via net-gunning from a helicopter and fitted with a GPS collar. Small fixed-wing aircraft support may be used to help locate wolves for collaring. Although netting will be the primary means of restraint, chemical immobilization using an approved drug combination may also be used to facilitate capture and collaring. Up to 30 GPS collars will be deployed on wolves, targeting 10 collars on wolves associated with each of the Bathurst (BA), Bluenose East (BNE), and Beverly caribou ranges. One wolf will be collared per pack with the breeding female preferred. Captured wolves will also be weighed and measured, body condition assessed, ear-tagged, and blood and hair samples will be collected. Trail cameras at bait stations may be used on caribou winter ranges to facilitate locating wolf tracks, to enhance efforts to deploy collars. Depending on the GPS collar model, collars are programmed to operate for a period ranging from 24-48 months, and will automatically drop off. In addition to collaring wolves on the BA and BNE caribou winter ranges (Jan-April), capture efforts may also be carried out in early spring near active den areas, or on other areas of the range in late summer or fall. Collaring is expected to occur in each of the five years, to maintain 30 active collars on wolves annually. The purpose of these collars is to address the program objectives and will not be used to locate and target pack mates during removal activities.

Abundance survey: A geospatial random block design survey to estimate wolf abundance was conducted in 2021. We anticipate repeating this survey in either 2023 or 2024 by building on lessons learned. Using a small fixed-wing aircraft or helicopter, this survey will occur within the North Slave Wolf Harvest Incentive Area in areas of highest caribou abundance, focusing on the BA and BNE herds. We will attempt to address the confounding factors of wolf movements out of the cells by increasing cell size and conducting the survey earlier in March when movement rates of wolves are lower. We may also add an additional stratification category of the survey blocks into high, medium and low wolf densities. These revisions aim to improve survey precision. In addition, to help improve survey accuracy we took steps to quantify detection rate through a set of surveys in winter 2022.

Detection survey: To increase precision and narrow confidence limits of abundance surveys, wolf detection rates were estimated and the potential factors influencing wolf detection were recorded in 2022. Of the 21 plots surveyed for collared wolves, there were 12 wolf detections and 9 misses for an overall detection rate of 57%. Visual obstruction (e.g., the percent of vegetation), distance from wolf, wolf movement, and the number of caribou negatively influenced the ability to detect wolves. Incorporating the collection of additional detection rate samples into a full aerial survey will be considered moving forward. This survey involves using a fixed-wing aircraft and an experienced Biologist to navigate to known wolf locations (i.e. collared wolves) without the rear observers knowing the exact location of the wolf. A plot surrounding the collared wolf will be immediately selected and transects will be flown with 1km spacing. Only the rear observers are used to survey the plot with the front observer serving as a data recorder and monitoring the radio telemetry equipment to confirm the wolf is within the plot during the survey. Data recorded includes whether the collared wolf was detected by the observers, GPS points taken along the transect when a wolf is seen as well as the actual wolf

location, an estimate of forest coverage including photos when possible, and all other wildlife seen within the plot. If the collared wolf is missed during the survey, radio telemetry will be used to locate the wolf, record its location with GPS, and take the same estimates of forest coverage including photos.

Den surveys: Aerial reconnaissance surveys using a small fixed-wing aircraft are anticipated to be completed across a previously determined 10km grid cell pattern to locate den sites, count the number of pups in early spring, and evaluate the survival and recruitment of pups in fall. A 10 km grid cell pattern will be used to record den site activity each year to accommodate any small shifts in den site location over time but still measure frequency of use. Territorial behaviour of denning wolves will minimize the probability of grid cell overlap with adjacent breeding packs. This spacing behaviour of wolves will be used with an intensive search for all wolf dens within a localized area to estimate wolf density. The resulting density estimate will be extrapolated to the tundra ecoregion to estimate a coarse population estimate of wolves on the caribou range. If conducted, den occupancy surveys will be compared to previous surveys completed prior to this program to assess changes in wolf abundance.

Kill-site investigation: GNWT has GPS collared wolves that obtain several precise locations per day. For wolves consuming large prey, concentration of locations may reveal kill/feeding sites. However, distinguishing these sites from other behaviours (e.g., resting sites) can be challenging without visiting many clusters to confirm whether or not a cluster contains remains of large prey (e.g., caribou or moose). These investigations were completed in 2022 and similar methodology may be implemented in future years. A small fixed-wing plane will fly to a set of co-ordinates representing a cluster of repeated wolf collar locations to determine if there are remains of a feeding site by wolves in the area. The plane will circle the co-ordinates low level at least 2-3 times to ascertain if carcass remains are present in the area. If a carcass or feeding site is seen, a waypoint will be taken to obtain its exact location. A count of wolves and pack size will be taken when observed at any time, whether near a cluster site or in transit. Once a site has been adequately searched and documented, the plane will fly to the next provided cluster site and repeat the same procedure.

Non-invasive monitoring: Trail cameras and rub posts may be set up at select den sites, and will serve to obtain data on wolf abundance, pup production and survival rates. Efforts will be made to minimize disturbance at the dens as to not displace any wolves. Rub posts will be made of wood and wrapped in barbed wire so that hair will be left behind during normal scratching behavior. Images from trail cameras and hair on rub posts will be collected opportunistically during surveys. Analyses of hair will allow us to determine genetically distinct individuals, sex, and potentially, physiological status (e.g., diet, stress, reproduction). By combining GPS data from collars, abundance/detection surveys, den surveys, kill-site investigations, and non-invasive monitoring approaches, we aim to determine the effectiveness of the wolf management program and inform adaptive management action in the future. A WRP amendment was applied for previously in summer 2020 to allow for collaring in spring and fall, however, in the end the permit was not amended.