

**Calving Strategies of Woodland Caribou (*Rangifer tarandus caribou*) in a Multi-predator
Ecosystem in Northeastern British Columbia**

Final Report
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I would like to sincerely thank the Northern Land Use Institute for their generous support for my research in the Muskwa-Kechika Management Area. Your funding has been critical to my success these past two summers, and I thank you.

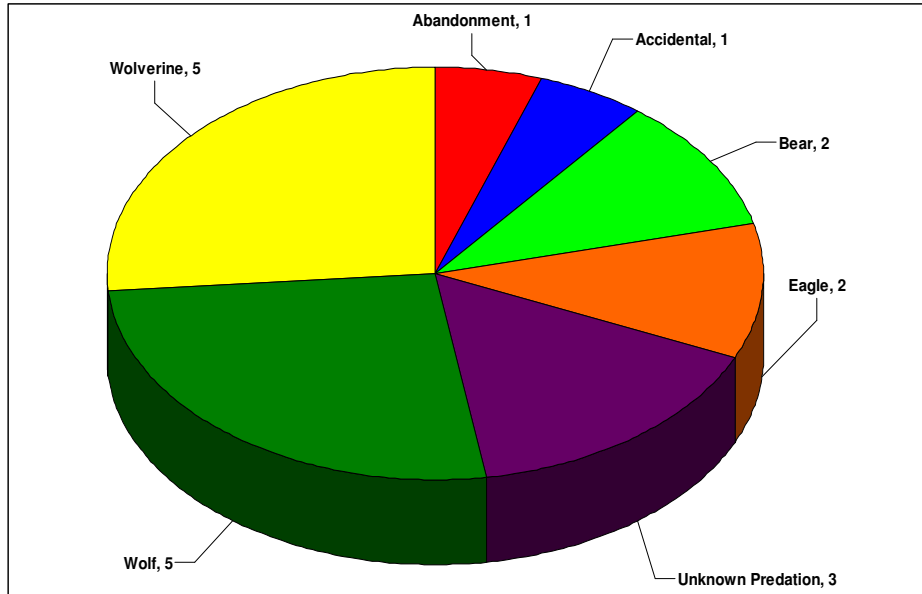
Introduction

Woodland caribou require large areas to meet seasonal demands for calving (spring and summer), breeding (fall), and over-wintering. Caribou migrate east to west from wintering to calving areas. Movement corridors and selection of calving areas is largely in response to spring snow cover, predation pressure, and forage availability (Poole et al. 2000, K. Parker, pers. comm.). Migrations and calving often occur in, or adjacent to, areas with high densities of wolves and other prey species (i.e. moose and elk) (Bergerud and Elliot 1986, Bergerud and Page 1987, Seip 1992, Barten et al. 2001). Moose, wolf, and elk populations appear to be above historic levels in northern British Columbia (R. Peck, pers. comm., G. Williams, pers. comm.). The inter-relationship(s) of caribou and predator populations have been altered due to increased abundance of alternate prey species (Bergerud 1974, Bergerud and Page 1987, Seip 1992). The proximate role of predation in limiting caribou populations is well documented, but the long-term effects of predation risk on selection of calving habitat and migration routes, nutritional stress, and the subsequent impacts to calving success remain unclear (Bergerud 1974, Bergerud and Elliot 1986, Bergerud and Page 1987, Seip 1992). Studies suggest that predation risk is a driving factor in selection of calving habitat, and that parturient caribou appear to meet nutritional demands while using an alternate foraging strategy to non-parturient caribou (Bergerud and Page 1987, Barten et al. 2001). Because calving caribou are under high nutritional stress during early lactation, nutritional demands should be an important component in habitat selection. Calving areas should provide for this nutritional need, while minimizing the level of predation risk. Resource development and environmental disturbance may have additional negative impacts on caribou persistence (Bradshaw et al. 1997). For example, linear corridors associated with industrial development tended to increased predation rates in caribou populations in Alberta (James and Stuart-Smith 2000). Critical travel corridors and calving areas for Besa Prophet caribou must be identified to minimize potential impacts of proposed oil and gas development and the associated effect(s) of increased predation risk.

Study Area

The Greater Besa-Prophet (GBP) area encompasses 740,800 ha of the 6.2 million ha Muskwa-Kechika Management Area in northern British Columbia and is located between W 57⁰ 11' and 57⁰ 15' latitude, and 121⁰ 51' and 124⁰ 31' longitude. Elevations range from 700-2200 m, with treeline occurring at 1450-1600 m. Biogeoclimatic zones in the Besa Prophet are Boreal White and Black Spruce, Spruce-Willow-Birch, and Alpine Tundra (British Columbia Ministry of Forests 1992). The area is characterized by repeated east-west drainages and south facing slopes that support one of the largest intact predator-prey ecosystems in North America. Moose (*Alces alces*), deer (*Odocoileus* spp.), elk (*Cervus elaphus*), caribou (*Rangifer tarandus*), Stone's sheep (*Ovis dallei stonei*), mountain goat (*Oreamnos americanus*), and wolf (*Canis lupus*) hunting occur throughout the area. There is a limited harvest of grizzly bears (*Ursus arctos*). The Besa Prophet is relatively unaffected by human activity. Access is restricted except for low off-highway vehicle activity in the southern portion of the study area west of Redfern Lake. Seismic oil exploration has been minimal, but applications for oil and gas exploration have increased. The Besa-Prophet pre-tenure management area is designated as a Special

Figure 1. Cause-specific mortality for woodland caribou calves in the Besa Prophet, 2002-2003.



Management zone of the Muskwa-Kechika Management Area and is bounded by the Northern Rocky Mountains and Keily-Redfern Provincial Parks to the north and west, respectively. This designation allows exploration and extraction of natural resources if the needs of wildlife are addressed prior to any development.

Objectives

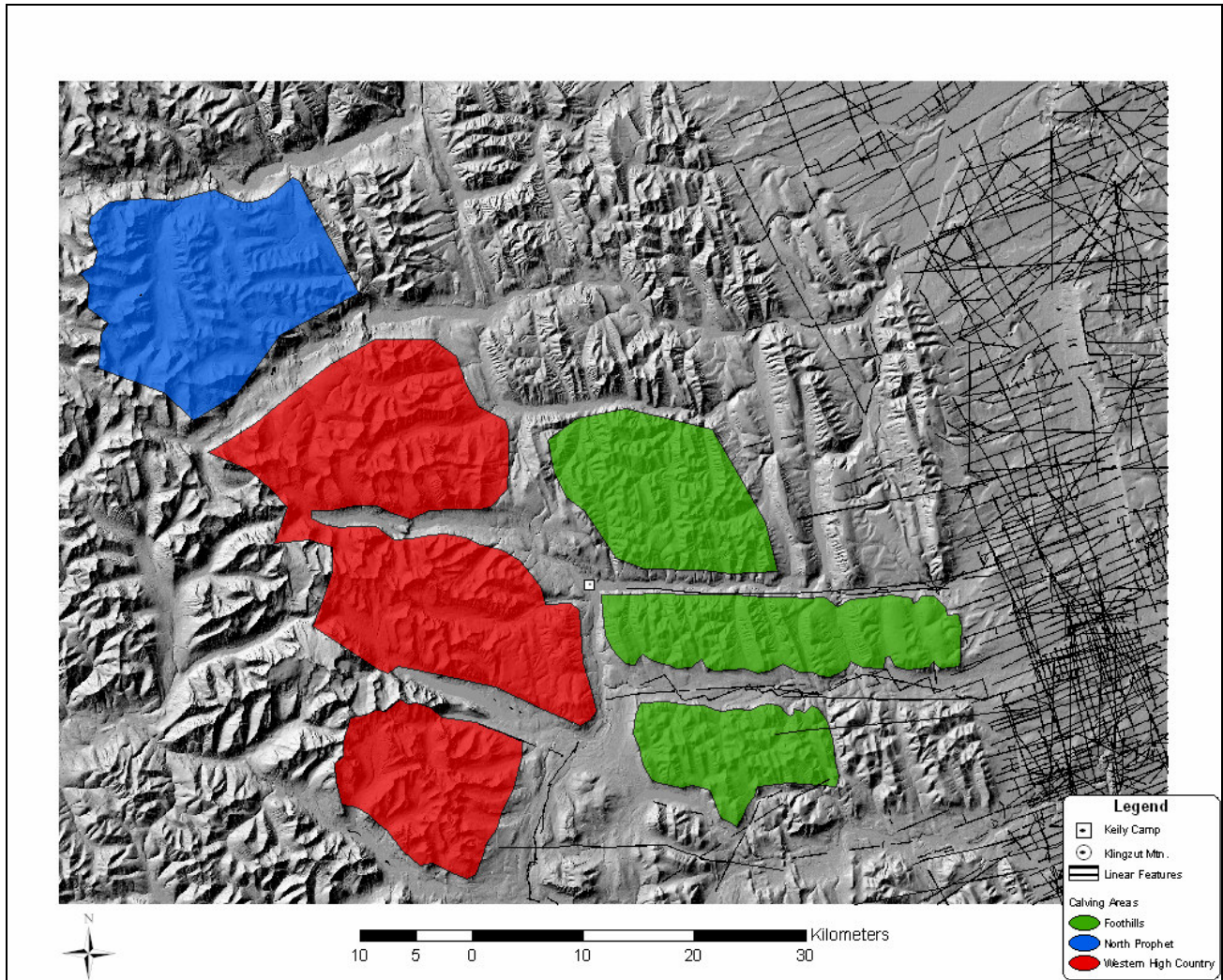
The primary goals of this project are; 1) to provide baseline data on critical woodland caribou habitats in the Besa Prophet, 2) to determine potential impacts of resource exploration and extraction on the Besa Prophet caribou, 3) to enhance landscape, recreational, and resource development planning, 4) to participate in local and regional extension efforts (e.g. University of Northern British Columbia's Muskwa-Kechika Community Presentation Series), and 5) to foster sustainable resource development that will assist in problem solving at the local and regional level. The following objectives were formed to accomplish these goals; 1) determine the relationship(s) among movement corridors from wintering to calving areas, spring snow cover, predation risk, and habitat selection, 2) determine relationships among calving habitat types, calf survival, and cause-specific mortality, 3) develop a calving habitat use model and suitability map for Besa-Prophet caribou, and 4) determine the role of autumn maternal condition on calving success.

Results

My work with local pilot and guide outfitter, Greg Williams, concluded at the end of last summer 28-July 2003. This success of this project is largely due to his abilities as a pilot and extensive knowledge of the area. The first two field seasons yielded some interesting results and provided insight into my second and third objectives. The first and fourth objectives cannot not be addressed due to the mass collar failure of the caribou global positioning (GPS) collars in 2002 and 2003, so I will discuss the second and third objectives, and these involve; the population parameters of the Besa Prophet caribou, calf survival, and predation risk and forage characteristics models.

Forty-three of forty-seven cows (91.5 +/-8.3%) were pregnant in the winters of 2002 and 2003. Twenty-two collared caribou cows were located and identified as with or without young. Fifteen of those twenty-two cows (68.2 +/-22%) had calves. Fifty neonates were captured in summers of 2002 and 2003 with ages varying from 5-6 hours to 6 days old. Peak calving is on 28-May (+/- 0.67 days). Average weight of captured calves was 9.59 kg (+/- 0.66 kg). Thirty-one of the

Figure 1. The Foothills, Western High-Country, and North Prophet calving areas for woodland caribou in the Greater Besa Prophet area, 2004.



collared calves survived through July, with wolves (5), wolverines (5), eagles (2), bears (2), an unknown predator (3), and abandonment/accidental death (2) as sources of mortality (Figure 1).

Three unique calving areas have been identified in the Besa Prophet, the Foothills, the North Prophet, and the Western-High Country (Figure 2). To evaluate the relative importance of these calving areas, I estimated the risk of predation and relative forage biomass and quality for caribou in the Besa Prophet. I incorporated GPS collar data from five wolf packs and fifteen grizzly bears into spatially and temporally explicit resource selection models to define predation risk. R. Lay and I used Landsat Thematic Mapper 5/7 images and the normalized difference vegetation index to model relative forage biomass and quality data for the Besa Prophet. These data are currently being analyzed to assess the change in risk and forage characteristics across the landscape and calving areas as well at locations where calves were captured. This should offer us some unique insight on predator sensitive foraging strategies of woodland caribou during a critical time of year (i.e. calving). Calf survival rates by calving area are being used

with these predation and forage models to assess relative importance and productivity of each calving area in the Besa Prophet. This information will be valuable in identifying areas critical for caribou during calving as well as calving strategies of woodland caribou in the Besa Prophet.

Outreach

I gave a variety of presentations from 2002-2004. I presented to the Ministry of Land, Water, and Air Protection in December 2002 and participated in the Muskwa-Kechika Community Presentation Series in January 2003 by presenting my research to the communities of Fort St. John, and Fort Nelson. I went to Girdwood, Alaska in May of 2004 to present my preliminary findings at two professional conferences, the Northwest Chapter of The Wildlife Society meeting and the 10th North American Caribou Conference. I was also informed in early May, that my paper has been accepted as a presentation to the National Meeting of the Wildlife Society in Calgary, Alberta in September 2004.

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