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# **Mountain Caribou Habitat, Range, and Movement Patterns in and around Stagleap Provincial Park**

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## 1.0 Introduction

Mountain Caribou (*Rangifer tarandus caribou*) are of the arboreal lichen-winter feeding ecotype of woodland caribou, one of three subspecies found in British Columbia. What differentiates them from other species of caribou is their eating habits, as they feed primarily on tree lichen such as *Alectoria spp.* and *Bryoria spp.* during the months of October through April.

Generally, Mountain Caribou have adapted a strategy where they migrate in elevation several times a year (Simpson et al., 1987). In early winter (October-January), Mountain Caribou are found in the Interior Cedar Hemlock ICH forests at approximately 1000-1500m. This enables caribou to forage on shrubs (ie. *Salix spp.*) and herbs (ie. *Pachistima myrsinites*) while the snowpack is forming at higher elevations. In late winter (February-April), Mountain Caribou move up to the Engelmann Spruce Sub-alpine Fir (ESSF) forest at approximately 1500-1800m in elevation. At this stage the caribou access arboreal lichens (*Alectoria spp.* and *Bryoria spp.*) while they are elevated on the deep, consolidated snowpack. Within this late winter time period, the caribou will be found on ridge tops and at high points along moderately steep slopes at treeline and above treeline. During the spring period (March-May), the caribou move back down to the ICH forest to forage on the green vegetation. When June comes the females move back up to the high elevation ESSF to calve, while males remain in the ICH forest. The females will return to the lower elevations within the month and continue to forage here until winter.

Currently there are approximately 13 subpopulations of Mountain Caribou in British Columbia, some of which are in total isolation from other populations, making up a metapopulation (Spalding, 2000). They all occur on the east side of the province, and range as far north as Prince George inhabiting the Hart Range, with the southern most population inhabiting the South Selkirk Mountains extending into Idaho and Washington in the United States.

As stated in the Strategy for the Recovery Mountain Caribou and British Columbia, over the past several decades Mountain Caribou in British Columbia have become a major management issue within natural resources. Declining numbers and viability of populations are the most significant issues right now for caribou in this province. There are a number of factors that are possibly having a negative impact on Mountain Caribou, which include mechanized/non-mechanized recreation, heli-skiing, forestry, and habitat fragmentation (Simpson and Terry, 2000). How to best manage these issues will be important for the survival and viability of this species.

Due to the geographic location and increased growth in backcountry recreation, the South Selkirk Mountain Caribou population may be under threat from a number of these possible impacts. The population of Mountain Caribou in Stagleap Provincial Park and surrounding area is decreasing and no one direct cause has been determined for this occurrence (Simpson and Terry, 2000).

The objectives of this study were to: 1) determine Mountain Caribou habitat in and around Stagleap Provincial Park, 2) determine relative abundance of this caribou population and how it has changed over time 3) determine what the normal movement pattern is for the caribou (annually, seasonally) and if it has changed over time, and 4) discuss options for mitigating the potential loss of habitat in and around Stagleap Provincial Park.

## 2.0 Literature Review

### **Summary**

Previous research papers were reviewed to obtain all relevant information concerning Mountain Caribou within the province of British Columbia and more specifically the South Selkirk Mountain Caribou herd. Data on historic population size and abundance were researched through a number of papers documenting sighting and historic accounts, up to scientific studies on population size. Habitat and movement characteristics were researched for a number of populations to get an idea of what similarities and what differences were observed throughout these populations. Also, recreational and non recreational impacts were examined with regards to the effects they have on caribou habitat and movement patterns.

### 2.1

Population dynamics of the endangered mountain ecotype of woodland caribou (*Rangifer tarandus caribou*) in British Columbia, Canada.

Heiko Wittmer, Bruce McLellan, Dale Seip, James Young, Trevor Kinley, Glen Watts, and Dennis Hamilton.

Published May 7<sup>th</sup>, 2005 on the Natural Resources Canada Research Press Website.

**Qualifications of Authors:** **H.U. Wittmer.** Biology diploma, University of the Saarland. Ph.D. student at University of B.C.  
**B.N. McLellan.** Wildlife research biologist.  
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**G.S. Watts.** Biologist, Ministry of Water, Land and Air Protection  
**D. Hamilton.** Biologist



## **Objectives**

The objectives of this study were to objectively delineate the remaining subpopulations of mountain caribou in British Columbia and document their size, trend, pregnancy and recruitment rates, and causes and temporal distribution of adult mortality. By understanding these different aspects of caribou I better understood their role in the ecosystem and was able to discuss reasons for why the caribou in the Southern Selkirk Mountains are at their current population level.

## **Structure of Research**

The structure of the study was set up as scientific design. There was no alteration to the habitat and the study only included where the caribou were and what they were doing as the research structure. The authors of this study accomplished this through radio telemetry, GPS collars, blood samples, and death site examination.

My work was set up similarly as scientific design by gathering data on the caribou without altering their habitat. Although I did not use radio telemetry to determine caribou location in and around Stagleap Provincial Park, I was able to locate some caribou by helicopter flight observations.

## **Data Collection**

The data collected throughout the research done by Wittmer and others aided me in determining popular movements exhibited by caribou and the type of range and habitat that they are likely to be found in. This study of population dynamics enabled me to map the key habitat areas that can be found in and around Stagleap Provincial Park. It also gave me a better understanding of where to look when I went to the park to locate the caribou.

## **Data Analysis**

The findings of the population dynamics study are useful because they allow me to identify the key areas that I should focus my data collection on. It also enabled me to focus in on and determine which areas are suitable for the caribou and which are not. Knowing the characteristics of caribou habitat and where the caribou are likely to be will gave me an advantage when I had to collect data. I understood the suitable habitat locations with regards to terrain and vegetation characteristics of the Stagleap area.

## **Limitations of Study**

There were some limitations to this study including the accuracy of identifying a cause of mortality. When the circumstances were indeterminable the authors of this study classified the collected data conservatively. By classifying data in this way a certain amount of bias is introduced. This will ultimately yield unreliable data. Since I am not looking directly at causes of mortality I did not need to worry about this, but from an

overall data collection stand point I would set such limitations to undeterminable. Also data such as survival rate between sexes could not be determined because too few males were sampled.

Fitting the caribou with animal collars and monitoring them is a very suitable sample method and one which I would have utilize had there been sufficient study time.

## **2.2**

Snowmobile- mountain caribou interactions: a summary of perceptions and an analysis of trends in caribou distribution.

Trevor Kinley

Published May 9, 2003. Ministry of Water, Land and Air Protection, Victoria British Columbia.

**Qualifications of Author:** Trevor Kinley is a Registered Professional Biologist

### **Objectives**

The objectives of the Kinley (2003) study included: 1) Collecting and summarizing experiences and observations of snowmobilers, wildlife managers, and others related to Mountain Caribou, 2) determine if there has been a change in the proportion of mountain caribou within the areas that snowmobiling is permitted versus outside of this area, 3) recommend further specific studies to determine key questions. This type of research was of use to me because it dealt with recreational aspects impacts of Mountain Caribou movement.

### **Structure of Research**

The structure is fairly similar to mine as it utilized people who have either seen the caribou or evidence of the caribou in certain areas. I made use of this method as I did not have sufficient time to go and monitor the caribou over an extended time period during late winter of 2006. By finding information this way it includes all possible caribou in the area and not just radio collared caribou. It is closely related to the way in which I have collected information, therefore I was able to compare and contrast my results with greater confidence.

## **Data Collection**

The Data in the Kinley (2003) study was useful to my research because it is of a similar type to the data I am collecting. Although I did not look specifically at the effects of snowmobiles, I gathered similar caribou data, using similar methods. The Kinley (2003) study findings also enabled me to make better judgment when it comes to identifying possible threats to the caribou.

## **Data Analysis**

Using the analyzed data from the Kinley (2003) report gave me direct information to the Mountain Caribou in the South Selkirk Mountains. It allowed me to develop on other information that I collect and build a better understanding of this population in specific. The findings by Kinley (2003) allowed me to build on patterns seen throughout my research on the South Selkirk Mountain Caribou herd and are another reliable source of information.

## **Limitations of Study**

The limitations to this study are the fact that it is dealing with human elements and there are always biases when introducing human perception to a study. The data may not be fully reliable as there may be a number of exclusions, or omissions on the part of the people taking part in the study. However, going about it another way would be far too costly and time consuming for any researches pursuing the input of persons participating in recreational activities.

## **2.3**

Population status and mortality of mountain caribou in the Southern Purcell Mountains, British Columbia.

Trevor Kinley, Clayton Apps

February 9<sup>th</sup>, 1999, Kamloops B.C.

**Qualifications of Author:** Trevor Kinly and Clayton Apps are both Registered Professional Biologists.

## **Objectives**

The objectives of this study were to report the results of population surveys and observed rates of mortality among radio collared caribou. A second objective was to test gender



differences in mortality and the potential influence through forest resource development, along with discussing management concerns and implications in relation to the information collected. These objectives are relevant to my study because they looked at similar information with the intent to discuss management implications.

### **Structure of Research Design**

This study used radio telemetry and aerial telemetry to assess the population of caribou in the South Purcell region east of Kootenay Lake and west of Kimberly, B.C., from as far south as the Creston region up to the bottom part of the Purcell Wilderness Conservancy. Tracks were also noted when doing fly-overs and made sure that they were not made by a radio collared caribou. The information was gathered from 1994 through 1998. Since these methods were similar to mine the findings can be compared to mine, however the fact that this is a different caribou population needs to be considered.

### **Data Collection**

This study was useful to my own research because it reflects the work and research that I did. It gave me added insight into population dynamics of caribou as well as information on ways to collect the data. The data collected in this study gave trends to work from and enabled me to make more knowledgeable predictions for the South Selkirk herd.

### **Data Analysis**

The findings were useful because I was able to take into consideration this information when I am doing my own research. It gave me an overall better understanding of the impacts on Mountain Caribou through resource development. It also showed their mortality and reasoning, which I considered similar findings for my report. Also, the Kinley and Apps (1999) study dealt with management considerations which are at the heart of the caribou matter I am studying.

### **Limitations of Study**

With the Kinley and Apps (1999) study it is difficult to determine whether or not tracks were made by radio collared caribou. As a result, the findings may be biased. Also, defining a cause for mortality is problematic as many things can happen to a carcass, such as intensive feeding by numerous animal species, before a researcher is able to obtain it.



## **3.0 Methods**

### **3.1 Study Area**

The study area was Stagleap Provincial Park, located in the West Kootenay region of southern British Columbia, and the immediate surrounding area. The park is 1133 Ha in size and ranges in elevation from approximately 1600m to 2100m.

The park is dominated by Engelman Spruce Sub-alpine Fir forest (*Picea engelmannii* and *Abies lasiocarpa*) as well as spruce-fir parkland. Whitebark Pine can also be found within the forest. The average age of the forest within the park is approximately 200 years old. Surrounding the park there are numerous anthropogenic disturbances including a major highway bisecting the park, as well as transmission lines and gas lines running adjacent to the park. These developments have fragmented the Mountain Caribou habitat in this region (Spalding, 2000).

This park has many backcountry recreation visitors during winter months (Tweedy, personal communication, 2006). This is due primarily to its accessibility and the amount of snowfall it receives. On average this area receives approximately 9.6m of snow between late October and the end of April (Tweedy, personal communication, 2006).

### **3.2 Techniques**

#### **3.2.1 Air Survey**

A helicopter flight over the park and surrounding area was conducted on February 24<sup>th</sup>, 2006 lasting approximately 15 minutes. This was not a transect flight or one with any structure, it was merely to search for caribou in the vicinity of Stagleap Provincial Park.

#### **3.2.2 Field Reconnaissance**

An observational walk was also conducted within the northern portion of Stagleap Provincial Park on March 2<sup>nd</sup>. The route followed was from the parking lot located near Bridal Lake over the Cornice Ridge hump and throughout the basin below Cornice Ridge, to the highway and then back to the parking lot. The observations were taken in the ESSF biogeoclimatic zone at 1800-2000m in elevation.

### 3.3.3 Interviews

Personal interviews were conducted with John Tweedy, Ministry of Transportation and Leo Degroot, Wildlife Biologist, in February and March 2006. The information collected was used to identify population size and movement patterns related to Mountain Caribou in Stagleap Provincial Park.

### 3.3.4 Mapping

To quantify available habitat and to display movement of the caribou, I used Geographic Information System (GIS) mapping. This GIS analysis combined information from within the park as well as limited area outside the park boundaries (Appendix A).

## 4.0 Results

### 4.1 Population

There are currently approximately 35 Mountain Caribou within the South Selkirk herd (Degroot, personal communication). This number has declined from past years with numbers as high as 100 animals prior to 1950 (Spalding 2000). Before the first transplant in 1987, there were approximately 25-30 caribou. To date there have been 122 caribou transplanted to this herd (Degroot, personal communication, 2006) (Table 1). The decline in numbers is thought to have started in the late 1800's or early 1900's for the southern Kootenay area of B.C. (Spalding 2000).

Table 1: Date, number and origin of Mountain Caribou transplanted to augment the South Selkirk herd.

Year	# of Caribou	Transplanted From
1987	24	12 from Anahim Lake, 12 from Revelstoke
1988	24	14 from Anahim Lake, 10 from Revelstoke
1989	12	Blue River
1990		
1991		
1992		
1993		
1994		
1995		
1996	38	19 from Revelstoke, 19 from Prince George
1997	13	Prince George
1998	11	Prince George

Information provided by Leo Degroot, 2006.

### 4.2 Caribou Habitat

The Park is dominated by an Engelmann Spruce Sub-alpine Fir forest greater than 200 years old, with some trees as old as 300 years. I observed an abundance of arboreal

lichen (*Bryoria spp.* and *Alectoria spp.*) growing on these trees as well as throughout the forests adjacent to the park. There are disturbed areas around the park including the transmission/gas line as well as small areas that have been noticeably cut, and areas that have been identified through forest cover through an ArcGIS analysis. Another very noticeable disturbance is Highway 3 which bisects the park. In addition, avalanche control has altered the terrain and snow accumulation along Highway 3, by increasing snow deposition near the road.

Throughout this habitat there are numerous avalanche zones though we did not see any caribou or tracks in these areas during our field reconnaissance in February and March of 2006.

#### **4.3 Movement Patterns**

The caribou around Stagleap Provincial Park generally move up and down in elevation several times a year from the 1500m ICH zone October through April, to the 1900m ESSF during the months of April through to October (Tweedy, personal communication, 2006). During the winter season there are generally two movements. During the summer months (June-October) a large number of the population are within Stagleap Provincial Park (Degroot, personal communication, 2006). In November and December there are a number of caribou in the park, however, these animals disperse in a northerly direction. In late winter (January-April) the caribou were fairly dispersed, with the majority outside of the park in a northeastern direction. During the months December through March, the caribou are generally located northeast of the park in areas such as Wolf Ridge, Waldie Lake, Arkansas Creek and Next Creek (Tweedy, personal communication, 2006).

#### **4.4 Area Observations**

The helicopter flight taken on February 24<sup>th</sup>, 2006 gave us no indication that there were caribou inside the park. Tracks were found to the east of the park along the transmission/gas line through the Lost Creek drainage and then heading north into the forest. The observational walk through the ESSF forest within 1km north of Bridal Lake yielded no results as there were no signs of caribou within this area of the park at this time.

### **5.0 Discussion**

Generally, I found that significant caribou habitat exists within and adjacent to Stagleap Provincial Park. There are many areas outside of the park with similar and suitable habitat, and the park itself only makes up a small portion of this overall area. During the time that I have spent in the park in 2006, I have seen no caribou activity within it and the mapping of caribou locations also shows that there are a very limited number of animals within the park during the late winter months. This observation is consistent with those made by John Tweedy, Senior Avalanche Technologist at Kootenay Pass. It is not until April that the caribou begin to return (Tweedy, personal communication, 2006). This is



possibly because of the deep snowpack that is experienced in this area and it makes travel very difficult for the animals in the early winter months. By April the snowpack has had time to consolidate and therefore the caribou have a much easier time travelling on top of the deep snowpack (Mountain Caribou Recovery Strategy, 2002). The disturbed areas specifically the transmission line/gas line, seemingly had no effect on the caribou as that is where their tracks were spotted. Although this area may not be abundant in lichen it was still used for travel. Also, there have been numerous sightings of caribou along the highway and within the Ministry of Transportation (MOT) compound from late winter/early spring and late summer to fall. This finding indicates a certain level comfort with concern to human activities. Another factor is the avalanche control that goes on in and around the park using Gazex exploder cannons to trigger avalanches during the months of December through early April. This may be a factor as to why the caribou do not return until April, as the avalanche season winds down. It is possible that they have become adapted to the increased avalanche activity brought about by avalanche control at this time.

The movement patterns I observed in Stagleap Provincial Park are fairly typical of Mountain Caribou. However, the South Selkirk herd appears to return to a higher elevation later than other herds such as the Revelstoke herd where they move up to approximately 1800m in March and then come down to around 1500m in April (Simpson & Woods, 1987). Although both of these areas receive a relatively high amount of precipitation in the form of snow, their movements are somewhat different. From the radio collar data given by Leo Degroot, it was hard to determine specific movements of these caribou from fall through the winter months (Degroot, personal communication, 2006). All of the animals are seemingly dispersed throughout the winter months and only really gather in larger numbers in the summer season.

It seems obvious that all the transplanting of Mountain Caribou that has occurred over the past two decades has done little to create a larger viable herd. Considering the high number of animals introduced, in the end the herd remains stable at approximately 35 individuals. The lichen growth that is an integral part of the Mountain caribou's survival is not thought to be the limiting factor in the low population numbers (Degroot, personal communication, 2006). Accounts such as those outlined by Spalding (2000), suggest that as development has increased over time, the number of Mountain Caribou has decreased proportionally.

## **6.0 Conclusion**

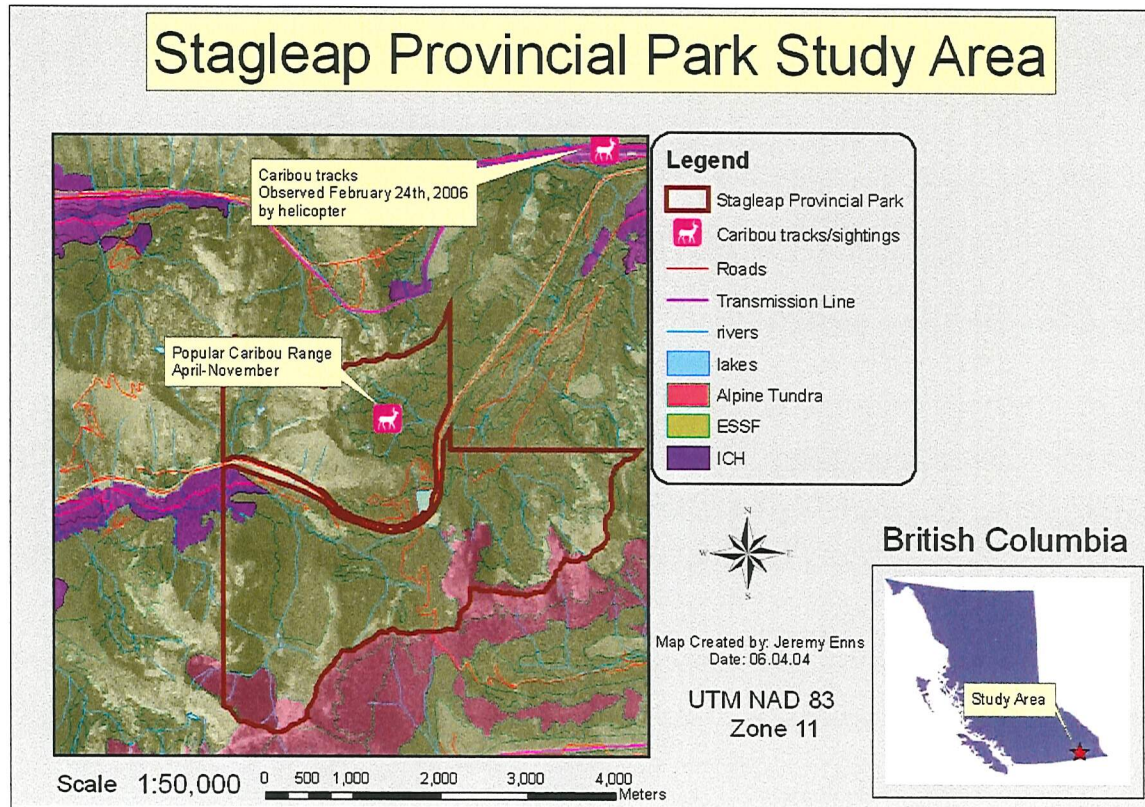
The habitat in and around Stagleap Provincial Park is definitely suitable for the Mountain Caribou and there is plenty of lichen for them to feed on. It is very likely that human presence and habitat segmentation plays a major role in the population decrease in this area. The decline from 100 animals prior to 1950, down to 35 at present, is a marked decrease. Transplantation alone has not been successful in increasing the viable population.



There are many factors that should be addressed in more detail if we are to more fully understand the South Selkirk caribou herd. One is to really gain an understanding of the relationship between the Ministry of Transportation avalanche control program and the caribou and the interactions that have been going on. Also, the road itself may cause numerous problems due to segregation and loss of habitat for the caribou as it is a major highway bisecting their habitat. There is a lot of habitat for these caribou in Stagleap Provincial Park, however these animals are not connected to any other population, thus decreasing the genetic variability of this population.

The impacts of winter recreation in this area seem minimal in comparison to other human activities such as road use and transmission line building, going on in the area. While managing caribou habitat for recreation may be the easiest route for resource managers, it should not draw attention away from bigger issues. Resource managers should be taking a more active role in protecting the caribou as it has been identified as their number one concern (Stagleap Provincial Park Purpose Statement and Zoning Plan). As I have shown, there are significant variables, such as population segmentation and habitat fragmentation, in this region. A lot more to be learned to support effective management. Presently, any way that parks can support the Mountain Caribou project and further the understanding of animals in this region will be beneficial. Overall, there will be no quick fix to the variety of issues facing the Mountain Caribou in Stagleap Provincial Park. With increased research and understanding resource managers will be able to make better decisions regarding protection of the caribou within the park, as well as providing recreational values. Stagleap Provincial Park makes up only a small part of the habitat in which the South Selkirk caribou range. Managing that one area will have little effect on the population as a whole because there are many other areas which are just as likely to be used outside of the park.

## Appendix A



## Acknowledgements

I thank Larua Adams (Selkirk College Renewable Resources) for supervising this project and research, and enabling me to develop valuable skills as a resource technician. I also thank John Tweedy and the staff with the Ministry of Transportation at Kootenay Pass, who provided me valuable and practical information on caribou in and around Stagleap park, as well as the opportunity to do a helicopter flight around the Stagleap Provincial Park area. I thank Leo Degroot and Garth Mowat for their contributions to this project on the South Selkirk Mountain Caribou population. Also, I thank B.C. Parks for allowing me the opportunity to study the Mountain Caribou in Stagleap Provincial Park. My partners in this research, Gary Phillips, Nola Flaws, Corinne Bexson, and James Kelly, were all very helpful in the collection of various data for this project.

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