ANNUAL REPORT

Enhancing Calf Survival to Help Avert Extirpation of the Klinse-Za Caribou Herd

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EXECUTIVE SUMMARY

The Klinse-Za caribou herd in northern British Columbia, part of the endangered Central Mountain population of caribou (*Rangifer tarandus caribou*), declined from 198 animals in 1995 to 16 animals in 2013. Due to unsustainable levels of predation, the herd was predicted to be extirpated by 2015. Consequently, removal of wolves in the area began in 2013 and maternity penning was implemented in 2014; both actions are seen as emergency measures to avert extirpation of the herd. The pen project in combination with wolf removal has helped to arrest the steep population decline and to create a positive population trajectory over the period since 2013.

Currently, we estimate that the population size of the combined Klinse-Za and Scott East caribou herd (hereafter referred to as the Klinse-Za) has increased from 36 individuals in 2013 to 101 in 2021 (average $\lambda = 1.14$). Ten months following the calving season in 2020, we observed seven calves (from 13 penned cows) and seven calves (from 19 free-ranging cows) still alive and presumed to soon become successful recruits into the juvenile stage of the population. Despite apparent successes in observed population growth and recruited juveniles over multiple years, the increase in the female reproductive population, about 10 cows, has been limited due to mortalities from avalanches in three winters (2017-18, 2018-19, 2020-2021) and significant predation (2019-20).

We recommend continuation of the maternity pen project in 2021 based on the following: 1) implementation of the penning operation has been relatively successful over multiple years with no catastrophic pen-related events, 2) penned cows in 2020 produced a higher ratio of recruited calves per cow compared to free-ranging cows (0.54 compared to 0.37), 3) we are likely still able to capture and pen >25% of the reproductive cows, 4) after accounting for mortalities that occurred during the year, penned animals contributed a net gain of seven animals and the free-ranging population contributed a net gain of five animals, 5) there is no evidence that the maternity pen operation has negatively influenced the health or behavior of the herd, and 6) we have been effectively meeting extension and reporting expectations. Assuming population vital rates continue as they have for the past seven years, forecasted population growth demonstrates the maternity pen is likely to remain as an effective recovery measure in this herd area.

The Klinse-Za maternity pen project aligns with the Fish and Wildlife Compensation Program's Species of Interest Action Plan in that it addresses the outlined Species-based Actions. Specifically, the Action addressed is 1b-3 'Implement projects identified through approved recovery strategies, action plans, and management plans developed for woodland caribou'. We address that action by enhancing the population size of the Klinse-Za caribou herd, which is a priority noted in the "Implementation Plan for the Ongoing Management of South Peace Northern Caribou (*Rangifer tarandus caribou* pop. 15) in British Columbia", specifically the section therein - 3.5.3 "Species and Population Management to increase the population of South Peace Northern Caribou across the current range, it is essential that species and population management occur in certain herd areas. Species and population management activities will include improving knowledge of South Peace Northern Caribou population estimates and trends, improving knowledge of adult and calf survival, increasing adult and calf survival, and augmenting herds (e.g., maternal penning, transplants)".

ACKNOWLEDGEMENTS

We would like to acknowledge the support provided by the ~25 individuals (helicopter pilots, veterinarians, government biologists, First Nations Lands Office biologists, First Nations Guardians, contract biologists) during the capture and transport of adult cows that occurs each March, from 2014 to present. This “team” performs the delicate job of handling each caribou in the most professional and humane manner possible. The 2020 “keepers of the caribou” or Guardians, Ryan Desjarlais, Rocky Desjarlais, Cheyenne Mercer, Julian Napoleon, Starr Gauthier and Lucas Talving should be especially congratulated and genuinely thanked for their continued support to this project and to the caribou. More than anyone else, the guardians personally make a difference to the recovery of caribou each day that they spend monitoring the cows and calves while they are penned. Their dedication to the caribou, and to the contribution that caribou make to their way of life, is something they demonstrate and care about strongly. Especially, we thank Chief Roland Willson (WMFN) and Ken Cameron (SFN) for their continued, unwavering support for recovery of caribou in their traditional territories. In addition, we also acknowledge the remarkable efforts of the Lands staff, Tamara Dokkie (WMFN) and Teena Demeulemeester (SFN).

Finally, this project could, of course, never have happened without the financial and in-kind support from a long list of sponsors; we thank each sponsor for their support and willingness to work with us to make the maternity pen project a success: Teck Coal, West Fraser Mills, Treaty 8 Tribal Association, Canadian Forest Products, BC Ministry of Forests, Lands, and Natural Resource Operations, Spectra Energy (now Enbridge), Anglo American Coal, Walter Energy (now Communa Coal), BC Hydro, Yellowstone to Yukon, Habitat Conservation Trust Foundation (FCTF), Environment and Climate Change Canada, TransCanada, and Public and Private Workers of Canada. This Project is also funded in part by the Fish and Wildlife Compensation Program (FWCP). The FWCP is a partnership between BC Hydro, the Province of B.C., Fisheries and Oceans Canada, First Nations and public stakeholders formed to conserve and enhance fish and wildlife impacted by the construction of BC Hydro dams. We also acknowledge and send thanks for the funding assistance provided by the BC Oil and Gas Research and Innovation Society (BC OGRIS) and the BC Boreal Caribou Research Effectiveness Monitoring Board (REMB).



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INTRODUCTION

The Klinse-Za caribou (*Rangifer tarandus caribou*) are part of the Central Group of Southern Mountain caribou in British Columbia (BC) and are listed as Threatened under Schedule 1 of the federal *Species at Risk Act* (Environment Canada 2014). Klinse-Za caribou inhabit the combined extent of what was historically referred to as the Moberly caribou herd and a portion of the Scott caribou herd east of the Williston Reservoir (Figure 1). These herd areas were combined for management purposes because caribou in the eastern portion of the Scott became less associated with the western portion of their historic range after creation of the Williston Reservoir and are recently more associated with the Moberly caribou after initiation of maternal penning (this project) in that herd area.

Spalding (2000) summarized the recorded observations of caribou and caribou killed in the area around Moberly Lake in the late 1800s and early 1900s and suggested that caribou were plentiful. West Moberly First Nations Elders spoke of a "sea of caribou" and also referred to them as "bugs" on the landscape (WMFN 2009). However, by 1997 there were only 191 caribou in the Moberly area (TERA 1997) and by 2013 there were only 36 caribou in the entire Klinse-Za area; 16 caribou in Moberly and 20 caribou in the eastern portion of the Scott (Seip and Jones 2015). More detail on the demographic history of Klinse-Za caribou can be found in McNay et al. (submitted). With the functional extirpation of the adjacent Burnt Pine caribou herd around 2012, the rapid decline of caribou numbers in the Klinse-Za was seen by local First Nations (hereafter, the Nations) as an indication that Klinse-Za caribou would also be extirpated unless aggressive population management was undertaken. The Nations began ground-based wolf removal in 2013 and maternal penning in 2014 (see a more detailed account of Indigenous-led efforts to recover Klinse-Za caribou in Lamb et al. (2021)). Both programs were intended to be, and have been, successful at temporarily averting extirpation of Klinse-Za caribou by reducing adult female mortality, increasing juvenile recruitment, thereby providing for a steady 14% annual growth in the population (Serrouya et al. 2019, McNay et al. submitted).

Despite the success of population management, the Klinse-Za subpopulation is still below the minimum viable size of 120 (NCTAC 2004), below population objectives recommended in an implementation plan for the ongoing management of caribou in the area (Aitkens 2013), and below the population goal established as part of a Recovery Action Plan for the Klinse-Za herd (McNay et al. 2013). In 2019, we therefore recommended continuation of the maternal penning project in 2020 (McNay et al. 2019) with the objectives to: 1) protect adult and calf caribou to reduce mortality of pregnant cows and their newborn calves through the calving period, 2) conduct effectiveness monitoring, and 3) provide extension and reporting about the project.

The project is conducted under a BC Wildlife Act permit granting authority to the Nikanese Wah tzee Stewardship Society to capture and hold caribou in a maternity pen and to protect penned caribou against predators (Permit FJ18-421458; valid 2019-2024 and amended in September 2020), and conduct effectiveness monitoring surveys (Permit FJ19-568256; valid 2019-2024). A Lands Act, Special Use Permit (SUP S26316) was granted to Wildlife Infometrics Inc., in 2017, for construction of the maternity pen protection facility on public land.

STUDY AREA

The original maternity pen, in operation 2014-2017, was situated on Mt. Bickford, about 11 km north of Highway 97, along the Fisher Creek resource road, 50 km west of Chetwynd, in northern BC (Figure 1). The pen was located at ~1200 m asl in a natural subalpine meadow that was historically used by caribou during the calving period (Jones et al. 2004). This maternity pen was removed in the spring of 2018.

The maternity pen site used in 2018-2020 is located on Mt. Rochfort at ~1580 m asl in a natural sub-alpine forest/meadow complex that was also historically used by caribou, although to a lesser level than Bickford(Dubman et al. 2018). This site is 60 km west of Hudson's Hope, and ~71 km up the Johnson resource road (Figure 1). The Klinse-Za herd area is approximately 5,501 km^2 and located in the Rocky Mountains of northern BC. The herd area is bounded in the north by the Peace Arm of the Williston Reservoir, in the south by Highway 97, to the east by lowland agricultural areas around Moberly Lake, and to the west by the Williston Reservoir (Figure 1).

The herd area is characterized by mountains and rolling hills, forest cover of lodgepole pine (*Pinus contorta*) and hybrid white-spruce (*Picea glauca x engelmannii*) at lower elevations, and subalpine fir (*Abies lasiocarpa*) and Engelmann spruce (*Picea engelmannii*) forest at higher elevations. Alpine summits occur from 1400 m to 2090 m. Four biogeoclimatic zones

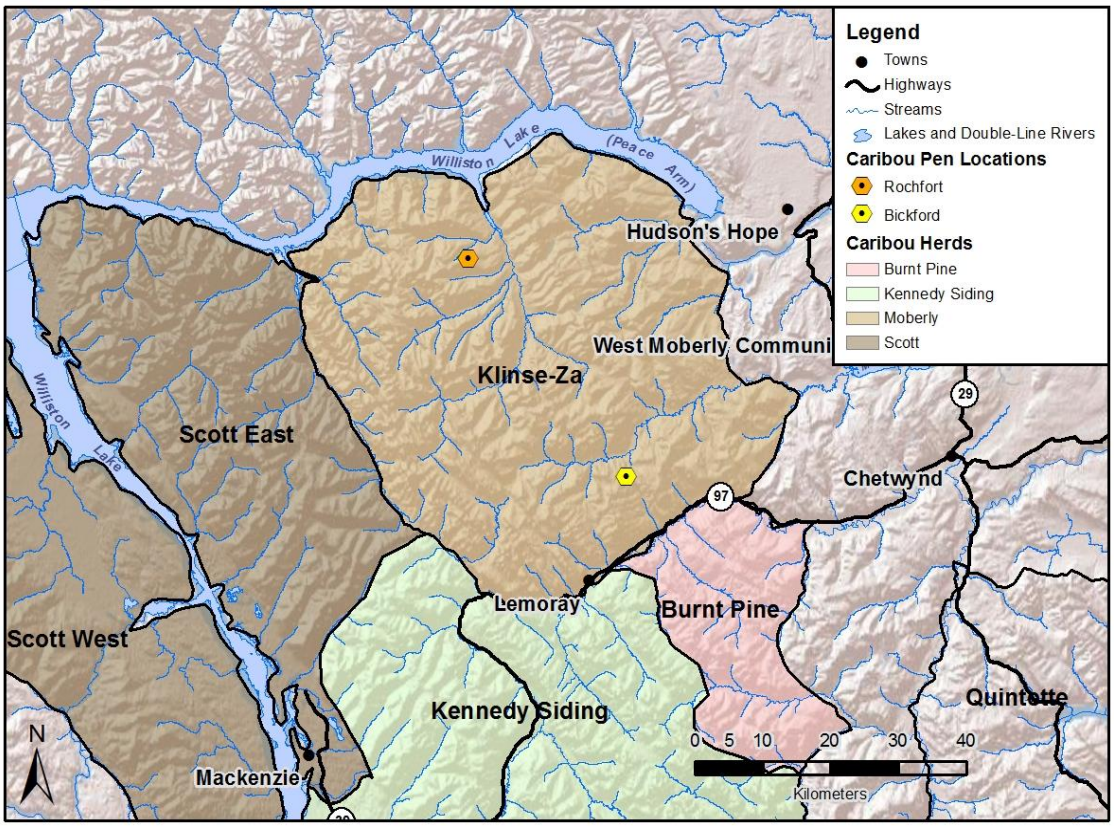

Figure 1. Location of the Klinse-Za caribou herd range and two maternity pens in northern British Columbia.

(Meidinger and Pojar 1991) occur within the herd area: Sub-Boreal Spruce (SBS), Boreal White and Black Spruce (BWBS), Engelmann Spruce-Subalpine Fir (ESSF), and Alpine Tundra (AT). Predators of caribou in the area include gray wolf (*Canis lupus*), black bear (*Ursus americanus*), grizzly bear (*Ursus arctos*), wolverine (*Gulo gulo*) and potentially lynx (*Lynx canadensis*) and cougar (*Puma concolor*), although cougar occur only rarely. Moose (*Alces alces*), elk (*Cervus canadensis*), mountain goat (*Oreamnos americanus*), and deer (*Odocoileus spp*.) also occur in the area, particularly in the eastern portions of the historic range of caribou where the landscape tends to be less mountainous and more altered by anthropogenic disturbance. The percentages of industrial-based disturbance in caribou range in the region is relatively high, affecting 89% and 34% of low-elevation range and the entire herd area, respectively[1]. Conversion of habitat within the Klinse-Za caribou range is caused by forestry, wind power generation, mining, hydro-electric power generation, oil and gas pipelines, roads, and other infrastructure/facilities.

METHODS

Protection of Adult and Calf Caribou

Planning and Preparation

Our planning for, and construction of, the two Klinse-Za maternity pens drew extensively on the design of maternity pens created for the Chisana caribou herd in Yukon (Farnell 2009, Adams et al. 2019) and in the Little Smokey herd in Alberta (Smith and Pittaway 2011). The 15 ha pen at Mt. Rochfort consists of a fence made of geotextile fabric, attached to three (or more) strands of cable; a top cable hung at 2-3 m above the snowpack and tightened around trees, a middle supporting cable, and a third cable positioned as close to the ground as possible. The geotextile fence is fortified by a 2 m high, 6-strand electric fence placed approximately 0.5 m away and along the exterior perimeter of the geotextile. A second electric fence 2 m high with 6-strands is placed ~3 m away from the other fence to establish multiple electric barriers to deter predators. More specific details on the construction of the Rochfort pen site are presented in Erickson and McNay (2018). Prior to pen operations each year, crews re-establish access to the pen site, inspect the condition of the pen, and undertake any necessary repairs.

We collect terrestrial forage lichens (*Cladina* sp*.*, *Cladonia* sp*.*, *Stereocaulon* sp., *Cetraria* sp.) twice each year, usually in June and September. Two collections allow for fresher lichen to be available after the ground thaws, thus reducing the chance of quality deterioration. Lichens are fed to penned caribou on a schedule that allows a slow change in diet away from natural forage to a commercial pelleted ration (see Appendix A for pellet composition). The amount of terrestrial forage lichens is increased back to 100% of the diet prior to releasing the animals from the pen. Details of the collection and storage techniques undertaken for the first year of collections were provided by Robin et al. (2013). The lichen collection task is now primarily collected by West Moberly and Saulteau First Nations schools using the same or similar methods as described by Robin et al. (2013).

[1] Disturbance was calculated as the area covered by a 250 m buffer around the footprint of all anthropogenic features (WMFN 2014).

Pen operation

We conduct cow captures, collaring, and transport to the pen each year in mid-March using experienced crews following Resource Inventory Standards Committee (RISC) protocols. The operation is under veterinarian supervision and monitoring is conducted by First Nation Guardians. Details on capture and translocation methods and other operational protocols are provided in Sittler et al. (2017). We collar cows with a GPS-enabled Iridium Satellite transmitter also capable of emitting a Very High Frequency (VHF) signal (model Survey-2D Iridium Collar; Vectronic aerospace GmbH, Germany). In 2020, we also deployed six other GPS-enabled collars which have video capability (Lotek LiteTrack with a small Insight camera attachment). We capture calves about 2-3 days after birth and fit them with an expandable, rot-away collar (model M4200, Advanced Telemetry Systems, Isanti, MN) equipped with a VHF transmitter. Collars used for adults and calves meet animal care guidelines for weight restrictions. The average lifetime of GPS collars used on caribou cows is four years, with a fix rate of four per day, and a transmission frequency of once per day. Calf collars have an average lifetime of two years; after this time the neck has generally grown sufficiently to break all of the expandable threads. Battery life is around 4-5 years for these small VHF collars.

Guardians monitor penned caribou 24 hrs/day from the time of initial capture (i.e., mid-March) to release of cows and calves (mid- to late-July). Two Guardian crews (one crew from Saulteau First Nations and one from West Moberly) are composed of two First Nations each. The Guardians are supported by professional biologists and veterinarians that are on call to address any issues that may arise with the pen itself or the penned caribou. Guardian responsibilities during monitoring are to: 1) feed caribou twice daily, 2) visually assess the penned caribou for injuries, signs of nutritional or behavioral distress, 3) identify when cows start calving, 4) look for compromises to the pen structure, 5) search for signs of predators, 6) take any corrective actions that may be necessary regarding any observations made, and 7) log all observations and/or corrective actions daily (Appendix B). As part of the monitoring protocol, the pen crews record the amount of feed (lichen and commercial pellets) provided to caribou, and note the quantity of feed left over after each feeding. If no food is left, the ration provided is increased. In 2019, after observing caribou experiencing ingestion difficulties, we amended the feeding protocol to mitigate the chance of caribou choking on pelleted rations. We did this by putting blocks of wood in the feed troughs and added additional feedings of reduced quantity; both actions were designed to help reduce the rate of feed intake.

We release penned cows and calves from the pen each year with a ‘soft’ release. In the days leading up to the release, the Guardians gradually move one of the feeding troughs towards the section of the pen wall chosen as the release point. On the date of release (which in 2020 occurred on August 17th), the pen crew opens a 20 m section of the geotextile fabric at the release point and the cows and calves are left to leave the pen on their own.

Effectiveness Monitoring

Pen operation

We assess the effectiveness of penning operations based on the following measures and targets:

- sufficient amounts of forage lichen are in storage to initiate feeding immediately after capture;

- cow mortality as a direct result of capture, transport, or operation of the pen is minimized and all mortalities are discussed with the provincial veterinarian to ensure the highest level of animal care has been, and is being, taken;
- percent of the adult cow population protected by the pen is >25% (adjusted from the previous goal of 40% as the herd size increases).
- no major breach in the integrity of the maternity pen structure while in operation;
- no predators gain access to the inside of the maternity pen while in operation;
- successful removal of predators that threaten to compromise the integrity of the pen;
- release of penned caribou is conducted without incident; and
- recording of daily observations at the pen is consistently completed by the Guardians (Appendix B).

Protection of adult and calf caribou

We posed the following expectations (or predictions) on which to assess effectiveness of using a maternity pen to protect adult and calf caribou:

- Pregnancy and parturition rates– penned cows should have pregnancy and parturition rates that are not lower than the rates observed for the free-ranging population. Pregnancy was assumed if blood progesterone levels ≥ 1.5 ng/ml. Blood samples were taken as part of the regular health sampling during capture (Sittler et al. 2017). Parturition was assessed daily in the pen during calving. Estimates of parturition rates from free-ranging caribou were assumed to be similar to the rates observed during a study of three reference populations west of the Klinse-Za herd in the Omineca Region of BC (McNay and Giguere 2007).
- Cow and calf survival– penned cows and their calves should survive better than cows and calves in the free-ranging population. This was measured as number of radio-collared cows (free-ranging and penned) surviving annually and calves/100 cows surviving at three milestone dates: the first of July, end of October or first of November, and in mid-March (i.e., still in their first year).
- Population growth– lambda (i.e., instantaneous population growth rate; $\lambda = (N_{2020\text{-}21}/N_{2013\text{-}14})^{(1/7_{years})}$) should be positive and the number of cows assumed to be reproductive (i.e., ≥34 months old in the March survey) should be increasing. Because we are unable to distinguish 2.8-year-old cows from juvenile cows (i.e., 1.8 year olds) in March, we assume all non-calf females to be of reproductive status.

We acknowledge that population demographics (i.e., population size, population growth rate, adult survival rates, and calf recruitment) estimated from monitoring data is confounded by other simultaneous recovery efforts, such as predator removal. For that reason, we take precaution to stratify demographic observations between radio-collared animals that are taken to the pen, and ones that are not (i.e., free-ranging). We infer demographic parameters for penned caribou from the daily monitoring records taken during the penning period. We also complete aerial surveys in May, June, and July to assess reproductive status of free-ranging animals. After penned animals are released, we monitor both the previously penned and free-ranging caribou with two aerial surveys conducted in November[2] and the population survey in late February or early March.

[2] In November, weather conditions and animal locations do not always allow for an accurate survey to be conducted.

Each year we collar additional free-ranging, adult female caribou to ensure there is at least one active collar in each group of caribou. Doing so increases the likelihood of an accurate minimum total count by telemetry methods. However, the preferred method for estimating population size (N), and the one used in the March 2021 survey, is a blind survey without telemetry using a standard mark-resight model based on the Lincoln-Peterson estimator as follows (McClintock and White 2009):

$$N = m_1 n_2 / m_2 ,$$

where m_1 is the number of collared caribou in the surveyed population, n_2 is the total number of caribou seen including those collared, and m_2 is the number of collared caribou seen without the aid of telemetry. If any collared animals are using habitat below the alpine, we locate those animals, and any others with them, using telemetry and do not attempt a mark-resight survey in that portion of the range. Total herd size is the sum of the mark-resight estimate and the number of animals located by telemetry.

Health and behavior indicators

Maternity penning could be effectively operated and successful in protecting caribou but, at the same time, still put the herd at greater risk from: i) a build-up and/or transmission of disease or ii) a modification of habitat selection behavior that leads to reduced nutritional status and more chronic, rather than acute, causes of mortality. As a result of these considerations, we implemented a deeper study of the potential for maternity penning to have subtle but significant, effects on the health and behavior of the Klinse-Za caribou and results will be reported elsewhere.

Extension and Reporting

We pursued a variety of extension and reporting outlets to make sure that a broad audience was well informed about the maternity pen project, including the following: regular internal and external meetings and presentations, digital and other media updates (web pages, Facebook, newspaper articles), engagement with schools, technical and annual reports, information for FWCP extension, and informal periodic newsletters. We tracked all costs for the project, assigned each cost to a project phase, reconciled cost against revenue, and reported results in a separate financial report. We assessed effectiveness of extension by:

- Opposition to the maternity pen– opposition was measured by the number of negative media events recorded from national, regional, or local sources (e.g., newspapers, periodical publications, television, and social media such as web pages, Facebook, twitter, or personal blogs).
- Opportunities to present maternity pen results– opportunities were counted as the number of outputs used to relay results of the pen to all audiences.

RESULTS

Pen Operation

Terrestrial forage lichens were collected in September 2019 (n = 300 bags) for storage in advance of the 2020-21 pen operation. Lichen was also collected over five sessions in August and September 2020 (n = 400 bags) for storage in advance of the 2021-22 pen operation.

We surpassed our desired goal for the number of penned cows, penning 45% of the adult cow population (n = 13 cows, 1 yearling). We successfully conducted the captures during one session in March, however one cow died, falling over and breaking her neck after being netted. Eleven of the 13 adult cows had previous pen experience (two being calves born in the pen); one of which has been penned in five previous years, two of which have been penned in four previous years, one of which has been penned in three previous years, three of which have been penned in two previous years, and four that have been in the pen only once before, and the yearling was born in the pen the previous year. We were unsuccessful at capturing more cows because some collared groups were using forested habitats and could not be safely moved to more open areas for capture, and because we did not want to overly pressure larger groups of animals during captures.

No predators gained access to the pen and the pen structure itself was not compromised in any way during the pen operation in 2020. Throughout the penning season, Guardians observed predators and/or predator sign around the pen, and on the access road up to the pen, by both remote cameras and visual sightings. The main predator species consistently observed around the maternity pen was grizzly bears: several different individuals were observed throughout the year. In total, there were two black bears, and one lynx shot to protect the penned caribou.

There were no issues related to ingestion of food inside the pen (e.g., choking or aggression at the feeding troughs) or other types of negative behavioral incidents. Unfortunately, one calf died after its collar was caught on a branch, strangling itself several hours after being captured. To reduce the chance of this occurring again, calf collars will be sewn with more folds to accommodate smaller animals, and stitching will be broken to accommodate larger animals accordingly.

On August 17th 2020, we released all eight calves that were born in the pen as well as the one juvenile and 13 cows. This year we observed a significant gap in birthing events, with the first calf being born on May 12th and the last calf being born on July 4th. To allow more time for the calves born later to grow and put on weight, we decided to move the release date until August 17th, at which point the youngest calves would be eight weeks old. At release, five calves were 13 weeks old and three calves were eight weeks old.

All daily observation sheets for the penning period (n = 161 days) were properly completed and filed. An example of a completed sheet is presented in Appendix B. There were occasional unplanned visits made by members of the public to the Mt. Rochfort site during penning, but all visitors were informed of the need for minimal disturbance to the penned caribou, and most of them congenially agreed to leave the site. Informational brochures were available for the Guardians to provide to any unplanned visitors (see Appendix E). Considerably fewer visitors were seen at the Mt. Rochfort site, compared to the Mt. Bickford site; largely due to the more difficult access to the pen.

Protection of Adult and Calf Caribou

Blood PSPB levels indicated that nine of the 13 penned cows, and the one cow that died during capture, were pregnant (range: 0.06-0.49 ng/ml). Blood was also available from seven re-collared cows that were left outside the pen and they were all pregnant. While pregnancy rates differed considerably between penned (69%) and free-ranging (100%) animals, the overall pregnancy rate, including the one cow that died, was 81%. Nine calves (five♂ and four♀), from the nine pregnant cows, were born between May 14th and July 7th, 2020. Successful parturition

of penned cows was therefore 100% and calves per penned cow was 0.69 at that time (Table 1).

Table 1. Parameters used to evaluate effectiveness of a maternity pen to protect caribou cows and their calves from March to July, Klinse-Za caribou herd area, northern British Columbia, 2020-21.

	Data stratum	Pen	Free-ranging
(A) Natal and Survival Rate	Number of radio-collared adult cows	13	7
	Number of radio-collared juveniles	0	5
	Number of collared mortalities	0	1
	Number of collared juvenile mortalities	0	1
	Collared adult survival	1.00	0.83[a]
	Collared adult mortality	8.3%	
	Number of other mortalities[b]	0	4
	Pregnancy	0.69	1.00
	Parturition	1.00	0.81[c]
	Calf/cow in Jul	0.62	0.61[d]
	Calf/cow next Mar	0.54	0.37
	Number added to population	7[f]	5[e]
(B) Population survey	Number of cows		32
	Number of males		44
	Number of unknown adults		4
	Number of juveniles		7
	Number of calves		14
	Total (observed)		101
	Total (estimated from mark-resight)		101
	Total (calculated from known births and deaths)		93
	Known immigration		0
	Calves (% of population)		14
	Bulls:Cow		1.38

[a] – This is likely an underestimate because we have 6 other video collared animals that don't fit into this equation.
b – Calculated by the total adult population size at year start (n = 85-14 calves = 71 adults) multiplied by the collared mortality rate (2/24 = 0.083) and subtracting the known number of mortalities (n = 2).
c – Observed as an average from other herd areas in the region.
d – Seven calves were observed with 12 of 13 collars observed (i.e., excludes collared juveniles), the 13th cow was known to be unreproductive (i.e., seven calves for 13), and one calf was apparently born just after the survey (i.e., eight calves for 13 cows)
e – Calculated as the number calves in $March_{2021}$ – number of known non-calf $deaths_{2020/21}$
f – One pen calf not observed during the census, fate unknown.

Observed post-partum calf survival in the pen to the end of July was 89%, accounting for one calf dying shortly after capture, so the ratio of calves per penned cow was 0.62 at the time of release. We observed seven calves with 12 free-ranging, collared cows in July and, accounting for one collared cow that we knew was unreproductive and without calf, and for one other calf that was born after the survey, calculated a ratio of 0.61 calves per free-ranging collared cow around the post-neonatal period.

All six video-collared cows were pregnant at the time of capture in March. These collars were remotely released mid-July to allow video downloading and processing. The video collars deployed captured three out of six parturition events, with the other three parturition events confirmed with frequent aerial surveys and movement analysis. One video collar failed to activate due to a programming error, and two events were missed due to the unusually late timing of calving in 2020 which led to the cameras memory being filled prior to the calving events. We believe that one of the cows with the failed video collars did have a calf based on her movement pattern, but the calf was never found. We assumed this calf was lost to a grizzly

bear that was seen in the exact area the cow would have calved, and confirmed with GPS data that the cow fled the area shortly thereafter.

In March 2021, we observed seven calves from collared pen cows, three from collared free-ranging cows, and four from uncollared free-ranging cows, for a total of 14 calves and an overall ratio of 0.44 calves/cow (n = 32 cows total; 19 collared cows, 13 from the pen and 6 free-ranging, and 13 uncollared). The penned calves/cow ratio in March 2021 was 0.54 (7/13) representing the loss of one penned calf since release, while the free-ranging calves/cow ratio was 0.37 (7/19), representing a loss of one known free-ranging calf after the neonatal period. The collar of the one pen calf not seen during the census was heard in mortality and thought to be dead. Following investigation it was determined this collar was dropped and that the calf was potentially alive, though it was not observed during the census. Calves overall made up 14% of the total population of 101 (Table 1B).

One cow that had been penned in previous years died in an avalanche. One juvenile that was born in the pen last year, died of unknown causes, but likely wolf predation. Overall, adult mortality based on radio-collared animals was therefore 8.3% (i.e., from Table 1A (1/24)). The number of reproductive cows in the population has increased from 22 in 2013 to 32 in 2021.

Minimum count -- In March 2021, we observed 32 adult cows, 44 adult males, four unknown adults, seven juveniles, and 14 calves for an overall minimum count of 101 caribou (Table 1, Table 2, Figure 2).

Population estimate -- The population estimate using the mark-resight approach was also 101, calculated as follows:

- there were 19 GPS collared adult caribou and four VHF collared juvenile caribou,
- 19 collars were in the survey unit (m_1) and all 19 were found without the use of telemetry (m_2) which would make the sightability in the survey unit equal to 100%,
- the total number of caribou seen in the survey unit, including collared cows, was 85 (n_1) so the estimate of caribou in the survey unit was 85.
- the other four collars were located after the survey, in dense timber outside of the survey unit using telemetry (Table 2). A total of 16 caribou were seen in three groups with the use of telemetry (Table 2) so the total herd size is 101 (85 + 16).

Reconstructed population -- Our observations of 85 animals in March 2020 (McNay et al. 2020), plus the 14 new calves, minus the one known adult mortality, one known juvenile mortality, and another four estimated adult deaths (Table 1) would result in a total population of 93.

Table 2. Observations of caribou, group numbers, and sex/age class in the Klinse-Za/ScottE caribou herd in northern British Columbia, March 2021. Observations (Obs) align with those in Figure 2.

Obs	Type	Adult Male	Adult Female	Adult Unknown	Juvenile	Penned Calf	Free-ranging Calf	Total
1	Telemetry	3	1	0	0	0	1	5
2	Telemetry	4	1	2	2	0	0	9
3	Visual	1	0	0	0	0	0	1
4	Visual	2	1	0	0	0	0	3
5	Visual	2	0	0	0	0	0	2
6	Visual	1	0	0	0	0	0	1
7	Visual	4	0	2	0	0	0	6
8	Visual	2	5	0	1	1	1	10
9	Visual	2	0	0	0	0	0	2
10	Visual	3	0	0	0	0	0	3
11	Visual	3	1	0	0	0	1	3
12	Visual	5	0	0	0	0	0	5

13	Visual	1	0	0	0	0	0	1
14	Visual	3	2	0	0	0	1	6
15	Telemetry	0	2	0	0	0	0	2
16	Visual	5	17	0	3	5	2	33
17	Visual	3	3	0	1	1	1	9
Total		44	32	4	7	7	7	101

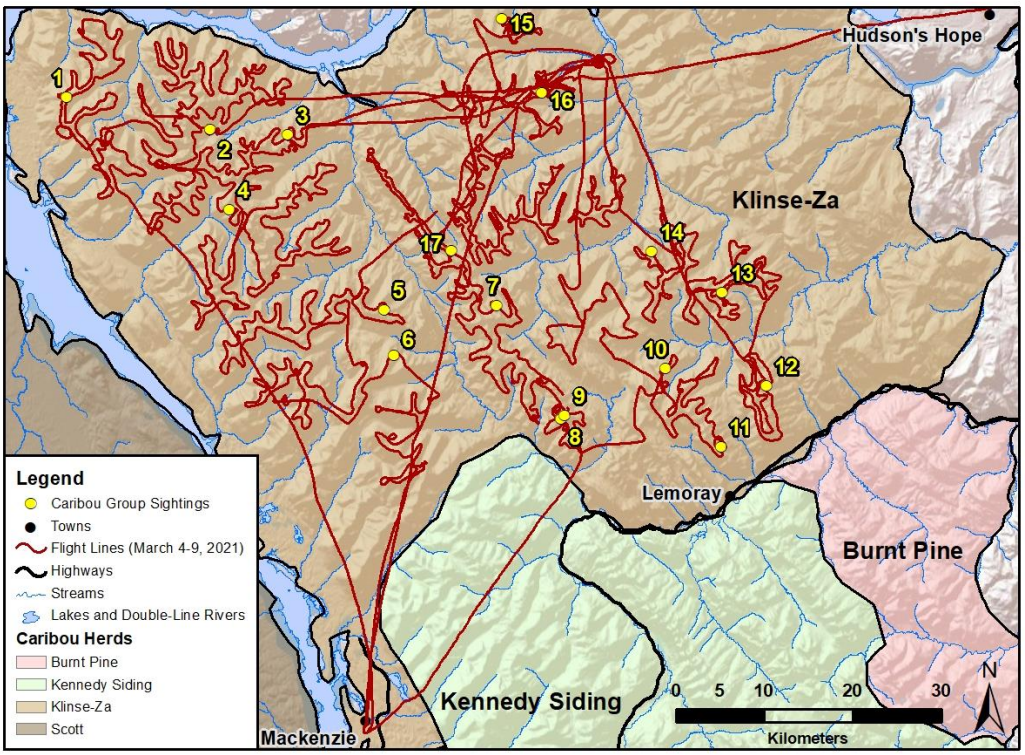

Figure 2. Observations of caribou groups in the Klinse-Za caribou herd in northern British Columbia, March 2021. Yellow Caribou group sightings align with observations (Obs) presented in Table 2.

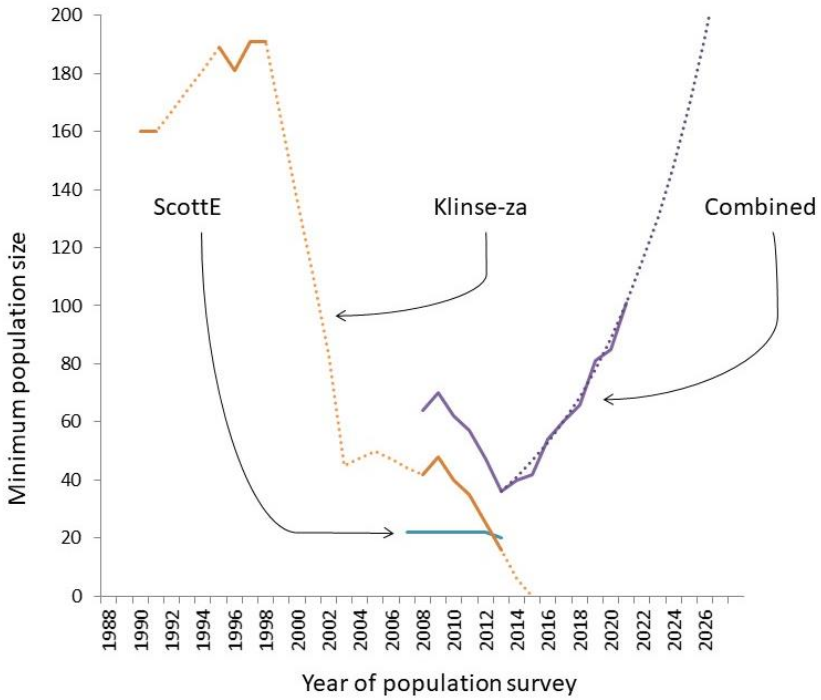

Figure 3. Population trends for Klinse-Za (orange), ScottE (blue), or combined (purple) caribou herds, British Columbia. Dotted lines depict no data (orange/blue) or estimates (purple; assuming $\lambda = 1.14$).

Extension and Reporting

The following is a listing of extension and reporting events, concerning the maternity pen project, which occurred during the 2020-21 fiscal year[3]:

- Internal meetings between project partners (West Moberly FN, Saulteau FN, and Wildlife Infometrics): in total, 12 meetings took place between April 2020 and March 2021 (dates are provided in Appendix C).
- External outreach and engagement:
    - Presentation to Alberta Environment and Parks biologists, June 04, 2020;
    - Two meetings with BC Caribou Team, summer 2020;
    - Webinar presentation to ABMI's Caribou Ecology and Recovery Webinbars, March 30, 2021;
- Digital and other media:
    - Five internal/external extension memos issued between April 2020 and March 2021 (dates are provided in Appendix C);
    - Informational brochure available to members of the public (see Appendix D);
    - Infographics provided to sponsors and communities (see Appendix E);
    - Updated project webpage published on the Wildlife Infometrics Inc. website: http://wildlifeinfometrics.com/project/klinse-za-caribou-maternity-pen/
    - Two private media personnel (David Moscovitz, Benjamin Polley) visited the maternity pen at release time, end of July 2020;
- Technical materials:

[3] As confirmation of recognition for sponsorship, sponsor logos were included in each of these events on an acknowledgement page or were mentioned during interviews.

    - Annual project report (this report) submitted to HCTF and FWCP by mid-April 2021;
    - Technical manuscripts prepared and sent for publication:
        - Lamb, C.T., R. Willson, C. Richter, N. Owens-Beek, J. Napoleon, B. Muir, R.S. McNay, E. Lavis, M. Hebblewhite, L. Giguere, T. Dokkie, S. Boutin, and A.T. Ford. 2021. Indigenous-led conservation: pathways to recovery for the nearly extirpated Klinse-Za mountain caribou. Ecol. Appl. In Press.
        - McNay, R.S., C. Lamb, L. Giguere, S.H. Williams, H. Martin, M. Hebblewhite, and G. Sutherland. Submitted. Demographic responses of nearly-extirpated endangered mountain caribou to recovery actions in central British Columbia. Ecol. Appl.
- Additionally, we have provided information for FWCP's website, which is another source of public communication about the project:
    - http://fwcp.ca/enhancing-caribou-survival-in-the-klinse-za-herd/,
    - http://fwcp.ca/supporting-risk-caribou-herds/,
    - http://fwcp.ca/update-on-fwcps-caribou-recovery-projects/.

In addition to these tracked references to the maternity pen, there have been many recent news articles and blogs written about the maternity pen in general and the Klinse-Za pen specifically. Examples:

- https://thetyee.ca/News/2020/09/25/Caribou-Recovery-Indigenous-Leadership/
- https://sierraclub.bc.ca/50-places-caribou-recovery/

DISCUSSION

The observed population decline of the Klinse-Za caribou herd has been arrested through recovery actions (maternity penning and wolf removal) during the past eight years. The population trajectory has been positive since implementation of the management measures and there has been an observed population growth of 65 animals, almost triple the population size of the herd in 2013. While there has been an overall increase of animals, we consider the stable/increasing population growth to be heavily dependent on recovery actions.

In general, population increase has occurred steadily at 14% per year despite episodic mortality events; specifically, deaths from avalanches (2016-17, 2018-19, 2020-2021), and localized predation events (2014-15, 2019-20). There were five known mortality events this past year; one 2019 penned calf was predated, with evidence pointing to wolves, one calf has been assumed dead after hearing its collar on mortality, one pen calf died from its collar becoming entangled in brush, one wild calf died from unknown causes, and one adult cow was killed in an avalanche. Due to hazardous avalanche conditions this winter, we won't be able to determine if more than one animal was trapped in the avalanche until late spring, when we can excavate the area.

We have noticed a trend in the population structure towards a high male to female ratio. The overall increase of adult females has been only 10, while the increase of adult males has apparently been 36. Factors that could contribute to uneven population growth include: 1) a higher mortality of relatively older adult females, compared to the mortality rate of the relatively young males added to the population and/or 2) a sex bias in birth of penned calves. The young males in the population may not have been exposed to the same mortality pressures that older,

more mature bulls naturally undergo (e.g., accidents from fighting in the rut, energy drain during the rut leading to a higher susceptibility to predation, or subsequent exposure to other mortality factors, etc.) but we expect this may begin to occur which, if it does, could limit population growth in future years. Although there was an apparent sex bias in births of calves in the pen (30 females, 38 males), this did not manifest in a sex bias of recruited calves (24 females, and 24 males). Self-sustaining populations are generally discussed in reference to only the number of individuals (e.g., 120 (NCTAC 2004)), however, the demographics, especially age/sex structure, of small herds should be considered when implementing, changing, or ceasing recovery efforts.

Both free-ranging and penned caribou seem to have high pregnancy rates, and yet, in most years, we have observed significant differences in recruitment rates between the two groups. We don't know if free-ranging calves are being aborted or reabsorbed between pregnancy and parturition or alternatively, perhaps parturition is similar to pen cows with subsequent, high rates of neonatal predation on free-ranging calves. In 2020-21, this difference was not as obvious with calves/cow being very similar between penned and free-ranging collared cows and calves/cow in March only marginally better for penned cows over free-ranging cows. In 2021, we intend to increase our deployment of video collars to 10 on free-ranging cows, and deploy 10 GPS enabled expandable collars on free-ranging calves, in an effort to gain a better understanding of parturition rates and causes of mortality in free-ranging calves. In a separate project, we plan to collar 10 grizzly bears to investigate their predation and impact on free-ranging caribou calf survival. Combatting video collar memory issues, this year we will reduce the amount of video taken per day to increase our chances at capturing late June calving events. In addition, programming will be checked by multiple personnel to ensure all errors are fixed prior to video collar deployment.

Part of the funding that enables maternity pen operations is conditionally approved provided we continue working with the provincial caribou recovery team (henceforth, the BC Team) "to determine longevity and effectiveness of the …project and to determine…thresholds….for a sustainable herd". To address this condition we have prepared the following.

We have had *ad hoc* meetings with the BC Team to discuss measures of effectiveness and the BC Team has constructively commented on, and made improvements to, the measures of effectiveness that we document in annual technical reports such as this one. Additionally, in 2020, we focused a stand-alone technical paper addressing the effectiveness of the maternity pen (McNay et al. submitted and under review) which we presented in draft to BC Peace region staff in July 2020, and to the BC Team in August 2020. We were recently given the opportunity by the BC Team to provide input on a provincial policy for maternity penning.

All effectiveness measures up to, and including, the 2020 maternity pen indicate the current maternity pen operations are successful (see Results, Pen Operation), that results are an effective contribution to population recovery (see Results, Protection of Adult and Calf Caribou), and no measure indicates that termination of the pen operations would be appropriate at this time. The substantive evidence in support of this conclusion is based on the operational success coupled with the complementary additional improvement to population growth provided by the pen over wolf removal alone (McNay et al. submitted). The cost of the penning operation and the amount of improvement to population growth could contribute to a measure of return-on-investment but this indicator is not considered in the context of expeditiously growing a population to self-sustaining levels able to provide for a meaningful harvest of caribou by Indigenous People (Intergovernmental Partners 2020). The Nikanese Wah tzee Stewardship Society holds the view that a precautionary approach to reaching the goal of meaningful harvest

expeditiously, is benefited by any boosted growth and that funding has only minor opportunity cost (i.e., many sponsors are more able to fund maternity penning but not other recovery measures).

Estimating longevity of the maternity pen operations is an intractable problem and challenging to predict with any degree of confidence. For example, one might argue that simple metrics like herd size and pen size can be used to predict when contributions of penned calves, to herd level recruitment rates, are no longer significant (Sutherland et al. 2015). However, we have learned in the Klinse-Za case that sex/age structure confounds the interaction of those metrics – while the Klinse-Za population has grown from 32 to 101 (180%) individuals, the number of reproductive cows has only grown from 22 to 32 (60%) and we are therefore still able to capture and protect between 25-50% of the reproductive population (one of our success measures) even before contemplating enlarging the pen capacity to achieve that success. Furthermore, the number and spatial arrangement of caribou groups at the time of capture also plays a role in how many cows can be brought to, and therefore protected by, the pen. More and smaller groups offer more opportunity than fewer, larger groups. We could not have predicted that parameters like sex/age and group size would influence longevity of penning operations. We therefore conclude that, so long as we are able to pen at least 25% of the reproductive cows, the maternity pen (whether the same size or larger) will continue to significantly augment population growth and we are unable to predict how long that condition will last.

The issue concerning the estimate of thresholds for herd sustainability is similarly challenging. In theory, as long as the population is above a minimum viable size genetically, and predator density is sufficiently low (in some cases meaning more than just wolves), a population of caribou could become relatively stable at a number that varies with carrying capacity which itself would vary with the dynamics of habitat conditions. Self-sustaining implies that population management measures like maternity penning and predator management are unnecessary, that lambda is somewhat stable, and that episodic events do not have lasting negative implications on lambda. In a recent paper (Lamb and McNay 2020), we calculated ecological carrying capacity for the Klinse-Za herd to be 633. Given the amount of permanent disturbance in the area, carrying capacity could be 576 and in the unlikely event of managing the land to achieve that much habitat, the more likely number is 295-498. Whether any of these population sizes would be self-sustaining is uncertain and it is likely we'll need to make that assessment only when the herd nears the carrying capacity provided by the habitat that can be negotiated through Land Use Objectives (Intergovernmental Partners 2020). We therefore conclude that modeling self-sustainability may become more tractable only once Land Use Objectives have been established for the Klinse-Za herd area.

CONCLUDING THOUGHTS

We think that intrusive management measures, such as the maternity penning implemented at Mt. Rochfort, is best used only as an emergency measure to avert imminent extirpation such as the Klinse-Za case. Furthermore, penning should only be considered in conjunction with other recovery measures such as predator removal. While maternity penning has helped to avert extirpation of the herd, it is unlikely the return on investment could be defended in populations that are less at risk of extirpation.

Specific to penning operations, pen area should be large enough to accommodate a large number of caribou, as we would expect a steep diminishing return to a growing population,

hence a declining rationale for maternity penning. That said, in such emergency situations as the Klinse-Za (i.e., steeply declining, small populations), sponsors appear willing to support maternity penning as a recovery measure whereas we speculate they might not be as willing to support other recovery measures to the same level. Given the current demographic statistics, there appears to be sufficient rationale to continue the maternity pen operation in the Klinse-Za but we will need to address diminishing returns by penning more adult cows and by continuing to track the number of animals added to the population from the pen versus the number added by the free-ranging population.

RECOMMENDATIONS

Based on the demographic parameters presented here, we recommend continuing maternity pen in 2021 operations. We will be undertaking the following progressive actions during the 2021-22 operation:

- Continue efforts to monitor health of individual caribou with specific attention to how maternity penning may influence overall health of the population;
- Initiate a separate investigation using relocations from collared caribou to better understand post-release habitat use and possible effects of maternity penning;
- Continue investigating parturition rates, and neonatal survival in the free-ranging population;
- Construct another maternity pen for use in 2021-2022, in order to reduce concentration of animals around Mt. Rochfort, and reduce any chance of parasite/contaminant buildup.

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APPENDIX A. COMMERCIAL CARIBOU PELLET INGREDIENTS

15% CARIBOU PELLETS
(For Caribou)

INGREDIENTS:

Barley, Wheat, Corn
Faba beans, Soybean meal
Molasses
Canola oil
Limestone, Salt, Dical
HP Mineral Mix(Wheat, Millrun, Canola oil, Copper Sulfate, Zinc Oxide, Calcium Carbonate, Iodine, Manganeous Oxide, Selenium, Cobalt)
HP Fortifier(Wheat, Millrun, Canola oil, Copper Sulfate, Zinc Oxide, Calcium Carbonate, Iodine, Manganeous Oxide, Iron Sulfate, Calcium Pentothenate, Selenium, Santoquin, Biotin, B-Traxim, Niacin, Folic Acid, Vitamin A, Vitamin B1, Vitamin B2, Vitamin B6, Vitamin B12, Vitamin D, Vitamin E, Vitamin K3)
Vitamin A, D, E, Vitamin E
Choline chloride
MAG OX, Dyna-Mate

INGREDIENTS: A list of ingredients used in this feed may be obtained by the manufacturer or registrant.

This feed contains added selenium at 0.4 mg/kg.

GUARANTEED ANALYSIS: Crude Protein (min) 15.0%; Crude Fat (min) 2.0%; Crude Fibre (max) 6.0%; Calcium (act) 1.00%; Phosphorus (act) 0.90%; Sodium (act) 0.25%; Potassium (act) 0.83%; Magnesium (act) 0.20%; Sulfur (act) 0.20%; Iron (act) 400 mg/kg; Iodine (act) 1.3 mg/kg; Copper (act) 25 mg/kg; Manganese (act) 100 mg/kg; Zinc (act) 191 mg/kg; Cobalt (act) 0.40 mg/kg; Vitamin A (min) 15,000 I.U./kg; Vitamin D (min) 2,000 I.U./kg; Vitamin E (min) 100 I.U./kg; Thiamin (min) 5.3 mg/kg; Riboflavin (min) 8.2 mg/kg; Niacin (min) 72 mg/kg; Vitamin B_6 (min) 14 mg/kg; Biotin (min) 0.28 mg/kg; Pantothenate (min) 28 mg/kg; Choline (min) 1,500 mg/kg; Folate (min) 4 mg/kg; Vitamin B_{12} (min) 0.02 mg/kg.

FEEDING INSTRUCTIONS: Feed Caribou Pellets to Caribou when they are on tundra. Provide Hi-Pro Mineral and salt free choice and provide fresh water.

CAUTION:
1. Directions for use must be carefully followed.
2. Do not feed in association with another feed containing supplemental selenium.

Individual results from the use of this product may vary due to management, environment, genetics, health and sanitation differences. Therefore, Hi-Pro Feeds does not warrant or guarantee individual results.

Net Weight 20 KG

APPENDIX B. MATERNITY PEN DAILY MONITORING REPORT

Klinse-Za Caribou Maternal Pen Project – 2018

Crew Name (Full Names): Ryan/Steven Desrochers Date: March 29/18

Visitors (Full Names):

CARIBOU

ID#	Freq. #	Collar #	Ear tag Left	Ear tag Right	Observation* (V, H, NS, NH) AM	Observation* (V, H, NS, NH) PM	Health issues? (yes/no) (If 'yes', leave comment in last column) Limping	discharge	skinny	wound	head low	alone	Calf ID	Calf Freq	Calf Ear Tag Left	Calf Ear Tag Right	Comments
C319K	148.805	29173	2	NA	V	V											
C372K	149.653	NA	15	NA	V	V											
C349S	148.925	29594	22	NA	V	V											
C347K	149.135	29595	12	20	V	V											
C317S	149.365	29596	7	1	V	V											
C332K	149.525	29597	NA	799	V	V											
C364K	149.545	29598	6	10	V	V											
C312K	149.565	29599	4	3	V	V											
C336K	149.750	31174	6	7	V	V											
C376K	None	None	NA	NA	V	V											
C335K	149.780	31175	2	NA	V	V											
C313K	149.795	31176	796	1	V	V											
C337S	149.024	34839	8	NA	V	V											

*Codes for Observation: V = Visual, H = Heard (with telemetry), NS = Not Seen, NH = Not Heard

Comments: All animals looked to be in good health.
Calf 13 were in feeding meeting.

SCALES

Time	Reading (kg) before re-set	Reading after re-set?	Comments: (scale not working properly - needs fixing, caribou refusing to use the scale, problems like aggressive behavior, etc)
AM :			
PM :			

	Time	Amount (bags)	% Remaining <5%, 5-10%, 20-50%, 50-100%	Trough Condition comments: (e.g. lots of moss, only dirt left, etc.)
LICHEN	AM 8:30	2	0	All lichen was gone.
	PM 7:	2	0	
	Time	**Amount (kg)**	**% Remaining <5%, 5-10%, 20-50%, 50-100%**	**Trough Condition comments: (e.g. foggy, birds feeding in trough, etc.)**
PELLETS	AM 8:30	20	>5	Only 1 trough had little pellets left.
	PM 7:	20	0	All gone

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DISTURBANCE

Time	Event *	Location **	Comments: *(any actions taken?)*
2:00	People	Pen	Drove into meadow to drop of pellets
:			
:			
:			

*Codes for Event: Aircraft – Visitors (expected) – Public (unexpected) – Trucks – Sleds – Quads – Big wind storm – Rainstorm – Tree falling, etc...
**Codes for Location: Camp – Pen – Road (which km?) – Alpine – etc...

PEN PERIMETER WALK-AROUND

Section #	Time	Snow * Inside	Snow * Outside	Electric *	Voltage (min 6v)	Geo *	Veg *	Comments: *Describe the problem(s) and indicate if it is "Fixed" or not and if not when it will be fixed* (hole, wire short, broken wire, vegetation touching the wire tree on the fence, etc.)
All	8:30	✓	✓	X	X	✓	✓	No Concerns at all
	:							
7a	:							
all	7:00pm							Need shovelling tomorrow
	:							
	:							
	:							
	:							
	:							
	:							
	:							
	:							

*Codes: ✓ = Checked & in good standard; X = Need attention; F = Fixed

PREDATOR CONTROL

Time	Species	Sign (Tracks, Scat, Visual)	Location (Pen, Camp, Road, Alpine)	Actions = what did you do? Note: If no predators or predator sign seen, WRITE DOWN "No predator sign observed, and no action needs to be taken"
8:30				Nothing seen or tracked
:				
7:pm				No Concern
:				
:				
:				
:				

WEATHER

Time	Max Temp (°C)	Min Temp (°C)	Wind *	Precipitation (Snow, Rain, Fog, Dry, Windy)	Comments:
:					

*Codes for Wind: 0 = calm, 1 = light air, 2 = light breeze, 3 = gentle breeze, 4 = moderate breeze, 5 = fresh breeze, 6 = strong breeze

GENERAL COMMENTS and OTHER NOTES:

Walked through camp side of the inside pen No Caribou sign on this side at all.

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APPENDIX C. DATES FOR INTERNAL EXTENSION ACTIVITIES

Communication medium	Date
Meeting – NWS Society Financial	2020-04-28
Meeting – NWS Society BOD	2020-04-30
Meeting – NWS Society Financial	2020-05-07
Meeting – NWS Society BOD	2020-05-13
Meeting – NWS Society BOD	2020-07-15
Meeting – NWS Society BOD	2020-08-05
Meeting – NWS Society Financial	2020-08-11
Meeting – NWS Society BOD	2020-10-29
Meeting – NWS Society Financial	2020-11-16
Meeting – NWS Society Financial	2021-01-13
Meeting – NWS Society BOD	2021-01-14
Meeting – NWS Society BOD	2021-02-24
Newsletter	2020-05-08
Newsletter	2020-0605
Newsletter	2020-08-07
Newsletter	2020-09-15
Newsletter	2021-03-25

APPENDIX D. BROCHURE PROVIDED TO PUBLIC AT PEN

Maternal Penning

Mt. Bickford is the site of a protective maternal pen for caribou. The maternal penning project is an important initiative, now in its 4th year, which is helping the Klinse-Za herd avoid extinction.



Spring is calving time for the caribou. During these months, the pregnant and nursing cows are very attentive and protective of their vulnerable calves. Both cows and calves are easily stressed at this time, so it is crucial that we minimize disturbance and keep their stress low.

Legal Regulations

Please note that under the BC Wildlife Act (1996), there are **no motor vehicles allowed above 1,400 m in this area** (MU 7-31). Snowmobiles weighing > 450 kg are not allowed above 1,400m year-round, while snowmobiles < 450kg are allowed above 1,400 m ONLY from Nov 1—April 30.

Partners & Sponsors

Many thanks to our dedicated partners and generous supporters. Without their contributions the penning project would not have been possible.

West Moberly First Nations
Saulteau First Nations
Spectra Energy
British Columbia — Ministry of Forests, Lands & Natural Resource Operations
Wildlife Infometrics
Habitat Conservation Trust Foundation
FWCP Fish & Wildlife Compensation Program
Teck
TransCanada — In business to deliver
Environment Canada
BC Hydro
West Fraser Mills
Anglo American
CANFOR
Walter Energy

Klinse-Za caribou maternal pen



***** Please *** respect the calving season**

There are 9 caribou cows with their calves currently living in a maternal pen on Mt Bickford. Please refrain from driving and quadding in the alpine (i.e. above 1,400m) to avoid disturbing the animals during this sensitive time.



Woodland Caribou

Woodland caribou are considered a species of Special Concern in BC and across Canada. In BC, caribou are classified into three ecotypes - Mountain, Northern and Boreal – based primarily on behavior and how they use their habitat.

The Klinse-Za herd is the Northern ecotype because they migrate long distances between seasonal habitats, eat terrestrial lichens, and over-winter at both low- and high-elevations, depending on snow conditions.

Caribou are an iconic northern species. Both male and female caribou have antlers. Caribou used to be abundant in this region, and are culturally important to indigenous communities.

Caribou Food





Klinse-Za Herd

The Klinse-Za herd belongs to the Pine group of caribou, which is composed of 4 herds that inhabit the region between the Peace Arm and the Parsnip Reach of Williston Lake: Klinse-Za, Kennedy Siding, Scott East, and Burnt Pine.

This herd has been declining since 1997, from ~190, reaching a record low of 16 individuals in 2013. This population crisis brought together concerned First Nations communities (West Moberly and Saulteau) and other partners to implement emergency management measures intended to avoid the extinction of the herd.

The immediate cause of caribou population decline is believed to be excessive predation. As such, a multi-pronged approach that includes maternal penning, local predator control, and habitat restoration has been developed and is being implemented.



The essential purpose of a maternal pen is to protect calves from predators during the vulnerable neonatal (i.e. infant) stage. By keeping the cows and calves in a pen guarded 24/7, from late March to mid-July, we are giving those calves a much better chance of surviving to adulthood and continuing to perpetuate the herd.



While in the pen, the caribou are closely monitored for health and behavior. First Nations Caribou Keepers from West Moberly and Saulteau First Nations guard the pen from predators, feed the caribou (see 'Caribou Food') and work to minimize the disturbance from the surrounding area.

These measures have stopped the previous decline in the population and the herd has grown in size to 61 individuals.

Thank you for respecting the caribou

For more information, please contact Wildlife Infometrics at 250-997-5700 or WILD_INFO@wildlifeinfometrics.com

APPENDIX E. MATERNITY PEN INFOGRAPHIC

