Wolf management permit - Hart Ranges and North Cariboo Mtns caribou recovery

s.15; s.19

From:	Klaczek, Michael FLNR:EX <Michael.Klaczek@gov.bc.ca>
To:	Jacklin, James FLNR:EX <James.Jacklin@gov.bc.ca>
Cc:	McKinley, Leslie L FLNR:EX <Leslie.McKinley@gov.bc.ca>, Pillipow, Ray FLNR:EX <Ray.Pillipow@gov.bc.ca>
Sent:	December 3, 2021 9:07:17 AM PST
Attachments:	draft_BC_AnimalCareForm_Wolf Reduction_HartRanges_NorthCariboo_CWC_2021_1.doc, COORS - s.15; s.19 .pdf, hart_northCariboo_wolf_treatment_area.pdf, CWC_ApplicationFormReport.pdf, Hart Ranges_operational_plan for wolf reduction_27Sept2019.pdf, s.15; s.19 _PG21-668426_Wolf_Reduction_Hart Ranges_North Cariboo.docx, NE and OMINECA FLNRORD SDM_Predator Reduction Decision Support.docx, RE: ACA - wolf reduction - Hart Ranges and North Cariboo

Hi James,

For your consideration, this permit is for s.15; s.19 to implement wolf reduction to support caribou recovery for the endangered Hart Ranges and North Cariboo Mountains caribou subpopulations from December 15th 2021 to March 31st 2022. Permit fee is exempt. The North Cariboo is a new treatment area which is basically an extension of the Hart Ranges to include the Bowron River- some of the North Cariboo would overlap in the Cariboo (region 5). My understanding is region 7A can still administer the permit for both regions – similar to the NE that administers the permit for Kennedy Siding (7-30 and 7-23A) for the South Peace work reduction area.

The permit and supporting documents can be found here (and attached).

Z:\7a_Omineca\Wildlife_Permits\2 (c)(i) Hunt, Trap, Killl -Scientific or Wildlife research\s.15; s.19 s.15; s.19 \2020_2021

Documents in the folder (and attached) include:
1) draft permit PG21-668426
2) BC animal care form and approval email
3) Operational Plan - Wolf control for Hart Ranges Caribou Subpopulation Recovery
4) engagement materials developed by the caribou program – for ease of reference – the only FN opposed that I'm aware of was Lhtako Dene for the North Cariboo.
5) COORS of the applicant
6) study area maps

Mike

Michael Klaczek
Senior Wildlife Biologist - Omineca Region
Ministry of Forests, Lands, Natural Resource Operations and Rural Development
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Ministry of Forests, Lands and Natural Resource Operations

FISH, WILDLIFE AND HABITAT MANAGEMENT BRANCH
ANIMAL CARE APPLICATION FORM

PLEASE TYPE

For office use: Date Received: Project Number:

Project Title: Hart Ranges and North Cariboo Wolf Reduction to Support Caribou Recovery

2. Starting Date: December 2021 **Completion Date: March 31, 2022**

3. Principal Investigator:

Name: s.15; s.19
Position: Pilot and Owner
Department/Organization: s.15; s.19
Region/Institution: n/a

Phone: s.15; s.19
Fax: n/a
E-mail: s.15; s.19

Mailing Address: s.15; s.19

Experience related to the described proposal:

s.15; s.19

4. Additional Investigators:

Name: s.15; s.19;
Position: Secondary Pilot
Department/Organization: s.15; s.19
Region/Institution: n/a

Phone: s.22
Fax: n/a
E-mail: s.22

Experience related to the described proposal:

s.15; s.19

Name: s.15; s.19
Position: Primary Net-gunner and Shooter/Secondary Net-gunners and Shooters
Department/Organization: s.15; s.19 Ltd.

Experience related to the described proposal:

s.15; s.19

5. Project Proposal

Southern Mountain caribou are nationally listed as threatened in Canada and are Red-listed (Threatened or Endangered) in the Omineca Region of British Columbia (BC). Estimated at 375 caribou in 2019, the Hart Ranges herd, has declined by approximately 50% since 2006 when the herd was estimated over 700 caribou. The North Cariboo Mountains subpopulation has declined drastically since 2016 when the herd declined from approximately 210 to 145 caribou. Through negotiations with the Province, an agreement has been made to initiate wolf control to support caribou recovery within the Hart Ranges treatment area boundary (see operational plan attached) which started in 2020. The North Cariboo herd is a new study area which hasn't had wolf reduction prior. The demographic indicators, along with the continued recession of habitat, have made both herds priority for recovery actions (in the form of predator management). Recent monitoring in the Hart Ranges suggests wolf predation as the primary proximate cause of mortality accounting for 4 of the 6 known mortalities investigated on GPS-collared adult female caribou in the 2018/19 survival year. Previous studies in the Hart Ranges have also documented wolf predation as the primary proximate cause of mortality for caribou in the Hart Ranges. Less is know about direct mortality in the North Cariboo however a recent wolf survey suggested that densities were above the threshold conducive for caribou recovery. These patterns are consistent with other subpopulations of mountain caribou (southern, central, and northern ecotypes) in British Columbia. In 2016, an aerial survey of the Parsnip River study area (3388 km2) estimated a wolf density of 16.7 wolves/1000-km2 for areas <1200-m in elevation (wolf occurrence is low for areas >1200-m in winter). IRecent GPS radio-collar monitoring of wolves in areas <1200-m within the MacGregor/Hart South portion of the HRC range suggested a density of 8.2 wolves/1000km2. These values suggest an abundance of ~104 wolves in the proposed wolf control area (9,212-km2 below 1200-m). Thus, to achieve the target wolf density >76 wolves would need to be removed from the proposed wolf control area. Results from a 2020 wolf survey in the North Cariboo Mountains suggested a minimum of 36 wolves in 5 separate packs were distributed across the study area resulting in a density of 7.3 wolves/1000km^2.

The reduction of wolves has been shown to be effective for reversing the trends of declining woodland caribou populations in BC. Reduction efforts must be intensive, and applied with the highest standards of scientific rigor and humaneness. From January to March 2020, the first year of wolf reduction was implemented in the Hart Ranges were a total of 91 wolves were removed. A total of 32 wolves were removed in 2021. Wolf reduction efforts in both ranges are expected to support recovery while the ultimate causes of population declines (i.e. habitat-related impacts) are addressed. Radio-collaring individual wolves from wolf packs greatly increases the efficacy of removing entire wolf packs over the course of the winter; complete pack removal is an objective of intensive wolf reduction programs.

Reduction efforts must continue to be implemented intensively and applied with the highest standards of scientific rigor and humaneness. Radio-collaring individual wolves from wolf packs greatly increases the efficacy of removing entire wolf packs over the course of the winter; complete pack removal is an objective of intensive wolf reduction programs.

* Operational plan for the Hart Ranges wolf reduction program is attached.

A. Background – Goals and Objectives:

Wolf reduction has been identified as an effective short-term management action for supporting the recovery of woodland caribou in BC.

The goals and objectives are to:

1) Conduct net-gun aerial capture of individual wolves from all packs (estimated to be 8 – 10 packs) located within both treatment areas and deploy one radio collar per pack for the purpose of increasing the efficiency of lethal, aerial removal;
2) Using radio collar locations to indicate pack locations, dispatch (via aerial shooting) the majority of wolves (>80%) found within the treatment area and reduce the wolf density to below 3 wolves per 1000 km^2;
3) Implement scientific rigor and the highest possible standards for humaneness, and report out on all facets of the program

B. Key Expected Results and Management Implications:

1) Radio-collar deployment on individual wolves from the majority of wolf packs within the treatment area with biological sampling for health profiles
2) Reduction of the majority (>80%) of wolves via aerial shooting
3) Simultaneous monitoring of caribou populations (separate program) to report population growth, adult female survival, and calf survival in response to wolf reduction
4) Ultimately, expecting positive caribou population growth on an annual basis (target 15% annually)

6. CCAC Invasiveness Category: (see Appendix A)
A_____B_____C_____D x __

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7. **Species and Number of Animals Required:** (include justification of numbers predicted to be used)

Species: Wolf (*Canis lupus*)

Number expected for 2020 to 2021: 8 to 10 radio collar deployments, 50 to 70 dispatched across both ranges.

The number of radio collars to be deployed is contingent on the number of wolf packs within the treatment area. It is estimated that there will be between 8–10 wolf packs within the South Peace caribou herd ranges. Radio-collar deployment is generally non-selective but will be applied to adult wolves preferentially and both sexes.

The number of wolves to be dispatched is also dependent on the number of wolves present within the treatment area. It is estimated that at least 50–70 wolves will be dispatched across both treatment areas.

Justification for numbers: The number of wolves to be radio-collared is based on the estimated number of wolf packs in the treatment area. Having one wolf radio-collared within each pack greatly increases the efficacy of

removing subsequent wolves from the pack. It is estimated that 50–70 wolves will be dispatched in order to achieve greater than 80% reduction rate required to support caribou recovery.

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8. Details of Capture, Handling and Surgical Procedures and Final Disposition:
(be detailed and SPECIFIC, attach additional pages, if necessary)
Please refer to Appendix B – CCAC guidelines on: the care and use of wildlife (2003) for techniques considered appropriate and other guidelines for handling and care.

Capture Technique:

Wolves will be captured for radio collar deployment via aerial net-gunning, and euthanasia will occur via aerial shooting

Helicopter captures and removal will take place between December and the end of March using aerial net gunning and physical restraint and aerial shooting. An H500D helicopter will be used to track and target wolves in snow-covered, sparsely treed habitats and frozen watercourses suitable for safe capture or removal. Deep, soft snow is preferred as it will slow the wolves down, make their movements more predictable, and reduce the risk of injury during capture, and increases the likelihood of accurate, humane shooting.

Net-gunning: The identified personnel (either s.15; s.19
will use a hand-held net gun to capture wolves for radio collar deployment. When a candidate animal has been selected in close proximity to a suitable capture location, the capture helicopter will approach the animal, haze it into a suitable nearby opening and on close approach (within 5–10 m), fire a 12' x 12' net over the front of the animal. Capture location will be selected in order to minimize risks to the crew and animal (i.e. avoiding open water, avalanche terrain, thin ice, wooded areas, steep terrain, etc.). A second net may be deployed in order to further entangle the wolf. Only one wolf will be captured at a time. Two net-guns with 4 or 5 detachable net canisters will be available to the net-gunner for each capture. This provides a backup net-gun and nets that can be used to reduce chase duration if the first net fails to adequately restrain the animal, or to further entangle the animal if the single net is not enough. Once the net is deployed the animal usually quickly trips and is wrapped up in the net, becoming immobile. The helicopter will immediately land to drop off the capture crew, and the net-gunner will restrain the wolf with a Y-pole around the neck before it can chew out of the net. The handler will apply a catch-pole snare around the mouth of the wolf and tighten it until it is securely closed. The crew will then apply a muzzle or multiple wraps of strong duct tape to the mouth in order to eliminate the risk of a wolf biting any crew. A blindfold will then be applied to reduce stress to the animal. Hobbles will then be applied to the front and back legs of the animal as restraint to eliminate the possibility of the wolf escaping.

Shooting: The identified personnel (either s.15; s.19 will conduct the aerial removal (euthanasia) of wolves by use of high-powered rifle. The rifle will be a semi-automatic 7.62x39 caliber (equivalent to .308 caliber) using a red-dot scope for quick and accurate target acquisition. Polymer-tipped or copper, rapid expansion bullets will be used to maximize shot impact and ensure quick or immediate kill times. The rifle includes detachable magazines for quick reloading of the firearm, and a semi-automatic action allowing for a quick succession of shots if necessary. Wolves chosen to be shot will be hazed into open locations where the shot distance is no greater than 50 m, ensuring a high likelihood of accurate shot placement. Shot placement will preferentially be the back of the skull (brain and upper spinal cord) or the chest area (lungs and heart). If immediate death does not occur following the first shot, follow-up shots will occur preferentially in the head, then neck, or chest area to ensure death. Wolves will be visually observed from as close a distance as possible from a hovering helicopter for visual signs of movement (e.g. respiratory effort and movement) to confirm death before moving on. Any animal that is shot and is not recumbent will be followed until the gunner is able to kill as quickly and humanely as possible. Humaneness will be documented by recording shot placement and kill times. Once a pack is completely eliminated, a subsample of wolves killed will be inspected on the ground (in those cases where the helicopter can safely land nearby), clearly documenting shot locations and providing standardized photographs to the project lead and provincial wildlife veterinarian. These documentation (time, number of shots, shot placement and photographs) will be provided to the lead veterinarian at the completion of the project.

Method of Handling:

Each wolf to be radio collared and sampled will be handled by an experienced handling crew of two. As described above, the net-gunner will be the first to engage with the animal after it has been entangled in the net. The net-gunner will use a Y-pole to pin the wolf to the ground by applying the Y-pole directly behind the animal's head. The handler will approach the animal with the catch-pole, and secure the mouth shut using the catch pole snare. Once the catch-pole snare is confirmed to be secured, the handlers will apply a quick release commercial dog muzzle and/or multiple wraps of duct tape around the animal's muzzle to ensure it is unable to bite any crew. A blindfold will then be applied to reduce visual stress to the animal. Hobbles will then be applied by securing the right front leg to the right back leg, and the left front leg to the left back leg. The wolf will then be positioned to minimize discomfort and complications (i.e. lateral recumbency, head slightly uphill, head free from deep snow). Once fully restrained, the crew will assess the wolf for any injuries that may have occurred during capture, general health and body condition, the sex, age, mark and sample the animal. The restraining process generally takes less than 2–3 minutes, at which point the radio-collaring and sampling procedures will occur which typically takes less than 10 minutes. Small crews of two personnel will be used to minimize stress, and sudden movements or auditory stimuli will be kept to a minimum. To release the wolf, it is first pointed in a safe direction of travel away from the crew, helicopter, or any hazards. The catch-pole snare is securely attached around the mouth, at which point the muzzle, or tape around the wolf's muzzle, is carefully removed. The Y-pole is re-applied, then the blindfold is removed, followed by removal of the hobbles and release of the catch-pole snare, and finally the Y-pole is lifted, allowing the wolf to flee.

Other Procedures: (Marking method, Sampling)

Each wolf will be fitted with a satellite GPS radio-collar (Lotek LiteTrack Iridium - 680 g – equivalent to approximately 1.5% of the body mass of the average wolf). The radio collar will be applied by the most experienced crew member to ensure the correct fit. Radio-collars will be fitted to ensure comfort for the animal, while ensuring that they are not too loose as to slip off or cause irritation by fitting snuggly with one or two fingers width between the skin and collar belt. Radio-collars will not be fitted on young wolves preferentially, but if necessary will be slightly looser to allow for growth over the course of the winter. Satellite collars will be programmed to obtain positional fixes every 3–4 hours over the course of the winter to acquire up-to-date location information to support removal efforts. Radio-collared wolves will either be left alive following the winter's removal efforts in order to collect further data and to support removal efforts the following winter, or they will be dispatched once all other pack members have been removed.

Biological samples will be taken by the crew while the wolf is immobilized according to a standard protocol supplied by the Wildlife Health Program. The total time associated with radio-collar attachment and sample collection is less than 7–10 minutes.

The radio-collars contain an internal tip switch to detect animal movement rates, and are programmed to send a mortality alert via email and text message if no movement is detected for a sustained period of time (12 hours). Immediate investigation of mortalities is not anticipated, although radio collars will be picked up as soon as logistically feasible and an investigation on cause of death will occur if possible. Collars include label plates instructing hunters/trappers to contact FLNRO if they harvest a collared wolf. This is to facilitate collar retrieval.

Additional data will be recorded and samples will be taken by the crew while the wolf is physically restrained. The crew will examine and sample captured wolves according to the standardized BC wolf sampling protocol:

- Age class using tooth eruption/wear/staining as an index (if visible under the tape)
- Sex
- Colour
- Pack size
- Location
- Body condition
- Photos
- Presence of old injuries or new capture-related injuries
- External parasite presence and prevalence
- From each wolf, 10 to 15 ml of blood will be withdrawn from the saphenous or cephalic vein for serological screening (parvovirus, Neospora, distemper), ensuring bleeding has stopped before releasing the animal
- Each wolf will be ear-tagged with a Rototag with a unique identifier number, and a 6 mm punch biopsy of the ear will be air-dried and archived for genetics

- At least 100 hairs with roots from the top of the shoulders from each wolf for genetic or other studies (e.g., stress assessment through cortisol levels, diet analysis with stable isotopes).
- Samples will be processed each evening and stored before shipping to the BC Wildlife Health Program
- For dispatched wolves, when the helicopter can land safely near the carcass, an ear tip will be sampled, and photos will be taken showing shot placement

Contingency Plan: (what training, preparations and equipment are available in event of animal injury during capture or handling)
The following measures will be in place to reduce the risk of injury to wolves:

1) Investigators are qualified, trained, and experienced in general wildlife capture, net-gunning, handling, and shooting
2) Capture crews are personnel with extensive experience in capturing, handling and shooting wild canids
3) At least two personnel are trained in first aid, CPR, and avalanche safety
4) Aerial net-gun captures will be conducted in deep, soft snow in ambient temperatures of between 0 to -25 C, on terrain consisting of flat or rolling terrain and not exposed ground or open water and animals will be assessed and monitored during physical restraint.
5) The capture crew will have a satellite phone to contact other experienced professionals and veterinarians for advice and guidance for any unusual circumstances that arise in the field
6) While mortalities can occur during capture operations, any mortality must be investigated and if the mortality rate exceeds 2% the operation must cease and the wildlife veterinarian and project lead be contacted immediately.
7) A firearm will be available for humane killing of any wolves badly injured during net-gun captures

Method of Euthanasia and Disposal Technique: (if necessary)
In the event of an animal being injured without a chance of survival after release, it will be dispatched humanely by high caliber gunshot to the brain. Carcasses may be left in the field unless brought back to the lab for necropsy and final disposal at the local landfill (buried deeply), s.18.1
s.18.1

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9. Details of Potentially Controversial Procedures and Justification: (Include any expected morbidity and methods used to avoid)

Animal welfare is of high priority for this project. All net-gun captures will occur following the procedures described above (and in the regional SOPs for aerial net-gun capture). Few complications have been observed using this protocol. Aerial shooting of wolves is considered to be the most effective and humane method of removing wolves in remote, expansive areas, with the ability to target without bycatch occurring (AVMA, 2020). All possible measures will be taken to ensure the ethical and humane removal of wolves.

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10. Budget:

Funding sources applied for: Provincial Caribou Recovery Program

Are these peer reviewed? Yes (the region's wolf reduction programs have undergone internal and external reviews to measure effectiveness)

Status: Approved

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11. Region:

The wolf reduction will occur within the Hart Ranges and North Cariboo Mountains caribou ranges. The caribou herd ranges (core + matrix range) will serve as the boundary for the wolf reduction treatment areas. The treatment area was identified due to the recovery urgency for these particular caribou herds.

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12. Permit:

Is a permit required? Yes **Status**: Pending Decision

Please attach any permit documents to application.

Please send the completed BC Animal Care Form Application Form to the Permit & Authorization Service Bureau (PASB) along with a General Permit Application, detailed project proposal and permit fees (if applicable). For further information on how to apply, please visit the PASB website at http://www.env.gov.bc.ca/pasb/ or call PASB at 1-866-433-7272 (to bypass phone tree push 231).

Approval of an Animal Care Application does not constitute approval of any application to handle wildlife. Applicants must also have a valid permit, issued under the Wildlife Act, before engaging in any such activity.

s.15; s.19

Principal Investigator's Signature

Dec 1st 2021
Date of Application

Appendix A:

Canadian Council on Animal Care: Categories of Invasiveness for Wildlife Studies

A. Methods used on most invertebrates or on live isolates

Possible examples: the use of tissue culture and tissues obtained at necropsy; the use of eggs, protozoa or other single-celled organisms; experiments involving containment, incision or other invasive procedures on metazoa.

B. Methods used which cause little or no discomfort or stress

Possible examples: observational studies in which the same individuals are not repeatedly observed so as to habituate or otherwise modify their behavior; census or other surveys which do not involve capture or marking individuals; non-invasive studies on animals that have been habituated to captivity; short periods of food and/or water deprivation equivalent to periods of abstinence in nature.

C. Methods which cause minor stress or pain of short duration

Possible examples: capture, using methods with little or no potential to cause injury and marking of animals for immediate release; long-term observational studies on free-ranging animals where the behaviour of individuals may be altered by repeated contact; brief restraint for blood or tissue sampling; short periods of restraint beyond that for simple observation or examination, but consistent with minimal distress; short periods of food and/or water deprivation which exceed periods of abstinence in nature; exposure to non-lethal levels of drugs or chemicals; low velocity darting and slow-injection darts with immobilization chemicals. Such procedures should not cause significant changes in the animal's appearance, in physiological parameters such as respiratory or cardiac rate, or fecal or urinary output, in social responses or *in ability to survive*.

Note: During or after Category C studies, animals must not show self-mutilation, anorexia, dehydration, hyperactivity, increased recumbency or dormancy, increased vocalization, aggressive-defensive behavior or demonstrate social withdrawal and self-isolation.

D. Methods which cause moderate to severe distress or discomfort

Possible examples: *capture, using methods that have the potential to cause injury (e.g. Leg snares, leghold traps, high velocity darting and rapid-injection darts with immobilization chemicals, net gunning, etc.); maintenance of wild caught animals in captivity*; translocation *of wildlife to* new habitats; major surgical procedures conducted under general anesthesia, with subsequent recovery; prolonged (several hours or more) periods of physical restraint; induction of behavioral stresses such as maternal deprivation, aggression, predator-prey interactions; procedures which cause severe, persistent or irreversible disruption of sensorimotor organization.

Other examples *in captive animals* include induction of anatomical and physiological abnormalities that will result in pain or distress; the exposure of an animal to noxious stimuli from which escape is impossible; the production of radiation sickness; exposure to drugs or chemicals at levels that impair physiological systems. *(NB. Experiments described in this paragraph would be Category E if performed on wildlife immediately prior to release.)*

Note: Procedures used in Category D studies should not cause prolonged or severe clinical distress as may be exhibited by a wide range of clinical signs, such as marked abnormalities in behavioral patterns or attitudes, the absence of grooming, dehydration, abnormal vocalization, prolonged anorexia, circulatory collapse, extreme lethargy or disinclination to move, and clinical signs of severe or advanced local or systemic infection, etc.

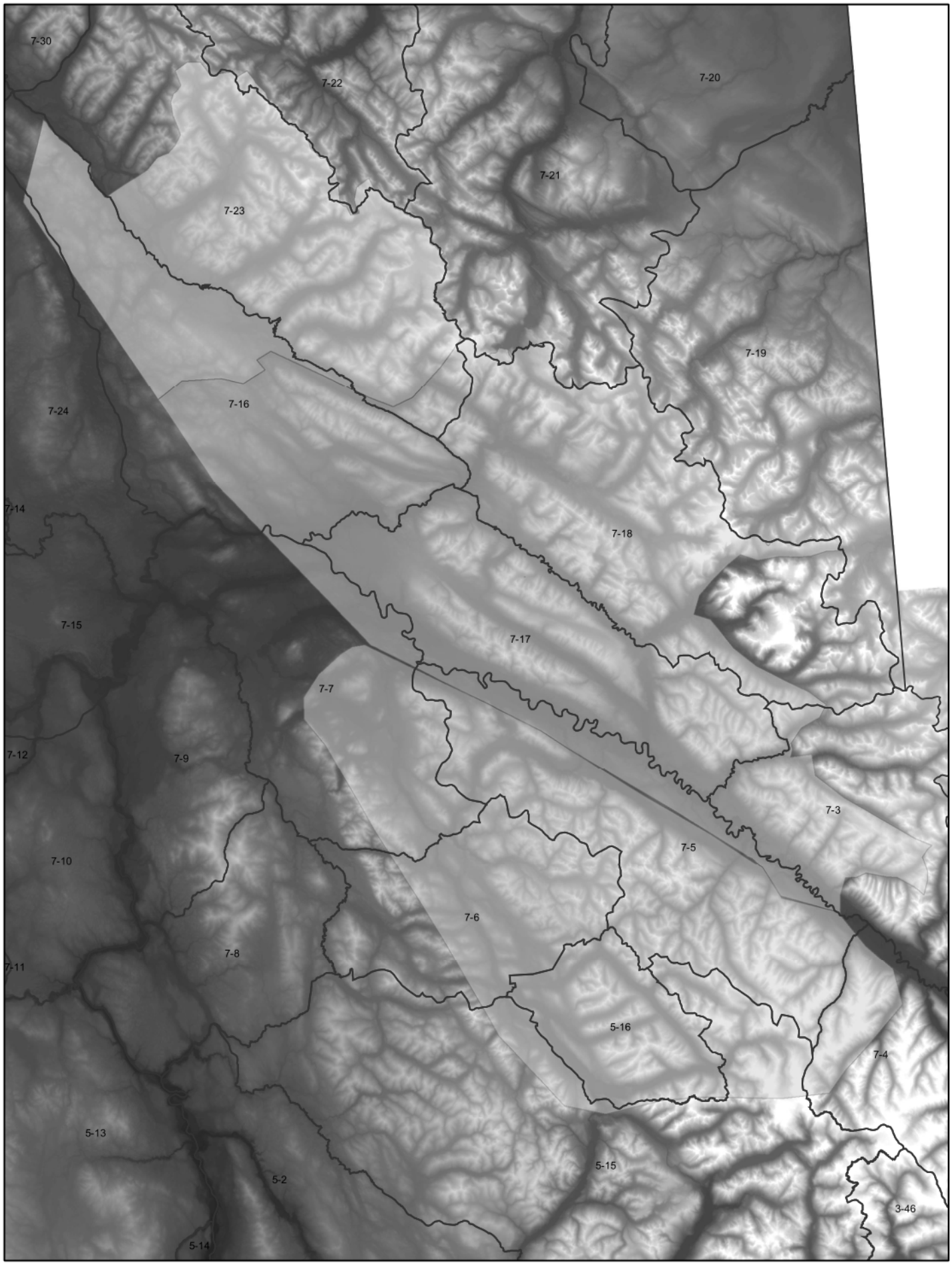
E. Procedures which cause severe pain near, at, or above the pain tolerance threshold of unanesthetized conscious animals

This Category of Invasiveness is not necessarily confined to surgical procedures, but may include exposure to noxious stimuli or agents whose effects are unknown; exposure to drugs or chemicals at levels that (may) markedly impair physiological systems and which cause death, severe pain, or extreme distress; behavioral studies about which the effects of the degree of distress are not known; *environmental deprivation that has the potential to seriously jeopardize an animal's wellbeing*; use of muscle relaxants or paralytic drugs without anesthetics; burn or trauma infliction on unanesthetized animals; a euthanasia method not approved by the CCAC; any procedures (e.g., the injection of noxious agents or the induction of severe stress or shock) that will result in pain which approaches the pain tolerance threshold and cannot be relieved by analgesia (e.g., removal of teeth without analgesia, or when toxicity testing and experimentally-induced infectious disease studies have death as the endpoint), *capture methods with a high potential of causing severe injury that could result in severe chronic pain and/or death.*

Appendix B:

Canadian Council on Animal Care guidelines on: the care and use of wildlife (2003)

http://www.ccac.ca/english/gui_pol/GUFRAME.HTM
http://www.ccac.ca/english/gdlines/wildlife/Wildlife.pdf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Fish and Wildlife Application

Tracking Number: 100364532

Applicant Information

If approved, will the authorization be issued to an Individual or Company/Organization?	Company/Organization
What is your relationship to the company/organization?	Employer

APPLICANT COMPANY/ORGANIZATION CONTACT INFORMATION

Applicant is an Individual or an Organization to whom this authorization Permit/Licence will be issued, if approved.-

Name: s.15; s.19
Doing Business As:
Phone:
Fax:
Email:
BC Incorporation Number:
Extra Provincial Inc. No:
Society Number:
GST Registration Number:
Contact Name:
Mailing Address:

TECHNICAL INFORMATION

APPLICATIONS

You may submit one or more application(s) Click on the 'Add Application' for each application you would like to add. In order to submit multiple applications together they must be for one applicant and in the same region.

Type
General Wildlife Permit

GENERAL WILDLIFE PERMIT

Please provide the following general information about you and your application.

APPLICATION TYPE

Please provide the following details regarding your application.

What type of permit are you applying for:	New Permit
Applicant Date of Birth (DD/MM/YYYY)	Oct 5, 1985

PROPOSED ACTIVITY

Please provide the following details regarding your proposed activity.

Wildlife Species - Common Name:	Grey Wolf
Wildlife Species - Scientific Name:	Canis lupus
Location of Activity:	Hart Ranges and North Cariboo Mountains wolf reduction areas
Activity Start Date:	Dec 15, 2021
Activity End Date:	Mar 31, 2022

ACTIVITY DESCRIPTION

Provide a detailed description of the activity you require a permit for. Include methods and equipment to be used. If your activity involves the capture, transport, possession, release or export of live animals or viable eggs, you must also include a detailed safety plan that explains the measures you will take to ensure that public safety will be protected. (For example, how would you prevent escapes?) In your own words, also describe the purpose of this activity and any special circumstances the Ministry should be aware of.

Description:	This permit is in support of being exempt from the prohibition in section 27 of the Wildlife Act against hunting GREY WOLVES (Canis lupus) from a helicopter. Wolves will be hunted from a helicopter with a rifle in support of the BC caribou recovery program in areas that they approved to do so.
Additional Permit-Specific Information:	All activities will be conducted in accordance with an approved animal care application (attached).

GENERAL WILDLIFE PERMIT - APPENDIX

Legislation

Below is a non-exhaustive list of provisions under the Wildlife Act and regulations that are relevant to this licence. It is the licence holder's responsibility to be aware of any provisions under the Act or regulations that may apply to this licence.

Failure to pay fine

85 (1) This section applies if a person

(a) fails to pay, within the time required by law, a fine imposed as a result of the person's conviction for an offence under this

Act or the Firearm Act, and

(b) has been served with notice of this section.

(2) In the circumstances referred to in subsection (1),

(a) the person's right to apply for or obtain a licence, permit or limited entry hunting authorization under this Act is suspended immediately and automatically on the failure to pay the fine,

(b) all licences, permits and limited entry hunting authorizations issued to that person under this Act are cancelled immediately and automatically on the failure to pay the fine

(i) the person must not apply for employment as an assistant guide

(ii) the person must not guide as an assistant guide

(c) the person commits an offence if, before that fine is paid, the person

(i) applies for, or in any way obtains, a licence, permit or limited entry hunting authorization under this Act, or

(ii) does anything for which a licence, permit or limited entry hunting authorization under this Act is required.

(iii) applies for employment as an assistant guide

(iv) guides as an assistant guide

ATTACHED DOCUMENTS

Document Type	Description	Filename
Generic Document Upload	Animal Care Application	draft_BC_AnimalCareForm_Wol...

PRIVACY DECLARATION

☑ Check here to indicate that you have read and agree to the privacy declaration stated above.

IMPORTANT NOTICES

Please review the clauses and conditions associated with your application below.

DECLARATION

☑ I acknowledge that the information I have provided is true and that I fulfill the requirements for the applications.

OTHER INFORMATION

Is there any other information you would like us to know?	Work conducted under contract by FLNORD - fee exempt.

OFFICE

Office to submit application to: Prince George

APPLICANT SIGNATURE

Applicant Signature	**Date**

OFFICE USE ONLY		
Office Prince George	**File Number**	**Project Number**
	Disposition ID	**Client Number**

Wolf Control for Hart Ranges Caribou Subpopulation Recovery – Operational Plan

By: Michael Klaczek, Wildlife Biologist, Omineca Region

Table of Contents

Acknowledgements

This report closely follows previous draft plans developed by Mike Bridger (Wildlife Biologist NE region). It also uses significant content from a recent report drafted by C. DeMars and R. Serruoya (2019). Recommendations for implementing and evaluating predator management within the Tweedsmuir-Entiako and Hart Ranges caribou herds: Predator feasibility project phase II.

Introduction

The Southern Mountain (SM) population of woodland caribou is listed as *Threatened* under the federal *Species at Risk Act*. In 2014, the Committee on the Status of Endangered Wildlife in Canada re-evaluated the status of the population and recommended their status be upgraded to *Endangered* because of ongoing population declines throughout their distribution and many subpopulations are isolated and have less than 50 individuals. Studies have shown that a core driver of caribou population decline is habitat disturbance leading to altered predator-prey dynamics that places unsustainable predation pressure on caribou, a process known as apparent competition. As of 2019, only 1201 individual caribou remain within the SM population. At the northern extent of the distribution, the 3 subpopulations east of Prince George (the Hart Ranges, North Cariboo Mountains and Narrow Lake) represent approximately 49% of the total remaining mountain caribou population (unpublished data, pers comm N. Dodd Sept 2019). However, since 2006, caribou within these 3 ranges have also declined by 40-70% (Klaczek and Heard 2016). The Hart Ranges subpopulation located within the Rocky Mountains approximately 70-120 km east of Prince George, British Columbia is the largest remaining subpopulation currently estimated at 377 caribou (Klaczek and Heard 2019).

Since 2007, 4 management actions have been implemented to support caribou recovery within the Hart Ranges: 1) the establishment of Ungulate Winter Range polygons over much of the high elevation habitat to minimize habitat loss through forestry-related activities, 2) the implementation of Motor Vehicle Closures which prohibit the operation of snowmobiles to minimize disturbance on key caribou winter range, 3) the placement and evaluation of restrictions of commercial heli-skiing operations, and 4) the increase in moose hunting permits in the northern portion of the range (i.e. Parsnip area) to reduce moose numbers and by extension, reducing wolf density to ultimately reduce predation pressure on caribou. While these actions increase the probability of recovery, the subpopulation has continued to decline. Therefore, additional population management actions aimed improving adult female survival and calf recruitment in the short term is necessary to achieve caribou population growth. The

population target is to increase population the Hart Ranges subpopulation to pre-existing numbers observed in 2006 when over 700 caribou where estimated within the range.

Caribou Status

Estimated at 718 caribou in 2006, the Hart Ranges caribou subpopulation declined by approximately 5% per year for over a decade contributing to a 47% reduction in caribou abundance by 2016 (375 caribou, Klaczek and Heard 2016). The most recent census conducted in 2019 estimated 377 caribou (95% CI 356 – 422 caribou) with calves representing 19% of the population suggesting the population remained stable in the short-term and population vital rates (i.e. calf recruitment, and adult female survival) monitored during the 2018/19 survival year were within ranges expected for a stable population (λ_{RM} = 1.02, 95% CI = 0.92-1.15). However, it is unlikely the population will remain stable over the long-term unless calf recruitment consistently increases above the 15% recruitment threshold generally considered necessary for a long-term stable population (Bergerud 1992). Since 2006, mean recruitment in the Hart Ranges averaged only 12.8% over 14 surveys that covered all or part of the study area (Seip et al. 2006, Heard et al. 2012, Klaczek and Heard 2019). Short term periods of stability, like 2016-2019, are not uncommon even with declining long terms trends. The Hart Ranges subpopulation was stable (560 – 532 caribou) between 2010 and 2012, (Heard et al. 2012) but then declined by 40% (λ_{CENSUS} = 0.85) from 2012 to 2016 (Klaczek and Heard 2016). Likewise, the adjacent North Cariboo Mountains subpopulation declined from 284 to 187 between 2002 and 2018 but was stable between 2002 and 2005 at 284 and between 2011 and 2014 at ~220 caribou (Courtier and Heard 2014, Klaczek and Lirette 2018). The Hart Ranges subpopulation will likely continue to decline without management actions to increase survival and calf recruitment.

Recent monitoring in the Hart Ranges suggests wolf predation as the primary proximate cause of mortality accounting for 4 of the 6 known mortalities investigated on GPS-collared adult female caribou in the 2018/19 survival year. However, other factors, such as the interaction between health-related issues or climate change that may predispose caribou to mortality or predation are unknown. Previous studies in the Hart Ranges have also documented wolf

predation as the primary proximate cause of mortality for caribou in the Hart Ranges (Wittmer et al. 2005, Heard et al. 2013). These patterns are consistent with other subpopulations of mountain caribou (southern, central, and northern ecotypes) in British Columbia (Wittmer et al. 2005, Seip and Jones 2018, Klaczek 2019).

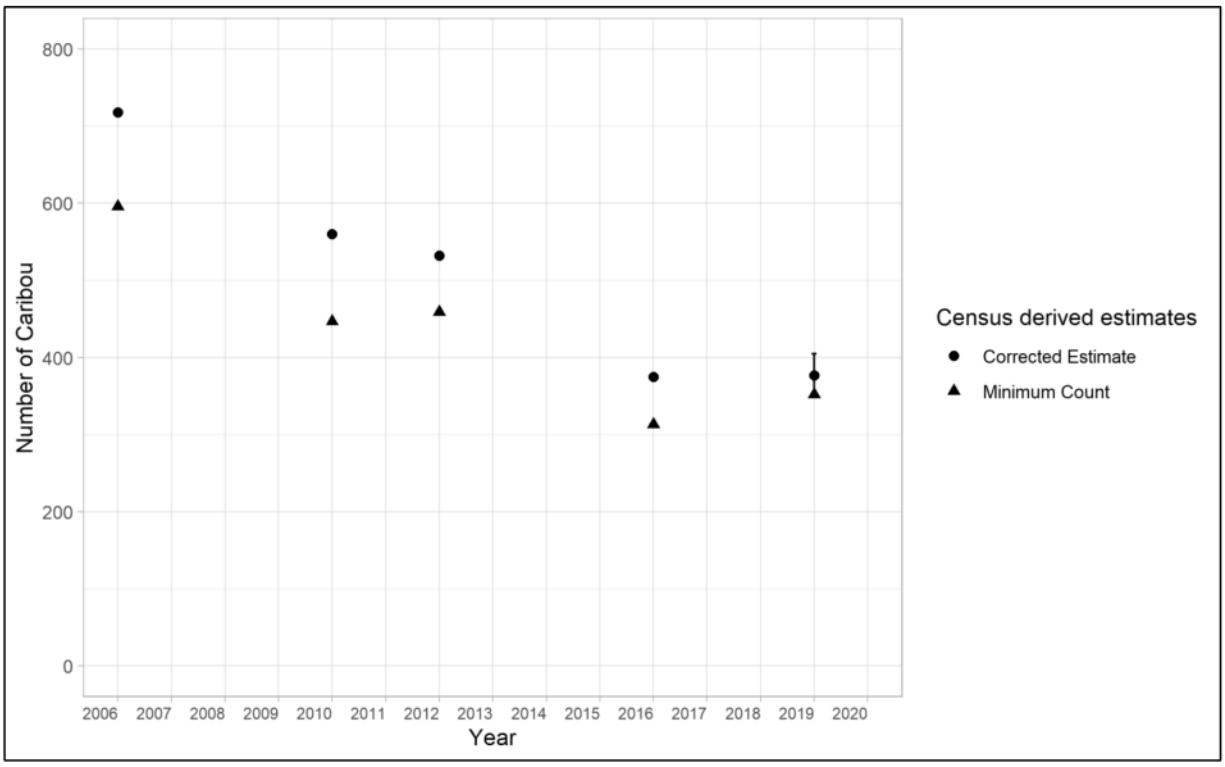

Figure 1. Late-winter population estimates for the Hart Ranges caribou subpopulation. The black circles represent corrected population estimates and the black triangles represent the minimum number of caribou counted during the surveys. In 2006, 2010, 2012 and 2016, corrected estimates were based on a fixed correction factor (0.83, Seip 1987). The 2019 estimate was based on a mark-resight technique using GPS-collars to estimate sightability (0.91, Klaczek and Heard 2019).

Rationale for Predator Management

As part of ongoing monitoring an aerial survey of the Parsnip River study area (3388 km^2) estimated a wolf density of 16.7 wolves/1000-km^2 for areas <1200-m in elevation (wolf occurrence is low for areas >1200-m in winter; Klaczek and Heard 2017). Recent GPS radio-

collar monitoring of wolves in areas <1200-m within the MacGregor/Hart South portion of the HRC range suggested a density of 8.2 wolves/1000km^2 (M. Klaczek, *unpublished data*). These values suggest an abundance of ~104 wolves in the proposed wolf control area (Figure 2). The wolf density estimated within the Hart caribou range (8.84 wolves/1000km^2) is well above the target density considered necessary for caribou recovery (~1.5 – 3 wolves/1000km2; Wilson 2009, Environment Canada 2014).

Recommendations for predator management are focused on wolves because recent studies suggest that wolf predation constitutes a high proportion of adult female mortalities (≥70%; Heard et al. 2013, M. Klaczek, *unpublished data*). In the Hart Ranges, these high and unsustainable predation rates are likely due to the high estimated densities of wolves within the Hart Ranges (8.2 wolves/1000km2 [McGregor/Hart South low elevation winter caribou range] to 16.7 wolves/1000-km2[Parsnip low elevation caribou winter range]; Klaczek and Heard 2017; M. Klaczek, *unpublished data*).

Wolf management for caribou recovery aligns with the Provincial Wolf Management Plan, Control of Species policy (4-7-04.01.3), the Mountain Caribou Recovery Implementation Plan, federal Recovery Strategy, and recent draft Section 11 agreement. Properly applied aerial shooting of wolves is considered the most humane and effective method for wolf removal. Wolf control programs must occur in the winter as snow cover assists in locating wolves and slows their movement to facilitate as aircraft approach. Wolf reductions have reversed caribou population declines where treatments were intense (Seip and Jones 2018). The intensity of wolf reduction is specified to a target wolf density. In British Columbia and Alberta, caribou populations have stabilized or increased when wolf densities range were reduced or maintained at 2 – 6 wolves/1000km^2. The federal Recovery Strategy recommends reducing wolves <3 wolves/1000km2 within matrix and core ranges. Given uncertainty and rapid recolonization of wolves into caribou range (Bergerud and Elliot 1998m Hervieux et al. 2014, Seip and Jones 2018), operational plans focus on removing all observed wolves within a range, each year, acknowledging that some are missed or soon recolonize after the winter control period.

Initiating a wolf reduction program for Hart Ranges caribou has noted benefits on several levels. Although the Hart Ranges subpopulation has declined by ~50% since 2006, it is the largest remaining subpopulation within the Southern Mountain DU comprising 25% of the remaining individuals within the overall mountain caribou population. Assuming other factors are equal, a higher number of adult female caribou would benefit by removing essentially the similar density of wolves. For example, based on population growth rates observed in the adjacent South Peace wolf control area since 2015 (annual caribou population growth/lambda = 1.15; Seip and Jones 2018) the Hart Ranges subpopulation could be expected to double in size in 5 years (i.e. >700 caribou by 2025). Whereas enacting the same control effort on a smaller caribou population could take 2-3 times longer to reach those numbers or to reach a sustainable population target. The Hart Ranges subpopulation range is immediately adjacent to ongoing wolf control areas in the South Peace (i.e. Kennedy Siding, Quintette, and Narraway; Figure 2). As a result, population management actions within the Hart Ranges may be more efficient and effective relative similar actions implemented in isolated subpopulations. By incorporating the Hart Ranges into a larger collection of connected treatment areas should help reduce wolf recolonization which would provide further benefit to all of the treatment herds in the greater area. Further, caribou from the Narraway and Redrock/Prairie Creek subpopulations move into the Hart Ranges during the summer, a time when wolf predation on caribou is highest relative to other seasons of the year. Narraway and Redrock/Prairie Creek subpopulations are listed under Environment Canada's imminent risk analysis, and should benefit from wolf removal in the Hart Ranges (Environment Canada 2018).

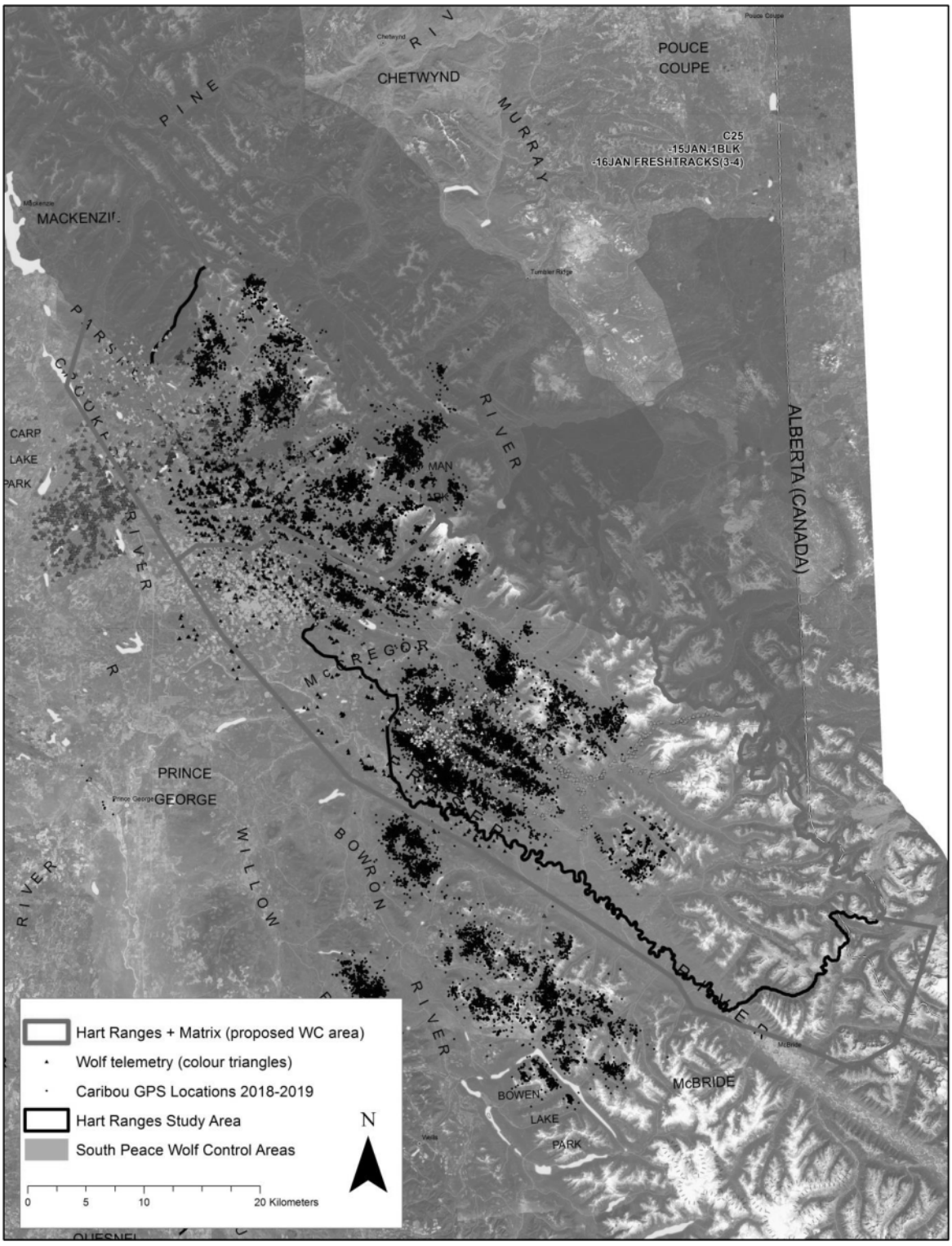

Figure 2. Wolf control treatment area (Hart Ranges caribou herd boundary) with recent caribou and wolf telemetry locations.

Spatial Scale

A recently completed draft of matrix range within and adjacent to the annual range for the Hart Ranges subpopulation can be used to initially define the area for potential wolf reduction (Figure. 2). This area encompasses 17,789 km^2 and its boundaries extend beyond the north, south and west boundaries of the HRC annual range. The eastern boundary of the proposed wolf reduction area was clipped to the height of land as wolves are unlikely to occur in high alpine areas during winter, which is when wolf reduction is generally conducted. Note that this area partially overlaps with the area of ongoing wolf reduction in the Kennedy Siding and Quintette caribou ranges and wolf reduction has also been recently initiated in the Narraway range. This adjacency should increase the temporal effectiveness of wolf reduction within the Hart Ranges as it should lower the rate of wolf recolonization following reduction efforts.

Intensity

The federal Recovery Strategy recommendation of reducing wolves to <3 wolves/1000-km^2 within their buffered ranges represents a reasonable initial management target for stabilizing or reversing current population declines. Because of uncertainty in the size of the proposed reduction areas and the high reproductive rates and dispersal capabilities of wolves, removing all wolf packs occurring within seasonal core areas of caribou is recommended, which follows Wilson (2009). Range-specific targets are estimated using the most current estimates of wolf densities and the proposed areas for wolf reduction. In 2016, an aerial survey of the Parsnip River study area (3388 km^2) estimated a wolf density of 16.7 wolves/1000-km^2 for areas <1200-m in elevation (wolf occurrence is low for areas >1200-m in winter; Klaczek and Heard 2017). Recent GPS radio-collar monitoring of wolves in areas <1200-m within the MacGregor/Hart South portion of the HRC range suggested a density of 8.2 wolves/1000km^2 (M. Klaczek, unpublished data). These values suggest an abundance of ~104 wolves in the proposed wolf control area (9,212-km^2 below 1200-m). Thus, to achieve the target wolf density >76 wolves would need to be removed from the proposed wolf control area.

Duration

Evidence from Alberta (Hervieux et al. 2014) and the current wolf reduction program in BC's Central group of Southern Mountain caribou suggest that annual wolf reductions will likely need to occur for at least five years and potentially for multiple decades if primary prey and caribou habitat are not concurrently managed. Beyond this initial timeframe, it is difficult to estimate the exact frequency and duration of wolf reduction necessary to stabilize and maintain caribou in HRC ranges because of variation in species-specific responses to management actions and the rate and extent of habitat recovery. This variation necessitates that wolf reduction be deployed in an adaptive management framework.

Managing and reducing primary prey

As wolf populations are numerically linked to populations of primary prey (i.e. moose for the HRC herd area), an indirect method to reduce wolf numbers over time is to manage moose to a density that supports the targeted wolf density required for caribou recovery. Habitat management treatments may help reduce predation risk by altering the distribution of moose away from core caribou range. Also, as an intermediate-term (15-20 years) approach to caribou recovery, moose are reduced through liberalized hunting seasons including a cow/calf component. A moose reduction trial has been ongoing with the Parsnip area since 2006 (northern Hart Ranges) but will likely need to be expanded into the southern portion of the Hart Ranges (WMUs 7-17 and 7-18). If increasing the number of LEH permits is insufficient because of a limited number of available hunters or low hunter success, then additional regulation changes such as increasing bag limits, introducing a new season, and lengthening existing hunting seasons may be warranted to achieve an effective hunting intensity. Existing models of wolf-prey density relationships can be used to estimate moose targets that are associated with wolf densities conducive to caribou population persistence. For example, Messier's (1994) numeric response model predicts moose densities need to be <0.13 moose/km^2 for wolves to be <6.5 wolves/1000-km^2. Wilson (2009) used Fuller's (1989) prey biomass equation to estimate moose densities of <0.3 moose/km^2 and <0.05 moose/km^2 for

wolves to be <6.5/1000-km^2 and <1.5/1000-km^2, respectively. A total of 3170 moose are estimated to occur within the Hart Ranges wolf control area based on population survey data (0.48 moose/km^2; Parnsip, Scheideman et al. 2018) and an a density estimate based on hunter trend index (0.27 moose/km^2, Hart South, Klaczek unpublished data 2019). A moose population survey is planned during the winter of 2019/20 in the Hart South area to estimate moose population density and overall abundance.

Enacting multiple interventions (i.e. pulling multiple levers at the same time) is the most effective means for reaching and maintaining self-sustaining caribou populations in the long-term. In the context of apparent competition, monitoring data collected from the Hart Ranges indicates moose and wolf densities are too high at current levels to create a sustainable situation for caribou; and moose abundance is expected to increase further once wolf removal occurs. Not addressing the current density or subsequent expected increases in the moose population will likely lead to rapid recolonization of wolves into the caribou recovery area thus maintaining wolf predation pressure on caribou in perpetuity. This process will likely continue until habitat recovers (>25 – 40 years; Heard et al. 2008) or until moose are reduced through hunting or habitat management. This process has been demonstrated within wolf removal areas in Alberta and BC where prey management was not addressed within wolf control areas leading to 60-100% recolonization rates year after year. For example, in northeast BC, Bergerud and Elliott (1998) reported annual recolonization rates of 97%, 90%, 72% and 81% during the first four years of wolf control. During seven years of wolf control in Alberta's Little Smoky caribou range, Hervieux et al. (2014) removed 11.6 wolves/1000-km^2 on average annually, indicating high rates of recolonization. For the first three years of the current control program in BC's Central group of SM caribou, Seip and Jones (2018) observed that wolf populations recovered each year to ~50-60% of their pre-reduction abundances. If primary prey is managed as caribou habitat recovers and is protected, the need for wolf removal is expected to diminish over time. Without prey and habitat management, wolf control is required in perpetuity to maintain caribou populations. Managing moose to target densities that support caribou recovery is an intermediate-term approach (i.e. 10-20 years). Habitat management and recovery is often the ultimate goal, but may take decades (25-40 years) to unfold. Moose

management, through habitat management or hunter harvest for example, is be required in conjunction with predator reduction.

Effective management of moose to reduce wolf populations should have short- and long-term objectives. For the latter, reducing the extent of early seral forest (i.e., <40 years old) to <35% of low-elevation winter range and matrix ranges—as recommended by the federal Recovery Strategy for SM caribou—should be a priority. However, until the effects of caribou habitat recovery are realized, managing moose concurrently with wolf reduction is recommended for the Hart Ranges subpopulation. Although moose have declined in the Parsnip area over the past 2 decades (2006 -2017; Scheideman et al. 2018), moose are the most abundant ungulate prey for wolves (Steenweg 2011; Scheideman et al. 2018) and should be the primary focus of reduction efforts. Reducing moose densities to <0.15/km^2, which is associated with wolf densities of <3/1000-km^2, is a reasonable initial target. However, the timing and intensity of such actions will vary will be informed through herd planning.

Adaptive Management and Study Design

Implementing predator reduction within Hart Ranges should be done in a framework of active Adaptive Management with before-after data and spatial reference areas, if possible (i.e., a BACI design; Green 1979; Serrouya et al. 2017b, 2019). Identifying suitable reference ranges will be difficult because of the limited number of SM caribou ranges that occur at similar latitude, have similar ecosystems, are not immediately adjacent to treatment areas and are not subject to their own management actions. Two potential candidates are the Wolverine range or North Cariboo Mountains, although management actions for these subpopulations may be required in the future. Note that the lack of suitable reference areas should not limit applying actions Hart Ranges as substantial learning can still be achieved with simpler before-after designs.

Response metrics

Evaluating the effectiveness of predator reduction will require monitoring multiple response metrics (Table 1). Because predator reduction is being implemented to stabilize and recover caribou populations, monitoring caribou demographics is of primary importance. Monitoring

wolf responses to management actions will also be necessary as understanding treatment outcomes (i.e., the demographic response of caribou) requires understanding parameters governing the treatment dose (wolf reduction). For example, annual estimates of wolf density are critical for understanding recolonization rates by wolves post-reduction, which can consequently guide the intensity and spatial scale of future wolf reduction efforts, and ultimately determine whether wolf density targets are being met. As previously mentioned, however, monitoring this density can be achieved concurrently with the wolf removal program. Managing moose concurrently with wolf reduction has also been recommended and therefore will require monitoring the response of moose populations to management actions. Responses of moose can further inform expected responses of wolves post-reduction and can yield insights into habitat conditions within caribou core areas and the surrounding matrix. Habitat conditions, however, should be monitored directly for at least two reasons. First, understanding temporal changes in habitat conditions can inform various aspects of future management actions. For example, the frequency and duration of wolf reduction would be expected to decrease over time if rates of habitat recovery exceed those of habitat loss (Serrouya et al. 2019). Second, given that habitat loss and alteration is the ultimate cause of caribou population declines, public support for management actions such as wolf reduction will be limited and/or wane unless meaningful progress on habitat protection and recovery can be demonstrated.

Caribou Monitoring

The ultimate objective for implementing predator management within the Hart Ranges is to stabilize and recover the Hart Ranges caribou population to 2006 levels (718 caribou; Seip et al 2006). Evaluating progress toward this objective requires obtaining baseline demographic data in each range and reference area then monitoring whether and how these data change after the implementation of management actions. The most relevant demographic response for caribou is the finite annual rate of population change (λ), which can be estimated directly or indirectly. Direct estimation can be accomplished by repeated estimates of population size (Serrouya et al. 2017). This method, however, may be impractical for populations where low sightability of caribou prevents reliable estimates of population size. For these populations, λ

can be estimated indirectly using Hatter and Bergerud's (1991) recruitment-mortality (R-M) equation (e.g., DeCesare et al. 2012; Hervieux et al. 2013; Serrouya et al. 2017a). This approach calculates λ as

$$\lambda=(1-M)(1-R)$$

where M is the finite annual mortality rate and R is the finite annual recruitment rate. The numerator is usually derived from Kaplan-Meier estimates of survival (1 – M) from radio-collared females. Caribou demography will need to be monitored on an annual basis in the treatment and reference areas for at least seven years (one caribou generation; COSEWIC 2002) or until targets of caribou population size are met.

Predator Monitoring

Monitoring wolf density before and after reduction will be necessary to evaluate whether targets of wolf density are achieved. Recent estimates of baseline wolf densities have been collected within portions of the proposed wolf reduction areas for the Hart Ranges subpopulation (Table 1). Post-reduction monitoring is important for evaluating the effectiveness of reduction intensity and spatial scale as well as determining the duration and frequency of reduction efforts. Evidence from other wolf reduction programs suggests that reduction will need to occur annually, at least for the first 5-10 years (Hervieux et al. 2014; Seip and Jones 2018). Because wolf reduction within the Hart Ranges will likely be done, at least in part, by aerial shooting, estimating wolf densities can be done concurrently with reduction actions.

Moose Monitoring

Monitoring populations of moose is required to assess the effectiveness of management actions to reduce prey densities. These actions include direct population management and more indirect actions that focus on limiting the extent of habitat favorable to primary prey (i.e., early seral conditions). As with caribou and wolves, baseline estimates of moose densities should be derived in both the treatment and reference areas prior to initiating management actions. These estimates are typically calculated from data obtained through a stratified

random block design (SRB; Gasaway et al. 1986; Scheideman et al. 2018). Moose population surveys should be conducted before the treatment and then every 3-5 years to assess changes in moose population trend.

Monitoring of Range and Matrix Habitat Conditions

Achieving self-sustaining populations of caribou will require protecting and restoring the old-growth conditions that are conducive to population persistence. Without habitat recovery and protection, management actions such as predator reduction will need to be continued in perpetuity and public support for these controversial measures will likely wane.

Monitoring habitat conditions (i.e., the percent early seral [<40 year old] forest within and adjacent to caribou range) can primarily be accomplished via remote sensing and GIS analyses (Fig. 5), and, as such, should be completed every three to five years.

Prioritizing response metrics

Given finite conservation resources, the monitoring of all response metrics in both the treatment and reference areas may not be possible, but such limitations should not preclude the implementation of management actions. The response metrics reviewed above can be prioritized in terms of their importance within an adaptive management framework. Because the primary impetus for predator management is the recovery of caribou populations, the response metrics with the highest priority are those necessary to estimate or infer caribou population trend.

Table 1. Current estimates of various response metrics for monitoring the effectiveness of predator management for the Hart Ranges subpopulation.

Monitoring Target	Response Metric	Value	Year
Caribou	population growth rate	0.95	2012-2019
	abundance	377	2019
	adult female survival	0.82-0.87	2018
	juvenile recruitment	19%	2019
Wolf	abundance/density	104 wolves – density = 8.4 wolves/1000km2 (Hart South)-and 16.6 wolves/1000km2 (parsnip) (LEWR)	2016
Primary Prey (moose)	abundance/density	0.48/km2 (parsnip)	2017; moose survey planned for Hart south in winter 2019/20
Range/Matrix	% early seral	UNK	Analysis required

Operational Plan for Hart Ranges Wolf Reduction Program

1. Wolf reduction would occur through the Hart Ranges caribou herd range (17,789 km^2; Figure 2). Wolf removal would be guided by recent wolf research that has occurred in the treatment area, outlining pack boundaries and areas of high use. There is an estimate of 104 wolves within or immediately adjacent to the Hart Ranges herd boundary. The objective will be to remove a minimum of 80% of wolves during the first year of the program (approx. 75 wolves). Many areas within the caribou range are conducive to wolf capture, collaring, and removal, with large river valleys, open slopes, and high alpine. It is expected that removal efforts in such terrain would be highly effective. A few active wolf radio-collars currently remain in the treatment area would further increase removal efficiency. It would be expected that reducing the overall wolf density to a level less than 3 wolves / 1000 km^2 would elicit a positive population

response in caribou. This response should become apparent as soon as one year following the first removal effort.

2. Wolves would be removed by aerial shooting from a helicopter each winter for five years, at which point the program would be re-evaluated for effectiveness. Wolves would be located by following tracks in snow and the locating of wolves may be supported by an additional fixed-wing aircraft. When immediate and complete removal of a pack is unlikely, radio-collars equipped with GPS would be deployed on one or two wolves within the pack to allow for location at a later date. This method increases the likelihood of removing complete packs over the course of the winter. If capture and collaring is not feasible, or if packs present themselves in locations where entire removal is possible, wolves would be shot once located.

3. Wolf packs that are radio-collared within the treatment area but are later found outside the treatment area would be removed because the treatment area is within their pack territory. Similarly, any wolves that are tracked from the treatment area to areas outside the treatment boundary would be removed.

4. The locations of all wolf carcasses would be recorded with a GPS. Given the remote locations in the treatment area, the majority of wolf carcasses would not be removed in order to salvage pelts for First Nations or trappers. The time and costs associated with removing carcasses reduces productivity and efficiency of the program. However, in cases where wolf carcasses may be relatively accessible, the locations would be passed on to local First Nations or trappers that may access the locations from the ground in order to salvage pelts.

5. An experienced wildlife capture crew and pilot would be responsible to deploy radio-collars and remove wolves. The deployment of radio-collars would be prioritized, as this makes removal at a later date easy and efficient. Currently, there is one active radio-

collars deployed in a wolf pack overlapping the Hart Ranges caribou range, which could be used to initiate wolf removal as soon as the winter of 2019-2020.

Obstacles to a Successful Caribou Recovery Program

There are also several caveats to caribou recovery efforts where other factors may influence caribou population dynamics that go beyond controlling wolves and their primary prey. Confounding factors may affect the success of population management interventions and influence the magnitude of expected results:

- For example, while McLennen et al. (2012) found excessive predation on mountain caribou was not linked to body condition using historic data (1984-2009), climate change and increasing landscape change appear to be placing additional physical stress on ungulates. These stressors can manifest as decreased body condition or increased prevalence of disease/pathogens. Both of these factors can contribute to increasing predation vulnerability and direct mortality such that some individual caribou may die from health factors despite the decreased abundance of wolves.
- Predicting the effect of wolf control on meso-carnivores is a complex yet an important consideration. Meso-carnivore populations that are "released" during a wolf control program because there are fewer wolves directly predating on them, may exploit caribou as a prey source, especially caribou calves. These meso-carnivores can have higher predation rates than wolves. [might be good to include citations here – I don't have them offhand but were they in the discussion paper that morphed into the DN?]
- Farnell et al. (1996) studied a moose-caribou-wolf system in the Yukon, without wolf control, that was able to support increasing caribou populations while moose numbers also increased. They hypothesized that wolves preyed primarily on moose and the clumped caribou winter habitat/distribution reduced wolf predation pressure allowing the caribou population to grow. Although this has been noted to occur, BC does not currently have a herd range with similar conditions such that the increases in both caribou and moose populations in unison are expected. Observed moose densities in the Yukon study area (0.13 - 0.32 moose/km^2) were low relative to most BC caribou

ranges within the Southern Mountain National Ecological Area and closer to the target moose densities expected for caribou recovery in BC (0.15 – 0.3 moose/km^2).

- Finally, while grizzly bear and wolverine are not thought to have increased as a result of human-caused landscape change, both predators represent important sources of adult caribou mortality and both are major predators of caribou calves. Their influence on caribou survival, recruitment and ultimately population growth is unknown.

- Predation by wolves is likely the proximate cause of a decline in the Hart Ranges caribou herd. This has been evidenced by estimates of reduced herd sizes, poor calf survival and recruitment, high rates of adult female mortality, and wolf densities well above the levels associated with caribou declines. However, caribou are not the primary prey for wolves throughout the herd range. Moose abundance is the likely driver of high wolf densities. Habitat management measures that create spatial separation between moose and caribou must be considered if wolf control is to be effective. Primary prey reduction through First Nations and licensed hunting should also be considered.

- Given the moderate abundance of primary prey for wolves in the Hart Ranges herd range, recolonization by wolves may occur at a moderate-high rate annually. This will require consistent follow-up of wolf removal on an annual basis for at least five years. Furthermore, the reductions of wolves will likely result in an increase in primary prey populations. The surplus of primary prey species must be considered by wildlife managers when regulating licensed harvest, and liberal hunting seasons and regulations may be implemented.

Annual Budget Requirements

Implementing a comprehensive predator management program over the spatial and temporal scales relevant to caribou and wolves will necessarily incur high costs. These costs are associated with the deployment of management actions and monitoring the responses of the various system components within both the treatment and reference areas. Table 2 highlights the basic annual operating budget for

aerial removal and associated caribou response monitoring. Moose population inventories will also be required a 3-5 intervals (estimated cost approximately $90,000 for the entire range).

Table 2. Estimated annual budget for implementing a comprehensive predator reduction program in the Hart Ranges.

Aerial Wolf Removal		**Costs**
Wolf collar purchase	10 collars @ $2200/collar	$22,000
Helicopter flight costs:	150 flight hours @ $1600/hr (includes fuel)	$240,000
Gunner costs	$500 / day * 21 days	$10,500
Accommodation for crew	2 people @ $200/day *21 days	$8,400
Equipment costs (i.e. ammunition)		$1,000
	Total	**$281,900**
Caribou Monitoring		
Caribou collar purchase	15 GPS collars @ $1800 (maintain sample size of 50 (already deployed)	$27,000
Caribou collar deployment	15 flight hours *$1500/hr (wet rate includes accommodation)	$22,500
Annual census (required annually for first 3 years and then every 2 years)	55 flight hours * $1200/hr	66,000
	Total	**$115,500**

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78470-45

WILDLIFE ACT
PERMIT PG21-668426

PERMIT HOLDER	s.15; s.19 **s.15; s.19**

IS AUTHORIZED UNDER s. 2(c)(i), 2(c)(iii), 2(h), 2(j), 2(k)(i), 2(k)(ii), and 2 (o) of the Permit Regulation, B.C. Reg. 253/2000,

TO	Hunt and kill wildlife during the open or closed season, specifically **grey wolves** (*Canis lupus*), in the Hart Ranges and North Cariboo Mountains caribou ranges for caribou recovery, as it is necessary for the proper management of wildlife resources, specifically **grey wolves** (*Canis lupus*). Hunt and capture and on-site release live **grey wolves** (*Canis lupus*) in the Hart Ranges and North Cariboo Mountains caribou ranges, for radio collar deployment to support the hunting and killing of **grey wolves** (*Canis lupus*) within the Hart Ranges and North Cariboo Mountains caribou ranges to support the Caribou Recovery Program. Possess and dispose of dead wildlife or parts of wildlife for scientific purposes purposes, specifically from dead/captured **grey wolves** (*Canis lupus*) for the purposes authorized above.

AND

IS EXEMPT UNDER s. 3(1)(b)(i), 3.1(1)(b), 3.1(1)(c), and 3.1(1)(d) of the Permit Regulation, B.C. Reg. 253/2000,

FROM	The prohibition in section 26(1)(d) of the Act against hunting, taking, trapping, wounding, or killing wildlife, specifically **grey wolves** (*Canis lupus*) with a firearm or bow during the prohibited hours for the purposes authorized above. The prohibition in section 27(2)(a) of the Act against hunting wildlife from an aircraft, specifically a helicopter for the purposes authorized above. The prohibition in section 27(2)(b) of the Act against using a helicopter to transport hunters or game, and while on a hunting expedition for the purposes authorized above. The prohibition in section 27(3) of the Act against herding or harassing wildlife with the use of an aircraft while carrying out the activities authorized above. These exemptions are necessary for the proper management of wildlife resources, specifically **grey wolves** (*Canis lupus*).

SUBJECT TO THE FOLLOWING:

TERMS OF PERMIT	This permit is only valid in Hart Ranges and North Cariboo Mountains wolf treatment areas within the Omineca and Cariboo regions. The permit holder must comply with the terms in Appendix A.

COMPLIANCE ADVISORY	Failure to comply with any term of this permit is an offence under the *Wildlife Act*, and may result in any or all of prosecution, suspension of the permit, cancellation of the permit, ineligibility for future permits, and denial of future permit requests.	
PERIOD OF PERMIT	This permit is only valid from December 15, 2021 to March 31, 2022	
DATE OF ISSUE	<DATE>	
SIGNATURE OF ISSUER	s.15; s.19; s.21 Recreational Fisheries & Wildlife Programs Omineca Region	**PERMIT FEE** $100.00 **HCTF SURCHARGE** $10.00

APPENDIX A
TERMS OF PERMIT

PERMIT PG21-668426

REPORTING REQUIREMENTS:

1. The permit holder must maintain an accurate up to date record of the wildlife observed under the permit that includes the following information:
    (a) number of wolves killed or radio-collared,
    (b) location where the wolves were killed or radio-collared, including coordinates (i.e., latitude and longitude or a UTM grid location),
    (c) the date wolves were killed or radio-collared, and
    (d) the classification of the wolves' radio-collared (i.e., sex, colour, age estimate).

2. The permit holder must submit the data collected in an electronic format (excel or access base) to the regional biologist or project manager **within 21 days** of the permit's expiry.

3. The permit holder must produce a copy of the record referred to in paragraph 1 on demand of an officer.

GENERAL CONDITIONS:

s.13

1. The permit holder must comply with all laws applicable to the activities carried out under this permit.

2. All work is to be undertaken by trained professionals with experience in capturing and handling wolves (*Canis lupus*).

3. The permit holder must take all reasonably necessary steps to ensure that public safety is not jeopardized, and fish or wildlife habitat is not damaged, other than as permitted by this permit, by any action taken under authority of this permit.

4. The permit holder must ensure that the wildlife are treated in a humane manner and are not subjected to any unnecessary harm or suffering.

5. The permit holder must follow the Details of Capture, Handling and Surgical Procedures and Final Disposition outlined under #8 in the approved BC Animal Care Application form.

APPENDIX B
ADVISORY

PERMIT PG21-668426

GENERAL

- It is the permit holder's responsibility to be aware of all applicable laws and the limits of this permit. For example, this permit does not give the permit holder authority to access or travel though any private land without permission from the landowner.
- The Province is not liable for any illness contracted through wildlife handling. It is the responsibility of the permit holder to inform themselves of possible health hazards, and to ensure that all reasonably necessary safety measures are undertaken.
- To assist you, consider the following in your capturing and handling of animals:
  - Standards for Live Animal Capture and Handling Guidelines established by the Ministry of Environment. https://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/laws-policies-standards-guidance/inventory-standards/terrestrial-ecosystems-biodiversity
  - Further guidelines can be obtained on the Canadian Council on Animal Care website at https://www.ccac.ca/en/standards/guidelines/types-of-animals.html
- If applicable, the permit holder is responsible for renewing this permit. The issuer is not obliged to send a reminder notice.

LEGISLATION

Below is a non-exhaustive list of provisions under the *Wildlife Act* and regulations that are relevant to this permit. It is the permit holder's responsibility to be aware of any provisions under the *Wildlife Act* or regulations that may apply to this permit.

Wildlife Act

Property in Wildlife

2 (1) Ownership in all wildlife in British Columbia is vested in the government

(4) If a person by accident or for the protection of life or property kills wildlife, that wildlife, despite subsection (3), remains the property of the government.

(5) Despite anything in this Act, no right of action lies, and no right of compensation exists, against the government for death, personal injury or property damage caused by

(a) wildlife,

(a.1) controlled alien species described in paragraph (a) of the definition of "species", or

(b) an animal that escapes or is released from captivity or is abandoned in British Columbia

Documents not transferable

81 Except as authorized by regulation or as otherwise provided under this Act, a licence, permit or limited entry hunting authorization is not transferable, and a person commits an offence if the person

(a) allows his or her licence, permit or limited entry hunting authorization to be used by another person, or

(b) uses another person's licence, permit or limited entry hunting authorization.

Failure to pay fine

85 (1) This section applies if a person

(a) fails to pay, within the time required by law, a fine imposed as a result of the person's conviction for an offence under this Act or the *Firearm Act*, and

(b) has been served with notice of this section.

(2) In the circumstances referred to in subsection (1),

(a) the person's right to apply for or obtain a licence, permit or limited entry hunting authorization under this Act is suspended immediately and automatically on the failure to pay the fine,

(b) all licences, permits and limited entry hunting authorizations issued to that person under this Act are cancelled immediately and automatically on the failure to pay the fine,

(b.1) the person must not apply for employment as an assistant guide,

(b.2) the person must not guide as an assistant guide, and

(c) the person commits an offence if, before that fine is paid, the person

(i) applies for, or in any way obtains, a licence, permit or limited entry hunting authorization under this Act,

(ii) does anything for which a licence, permit or limited entry hunting authorization under this Act is required,

(iii) applies for employment as an assistant guide, or

(iv) guides as an assistant guide.

Proof of identity and authorization

97 (1) In this section, **"authorization"** means a licence, permit or limited entry hunting authorization issued under this Act.

(2) Subject to subsection (5), a person who is required to hold an authorization must, on the request of an officer,

(a) state the person's name and address,

(b) produce prescribed photo identification, and

(c) demonstrate in accordance with subsection (3) that the person holds the authorization.

(3) A person may demonstrate that the person holds an authorization by

(a) producing the authorization, or

(b) unless the regulations require that the original authorization be produced,

(i) producing a legible copy of the authorization, or

(ii) if authorized by the regulations, stating a number assigned to the person by the s.15; as an identification number for the person.

(4) Subject to subsection (5), a person who would be required to hold a licence or permit issued under this Act were the person not exempt under section 11 (9) or 12 (b) must, on the request of an officer,

(a) state the person's name and address, and

(b) produce prescribed photo identification.

(5) Subsections (2) (b) and (4) (b) do not apply to a person in a prescribed class of persons.

(6) A person who contravenes subsection (2) or (4) commits an offence.

Permit Regulation

Permit for use of conveyance

3.1 (5) Subject to subsection (6), a person who undertakes an activity in accordance with a permit issued under subsection (1) is exempt from the following:

(a) Section 35 (2) of the Act;

(b) Section 18 (1)(q) of the Hunting Regulation, B.C. Reg. 190/84

General offence – failure to comply with permit

8 A person who holds a permit under the Act or this regulation commits an offence if the person fails to comply with a term of the permit.

Wildlife Act General Regulation

Proof of identity

21.01 (1) For the purposes of section 97 (2)(b) and (4)(b) of the Act, the following photo identification is prescribed:

(a) valid photo identification issued to a person by any of the following:

(i) the government of Canada;

(ii) the government of a province or territory, or an agent of the government of a province or territory, in which the person has a current address;

(iii) the Nisga'a Nation, if the person is a Nisga'a citizen;

(iv) a treaty first nation, if the person is a treaty first nation member of the treaty first nation;

(b) in the case of a person who is a non-resident alien,

(i) valid photo identification in the form of

(A) a passport, or

(B) a driver's licence issued to the person by a foreign jurisdiction in which the person has a current address, or

(ii) a copy of a photo identification referred to in subparagraph (i) that has been certified as a true copy by

(A) a lawyer, or

(B) a notary who is a member in good standing under the *Notaries Act;*

(c) in any case, a valid NEXUS card.

(2) For the purposes of section 97 (5) of the Act, persons under 16 years of age are prescribed as exempt from the requirement to produce photo identification.

APPENDIX C
DESIGNATES

PERMIT PG21-668426

- Designate – Secondary Pilot
- Designate – Netgunner/handler/shooter
- Designate – s.15; s.19 Netgunnder/handler/shooter
- Designate – Netgunner/handler/shooter
- Designate – Netgunner/handler/shooter

CARIBOU RECOVERY PROGRAM

Predator Reduction
5-Year Proposal

2021 FLNRORD
Decision Support Document

BRITISH COLUMBIA

The BC Caribou Recovery Program Team has worked between divisions and across ministries to develop a comprehensive decision support package for statutory decision makers (SDMs) that are required to consider implementation of predator reduction in B.C.

We encourage decision makers to have this document and all the appendices at hand when you turn your mind to decision.

Once decisions have been made, regions are to submit completed copies of the decision rationale template (Appendix D), permits (already in draft), and letters of authorizations. These copies will become part of the Program's complete record of the decisions (2021). It is through this record that B.C. can demonstrate consistency in considerations to support the decision, and commitment to durable record of decision rationale.

Coordination of people and resources for a recovery action proposed for implementation in many herds across B.C. has been no small feat. Great appreciation to Caribou Program staff and BC Science Team members who contributed to the creation of the procedure, development of engagement materials, response to media and Ministerial letters, briefing of Ministers, and leadership in what is now the largest engagement and consultation effort for a caribou recovery action to date.

The team coordinating much of this effort is small but mighty: Michael Bridger (Program Area Lead), Leo DeGroot, Oliver Holt, Loni Arman, and Jamiee Remond. Thanks also to Alana Phillips for her efforts on the procedure, and to James Quayle for leading the charge for BC Parks.

These documents developed for decision support will be put through the test as you utilize them. Please let us know where you find them clunky or where they can be improved.

s.15; s.19

1 EXEC SUMMARY

The British Columbia Caribou Recovery Program is considering a five-year approval for the continuation of predator reduction to support the recovery of the Columbia North, Central Selkirks, Hart Ranges, Itcha-Ilgachuz, Graham, Tweedsmuir-Entiako, Pink Mountain, Chinchaga, and South Peace caribou herds, recommencing in the winter of 2021-2022. This would include wolf reduction in all aforementioned herds, and cougar reduction specifically in the Central Selkirks, Columbia North, and Itcha-Ilgachuz herds. Additionally, a new predator reduction program is being proposed for the North Cariboo Mountains herd, to commence in the winter of 2021-2022 for an initial 5-year program approval. These caribou herds cannot afford delays that could jeopardize ongoing recovery efforts and ultimately lead to declines to levels from which they could not be recovered.

2 CONTENTS

3 SUPPORTING INFORMATION

3.1 PREDATOR REDUCTION PROGRAM BACKGROUND

Predator reduction to support caribou recovery has been occurring in B.C. since 2015. The reduction efforts were expanded into new caribou herds in 2019 with an initial two-year approval. Since the expansion of predator reduction in 2019, there have been 399 wolves removed from the Central Selkirks, Hart Ranges, Itcha-Ilgachuz, Graham, and Tweedsmuir-Entiako herds, and 21 cougars removed from the Central Selkirks and Columbia North herds. During that two-year period, an additional 312 wolves were removed from Columbia North, Chinchaga, Pink Mountain, and South Peace herds (these programs were approved separately prior to 2019). Early monitoring efforts suggest several of these herds have responded positively to predator reduction.

- South Peace Caribou Recovery Following Five Years of Experimental Wolf Reduction
- Predator Management to Support Caribou Recovery: 2020-2021 Summary

3.2 PREDATOR REDUCTION PROCEDURES

The BC Caribou Recovery Program worked with Wildlife and Habitat Branch, the Ministry of Environment and Climate Change Strategy's Environmental Sustainability Division, and regions to produce the Caribou Recovery Program Interim Aerial Wolf Reduction Procedure (2021), appendix E. This procedure was developed, in part, to address concerns raised in the 2020 court petition and documents the decision path, statutory decision makers, monitoring and reporting, and future reasons for discontinuation of this recovery action.

3.3 HERD PLANNING

The herd planning process is ongoing and remains a commitment under the Section 11 Conservation Agreement with the Federal Government through the *Species at Risk Act*. Phase 1 herd plans that effectively describe the state of a caribou herd and identify the limiting factors, and potential recovery actions to address those limiting factors, have been developed for all extant caribou herds. Ongoing engagement with Indigenous Governments continues to further develop these herd plans for specific herd ranges including Itcha-Ilgatchuz, Rainbows, Charlotte Alplands, Central Selkirks, Columbia North, Hart, South Peace and Boreal herd ranges.s.12; s.13

s.12; s.13

s.12; s.13 Where herd planning overlaps with regional modernized land use planning processes (e.g, Omineca Resource Management Planning (RMP)) or Indigenous Stewardship Forums (e.g, Skeena Sustainability Assessment Forum (SSAF ESI)), our direction is to bring forward a science-based herd plan that is locally made by subject matter experts as an input into these processes where engagement and trade-off discussions are occurring to balance the multiple values on the landscape. The overall objective behind herd planning is to bring forward a suite of recommended short- and long-term recovery actions to decision makers to consider when planning a future for caribou and other resource values on the landscape. We are committed to ensuring all recovery management actions are designed around the best available science and local knowledge and will result in a positive outcome for caribou.

4 CONSULTATION AND ENGAGEMENT

4.1 GENERAL SUMMARY

Engagement and consultation for predator reduction ran from September 15 to November 15 of 2021 and followed a three-pronged approach:

- Lands and Resource Specialist, Loni Arman, led a comprehensive Indigenous consultation process that included direct communications with all Nations whose traditional territories overlapped the proposed predator reduction areas.
- Consultation with guide outfitters, trappers, and regional wildlife regulation advisory committees formed the foundation for the impacted tenure holder consultation led by our Land and Resource Coordinator Oliver Holt.
- Finally, a virtual engagement process was available through our engage.gov.bc.ca/caribou website that provided an opportunity for the general public to complete a survey and have their voices heard.

4.2 ENGAGEMENT AND CONSULTATION OF NOTE

4.2.1 BC SOCIETY FOR THE PREVENTION OF CRUELTY TO ANIMALS

During engagement, BCSPCA published a webpage stating that aerial wolf reduction is inhumane and calling for citizens to use the EngageBC survey to voice their concerns for this recovery action. Dr. Caeley Thacker, as the Provincial Veterinarian who approves animal care documents, has reached out to Dr. Dubois with BCSPCA for follow-up discussion. Dr. Thacker will be developing a document on this topic in coming months that will be posted on the FLNRORD caribou web page.

4.2.2 BC TRAPPER ASSOCIATION

BCTA executive shared information pertaining to a proposal the Alberta Trappers Association brought forward to Alberta Environment and Parks. This proposal outlines how they desire to grow the role of trappers in managing wolves in Alberta. These executives expressed they are willing to engage with the Caribou Program to help support the potential for their role to grow in managing wolves in BC in support of caribou recovery. We have committed to following up with BCTA once we discuss this potential with the Caribou Program Science Team.

5 LAWFULNESS OF AERIAL WOLF REDUCTION

Pacific Wild Alliance filed court documents in 2020 challenging the lawfulness of aerial wolf reduction. Court convened in July of 2021 and had a 3 day continuance in October (27-29). It is unlikely that findings from court will be known prior to decision and implementation of aerial wolf reduction this season. BC believes issues raised in court (legality and consistency of considerations for decision) have been significantly addressed through: updates to *Wildlife Act Permit Regulation* (permit for use of conveyance), aerial wolf removal procedures, decision support materials, and decision rationale template.

6 DECISIONS

6.1 FLNRORD

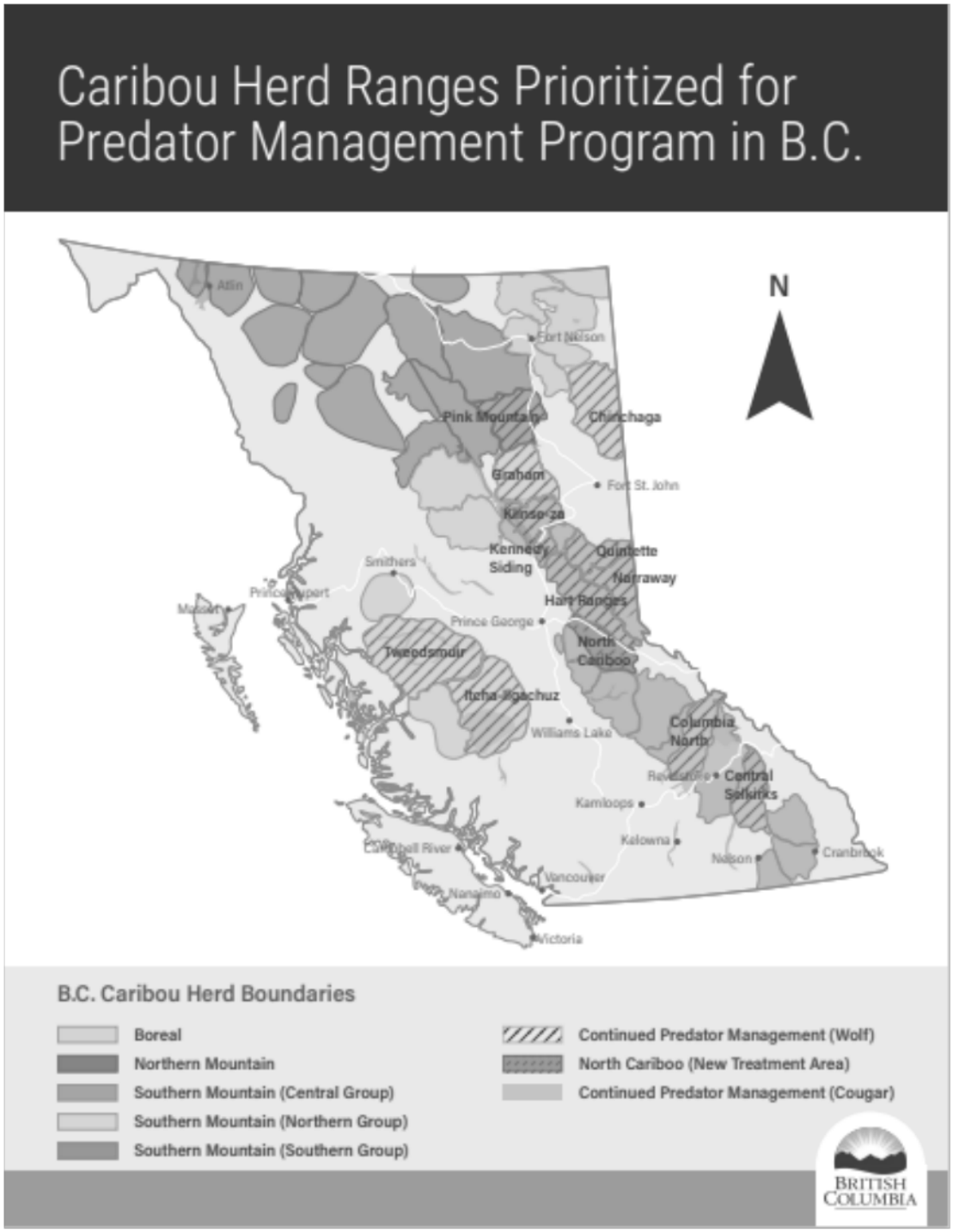
Discussions occurred over the summer on a DRM community of practice call to identify where decisions would be made for this recovery action in the chain of authority transfer for the *Wildlife Act*. It was decided that the decision will remain with the Regional Managers.

A draft "PREDATOR REDUCTION FOR CARIBOU RECOVERY FLNRORD RATIONALE FOR DECISIONS" document, appendix D, was created upon the request of the DRMs. This document, paired with the 2020 changes to regulations and the Caribou Recovery Program Interim Aerial Wolf Reduction Procedure (2021), appendix E, effectively mitigate the concerns identified in the 2020 court proceedings. It is because of these additional steps that the BC Caribou Recovery Program deems making decisions on predator reductions LOW RISK prior to court's reasons for judgment from the October 27-29 continuance are known.

6.2 BC PARKS

To implement this recovery action in BC Parks and Protected areas, additional statutory decisions under the *Park Act* and Park, Conservancy and Recreation Area Regulation are required to implement this recovery action in BC Parks and Protected Areas. For an overview of these decisions and required policy alignment please refer to the draft Predator Reduction for Caribou Recovery BC Parks Rationale for Decision template in appendix D.

7 APPENDIX A: CARIBOU HERD RANGES PRIORITIZED FOR PREDATOR REDUCTIONS



8 APPENDIX B: ENGAGEMENT MATERIAL AND ADDITIONAL BACKGROUND INFORMATION

Our project team worked with subject matter experts to develop materials to be used on Engage BC and in communications with Indigenous Nations and stakeholders.

Predator Reduction Engagement Material.

DOUBLE CLICK

9 APPENDIX C: CONSULTATION AND ENGAGEMENT RESULTS

The What We Heard report provides a summary of the results from our virtual engagement process with all citizens willing to engage. The consultation reports provide a summary and record of our consultation processes with impacted tenure holders and Indigenous governments.

Impacted Tenure Holder Consultation R

North Area Indigenous Consultati

DOUBLE CLICK

10 APPENDIX D: PREDATOR REDUCTION FOR CARIBOU RECOVERY TEMPLATE FOR DECISION RATIONALE

FLNRORD predator reduction decision rat

PARKS predator reduction decision rat

DOUBLE CLICK

11 Appendix E: BC Caribou Recovery Program Interim Aerial Wolf Reduction Procedure (2021)

This procedure was developed, in part, to address concerns raised in the 2020 court petition and documents the decision path, statutory decision makers, monitoring and reporting, and future reasons for discontinuation of this recovery action.

Interim Aerial Wolf Reduction Procedure .

DOUBLE CLICK

12 Appendix F: Population estimates and list of recovery actions for caribou herds

Developed annually by the Caribou Recovery Program Science Team, this document outlines the current trend and status of all caribou herds in the province and describes the recovery actions that are being implemented.

BC_Caribou_herds_population_estimates_2

DOUBLE CLICK

RE: ACA - wolf reduction - Hart Ranges and North Cariboo

From: Thacker, Caeley FLNR:EX <Caeley.Thacker@gov.bc.ca>
To: Klaczek, Michael FLNR:EX <Michael.Klaczek@gov.bc.ca>
Sent: December 2, 2021 1:36:44 PM PST

Looks good, thanks. Approved for animal care.

Caeley

From: Klaczek, Michael FLNR:EX <Michael.Klaczek@gov.bc.ca>
Sent: December 2, 2021 1:30 PM
To: Thacker, Caeley FLNR:EX <Caeley.Thacker@gov.bc.ca>
Subject: RE: ACA - wolf reduction - Hart Ranges and North Cariboo

Thanks Caley- I've updated with you comments and removed s.15; s.19 from the permit/ACA.

Cheers
MK

From: Thacker, Caeley FLNR:EX <Caeley.Thacker@gov.bc.ca>
Sent: December 2, 2021 12:18 PM
To: Klaczek, Michael FLNR:EX <Michael.Klaczek@gov.bc.ca>
Subject: RE: ACA - wolf reduction - Hart Ranges and North Cariboo

Hi Mike,

A couple comments, but nothing that would prevent approval.

Caeley

Investigators

- s.15; s.19 is listed as an additional investigator but there is not bio/experience for him – please either include a bio or remove his name.

General

- SPCA has an issue with us using the word 'euthanize' in this context, in the interest of following definitions I suggest using 'remove' or 'dispatch' instead.

Euthanasia

- There are newer AVMA Guidelines, change 'AVMA 2013' to 'AVMA 2020' if appropriate

---

From: Klaczek, Michael FLNR:EX <Michael.Klaczek@gov.bc.ca>
Sent: December 2, 2021 10:37 AM
To: Thacker, Caeley FLNR:EX <Caeley.Thacker@gov.bc.ca>
Subject: ACA - wolf reduction - Hart Ranges and North Cariboo

Hi Caeley,

For your consideration/approval. I've attached the ACA for wolf reduction for caribou recovery in the Hart Ranges and North Cariboo Mountains ranges. s.15; s.19 is leading this work again for our region.

Please let me know if question.

Mike

Michael Klaczek
Senior Wildlife Biologist - Omineca Region
Ministry of Forests, Lands, Natural Resource Operations and Rural Development
Prince George, BC
250-649-4401
michael.klaczek@gov.bc.ca

Emailing: 2020 North Cariboo and Narrow Lake Wolf Survey.pdf

From:	Klaczek, Michael FLNR:EX <Michael.Klaczek@gov.bc.ca>
To:	Jacklin, James FLNR:EX <James.Jacklin@gov.bc.ca>
Sent:	December 13, 2021 12:19:28 PM PST
Attachments:	2020 North Cariboo and Narrow Lake Wolf Survey.pdf

Your message is ready to be sent with the following file or link attachments:

2020 North Cariboo and Narrow Lake Wolf Survey.pdf

Note: To protect against computer viruses, e-mail programs may prevent sending or receiving certain types of file attachments. Check your e-mail security settings to determine how attachments are handled.

Minimum count snow track survey of wolves in the North Cariboo Mountains and Narrow Lake ranges, winter 2020.

Duncan Blagdon[1]

Mike Klaczek[2]

December 20, 2020

[1]Junior Biologist, Profor Resource Development Inc.; 2786 Wildwood Crescent, Prince George BC, V2K 3Y3

[2]Wildlife Biologist, BC Ministry of Forests, Lands, Natural Resource Operations and Rural Development; 2000 South Ospika Blvd, Prince George BC, V2N 4W5

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Abstract

We surveyed the wolf population in the North Cariboo Mountains and Narrow Lake ranges using a minimum count snow track survey method during February 18-20, 2020. The objective of the survey was to estimate the density, abundance and distribution of wolves in the North Cariboo Mountains and Narrow Lake caribou ranges. The aerial survey was conducted by searching for wolf tracks in fresh snow and estimating minimum population numbers by examining patterns in the tracks. Conditions were ideal for the duration of the survey as there was good visibility and 2-3 day old snow. During 21.7 hours of flight time, we observed 46 wolf tracks from a total of 6 separate packs. The density of wolves was estimated at 7.3 wolves/1000 km^2 in the North Cariboo Mountains and 5.1 wolves/1000 km^2 in the Narrow Lakes range, for an average of 6.7 wolves/1000 km^2 over the entire study area. Both sections of the study area provide habitat for at-risk subpopulations of southern mountain caribou. Further, estimated wolf densities are well above the threshold considered ideal for positive population growth in mountain caribou populations (1.5-3 wolves/1000 km^2).

Introduction

In a system where two prey species are predated on by a common predator, changes in population size of one prey species can lead to a decline in the other. This indirect competition between two prey species is known as apparent competition and is hypothesized to be the main causative factor for recent mountain caribou (*Rangifer tarandus caribou*) declines in British Columbia. Increases to moose (*Alces alces*) population numbers, attributed to changes in forest age structure as a result of timber harvesting, has increased wolf population sizes, and indirectly lead to higher predation rates on mountain caribou (Bergerud and Elliot 1986, Wittmer et al. 2005, Seip 2008). Caribou recovery strategies are often focused on controlling the number of wolves (*Canis lupus*) in a particular area, either by direct removal of wolves or by indirect techniques aimed at reducing their primary prey (Serrouya et al. 2017). Therefore, determining up-to-date wolf population numbers is important to provide baseline data, and to implement and measure the progress of various caribou recovery strategies.

Wolf are difficult accurately and effectively inventory because of their extensive home ranges, low population densities, and their preference for rugged, forested landscapes. There are a variety of techniques that have been developed to estimate wolf populations within a given area. If sampling is not feasible, indirect population estimates can be determined by extrapolating data from similar known wolf population numbers and relative prey populations (FLNRO 2014). Further, regressions of ungulate biomass indexes can be used to gather rough estimates of wolf population densities (Fuller 1989, Fuller et al. 2003, Kuzyk et al. 2014). Wolves are often opportunistically observed during surveys of species which share common habitats, such as caribou. These observations can yield density estimates by comparing the number of wolves seen with time spent completing the aerial survey (Williams and Elliot 1985, Williams and Heard 1986, Miller and Reintjes 1995). If resources are available for radio-collaring of individual wolves within a territory, pack counts can be undertaken to provide a more accurate density estimate (Fuller and Snow 1988, Patterson et al. 2004, Latham et al. 2011, Lake et al. 2015, Kittle et al. 2017). Several non-invasive techniques exist to estimate density by means of collecting genetic samples from areas frequented by wolves; however, this technique requires extensive resources to be effective (Stenglein et al. 2010, Caniglia et al. 2012, Stansbury et al. 2014). Sampling unit probability estimators derived from track detections in defined sampling units have also been used with success (Patterson et al. 2004). This study utilized a minimum count aerial snowtrack method, which aims to identify individual wolfpacks within a given geographical area and estimate their population size from tracks in the snow. Wolf tracks are located using a helicopter in the winter months and followed until they either disappear or wolves can be spotted. The information gathered is then used to develop a minimum number of wolves in a given territory (Baer 2010, Baer 2011, van Oort and Bird 2011, Serrouya 2013, Serrouya et al. 2015).

The North Cariboo Mountains and Narrow Lake ranges provide habitat for two of the northern-most subpopulations of Southern Mountain Caribou (SMC). These caribou comprise two of the fifteen SMC subpopulations included in 'Designatable Unit 9', which totalled an estimated 1200 individuals in 2020 (BC Caribou Program). Caribou in DU9 have declined across their range. Dating back to 2005, the North Cariboo Mountain subpopulation was estimated at 290 individuals, which had decreased to about 220 caribou by 2011 (Seip et al. 2011). Further, a 2018 aerial surveyed yielded an estimate of 187 caribou (Klaczek and Lirette 2018), while the most recent estimate totalled just 145 caribou (Klaczek and Seip

2020). The Narrow Lake subpopulation has seen an even more extensive declines over the past 20 years, with an estimated 81 caribou present in 1999, eventually appearing to stabilize at 40 individuals in 2006 (Watts 1999). By 2016, population estimates began decreasing to 36 individuals, which then reached the extremely low count of 8 caribou in 2020 (Klaczek and Heard 2016, Klaczek and Seip 2020). Both of these caribou subpopulations are at risk of further declines and eventual extirpation if recovery actions are not performed. Wolf population estimates in these areas are important baselines for planning caribou recovery actions that aim to improve adult female survival and calf recruitment.

Study Area

The study area was located in the Narrow Lake and North Cariboo Mountain caribou ranges (Figure 1). The study area was situated within the northern-most portion of the Cariboo Mountains which stretched from Bowron Lakes Provincial Park in the south, to Purden Lake Provincial Park in the north. The study area included sections of Wildlife Management Units 5-16, 7-5, 7-6, and 7-7. The main Biogeoclimatic (BEC) zone found predominantly at the lowest elevations throughout the area was the sub-boreal spruce zone (SBS). This zone generally occurs in mountainous areas of central BC, occupying valley bottoms between 1100 and 1300 m of elevation. SBS temperature regimes are characterized by seasonal extremes, with short, warm, moist summers and severe snowy winters. Hybrid white spruce (*Picea glauca x engelmannii*) and subalpine fir (*Abies lasiocarpa*) represent dominant tree species, while lodgepole pine (*Pinus contorta*) are also present in drier SBS subzones (Meidinger and Pojar 1991). Lodgepole pine have recently been the target of extensive logging operations due to the pine beetle outbreak that began in the early 1990s. Widespread forest harvesting has resulted in a patchwork of cutblocks and new growth of various ages. Above SBS, the study area mainly consists of the Engelmann Spruce – Subalpine Fir (ESSF) BEC zone before reaching the Alpine Tundra BEC zone at the highest elevations. The ESSF zone is characterized by a cold, moist, and snowy continental climate with a very short growing season. The main climax tree species include Engelmann spruce and subalpine fir, which transition from thick forest at mid elevation, to small patches of subalpine parkland at highest elevations (Meidinger and Pojar 1991). The highest elevations in the study area display a rugged, treeless alpine ecosystem which provide important high-elevation habitat for mountain caribou.

Other than wolves, main predator species found throughout the study area consist mainly of black bears (*Ursus americanus*) and grizzly bears (*Ursus arctos*), Canada lynx (*Lynx canadensis*), wolverines (*Gulo gulo)* and to a lesser extent mountain lions (*Puma concolor*). The dominant ungulate species found in the area are moose and caribou; however, populations of mule deer (*Odocoileus hemionus*), white-tailed deer (*Odocoileus virginianus*), mountain goats (*Oreamnos americanus*), and elk (*Cervus elaphus*) are found in certain locations throughout the study area.

Methods

We used the minimum count aerial snow track method to document wolf numbers, determine pack distribution, and evaluate wolf density in the study areas. A Bell 206B helicopter was used for the aerial survey that took place in February 2020. This timeframe was ideal because it allowed for the survey to be completed before breeding season, when wolf packs are known to separate due to social pressures associated with reproductive behaviour. The survey period also provided ideal conditions for identifying

wolf tracks. This included 2-3 day old fresh snow that allowed for sufficient time for tracks to be created without 'tracking out' an area. Flight lines were focused in areas that had high likelihood of providing sightlines to observe wolf tracks, such as open forests, cutblocks, ridges, river valleys, and meadows. The helicopter landed to positively identify tracks as wolf tracks when required. Once tracks were identified, they were followed by helicopter until wolves were seen, or the trail was lost by snow drifts, rocky terrain, or thick forest cover. Tracks were also backtracked to ensure tracks weren't counted twice if the same wolfpack was observed again. Wolf packs were characterized by the actual observation of wolves or at least two sets of tracks in a given geographical location.

Snow track counts are designed to give a minimum count based on observation of tracks or actual observation of live wolves. Wolves tend to travel in a single-file manner until reaching an area of low snow depth. These areas allow for the observation of individual tracks as they split from the lead path. These splits were counted if wolves weren't encountered (Baer 2010, 2011, van Oort and Serrouya 2014). We recorded location details of each wolf track observation using hand-held GPS units and we used iPads with georeferenced maps to ensure we surveyed the entire study area. Each aerial survey included a crew of one pilot and two observers. All members of the crew searched for tracks.

Results

The wolf survey was conducted from February 18th to 20th, 2020. The total helicopter effort totalled 21.7 hours, which included ferry time from Prince George to the study area. The weather was ideal for observation of wolf tracks, which included good visibility and 2-3 day old snow for all 3 days of the survey. The survey covered an area totalling 6887 Km^2, with the North Cariboo Mountain and Narrow Lake range covering 4910 and 1977 Km^2, respectively.

The survey resulted in the minimum count of 46 wolves in 6 separate packs found throughout the study area (Table 1). The majority of observations were concentrated below 1200 m in elevation. Two wolves were observed in a cutblock and one in a wetland, both near the Fraser River; however, all other wolf observations were attributed to fresh tracks. Fresh tracks were observed in the Lower Bowron section of the study area that suggested a pack that totalled 10 wolves. Observations in this area also included 2 bedding and 2 moose kill sites with tracks that were concentrated between Purden Lake and the Bowron River. The west section of the study area resulted in observations of 10 wolf tracks on the Willow River. The tracks split along the river so splitting patterns were used to estimate pack size. Tracks left from a small pack of 3 wolves were followed from Haggen Creek across mountainous terrain to Dome Creek. Additionally, a pack of 5 was located in a cut block in the Dome Creek area near the Fraser River. The largest pack totalled 13 wolves and was found in the Penny area, also close to the Fraser River. Lastly, a pack of 5 was observed near the southwest corner of Bowron Lake as they passed through riparian areas connected to the lake chain.

Table 1. Pack designations and characteristics for wolf tracks detected on a minimum count snow track survey in the North Cariboo and Narrow Lake ranges, February 18-20, 2020.

Area	Number of Packs	Number of Wolves	Comments
Lower Bowron	1	10	Observed fresh tracks, 2 areas with different bed sites, 2 kill sites (moose), and tracks connect from Purden Lake up the Bowron River
Willow River	1	10	Fresh tracks observed on River, splitting on the river so estimate pack size. Gap in distribution between Willow and Bowron, suggesting 2 separate packs, both 10 wolves.
Haggen Creek	1	3	Fresh tracks picked up on Haggen Creek and followed across high elevation down to Dome Creek area.
Dome Creek	1	5	Observed 2 wolves and tracks of 5 in a cutblock near Fraser River.
Penny	1	13	Observed 1 wolf in wetland, lots of tracks on Fraser River - large pack.
Upper Bowron	1	5	Fresh tracks picked up on the Bowron Lake Southwest corner moving north along the chain, through wetlands north of the lakes.
Total	**6**	**46**	

Table 2. Wolf and pack density in the North Cariboo/Narrow Lake ranges.

Area	Area (km2)	Number of Wolves	Density (wolves/1000km2)	Number of Packs	Pack density (packs/1000km2)
North Cariboo	4910	36	7.33197556	5	1.01832994
Narrow Lake	1977	10	5.058168943	1	0.50581689
Combined	**6887**	**46**	**6.679250762**	**6**	**0.87120662**

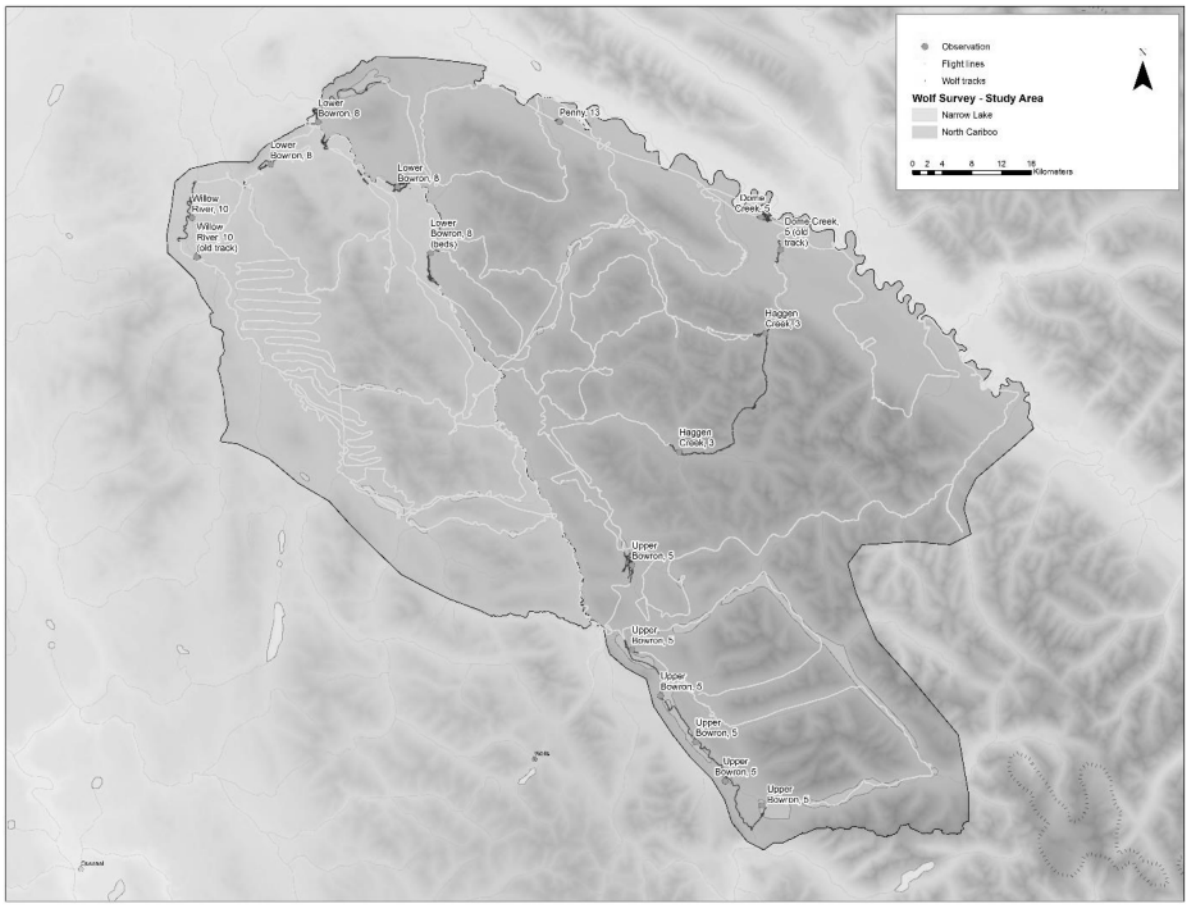

Figure 1. North Cariboo Mountains and Narrow Lake ranges, surveyed on February 18-20, 2020 for wolf tracks using a minimum snow track count method. Yellow lines indicate flight paths and red lines show sections where wolf tracks were observed.

Discussion

Winter snow track surveys can be an effective way to determine minimum counts of wolves and wolf packs within a given area. These surveys are only effective if conditions allow for tracks to be observed with confidence that others weren't missed, or packs weren't counted multiple times. This survey was performed under ideal conditions which allowed for enough time for tracks to be created, without allowing too much time for tracks to become too numerous to effectively count. Wolf track observations were heavily associated with frozen rivers and lakes within valley bottoms, which indicates that snow conditions forced wolves into areas with shallower snow. The concentration of wolves to low elevations allowed for us to be fairly certain that the majority of wolves were observed. However, there were no observations of lone wolves in the study area, which typically account for approximately 10% of a wolf population (Baer 2011). We chose not to inflate our population estimate to account for lone wolves. The addition of VHF or GPS collars to wolves within this study area would help future wolf surveys to provide

a sightability correction. Despite the absence of sightability, results from this study provide a minimum baseline for future management actions.

Average wolf densities across North America are correlated with the amount of ungulate biomass per individual wolf. Therefore, areas with the highest amounts of prey biomass have the greatest number of wolves. Further, typical wolf densities throughout North America range from 2 to 4 wolves per 1000 km^2 (Paquet and Carbyn 2003). This minimum count snow track survey suggested a lower density of wolves (6.7 wolves/1000 km^2) than other wolf densities reported for Northern BC (10-44 wolves/1000 km^2, FLNRO 2014). Although the density observed within the study area is relatively low, the hypothesized threshold for woodland caribou persistence is 6.5 wolves/1000 km^2 (Bergerud 1988). This indicates that the minimum wolf densities in both the North Cariboo Mountain range and the Narrow Lake range are both slightly higher than the caribou persistence threshold. Both subpopulations of mountain caribou have declined rapidly within the past 10 years, indicating that wolf densities likely need to be much lower to generate any significant positive caribou population responses. Caribou recovery is often associated with target wolf densities of 1.5-3 wolves/1000 Km^2 (Wilson 2009, Environment Canada 2014). Wolf predation is considered to be the major limiting factor for mountain caribou population growth, and aggressive wolf reductions have been linked to fast and effective responses in mountain caribou population stability and growth (Bergerud and Elliot 1998, Wilson 2009). In addition, moose reductions have been used in similar ecosystems in the Omineca region as an alternate species approach to reduce wolves and their effects on caribou (Heard 2013).

An additional finding of this study was the low pack density in 3 of the 6 packs. Low pack densities can be detrimental to prey species because smaller packs tend to kill higher amounts of prey. This is attributed to greater losses to scavengers and higher energetic demands for each wolf in smaller packs (Ballard et al. 1987, Thurber and Peterson 1993, Vucetich et al. 2004, Kaczensky et al. 2005). There are many factors that determine wolf densities within a given area, that include hunting and trapping pressure (Ballard and Stephenson 1982, Mech and Boitani 2003). Consequently, pack density must be considered when planning caribou recovery actions in this area to effectively decrease wolf predation on caribou.

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2020 Population Assessment of Southern Mountain Caribou (*Rangifer tarandus*) in the Prince George Forest District

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September 8th, 2020

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Photo: Bearpaw Ridge in the southern Hart Ranges.

Abstract

In March 2020, we conducted an aerial survey for woodland caribou (*Rangifer tarandus*) within the Hart, North Cariboo Mountains, and Narrow Lake ranges approximately 50-120 km east of Prince George, British Columbia. The surveys of the Hart Ranges and North Cariboo Mountains followed a mark-resight technique for population estimation using a total of 51 active radio-collars to assess sightability (n = 39 and 12 radio-collars, respectively). The survey of the Narrow Lake range followed the standard total count survey method, however, the estimate was not corrected for sightability given the low number of caribou and few available radio-collars (n = 2). Using a correction factor of 0.97 (38 of 39 radio-collars observed during the survey), the Hart Ranges subpopulation was estimated at 408 caribou (95% CI 388 – 428 caribou) with calves representing 17% of the population. A total of 97 caribou were observed during the survey of the North Cariboo Mountains with approximately 16% calves. The North Cariboo Mountains subpopulation was estimated at 145 caribou (95% CI 111-246) using a correction factor of 0.67 (8 of 12 available collar observed during survey). Only 8 adult caribou with 0 calves were observed in the Narrow Lake range. Results from the 2020 census of the Hart Ranges was similar to the previous 2019 estimate (377 caribou), however, these recent inventories confirmed that the subpopulation declined by 47% since 2006 when 718 caribou were estimated within the range. Since 2010, the Hart Ranges subpopulation declined about 4-5% per year (λ_{census} = 0.958, 2010-2020). Adult female survival in 2018-2019 and 2019-2020 was consistently estimated at 0.851 (95% CI = 0.77 – 0.901) and suggested that the relatively high calf recruitment observed in 2019 and 2020 (19% and 17%, respectively) contributed to a short-term stable population trend (λ_{RM} = 0.996, 95% CI = 0.91-1.13). However, since 2006 most surveys (78%, n = 14) covering all or part of the Hart Ranges estimated calf recruitment below 15% calves (average = 12.8%), the rate generally considered necessary for a stable population. The North Cariboo Mountains subpopulation continues to decline significantly since the last census in 2018 (λ_{census} = 0.881, 2018-2020; 2018 estimate =

187 caribou) and has been steadily declining since 2016 when the population was estimated at 210 caribou. The North Cariboo Mountains subpopulation will likely continue to decline without management actions to increase adult survival and calf recruitment. With only 8 caribou remaining, the Narrow Lake subpopulation is at imminent risk of extirpation.

As part of ongoing efforts to stabilize and recover identified caribou populations in BC, the Government of British Columbia initiated a wolf reduction program for the Hart Ranges subpopulation in January 2020. A total of 91 wolves were removed between January and late-March during the 1st year of wolf removal, a reduction in density from approximately 7.8 wolves/1000km^2 to 0.8 wolves/1000km^2 within the wolf treatment area. Ongoing monitoring of the caribou population will continue to help evaluate wolf reduction under an adaptative management framework.

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Introduction

Caribou within the Prince George Forest District (DPG) are classified under Designatable Unit 9, Southern Mountain Caribou (Committee on the Status of Endangered Wildlife in Canada 2014) and are currently listed as *Threatened* under the federal *Species at Risk Act* (Environment Canada 2014). In 2014, the Committee on the Status of Endangered Wildlife in Canada re-evaluated the Southern Mountain caribou population and recommended their status be upgraded to *Endangered* because of ongoing population declines throughout their distribution and many subpopulations are isolated and have less than 50 individuals (COSEWIC 2014). Currently there are 3 subpopulations (or herds) of Southern Mountain caribou within the DPG: Hart Ranges (also known as the Parsnip and Hart South herds); North Cariboo Mountains; and Narrow Lake (Figure 1). These 3 subpopulations make up the northern extent of the distribution for the southern mountain ecotype that stretches from the Rocky Mountains east of Prince George, south to the central Selkirk mountains in southern BC. As of 2019, caribou within these 3 subpopulations represented approximately 45% of the total remaining population of southern mountain caribou in the world (Environment Canada 2014). The George Mountain subpopulation, also within the DPG, was estimated at 20 individuals in 1993 (Watts 1999). However, this subpopulation was extirpated in the early 2000s (Seip et al. 2004).

Long-term population monitoring of the Hart Ranges and North Cariboo Mountains indicate both subpopulations have declined gradually, approximately 4-5% annually (±5%), since 2006. Cumulatively, the successive years of negative population growth since that time has resulted in significant population declines. Estimated at over 700 caribou in 2006 (Seip et al. 2006), the Hart Ranges subpopulation declined 47% by 2019 when 377 caribou were estimated within the range (Klaczek and Heard 2019). Likewise, the North Cariboo Mountains subpopulation was estimated 284 caribou in 2006, however, only 187 caribou were estimated during the most recent census in 2018 (Klaczek and Lirette 2018). The population trajectory of the Narrow Lake subpopulation varied over this same timeframe. For example, Watts (1999) estimated 81 caribou in the Narrow Lake range in 1999. The subpopulation declined by the mid-2000s but appeared relatively stable around 40 caribou from 2006 and up until 2016 (36 caribou; Klaczek and Heard 2016). However, recent monitoring indicated the Narrow Lake subpopulation

declined after 2016 as only 21 caribou were observed during survey flights in both 2017 and 2018 (Klaczek and Lirette 2018).

As part of ongoing efforts to stabilize and recover identified caribou populations in BC, the Government of British Columbia initiated a wolf reduction program for the Hart Ranges subpopulation in January 2020. The objective of the program is to reduce the number of wolves within core and matrix ranges to help improve adult caribou survival and calf recruitment. The caribou population response is being assessed in a before-after study design using key metrics such as adult female survival, calf recruitment, and annual population estimates to help guide future actions under an adaptive management framework (DeMars and Serrouya 2019). The primary objective of this census was to assess the current population status of each subpopulation by estimating the total number of caribou and proportion of calves in each subpopulation. We compare data collected in 2020 to past population estimates to assess population trend and changes in calf recruitment over time.

Study Area & Methods

The study areas are located in the subalpine and alpine zones of the Rocky and Cariboo Mountains, approximately 70-120 km east of Prince George, British Columbia (Figure 1). The combined area extends from Bowron Lake Provincial Park in the south up to Reynolds Creek in the North. To allow comparisons with previous surveys census blocks were set up for each subpopulation: 15 census blocks were distributed across the Hart Ranges, 7 in the North Cariboo Mountains, and 2 in Narrow Lake.

Census blocks

Each census block is characterized by gentle rolling mountains with trees extending near the mountain tops. Southern mountain caribou remain at mid-high elevations during most of the year (Seip 1990, 1992, Hamilton et al. 2000, Terry et al. 2000, Apps et al. 2001). During late-winter, caribou move into mature forest when consolidated snow allows them to feed on arboreal lichens (RISC 2002). As such, the survey area included the Englemann spruce subalpine

fir biogeoclimatic zone and portions of the alpine tundra above 1300 m and divided blocks using terrain features such as height of land or creek drainages.

Survey

Using 2 helicopters (Bell 206) we used a total count method to fly near treeline searching for caribou tracks within each census block (RISC 2002). When caribou tracks were located, we intensively searched the area to locate and count caribou in each group. Caribou were classified as either adults or calves. We used an iPad (Avenza PDF Maps) connected to a GPS to navigate during the survey and record flight lines. Caribou locations were recorded on an independent GPS. Where possible, photographs were taken of each group. Photos helped confirm the field call of distinguishing calves from yearlings where identification was challenging. Photos also helped account for failed collars that could not be scanned using the telemetry receiver.

Population estimates

Sightability correction factors used to assess the status of southern mountain caribou subpopulations are generally high for most subpopulations (>85%; Serrouya et al. 2017). However, rates can vary between years and study areas. For example, the percent of radio-collared caribou observed in the Parsnip study area in 2007, 2008, 2009 and 2010 was estimated at 77%, 78%, 80% and 82%, respectively (Heard et al. 2010) while 91% of available radio-collared were observed during the most recent census in 2019 (Klaczek and Heard 2019). Sightability in the adjacent North Cariboo Mountains subpopulation is generally lower (0.50 and 0.57, Heard 1993; 0.62, Seip et al. 2002; 0.73 Klaczek and Lirette 2018). The surveys of the Hart and North Cariboo Mountains ranges followed a mark-resight technique for population estimation using a total of 51 radio-collared adult female caribou (39 and 12, respectively) to assess sightability. Once a group of caribou was observed during the survey, all observers looked for GPS-collars and once a collar was observed the navigator scanned through available frequencies to determine the radio-collared individual(s) present in the group. The survey crews remained naïve to the distribution of collars in each census block during the survey. The telemetry receiver was not used to locate groups of caribou until the survey of the census block was completed. After which, the navigator checked a post-hoc map of each census block in Avenza that showed a location

recent (within a week prior to survey) GPS location of each GPS-collared caribou to determine if a caribou was missed. Any missed collared caribou were noted and tracked using VHF telemetry to determine a minimum count and calf recruitment. Thus we report a survey count, a minimum count that included any missed radio-collared caribou and their association group size/composition, and a population estimate for each subpopulation. A population estimate, with 95% confidence intervals, was calculated using the joint hypergeometric maximum likelihood estimator (JHE) in NOREMARK (White 1996). The Narrow Lake survey was conducted using a total count survey design, however, we did not correct the Narrow Lake population estimate because the low number of caribou observed in the previous census (i.e. 21 caribou in 2018) and there were only 2 available GPS collars in that range. The Narrow Lake subpopulation was estimated using the minimum number counted within each census block.

Population trend

With a value of 1 representing population stability, annual population change (λ) was calculated using corrected estimates from aerial census data as $\lambda_{census} = (N_t/N_0)^{(1/t)}$ where N was the population estimate, and t was the interval or number or years between estimates (Caughley 1977). Ongoing monitoring of GPS-collared adult female caribou in the Hart Ranges since March 2018 allowed for an indirect comparison of λ (Serrouya et al. 2017) using a stochastic version of Hatter and Bergerud's (1991) Recruitment-Mortality (R-M) equation. The R-M equation was calculated as $\lambda_{R\text{-}M} = S/(1\text{-}R_{RM})$ where S is the survival rate and R is the calf recruitment rate (Hatter and Bergerud 1991). Survival was calculated using a Kaplan-Meier estimator (Pollock et al. 1989) estimated from GPS-collared adult female caribou during the 2018/19 and 2019/20 survival years (May 1st to April 30th). The recruitment parameter (R_{RM}) was estimated using equation 3 from DeCesare et al. (2012) based on % calves observed during the census with an assumed sex ratio of 0.6 males/female (Serrouya et al. 2017). Variance for $\lambda_{R\text{-}M}$ was calculated using the Monte Carlo PopTools extension in Excel (25,000 simulations; Hervieux et al. 2013).

Hart Ranges Wolf Reduction

A recently completed draft of matrix range within and adjacent to the annual range for the Hart Ranges subpopulation was used to define the area for wolf reduction treatment (Figure. 2). This area encompasses 13,730 km^2 and its boundaries extend beyond the north, south and west boundaries of the Hart caribou annual range. The target density considered necessary for significant population growth for southern mountain caribou populations is <1.5 wolves/1000km^2 (Wilson 2009, Environment Canada 2014). An aerial survey of the Parsnip River study area (4750 km^2) within the Northern Hart Ranges estimated a wolf density of 8.84 wolves/1000 km^2 (Klaczek and Heard 2017). Recent GPS radio-collar monitoring of wolves within the McGregor/Hart South portion of the Hart Ranges suggested a density of 6.62 wolves/1000 km^2 (M. Klaczek, unpublished data). These values suggest an abundance of between 97-104 wolves in the proposed wolf reduction area. Thus, to achieve the target wolf density, ~83 wolves would need to be removed from the proposed wolf control area. Aerial removal was used to reduce wolves in the treatment area. Properly applied aerial shooting of wolves is considered the most humane and effective method for wolf removal (AVMA Guidelines for Euthanasia of Animals, American Veterinary Medical Association 2013).

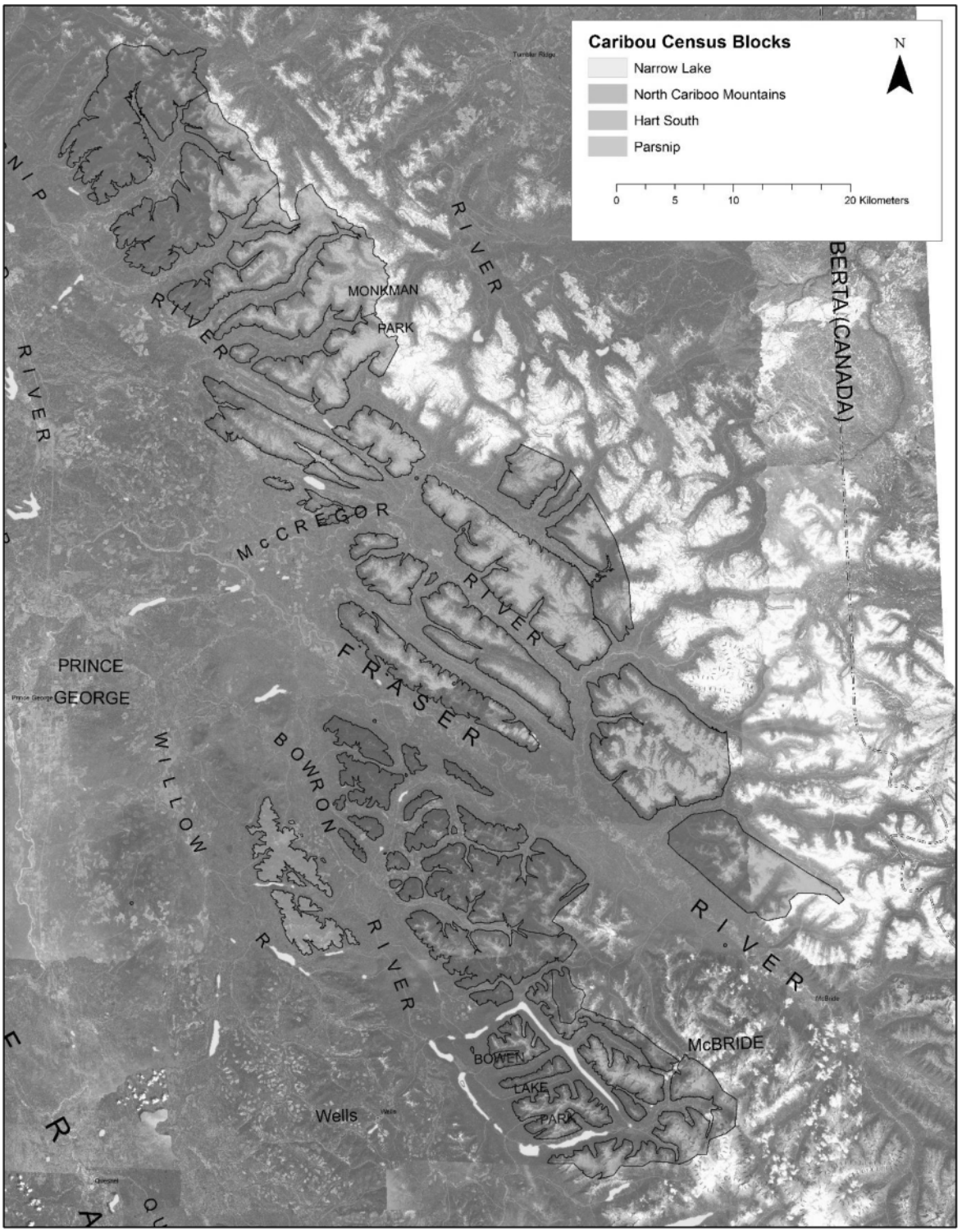

Figure 1. Areas surveyed during the 2020 southern mountain caribou census within the Hart Ranges, North Cariboo Mountains, and Narrow Lake Ranges.

Results

The aerial caribou surveys were conducted from March 9th –16th based out of Prince George, British Columbia using 2 Bell 206 helicopters equipped with rear bubble windows and aerial telemetry antennas. We used 79.7 hours of helicopter support (including ferry time) to complete the surveys. Survey conditions ranged from good to excellent. A deep snow pack, accumulated during the winter of 2019/20, appeared to push most of the caribou to high elevations. Based on a post-hoc analysis, 50 of the 51 GPS-collared females were within the delineated census blocks in the subalpine or alpine suggesting most of the caribou within each subpopulation would be in areas with high sightability during the census. Fresh snowfall, occurring 1 day after the start of the survey (March 10th and 11th) helped distinguish old tracks from new which created good-excellent conditions for tracking. Temperatures ranged from -20°C to 0°C. We counted 494 caribou during the survey, 389 in the Hart Ranges (289 in Hart South, and 109 in the Parsnip), 97 in the North Cariboo Mountains and 8 caribou within Narrow Lake. An additional 28 caribou were added to the minimum count after radio-tracking GPS-collared females that were missed (n = 5) during the survey. No caribou or tracks were observed within low elevation habitats.

Hart Ranges Census

A total of 37 of the 38 (97%) adult female caribou that were available as marked individuals (functioning radio-collars) within the Hart Ranges study area were observed during the survey without using telemetry. An additional 4 caribou were counted when radio-tracking the 1 radio-collared caribou that was missed. These caribou were outside the census zone on a smaller mountain in the upper Parsnip, an area slightly below the 1300 m elevational cut-off that defined the lower boundary of survey zones and thus that mountain was not surveyed during the census. Based on the mark-resight analysis, the Hart Ranges subpopulation was estimated at 408 caribou (95% CI 399 – 445). The population estimates for the Hart South and Parsnip subgroups were estimated at 289 (95% CI 289-310) and 118 (95% CI 110-157), respectively. Calf recruitment was estimated at 17% and was slightly lower than previous estimate in 2019 (19%) but higher than most previous estimates observed in the Hart Ranges over the past decade (range 10-16%; 2012-2016; n = 4 surveys; Table 2, Appendix B). Results from the 2020

survey suggest the Hart Ranges subpopulation remained stable since the most recent survey in 2019 (λ_{census} = 1.08, 2019-2020) and since 2016 when the subpopulation was estimated at 375 caribou (λ_{census} = 1.02, 2016-2020). Population change estimated from the vital rate model was consistent with the census derived lambda suggesting a stable population (λ_{RM} = 0.996, 95% CI = 0.91-1.13, Figure 4, Appendix D).

Table 1. Number of caribou counted in March 2020 during the southern mountain caribou census within the Hart Ranges, British Columbia.

Census area	**Survey Zone**	**Zone Number**	**Total Counted**	**# of Calves**	**# GPS collared caribou observed**
Hart South	Bearpaw	HS1	104	17	10
	Sande/Torpy	HS2	15	4	0
	Severied	HS3	43	6	4
	Walker Creek	HS4	33	3	5
	Mt Hedrick	HS5	44	9	4
	Herrick	HS6	0	0	0
	Arctic Pacific	HS7	2	1	0
	Captain Otter	HS8	48	9	3
	Seeback	HS9	0	0	0
	Morkill	HS10	0	0	0
Parsnip	Upper Parsnip	P1	7	2	2
	Missinka	P2	30	6	3
	Hominka	P3	20	3	4
	Table	P4	38	7	3
	Anzac	P5	28	6	1
		Survey Count	**398**	**67**	**37**
		Minimum Count*	**402**	**69**	**38**
		Population Estimate	**408 caribou (95% CI 388 – 428 caribou)**		

*Includes GPS collared caribou, and other caribou within their associated groups, that were missed during the survey and were located by radio-telemetry post-survey.

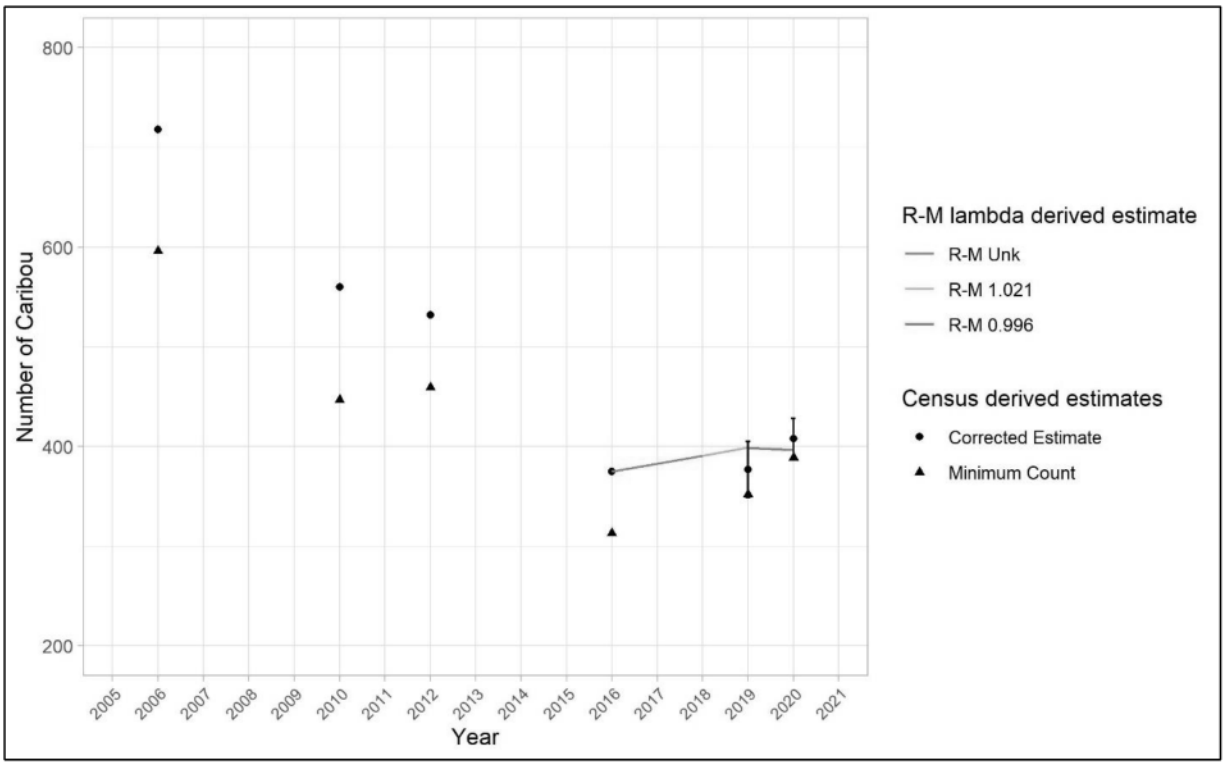

Figure 2. Late-winter population estimates for the Hart Ranges caribou subpopulation. The black circles represent corrected population estimates and the black triangles represent the minimum number of caribou counted during the surveys. The yellow and red solid lines ($\lambda_{R\text{-}M}$) show an indirect measure of population trend based survival and recruitment data collected from radio-collared adult female caribou (2018-2019, $\lambda_{R\text{-}M}$ = 1.021 and 2019-2020, $\lambda_{R\text{-}M}$ = 0.996, this study). No survival-recruitment data were available to assess population trend between 2016 and 2018 and thus the yellow lines represents a hypothetical trend based on the measured R-M lambda estimate from this study (2018-19 survival year estimate λ = 1.021)

North Cariboo Mountains Census

A total of 12 radio-collared caribou were available as marked individuals for the North Cariboo Mountains census, 8 of which were observed without using telemetry (67%). We counted a total of 97 caribou during the survey and a further 24 caribou were observed when tracking the 4 radio-collared caribou that were missed. Two radio-collared caribou were missed in 2 separate groups (9 and 7 caribou) in the Upper Goat river area. The other 2 radio-collared individuals were in a single group of 7 caribou in the upper headwaters of Haggen Creek. A total of 32 caribou were observed in the Sugarbowl/Raven Lake area, 64 in the Haggen Creek area and 25 caribou observed in the Bowron/Upper Goat river area. Calf recruitment was estimated

at 16%. Results from the 2020 census suggest the North Cariboo Mountains subpopulation continues to decline since 2018 (λ_{census} = 0.88, 2018-2020; 2018 estimate was 187 caribou).

Table 2. Number of caribou counted in March 2020 during the southern mountain caribou census within the North Cariboo Mountains range, British Columbia.

Census area	**Survey Zone**	**Zone Number**	**Total Counted**	**# of Calves**	**# GPS collared caribou observed**
Sugarbowl/Raven Lake	Sugarbowl-Raven Lake	NC1	32	5	4
Haggen Creek	Tomuch	NC2	1	0	0
	Haggen east	NC3	2	0	0
	Haggen west	NC4	61	7	6
Bowron Lakes	Bowron	NC5	4	1	0
	Upper Goat	NC6	21	6	2
		Survey Count	**97**	**14**	**8**
		Minimum Count*	**121**	**19**	**12**
		Population Estimate	**145 caribou (95% CI 111-246)**		

*Includes GPS collared caribou, and other caribou within their associated groups, that were missed during the survey and were located by radio-telemetry post-survey.

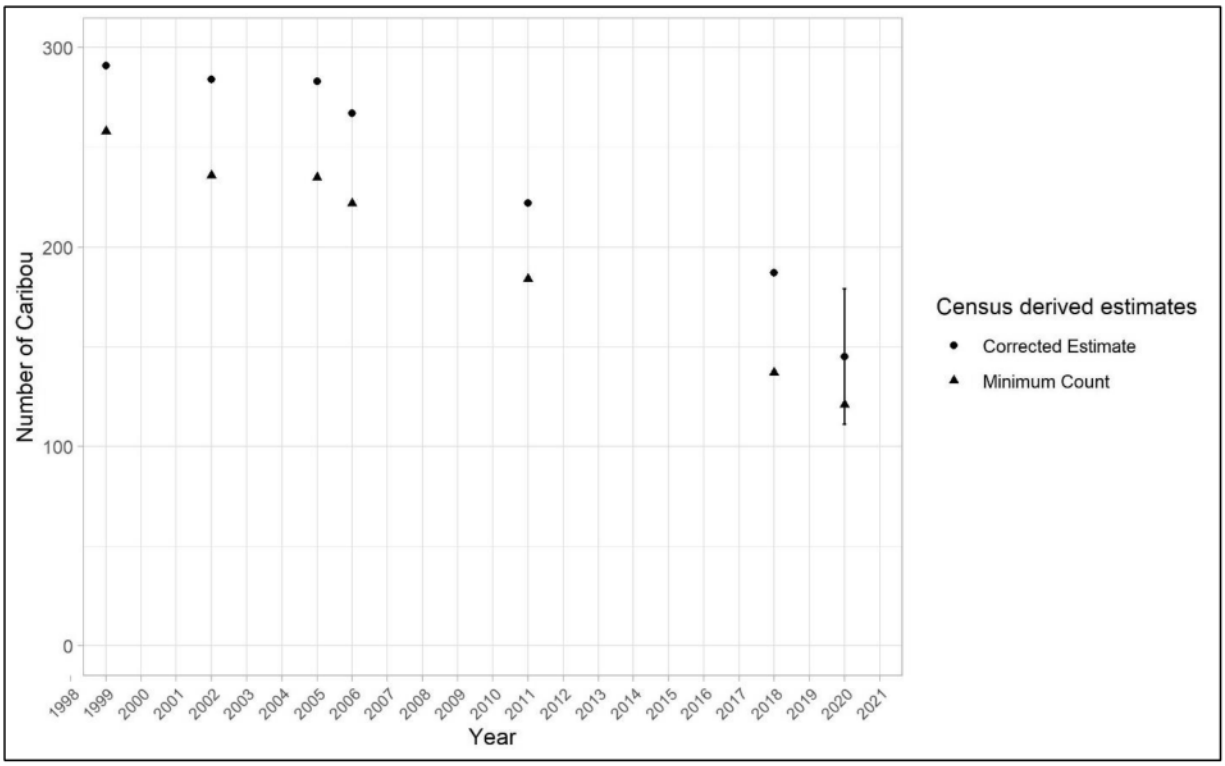

Figure 3. Late-winter population estimates for the North Cariboo Mountains caribou subpopulation. The black circles represent corrected population estimates and the black triangles represent the minimum number of caribou counted during the surveys.

Narrow Lake Census

The Narrow Lake subpopulation was surveyed on March 13th, 2020. We counted 8 caribou in total and 0 calves. All 8 caribou were in a single group in the southern block (NL2) and both radio-collared adult female caribou (n = 2) were observed in this same group. No additional caribou were estimated from tracks. The 2020 survey results indicate the Narrow Lake subpopulation continued to decline from 21 caribou estimated in 2018 (minimum count 15). No caribou were observed in the North block in 2020. After appearing stable since 2005, the Narrow Lake subpopulation declined by 77% since 2016 when the population was estimated at 36 caribou (λ_{census} = 0.68, 2016-2020).

Table 3. Number of caribou counted in March 2020 during the southern mountain caribou census within the Narrow Lake range, British Columbia.

Census area	Survey Zone	Zone Number	Total Counted	# of Calves	# GPS collared caribou observed
Narrow Lake	North	NL1	0	0	0
	South	NL2	8	0	2
		Survey Count	**8**	**0**	**2**
		Minimum Count*	**8**	**0**	**2**
		Population Estimate	**8 caribou (uncorrected)**		

*Includes GPS collared caribou, and other caribou within their associated groups, that were missed during the survey and were located by radio-telemetry post-survey.

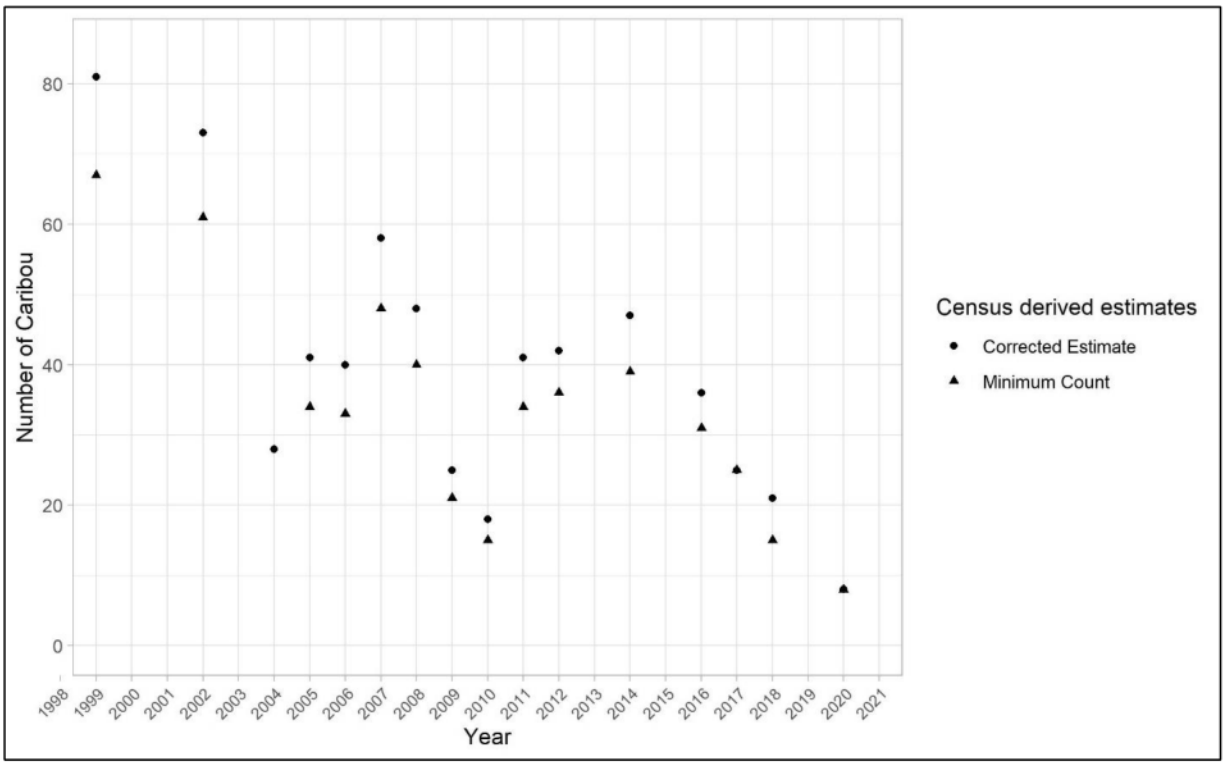

Figure 4. Late-winter population estimates for the Narrow Lake caribou subpopulation. The black circles represent corrected population estimates and the black triangles represent the minimum number of caribou counted during the surveys

Hart Ranges Wolf Reduction Winter 2020

A total of 91 wolves were removed between January and late-March during the 1st year of wolf removal in the Hart Ranges. Of those, 80 wolves were removed within the treatment area, 11 wolves were removed adjacent to the zone after following tracks that started within the

treatment area (Appendix E). A total of 10 wolves were radio-collared in separate packs to facilitate locating and removing entire packs. Estimated at 104 wolves (Klaczek unpublished data) in 2019, the wolf population declined by approximately 93% following the removal period, a reduction in density from approximately 7.8 wolves/1000km^2 to 0.8 wolves/1000km^2 within the wolf treatment area.

Table 4. Summary of 2020 wolf reduction in the Hart Ranges treatment area.

Treatment Area	Pack Name	Pack Size Estimate	Wolves Removed	Wolves Remaining	GPS – collar deployed
Hart South (9360 km^2)	Lower McGregor	3	3	0	0
	Upper McGregor	13	13	0	1
	Penny	13	9	3	1
	Dome Creek	6	4	1	1
	Herrick	2	2	0	0
	Torpy	13	10	5	1
	Upper Fraser	1	1	0	0
	Total	**51**	**42**	**9**	**4**
	Density (wolves/1000km^2)	**5.4**	**4.5**	**1**	
Parsnip (4370 km^2)	Upper Parsnip	10	10	0	1
	Lower Parsnip	2	2	0	1
	McLeod Lake	6	5	1	1
	Anzac	6	6	0	2
	Table	16	16	0	1
	Hominka	6	5	1	1
	Missinka	2	2	0	0
	Bear Lake	3	3	0	0
	Total	**51**	**49**	**2**	**6**
	Density (wolves/1000km^2)	**11.7**	**11.2**	**0.5**	

Discussion

Similar to previous surveys for southern mountain caribou, we used the standard total count method but estimated sightability using a sample of GPS-collared adult female caribou as a

marked sample to correct for variation in sightability. We used a mark-resight analysis (White 1996) to estimate population size which allowed for the population estimate to be expressed with confidence intervals to assess survey precision. We observed a total 46 of the 51 functioning collars (90%) without using telemetry overall suggesting that overall most caribou within the study areas were counted during the surveys. However, sightability varied between the North Cariboo Mountains and the Hart Ranges (67% vs 97%, respectively). Based on past surveys, sightability appears to generally lower in the North Cariboo Mountains relative to the Hart Ranges. The Haggen and Upper Goat census blocks, where the radio-collared caribou were missed, were surveyed on the final day of the survey, about a week after fresh snow created good-excellent survey conditions. Older tracking conditions contributed to the challenges in detection, however, our sightability estimate in 2020 was similar to previous estimates in the North Cariboo. For example, sightability during the 2018 census in the North Cariboo was estimated at 73% (Klaczek and Lirette 2018) whereas the correction factor for the Hart Ranges in 2019 Hart Ranges was estimated at 93%. Previous trials in Sugarbowl and Haggen estimated sightability at 0.50 and 0.57, respectively (Heard 1993); and during the 2002 survey Seip et al. (2002) estimated sightability at 62% (n = 16 radio-collared caribou). Given that population change for caribou is often estimated between 5-10% per year (positive or negative), variation in estimates due to changes in sightbility (in this study area ranging from 67%-91%) may make annual assessment of population change uncertain. We recommend maintaining a sample of GPS-collared caribou within the Hart Ranges and North Cariboo Mountains study areas to ensure accurate and precise population estimates. In addition, GPS-collars are used to assess adult female survival, calf recruitment, and main causes of mortality which can also act as key response variables to assess the efficacy of population management actions.

Estimated at 718 caribou in 2006, the Hart Ranges caribou subpopulation declined by approximately 5% per year for over a decade contributing to a 47% reduction in caribou abundance by 2016 (Klaczek and Heard 2016). The steepest decline occurred between 2012 and 2016 when the population was declining at 9% per year (λ_{census} = 0.91, 2012-2016). Population vital rates (i.e. calf recruitment, and adult female survival) monitored during the

2018/19 and 2019/20 survival years were within ranges expected for a stable population (geomean λ_{RM} = 1.008, 95% CI = 0.92-1.15, 2018/19 and 2019/20 survival years) and were consistent with census derived lambdas since 2016. Recent stability of the Hart ranges subpopulation may have been, in part, associated with the major reduction of wolves in the adjacent South Peace treatment area. Initiated in 2015 to support recovery of the central mountain caribou population, a total of 31 wolves were removed from 2016-2018 with the Hart Ranges. Wolves that were removed during this time occupied territories that overlapped the treatment areas and were tracked within the Hart (Anzac and Herrick) from the adjacent South Peace treatment areas (Kennedy Siding and Narraway; Seip and Jones 2018, Bridger 2019, Pelletier and Seip 2019).

Even with significant population decline, the Hart Ranges subpopulation currently represents the largest remaining subpopulation within the Southern Mountain DU comprising 31% of remaining 1201 individuals within the overall population (unpublished data, pers comm N. Dodd Sept 2019). Since 2007, 4 management actions have been implemented to support caribou recovery within the Hart Ranges: 1) the establishment of Ungulate Winter Range polygons over much of the high elevation habitat to minimize habitat loss through forestry-related activities, 2) the implementation of Motor Vehicle Closures which prohibit the operation of snowmobiles to minimize disturbance on key caribou winter range, 3) the placement and evaluation of restrictions of commercial heli-skiing operations, and 4) the increase in moose hunting permits in the northern portion of the range (i.e. Parsnip area) to reduce moose numbers and by extension, reducing wolf density to ultimately reduce predation pressure on caribou. Despite those actions, the Hart Ranges subpopulation declined. In January 2020, a wolf reduction program was initiated to help recover the Hart Ranges caribou subpopulation to 2006 levels (718 caribou; Seip et al. 2006). The objective during the first year of the program was reduce wolves below the threshold conducive to caribou recovery (<1.5 wolves/1000km^2; Wilson 2009, Environment Canada 2014). From January to March 2020, a total of 91 wolves were killed within treatment area representing a 93% reduction. Based on results from caribou recovery areas in the South Peace and Alberta we expect a significant level of wolf recolonization (60-100%) over the summer and fall months (Hervieux et al. 2014, Seip

and Jones 2018). If primary prey is managed as caribou habitat recovers and is protected, the need for wolf removal is expected to diminish over time (Serrouya et al. 2019). Wolf removal will need to be implemented in subsequent years until caribou population objectives are met. Ongoing monitoring of the caribou population will continue to help evaluate wolf reduction under an adaptative management framework (DeMars and Serrouya 2018).

Estimated at 145 caribou in 2020, the North Cariboo Mountains subpopulation is 1 of only 5 remaining subpopulations within the Southern Mountain DU that is currently estimated over 100 animals. Results from the 2020 census indicated the North Cariboo Mountains subpopulation has continued to decline significantly by approximately 9-12% per year since 2016 when the subpopulation was estimated at 210 caribou (Klaczek and Heard 2016). The number of caribou observed in 2020 within the Sugarbowl (32 caribou) and Haggen Creek (64) areas represents a fraction of the numbers observed in the early 1990s when a total a total of 79 and 150 caribou were counted in these areas, respectively (minimum counts; Heard 1993). Similarly, there was a low number of caribou counted within Bowron Lakes Provincial Park in 2020 (4 caribou), compared to past surveys, however, 21 caribou were observed in the nearby upper Goat River watershed (21 caribou) which is down from a total of 41 caribou counted in the Bowron block in 2018. Future surveys should include the upper portion of the Goat River as part of the larger Bowron Lakes census block.

Much of the high elevation core habitat within the North Cariboo Mountains range is covered by existing Ungulate Winter Range polygons or by Provincial Parks. However, in despite of habitat protection of core range, the subpopulation continues to decline. It appears that further recovery actions aimed improving adult female survival and calf recruitment will be required in the short term to stabilize the herd and to achieve population growth.

The 2020 count in the Narrow Lake range (8 caribou) indicated the herd also declined by 77% since 2016 (36 caribou; Klaczek and Heard 2016). With no calves observed in the group, the population is at immediate risk of extirpation and represents the potential for further contraction of caribou range in the Omineca region (i.e. Scott West herd and George Mountain herd).

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Appendix A: 2020 survey flight lines for southern mountain caribou subpopulations within the Prince George Forest District.

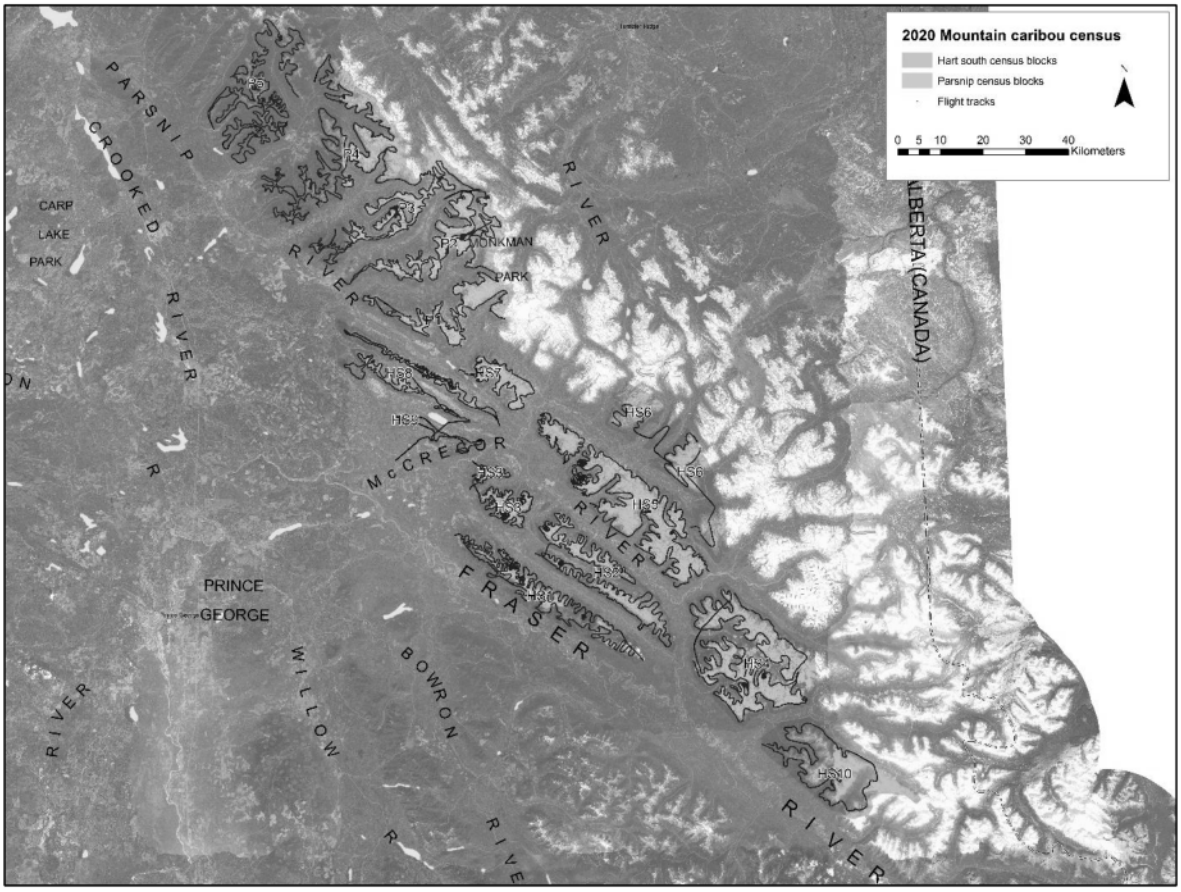

Figure 5. Flight lines representing the area covered during the 2020 late-winter caribou census within the Hart Ranges.

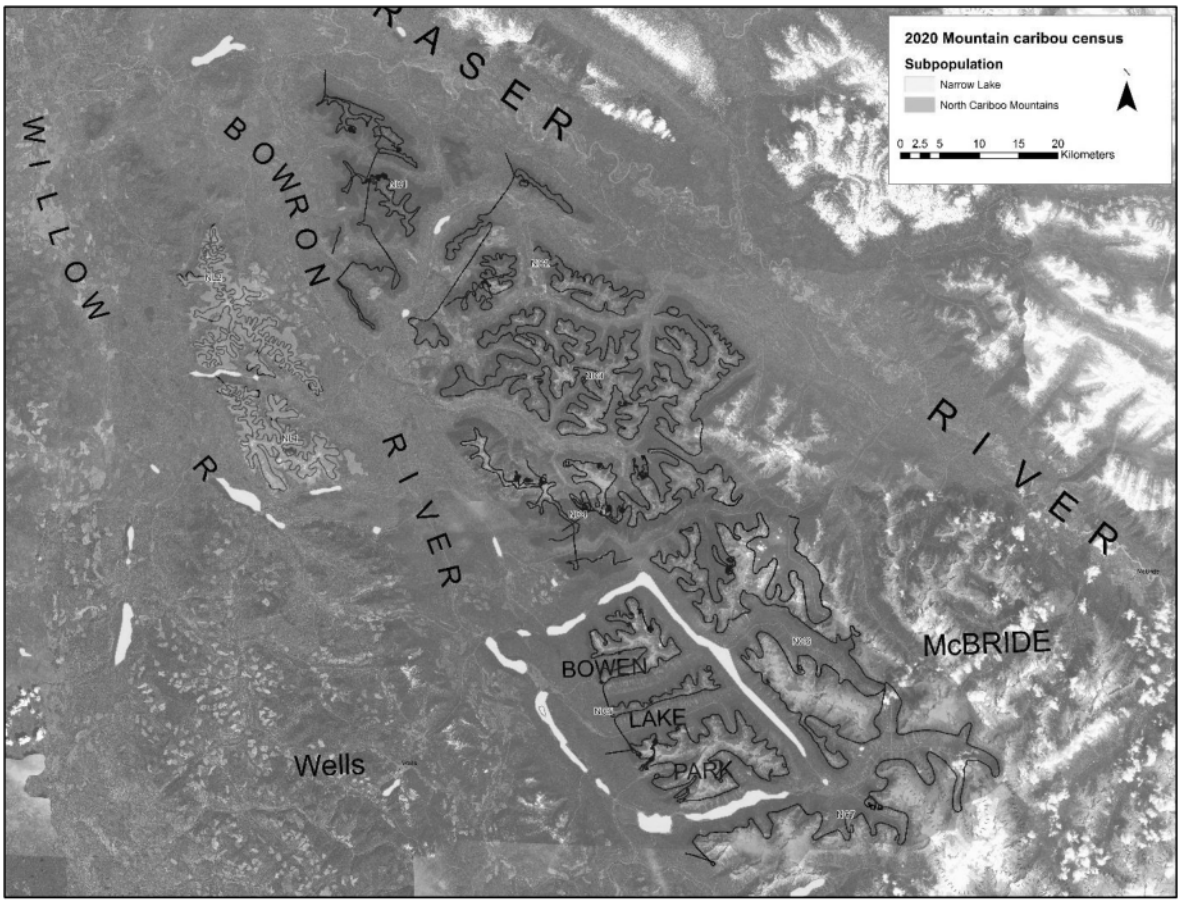

Figure 6. Flight lines representing the area covered during the 2020 late-winter caribou census within the Hart Ranges.

Appendix B: Population trends for southern mountain caribou subpopulations within the Prince George Forest District.

Table 5. Number of caribou and per cent calves in the Hart Ranges, British Columbia between 2006 and 2020.

Year	Minimum Count	Population Estimate	% Calves	Reference
2006	596	718	17.6	Seip et al. 2006
2010	447	560	11	Heard et al. 2010
2012	459	532	9	Heard et al. 2012
2016	313	375	14	Klaczek and Heard 2016
2019	352	377	19	Klaczek and Heard 2019
2020	398	408	17	Klaczek and Seip 2020

Table 6. Number of caribou and per cent calves in the North Cariboo Mountains, British Columbia between 1999 and 2020. Table doesn't include partial counts of Haggen/Sugarbowl (2010, 2014 and 2016) and Bowron (2015) census blocks.

Year	Minimum Count	Population Estimate	% Calves	Reference
1999	258	291	UNK	Watts 1999
2002	236	284	9.3	Seip et al. 2002
2005	235	283	16.7	Seip et al. 2005
2006	222	267	17.7	Seip et al. 2006
2011	184	222	9.2	Seip et al. 2011
2018	137	187	12.5	Klaczek and Lirette 2018
2020	121	145	15.7	Klaczek and Seip 2020

Table 7. Number of caribou and per cent calves in the Narrow Lake subpopulation, British Columbia between 1999 and 2020.

Year	Minimum Count	Population Estimate	% Calves	Reference
1999	67	81	UNK	Watts 1999
2002	61	73	11.5	Seip et al. 2002
2004	23	28	UNK	Seip et al. 2002
2005	34	41	5.2	Seip et al. 2005
2006	33	40	9.0	Seip et al. 2006
2007	48	58	8.3	Seip et al. 2007
2008	40	48	15	Seip et al. 2008
2009	21	25	0	Heard et al. 2009
2010	8	18	0	Heard et al. 2010
2011	34	41	UNK	Seip et al. 2011
2012	36	42	6	Heard et al. 2012
2014	39	47	5.4	Courtier and Heard 2014
2016	31	36	16	Klaczek and Heard 2016
2017	15	21	25	Klaczek unpublished
2018	15	21	13	Klaczek and Lirette 2018
2020	8	8	0	Klaczek and Seip 2020

Appendix C: Survey results summarized by census block, 2006-2019.

Table 8. Minimum counts (uncorrected) of caribou and calf recruitment rates documented during late-winter aerial surveys within the Hart South and Parsnip census blocks, 2005–2020.

Block	2005		2006		2010		2012		2013		2016		2019		2020	
	Total	% Calves	Total	% Calves	Total	% Calves	Total	% Calves	Total	% Calves	Total	% Calves	Total	% Calves	Total	% Calves
Bearpaw (HS1)	88	24	142	14	78	8	155	12	112	14	58	7	79	14	104	16
Captain-Otter (HS8)	106	15	65	17	45	16	62	10	72	12	37	18	38	24	48	19
Hedrick (HS5)	36	19	42	14	31	13	32	9	-	-	20	20	35	17	44	20
Severied (HS3)	46	13	39	15	36	8	53	11	35	17	18	19	23	30	43	14
Sande (HS2-north)	2	0	22	27	43	14	7	14	12	16	0	0	0	0	1	0
Torpy (HS2-south)	72	19	30	20	22	18	30	10	22	5	33	6	17	24	14	28
Walker (HS4)	27	18	55	16	30	0	9	22	-	-	27	18	33	18	33	9
Arctic-Pacific (HS7)	5	0	10	20	13	0	0	0	4	0	10	10	7	0	2	50
Hart South Total	382	18	405	18	298	10	348	11	257[a]	11	203	13	204	18	289	17
Parsnip Total	NA	NA	230	20	149	13	111	9	121	13	110	16	110	21	113	18

[a] Total count does not include the Hedrick and Walker census blocks.

Appendix D. Survival Rates estimated for adult female caribou in the 2018/19 and 2019/20 survival years.

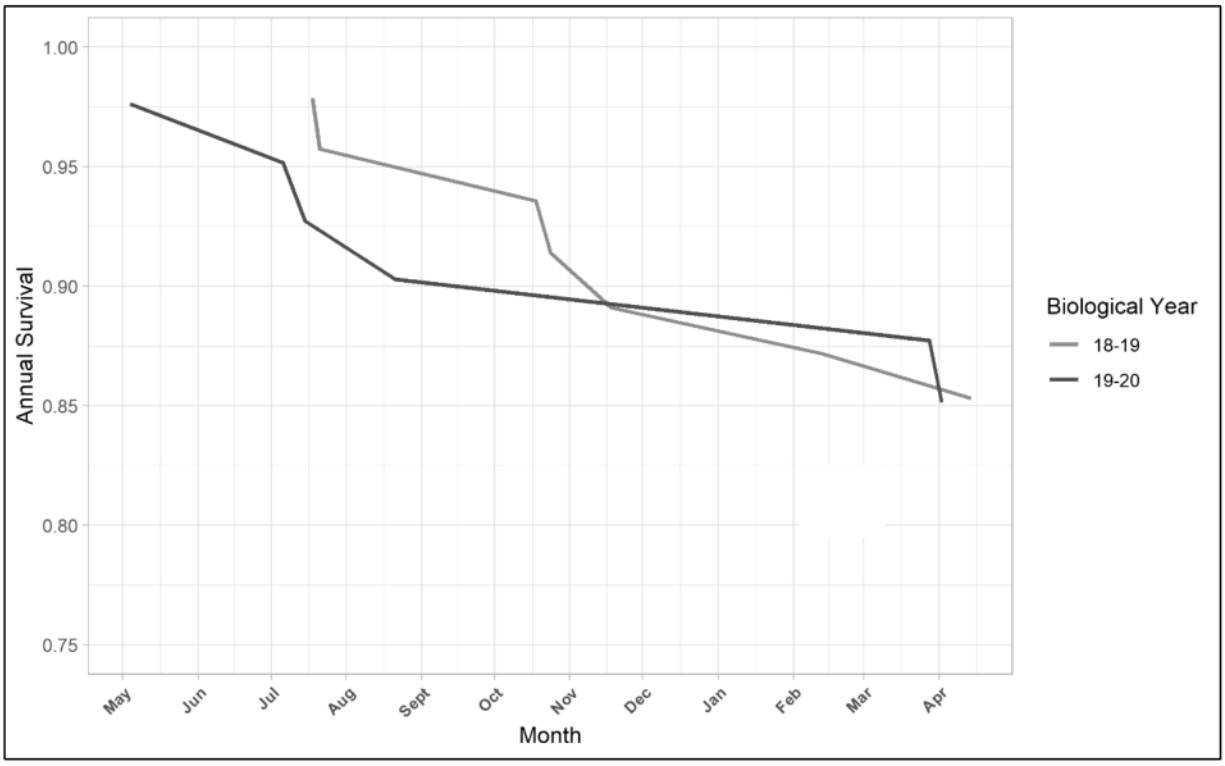

Figure 7. Kaplan-Meier annual adult survival rate estimated for adult female caribou within the Hart Ranges calculated during the 2018/19 and 2019/20 survival years (May 1st to April 30th). Annual sample sizes were 60 and 42 radio-collared caribou in 2018/19 and 2019/20 survival years, respectively.

Appendix E. Wolf Removal Locations in the Hart Ranges treatment area from January to March 2020.

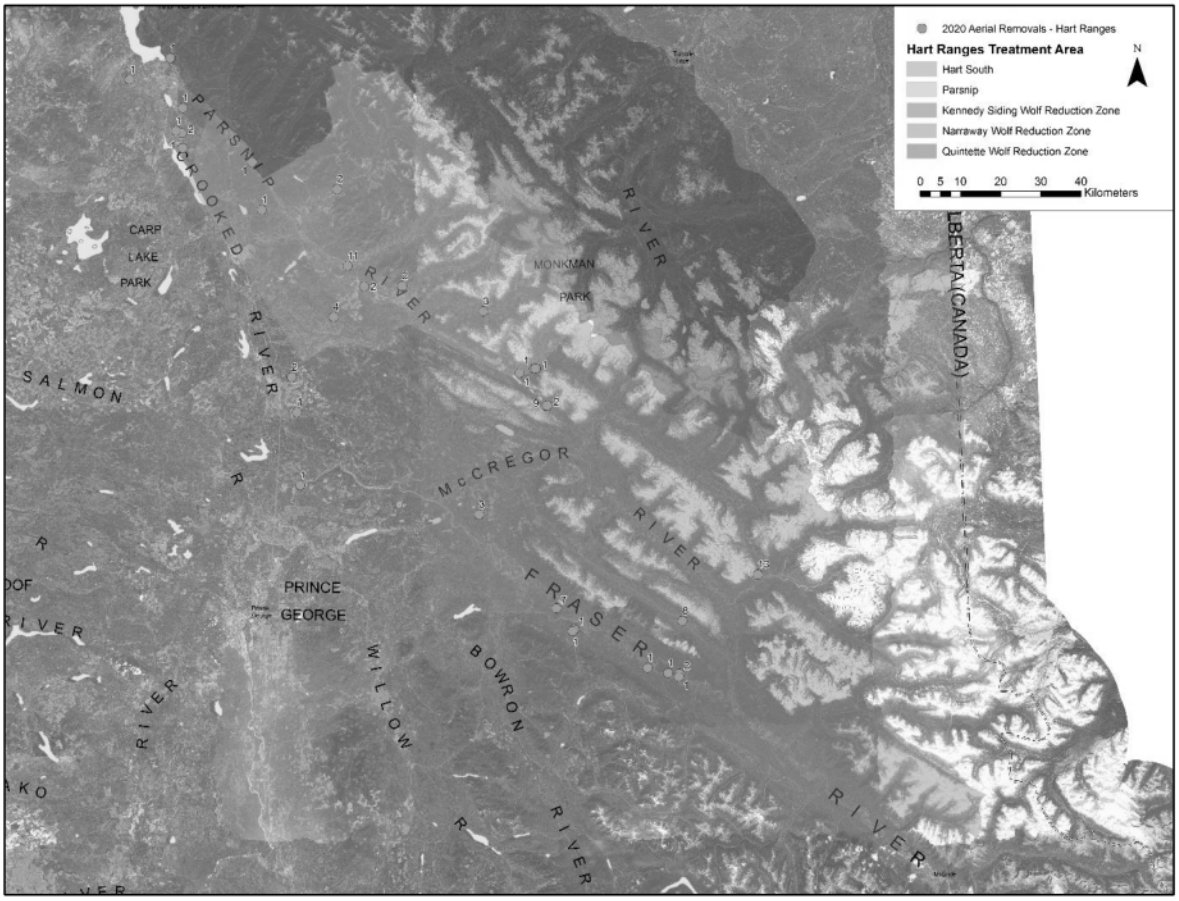

Figure 8. Wolf removal locations within the Parsnip (4369 km^2) and Hart South (9360 km^2) zones that make up the Hart Ranges wolf reduction treatment area from January to March 2020. Locations are approximate do not represent pack boundaries, removals outside the zone were picked up and tracked from inside the treatment area.

78470-45

WILDLIFE ACT
PERMIT PG21-668426

PERMIT HOLDER	s.15; s.19

IS AUTHORIZED UNDER s. 2(c)(i), 2(c)(iii), 2(h), 2(j), 2(k)(i), 2(k)(ii), and 2 (o) of the Permit Regulation, B.C. Reg. 253/2000,

TO	Hunt and kill wildlife during the open or closed season, specifically **grey wolves** (*Canis lupus*), in the Hart Ranges and North Cariboo Mountains caribou ranges for caribou recovery, as it is necessary for the proper management of wildlife resources, specifically **grey wolves** (*Canis lupus*). Hunt and capture and on-site release live **grey wolves** (*Canis lupus*) in the Hart Ranges and North Cariboo Mountains caribou ranges, for radio collar deployment to support the hunting and killing of **grey wolves** (*Canis lupus*) within the Hart Ranges and North Cariboo Mountains caribou ranges to support the Caribou Recovery Program. Possess and dispose of dead wildlife or parts of wildlife for scientific purposes purposes, specifically from dead/captured **grey wolves** (*Canis lupus*) for the purposes authorized above.

AND

IS EXEMPT UNDER s. 3(1)(b)(i), 3.1(1)(b), 3.1(1)(c), and 3.1(1)(d) of the Permit Regulation, B.C. Reg. 253/2000,

FROM	The prohibition in section 26(1)(d) of the Act against hunting, taking, trapping, wounding, or killing wildlife, specifically **grey wolves** (*Canis lupus*) with a firearm or bow during the prohibited hours for the purposes authorized above. The prohibition in section 27(2)(a) of the Act against hunting wildlife from an aircraft, specifically a helicopter for the purposes authorized above. The prohibition in section 27(2)(b) of the Act against using a helicopter to transport hunters or game, and while on a hunting expedition for the purposes authorized above. The prohibition in section 27(3) of the Act against herding or harassing wildlife with the use of an aircraft while carrying out the activities authorized above. These exemptions are necessary for the proper management of wildlife resources, specifically **grey wolves** (*Canis lupus*).

SUBJECT TO THE FOLLOWING:

TERMS OF PERMIT	This permit is only valid in Hart Ranges and North Cariboo Mountains wolf treatment areas within the Omineca and Cariboo regions. The permit holder must comply with the terms in Appendix A.

COMPLIANCE ADVISORY	Failure to comply with any term of this permit is an offence under the *Wildlife Act*, and may result in any or all of prosecution, suspension of the permit, cancellation of the permit, ineligibility for future permits, and denial of future permit requests.	
PERIOD OF PERMIT	This permit is only valid from December 15, 2021 to March 31, 2022	
DATE OF ISSUE	December 13, 2021	
s.15; s.19 **SIGNATURE OF ISSUER**	s.15; s.19 Recreational Fisheries & Wildlife Programs Omineca Region	**PERMIT FEE** $100.00 **HCTF SURCHARGE** $10.00

APPENDIX A
TERMS OF PERMIT

PERMIT PG21-668426

REPORTING REQUIREMENTS:

1. The permit holder must maintain an accurate up to date record of the wildlife observed under the permit that includes the following information:
    (a) number of wolves killed or radio-collared,
    (b) location where the wolves were killed or radio-collared, including coordinates (i.e., latitude and longitude or a UTM grid location),
    (c) the date wolves were killed or radio-collared, and
    (d) the classification of the wolves' radio-collared (i.e., sex, colour, age estimate).

2. The permit holder must submit the data collected in an electronic format (excel or access base) to the regional biologist or project manager **within 21 days** of the permit's expiry.

3. The permit holder must produce a copy of the record referred to in paragraph 1 on demand of an officer.

GENERAL CONDITIONS:

Note to region: s.13
s.13

1. The permit holder must comply with all laws applicable to the activities carried out under this permit.

2. All work is to be undertaken by trained professionals with experience in capturing and handling wolves (*Canis lupus*).

3. The permit holder must take all reasonably necessary steps to ensure that public safety is not jeopardized, and fish or wildlife habitat is not damaged, other than as permitted by this permit, by any action taken under authority of this permit.

4. The permit holder must ensure that the wildlife are treated in a humane manner and are not subjected to any unnecessary harm or suffering.

5. The permit holder must follow the Details of Capture, Handling and Surgical Procedures and Final Disposition outlined under #8 in the approved BC Animal Care Application form.

APPENDIX B
ADVISORY

PERMIT PG21-668426

GENERAL

- It is the permit holder's responsibility to be aware of all applicable laws and the limits of this permit. For example, this permit does not give the permit holder authority to access or travel though any private land without permission from the landowner.
- The Province is not liable for any illness contracted through wildlife handling. It is the responsibility of the permit holder to inform themselves of possible health hazards, and to ensure that all reasonably necessary safety measures are undertaken.
- To assist you, consider the following in your capturing and handling of animals:
  - Standards for Live Animal Capture and Handling Guidelines established by the Ministry of Environment. https://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/laws-policies-standards-guidance/inventory-standards/terrestrial-ecosystems-biodiversity
  - Further guidelines can be obtained on the Canadian Council on Animal Care website at https://www.ccac.ca/en/standards/guidelines/types-of-animals.html
- If applicable, the permit holder is responsible for renewing this permit. The issuer is not obliged to send a reminder notice.

LEGISLATION

Below is a non-exhaustive list of provisions under the *Wildlife Act* and regulations that are relevant to this permit. It is the permit holder's responsibility to be aware of any provisions under the *Wildlife Act* or regulations that may apply to this permit.

Wildlife Act

Property in Wildlife

2 (1) Ownership in all wildlife in British Columbia is vested in the government

(4) If a person by accident or for the protection of life or property kills wildlife, that wildlife, despite subsection (3), remains the property of the government.

(5) Despite anything in this Act, no right of action lies, and no right of compensation exists, against the government for death, personal injury or property damage caused by

(a) wildlife,

(a.1) controlled alien species described in paragraph (a) of the definition of "species", or

(b) an animal that escapes or is released from captivity or is abandoned in British Columbia

Documents not transferable

81 Except as authorized by regulation or as otherwise provided under this Act, a licence, permit or limited entry hunting authorization is not transferable, and a person commits an offence if the person

(a) allows his or her licence, permit or limited entry hunting authorization to be used by another person, or

(b) uses another person's licence, permit or limited entry hunting authorization.

Failure to pay fine

85 (1) This section applies if a person

(a) fails to pay, within the time required by law, a fine imposed as a result of the person's conviction for an offence under this Act or the *Firearm Act*, and

(b) has been served with notice of this section.

(2) In the circumstances referred to in subsection (1),

(a) the person's right to apply for or obtain a licence, permit or limited entry hunting authorization under this Act is suspended immediately and automatically on the failure to pay the fine,

(b) all licences, permits and limited entry hunting authorizations issued to that person under this Act are cancelled immediately and automatically on the failure to pay the fine,

(b.1) the person must not apply for employment as an assistant guide,

(b.2) the person must not guide as an assistant guide, and

(c) the person commits an offence if, before that fine is paid, the person

(i) applies for, or in any way obtains, a licence, permit or limited entry hunting authorization under this Act,
(ii) does anything for which a licence, permit or limited entry hunting authorization under this Act is required,
(iii) applies for employment as an assistant guide, or
(iv) guides as an assistant guide.

Proof of identity and authorization

97 (1) In this section, **"authorization"** means a licence, permit or limited entry hunting authorization issued under this Act.

(2) Subject to subsection (5), a person who is required to hold an authorization must, on the request of an officer,

(a) state the person's name and address,

(b) produce prescribed photo identification, and

(c) demonstrate in accordance with subsection (3) that the person holds the authorization.

(3) A person may demonstrate that the person holds an authorization by

(a) producing the authorization, or

(b) unless the regulations require that the original authorization be produced,

(i) producing a legible copy of the authorization, or

(ii) if authorized by the regulations, stating a number assigned to the person by the s.15; as an identification number for the person.

(4) Subject to subsection (5), a person who would be required to hold a licence or permit issued under this Act were the person not exempt under section 11 (9) or 12 (b) must, on the request of an officer,

(a) state the person's name and address, and

(b) produce prescribed photo identification.

(5) Subsections (2) (b) and (4) (b) do not apply to a person in a prescribed class of persons.

(6) A person who contravenes subsection (2) or (4) commits an offence.

Permit Regulation

Permit for use of conveyance

3.1 (5) Subject to subsection (6), a person who undertakes an activity in accordance with a permit issued under subsection (1) is exempt from the following:

(a) Section 35 (2) of the Act;
(b) Section 18 (1)(q) of the Hunting Regulation, B.C. Reg. 190/84

General offence – failure to comply with permit

8 A person who holds a permit under the Act or this regulation commits an offence if the person fails to comply with a term of the permit.

Wildlife Act General Regulation

Proof of identity

21.01 (1) For the purposes of section 97 (2)(b) and (4)(b) of the Act, the following photo identification is prescribed:

(a) valid photo identification issued to a person by any of the following:

(i) the government of Canada;

(ii) the government of a province or territory, or an agent of the government of a province or territory, in which the person has a current address;

(iii) the Nisga'a Nation, if the person is a Nisga'a citizen;

(iv) a treaty first nation, if the person is a treaty first nation member of the treaty first nation;

(b) in the case of a person who is a non-resident alien,

(i) valid photo identification in the form of

(A) a passport, or

(B) a driver's licence issued to the person by a foreign jurisdiction in which the person has a current address, or

(ii) a copy of a photo identification referred to in subparagraph (i) that has been certified as a true copy by

(A) a lawyer, or

(B) a notary who is a member in good standing under the *Notaries Act;*

(c) in any case, a valid NEXUS card.

(2) For the purposes of section 97 (5) of the Act, persons under 16 years of age are prescribed as exempt from the requirement to produce photo identification.

APPENDIX C
DESIGNATES

PERMIT PG21-668426

- Designate – Secondary Pilot
- Designate – Netgunner/handler/shooter
- Designate – s.15; s.19 Netgunnder/handler/shooter
- Designate – Netgunner/handler/shooter
- Designate – , Netgunner/handler/shooter

ACTION: s.14

s.15; s.19

From: FLNR Fish & Wildlife Permit Clerks Cranbrook FLNR:EX <fw.cbk@gov.bc.ca>
To: Stent, Patrick FLNR:EX <Patrick.Stent@gov.bc.ca>, Ernst, Bevan FLNR:EX <Bevan.Ernst@gov.bc.ca>
Cc: Krebs, John A FLNR:EX <John.Krebs@gov.bc.ca>, Valdal, Eric FLNR:EX <Eric.Valdal@gov.bc.ca>
Sent: December 21, 2021 10:27:03 AM PST
Attachments: Appl.pdf, ACA - Submitted.doc s.14

s.14

Hello: Could I please have your s.15; s.19 consideration on this s.14 Please reply to fw.cbk@gov.bc.ca <mailto:fw.cbk@gov.bc.ca>

Notes:

s.14

Supporting Documents Attached:

* Application

s.14

* ACA (this is a joint ACA fc s.15; s.19

COORS Info:

s.15; s.19 - No History

If you require anything further, just let me know.

Regards

Marsha Snow - Fish & Wildlife Permit Administrator, Front Counter BC
Ministry of Forests, Lands, Natural Resource Operations and Rural Development
1902 Theatre Road / Cranbrook BC V1C 7G1
Kootenay – Boundary Region; Phone: 250-420-6395; Email: fw.cbk@gov.bc.ca <mailto:fw.cbk@gov.bc.ca>
FrontCounter BC Website <http://www.frontcounterbc.gov.bc.ca/> | Toll-Free Contact Centre: 1-877-855-3222

Page 02 of 72 to/à Page 03 of 72

Withheld pursuant to/removed as

s.14 ; s.15 ; s.19

Page 04 of 72 to/à Page 05 of 72

Withheld pursuant to/removed as

s.14

ACTION: s.14

s.14; s.15; s.19

From:	FLNR Fish & Wildlife Permit Clerks Cranbrook FLNR:EX <fw.cbk@gov.bc.ca>
To:	Stent, Patrick FLNR:EX <Patrick.Stent@gov.bc.ca>, Ernst, Bevan FLNR:EX <Bevan.Ernst@gov.bc.ca>
Cc:	Krebs, John A FLNR:EX <John.Krebs@gov.bc.ca>, Valdal, Eric FLNR:EX <Eric.Valdal@gov.bc.ca>
Sent:	December 21, 2021 10:47:59 AM PST
Attachments:	ACA - Submitted.doc, s.14 s.14 s.14 s.14; s.15; s.19 s.14 Appl.pdf

Hello: Could I please have yours.15; s.19 consideration on this.14 Please reply to fw.cbk@gov.bc.ca <mailto:fw.cbk@gov.bc.ca>

Notes:
s.14

Supporting Documents Attached:

* Application
s.14

* ACA (this is a joint ACA fors.15; s.19

COORS Info:

s.15; s.19 – No History;

s.15; s.19 Nothing new previous 5 years and no outstanding fines.

If you require anything further, just let me know.

Regards

Marsha Snow - Fish & Wildlife Permit Administrator, Front Counter BC
Ministry of Forests, Lands, Natural Resource Operations and Rural Development
1902 Theatre Road / Cranbrook BC V1C 7G1
Kootenay – Boundary Region; Phone: 250-420-6395; Email: fw.cbk@gov.bc.ca <mailto:fw.cbk@gov.bc.ca>
FrontCounter BC Website <http://www.frontcounterbc.gov.bc.ca/> | Toll-Free Contact Centre: 1-877-855-3222

Ministry of Forests, Lands and Natural Resource Operations

FISH, WILDLIFE AND HABITAT MANAGEMENT BRANCH
ANIMAL CARE APPLICATION FORM

PLEASE TYPE

For office use: Date Received: ***2021Dec14*** Project Number: ***MRCB21-672843***

Project Title: Wolf Reduction in Revelstoke-Shuswap Local Population Unit and Central Selkirk subpopulation to Support Caribou Recovery

2. Starting Date: January 2022 **Completion Date: March 31, 2022**

3. Principal Investigator (A):

Name: s.15; s.19
Position:
Department/Organization: s.15; s.19
Region/Institution: n/a

Phone:
Fax: n/a
E-mail: s.15; s.19

Mailing Address: s.15; s.19

Experience related to the described proposal:

s.15; s.19

Additional Investigators:

a) Secondary Pilots

Name: s.15; s.19
Position: Secondary Pilot
Department/Organization: s.15; s.19
Region/Institution: n/a

Experience related to the described proposal:

s.15; s.19

s.15; s.19

b) Net Gunners

Name: s.15; s.19
Position: Primary Net-gunners and Shooters
Department/Organization: s.15; s.19
Region/Institution: n/a

Experience related to the described proposal:

s.15; s.19

---

4. Principal Investigator (B)

Name: s.15; s.19
Position: Lead pilot
Department/Organization: s.15; s.19
Region/Institution: n/a

Mailing Address: s.15; s.19

Phone:
Fax: n/a
E-mail: s.15; s.19

Experience related to the described proposal:

s.15; s.19

s.15; s.19

Additional Investigators:
a) secondary pilots

Name: s.15; s.19
Position: Pilot, netgunner, shooter, handler
Department/Organization: s.15; s.19

Experience related to the described proposal:

s.15; s.19

b) net gunner/shooter/handler

Name: s.15; s.19
Position: net gunner, shooter, handler
Department/Organization: s.15; s.19

Experience related to the described proposal:

s.15; s.19

---

5. Project Proposal

Mountain caribou are an endangered species in Canada. Most populations are in decline. In British Columbia the core habitat of many populations have been protected from forest harvesting on crown land since 2008. However early seral conditions created by previous harvesting are likely still supporting greater populations of alternate prey than historic conditions. The alternate prey are drawing in predators such as cougars and wolves, subjecting the caribou to higher predation risk.

In the Revelstoke-Shuswap Local Population Unit (Herds: Columbia North, Columbia South, Frisby-Boulder) we are entering our fifth season of wolf control. The population is stabilized and showing sign of growth in recent years. We hope that by increasing pressure on both wolves and cougars in this area in 2021 we can further influence the growth of these populations. Meanwhile in the Central Selkirk subpopulation we entering into our second season of predator control.

The reduction of wolves has been shown to be effective for reversing the trends of declining woodland caribou populations in BC. Reduction efforts must be intensive and applied with the highest standards of scientific rigor and humaneness. Wolf reduction efforts within the Revelstoke-Shuswap Local Population Unit and Central Selkirk subpopulation are expected to support recovery while the ultimate causes of population declines (i.e. habitat-related impacts) are addressed. Radio-collaring individual wolves from wolf packs greatly increases the efficacy of removing entire wolf packs over the course of the winter.

A. Background – Goals and Objectives:

Wolf reduction has been identified as an effective short-term management action for supporting the recovery of woodland caribou in BC.

The goals and objectives of this project are to:

1) When possible conduct net-gun aerial capture of individual wolves from packs located within the Revelstoke/Shuswap LPU and the Central Selkirk treatment area to deploy radio collars and potentially health sample 1-2 wolves for the purpose of increasing the efficiency of aerial removal (culling);
2) using radio collar locations to identify pack locations, dispatch (via aerial shooting) the majority of wolves (>80%) found within the treatment area and reduce the wolf density to below 3 wolves per 1000 km^2;
3) implement scientific rigor and the highest possible standards for humaneness, and report out on all facets of the program

B. Key Expected Results and Management Implications:

1) Radio-collar deployment on individual wolves when feasible within the treatment areas with biological sampling for health profiles.
2) Reduction of the majority (>80%) of wolves via aerial shooting

6. CCAC Invasiveness Category: (see Appendix A)

A_____B_____C_____D x __

---

7. Species and Number of Animals Required: (include justification of numbers predicted to be used)

Species: Wolf (*Canis lupus*)

Number expected for 2021: approximately 6 radio collar deployments (6 Revelstoke-Shuswap, 3 in Central Selkirk), up to 40 to be dispatched.

The number of radio collars to be deployed is contingent on the number of wolf packs within the treatment area and where the wolf packs are located. Limited amount of open habitat is the primary barrier for netgun capture in these herds. It is estimated that there will be between 4-6 packs in each of the two treatment areas. Radio-collar deployment is generally non-selective but will be applied to adult wolves preferentially and of both sexes.

Justification for numbers: The number of wolves in the treatment area are based on the past years removal and recolonization rate. Revelstoke-Shuswap has seen a decline in recolonization since the beginning of wolf removal with 11, 18, 13, 10, 6 removed in 2017, 2018, 2019, 2020 and 2021 respectively. In 2020, a total of 20 wolves were removed from the Central Selkirk herd during the first year of control but only 3 were removed in 2021. The lower numbers in 2021 for both control areas is primally attributed to a late start and poor tracking conditions. Based on these data we estimate that between 20 and 40 wolves will be removed between the two treatment areas in 2022.

---

8. Details of Capture, Handling and Surgical Procedures and Final Disposition:
(be detailed and SPECIFIC, attach additional pages, if necessary)
Please refer to Appendix B – CCAC guidelines on: the care and use of wildlife (2003) for techniques considered appropriate and other guidelines for handling and care.

Capture Technique:

Wolves will be captured for radio collar deployment via aerial net-gunning, and removal will occur via aerial shooting.

Helicopter captures and removal will take place between February and the end of March using aerial net gunning and physical restraint and aerial shooting. An MD500D helicopter will be used to track and target wolves in snow-covered, sparsely treed habitats and frozen watercourses suitable for safe capture or removal. Deep, soft snow is

preferred as it will slow animals, make their movements more predictable, and reduce the risk of injury during capture, and increases the likelihood of accurate, humane shooting.

Net-gunning – Wolves: The identified personnel will use a hand-held net gun to capture wolves for radio collar deployment and health sampling. When a candidate animal has been selected in close proximity to a suitable capture location, the capture helicopter will approach the animal, haze it into a suitable nearby opening and on close approach (within 5–10 m), fire a 12' x 12' net over the front of the animal. Hazing time will not exceed the standards required by the Province and recommended by Wildlife Health, generally less than 5 minutes with close approach. Capture location will be selected in order to minimize risks to the crew and animal (i.e. avoiding open water, avalanche terrain, thin ice, wooded areas, steep terrain, etc.). A second net may be deployed in order to further entangle the wolf. Only one wolf will be captured at a time. Two net-guns with 4 or 5 detachable net canisters will be available to the net-gunner for each capture. This provides a backup net-gun and nets that can be used to reduce chase duration if the first net fails to adequately restrain the animal, or to further entangle the animal if the single net is not sufficient. Once the net is deployed the animal usually quickly trips and is wrapped up in the net, becoming immobile. The helicopter will immediately land to drop off the capture crew, and the net-gunner will restrain the wolf with a Y-pole around the neck before it can chew out of the net. The handler will apply a catch-pole snare around the mouth of the wolf and tighten it until it is securely closed. The crew will then apply a muzzle or multiple wraps of strong duct tape to the mouth in order to eliminate the risk of a wolf biting the crew. A blindfold will then be applied to reduce stress to wolves. Hobbles will then be applied to the front and back legs as restraint to eliminate the possibility of the wolf escaping.

Shooting - Wolves: The identified personnel will conduct the aerial removal of wolves by use of high-powered rifle. The rifle will be a semi-automatic 7.62 x 39mm caliber using a red-dot scope for quick and accurate target acquisition. Polymer or lead-tipped, rapid expansion lead-core bullets will be used to maximize shot impact and ensure quick or immediate kill times. Non lead bullets of this caliber will be used if available to reduce the use of lead and habitat contamination. The rifle includes detachable magazines for quick reloading of the firearm, and a semi-automatic action allowing for a quick succession of shots if necessary. Wolves chosen to be shot will be hazed into open locations where the shot distance is no greater than 50 m, ensuring a high likelihood of accurate shot placement. Shot placement will preferentially be the cranium (targeting the brain first and upper spinal cord) or the chest area (lungs and heart). If immediate death is not observed following the first shot, follow-up shots will occur as soon as possible and preferentially in the head, then neck, or chest area to ensure death. Wolves will be visually observed from as close a distance as possible from the hovering helicopter for visual signs of movement (eg. respiratory effort and movement) to confirm death before moving on. Any animal that is shot and is not recumbent will be followed until the gunner is able to kill as quickly and humanely as possible. Humaneness will be documented by recording time, number of and shot placement and time of death. Once a pack is eliminated, at least half of the wolves killed will be inspected on the ground, clearly documenting shot locations and providing standardized photographs to the project lead and provincial wildlife veterinarian. These documentation (time, number of shots, shot placement and photographs will be provided to the lead and veterinarian at the completion of the project.

Method of Handling:

Each wolf will be handled by an experienced handling crew. As described above, the net-gunner will be the first to engage with the animal after it has been entangled in the net.

The net-gunner will use a Y-pole to pin the wolf to the ground by applying the Y-pole directly behind the animal's head. The handler will approach the wolf with the catch-pole, and secure the mouth closed using the catch pole snare. Once the catch-pole snare is confirmed to be secured, the crew will apply a commercial dog muzzle and/or multiple wraps of duct tape around the wolf's muzzle to ensure it is unable to bite and blindfold the animal. The wolf will then be hobbled as described above.

The net(s) will be removed from the wolf which will then be positioned to minimize discomfort (i.e. sternal or lateral recumbency, head slightly uphill, head free from deep snow). Once fully immobilized, the crew will assess the wolf for any injuries that may have occurred during capture and confirm the animal's general health and sex. The restraining process generally takes less than 2–3 minutes, at which point the radio-collaring and sampling procedures will begin. Small crews of two personnel will be used to minimize stress, and sudden movements or auditory stimuli will be kept to a minimum. To release the wolf, it is first pointed in a safe direction of travel away from the crew, helicopter, or any hazards.

Once sampling and collaring is completed, the catch-pole snare is securely attached around the mouth, at which point the muzzle or tape around the wolf's muzzle is carefully removed and the Y-pole is re-applied. The blindfold is removed, the hobbles are removed, and the catch-pole is released, and finally the Y-pole is lifted.

Other Procedures: (Marking method, Sampling)

Each wolf will be fitted with a satellite GPS radio-collar. The radio collar will be applied by the most experienced crew member to ensure the correct fit. Radio-collars will be fitted to ensure comfort for the animal, while ensuring that they are not too loose as to slip off or cause irritation (generally two fingers fitted vertically). Radio-collars fitted on younger animals, if necessary, will be slightly looser to allow for growth. Satellite collars will be programmed to obtain positional fixes every 3–4 hours over the course of the winter to acquire up-to-date location information to support reduction efforts. Radio-collared wolves will either be left alive following the winter's removal efforts in order to collect further data and to support removal efforts the following winter, or they will be dispatched once all other pack members have been removed.

Biological samples will be taken by the crew as per standardized Wildlife Health Program protocols while the wolf is immobilized. The total time associated with radio-collar attachment and sample collection takes less than 10 minutes.

The radio-collars contain an internal tip switch to detect animal movement rates and are programmed to send a mortality alert via email and text message if no movement is detected for a sustained period of time (12 hours). Immediate investigation of mortalities is not anticipated for wolves, although radio collars will be picked up as soon as logistically feasible and an investigation on cause of death will occur if possible. Collars include label plates instructing hunters/trappers to contact FLNRO if they harvest a collared wolf or a collar is found.

Additional data will be recorded and samples will be taken by the handling crew while animals are physically restrained according to the standardized BC wolf sampling protocols (Appendix C):
For wolves:

- Age class using tooth eruption/wear/staining as an index (if visible under the tape)
- Sex
- Colour
- Pack size
- Location
- Body condition
- Photos
- Presence of old injuries or new capture-related injuries
- External parasite presence and prevalence
- From each wolf, 10 to 15 ml of blood will be withdrawn from the saphenous or cephalic vein for serological screening (parvovirus, Neospora, distemper), ensuring bleeding has stopped before releasing the animal
- Each wolf will be ear-tagged with a Rototag with a unique identifier number, and a 6 mm punch biopsy of the ear will be air-dried and archived for genetics
- At least 100 hairs with roots from the top of the shoulders from each wolf for genetic or other studies (e.g., stress assessment through cortisol levels, diet analysis with stable isotopes).
- Samples will be processed each evening and stored before shipping to the BC Wildlife Health Program
- For dispatched wolves, when the helicopter can land safely near the carcass, an ear tip will be sampled, and photos will be taken showing shot placement

Contingency Plan: (what training, preparations and equipment are available in event of animal injury during capture or handling)
The following measures will be in place to reduce the risk of injury to wolves:

1) Capture crews are personnel with extensive experience in capturing, handling and shooting wild canids.
2) At least two out of three personnel are trained in first aid and CPR and avalanche safety?
3) Aerial net-gun captures will be conducted in deep, soft snow in ambient temperatures of between 0 to -25 C, on terrain consisting of flat or rolling terrain and not exposed ground or open water and animals will be assessed and monitored during physical restraint.
4) The capture crew will have a satellite phone to contact other experienced professionals and veterinarians for advice and guidance for any unusual circumstances that arise in the field
5) A firearm will be available for humane killing of any wolves badly injured during net-gun captures

6) While mortalities can occur with capture operations any mortality must be investigated and if the mortality rate exceeds 2% the operation must cease, and the wildlife veterinarian and project lead contacted immediately.
7) A firearm will be available for humane killing of any wolves badly injured during net-gun captures.

Method of Euthanasia and Disposal Technique: (if necessary)
In the event of an animal being injured without a chance of survival after release, it will be euthanized humanely by high caliber gunshot to the brain and samples taken to confirm cause of death. Wolf carcasses may be sampled and left in the field unless brought back to the lab for examination or necropsy and disposal at the dump, and pelts may be offered to First Nations.

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9. Details of Potentially Controversial Procedures and Justification:
(Include any expected morbidity and methods used to avoid)

Animal welfare is of high priority for this project. All net-gun captures will occur following the procedures described above (and in the regional SOPs for aerial net-gun capture). Few complications have been observed using this protocol. Aerial shooting of wolves is considered the most effective and humane method of removing wolves in remote, expansive areas, with the ability to target without bycatch occurring (AVMA, 2013). All possible measures will be taken to ensure the ethical and humane removal of wolves.

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10. Budget:

Funding sources applied for: Provincial Caribou Recovery Program

Are these peer reviewed? Yes (the region's wolf reduction programs have undergone internal and external reviews to measure effectiveness)

Status: Approved

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11. Region:

The wolf reduction will occur within the Revelstoke-Shuswap Local Population Unit (Herds: Columbia North, Columbia South and Frisby-Boulder) and Central Selkirk subpopulation herd boundary. The control areas were identified due to the recovery urgency for these particular caribou herds.

---

12. Permit:

Is a permit required? Yes **Status**: Pending Decision

Please attach any permit documents to application.

Please send the completed BC Animal Care Form Application Form to the Front Counter BC along with a General Permit Application, detailed project proposal and permit fees (if applicable). For further information on how to apply, please visit the Front Counter BC website at https://portal.nrs.gov.bc.ca/web/client/home or call at 1-877-855-3222.

Approval of an Animal Care Application does not constitute approval of any application to handle wildlife. Applicants must also have a valid permit, issued under the Wildlife Act, before engaging in any such activity.

Principal Investigator's Signature **Date of Application**

Appendix A:

Canadian Council on Animal Care: Categories of Invasiveness for Wildlife Studies

A. Methods used on most invertebrates or on live isolates

Possible examples: the use of tissue culture and tissues obtained at necropsy; the use of eggs, protozoa or other single-celled organisms; experiments involving containment, incision or other invasive procedures on metazoa.

B. Methods used which cause little or no discomfort or stress

Possible examples: observational studies in which the same individuals are not repeatedly observed so as to habituate or otherwise modify their behavior; census or other surveys which do not involve capture or marking individuals; non-invasive studies on animals that have been habituated to captivity; short periods of food and/or water deprivation equivalent to periods of abstinence in nature.

C. Methods which cause minor stress or pain of short duration

Possible examples: capture, using methods with little or no potential to cause injury and marking of animals for immediate release; long-term observational studies on free-ranging animals where the behaviour of individuals may be altered by repeated contact; brief restraint for blood or tissue sampling; short periods of restraint beyond that for simple observation or examination, but consistent with minimal distress; short periods of food and/or water deprivation which exceed periods of abstinence in nature; exposure to non-lethal levels of drugs or chemicals; low velocity darting and slow-injection darts with immobilization chemicals. Such procedures should not cause significant changes in the animal's appearance, in physiological parameters such as respiratory or cardiac rate, or fecal or urinary output, in social responses or *in ability to survive*.

Note: During or after Category C studies, animals must not show self-mutilation, anorexia, dehydration, hyperactivity, increased recumbency or dormancy, increased vocalization, aggressive-defensive behavior or demonstrate social withdrawal and self-isolation.

D. Methods which cause moderate to severe distress or discomfort

Possible examples: *capture, using methods that have the potential to cause injury (e.g. Leg snares, leghold traps, high velocity darting and rapid-injection darts with immobilization chemicals, net gunning, etc.); maintenance of wild caught animals in captivity*; translocation *of wildlife to* new habitats; major surgical procedures conducted under general anesthesia, with subsequent recovery; prolonged (several hours or more) periods of physical restraint; induction of behavioral stresses such as maternal deprivation, aggression, predator-prey interactions; procedures which cause severe, persistent or irreversible disruption of sensorimotor organization.

Other examples *in captive animals* include induction of anatomical and physiological abnormalities that will result in pain or distress; the exposure of an animal to noxious stimuli from which escape is impossible; the production of radiation sickness; exposure to drugs or chemicals at levels that impair physiological systems. *(NB. Experiments described in this paragraph would be Category E if performed on wildlife immediately prior to release.)*

Note: Procedures used in Category D studies should not cause prolonged or severe clinical distress as may be exhibited by a wide range of clinical signs, such as marked abnormalities in behavioral patterns or attitudes, the absence of grooming, dehydration, abnormal vocalization, prolonged anorexia, circulatory collapse, extreme lethargy or disinclination to move, and clinical signs of severe or advanced local or systemic infection, etc.

E. Procedures which cause severe pain near, at, or above the pain tolerance threshold of unanesthetized conscious animals

This Category of Invasiveness is not necessarily confined to surgical procedures, but may include exposure to noxious stimuli or agents whose effects are unknown; exposure to drugs or chemicals at levels that (may) markedly impair physiological systems and which cause death, severe pain, or extreme distress; behavioral studies about which the effects of the degree of distress are not known; *environmental deprivation that has the potential to seriously jeopardize an animal's wellbeing*; use of muscle relaxants or paralytic drugs without anesthetics; burn or trauma infliction on unanesthetized animals; a euthanasia method not approved by the CCAC; any procedures (e.g., the injection of noxious agents or the induction of severe stress or shock) that will result in pain which approaches the pain tolerance threshold and cannot be relieved by analgesia (e.g., removal of teeth without analgesia, or when toxicity testing and experimentally-induced infectious disease studies have death as the endpoint), *capture methods with a high potential of causing severe injury that could result in severe chronic pain and/or death.*

Appendix B:

Canadian Council on Animal Care guidelines on: the care and use of wildlife (2003)

http://www.ccac.ca/english/gui_pol/GUFRAME.HTM
http://www.ccac.ca/english/gdlines/wildlife/Wildlife.pdf

Appendix C:

BC Wolf Sampling Protocols

BC Wolf Capture Sampling Protocols_C

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Withheld pursuant to/removed as

s.14 ; s.15 ; s.19

Page 21 of 72 to/à Page 24 of 72

Withheld pursuant to/removed as

s.14

FW: ACTION: s.14

s.14; s.15; s.19

s.15; s.19

From:
To: Valdal, Eric FLNR:EX <Eric.Valdal@gov.bc.ca>, FLNR Fish & Wildlife Permit Clerks Cranbrook FLNR:EX <fw.cbk@gov.bc.ca>
Sent: January 22, 2022 2:23:10 PM PST
Attachments: s.14; s.15; s.19
Appl.pdf, ACA - Submitted.doc, s.14; s.15; s.19

Hello Marsha

s.14

s.14

as this work is in service to government. Eric will respond separately.

Please note this is a Top priority for issuance due to operational window considerations.

Thank you for the work on this.

s.15; s.19

s.15; s.19 Resource Management | Kootenay Boundary Region
s.15; s.19 Recreational Fisheries and Wildlife Programs
Ministry of Forests, Lands and Natural Resource Operations and Rural Development
Phone: s.15; s.19

From: FLNR Fish & Wildlife Permit Clerks Cranbrook FLNR:EX <fw.cbk@gov.bc.ca>
Sent: December 21, 2021 11:48 AM
To: Stent, Patrick FLNR:EX <Patrick.Stent@gov.bc.ca>; Ernst, Bevan FLNR:EX <Bevan.Ernst@gov.bc.ca>
Cc: Krebs, John A FLNR:EX <John.Krebs@gov.bc.ca>; Valdal, Eric FLNR:EX <Eric.Valdal@gov.bc.ca>
Subject: s.14; s.15; s.19

Hello: Could I please have your s.15; s.19 consideration on thi s.14 Please reply to fw.cbk@gov.bc.ca <mailto:fw.cbk@gov.bc.ca>
Notes:
s.14

Supporting Documents Attached:
* Application
s.14
* ACA (this is a joint ACA fos.15; s.19

COORS Info:
s.15; s.19 l. – No History;
s.15; s.19 Nothing new previous 5 years and no outstanding fines.

If you require anything further, just let me know.

Regards

Marsha Snow - Fish & Wildlife Permit Administrator, Front Counter BC
Ministry of Forests, Lands, Natural Resource Operations and Rural Development
1902 Theatre Road / Cranbrook BC V1C 7G1
Kootenay – Boundary Region; Phone: 250-420-6395; Email: fw.cbk@gov.bc.ca <mailto:fw.cbk@gov.bc.ca>
FrontCounter BC Website <http://www.frontcounterbc.gov.bc.ca/> | Toll-Free Contact Centre: 1-877-855-3222

Page 30 of 72 to/à Page 31 of 72

Withheld pursuant to/removed as

s.14 ; s.15 ; s.19

Page 32 of 72 to/à Page 36 of 72

Withheld pursuant to/removed as

s.14

Fish and Wildlife Application

Tracking Number: 100365632

Applicant Information

If approved, will the authorization be issued to an Individual or Company/Organization?	Company/Organization
What is your relationship to the company/organization?	Employee

APPLICANT COMPANY/ORGANIZATION CONTACT INFORMATION

Applicant is an Individual or an Organization to whom this authorization Permit/Licence will be issued, if approved.-

Name: s.15; s.19
Doing Business As:
Phone:
Fax:
Email:
BC Incorporation Number
Extra Provincial Inc. No:
Society Number:
GST Registration Number
Contact Name:
Mailing Address:

TECHNICAL INFORMATION

APPLICATIONS

You may submit one or more application(s) Click on the 'Add Application' for each application you would like to add. In order to submit multiple applications together they must be for one applicant and in the same region.

Type
General Wildlife Permit

GENERAL WILDLIFE PERMIT

Please provide the following general information about you and your application.

APPLICATION TYPE

Please provide the following details regarding your application.

What type of permit are you applying for:	New Permit
Applicant Date of Birth (DD/MM/YYYY)	Jul 20, 1978

PROPOSED ACTIVITY

Please provide the following details regarding your proposed activity.

Wildlife Species - Common Name:	Grey Wolves
Wildlife Species - Scientific Name:	Canis Lupus
Location of Activity:	Kootenay/Boundary and Thompson/Okanagan Regions
Activity Start Date:	Dec 24, 2021
Activity End Date:	Mar 31, 2022

ACTIVITY DESCRIPTION

Provide a detailed description of the activity you require a permit for. Include methods and equipment to be used. If your activity involves the capture, transport, possession, release or export of live animals or viable eggs, you must also include a detailed safety plan that explains the measures you will take to ensure that public safety will be protected. (For example, how would you prevent escapes?) In your own words, also describe the purpose of this activity and any special circumstances the Ministry should be aware of.

Description:	Detailed activities can be found in permit templated emailed to Front Counter: authorization under: s. 2(c)(i), 2(c)(iii), 2(h), 2(j), 2(m) and 2 (o) of the Permit Regulation, B.C. Reg. 253/2000, Hunt and kill wildlife during the open or closed season, specifically grey wolves (Canis lupus), in the Revelstoke/Shuswap Local Population Unit and the Central Selkirk subpopulation caribou recovery areas, as it is necessary for the proper management of wildlife resources, specifically grey wolves (Canis lupus) and caribou (Rangifer tarandus). Hunt and capture and on-site release live grey wolves (Canis lupus) in the Revelstoke/Shuswap and the Central Selkirk caribou recovery areas, for radio collar deployment to support the hunting and killing of grey wolves (Canis lupus) within the Revelstoke/Shuswap and the Central Selkirk caribou recovery areas, to support the Caribou Recovery Program. To transport dead wildlife and wildlife parts, specifically up to 10 ungulates killed in motor vehicle collisions, to use as bait in the above-described hunting, capturing and killing grey wolves.
Additional Permit-Specific Information:	exempt under: s. 3(1)(b)(i), 3.1(1)(b), 3.1(1)(c), 3.1(1)(d) and 2(p) of the Permit Regulation, B.C. Reg. 253/2000 The prohibition in section 26(1)(d) of the Act against hunting, taking, trapping, wounding, or killing wildlife, specifically grey wolves (Canis lupus) with a firearm or bow during the prohibited hours for the purposes authorized above. The prohibition in section 27(2)(a) of the Act against hunting wildlife from an aircraft, specifically a helicopter for the purposes authorized above. The prohibition in section 27(2)(b) of the Act against using a helicopter to transport hunters while on a hunting expedition for the purposes authorized above. The prohibition in section 27(3) of the Act against herding or harassing wildlife with the use of an aircraft while carrying out the activities authorized above. These exemptions are necessary for the proper management of wildlife resources, specifically grey wolves (Canis lupus) and caribou (Rangifer tarandus). The right of property in dead wildlife or wildlife parts, specifically up to 10 dead ungulates killed in motor vehicle collisions, is transferred from the government to the permit holder.

GENERAL WILDLIFE PERMIT - APPENDIX

Legislation

Below is a non-exhaustive list of provisions under the Wildlife Act and regulations that are relevant to this licence. It is the licence holder's responsibility to be aware of any provisions under the Act or regulations that may apply to this licence.

Failure to pay fine

85 (1) This section applies if a person

(a) fails to pay, within the time required by law, a fine imposed as a result of the person's conviction for an offence under this

Act or the Firearm Act, and

(b) has been served with notice of this section.

(2) In the circumstances referred to in subsection (1),

(a) the person's right to apply for or obtain a licence, permit or limited entry hunting authorization under this Act is suspended immediately and automatically on the failure to pay the fine,

(b) all licences, permits and limited entry hunting authorizations issued to that person under this Act are cancelled immediately and automatically on the failure to pay the fine

(i) the person must not apply for employment as an assistant guide

(ii) the person must not guide as an assistant guide

(c) the person commits an offence if, before that fine is paid, the person

(i) applies for, or in any way obtains, a licence, permit or limited entry hunting authorization under this Act, or

(ii) does anything for which a licence, permit or limited entry hunting authorization under this Act is required.

(iii) applies for employment as an assistant guide

(iv) guides as an assistant guide

ATTACHED DOCUMENTS

Document Type	Description	Filename
Generic Document Upload	ACA	2021-2022_BC_AnimalCareForm...

PRIVACY DECLARATION

☑ Check here to indicate that you have read and agree to the privacy declaration stated above.

IMPORTANT NOTICES

Please review the clauses and conditions associated with your application below.

DECLARATION

☑ I acknowledge that the information I have provided is true and that I fulfill the requirements for the applications.

OFFICE

Office to submit application to: Cranbrook

APPLICANT SIGNATURE

Applicant Signature	Date

OFFICE USE ONLY		
Office Cranbrook	**File Number**	**Project Number**
	Disposition ID	**Client Number**

Page 41 of 72 to/à Page 42 of 72

Withheld pursuant to/removed as

s.14 ; s.15 ; s.19

Page 43 of 72 to/à Page 44 of 72

Withheld pursuant to/removed as

s.14

Withheld pursuant to/removed as

s.14

FW: ACTION: s.14

s.14; s.15; s.19

From: s.15; s.19

To: Valdal, Eric FLNR:EX <Eric.Valdal@gov.bc.ca>, FLNR Fish & Wildlife Permit Clerks Cranbrook FLNR:EX <fw.cbk@gov.bc.ca>

Sent: January 22, 2022 2:26:36 PM PST

Attachments: s.14 , Appl.pdf, ACA - Submitted.doc, s.14

Hello Marsha

s.14

s.14

as this work is in service to government. Eric will respond separately.

Please note this is a Top priority for issuance due to operational window considerations.

Thank you for the work on this.

s.15; s.19
s.15; s.19 Resource Management | Kootenay Boundary Region
s.15; s.19 | Recreational Fisheries and Wildlife Programs
Ministry of Forests, Lands and Natural Resource Operations and Rural Development
s.15; s.19

From: FLNR Fish & Wildlife Permit Clerks Cranbrook FLNR:EX <fw.cbk@gov.bc.ca>
Sent: December 21, 2021 11:27 AM
To: Stent, Patrick FLNR:EX <Patrick.Stent@gov.bc.ca>; Ernst, Bevan FLNR:EX <Bevan.Ernst@gov.bc.ca>
Cc: Krebs, John A FLNR:EX <John.Krebs@gov.bc.ca>; Valdal, Eric FLNR:EX <Eric.Valdal@gov.bc.ca>
Subject: s.14; s.15; s.19

Hello: Could I please have your s.15; s.19 consideration on this s.14 Please reply to fw.cbk@gov.bc.ca <mailto:fw.cbk@gov.bc.ca>
Notes:
s.14; s.15; s.19

Supporting Documents Attached:
* Application
s.14

* ACA (this is a joint ACA for s.15; s.19

COORS Info:
s.15; s.19 - No History

If you require anything further, just let me know.

Regards

Marsha Snow - Fish & Wildlife Permit Administrator, Front Counter BC
Ministry of Forests, Lands, Natural Resource Operations and Rural Development
1902 Theatre Road / Cranbrook BC V1C 7G1
Kootenay – Boundary Region; Phone: 250-420-6395; Email: fw.cbk@gov.bc.ca <mailto:fw.cbk@gov.bc.ca>
FrontCounter BC Website <http://www.frontcounterbc.gov.bc.ca/> | Toll-Free Contact Centre: 1-877-855-3222

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Withheld pursuant to/removed as

s.14 ; s.15 ; s.19

Withheld pursuant to/removed as

s.14

Fish and Wildlife Application

Tracking Number: 100365625

Applicant Information

If approved, will the authorization be issued to an Individual or Company/Organization?	Company/Organization
What is your relationship to the company/organization?	Employee

APPLICANT COMPANY/ORGANIZATION CONTACT INFORMATION

Applicant is an Individual or an Organization to whom this authorization Permit/Licence will be issued, if approved.-

Name:	s.15; s.19
Doing Business As:	
Phone:	s.15; s.19
Fax:	
Email:	s.15; s.19
BC Incorporation Number:	
Extra Provincial Inc. No:	
Society Number:	
GST Registration Number:	
Contact Name:	s.15; s.19
Mailing Address:	s.15; s.19

TECHNICAL INFORMATION

APPLICATIONS

You may submit one or more application(s) Click on the 'Add Application' for each application you would like to add. In order to submit multiple applications together they must be for one applicant and in the same region.

Type

General Wildlife Permit

GENERAL WILDLIFE PERMIT

Please provide the following general information about you and your application.

APPLICATION TYPE

Please provide the following details regarding your application.

What type of permit are you applying for:	New Permit
Applicant Date of Birth (DD/MM/YYYY)	Jul 10, 1962

PROPOSED ACTIVITY

Please provide the following details regarding your proposed activity.

Wildlife Species - Common Name:	Grey Wolves
Wildlife Species - Scientific Name:	Canis lupus
Location of Activity:	Kootenay/Boundary and Thompson/Okanagan Region
Activity Start Date:	Dec 24, 2021
Activity End Date:	Mar 31, 2022

ACTIVITY DESCRIPTION

Provide a detailed description of the activity you require a permit for. Include methods and equipment to be used. If your activity involves the capture, transport, possession, release or export of live animals or viable eggs, you must also include a detailed safety plan

that explains the measures you will take to ensure that public safety will be protected. (For example, how would you prevent escapes?) In your own words, also describe the purpose of this activity and any special circumstances the Ministry should be aware of.

Description:	See permit template provided to Front Counter via direct email for permit details: Authorization under: 2(c)(i), 2(c)(iii), 2(h), 2(j), 2(m) and 2 (o) of the Permit Regulation, B.C. Reg. 253/2000, Hunt and kill wildlife during the open or closed season, specifically grey wolves (Canis lupus), in the Revelstoke/Shuswap Local Population Unit and the Central Selkirk subpopulation caribou recovery areas, as it is necessary for the proper management of wildlife resources, specifically grey wolves (Canis lupus) and caribou (Rangifer tarandus). Hunt and capture and on-site release live grey wolves (Canis lupus) in the Revelstoke/Shuswap and the Central Selkirk caribou recovery areas, for radio collar deployment to support the hunting and killing of grey wolves (Canis lupus) within the Revelstoke/Shuswap and the Central Selkirk caribou recovery areas, to support the Caribou Recovery Program. To transport dead wildlife and wildlife parts, specifically up to 10 ungulates killed in motor vehicle collisions, to use as bait in the above-described hunting, capturing and killing grey wolves.
Additional Permit-Specific Information:	Exemption to: 3(1)(b)(i), 3.1(1)(b), 3.1(1)(c), 3.1(1)(d) and 2(p) of the Permit Regulation, B.C. Reg. 253/2000 The prohibition in section 26(1)(d) of the Act against hunting, taking, trapping, wounding, or killing wildlife, specifically grey wolves (Canis lupus) with a firearm or bow during the prohibited hours for the purposes authorized above. The prohibition in section 27(2)(a) of the Act against hunting wildlife from an aircraft, specifically a helicopter for the purposes authorized above. The prohibition in section 27(2)(b) of the Act against using a helicopter to transport hunters while on a hunting expedition for the purposes authorized above. The prohibition in section 27(3) of the Act against herding or harassing wildlife with the use of an aircraft while carrying out the activities authorized above. These exemptions are necessary for the proper management of wildlife resources, specifically grey wolves (Canis lupus) and caribou (Rangifer tarandus). The right of property in dead wildlife or wildlife parts, specifically up to 10 dead ungulates killed in motor vehicle collisions, is transferred from the government to the permit holder.

GENERAL WILDLIFE PERMIT - APPENDIX

Legislation

Below is a non-exhaustive list of provisions under the Wildlife Act and regulations that are relevant to this licence. It is the licence holder's responsibility to be aware of any provisions under the Act or regulations that may apply to this licence.

Failure to pay fine

85 (1) This section applies if a person

(a) fails to pay, within the time required by law, a fine imposed as a result of the person's conviction for an offence under this

Act or the Firearm Act, and

(b) has been served with notice of this section.

(2) In the circumstances referred to in subsection (1),

(a) the person's right to apply for or obtain a licence, permit or limited entry hunting authorization under this Act is suspended immediately and automatically on the failure to pay the fine,

(b) all licences, permits and limited entry hunting authorizations issued to that person under this Act are cancelled immediately and automatically on the failure to pay the fine

(i) the person must not apply for employment as an assistant guide

(ii) the person must not guide as an assistant guide

(c) the person commits an offence if, before that fine is paid, the person

(i) applies for, or in any way obtains, a licence, permit or limited entry hunting authorization under this Act, or

(ii) does anything for which a licence, permit or limited entry hunting authorization under this Act is required.

(iii) applies for employment as an assistant guide

(iv) guides as an assistant guide

ATTACHED DOCUMENTS

Document Type	Description	Filename
Generic Document Upload	ACA	2021-2022_BC_AnimalCareForm...

PRIVACY DECLARATION

☑ Check here to indicate that you have read and agree to the privacy declaration stated above.

IMPORTANT NOTICES

Please review the clauses and conditions associated with your application below.

DECLARATION

☑ I acknowledge that the information I have provided is true and that I fulfill the requirements for the applications.

OFFICE

Office to submit application to: Cranbrook

APPLICANT SIGNATURE	
Applicant Signature	**Date**

OFFICE USE ONLY		
Office Cranbrook	**File Number**	**Project Number**
	Disposition ID	**Client Number**

Ministry of Forests, Lands and Natural Resource Operations

FISH, WILDLIFE AND HABITAT MANAGEMENT BRANCH
ANIMAL CARE APPLICATION FORM

PLEASE TYPE

For office use: Date Received: ***2021Dec15*** Project Number: ***MRCB21-673564***

Project Title: Wolf Reduction in Revelstoke-Shuswap Local Population Unit and Central Selkirk subpopulation to Support Caribou Recovery

2. Starting Date: January 2022 **Completion Date: March 31, 2022**

3. Principal Investigator (A):

Name: s.15; s.19
Position:
Department/Organization: s.15; s.19
Region/Institution: n/a

Mailing Address: s.15; s.19

LTD.

Phone:
Fax: n/a
E-mail: s.15; s.19

Experience related to the described proposal:

s.15; s.19

Additional Investigators:

a) Secondary Pilots

Name: s.15; s.19
Position: Secondary Pilot
Department/Organization: s.15; s.19
Region/Institution: n/a

Ltd/ Manager Pilot at s.15; s.19

Experience related to the described proposal:

s.15; s.19

Clint Walker is the alternate helicopter pilot associated with the program and has over 5400 flight hours with 23 years' experience flying in mountainous terrain. He has successfully piloted 186 caribou net gun captures in 166 flight hours and has over 750 flight hours in wildlife surveys. He is experienced in attaching collars, gathering blood/ hair/ fecal samples and the collection of other physiological data. He has also spent 10 days as a handler and net-gunner on net-gun wolf captures with CWC.

b) Net Gunners

Name: s.15; s.19
Position: Primary Net-gunners and Shooters
Department/Organization: s.15; s.19
Region/Institution: n/a

Experience related to the described proposal:

s.15; s.19

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4. Principal Investigator (B)

Name: s.15; s.19
Position: Lead pilot
Department/Organization: s.15; s.19
Region/Institution: n/a

Mailing Address: s.15; s.19

Phone:
Fax: n/a
E-mail: s.15; s.19

Experience related to the described proposal:

s.15; s.19

s.15; s.19

Additional Investigators:
a) secondary pilots

Name: s.15; s.19
Position: Pilot, netgunner, shooter, handler
Department/Organization: s.15; s.19

Experience related to the described proposal:

s.15; s.19

Name: s.15; s.19
Position: net gunner, shooter, handler
Department/Organization: s.15; s.19

Experience related to the described proposal:

s.15; s.19

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5. Project Proposal

Mountain caribou are an endangered species in Canada. Most populations are in decline. In British Columbia the core habitat of many populations have been protected from forest harvesting on crown land since 2008. However early seral conditions created by previous harvesting are likely still supporting greater populations of alternate prey than historic conditions. The alternate prey are drawing in predators such as cougars and wolves, subjecting the caribou to higher predation risk.

In the Revelstoke-Shuswap Local Population Unit (Herds: Columbia North, Columbia South, Frisby-Boulder) we are entering our fifth season of wolf control. The population is stabilized and showing sign of growth in recent years. We hope that by increasing pressure on both wolves and cougars in this area in 2021 we can further influence the growth of these populations. Meanwhile in the Central Selkirk subpopulation we entering into our second season of predator control.

The reduction of wolves has been shown to be effective for reversing the trends of declining woodland caribou populations in BC. Reduction efforts must be intensive and applied with the highest standards of scientific rigor and humaneness. Wolf reduction efforts within the Revelstoke-Shuswap Local Population Unit and Central Selkirk subpopulation are expected to support recovery while the ultimate causes of population declines (i.e. habitat-related impacts) are addressed. Radio-collaring individual wolves from wolf packs greatly increases the efficacy of removing entire wolf packs over the course of the winter.

A. Background – Goals and Objectives:

Wolf reduction has been identified as an effective short-term management action for supporting the recovery of woodland caribou in BC.

The goals and objectives of this project are to:

1) When possible conduct net-gun aerial capture of individual wolves from packs located within the Revelstoke/Shuswap LPU and the Central Selkirk treatment area to deploy radio collars and potentially health sample 1-2 wolves for the purpose of increasing the efficiency of aerial removal (culling);
2) using radio collar locations to identify pack locations, dispatch (via aerial shooting) the majority of wolves (>80%) found within the treatment area and reduce the wolf density to below 3 wolves per 1000 km^2;
3) implement scientific rigor and the highest possible standards for humaneness, and report out on all facets of the program

B. Key Expected Results and Management Implications:

1) Radio-collar deployment on individual wolves when feasible within the treatment areas with biological sampling for health profiles.
2) Reduction of the majority (>80%) of wolves via aerial shooting

6. CCAC Invasiveness Category: (see Appendix A)

A_____B_____C_____D x __

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7. Species and Number of Animals Required: (include justification of numbers predicted to be used)

Species: Wolf (*Canis lupus*)

Number expected for 2021: approximately 6 radio collar deployments (6 Revelstoke-Shuswap, 3 in Central Selkirk), up to 40 to be dispatched.

The number of radio collars to be deployed is contingent on the number of wolf packs within the treatment area and where the wolf packs are located. Limited amount of open habitat is the primary barrier for netgun capture in these herds. It is estimated that there will be between 4-6 packs in each of the two treatment areas. Radio-collar deployment is generally non-selective but will be applied to adult wolves preferentially and of both sexes.

Justification for numbers: The number of wolves in the treatment area are based on the past years removal and recolonization rate. Revelstoke-Shuswap has seen a decline in recolonization since the beginning of wolf removal with 11, 18, 13, 10, 6 removed in 2017, 2018, 2019, 2020 and 2021 respectively. In 2020, a total of 20 wolves were removed from the Central Selkirk herd during the first year of control but only 3 were removed in 2021. The lower numbers in 2021 for both control areas is primally attributed to a late start and poor tracking conditions. Based on these data we estimate that between 20 and 40 wolves will be removed between the two treatment areas in 2022.

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8. Details of Capture, Handling and Surgical Procedures and Final Disposition:
(be detailed and SPECIFIC, attach additional pages, if necessary)
Please refer to Appendix B – CCAC guidelines on: the care and use of wildlife (2003) for techniques considered appropriate and other guidelines for handling and care.

Capture Technique:

Wolves will be captured for radio collar deployment via aerial net-gunning, and removal will occur via aerial shooting.

Helicopter captures and removal will take place between February and the end of March using aerial net gunning and physical restraint and aerial shooting. An MD500D helicopter will be used to track and target wolves in snow-covered, sparsely treed habitats and frozen watercourses suitable for safe capture or removal. Deep, soft snow is

preferred as it will slow animals, make their movements more predictable, and reduce the risk of injury during capture, and increases the likelihood of accurate, humane shooting.

Net-gunning – Wolves: The identified personnel will use a hand-held net gun to capture wolves for radio collar deployment and health sampling. When a candidate animal has been selected in close proximity to a suitable capture location, the capture helicopter will approach the animal, haze it into a suitable nearby opening and on close approach (within 5–10 m), fire a 12' x 12' net over the front of the animal. Hazing time will not exceed the standards required by the Province and recommended by Wildlife Health, generally less than 5 minutes with close approach. Capture location will be selected in order to minimize risks to the crew and animal (i.e. avoiding open water, avalanche terrain, thin ice, wooded areas, steep terrain, etc.). A second net may be deployed in order to further entangle the wolf. Only one wolf will be captured at a time. Two net-guns with 4 or 5 detachable net canisters will be available to the net-gunner for each capture. This provides a backup net-gun and nets that can be used to reduce chase duration if the first net fails to adequately restrain the animal, or to further entangle the animal if the single net is not sufficient. Once the net is deployed the animal usually quickly trips and is wrapped up in the net, becoming immobile. The helicopter will immediately land to drop off the capture crew, and the net-gunner will restrain the wolf with a Y-pole around the neck before it can chew out of the net. The handler will apply a catch-pole snare around the mouth of the wolf and tighten it until it is securely closed. The crew will then apply a muzzle or multiple wraps of strong duct tape to the mouth in order to eliminate the risk of a wolf biting the crew. A blindfold will then be applied to reduce stress to wolves. Hobbles will then be applied to the front and back legs as restraint to eliminate the possibility of the wolf escaping.

Shooting - Wolves: The identified personnel will conduct the aerial removal of wolves by use of high-powered rifle. The rifle will be a semi-automatic 7.62 x 39mm caliber using a red-dot scope for quick and accurate target acquisition. Polymer or lead-tipped, rapid expansion lead-core bullets will be used to maximize shot impact and ensure quick or immediate kill times. Non lead bullets of this caliber will be used if available to reduce the use of lead and habitat contamination. The rifle includes detachable magazines for quick reloading of the firearm, and a semi-automatic action allowing for a quick succession of shots if necessary. Wolves chosen to be shot will be hazed into open locations where the shot distance is no greater than 50 m, ensuring a high likelihood of accurate shot placement. Shot placement will preferentially be the cranium (targeting the brain first and upper spinal cord) or the chest area (lungs and heart). If immediate death is not observed following the first shot, follow-up shots will occur as soon as possible and preferentially in the head, then neck, or chest area to ensure death. Wolves will be visually observed from as close a distance as possible from the hovering helicopter for visual signs of movement (eg. respiratory effort and movement) to confirm death before moving on. Any animal that is shot and is not recumbent will be followed until the gunner is able to kill as quickly and humanely as possible. Humaneness will be documented by recording time, number of and shot placement and time of death. Once a pack is eliminated, at least half of the wolves killed will be inspected on the ground, clearly documenting shot locations and providing standardized photographs to the project lead and provincial wildlife veterinarian. These documentation (time, number of shots, shot placement and photographs will be provided to the lead and veterinarian at the completion of the project.

Method of Handling:

Each wolf will be handled by an experienced handling crew. As described above, the net-gunner will be the first to engage with the animal after it has been entangled in the net.

The net-gunner will use a Y-pole to pin the wolf to the ground by applying the Y-pole directly behind the animal's head. The handler will approach the wolf with the catch-pole, and secure the mouth closed using the catch pole snare. Once the catch-pole snare is confirmed to be secured, the crew will apply a commercial dog muzzle and/or multiple wraps of duct tape around the wolf's muzzle to ensure it is unable to bite and blindfold the animal. The wolf will then be hobbled as described above.

The net(s) will be removed from the wolf which will then be positioned to minimize discomfort (i.e. sternal or lateral recumbency, head slightly uphill, head free from deep snow). Once fully immobilized, the crew will assess the wolf for any injuries that may have occurred during capture and confirm the animal's general health and sex. The restraining process generally takes less than 2–3 minutes, at which point the radio-collaring and sampling procedures will begin. Small crews of two personnel will be used to minimize stress, and sudden movements or auditory stimuli will be kept to a minimum. To release the wolf, it is first pointed in a safe direction of travel away from the crew, helicopter, or any hazards.

Once sampling and collaring is completed, the catch-pole snare is securely attached around the mouth, at which point the muzzle or tape around the wolf's muzzle is carefully removed and the Y-pole is re-applied. The blindfold is removed, the hobbles are removed, and the catch-pole is released, and finally the Y-pole is lifted.

Other Procedures: (Marking method, Sampling)

Each wolf will be fitted with a satellite GPS radio-collar. The radio collar will be applied by the most experienced crew member to ensure the correct fit. Radio-collars will be fitted to ensure comfort for the animal, while ensuring that they are not too loose as to slip off or cause irritation (generally two fingers fitted vertically). Radio-collars fitted on younger animals, if necessary, will be slightly looser to allow for growth. Satellite collars will be programmed to obtain positional fixes every 3–4 hours over the course of the winter to acquire up-to-date location information to support reduction efforts. Radio-collared wolves will either be left alive following the winter's removal efforts in order to collect further data and to support removal efforts the following winter, or they will be dispatched once all other pack members have been removed.

Biological samples will be taken by the crew as per standardized Wildlife Health Program protocols while the wolf is immobilized. The total time associated with radio-collar attachment and sample collection takes less than 10 minutes.

The radio-collars contain an internal tip switch to detect animal movement rates and are programmed to send a mortality alert via email and text message if no movement is detected for a sustained period of time (12 hours). Immediate investigation of mortalities is not anticipated for wolves, although radio collars will be picked up as soon as logistically feasible and an investigation on cause of death will occur if possible. Collars include label plates instructing hunters/trappers to contact FLNRO if they harvest a collared wolf or a collar is found.

Additional data will be recorded and samples will be taken by the handling crew while animals are physically restrained according to the standardized BC wolf sampling protocols (Appendix C):
For wolves:

- Age class using tooth eruption/wear/staining as an index (if visible under the tape)
- Sex
- Colour
- Pack size
- Location
- Body condition
- Photos
- Presence of old injuries or new capture-related injuries
- External parasite presence and prevalence
- From each wolf, 10 to 15 ml of blood will be withdrawn from the saphenous or cephalic vein for serological screening (parvovirus, Neospora, distemper), ensuring bleeding has stopped before releasing the animal
- Each wolf will be ear-tagged with a Rototag with a unique identifier number, and a 6 mm punch biopsy of the ear will be air-dried and archived for genetics
- At least 100 hairs with roots from the top of the shoulders from each wolf for genetic or other studies (e.g., stress assessment through cortisol levels, diet analysis with stable isotopes).
- Samples will be processed each evening and stored before shipping to the BC Wildlife Health Program
- For dispatched wolves, when the helicopter can land safely near the carcass, an ear tip will be sampled, and photos will be taken showing shot placement

Contingency Plan: (what training, preparations and equipment are available in event of animal injury during capture or handling)
The following measures will be in place to reduce the risk of injury to wolves:

1) Capture crews are personnel with extensive experience in capturing, handling and shooting wild canids.
2) At least two out of three personnel are trained in first aid and CPR and avalanche safety?
3) Aerial net-gun captures will be conducted in deep, soft snow in ambient temperatures of between 0 to -25 C, on terrain consisting of flat or rolling terrain and not exposed ground or open water and animals will be assessed and monitored during physical restraint.
4) The capture crew will have a satellite phone to contact other experienced professionals and veterinarians for advice and guidance for any unusual circumstances that arise in the field
5) A firearm will be available for humane killing of any wolves badly injured during net-gun captures

6) While mortalities can occur with capture operations any mortality must be investigated and if the mortality rate exceeds 2% the operation must cease, and the wildlife veterinarian and project lead contacted immediately.
7) A firearm will be available for humane killing of any wolves badly injured during net-gun captures.

Method of Euthanasia and Disposal Technique: (if necessary)
In the event of an animal being injured without a chance of survival after release, it will be euthanized humanely by high caliber gunshot to the brain and samples taken to confirm cause of death. Wolf carcasses may be sampled and left in the field unless brought back to the lab for examination or necropsy and disposal at the dump, and pelts may be offered to First Nations.

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9. Details of Potentially Controversial Procedures and Justification:
(Include any expected morbidity and methods used to avoid)

Animal welfare is of high priority for this project. All net-gun captures will occur following the procedures described above (and in the regional SOPs for aerial net-gun capture). Few complications have been observed using this protocol. Aerial shooting of wolves is considered the most effective and humane method of removing wolves in remote, expansive areas, with the ability to target without bycatch occurring (AVMA, 2013). All possible measures will be taken to ensure the ethical and humane removal of wolves.

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10. Budget:

Funding sources applied for: Provincial Caribou Recovery Program

Are these peer reviewed? Yes (the region's wolf reduction programs have undergone internal and external reviews to measure effectiveness)

Status: Approved

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11. Region:

The wolf reduction will occur within the Revelstoke-Shuswap Local Population Unit (Herds: Columbia North, Columbia South and Frisby-Boulder) and Central Selkirk subpopulation herd boundary. The control areas were identified due to the recovery urgency for these particular caribou herds.

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12. Permit:

Is a permit required? Yes **Status**: Pending Decision

Please attach any permit documents to application.

Please send the completed BC Animal Care Form Application Form to the Front Counter BC along with a General Permit Application, detailed project proposal and permit fees (if applicable). For further information on how to apply, please visit the Front Counter BC website at https://portal.nrs.gov.bc.ca/web/client/home or call at 1-877-855-3222.

Approval of an Animal Care Application does not constitute approval of any application to handle wildlife. Applicants must also have a valid permit, issued under the Wildlife Act, before engaging in any such activity.

Principal Investigator's Signature **Date of Application**

Appendix A:

Canadian Council on Animal Care: Categories of Invasiveness for Wildlife Studies

A. Methods used on most invertebrates or on live isolates

Possible examples: the use of tissue culture and tissues obtained at necropsy; the use of eggs, protozoa or other single-celled organisms; experiments involving containment, incision or other invasive procedures on metazoa.

B. Methods used which cause little or no discomfort or stress

Possible examples: observational studies in which the same individuals are not repeatedly observed so as to habituate or otherwise modify their behavior; census or other surveys which do not involve capture or marking individuals; non-invasive studies on animals that have been habituated to captivity; short periods of food and/or water deprivation equivalent to periods of abstinence in nature.

C. Methods which cause minor stress or pain of short duration

Possible examples: capture, using methods with little or no potential to cause injury and marking of animals for immediate release; long-term observational studies on free-ranging animals where the behaviour of individuals may be altered by repeated contact; brief restraint for blood or tissue sampling; short periods of restraint beyond that for simple observation or examination, but consistent with minimal distress; short periods of food and/or water deprivation which exceed periods of abstinence in nature; exposure to non-lethal levels of drugs or chemicals; low velocity darting and slow-injection darts with immobilization chemicals. Such procedures should not cause significant changes in the animal's appearance, in physiological parameters such as respiratory or cardiac rate, or fecal or urinary output, in social responses or *in ability to survive*.

Note: During or after Category C studies, animals must not show self-mutilation, anorexia, dehydration, hyperactivity, increased recumbency or dormancy, increased vocalization, aggressive-defensive behavior or demonstrate social withdrawal and self-isolation.

D. Methods which cause moderate to severe distress or discomfort

Possible examples: *capture, using methods that have the potential to cause injury (e.g. Leg snares, leghold traps, high velocity darting and rapid-injection darts with immobilization chemicals, net gunning, etc.); maintenance of wild caught animals in captivity*; translocation *of wildlife to* new habitats; major surgical procedures conducted under general anesthesia, with subsequent recovery; prolonged (several hours or more) periods of physical restraint; induction of behavioral stresses such as maternal deprivation, aggression, predator-prey interactions; procedures which cause severe, persistent or irreversible disruption of sensorimotor organization.

Other examples *in captive animals* include induction of anatomical and physiological abnormalities that will result in pain or distress; the exposure of an animal to noxious stimuli from which escape is impossible; the production of radiation sickness; exposure to drugs or chemicals at levels that impair physiological systems. *(NB. Experiments described in this paragraph would be Category E if performed on wildlife immediately prior to release.)*

Note: Procedures used in Category D studies should not cause prolonged or severe clinical distress as may be exhibited by a wide range of clinical signs, such as marked abnormalities in behavioral patterns or attitudes, the absence of grooming, dehydration, abnormal vocalization, prolonged anorexia, circulatory collapse, extreme lethargy or disinclination to move, and clinical signs of severe or advanced local or systemic infection, etc.

E. Procedures which cause severe pain near, at, or above the pain tolerance threshold of unanesthetized conscious animals

This Category of Invasiveness is not necessarily confined to surgical procedures, but may include exposure to noxious stimuli or agents whose effects are unknown; exposure to drugs or chemicals at levels that (may) markedly impair physiological systems and which cause death, severe pain, or extreme distress; behavioral studies about which the effects of the degree of distress are not known; *environmental deprivation that has the potential to seriously jeopardize an animal's wellbeing*; use of muscle relaxants or paralytic drugs without anesthetics; burn or trauma infliction on unanesthetized animals; a euthanasia method not approved by the CCAC; any procedures (e.g., the injection of noxious agents or the induction of severe stress or shock) that will result in pain which approaches the pain tolerance threshold and cannot be relieved by analgesia (e.g., removal of teeth without analgesia, or when toxicity testing and experimentally-induced infectious disease studies have death as the endpoint), *capture methods with a high potential of causing severe injury that could result in severe chronic pain and/or death.*

Appendix B:

Canadian Council on Animal Care guidelines on: the care and use of wildlife (2003)

http://www.ccac.ca/english/gui_pol/GUFRAME.HTM
http://www.ccac.ca/english/gdlines/wildlife/Wildlife.pdf

Appendix C:

BC Wolf Sampling Protocols

BC Wolf Capture Sampling Protocols_C

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Withheld pursuant to/removed as

s.14 ; s.15 ; s.19

Page 68 of 72 to/à Page 69 of 72

Withheld pursuant to/removed as

s.14

Withheld pursuant to/removed as

s.14 ; s.15 ; s.19

Withheld pursuant to/removed as

s.14

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s.14 ; s.15 ; s.19

Fish and Wildlife Application

Tracking Number: 100367014

Applicant Information

If approved, will the authorization be issued to an Individual or Company/Organization?	Company/Organization
What is your relationship to the company/organization?	Owner

APPLICANT COMPANY/ORGANIZATION CONTACT INFORMATION

Applicant is an Individual or an Organization to whom this authorization Permit/Licence will be issued, if approved.-

Name:	s.15; s.19 Ltd
Doing Business As:	
Phone:	s.15; s.19
Fax:	
Email:	s.15; s.19
BC Incorporation Number:	
Extra Provincial Inc. No:	Powell River
Society Number:	
GST Registration Number:	
Contact Name:	s.15; s.19; s.21
Mailing Address:	s.15; s.19

TECHNICAL INFORMATION

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Type

General Wildlife Permit

GENERAL WILDLIFE PERMIT

Please provide the following general information about you and your application.

APPLICATION TYPE

Please provide the following details regarding your application.

What type of permit are you applying for:	New Permit
Applicant Date of Birth (DD/MM/YYYY)	Jul 20, 1978

PROPOSED ACTIVITY

Please provide the following details regarding your proposed activity.

Wildlife Species - Common Name:	caribou and wolves
Wildlife Species - Scientific Name:	Rangifer tarandus and Canis lupus
Location of Activity:	Tweedsmuir- Entiako
Activity Start Date:	Feb 1, 2022
Activity End Date:	Apr 20, 2022

ACTIVITY DESCRIPTION

Provide a detailed description of the activity you require a permit for. Include methods and equipment to be used. If your activity involves the capture, transport, possession, release or export of live animals or viable eggs, you must also include a detailed safety plan that explains the measures you will take to ensure that public safety will be protected. (For example, how would you prevent escapes?) In your own words, also describe the purpose of this activity and any special circumstances the Ministry should be aware of.

Description: s.15; s.19

Additional Permit-Specific Information:

GENERAL WILDLIFE PERMIT - APPENDIX

Legislation

Below is a non-exhaustive list of provisions under the Wildlife Act and regulations that are relevant to this licence. It is the licence holder's responsibility to be aware of any provisions under the Act or regulations that may apply to this licence.

Failure to pay fine

85 (1) This section applies if a person

(a) fails to pay, within the time required by law, a fine imposed as a result of the person's conviction for an offence under this

Act or the Firearm Act, and

(b) has been served with notice of this section.

(2) In the circumstances referred to in subsection (1),

(a) the person's right to apply for or obtain a licence, permit or limited entry hunting authorization under this Act is suspended immediately and automatically on the failure to pay the fine,

(b) all licences, permits and limited entry hunting authorizations issued to that person under this Act are cancelled immediately and automatically on the failure to pay the fine

(i) the person must not apply for employment as an assistant guide

(ii) the person must not guide as an assistant guide

(c) the person commits an offence if, before that fine is paid, the person

(i) applies for, or in any way obtains, a licence, permit or limited entry hunting authorization under this Act, or

(ii) does anything for which a licence, permit or limited entry hunting authorization under this Act is required.

(iii) applies for employment as an assistant guide

(iv) guides as an assistant guide

PRIVACY DECLARATION

☑ Check here to indicate that you have read and agree to the privacy declaration stated above.

IMPORTANT NOTICES

Please review the clauses and conditions associated with your application below.

DECLARATION

☑ I acknowledge that the information I have provided is true and that I fulfill the requirements for the applications.

OFFICE

Office to submit application to: Smithers

APPLICANT SIGNATURE

Applicant Signature	**Date**

OFFICE USE ONLY		
Office Smithers	**File Number**	**Project Number**
	Disposition ID	**Client Number**

ISSUED: GWP PREDATOR MANAGEMENT SM22-679304 & SM22-681663

From: Lambie, Shelley FLNR:EX </o=BCGOVT/ou=Exchange Administrative Group (FYDIBOHF23SPDLT)/cn=Recipients/cn=3963567e5e034301b555f0eb79a3e82c-Lambie, Shelley F>

To: s.15; s.19

Sent: January 26, 2022 8:20:21 AM PST

Attachments: image002.jpg, s.15; s.19 Ltd SM22-681663 (Wolf).pdf, s.15; s.19; s.15; s.19 Ltd SM22-679304 (Caribou).pdf

Good morning s.15;

On behalf of Forests, Lands, Natural Resource Operations and Rural Development in Skeena Region, you will find attached your General Wildlife permits **SM22-681663 and SM22-679304,** issued today.
Please take a moment to review the terms and conditions within.

We recommend you **review** and then print the attached permit or licence in this email. No hard copy will be mailed unless specifically requested.

Thank you for your payment. A receipt has been attached for your records.

Sincerely,

Shelley Lambie
Fish and Wildlife Permit Clerk, Skeena Region
FrontCounter BC
Ministry of Forests, Lands, Natural Resource Operations & Rural Development
PO Box 5000, 3726 Alfred Avenue | Smithers, BC V0J 2N0
New TEL: 250-876-6839| Fax: 250-847-7556
FrontCounter BC Website | Toll-Free Contact Centre: 1-877-855-3222
Tell us about your experience with FrontCounter BC: Complete an Online Comment Card

I acknowledge the Gitdumden Clan of the Wet'suwet'en, on whose land I am grateful to work, live, and grow.

78470-45

WILDLIFE ACT
PERMIT SM22-681663

PERMIT HOLDER	s.15; s.19 Ltd s.15; s.19 Specifically, the designates listed under Appendix C

IS AUTHORIZED UNDER s. 2(c)(i), 2(c)(iii), 2(h), 2(j), 2(k)(i), and 2 (o) of the Permit Regulation, B.C. Reg. 253/2000,

TO **Note to region:** If additional authorizations are added here, it is highly recommended that they are reviewed by legal counsel (Geneva Grande-McNeill) prior to the permit being issued.	Hunt and kill wildlife during the open or closed season, specifically **grey wolves** (*Canis lupus*), in the Tweedsmuir-Entiako caribou recovery treatment area for scientific purposes, specifically specifically for caribou recovery. Hunt and kill wildlife during the open or closed season, specifically **grey wolves** (*Canis lupus*), in Tweedsmuir-Entiako caribou recovery treatment area for caribou recovery, as it is necessary for the proper management of wildlife resources, specifically **grey wolves** (*Canis lupus*). Hunt and capture and on-site release live **grey wolves** (*Canis lupus*) in Tweedsmuir-Entiako caribou recovery treatment area, for radio collar deployment to support the hunting and killing of **grey wolves** (*Canis lupus*) within Tweedsmuir-Entiako caribou recovery treatment area to support the Caribou Recovery Program. Possess and dispose of dead wildlife or parts of wildlife for scientific purposes, specifically tissue, bone, hair, or blood samples from dead/captured **grey wolves** (*Canis lupus*).

AND

IS EXEMPT UNDER s. 3(1)(b)(i), 3.1(1)(b), 3.1(1)(c), and 3.1(1)(d) of the Permit Regulation, B.C. Reg. 253/2000,

FROM	The prohibition in section 26(1)(d) of the Act against hunting, taking, trapping, wounding, or killing wildlife, specifically **grey wolves** (*Canis lupus*) with a firearm or bow during the prohibited hours for the purposes authorized above. The prohibition in section 27(2)(a) of the Act against hunting wildlife from an aircraft, specifically a helicopter for the purposes authorized above. The prohibition in section 27(2)(b) of the Act against using a helicopter to transport hunters or game, and while on a hunting expedition for the purposes authorized above. The prohibition in section 27(3) of the Act against herding or harassing wildlife with the use of an aircraft while carrying out the activities authorized above. These exemptions are necessary for the proper management of wildlife resources, specifically **grey wolves** (*Canis lupus*).

SUBJECT TO THE FOLLOWING:

TERMS OF PERMIT	This permit is only valid in the Skeena Region within Tweedsmuir-Entiako. The permit holder must comply with the terms in Appendix A.

COMPLIANCE ADVISORY	Failure to comply with any term of this permit is an offence under the *Wildlife Act*, and may result in any or all of prosecution, suspension of the permit, cancellation of the permit, ineligibility for future permits, and denial of future permit requests.	
PERIOD OF PERMIT	This permit is only valid from January 27, 2022 to April 20, 2022	
DATE OF ISSUE	January 26, 2022	
s.15; s.19 **SIGNATURE OF ISSUER**	s.15; s.19 **Skeena Region**	**PERMIT FEE** EXEMPT **HCTF SURCHARGE** EXEMPT

APPENDIX A
TERMS OF PERMIT

PERMIT SM22-681663

REPORTING REQUIREMENTS:

1. The permit holder must maintain an accurate up to date record of the wildlife observed under the permit that includes the following information:
    (a) number of wolves killed or radio-collared,
    (b) location where the wolves were killed or radio-collared, including coordinates (i.e., latitude and longitude or a UTM grid location),
    (c) the date wolves were killed or radio-collared, and
    (d) the classification of the wolves' radio-collared (i.e., sex, colour, age estimate).

2. The permit holder must submit the data collected in an electronic format (excel or access base) to the regional biologist or project manager **within 21 days** of the permit's expiry.

3. The permit holder must produce a copy of the record referred to in paragraph 1 on demand of an officer.

GENERAL CONDITIONS:

Note to region: If additional conditions are added to this permit, it is highly recommended that they are reviewed by legal counsel (Geneva Grande-McNeill) prior to the permit being issued.

1. The permit holder must comply with all laws applicable to the activities carried out under this permit.

2. All work is to be undertaken by trained professionals with experience in capturing and handling wolves (*Canis lupus*).

3. The permit holder must take all reasonably necessary steps to ensure that public safety is not jeopardized, and fish or wildlife habitat is not damaged, other than as permitted by this permit, by any action taken under authority of this permit.

4. The permit holder must ensure that the wildlife are treated in a humane manner and are not subjected to any unnecessary harm or suffering.

5. The permit holder must follow the Details of Capture, Handling and Surgical Procedures and Final Disposition outlined under #8 in the approved BC Animal Care Application form.

APPENDIX B
ADVISORY

PERMIT SM22-681663

GENERAL

- It is the permit holder's responsibility to be aware of all applicable laws and the limits of this permit. For example, this permit does not give the permit holder authority to access or travel though any private land without permission from the landowner.
- The Province is not liable for any illness contracted through wildlife handling. It is the responsibility of the permit holder to inform themselves of possible health hazards, and to ensure that all reasonably necessary safety measures are undertaken.
- To assist you, consider the following in your capturing and handling of animals:
  - Standards for Live Animal Capture and Handling Guidelines established by the Ministry of Environment. https://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/laws-policies-standards-guidance/inventory-standards/terrestrial-ecosystems-biodiversity
  - Further guidelines can be obtained on the Canadian Council on Animal Care website at https://www.ccac.ca/en/standards/guidelines/types-of-animals.html
- If applicable, the permit holder is responsible for renewing this permit. The issuer is not obliged to send a reminder notice.

LEGISLATION

Below is a non-exhaustive list of provisions under the *Wildlife Act* and regulations that are relevant to this permit. It is the permit holder's responsibility to be aware of any provisions under the *Wildlife Act* or regulations that may apply to this permit.

Wildlife Act

Property in Wildlife

2 (1) Ownership in all wildlife in British Columbia is vested in the government

(4) If a person by accident or for the protection of life or property kills wildlife, that wildlife, despite subsection (3), remains the property of the government.

(5) Despite anything in this Act, no right of action lies, and no right of compensation exists, against the government for death, personal injury or property damage caused by

(a) wildlife,

(a.1) controlled alien species described in paragraph (a) of the definition of "species", or

(b) an animal that escapes or is released from captivity or is abandoned in British Columbia

Documents not transferable

81 Except as authorized by regulation or as otherwise provided under this Act, a licence, permit or limited entry hunting authorization is not transferable, and a person commits an offence if the person

(a) allows his or her licence, permit or limited entry hunting authorization to be used by another person, or

(b) uses another person's licence, permit or limited entry hunting authorization.

Failure to pay fine

85 (1) This section applies if a person

(a) fails to pay, within the time required by law, a fine imposed as a result of the person's conviction for an offence under this Act or the *Firearm Act*, and

(b) has been served with notice of this section.

(2) In the circumstances referred to in subsection (1),

(a) the person's right to apply for or obtain a licence, permit or limited entry hunting authorization under this Act is suspended immediately and automatically on the failure to pay the fine,

(b) all licences, permits and limited entry hunting authorizations issued to that person under this Act are cancelled immediately and automatically on the failure to pay the fine,

(b.1) the person must not apply for employment as an assistant guide,

(b.2) the person must not guide as an assistant guide, and

(c) the person commits an offence if, before that fine is paid, the person

(i) applies for, or in any way obtains, a licence, permit or limited entry hunting authorization under this Act,

(ii) does anything for which a licence, permit or limited entry hunting authorization under this Act is required,

(iii) applies for employment as an assistant guide, or

(iv) guides as an assistant guide.

Proof of identity and authorization

97 (1) In this section, **"authorization"** means a licence, permit or limited entry hunting authorization issued under this Act.

(2) Subject to subsection (5), a person who is required to hold an authorization must, on the request of an officer,

(a) state the person's name and address,

(b) produce prescribed photo identification, and

(c) demonstrate in accordance with subsection (3) that the person holds the authorization.

(3) A person may demonstrate that the person holds an authorization by

(a) producing the authorization, or

(b) unless the regulations require that the original authorization be produced,

(i) producing a legible copy of the authorization, or

(ii) if authorized by the regulations, stating a number assigned to the person by the s.15; as an identification number for the person.

(4) Subject to subsection (5), a person who would be required to hold a licence or permit issued under this Act were the person not exempt under section 11 (9) or 12 (b) must, on the request of an officer,

(a) state the person's name and address, and

(b) produce prescribed photo identification.

(5) Subsections (2) (b) and (4) (b) do not apply to a person in a prescribed class of persons.

(6) A person who contravenes subsection (2) or (4) commits an offence.

Permit Regulation

Permit for use of conveyance

3.1 (5) Subject to subsection (6), a person who undertakes an activity in accordance with a permit issued under subsection (1) is exempt from the following:

(a) Section 35 (2) of the Act;

(b) Section 18 (1)(q) of the Hunting Regulation, B.C. Reg. 190/84

General offence – failure to comply with permit

8 A person who holds a permit under the Act or this regulation commits an offence if the person fails to comply with a term of the permit.

Wildlife Act General Regulation

Proof of identity

21.01 (1) For the purposes of section 97 (2)(b) and (4)(b) of the Act, the following photo identification is prescribed:

(a) valid photo identification issued to a person by any of the following:

(i) the government of Canada;

(ii) the government of a province or territory, or an agent of the government of a province or territory, in which the person has a current address;

(iii) the Nisga'a Nation, if the person is a Nisga'a citizen;

(iv) a treaty first nation, if the person is a treaty first nation member of the treaty first nation;

(b) in the case of a person who is a non-resident alien,

(i) valid photo identification in the form of

(A) a passport, or

(B) a driver's licence issued to the person by a foreign jurisdiction in which the person has a current address, or

(ii) a copy of a photo identification referred to in subparagraph (i) that has been certified as a true copy by

(A) a lawyer, or

(B) a notary who is a member in good standing under the *Notaries Act;*

(c) in any case, a valid NEXUS card.

(2) For the purposes of section 97 (5) of the Act, persons under 16 years of age are prescribed as exempt from the requirement to produce photo identification.

APPENDIX C
DESIGNATES

PERMIT SM22-681663

- s.15; s.19
-
-
-
-
-

78470-45

WILDLIFE ACT

PERMIT SM22-679304

PERMIT HOLDER	s.15; s.19 Ltd s.15; s.19 Specifically, the designates listed under Appendix C

IS AUTHORIZED UNDER s. 2(c)(i), 2(c)(iii), 2(h), 2 (j), 2(k)(i), 2(m), and 2(o) of the Permit Regulation, B.C. Reg. 253/2000,

TO **Note to region:** If additional authorizations are added here, it is highly recommended that they are reviewed by legal counsel (Geneva Grande-McNeill) prior to the permit being issued.	Hunt and capture and on-site release live **caribou** (*Rangifer tarandus*), in Tweedsmuir-Entiako caribou recovery area for scientific purposes, specifically for proper management of wildlife resources. Hunt and capture and on-site release live **caribou** (*Rangifer tarandus*) in Tweedsmuir-Entiako caribou recovery area, for radio collar deployment, as it is necessary for the proper management of wildlife resources, specifically **caribou** (*Rangifer tarandus*). Release from captivity live **caribou** (*Rangifer tarandus*), following the carrying out of the activities authorized above. Possess and dispose of dead wildlife or parts of wildlife for scientific purposes, specifically tissue, bone, or blood samples, from dead or captured **caribou** (*Rangifer tarandus*).

AND

IS EXEMPT UNDER s. 3.1(1)(b), 3.1(1)(c), and 3.1(1)(d) of the Permit Regulation, B.C. Reg. 253/2000,

FROM <Choose applicable paragraphs based on the authorizations selected above, delete rest>	The prohibition in section 27 (2)(a) of the Act against hunting wildlife from an aircraft, specifically a helicopter for the purposes authorized above. The prohibition in section 27 (2)(b) of the Act against using a helicopter to transport hunters, and while on a hunting expedition for the purposes authorized above. The prohibition in section 27 (3) of the Act against herding or harassing wildlife with the use of an aircraft while carrying out the activities authorized above. These exemptions are necessary for the proper management of wildlife resources, specifically **caribou** (*Rangifer tarandus*).

SUBJECT TO THE FOLLOWING:

TERMS OF PERMIT	This permit is only valid in Skeena Region within Tweedsmuir- Entiako. .The permit holder must comply with the terms in Appendix A.
COMPLIANCE ADVISORY	Failure to comply with any term of this permit is an offence under the *Wildlife Act*, and may result in any or all of prosecution, suspension of the permit, cancellation of the permit, ineligibility for future permits, and denial of future permit requests.
PERIOD OF PERMIT	This permit is only valid from January 27, 2022 to April 20, 2022

DATE OF ISSUE	January 26, 2022	
s.15; s.19 **SIGNATURE OF ISSUER**	s.15; s.19 **Skeena Region**	**PERMIT FEE** EXEMPT **HCTF SURCHARGE** EXEMPT

APPENDIX A
TERMS OF PERMIT

PERMIT SM22-679304

REPORTING REQUIREMENTS:

1. The permit holder must complete the **BC Caribou Research Program – Capture Data Form**, marked as Appendix D in this permit, for each caribou captured.

   NOTE: It is recommended that multiple copies of Appendix D be printed off prior to the start of the project to ensure that you have sufficient copies in the field.

2. The permit holder must submit the data sheets and biological samples collected to the regional biologist or project manager **within 21 days** of the permit's expiry.

GENERAL CONDITIONS:

Note to region: If additional conditions are added to this permit, it is highly recommended that they are reviewed by legal counsel (Geneva Grande-McNeill) prior to the permit being issued.

1. The permit holder must comply with all laws applicable to the activities carried out under this permit.

2. All work is to be undertaken by trained professionals with experience in capturing and handling caribou (*Rangifer tarandus*).

3. The permit holder must take all reasonably necessary steps to ensure that public safety is not jeopardized, and fish or wildlife habitat is not damaged, other than as permitted by this permit, by any action taken under authority of this permit.

4. The permit holder must ensure that the wildlife are treated in a humane manner and are not subjected to any unnecessary harm or suffering.

5. The permit holder must review the attached **British Columbia Caribou Health Assessment and Sampling Protocols Net Gun Captures** document prior to any caribou captures.

6. The permit holder must follow the Details of Capture, Handling and Surgical Procedures and Final Disposition outlined under #8 in the approved BC Animal Care Application form.

APPENDIX B
ADVISORY

PERMIT SM22-679304

GENERAL

- It is the permit holder's responsibility to be aware of all applicable laws and the limits of this permit. For example, this permit does not give the permit holder authority to access or travel though any private land without permission from the landowner.
- The Province is not liable for any illness contracted through wildlife handling. It is the responsibility of the permit holder to inform themselves of possible health hazards, and to ensure that all reasonably necessary safety measures are undertaken.
- To assist you, consider the following in your capturing and handling of animals:
  - Standards for Live Animal Capture and Handling Guidelines established by the Ministry of Environment. https://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/laws-policies-standards-guidance/inventory-standards/terrestrial-ecosystems-biodiversity
  - Further guidelines can be obtained on the Canadian Council on Animal Care website at https://www.ccac.ca/en/standards/guidelines/types-of-animals.html
- If applicable, the permit holder is responsible for renewing this permit. The issuer is not obliged to send a reminder notice.

LEGISLATION

Below is a non-exhaustive list of provisions under the *Wildlife Act* and regulations that are relevant to this permit. It is the permit holder's responsibility to be aware of any provisions under the *Wildlife Act* or regulations that may apply to this permit.

Wildlife Act

Property in Wildlife

2 (1) Ownership in all wildlife in British Columbia is vested in the government

(4) If a person by accident or for the protection of life or property kills wildlife, that wildlife, despite subsection (3), remains the property of the government.

(5) Despite anything in this Act, no right of action lies, and no right of compensation exists, against the government for death, personal injury or property damage caused by

(a) wildlife,

(a.1) controlled alien species described in paragraph (a) of the definition of "species", or

(b) an animal that escapes or is released from captivity or is abandoned in British Columbia

Documents not transferable

81 Except as authorized by regulation or as otherwise provided under this Act, a licence, permit or limited entry hunting authorization is not transferable, and a person commits an offence if the person

(a) allows his or her licence, permit or limited entry hunting authorization to be used by another person, or

(b) uses another person's licence, permit or limited entry hunting authorization.

Failure to pay fine

85 (1) This section applies if a person

(a) fails to pay, within the time required by law, a fine imposed as a result of the person's conviction for an offence under this Act or the *Firearm Act*, and

(b) has been served with notice of this section.

(2) In the circumstances referred to in subsection (1),

(a) the person's right to apply for or obtain a licence, permit or limited entry hunting authorization under this Act is suspended immediately and automatically on the failure to pay the fine,

(b) all licences, permits and limited entry hunting authorizations issued to that person under this Act are cancelled immediately and automatically on the failure to pay the fine,

(b.1) the person must not apply for employment as an assistant guide,

(b.2) the person must not guide as an assistant guide, and

(c) the person commits an offence if, before that fine is paid, the person

(i) applies for, or in any way obtains, a licence, permit or limited entry hunting authorization under this Act,

(ii) does anything for which a licence, permit or limited entry hunting authorization under this Act is required,

(iii) applies for employment as an assistant guide, or

(iv) guides as an assistant guide.

Proof of identity and authorization

97 (1) In this section, **"authorization"** means a licence, permit or limited entry hunting authorization issued under this Act.

(2) Subject to subsection (5), a person who is required to hold an authorization must, on the request of an officer,

(a) state the person's name and address,

(b) produce prescribed photo identification, and

(c) demonstrate in accordance with subsection (3) that the person holds the authorization.

(3) A person may demonstrate that the person holds an authorization by

(a) producing the authorization, or

(b) unless the regulations require that the original authorization be produced,

(i) producing a legible copy of the authorization, or

(ii) if authorized by the regulations, stating a number assigned to the person by the s.15 as an identification number for the person.

(4) Subject to subsection (5), a person who would be required to hold a licence or permit issued under this Act were the person not exempt under section 11 (9) or 12 (b) must, on the request of an officer,

(a) state the person's name and address, and

(b) produce prescribed photo identification.

(5) Subsections (2) (b) and (4) (b) do not apply to a person in a prescribed class of persons.

(6) A person who contravenes subsection (2) or (4) commits an offence.

Permit Regulation

Permit for use of conveyance

3.1 (5) Subject to subsection (6), a person who undertakes an activity in accordance with a permit issued under subsection (1) is exempt from the following:

(a) Section 35 (2) of the Act;

(b) Section 18 (1)(q) of the Hunting Regulation, B.C. Reg. 190/84

General offence – failure to comply with permit

8 A person who holds a permit under the Act or this regulation commits an offence if the person fails to comply with a term of the permit.

Wildlife Act General Regulation

Proof of identity

21.01 (1) For the purposes of section 97 (2)(b) and (4)(b) of the Act, the following photo identification is prescribed:

(a) valid photo identification issued to a person by any of the following:

(i) the government of Canada;

(ii) the government of a province or territory, or an agent of the government of a province or territory, in which the person has a current address;

(iii) the Nisga'a Nation, if the person is a Nisga'a citizen;

(iv) a treaty first nation, if the person is a treaty first nation member of the treaty first nation;

(b) in the case of a person who is a non-resident alien,

(i) valid photo identification in the form of

(A) a passport, or

(B) a driver's licence issued to the person by a foreign jurisdiction in which the person has a current address, or

(ii) a copy of a photo identification referred to in subparagraph (i) that has been certified as a true copy by

(A) a lawyer, or

(B) a notary who is a member in good standing under the *Notaries Act;*

(c) in any case, a valid NEXUS card.

(2) For the purposes of section 97 (5) of the Act, persons under 16 years of age are prescribed as exempt from the requirement to produce photo identification.

APPENDIX C
DESIGNATES

PERMIT SM22-679304

- s.15; s.19
-
-
-
-
-

APPENDIX D
CARIBOU CAPTURE DATA FORM

PERMIT SM22-679304

V3.1 April 2021

BC Caribou Research Program - Capture Data Form

CAPTURE

Herd: _____ Date: (DD/MM/YYYY): _____ Ambient temperature: _____ ˚C

Weather: _____ Personnel: _____

Haze time (mins): _____ Chase (mins): _____ Net on (HH:MM): _____ Release (HH:MM): _____

Haze time 2 (mins): _____ Chase 2 (mins): _____ Net 2 on (HH:MM): _____ No second net ☐

Waypoint: _____ UTM Zone: _____ East: _____ North: _____ or Lat: _____ Long: _____

ANIMAL IDENTIFICATION

WLH ID: _____ Other ID: _____ Recapture No / Yes Previous WLH ID: _____

Collar type: _____ Frequency: _____ Serial number: _____

Ear tag(s) (number and colour): Left: _____ Right: _____

Sex: M / F Calf at heel (circle): Uncertain / No / Yes Lactating (circle): No / Yes

Age class (circle): Yearling / Subadult (2-3) / Adult (4-7) / Old Adult (8+)

Field age (degree of incisor wear) (circle): Yearling / 2-3 / 4-5 / 6-7 / 8-9 / 10-11 / 12+

Take three photos of teeth and jaw – one from each side and one from the front showing the incisors

HEALTH ASSESSMENT

Rectal temp: _____ ˚C Injuries (circle): None / Yes - Net or Capture / Other (describe in comments on reverse)

Antlers (circle): None / One / Two Broken (Net) / Deformity / Retained Velvet **Take pictures if abnormal**

General body condition (circle): Emaciated / Poor / Fair / Good + **Take pictures if condition is less than fair**

CARMA BCS (see page 2): Shoulder: _____ Ribs: _____ Hips/Spine: _____ Total Score: _____

Ticks: No / Yes **Collect 10-15 ticks** Hair loss (circle): None / Mild / Moderate / Severe / Extreme

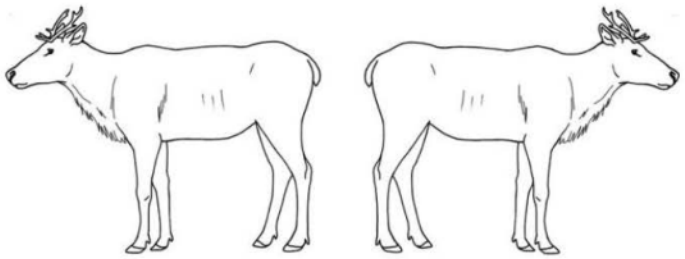
Tick burden estimate (circle): None / Mild (Approx. 0-15 ticks per 10cm transect) / Moderate (15-30) / Severe (>30)

OPTIONAL Tick count (lowest priority): # on shoulder: _____ or # on rump: _____ No count performed
OPTIONAL Neck circumference: _____ cm

SAMPLES COLLECTED ** PLEASE READ PROTOCOL**	Yes (#)	No
Blood: 4 x Gold Top SST tubes (serum) * Must invert for 30 seconds to 1 min after collected*		
Blood: 1 x Royal Blue Top Trace tube (trace nutrients) * Must invert for 30 seconds to 1 min after collected*		
Blood: 1 x Purple Top EDTA tube (buffy coat / plasma) * Must invert for 30 seconds to 1 min after collected *		
Blood: 1 x Green Top RNA tube (whole blood) * Must invert for 30 seconds to 1 min after collected*		
Hair: Large envelope full, plucked from top of shoulder Circle: Clean / Contaminated / Dry / Wet		
Skin biopsy: Small envelope		
Feces: 20 – 30 pellets if possible, collected from (circle): rectum / off ground / off snow		
Pictures: PRIORITY = Incisors / Abnormalities / Hair loss / Poor condition IF TIME = Body / Head / Profile		

* EMERGENCY VETERINARY CONTACT: DR. CAELEY THACKER 250-361-7619 *

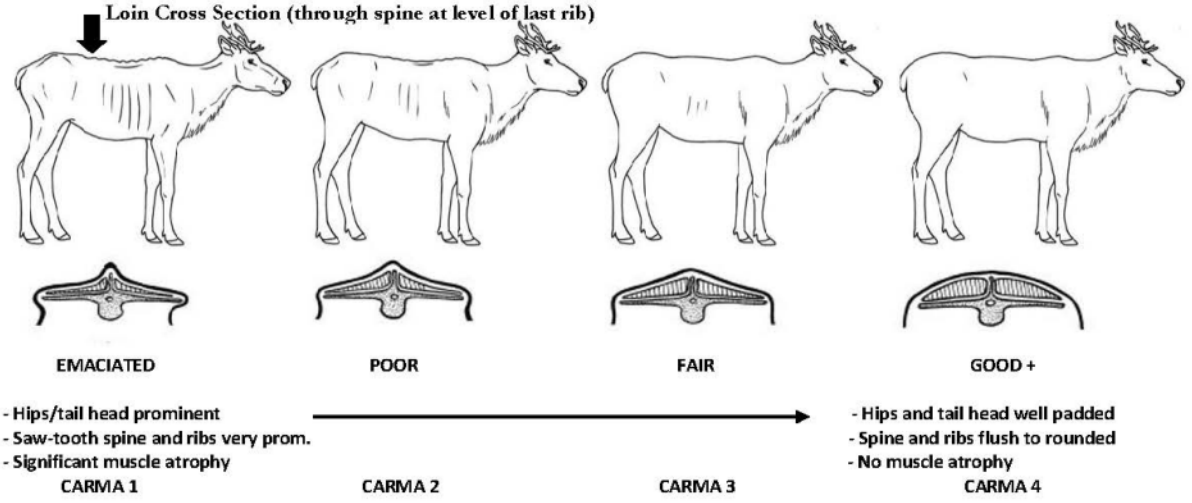
COMMENTS
Take Pictures /Draw / Describe abnormal



FIELD AGE	PATTERN OF INCISOR WEAR	AGE CLASS
2-3	Very white teeth with rounded caps (little or no wear)	Subadult
4-5	First incisors are flattening, and second incisors are beginning to wear	Adult
6-7	All teeth in the incisor bar are flattening and appear to be a straight line across the top	Adult
8-9	All teeth in the incisor bar are flattened significantly (teeth appear shorter)	Old Adult
10-11	All teeth in the incisor bar are stubs (shorter still)	Old Adult
12+	All teeth in the incisor bar are worn to the gum line	Old Adult

SHOULDER	CARMA DESCRIPTION	SCORE#
1	V-shaped scapula, very bony, hollows behind scapula and immediately behind the scapular spine	
2	Somewhat V shaped, less bony, hollows still present	
3	U-shaped withers, hollows filled	
4	U-shaped, very broad, difficult to feel edges of bone	
RIBS	**CARMA DESCRIPTION**	**SCORE#**
1	Deep groves between ribs including behind the shoulder	
2	Ribs fairly well covered immediately behind shoulder	
3	Can still feel ribs, groves are not too deep	
4	Ribs nearly flush with tissue between them	
HIPS/SPINE	**CARMA DESCRIPTION**	**SCORE#**
1	Hip bones very distinct, no fat on back or tail head, spine very distinct	
2	Some padding on hips, spine remains very distinct	
3	Hips fairly well padded, spine partly covered along each side	
4	Hips well padded, spine is flush with or nearly covered with fat	
	Total CARMA Condition Score (sum of shoulder, ribs, hips/spine)	

Assigned numbers may be in increments of 0.5 points. Area scores may not be the same.



FW: TIME SENSITIVE: for consideration 4(a)(i) permit application - NR to hunt game - predator management - Hart Ranges, North Cariboo, Itchas and Tweedmuir ranges

From:	Burwash, Michael FLNR:EX <Michael.Burwash@gov.bc.ca>
To:	Maricle, Kindra L FLNR:EX <Kindra.L.Maricle@gov.bc.ca>
Cc:	Smith, Kelly B FLNR:EX <Kelly.Smith@gov.bc.ca>, White, Shane FLNR:EX <Shane.White@gov.bc.ca>, Shores, Carolyn FLNR:EX <Carolyn.Shores@gov.bc.ca>, Klaczek, Michael FLNR:EX <Michael.Klaczek@gov.bc.ca>, Hales, Gerad S FLNR:EX <Gerad.Hales@gov.bc.ca>
Sent:	January 26, 2022 10:45:25 AM PST
Attachments:	image001.png;[s.15; s.19] 4 (a)(i) VI22-685563_NR or NRA to hunt game (predator mgmt)_caribou recovery-R5DRAFT.docx[s.15; s.19] 4 (a)(i) VI22-681676_NR or NRA to hunt game (predator mgmt)_caribou recovery-R6Draft.docx

Hi Kindra,
Hope you are doing well too!

I have reviewed and approve of the multi-region permit attached.

Please note the title for the permit as Deputy Director, Wildlife & Habitat Branch.

Thank you,

Michael Burwash
Deputy Director, Wildlife Branch
Wildlife & Habitat Branch
Ministry of Forests, Lands, Natural Resource Operations & Rural Development
1259 Dalhousie Drive, Kamloops, BC V2C 5Z5
Phone: 250-312-7305 Email: michael.burwash@gov.bc.ca

From: Maricle, Kindra L FLNR:EX <Kindra.L.Maricle@gov.bc.ca>
Sent: January 25, 2022 3:39 PM
To: Burwash, Michael FLNR:EX <Michael.Burwash@gov.bc.ca>
Cc: Smith, Kelly B FLNR:EX <Kelly.Smith@gov.bc.ca>; White, Shane FLNR:EX <Shane.White@gov.bc.ca>; Shores, Carolyn FLNR:EX <Carolyn.Shores@gov.bc.ca>; Klaczek, Michael FLNR:EX <Michael.Klaczek@gov.bc.ca>
Subject: RE: TIME SENSITIVE: for consideration 4(a)(i) permit application - NR to hunt game - predator management - Hart Ranges, North Cariboo, Itchas and Tweedmuir ranges

Sorry for the additional email. Updating Region 5's permit.

Thanks everyone for your work on this, I think we are almost at the finish line.

Kindra

From: Maricle, Kindra L FLNR:EX
Sent: January 25, 2022 2:45 PM
To: Burwash, Michael FLNR:EX <Michael.Burwash@gov.bc.ca>
Cc: Smith, Kelly B FLNR:EX <Kelly.Smith@gov.bc.ca>; White, Shane FLNR:EX <Shane.White@gov.bc.ca>; Shores, Carolyn FLNR:EX <Carolyn.Shores@gov.bc.ca>; Klaczek, Michael FLNR:EX <Michael.Klaczek@gov.bc.ca>

Subject: RE: TIME SENSITIVE: for consideration 4(a)(i) permit application - NR to hunt game - predator management - Hart Ranges, North Cariboo, Itchas and Tweedmuir ranges
Importance: High

Hi Michael, hope all is well.

Since approving this permit R6 and R5 have received direction from front counter to separate our caribou capture and wolf removal permits into two permits. They also advised us to no longer submit multi-region permits.

At your earliest convenience would you be able to review and approve the attached permits.

Thank you for your time and consideration, please note this request is time sensitive.

Kindra

From: Burwash, Michael FLNR:EX <Michael.Burwash@gov.bc.ca>
Sent: January 14, 2022 9:27 AM
To: Klaczek, Michael FLNR:EX <Michael.Klaczek@gov.bc.ca>
Cc: Maricle, Kindra L FLNR:EX <Kindra.L.Maricle@gov.bc.ca>; Smith, Kelly B FLNR:EX <Kelly.Smith@gov.bc.ca>
Subject: FW: TIME SENSITIVE: for consideration 4(a)(i) permit application - NR to hunt game - predator management - Hart Ranges, North Cariboo, Itchas and Tweedmuir ranges

Hi Mike,

I approve of the permit.

Thanks,

Michael Burwash
Deputy Director, Wildlife Branch
Wildlife & Habitat Branch
Ministry of Forests, Lands, Natural Resource Operations & Rural Development
1259 Dalhousie Drive, Kamloops, BC V2C 5Z5
Phone: 250-312-7305 Email: michael.burwash@gov.bc.ca

From: Klaczek, Michael FLNR:EX <Michael.Klaczek@gov.bc.ca>
Sent: January 13, 2022 5:35 PM
To: Burwash, Michael FLNR:EX <Michael.Burwash@gov.bc.ca>
Cc: White, Shane FLNR:EX <Shane.White@gov.bc.ca>; Maricle, Kindra L FLNR:EX <Kindra.L.Maricle@gov.bc.ca>
Subject: TIME SENSITIVE: for consideration 4(a)(i) permit application - NR to hunt game - predator management - Hart Ranges, North Cariboo, Itchas and Tweedmuir ranges

Hi Michael,

Hope all is well and Happy New Year.

One of the pilots conducting the wolf reduction work for the Hart/North Cariboo, Itchas and Tweedsmuir is not a BC resident (from Yukon) and thus requires a 4(a)(i) permit. So while the regional wolf reduction permits are approved (Hart/North Cariboo) or soon to be (Itchas/Tweeds) by regional SDMs we also need this 4(a)(i) permit but the signing authority is at the Wildlife Director level in Branch. Because the same contractors s.15; s.19; s.21 are doing work for 3 regions – we added all 3 regions onto this 1 permit. Hopefully that works ok with you guys.

For your consideration. Please note that this is request is time sensitive.

Mike

Michael Klaczek
Senior Wildlife Biologist - Omineca Region
Ministry of Forests, Lands, Natural Resource Operations and Rural Development
Prince George, BC
250-649-4401
michael.klaczek@gov.bc.ca

Ministry of Forests, Lands, Natural Resource Operations and Rural Development

PERMIT

78470-4
VT#100367628

WILDLIFE ACT
PERMIT V122-685563

PERMIT HOLDER	s.15; s.19; s.21

IS AUTHORIZED UNDER s. 4 (a)(i) of the Permit Regulation, B.C. Reg. 253/2000

TO	Hunt big game **CARIBOU (*Rangifer tarandus*)** and **WOLVES (*Canis lupus*)** in accordance with Permit WL22-680643 and WL22-682577

SUBJECT TO THE FOLLOWING:

TERMS OF PERMIT	1) The above authorization is only applicable while the permit holder is conducting activities authorized in the following permits: **Permit WL22-682577 (wolf management)** **Permit WL22-680643 (caribou capture)** 2) **This permit is only exercisable** in the Itcha-Ilgachuz, Barkerville and Wells Gray North caribou ranges. 3) The permit holder must comply with all laws applicable to the activities carried out under permits **WL22-682577, WL22-680643.**
COMPLIANCE ADVISORY	Failure to comply with any term of this permit is an offence under the *Wildlife Act*, and may result in any or all of prosecution, suspension of the permit, cancellation of the permit, ineligibility for future permits, and denial of future permit requests. See Appendix A for further advisories.
PERIOD OF PERMIT	This permit is only valid for the period **January 27, 2022 to March 31, 2022.**
DATE OF ISSUE	

s.15; s.19 **SIGNATURE OF ISSUER**	s.15; s.19	**PERMIT FEE** Exempt **HCTF SURCHARGE** Exempt

APPENDIX A
ADVISORY

PERMIT V122-685563

GENERAL

- It is the permit holder's responsibility to be aware of all applicable laws and the limits of this permit.
- The Province is not liable for any illness contracted through wildlife handling. It is the responsibility of the permit holder to inform themselves of possible health hazards, and to ensure that all reasonably necessary safety measures are undertaken.
- If applicable, the permit holder is responsible for renewing this permit. The issuer is not obliged to send a reminder notice.

LEGISLATION

Below is a non-exhaustive list of provisions under the *Wildlife Act* and regulations that are relevant to this permit. It is the permit holder's responsibility to be aware of any provisions under the *Wildlife Act* or regulations that may apply to this permit.

Wildlife Act

Documents not transferable

81 Except as authorized by regulation or as otherwise provided under this Act, a licence, permit or limited entry hunting authorization is not transferable, and a person commits an offence if the person

(a) allows his or her licence, permit or limited entry hunting authorization to be used by another person, or

(b) uses another person's licence, permit or limited entry hunting authorization.

Failure to pay fine

85 (1) This section applies if a person

(a) fails to pay, within the time required by law, a fine imposed as a result of the person's conviction for an offence under this Act or the *Firearm Act*, and

(b) has been served with notice of this section.

(2) In the circumstances referred to in subsection (1),

(a) the person's right to apply for or obtain a licence, permit or limited entry hunting authorization under this Act is suspended immediately and automatically on the failure to pay the fine,

(b) all licences, permits and limited entry hunting authorizations issued to that person under this Act are cancelled immediately and automatically on the failure to pay the fine,

(b.1) the person must not apply for employment as an assistant guide,

(b.2) the person must not guide as an assistant guide, and

(c) the person commits an offence if, before that fine is paid, the person

(i) applies for, or in any way obtains, a licence, permit or limited entry hunting authorization under this Act,

(ii) does anything for which a licence, permit or limited entry hunting authorization under this Act is required,

(iii) applies for employment as an assistant guide, or

(iv) guides as an assistant guide.

Proof of identity and authorization

97 (1) In this section, **"authorization"** means a licence, permit or limited entry hunting authorization issued under this Act.

(2) Subject to subsection (5), a person who is required to hold an authorization must, on the request of an officer,

(a) state the person's name and address,

(b) produce prescribed photo identification, and

(c) demonstrate in accordance with subsection (3) that the person holds the authorization.

(3) A person may demonstrate that the person holds an authorization by

(a) producing the authorization, or

(b) unless the regulations require that the original authorization be produced,

(i) producing a legible copy of the authorization, or

(ii) if authorized by the regulations, stating a number assigned to the person by the director as an identification number for the person.

(4) Subject to subsection (5), a person who would be required to hold a licence or permit issued under this Act were the person not exempt under section 11 (9) or 12 (b) must, on the request of an officer,

(a) state the person's name and address, and

(b) produce prescribed photo identification.

(5) Subsections (2) (b) and (4) (b) do not apply to a person in a prescribed class of persons.

(6) A person who contravenes subsection (2) or (4) commits an offence.

Permit Regulation

General offence – failure to comply with permit

8 A person who holds a permit under the Act or this regulation commits an offence if the person fails to comply with a term of the permit.

Wildlife Act General Regulation

Proof of identity

21.01 (1) For the purposes of section 97 (2)(b) and (4)(b) of the Act, the following photo identification is prescribed:

(a) valid photo identification issued to a person by any of the following:

(i) the government of Canada;

(ii) the government of a province or territory, or an agent of the government of a province or territory, in which the person has a current address;

(iii) the Nisga'a Nation, if the person is a Nisga'a citizen;

(iv) a treaty first nation, if the person is a treaty first nation member of the treaty first nation;

(b) in the case of a person who is a non-resident alien,

(i) valid photo identification in the form of

(A) a passport, or

(B) a driver's licence issued to the person by a foreign jurisdiction in which the person has a current address, or

(ii) a copy of a photo identification referred to in subparagraph (i) that has been certified as a true copy by

(A) a lawyer, or

(B) a notary who is a member in good standing under the *Notaries Act;*

(c) in any case, a valid NEXUS card.

(2) For the purposes of section 97 (5) of the Act, persons under 16 years of age are prescribed as exempt from the requirement to produce photo identification.

Ministry of Forests, Lands, Natural Resource Operations and Rural Development

PERMIT

78470-4
VT#100367628

WILDLIFE ACT
PERMIT V122-685543

PERMIT HOLDER	s.15; s.19; s.21

IS AUTHORIZED UNDER s. 4 (a)(i) of the Permit Regulation, B.C. Reg. 253/2000

TO	Hunt big game **CARIBOU (*Rangifer tarandus*)** and **WOLVES (*Canis lupus*)** in accordance with Permit SM22-681663 and SM22-679304

SUBJECT TO THE FOLLOWING:

TERMS OF PERMIT	1) The above authorization is only applicable while the permit holder is conducting activities authorized in the following permits: **Permit SM22-681663 (wolf management)** **Permit SM22-679304 (caribou capture)** 2) **This permit is only exercisable** in the Tweedsmuir-Entiako caribou ranges. 3) The permit holder must comply with all laws applicable to the activities carried out under permits **SM22-681663, and SM22-679304**
COMPLIANCE ADVISORY	Failure to comply with any term of this permit is an offence under the *Wildlife Act*, and may result in any or all of prosecution, suspension of the permit, cancellation of the permit, ineligibility for future permits, and denial of future permit requests. See Appendix A for further advisories.
PERIOD OF PERMIT	This permit is only valid for the period **January 27, 2022 to April 20, 2022.**
DATE OF ISSUE	

s.15; s.19 **SIGNATURE OF ISSUER**	s.15; s.19	**PERMIT FEE** Exempt **HCTF SURCHARGE** Exempt

APPENDIX A
ADVISORY

PERMIT V122-685543

GENERAL

- It is the permit holder's responsibility to be aware of all applicable laws and the limits of this permit.
- The Province is not liable for any illness contracted through wildlife handling. It is the responsibility of the permit holder to inform themselves of possible health hazards, and to ensure that all reasonably necessary safety measures are undertaken.
- If applicable, the permit holder is responsible for renewing this permit. The issuer is not obliged to send a reminder notice.

LEGISLATION

Below is a non-exhaustive list of provisions under the *Wildlife Act* and regulations that are relevant to this permit. It is the permit holder's responsibility to be aware of any provisions under the *Wildlife Act* or regulations that may apply to this permit.

Wildlife Act

Documents not transferable

81 Except as authorized by regulation or as otherwise provided under this Act, a licence, permit or limited entry hunting authorization is not transferable, and a person commits an offence if the person

(a) allows his or her licence, permit or limited entry hunting authorization to be used by another person, or

(b) uses another person's licence, permit or limited entry hunting authorization.

Failure to pay fine

85 (1) This section applies if a person

(a) fails to pay, within the time required by law, a fine imposed as a result of the person's conviction for an offence under this Act or the *Firearm Act*, and

(b) has been served with notice of this section.

(2) In the circumstances referred to in subsection (1),

(a) the person's right to apply for or obtain a licence, permit or limited entry hunting authorization under this Act is suspended immediately and automatically on the failure to pay the fine,

(b) all licences, permits and limited entry hunting authorizations issued to that person under this Act are cancelled immediately and automatically on the failure to pay the fine,

(b.1) the person must not apply for employment as an assistant guide,

(b.2) the person must not guide as an assistant guide, and

(c) the person commits an offence if, before that fine is paid, the person

(i) applies for, or in any way obtains, a licence, permit or limited entry hunting authorization under this Act,

(ii) does anything for which a licence, permit or limited entry hunting authorization under this Act is required,

(iii) applies for employment as an assistant guide, or

(iv) guides as an assistant guide.

Proof of identity and authorization

97 (1) In this section, **"authorization"** means a licence, permit or limited entry hunting authorization issued under this Act.

(2) Subject to subsection (5), a person who is required to hold an authorization must, on the request of an officer,

(a) state the person's name and address,

(b) produce prescribed photo identification, and

(c) demonstrate in accordance with subsection (3) that the person holds the authorization.

(3) A person may demonstrate that the person holds an authorization by

(a) producing the authorization, or

(b) unless the regulations require that the original authorization be produced,

(i) producing a legible copy of the authorization, or

(ii) if authorized by the regulations, stating a number assigned to the person by the director as an identification number for the person.

(4) Subject to subsection (5), a person who would be required to hold a licence or permit issued under this Act were the person not exempt under section 11 (9) or 12 (b) must, on the request of an officer,

(a) state the person's name and address, and

(b) produce prescribed photo identification.

(5) Subsections (2) (b) and (4) (b) do not apply to a person in a prescribed class of persons.

(6) A person who contravenes subsection (2) or (4) commits an offence.

Permit Regulation

General offence – failure to comply with permit

8 A person who holds a permit under the Act or this regulation commits an offence if the person fails to comply with a term of the permit.

Wildlife Act General Regulation

Proof of identity

21.01 (1) For the purposes of section 97 (2)(b) and (4)(b) of the Act, the following photo identification is prescribed:

(a) valid photo identification issued to a person by any of the following:

(i) the government of Canada;

(ii) the government of a province or territory, or an agent of the government of a province or territory, in which the person has a current address;

(iii) the Nisga'a Nation, if the person is a Nisga'a citizen;

(iv) a treaty first nation, if the person is a treaty first nation member of the treaty first nation;

(b) in the case of a person who is a non-resident alien,

(i) valid photo identification in the form of

(A) a passport, or

(B) a driver's licence issued to the person by a foreign jurisdiction in which the person has a current address, or

(ii) a copy of a photo identification referred to in subparagraph (i) that has been certified as a true copy by

(A) a lawyer, or

(B) a notary who is a member in good standing under the *Notaries Act;*

(c) in any case, a valid NEXUS card.

(2) For the purposes of section 97 (5) of the Act, persons under 16 years of age are prescribed as exempt from the requirement to produce photo identification.

FW: ACTION: 2022 Predator reduction decision note for review

From:	Maricle, Kindra L FLNR:EX <Kindra.L.Maricle@gov.bc.ca>
To:	Maricle, Kindra L FLNR:EX <Kindra.L.Maricle@gov.bc.ca>
Sent:	March 31, 2022 9:22:13 AM PDT
Attachments:	RFD TEC Predator Management 2022.pdf

From: Skerik, David FLNR:EX <David.Skerik@gov.bc.ca>
Sent: January 25, 2022 1:04 PM
To: Maricle, Kindra L FLNR:EX <Kindra.L.Maricle@gov.bc.ca>; Wong, Mark M FLNR:EX <Mark.M.Wong@gov.bc.ca>
Cc: Greene, Laura FLNR:EX <Laura.Greene@gov.bc.ca>
Subject: RE: ACTION: 2022 Predator reduction decision note for review

Approved.

Thanks so much for all the support, I really need it right now!

Please make sure this ends up in the right folder and those that require notification receive it.

Cheers,

David

From: Maricle, Kindra L FLNR:EX <Kindra.L.Maricle@gov.bc.ca>
Sent: January 25, 2022 12:52 PM
To: Wong, Mark M FLNR:EX <Mark.M.Wong@gov.bc.ca>; Skerik, David FLNR:EX <David.Skerik@gov.bc.ca>
Cc: Greene, Laura FLNR:EX <Laura.Greene@gov.bc.ca>
Subject: RE: ACTION: 2022 Predator reduction decision note for review

Correct[s.13]

Updated wording looks good to me, thanks Dave and Mark

From: Wong, Mark M FLNR:EX <Mark.M.Wong@gov.bc.ca>
Sent: January 25, 2022 12:44 PM
To: Skerik, David FLNR:EX <David.Skerik@gov.bc.ca>; Maricle, Kindra L FLNR:EX <Kindra.L.Maricle@gov.bc.ca>
Cc: Greene, Laura FLNR:EX <Laura.Greene@gov.bc.ca>
Subject: RE: ACTION: 2022 Predator reduction decision note for review

My understanding i[s.13]
correct Kindra?

So, I think your amended wording best describes the situation. I've made some minor changes to the altered sentence.

From: Skerik, David FLNR:EX <David.Skerik@gov.bc.ca>
Sent: January 25, 2022 12:37 PM
To: Maricle, Kindra L FLNR:EX <Kindra.L.Maricle@gov.bc.ca>
Cc: Wong, Mark M FLNR:EX <Mark.M.Wong@gov.bc.ca>; Greene, Laura FLNR:EX <Laura.Greene@gov.bc.ca>
Subject: RE: ACTION: 2022 Predator reduction decision note for review

There is only one tiny thing that has me curious.

Does this read better to you?

From: Maricle, Kindra L FLNR:EX <Kindra.L.Maricle@gov.bc.ca>
Sent: January 25, 2022 10:50 AM
To: Skerik, David FLNR:EX <David.Skerik@gov.bc.ca>
Cc: Wong, Mark M FLNR:EX <Mark.M.Wong@gov.bc.ca>; Greene, Laura FLNR:EX <Laura.Greene@gov.bc.ca>
Subject: RE: ACTION: 2022 Predator reduction decision note for review
Importance: High

Hi Dave-Please review this attached copy. Thank you Laura for reviewing and making changes to the document.

Kindra

From: Skerik, David FLNR:EX <David.Skerik@gov.bc.ca>
Sent: January 25, 2022 9:12 AM
To: Maricle, Kindra L FLNR:EX <Kindra.L.Maricle@gov.bc.ca>
Cc: Wong, Mark M FLNR:EX <Mark.M.Wong@gov.bc.ca>
Subject: RE: ACTION: 2022 Predator reduction decision note for review

Thanks so much. I will get on it at lunch or soon as RMT wraps up…..

From: Maricle, Kindra L FLNR:EX <Kindra.L.Maricle@gov.bc.ca>
Sent: January 25, 2022 9:11 AM
To: Skerik, David FLNR:EX <David.Skerik@gov.bc.ca>
Cc: Wong, Mark M FLNR:EX <Mark.M.Wong@gov.bc.ca>
Subject: ACTION: 2022 Predator reduction decision note for review
Importance: High

Hi David,

Please see the attached decision note for your review and approval. We have updated preliminary caribou response and predator reduction results over the first two-years (both showing positive results). The Appendices are also updated to this year's ACA (approved by our provincial wildlife vet- Caeley Thacker) and a thorough Indigenous Consultation Summary completed by Loni Arman with the CRP this fall.

Please call me if you need anything further. CWC is planning on heading to Ootsa tomorrow afternoon to get started on January 27th so if possible please review this at your earliest convenience.

Thank you,
Kindra

Kindra Maricle
Wildlife Biologist | Skeena Region
Forests, Lands, Natural Resource Operations and Rural Development
Bag 5000, 3726 Alfred Avenue, Smithers BC V0J 2N0
**New Phone: 250-876-7049| email: kindra.l.maricle@gov.bc.ca

s.15; s.19

REASONS FOR DECISION IN THE MATTER OF THE ISSUANCE OF A WILDLIFEACT PERMIT FOR THE PURPOSES OF CAPTURING AND COLLARING CARIBOU AND CAPTURING, COLLARING, AND KILLING WOLVES IN SUPPORT OF TWEEDSMUIR-ENTIAKO CARIBOU RECOVERY

On January 19, 2022 I received an application for authorizing the applicant to conduct activities for the purpose of capturing and collaring caribou and for capturing, collaring, and killing wolves in relation to the Tweedsmuir-Entiako Caribou Population recovery efforts. This permit supports the implementation of a five-year re-approval for the continuation of predator reduction to support caribou recovery of the Tweedsmuir-Entiako caribou herds.

The statutory authority for capturing, collaring, and killing wildlife by permit is s. 2(c)(i), 2(c)(iii), 2(h), 2 (j), 2(k)(i), 2(m), and 2(o) of the *Permit Regulation*, B.C. Reg. 253/2000 ('Permitted Activities'). The statutory authority for authorizing an exemption from Section 27 of the *Wildlife Act* for conducting the Permitted Activities is s.3.1 (1)(b), 3.1(1)(c) and 3.1 (1)(d) of the Permit Regulation, B.C. Reg. 253/2000. There authorities rest with the s.15; s.19 under the *Wildlife Act*. As the Director, Resource Management, Skeena Region, I am appointed as the s.15; s.19

I have decided to authorize the permit application SM22-681663, and SM22-679304 to s.15; s.19 of s.15; s.19 Ltd. for the term January 27, 2022 to April 20, 2022. My reasons for decision are set out below.

Application Requirements Met

File review by FrontCounter staff and Senior Wildlife Biologist conclude that the application requirements have been met. Specific requirements include:

- COORS check on applicant;
- Operational Plan for Wolf Reduction to Support Tweedsmuir Entiako Caribou Recovery; and,
- BC Animal Care Form approved by BC Veterinarian.

Reporting Requirements

The contractor s.15; s.19 and regional staff have developed reporting requirements. The reporting requirements are a condition of the Permit SM22-681663, and SM22-679304 and contained in the approved Animal Care Form.

Therefore, I am satisfied with the reporting required by Section 9 of the *Permit Regulation*.

Permit Not Contrary to the Proper Management of Wildlife Resources

The Province of BC is undertaking caribou recovery projects throughout the province where population declines have been detected. In 2021, The Director of Wildlife and Habitat signed an Interim Aerial Wolf Reduction Procedure. This procedure documents the decision path, statutory decision makers, monitoring and reporting.

The Tweedsmuir-Entiako caribou (TEC) herd is currently numbered between 150-200 animals and is declining (population growth rate of 0.89). Multiple lines of evidence suggest that increased predation by wolves as a result of habitat alteration has led to the decline in the TEC herd:

- the extent and magnitude of landscape disturbance has increased drastically over the past 20 years,
- the majority of adult female mortalities in this herd have been attributed to wolves, and
- the wolf density is greater than what is thought to be sustainable for caribou populations.

Currently, enhanced habitat protection, management, and restoration measures are underway to support recovery of the TEC herd. However, habitat recovery will take decades to unfold and interim management actions, such as wolf reduction, are necessary to ensure the persistence of the TEC herd in the near-term. This permit enables the implementation of an operational plan (Appendix A) required to sustain the TEC herd as an interim measure.

This permit will authorize the first year of a 5 year predator reduction program that will build off the initial 2 year pilot program started in the winter of 2020.. Reduction activities over the two-year program were effective at reducing wolf densities by approximately 85% from 6.5 wolves/1000 km^2 to < 1 wolf/ 1000 km^2, representing the removal of 125 wolves over the two years.

There are several indications that predator reduction conducted in 2020 and 2021 has resulted in a positive effect on the TEC herd. There was an increase in the proportion of females caribou with calves during the annual neonate surveys (30% with calves in 2020, and 36% with calves in 2021) compared to 20% counted in 2019; prior to predator reduction. The 2021 recruitment survey, which monitors the proportion of young animals entering the breeding population, was also yielded a high percent calf ratio at 23% calves. Additionally, in October of 2021, the largest minimum count since 2006 was recorded at 166 caribou, and population growth rate (lambda, λ) has changed from λ= 0.89 (2014-2019) pre wolf reduction to increasing λ=1.03 (2020-2021). These preliminary results from predator reduction show encouraging signs for caribou recovery; however, further monitoring is required to confirm the response of the TEC herd to this management action.

Therefore, I am satisfied that issuing this permit is for a scientific purpose; to control wildlife populations; and, is not contrary to the proper management of wildlife resources, a required consideration as per Section 5 (1) (b) of the *Permit Regulation* and a relevant consideration for an exemption for hunting and herding wildlife using a conveyance as required under s. 3.1(3) and s. 3.1.(4) of the *Permit Regulation*.

Sufficient Skill to Undertake Aerial Hunting, Handling, and Herding

To issue an exemption from Section 27 of the *Wildlife Act* the s.15; s.19 must be satisfied that people undertaking permitted activities using a conveyance can demonstrate they have sufficient skill to conduct the permitted activity. The Animal Care Application approved by the Provincial Wildlife Veterinarian (Appendix B) describes the past experiences of the pilots and crew undertaking the capture and killing of wildlife from an aircraft. All the pilots and crews have significant past experiences herding, handling, and hunting wildlife using aircraft, including satisfactory implementation of the first two years of the operational plan for the undertaking being considered here.

Therefore, I am satisfied that the pilot and crew have sufficient skill to undertake aerial hunting and herding of wildlife using an aircraft as required by s.3.1(3)(a) of the *Permit Regulation*.

Potential Impacts on Aboriginal Rights and Title Claims

The activities under consideration have a potential to impact aboriginal rights and titles. As a result, the project was sent to relevant First Nations by the Caribou Recovery engagement team for consultation. A summary of engagement is appended (Appendix C).

Conclusion

I have reviewed and considered all of the information relevant to the decisions before me, whether specifically referenced in these reasons or not. s.15; s.19 and his crew are qualified to conduct the activities associated with this permit and I am satisfied with the reporting requirements and that the activity is not contrary to the proper management of wildlife resources.

I am required to consider the potential adverse impacts of the decision before me on aboriginal rights and title claims and ensure that potentially affected aboriginal groups have been adequately consulted, and where appropriate accommodated. I consider the Crown's duty to consult to have been satisfied and accommodation to be adequate in the circumstances.

Accordingly, I have decided to authorize permits SM22-681663, and SM22-679304

s.15; s.19

Date: January 25, 2022

s.15; s.19 , Skeena Region

Appendices

Appendix A- Operational Plan for Wolf Reduction to Support Tweedsmuir Entiako Caribou

Appendix B- BC Animal Care Application Form

Appendix C – 2021 Skeena and Cariboo Regions Indigenous Consultation Summaries

APPENDIX A

Operational Plan for Wolf Reduction to Support Tweedsmuir Entiako Caribou Herd Recovery

Summary

- The Tweedsmuir-Entiako caribou (TEC) herd is currently numbered between 150-200 animals and is rapidly declining (population growth rate of 0.89).
- Multiple lines of evidence suggest wolf populations are the proximate cause of decline in the TEC herd.
- Habitat recovery will take decades to unfold and interim management actions, such as wolf reduction, are necessary to ensure the persistence of the TEC herd in the near-term.
- Habitat management measures, such as protection and restoration, and primary prey management should occur in conjunction with wolf reduction to support the long-term recovery of the TEC herd.
- Wolf reduction is being proposed over a 15,786 km^2 area in the low-elevation winter range of the TEC range and would be conducted for a 5-year period.
- Wolf reduction will seek to reduce wolves by >80% each year, ultimately reducing the density of wolves to <3 wolves/1000 km^2.
- Wolf reduction will be applied within an adaptive management framework, which will include monitoring caribou, wolf, and moose populations and habitat condition over the course of the program.
- The desired outcome for the TEC wolf reduction program is a stable or increasing population growth rate in 3 of the 5 years and a positive cumulative population growth rate over the course of the 5-year program.
- The first year of wolf reduction will cost approximately $400,000 and will require approximately 0.40 of a biologist's FTE. Over time, required resources and capacity are expected to decrease as the program becomes more efficient.

Introduction

The Tweedsmuir-Entiako caribou (*Rangifer tarandus*) range is located in west-central BC, approximately 140km south of Smithers and 180km west of Prince George. The TEC are a subpopulation of the Northern group of Southern Mountain caribou and are federally designated as "threatened" meaning they could regress to a state of imminent extirpation if limiting factors are not reversed (COSEWIC 2014, EC 2014). The TEC herd has been declining over the past few decades and is currently

estimated at 150-200 individuals, down from an estimated 600 individuals in 1963 (Low 1964, Cichowski 2015).

Declines in caribou populations across Canada have been attributed to the direct and indirect effects of human activities (Environment Canada 2014). Human-induced landscape change, such as forestry and roads, has led to an increase in early seral forests which attract moose, deer, and elk to areas where they were previously not found in high densities. Increased densities of these species, mainly moose in the TEC range, can, and has resulted in more abundant wolf populations. This has led to an increase in predation on caribou and a decline in the TEC population.

In the long term, addressing the ultimate cause of caribou decline through protecting and restoring habitat is key to recovering and stabilizing caribou populations; however, disturbed areas may take decades to recover to a condition that is conducive to caribou persistence. For a relatively small and rapidly declining population residing in a highly disturbed landscape, this time frame may compromise the long-term viability of the TEC herd. Consequently, interim management actions, such as predator reduction, are necessary to achieve population stability and lower the risk of extirpation until the effects of habitat protection and restoration are realized.

In northeast BC, wolf reduction has been underway for four years in support of Central Mountain caribou recovery. This program has resulted in positive demographic responses in three caribou herds within the treatment area, while caribou herds in adjacent non-treatment areas continue to decline (Seip and Jones 2018). In the Klinse-Za caribou herd, the population has increased by 57% and calfrecruitment has increased by 43% following four years of intensive aerial wolf reduction. In the Kennedy Siding caribou herd, the population has increased by 32% in response to wolf reduction, with annual population growth rates as high as 1.26 and calf to cow ratios as high as 67 calves per 100 cows. Within the Quintette caribou herd, calf recruitment has increased from lows of 10% calves to 19% calves in the population following wolf control and a population growth rate of 1.26 was observed following the third year of wolf reduction. Adult female mortality rates have decreased across all herds within the treatment area, with few to zero mortalities associated with wolf predation.

In early 2018, the Predator Feasibility Project (PFP; DeMars and Serrouya 2018 & 2019) was initiated to investigate factors that may influence the feasibility and success of predator reduction in the TEC range. The first phase of the project was completed in March 2018 and addressed the following: 1) how to best monitor the influence of predators on caribou population dynamics, using the TEC herd as a case study, and, 2) the lines of evidence supporting predation impacts on the survival of TEC caribou. Results from these analyses suggested that wolf predation was a key driver in the recent TEC population decline, accounting for >70% of mortalities among radio-collared female caribou from 2014-2018.

The efficacy of wolf reduction for stabilizing the TEC population decline will depend on the direct and indirect method(s) used, the spatial scale over which wolves are reduced, the intensity of reduction and the frequency and duration of reduction. Phase 2 of the PFP was completed in 2019 and outlined a framework for implementing predator reduction within the range of the TEC subpopulation and assessed the efficacy of this tool at reversing the decline of the herd. This operational plan follows recommendations set out by DeMars and Serrouya (2019) in Phase 2 of the PFP.

Caribou Status

Annual population surveys, adult female mortality rates, late winter calf recruitment rates, and population growth rates suggest a rapidly declining TEC population with a high proportion of female mortality caused by wolf predation.

Of the 15 years where data was available to estimate population growth rate between 1985 and 2018, 10 years had declining growth rates, 2 years had stable growth rates and 3 years had increasing growth rates. Between 2014-2018, the population growth rate for the TEC subpopulation was 0.89, which is indicative of a rapidly declining population. Additionally, the cumulative population growth rate since data has been available suggests that the current population has declined by approximately 32% since the 1980s.

Bergerud (1996) recommends a late winter calf recruitment rate of >15% calves to achieve population stability. Annual calf recruitment for the TEC from late winter (March) surveys conducted between 1985 and 2019 suggest that calf recruitment was insufficient to maintain a stable population in 18 of the 20 years that data were available for.

The estimated annual female mortality rate from collared TEC females between 2014-2018 was 21.4, which is considered high. Almost half of the 2015-2018 mortalities of radio-collared female caribou occurred during the winter and wolf predation accounted for 70% of mortalities during the same period. In contrast, confirmed predation mortalities between 1983-2009 were more equally attributed to bears and wolves and confirmed wolf mortalities were evenly spread throughout seasons.

Wolf Status

An ongoing wolf-collaring program has been in place in the TEC range since late 2014. A total of 19 wolves have been fitted with GPS collars over the course of the study, with 2 collars active as of September 2019. The active collars are distributed among two suspected wolf packs. Additional collars in the adjacent Itcha-Ilgachuz caribou range include some of the trans-boundary wolf packs.

A minimum count snow track survey in TEC core winter range was conducted in 2018, yielding a density estimate of 21-30 wolves/1000km^2 in low-elevation winter habitat (Apps et al. 2018). Winter is expected to concentrate packs in low-elevation areas to exploit wintering prey, and the survey estimate might have been inflated by the inclusion of edge packs within a relatively small survey area. Regardless, previous research has suggested that wolf densities greater than 6.5 wolves / 1000 km^2 may result in caribou population declines (Bergerud 2007). Furthermore, Environment Canada recommends wolf densities of <3 wolves/1000km^2 in both core and matrix habitat for caribou recovery (Environment Canada 2014). Therefore, current wolf populations in the TEC range are inconsistent with a positive caribou population trend.

To date, no aerial wolf reduction programs have been conducted in the TEC range. From 1950-1961, widescale wolf poisoning programs were conducted in northern and central BC, including within the TEC range in 1956 and 1957 (BC Ministry of Environment 1979, Bergerud 1978, Hatter 1979). The poisoning program combined with a bounty program that lasted until 1955 resulted in wolf populations declining to their lowest estimated numbers Provincially in the late 1950's (BC Ministry of Environment 1979).

Wolf hunting in the TEC range is managed through a general open season, with an annual bag limit of 3 wolves/person (BC Government 2016). There is also a trapping season for wolves from mid-October to the end of March with no limits on the number taken. Hunting and trapping do not usually result in the removal of complete packs, as remaining pack members can reproduce and recover within one year if adequate resources are available. Partial pack removal can also splinter packs, resulting in more wolves as their territorial system is compromised. Complete pack removal, usually carried out from a helicopter, would likely be a more effective option for meaningful wolf reduction.

Primary Prey Status

Ultimately, long-term reductions in primary prey should occur naturally with the recovery and protection of caribou habitat and a decrease in the extent of early seral forest within caribou matrix range. Because habitat recovery can take decades, active population management of primary prey has been used in the short-term to indirectly reduce predator populations. It is currently not supported by the Province as a standalone recovery tool but should be used concurrently with wolf reduction to a) ensure the long-term stabilization of predator-prey dynamics and, b) reduce the intensity of wolf reduction required in the future.

Reducing, or maintaining, moose densities to <0.15 moose/km^2 is the recommended target for moose in the context of caribou recovery. The moose density in the Tweedsmuir and Entiako moose survey areas is approximately 0.21 – 0.22 moose/km^2, which is likely low or close enough to target densities to support caribou recovery efforts. However, the moose population is likely to respond positively to wolf reduction and may need to be managed to ensure moose density remains low in this area. A strategy for managing moose to support TEC recovery is being developed in the 2019-2020.

Wolf Reduction Operational Plan for Tweedsmuir-Entiako Caribou Recovery

Direct Wolf Control

The proposed wolf reduction treatment area (15,786km^2) is the TEC core winter range with a 25km buffer that was calculated using wolf territory size in the TEC range (DeMars and Serrouya 2019; Figure 1). Wolf density in 2018 was estimated at 21-30 wolves/1000 km^2 (5-6 packs of 13-15 animals) over 2,960 km^2 of low-elevation caribou winter range (Apps 2018). Although there is some uncertainty with this estimate, this would suggest approximately 410 (range 332-474) wolves within the treatment area. The target for the first year of wolf reduction is to remove all wolf packs occurring within the TEC core winter range and reduce wolf densities in the buffer zone to <3 wolves/1000km^2. These targets would require an approximate 88% reduction, or removal of >363 (range 285-427) wolves in the first year. There are overlapping wolf packs with Itcha-Ilgatchuz caribou range, where wolf reduction is also being proposed. Concurrent programs will increase the efficiency and effectiveness of this action for both herds.

As of September 2019, only two wolf collars were active and at least 5-6 packs exist in the area. In order for the program to be successful, an upfront investment in collaring wolves will be necessary. This may occur concurrently with removal and will largely be guided by locating den/activity hot spots and/or tracking. Overtime, removal will be increasingly guided by locating wolves with active collars. A fixed wing

aircraft may be used to more efficiently search the landscape and relay locations of wolves to the removal crew.

Wolves will be removed by aerial shooting from a helicopter. Experienced pilot and wildlife capture/removal crews will be used to ensure efficient and humane removal. When immediate and complete removal of a pack is unlikely during a flight, radio collars equipped with GPS would be deployed on one or two of the wolves within the pack to allow for relocation at a later date. Wolf packs that are radio-collared within the treatment area but are later found outside of the treatment area would be removed because the treatment area is within their pack territory. Similarly, any wolves that are tracked from the treatment area to areas outside the treatment boundary would be removed.

The humaneness of the wolf reduction will be monitored throughout the program. Ministry staff oversight has proven crucial in ensuring humanness in the South Peace Wolf Reduction program (Bridger 2019). Humaneness was closely monitored by Ministry staff by documenting shooting proficiency, shot locations, and subsequent dispatch times of a large subsample of wolves removed during South Peace Wolf Reduction program delivery. The TEC program will use the same methods to ensure humanness to ensure wolf reduction occurs at the highest possible level of humaneness.

The locations of all wolf carcasses will be recorded with a GPS. Given the remote location of the treatment area, the majority of wolf carcasses will not be removed in order to salvage pelts for First Nations or trappers. The time and costs associated with removing carcasses reduces productivity and efficiency of the program. However, in cases where wolf carcasses may be relatively accessible, the locations will be passed on to local First Nations or trappers that may access the locations to salvage pelts.

A community-based ground trapping program will be implemented to augment aerial shooting and support end of season removal. The details of the ground trapping program have yet to be finalized, but will be conducted in collaboration with First Nations communities and will seek to complement the efficiency of aerial efforts.

The wolf reduction program will continue for at least 5 years and it is expected that the intensity of the program will decrease over the course of the 5 years. Wolves have high rates of reproduction and can disperse over large distances, rapidly recolonizing areas after reduction. Annual recolonization rates in northeast BC were 97%, 90%, 72%, and 81% during the first four years of a wolf reduction program (Bergerud and Elliot 1998).

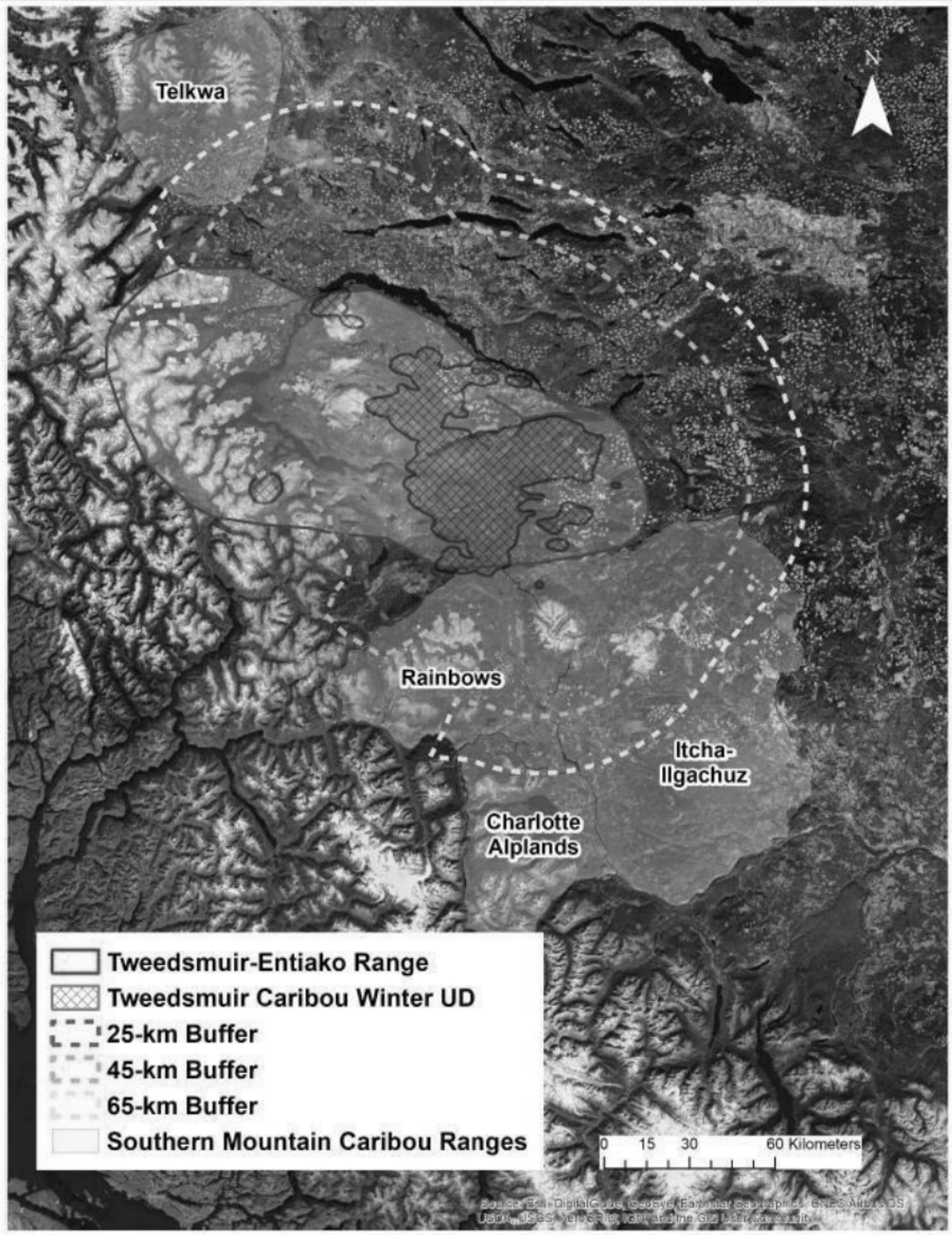


Figure 1. Wolf control treatment area (Tweedsmuir Caribou Winter ID + 25-km Buffer) for the TEC herd. 45 and 65km buffer widths were alternative scenarios to the 25km buffer width which was ultimately recommended. Image from DeMars and Serrouya 2019.

Monitoring and Measures of Success

Study Design

Wolf reduction in the TEC range will be conducted in an Adaptive Management (AM) framework (Demars and Serrouya 2019), which refers to a scientific framework for evaluating the effectiveness of management actions. AM provides stronger inferences about the focal system and why management actions did or did not achieve the desired outcome (Walters and Holling 1990). The AM framework will include extensive monitoring of caribou, wolf, and moose populations and habitat condition to inform the efficacy of wolf reduction at recovering caribou populations. As part of adaptive management, the Before-After-Control-Impact (BACI) design will be employed whereby a comparable caribou herd not undergoing wolf reduction will be monitored in conjunction with the TEC herd. The most suitable reference area is the Wolverine caribou range. There is already on-going collaring and population monitoring of the Wolverine caribou herd, making comparisons between the Wolverine herd and TEC herd relatively easy and with minimal cost. An active AM study design, using the Wolverine caribou herd as a reference will continue for as long as the Wolverine herd does not undergo management actions, after which, wolf reduction will continue in the TEC range without a reference area. Substantial learning can still be achieved with a simpler before-after study design (DeMars and Serrouya 2019).

Caribou Monitoring

Monitoring the response of the TEC herd to wolf reduction will primarily be achieved through ongoing radio-collaring efforts, with the objective of maintaining collars on approximately 25-30 collared females. Collaring will allow for the assessment of adult female survival, mortality, and ultimately, population growth rate. Given the challenges in accurately measuring population size, the finite annual rate of population change (λ) is the most important metric to measure the demographic response of the TEC herd and is calculated using a recruitment-mortality equation. The TEC herd is currently estimated at a minimum of 154 individuals with a population growth rate of 0.89 (declining population). A stable or increasing lambda in 3 of the 5 years and a positive cumulative growth rate over the course of the 5-year program would suggest this management action is eliciting a positive response in the TEC population.

Annual census and recruitment surveys must continue to monitor population numbers, calf survival, and calf recruitment in response to wolf removal; however, calf recruitment may not be a clear indicator of success if other predators (i.e., bears, wolverines, and eagles) are abundant and preying on caribou calves. In addition to survival information gathered from collars, calf recruitment from annual recruitment surveys is crucial for calculating the aforementioned population growth rate.

Predator Monitoring

Monitoring wolf density before and after reduction will be necessary to evaluate whether target wolf densities are being achieved. Current baseline wolf densities for the TEC winter range are between 21-26 wolves/1000km^2 in the low elevation winter range (Apps et al. 2018). The annual objective would be the removal of all wolf packs within TEC core range, leading to the target wolf density of <3 wolves/1000km^2 within the buffered TEC range. Activities conducted through the wolf reduction program allow for wolf densities to be estimated annually. Comparing annual indices of search effort can also yield insight into potential changes in wolf density.

Primary Prey Monitoring

Monitoring primary prey populations will be necessary to monitor for potential eruptions in primary prey populations post-wolf reduction and to assess the effectiveness of management actions to maintain current prey densities. An extensive program exists to monitor moose populations in the Entiako portion of the TEC herd range and includes collaring, mortality investigations, and calf survival estimates. Additionally, moose abundance is estimated every five years via stratified random block surveys. In between such surveys, estimates of population trend can be derived from hunter harvest data or with collared female mortality and recruitment data (if available). This monitoring will suffice to support the adaptive management framework proposed for wolf reduction.

Monitoring of range and matrix habitat conditions

Achieving self-sustaining populations of caribou will require habitat recovery to a level that is conducive to population persistence. Without restoration and protection to promote habitat recovery, management actions, such as predator reduction, will need to be continued in perpetuity and public support for these controversial measures will likely wane. Monitoring habitat conditions (i.e. the percent of early seral forest within and adjacent to caribou range and linear feature densities) will be completed every 3-5 years via remote sensing and GIS analyses. Habitat condition analyses have recently been conducted for the TEC range (January 2019). The federal Recovery Strategy recommends limiting disturbance within low-elevation winter range and Type 1 matrix range to <35%, and that disturbance within other seasonal ranges be "minimal"; however, the relationship between disturbance and caribou population dynamics remains uncertain. Given that the TEC herd is likely declining due to disturbance-mediated apparent competition, a key objective of habitat monitoring will be to ensure that the amount of habitat recovery exceeds that of new disturbances within the TEC range (i.e. a positive habitat trend). An increase in functional caribou habitat should eventually lead to less of a need for active management actions such as predator and primary prey reduction.

Obstacles to a Tweedsmuir-Entiako Caribou Recovery

There are other factors that influence caribou recovery that go beyond controlling wolves. The following confounding factors may affect the success of population management interventions and influence the magnitude of expected results:

- While McLennen et al. (2012) found excessive predation on mountain caribou was not linked to body condition using historic data (1984-2009), climate change and increasing landscape change appear to be placing additional physical stress on ungulates. These stressors can manifest as decreased body condition and/or increased prevalence of disease/pathogens. Both of these factors can contribute to increasing predation vulnerability and direct mortality such that some individual caribou may die from health factors despite the decreased abundance of wolves.

- Farnell et al. (1996) studied a moose-caribou-wolf system in the Yukon, without wolf control, that was able to support increasing caribou populations while moose numbers also increased. They hypothesized that wolves preyed primarily on moose and that caribou winter habitat/distribution reduced wolf predation pressure, allowing the caribou population to grow. Although this has been noted to occur, BC does not currently have a herd range with similar conditions such that increases in

both caribou and moose populations are expected. Observed moose densities in the Yukon study area (0.13 - 0.32 moose/km2) were low relative to most BC caribou ranges within the Southern Mountain National Ecological Area and closer to the target moose densities expected for caribou recovery in BC (0.15 – 0.3 moose/km2).

- Finally, while grizzly bear and wolverine are not thought to have increased as a result of human-caused landscape change, both predators represent important sources of adult caribou mortality and both are major predators of caribou calves. Their influence on caribou survival, recruitment and ultimately, population growth is largely unknown.

- Predation by wolves is likely the proximate cause of decline in the TEC herd. However, caribou are not the primary prey for wolves throughout the herd range. Increased moose abundance, driven by early seral habitat, is likely the driver of high wolf densities. Primary prey and habitat management (i.e. protection and restoration) must be considered to support long-term caribou recovery.

- The impact of climate change on caribou habitat and population dynamics is largely unknown. A more thorough understanding of how climate change may shift habitat availability, change the presence/abundance of other prey species, and influence caribou health is required to inform long-term caribou recovery.

Annual Budget Requirements

Budget requirements for the first year of wolf reduction in the TEC range are listed in Table 1. It is expected that the program will become more cost and time efficient over the course of the 5 years of implementation. The South Peace Wolf Reduction Program increased in efficiency and efficacy as crews gained more experience and familiarity with the treatment area and as the operational oversight by Ministry staff has increased (Bridger 2019). While it is expected that efficiency of the program will increase, it is challenging to explicitly detail how costs may change in future years without having gleaned operational considerations from year 1 of implementation. That being said, examples of potential cost savings include:

1) It is expected that required support from a contract biologist will decrease over time as the program becomes more established.
2) There is an upfront investment in collaring caribou for the program. Costs of collars and deployment may not be as high for all years of the program.
3) Wolf reduction rates should decrease over time, potentially leading to less funds being required for removal in years 3-5.

Table 1. Estimated annual budget for implementing a comprehensive predator reduction program in the Tweedsmuir-Entiako caribou herd range.

Aerial Wolf Removal		**Costs**
Wolf Collar Purchase	7 collars @ $2000/collar (9 collars to be deployed)	$14,000
Contract Biologist	Contract biologist to support the reduction program (coordination, logistics, data	$22,000

	management, mapping, contract supervision and monitoring)	
Helicopter Flight Costs	180 flight hours @ $1500/hr (includes fuel) To include wolf collar deployment	$255,000
Gunner Costs	$1000 / day * 30 days	$30,000
Handler Costs	$600 / day * 30 days	$18,000
Accommodation for Crew	$500 /day * 30 days	$15,000
Equipment Costs	Ammunition, etc.	$1,000
Fixed Wing	$400 / hr * 60 hours	$24,000
Community-based Ground Trapping	Support for First Nations and trappers to enhance reduction	$22,000
	Total	**$392,000**
Caribou Monitoring		
Caribou collar purchase	12 GPS collars @ $1500	$18,000
Caribou collar deployment (13 to be deployed)	Est 18 flight hours *$1250/hr (wet rate)	$22,000
Recruitment Survey (Annually first 3 years, then every 2nd year)	7 Hours @~$1250/hr (wet rate)	$8000
	Total	**$48,000**

Acknowledgements

This report was prepared by L. Grant and A. Roberts with support from J. Lee and is based on a template from previous draft plans developed by Mike Bridger (Wildlife Biologist NE region). It also uses significant content from a recent report drafted by C. DeMars and R. Serruoya (2019). Recommendations for implementing and evaluating predator management within the Tweedsmuir-Entiako and Hart Ranges caribou herds: Predator feasibility project phase II.

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Appendix B

BRITISH COLUMBIA | Ministry of Forests, Lands and Natural Resource Operations

FISH, WILDLIFE AND HABITAT MANAGEMENT BRANCH
ANIMAL CARE APPLICATION FORM

PLEASE TYPE

For office use: Date Received: Project Number:

Project Title: Itcha-Ilgachuz, Quesnel Highland& Tweedsmuir-Entiako Caribou Capture and Wolf Reduction in Itcha-Ilgachuz & Tweedsmuir-Entiako to Support Caribou Recovery

2. Starting Date: January 15, 2021 **Completion Date: April 20, 2022**

3. Principal Investigator:

Name: s.15; s.19 s.15; s.19
Position:
Department/Organization: s.15; s.19
Region/Institution: n/a

Phone: s.15; s.19
Fax: n/a
E-mail:

Experience related to the described proposal:

s.15; s.19

4. Additional Investigators:

a) Secondary Pilots

Name: s.15; s.19
Position:
Department/Organization: s.15; s.19
Region/Institution: n/a

Experience related to the described proposal:

s.15; s.19

c) Net Gunners

Name: s.15; s.19
Position: Primary Net-gunners and Shooters
Department/Organization: s.15; s.19
Region/Institution: n/a

Experience related to the described proposal

s.15; s.19

s.15; s.19

5. Project Proposal

The Itcha-Ilgachuz caribou population is currently designated as Threatened in schedule 1 of the federal Species at Risk Act. The Itcha-Ilgachuz caribou have been regularly monitored since 1985 with population surveys generally occurring in June, shortly after the calving period when the majority of adult female caribou utilize alpine habitat in the Itcha and Ilgachuz mountain ranges. The Itcha-Ilgachuz caribou population has declined steeply since the herd's population peak in 2003. In June 2019, population inventory for this herd reported a sightability corrected population estimate of 385 caribou. The finite population growth rate (lambda, or λ) describes the proportional change in population size over a discrete time period. From 2018-2019, lambda for the Itcha-Ilgachuz herd was 0.604, which indicates a 40% decline in the herd from 2018 (N=637) to 2019 (N=385). The 2018-19 adult female survival rate was 80%. This is below the threshold of adult female survival of 88% associated with stable caribou populations. The average annual rate of decline over the past 10 years (2009-2019) is 23.2%, while the average rate of decline over the past three years (2017-2019) is 33.4%, suggesting that the rate of decline may be accelerating. Given the three-year average rate of decline, it is possible the herd will be functionally extirpated (<20 animals) from the Chilcotin in eight years, although this may be sooner if the decline continues to accelerate. Since wolf reduction efforts began, this herd has increased by 165 animals, and the population growth rate (lambda, λ) has changed from steeply declining (2018-2019 λ = 0.60) to increasing (λ =1.08). One of the largest early indications of success appears to be in calf recruitment, which indicates how many calves are surviving to adulthood to reproduce, measured via surveys in late winter (March). Calf recruitment changed from 8% in 2013, the last time it was measured before wolf removal, to 24% in 2021, which is above the recommended replacement level of 15%. Neonate percentages were at 25% in June 2020, while late winter recruitment the following late winter was 24%, indicating high calf survival to reproductive age. The preliminary results of predator reduction show encouraging signs for Itcha-Ilgachuz caribou recovery; however, further monitoring is required to confirm the response of this herd to wolf reduction actions.

The Tweedsmuir-Entiako caribou (TEC) are a subpopulation of the Northern group of Southern Mountain caribou and are federally designated as "threatened" meaning they are at risk of extirpation if limiting factors are not reversed. The TEC herd has been declining over the past few decades and is currently estimated at 150-200 individuals, down from an estimated 600 individuals in 1963. Annual population surveys, adult female mortality rates, late winter calf recruitment rates, and population growth rates suggest a rapidly declining TEC population with a high proportion of female mortality caused by wolf predation. Between 2014-2018, the population growth rate for the TEC subpopulation was 0.89, which is indicative of a rapidly declining population. Additionally, the cumulative population growth rate since data has been available suggests that the current population has declined by approximately 32% since the 1980s. The estimated annual female mortality rate from collared TEC females between 2014-2018 was 21.4, which is considered high. Almost half of the 2015-2018 mortalities of radio-collared female caribou occurred during the winter and wolf predation accounted for 70% of mortalities during the same period. In contrast, confirmed predation mortalities between 1983-2009 were more equally attributed to bears and wolves and confirmed wolf mortalities were evenly spread throughout seasons. Following the first year of wolf reductions for this herd in February - March 2020, the TEC calf survey in June 2020 observed an increase in calf numbers from 30 calves: 100 cows in 2019, to 45 calves: 100 cows in 2020. Following predator reduction in 2020 and 2021, there was an increase in the proportion of calves counted during the neonate surveys (30% calves in 2020, and 36% calves in 2021) compared to the previous estimate of 20% counted in 2019. The 2021 recruitment survey also yielded a

high percent calf ratio at 23% calves. Additionally, in the fall of 2021, the largest minimum count since 2006 was recorded at 166 caribou, and population growth rate (lambda, λ) has changed from λ= 0.86 (2014-2019) pre wolf reduction to increasing λ=1.03 (2020-2021). The preliminary results of predator reduction show encouraging signs for caribou recovery; however, further monitoring is required to confirm the response of the TEC herd to this management action.

Consistent with other research examining woodland caribou mortality predation is considered to be the proximate cause in the observed decline of the Itcha-Ilgachuz and Tweedsmuir caribou, with wolves considered to be the primary predator responsible for herd decline. The reduction of wolves has been shown to be effective for reversing the trends of declining woodland caribou populations in BC. Reduction efforts must be intensive and applied with the highest standards of scientific rigor and humaneness. The wolf reduction efforts in the Itcha-Ilgachuz and Tweedsmuir caribou herd are expected to support recovery while the ultimate causes of population declines (i.e. habitat-related impacts) are addressed. Radio-collaring individual wolves from wolf packs greatly increases the efficacy of removing entire wolf packs over the course of the winter; complete pack removal is an objective of intensive wolf reduction programs. Concurrent with aerial wolf reduction and collaring efforts, caribou will also be captured and radio-collared for ongoing population monitoring purposes.

*Operational plan for the Itcha-Ilgachuz and Tweedsmuir-Entiako wolf reduction program is attached.

A. Background – Goals and Objectives:

Wolf reduction has been identified as an effective short-term management action for supporting the recovery of woodland caribou in BC.

The goals and objectives of this project are to:

1) conduct net-gun aerial capture of individual wolves from all packs located within the Itcha-Ilgachuz and TEC treatment area to deploy radio collars and health sample 1-2 wolves per pack for the purpose of increasing the efficiency of aerial removal (humane removal);
2) using radio collar locations to identify pack locations, humane removal (via aerial shooting) the majority of wolves (>80%) found within the treatment area and reduce the wolf density to below 3 wolves per 1000 km^2;
3) conduct net-gun aerial capture of individual caribou to deploy radio collars and health sample to monitor response of the Itcha-Ilgachuz, Barkerville and TEC population and inform adaptive management
4) implement scientific rigor and the highest possible standards for humaneness, and report out on all facets of the program

B. Key Expected Results and Management Implications:

1) Radio-collar deployment on individual wolves from the majority of wolf packs within the treatment areas with biological sampling for health profiles.
2) Reduction of the majority (>80%) of wolves via aerial shooting
3) Simultaneous monitoring of caribou populations via radio-collaring to report population growth, health parameters, adult female survival, and calf survival in response to wolf reduction
4) Ultimately, expecting positive caribou population growth on an annual basis (target 15% annually)

6. CCAC Invasiveness Category: (see Appendix A)

A_____B_____C_____D x ___

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7. Species and Number of Animals Required: (include justification of numbers predicted to be used)

Species: Wolf (*Canis lupus*)

Number expected for 2022: approximately 23 radio collar deployments (16 in Itcha-Ilgachuz, 7 in Tweedsmuir-Entiako), up to 200 to be humanely removed.

The number of radio collars to be deployed is contingent on the number of wolf packs within the treatment area. It is estimated that there will be between 10-15 packs within the Itcha-Ilgachuz and 5-10 wolf packs within the TEC treatment area. Radio-collar deployment is generally non-selective but will be applied to adult wolves preferentially and of both sexes.

The number of wolves to be humanly removed is also dependent on the number of wolves present within the treatment area. It is estimated that at least 75-150 wolves will be humanly removed across both treatment areas.

Justification for numbers: The number of wolves to be radio-collared is based on the estimated number of wolf packs in the treatment area. Having at least one wolf radio-collared within each pack greatly increases the efficacy of humanely removing subsequent wolves from the pack. It is estimated that at least 75-150 wolves will be humanely removed from both treatment areas in order to achieve greater than 80% reduction rate required to support caribou recovery.

Species: Caribou (*Rangifer tarandus*)

Number expected for 2022: approximately 30 radio collar deployments (10 in Itcha-Ilgachuz, 5 in Quesnel Highlands and 15 in Tweedsmuir-Entiako).

The number of radio collars to be deployed is based on maintaining an approximate sample size in both study areas of a desired number. We will be capturing primarily female caribou.

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8. Details of Capture, Handling and Surgical Procedures and Final Disposition:
(be detailed and SPECIFIC, attach additional pages, if necessary)

Please refer to Appendix B - CCAC guidelines on: the care and use of wildlife (2003) **for techniques considered appropriate and other guidelines for handling and care.**

Capture Technique:

Wolves will be captured for radio collar deployment via aerial net-gunning, and humane removal will occur via aerial shooting. Caribou will be captured for collar deployment via aerial net-gunning.

Helicopter captures and removal will take place between January and the end of March using aerial net gunning and physical restraint and aerial shooting. An MD500D helicopter will be used to track and target wolves in snow-covered, sparsely treed habitats and frozen watercourses suitable for safe capture or removal. Deep, soft snow is preferred as it will slow animals, make their movements more predictable, and reduce the risk of injury during capture, and increases the likelihood of accurate, humane shooting.

Net-gunning – Wolves and Caribou: The identified personnel (s.15; s.19

s.15; s.19

s.15; s.19

Method of Handling:

Each wolf or caribou will be handled by an experienced handling crew. As described above, the net-gunner will be the first

to engage with the animal after it has been entangled in the net.

For wolves: The net-gunner will use a Y-pole to pin the wolf to the ground by applying the Y-pole directly behind the animal's head. The handler will approach the wolf with the catch-pole, and secure the mouth closed using the catch pole snare. Once the catch-pole snare is confirmed to be secured, the crew will apply a commercial dog muzzle and/or multiple wraps of duct tape around the wolf's muzzle to ensure it is unable to bite and blindfold the animal. The wolf will then be hobbled as described above.

For caribou: The net-gunner and handler will immediately approach the animal, with the handler going to the back of the animal and applying weight carefully on the rump to secure the animal and help the net-gunner to untangle the net. A blindfold will then be applied to reduce visual stress and the neck and head carefully restrained. Hobbles will then be applied by securing the right front leg to the right back leg, and the left front leg to the left back leg. Rectal body temperature will be taken immediately following restraint. Animals showing evidence of extreme stress (body temperatures above 41°C, open mouth breathing and tremors, in poor body condition) will be released immediately after basic sampling if possible or none at all. Animals with previous injuries not considered survivable will be humanely removed by gunshot to the head. Rangifer have been listed as one of the potentially susceptible species for SARS-CoV-2. All personnel handing caribou will be symptom-free, and fully- vaccinated or received a negative test for SARS-CoV-2 within 48 hours of starting the capture session.

For wolves and caribou: The net(s) will be removed from the wolf or caribou which will then be positioned to minimize discomfort (i.e. sternal or lateral recumbency, head slightly uphill, head free from deep snow). Once fully immobilized, the crew will assess the wolf or caribou for any injuries that may have occurred during capture and confirm the animal's general health and sex. The restraining process generally takes less than 2–3 minutes, at which point the radio-collaring and sampling procedures will begin. Small crews of two personnel will be used to minimize stress, and sudden movements or auditory stimuli will be kept to a minimum. To release the wolf or caribou, it is first pointed in a safe direction of travel away from the crew, helicopter, or any hazards.

For wolves: Once sampling and collaring is completed, the catch-pole snare is securely attached around the mouth, at which point the muzzle or tape around the wolf's muzzle is carefully removed and the Y-pole is re-applied. The blindfold is removed, the hobbles are removed, and the catch-pole is released, and finally the Y-pole is lifted.

For caribou: Once sampling and collaring is completed, the animal is positioned to rise in a direction away from the team, the blindfold is removed, followed by removal of the hobbles.

Other Procedures: (Marking method, Sampling)

Each wolf and caribou will be fitted with a satellite GPS radio-collar (Caribou = Vectronics Vertex Lite 2D =1700 g, Wolves = Vectronics Vertex Lite 2D =1500 g). The radio collar will be applied by the most experienced crew member to ensure the correct fit. Radio-collars will be fitted to ensure comfort for the animal, while ensuring that they are not too loose as to slip off or cause irritation (generally two fingers fitted vertically). Radio-collars fitted on younger animals, if necessary, will be slightly looser to allow for growth. For wolves, satellite collars will be programmed to obtain positional fixes every 3–4 hours over the course of the winter to acquire up-to-date location information to support reduction efforts. For caribou, satellite collars will be programmed to obtain position fixes twice a day during most seasons and up to 6 times a day during calving. Radio-collared wolves will either be left alive following the winter's removal efforts in order to collect further data and to support removal efforts the following winter, or they will be humanly removed once all other pack members have been removed.

Biological samples will be taken by the crew as per standardized Wildlife Health Program protocols while the wolf or caribou is immobilized. The total time associated with radio-collar attachment and sample collection takes less than 10 minutes for wolves and less than 15 minutes for caribou.

The radio-collars contain an internal tip switch to detect animal movement rates and are programmed to send a mortality alert via email and text message if no movement is detected for a sustained period of time (12 hours). Immediate investigation of mortalities is not anticipated for wolves, although radio collars will be picked up as soon as logistically feasible and an investigation on cause of death will occur if possible. Caribou mortalities will be investigated as per the standardized Wildlife Health Program protocol by Ministry staff. Collars include label plates instructing hunters/trappers to contact FLNRO if they harvest a collared wolf, or a collar is found.

Additional data will be recorded, and samples will be taken by the handling crew while animals are physically restrained according to the standardized BC wolf and caribou sampling protocols (Appendix C):
For wolves:

- Age class using tooth eruption/wear/staining as an index (if visible under the tape)
- Sex
- Colour
- Pack size
- Location
- Body condition
- Photos
- Presence of old injuries or new capture-related injuries
- External parasite presence and prevalence
- From each wolf, 10 to 15 ml of blood will be withdrawn from the saphenous or cephalic vein for serological screening (parvovirus, Neospora, distemper), ensuring bleeding has stopped before releasing the animal
- Each wolf may be ear-tagged with a unique identifier number, and a 6 mm punch biopsy of the ear will be air-dried and archived for genetics
- Approximately 100 hairs with roots from the top of the shoulders from each wolf for genetic or other studies (e.g., stress assessment through cortisol levels, diet analysis with stable isotopes).

For caribou:

- Similarly, data will be recorded on the standard BC caribou capture form and samples will be taken by the crew while the caribou is physically restrained. This will include all samples and data required by the *BC Caribou Research Capture Sampling Protocols*. Samples will be processed each evening and stored before shipping to the BC Wildlife Health Program.

Contingency Plan: (what training, preparations and equipment are available in event of animal injury during capture or handling)

The following measures will be in place to reduce the risk of injury to wolves:

1) Capture crews are personnel with extensive experience in capturing, handling and shooting wild canids.
2) At least two out of three personnel are trained in first aid and CPR and avalanche safety?
3) Aerial net-gun captures will be conducted in deep, soft snow in ambient temperatures of between 0 to -25 C, on terrain consisting of flat or rolling terrain and not exposed ground or open water and animals will be assessed and monitored during physical restraint.
4) The capture crew will have a satellite phone to contact other experienced professionals and veterinarians for advice and guidance for any unusual circumstances that arise in the field
5) A firearm will be available for humane killing of any wolves or caribou badly injured during net-gun captures
6) While mortalities can occur with capture operations any mortality must be investigated and if the mortality rate exceeds 2% the operation must cease and the wildlife veterinarian and project lead contacted immediately.

Method of Humane Removal and Disposal Technique: (if necessary)

In the event of an animal being injured without a chance of survival after release, it will be euthanized humanely by high caliber gunshot to the brain and samples taken to confirm cause of death. Wolf carcasses may be sampled and left in the

field unless brought back to the lab for examination or necropsy and disposal at the dump, and pelts may be offered to First Nations. Caribou deaths will be documented and followed by full necropsy and sampling if possible.

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9. Details of Potentially Controversial Procedures and Justification: (Include any expected morbidity and methods used to avoid)

Animal welfare is of high priority for this project. All net-gun captures will occur following the procedures described above (and in the regional SOPs for aerial net-gun capture). Few complications have been observed using this protocol. Aerial shooting of wolves is considered the most effective and humane method of removing wolves in remote, expansive areas, with the ability to target without bycatch occurring (AVMA, 2013). All possible measures will be taken to ensure the ethical and humane removal of wolves.

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10. Budget:

Funding sources applied for: **Provincial Caribou Recovery Program**

Are these peer reviewed? Yes (the region's wolf reduction programs have undergone internal and external reviews to measure effectiveness)

Status: Approved

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11. Region:

The wolf reduction and caribou capture will occur within the TEC treatment area. The treatment boundary covers an area of approximately 15,786 km^2 in the mountain caribou range of west-central British Columbia. The treatment area was identified due to the recovery urgency for this particular caribou herd.

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12. Permit:

Is a permit required? Yes **Status**: Pending Decision

Please attach any permit documents to application.

Please send the completed BC Animal Care Form Application Form to the Permit & Authorization Service Bureau (PASB) along with a General Permit Application, detailed project proposal and permit fees (if applicable). For further information on how to apply, please visit the PASB website at http://www.env.gov.bc.ca/pasb/ or call PASB at 1-866-433-7272 (to bypass

phone tree push 231).

Approval of an Animal Care Application does not constitute approval of any application to handle wildlife. Applicants must also have a valid permit, issued under the Wildlife Act, before engaging in any such activity.

Principal Investigator's Signature **Date of Application**

Appendix A:

Canadian Council on Animal Care: Categories of Invasiveness for Wildlife Studies

A. Methods used on most invertebrates or on live isolates

Possible examples: the use of tissue culture and tissues obtained at necropsy; the use of eggs, protozoa or other single-celled organisms; experiments involving containment, incision or other invasive procedures on metazoa.

B. Methods used which cause little or no discomfort or stress

Possible examples: observational studies in which the same individuals are not repeatedly observed so as to habituate or otherwise modify their behavior; census or other surveys which do not involve capture or marking individuals; non-invasive studies on animals that have been habituated to captivity; short periods of food and/or water deprivation equivalent to periods of abstinence in nature.

C. Methods which cause minor stress or pain of short duration

Possible examples: capture, using methods with little or no potential to cause injury and marking of animals for immediate release; long-term observational studies on free-ranging animals where the behaviour of individuals may be altered by repeated contact; brief restraint for blood or tissue sampling; short periods of restraint beyond that for simple observation or examination, but consistent with minimal distress; short periods of food and/or water deprivation which exceed periods of abstinence in nature; exposure to non-lethal levels of drugs or chemicals; low velocity darting and slow-injection darts with immobilization chemicals. Such procedures should not cause significant changes in the animal's appearance, in physiological parameters such as respiratory or cardiac rate, or fecal or urinary output, in social responses or *in ability to survive*.

Note: During or after Category C studies, animals must not show self-mutilation, anorexia, dehydration, hyperactivity, increased recumbency or dormancy, increased vocalization, aggressive-defensive behavior or demonstrate social withdrawal and self-isolation.

D. Methods which cause moderate to severe distress or discomfort

Possible examples: *capture, using methods that have the potential to cause injury (e.g. Leg snares, leghold traps, high velocity darting and rapid-injection darts with immobilization chemicals, net gunning, etc.); maintenance of wild caught animals in captivity*; translocation *of wildlife to* new habitats; major surgical procedures conducted under general anesthesia, with subsequent recovery; prolonged (several hours or more) periods of physical restraint; induction of behavioral stresses such as maternal deprivation, aggression, predator-prey interactions; procedures which cause severe, persistent or irreversible disruption of sensorimotor organization.

Other examples *in captive animals* include induction of anatomical and physiological abnormalities that will result in pain or distress; the exposure of an animal to noxious stimuli from which escape is impossible; the production of radiation sickness; exposure to drugs or chemicals at levels that impair physiological systems. *(NB. Experiments described in this paragraph would be Category E if performed on wildlife immediately prior to release.)*

Note: Procedures used in Category D studies should not cause prolonged or severe clinical distress as may be exhibited by a wide range of clinical signs, such as marked abnormalities in behavioral patterns or attitudes, the absence of grooming, dehydration, abnormal vocalization, prolonged anorexia, circulatory collapse, extreme lethargy or disinclination to move, and clinical signs of severe or advanced local or systemic infection, etc.

E. Procedures which cause severe pain near, at, or above the pain tolerance threshold of unanesthetized conscious animals

This Category of Invasiveness is not necessarily confined to surgical procedures, but may include exposure to noxious stimuli or agents whose effects are unknown; exposure to drugs or chemicals at levels that (may) markedly impair physiological systems and which cause death, severe pain, or extreme distress; behavioral studies about which the effects of the degree of distress are not known; *environmental deprivation that has the potential to seriously jeopardize an animal's wellbeing*; use of muscle relaxants or paralytic drugs without anesthetics; burn or trauma infliction on unanesthetized animals; a euthanasia method not approved by the CCAC; any procedures (e.g., the injection of noxious agents or the induction of severe stress or shock) that will result in pain which approaches the pain tolerance threshold and cannot be relieved by analgesia (e.g., removal of teeth without analgesia, or when toxicity testing and experimentally-induced infectious disease studies have death as the endpoint)*, capture methods with a high potential of causing severe injury that could result in severe chronic pain and/or death.*

Appendix B:

Canadian Council on Animal Care guidelines on: the care and use of wildlife (2003)

http://www.ccac.ca/english/gui_pol/GUFRAME.HTM
http://www.ccac.ca/english/gdlines/wildlife/Wildlife.pdf

Appendix C:

BC Caribou and Wolf Sampling Protocols

BC Caribou Research Capture Sampling Pro

BC Wolf Capture Sampling Protocols_C

Appendix C

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2021 Indigenous Government Consultation Report for Predator

BRITISH COLUMBIA

1 EXECUTIVE SUMMARY

Engagement and consultation followed a three-pronged approach. Our Lands and Resource Specialist, Loni Arman, lead a comprehensive Indigenous consultation process that included direct communications with 45 Indigenous governments whose traditional territories overlapped the proposed predator reduction areas. Consultation with guide outfitters, trappers, and regional wildlife regulation advisory committees formed the foundation for the impacted tenure holder consultation lead by our land and resource coordinator Oliver Holt. Finally, a virtual engagement process was available through our engage.gov.bc.ca/caribou website that provided an opportunity for the general public to complete a survey and have their voices heard.

2 CONTENTS

3 BACKGROUND

This report is for the Itcha-Ilgachuz and Tweedsmuir herds.
SDM is Director of Resource Management: Chris Swan.

The British Columbia Caribou Recovery Program is considering a five-year approval for the continuation of predator reduction to support the recovery of the Columbia North, Central Selkirks, Hart Ranges, Itcha-Ilgachuz, Graham, Tweedsmuir-Entiako, Pink Mountain, Chinchaga, and South Peace caribou herds (Scott E, Moberly, Kennedy Siding, Quintette and Narraway), commencing in the winter of 2021-2022. This would include wolf reduction in all aforementioned herds, and cougar reduction specifically in the Central Selkirks and Columbia North herds. Additionally, a new predator reduction program is being proposed for the North Cariboo Mountains herd, to commence in the winter of 2021-2022 for an initial 5-year program approval.

A review of RAAD and ethnohistoric information has determined that there are several Arch sites and TUS info within the proposed predator reduction areas - there will be no impacts to these sites.

A review of land-use designations and available information has resulted in the following finding: The activity area includes the Southern Mountain Caribou (Central and South group) which is considered to be Red Listed. The activity is being proposed to help declining caribou populations. A critical caribou habitat is in the area and will not be impacted by the activity. The proposed activity is located in/near to an area recognized to be of high value to migratory birds. The anticipated impact to this habitat value is LOW . The proposed activity is located in an area recognized to be of part of a Migratory corridor. The anticipated impact to this habitat value is LOW .Wildlife habitat values have been specially ascribed to this area. Ungulate Winter Ranges are located in the proposed activity. Designated Core Caribou Habitat is located in the proposed activity area. Wildlife Habitat Areas are located in the proposed activity area. The activity is in or near to a recognized Sensitive Fish Watershed, no impacts will occur. The activity is in or near to a recognized Fish Bearing Stream.

If approved, this application is assessed to have minor impacts to Treaty Rights and Aboriginal Interests as there is no land alteration, no permanent closures or permanent structures, no increase to access associated with this authorization, as well riparian and water ways will not be impacted. For threatened caribou populations, reducing the density of wolves in caribou habitat is the quickest and most effective short-term management tool to reverse declining caribou population trends.

Based on the initial impact assessment consultation was initiated at the normal level with a 60 day timeline for response.

Based on current information and knowledge, further consultation with First Nations is not required, although a follow up with Lhtako Dene and Neskonlith should occur.

The Province’s efforts to engage and consult with all the impacted First Nations has been carried out in good faith and the process of consultation was fair, open and transparent. The Province has provided First Nations with an adequate opportunity to provide comments and concerns regarding the proposed application. Consultation with First Nations is complete and the Statutory Decision Makers for the above-noted authorizations can proceed to decision.

3.1 Preparation and Initiation

Prior to consultation, Caribou Recovery Program staff reached out to each Regions First Nations Relation team for advice and guidance.

Consultation Area Database (CAD) was used to determine which First Nations overlap the herd boundaries where the proposed predator reduction programs will be implemented. The Profiles of Indigenous Peoples (PIP) was used to identify consultation procedures with each Nation and to identify Chiefs and referral staff. PIP provides one-stop access to information previously accessed through the Consultation Area Database (CAD) and community profiles of the Aboriginal Engagement Corporate Information Site (AECIS). It acts as government's "address book" for contact information as well as consultation advice and consultation area geometries.

3.2 Impact Assessment

If approved, this application is assessed to have minor impacts to Aboriginal Interests including Treaty Rights as there is no land alteration, no permanent closures or permanent structures, no increase to access associated with this authorization, as well riparian and water ways will not be impacted. For threatened caribou populations, reducing the density of wolves in caribou habitat is the quickest and most effective short-term management tool to reverse declining caribou population trends. Based on the initial impact assessment review, the Province is proposed consultation at the normal level (60 days).

In assessing Aboriginal rights claims, consultation staff reviewed the readily available information related to the activities, practices, traditions, and customs integral to the distinctive culture for the known First Nations of the area prior to contact with Europeans.

Based on the initial impact assessment consultation was initiated at the normal level with a 60 day timeline for response.

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4.3 Accommodation

No accommodation is required at this time. Where requested the Regional Bios should reach out to the Nations to provide GPS locations of the carcasses in order for them to retrieve for traditional purposes.

4.4 Other Issues

In meetings and letters provided, the Nations concerns was that Predator Reduction is a short term action, all would like to see more protections, rehab and better practices for Natural Resource Extraction. The Province should provide a rationale as to how recovery will be realized in the long term - including how much habitat will be protected, where rehab is being completed and any BMP's that industry are following.

A Reason's for Decision should be completed by each SDM and provided to Nations that were engaged in the process.

4.5 Recommendation

Based on current information and knowledge, further consultation with First Nations is not required, although a reasons for decision should be provided to all Nation.

The Province's efforts to engage and consult with all the impacted First Nations has been carried out in good faith and the process of consultation was fair, open and transparent. The Province has provided First Nations with an adequate opportunity to provide comments and concerns regarding the proposed application. Consultation with First Nations is complete and the Statutory Decision Makers for the above-noted authorizations can proceed to decision.

Prepared by: Loni Arman, Lands and Resource Specialist, Caribou Recovery Program
Loni.Arman@gov.bc.ca 250-997-2171

5 Communication Log

Nation	Date/Type	Sender	Comms
Cheslatta Carrier Nation	September 15, 2021/ Initial Letter	Loni Arman	**Consultation regarding predator r**
	October 27, 2021/ Follow up	Loni Arman	**RE_ Consultation regarding predator r**
Da'naxda'xw/ Awaetlala First Nation	September 15, 2021/ Initial Letter – sent to Nanwakolas		**Consultation regarding predator r**

	Clearing house as per guidance		
	October 12, 2021/ Response	Bill Glendale	DNDX Response 21-511.pdf
Haisla Nation	September 15, 2021/ Initial Letter	Loni Arman	Consultation regarding predator r
	October 27, 2021/ Follow up	Loni Arman	RE_ Consultation regarding predator r
Heiltsuk Nation	September 15, 2021/ Initial Letter	Loni Arman	Consultation regarding predator r
	October 27, 2021/ Follow up	Loni Arman	RE_ Consultation regarding predator r
	November 1, 2021/ Response	s.18.1	From: Arman, Loni FLNR:EX Sent: November 1, 2021 10:49 AM To: s.18.1 <s.18.1 s.18.1

x+1201294622429896@mail.asana.com
Subject: RE: Consultation regarding predator reduction to support caribou recovery_Heiltsuk

HI s.18.1
I'm sorry to hear that your community is going through this.

I'm not sure when you will be back to capacity, but we could possibly do a presentation the week of the 15th and have comments due by the following week? Please let me know if this would work for you and some possible dates/times for a presentation (we have been scheduling one hour which allows for the presentation and a Q/A) – realizing that you may not know of potential dates at this time.

I will be in and out of the office this week but will be checking emails, I will schedule a presentation once you have a better idea of potential times.
Thank you,

From: s.18.1
s.18.1
Sent: October 29, 2021 7:52 AM
To: Arman, Loni FLNR:EX <Loni.Arman@gov.bc.ca>; s.18.1
s.18.1
s.18.1

x+1201294622429896@mail.asana.com
Subject: RE: Consultation regarding predator reduction to support caribou recovery_Heiltsuk

Hi Loni – thank you for your email.

Our community is currently dealing with a COVID outbreak. That said, we'd like to schedule a presentation with you and your team member once we're back on our feet. I'd anticipate Heiltsuk will have feedback for you once we've seen your presentation and had some time to discuss internally and with our own wildlife experts.

Are we able to touch base with you once we are open again to schedule something?

Best, s.18.1

Xwemalhkwu (Homalco) First Nation	September 15, 2021/ Initial Letter	Loni Arman	**Consultation regarding predator r**
	October 12, 2021/ Response	Eliette Harry	**RE_ Consultation regarding predator r**
Lhtako Dene Nation	September 15, 2021/ Initial letter	Loni Arman	**Consultation regarding predator r**

September 24, 2021/Info Request	Bruce McDonald	FW_ Predator Reduction.msg
October 25, 2021/Info Request	Bruce McDonald	Consultation regarding predator r
October 26, 2021/Response	Loni Arman	RE_ Consultation regarding predator r
October 26, 2021/ Info Request	Bruce McDonald	RE_ Consultation regarding predator r
October 27, 2021/ Response	Loni Arman	RE_ Consultation regarding predator r
November 10, 2021/ Response	Bruce McDonald	RE_ Consultation regarding predator r
November 17, 2021/Response	Loni Arman	RE_ Consultation regarding predator r
November 22, 2021/ Response	s.18.1	s.16
November 24, 2021/ Response	Loni Arman	RE_ Consultation regarding predator r
November 24, 2021/Response	s.18.1	From: s.18.1 Sent: November 24, 2021 10:13 AM

			To: Arman, Loni FLNR:EX <Loni.Arman@gov.bc.ca> Subject: RE: Consultation regarding predator reduction to support caribou recovery_Lhtako Dene - REFERRAL #765 Thank you Bruce
Lhoosk'uz Dene Nation	September 15, 2021/ Initial Letter	Loni Arman	 **Consultation regarding predator r**
	October 27, 2021/ Follow up	Loni Arman	 **RE_ Consultation regarding predator r**
Nadleh Whut'en Band	September 15, 2021/ Initial Letter	Loni Arman	 **Consultation regarding predator r**
	October 27, 2021/ Follow up	Loni Arman	 **RE_ Consultation regarding predator r**
Nanwakolas	September 15, 2021/ Initial Letter	Loni Arman	 **Consultation regarding predator r**
	September 17, 2021/ Confirmation	Art Wilson	 **Nanwakolas Confirmation 21-511**
Nazko Indian Band	September 15, 2021/ Portal Submission	Loni Arman	 **_Nazko Connect_ Referral Submission R**
	September 27, 2021/ Portal response	Terrence Paul	New Comment Terrence Paul (Nazko Band) (Nazko Band) posted a comment _____ __ Nazko has no issues or concerns. Thank you
	October 26, 2021/ Follow up	Florian Bergoin	 **Predator Reduction 2021.msg**

	October 26, 2021/ Follow up	Loni Arman	RE_ Predator Reduction 2021.msg
	October 28, 2021/ Follow up	Loni Arman	RE_ Predator Reduction 2021.msg
	November 15, 2021/ Response	Florian Bergoin	_Nazko Connect_ Florian Bergoin (Nazk
	November 18, 2021/ Response	Loni Arman	RE_ Predator Reduction 2021.msg
Nee-Tahi-Buhn Indian Band	September 15, 2021/ Initial Letter	Loni Arman	Consultation regarding predator r
	October 27, 2021/ Follow up	Loni Arman	RE_ Consultation regarding predator r
Nuxalk Nation	September 15, 2021/ Initial Letter	Loni Arman	Consultation regarding predator r
	October 27, 2021/ Follow up	Loni Arman	RE_ Consultation regarding predator r
Office of the Wet'suwet'en	September 15, 2021/ Initial Letter	Loni Arman	Consultation regarding predator r
	October 7, 2021/ Follow up	Loni Arman	RE_ Consultation regarding predator r
	October 7, 2021/ Follow up	Leanne Helkenberg	RE_ Consultation regarding predator r
	October 18, 2021	Loni Arman	RE_ Consultation regarding predator r
Dark House Wet'suwet'en	September 15, 2021/ Initial Letter	Loni Arman	RE_ Consultation regarding predator r

	October 7, 2021/ Follow up	Loni Arman	Consultation regarding predator r
Saik'uz First Nation	September 15, 2021/ Initial Letter	Loni Arman	Consultation regarding predator r
	October 27, 2021/ Follow up	Loni Arman	RE_ Consultation regarding predator r
Skin Tyee Nation	September 15, 2021/ Initial Letter	Loni Arman	Consultation regarding predator r
	September 20, 2021/ response	Rilla Middleton	Re_ Consultation regarding predator r
Stellat'en First Nation	September 15, 2021/ Initial Letter	Loni Arman	Consultation regarding predator r
	October 27, 2021/ Follow up	Loni Arman	RE_ Consultation regarding predator r
	November 3, 2021/ Response	Mike Lapointe	RE_ Consultation regarding predator r
	November 4, 2021/ Response	Loni Arman	RE_ Consultation regarding predator r
Tsilhqot'in National Government	September 15, 2021/ Portal submission	Loni Arman	TNG Stewardship Portal Notification - ID TNG_Predator Reduction.docx
	October 22, 2021/Request		On Oct 22 TNG requested an extension for 1 week in order to present to Chief and counsel. It was granted with an end date of Nov 23.
	November 23, 2021/ Response	Mitchell Warne	TNG_20015_PredControl_Response.pdf
	December 3, 2021/Response	Loni Arman	TNG Stewardship Portal Notification - ID 20015_PredatorReduction_Response.pdf

Ulkatcho First Nations	September 15, 2021/ Portal Submission	Loni Arman	_Ulkatcho Connect_ Referral Submission R
	October 27, 2021/ Follow up	Loni Arman	FW_ _Ulkatcho Connect_ Referral Sub
Wet'suwet'en First Nation	September 15, 2021/ Initial Letter	Loni Arman	Consultation regarding predator r
	October 27, 2021/ Follow up	Loni Arman	RE_ Consultation regarding predator r
Yunesit'in	September 15, 2021/ Initial Letter	Loni Arman	Consultation regarding predator r
	October 27, 2021/ Follow up	Loni Arman	RE_ Consultation regarding predator r

Fish and Wildlife Application

Tracking Number: 100368981

Applicant Information

If approved, will the authorization be issued to an Individual or Company/Organization?	Individual
Are you the Individual this application will be issued to?	Yes

APPLICANT CONTACT INFORMATION

Applicant is an Individual or an Organization to whom this authorization Permit/Licence will be issued, if approved.-

Name: s.15; s.19; s.21
Phone:
Daytime Phone:
Fax:
Email:
Mailing Address:

TECHNICAL INFORMATION

APPLICATIONS

You may submit one or more application(s) Click on the 'Add Application' for each application you would like to add. In order to submit multiple applications together they must be for one applicant and in the same region.

Type

General Wildlife Permit

GENERAL WILDLIFE PERMIT

Please provide the following general information about you and your application.

APPLICATION TYPE

Please provide the following details regarding your application.

What type of permit are you applying for:	New Permit
Applicant Date of Birth (DD/MM/YYYY)	Nov 26, 1973

PROPOSED ACTIVITY

Please provide the following details regarding your proposed activity.

Wildlife Species - Common Name:	caribou and wolves
Wildlife Species - Scientific Name:	Rangifer tarandus and Canis lupus
Location of Activity:	Tweedsmuir-Entiako
Activity Start Date:	Jan 15, 2022
Activity End Date:	Apr 20, 2022

ACTIVITY DESCRIPTION

Provide a detailed description of the activity you require a permit for. Include methods and equipment to be used. If your activity involves the capture, transport, possession, release or export of live animals or viable eggs, you must also include a detailed safety plan that explains the measures you will take to ensure that public safety will be protected. (For example, how would you prevent escapes?) In your own words, also describe the purpose of this activity and any special circumstances the Ministry should be aware of.

Description:

1) The above authorization is only applicable while the permit holder is conducting activities authorized in the following

permits: SM22-679304, SM22-681663

2) The permit is only exercisable in the Tweedsmuir-Entiako Caribou range

3) The permit holder must comply with all laws applicable to the activities carried out under permits SM22-679304, SM22-681663

Additional Permit-Specific Information:

GENERAL WILDLIFE PERMIT - APPENDIX

Legislation

Below is a non-exhaustive list of provisions under the Wildlife Act and regulations that are relevant to this licence. It is the licence holder's responsibility to be aware of any provisions under the Act or regulations that may apply to this licence.

Failure to pay fine

85 (1) This section applies if a person

(a) fails to pay, within the time required by law, a fine imposed as a result of the person's conviction for an offence under this

Act or the Firearm Act, and

(b) has been served with notice of this section.

(2) In the circumstances referred to in subsection (1),

(a) the person's right to apply for or obtain a licence, permit or limited entry hunting authorization under this Act is suspended immediately and automatically on the failure to pay the fine,

(b) all licences, permits and limited entry hunting authorizations issued to that person under this Act are cancelled immediately and automatically on the failure to pay the fine

(i) the person must not apply for employment as an assistant guide

(ii) the person must not guide as an assistant guide

(c) the person commits an offence if, before that fine is paid, the person

(i) applies for, or in any way obtains, a licence, permit or limited entry hunting authorization under this Act, or

(ii) does anything for which a licence, permit or limited entry hunting authorization under this Act is required.

(iii) applies for employment as an assistant guide

(iv) guides as an assistant guide

PRIVACY DECLARATION

☑ Check here to indicate that you have read and agree to the privacy declaration stated above.

IMPORTANT NOTICES

Please review the clauses and conditions associated with your application below.

DECLARATION

☑ I acknowledge that the information I have provided is true and that I fulfill the requirements for the applications.

OFFICE

Office to submit application to: Smithers

OFFICE USE ONLY		
Office Smithers	**File Number**	**Project Number**
	Disposition ID	**Client Number**

FW: ISSUED: GWP s.15; s.19 VI22-685543 4 (a)(i)

From: s.15; s.19
To: Kindra Maricle <Kindra.L.maricle@gov.bc.ca>, Maricle, Kindra L FLNR:EX <Kindra.L.Maricle@gov.bc.ca>
Sent: March 31, 2022 10:01:03 AM PDT
Attachments: image003.jpg, s.15; s.19 VI22-681676 4 (a)(i).pdf

Sent from my Galaxy
-------- Original message --------
From: "Lambie, Shelley FLNR:EX" <Shelley.Lambie@gov.bc.ca>
Date: 2022-01-26 14:06 (GMT-07:00)
To: s.15; s.19
Subject: s.15; s.19 VI22-685543 4 (a)(i)

Good afternoon s.15; s.19 ,

On behalf of Forests, Lands, Natural Resource Operations and Rural Development in Skeena Region, you will find attached your General Wildlife permit **VI22-685543 4 (a)(i),** issued today.

Please take a moment to review the terms and conditions within.

We recommend you **review** and then print the attached permit or licence in this email. No hard copy will be mailed unless specifically requested.

Thank you for your payment. A receipt has been attached for your records.

Sincerely,

Shelley Lambie

Fish and Wildlife Permit Clerk, Skeena Region

FrontCounter BC

Ministry of Forests, Lands, Natural Resource Operations & Rural Development
PO Box 5000, 3726 Alfred Avenue | Smithers, BC V0J 2N0

New TEL: 250-876-6839| Fax: 250-847-7556

FrontCounter BC Website | Toll-Free Contact Centre: 1-877-855-3222

Tell us about your experience with FrontCounter BC: Complete an Online Comment Card

I acknowledge the Gitdumden Clan of the Wet'suwet'en, on whose land I am grateful to work, live, and grow.

Ministry of Forests, Lands, Natural Resource Operations and Rural Development

PERMIT

78470-4
VT#100367628

WILDLIFE ACT
PERMIT V122-685543

PERMIT HOLDER	s.15; s.19; s.21

IS AUTHORIZED UNDER s. 4 (a)(i) of the Permit Regulation, B.C. Reg. 253/2000

TO	Hunt big game **CARIBOU (***Rangifer tarandus*) and **WOLVES (***Canis lupus***)** in accordance with Permit SM22-681663 and SM22-679304

SUBJECT TO THE FOLLOWING:

TERMS OF PERMIT	1) The above authorization is only applicable while the permit holder is conducting activities authorized in the following permits: **Permit SM22-681663 (wolf management)** **Permit SM22-679304 (caribou capture)** 2) **This permit is only exercisable** in the Tweedsmuir-Entiako caribou ranges. 3) The permit holder must comply with all laws applicable to the activities carried out under permits **SM22-681663, and SM22-679304**
COMPLIANCE ADVISORY	Failure to comply with any term of this permit is an offence under the *Wildlife Act*, and may result in any or all of prosecution, suspension of the permit, cancellation of the permit, ineligibility for future permits, and denial of future permit requests. See Appendix A for further advisories.
PERIOD OF PERMIT	This permit is only valid for the period **January 27, 2022 to April 20, 2022.**
DATE OF ISSUE	

s.15; s.19 **SIGNATURE OF ISSUER**	s.15; s.19	**PERMIT FEE** Exempt **HCTF SURCHARGE** Exempt

APPENDIX A
ADVISORY

PERMIT V122-685543

GENERAL

- It is the permit holder's responsibility to be aware of all applicable laws and the limits of this permit.
- The Province is not liable for any illness contracted through wildlife handling. It is the responsibility of the permit holder to inform themselves of possible health hazards, and to ensure that all reasonably necessary safety measures are undertaken.
- If applicable, the permit holder is responsible for renewing this permit. The issuer is not obliged to send a reminder notice.

LEGISLATION

Below is a non-exhaustive list of provisions under the *Wildlife Act* and regulations that are relevant to this permit. It is the permit holder's responsibility to be aware of any provisions under the *Wildlife Act* or regulations that may apply to this permit.

Wildlife Act

Documents not transferable

81 Except as authorized by regulation or as otherwise provided under this Act, a licence, permit or limited entry hunting authorization is not transferable, and a person commits an offence if the person

(a) allows his or her licence, permit or limited entry hunting authorization to be used by another person, or

(b) uses another person's licence, permit or limited entry hunting authorization.

Failure to pay fine

85 (1) This section applies if a person

(a) fails to pay, within the time required by law, a fine imposed as a result of the person's conviction for an offence under this Act or the *Firearm Act*, and

(b) has been served with notice of this section.

(2) In the circumstances referred to in subsection (1),

(a) the person's right to apply for or obtain a licence, permit or limited entry hunting authorization under this Act is suspended immediately and automatically on the failure to pay the fine,

(b) all licences, permits and limited entry hunting authorizations issued to that person under this Act are cancelled immediately and automatically on the failure to pay the fine,

(b.1) the person must not apply for employment as an assistant guide,

(b.2) the person must not guide as an assistant guide, and

(c) the person commits an offence if, before that fine is paid, the person

(i) applies for, or in any way obtains, a licence, permit or limited entry hunting authorization under this Act,

(ii) does anything for which a licence, permit or limited entry hunting authorization under this Act is required,

(iii) applies for employment as an assistant guide, or

(iv) guides as an assistant guide.

Proof of identity and authorization

97 (1) In this section, **"authorization"** means a licence, permit or limited entry hunting authorization issued under this Act.

(2) Subject to subsection (5), a person who is required to hold an authorization must, on the request of an officer,

(a) state the person's name and address,

(b) produce prescribed photo identification, and

(c) demonstrate in accordance with subsection (3) that the person holds the authorization.

(3) A person may demonstrate that the person holds an authorization by

(a) producing the authorization, or

(b) unless the regulations require that the original authorization be produced,

(i) producing a legible copy of the authorization, or

(ii) if authorized by the regulations, stating a number assigned to the person by the s.15: as an identification number for the person.

(4) Subject to subsection (5), a person who would be required to hold a licence or permit issued under this Act were the person not exempt under section 11 (9) or 12 (b) must, on the request of an officer,

(a) state the person's name and address, and

(b) produce prescribed photo identification.

(5) Subsections (2) (b) and (4) (b) do not apply to a person in a prescribed class of persons.

(6) A person who contravenes subsection (2) or (4) commits an offence.

Permit Regulation

General offence – failure to comply with permit

8 A person who holds a permit under the Act or this regulation commits an offence if the person fails to comply with a term of the permit.

Wildlife Act General Regulation

Proof of identity

21.01 (1) For the purposes of section 97 (2)(b) and (4)(b) of the Act, the following photo identification is prescribed:

(a) valid photo identification issued to a person by any of the following:

(i) the government of Canada;

(ii) the government of a province or territory, or an agent of the government of a province or territory, in which the person has a current address;

(iii) the Nisga'a Nation, if the person is a Nisga'a citizen;

(iv) a treaty first nation, if the person is a treaty first nation member of the treaty first nation;

(b) in the case of a person who is a non-resident alien,

(i) valid photo identification in the form of

(A) a passport, or

(B) a driver's licence issued to the person by a foreign jurisdiction in which the person has a current address, or

(ii) a copy of a photo identification referred to in subparagraph (i) that has been certified as a true copy by

(A) a lawyer, or

(B) a notary who is a member in good standing under the *Notaries Act;*

(c) in any case, a valid NEXUS card.

(2) For the purposes of section 97 (5) of the Act, persons under 16 years of age are prescribed as exempt from the requirement to produce photo identification.

Ministry of Forests, Lands and Natural Resource Operations

FISH, WILDLIFE AND HABITAT MANAGEMENT BRANCH
ANIMAL CARE APPLICATION FORM

PLEASE TYPE

For office use: Date Received: Project Number:

Project Title: Itcha-Ilgachuz, Quesnel Highland& Tweedsmuir-Entiako Caribou Capture and Wolf Reduction in Itcha-Ilgachuz & Tweedsmuir-Entiako to Support Caribou Recovery

2. Starting Date: January 15, 2021 **Completion Date: April 20, 2022**

3. Principal Investigator:

Name: s.15; s.19
Position:
Department/Organization: s.15; s.19
Region/Institution: n/a

Mailing Address: s.15; s.19

Phone: s.15; s.19
Fax: n/a
E-mail: s.15; s.19

Experience related to the described proposal:

s.15; s.19

4. Additional Investigators:

a) Secondary Pilots

Name: s.15; s.19
Position:
Department/Organization: s.15; s.19
Region/Institution: n/a

Experience related to the described proposal:

s.15; s.19

s.15; s.19

c) Net Gunners

Name: s.15; s.19
Position: Primary Net-gunners and Shooters
Department/Organization: s.15; s.19; s.21
Region/Institution: n/a

Experience related to the described proposal

s.15; s.19

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5. Project Proposal

The Itcha-Ilgachuz caribou population is currently designated as Threatened in schedule 1 of the federal Species at Risk Act. The Itcha-Ilgachuz caribou have been regularly monitored since 1985 with population surveys generally occurring in June, shortly after the calving period when the majority of adult female caribou utilize alpine habitat in the Itcha and Ilgachuz mountain ranges. The Itcha-Ilgachuz caribou population has declined steeply since the herd's population peak in 2003. In June 2019, population inventory for this herd reported a sightability corrected population estimate of 385 caribou. The finite population growth rate (lambda, or λ) describes the proportional change in population size over a discrete time period. From 2018-2019, lambda for the Itcha-Ilgachuz herd was 0.604, which indicates a 40% decline in the herd from 2018 (N=637) to 2019 (N=385). The 2018-19 adult female survival rate was 80%. This is below the threshold of adult female survival of 88% associated with stable caribou populations. The average annual rate of decline over the past 10 years (2009-2019) is 23.2%, while the average rate of decline over the past three years (2017-2019) is 33.4%, suggesting that the rate of

decline may be accelerating. Given the three-year average rate of decline, it is possible the herd will be functionally extirpated (<20 animals) from the Chilcotin in eight years, although this may be sooner if the decline continues to accelerate. Since wolf reduction efforts began, this herd has increased by 165 animals, and the population growth rate (lambda, λ) has changed from steeply declining (2018-2019 λ = 0.60) to increasing (λ =1.08). One of the largest early indications of success appears to be in calf recruitment, which indicates how many calves are surviving to adulthood to reproduce, measured via surveys in late winter (March). Calf recruitment changed from 8% in 2013, the last time it was measured before wolf removal, to 24% in 2021, which is above the recommended replacement level of 15%. Neonate percentages were at 25% in June 2020, while late winter recruitment the following late winter was 24%, indicating high calf survival to reproductive age. The preliminary results of predator reduction show encouraging signs for Itcha-Ilgachuz caribou recovery; however, further monitoring is required to confirm the response of this herd to wolf reduction actions.

The Tweedsmuir-Entiako caribou (TEC) are a subpopulation of the Northern group of Southern Mountain caribou and are federally designated as “threatened” meaning they are at risk of extirpation if limiting factors are not reversed. The TEC herd has been declining over the past few decades and is currently estimated at 150-200 individuals, down from an estimated 600 individuals in 1963. Annual population surveys, adult female mortality rates, late winter calf recruitment rates, and population growth rates suggest a rapidly declining TEC population with a high proportion of female mortality caused by wolf predation. Between 2014-2018, the population growth rate for the TEC subpopulation was 0.89, which is indicative of a rapidly declining population. Additionally, the cumulative population growth rate since data has been available suggests that the current population has declined by approximately 32% since the 1980s. The estimated annual female mortality rate from collared TEC females between 2014-2018 was 21.4, which is considered high. Almost half of the 2015-2018 mortalities of radio-collared female caribou occurred during the winter and wolf predation accounted for 70% of mortalities during the same period. In contrast, confirmed predation mortalities between 1983-2009 were more equally attributed to bears and wolves and confirmed wolf mortalities were evenly spread throughout seasons. Following the first year of wolf reductions for this herd in February - March 2020, the TEC calf survey in June 2020 observed an increase in calf numbers from 30 calves: 100 cows in 2019, to 45 calves: 100 cows in 2020. Following predator reduction in 2020 and 2021, there was an increase in the proportion of calves counted during the neonate surveys (30% calves in 2020, and 36% calves in 2021) compared to the previous estimate of 20% counted in 2019. The 2021 recruitment survey also yielded a high percent calf ratio at 23% calves. Additionally, in the fall of 2021, the largest minimum count since 2006 was recorded at 166 caribou, and population growth rate (lambda, λ) has changed from λ= 0.86 (2014-2019) pre wolf reduction to increasing λ=1.03 (2020-2021). The preliminary results of predator reduction show encouraging signs for caribou recovery; however, further monitoring is required to confirm the response of the TEC herd to this management action.

Consistent with other research examining woodland caribou mortality predation is considered to be the proximate cause in the observed decline of the Itcha-Ilgachuz and Tweedsmuir caribou, with wolves considered to be the primary predator responsible for herd decline. The reduction of wolves has been shown to be effective for reversing the trends of declining woodland caribou populations in BC. Reduction efforts must be intensive and applied with the highest standards of scientific rigor and humaneness. The wolf reduction efforts in the Itcha-Ilgachuz and Tweedsmuir caribou herd are expected to support recovery while the ultimate causes of population declines (i.e. habitat-related impacts) are addressed. Radio-collaring individual wolves from wolf packs greatly increases the efficacy of removing entire wolf packs over the course of the winter; complete pack removal is an objective of intensive wolf reduction programs. Concurrent with aerial wolf reduction and collaring efforts, caribou will also be captured and radio-collared for ongoing population monitoring purposes.

*Operational plan for the Itcha-Ilgachuz and Tweedsmuir-Entiako wolf reduction program is attached.

A. Background – Goals and Objectives:

Wolf reduction has been identified as an effective short-term management action for supporting the recovery of woodland caribou in BC.

The goals and objectives of this project are to:

1) conduct net-gun aerial capture of individual wolves from all packs located within the Itcha-Ilgachuz and TEC treatment area to deploy radio collars and health sample 1-2 wolves per pack for the purpose of increasing the efficiency of aerial removal (humane removal);

2) using radio collar locations to identify pack locations, humane removal (via aerial shooting) the majority of wolves (>80%) found within the treatment area and reduce the wolf density to below 3 wolves per 1000 km^2;
3) conduct net-gun aerial capture of individual caribou to deploy radio collars and health sample to monitor response of the Itcha-Ilgachuz, Barkerville and TEC population and inform adaptive management
4) implement scientific rigor and the highest possible standards for humaneness, and report out on all facets of the program

B. Key Expected Results and Management Implications:

1) Radio-collar deployment on individual wolves from the majority of wolf packs within the treatment areas with biological sampling for health profiles.
2) Reduction of the majority (>80%) of wolves via aerial shooting
3) Simultaneous monitoring of caribou populations via radio-collaring to report population growth, health parameters, adult female survival, and calf survival in response to wolf reduction
4) Ultimately, expecting positive caribou population growth on an annual basis (target 15% annually)

6. CCAC Invasiveness Category: (see Appendix A)
A_____B_____C_____D x __

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7. **Species and Number of Animals Required:** (include justification of numbers predicted to be used)

Species: Wolf (*Canis lupus*)

Number expected for 2022: approximately 23 radio collar deployments (16 in Itcha-Ilgachuz, 7 in Tweedsmuir-Entiako), up to 200 to be humanely removed.

The number of radio collars to be deployed is contingent on the number of wolf packs within the treatment area. It is estimated that there will be between 10-15 packs within the Itcha-Ilgachuz and 5-10 wolf packs within the TEC treatment area. Radio-collar deployment is generally non-selective but will be applied to adult wolves preferentially and of both sexes.

The number of wolves to be humanly removed is also dependent on the number of wolves present within the treatment area. It is estimated that at least 75-150 wolves will be humanly removed across both treatment areas.

Justification for numbers: The number of wolves to be radio-collared is based on the estimated number of wolf packs in the treatment area. Having at least one wolf radio-collared within each pack greatly increases the efficacy of humanely removing subsequent wolves from the pack. It is estimated that at least 75-150 wolves will be humanely removed from both treatment areas in order to achieve greater than 80% reduction rate required to support caribou recovery.

Species: Caribou (*Rangifer tarandus*)

Number expected for 2022: approximately 30 radio collar deployments (10 in Itcha-Ilgachuz, 5 in Quesnel Highlands and 15 in Tweedsmuir-Entiako).

The number of radio collars to be deployed is based on maintaining an approximate sample size in both study areas of a desired number. We will be capturing primarily female caribou.

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8. Details of Capture, Handling and Surgical Procedures and Final Disposition:
(be detailed and SPECIFIC, attach additional pages, if necessary)
Please refer to Appendix B – CCAC guidelines on: the care and use of wildlife (2003) for techniques considered appropriate and other guidelines for handling and care.

Capture Technique:

Wolves will be captured for radio collar deployment via aerial net-gunning, and humane removal will occur via aerial shooting. Caribou will be captured for collar deployment via aerial net-gunning.

Helicopter captures and removal will take place between January and the end of March using aerial net gunning and physical restraint and aerial shooting. An MD500D helicopter will be used to track and target wolves in snow-covered, sparsely treed habitats and frozen watercourses suitable for safe capture or removal. Deep, soft snow is preferred as it will slow animals, make their movements more predictable, and reduce the risk of injury during capture, and increases the likelihood of accurate, humane shooting.

s.15; s.19

s.15; s.19

Method of Handling:

Each wolf or caribou will be handled by an experienced handling crew. As described above, the net-gunner will be the first to engage with the animal after it has been entangled in the net.

For wolves: The net-gunner will use a Y-pole to pin the wolf to the ground by applying the Y-pole directly behind the animal's head. The handler will approach the wolf with the catch-pole, and secure the mouth closed using the catch pole snare. Once the catch-pole snare is confirmed to be secured, the crew will apply a commercial dog muzzle and/or multiple wraps of duct tape around the wolf's muzzle to ensure it is unable to bite and blindfold the animal. The wolf will then be hobbled as described above.

For caribou: The net-gunner and handler will immediately approach the animal, with the handler going to the back of the animal and applying weight carefully on the rump to secure the animal and help the net-gunner to untangle the net. A blindfold will then be applied to reduce visual stress and the neck and head carefully restrained. Hobbles will then be applied by securing the right front leg to the right back leg, and the left front leg to the left back leg. Rectal body temperature will be taken immediately following restraint. Animals showing evidence of extreme stress (body temperatures above 41^{o}C, open mouth breathing and tremors, in poor body condition) will be released immediately after basic sampling if possible or none at all. Animals with previous injuries not considered survivable will be humanely removed by gunshot to the head. Rangifer have been listed as one of the potentially susceptible species for SARS-CoV-2. All personnel handing caribou will be symptom-free, and fully-vaccinated or received a negative test for SARS-CoV-2 within 48 hours of starting the capture session.

For wolves and caribou: The net(s) will be removed from the wolf or caribou which will then be positioned to minimize discomfort (i.e. sternal or lateral recumbency, head slightly uphill, head free from deep snow). Once fully immobilized, the crew will assess the wolf or caribou for any injuries that may have occurred during capture and confirm the animal's general health and sex. The restraining process generally takes less than 2–3 minutes, at which point the radio-collaring and sampling procedures will begin. Small crews of two personnel will be used to minimize stress, and sudden movements or auditory stimuli will be kept to a minimum. To release the wolf or caribou, it is first pointed in a safe direction of travel away from the crew, helicopter, or any hazards.

For wolves: Once sampling and collaring is completed, the catch-pole snare is securely attached around the mouth, at which point the muzzle or tape around the wolf's muzzle is carefully removed and the Y-pole is re-applied. The blindfold is removed, the hobbles are removed, and the catch-pole is released, and finally the Y-pole is lifted.

For caribou: Once sampling and collaring is completed, the animal is positioned to rise in a direction away from the team, the blindfold is removed, followed by removal of the hobbles.

Other Procedures: (Marking method, Sampling)

Each wolf and caribou will be fitted with a satellite GPS radio-collar (Caribou = Vectronics Vertex Lite 2D =1700 g, Wolves = Vectronics Vertex Lite 2D =1500 g). The radio collar will be applied by the most experienced crew member to ensure the correct fit. Radio-collars will be fitted to ensure comfort for the animal, while ensuring that they are not too loose as to slip off or cause irritation (generally two fingers fitted vertically). Radio-collars fitted on younger animals, if necessary, will be slightly looser to allow for growth. For wolves, satellite collars will be programmed to obtain positional fixes every 3–4 hours over the course of the winter to acquire up-to-date location information to support reduction efforts. For caribou, satellite collars will be programmed to obtain position fixes twice a day during most seasons and up to 6 times a day during calving. Radio-collared wolves will either be left alive following the winter's removal efforts in order to collect further data and to support removal efforts the following winter, or they will be humanly removed once all other pack members have been removed.

Biological samples will be taken by the crew as per standardized Wildlife Health Program protocols while the wolf or caribou is immobilized. The total time associated with radio-collar attachment and sample collection takes less than 10 minutes for wolves and less than 15 minutes for caribou.

The radio-collars contain an internal tip switch to detect animal movement rates and are programmed to send a mortality alert via email and text message if no movement is detected for a sustained period of time (12 hours). Immediate investigation of mortalities is not anticipated for wolves, although radio collars will be picked up as soon as logistically feasible and an investigation on cause of death will occur if possible. Caribou mortalities will

be investigated as per the standardized Wildlife Health Program protocol by Ministry staff. Collars include label plates instructing hunters/trappers to contact FLNRO if they harvest a collared wolf, or a collar is found.

Additional data will be recorded, and samples will be taken by the handling crew while animals are physically restrained according to the standardized BC wolf and caribou sampling protocols (Appendix C):
For wolves:

- Age class using tooth eruption/wear/staining as an index (if visible under the tape)
- Sex
- Colour
- Pack size
- Location
- Body condition
- Photos
- Presence of old injuries or new capture-related injuries
- External parasite presence and prevalence
- From each wolf, 10 to 15 ml of blood will be withdrawn from the saphenous or cephalic vein for serological screening (parvovirus, Neospora, distemper), ensuring bleeding has stopped before releasing the animal
- Each wolf may be ear-tagged with a unique identifier number, and a 6 mm punch biopsy of the ear will be air-dried and archived for genetics
- Approximately 100 hairs with roots from the top of the shoulders from each wolf for genetic or other studies (e.g., stress assessment through cortisol levels, diet analysis with stable isotopes).

For caribou:

- Similarly, data will be recorded on the standard BC caribou capture form and samples will be taken by the crew while the caribou is physically restrained. This will include all samples and data required by the *BC Caribou Research Capture Sampling Protocols*. Samples will be processed each evening and stored before shipping to the BC Wildlife Health Program.

Contingency Plan: (what training, preparations and equipment are available in event of animal injury during capture or handling)
The following measures will be in place to reduce the risk of injury to wolves:

1) Capture crews are personnel with extensive experience in capturing, handling and shooting wild canids.
2) At least two out of three personnel are trained in first aid and CPR and avalanche safety?
3) Aerial net-gun captures will be conducted in deep, soft snow in ambient temperatures of between 0 to -25 C, on terrain consisting of flat or rolling terrain and not exposed ground or open water and animals will be assessed and monitored during physical restraint.
4) The capture crew will have a satellite phone to contact other experienced professionals and veterinarians for advice and guidance for any unusual circumstances that arise in the field
5) A firearm will be available for humane killing of any wolves or caribou badly injured during net-gun captures
6) While mortalities can occur with capture operations any mortality must be investigated and if the mortality rate exceeds 2% the operation must cease and the wildlife veterinarian and project lead contacted immediately.

Method of Humane Removal and Disposal Technique: (if necessary)
In the event of an animal being injured without a chance of survival after release, it will be euthanized humanely by high caliber gunshot to the brain and samples taken to confirm cause of death. Wolf carcasses may be sampled and left in the field unless brought back to the lab for examination or necropsy and disposal at the dump, and pelts may be offered to First Nations. Caribou deaths will be documented and followed by full necropsy and sampling if possible.

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9. Details of Potentially Controversial Procedures and Justification: (Include any expected morbidity and methods used to avoid)

Animal welfare is of high priority for this project. All net-gun captures will occur following the procedures described above (and in the regional SOPs for aerial net-gun capture). Few complications have been observed using this

protocol. Aerial shooting of wolves is considered the most effective and humane method of removing wolves in remote, expansive areas, with the ability to target without bycatch occurring (AVMA, 2013). All possible measures will be taken to ensure the ethical and humane removal of wolves.

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10. Budget:

Funding sources applied for: Provincial Caribou Recovery Program

Are these peer reviewed? Yes (the region's wolf reduction programs have undergone internal and external reviews to measure effectiveness)

Status: Approved

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11. Region:

The wolf reduction and caribou capture will occur within the TEC treatment area. The treatment boundary covers an area of approximately 15,786 km^2 in the mountain caribou range of west-central British Columbia. The treatment area was identified due to the recovery urgency for this particular caribou herd.

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12. Permit:

Is a permit required? Yes **Status**: Pending Decision

Please attach any permit documents to application.

Please send the completed BC Animal Care Form Application Form to the Permit & Authorization Service Bureau (PASB) along with a General Permit Application, detailed project proposal and permit fees (if applicable). For further information on how to apply, please visit the PASB website at http://www.env.gov.bc.ca/pasb/ or call PASB at 1-866-433-7272 (to bypass phone tree push 231).

Approval of an Animal Care Application does not constitute approval of any application to handle wildlife. Applicants must also have a valid permit, issued under the Wildlife Act, before engaging in any such activity.

Principal Investigator's Signature **Date of Application**

Appendix A:

Canadian Council on Animal Care: Categories of Invasiveness for Wildlife Studies

A. Methods used on most invertebrates or on live isolates

Possible examples: the use of tissue culture and tissues obtained at necropsy; the use of eggs, protozoa or other single-celled organisms; experiments involving containment, incision or other invasive procedures on metazoa.

B. Methods used which cause little or no discomfort or stress

Possible examples: observational studies in which the same individuals are not repeatedly observed so as to habituate or otherwise modify their behavior; census or other surveys which do not involve capture or marking individuals; non-invasive studies on animals that have been habituated to captivity; short periods of food and/or water deprivation equivalent to periods of abstinence in nature.

C. Methods which cause minor stress or pain of short duration

Possible examples: capture, using methods with little or no potential to cause injury and marking of animals for immediate release; long-term observational studies on free-ranging animals where the behaviour of individuals may be altered by repeated contact; brief restraint for blood or tissue sampling; short periods of restraint beyond that for simple observation or examination, but consistent with minimal distress; short periods of food and/or water deprivation which exceed periods of abstinence in nature; exposure to non-lethal levels of drugs or chemicals; low velocity darting and slow-injection darts with immobilization chemicals. Such procedures should not cause significant changes in the animal's appearance, in physiological parameters such as respiratory or cardiac rate, or fecal or urinary output, in social responses or *in ability to survive*.

Note: During or after Category C studies, animals must not show self-mutilation, anorexia, dehydration, hyperactivity, increased recumbency or dormancy, increased vocalization, aggressive-defensive behavior or demonstrate social withdrawal and self-isolation.

D. Methods which cause moderate to severe distress or discomfort

Possible examples: *capture, using methods that have the potential to cause injury (e.g. Leg snares, leghold traps, high velocity darting and rapid-injection darts with immobilization chemicals, net gunning, etc.); maintenance of wild caught animals in captivity*; translocation *of wildlife to* new habitats; major surgical procedures conducted under general anesthesia, with subsequent recovery; prolonged (several hours or more) periods of physical restraint; induction of behavioral stresses such as maternal deprivation, aggression, predator-prey interactions; procedures which cause severe, persistent or irreversible disruption of sensorimotor organization.

Other examples *in captive animals* include induction of anatomical and physiological abnormalities that will result in pain or distress; the exposure of an animal to noxious stimuli from which escape is impossible; the production of radiation sickness; exposure to drugs or chemicals at levels that impair physiological systems. *(NB. Experiments described in this paragraph would be Category E if performed on wildlife immediately prior to release.)*

Note: Procedures used in Category D studies should not cause prolonged or severe clinical distress as may be exhibited by a wide range of clinical signs, such as marked abnormalities in behavioral patterns or attitudes, the absence of grooming, dehydration, abnormal vocalization, prolonged anorexia, circulatory collapse, extreme lethargy or disinclination to move, and clinical signs of severe or advanced local or systemic infection, etc.

E. Procedures which cause severe pain near, at, or above the pain tolerance threshold of unanesthetized conscious animals

This Category of Invasiveness is not necessarily confined to surgical procedures, but may include exposure to noxious stimuli or agents whose effects are unknown; exposure to drugs or chemicals at levels that (may) markedly impair physiological systems and which cause death, severe pain, or extreme distress; behavioral studies about which the effects of the degree of distress are not known; *environmental deprivation that has the potential to seriously jeopardize an animal's wellbeing*; use of muscle relaxants or paralytic drugs without anesthetics; burn or trauma infliction on unanesthetized animals; a euthanasia method not approved by the CCAC; any procedures (e.g., the injection of noxious agents or the induction of severe stress or shock) that will result in pain which approaches the pain tolerance threshold and cannot be relieved by analgesia (e.g., removal of teeth without analgesia, or when toxicity testing and experimentally-induced infectious disease studies have death as the endpoint), *capture methods with a high potential of causing severe injury that could result in severe chronic pain and/or death.*

Appendix B:

Canadian Council on Animal Care guidelines on: the care and use of wildlife (2003)

http://www.ccac.ca/english/gui_pol/GUFRAME.HTM
http://www.ccac.ca/english/gdlines/wildlife/Wildlife.pdf

Appendix C:

BC Caribou and Wolf Sampling Protocols

BC Caribou Research Capture Sampling Pro

BC Wolf Capture Sampling Protocols_C

British Columbia Caribou Health Assessment and Sampling Protocols
Net Gun Captures

This is a companion document to the current BC Caribou Research Capture Data Form and MUST be reviewed prior to any caribou captures as it is modified on a regular basis.

General Considerations

The net-gun capture of free-ranging caribou creates risk so animal welfare is critical at all stages of animal capture and sampling. Minimizing hazing time (of groups and individuals), limiting the duration of intense pursuit (< 2 minutes), restricting operations to cooler weather (< -10 ˚C), and quick and efficient handling (< 15 minutes) are key to reducing the risk of injury or complications such as capture myopathy.

These sampling protocols are modified from those used for net-gun capture of > 250 boreal caribou in NE BC from 2013-2016. Complete sample sets were obtained from most animals and no serious injuries or mortalities occurred.

Recommendations for Time/Temperature Cut-offs and Sampling Priority

The collection of a complete set of biological samples from each live-captured caribou is an obligation, a high priority research need, and protocols have been designed to balance this need with animal welfare. An experienced capture/handling team can collar, tag, collect all samples, and perform a basic health assessment on a properly restrained, net-gunned caribou in ≤ 15 minutes. However, capture teams must be able to recognize signs of distress in captured animals. If distress occurs, partial sampling or immediate release may be required. Body temperature, animal behaviour, and handling time should be used to guide decision making (See Table 1).

Table 1. Decision Matrix for Sampling Free-Ranging Caribou Captured by Net-Gun

Rectal Temperature	Recommended Sampling Strategy	Recommended Handling Time
≤ 41˚C/ 105.8 ˚F	Full collar/ear tag and sample collection protocol	Aim ≤ 15 minutes
41-41.5˚C/105.8-106.7˚F	Collar/ear tag and collect blood and hair only	Do not exceed 10 minutes
> 41.5 ˚C/106.7˚F	Collar/ear tag and collect hair only	Release immediately

- Rectal temperature is taken with a digital thermometer immediately after a caribou is hobbled and blindfolded. Most net-gunned caribou captured in cooler weather, after an acceptable chase time will have rectal temperatures ≤ 41˚C/105.8˚F.
- Excessive struggling may increase body temperature and lead to modifying sampling.
- If an animal must be released, fecal samples may be collected off snow.
- To increase handling efficiency, the role of each team member should be clearly defined prior to capture and the most experienced team member should take blood when handling times are limited.

Estimating Age

AGE CLASS	PATTERN OF INCISOR WEAR	FIELD AGE
Subadult	Very white teeth with rounded caps (little or no wear)	2-3 Years (Picture 1)
Adult	First incisors are flattening, and second incisors are beginning to wear.	4-5 Years (Picture 2)
Adult	All teeth in the incisor bar are flattening and appear to be a straight line across the top of the teeth.	6-7 Years (Picture 3)
Old Adult	All teeth in the incisor bar are flattened significantly (all teeth appear significantly shorter than 6-7 year old)	8-9 Years (No Picture)
Old Adult	All teeth in the incisor bar are stubs (shorter still)	10-11 Years (Picture 4)
Old Adult	All teeth in the incisor bar are worn to the gum line	12+ Years (Picture 5)

Modified After: Cattet, M.R.L. (2011) Government of Northwest Territories, Wildlife Care Committee Standard Operating Procedure (SOP) for Capture, Handling and Release of Caribou. Version 2-2011. Picture 5. Mike Klaczek, Government of BC.

Assessment of Body Condition

Evaluate the body condition of each live-captured caribou **USING BOTH** the standardized CARMA condition score and a general assessment technique.

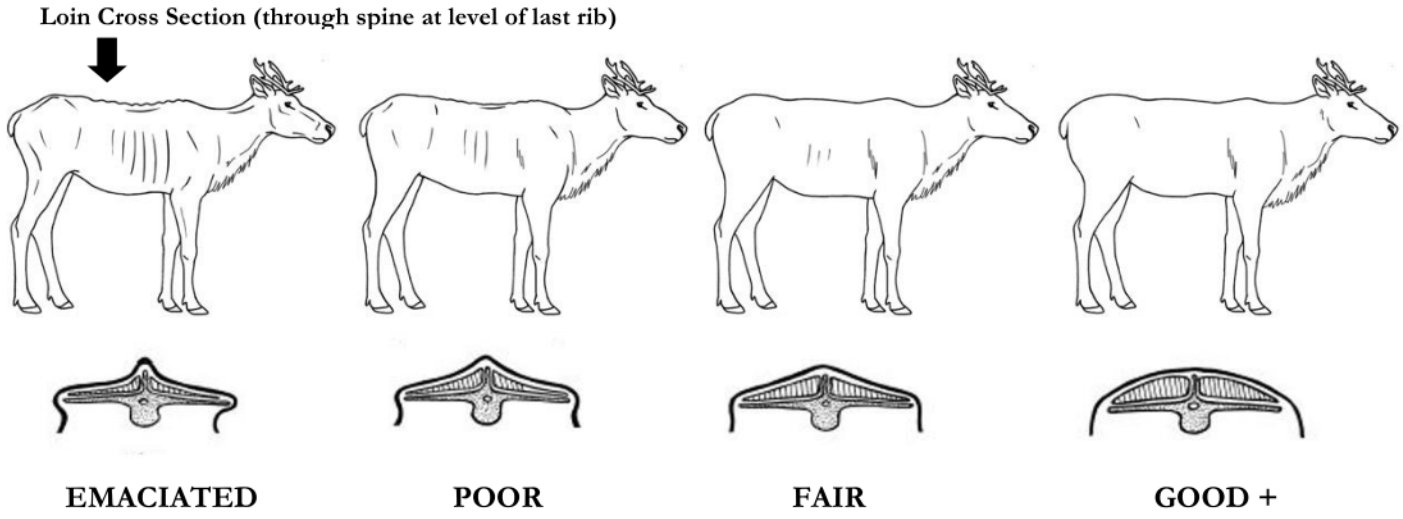
***CARMA* Body Condition Score**

- A standardized palpation technique developed by the Circum Arctic *Rangifer* Monitoring and Assessment (*CARMA*) Network is used as a standard method to estimate body condition of caribou.
- It assigns scores that have not been calibrated to back fat and are subjective (but still useful) indicators of overall fatness. It is a more precise method of assessing condition vs. the general approach.
- Using the chart below, assign palpation scores to the shoulder, ribs, and hips-spine.
- Scores may be broken down to halves (e.g. 2.5, 3.5) and area scores won't necessarily be the same.

SHOULDER	DESCRIPTION	SCORE
1	V-shaped scapula (shoulder blade), very bony, hollows behind scapula and immediately behind the scapular spine	
2	Somewhat V shaped, less bony, hollows still present	
3	U-shaped withers, hollows filled	
4	U-shaped, very broad, difficult to feel edges of bone	
RIBS	**CARMA DESCRIPTION**	**SCORE**
1	Deep groves between ribs including behind the shoulder	
2	Ribs fairly well covered immediately behind shoulder	
3	Can still feel ribs, groves are not too deep	
4	Ribs nearly flush with tissue between them	
HIPS/SPINE	**CARMA DESCRIPTION**	**SCORE**
1	Hip bones very distinct, no fat on back or tail head, spine very distinct	
2	Some padding on hips, spine remains very distinct	
3	Hips fairly well padded, spine partly covered along each side	
4	Hips well padded, spine is flush with or nearly covered with fat	
	Total Score (sum of shoulder, ribs, hips/spine assessments)	

Gunn, A. et al. Eds. (2008). CircumArctic *Rangifer* Monitoring and Assessment (CARMA) Network Monitoring Protocols Level 2. 57 pp.

General Body Condition Scoring (overall appearance and loin profile)



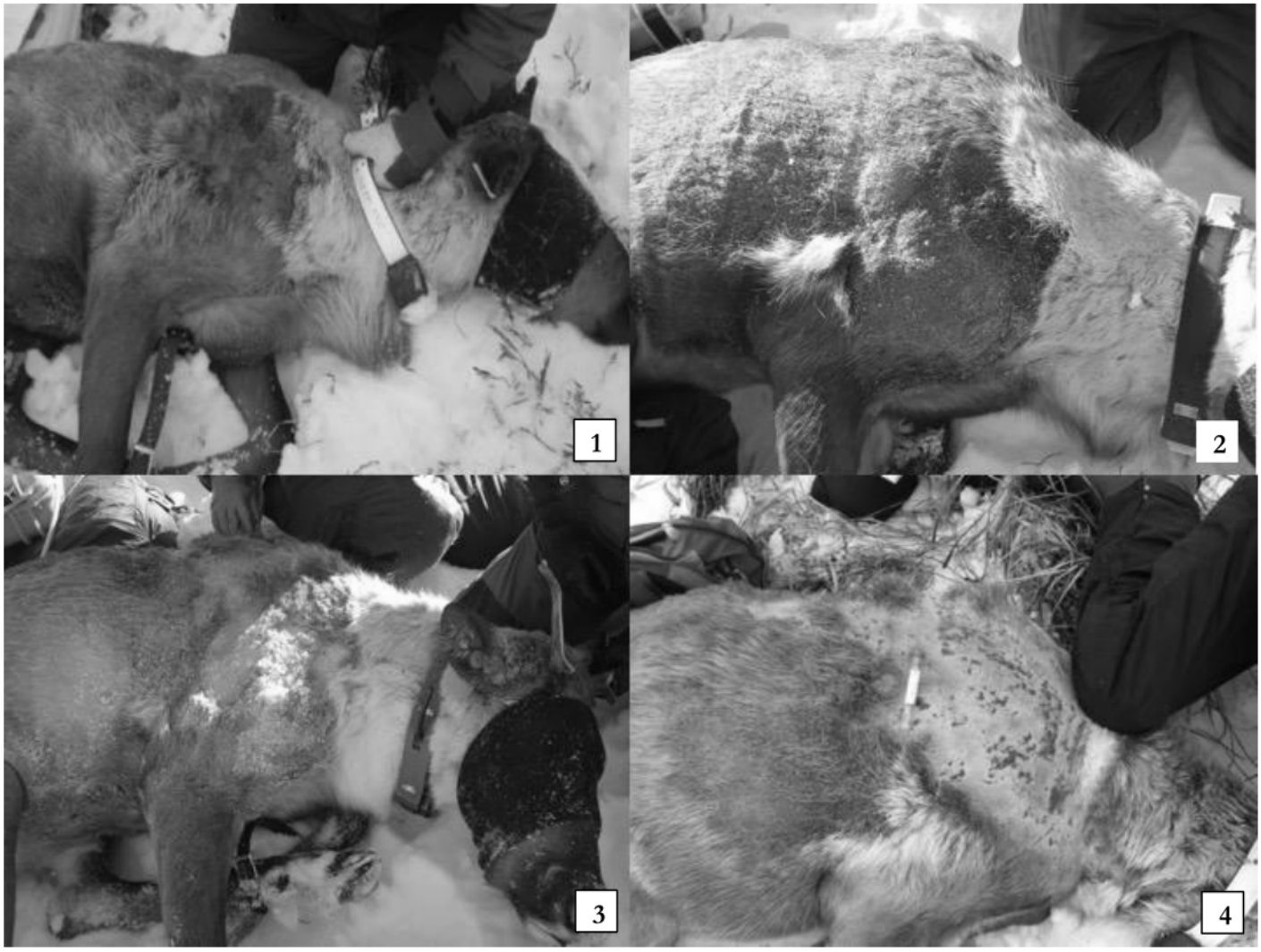
Caribou Drawings: M. Winchester, Government BC.

Winter Ticks

Tick Associated Hair Loss Scoring in Caribou

HAIR LOSS CATEGORY	PATTERN
None (No Picture)	No hair loss or breakage
Mild (Picture 1)	Few small to medium sized patches of broken hair or hair loss
Moderate (Picture 2)	Several or large patches broken hair or hair loss - NO EXPOSED SKIN
Severe (Picture 3)	Several or large patches broken hair or hair loss with 1-2 SMALL AREAS EXPOSED SKIN
Extreme (Picture 4)	Several or large patches broken hair or hair loss with large or > 2 AREAS OF EXPOSED SKIN

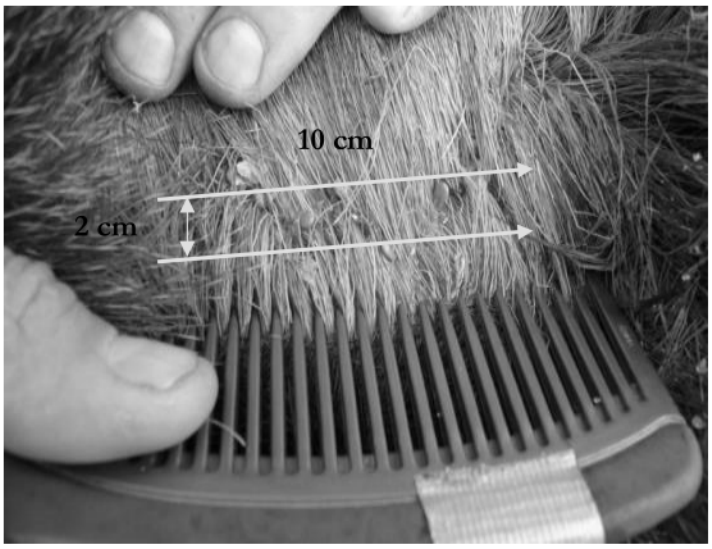
** Degree of tick associated hair loss in caribou is not always correlated with number of ticks.



* Photos and Hair Loss Classification Score: D. Culling, Diversified Environmental Services Inc., Fort St. John, BC.

Tick Burden Assessment - Rapid Method

- **PERFORM THIS ASSESSMENT ONLY IF TIME AND ANIMAL WELFARE PERMIT**
- Permanently mark a comb with 10 cm transect length to assist.
- Part the hair along the upper edge of the shoulder blade with the comb.
- **ESTIMATE or COUNT (best)** the number of ticks along a single 10 cm x 2 cm transect.
- If there is significant hair loss on the shoulder, perform the assessment on the rump.
- **SCORE for BURDEN: None (0 count), Mild (0-15 ticks total), Moderate (15-30 ticks total), Severe (>30 ticks total).**
- **COLLECT** a representative sample (e.g. various life stages, engorged, not engorged) of ticks in 70% ETOH (minimum 10:1 ratio; ethanol:ticks).
- **STORE** ticks in ETOH at room temperature, protected from heat and light.
- Ensure tick specimens are in well-sealed containers (e.g. cryovials or similar) to prevent evaporation.



Sample Collection Protocols for Live-Captured Caribou

Each caribou sampling kit contains:

- 4 x 5.0 ml Gold top (SST) collection tubes - for serum
- 1 x 6.0 ml Royal Blue top collection tube - for serum for trace nutrients
- 1 x 6.0 ml Purple top collection tube - for whole blood
- 1 x 3.0 ml Green top collection tube - for DNA/RNA
- 2 x 18 G 1.5 inch, plastic hub needles
- 1 x 35 ml syringe
- 1 x small coin envelope (white)
- 1 x large coin envelope (white)
- 1 x disposable 6 mm biopsy punch - can use for both ears in same animal
- 1 x ear tag with unique ID number [Note: Tag ID is not the same as Wildlife Health ID (WLH ID) Number]
- 1 x Whirl-pak bag
- 1 x nitrile glove

Sample Collection

To increase handling and sampling efficiency, the role of each team member should be clearly defined prior to capture.

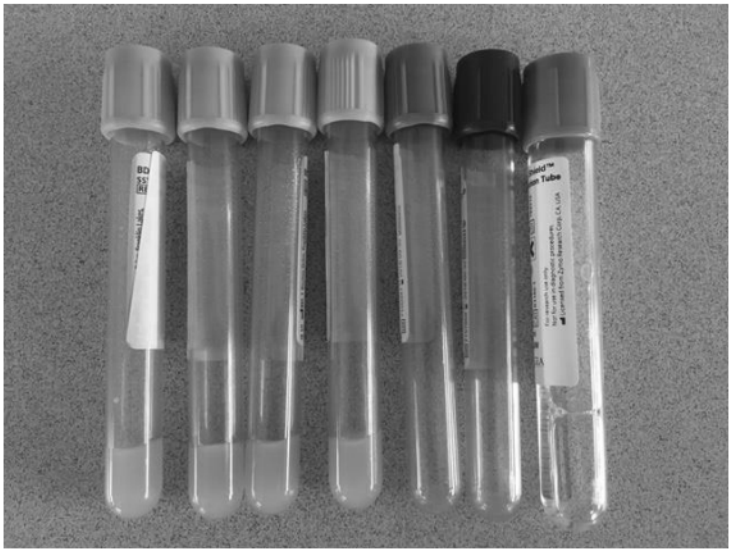
Blood Collection

- **Blood is the most important sample to collect from each caribou.**
- **Training and experience are required to collect blood. The most experienced team member should oversee blood collection by new staff and should take blood when handling times are limited.**
- Ensure caribou are well restrained before blood collection. Head control and proper positioning (head and neck not bent or twisted) are especially important if taking blood samples from the jugular vein.
- Each kit has all supplies and blood tubes for completing the collection.
- Ensure the blood collection tubes are at 18-25 ºC prior to use. **NOTE**: all blood tubes are best at this temperature as it avoids temperature shock to the blood cells.
- Blood is collected with needle and syringe from **EITHER** the jugular vein, the cephalic vein (front leg), or the saphenous vein (hind leg).

Location for blood sampling from the jugular vein (yellow arrow). Picture from: University of Calgary, Faculty of Veterinary Medicine, *Rangifer* Anatomy Project.

- The vein must be held off by a hand or tourniquet to build up pressure and locate the vein.
- Hold the needle with the bevel up and insert carefully beside or above the vein and puncture the vein. Once the vein is punctured blood is seen in the needle hub and the blood can then be pulled into the syringe. Slowly pull past the 35 ml mark to ensure that enough blood is collected to fill all tubes.
- There is an extra needle in each kit. Please secure used needles in a crush proof, puncture proof sharps container and syringes without needles can be disposed of in a sealed garbage bag.

Blood Transfer to Sample Collection Tubes



- The blood collection tubes are in the kit in a BUNDLE with an elastic band. They contain a variety of fluids or compounds and are all under negative pressure.
- To prevent hemolysis (the rupture of red blood cells turning serum pink or red), do not squirt/force blood into collection tubes. Instead, once the syringe is full, carefully insert the needle through the end and negative pressure will passively draw the blood from the needle/syringe into the collection tube.
- If the vacuum has been compromised, blood can be gently and slowly injected along the sides of the tube.
- **START FILLING THE YELLOW TOP TUBES, FOLLOWED BY THE BLUE, PURPLE AND THE GREEN TOP TUBE LAST.**
- **GENTLY ROLL OR TURN ALL THE TUBES IN THEIR BUNDLE IMMEDIATELY AFTER COLLECTION TO ENSURE THE BLOOD AND CONTENTS ARE WELL MIXED (30 seconds to 1 minute). THIS IS ESPECIALLY FOR PURPLE AND GREEN TOPS TO MIX THEIR CONTENTS TO PRESERVE BLOOD CELLS.**
- Each blood tube type is designed to collect the specific samples required for pregnancy determination, health and disease surveillance, trace nutrient testing, etc.
- The quality of data obtained from blood samples will be compromised by improper collection, handling, processing, and storage. Please ensure blood protocols are followed.
- **ONCE FILLED, HANDLE BLOOD TUBES WITH CARE: PLACE UPRIGHT IN A COOLER IN THE HELICOPTER, PROTECT FROM SHAKING, ROUGH HANDLING, DIRECT SUNLIGHT, FREEZING, AND HEAT.**

Blood Post Field Processing and Storage

Supplies needed: From the Wildlife Health Program

- **Cryovials - 2 ml volume**
- **Preprinted labels with: Species, WLH ID, Blood Sample Type (i.e. serum, plasma, buffy, trace, RNA)**
- **Transfer pipettes - disposable plastic**
- **Small Ziploc bag to keep all blood samples grouped together by individual WLH ID#.**

Gold Top (SST) Serum Tubes

- Once back from the field, centrifuge gold top tubes for 15 minutes after blood has clotted and within 12 hours of collection.
- After centrifuging, serum (clear, yellowish liquid) will be separated from clotted blood by the gel plug. If the gel does not separate the serum you may need to re-spin.
- Decant serum into labelled cryovials using a disposable transfer pipette.
- **Use a new transfer pipette for each type of tube and use transfer pipettes to process samples from each caribou.**

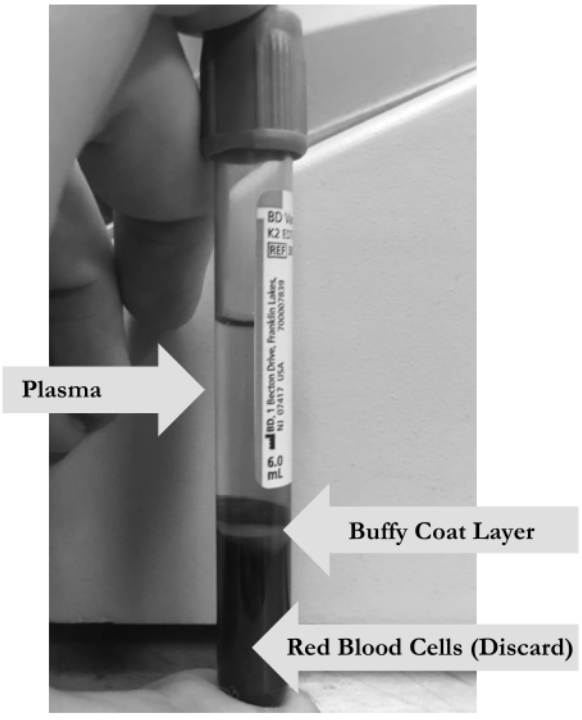
- If a transfer pipette becomes contaminated with gel, blood from the clot, other debris, etc. discard and use a new pipette.
- Fill each cryovial with 1 ml, with a maximum of 2 ml serum.
- Please do not use cryovials > 2 ml. Freeze/thaw can degrade serum samples and is required for sub sampling if larger cryovials are used.
- Ensure each cryovial is labelled with: WLH ID **(NOT COLLAR FREQUENCIES)**, herd, species, **SERUM**, and date. **USE PREPRINTED LABELS**
- Store serum from gold top tubes frozen (minimum -20 ºC).
- **Recap gold top tube and retain one with clot (frozen, minimum -20 ºC).**

Royal Blue Top (Trace Nutrient) Serum Tube

- Centrifuge for 15 minutes once blood has clotted and within 12 hours of collection.
- **Royal blue top tubes do not have separating gel, so try not to disturb the clot after centrifuging and while processing.**
- **Royal blue top tubes are also more easily affected by hemolysis (red blood cell rupture). Please note (in data sheet comments section) if the serum sample from a royal blue top tube appears red as hemolysis may influence interpretation of results.**
- Decant serum into two labelled cryovials. Label cryovials with WLH ID, herd, species, **TRACE NUTRIENTS**, and date. **USE PREPRINTED LABELS**
- Store serum from the royal blue top tube frozen (minimum -20 ºC).
- Discard the clot and the royal blue top tube.

Purple Top (EDTA) Whole Blood Tube

- **Remember this tube MUST be mixed immediately after collection.**
- Centrifuge the purple top tube for 15 minutes as with other tubes.
- **CAUTION AFTER SPINNING.** The blood cell and plasma layers in the purple top tube are in a liquid state (not clotted). Do not bump or disturb the red blood cell layer and buffy coat (the opaque white blood cell layer between plasma and red cells) before sampling.
- **RE-CENTRIFUGE IF LAYERS ARE ACCIDENTALLY DISTURBED.**
- Collect plasma (clear/yellow layer) into cryovials using a new pipette.
- Fill each cryovial with a maximum of 2 ml plasma.
- Label each cryovial with WLHID, herd, species, **PLASMA**, and date. **USE PREPRINTED LABELS**



- Store plasma from the purple top tube frozen (minimum -20 ºC).
- Collect the buffy coat (opaque middle layer) into a **SEPARATE** cryovial.
- Label this vial with WLH ID, herd, species, **BUFFY**, and date. **USE PREPRINTED LABELS**
- The buffy coat sample will appear red as some red blood cells will be sucked up with the white blood cell layer. **Try to minimize this as much as possible.**
- Store buffy from the purple top tube coat frozen (minimum -20 ºC).
- Discard the remaining red blood cell layer and the purple top tube.

Green Top DNA/RNA Blood Tube NEW****

- The DNA/RNA blood tube should be **the last tube that blood is placed into**.
- **Remember this tube MUST be mixed immediately after collection.**
- **Do not spin the green top tube or draw off serum**.
- The blood is stabilized in this tube and can be sent to Wildlife Health in the original collection tube.
- Green top tubes do not need to be frozen, they can be kept at room temperature.

Skin Biopsy

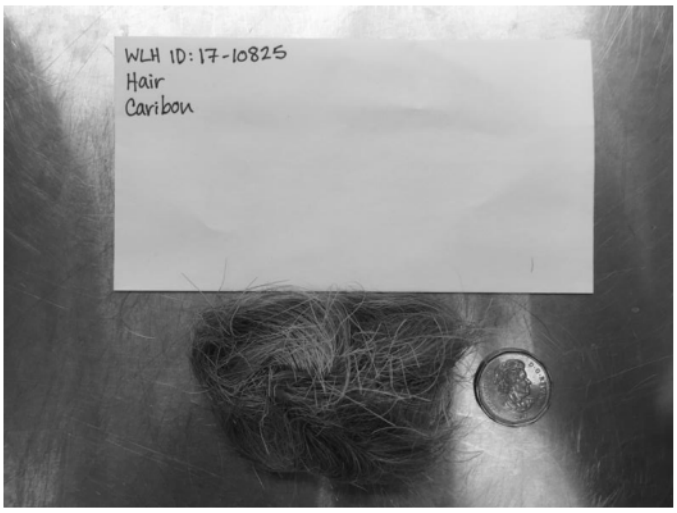
- Use the 6 mm biopsy punch to place holes for each ear tag. Use the same punch for both ears if two tags are used.
- Avoid large blood vessels in the ear.
- Punch blade is very sharp. Use an old piece of radio collar belt or folded paper placed on the back of the ear to protect your fingers.
- Transfer each ear biopsy into the **SMALLER PAPER ENVELOPE** provided in the kit.
- Record the number of biopsies collected.
- Air dry (in envelope) at room temperature.
- Ensure biopsy sample envelope is labelled with: WLH ID, herd, species, body site of collection, and date.
- Store skin biopsies at room temperature, protected from heat, light, and moisture.
- **DO NOT FREEZE SKIN BIOPSIES.**
- Dispose of used punches in a crush proof, puncture proof sharps container.

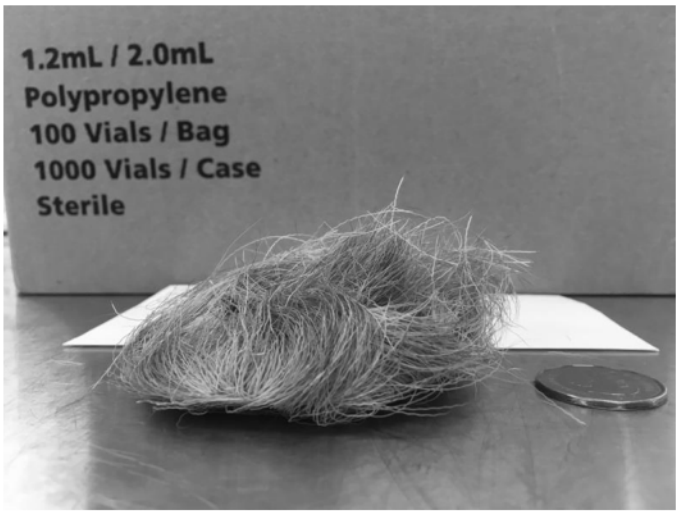
Hair

- **PLUCK** hair from the **TOP OF THE SHOULDER** (yellow arrow) where skin is as dry and as free of contaminants (blood, dirt etc.) as possible.
- Use needle nose pliers, hemostats or a Leatherman to obtain undamaged, intact hairs with roots.
- Place hair (more is better) in the **LARGE PAPER ENVELOPE** provided. **ENSURE ENVELOPE IS WELL FILLED**


Photo: D. Culling

- Ensure hair samples are dry before long-term storage.
- Wet or damp hair samples should be gently blotted (not wiped) with paper towel immediately on return from the field then air dried before transferring to a new envelope for long-term storage.
- Air dry wet or damp hair samples out of direct sunlight and protected from heat (i.e. NOT near a wood stove, hot windowsill, on a truck dashboard etc.).
- Ensure hair samples are labelled with: WLH ID, herd, species, body site of collection, and date. Also note on labels if samples were collected from wet or dirty animals.
- For long-term storage keep caribou hair samples at room temperature in a dry, white, paper envelope protected from heat, light, and moisture.
- Silica desiccant can be kept in the same general storage container (i.e. if storing many envelopes containing hair in a larger Rubbermaid etc.).
- **DO NOT FREEZE HAIR SAMPLES**.





Feces

- Using the glove provided, collect a "palm full" of fecal pellets per rectum (or from the ground/snow).
- If collecting from the rectum, be careful to prevent tissue damage.
- Place pellets in the Whirl-pak **(NO ZIPLOCS**) provided, remove as much air as possible and avoid crushing pellets.
- Fold the tabs, sealing the bag and store the fecal sample frozen (minimum -20 ºC).
- **AVOID FREEZING/THAWING**.

External Parasites

- Collect a sample of any external parasites (e.g. different life stages if present) if noted.
- **10+ winter ticks should be collected from any infested caribou.**
- In the field, ectoparasites can be temporarily placed in any small container if well sealed.
- Back at the lab, transfer specimens into cryovial(s) or screw-top specimen containers with 70% ETOH (Ratio of 10 parts ethanol:1-part parasite).
- Label containers with WLH ID, herd, species, parasite type, body location recovered, and date.
- Store 70% ETOH at room temperature, protected from heat and light.

Pictures

- Take a clear picture of the incisors of all caribou (see section 3.0). **This is a high priority sample.**
- If time permits, take a profile picture (head to rump) of each. This is a lower priority unless the animal is in poor condition, has hair loss, or is otherwise abnormal.
- If time permits, take a picture of the head of each caribou to assess antler development. Lower priority unless antler development is abnormal.

Basic Health Assessment

- A basic health assessment should be performed during sampling and handling (collaring, tagging, sampling etc.).
- The health assessment includes checking teeth, ears, hair coat, skin, eyes, nostrils, hooves, evidence of diarrhea/fecal staining, nasal or ocular discharge, swollen joints, traumatic injuries or other abnormalities and recording them on each live captured caribou.
- **Take pictures of any caribou in poor condition, with hair loss, or of any other abnormalities.**
- **When taking pictures of abnormalities include a wide frame picture showing the entire animal and close-up views (multiple angles) with scale (e.g. a Leatherman, needle cap, etc. placed in frame).**

Capture Related Mortalities

- **If a caribou is accidently killed or dies during capture operations the carcass should be slung out for a full necropsy and health assessment by a project veterinarian (HIGH PRIORITY).**
- If this is logistically impossible, a complete necropsy must be performed, and samples collected in the field following guidelines outlined in the BC Caribou Necropsy Protocol.

FOR HEALTH-RELATED QUESTIONS DURING CARIBOU CAPTURE OPERATIONS
OR
FOR ANY QUESTIONS RELATED TO CARIBOU SAMPLE COLLECTION, HANDLING, PROCESSING, AND STORAGE

CONTACT

Dr. Helen Schwantje 250-751-3234 or cell 250-361-7619

Sample Shipping Instructions

ALL SAMPLES MUST BE RETURNED TO:

Wildlife Health Program
Attention: Dr. H. Schwantje
Ministry of Forests, Lands, Natural Resource Operations and Rural Development
2080 Labieux Road
Nanaimo BC, V9T 6J9

This includes sample kits that are not used this season. Please do not keep unused kits for "extra" sampling supplies. Return unused kits so that we can keep track of WLH IDs.

- Frozen samples MUST remain frozen during transport or their use is compromised.
- Appropriate insulated shipping containers and icepacks and can be purchased at low cost from ULINE.ca or contact the Wildlife Health Program.
- **Please notify** the Wildlife Health Lab in Nanaimo **BEFORE samples are shipped**
  Shari Willmott, (250) 751-7246 Shari.Willmott@gov.bc.ca
  Maeve Winchester, (250) 751-7246 Maeve.Winchester@gov.bc.ca
  or Helen Schwantje, (250) 751-3234 Helen.Schwantje@gov.bc.ca
- **Try to ship samples on Monday or Tuesday, never past Wednesday.**

Shipping Checklist

- Copy of 1 x completed caribou capture form
- Serum in multiple cryovials from 4 x gold top tubes. **FROZEN**
- 1 x empty/spun gold top tube (re-capped) with clot. **FROZEN**
- Plasma in multiple cryovials from 1 x purple top tube. **FROZEN**
- Buffy coat in 1 SEPARATE cryovial from 1 x purple top tube. **FROZEN**
- Serum in two cryovials from 1 x royal blue top tube. **FROZEN**
- DNA/RNA blood collection tube. **ROOM TEMPERATURE**
- 1 x whirl-pack with fecal pellets. **FROZEN**
- 1 x small envelope with skin biopsy or biopsies (if multiple ear tags applied). **ROOM TEMPERATURE, DO NOT FREEZE**
- 1 x large envelope with plucked hair from shoulder. **ROOM TEMPERATURE, DO NOT FREEZE**
- Parasites in cryovial(s) or similar if collected. **70% ETOH, ROOM TEMPERATURE, DO NOT FREEZE**

WILDLIFE ACT

PERMIT WL22-682577

PERMIT HOLDER	s.15; s.19 s.15; s.19 Specifically, the designates listed under Appendix C

IS AUTHORIZED UNDER s. 2(c)(i), 2(c)(iii), 2(h), 2(j), 2(k)(i), 2(k)(ii), and 2 (o) of the Permit Regulation, B.C. Reg. 253/2000,

TO	Hunt and kill wildlife during the open or closed season, specifically **grey wolves** (*Canis lupus*), in Itcha Ilgachuz for scientific purposes, specifically for caribou recovery. Hunt and kill wildlife during the open or closed season, specifically **grey wolves** (*Canis lupus*), in Itcha Ilgachuz for caribou recovery, as it is necessary for the proper management of wildlife resources, specifically **grey wolves** (*Canis lupus*) and **caribou** (*Rangifer tarandus*). Hunt and capture and on-site release live **grey wolves** (*Canis lupus*) in Itcha Ilgachuz for radio collar deployment to support the hunting and killing of **grey wolves** (*Canis lupus*) within Itcha Ilgachuz to support the Caribou Recovery Program. Possess and dispose of dead wildlife or parts of wildlife for scientific purposes, specifically samples (tissues and bones) from dead/captured **grey wolves** (*Canis lupus*).

AND

IS EXEMPT UNDER s. 3(1)(b)(i), 3.1(1)(b), 3.1(1)(c), and 3.1(1)(d) of the Permit Regulation, B.C. Reg. 253/2000,

FROM	The prohibition in section 26(1)(d) of the Act against hunting, taking, trapping, wounding, or killing wildlife, specifically **grey wolves** (*Canis lupus*) with a firearm or bow during the prohibited hours for the purposes authorized above. The prohibition in section 27(2)(a) of the Act against hunting wildlife from an aircraft, specifically a helicopter for the purposes authorized above. The prohibition in section 27(2)(b) of the Act against using a helicopter to transport hunters or game, and while on a hunting expedition for the purposes authorized above. The prohibition in section 27(3) of the Act against herding or harassing wildlife with the use of an aircraft while carrying out the activities authorized above. These exemptions are necessary for the proper management of wildlife resources, specifically **grey wolves** (*Canis lupus*) and **caribou** (*Rangifer tarandus*).

SUBJECT TO THE FOLLOWING:

TERMS OF PERMIT	This permit is only valid in Itcha Ilgachuz Cariboo Region 5. The permit holder must comply with the terms in Appendix A.

COMPLIANCE ADVISORY	Failure to comply with any term of this permit is an offence under the *Wildlife Act*, and may result in any or all of prosecution, suspension of the permit, cancellation of the permit, ineligibility for future permits, and denial of future permit requests.	
PERIOD OF PERMIT	This permit is only valid from January 26, 2022 to March 31, 2022.	
DATE OF ISSUE	January 26, 2022	
s.15; s.19 **SIGNATURE OF ISSUER**	s.15; s.19	**PERMIT FEE** Exempt **HCTF SURCHARGE** Exempt

APPENDIX A
TERMS OF PERMIT

PERMIT WL22-682577

REPORTING REQUIREMENTS:

1. The permit holder must maintain an accurate up to date record of the wildlife observed under the permit that includes the following information:
    (a) number of wolves killed or radio-collared,
    (b) location where the wolves were killed or radio-collared, including coordinates (i.e., latitude and longitude or a UTM grid location),
    (c) the date wolves were killed or radio-collared, and
    (d) the classification of the wolves' radio-collared (i.e., sex, colour, age estimate).

2. The permit holder must submit the data collected in an electronic format (excel or access base) to the regional biologist or project manager **within 21 days** of the permit's expiry.

3. The permit holder must produce a copy of the record referred to in paragraph 1 on demand of an officer.

GENERAL CONDITIONS:

1. The permit holder must comply with all laws applicable to the activities carried out under this permit.

2. All work is to be undertaken by trained professionals with experience in capturing and handling wolves (*Canis lupus*).

3. The permit holder must take all reasonably necessary steps to ensure that public safety is not jeopardized, and fish or wildlife habitat is not damaged, other than as permitted by this permit, by any action taken under authority of this permit.

4. The permit holder must ensure that the wildlife are treated in a humane manner and are not subjected to any unnecessary harm or suffering.

5. The permit holder must follow the Details of Capture, Handling and Surgical Procedures and Final Disposition outlined under #8 in the approved BC Animal Care Application form.

APPENDIX B
ADVISORY

PERMIT WL22-682577

GENERAL

- It is the permit holder's responsibility to be aware of all applicable laws and the limits of this permit. For example, this permit does not give the permit holder authority to access or travel though any private land without permission from the landowner.
- The Province is not liable for any illness contracted through wildlife handling. It is the responsibility of the permit holder to inform themselves of possible health hazards, and to ensure that all reasonably necessary safety measures are undertaken.
- To assist you, consider the following in your capturing and handling of animals:
  - Standards for Live Animal Capture and Handling Guidelines established by the Ministry of Environment. https://www2.gov.bc.ca/gov/content/environment/natural-resource-stewardship/laws-policies-standards-guidance/inventory-standards/terrestrial-ecosystems-biodiversity
  - Further guidelines can be obtained on the Canadian Council on Animal Care website at https://www.ccac.ca/en/standards/guidelines/types-of-animals.html
- If applicable, the permit holder is responsible for renewing this permit. The issuer is not obliged to send a reminder notice.

LEGISLATION

Below is a non-exhaustive list of provisions under the *Wildlife Act* and regulations that are relevant to this permit. It is the permit holder's responsibility to be aware of any provisions under the *Wildlife Act* or regulations that may apply to this permit.

Wildlife Act

Property in Wildlife

2 (1) Ownership in all wildlife in British Columbia is vested in the government

(4) If a person by accident or for the protection of life or property kills wildlife, that wildlife, despite subsection (3), remains the property of the government.

(5) Despite anything in this Act, no right of action lies, and no right of compensation exists, against the government for death, personal injury or property damage caused by

(a) wildlife,

(a.1) controlled alien species described in paragraph (a) of the definition of "species", or

(b) an animal that escapes or is released from captivity or is abandoned in British Columbia

Documents not transferable

81 Except as authorized by regulation or as otherwise provided under this Act, a licence, permit or limited entry hunting authorization is not transferable, and a person commits an offence if the person

(a) allows his or her licence, permit or limited entry hunting authorization to be used by another person, or

(b) uses another person's licence, permit or limited entry hunting authorization.

Failure to pay fine

85 (1) This section applies if a person

(a) fails to pay, within the time required by law, a fine imposed as a result of the person's conviction for an offence under this Act or the *Firearm Act*, and

(b) has been served with notice of this section.

(2) In the circumstances referred to in subsection (1),

(a) the person's right to apply for or obtain a licence, permit or limited entry hunting authorization under this Act is suspended immediately and automatically on the failure to pay the fine,

(b) all licences, permits and limited entry hunting authorizations issued to that person under this Act are cancelled immediately and automatically on the failure to pay the fine,

(b.1) the person must not apply for employment as an assistant guide,

(b.2) the person must not guide as an assistant guide, and

(c) the person commits an offence if, before that fine is paid, the person

(i) applies for, or in any way obtains, a licence, permit or limited entry hunting authorization under this Act,

(ii) does anything for which a licence, permit or limited entry hunting authorization under this Act is required,

(iii) applies for employment as an assistant guide, or

(iv) guides as an assistant guide.

Proof of identity and authorization

97 (1) In this section, **"authorization"** means a licence, permit or limited entry hunting authorization issued under this Act.

(2) Subject to subsection (5), a person who is required to hold an authorization must, on the request of an officer,

(a) state the person's name and address,

(b) produce prescribed photo identification, and

(c) demonstrate in accordance with subsection (3) that the person holds the authorization.

(3) A person may demonstrate that the person holds an authorization by

(a) producing the authorization, or

(b) unless the regulations require that the original authorization be produced,

(i) producing a legible copy of the authorization, or

(ii) if authorized by the regulations, stating a number assigned to the person by the s.15 as an identification number for the person.

(4) Subject to subsection (5), a person who would be required to hold a licence or permit issued under this Act were the person not exempt under section 11 (9) or 12 (b) must, on the request of an officer,

(a) state the person's name and address, and

(b) produce prescribed photo identification.

(5) Subsections (2) (b) and (4) (b) do not apply to a person in a prescribed class of persons.

(6) A person who contravenes subsection (2) or (4) commits an offence.

Permit Regulation

Permit for use of conveyance

3.1 (5) Subject to subsection (6), a person who undertakes an activity in accordance with a permit issued under subsection (1) is exempt from the following:

(a) Section 35 (2) of the Act;

(b) Section 18 (1)(q) of the Hunting Regulation, B.C. Reg. 190/84

General offence – failure to comply with permit

8 A person who holds a permit under the Act or this regulation commits an offence if the person fails to comply with a term of the permit.

Wildlife Act General Regulation

Proof of identity

21.01 (1) For the purposes of section 97 (2)(b) and (4)(b) of the Act, the following photo identification is prescribed:

(a) valid photo identification issued to a person by any of the following:

(i) the government of Canada;

(ii) the government of a province or territory, or an agent of the government of a province or territory, in which the person has a current address;

(iii) the Nisga'a Nation, if the person is a Nisga'a citizen;

(iv) a treaty first nation, if the person is a treaty first nation member of the treaty first nation;

(b) in the case of a person who is a non-resident alien,

(i) valid photo identification in the form of

(A) a passport, or

(B) a driver's licence issued to the person by a foreign jurisdiction in which the person has a current address, or

(ii) a copy of a photo identification referred to in subparagraph (i) that has been certified as a true copy by

(A) a lawyer, or

(B) a notary who is a member in good standing under the *Notaries Act;*

(c) in any case, a valid NEXUS card.

(2) For the purposes of section 97 (5) of the Act, persons under 16 years of age are prescribed as exempt from the requirement to produce photo identification.

APPENDIX C
DESIGNATES

PERMIT WL22-682577

s.15; s.19

Fish and Wildlife Application

Tracking Number: 100367042

Applicant Information

If approved, will the authorization be issued to an Individual or Company/Organization?	Company/Organization
What is your relationship to the company/organization?	Owner

APPLICANT COMPANY/ORGANIZATION CONTACT INFORMATION

Applicant is an Individual or an Organization to whom this authorization Permit/Licence will be issued, if approved.-

Name:	s.15; s.19
Doing Business As:	
Phone:	s.15; s.19
Fax:	
Email:	s.15; s.19
BC Incorporation Number:	
Extra Provincial Inc. No:	
Society Number:	
GST Registration Number:	
Contact Name:	s.15; s.19
Mailing Address:	s.15; s.19

TECHNICAL INFORMATION

APPLICATIONS

You may submit one or more application(s) Click on the 'Add Application' for each application you would like to add. In order to submit multiple applications together they must be for one applicant and in the same region.

Type

General Wildlife Permit

GENERAL WILDLIFE PERMIT

Please provide the following general information about you and your application.

APPLICATION TYPE

Please provide the following details regarding your application.

What type of permit are you applying for:	New Permit
Applicant Date of Birth (DD/MM/YYYY)	Jul 20, 1978

PROPOSED ACTIVITY

Please provide the following details regarding your proposed activity.

Wildlife Species - Common Name:	caribou and wolves
Wildlife Species - Scientific Name:	Rangifer tarandus and Canis lupus
Location of Activity:	Itcha Ilgachuz and Quesnel Highlands
Activity Start Date:	Jan 15, 2021
Activity End Date:	Apr 20, 2021

ACTIVITY DESCRIPTION

Provide a detailed description of the activity you require a permit for. Include methods and equipment to be used. If your activity involves the capture, transport, possession, release or export of live animals or viable eggs, you must also include a detailed safety plan that explains the measures you will take to ensure that public safety will be protected. (For example, how would you prevent escapes?) In your own words, also describe the purpose of this activity and any special circumstances the Ministry should be aware of.

Description:

s.15; s.19 wildlife handing staff s.15; s.15; s.19 and s.15; s.19 along with pilots: s.15; s.19 will provide helicopter net gun capture services of caribou and wolves for caribou recovery efforts. Hunt, trap or kill wildlife during the open season for the proper management of the wildlife resource, specifically, Wolf (Canis lupus) by the use of aerial net gunning for the capture, handling, sampling and GPS collaring of wolves within the Itcha-Ilgachuz Predator Management area during the open or closed season, as the s.15 consider necessary for the proper management of the wildlife resource within the Itcha-Ilgachuz Predator management area.
Utilize aerial net-gunning for the capture, handling, sampling and GPS collaring of wolves within the Quesnel Highland caribou range during the open or closed season, as the s.15 consider necessary for the proper management of the wildlife resource within the Quesnel Highland caribou range.
Hunt, trap or kill wildlife during the open or closed season for the proper management of the wildlife resource, specifically Caribou (Rangifer tarandus) by the use of aerial net gunning for the capture, handling, sampling and GPS collaring of caribou within Region 5 Itcha-Ilgachuz Predator Management area AND Caribou (Rangifer tarandus) in the Quesnel Highlands caribou range as the s.15; s.19 considers it necessary for the proper management of the wildlife resource.
Possess Caribou (Rangifer tarandus) and Wolf (Canis lupus) samples (tissues and bones) and dispose of dead wildlife or parts of wildlife for scientific purposes, specifically Wolf (Canis lupus) samples (tissue and bones) collected from mortality investigations and captures of wolves for the purpose of wolf reduction treatment.

Additional Permit-Specific Information:

GENERAL WILDLIFE PERMIT - APPENDIX

Legislation

Below is a non-exhaustive list of provisions under the Wildlife Act and regulations that are relevant to this licence. It is the licence holder's responsibility to be aware of any provisions under the Act or regulations that may apply to this licence.

Failure to pay fine

85 (1) This section applies if a person

(a) fails to pay, within the time required by law, a fine imposed as a result of the person's conviction for an offence under this

Act or the Firearm Act, and

(b) has been served with notice of this section.

(2) In the circumstances referred to in subsection (1),

(a) the person's right to apply for or obtain a licence, permit or limited entry hunting authorization under this Act is suspended immediately and automatically on the failure to pay the fine,

(b) all licences, permits and limited entry hunting authorizations issued to that person under this Act are cancelled immediately and automatically on the failure to pay the fine

(i) the person must not apply for employment as an assistant guide

(ii) the person must not guide as an assistant guide

(c) the person commits an offence if, before that fine is paid, the person

(i) applies for, or in any way obtains, a licence, permit or limited entry hunting authorization under this Act, or

(ii) does anything for which a licence, permit or limited entry hunting authorization under this Act is required.

(iii) applies for employment as an assistant guide

(iv) guides as an assistant guide

PRIVACY DECLARATION

☑ Check here to indicate that you have read and agree to the privacy declaration stated above.

IMPORTANT NOTICES

Please review the clauses and conditions associated with your application below.

DECLARATION

☑ I acknowledge that the information I have provided is true and that I fulfill the requirements for the applications.

OFFICE

Office to submit application to: Williams Lake

APPLICANT SIGNATURE

Applicant Signature	**Date**

OFFICE USE ONLY		
Office Williams Lake	**File Number**	**Project Number**
	Disposition ID	**Client Number**