

BC's Mountain Caribou: Last Chance for Conservation?

Special Report



FPB/SR/22

September 2004

Transmittal Letter

File: 97350-20/2004-03

September 29, 2004

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

Honourable Roger Harris
Minister of State for Forestry Operations
Room 151, Parliament Buildings
Victoria, BC V8W 9E2

Honourable George Abbott
Minister of Sustainable Resource
Management
Room 346, 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,



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.

BC's Mountain Caribou: Last Chance for Conservation?

Special Report

Table of Contents

Introduction	1
Natural History of Mountain Caribou	2
Current Status	2
Population Trends for Mountain Caribou in BC	2
Threats to Mountain Caribou Survival	4
Current Mountain Caribou Management	6
Federal Government Role.....	6
Provincial Government Role	7
Community and Corporate Roles	8
Existing Provincial Guidance and Direction	8
Mountain Caribou Recovery Strategy	8
Land Use Planning.....	10
Forest Practices Code.....	12
Relevant Forest Practices Board Findings.....	15
Forest and Range Practices Act	17
Conclusions	20
Appendix 1: Land Use Plan Summary Table	25
Land Use and LRMP Goals/Objectives for Mountain Caribou	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 extinctionⁱ. In 1996, British Columbia signed the National Accord for Protection of Species at Riskⁱⁱ. That agreement obliged the province to act to protect species at risk and their habitats, and to develop recovery plans for nationally designated speciesⁱⁱⁱ. Nevertheless, the number of mountain caribou in the province declined by 17 percent between the years 1996 and 2002^{iv}. 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 (tree-borne) 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.

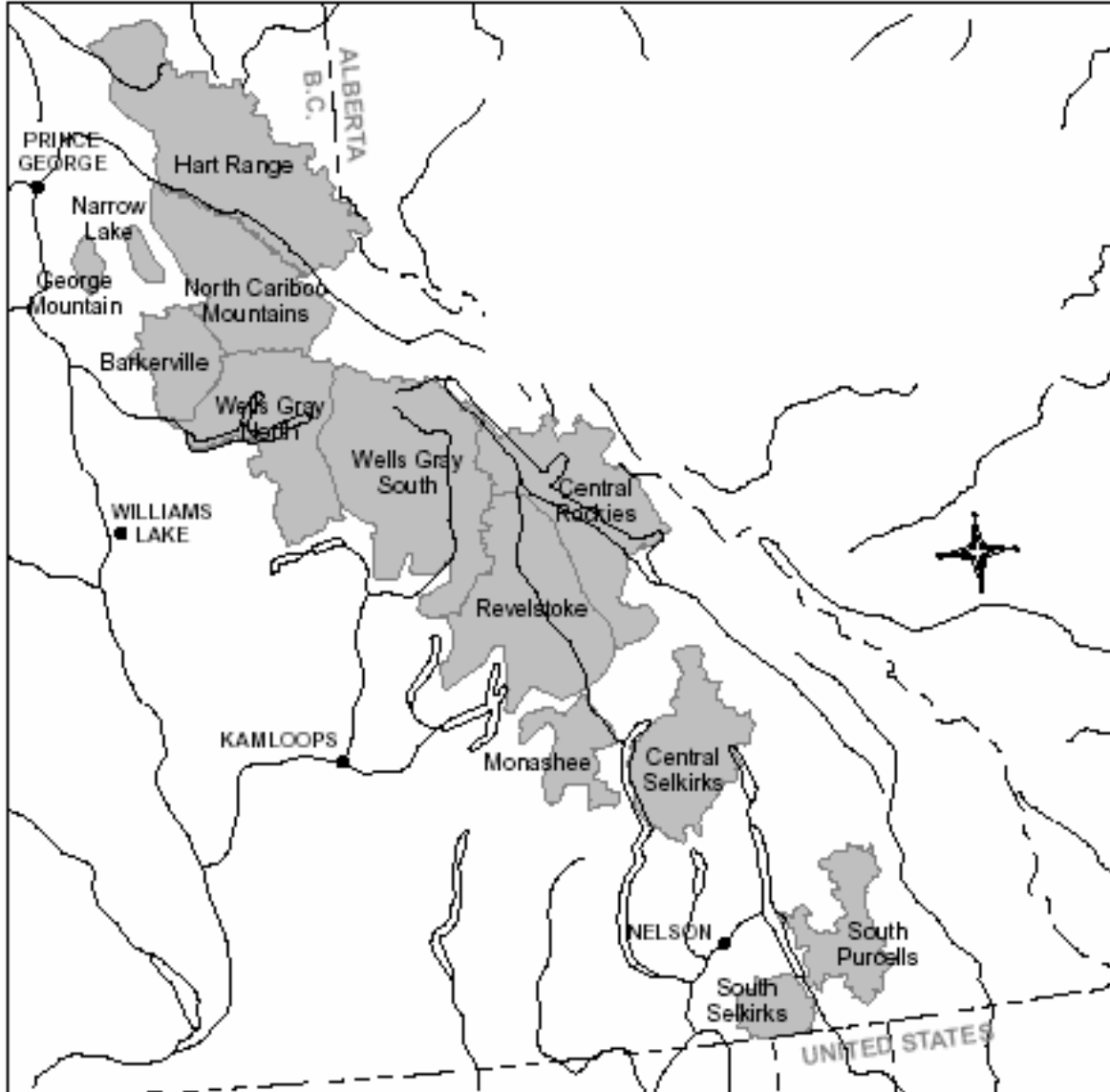
Predation is the most frequent identifiable cause of mountain caribou mortality. Cougar, wolves, bears and wolverine are common predators. Populations will decline if mortality exceeds productivity, and mountain caribou productivity is low. Adult females usually have only a single calf per year, over 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^v mountain caribou occur in BC in 13 isolated populations, scattered from the Kootenays north to Prince George (see Figure 1)^{vi}. 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^{vii}. Experts predict continued declines^{viii}, and expect that the most southerly populations in BC will likely disappear^{ix} 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^x.

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^{xi}, possibly because of over-hunting^{xii}. 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^{xiii}. 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.

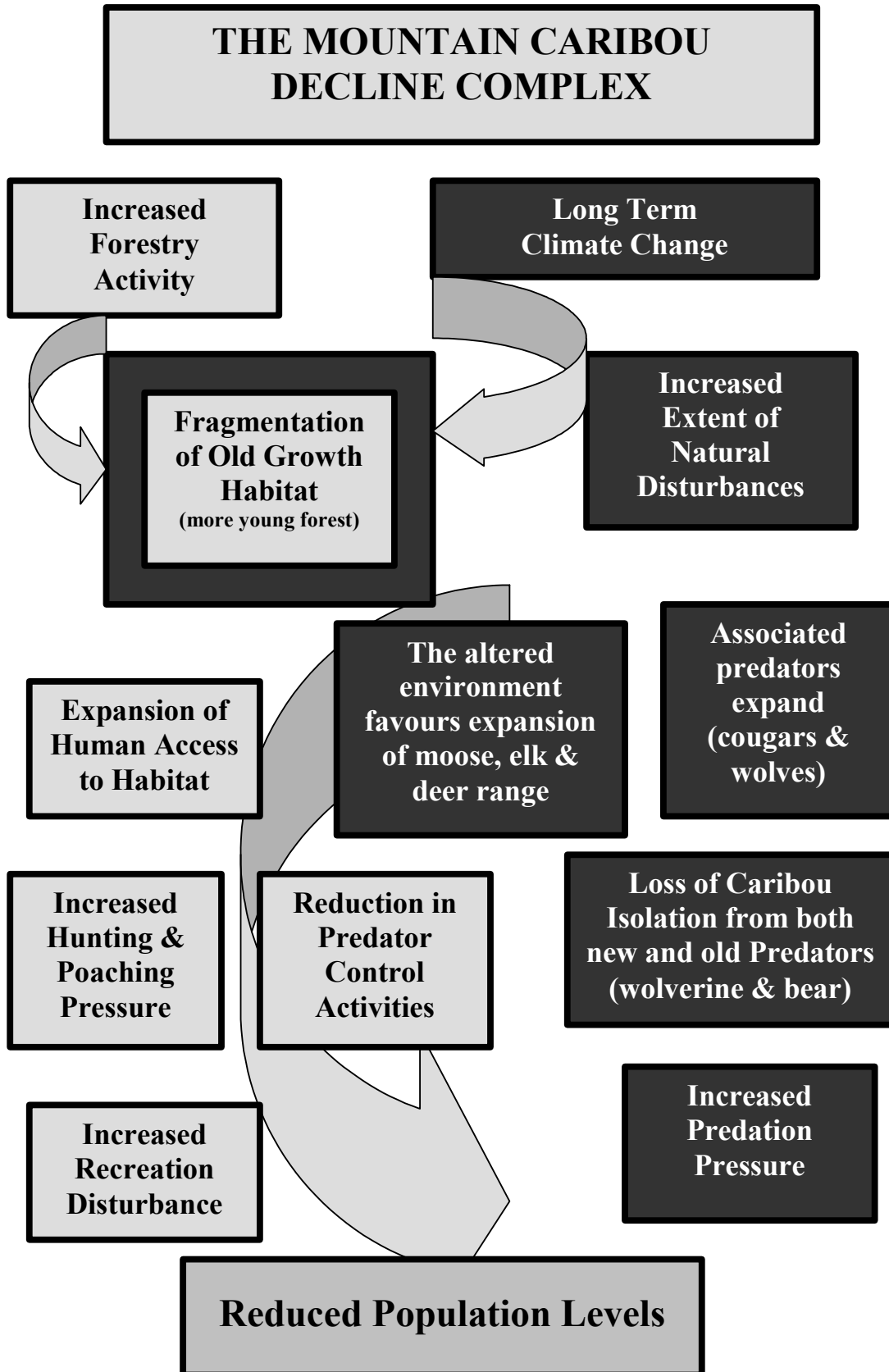
Potential causes for the recent decline of caribou include:

- 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^{xiv}.
- 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^{xv}. 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^{xvi}.

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^{xvii}, sufficient food apparently exists in the remaining forest to support the existing, albeit reduced, numbers of mountain caribou.

Figure 2: The Mountain Caribou Decline Complex



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^{xviii}.



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^{xix}. In the absence of research that establishes a singular cause of 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^{xx}. 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*^{xxi}, the *Wildlife Amendment Act*^{xxii}, and the *Forest and Range Practices Act*^{xxiii}. Part of the broad mission of MWLAP is "to maintain and restore the ecological diversity of fish and wildlife species and their habitats."^{xxiv} 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^{xxv}. 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. MSRSM 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^{xxvi}.

Existing Provincial Guidance and Direction

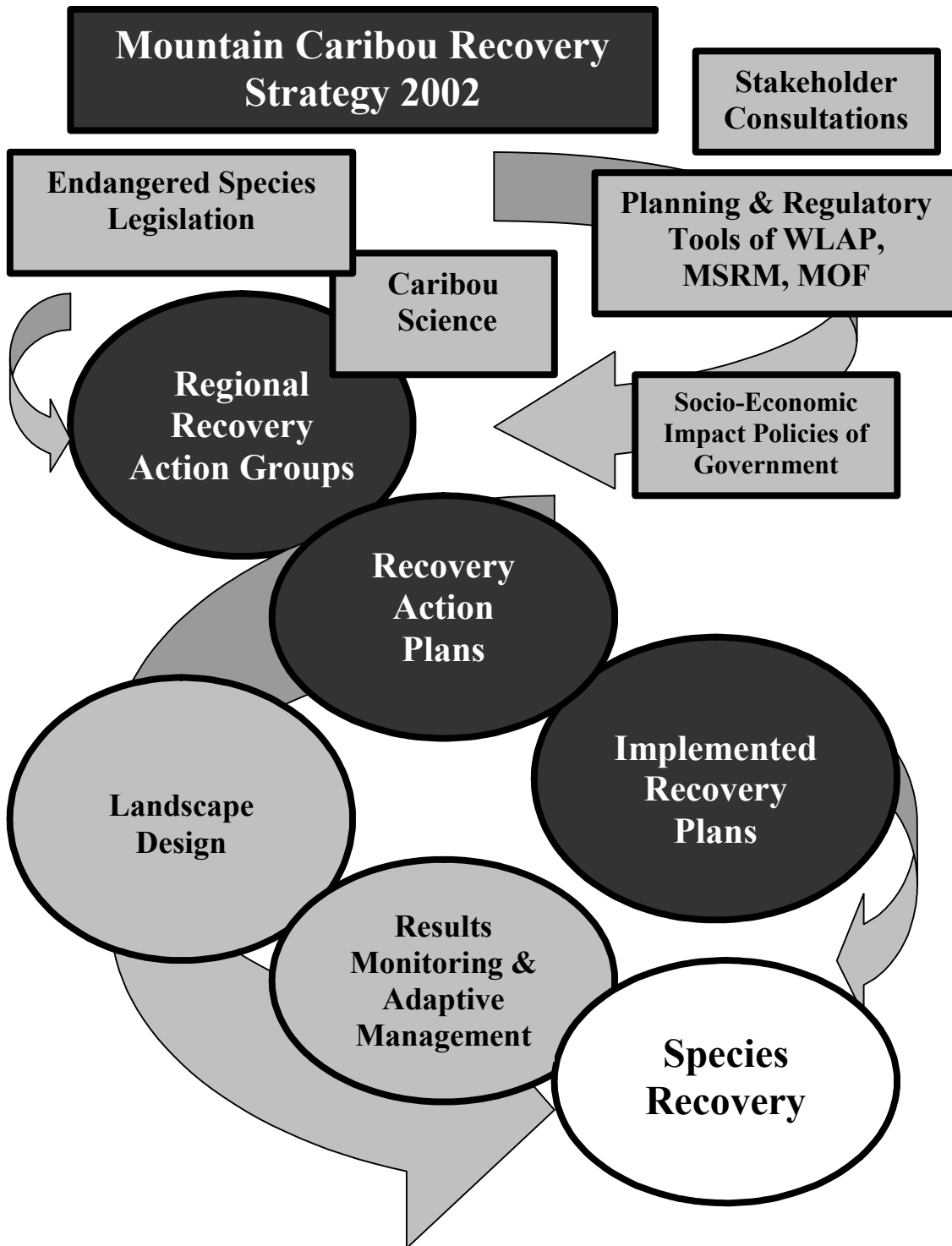
Mountain Caribou Recovery Strategy

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.

Figure 3: The Mountain Caribou Recovery Strategy 2002



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^{xxvii}. 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^{xxviii}. 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^{xxix}.

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 total range areas in forests older than 140 years, while the most productive mountain caribou population has 73 percent of its total range area in forests that age or older^{xxx}. 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^{xxxii}. In June 2004, the ministry released its *Identified Wildlife Management Strategy 2004*, which also includes caribou^{xxxiii}. 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^{xxxiii}. 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^{xxxiv}, 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^{xxxv} 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^{xxxvi}.

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^{xxxvii}.

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^{xxxviii}. 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^{xxxix}.

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^{xl}. 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^{xi}. 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^{xiii}. 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^{xiii}. 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^{xiv}. 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^{xv}. 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^{xvi}. 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^{xlvii}.

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*^{xlviii}. 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^{xlix}. 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^l.

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^{li}. 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^{lii}.

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^{liii} 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.

-
- ⁱ Committee on the Status of Endangered Wildlife in Canada (COSEWIC). 2003. Canadian Species at Risk. http://www.cosewic.gc.ca/htmlDocuments/sar_2003_11_e.htm#threatened
- ⁱⁱ See Environment Canada's website: http://www.ec.gc.ca/press/wild_b_e.htm and http://www.ec.gc.ca/press/wild_n_e.htm
- ⁱⁱⁱ Ministry of Forests. 2003. British Columbia's Forests and their Management. Victoria BC. http://www.growingtogether.ca/pubs/bcfm/BC_Forest_Management.pdf (page 7)
- ^{iv} MCTAC (The Mountain Caribou Technical Advisory Committee). 2002. A strategy for the recovery of mountain caribou in British Columbia. Report to MWLAP, Victoria, BC <http://wlapwww.gov.bc.ca/wld/documents/mtcaribourcvrystat02.pdf>
- ^v Estimated from the 2002 late-winter population as reported in MCTAC's recovery strategy. 2002. (See earlier endnote for source.)
- ^{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.
- ^{viii} MCTAC recovery strategy, Table 2. Mountain caribou have decreased over the short term and the current trend is down. (See earlier endnote for source.)
- ^{ix} COSEWIC. Species Database, reason for designation (caribou, woodland). www.cosewic.gc.ca
- ^x Witter, H.U. 2004. Mechanisms underlying the decline of mountain caribou (*Rangifer tarandus caribou*) in British Columbia. PhD. Thesis, UBC, Vancouver
- ^{xi} COSEWIC. 2002. Assessment and update status report on the woodland caribou *Rangifer tarandus caribou* in Canada. http://www.sararegistry.gc.ca/status/showDocument_e.cfm?id=229
- ^{xii} COSEWIC, Species at Risk fact sheet, Caribou *dawsoni* subspecies. www.cosewic.gc.ca
- ^{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.
- ^{xiv} 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.
- ^{xv} Wittmer, H.U. 2004. PhD. Thesis, UBC, Vancouver. (See earlier endnote for source.)
- ^{xvi} 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
- ^{xxi} The killing of mountain caribou has been prohibited by hunting regulation under the provincial Wildlife Act for some time. http://www.qp.gov.bc.ca/statreg/stat/W/96488_01.htm
- ^{xxii} 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: http://www.legis.gov.bc.ca/37th5th/3rd_read/gov51-3.htm.
- ^{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.
- ^{xxiv} 2004/05 – 2006/07 Service Plan Ministry of Water, Land and Air Protection. http://www.bcbudget.gov.bc.ca/sp2004/wlap/wlap_goals.htm
- ^{xxv} McKinnon, G.A. 1996. A mountain caribou strategy for British Columbia. *Rangifer*, Special Issue No. 9: 149-152.
- ^{xxvi} The Columbia Mountains Institute of Applied Ecology (www.cmiae.org) 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 (<http://www.cmiae.org/mtn-caribou-compendium.htm>); a review of mountain caribou predator-prey-habitat interactions (http://www.cmiae.org/pdf/panel_report_final.pdf) and a compendium of lichen management presentations on its website (<http://www.cmiae.org>).
- ^{xxvii} 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

Land Resource Management Plan, Kamloops Land Resource Management Plan, and Robson Valley Land Resource Management Plan. (See: <http://srmwww.gov.bc.ca/rmd/lrmp/index.htm>) 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.

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.

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

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

xxxvi Pearce, C. pers. comm., Revelstoke. 2004.

xxxvii 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.

xl Forest Practices Board. 2001. Implementation of the Cariboo-Chilcotin Land-Use Plan in forest development plans.

<http://www.fpb.gov.bc.ca/special/investigations/sir06/sir06.pdf>

xli 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>

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

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

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

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

xlvii An example is the draft Horsefly Sustainable Resource Management Plan, MSRM, January 2003.

http://srmwww.gov.bc.ca/car/planning/horsefly/srp_index.html

xlviii 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). <http://www.rpf-bc.org/download/species-at-risk.pdf>

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

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

¹ Forest Practices Board. 2000. A review of the forest development planning process in British Columbia.

<http://www.fpb.gov.bc.ca/SPECIAL/reports/fdp/index.htm>

ⁱⁱ Ministry of Sustainable Resource Management. 2002. Sustainable resource management planning – A landscape-level strategy for resource development (working paper), Victoria, BC.

ⁱⁱⁱ Some examples are Eight Peaks SRM Plan; Horsefly SRM Plan (draft); 100-Mile Subregional Plan (draft) – see <http://srmwww.gov.bc.ca/rmd/srmp/index.htm>

ⁱⁱⁱⁱ 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...”

Table 8. Summarized regional forest management prescriptions (extracted from LRMP and regional Land Use Plans).

Forest District/ Land Use Plan	Prince George LRMP	Robson Valley LRMP	Cariboo- Chiboulin LUPa	Kamloops LRMP	Okanagan-Shuswap LRMPc	Kodanay Boundary LUP
Local populations affected by forest development plans	Hart Ranges, North Cariboo Mountains, George Mtn., Narrow Lake	North Cariboo Mountains, minor part of the Hart Ranges	Barkerville, Wells Gray/North	Wells Gray South	Monashee, Revelstoke, Wells Gray/South	Revelstoke, Central Rockies, Central Selkirk, South Purcells, South Selkirk
High-ale valuation and late-winter habitat (ESSF)	No harvest 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.	Deferred forest harvesting within high valued habitat for 10 years or until proven management strategies are developed in areas of medium habitat value.	Within caribou range, 65% of habitat identified as no-harvest areas. Remaining 35% designated for modified harvest (described below).	Maintain a minimum of 33% of the caribou habitat such that it retains old-growth attributes. Silviculture systems other than clearcutting recommended; clearcuts restricted to 15 ha.	No parkland harvesting. At least 20% of THLB ^b to be reserved now; 7-year research program will determine need for additional reserves or special management areas.	No harvest in parkland and designated caribou no-harvest areas. Elsewhere between parkland and the Caribou Line ^d , maintain 70% in age class 8 or older.
Transitional or early-winter habitat (ICH & ESSF)	In medium habitat implement alternative silviculture systems to maintain caribou habitat values over a 240-year rotation.	In medium habitat implement alternative silviculture systems to maintain caribou habitat values over a 240-year rotation.	In modified harvest areas, including key early-winter range, implement alternative silviculture systems to maintain caribou habitat values.	In transitional habitat maintain 20% of the area such that it retains old-growth attributes through treed islands, ecosystem networks and riparian buffers.	At least 20% of THLB ^b to be reserved now; 7-year research program will determine need for additional reserves or special management areas.	Below the Caribou Line ^d maintain 30% of the forested area in a class 8 or older (10% age class 9), and an additional 20% in alternative silvicultural systems to maintain caribou habitat values in the ESSF. In the ICH, 40% in age 8 or older (10% age class 9)
Movement corridors	Schedule harvesting to maintain the integrity of the corridor for caribou movement throughout the rotation.	Schedule harvesting to maintain the integrity of the corridor for caribou movement throughout the rotation.	No specific strategies; follow strategies for modified harvest areas.	Must be 1–1.5 km wide with at least 30% of the timber sufficient in age/size to intercept snow.	At least 30% of the timber within corridors must provide snow interception and exhibit pruning of lower branches.	No specific strategies except maintain continuous broad corridors of old- growth and mature at regular intervals to connect pockets of old growth forest.
Access management	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 conservation.	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 conservation.	Define parts of the caribou range sensitive to recreational activities, especially snowmobile use, and address through sub-regional planning.	No specific strategies, but some local recreation plans exist.	Manage summer and winter backcountry recreation through local planning. Develop access management plans. Include caribou concerns in mine planning.	Avoid access to parkland. Develop access plan for caribou area. Assess CBR proposals. Work with snowmobile club to direct snowmobile access away from lab- winter habitat.

^a CCLUP Mountain Caribou Strategy, October 2000. ^b Kamloops LRMP, Appendix 10: Timber Harvesting Guidelines for North Thompson Caribou Habitat. ^c Okanagan-Shuswap LRMP Final Recommendations: Mountain Caribou Habitat RMZ. ^d J. Morgan, MSRM, Kamloops, pers. comm. ^e Timber Harvesting Land Base. ^f The Caribou Line is the 1994 forestry operability line. Incentive to facilitate discussion of guidelines. [†] Commercial Backcountry Recreation.