Lockhart All-Season Road (LASR) - Wolverine and grizzly bear density and distribution surveys

STUDY AREA

Systematic grids that buffer the LASR road route by 50 km on all sides are proposed for DNA sampling.

METHODS:

The proposed methods would use non-invasive DNA sampling combined with spatially explicit capture recapture (SECR) methods (Efford 2004, Efford et al. 2009) to estimate baseline densities and spatial distribution of wolverines and grizzly bears.

<u>Wolverine</u>

Hair snagging stations will be set up within the LASR study area to determine wolverine density and distribution prior to construction. Study design outlined in this proposal follows the methods used in a similar study by Mulders et al. (2007) (Figure 1). For public safety reasons, a 2 km buffer was added to added to NWT public highways (Ingraham Trail), within which no hair snagging stations will be placed.

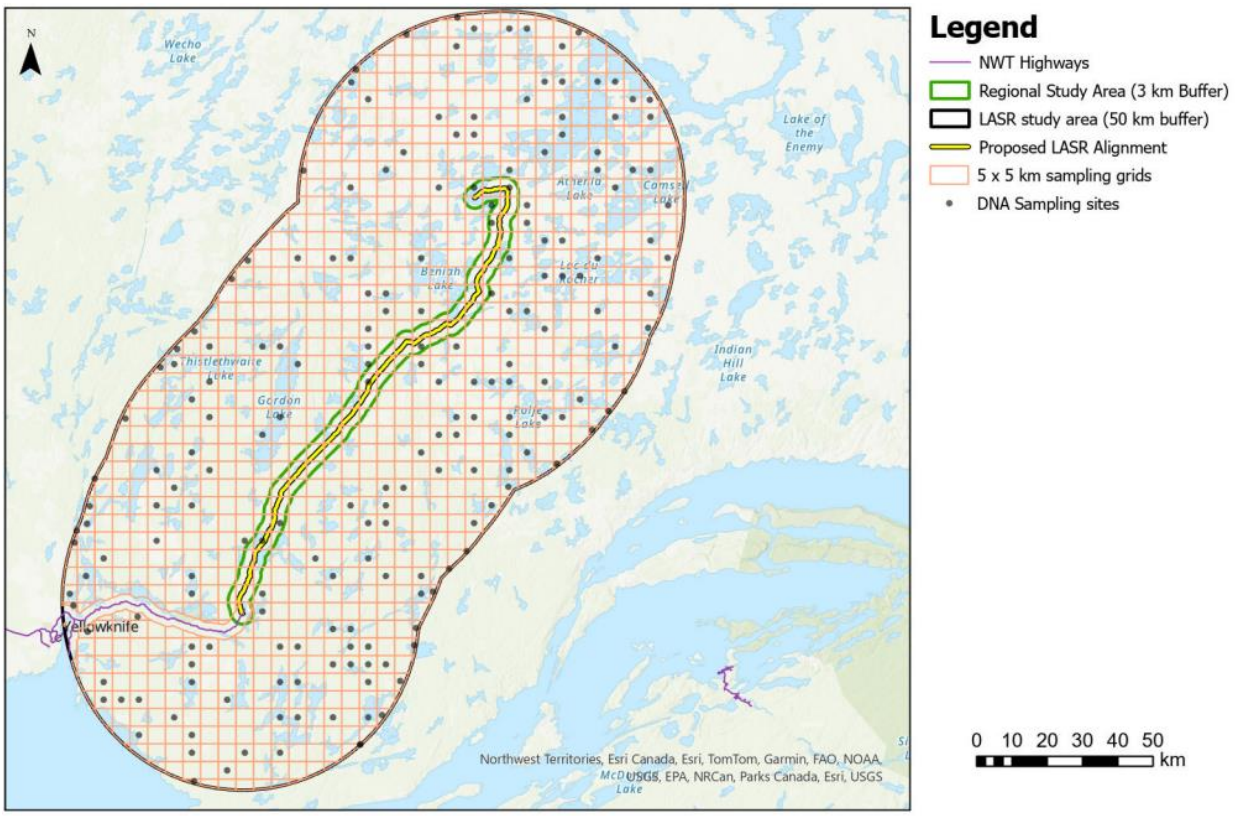

Figure 1: Proposed SGP wolverine study grid design with 50 km buffers around proposed road route (DNA sites to be finalized)

A 1.5 m vertical, wood post will be installed in a random location (with input from a statistician, considering access and habitat) within each 5 km x 5 km grid cell, unless site conditions require an alternative placement (Figure 2).

Figure 2: Sample Wolverine hair-snagging post (Boulanger 2012).

Surveys will be conducted in winter 2025 (late February to April) and winter 2026 to avoid attracting bears to the stations. One hundred hair snagging stations will be set up within the LASR study area to determine wolverine density and distribution prior to construction. Study design includes:

- A project buffer of 50 km,
- One hundred hair snagging stations per year (200 total)
- 5 x 5 km sampling grid
- 4 sampling sessions

Double-stranded barbed wire will be wrapped around the posts to snag hairs from ascending hungry wolverine. Posts will be baited with caribou, bison and/or beaver if available, as well as commercial bait/lures. It will take approximately 7 days to survey all 100 stations once (i.e., one “session”), and each station will be surveyed four times total for the whole season (four “sessions”). Sessions will be spaced one week apart. The locations of the hair snag stations may be adjusted for the second round of surveys, pending the outcome of the first round of surveys. Two years of sampling will provide 200 sites total. Travel to each station by helicopter will be necessary due to the distance between the LASR and the existing winter road.

The best hair samples from each barb will be selected (i.e., more hairs with visible roots) and labelled with the date, station number and other identification details. Any remaining hair will be burned away at the end of each visit, and the station will be re-baited if necessary.

A motion-detector trail camera will be placed at each hair snagging station in close proximity to the bait station.

Remote cameras (HP2X0DG Reconyx Hyperfire 2 Professional Covert IR Camera) will be mounted on trees. The camera will be placed to capture images of the stomachs and faces of wolverines (identify individuals) consuming bait. Cameras can detect movement and capture images of wildlife up to 30 meters away, and images captured of incidental species (i.e., barren-ground caribou) will be documented and potentially used in populations analysis of those species.

Once the site visits have been completed, the station will be de-constructed until re-deployment for the second round of surveys (winter 2026).

<u>Grizzly Bear</u>

Sampling for grizzly bears will focus on areas within their existing range (Figure 3).

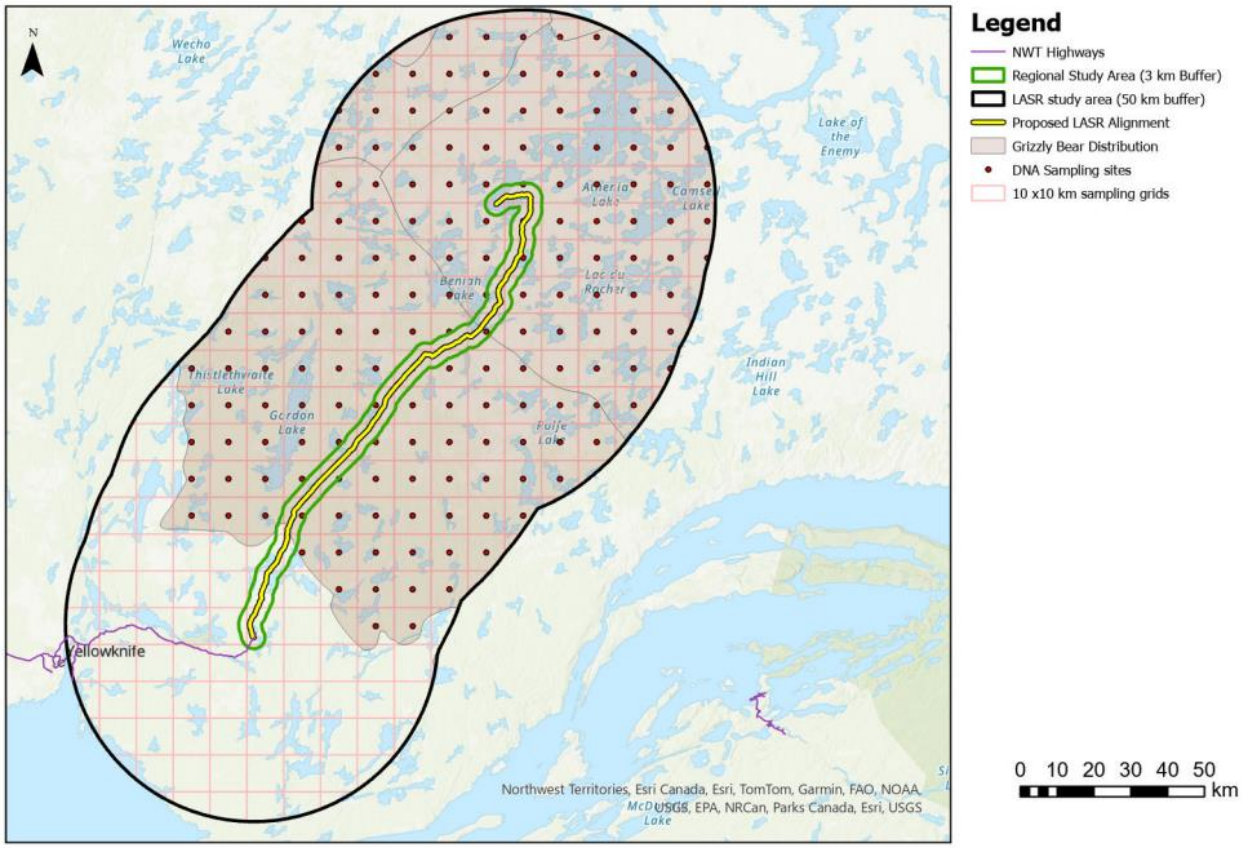

Figure 3: Proposed SGP grizzly bear study grid design with 50 km buffers around proposed road route

As the majority of the LASR alignment is below the treeline, it is likely that black bears will visit the hair snag stations. For the grizzly bear study, the study design and sampling grid are limited to the known grizzly bear distribution.

Although not intended as part of the study design, DNA sampling will also provide an estimate of black bear baseline densities.

One hundred hair snagging stations will be set up within the LASR study area to determine grizzly bear density and distribution prior to construction. Study design outlined in this proposal follows the methods used in similar studies (Boulanger et al. 2005, Stenhouse et al. 2015, Woods et al. 1999.) According to Boulanger (2020), a study design should include:

- A project buffer of 50 km,
- One hundred hair snagging stations per year (200 total)
- 10 x 10 km sampling grid
- 4 sampling sessions should be sufficient to detect grizzly bears and estimate density.

For grizzly bear, the study design outlined in this proposal will use a combination of two DNA collection methods:

1. Hair Snag Corrals (when adequate trees available)

- follows methods used by Woods et al. (1999) and Boulanger et al. (2005, 2006)
- snag sites will use approximately 50 m of barbed wire wrapped around 3-6 trees approximately 50 cm off the ground (creating a corral) (Figure 4).
- lure piles will be constructed at the centre of each corral using branches, and other wooden debris and topped with a thick layer of moss. Lure piles will be baited with caribou and beaver meat (if available) as well as commercial bait and lures.
- Corrals will be constructed such that bears must cross the barbwire to reach the lure pile.

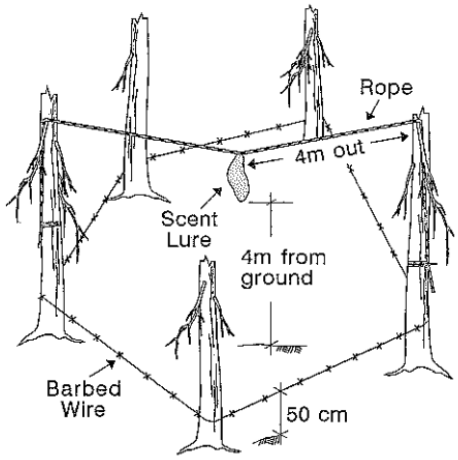

Figure 4. Sample Hair Snagging Corral (Woods et al. 1999)

2. Hair Snagging Tripods (when trees are unavailable)
   - follows methods used by Mulders et al. (2007) at Daring Lake NWT, as well as by Boulanger & Branigan (2020), and Boulanger and D'Eon-Eggertson (2024) for the Inuvik-Tuktoyaktuk highway between 2013 – 2014. (Figure 5).
   - grizzly bear stations consist of large, wooden tripods with wooden bases, created using 2" x 4" pieces of lumber 5'3" in length, secured at the corners with aircraft cable. Each piece of lumber in the tripod will be wrapped in double-stranded barbed wire (wood at the base of the tripod to be kept bare).
   - tops and bases of the tripods will be baited with caribou and beaver meat (if available) as well as commercial bait/lures.

Figure 5. Sample Hair Snagging Tripod (Boulanger and D'Eon-Eggertson, 2024)

Hair snag stations will be assembled in the field, and materials and personnel will be transported to each sampling station by helicopter.

Motion-detector trail cameras (HP2X0DG Reconyx Hyperfire 2 Professional Covert IR Camera) will be deployed at each sampling location, in close proximity to the bait station.

Cameras can detect movement and capture images of objects up to 30 meters away. It will take approximately 7 days to visit all 100 stations once (i.e., one "session"), and each station will be visited 4 times total for the whole season (4 "sessions"). Sessions will be spaced one week apart, as DNA degrades faster in the summer. Hair will be collected each visit and labelled with the date, station number and other identification details, and stations will be re-baited. Hair will be completely cleared from barbed wire after each visit.

Sites will be surveyed during the summer of 2025. Once the 4 sessions have been completed in summer 2025 (year 1), the station will be dismantled until re-deployment for second round of surveys (summer 2026). The locations of the hair snag stations may be adjusted for the second round of surveys, pending the outcome of the first round of surveys.

DATA ANALYSIS

Genetic analysis of hair collected from hair snags will be conducted to identify individual animals and their sex. Analysis methods will follow those used in Efford et al. (2023). Population densities and distributions will be estimated from genetic records combined with occurrences of each species extracted from wildlife camera images using spatially explicit capture–recapture (SECR) methods.

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