BC's Mountain Caribou: Last Chance for Conservation?

**Special Report** 



FPB/SR/22

September 2004

File: 97350-20/2004-03

September 29, 2004

Honourable Michael de Jong Minister of Forests Room 128, Parliament Buildings Victoria, BC V8W 9E2

Honourable George Abbott Minister of Sustainable Resource Management Room 346, Parliament Buildings Victoria, BC V8W 9E2 Honourable Roger Harris Minister of State for Forestry Operations Room 151, Parliament Buildings Victoria, BC V8W 9E2

Honourable Bill Barisoff Minister of Water, Land and Air Protection Room 112, Parliament Buildings Victoria, BC V8W 9E2

Dear Ministers:

Please find enclosed a news release, two backgrounders and a Forest Practices Board special report entitled *BC's Mountain Caribou: Last Chance for Conservation?* The report is being publicly released today.

Due to the complexity and urgent nature of this issue, my Board colleagues and I have drafted some general recommendations on mountain caribou conservation based on consultations with key stakeholders and an overview of the latest mountain caribou research, including but not limited to the report being released today. These recommendations are intended to contribute to an effective recovery effort and will assist the Board in our ongoing monitoring of the progress of the mountain caribou recovery program. We recognize that it is government's prerogative to decide on the allocation of resources and it may well decide on additional actions or find other ways of achieving the same objective.

The activities and initiatives recommended form the basis of a comprehensive and well coordinated program that is, in our view, necessary to address mountain caribou recovery in British Columbia. Because the recommendations are drawn from discussions with relevant agency, industry and non-governmental parties, the program of initiatives is an extension of many specific efforts that they are already undertaking or planning to implement.

The Forest Practices Board is anxious to support the work of all the parties and to acknowledge the dedication of the members of the community-based Recovery Action Groups that have been laying the groundwork for the balance of scientific, socio-economic and locally practical actions that must soon be taken for conservation efforts to be effective. It appears that government has an opportunity to consolidate and support these efforts on behalf of mountain caribou in order to demonstrate its commitment to address the overall issue of biodiversity and endangered species.

Please feel free to contact me if you require a briefing or have any questions.

Yours sincerely,

Buce Arerer

Bruce Fraser, PhD Chair

Enclosure (1 report, 1 news release and 2 backgrounders)

#### RECOMMENDATIONS

There are two main initiatives that appear to be necessary to foster recovery of threatened mountain caribou populations in British Columbia:

- increasing the level of investment in making the current suite of regulatory, research, planning and recovery action tools work in practice, and
- developing the strength of provincial coordination to manage the complex of threats to mountain caribou, particularly including forestry, predator-prey relationships and backcountry access and recreation.

Specifically, our recommendations are that government implement a well-coordinated and significant investment, including specific timelines, to make the Mountain Caribou Recovery Strategy work, particularly for the most vulnerable mountain caribou populations. The following overall course of action is intended as a basis for developing a program that is scientifically sound, technically feasible, and economically responsible and which makes effective use of existing recovery efforts. It is imperative that such a program leads to early practical action on the ground if threatened mountain caribou herds are to benefit from an increased recovery investment.

#### **Investment in Recovery Action Plans**

Without further delay, increase the level of **effort and investment** in the work of the established Recovery Action Groups with the intent of accelerating development of their recovery action plans within a defined and timely period, providing for independent assessment of the socioeconomic implications and moving technically and economically feasible action recommendations rapidly into implementation.

Ensure that the Recovery Action Plans specify programs of specific on-the-ground actions that package forestry, mining, recreation, access and wildlife management into a well integrated and mutually supporting set of initiatives focusing on spatially explicit landscapes.

Provide the necessary site-specific objectives and strategies to convey forestry-related mountain caribou recovery guidance to operational planning under FRPA. There appear to be two potential mechanisms to achieve this. One would be through **targeted Sustainable Resource Management Plans**, leading to establishment of objectives under the *Land Act*. The other would be through notices under section 7 of the *Forest Planning and Practices Regulation*.

#### **Regulatory Implementation**

Establish the **technically and economically feasible elements** of recovery action plans as "Objectives Set by Government" under FRPA to ensure that they are reflected in the forthcoming forest stewardship plans developed by the forest licensees.

Ensure that the objectives reflect the work of the Recovery Action Groups to define and locate critical habitat such as core reserve areas, integrated buffer areas and movement corridors.

Establish the **best practices for backcountry access and recreation as 'conditions'** of recreational land use tenures provided by Land and Water BC and MOF.

Conduct audits of the **operational effectiveness of the results and strategies** within approved forest stewardship plans for maintaining threatened mountain caribou populations, in order to supplement and verify ongoing population and inventory monitoring.

#### Use Research and Field Trials to Refine Best Practices

Develop and support a **targeted mountain caribou research agenda** to address continuing knowledge gaps in such areas as: required habitat attributes, nutrition, recruitment, predator-prey relationships and predator/alternate prey control options, recreation disturbance impacts, implications of climate change and the efficacy of forest and recreation industry-led models in conserving habitat and populations – all with respect to the variability of the specific complex of conditions that influence individual populations.

Establish an **intensive population inventory and tracking system** to support monitoring and managing population levels for mountain caribou and their predators, including recruitment, location and health status, in conjunction with recovery efforts for each threatened population.

Establish an operational study to **examine and publish the industrial forestry and commercial recreation innovations** in mountain caribou habitat planning and management being

conducted by leading industry practitioners based on the guidelines established in the second edition of *Mountain Caribou in Managed Forests: Recommendations for Managers.* 

Establish operational studies to investigate the **potential impacts of heli-ski and snowmobile recreation on winter survival** of mountain caribou with the intent of producing specific guidance on best practices for minimization of harm to mountain caribou.

#### Focus on Preserving All Mountain Caribou Herds

Given the recovery effort inherent in federal and provincial species at risk legislation, defer the question of '**triage**' for the most threatened mountain caribou populations and concentrate on implementing a full recovery program. The 'triage' approach should only be considered if rigorously applied recovery efforts are found through the monitoring program to be ineffective.

#### Provincial Leadership

Establish a small **Mountain Caribou Implementation Task Force, with representation from MWLAP, MSRM and MOF**, charged with the integration and timely implementation of the province's investment in mountain caribou recovery, regulatory, research, inventory and monitoring program. Employ the Mountain Caribou Technical Advisory Committee as a supporting scientific panel to the task force.

As recommended by MCTAC, appoint a provincial **Recovery Program Coordinator** to lead the Mountain Caribou Implementation Task Force, link with northern caribou recovery efforts and provide a level of investment recommendation to government to ensure sufficient funding of the caribou recovery programs.

Provide the Coordinator with the **necessary operational funding and authority** to direct the implementation and integration of resource agency initiatives currently being developed under the Mountain Caribou Recovery Action Plan, including forest, wildlife, commercial and public recreation, back-country access and mineral exploration management actions that need to be taken collaboratively and simultaneously.

Drawing on the experience of the Mountain Caribou Technical Advisory Committee and with reference to existing strategies and land use plans, assemble and analyze the **current information base on caribou ecology and recovery management** to assess the state of knowledge, the state of recovery activity and the gaps that most need concentrated attention – where these are not already articulated in the 2002 Mountain Caribou Recovery Strategy.

### Public Communication

Publish the program as a provincial initiative and have the task force develop a **bulletin series and a mountain caribou recovery website** to inform the public about progress as the program proceeds.

Provide for the Mountain Caribou Implementation Task Force, Mountain Caribou Technical Advisory Committee and the local Recovery Action Groups to share scientific and practical results with each other and ensure that public information on mountain caribou recovery is balanced and accurate.

# BC's Mountain Caribou: Last Chance for Conservation?

**Special Report** 

# Table of Contents

Introduction	.1
Natural History of Mountain Caribou	.2
Current Status Population Trends for Mountain Caribou in BC Threats to Mountain Caribou Survival	2 2 4
Current Mountain Caribou Management   Federal Government Role   Provincial Government Role   Community and Corporate Roles   Existing Provincial Guidance and Direction   Mountain Caribou Recovery Strategy   Land Use Planning   Forest Practices Code   Relevant Forest Practices Board Findings   1   Forest and Range Practices Act	6 7 8 8 8 0 2 5
Conclusions2	20
Appendix 1: Land Use Plan Summary Table2 Land Use and LRMP Goals/Objectives for Mountain Caribou	25 25

# Introduction

The Forest Practices Board is British Columbia's independent watchdog for sound forest practices. The Board helps ensure forests are soundly managed to sustain the full range of forest values and forest resources for British Columbians. If it is in the public interest, the Board Chair may make a special report about matters relating to the Board's duties.



Mountain caribou. Source: Bruce N. McLellan

All mountain caribou in Canada are nationally designated as 'threatened'. Threatened status means that action is required to improve caribou survival in order to avoid extinction<sup>i</sup>. In 1996, British Columbia signed the National Accord for Protection of Species at Risk<sup>ii</sup>. That agreement obliged the province to act to protect species at risk and their habitats, and to develop recovery plans for nationally designated species<sup>iii</sup>. Nevertheless, the number of mountain caribou in the province declined by 17 percent between the years 1996 and 2002<sup>iv</sup>. Experts anticipate further declines and local extinctions over time. Clearly, the survival of mountain caribou in BC is an issue of significant public interest.

Since 1995, mountain caribou management has been influenced by the *Forest Practices Code of British Columbia Act* (the Code), including higher level plans and objectives. In 2004, the *Forest and Range Practices Act* (FRPA) came into force to replace the Code. FRPA establishes a 'results-based' approach to forest practices focused on the objectives of forest and range practices, rather than the means by which they are achieved. The move to a more objectives-based regulatory regime means that required results for mountain caribou habitat will need to be clearly defined, and strategies to protect important habitat developed by forest licensees and incorporated into their forest stewardship plans.

The issues related to mountain caribou conservation are varied and span a broad range of legislation, government policy and land use. However, the Board's mandate is limited to matters related to the Code and FRPA. Accordingly, the Board decided to prepare a special report about mountain caribou conservation and the changing legislation for forest practices. The objectives of this special report are:

- To inform and add value to public debate about the extraction of timber, forest stewardship and conservation of remnant populations of mountain caribou.
- To review the Board's experience with mountain caribou and forest practices.

• To raise the public profile of the status of mountain caribou as a forest resource and thereby improve the likelihood that an objectives-based forest regulatory regime will contribute to mountain caribou conservation and recovery.

# **Natural History of Mountain Caribou**

All caribou in British Columbia are woodland caribou, a sub-species found across Canada. Managers categorize woodland caribou into types based on their habitat and feeding strategies. Mountain caribou feed in winter, almost exclusively on tree-borne lichens. The world's population of mountain caribou occurs almost exclusively in British Columbia.

Mountain caribou typically use lower-elevation cedar-hemlock or spruce-sub alpine fir forests in fall and early winter, feeding on ground-level plants and on lichens from litter-fall and downed trees. As snow depth increases, mountain caribou must move to higher, colder elevations where they can walk on hardened snow, which allows them to reach arboreal (treeborne) lichens. Those lichens are their primary food source until the snow recedes.

Mountain caribou are old growth dependent-that is, mountain caribou need older trees to both provide suitable habitat and supply sufficient tree-borne lichen. The canopy of older, low-elevation forests intercepts soft snow, preventing burial of ground lichen and other food sources in early winter. At higher elevations, the canopy of older forest supports the essential winter food source of abundant tree-borne lichens. Large tracts of high-elevation forest are important year-round for caribou to avoid predators.

Predation is the most frequent identifiable cause of mountain caribou mortality. Cougar, wolves, bears and wolverine are common predators. Populations will decline if mortality exceeds productivity, and mountain caribou productivity is low. Adult females usually have only a single calf per year, over a typical lifespan of up to 15 years.

# **Current Status**

### Population Trends for Mountain Caribou in BC

A census in 2002 determined that about 1,900<sup>v</sup> mountain caribou occur in BC in 13 isolated populations, scattered from the Kootenays north to Prince George (see Figure 1)<sup>vi</sup>. In 1996, there were 2,300. Most of the populations continue to shrink, and none are expanding. Six of the thirteen have less than 50 animals, and one of those appears to have recently disappeared<sup>vii</sup>. Experts predict continued declines<sup>viii</sup>, and expect that the most southerly populations in BC will likely disappear<sup>ix</sup> regardless of conservation efforts to date or in the future. A more recent analysis is still more pessimistic; it predicts that mountain caribou will likely disappear in the south within 20 years and over most of their distribution within the next 100 years, assuming current demographic factors continue<sup>x</sup>.



Figure 1: Current distribution of 13 local populations of mountain caribou in British Columbia.

#### Source: MCTAC, 2002.

Local extinction of caribou populations is not new. Caribou disappeared from the Queen Charlotte Islands - Haida Gwaii in the 1930s<sup>xi</sup>, possibly because of over-hunting<sup>xii</sup>. On mainland BC, the southern caribou populations began to decline in the mid-1850s, coinciding with European settlement, advancing industrial and agricultural development and resulting in hunting and habitat impacts. Pre-colonially, mountain caribou numbers were probably quite abundant, and spread over about twice their current range in BC. With hunting regulation and predator control, some herds slowly began to recover; however, habitat loss became a growing concern in the 1950s<sup>xiii</sup>. Mountain caribou have never regained their historic population level.

### Threats to Mountain Caribou Survival

The number and magnitude of concurrent and recent changes to land use, landscape and climate make it difficult to isolate the causes of mountain caribou decline. Interactions between factors further complicate the identification of causes.

Potential causes for the recent decline of caribou include:

- The colonization of BC by moose in the early 1900s, which allowed the existing wolf numbers to increase and resulted in increased wolf predation on caribou<sup>xiv</sup>.
- Logging and road-building that: converts old forest to young forest, allowing moose, deer and their predators to increase to the detriment of caribou; improves predator access to caribou habitat, increases the chance that predators will locate mountain caribou; reduces available lichen supply; improves human access and thus the potential for disturbance; and fragments large tracts of otherwise suitable caribou habitat.
- Predator population increases resulting from non-forestry related wildlife management decisions such as hunting and trapping regulation and predator control.
- Backcountry motorized and non-motorized human recreation, especially in winter, that displaces caribou into marginal habitats, threatening their physical condition and reproductive success and increasing their risk of death.
- Climate change, which causes variable snow packs, affecting access to food and restricting caribou movement; leading to more wildfires in caribou habitats; and thus influencing the size and distribution of ungulate and predator populations.
- Accidents and poaching that result in death of caribou.
- In-breeding, which causes loss of genetic diversity in small populations.

Some evidence for all of these factors exists and each may contribute to or even cause declines in different populations at different times (see Figure 2). Unfortunately, identifying interactions between factors and the separate causes of declines is difficult and costly. Research indicates that predation in summer and fall is the primary cause of mortality across the range of mountain caribou, accounting for 66 percent of known deaths<sup>xv</sup>. However, other factors like human winter recreation use and increased road and trail density may make caribou more vulnerable to predation, by reducing the physical condition of caribou adults and calves, and by enhancing the effectiveness of predators in locating prey<sup>xvi</sup>.

The current evidence appears to eliminate one potential cause of mountain caribou decline: mountain caribou rarely starve to death. Although logging removes old lichen-bearing trees and converts the old forest into young stands<sup>xvii</sup>, sufficient food apparently exists in the remaining forest to support the existing, albeit reduced, numbers of mountain caribou.





However, to survive, not only do mountain caribou require sufficient food, but it must be available in suitable habitat. Mountain caribou are adapted to spread out through large areas of relatively undisturbed habitat. That was the nature of pre-colonial interior wet belt forests large areas of old trees with small disturbances. Being widely dispersed in old forest and thus

hard to locate was the mountain caribou's best defence against predation. Today, mid-sized patches of young forest—regenerating clearcuts and recovering fire disturbances increasingly dominate what were large areas of old forest. That frequent and continuous disturbance pattern influences predator-prey systems to the detriment of mountain caribou, affects the ability of mountain caribou to move through and between habitats and increases human access to mountain caribou habitat. Recent research shows a strong relationship between adult female mountain caribou mortality and the proportion of younger-aged forest on the landscape<sup>xviii</sup>.



Caribou habitat alteration. Source: Bruce N. McLellan

Predator control is a controversial matter; however, the need to manage the loss of mountain caribou to predation seems urgent. For mountain caribou to be conserved, it appears that predator numbers may need to be reduced, but long-term recovery of mountain caribou will ultimately depend on forest management that assures an adequate supply of suitable habitat.

Regardless of which specific factors limit individual mountain caribou populations, forest practices appear to play a significant role in the decline of mountain caribou. Forest practices are also easier to regulate than other more indirect factors like climate change. Thus, to date, attempts to stabilize mountain caribou populations have focussed primarily on the management of forest practices. That may be changing. A recent panel on mountain caribou predator-prey-habitat interactions concluded that addressing individual factors in isolation such as protecting old-growth forest, managing younger-aged forest, reducing moose numbers or reducing predator numbers is doomed to fail at conserving mountain caribou decline, management that addresses all risk factors seems prudent.

# **Current Mountain Caribou Management**

### Federal Government Role

The federal *Species at Risk Act* (SARA) requires recovery planning for species at risk, and provides for focused protection on federal lands<sup>xx</sup>. However, SARA does not automatically protect habitat on provincial or private lands. Under SARA, critical habitats must first be

described for protection in a recovery strategy or action plan. For mountain caribou, 'critical habitat' has not yet been legally defined.

Some mountain caribou habitat is within national and provincial parks and is already protected from most development, but most mountain caribou habitat is in the provincial forest where resource development and caribou habitat co-exist and are managed by provincial regulations and strategic land use plans. Finally, some mountain caribou habitat is on private land and has no requirement for protection.

SARA focuses its approach on multi-jurisdictional cooperation, consultation and stewardship, but requires some action to recover a species at risk. Ultimately, the federal government may step in and take emergency action (a so-called 'safety net') to protect a listed species, or its habitat, that is facing imminent threats to survival or recovery.

## **Provincial Government Role**

Biologists with the Ministry of Water, Land and Air Protection (MWLAP) and the Ministry of Forests (MOF) provide mountain caribou conservation advice to strategic land use planners within the Ministry of Sustainable Resource Management (MSRM), as well as to forest resource users such as the forest industry, commercial tourism operators and organized recreationists. Government and contract biologists also conduct and assist mountain caribou research and mountain caribou habitat studies and inventory mountain caribou and work to enhance both populations and habitat. In short, they support the conservation of mountain caribou.

Several provincial statutes give authority to protect and recover species at risk, including the *Wildlife Act*<sup>xxii</sup>, the *Wildlife Amendment Act*<sup>xxii</sup>, and the *Forest and Range Practices Act*<sup>xxiii</sup>. Part of the broad mission of MWLAP is "to maintain and restore the ecological diversity of fish and wildlife species and their habitats."<sup>xxiv</sup> Taken literally, that could mean a mandate to conserve and restore mountain caribou wherever they occur, or did occur. In fact, a decade ago, the ministry (then BC Environment) pledged to maintain the populations and habitat of mountain caribou present in 1994<sup>xxv</sup>. That goal was not achieved, despite a substantial focus on mountain caribou management and research to date.

MWLAP is the provincial agency responsible for mountain caribou management. It receives scientific advice about mountain caribou from the *Mountain Caribou Technical Advisory Committee* (MCTAC), a multi-disciplinary team of experts who represent specific government and stakeholder interests. While MWLAP has the authority to evaluate and manage mountain caribou numbers, mostly it can only influence what happens to mountain caribou habitat by providing advice to other land management agencies such as MOF through its process of timber supply allotment and regulation of forest practices, and MSRM through its land use planning initiatives.

MOF and MSRM have the greatest authority to affect what happens to mountain caribou habitat outside of protected areas. MOF has a general responsibility to protect, manage and

improve the province's forest and range resources, which includes mountain caribou. MSRM is the lead agency responsible for planning, policies and resource information in support of sustainable economic development of Crown land, water and other resources.

## **Community and Corporate Roles**

The needs of mountain caribou traverse complex government jurisdictions, but also affect many local communities and corporate interests. Government mandates aside, corporate initiatives, community involvement and debate support mountain caribou conservation through transferring ecological, social and traditional knowledge; assuring a balance of viewpoints; and promoting accurate reporting on mountain caribou research and management programs. One example is the Columbia Mountains Institute of Applied Ecology in Revelstoke, which supports the sharing of ecological knowledge among community members, ecologists and resource managers<sup>xxvi</sup>.

## **Existing Provincial Guidance and Direction**

### Mountain Caribou Recovery Strategy

In 2002, the MCTAC completed a mountain caribou recovery strategy focussing on management that influences caribou survival. The strategy recognizes forestry as the greatest concern to caribou habitat management over the past two decades, especially since logging has moved into higher-elevation forest types. The recovery strategy's objectives include raising public awareness of mountain caribou, protecting and managing habitat and restoring the provincial population to a level of 2,500 to 3,000 animals.

The recovery strategy summarizes current knowledge about mountain caribou based on the best available science and presents options to achieve recovery. However, implementation of the strategy is not legally required; it provides advice to government and other forest managers, and is subject to the priorities and fiscal resources of the participating agencies and organizations. For example, the strategy calls for identification of a provincial caribou recovery coordinator, which has not yet occurred. The strategy also states that additional, local recovery action planning will provide specific guidance for on-the-ground activities to benefit mountain caribou recovery, where recovery is deemed feasible (see Figure 3).

Groups of stakeholders and resource agency staff are now developing local recovery action plans to translate the provincial recovery objectives into site-specific recommendations for all mountain caribou populations in BC, but like the strategy, the local recovery action plans will be advisory only and not binding. Government and industry may choose whether to act on that advice. So far, no recovery action plans have been completed. The first of three plans is expected to be finished in 2005.



The recovery strategy acknowledges that almost all conservation-based decisions are made in the absence of full scientific certainty. The recovery strategy reiterates the precautionary principle of biological conservation: *where there is a threat of significant reduction or loss of biological diversity, lack of full scientific certainty should not be used as a reason for postponing measures to avoid or minimize a threat.* 

#### Land Use Planning

The most comprehensive guidance for management of mountain caribou habitat is provided by seven regional and sub-regional land use plans<sup>xxvii</sup>. These land use plans cover all the areas where mountain caribou populations are found in British Columbia, and provide strategic, Cabinet-approved policy direction for land and resource management in mountain caribou habitat (see Appendix 1).

All the land use plans provide zones of limited or no timber harvest within defined zones of mountain caribou habitat, with particular reference to mountain caribou winter range. Overall, the strategies for mountain caribou are designed to maintain a minimum amount of mature and old forest within those defined areas. Although the strategies arose from the scientific knowledge and expert opinion of the day, each plan differs in approach. The variation is likely the result of regional interpretation of mountain caribou needs and participant negotiation over impacts to other resources, such as timber supply and backcountry access.

When the land use plans were developed in the last decade, the best available science indicated that most high-use mountain caribou habitats had greater than 60 percent old growth forest, but that some areas with less old growth were occasionally used<sup>xxviii</sup>. That study suggested that, at minimum, mountain caribou needed 60 percent of their total late winter and summer seasonal habitat to be forested, and 60 percent of that forested area in old growth forest. From this formula, a simple interpretation of the minimum requirement for retention of old forest in the forested portion of late-winter mountain caribou habitat is 36 percent (60 percent of 60 percent). The same study also suggested that mountain caribou may survive in early winter habitat areas totalling 20 to 25 percent of the available cedar-hemlock forest, located in areas needed by mountain caribou, and with 60 percent of those areas in old growth forest. Land use planning participants based protection of mountain caribou habitat on these standards, but made adjustments to suit local knowledge about mountain caribou needs and/or to mitigate competing economic and recreational resource values. In other words, the land use plans assumed a risk management approach to mountain caribou conservation in order to mitigate economic and recreational impacts.

For example, the Cariboo-Chilcotin Land Use Plan includes a strategy to restrict forest harvesting from 65 percent of identified high-elevation late-winter caribou habitat, and allows forest harvesting that maintains caribou habitat values in the remaining late-winter area, as well as key early-winter habitats.

Neither the Prince George Land and Resource Management Plan (LRMP) nor the Robson LRMP specified percentages, but both adopted a strategy for temporary deferral of forest harvesting within identified high-value caribou habitats, pending development of proven management strategies in areas of medium habitat value.

The implementation strategy for the Kootenay-Boundary Land Use Plan includes areas of no or limited harvest, as well as a strategy to maintain 30 to 40 percent of defined caribou habitat areas in old and mature forest. The adjacent Revelstoke Minister's Advisory Committee Plan also advises retention of 30 to 40 percent old and mature forest, but the retention requirements for some immature forest stands (i.e. large burned areas with a component of older trees) within mountain caribou habitat are calculated separately, which reduces the current retention of old and mature forested habitat.

The Okanagan-Shuswap LRMP sets aside 20 percent of a defined mountain caribou habitat zone within the timber harvesting land base as 'old growth management areas', and temporarily defers timber harvesting from an additional 20 percent pending research into the need for further reserves or special management areas for mountain caribou.

The Kamloops LRMP calls for retention of 20 to 33 percent of old growth attributes within mountain caribou winter range. The 'old growth attributes' required by mountain caribou are not defined in the plan and neither the resource agencies nor industry monitors 'old growth attributes' for the planning area<sup>xxix</sup>.

It is not readily evident to the Board how closely each land use plan reflects the science of the day in terms of actually providing suitable and correctly arranged mountain caribou habitat on the ground (it would depend on the relationship between actual habitat conditions and the location and size of the various caribou-strategy zones in each plan). It is important to note that all the land use plans contain complex and inter-dependent objectives and strategies that are difficult to assess against a common standard without a great deal of supporting information. In addition, the Board recognizes that the entire 'package' of a land use plan ultimately influences what happens on the land, so there is risk in attempting to isolate a single component for assessment.

Nevertheless, recent scientific research raises a concern that mountain caribou habitat requirements may actually be greater than the land use plans recommend. That research shows that habitats supporting currently stable mountain caribou populations have at least 40 percent of their <u>total</u> range areas in forests older than 140 years, while the most productive mountain caribou population has 73 percent of its <u>total</u> range area in forests that age or older<sup>xxx</sup>. None of the land use plans currently in place expressly recommends setting aside that much older forest.

Furthermore, even Cabinet-approved land use plan zones, objectives and strategies are not legally binding unless specifically declared so under the Code. Some have been declared by a legal order, but the rest are discretionary policy, available for consideration by resource

managers, resource users or FRPA decision-makers. Implementation of discretionary policies, guidelines and expert opinion about caribou habitat is not guaranteed.

Although the mountain caribou recovery planning initiative is underway, the province appears to lack a coordinated, coherent process to translate provincial mountain caribou population goals into land use and population management priorities and actions. Recovery Action Group members and other government staff are working in this area, but neither the planning products nor the timing of their completion is clear. Critical habitat remains undefined, as do legal requirements to conserve, or enhance this habitat. It seems unlikely that effective mountain caribou recovery will be achievable under the current land use plans. Mountain caribou populations have declined under the existing land use plan provisions and not all the plans' management approaches to mountain caribou habitat appear to be consistent with the best available science.

### **Forest Practices Code**

In 1999, British Columbia designated caribou a species at risk under the Code. The Code provided a variety of tools to address species at risk. These include the *Identified Wildlife Management Strategy, Ungulate Winter Ranges* and *Resource Management Zone Orders*. In 1999, the Board commended government for implementing the *Identified Wildlife Management Strategy,* but at the same time identified the need to designate ungulate winter ranges and resource management zones under the Code to protect wildlife values across the landscape—particularly for mountain caribou. The following three sections evaluate the implementation of these tools relative to mountain caribou.

#### Identified Wildlife Management Strategy

Under the Code, government officials could designate species at risk as 'identified wildlife' – those requiring special protection because they are especially vulnerable to forest and range practices. Resource agencies could then establish specific wildlife habitat areas (WHAs), or apply 'general wildlife measures' to limit the effect of harmful practices on identified wildlife populations and habitats. Policy restricted application of the strategy to a one percent impact on timber supply. Where land use conflicts were evident and impact on timber supply was likely to exceed one percent, government deferred implementation of the strategy's suggested management measures to the outcome of a land use planning process.

Caribou were never designated 'identified wildlife' under the Code, and there have been no WHAs or general wildlife measures established for mountain caribou under the Code. However, in May 2004, the Minister of Water Land and Air Protection established a category of species at risk under the *Government Actions Regulation* of FRPA. That category represents those species listed by the Committee on the Status of Endangered Wildlife in Canada that may be affected by forest or range management on Crown land in BC, and so includes caribou<sup>xxxi</sup>. In June 2004, the ministry released its *Identified Wildlife Management Strategy 2004*, which also includes caribou<sup>xxxii</sup>. That strategy provides resource management and planning recommendations for consideration when existing land use plans are reviewed or revised, and also allows for establishment of WHAs and general wildlife measures to provide interim protection of critical habitat features such as mineral licks, rutting and calving sites and small areas necessary to connect winter foraging areas.

The Identified Wildlife Management Strategy under the Forest Practices Code did not assist mountain caribou conservation. However, under FRPA, government recently enabled the opportunity for improved and more consistent management of mountain caribou via regional planning and the establishment of WHAs and general wildlife measures.

#### **Ungulate Winter Range**

An amendment to the Code in 1998 allowed government to designate ungulate winter ranges and establish objectives for their management. Forest and range planning within designated winter ranges had to be consistent with objectives specified for the range<sup>xxxiii</sup>. In 2003, government established the first Code-designated ungulate winter ranges for caribou in the province, in parts of the Omineca Region in north-central BC (other regions in BC currently protect mountain caribou winter habitat through land use plans and resource management zone orders).

Many Code-designated ungulate winter ranges exist for enhancement of deer, moose and elk populations. An emerging concern is that where these ranges are in proximity to mountain caribou habitat, the increased presence of other ungulates and the predators they attract may contribute to mountain caribou mortality.

The ungulate winter range designations in the Omineca Region give legal status to the strategic direction for management of winter habitat found in the region's mountain caribou strategy<sup>xxxiv</sup>, endorsed by both the Prince George and Robson Valley land and resource management plans. Mountain caribou populations using the designated winter ranges are generally stable except for one small population that has recently disappeared.

The potential for enhanced winter range management to immediately benefit the declining mountain caribou populations elsewhere in the province is uncertain, since most mountain caribou do not die during winter. However, winter and summer habitats often overlap, so protecting winter range also protects some of the summer habitat where mountain caribou die most frequently. Regardless of the seasonal intent of designation, habitat change that reduces suitability for mountain caribou, on or adjacent to winter and summer habitats, could further jeopardize the viability of a mountain caribou population.

Some regions provide some protection for mountain caribou winter ranges through land use plans and resource management zone orders, however, there is no transparent, coherent standard for protection of caribou winter habitat across the distribution of mountain caribou.

#### **Resource Management Zone Orders**

Under the Code, government could impose a balance between competing forest values by legally establishing resource management zones (RMZs) and their objectives. Typically, these 'higher-level plan' orders were developed from the zones, objectives and strategies of approved land use plans. Three<sup>xxxv</sup> of the seven land use plans that have objectives for the protection of mountain caribou also have higher-level plan orders for RMZs declared under the Code. Forest development plans and other operational plans under the Code had to be consistent with objectives of the declared RMZs, as will forest stewardship plans prepared under FRPA.

The orders generally reflect the three-pronged approach common to most of the land use plans:

- Maintain 'core' caribou habitat areas of no timber harvest.
- Establish 'buffer zones' of limited resource development with a targeted amount of old and mature forest retained.
- Designate 'linkage' areas to connect core caribou habitats and areas of seasonal use.

Some forest districts are also attempting to proactively monitor for consistency with legally declared RMZ orders. For example, the objectives of the Kootenay-Boundary Higher Level Plan Order are intended to retain seasonal habitats for mountain caribou. That order establishes minimum amounts of older forest within defined caribou habitat areas. This is a surrogate means of assuring that a minimum supply of mountain caribou habitat remains on the landscape. In the Columbia Forest District, MOF monitors caribou habitat supply by computing timber availability estimates prior to forest development planning. However, although regularly assessed to assure the numerical standard is met, the minimum retention target for older forest is not spatially applied, and thus may not spatially optimize or even provide suitable mountain caribou habitat. In this circumstance, a decision whether to harvest trees hinges on the surplus availability of timber, not on the quality of mountain caribou habitat in the field. Recently, some licensees in the Columbia Forest District have implemented spatial planning for mountain caribou in their operating areas, thereby improving the opportunity to maintain quality mountain caribou habitat<sup>xxxvi</sup>.

Monitoring for consistency with guidelines is also occurring. In the Kamloops LRMP area, a legal order refers to timber-harvesting guidelines developed to support achievement of RMZ objectives for mountain caribou. The guidelines define acceptable timber harvesting systems and clearcut sizes. Selection harvesting is preferred, while clearcuts of 5 to 40 hectares are least preferred, presumably because of the harm to mountain caribou habitat associated with clearcuts of that size. However, preliminary monitoring of mountain caribou winter range by MWLAP indicates that substantial harvesting using the 'least preferred' size of clearcuts occurred between 1995 and 2002<sup>xxxvii</sup>.

A desirable outcome of forest practices monitoring is to provide feedback that promotes adaptive improvement to management practices. MWLAP staff and area forest licensees disagree over the accuracy of MWLAP's monitoring results, citing confusion about interpretation of silviculture system terminology and the application of harvesting methods on the ground. Nonetheless, it appears that economic and social considerations associated with fire salvage, forest health problems and operational challenges with selection harvesting of cedar-hemlock stands did create compelling arguments for approval of many 'least preferred' clearcuts. The scope of the MWLAP monitoring did not include whether the 'least preferred' clearcuts resulted in any harm to mountain caribou habitat. The result is uncertainty about the implementation of the Kamloops LRMP guidelines and their effect on mountain caribou habitat.

For several years, a committee of area licensees and resource agency staff, including MWLAP, has discussed revising the Kamloops LRMP guidelines, which the committee agrees do not work well for either sustainable forestry or mountain caribou. The committee recently decided to modify the guidelines, through amendment of the legal order, to achieve a workable solution for both timber and mountain caribou<sup>xxxviii</sup>. The proposed modifications appear to be more consistent with mountain caribou habitat management approaches elsewhere in the province.

Both the Columbia Forest District and Kamloops LRMP examples highlight the importance of crafting legal orders that provide measurable objectives defined in terms relevant to mountain caribou, and underscore the challenges of developing an effective monitoring approach that accurately measures the condition of mountain caribou habitat. The examples also demonstrate a potential limitation of discretionary guidelines in support of legal objectives. Where simultaneous achievement of mountain caribou conservation goals and other resource goals are not attainable, discretionary guidance to protect mountain caribou habitat may prove insufficient to ensure that habitat conservation takes priority, if that is government's intent. Finally, the Kamloops example also demonstrates the potential benefit of management feedback that supports and promotes continual improvement to uncertain management practices.

The Code's focus on managing the details of forest planning has not produced healthy or recovering mountain caribou populations. Available tools under the Code such as the Identified Wildlife Management Strategy, designated ungulate winter ranges, and legally declared orders for resource management zones have not been of much benefit to mountain caribou.

### **Relevant Forest Practices Board Findings**

Since the Code came into force in 1995, the Board has conducted audits and investigated public complaints about compliance with the Forest Practices Code. Some of this work has addressed mountain caribou. The Board has also been involved in an administrative review involving mountain caribou<sup>xxxix</sup>.

Through its audits and investigations, the Board has found that forest practices planning generally met legally established requirements for caribou. In its 2001 review of the Cariboo-Chilcotin Land Use Plan, the Board found all but 1 of 14 forest development plans were consistent with Code-declared orders that legally established no-harvest areas for caribou<sup>xl</sup>. All those forest development plans were also consistent with targets for backcountry recreation,

although only when the least restrictive interpretation of access (semi-primitive motorized) was assumed.

However, in an administrative review from 1998, the Board argued that a forest development plan did not adequately address habitat requirements for mountain caribou<sup>xli</sup>. In the Board's view, the plan failed to consider – let alone implement – very specific caribou guidelines in a Cabinet-approved plan. On that basis, the Board requested that approval of some cutblocks be set aside or, alternatively, that managers apply mitigating measures. The review panel acknowledged that the cutblocks would increase risk to mountain caribou habitat, but disagreed with the Board about overturning or attaching conditions to the approval<sup>xlii</sup>. The panel maintained approval to harvest the cutblocks.

In 2002, the Board investigated two complaints about roads that encroached into mountain caribou habitat. In one, the Board found that the approved road location was contrary to government policy and professional opinion<sup>xliii</sup>. In the second, the Board found that resource managers had adequately considered policy and professional opinion, but that there should have been an explicit commitment to manage public access, otherwise the desired outcome for caribou would not be enforceable<sup>xliv</sup>. In both investigations, the Board found it inappropriate that the district manager was satisfied the roads would adequately manage and conserve mountain caribou habitat.

In 2002, the Board also investigated the logging of an area used by mountain caribou in early winter<sup>xiv</sup>. The licensee employed an innovative harvesting approach intended to retain mountain caribou habitat attributes while providing operational flexibility. That approach allowed the licensee to decide on the amount and location of trees to retain during logging operations. Ultimately, the licensee decided to clearcut much of the area in question, as was allowed by the flexibility provided in the silviculture prescription. As a result, high value early winter mountain caribou habitat was rendered unsuitable for caribou. The Board found that it was inappropriate for the district manager to be satisfied, when approving the plan, that the silviculture prescription would adequately manage and conserve mountain caribou habitat values, given the wide range of possible outcomes it permitted. The Board stated that operational plans should express desired outcomes in practical and measurable terms that relate to the resource being conserved, and that doing so is especially important when dealing with special resource values such as wildlife species at risk.

These cases came to the Board's attention because of public concern that the Code was not being followed. The Board discovered, in these instances, that effective caribou management was falling through the Code's 'safety net' intended to ensure that forest resources be adequately managed and conserved.

Alternatively, the Board has also found that some licensees exceed required standards to protect mountain caribou habitat. During an audit in 2003, the Board found an innovative and alternative approach to forest practices planning in support of the legally required RMZ objectives of the Kootenay-Boundary Higher Level Plan Order<sup>xlvi</sup>. The audited licensee had

done extensive inventory work on mountain caribou, and assessed caribou habitat suitability and capability. Using that information, the licensee was able to plan its harvesting activities spatially to address the habitat needs of mountain caribou. The licensee did not harvest certain high-capability, high-use mountain caribou habitats. In other areas, where harvesting did occur, field experts had first assessed proposed cutblocks for impact on mountain caribou habitat. In this way, the licensee planned its harvesting activities relative to the spatial distribution and quality of mountain caribou habitat in the field.

#### **Forest and Range Practices Act**

The move from the Forest Practices Code to the *Forest and Range Practices Act* (FRPA) places less emphasis on planning and process and greater emphasis on achievement of government objectives. Consequently, regulations under FRPA focus on achieving desired results rather than how to conduct forest practices. Although licensees will still be required to address legally declared objectives for RMZs, FRPA creates a shift away from legal requirements toward greater reliance on forest professionals, available science, and adaptive management processes. For example, FRPA lacks the operational plan approval test that, under the Code, required the approving official to be satisfied that forest resources be adequately managed and conserved.

That shift enhances the opportunity for the forest industry to undertake different and innovative approaches to conservation of mountain caribou habitat and the management of timber supply. However, the process of being innovative and adaptive implies that resource management errors will occur, and mistakes are likely because the new legislative framework places greater emphasis on monitoring for success and less emphasis on how forest practices are conducted. That could be problematic where species are at risk and diminishing. Innovative management should reflect subtle differences in the local needs of mountain caribou populations, habitats and human use of those habitats, but doing something different everywhere may amount to chaos. Moreover, monitoring for success may not be able to distinguish between the effects of different management approaches and effects unrelated to forest practices.

Further, the transition from the rules-based Code to results-based FRPA creates a risk that a void of management direction will exist during translation of old management guidance into results-based objectives and strategies. Government has reduced the capacity of resource agency staff to assist with development and review of licensee harvesting plans. Government staff are, however, working to develop efficient, alternative approaches to deliver both results-based objectives and effective monitoring procedures for both non-legal direction found in land use plans and legal orders concerning resource management zones<sup>xlvii</sup>.

Recently, the Kootenay-Boundary Regional Caribou Committee, led by MWLAP, proposed an update to the RMZ objectives and mapping for mountain caribou in the Kootenay-Boundary Higher Level Plan Order. The committee intends to improve both management of mountain caribou within the plan area and the clarity of existing caribou management objectives. Variance of the existing higher level plan order is a controversial issue, given the recent declines in mountain caribou numbers and divergent public and stakeholder opinions expressed during a public review period. In the absence of stakeholder agreement, the government will need to make a clear decision on how best to proceed.

Undoubtedly, ongoing land use planning will result in changed procedures and forest management activities under FRPA. The monitoring of new practices for success and accountability presents a special challenge when populations are declining and the causes remain uncertain. Continuing industry and resource agency efforts to refine mountain caribou management strategies indicate a strong desire for integrated forest management prescriptions to evolve, particularly as more detailed caribou inventory and spatial habitat information comes available.

Industry and resource agency studies often contribute to technical advancement of caribou habitat definition and mapping. Those techniques utilize radio-telemetry data, detailed habitat inventory and computer simulation. Although less dependent on qualitative scientific opinion, such techniques demand quantifiable data and analysis, which is not yet widely available. Standardized mapping of existing and critical caribou habitat (when defined) would likely assist not only the continual improvement of conservation efforts under FRPA, but support consistency in monitoring, as well as further public understanding of mountain caribou management issues.

Under FRPA, detailed forest development plans are replaced with forest stewardship plans (FSPs). FSPs focus less on operational details, and more on results and strategies consistent with government objectives for the forest values identified in FRPA, or in strategic land use plans. For example, including a mountain caribou result or strategy in a FSP is required only if the Minister of Water, Land and Air Protection so notifies the licensee, or if there are other related objectives that apply, such as objectives for a wildlife habitat area, ungulate winter range, or a general wildlife measure. On one hand, FRPA streamlines use of these tools by granting authority for their establishment solely to the Minister of Water, Land and Air Protection. However, that minister may not establish an ungulate winter range or a wildlife habitat area if it is inconsistent with the objectives set by government for the area. Apparently, that constraint is additional to the current one percent policy cap for impact of wildlife habitat areas on timber supply. So, on the other hand, it is uncertain to what degree the additional constraint will influence use of these tools under FRPA.

Of course, licensees may choose to include as much detail in their FSP as necessary to express a particular management concern, although only results and strategies are legally enforceable. Under FRPA, government clearly intends for industry to have an increased level of accountability for forest practices results and strategies, and the *Association of British Columbia Forest Professionals* has already defined a standard for management of species at risk. That association recently outlined a statement of intent that could support mountain caribou conservation. It confirmed that its members are obliged, to the extent that factors relate to forest management and are under their control, *to manage for species at risk with the aim of recovering or adequately protecting these species at a level where they are no longer at risk*<sup>xtviii</sup>. It seems likely that achievement of that obligation will require forest professionals to diligently seek out and

employ low-risk approaches to forest management in the habitats of species at risk, particularly where the population at risk is small and/or the rate of decline is rapid.

The new regulatory framework enables innovative approaches to achievement of desired results of forest practices. That could encourage forest professionals to incorporate emerging science about mountain caribou in their forest management practices. Alternatively, unless cautiously applied, innovative approaches will inherently result in some failures. Therefore, the new FRPA framework may not reduce risks to mountain caribou populations that are already at high risk of extirpation or extinction, and where the next effort at conservation may be the last.

#### Sustainable Resource Management Planning

In the Board's view, to have confidence in forest management efforts to conserve mountain caribou, the public must be able to understand how the objectives of higher-level plans and government policies translate to on-the-ground activities of benefit to caribou. Under FRPA, the public must also be able to understand how achievement of results will be measured. The public must also see how government can deliver redesigned objectives, consistent with FRPA, within its current fiscal constraints and in the timely fashion required given the current risks and recent declines in mountain caribou. However, much of the public is likely to find the array of complex and evolving strategies for mountain caribou bewildering, particularly where basic knowledge about habitat supply and population trends is unavailable or uncertain.

The continued development of clear goals and objectives at a landscape level, and more defined results for existing and new land use plans to support FRPA are a priority for the Ministry of Sustainable Resource Management<sup>xlix</sup>. In the Board's view, strategic landscape-level plans with measurable and spatial objectives enable better planning, promote clearer and more enforceable plans for all forest uses, and contribute to more satisfactory working relationships between agencies and the public<sup>1</sup>.

The Board has recommended on a number of occasions that government move to quickly complete landscape unit planning in a manner that considers the full range of forest resource values, including wildlife. Sustainable Resource Management (SRM) planning replaces landscape level plans and primarily supports economic development, ecosystem management and watershed planning. SRM plans could provide a consistent landscape-level management approach for mountain caribou. SRM planning is expected to produce objectives and strategies that are site-specific, results-based, set in an economic and ecosystem context and operationally relevant<sup>li</sup>. Government could order that forest stewardship plans under FRPA be consistent with SRM plan objectives and strategies for mountain caribou. However, SRM plans are not intended to cover all areas of the province and their preparation is proceeding slowly. To date, only a few SRM plans contain or propose landscape-level management direction for mountain caribou<sup>lii</sup>.

# Conclusions

To date, much public and private wildlife research, resource planning effort and approved land use policy in the province has aimed to conserve mountain caribou; but it does not appear to have been enough. A number of factors either singularly or more likely in combination are causing ongoing decline of mountain caribou numbers and distribution. Forest practices are one of these factors.

The Forest Practices Code has not resulted in coordinated actions on the ground to address mountain caribou management. What work has been done is mostly based on industry initiatives, which are not necessarily coordinated or linked to the overall recovery strategy. FRPA, which permits innovation, could add further uncertainty. Some innovative approaches to mountain caribou management are likely to be unsuccessful and could result in lost populations. Further, the difficulty of precisely determining the cause of mountain caribou losses could make it difficult to attribute losses to forest practices (if that is the case) and, accordingly, to hold forest professionals or government accountable for decisions or actions that affect mountain caribou, as envisioned under FRPA.

Enhancing habitat suitability to improve the survival of mountain caribou will require intensive management over many decades, including actions spanning the breadth of forestry, predator control, caribou population manipulation, access and recreation management.

There appears little time left to act before options for mountain caribou conservation are ultimately forfeited. Current science suggests that if older forests continue to be fragmented and mountain caribou continue to be lost to predators, the final opportunity to restore mountain caribou populations in the province will soon be lost.

A provincial recovery strategy is complete, but relies on community stakeholder groups and scientists to debate and develop the on-the-ground actions necessary for recovery of local mountain caribou populations. Local recovery action plans are underway but not complete; this process may be taking too long to address the immediate threats to caribou populations.

When complete, the recovery action plans will provide discretionary advice to forest managers. The Board's experience is that discretionary policy is not consistently applied, increasing the risk that mountain caribou will not survive in BC. In the Board's view, the highest likelihood for achievement of mountain caribou conservation, if government decides that conservation is the most important priority, would be with clear direction and a legally required standard of habitat management to assure implementation of government's intent for mountain caribou.

Furthermore, the Board believes the public requires transparent access to reliable information about implementation of management strategies for mountain caribou and mountain caribou habitat. A landscape-level monitoring strategy that tracks caribou numbers and the distribution of habitat through time would help achieve caribou conservation goals and support public confidence. The Board supports sustaining the full range of forest values and forest resources in British Columbia, including mountain caribou, but is aware that recovery efforts can be economically and socially expensive and require long-term commitments, especially when population numbers are low. Successful and efficient mountain caribou conservation will depend on timely focussing of actions where they will be the most effective at reducing risks to mountain caribou in both the short- and long-term. It may be that mountain caribou and industrial forestry are not both sustainable in some landscapes, particularly those already extensively altered by historic land use.

For the populations at highest risk, the probability of successful conservation may be low and the economic or social costs of conservation prohibitively high. Conversely, the cost of abandoning a threatened species could also be substantial, bearing in mind trade sanctions, market boycotts, environmental protest and the potential difficulties of forest certification. Ultimately, it will be up to elected government officials to decide what price is worth paying to conserve mountain caribou relative to other social, economic and environmental priorities.

One school of thought is that some mountain caribou populations may not be recoverable at any cost; and that recovery actions should be directed to those populations where effort is most likely to lead to recovery. Since it appears that most mountain caribou populations have only a few decades remaining, some would argue that under current management practices, the practical options available would focus by necessity on creating the best possible habitat for the most viable populations. Another school of thought is that ethical obligations and international and federal/provincial agreements<sup>liii</sup> require that British Columbians ensure the maintenance of biodiversity in general and individual species at risk, whatever the cost. These issues raise social and political considerations that are beyond the scope of this report.

Government faces some hard decisions if it intends to identify landscapes where caribou conservation is the highest priority; adopt and implement recovery actions that tackle mortality causes aggressively; and deal with the eventuality that it may not be possible to conserve mountain caribou everywhere they currently occur. However, given the potential for federal species at risk legislation and the provincial mountain caribou recovery strategy to provide a framework for caribou protection, the question of such 'triage' should be deferred for now. Efforts should concentrate on implementation of a full recovery program; a 'triage' approach should be considered only if rigorously applied recovery efforts for all mountain caribou populations are found through a monitoring program to be ineffective.

Despite the many challenges facing mountain caribou conservation, there are opportunities for leadership that could produce a more optimistic outlook for mountain caribou. Management intervention and commitment to conservation have resulted in a promising future for other species at risk in Canada—for example, the whooping crane. This is the time to for government to decide if it is in the public interest to incur the costs and accept the consequences involved in a serious effort to conserve mountain caribou, and if the answer is yes, to get on with the job of conservation without further delay.

http://wlapwww.gov.bc.ca/wld/documents/mtcaribourcvrystrat02.pdf

<sup>ix</sup> COSEWIC. Species Database, reason for designation (caribou, woodland). <u>www.cosewic.gc.ca</u>

<sup>x</sup> Witter, H.U. 2004. Mechanisms underlying the decline of mountain caribou (*Rangifer tarandus caribou*) in British Columbia. PhD. Thesis, UBC, Vancouver

<sup>xi</sup> COSEWIC. 2002. Assessment and update status report on the woodland caribou Rangifer tarandus caribou in Canada. <u>http://www.sararegistry.gc.ca/status/showDocument\_e.cfm?id=229</u>

xii COSEWIC, Species at Risk fact sheet, Caribou dawsoni subspecies. <u>www.cosewic.gc.ca</u>

xiii Spalding, D.J. 2000. The early history of woodland caribou (Rangifer tarandus caribou) in British Columbia, BC Ministry of Environment, Victoria, BC. Wildlife Bulletin B-100.

x<sup>iv</sup> Seip, D.R. 1992. Factors limiting woodland caribou populations and their interrelationships with wolves and moose in southeastern British Columbia. – Canadian Journal of Zoology. 70: 1494-1503.

<sup>xv</sup> Wittmer, H.U. 2004. PhD. Thesis, UBC, Vancouver. (See earlier endnote for source).

<sup>xvi</sup> Simpson, K. and E. Terry, 2000. Impacts of backcountry recreation activities on mountain caribou. BC Ministry of Environment, Wildlife Branch, Victoria, BC, WR-99 (Page 2).

xvii MCTAC recovery strategy. 2002. Page 17. (See earlier endnote for source.)

xviii Wittmer, H.U. 2004. PhD. Thesis, UBC, Vancouver. (See earlier endnote for source.)

xix Messier, F., S. Boutin and D. Heard. 2004. Revelstoke mountain caribou recovery: An independent review of predator-prey-habitat interactions. Report submitted to the Revelstoke Caribou Recovery Committee, Revelstoke. http://www.cmiae.org/pdf/panel\_report\_final.pdf

xx For detailed information about SARA, see: http://www.sararegistry.gc.ca/default\_e.cfm

<sup>xxi</sup> The killing of mountain caribou has been prohibited by hunting regulation under the provincial Wildlife Act for some time. <u>http://www.qp.gov.bc.ca/statreg/stat/W/96488\_01.htm</u>

<sup>xxii</sup> The amendments enable Cabinet to list as endangered, threatened or extirpated the full range of species similarly listed under SARA. With listing comes a series of prohibitions and the ability to define and protect the residence of the listed species. See: <u>http://www.legis.gov.bc.ca/37th5th/3rd\_read/gov51-3.htm</u>.

xxiii Thirty-nine COSEWIC-listed species are identified under the species at risk category for FRPA. See:

http://wlapwww.gov.bc.ca/wld/documents/identified/approved sar order list.pdf.

<sup>xxiv</sup> 2004/05 – 2006/07 Service Plan Ministry of Water, Land and Air Protection.

http://www.bcbudget.gov.bc.ca/sp2004/wlap/wlap\_goals.htm

<sup>xxv</sup> McKinnon, G.A. 1996. A mountain caribou strategy for British Columbia. Rangifer, Special Issue No. 9: 149-152.

<sup>xxvi</sup> The Columbia Mountains Institute of Applied Ecology (<u>www.cmiae.org</u>) is a non-profit society that facilitates cooperative research and community involvement in the Columbia River Basin of southeastern British Columbia. The institute has hosted and assisted several important workshops and seminars about mountain caribou, and includes a compendium of management and research reports (<u>http://www.cmiae.org/mtn-caribou-compendium.htm</u>); a review of mountain caribou predator-prey-habitat interactions (<u>http://www.cmiae.org/pdf/panel\_report\_final.pdf</u>) and a compendium of lichen management presentations on its website (<u>http://www.cmiae.org</u>).

<sup>xxvii</sup> The MCTAC caribou recovery strategy recognizes six such plans. These include the Okanagan-Shuswap Land Resource Management Plan, Kootenay-Boundary Land Use Plan, Cariboo-Chilcotin Land Use Plan, Prince George

<sup>&</sup>lt;sup>i</sup> Committee on the Status of Endangered Wildlife in Canada (COSEWIC). 2003. Canadian Species at Risk. <u>http://www.cosewic.gc.ca/htmlDocuments/sar\_2003\_11\_e.htm#threatened</u>

<sup>&</sup>lt;sup>ii</sup> See Environment Canada's website: <u>http://www.ec.gc.ca/press/wild\_b\_e.htm</u> and <u>http://www.ec.gc.ca/press/wild\_n\_e.htm</u>

<sup>&</sup>lt;sup>iii</sup> Ministry of Forests. 2003. British Columbia's Forests and their Management. Victoria BC. <u>http://www.growingtogether.ca/pubs/bcfm/BC\_Forest\_Management.pdf</u> (page 7)

<sup>&</sup>lt;sup>iv</sup> MCTAC (The Mountain Caribou Technical Advisory Committee). 2002. A strategy for the recovery of mountain caribou in British Columbia. Report to MWLAP, Victoria, BC

<sup>&</sup>lt;sup>v</sup> Estimated from the 2002 late-winter population as reported in MCTAC's recovery strategy. 2002. (See earlier endnote for source.)

 $<sup>^{\</sup>rm vi}$  MCTAC recovery strategy. 2002. (See earlier endnote for source).

vii Ian Hatter, pers. comm., about the George Mountain herd near Prince George. MWLAP Victoria. 2003.

<sup>&</sup>lt;sup>viii</sup> MCTAC recovery strategy, Table 2. Mountain caribou have decreased over the short term and the current trend is down. (See earlier endnote for source).

Land Resource Management Plan, Kamloops Land Resource Management Plan, and Robson Valley Land Resource Management Plan. (See: <u>http://srmwww.gov.bc.ca/rmd/lrmp/index.htm</u>) We have included the Revelstoke Minister's Advisory Committee Plan as a separate planning document. (See:

http://www.for.gov.bc.ca/dco/MAC/Rlupr99.pdf )

xxviii Simpson, K., J.P. Kelsall, and M. Leung. 1994. Integrated management of mountain caribou and forestry in

southern British Columbia. Report to Ministry of Environment, Victoria, BC.

xxix Bieber, W. pers. comm. Weyerhaeuser Company Limited (Vavenby) 2004.

xxx Wittmer, H.U. pers comm. UBC. Vancouver. 2004.

 $^{\mbox{\tiny XXXi}}$  The order and list of species in the category can be viewed at:

http://wlapwww.gov.bc.ca/wld/identified/approved\_order.html.

xxxii The Identified Wildlife Management Strategy Version 2004 can be accessed at:

http://wlapwww.gov.bc.ca/wld/identified/index.htm

xxxiii Similar provisions exist under FRPA. In May 2004, the Minister of MWLAP established a category of ungulate species under the *Government Actions Regulation* of FRPA. This category represents those species for which an ungulate winter range may be required for winter survival.

<sup>xxxiv</sup> Stevenson, D., C. Ritchie, J. Vinnedge, B. Brade and B. Arthur. 2003. Mountain caribou ungulate winter range proposal – Omineca Region. MWLAP, Prince George.

<sup>xxxv</sup> The Cariboo-Chilcotin Land Use Plan, Kootenay-Boundary Land Use Plan and Kamloops Land and Resource Management Plan.

<sup>xxxvi</sup> Pearce, C. pers. comm., Revelstoke. 2004.

<sup>xxxvii</sup> MWLAP (Ministry of Water, Land and Air Protection). 2003: Summary of timber harvesting on caribou winter range in the North Thompson. Unpublished Draft Report. Thompson Region. 4pp.

xxxviii Surgenor, J. pers. comm., MWLAP Kamloops. 2004.

xxxix The Board may appeal decisions made by government officials, such as determinations of non-compliance, penalties, and (under the Code) approvals of forest development and range use plans. The Board acts as an advocate for the public interest in these cases. Under the Code, the first step in the appeal process was appeal to an 'administrative review' panel, consisting of public servants. A second step could be appeal to the independent Forest

Appeals Commission.

<sup>xl</sup> Forest Practices Board. 2001. Implementation of the Cariboo-Chilcotin Land-Use Plan in forest development plans. <u>http://www.fpb.gov.bc.ca/special/investigations/sir06/sir06.pdf</u>

<sup>xli</sup> Forest Practices Board. 1998. Memorandum of Argument - (Approval of a forest development plan in the Kootenay Lake Forest District).

xlii Administrative Review Decision Report: Forest Practices Board vs. Kootenay Lake Forest District. http://www.fpb.gov.bc.ca/REVIEWS/1998/07/decision.htm

x<sup>iiii</sup> Forest Practices Board. 2002. Road relocation through high-value caribou habitat near Tsus Creek, east of Prince George. <u>http://www.fpb.gov.bc.ca/SPECIAL/investigations/sir07/sir07.pdf</u>

<sup>xliv</sup> Forest Practices Board. 2002. Concern about a logging road extension and wildlife habitat near Kinbasket Reservoir. <u>http://www.fpb.gov.bc.ca/COMPLAINTS/irc60/IRC60.pdf</u>

<sup>xlv</sup> Forest Practices Board. 2002. Management and conservation of mountain caribou habitat in the Cariboo Region. <u>http://www.fpb.gov.bc.ca/SPECIAL/investigations/SIR09/SIR09.pdf</u>

<sup>xlvi</sup> Forest Practices Board. 2003. Audit of forest planning and practices - Pope and Talbot Ltd, Tree Farm Licence 23. <u>http://www.fpb.gov.bc.ca/AUDITS/arc53/arc53.pdf</u>

<sup>xlvii</sup> An example is the draft Horsefly Sustainable Resource Management Plan, MSRM, January 2003. <u>http://srmwww.gov.bc.ca/car/planning/horsefly/srp\_index.html</u>

x<sup>lviii</sup> Association of British Columbia Professional Foresters. 2003. Managing for species at risk: What are a forester's professional responsibilities? ABCPF Species at Risk Working Group, Vancouver. (Page 5). <u>http://www.rpf-bc.org/download/species-at-risk.pdf</u>

<sup>xlix</sup> 2004/05 – 2006/07 Service Plan Ministry of Sustainable Resource Management.

http://www.bcbudget.gov.bc.ca/sp2004/srm/srm\_goals.htm

<sup>1</sup> Forest Practices Board. 2000. A review of the forest development planning process in British Columbia. <u>http://www.fpb.gov.bc.ca/SPECIAL/reports/fdp/index.htm</u>

<sup>li</sup> Ministry of Sustainable Resource Management. 2002. Sustainable resource management planning – A landscapelevel strategy for resource development (working paper), Victoria, BC. <sup>lii</sup> Some examples are Eight Peaks SRM Plan; Horsefly SRM Plan (draft); 100-Mile Subregional Plan (draft) – see <u>http://srmwww.gov.bc.ca/rmd/srmp/index.htm</u>

<sup>iiii</sup> At the 1992 Earth Summit in Rio de Janeiro, one of the key agreements adopted was the Convention on Biological Diversity. This pact among the majority of the world's governments sets out commitments for maintaining the world's ecological underpinnings during economic development. The Convention establishes three main goals: the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits from the use of genetic resources.

In October 1996, federal and provincial wildlife ministers in Canada agreed in principle to the Accord for Protection of Species at Risk and committed to a national approach to protect species at risk. The Accord outlines commitments to designate species at risk, protect their habitats and develop recovery plans. Under the accord, governments have agreed to play a leadership role by developing complementary legislation, regulations, policies and programs to identify and protect threatened and endangered species and their critical habitats – see

http://www.speciesatrisk.gc.ca/recovery/accord\_bac\_e.cfm

# Appendix 1: Land Use Plan Summary Table

### Land Use and LRMP Goals/Objectives for Mountain Caribou

Prince George LRMP: "Manage caribou habitat to provide opportunity for population levels to increase"

Robson Valley LRMP: "Protect critical high elevation winter range habitat. Improve understanding of the behaviour and biology of caribou populations and the effect of resource development on caribou habitat."

Cariboo-Chilcotin LUP: "The overriding objective is to maintain habitat values for mountain caribou within the Cariboo Region."

Kamloops LRMP: "Maintain a viable population of caribou within defined ranges, while maintaining ecosystem health."

Okanagan-Shuswap LRMP: "The primary goal in managing for caribou is to maintain adequate habitat to provide opportunities for viable populations within the plan area, and to maintain connectivity with adjoining areas."

Kootenay-Boundary LUP: "Maintain viable populations of mountain caribou." Revelstoke Minister's Advisory Committee Plan: "Maintain the current population in the northern portion of the area..."

t management prescriptions (extracted from LRMP and regional Land Use Plans).	Rotson Valley Carboo-Chilsotin Kamloops Okanagan-Shuswap Kodenay LRMP LUPa LUPa LUPa LRMPb LRMPc Boundary LUP	North Cariboo Barke rville. Wells Wells Gray Monashee, Revels to ke, Revels to ke, Central Mountains, minor Gray North South South Wells Gray South Rockies, Central part of the Hart Ranges South Purcells, South Purcells,	Deferred forest Within caribou range, Maintain a minimum No parkland harvesting. No harvest in parkland harvesting within high 65% of habitat identified of 33% of the caribou At teast 20% of THLB <sup>4</sup> and designated valued habitat for 10 as no-harvest areas. habitat such that it to be reserved now. caribou no-harvest weats or until proven Remaining 35% retains obt-growth 7-year research program areas. Elsewhere maragement strategies designated for modified attributes. Silviculture will determine need for between parkland and are developed in areas harvest (described systems other than additional reserves or the Caribou Line <sup>6</sup> , of medium habitat value. below). Clearcuts restricted to 15 ha. arces.	In medium habitat In modified havest In transitional habitat At least 20% of THLB <sup>rd</sup> Below the Caribou implement alternative areas, including key maintain 20% of the area to be reserved now, Line® maintain 30% of maintain caribou habitat implement alternative old-growth attributes will determine need for dass 8 or older (10% values over a 240-year implement alternative old-growth attributes will determine need for age class 9) and an values over a 240-year site and inpartial caribou eccessistem networks special management alternation totation. An intrain caribou and riparian buffers. Areas. Areas. Areas. Areas. Areas. Areas. And titonal reserves or age class 9) and an initiation. An intrain caribou and riparian buffers. Areas.	Schedule harvesting No specific strategies; Must be 1–1.5 km wide At least 30% of the No specific strategies to maintain the integrity bilow strategies for with at least 30% of timber within corridors eccent maintain continuous of the corridor for caribou modified harvest the timber sufficient must provide snow broad corridors of old-movement throughout areas. In age/size to intercept interception and exhibit growth and mature at the rotation. Provide areas in age/size to intercept interception and exhibit growth and mature at the rotation.	Where there is harvesting Define parts of the No specific strategies, Manage summer and Avoid access to parkand. In or adjacent to caribou carries but some local writer fackcountry Develop access plan for habital minimize amount to recreational activities, recreation plans exist, recreation through local carribou area. Assess of open writer roads, especially snowmobile recreation plans exist, paraning, Develop access plan for carribou area. Assess planning, Develop access through local carribou area. Assess planning, Develop access through local carribou area. Assess planning, Develop access through the next carribou area. Assess planning, Develop access through local carribou access through local carribou consent plans. Writer habitat that incompatible with carribou consent planning.
arized regional forest management prescriptions	Rotson Valley Carboo LRMP LUPa	North Cariboo Barkerv Mountains, minor Gray M part of the Hart Ranges	Deferred forest Within har within harwesting within high 55% of valued habitat for 10 as no-h sears or until proven Remain management strategies de signa are developed in areas harvest of medium habitat value. De low),	In medium habitat In modi implement alternative areas, in sitviculture systems to early-w maintain caribou habitat implem values over a 240-year implem initiai rotation. A 240-year maintai habitat	Schedule har vesting No spe- to maintain the integrity to blow s of the corridor for caribou modifie movement throughout areas. the rotation.	Where there is harvesting Define - in or adjacent to caribou habitat, minimize amount to recre of open winter roads. especia Recommend constraint use, and on backcountry recreation sub-reg that is incompatible with caribou conservation.
	Prince George LRMP	Hart Ranges, North Cariboo Mountains, George Mitn., Narrow Lake	No har vest with areas identified as having high value to caribou until proven management strategies are developed in areas of medium habitat suitability. High valued areas are excluded from the TSR.	In medium habitat implement altermative silviculture systems to mainta in caribou habitat values over a 240-year rotation.	Schedule harvesting to maintain the integrity of the corridor for caribou movement throughout the rotation.	Where there is harvesting in or adjacent to caribou habitat, minimize amount of open winter roads. Recommend constraint on backcountry recreation that is incompatible with caribou corservation.
Table 8. Summ	Forest District/ Land Use Plan	Local populations affected by forest development plans	High-ele vation and tate-winter habitat (ESSF)	Tran sitrional or early-winter habitat (ICH & ESSF)	Movement corridors	Access management

(Table extracted from MCTAC Recovery Strategy, 2002.)

Forest Practices Board



Home > Media Room > News Releases > News Releases 2004 > Quick Action Needed to Protect Threatened Mountain Caribou

## **NEWS RELEASE**

For Immediate Release September 29, 2004

### **Quick Action Needed to Protect Threatened Mountain Caribou**

VICTORIA – Decisive government leadership and prompt action are needed to address serious threats to the survival of BC's mountain caribou, the Forest Practices Board reported today. The board has prepared a series of recommendations to promote mountain caribou recovery and will be monitoring government's response to these recommendations in the coming weeks.

The board's special report, entitled BC's Mountain Caribou: Last Chance for Conservation?, focuses on the impact of forest practices and a complex of associated factors on the viability of BC's mountain caribou population. British Columbia is home to virtually all of the world's mountain caribou, but the population has been declining in recent years, dropping 17 per cent between 1996 and 2002.

Over the past few decades, logging, fires and road building have led to fragmentation of old-growth forest, disrupting critical caribou habitat and increasing vulnerability to predators such as wolves and cougars. Other factors such as historic over-hunting, increased backcountry recreation and climate change have also contributed to reduced mountain caribou population levels.

"The substantial and continuing decline in the mountain caribou population is serious and requires urgent government attention," said board chair Bruce Fraser. "This is a complex problem that requires a timely, coordinated and integrated approach to be effective in both protecting mountain caribou habitat and in dealing with immediate causes of mortality, such as predation.

"Government will need to make difficult decisions in the short and medium term on issues such as habitat conservation, predator/prey management and recreational access to demonstrate a serious commitment to mountain caribou recovery."

Although an overall provincial mountain caribou recovery strategy was published in 2002, the board found that actions to benefit mountain caribou on the ground remain largely unco-ordinated. The recovery strategy has relied mainly on community stakeholder groups to develop local plans for recovery but no local action plans have been completed to date. It is important to note that locally developed recovery plans will not be binding on forest managers and resource agencies unless translated into law and regulations that will mandate implementation.

The recommendations from the board were developed in discussions with government agencies, industry representatives and environmental organizations and reflect the on-the-ground strategies currently underway to conserve mountain caribou. The board is encouraged by recent indications from government which point towards better coordination and research efforts, a new collaboration with industry and recreation interests to accommodate mountain caribou conservation and increased resources for recovery efforts. These initiatives have the potential to lead to an effective long-term mountain caribou recovery program. The board will monitor these developments closely through its ongoing program of independent audits and investigations.

"The established multi-stakeholder recovery action groups deserve expanded support from government, given the urgency of the decline in mountain caribou populations," said Fraser. "Government must decide what value to place on protecting mountain caribou, in balance with other land use priorities such as forestry and commercial and public recreation, based on objective estimates of the social and economic costs of recovery.

"The board encourages government to provide clear leadership on mountain caribou conservation by bringing forward new initiatives in this area as soon as possible. The decline in mountain caribou is likely to become irreversible in the next few years without strong government co-ordination of the combined actions of scientists, agencies, forest and recreation industries and environmental groups."

In a letter to government ministers, Fraser makes a number of recommendations in two key areas: immediate investments in recovery action plans, research and on the ground actions to implement more effective

	Higher Contrast
24	Email this Page
9	Print this Page
	Text Size 🕒 🛈 🕂

#### BC's Mountain Caribou: Last Chance for Conservation?

All mountain caribou in Canada are nationally designated as 'threatened'. The number of mountain caribou in the province declined by 17 percent between the years 1996 and 2002. Experts anticipate further declines and local extinctions over time.

**Download Full Report** 

#### Backgrounder

#### Forest Practices Board

conservation efforts; and stronger provincial co-ordination to ensure that government's intent for mountain caribou conservation is understood and implemented by all resource agencies and forest managers dealing with mountain caribou herds.

The Forest Practices Board is an independent public watchdog that reports to the public about compliance with the Forest Practices Code and the achievement of its intent. The board's mandate has been retained under the new Forest and Range Practices Act (FRPA). The board's main roles under FRPA are:

- Auditing forest practices of government and licence holders on public lands.
- Auditing government enforcement of FRPA.
- Investigating public complaints.
- Undertaking special investigations of forestry issues.
- Participating in administrative appeals.
- Providing reports on board activities, findings and recommendations.

-30-

Erik Kaye Communications Forest Practices Board Phone: 250 356-1586 / 1 800 994-5899




September 29, 2004

## Letter from Forest Practices Board Chair on Recommendations for Mountain Caribou Conservation

Due to the complexity and urgent nature of this issue, my Board colleagues and I have drafted some general recommendations on mountain caribou conservation based on consultations with key stakeholders and an overview of the latest mountain caribou research, including but not limited to the report being released today. These recommendations are intended to contribute to an effective recovery effort and will assist the Board in our ongoing monitoring of the progress of the mountain caribou recovery program. We recognize that it is government's prerogative to decide on the allocation of resources and it may well decide on additional actions or find other ways of achieving the same objective.

The activities and initiatives recommended form the basis of a comprehensive and well coordinated program that is, in our view, necessary to address mountain caribou recovery in British Columbia. Because the recommendations are drawn from discussions with relevant agency, industry and non-governmental parties, the program of initiatives is an extension of many specific efforts that they are already undertaking or planning to implement.

The Forest Practices Board is anxious to support the work of all the parties and to acknowledge the dedication of the members of the community-based Recovery Action Groups that have been laying the groundwork for the balance of scientific, socio-economic and locally practical actions that must soon be taken for conservation efforts to be effective. It appears that government has an opportunity to consolidate and support these efforts on behalf of mountain caribou in order to demonstrate its commitment to address the overall issue of biodiversity and endangered species.

Please feel free to contact me if you require a briefing or have any questions.

Yours sincerely,

Bure Strever

Bruce Fraser, PhD Chair

Enclosure (1 report, 1 news release and 2 backgrounders)

### RECOMMENDATIONS

There are two main initiatives that appear to be necessary to foster recovery of threatened mountain caribou populations in British Columbia:

- Increasing the level of investment in making the current suite of regulatory, research, planning and recovery action tools work in practice, and
- Developing the strength of provincial coordination to manage the complex of threats to mountain caribou, particularly including forestry, predator-prey relationships and backcountry access and recreation.

Specifically, our recommendations are that government implement a well-coordinated and significant investment, including specific timelines, to make the Mountain Caribou Recovery Strategy work, particularly for the most vulnerable mountain caribou populations. The following overall course of action is intended as a basis for developing a program that is scientifically sound, technically feasible, and economically responsible and which makes effective use of existing recovery efforts. It is imperative that such a program leads to early practical action on the ground if threatened mountain caribou herds are to benefit from an increased recovery investment.

#### **Investment in Recovery Action Plans**

Without further delay, increase the level of **effort and investment** in the work of the established Recovery Action Groups with the intent of accelerating development of their recovery action plans within a defined and timely period, providing for independent assessment of the socio-economic implications and moving technically and economically feasible action recommendations rapidly into implementation.

Ensure that the Recovery Action Plans specify programs of specific on-the-ground actions that package forestry, mining, recreation, access and wildlife management into a well integrated and mutually supporting set of initiatives focusing on spatially explicit landscapes.

Provide the necessary site-specific objectives and strategies to convey forestry-related mountain caribou recovery guidance to operational planning under FRPA. There appear to be two potential mechanisms to achieve this. One would be through **targeted Sustainable Resource Management Plans**, leading to establishment of objectives under

the *Land Act*. The other would be through notices under section 7 of the *Forest Planning and Practices Regulation*.

### **Regulatory Implementation**

Establish the **technically and economically feasible elements** of recovery action plans as "Objectives Set by Government" under FRPA to ensure that they are reflected in the forthcoming forest stewardship plans developed by the forest licensees.

Ensure that the objectives reflect the work of the Recovery Action Groups to define and locate critical habitat such as core reserve areas, integrated buffer areas and movement corridors.

Establish the **best practices for backcountry access and recreation as 'conditions'** of recreational land use tenures provided by Land and Water BC and MOF.

Conduct audits of the **operational effectiveness of the results and strategies** within approved forest stewardship plans for maintaining threatened mountain caribou populations, in order to supplement and verify ongoing population and inventory monitoring.

### Use Research and Field Trials to Refine Best Practices

Develop and support a **targeted mountain caribou research agenda** to address continuing knowledge gaps in such areas as: required habitat attributes, nutrition, recruitment, predator-prey relationships and predator/alternate prey control options, recreation disturbance impacts, implications of climate change and the efficacy of forest and recreation industry-led models in conserving habitat and populations – all with respect to the variability of the specific complex of conditions that influence individual populations.

Establish an **intensive population inventory and tracking system** to support monitoring and managing population levels for mountain caribou and their predators, including recruitment, location and health status, in conjunction with recovery efforts for each threatened population.

Establish an operational study to **examine and publish the industrial forestry and commercial recreation innovations** in mountain caribou habitat planning and management being conducted by leading industry practitioners based on the guidelines established in the second edition of *Mountain Caribou in Managed Forests: Recommendations for Managers.* 

Establish operational studies to investigate the **potential impacts of heli-ski and snowmobile recreation on winter survival** of mountain caribou with the intent of producing specific guidance on best practices for minimization of harm to mountain caribou.

### Focus on Preserving All Mountain Caribou Herds

Given the recovery effort inherent in federal and provincial species at risk legislation, defer the question of '**triage**' for the most threatened mountain caribou populations and concentrate on implementing a full recovery program. The 'triage' approach should only be considered if rigorously applied recovery efforts are found through the monitoring program to be ineffective.

### Provincial Leadership

Establish a small **Mountain Caribou Implementation Task Force, with representation from MWLAP, MSRM and MOF**, charged with the integration and timely implementation of the province's investment in mountain caribou recovery, regulatory, research, inventory and monitoring program. Employ the Mountain Caribou Technical Advisory Committee as a supporting scientific panel to the task force.

As recommended by MCTAC, appoint a provincial **Recovery Program Coordinator** to lead the Mountain Caribou Implementation Task Force, link with northern caribou recovery efforts and provide a level of investment recommendation to government to ensure sufficient funding of the caribou recovery programs.

Provide the Coordinator with the **necessary operational funding and authority** to direct the implementation and integration of resource agency initiatives currently being developed under the Mountain Caribou Recovery Action Plan, including forest, wildlife, commercial and public recreation, back-country access and mineral exploration management actions that need to be taken collaboratively and simultaneously.

Drawing on the experience of the Mountain Caribou Technical Advisory Committee and with reference to existing strategies and land use plans, assemble and analyze the **current information base on caribou ecology and recovery management** to assess the state of knowledge, the state of recovery activity and the gaps that most need concentrated attention – where these are not already articulated in the 2002 Mountain Caribou Recovery Strategy.

### Public Communication

Publish the program as a provincial initiative and have the task force develop a **bulletin series and a mountain caribou recovery website** to inform the public about progress as the program proceeds.

Provide for the Mountain Caribou Implementation Task Force, Mountain Caribou Technical Advisory Committee and the local Recovery Action Groups to share scientific and practical results with each other and ensure that public information on mountain caribou recovery is balanced and accurate.





October 18<sup>th</sup>, 2005

#### RE: Request for Input on Recovery Options for Mountain Caribou

Dear Sir or Madame:

I am contacting you on behalf of the Species at Risk Co-ordination Office (SaRCO). We are seeking to better co-ordinate activities and decision-making for the listing and recovery of a variety of species at risk in British Columbia, including Mountain Caribou.

We are keen to meet with you or your representatives to discuss the attached draft recovery options for Mountain Caribou that have been developed for consideration by the provincial government. As you are likely aware, Mountain Caribou are absent from much of their historical range in south-eastern B.C. and populations are threatened by a variety of disturbances throughout parts of their range.

SaRCO has initiated an aggressive, science-based process for developing recovery options. Our recovery objective is to halt the current province-wide decline in Mountain Caribou within one generation (7 years), promote a stable-increasing population trend over the next three generation (20 years), and promote ecological conditions that allow Mountain Caribou herds to be self-sustaining within nine generations (60 years), where ecologically feasible. It is our intent to obtain input on the options we have developed and to provide this input to government when a decision is sought in the coming months. We are interesting in meeting with your members to discuss these options, and also look at ways we can enhance site-specific options for recovery thereafter.

Please also find attached a situation analysis that summarizes the current state of Mountain Caribou in British Columbia, a table summarizing information on the specific herds, and a map outlining the management area. Additional details on Mountain Caribou recovery can be found in *A Strategy for the Recovery of Mountain Caribou in British Columbia*, which can be downloaded at <a href="http://wlapwww.gov.bc.ca/wld/documents/mtcaribou\_rcvrystrat02.pdf">http://wlapwww.gov.bc.ca/wld/documents/mtcaribou\_rcvrystrat02.pdf</a>.

Again, we would be happy to meet with you or your representatives over the next several weeks to discuss further. Please feel free to contact either myself at 250-387-5727 (<u>mark.zacharias@gov.bc.ca</u>) or Pat Field at 250-365-9669 (<u>aboulder@shaw.ca</u>).

Sincerely Mark Zacharias Species at Risk Coordination Office Integrated Land Management Bureau Ministry of Agriculture and Lands

Integrated Land Management Agency

Species at Risk Coordination Office

Mailing Address: PO Box 9353 Stn Prov Govt Victoria BC Canada, V8W 9M1

Telephone: (250) 387-5727 Facsimile: (250) 953-3752 Location: Second Floor 780 Blanshard St Victoria BC

### Mountain Caribou Recovery Background

### The Species.

Mountain Caribou are one of three ecotypes of the Woodland Caribou subspecies, and are defined from the other ecotypes by their behaviour and movement patterns. Mountain Caribou travel to high elevation sites to feed almost exclusively on arboreal (tree) lichens during the late winter months. This behaviour allows them to inhabit the deep snow zone of the Interior Wet Belt of British Columbia where arboreal lichens are abundant on the older trees.

There are 12 populations of mountain caribou, with an estimated total population of about 1700 animals. Six populations currently number 50 or fewer individuals, and one population (George Mountain) is now extirpated. All remaining populations, with the exception of the Hart Range population are currently declining. Threats to the current viability of Mountain Caribou include:

- habitat change,
- predation,
- disturbance, and
- climate change.

Of particular concern is forest harvesting, which removes and fragments suitable mature and old forests, and back-country recreation activities which may affect both short-term behaviour of caribou and longer-term habitat use. While the predominant mortality factor on caribou is predation by wolves and cougars, it is believed that predation rates have increased as a result of habitat changes and fragmentation.

#### Management Actions.

The Mountain Caribou Technical Advisory Committee was formed in 1999 to develop a recovery strategy for Mountain Caribou. The committee includes both government and non-government biologists and experts. A provincial recovery strategy for mountain caribou was completed in 2002. This document is available on the ministry website at <a href="http://wlapwww.gov.bc.ca/wld/documents/recovery/mtcaribou\_rcvrystrat02.pdf">http://wlapwww.gov.bc.ca/wld/documents/recovery/mtcaribou\_rcvrystrat02.pdf</a>.

The committee has also formed three regional recovery implementation groups (RIGs) that are addressing caribou recovery for the 12 mountain caribou herds.

Species at Risk Co-ordination Office Involvement.

More recently, the ministry established the Provincial Species at Risk Coordination Office in October 2004 to accelerate recovery planning for several key species, including mountain caribou.

(http://www2.news.gov.bc.ca/nrm\_news\_releases/2004WLAP0054000869.htm)

Informed by the work of the Recovery Implementation Groups, SaRCO is developing options for recovery of mountain caribou to deliver to government for decision making during 2005.

Since the announcement of the Species at Risk Coordination Office (SaRCO) to aggressively advance recovery planning for several key species, including Mountain Caribou, SaRCO has taken the lead to coordinate a proactive approach to recovery with the Ministry of Environment, Ministry of Forests and Range, Ministry of Agriculture and Lands and Ministry of Energy and Mines.

#### Activities this year to date

#### 1. Science Team

SaRCO established a Provincial Mountain Caribou Recovery Science Team in December 2004 to assist with the development of recovery decision tools and advise government on interim actions necessary to retain all potential recovery options while the recovery planning process is underway. Much of the work of their work to do date has focussed on synthesis of information, and the development of a Habitat Supply Model for Mountain Caribou.

MEMBERSHIP	AFFILIATION
Harold Armleder	B.C. Ministry of Forests and Range, Williams Lake
Jim Young	B.C. Ministry of Environment, Williams Lake
John Surgenor	B.C. Ministry of Environment, Kamloops
Clayton Apps	Wildlife Research Consultant, Calgary
Dennis Hamilton	Wildlife Consultant, Nelson
Rob Serrouya	Wildlife Research Biologist, Revelstoke
Greg Utzig	Resource Management Consultant, Nelson
Trevor Kinley	B.C. Ministry of Environment, Victoria
Wayne Wakkinen	Wildlife Biologist, Idaho Fish and Game
Cindy Pearce	Resource Management Consultant, Revelstoke
Ian Hatter	B.C. Ministry of Environment, Victoria
Mark Zacharias	Ministry of Agric. & Lands, SaRCO
Pat Field	Resource Management Consultant, Castlegar
Bruce McLellan	B.C. Ministry of Forests and Range, Revelstoke
Dale Seip	B.C. Ministry of Forests and Range, Prince George
Eric Valdal	Ministry of Agric. & Lands, Kamloops
Guy Woods	B.C. Ministry of Environment, Nelson
Steve Wilson	Wildlife Research Consultant, Gabriola Island

#### 2. Options Team

The Science team also includes an Options team. The role of the Options team is to develop recovery options that are technically sound, and supported by the work of the Science team.

MEMBERSHIP	AFFILIATION
Ian Hatter	B.C. Ministry of Environment, Victoria
Mark Zacharias	Ministry of Agric. & Lands, SaRCO, Victoria
Pat Field	Resource Management Consultant, Castlegar
Matt Austin	B.C. Ministry of Environment and SaRCO, Victoria
Brian Nyberg	Ministry of Forests and Range, Victoria
Sean Sharpe	Ministry of Environment, Victoria
Jenny Feick	Ministry of Environment, Victoria

Progress from December 2004 to October 2005 on mountain caribou recovery efforts include:

- The Science team has developed and approved a Situation Analysis, which summarizes the current status and threats to mountain caribou, as well as discusses the broad scope of recovery options that could be applied.
- The Analysis team is developing habitat-based models to inform decision-making for mountain caribou.
- Several broad recovery statements were provided to the SaR DMs on March 11, 2005. Deputies selected a recovery statement, which does not constrain the Options team as to any particular geographic location for recovery, but generally establishes the timeframes and population thresholds for various phases of recovery.
- LWBC placed a moratorium on new commercial recreation tenures in mountain caribou habitat zones as well as approved variances to the Kootenay Boundary LUP and Revelstoke HLP on March 26, 2005.
- The Options team conducted an expert opinion survey of caribou experts in Sept. 2005 to acquire additional information and solicit professional judgement on management alternatives, which could be used to help inform the recovery options.

Activities since September 2005 have focused on the development of recovery options as preliminary options are to be completed by mid-October. Focussed consultations on the options with industry, First Nations and stakeholders will be conducted throughout the last two weeks of October. SaRCO will be bringing options forward to government in November. Government is expected to make a decision on where to recover Mountain Caribou based on an analysis of the ecological, social, and economic costs and benefits of recovery. Detailed recovery options are to be delivered by SaRCO in fall 2006.

### Expert opinion survey respondents

Chris Addison Clayton Apps Greg Ashcroft Dave Butler John Flaa Milt Hamilton Brenda Herbison Doug Jury Trevor Kinley Tim Layser Bruce McLellan Scott McNay Dale Seip Rob Serrouya Keith Simpson Susan Stevenson Kari Stuart-Smith John Surgenor Greg Utzig Wayne Wakkinen Stephen Wilson Heiko Wittmer Guy Woods John Youds Jim Young

## Introduction

An objective of the new Species at Risk Coordination Office is to develop recommendations for recovery of mountain caribou to deliver to government for decision-making during 2005. As an initial step in this process the following summary has been prepared to describe the current situation facing mountain caribou in British Columbia.

## British Columbia's Mountain Caribou in a Global Context

Caribou (*Rangifer tarandus*) are found in the arctic tundra, mountain tundra, and boreal forests of the northern hemisphere<sup>1</sup>. Historically, caribou populations inhabited nearly all northern latitudes, but they have been extirpated from most of Europe and eastern North America and are currently restricted to the more northern latitudes of North America, Russia, and Scandinavia. Current global populations are estimated at approximately 5 million and, although some are expanding, most are in decline at various rates. Caribou are important to most northern indigenous people for food and clothing and consequently the geographical distribution of some indigenous groups reflect the historic distribution of caribou. This importance resulted in the domestication of reindeer (the same species as caribou) in Eurasia approximately 7000 years ago.

Globally, caribou have been separated into seven to nine subspecies based on geographic location, behaviour, and ecology. Three subspecies are found in Canada; the barren ground and Peary caribou (*Rangifer tarandus groenlandicus* and *R. t. pearyi*), which are found predominantly in tundra environments, and the woodland caribou (*Rangifer tarandus caribou*), found predominantly in coniferous forests and muskegs. The Committee on the Status of Endangered Wildlife (COSEWIC) has identified several national populations of woodland caribou as *Threatened* or *Endangered* under the federal *Species at Risk Act* (SARA)<sup>2</sup>. The national population of woodland caribou inhabiting the Southern Mountains National Ecological Area (SMNEA), which covers most of the southern and central interior of British Columbia, is listed as *Threatened*.

Three different "ecotypes" of woodland caribou are recognized in BC: boreal, northern and mountain<sup>3</sup>. About 1500 boreal caribou reside in the Peace River region and are geographically linked with boreal caribou populations that occupy ranges throughout Canada's boreal forest as far east as Newfoundland. There are approximately 15,000 northern caribou in BC and, as a result, this ecotype is considered relatively secure<sup>4</sup>. The mountain ecotype (hereafter "mountain caribou") resides in the wet forests of central and south-eastern BC and is the ecotype of greatest concern. The Provincial Government considers mountain caribou to be *Endangered or Threatened* (i.e., the BC Conservation Data Centre's Red List). The estimated population of mountain caribou was less than 1700 as of 2002, and many subpopulations have experienced declines of 50% or more in the past 10 years.

Mountain caribou are among the southernmost populations of caribou in the world, a result of favourable habitat conditions created by the relatively wet and mountainous terrain of their range. Over geologic time, caribou populations have likely advanced and retreated with glacial events. As a result, mountain caribou populations have probably existed in southern BC for greater than ten thousand years<sup>5</sup>. Nearly the entire current range of mountain caribou occurs in British Columbia. There is a small subpopulation that moves between BC and northern Washington and Idaho. Historically the range of mountain caribou extended farther south into the US and was more extensive in southern BC. Both the atypical range of mountain caribou and their unique life history make this ecotype globally significant.

## Critical Aspects of Mountain Caribou Biology

Mountain caribou are distinguished from other ecotypes by their behavioural and ecological characteristics, rather than by genetics<sup>6</sup>. Genetic analyses have concluded that mountain caribou and other woodland caribou ecotypes are genetically similar, suggesting that the unique behavioural and ecological characteristics of mountain caribou have evolved without long periods of isolation from other ecotypes (perhaps even evolving more than once, judging by genetic differences among mountain caribou subpopulations).

Mountain caribou have adapted to the deep snow and rugged terrain of their range by occupying large patches of mature and old forest at high elevations throughout most of the year. During winter when snow is sufficiently deep and consolidated, mountain caribou's relatively large hooves allow them to travel on top of the snow pack and feed exclusively on lichens that hang from the branches of older trees. These arboreal lichens are most common in mature and old forest stands, but they will also grow in younger forests if the structure of the stands is suitable. Arboreal lichens are one of the few foods available to caribou above the snow in the subalpine in the winter. Caribou move seasonally to lower elevations, but only to reach green vegetation in spring and again in early winter when snow at higher elevations has yet to consolidate, making it difficult for animals to move efficiently or to reach arboreal lichens. Some caribou move to windswept ridges in early winter to avoid unconsolidated snow.

Spreading out over large areas at high elevations is essential for mountain caribou to avoid predators. In winter they occupy habitats that other ungulate species avoid. Deer, elk and moose commonly move to lower elevations to seek out areas with shallow snow and available food. The predators of these ungulates follow, leaving the subalpine forests to caribou. In summer other ungulates are more common in the high country and so are their predators; however, mountain caribou are relatively rare and spread out, which makes them infrequent prey for predators such as grizzly and black bears, wolves, cougars and wolverine.

## **Current Status and Trends**

Historically, mountain caribou were likely distributed throughout their geographic range (within suitable habitat); however, they now occur in several relatively distinct subpopulations (Figure 1). A subpopulation is defined as a group of caribou that interact with each other but have limited interaction with other subpopulations. Eighteen subpopulations have been defined on the basis of radio telemetry data. That is, available data suggest that the home ranges of these 18 subpopulations do not overlap. However, only a proportion of any subpopulation has been tracked by radio telemetry and for periods of only a few years. And thus there is likely more interaction among subpopulations than has been observed.



**Figure 1.** Historic range and current home range of mountain caribou in Canada and the United States. The historic range boundary estimates the geographic limit of mountain caribou distribution before European contact. The current home range is based on actual locations of mountain caribou collected during radio telemetry studies and aerial surveys conducted over the past 10-15 years.

Mountain caribou are one of the most well-studied wildlife species in BC, although significant gaps in our understanding of their biology remain. At a minimum, aerial surveys have been conducted on all subpopulations periodically over the past 10-15 years. Most subpopulations have also been the focus of more intensive work using radio telemetry to study movements and habitat use. These studies have also investigated the causes of mountain caribou mortalities and have estimated important population parameters. The southernmost subpopulation (South Selkirks), which ranges into Idaho and Washington, was augmented with approximately100 caribou from elsewhere in BC, after mountain caribou were federally listed as *Endangered* under the US Endangered Species Act.

From these studies biologists have quantified the current status and population trends of mountain caribou throughout their range. Broadly speaking, mountain caribou subpopulations can be stratified into four different geographic regions where ecology, population trends and threats differ:

Kootenay: Mountain caribou range south of the Trans-Canada highway. Current population is less than 150 animals.

- Mountain caribou are restricted to 4-6 fragmented subpopulations and population viability analyses suggest that the remaining subpopulations are at high risk of extirpation under current conditions<sup>7</sup>
- Seasonal migration to lower elevations in early winter and spring are less distinct than Columbia subpopulations
- Southern parts of the range are drier, warmer and less rugged than range farther north. Low elevation habitats have been extensively modified by human activity and are naturally fragmented by deep valleys and large lakes
- Predators include cougars, bears and wolverine but few wolves. Abundant ungulate prey include deer (both mule deer and white-tailed deer), elk and some moose

<u>Columbia</u>: The west slopes of the Rockies as well as the Columbia Mountains from Revelstoke north to approximately Valemount. Current population is less than 200 animals.

- Subpopulations are generally in decline and fragmenting and population viability analyses suggest that these subpopulations are at high risk of extirpation under current conditions
- Mountain caribou have distinct seasonal migrations between high elevation and low elevation habitats due to very high snowfall and rugged terrain
- Habitat is less modified by human activity than range farther south but forestry is still a significant activity, particularly at lower elevations
- Predator-prey dynamics are similar to those in the Kootenay, but increasingly include wolves and moose in northern sections

<u>Cariboo</u>: Includes subpopulations that range throughout the Quesnel Highland and into the Cariboo Mountains. Current population is less than 850 animals.

- Subpopulations are in decline and fragmenting and population viability analyses suggest that subpopulations are at high risk of extirpation under current conditions
- Seasonal migrations to lower elevations are limited because snow conditions at higher elevations are shallower than in other mountain caribou ranges
- Much of the range is located in large protected areas, although surrounding low elevation areas have been extensively modified by forest harvesting
- Predator-prey dynamics are dominated by a wolf-moose system

<u>North Mountain</u>: Includes the most northerly subpopulations of mountain caribou, located principally in the Hart Range of Rocky Mountains as far north as the Anzac River. Current population is less than 500 animals.

- Subpopulations are relatively stable
- Seasonal migration patterns are similar to Cariboo subpopulations
- Human population is relatively sparse compared to areas further south, but lower elevation areas have been extensively modified by forest harvesting
- Predator-prey dynamics are dominated by a wolf-moose system

## Threats to Mountain Caribou

Threats to the current viability of mountain caribou fall into four broad categories: habitat change, predation, disturbance and climate change. These categories are not independent and are hypothesized to interact to generate the population declines observed recently throughout much of the range. Declines in mountain caribou during the late 1800's and throughout most of the 1900's were at least partly due to over-hunting<sup>8</sup>; however, hunting was closed completely in 1996.

### Predation

Predation is the major natural cause of mortality in all ungulate populations and mountain caribou behaviour and ecology is largely based on the fundamental trade-off between the need to avoid predators and the need to acquire sufficient food.

Major declines in the population of mountain caribou began in parts of their range when moose colonized the province (or expanded from low densities) during the early 1900's, possibly due to a gradual warming of the climatic following the end of the "little ice age" of the mid-1800's<sup>9,10</sup>. It is believed that the presence of moose resulted in a higher wolf population, which in turn led to increased predation on caribou. Caribou disappeared from the interior plateau, but continued to survive in mountainous habitat where they could sustain spatial separation from other ungulate species<sup>11</sup>.

In the southern part of their range, mountain caribou faced a similar situation with cougars, which increased in response to expanding deer and elk populations. In addition to possible climate change, deer and elk populations increased in relation to widespread habitat change (see below).

Grizzly and black bears, as well as wolverines, are (and probably have always been) relatively common predators of mountain caribou throughout their range<sup>12</sup>. Interacting with other factors that have compromised the integrity of the mountain caribou population (such as already-reduced subpopulations as a result of historic over-hunting, loss and fragmentation of range), predation stands as the most important, direct cause of the mountain caribou population decline.

### Habitat Change

Threats to mountain caribou habitat include forest harvesting, fire, human settlement, roads and reservoirs. These changes can be either permanent or temporary and have both direct and indirect effects on the viability of the mountain caribou population.

Forest harvesting and fire directly remove and fragment suitable mature and old forests. These forests generally produce the dead structure most suitable for lichen establishment, on which mountain caribou rely for winter forage. Although this has a direct impact on an essential food resource for mountain caribou during a critical season, mountain caribou populations have declined faster than lichen-rich habitats have been harvested, suggesting that the availability of arboreal lichens is not currently limiting populations.

An indirect effect of forest harvesting and fire is the creation of young forest and edge habitat suitable for other ungulate species, such as deer, elk and moose<sup>13</sup>. Forest openings created by harvest activities are quickly colonized by browse (edible plants and shrubs), which attracts deer, elk and moose to areas that were previously unsuitable for feeding by these species. Remaining forested areas provide cover in association with these newly created feeding areas. This phenomenon has had a dramatic effect on the distribution and abundance of ungulates in BC. Moose have expanded both in distribution and abundance throughout much of the province from an historical range that was centred in the Peace River region, while white-tailed deer, a

recent arrival to BC, now occupy all valleys of the southern interior and are expanding northward. Elk, naturally found primarily in dry grassland habitats of southern BC, are also expanding northward.

While these expanding ungulate populations have enhanced hunting opportunities in BC, they have resulted in larger populations and wider distributions of the predators of deer, elk and moose – particularly wolves and cougars. This fundamental change in the predator-prey dynamics within and adjacent to the range of mountain caribou has been hypothesized as a major factor in the decline of mountain caribou. Although mountain caribou are not the primary prey of these predators, they are killed opportunistically when encountered by predators focussed on other species. The frequency of these kills is likely increasing because the habitat of deer, elk and moose is increasingly encroaching on the historic range of mountain caribou.

Additionally, there are other habitat changes that have likely affected mountain caribou either directly or indirectly. Barriers in valley bottoms such as human settlements, highways, railways and reservoirs have likely affected mountain caribou movements and have contributed to the fragmentation of caribou range. The proliferation of roads has had important secondary effects by creating travel corridors for predators, generating more human activity in the backcountry, including habitat alteration, hunting pressure (although now illegal, some caribou have been misidentified by hunters or poached) and displacement of caribou from preferred range.

Continuing degradation of mountain caribou habitat through forest harvesting and other activities in the backcountry are also reducing future recovery options. Many habitat changes result in permanent loss or fragmentation of range while others require many decades to recover.

### Disturbance

Disturbance by human-related activities affects both short-term behaviour of caribou and longer-term habitat use. Studies have demonstrated that caribou populations in other parts of Canada and Scandinavia spend less time foraging in the presence of winter ecotourism operations; however, caribou appear to acclimate to the presence of humans as the season progresses<sup>14</sup>.

While the short-term behavioural effects might be minimal, biologists are more concerned about longer-term consequences, such as displacement from preferred habitat caused by increasing backcountry activity and development, snowmobiling, skiing and commercial backcountry recreation and resource use.

A study of reindeer in Norway found that areas within 5 km of resorts or from roads and power lines in combination were avoided, and that maternal reindeer avoided areas up to 10 km from resorts<sup>15</sup>. Although data are limited, there is considerable concern regarding the effects of increasing use of snowmobiles in mountain caribou habitat<sup>16</sup>. The proliferation of roads in high elevation forests, improvements in the technology of snowmobiles, as well as a recent surge in the popularity of the sport, have led to extensive snowmobiling activity in some key areas of mountain caribou habitat. There are reliable but anecdotal reports that mountain caribou use of these areas has declined as snowmobiling activity has increased. A study of commercial heli-skiing activity within mountain caribou range in the West Kootenay found evidence that caribou use of areas was lower during months and years when heli-skiing activity was highest<sup>17</sup>. Alpine ski developments and cat-skiing in caribou habitat create very high levels of use that are also considered sufficient to displace mountain caribou. Researchers have observed caribou being displaced from range by snowmobiles, and lower use of some areas by caribou has been documented where snowmobile activity has increased in recent years<sup>18</sup>. Displacement might force caribou into poorer habitat, which could be associated with more abundant predators, poorer forage quality, or a higher risk of accidents.

## **Climate Change**

The potential effects of climate change on mountain caribou habitat is difficult to predict, and depends on the complex interaction of a number of factors, including changes in seasonal temperatures and precipitation, snowfall patterns, occurrence of wildfires, and outbreaks of forest insects and diseases. Climate change will likely alter the distribution and abundance of suitable habitat, and will also change the frequency and severity of significant snow events, which largely govern the seasonal movements of mountain caribou on the landscape.

Although there is considerable uncertainty regarding the future consequences of climate change, observations following mild winters indicate that warmer and drier conditions generally favour deer, elk and moose (by increasing over-winter survival).

## **Management Options**

### **Reducing Predation**

Because predation has been identified as the most important, direct threat currently facing mountain caribou, many of the possible management actions are aimed at reducing mortalities caused by predators. To be successful, predator management would be required over extensive areas both within and adjacent to mountain caribou range. Reducing predation can be approached in 3 ways:

- 1. Managing predators directly;
- 2. Managing the primary prey on which predators depend; and,
- 3. Managing the habitat of primary prey.

Managing predators is the most direct way to reduce predation on mountain caribou. Principle predators include bears (grizzly and black), cougar, wolf and wolverine. Cougars are generally considered the most significant predator in the southernmost subpopulations, while wolves are most significant in the north. Grizzly and black bears are effective predators on mountain caribou throughout their range<sup>19</sup>. Predation by wolverines is relatively rare.

While predator management appears to be a straightforward solution to halting subpopulation declines, there are several difficulties with the strategy. First, predator management using hunting regulations might be insufficient to kill the number of predators necessary to recover mountain caribou subpopulations<sup>20</sup>. Second, in the absence of other measures to recover mountain caribou, especially habitat management, predator management would need to be extensive and permanent. As a result, more extensive and socially sensitive measures, such as broad-scale kill programs, might be required. Third, reducing predators alone would likely result in even higher primary prey numbers, and if predator management was to end (for political or logistical reasons), the larger prey populations might support even higher numbers of predators, and/or unstable dynamics in the local predator-prey system.

Another way to manage predators is to manage the primary prey on which the predators largely subsist. Mountain caribou are too rare to be the primary prey of predators (although there is some evidence that some cougars have become mountain caribou specialists). Rather, cougars focus primarily on deer and elk, wolves on moose, and bears on a variety of foods. These predators will kill mountain caribou opportunistically when they are encountered; however, it is the abundance and distribution of the primary prey that ultimately determine the distribution and abundance of predators. Presumably, maintaining low deer, elk and moose populations (through hunting) will result in low predator populations, just as expanding ungulate populations resulted in higher predator numbers. However, reducing primary prey without simultaneously reducing predators might result in short-term increases in mountain caribou mortality because predators will likely range farther in search of prey and encounter mountain caribou more frequently.

The third method to manage predators is to create habitat conditions that are unsuitable for deer, elk and moose, particularly in, and adjacent to, mountain caribou habitat. This is accomplished by allowing early seral forests to grow older or by using silviculture techniques to reduce shrub cover and other deciduous vegetation that is naturally more abundant in young forests. Large, contiguous patches of older forest will remove the association of suitable forage and cover that is favoured by deer, elk and moose. This is expected to lead to lower primary prey populations and, hence predator populations in mountain caribou range. While this management action is most likely to lead to stable-to-increasing and self-sustaining subpopulations of mountain caribou, it may require up to 60 years for young forests to reach a sufficient age to deter deer, elk and moose and to re-establish spatial separation between mountain caribou and predators. Many mountain caribou subpopulations may become extirpated within this time frame and, therefore, any recovery actions

that are expected to lead towards self-sustaining mountain caribou populations must consider predator management, at least in the short term.

There is considerable uncertainty in the expected response of different predators or groups of predators to attempts to reduce their populations or those of their prey. The dynamics of multiple predator-multiple prey systems are very complex. As mentioned above, a decline in prey might cause some predators to switch to mountain caribou, or to encounter mountain caribou more often as they range more widely in search of prey. Some researchers argue that prey populations should be expanded in order to "swamp" predators with primary prey and reduce incidental predation on mountain caribou. In addition, predators interact with each other; bears are known to drive cougars off kills, perhaps leading to higher predation rates by cougars. Decisions regarding predator-prey management will need to be made in the context of multiple uncertainties and monitored closely to determine responses.

## Maintaining and Improving Habitat

Protection of current mountain caribou habitat (especially large patches of old forest) would reduce the need to recover areas in the future and would also provide additional recovery options.

In addition to the reductions in predation that are expected to occur if habitat currently fragmented by young forests is managed to include more mature and old forest, there are also more direct benefits of recovering suitable habitat. First, mountain caribou feed extensively on arboreal lichens in winter and these lichens are most abundant in mature and old forests. Although biologists believe that mountain caribou are not limited by food at their current population size, the abundance and distribution of suitable forage will play an important role in the recovery of some mountain caribou subpopulations.

Restoring habitat would also reduce threats associated with human activity in mountain caribou range, particularly if roads were closed and rehabilitated (to discourage, for example, snowmobiling in mountain caribou habitat). Restoring habitat to a state that would improve the likelihood of achieving mountain caribou population recovery would take several decades and in itself may not be sufficient to recover subpopulations. Again, some kind of predator management, at least in the short-term, will likely be required.

## **Reducing Disturbance**

Disturbance associated with commercial backcountry recreation is probably the easiest to manage because regulations and guidelines can be developed and included as legal requirements in management plans; however, to be effective these measures need to be monitored and enforced. Activity by individuals on Crown land is more difficult to control. Voluntary guidelines can be implemented by clubs and societies or, in critical areas, access restrictions can be considered.

Compared to predation and the direct and indirect effects of habitat change, current levels of disturbance are considered a less significant (although additive) threat to the viability of mountain caribou.

## Supplementing Subpopulations

Transplanting animals from healthy subpopulations, temporarily penning females and calves for protection from predators, or captive rearing are strategies usually considered as a last resort to save gravely endangered wildlife populations. Supplementing populations can forestall extirpation, but must be complimented with other actions to address the underlying causes of the population decline.

Transplanted animals might suffer higher mortality rates than residents<sup>21</sup>, and often wander outside suitable range, particularly in the weeks and months following release. Northern ecotype woodland caribou and some mountain caribou were transplanted to the South Selkirks subpopulation over several years during the late 1980's and 1990's. There is evidence that these northern woodland caribou were able to "learn" the habitat-use characteristics of mountain caribou. Augmenting the herd with more than 100 animals over 11 years increased the size of the South Selkirk subpopulation from 25 to more than 50 animals. Other caribou transplants have required fewer animals to achieve population increases. There are subpopulations that are now so gravely in danger of extirpation that there is little chance that they will recover unless they are supplemented.

"Maternity pens" have been used with significant success in the Yukon to protect cows and newborn calves from predators for short periods after calving.

Captive rearing has not been attempted with mountain caribou.

### Probability of Recovery Success under Different Scenarios

Work to determine the probability of recovery under different management scenarios is currently underway. This process involves the development of a model that estimates the likelihood of mountain caribou recovery in relation to the various factors and threats outlined above. The model will be used to forecast the effects of different management scenarios in order to provide recommendations for recovery based on the best-available information. The model will be tested with available data and results will be reviewed by qualified scientists. The predictive power of the model will be limited by our understanding of the system and our ability to predict future conditions.

Much work remains to be completed, but some general conclusions can be drawn:

- <u>Status quo management will lead to a continuing decline in the population</u>. Without altering the principle threats associated with the ongoing decline of mountain caribou, subpopulations will continue to get smaller and ranges will continue to retreat, although not necessarily at the rate observed over the past 10 years. Rates of decline might accelerate as sub-populations get smaller, although some sub-populations might persist at very low levels for many years.
- <u>Probability of success of recovery will vary throughout the range</u>. Threats to mountain caribou subpopulations and their habitat vary throughout the range, and as a result, the likelihood of recovery will also vary. For example, southern populations are smaller and are persisting in a range that is under greater pressure from human activities than habitat further north. In addition, they are threatened by a more diverse and complex predator-prey system. The effort required for successful recovery might be higher in the south than elsewhere where these threats are not as severe. The Cariboo subpopulations might also be more difficult to recover because there is limited separation between mountain caribou habitat and that of predators and primary prey. This is primarily a function of terrain and is not easily addressed through management actions. Other factors such as climate change might work against recovery efforts throughout the range.
- <u>Recovery is unlikely without increasing the survival of adult females and calves</u>. Sub-populations that are in decline are plagued by lower-than-average adult female and calf survival rates. Increasing survival, most likely by reducing predation over the coming years (and perhaps decades) is essential to population recovery. Reducing predation will likely require changes in habitat management (e.g., allowing young forests to age in some areas while reducing forest harvesting in others), reduction in primary prey populations in, and adjacent to, mountain caribou habitat, as well as direct reductions in predator populations.
- <u>Recovery will take many decades and will require a mix of management actions</u>. No single factor has been responsible for the decline of mountain caribou and, consequently, no single management action will be sufficient to ensure their recovery. A mix of management actions will be required over the long-term, although emphasis on different actions may be required at different times and in different parts of the range.

<sup>&</sup>lt;sup>1</sup> Wilson, D. E., and D. M. Reeder [editors]. 1993. Mammal species of the world. Smithsonian Institution Press, Washington, DC.

<sup>&</sup>lt;sup>2</sup> Thomas, D. C., and D. R. Gray. 2002. COSEWIC assessment and update status report on the woodland caribou *Rangifer tarandus caribou* in Canada. Committee on the Status of Endangered Wildlife in Canada, Ottawa, ON.

<sup>&</sup>lt;sup>3</sup> Heard, D. C., and K. L. Vagt. 1998. Caribou in British Columbia: a 1996 status report. Rangifer 10:117-123.

<sup>4</sup> Mountain Caribou Technical Advisory Committee. 2002. A strategy for the recovery of mountain caribou in British Columbia. BC Ministry of Water, Land and Air Protection, Victoria.

<sup>5</sup> Spalding, D. J. 2000. The early history of woodland caribou (*Rangifer tarandus caribou*) in British Columbia. BC Ministry of Environment, Lands and Parks Wildlife Bulletin No. B-100.

<sup>6</sup> Mountain Caribou Technical Advisory Committee. 2002. A strategy for the recovery of mountain caribou in British Columbia. BC Ministry of Water, Land and Air Protection, Victoria.

<sup>7</sup> Wittmer, H. U., B. N. McLellan, D. R. Seip, J. A. Young, T. A. Kinley, G. S. Watts, and D. Hamilton. 2005. Population dynamics of the endangered mountain ecotype of woodland caribou (*Rangifer tarandus caribou*) in British Columbia, Canada. Canadian Journal of Zoology, in press.

<sup>8</sup> Spalding, D. J. 2000. The early history of woodland caribou (*Rangifer tarandus caribou*) in British Columbia. BC Ministry of Environment, Lands and Parks Wildlife Bulletin No. B-100.

<sup>9</sup> Bergerud, A. T. and J. P. Elliot. 1986. Dynamics of caribou and wolves in northern British Columbia. Canadian Journal of Zoology 64:1515-1529.

<sup>10</sup> Spalding, D. J. 2000. The early history of woodland caribou (*Rangifer tarandus caribou*) in British Columbia. BC Ministry of Environment, Lands and Parks Wildlife Bulletin No. B-100.

<sup>11</sup> Heard, D. C., and K. L. Vagt. 1998. Caribou in British Columbia: a 1996 status report. Rangifer Special Issue 10:117-123.

<sup>12</sup> Wittmer, H. U., B. N. McLellan, D. R. Seip, J. A. Young, T. A. Kinley, G. S. Watts, and D. Hamilton. 2005. Population dynamics of the endangered mountain ecotype of woodland caribou (*Rangifer tarandus caribou*) in British Columbia, Canada. Canadian Journal of Zoology, in press.

<sup>13</sup> Seip, D. R. 1992. Factors limiting woodland caribou populations and their interrelationships with wolves and moose in southeastern British Columbia. Canadian Journal of Zoology 70:1494-1503.

<sup>14</sup> Duchesne, M., S. D. Côté, and C. Barrette. 2000. Responses of woodland caribou to winter ecotourism in the Charlevoix Biosphere Reserve, Canada. Biological Conservation 96:311-317.

<sup>15</sup> Nellemann, C., P. Jordhøy, O. G. Støen, and O. Strand. 2001. Cumulative impacts of tourist resorts on wild reindeer (*Rangifer tarandus tarandus*) during winter. Arctic 53:9-17.

<sup>16</sup> Kinley, T. 2003. Snowmobile-mountain caribou interactions: a summary of perceptions and an analysis of trends in caribou distribution. Prepared for: BC Ministry of Water, Land and Air Protection, Victoria.

<sup>17</sup> Wilson, S. F., and D. Hamilton. 2003. Cumulative effects of habitat change and backcountry recreation on mountain caribou in the Central Selkirk Mountains. Prepared for: BC Ministry of Sustainable Resource Management, Nelson, Canadian Mountain Holidays, Banff, AB, and Pope & Talbot Ltd., Nakusp, BC.

<sup>18</sup> Kinley, T. Snowmobile-mountain caribou interactions: a summary of perceptions and an analysis of trends in caribou distribution. Prepared for: BC Ministry of Water, Land and Air Protection, Victoria.

<sup>19</sup> Wittmer, H. U., B. N. McLellan, D. R. Seip, J. A. Young, T. A. Kinley, G. S. Watts, and D. Hamilton. 2005. Population dynamics of the endangered mountain ecotype of woodland caribou (*Rangifer tarandus caribou*) in British Columbia, Canada. Canadian Journal of Zoology, in press.

<sup>20</sup> Valkenburg, P., M. E. McNay, and B. W. Dale. 2004. Calf mortality and population growth in the Delta caribou herd after wolf control. Wildlife Society Bulletin 32:746-756.

<sup>21</sup> Compton, B. B., P. Zager, and G. Servheen. 1995. Survival and mortality of translocated woodland caribou. Wildlife Society Bulletin 23:490-496.

1-A South Sell	kirks				
Current Population Status and Trend	<ul> <li>2002 population estimate (MCTAC 2002): 35; 2004 population estimate (W. Wakkenin, <i>pers. comm.</i>): 33 observed including 2 calves</li> <li>Lambda (1991-2004): 0.97</li> </ul>				
Threat Category	Factor	Potential Risk to Viability of Subpopulation	Ease of Mitigation	Explanation	
Demography	Subpopulation size (probability of extirpation due to stochastic events, genetic factors, etc.)	High	Moderate	<ul> <li>Currently &lt;50 animals, suggesting that subpopulation is not viable in isolation</li> <li>103 translocations 1987-1993 were insufficient to generate a positive population trend</li> <li>Current population is greater than at start of transplant efforts 17 years ago.</li> <li>Some exchange of animals known to occur with South Purcells subpopulation</li> <li>Attempts to augment subpopulation might be blocked by First Nations</li> <li>High level of support from US</li> </ul>	
	Isolation (due to distances) from other subpopulations	High	Unlikely	Some exchange with South Purcells documented but this subpopulation also now very small	
Habitat (Direct)	Winter forage (arboreal lichen) availability	Moderate	Difficult	<ul> <li>Range relatively small and drier that northern populations</li> <li>Landscape-level habitat protection afforded by higher level plan</li> <li>Detailed habitat mapping has not been completed due to poor base maps available in US but has been done in BC</li> <li>Extensive private land holdings in recovery area</li> <li>Extensive Parks and Wildlife Management Areas in recovery area</li> </ul>	
	Non-winter forage availability	Low		•	
	Calving areas availability	Low		• Extensive undisturbed ridges available and used for	

				calving
Habitat (Indirect)	Extent of range (for predator avoidance)	High	Difficult	Range relatively small
	Fragmentation (reduced range effectiveness)	Moderate	Difficult	<ul> <li>Salmo-Creston highway bisects range</li> <li>Two Electrical and one gas transmission corridor</li> </ul>
	Isolation (due to poor habitat) from other subpopulations	Moderate	Difficult	<ul> <li>Movement corridor to South Purcells partially protected</li> </ul>
	Suitability for alternative prey within and near caribou range	Moderate	Moderate	<ul> <li>Moderate habitat in adjacent valley bottoms due to small winter ranges</li> <li>Expanding habitat due the continuing forestry</li> <li>Private landowners and small licensees relatively insensitive to caribou concerns</li> </ul>
Predation (Direct)	Species and density within ranges that overlap caribou	Moderate	Moderate	<ul> <li>Cougars and grizzly bears, and black bears likely primary predator species. Only occasional wolves present</li> <li>Access probably allows for high success among cougar hunters</li> <li>Population stabilized when cougar hunting increased</li> <li>Grizzlies are "threatened status in BC" thus not hunted. Threatened in the US thus federal protection</li> </ul>
Predation (Indirect)	Alternate prey densities within and adjacent to caribou range	Moderate	Easy	<ul> <li>alternate prey populations (particularly white-tailed deer) in adjacent valleys</li> <li>Bighorn sheep, elk, mule deer, moose and mtn. goat all present in small numbers.</li> </ul>
Disturbance (Direct)	Human-caused mortalities (collisions, poaching)	Moderate	Moderate	<ul><li>Highway collisions infrequent but documented</li><li>Rumours of poaching losses to caribou</li></ul>
Disturbance (Indirect)	Displacement from preferred habitats by tenured recreation (heli-skiing, snowcats, snowmobiles, ski areas, back country skiing)	Moderate		<ul> <li>Cat skiing and hekiskiing on private land</li> <li>Limited mechanized commercial recreation on Crown Land</li> </ul>
	Displacement from preferred habitats by recreationists (principally skiers and snowmobiles)	Moderate	Moderate	<ul> <li>Salmo-Creston provides easy public access and is a high use area for skiers as well as snowmobilers.</li> </ul>

1-A Valhalla-K	okanee			
Current Population Status and Trend	Extirpated			
Threat Category	Factor	Potential Risk to Viability of Subpopulation	Ease of Mitigation	Explanation
Demography	Subpopulation size (probability of extirpation due to stochastic events, genetic factors, etc.)	High	Difficult	Extirpated
	Isolation (due to distances) from other subpopulations	Moderate	Easy	<ul> <li>Adjacent habitats in Central Selkirks with little development along connecting corridors</li> </ul>
Habitat (Direct)	Winter forage (arboreal lichen) availability	Moderate	Difficult	<ul> <li>No habitat protection in place therefore continued erosion of existing habitat</li> </ul>
				<ul> <li>Kokanee and Valhalla Provincial Parks in area but parks protect rugged habitat.</li> </ul>
	Non-winter forage availability	Low	Difficult	
	Calving areas availability	Low		<ul> <li>Little development in likely areas due to terrain and Provincial Park status</li> </ul>
Habitat (Indirect)	Extent of range (for predator avoidance)	Moderate	Difficult	Limited by ruggedness in some areas.
				Small areas available with high quality habitat
	Fragmentation (reduced range effectiveness)	Moderate	Difficult	<ul> <li>Remote area that is not highly developed along east side of Arrow Lakes</li> </ul>
				No caribou habitat protection in place outside Parks
				Extensive logging at south end
	Isolation (due to poor habitat) from other subpopulations	Low	Easy	<ul> <li>Immediately adjacent to Central Selkirk with little development in connectivity zone</li> </ul>
				Some observed movement from South Selkirks
				<ul> <li>Connectivity in only a small portion of the exterior boundary</li> </ul>
	Suitability for alternative prey within and near caribou range	Low	Moderate	Limited winter ranges in adjacent areas and only moderate mule deer, whitetailed deer, elk, moose

				mountain goat and bighorn sheep population
Predation (Direct)	Species and density within ranges that overlap caribou	Low	Easy	<ul> <li>Cougar population low due to limited winter ranges in area.</li> <li>Grizzly bear population classified as threatened in BC in Valhalla.</li> <li>Rare wolf sighting s in area</li> </ul>
Predation (Indirect)	Alternate prey densities within and adjacent to caribou range	Low	Easy	Limited winter ranges in adjacent areas and only moderate mule deer, whitetailed deer, elk, moose mountain goat and bighorn sheep population
Disturbance (Direct)	Human-caused mortalities (collisions, poaching)	Low	Easy	<ul> <li>Little corridor development in key caribou habitats now or likely in the future</li> <li>Cause of extirpation unknown and possibly poaching related.</li> </ul>
Disturbance (Indirect)	Displacement from preferred habitats by tenured recreation (heli-skiing, snowcats, snowmobiles)	Moderate	Moderate	Recent heliski and cat ski tenures in a portion of the area. Two term cat skiing tenures.
	Displacement from preferred habitats by recreationists (principally snowmobiles)	Low	Moderate	<ul> <li>Limited local snowmobiling and skiing pressure due to small local human population and distance to population centres.</li> </ul>

1-B South Purcells (North and South)						
Current Population Status and Trend	• 2002 population estimate (MCTAC 2002): 20; 2003 population estimate (Kinley 2004): 17 observed including 2 calves; 2004 population estimate (Kinley 2004): 14 observed including 1 calf; 17 estimated, including 2 calves (based on additional tracks, no sightability correction)					
	Likely fragmented into 2 subpopulations (Wittmer et al. 2004)					
	• Lambda (1993-2004): 0.85					
Threat Category	Factor	Potential Risk to Viability of Subpopulation	Ease of Mitigation	Explanation		
Demography	Subpopulation size (probability of extirpation due to stochastic events, genetic factors, etc.)	High	Difficult	<ul> <li>Population of about 18 therefore high risk of stochastic events</li> <li>Efforts to augment by transplant currently under way but lacks approvals from government and First Nations</li> </ul>		

	Isolation (due to distances) from other subpopulations	High	Unlikely	<ul> <li>Some exchange of animals known to occur with South Selkirks subpopulation</li> </ul>
Habitat (Direct)	Winter forage (arboreal lichen) availability	Moderate	Difficult	<ul> <li>Suitability of range is marginal (MCTAC 2002) but suitability rating is questionable.</li> <li>High amount of Bryoria and found low on trees</li> <li>Kianuko, Lockhart, St. Mary's Alpine and Purcell Wilderness Conservancy Parks protect habitat.</li> </ul>
	Non-winter forage availability	Low		
	Calving areas availability	Low		<ul> <li>Little development or use in caving areas during calving period.</li> </ul>
Habitat (Indirect)	Extent of range (for predator avoidance)	High	Difficult	<ul> <li>Range relatively small and many connections to surrounding winter ranges.</li> </ul>
	Fragmentation (reduced range effectiveness)	Moderate	Moderate	<ul> <li>Extensive harvesting history, will take many decades to recover</li> <li>Landscape-level habitat protection afforded by higher level plan</li> <li>Higher natural fire frequency in eastern portion of range (NDT3) than caribou habitat elsewhere</li> </ul>
	Isolation (due to poor habitat) from other subpopulations	Low	Difficult	<ul> <li>Movement corridor to South Selkirks partially protected</li> <li>Much rugged terrain between Central Selkirk and South Purcell but little human-related development</li> </ul>
	Suitability for alternative prey within and near caribou range	High	Difficult	<ul> <li>Extensive harvesting history, will take many decades to recover</li> <li>High quality deer and elk habitat throughout area</li> </ul>
Predation (Direct)	Species and density within ranges that overlap caribou	High	Moderate	<ul> <li>Predation by cougars primary hypothesis for rapid decline in subpopulations size</li> <li>Population stabilized when cougar hunting was increased</li> <li>Moderate grizzly bear populations present</li> </ul>
Predation (Indirect)	Alternate prey densities within and adjacent to caribou range	High	High	Strong resistance can be expected to attempts to reduce alternative prey

				High quality natural summer ranges will continue to attract and support deer and elk.
Disturbance (Direct)	Human-caused mortalities (collisions, poaching)	Low		One electrical corridor and a summer use only road corridor
Disturbance (Indirect)	Displacement from preferred habitats by tenured recreation (heli-skiing, snowcats, snowmobiles)	Low	Moderate	<ul> <li>Limited cat skiing and heliskiing areas due to lack of snow and poor terrain.</li> <li>High demand for snowmobiling in area will continue to put pressure on for more commercial snowmobiling tenures</li> </ul>
	Displacement from preferred habitats by recreationists (principally skiers and snowmobiles)	Moderate	Difficult	<ul> <li>Popular local snowmobiling areas with groomed trails into key sub alpine basins. MSRM Recreation Strategy near completion.</li> </ul>

1-B McGillivra	у			
Current Population Status and Trend	Likely Extirpated			
	Rare but reliable sightings			
Threat Category	Factor	Potential Risk to Viability of Subpopulation	Ease of Mitigation	Explanation
Demography	Subpopulation size (probability of extirpation due to stochastic events, genetic factors, etc.)	High	Difficult	<ul> <li>Extirpated, would require augmentation</li> </ul>
	Isolation (due to distances) from other subpopulations	Moderate	Moderate	<ul> <li>Immediately adjacent to South Purcells population</li> <li>Occasional sightings likely animals from South Purcells or South Selkirks</li> </ul>
Habitat (Direct)	Winter forage (arboreal lichen) availability	Low	Difficult	<ul> <li>Abundant Bryoria.</li> <li>Dry area with high natural fire frequency (NDT3)</li> <li>Extensive logging development in place and no caribou habitat protection.</li> </ul>
	Non-winter forage availability	Low		•
	Calving areas availability			Little disturbance on likely calving areas in June

Habitat (Indirect)	Extent of range (for predator avoidance)	Moderate	Difficult	<ul> <li>Small area surrounded by high quality ungulate winter range.</li> </ul>
	Fragmentation (reduced range effectiveness)	Moderate	Difficult	Highly fragmented due to logging and natural wildfire
	Isolation (due to poor habitat) from other subpopulations	Moderate	Difficult	<ul> <li>Isolated, highway 3</li> <li>Immediately adjacent to South Purcells population</li> </ul>
	Suitability for alternative prey within and near caribou range	High	Difficult	An abundance of deer and elk due to high quality     ungulate winter range on east side of the area.
Predation (Direct)	Species and density within ranges that overlap caribou	High	Moderate	<ul> <li>High quality winter ranges adjacent support cougars and wolves.</li> </ul>
				Easy to reduce cougar populations but difficult to reduce wolf population.
				Grizzly bears threatened in BC and it is a grizzly bear recovery area in adjacent US.
Predation (Indirect)	Alternate prey densities within and adjacent to caribou range	High	Difficult	<ul> <li>Abundant deer , elk and moose due to low snowfall and large adjacent winter range in the Rocky Mountain Trench</li> </ul>
				<ul> <li>High productivity winter ranges that are seldom impacted by bad winters.</li> </ul>
Disturbance (Direct)	Human-caused mortalities (collisions, poaching)	Low		Little corridor development in area.
Disturbance (Indirect)	Displacement from preferred habitats by tenured recreation (heli-skiing, snowcats, snowmobiles)	Low		Poor quality area for alternate tenured winter recreation due to low snow depth and poor quality terrain.
	Displacement from preferred habitats by recreationists (principally snowmobiles)	Low	Moderate	<ul> <li>Local snowmobiling is extensive.</li> <li>MSRM currently completing a recreation strategy for this area that does not take caribou into consideration.</li> </ul>

2-A South Mon	nashee	
Current Population Status and Trend	Extirpated	

		Potential Risk to	Ease of	
Threat Category	Factor	Subpopulation	Mitigation	Explanation
Demography	Subpopulation size (probability of extirpation due to stochastic events, genetic factors, etc.)	High	Difficult	Extirpated
	Isolation (due to distances) from other subpopulations	High	Difficult	Adjacent Monashee population is very small
Habitat (Direct)	Winter forage (arboreal lichen) availability	Moderate	Difficult	<ul> <li>High natural fire frequency and extensive logging history.</li> </ul>
	Non-winter forage availability	Low		
	Calving areas availability	Low		Little development or use of calving areas in June.
Habitat (Indirect)	Extent of range (for predator avoidance)	Low	Difficult	<ul> <li>Two new Provincial Parks, Gladstone and Granby, Protect some habitats.</li> </ul>
				No caribou habitat protection guidelines in place
				Moderate to high quality deer winter ranges.
	Fragmentation (reduced range effectiveness)	High	Difficult	High grassland ridges highly suitable for mule deer.
	Isolation (due to poor habitat) from other subpopulations	High	Difficult	<ul> <li>Very poor connectivity with other caribou populations.</li> </ul>
	Suitability for alternative prey within and near caribou range	High	Difficult	<ul> <li>Dry, high quality mule and whitetail summer ranges naturally abundant.</li> </ul>
Predation (Direct)	Species and density within ranges that overlap caribou	Moderate	Moderate	<ul> <li>Cougar populations moderate due to cattle ranching and high hunter pressure.</li> </ul>
				<ul> <li>Grizzly bears threatened and poor habitat quality for them.</li> </ul>
				Wolves rare.
Predation (Indirect)	Alternate prey densities within and adjacent to caribou range	High	Moderate	<ul> <li>Dry, high quality mule and whitetail winter ranges naturally abundant to the south.</li> </ul>
Disturbance (Direct)	Human-caused mortalities (collisions, poaching)	Low		Little corridor development and low human pressure     in much of the area.

Disturbance (Indirect)	Displacement from preferred habitats by tenured recreation (heli-skiing, snowcats, snowmobiles)	Low	easy	<ul> <li>Little development pressure due to poor snow quality and quantity and low terrain suitability for heliskiing and cat skiing.</li> <li>Moderate demand for snowmobiling due to high quality sub-alpine terrain and suitable snow conditions.</li> </ul>
	Displacement from preferred habitats by recreationists (principally snowmobiles)	High	Moderate	<ul> <li>Moderate demand for snowmobiling due to high quality sub-alpine terrain and suitable snow conditions.</li> <li>Moderate distance from population centers in the Okanagan.</li> <li>Excellent connectivity along ridges for snowmobile use.</li> </ul>

2-A Monashee	2-A Monashee					
Current Population	2002 population estimate (MCTAC 2002): 10; 2004 population estimate (Hooge et al. 2004): 10, minimum 7					
Status and Trend	• Lambda (1994-2004): 1.00					
Threat Category	Factor	Potential Risk to Viability of Subpopulation	Ease of Mitigation	Explanation		
Demography	Subpopulation size (probability of extirpation due to stochastic events, genetic factors, etc.)	High	Difficult	<ul> <li>Some animals transplanted into south part of area in early1980's but known to have dispersed or died.</li> </ul>		
	Isolation (due to distances) from other subpopulations	Moderate	Unlikely	<ul> <li>Persistence of very small subpopulation for &gt;20 years suggests exchange with other subpopulations, likely Central Selkirks (caribou observed swimming Arrow reservoir (D. Hamilton, pers. comm.)</li> <li>Highway 1 and Arrow reservoir are barriers to dispersal between Monashees and adjacent subpopulations</li> </ul>		
Habitat (Direct)	Winter forage (arboreal lichen) availability	Low				
	Non-winter forage availability	Low				
	Calving areas availability					

Habitat (Indirect)	Extent of range (for predator avoidance)	Moderate		<ul> <li>Extensive habitat available relative to ungulate population size.</li> </ul>
	Fragmentation (reduced range effectiveness)	Moderate	Moderate	<ul> <li>Okanagan-Shuswap LRMP addresses caribou habitat requirements at the landscape level</li> <li>Kootenay HLP protects only habitat above the operability line.</li> </ul>
	Isolation (due to poor habitat) from other subpopulations	Moderate	Difficult	<ul><li>Directly adjacent to Revelstoke populations.</li><li>Highway 1 corridor separates the area.</li></ul>
	Suitability for alternative prey within and near caribou range	Moderate	Moderate	<ul> <li>Cougar population limited by moderate quality adjacent ungulate winter ranges.</li> <li>Grizzly population threatened in BC.</li> <li>Wolves rare</li> </ul>
Predation (Direct)	Species and density within ranges that overlap caribou	Moderate	Easy	<ul> <li>Major causes of mortality unknown; too small a population for a thorough study</li> <li>Cougar populations moderate due to lack of other prey populations.</li> </ul>
Predation (Indirect)	Alternate prey densities within and adjacent to caribou range	Moderate	Easy	<ul> <li>Low value and size of winter ranges limit total ungulate population</li> <li>Mule deer , white tail deer and elk populations low.</li> <li>Moose population building rapidly.</li> </ul>
Disturbance (Direct)	Human-caused mortalities (collisions, poaching)	Low	Easy	<ul> <li>No major corridors in area except Highway 1 at north end.</li> </ul>
Disturbance (Indirect)	Displacement from preferred habitats by tenured recreation (heli-skiing, snowcats, snowmobiles)	Moderate	Difficult	<ul> <li>Existing ski touring and heliskiing tenures have been in place for many years.</li> </ul>
	Displacement from preferred habitats by recreationists (principally snowmobiles)	High	Difficult	• Extensive high quality snowmobiling areas to the south with high level of use by Okanagan residents.

2-B Central Se	Ikirks (Nakusp and Duncan)
Current Population Status and Trend	<ul> <li>2002 population estimate (MCTAC 2002): 130; 2004 population estimate (Hamilton 2004): 70 observed including 13 calves, also 16 tracks. No caribou were found in the Duncan but tracks were observed.</li> </ul>

Situation Analysis: Mountain Caribou Recovery in British Columbia

	<ul> <li>Likely fragmented into 2 subpopulations (Wittmer et al. 2004); Duncan portion of herd in danger of extirpation; most likely herd to interact adjacent subpopulations to north</li> <li>Lambda (1996-2004): 0.87</li> </ul>				
Threat Category	Factor	Potential Risk to Viability of Subpopulation	Ease of Mitigation	Explanation	
Demography	Subpopulation size (probability of extirpation due to stochastic events, genetic factors, etc.)	Low		Currently close to 100 animals	
	Isolation (due to distances) from other subpopulations	Moderate	Unlikely	<ul> <li>Reservoir and highway barriers to north and west but distances small, much longer distances to South Selkirk and South Purcells subpopulations, dispersal not documented</li> </ul>	
Habitat (Direct)	Winter forage (arboreal lichen) availability	Low		<ul> <li>High lichen abundance in remaining ESSF habitats; landscape and stand-level policies in place</li> <li>Increased protection likely for best identified habitats</li> </ul>	
	Non-winter forage availability	Low			
	Calving areas availability	Low			
Habitat (Indirect)	Extent of range (for predator avoidance)	Low		<ul> <li>Contiguous range likely large enough for self- sustaining subpopulation</li> </ul>	
				<ul> <li>Some habitat protection in Provincial Park and Wildlife Management Area</li> </ul>	
	Fragmentation (reduced range effectiveness)	Moderate	Moderate	<ul> <li>Patch management not currently addressed by existing policy</li> </ul>	
				<ul> <li>Landscape-level habitat protection afforded by higher level plan, imminent improvements</li> </ul>	
	Isolation (due to poor habitat) from other subpopulations	Moderate	Difficult	<ul> <li>Isolated by reservoirs and highways to subpopulations to the north and east</li> </ul>	
	Suitability for alternative prey within and near caribou range	Low	Easy	Low elevation moose habitat in north and mule deer along reservoir farther south; increasing harvesting at higher elevations	
				<ul> <li>Very small winter ranges due to steep, narrow vallevs and deep vallev snowpacks support few</li> </ul>	

				<ul> <li>deer, elk and moose.</li> <li>Moderate potential for moose population expansion similar to that observed north of Revelstoke.</li> </ul>
Predation (Direct)	Species and density within ranges that overlap caribou	Low	Easy	<ul> <li>Cougar, wolverine primary predators; extensive control unlikely</li> <li>Cougar populations are low due to small alternate prey base.</li> <li>Wolf population in the area is of concern and is more difficult to manage.</li> </ul>
Predation (Indirect)	Alternate prey densities within and adjacent to caribou range	Low	Easy	<ul> <li>Mule deer and white-tailed deer (in south) recovering, moose increasing</li> <li>Total numbers are low.</li> </ul>
Disturbance (Direct)	Human-caused mortalities (collisions, poaching)	Low		<ul> <li>Some documented highway kills but highway is largely outside of caribou habitat.</li> </ul>
Disturbance (Indirect)	Displacement from preferred habitats by tenured recreation (heli-skiing, snowcats, snowmobiles)	Moderate	Moderate	<ul> <li>Generally cooperative tenure holders through most of range, less cooperative tenure holders in some high quality habitat</li> <li>High number of cat-skiing operations and potential for additional tenure applications is high due to excellent snow and terrain.</li> </ul>
	Displacement from preferred habitats by recreationists (principally snowmobiles)	Moderate	Moderate	<ul> <li>Semi-commercial and private snowmobiling in high quality habitat resulting in perceived decline in use by caribou</li> <li>Most snowmobile and skiing use limited to a small number of areas at this time.</li> <li>No Recreation Strategy in place and no Wildlife Act closures in place.</li> </ul>

2-B North Purcells				
Current Population Status and Trend	Likely extirpated – some animals ob	served every few year	S	
Threat Category	Factor	Potential Risk to Viability of Subpopulation	Ease of Mitigation	Explanation

Demography	Subpopulation size (probability of extirpation due to stochastic events, genetic factors, etc.)	High	Difficult	<ul><li>Extirpated</li><li>Dispersal from Central Selkirks likely</li></ul>
	Isolation (due to distances) from other subpopulations			Likely continuous with Duncan portion of Central Selkirks population
				<ul> <li>Duncan population is very low and seems to be isolated from the remainder of the Central Selkirks.</li> </ul>
Habitat (Direct)	Winter forage (arboreal lichen) availability	Moderate	Difficult	Extensive high elevation ridges present in the area
				<ul> <li>No caribou habitat protection in this area under the current Kootenay HLP</li> </ul>
	Non-winter forage availability	Low		
	Calving areas availability	Low		
Habitat (Indirect)	Extent of range (for predator avoidance)	Moderate	difficult	<ul> <li>Moderately distant from other ungulate winter ranges.</li> </ul>
	Fragmentation (reduced range effectiveness)			
	Isolation (due to poor habitat) from other subpopulations	Moderate	Difficult	<ul> <li>Adjacent to Duncan population therefore easy dispersal.</li> </ul>
				<ul> <li>Duncan population is very small and dispersal in unlikely.</li> </ul>
	Suitability for alternative prey within and near caribou range	Moderate	Moderate	<ul> <li>Very high quality winter ranges in the Rocky Mountain trench to the east support large populations of deer, elk and moose. Western portions of this habitat are distant from those winter ranges. Eastern portions of this habitat will likely support high populations of other ungulates</li> <li>High Mountain goat populations in this area.</li> </ul>
Predation (Direct)	Species and density within ranges that	High	Easy	Cougar populations easily managed and likely the most important predator.
				<ul> <li>Grizzly bears and wolf populations both likely to be significant and more difficult to manage.</li> </ul>
Predation (Indirect)	Alternate prey densities within and adjacent to caribou range	Moderate	Moderate	High densities of other ungulates likely to make it difficult to manage on the east side of the unit but

				easy to manage on the west side.
Disturbance (Direct)	Human-caused mortalities (collisions, poaching)	Low	Easy	<ul> <li>No major corridors or highways in this area.</li> </ul>
Disturbance (Indirect)	Displacement from preferred habitats by tenured recreation (heli-skiing, snowcats, snowmobiles)	Moderate	Moderate	<ul> <li>Extensive heliskiing in the area. Ease of management dependent on cooperation of operators.</li> </ul>
	Displacement from preferred habitats by recreationists (principally snowmobiles)			<ul> <li>Recreation strategy in place for part of this area.</li> </ul>

3-B Revelstoke (including 3-A Central Rockies)						
Current Population	• 2002 population estimate (MCTAC 2002):	2002 population estimate (MCTAC 2002): 211; 2004 population estimate (Hooge et al. 2004): 176 observed				
Status and Trend	• Wittmer et al. (2004) recognized 4 distinct subpopulations (S. Columbia, N. Columbia, Kinbasket, Queest/Frisby)					
	• Lambda (1994-2004): 0.93					
Threat Category	Factor	Potential Risk to Viability of Subpopulation	Ease of Mitigation	Explanation		
Demography	Subpopulation size (probability of extirpation due to stochastic events, genetic factors, etc.)	Moderate	Moderate	• 2 SPs at less than 50 animals (RD=38 and FBQ=16);		
	Isolation (due to distances) from other subpopulations	Moderate	Moderate or Low (?)	Distances are small, movement are probable		
Habitat (Direct)	Winter forage (arboreal lichen) availability	Low		<ul> <li>High lichen abundance in remaining ESSF habitats; landscape and stand-level policies in place</li> </ul>		
				<ul> <li>Most Licensees cooperative towards spatially allocating retention guidelines in areas best for caribou</li> </ul>		
				<ul> <li>Licensees Considering block deferrals to areas outside caribou linework</li> </ul>		
				Cat A clearcuts proposed in good habitat		
				<ul> <li>Not all caribou habitats protected by current guidelines under proposed MAC Plan.</li> </ul>		
	Non-winter forage availability	Low				

	Calving areas availability	Low		
Habitat (Indirect)	Extent of range (for predator avoidance)	Low		Early winter (ICH) habitat highly fragmented so may affect predator avoidance, though few mortalities during this season
				Range includes 2 National Parks
	Fragmentation (reduced range effectiveness)	Moderate	Moderate	Patch management not currently addressed by existing policy
				<ul> <li>Forest harvesting continuing in caribou habitat (even though guidelines being met)</li> </ul>
				Guidelines do not apply to all habitats capable of supporting caribou in the future.
	Isolation (due to poor habitat) from other subpopulations	Low	Moderate	<ul> <li>Mt Revelstoke-Downie (RD) and Frisby-Boulder- Queest (FBQ) SPs may be isolated by reservoir and highway</li> </ul>
				Caribou regularly observed crossing highway and reservoir
	Suitability for alternative prey within and near caribou range	High	Moderate	<ul> <li>Very high moose densities likely benefiting wolves and bears, probably wolverine, and (seasonally) cougars</li> </ul>
				Abundant early seral vegetation
				<ul> <li>Low suitability for deer and elk due to high snow pack and narrow valley.</li> </ul>
Predation (Direct)	Species and density within ranges that overlap caribou	High	Moderate	<ul> <li>Cougars, Grizzly bears, and wolverine primary predators; Predation accounts for &gt; 50% of known mortality</li> </ul>
				<ul> <li>High probability of wolf predation becoming a major problem for caribou. Wolves are difficult to manage.</li> </ul>
				Unstable deer populations and likely unstable cougar populations may result in predator switching to caribou after deer numbers decline. (Deer numbers have always been very low )
				Few cougar hunters
				Poor access for trappers on west side of Reservoir

Predation (Indirect)	Alternate prey densities within and adjacent to caribou range	High	Moderate	<ul> <li>moose population stable-declining with 5-fold increase in harvest</li> <li>Mule deer and whitetail deer populations are very small and are being managed to keep them stable.</li> <li>Elk may be invading the area.</li> </ul>
Disturbance (Direct)	Human-caused mortalities (collisions, poaching)	Low		Some documented highway kills
Disturbance (Indirect)	Displacement from preferred habitats by tenured recreation (heli-skiing, snowcats, snowmobiles)	Moderate	Difficult	<ul> <li>Extensive heli-skiing activities throughout range</li> <li>Heli-skiing using best management practices and will be getting "near-real-time" caribou telemetry from research staff</li> <li>No research on heli-skiing activities</li> </ul>
	Displacement from preferred habitats by recreationists (principally snowmobiles)	Moderate	Moderate	<ul> <li>Private snowmobiling in some high quality habitat resulting in perceived decline in use by caribou</li> <li>Extensive snowmobile closures in place under Wildlife Act.</li> </ul>

4-A Wells Gray South					
Current Population	• 2002 population estimate (MCTAC 2002): 325; 2004 population estimate (reference?): 185, 171 observed, including 33 calves				
Status and Trend	• Wittmer et al. (2004) considered this subpopulation to be continuous with Wells Gray North; recent movement from Allan Creek				
	• Wittmer et al. (2004) recognized 2 other subpopulations (Groundhog, Allan Creek)				
	• Lambda (1987-2004): 0.86				
Threat Category	Factor	Potential Risk to Viability of Subpopulation	Ease of Mitigation	Explanation	
Demography	Subpopulation size (probability of extirpation due to stochastic events, genetic factors, etc.)	Low			
	Isolation (due to distances) from other subpopulations	Low			
Habitat (Direct)	Winter forage (arboreal lichen) availability	Low			

	Non-winter forage availability	Low		
	Calving areas availability			
Habitat (Indirect)	Extent of range (for predator avoidance)	Moderate	Difficult	Much is in Wells Gray Park
	Fragmentation (reduced range effectiveness)	Moderate	Moderate	RIG considers current habitat management practices outside of protected areas to be inadequate
				<ul> <li>Significant portion of range occurs within protected area</li> </ul>
	Isolation (due to poor habitat) from other subpopulations	Low		
	Suitability for alternative prey within and near caribou range	Moderate	Difficult	Good moose habitat across area
Predation (Direct)	Species and density within ranges that overlap caribou	High	Difficult	<ul> <li>Much of the area is in the park and unaccessible.</li> </ul>
Predation (Indirect)	Alternate prey densities within and adjacent to caribou range	High	Difficult	<ul> <li>Much of the area is in the park and unaccessible.</li> </ul>
Disturbance (Direct)	Human-caused mortalities (collisions, poaching)	Low		
Disturbance (Indirect)	Displacement from preferred habitats by tenured recreation (heli-skiing, snowcats, snowmobiles)	Moderate	Difficult	Heli-skiing is intensive through much of the range
	Displacement from preferred habitats by recreationists (principally snowmobiles)	High	Moderate	Snowmobiling is intensive through much of the range

5-A North Cariboo Mountains				
Current Population	Opulation     Opulation estimate (MCTAC 2002; Seip 2003): 350; no 2004 population estimate			
• Lambda (1993-2002; Wittmer et al. 2004): 1.00				
	• High and stable female survival (0.91±0.04; Wittmer et al. 2004)			
		Potential Risk to Viability of	Ease of	
Threat Category	Factor	Subpopulation	Mitigation	Explanation

Demography	Subpopulation size (probability of extirpation due to stochastic events, genetic factors, etc.)	
	Isolation (due to distances) from other subpopulations	
Habitat (Direct)	Winter forage (arboreal lichen) availability	Most habitat is protected as ungulate winter range
	Non-winter forage availability	
	Calving areas availability	
Habitat (Indirect)	Extent of range (for predator avoidance)	
	Fragmentation (reduced range effectiveness)	Significant portion of range occurs within protected area
	Isolation (due to poor habitat) from other subpopulations	
	Suitability for alternative prey within and near caribou range	RIG recommends additional management of low- elevation habitats that are the source of predators
Predation (Direct)	Species and density within ranges that overlap caribou	
Predation (Indirect)	Alternate prey densities within and adjacent to caribou range	
Disturbance (Direct)	Human-caused mortalities (collisions, poaching)	
Disturbance (Indirect)	Displacement from preferred habitats by tenured recreation (heli-skiing, snowcats, snowmobiles)	Minimal disturbance by motorized backcountry recreation
		<ul> <li>Commercial backcountry recreation had not been tenured</li> </ul>
		Increasing demand for backcountry recreation
	Displacement from preferred habitats by recreationists (principally snowmobiles)	Minimal disturbance by motorized backcountry recreation

# 5-A George Mountain
Current Population Status and Trend	<ul> <li>2002 population estimate (MCTAC 2002): 5; 2004 population estimate (Seip et al. 2004): 0; 4 animals seen in 2004</li> <li>Population very small or extirpated</li> </ul>					
Threat Category	Factor	Potential Risk to Viability of Subpopulation	Ease of Mitigation	Explanation		
Demography	Subpopulation size (probability of extirpation due to stochastic events, genetic factors, etc.)					
	Isolation (due to distances) from other subpopulations					
Habitat (Direct)	Winter forage (arboreal lichen) availability			<ul> <li>RIG believes that habitat management practices are inadequate</li> </ul>		
	Non-winter forage availability					
	Calving areas availability					
Habitat (Indirect)	Extent of range (for predator avoidance)					
	Fragmentation (reduced range effectiveness)					
	Isolation (due to poor habitat) from other subpopulations					
	Suitability for alternative prey within and near caribou range					
Predation (Direct)	Species and density within ranges that overlap caribou			<ul> <li>Topography may not offer good predator avoidance opportunities</li> </ul>		
Predation (Indirect)	Alternate prey densities within and adjacent to caribou range					
Disturbance (Direct)	Human-caused mortalities (collisions, poaching)					
Disturbance (Indirect)	Displacement from preferred habitats by tenured recreation (heli-skiing, snowcats, snowmobiles)					

Displacement from preferred habitats by recreationists (principally snowmobiles)		Intensive snowmobile activity on critical habitat
	1	

5-A Narrow Lake					
Current Population Status and Trend	<ul> <li>2002 population estimate (MCTAC 2002): 6</li> <li>Lambda (1993-2000): 1.00</li> </ul>	65; 2004 population es	stimate (Seip e	t al. 2004): 50, 23 minimum	
Threat Category	Factor	Potential Risk to Viability of Subpopulation	Ease of Mitigation	Explanation	
Demography	Subpopulation size (probability of extirpation due to stochastic events, genetic factors, etc.)				
	Isolation (due to distances) from other subpopulations			Isolated from other subpopulations	
Habitat (Direct)	Winter forage (arboreal lichen) availability			Most habitat is protected as ungulate winter range	
	Non-winter forage availability				
	Calving areas availability				
Habitat (Indirect)	Extent of range (for predator avoidance)				
	Fragmentation (reduced range effectiveness)				
	Isolation (due to poor habitat) from other subpopulations				
	Suitability for alternative prey within and near caribou range			<ul> <li>Heavily logged valley bottoms provide source of predators</li> </ul>	
				RIG recommends additional management of low- elevation habitats that are the source of predators	
Predation (Direct)	Species and density within ranges that overlap caribou				
Predation (Indirect)	Alternate prey densities within and adjacent to caribou range				

Disturbance (Direct)	Human-caused mortalities (collisions, poaching)		
Disturbance (Indirect)	Displacement from preferred habitats by tenured recreation (heli-skiing, snowcats, snowmobiles)		<ul> <li>No disturbance by backcountry recreation</li> </ul>
	Displacement from preferred habitats by recreationists (principally snowmobiles)		No disturbance by backcountry recreation

5-B Wells Gray North						
Current Population	• 2002 population estimate (MCTAC 2002):	<ul> <li>2002 population estimate (MCTAC 2002): 220; 2004 population estimate (reference?): 220, 187 observed, including 35 calves</li> </ul>				
Status and Trend	• Wittmer et al. (2004) considered this subpo	opulation to be continu	ous with Wells	Gray South		
	• Lambda (1993-2004): 0.97					
Threat Category	Potential Risk to         Viability of         Factor         Subpopulation         Mitigation					
Demography	Subpopulation size (probability of extirpation due to stochastic events, genetic factors, etc.)					
	Isolation (due to distances) from other subpopulations					
Habitat (Direct)	Winter forage (arboreal lichen) availability			Land use plan protects additional habitat		
	Non-winter forage availability					
	Calving areas availability					
Habitat (Indirect)	Extent of range (for predator avoidance)					
	Fragmentation (reduced range effectiveness)			<ul> <li>RIG considers current habitat management practices outside of protected areas to be inadequate</li> <li>Significant portion of range occurs within protected areas</li> </ul>		
	Isolation (due to poor habitat) from other subpopulations					

	Suitability for alternative prey within and near caribou range		
Predation (Direct)	Species and density within ranges that overlap caribou		Wolf predation is excessive
Predation (Indirect)	Alternate prey densities within and adjacent to caribou range		
Disturbance (Direct)	Human-caused mortalities (collisions, poaching)		
Disturbance (Indirect)	Displacement from preferred habitats by tenured recreation (heli-skiing, snowcats, snowmobiles)		
	Displacement from preferred habitats by recreationists (principally snowmobiles)		Snowmobile plan has been completed

5-B Barkerville						
Current Population	• 2002 population estimate (MCTAC 2002): 50; 2004 population estimate (Wittmer et al. 2004): 32					
Status and Trend	• Lambda (1994-2004): 0.98					
Threat Category	Factor	Potential Risk to Viability of Subpopulation	Ease of Mitigation	Explanation		
Demography	Subpopulation size (probability of extirpation due to stochastic events, genetic factors, etc.)					
	Isolation (due to distances) from other subpopulations					
Habitat (Direct)	Winter forage (arboreal lichen) availability			RIG believes that habitat management practices are inadequate		
	Non-winter forage availability					
	Calving areas availability					
Habitat (Indirect)	Extent of range (for predator avoidance)					
	Fragmentation (reduced range			Land use plan provides some protection for habitat		

	effectiveness)		
	Isolation (due to poor habitat) from other subpopulations		
	Suitability for alternative prey within and near caribou range		
Predation (Direct)	Species and density within ranges that overlap caribou		<ul> <li>Topography may not offer good predator avoidance opportunities</li> </ul>
Predation (Indirect)	Alternate prey densities within and adjacent to caribou range		
Disturbance (Direct)	Human-caused mortalities (collisions, poaching)		
Disturbance (Indirect)	Displacement from preferred habitats by tenured recreation (heli-skiing, snowcats, snowmobiles)		
	Displacement from preferred habitats by recreationists (principally snowmobiles)		Intensive snowmobile activity on some critical habitat

6-A, 6-B Hart Ranges					
Current Population	• 2002 population estimate (MCTAC 2002):	450; 2004 estimate u	navailable		
Status and Trend	• Lambda (1992-2002; Wittmer et al. 2004):	0.99			
	• High and stable female survival (0.96±0.03; Wittmer et al. 2004)				
	Potential Risk to Viability of Ease of				
Threat Category	Factor	Subpopulation	Mitigation	Explanation	
Demography	Subpopulation size (probability of extirpation due to stochastic events, genetic factors, etc.)				
	Isolation (due to distances) from other subpopulations			<ul> <li>Contiguous with abundant northern ecotype herds to the north an east</li> </ul>	

Habitat (Direct)	Winter forage (arboreal lichen) availability		Most habitat is protected as ungulate winter range
	Non-winter forage availability		
	Calving areas availability		
Habitat (Indirect)	Extent of range (for predator avoidance)		
	Fragmentation (reduced range effectiveness)		
	Isolation (due to poor habitat) from other subpopulations		
	Suitability for alternative prey within and near caribou range		RIG recommends additional management of low- elevation habitats that are the source of predators
Predation (Direct)	Species and density within ranges that overlap caribou		
Predation (Indirect)	Alternate prey densities within and adjacent to caribou range		
Disturbance (Direct)	Human-caused mortalities (collisions, poaching)		
Disturbance (Indirect)	Displacement from preferred habitats by tenured recreation (heli-skiing, snowcats,		Limited disturbance by motorized backcountry recreation
	snowmobiles)		<ul> <li>Commercial backcountry recreation has not been tenured</li> </ul>
	Displacement from preferred habitats by recreationists (principally snowmobiles)		Limited disturbance by motorized backcountry recreation
			Increasing demand for backcountry recreation

Table 1	. Population	modelling	parameters.
---------	--------------	-----------	-------------

Туре	Factors	Parameters	Sources
Genetic	Inbreeding depression	Gene frequency?	Keri McFarlane analysis
	Drift	Number of alleles?	
	Migration / Gene flow	Degree of linkage?	
		Calculation of N <sub>e</sub>	
		OMPG	
		• Other?	
Stochastic	Catastrophes	Types (e.g., winter severity-climate change)	
		Frequencies	
		• Scope	
		Severity	
		Consequences	
Deterministic	Allee effects		
Meta-population	Number of subpopulations	• 17	Wittmer et al. (2004)
	Dispersal	Age and sex of dispersers = all	
		Survival of dispersers	
		<ul> <li>Pair-wise dispersal probabilities for each subpopulation (aspatial analysis only)</li> </ul>	
Reproduction and Survival	Breeding system	Polygynous	
		Degree of male monopolization	
	Fecundity	• Age at first reproduction (female) = 3	Wittmer (2004)
		• Age at first reproduction (male) = 4	
		Maximum age of reproduction = 13	
		• Sex ratio at birth (% males) = 42	
		<ul> <li>% females breeding (density-dependent function)</li> </ul>	

Туре	Factors	Parameters	Sources		
		<ul><li>Environmental variation in percent breeding</li><li>Number of offspring (function)</li></ul>			
	Mortality	<ul> <li>Mortality rates and SDs for 0-1 (0.28), 1-2 (same as adults), and 2+ years (infer from census data)</li> <li>Additional animals removals (translocations out, research mortalities, etc.)</li> <li>Supplementation (translocations in)</li> <li>Predation rates</li> </ul>	Wittmer (2004)		
Starting conditions	Population size	<ul> <li>Size and age structure of all subpopulations</li> </ul>			
	Carrying capacity	<ul> <li>Number of animals for each subpopulation (infer from census data)</li> <li>Role of environmental variation in altering carrying capacity</li> <li>Carrying capacity change over time (function; aspatial analysis only)</li> </ul>			

#### Table 2. Ecological correlates.

Threat Category	Factor	Inputs	Source	Possible Management Actions		
Demography	Subpopulation size (probability of extirpation due to stochastic events, genetic factors, etc.)	Population viability submodel	See Table	Augmentation		
	Isolation (due to distances) from other subpopulations	Population viability submodel	See Table			
Habitat (Direct)	Winter forage (arboreal lichen) availability	Subzone variant Stand type Stand age	BEC FIP FIP	<ul> <li>Status quo harvesting</li> <li>Higher Level Plan objectives</li> <li>Stand-level objectives</li> <li>No harvest (zonation)</li> </ul>		
Habitat (Indirect)	Extent of range (for predator avoidance)	Composite home ranges	Telemetry database			

Threat Category	Factor	Inputs	Source	Possible Management Actions			
	Fragmentation (reduced range effectiveness)	Stand type	FIP	<ul> <li>Status quo harvesting</li> </ul>			
		Stand age	FIP	Higher Level Plan objectives			
		Anthropogenic barriers	TRIM	Stand-level objectives			
				No harvest (zonation)			
	Isolation (due to poor habitat) from other	Stand type	FIP	Status quo harvesting			
	subpopulations	Stand age	FIP	Higher Level Plan objectives			
		Anthropogenic barriers	TRIM	Stand-level objectives			
				No harvest (zonation)			
	Suitability for alternative prey within and near	Ungulate habitat suitability	Capability/suitability	Status quo harvesting			
	caribou range	submodel		Stand-level objectives			
			HSI (FIP, TRIM)	No harvest (zonation)			
Predation (Direct)	Species and density within ranges that overlap caribou	Population viability submodel	See Table	Status quo predator management			
		Predator harvest submodel		<ul> <li>Alternative predator management actions (various)</li> </ul>			
Predation (Indirect)	dation (Indirect) Alternate prey densities within and adjacent to caribou range			Status quo ungulate harvest management			
				<ul> <li>Alternative ungulate harvest management</li> </ul>			
Disturbance (Direct)	Human-caused mortalities (collisions, poaching)	Population viability submodel	See Table				
Disturbance	Displacement from preferred habitats by tenured	Disturbance-displacement		No operating guidelines			
(Indirect)	recreation (heli-skiing, snowcats, snowmobiles)	submodel		Operating guidelines			
				No activity (zonation)			
	Displacement from preferred habitats by recreationists (principally snowmobiles)	Disturbance-displacement submodel		No operating guidelines/enforcement			
				Voluntary guidelines			
				No activity (zonation)			

## Literature Cited

- Gasaway, W. C., R. D. Boertje, D. V. Grangaard, D. G. Kelleyhouse, R. O. Stephenson, and D. G. Larsen. 1992. The role of predation in limiting moose at low densities in Alaska and Yukon and implications for conservation. Wildlife Monographs 120:1-59.
- Hamilton, D. 2004. 2004 population census for the Central Selkirk mountain caribou. Prepared for: Pope & Talbot Ltd., Nakusp, BC, Slocan Forest Products Ltd., Slocan, BC, Meadow Creek Cedar Company, Meadow Creek, BC, Canadian Mountain Holidays, Banff, AB, and Columbia Mountains Institute for Applied Ecology, Revelstoke, BC.
- Kinley, T. 2004. 2004 population survey for the South Purcell Subpopulation of mountain caribou. Prepared for: Columbia Basin Fish and Wildlife Compensation Program, Invermere, BC.
- MCTAC (Mountain Caribou Technical Advisory Committee. 2002. A strategy for the recovery of mountain caribou in British Columbia. BC Ministry of Water, Land and Air Protection, Victoria.
- Rettie, W. J., and F. Messier. 1998. Dynamics of woodland caribou populations at the southern limit of their range in Saskatchewan. Canadian Journal of Zoology 76:251-259.
- Seip, D. 2003. Winter distribution and abundance of mountain caribou in relation to habitat management zones in the Robson Valley: project report. BC Journal of Ecosystems and Management 4:1-9.
- Seip, D., B. Brade, C. Richie and D. Thornton. 2004. 2004, Omineca Region mountain caribou surveys. BC Ministry of Forests, Prince George, unpublished.
- Wittmer, H. U. 2004. Mechanisms underlying the decline of mountain caribou (*Rangifer tarandus caribou*) in British Columbia. Ph.D. thesis, University of British Columbia, Vancouver.
- Wittmer, H. U., B. N. McLellan, D. R. Seip, J. A. Young, T. A. Kinley, G. S. Watts, and D. Hamilton. 2004. Population dynamics of the endangered mountain ecotype of woodland caribou in British Columbia, Canada. Journal of Wildlife Management *in review*.

## **Expert Opinion Survey**

In order to ensure that Mountain Caribou recovery options were science-informed, a list of questions regarding caribou recovery was prepared and sent to Mountain Caribou experts. The survey was web-based and was conducted from September 13 to 19, 2005. Twenty-five experts responded to the survey.

The survey was comprised of six sections including:

- 1. Contact Information
- 2. Outcome Bounding and General Recovery Efforts
- 3. Limiting Factors and Recovery Efforts (a set of 16 questions to be answered for each planning unit or PU)
- 4. Herd Augmentation (to be answered only by individuals with expertise in this area)
- 5. Outstanding questions
- 6. Concluding comments

The following 11 graphs summarize the responses to a number of questions including:

- 1. What is the probability that Mountain Caribou will *become extirpated* with the next 7, 20 or 60 years under *current* caribou management practices?
- 2. What is the probability that Mountain Caribou will *become extirpated* within the next 7, 20 or 60 years under an *aggressive management regime* that includes comprehensive action (including where appropriate, action related to predator/prey management, habitat protection and management, recreation and access management and herd augmentation)?
- 3. What is the probability of achieving a *self-sustaining* population, within the next 7, 20 or 60 years under an *aggressive management* regime?
- 4. What is the immediacy of management action for recovery of Mountain Caribou? Specifically, respondents were asked to comment on: (i) in which PU's is management action urgently required in the next 7 years to prevent extirpation; (ii) in which PU's would it be possible to largely achieve recovery goals with a very low degree of incremental management over the next 7 years, and (iii) in which PU's is recovery likely to require herd augmentation to ensure persistence of Mountain Caribou over the next 7 years.
- 5. What is the impact of forest harvesting of early and late winter habitats on Mountain Caribou viability? Specifically, what is the probability of Mountain Caribou being self-sustaining within 60 years if: (i) timber extraction were ceased; (ii) if timber extraction were to continue at current levels, and (iii) if timber extraction was to continue at forecasted levels?
- 6. What is the probability that climate change is currently or will adversely affect Mountain Caribou viability over the next 7, 20 and 60 years?
- 7. What is the probability that translocations could prevent extirpations in each PU over the next 7 years with or without predator control/translocation of predators out of caribou areas?

- 8. What is the probability that the application of maternity enclosures could prevent extirpations in each PU over the next 7 years with or without predator control/translocation of predators out of caribou areas?
- 9. What is the probability that the application of captive breeding could prevent extirpations in each PU over the next 7 years with or without predator control/translocation of predators out of caribou areas?
- 10. What is the relative importance of each of the factors that you think currently limits (or will limit) Mountain Caribou survival in a PU over the next 7 years. Respondents were asked to distribute 100 "points" in a way that illustrates the relative significance of each factor in limiting the population of Mountain Caribou. The limiting factors considered were: (i) predation; (ii) winter food supply (availability of arboreal lichens); (iii) habitat fragmentation (e.g. loss of contiguous habitats for caribou to space-out at low density on the landscape); (iv) human access and associated disturbance; (v) low reproductive and/or survival rates (unrelated to above); and (vi) other.
- 11. What is the relative significance of various winter recreation activities in limiting a population of mountain caribou, where recreational disturbance is currently or likely to be a limiting factor in the next 7 years. The activities considered included (i) snowmobiling; (ii) helicopter related activity associated with skiing and/or snowboarding; (iii) snowcat skiing and (iv) backcountry skiing and/or snowshoeing.



Graph 1



Graph 2



Graph 3







Graph 5



Graph 6



Graph 7



Graph 8.



Graph 9



Graph 10



Graph 11

## Rationale for Designation of Mountain Caribou Population Units as Recover, Maintain, or Abandon

## October 20, 2005

### **Recovery Statement:**

Halt the current province-wide decline in Mountain Caribou within one generation (7 years), promote a stable-increasing population trend over the next three generations (20 years), and promote ecological conditions that allow Mountain Caribou populations to be self-sustaining within nine generations (60 years).

## **Definitions:**

- *Abandon* to take no additional action(s) to maintain or recover caribou within an existing population.
- *Extirpation* the absence of a local population within a PU.
- Local Population The basic unit of conservation and management commonly referred to as a herd. MCTAC (2004) has identified 13 local populations of Mountain Caribou.
- o *Maintain* maintain an existing population, i.e. avoiding extirpation.
- *Metapopulation* the group of 13 local populations of Mountain Caribou.
- *Planning Unit* the caribou recovery unit identified by SaRCO. A PU may contain 0, 1 or more local populations. The local populations are used, as they correspond more closely with the PU's, and because of the availability of a time series of survey data for quantitative analysis.
- *Quasi-extinction risk* the probability that caribou numbers within a PU will drop below 10 animals in 20 years, as determined by quantitative analysis.
- *Recovery* achieving a self-sustaining population.
- Self-sustaining population a population that is able to withstand random events and other environmental variables without direct management intervention (e.g. herd augmentation or predator control), but with ongoing habitat management and protection, management of backcountry recreation/access and sustainable harvests of specific caribou predators and their alternate prey species.
- *Sub-population* a component of a local population whose individuals remain separated from others for part of a year or for many years. Wittmer (2004) identified 18 sub-populations of Mountain Caribou.

## **Considerations for PU/Population Designation:**

*Note*: PU's selected to recover, maintain or abandon are based on ecological and technical factors, and socio-economic considerations. Although actual recovery costs have not yet been identified, some short-term recovery costs are inferred from the need for immediate management actions. Sources used in the PU designations include quantitative analysis (Morris and Doak 2003), a web-based expert opinion survey, and the Mountain Caribou situation analysis (SaRCO 2005).

- 1. Ecological and technical considerations affecting recovery:
  - a. Current and potential size
  - b. Recent population trend (average annual growth rate,  $\lambda$ )
  - c. Quasi-extinction risk based on recent population trend
  - d. Actual or potential connectivity to adjacent populations
  - e. Relative contribution to Mountain Caribou metapopulation viability.
  - f. Potential habitat to support  $\geq 100$  animals<sup>1</sup>.
  - g. Impact of climate change on caribou viability.<sup>2</sup>
- 2. Socio-economic considerations affecting recovery:
  - a. Probability of extirpation under current management practices
  - b. Probability of self-sustaining under aggressive management practices
  - c. Short-term recovery costs (as expressed by urgency of action, requirement for herd augmentation, and degree of incremental action required over next 7 years).
  - d. Impact of forest harvesting on caribou viability.
- 3. Additional considerations for PU designation
  - a. Local populations recommended for abandonment within a draft recovery action plan.
  - b. PU's without a local caribou population.
  - c. International trans-boundary populations

## Summary Rationale for Designation of Mountain Caribou PU's

- 1. PU1A South Selkirks
  - Includes one local transboundary population (South Selkirks, see USFWS 1993, and Mountain Caribou PU map)
  - Slow population decline, low number of caribou (<50), high probability of quasi-extinction, no current connectivity to adjacent populations, low metapopulation contribution (Table 1);
  - High probability of extirpation under current management practices (Fig. 1), probability of achieving self-sustaining population under aggressive management is less than more northern PU's (Fig. 2 and 3).
  - High short-term recovery costs (e.g. need for transplants and incremental management actions (Fig. 4)
  - Impact on forest harvesting on caribou viability is high (Fig. 5).

Designation: Recover (Option 1, 2, 3), Maintain (Option 5), Abandon (Option 4).

- 2. PU1B South Purcells
  - One local population (South Purcells, see Mountain Caribou PU map)
  - Rapid population decline, very low number of caribou (<20), high probability of quasi-extinction, likely little or no current connectivity to adjacent populations, low metapopulation contribution (Table 1);

 $<sup>^{1} \</sup>leq 100$  animals (adults) is one of a number of criteria that may be used to identify local caribou populations as either threatened or endangered (MCTAC 2002, Appendix 3)

 $<sup>^{2}</sup>$  the impact of climate change is not discussed at the PU level, as the potential impact is believed to be high in all PU's (see Fig. 6)

- High probability of extirpation under current management practices (Fig. 1), probability of achieving self-sustaining population under aggressive management is less than more northern PU's (Fig. 2 and 3).
- High short-term recovery costs (e.g. need for transplants and incremental management actions (Fig. 4).
- Impact on forest harvesting on caribou viability is high (Fig. 5).

**Designation:** Recover (Option 1), Maintain (Option 2, 3, 5), Abandon (Option 4).

- 3. PU 2A *Monashee* 
  - Includes one local population (Monashee, see Mountain Caribou PU map)
  - Moderate population decline, very low number of caribou (< 20), high probability of quasi-extinction, some possible connectivity to adjacent populations, low metapopulation contribution (Table 1).
  - Very high probability of extirpation under current management practices (Fig. 1), probability of achieving self-sustaining population under aggressive management is less than more northern PU's (Fig. 2 and 3).
  - High short-term recovery costs (e.g. need for transplants and incremental management actions (Fig. 4).
  - Impact on forest harvesting on caribou viability is very high (Fig. 5). **Designation**: Recover (Option 1), Maintain (Option 2, 5), Abandon (Option 3, 4).
- 4. PU 2B Central Selkirks
  - o Includes one local population (Central Selkirks, 2 sub-populations)
  - Very rapid population decline, moderate caribou numbers (> 50, <200), moderate probability of quasi-extinction, some potential for connectivity to adjacent populations, and possible moderate metapopulation contribution (Table 1);
  - Moderate probability of extirpation under current management practices (Fig. 1), but high probability of self-sustaining under aggressive management;
  - Relatively low short-term recovery costs.
  - Impact on forest harvesting on caribou viability is high (Fig. 5). **Designation:** Recover (Option 1), Maintain (Option 2, 3, 4 and 5).
- 5. PU 3A Central Rockies
  - Includes one local population (Central Rockies, several sub-populations)
  - Very rapid population decline, low caribou numbers (< 50), very high probability of quasi-extinction, good potential for connectivity to adjacent populations, but low metapopulation contribution (Table 1);
  - Moderately high probability of extirpation under current management practices (Fig. 1), and moderately high probability of self-sustaining under aggressive management (Fig. 2 and 3);
  - Moderate short-term recovery costs (Fig. 4).
  - Impact on forest harvesting on caribou viability is moderately high (Fig. 5). **Designation**: Recover (Option 1, 2, 3,), Maintain (Option 4 and 5).
- 6. PU 3B *Revelstoke*

- Includes one local population (and several sub-populations)
- Rapid population decline, moderate caribou numbers (> 100, < 250), negligible probability of quasi-extinction, connectivity to adjacent populations, potentially high metapopulation contribution (Table 1).
- Moderate probability of extirpation under current management practices (Fig. 1) and relatively high probability of self-sustaining under aggressive management (Fig. 2 and 3);
- Moderate short-term recovery costs (Fig. 4);
- Impact on forest harvesting on caribou viability is moderately high (Fig. 5).
- **Designation**: Recover (Option 1, 2, 3, 4), Maintain (Option 5)

#### 7. PU 4A – Wells Gray South

- o Includes one local population
- Slow population decline, moderate caribou numbers (> 100, < 250), negligible probability of quasi-extinction, high connectivity to adjacent populations and potentially high metapopulation contribution;
- Relatively low probability of extirpation under current management practices (Fig. 1) and relatively high probability of self-sustaining under aggressive management (Fig. 2 and 3).
- Moderately low short term recovery costs (Fig. 4)
- Impact on forest harvesting on caribou viability is moderately high (Fig. 5). **Designation**: Recover (Option 1, 2, 3, 4), Maintain (Option 5)

#### 8. PU 4B - Robson Valley

- No identified local population
- Low number of scattered individuals (< 50), likely high probability of quasiextinction, low metapopulation contribution (Table 1).
- Moderate probability of extirpation under current management practices (Fig. 1), but moderately-high probability of achieving self-sustaining population under aggressive management (Fig. 2 and 3).
- Moderate short term recovery costs
- Designation: Recover (Option 1), Maintain (Option 2, 5), Abandon (Option 3, 4)

#### 9. PU 5A - North Cariboo Mountains

- Includes 3 local populations: George Mtn, Narrow Lakes and North Cariboo Mountains.
- Moderate population decline, high caribou numbers (> 250), negligible probability of quasi-extinction (but note George Mountain population extirpated), connectivity to adjacent populations and high metapopulation contribution (Table 1);.
- Relatively low probability of extirpation under current management practices (Fig. 1) and relatively very high probability of self-sustaining under aggressive management (Fig. 2 and 3).
- Relatively low short term recovery costs (Fig. 4)
- Impact on forest harvesting on caribou viability is moderate (Fig. 5).

#### **Designation:**

- a. Narrow Lakes and North Cariboo Mountains: Recover (Option 1), Maintain (Option 2, 3, 4, and 5)
- b. George Mountain: Recover (Option 1), Maintain (Option 2, 5), Abandon (Option 3, 4)

#### 10. PU 5B – Wells Gray North

- o Includes 2 local populations: Wells Gray North and Barkerville;
- Stable numbers, high caribou numbers (> 250), negligible probability of quasi-extinction, high connectivity to adjacent populations and potentially high metapopulation contribution (Table 1).
- Relatively low probability of extirpation under current management practices (Fig. 1) and relatively high probability of self-sustaining under aggressive management (Fig. 2 and 3).
- Relatively low short term recovery costs (Fig. 4)
- Impact on forest harvesting on caribou viability is moderately low (Fig. 5).
- **Designation**: Recover (Option 1, 2, 3, 4), Maintain (Option 5)
- 11. PU 6A Hart Ranges
  - o Includes about 95% of the Hart Ranges population,
  - Slow population increase, high caribou numbers (> 250 caribou), negligible probability of quasi-extinction, high potential for connectivity to adjacent populations and metapopulation contribution (Table 1);
  - Relatively very low probability of extirpation under current management practices (Fig. 1) and relatively very high probability of self-sustaining under aggressive management (Fig. 2 and 3).
  - Relatively low short term recovery costs (Fig. 4)
  - o Impact on forest harvesting on caribou viability is low (Fig. 5).
  - **Designation**: Recover (Option 1, 2, 3, 4), Maintain (Option 5)

#### 12. PU 6B - Hart Ranges

- Includes about 5% of the Hart Ranges population
- o see PU 6A

**Designation**: Recover (Option 1, 2, 3, 4), Maintain (Option 5)

#### References

Mountain Caribou Technical Advisory Committee. 2002. A strategy for the recovery of Mountain Caribou in British Columbia. BC. Ministry of Water, Lands and Air Protection, Victoria.

Morris, W. F., and D. F. Doak. 2003. Quantitative conservation biology: theory and practice of population viability analysis. Sinauer Associates, Sunderland, Massachusetts, USA.

Wittmer, H. 2004. Mechanisms underlying the decline of Mountain Caribou (*Rangifer tarandus caribou*) in British Columbia. PhD. Thesis. Univ. British Columbia. 104 pp.

SaRCO, 2005, Mountain Caribou situation analysis. Unpubl. Report. 9 pp. plus threats table.

US Fish and Wildlife Service. 1993. Recovery plan for Woodland Caribou in the Selkirk Mountains. US Fish and Wildl. Serv., Portland, OR. 71 pp.

Planning Unit <sup>1</sup>	#	Cu	rrent #	<sup>£</sup> of	$\lambda^3$	Prob	Local		Trans-	Connectivity	Metapop	Potential #
		carib	ou in 1	P.U. <sup>2</sup>		of	Populations		boundary	to other	Contribution <sup>9</sup>	caribou in
		Min	Best	Max		QE <sup>4</sup>	# <sup>5</sup>	N<10 <sup>6</sup>	population <sup>7</sup>	populations <sup>8</sup>		P.U. <sup>10</sup>
South Selkirks	1A	35	37	42	0.98	13.6%	1	0	Yes	No	Low	285
South Purcells	1B	12	16	18	0.89	98.5%	1	0	No	No?	Low	215
Monashee	2A	5	10	20	0.96	86.8%	1	1?	No	Yes?	Low	310
Central Selkirks	2B	80	100	130	0.91	39.5%	1	0	No	Yes?	Medium	320
Central Rockies	3A	10	20	30	0.84	99.9%	1	0	No	Yes	Low	240
Revelstoke	3B	175	225	300	0.93	0.0%	1	0	No	Yes	High	530
Wells Gray South	4A	170	200	250	0.98	0.0%	1	0	No	Yes	High	520
Robson Valley	4B	25	30	50	n/a	90.6%	n/a	n/a	No	Yes	Low	160
North Cariboo Mt	5A	300	325	500	0.94	0.0%	3	1	No	Yes	High	440
Wells Gray North	5B	235	270	315	1.01	0.0%	2	0	No	Yes	High	430
Hart Ranges North	6A	435	525	575	1.04	0.0%	0.95	0	No	Yes	High	525
Hart Ranges South	6B	27	33	40	1.04	0.0%	0.05	0	No	Yes	High	100

Table 1. Ecological and Technical factors affecting the recovery of Mountain Caribou in Planning Units.

Explanatory Notes:

- 1. Planning unit (PU) refers to the Planning Units for caribou recovery. The PU's are named after the local population found within the planning unit. Local populations (MCTAC 2002), as opposed to sub-populations (Heiko 2004), were used as sub-population boundaries do not conform to Planning Units. PU 5A contains George Mountain, Narrow Lakes and North Cariboo Mountains populations while PU 5b contains both Wells Gray North and Barkerville populations.
- 2. Current population size includes the best estimate as well as minimum and maximum estimates. Minimum and maximum estimates reflect the degree of reliability associated with the best estimate.
- 3.  $\lambda$  is the average annual finite rate of change (e.g.  $\lambda = 0.98$  refers to a population that is declining at an average rate of 2% per year).  $\lambda$  was calculated from a time series of population counts available for each population using the methodology described

in Morris and Doak (2003, Chapter 3). If a PU contained more than the one population, the sum of the counts from all of the populations was used. Although the data available to calculate population trends extends back into the mid 1980's for some populations, most counts are primarily from the early 1990's to present.

- 4. QE is the quasi-extinction risk. QE is defined as the probability that the population will be < 10 animals in 20 years. PopTools software (Version 2.6.9) was used to estimate QE from 2000 stochastic simulations, based on the current PU population size,  $\lambda$  and its variance.
- # is the number of local populations within the PU. Most of the Hart Range Population (~ 95% occurs within PU 6A). Other caribou within PU 6B belong to the northern ecotype of woodland caribou. There is no defined caribou population within PU 4B.
- 6. N < 10 refers to the number of populations having less than 10 caribou. While the best estimate of the number of caribou in the Monashee PU is 10 animals, it is recognized that there could be as many as 20 animals present. The George Mountain population resides within PU 5A, and is believed to be extinct (caribou surveys in 2003, 3004 and 2005 failed to find any animals present).
- 7. The South Selkirk's population, located in PU 1A is a transboundary population. This international population was listed as endangered under the US Endangered Species Act in 1984. Recovery of the South Selkirk's population is an interagency effort involving the USFWS, Washington Dept of Fish and Wildlife, Idaho Dept of Fish and Game, the US Forest Service and the BC Ministry of Environment. Current recovery actions are based on an approved recovery plan (USFWS 1993).
- 8. Connectivity refers to populations that are either adjacent to each other, or believed to be connected through dispersal corridors (see Table 11 of MCTAC 2002).
- 9. Metapopulation contribution refers to the importance of each PU in maintaining the viability of the entire metapopulation of Mountain Caribou (see MCTAC 2002 for discussion of metapopulation persistence of Mountain Caribou).
- 10. Potential population size is a qualified estimate based on evaluation of current habitat suitability and historic habitat capability (see Figure 3 and 4 of MCTAC 2002), as well as potential population density (50 caribou/1000 km<sup>2</sup>).



## Summary Graphs from expert opinion survey

Figure 1. Probability that Mountain Caribou will become extirpated within the next 7, 20 or 60 years, under current management practices.



Figure 2. Probability that Mountain Caribou will become extirpated within the next 7, 20 or 60 years, under an aggressive management regime.



Figure 3. Probability of achieving a self-sustaining population within the next 7, 20 or 60 years, under an aggressive management regime.



Figure 4. PU's where management action is urgently required, recoverable with low degree of incremental action, and will require herd augmentation over next 7 years.



Figure 5. Probability of achieving a self-sustaining population within the next 60 years, if timber extraction within early and late winter habitats is ceased, continues at current level or continues at forecasted levels (note: level of uncertainty under current and forecasted levels is high).



Figure 6. Probability that climate change will adversely affect the viability of Mountain Caribou.

#### **MOUNTAIN CARIBOU RECOVERY OPTIONS**

#### **OCTOBER 25, 2005**

**Preamble**: This information note identifies five possible recovery options for Mountain Caribou. Several options consider the consequences of recovering, maintain or abandoning the specific caribou populations. The rationale for the placement of populations into these categories is included in Appendix A.

#### **Option 1: Recover all populations**

Attempt to reach recovery goal of self sustaining populations in all existing populations.

#### **Option 2: Recover some populations, maintain the rest**

Attempt to reach recovery goal of self sustaining populations in certain populations. Populations selected for recovery are based on ecological and technical factors, recovery costs, and socio-economic considerations (Appendix A). Existing management actions will be used to maintain the remaining populations for possible future recovery and until assessments of recovery costs, and social and economic impacts of recovery are completed.

#### **Populations to recover**

South Selkirks (1A) Central Rockies (3A) Revelstoke (3B) Wells Gray South (4A) North Cariboo Mtns (5A) Narrow Lakes (5A) Wells Gray North (5B) Barkerville (5B) Hart Range North (6A) Hart Range South (6B)

#### **Populations to maintain**

South Purcells (1B) Monashee (2A) Central Selkirks (2B) Robson Valley (4B) George Mountain (5A)

# **Option 3: Recover some populations, maintain others, and abandon populations** < **10 animals**

Attempt to reach recovery goal of self sustaining populations in certain populations. Populations selected for recovery are based on ecological and technical factors, recovery costs, and socio-economic considerations. Abandon caribou management efforts for those populations less than 10 animals. Existing status quo actions will be used to maintain the remaining populations for possible future recovery and until assessments of ecological and technical feasibility of recovery are completed.

#### **Populations to recover**

South Selkirks (1A) Central Rockies (3A) Revelstoke (3B) **Populations to maintain** South Purcells (1B) Central Selkirks (2B) **Populations to abandon** Monashee (2A) Robson Valley (4B) George Mountain (5A) Wells Gray South (4A) North Caribou Mountains (5A) Narrow Lakes (5A) Wells Gray North (5B) Barkerville (5B) Hart Ranges (6A and 6B)

#### **Option 4: Recover some populations, maintain others, and abandon herds < 10 animals and disjunct from core populations** (George Mountain, Monashee, South Selkirks, South Purcells)

Attempt to reach recovery goal of self sustaining populations in certain populations. Populations selected for recovery are based on ecological and technical, recovery costs, and socio-economic considerations. Abandon caribou management efforts for those populations less than 10 animals and those populations disjunct from core populations. Existing status quo actions will be used to maintain the remaining populations for possible future recovery and until assessments of ecological and technical feasibility of recovery are completed.

#### **Populations to recover**

Revelstoke (1A) Wells Gray South (4A) North Cariboo Mountains (5A) Narrow Lakes (5A) Wells Gray North (5B) Barkerville (5B) Hart Ranges (6A and 6B)

#### **Populations to maintain** Central Selkirks (2B)

Central Rockies (3A)

#### **Populations to abandon**

South Selkirks (1A) South Purcells (1B) Monashee (2A) Robson Valley (4A) George Mountain (5A)

#### **Option 5: Maintain all populations**

Existing status quo actions will be used to maintain all populations for possible future recovery and until assessments of ecological and technical feasibility of recovery are completed (within one year).

# **Mountain Caribou Planning Units**





File: 97350-20/2003-03

November 16, 2005

Mark Zacharias Species at Risk Coordination Office Integrated Land Management Bureau Ministry of Agriculture and Lands Box 9353, Stn Prov Govt Victoria, BC V8W 9M1

Dear Mark Zacharias:

#### Re: Request for Input on Recovery Options for Mountain Caribou

The Forest Practices Board is pleased to respond to your request for input into the recovery options paper you circulated on October 18, 2005. Board members have reviewed the paper and met to discuss it on November 15, 2005.

First, the Board would like to acknowledge the work of SaRCO to date and the effort that has gone into the development of the options paper. In our September 2004 report, the Board identified the need for government to take action to address the decline in the mountain caribou population and we are pleased that government is moving forward in that regard. The options paper released by SaRCO provides some valuable background information and has initiated a much needed public discussion of this issue.

In our original report, the Board made a number of recommendations focusing on investment in recovery plan development and implementation, preserving all caribou herds and providing provincial leadership (see attached letter). While the establishment of SaRCO has provided provincial leadership on this issue, we are concerned that the key recommendations we made are not being implemented. In particular, the following recommendation was made:

Given the recovery effort inherent in federal and provincial species at risk legislation, defer the question of '**triage**' for the most threatened mountain caribou populations and concentrate on implementing a full

Mark Zacharias November 16, 2005 Page 2

> recovery program. The 'triage' approach should only be considered if rigorously applied recovery efforts are found through the monitoring program to be ineffective.

The Board notes that the options paper invites a triage decision and we feel it is too early to make that decision. We believe there needs to be development of recovery plans for the herds, with the technical feasibility and the social and economic costs of implementing those plans carefully assessed. The plans should be implemented, and only if they are not successful, or if they are clearly infeasible or too costly, should government resort to a triage decision to abandon some herds.

The Board is concerned that the options paper does not provide any information on the likelihood of success of recovery efforts, nor the social or economic costs of implementing recovery efforts, particularly for the southernmost herds at greatest risk of extirpation. Without this information, it is not possible to make an informed decision on which option is preferred.

The Board also recommended a significant investment in the work of the recovery action groups, particularly for the most vulnerable caribou herds, to enable early, practical action on the ground. With the postponement of recovery action group work, the Board is very concerned that the grassroots support, necessary for any local recovery plans to be successfully implemented, will be lost or severely diminished.

Finally, as raised in the Board's report on implementation of the Code's Biodiversity Strategy, government does not have a clearly articulated provincial strategy for biodiversity conservation. Such a strategy would be very useful in providing some context for decisions about recovery of specific species-at-risk, such as mountain caribou. A strategy that includes concern for the ecosystems upon which threatened species rely would provide an overall purpose and rationale that would support decisions affecting individual species-at-risk.

In summary, the Board feels that, before any decision on these recovery options can be made, much more information is required on what individual recovery plans would involve, what their chances of success are, and what the social and economic costs of implementation would be. We also believe that involvement of the local recovery action groups in any recovery initiatives will be critical to their successful implementation. Mark Zacharias November 16, 2005 Page 3

×

Thank-you for the opportunity to comment. I would be pleased to meet with you, should you wish to discuss these comments further.

Yours sincerely,

Bure Chang

Bruce Fraser, PhD Chair

#### Attachment

cc: Honourable Pat Bell, Minister of Agriculture and Lands Larry Pedersen, Deputy Minister, Ministry of Agriculture and Lands Honourable Barry Penner, Minister of Environment Chris Trumpy, Deputy Minister, Ministry of Environment Honourable Rich Coleman, Minister of Forests and Range Doug Konkin, Deputy Minister, Ministry of Forests and Range Bob Simpson, Forests and Range Critic, Official Opposition Shane Simpson, Environment Critic, Official Opposition



## Integrated Land Management Burpari

November 22, 2007

Geoff Battersby. A/Chair Forest Practices Board PO Box 9905, Stn Prov Gov't Victoria BC V8W 9R1

Dear Mr. Battersby:

This letter is regarding government's October 16, 2007 announcement of the Mountain Caribou Recovery Implementation Plan (see the news release, details of the implementation plan and supporting documents at <u>http://ilmbwww.gov.bc.ca/sarco/mc/</u>). I would like to take this opportunity to convey my sincere appreciation for the valuable input you provided to government during the mountain caribou recovery consultation period.

On October 16, 2007, government announced the collaborative provincial implementation plan for Mountain Caribou Recovery. This plan represents years of work to reach agreement on how mountain caribou recovery management should proceed in order to balance socio-economic considerations while achieving successful recovery of the population.

The Implementation Plan was designed to achieve the goal of restoring the population to pre-1995 levels (2,500 animals) throughout their existing range in British Columbia and involves considerable provincial commitments toward mountain caribou recovery implementation.

On October 16, 2007, government committed to:

- Allocate \$1,000,000 per year for three years to support implementation;
- Protect 2.2 million ha, including 95% of high suitability mountain caribou habitat, from logging and road building;
- Manage recreation to reduce human disturbance in mountain caribou habitat;
- Manage predator and alternate prey populations to reduce predator densities in areas where predation is preventing mountain caribou recovery;
- Increase caribou subpopulations by transplanting animals from large to small herd areas; and,
- Ensure that all components of management proceed through a monitoring-based adaptive management framework.

Facsimile: 250-377-7036 Web Address: http://www.al.gov.bc.ca

.../2
To oversee implementation, a cross-sector progress board will be instituted in spring 2008 to monitor the effectiveness of recovery efforts.

Thank you for your time in contributing toward this collaborative effort. I would ask for your continued support and involvement in order to ensure the success of mountain caribou recovery implementation efforts.

Sincerely,

r

c

Ale Lala \_

Peter Lishman, Project Director