

MONITORING MOUNTAIN CARIBOU WILDLIFE HABITAT AREAS AND UNGULATE WINTER RANGES

FREP

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INTRODUCTION

One of three ecotypes of woodland caribou (*Rangifer tarandus caribou*) in British Columbia, mountain caribou are the southernmost population and differ from other ecotypes in that they inhabit rugged mountainous terrain and almost exclusively forage on arboreal lichens in winter. Mountain caribou are listed as “threatened” under the federal *Species at Risk Act* and red-listed¹ in British Columbia.

The population of mountain caribou, currently estimated at 1700 animals, has been in decline over the past decade. This decline has been linked to predation over the short term, but ultimately attributed to industrial activities over the longer term. To halt this decline and recover the populations, the British Columbia government announced the Mountain Caribou Recovery Implementation Plan in 2007. This plan committed government to several management actions that will support the recovery of the population to more than 2,500 animals across the caribou’s existing range within 20 years.

To meet this goal, the government implemented provisions under the *Forest and Range Practices Act* that designate Ungulate Winter Ranges, Wildlife Habitat Areas, and Specified Areas, collectively referred to as “designated areas.” These areas provide legal protection for mountain caribou habitat from industrial road building, forest harvesting, and oil and gas activities.² This provision also ensured that habitat protected under other legal designations, such as provincial and national parks (hereafter “protected areas”) within mountain caribou range,



Photo: Jared Hobbs

would contribute to capturing 95% of mountain caribou high suitability winter habitat under some form of protection. Designated areas include 36 Wildlife Habitat Areas (WHAs) and 1 Specified Area, ranging in size from 50.5 ha to 66 503 ha, and 9 Ungulate Winter Ranges (UWRs), ranging in size from 17 656 ha to 819 775 ha (Figure 1).

Following the release of the implementation plan, an Adaptive Management and Monitoring Strategy (Wilson and Nyberg 2009) was developed to direct compliance and effectiveness monitoring of recovery actions, including habitat management. The monitoring study reported here summarizes the results of a range-wide spatial analysis of habitat protection to document: (1) mountain caribou occupancy of designated areas and protected areas; and (2) the amount of protected high suitability winter habitat in designated areas for the purpose of identifying habitat change through time and space.

¹ Extirpated, endangered, or threatened.

² Since August 2011, WHAs and UWRs are also addressed within the *Oil and Gas Activities Act (OGAA)*.

The FREP Mission:

To be a world leader in resource stewardship monitoring and effectiveness evaluations; communicating science-based information to enhance the knowledge of resource professionals and inform balanced decision-making and continuous improvement of British Columbia’s forest and range practices, policies and legislation. <http://www.for.gov.bc.ca/hfp/frep/index.htm>



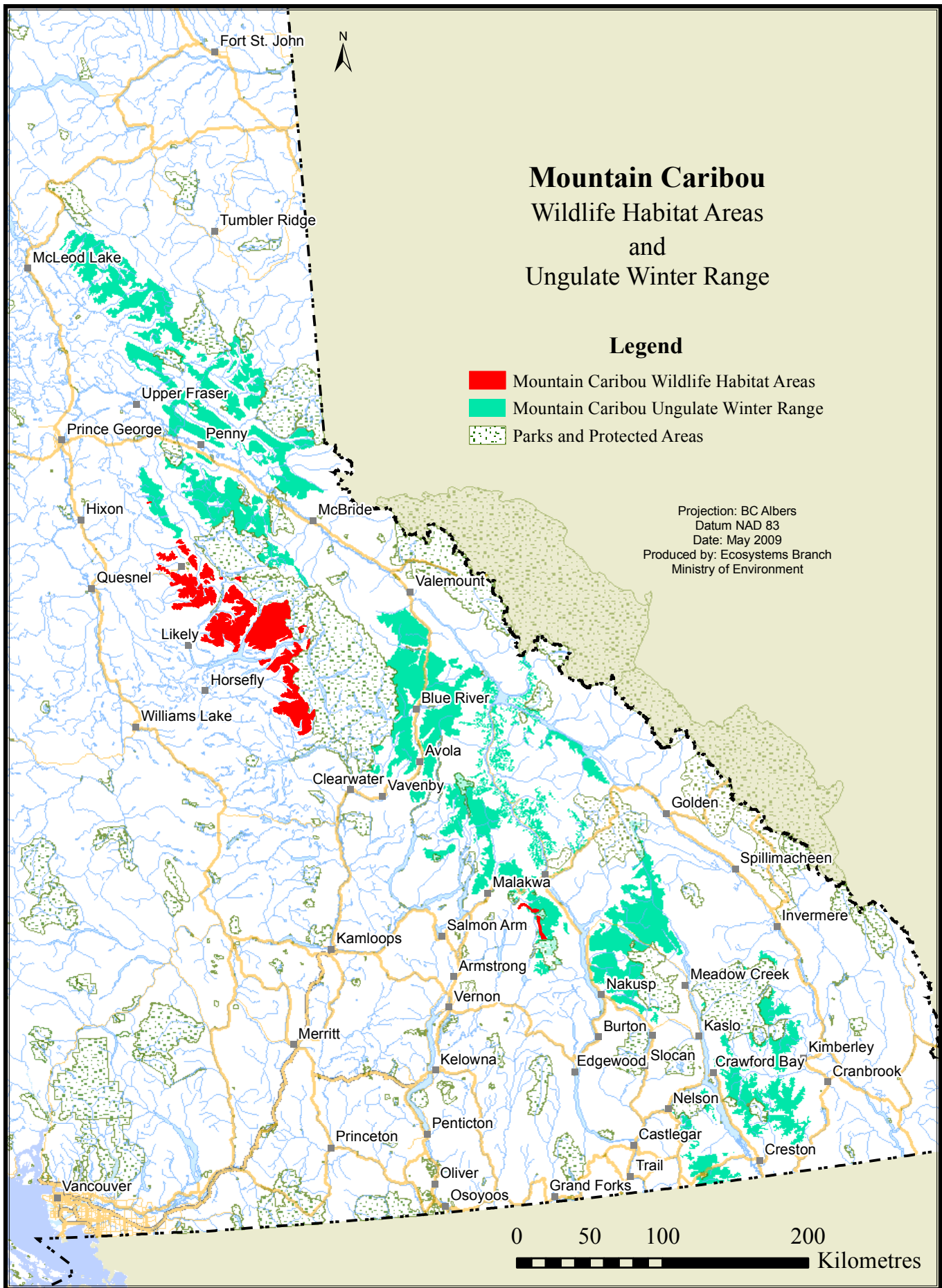


Figure 1. Mountain caribou designated areas and protected areas.

METHODS

This monitoring study determined mountain caribou occupancy of designated areas and protected areas, by buffering (1-km or 314.2 ha) mountain caribou telemetry point data ($n = 1080$) for census surveys conducted in 2008, 2009, and 2010, and intersecting these data with designated areas and protected areas. The sum of the intersected area was determined for each designated area and protected area defined as the “occupied area.”

In addition, the occupied areas were stratified by season (i.e., winter and summer) to determine seasonal patterns. When buffered areas for winter and summer overlapped, the area was considered to be occupied year round. Points were categorized by season as either winter (November 15 through April 15) or summer (April 16 through November 14). There were 661 summer points and 419 winter points. Selection for a 1-km buffer was based on a recommendation by Wilson and Nyberg (2009). In addition, selected years are the first years following the announcement of the recovery implementation plan in 2007.

The amount of high suitability habitat within designated areas was determined by intersecting the 2007 range-wide mountain caribou habitat suitability model (McNay et al. 2006) with the designated areas. The habitat suitability model is based on early- and late-winter habitat as these are considered the most limiting to mountain caribou.

All spatial analyses were performed using a geoprocessing Python script. Topology was created for each individual data set. Data was accessed using government’s Land and Resource Data Warehouse and the Wildlife Species Inventory database. (<http://www.env.gov.bc.ca/wildlife/wsi/index.htm>)

RESULTS

The analysis revealed a significant overlap between WHA numbers 8-228 and 8-233. To avoid double counting, the overlap area was assigned to 8-228, thereby reducing the area reported for 8-233. Ungulate Winter Range numbers 3-005 and 8-004 overlap by approximately 12706 ha. In this case, the overlap area was assigned to 8-004. Although this did not affect the overall analysis, caution should be applied when looking at any percentages assigned specifically to 8-233 and 3-005. Other less significant overlaps were noted. Every effort was made to avoid double counting.

Mountain caribou occupied all but one UWR and all but a few WHAs (e.g., 5-106, 5-109, 5-117, 8-230) during the study period (Table 1). Mountain caribou occupied UWRs more frequently (62.3%) than protected areas (9.3%), and WHAs (8.8%) (Table 1). Overall, approximately 80% of mountain caribou occupied designated areas during the

study period, suggesting 20% are using habitat outside these areas (Table 1).

Mountain caribou occupied designated areas more frequently in winter (50.8%) than in summer (23.3%). More specifically, UWRs were occupied 35.7% in winter and 20.3% in summer, and WHAs were occupied 8.7% in winter and 0.1% in summer (Table 1). This pattern is also seen in protected areas, which received greater use in winter (6.4%) than in summer (2.9%) (Table 1). A small proportion of mountain caribou occupied UWRs year round (Table 1).

Table 1. Mountain caribou occurrence in designated and protected areas by season. Occupied area is in hectares.

| OCCUPIED AREA (ha) | | | | |
|--------------------|-------------------|-------------------|-----------------|-------------------|
| | Summer | Winter | Year | TOTAL |
| WHA | 141.4 (0.1) | 9055.7 (8.7) | | 9197.1 (8.8) |
| UWR | 21007.0 (20.3) | 37042.3 (35.7) | 6553.1 (6.3) | 64602.4 (62.3) |
| Protected Areas | 3019.4 (2.9) | 6596.0 (6.4) | | 9615.4 (9.3) |
| Total | 24167.8 (23.3) | 52694.0 (50.8) | 6553.1 (6.3) | 83414.9 (80.4) |

The amount of high suitability winter habitat varied across UWRs and WHAs (Table 2 and 3). Ungulate Winter Ranges captured 829464 ha of high suitability winter habitat, while WHAs captured 161770 ha (Table 2 and 3). The amount of high suitability winter habitat in protected areas is not reported here.

DISCUSSION

This monitoring study provides a general understanding of mountain caribou habitat use, particularly in areas designated to protect their habitat. It also documents the baseline condition of the amount of high suitability winter habitat within designated areas (i.e., UWRs and WHAs) to monitor changes in habitat due to forest harvesting, road building, or other disturbances in these areas.

Government achieved its commitment to protect 2.2 million hectares of forested mountain caribou habitat through the legal establishment of UWRs, WHAs, and Specified Areas for mountain caribou. Designated areas protect 2314801 ha of mountain caribou habitat from road building, forest harvesting and oil and gas activities. The majority of mountain caribou occupied designated areas during winter, which is not unexpected given that these areas were established to protect mountain caribou early and late winter habitat. Ungulate Winter Ranges appear to have more use than WHAs and protected areas, but it is likely a product of their size and distribution, which captures a greater proportion of mountain caribou habitat across their range.

Table 2. High suitability habitat in mountain caribou WHAs and Specified Areas

| WHA # | WHA area (ha) | HIGH suitability habitat (ha) | HIGH suitability habitat (%) |
|--------------|-----------------|-------------------------------|------------------------------|
| 5-088 | 767.1 | 735.9 | 95.9 |
| 5-089 | 4072.9 | 3910.8 | 96.0 |
| 5-090 | 1767.0 | 1746.6 | 98.8 |
| 5-091 | 441.0 | 432.0 | 98.0 |
| 5-092 | 524.9 | 518.7 | 98.8 |
| 5-093 | 14880.2 | 10915.4 | 73.4 |
| 5-094 | 975.9 | 936.8 | 96.0 |
| 5-095 | 600.4 | 583.8 | 97.2 |
| 5-096 | 814.7 | 761.8 | 93.5 |
| 5-097 | 5772.7 | 3223.1 | 55.8 |
| 5-098 | 3274.7 | 2217.8 | 67.7 |
| 5-099 | 2558.4 | 1670.0 | 65.3 |
| 5-100 | 20422.6 | 17699.4 | 86.7 |
| 5-101 | 213.2 | 179.9 | 84.4 |
| 5-102 | 1259 | 1031.3 | 81.9 |
| 5-103 | 726.8 | 598.2 | 82.3 |
| 5-104 | 609.5 | 398.7 | 65.4 |
| 5-105 | 170.4 | 94.9 | 55.7 |
| 5-106 | 62668.8 | 40024.7 | 63.9 |
| 5-107 | 50.5 | 49.6 | 98.2 |
| 5-108 | 744.4 | 349.8 | 47.0 |
| 5-109 | 66503.0 | 31057.5 | 46.7 |
| 5-110 | 1231.5 | 923.6 | 75.0 |
| 5-111 | 1628.5 | 1255.2 | 77.1 |
| 5-112 | 5075.1 | 2524.0 | 49.7 |
| 5-113 | 4427.7 | 1108.4 | 25.0 |
| 5-114 | 3566.6 | 1100.8 | 30.9 |
| 5-115 | 2726.4 | 2094.0 | 76.8 |
| 5-116 | 821.1 | 727.2 | 88.6 |
| 5-117 | 45675.0 | 23568.0 | 51.6 |
| 7-003 | 174.8 | 129.7 | 74.2 |
| 8-226 | 237.0 | 181.7 | 76.7 |
| 8-227 | 464.0 | 343.6 | 74.1 |
| 8-228 | 782.5 | 198.8 | 25.4 |
| 8-229 | 983.0 | 106.3 | 10.8 |
| 8-230 | 3134.3 | 1280.6 | 40.9 |
| 8-233* | 16209.9 | 7091.8 | 43.7 |
| Total | 276955.6 | 161770.3 | 58.4 |

* Specified Area

Table 3. High suitability habitat in mountain caribou UWRs

| UWR # | UWR area (ha) | HIGH suitability habitat (ha) | HIGH suitability habitat (%) |
|--------------|------------------|-------------------------------|------------------------------|
| 4-012 | 61473.7 | 27553.3 | 44.8 |
| 4-013 | 212953.2 | 112439.9 | 52.8 |
| 8-012 | 17655.0 | 3902.4 | 22.1 |
| 4-014 | 276943.9 | 81762.4 | 29.5 |
| 8-004 | 178706.3 | 56719.2 | 31.7 |
| 3-005 | 156110.5 | 88239.2 | 56.5 |
| 4-010 | 30759.9 | 10710.9 | 34.8 |
| 3-004 | 283468.2 | 79342.4 | 28.0 |
| 7-003 | 819775.4 | 368794.9 | 45.0 |
| Total | 2037846.1 | 829464.6 | 40.7 |

The Mountain Caribou Adaptive Management and Monitoring Strategy suggests that mountain caribou occupancy of high suitability winter habitat within designated areas should achieve a desired condition of greater than 75% occupancy over a 3-year period. This desired condition assumes that designated areas were delineated based on the high suitability winter habitat model; however, the designation also considered local knowledge of habitat quality and habitat use. As a result, the Adaptive Management Team modified this desired condition to better reflect the information used to establish designated areas. With this in mind, the occurrence of mountain caribou within designated areas, as opposed to protected high suitability habitat based on the range-wide suitability model, was selected as an indicator of population distribution and defined as having a desired condition of 75% or greater occupancy over a 3-year period. With greater than 80% occupancy of designated areas reported in this study, the desired condition was achieved, suggesting that the distribution of the designated areas is currently appropriate; however, maintenance of habitat suitability still needs to be determined. Effectiveness of these designations must be considered within the broader context of the full suite of mountain caribou recovery actions, which include: managing access for backcountry winter recreation, managing predators and alternate prey, and augmenting caribou population to reflect changes in mountain caribou population sizes, trends, and distributions.

CONCLUSION

This mountain caribou monitoring study demonstrated greater than 80% occupancy of designated areas over a 3-year period (2008, 2009, and 2010), suggesting that these areas are designed appropriately. Further monitoring will determine the effectiveness of designated areas in supporting the BC government's commitment of protecting 2.2 million ha of habitat from road building and logging.

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