

## Little Smoky Woodland Caribou Calf Survival Enhancement Project

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*Abstract:* The Little Smoky woodland caribou (*Rangifer tarandus*) herd is a boreal ecotype located in west central Alberta, Canada. This herd has declined steadily over the past decade and is currently thought to number approximately 80 animals. Factors contributing to the herds' decline appear related to elevated predator-caused mortality rates resulting from industrial caused landscape change. At current rates of decline, the herd is at risk of extirpation. A calf survival enhancement project was initiated in the first half of 2006 as a means of enhancing recruitment while other longer-term approaches were implemented. A total of 10 pregnant females were captured in early March and held in captivity until all calves were at least 3 weeks old. Before release, calves were radiocollared with expandable drop-off collars. Following release, survival of mother and offspring were tracked at intervals until the fall rut. Survival of penned calves was compared to "wild-born" calves at heel of non captive radiocollared females. This approach is compared to other techniques designed to increase recruitment in caribou.

**Key words:** Alberta caribou; increased recruitment; maternal penning; mitigation of industrial activity.

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### Introduction

The Little Smoky caribou herd (LSM) is a small (~ 80 individuals) isolated herd of woodland caribou (*Rangifer tarandus*) located in west central Alberta. The herd is a boreal ecotype and poor recruitment (averaging 11% of the population) has resulted in a steadily declining population (Fig. 1). The impact of human activities (*i.e.*, oil and gas exploration and development, and timber harvest) on the Little Smoky caribou range has been extensive and is long-term in nature. This alteration to caribou habitat has

been linked to increased predation rates of caribou in Alberta (James, 1999; Dyer, 1999; Dyer *et al.*, 2001; Oberg, 2001; Smith, 2004; Neufeld, 2006). Factors contributing to the LSM herd's decline appear related to elevated predator-caused mortality rates driven by changes in land use. At current rates of decline, the herd is at risk of extirpation, potentially within the next 10 years. The Little Smoky Caribou Calf Project (LSCCP) was proposed by Suncor Energy Inc. as part of a program designed to mitigate the impact of a 100 km pipeline through the LSM range. The

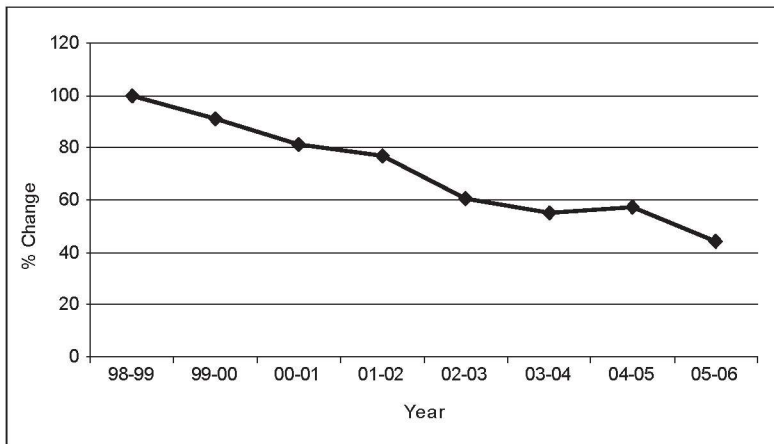


Fig. 1. Cumulative change in the adult female population size (%) of the Little Smoky woodland caribou herd, Alberta (1998 - 2006).

goal was to have an immediate positive impact on calf survival by capturing pregnant females in their last trimester of pregnancy and holding them in a predator-free pen until all calves were at least 3 weeks old. In the long-term, this program was expected to contribute to a broad-based program of intervention and landscape management designed to allow the Little Smoky caribou herd to increase and ultimately be self sustaining within its traditional range.

## Methods

The LSM range is located in the upper foothills ecoregion of west central Alberta, Canada (54°N, 119°W). The study area is characterized by an overstory of lodgepole pine (*Pinus contorta*) and white spruce (*Picea glauca*) on upland sites and black spruce (*Picea mariana*) and open muskies on poorly drained sites. The area has been described in more detail previously (Smith, 2004; Neufeld, 2006). The pen was located within the range of the LSM herd and it included dense, coniferous forest with some terrestrial lichen on elevated well-drained pine sites, arboreal lichens on wetter black spruce sites, an open muskeg and an old trail that bisected the northern half of the enclosure. It was approximately 4.0 ha in size and it was relatively remote from any regular, heavy industrial traffic. A Government of Alberta Ministerial Order was placed on Sections 21, 22, 27 and 28 of Twp. 59, Rge. 26 W5M as provided for under Section 128(1) of Alberta's *Wildlife Act*. The Ministerial Order excluded non-sanctioned human access and other land uses within the enclosure and the surrounding area between February 15 and July 15, 2006.

The methods guiding the project were mainly based on those developed and successfully imple-

mented for the Chisana caribou herd in the Yukon (<http://www.environment-yukon.gov.yk.ca/wildlife-biodiversity/chisanarecovery.php>). A geo-textile fence was constructed in late February to early March 2006 by stretching 2 small diameter cables between trees at a height of 2 m and along the ground. Geo-textile fabric was fastened to the cable by overlapping it and stitching it in place with 9 cm nails. An 8 strand, 2 m high electric fence was installed approximately 5 m out from

the geo-textile fence to discourage predators. Additional technical detail on the geo-textile and electric fences can be obtained from the authors.

Adult female woodland caribou were net gunned from a Hughes 500 helicopter and then restrained by the capture team. The caribou were examined by transrectal ultrasonography to determine pregnancy by a veterinarian. Physical parameters were measured, blood samples were drawn and non-pregnant females were collared prior to being released without sedation. Caribou that were pregnant received 100 mg of xylazine plus 1 mg of butorphanol intra-nasally via a 14 cm tomcat catheter. The tomcat catheter was modified for this purpose. After sedation, caribou were placed in specially designed bags for transport in a second (A-star) helicopter. Once in the helicopter, an intranasal oxygen line was placed and the oxygen was set to flow at 5 L/minute.

A staging area was located approximately 500 m from the enclosure to prevent disturbance to caribou already captured and within the enclosure. Ground crews at the staging area transferred the caribou from the helicopter to a sled. The sled was then pulled into the enclosure via a snowmobile. Inside the enclosure the oxygen line, transport bag and hobbles were removed. A reversal of 35 mg of atipamezole was given intramuscularly.

Once all female caribou were captured, field staff remained onsite full-time to manage the daily care of the caribou. This included daily feeding and monitoring, as well as patrolling the enclosure fence perimeter twice daily or more to check the integrity of the geotextile and electric fence, as well as to note any evidence of predator activity. Caribou were fed from troughs. Both lichens collected in the Yukon and commercial pellet rations were used. Feed-

ing began with about 75% lichens and 25% commercial feed, then was slowly switched to 75% commercial feed and 25% lichens. This was reversed a few weeks prior to release, with no commercial feed provided in the last week in order to allow the animals gut flora to once again adapt to native forage. A short (3 m) observation platform was built adjacent to the feed troughs to record daily food intake, behaviour and interactions between animals.

Once calves were born, they were captured within the pen and outfitted with an expandable radio collar (Telonics, Mesa, Arizona). Standard measurements, hair samples and weights were recorded. When the youngest calf was 19 days old, the geo-textile fence was taken down in one section of approximately 100 meters to facilitate release.

Once released, radio-collared caribou were located from the air weekly for the first 2 weeks and then monthly until initiation of the rut. An additional flight was conducted on March 13, 2007 to determine survival to 10 months.

## Results

The capture of caribou was delayed in February 2006 due to unseasonably warm weather that presented unsuitable conditions for capture (*i.e.*, +5 °C to +10 °C). A period of colder weather (-15 °C) and precipitation in early March 2006 provided the necessary conditions for capture. Ten pregnant females were successfully captured March 10 – 12, 2006 and transported to the pen without incident. An additional 2 females were captured and released immediately after collaring. A “wild” sample of adult female woodland caribou had been captured for monitoring purposes in previous winters.

Daily care of the captive caribou began on March 10, 2006. Within 2 days, all animals were approaching and feeding on lichens provided in feed troughs. Within 6 days, pelleted rations were provided along with lichens. Caribou often approached the feed troughs at the sound of the snowmobile or quad used to transport feed. Caribou consumed in the range of 25 to 32 kgs of commercial ration/day (2.5 to 3.2 kgs/animal/day). Caribou also fed upon vegetation within the pen and their reliance on pellets was reduced with spring green-up. Water was available in the muskeg area once temperatures warmed above freezing (no alternative water source was provided). No preda-

Table 1. Date of birth and sex of woodland caribou calves born in the Little Smoky Caribou Calf Project enclosure, Alberta 2006.

| Calf ID | Female ID | Calf Birth Date | Calf Sex |
|---------|-----------|-----------------|----------|
| C10     | F579      | May 14, 2006    | unknown  |
| C7      | F580      | May 27, 2006    | F        |
| C6      | F583      | May 23, 2006    | M        |
| C2      | F584      | May 17, 2006    | M        |
| C9      | F585      | June 1, 2006    | F        |
| C4      | F586      | May 15, 2006    | F        |
| C8      | F588      | May 28, 2006    | F        |
| C1      | F589      | May 22, 2006    | M        |
| C3      | F587      | May 18, 2006    | F        |
| C5      | F590      | May 13, 2006    | M        |

tors approached the fence and the 2 m electric fence functioned well.

Caribou calves were born between May 13 and June 1, 2006. All calves appeared healthy. Collaring of calves was conducted during the period of May 23 and June 3, 2006. During the May 23<sup>rd</sup> capture attempt one of the oldest calves was not collared because it was too mobile at 10 days of age. Of the nine captured calves, 5 were female and 4 were male (Table 1).

A calf died within the enclosure on June 17, 2006 two days prior to release. The calf was transported to the Calgary Zoo where an autopsy was conducted. Results indicated the cause of death was related to myocardial degeneration and necrosis of the heart (*i.e.*, hemopericardium - an effusion of blood within the sac enclosing the heart) (S. Black, Calgary Zoo, pers. comm.).

The caribou were released from the enclosure on June 19, 2006. The youngest calf was 19 days old. Prior to release, a 5 km wide search was conducted with a helicopter to ensure no predators were within the immediate area (none were observed). The caribou (10 cows and 9 calves) left the enclosure without incident. Staff remained onsite to remove the electric and geo-textile fence and close-up camp.

Aerial telemetry flights were conducted on June 27, July 5, August 25 and September 22, 2006. The cows dispersed well away from the enclosure post-release (up to 20 km). Data from the aerial monitoring surveys recorded two calf mortalities by bear predation (*Ursus* sp.) in the vicinity of the pen near the Little Smoky River (July 7 and August 25, 2006)



Table 2. A comparison of calf survival between penned and “wild born” calves in the Little Smoky woodland caribou range, Alberta, May to September, 2006.

| ID #<br>Cow | ID #<br>Calf         | Calves Alive/Dead |                   | Comments   |
|-------------|----------------------|-------------------|-------------------|--|
|             |                      | May 29,<br>2006   | Sept. 22,<br>2006 |  |
| <b>Pen</b>  |                      |                   |                   |  |
| F583        | C6                   | Alive             | Alive             |  |
| F584        | C2                   | Alive             | Alive             |  |
| F580        | C7                   | Alive             | Alive             |  |
| F586        | C4                   | Alive             | Alive             |  |
| F585        | C9                   | Born June<br>1    | Alive             |  |
| F588        | C8                   | Alive             | Dead              | Mortality by July 7,<br>2006. Bear mortality.                                  |
| F587        | C3                   | Alive             | Dead              | Died in enclosure on<br>June 16, 2006.   |
| F590        | C5                   | Alive             | Dead              | Mortality by<br>September 22,<br>2006. Cause of death<br>unknown.              |
| F589        | C1                   | Alive             | Dead              | Mortality by August<br>25, 2006. Bear<br>mortality.                            |
| F579        | C10 -not<br>collared | Alive             | Dead              | Mortality by<br>September 22,<br>2006. Cause of death<br>unknown.              |
| <b>Wild</b> |                      |                   |                   |  |
| F578        | N/A                  | Alive             | Alive             |  |
| F575        | N/A                  | Alive             | Alive             |  |
| F581        | N/A                  | Alive             | Alive             |  |
| F519        | N/A                  | Alive             | Alive             |  |
| F543        | N/A                  | Alive             | Alive             |  |
| F576        | N/A                  | Dead              | Dead              | Calf assumed to have<br>died before May 29,<br>2006 or female not<br>pregnant. |
| F554        | N/A                  | Dead              | Dead              | Calf assumed to have<br>died before May 29,<br>2006 or female not<br>pregnant. |

and a third mortality of unknown cause by September 22, 2006 near Meridian Lake (~ 13 km to the NW of the pen). Based on a sample size of 10 calves for the LSCCP and 7 calves for the wild population, the calf survival rate was 50% and 71% respectively. The uncollared captive calf was no longer “at heel” by September 22, 2006, but all other collared calves that had survived and the wild calves were still at heel at that time. The cause of death of the uncollared captive calf is unknown (Table 2).

The total count and classification of the Little Smoky caribou herd on September 22, 2006 was 73 caribou including 14 calves. This was the highest % calves (19%) observed up to that time based on 10 surveys that had been conducted between 1982 and this study. A final monitoring flight was completed on March 13, 2007. At that time, at least 3/5 remaining “penned” calves and 3/5 wild calves were observed alive (calves still made up 14.5% of the total of 55 classified caribou).

## Discussion

The success of the LSCCP is difficult to measure given that the Alberta Government implemented a wolf control program in west-central Alberta during the same period with the primary goal of increasing caribou calf survival. Wolf removal occurred through helicopter gunning between December 2005 and March 2006 over the entire LSM range including the immediate vicinity of the pen. Wolf densities were believed to have been reduced from ~ 30 wolves/1000 km<sup>2</sup> down to 5 to 8 wolves/1000 km<sup>2</sup>. The penned caribou were not exposed to predation during captivity and would have benefited once released.

The low sample size of calves available in the study provides a “marginal” opportunity to com-

pare survival rates between the penned calves and “wild” born calves. Based on the age of the LSCCP calves at release, it was anticipated the calves would have a greater chance of survival. Survival of penned calves may have been compromised by their mothers returning to the penning area during the summer and predisposing them to bear predation. This behavioral response of returning to the pen in the summer was also documented in the Yukon, but not with any apparent affect on survival of calves. There is no previous data related to location of calf mortalities in the Little Smoky herd (*i.e.*, calves have never been collared before) and similarly, data on movements of bears has not been studied in detail. The two bear mortality sites were located approximately 2 to 3 km from the caribou enclosure in close proximity to the Little Smoky River. A river the size of the Little Smoky River would tend to be used in the spring and mid summer by grizzly bears (Nielsen *et al.*, 2002). Black bears also select for riparian areas at this time of year (Czetwertynski, 2007). Although the supporting data to suggest a relationship between the calf mortalities and distance to the enclosure is limited, locating the enclosure a greater distance from a major river (where bear densities tend to be greater due to the presence of preferred bear forage) should be considered.

Woodland caribou appeared to adapt well to confinement and habituated to field staff readily. Dominance was apparent around the feed troughs, but not to any obvious detriment of any particular animal. The only apparent injuries accrued during the animals’ confinement were the previously mentioned death of a newborn calf and one cow which suffered an abrasion to her side and back in late May that resulted in hair loss to the skin. The cow had fallen into a tree well/hole in the muskeg and suffered the injury while struggling to release herself. She didn’t appear to be debilitated by the injury and she survived until the following spring (May 2007). (Her calf died by September 22, 2006, but it is not known if her injury in the pen contributed to this death).

If obvious benefits of penning were realized, they were masked by the simultaneous treatment of wolf control. Additionally, bear (or other) predation within the range of the LSM herd may be more significant than originally thought. The cost of penning (approximately \$40 000.00 CAN/calf) was much higher than wolf control (Alberta Fish and Wildlife Files). Penning is only effective if other land management and conservation strategies are implemented concurrently. In combination with the penning project, positive changes to the landscape (e.g., habitat condition) will serve to benefit calf recruitment and survival.

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