

Recovery Outline
Southern Mountain Caribou Distinct Population Segment of
Woodland Caribou



Species Name: Southern Mountain Caribou (*Rangifer tarandus caribou*)

Species Range: East-central British Columbia, Canada and northeastern Washington and northern Idaho, United States

Recovery Priority Number: 3C; southern mountain caribou is recognized as a subspecies with a high degree of threat and high recovery potential (explanation provided below).

Listing Status: Endangered; October 2, 2019 (USFWS 2019)

Lead Regional Office/Cooperating RO(s): Lead: Pacific Region, Cooperating: Mountain Prairie Region.

Lead Field Office/Cooperating FWO(s): Lead: Idaho Fish and Wildlife Office, 1387 South Vinnell Way, Room 368, Boise, Idaho 83709; Cooperating: Eastern Washington Field Office, Montana Field Office.

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I. Background

The designation of critical habitat (77 FR 71041; November 28, 2012 [USFWS 2012]) and proposed and final listing rules (79 FR 26504; May 8, 2014 [USFWS 2014] and 84 FR 52598; October 2, 2019 [USFWS 2019], respectively) for the southern mountain caribou distinct population segment (DPS) of woodland caribou (*Rangifer tarandus caribou*) (southern mountain caribou) provide detailed background information on the listing history of caribou in both the United States and Canada, as well as more in-depth information regarding the species biology, ecology, and threats.

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Currently, all southern mountain caribou individuals and the majority of suitable habitat occur in Canada. As such, the U.S. Fish and Wildlife Service (Service or USFWS) recognizes the importance of collaborating with Canada on the development and implementation of a recovery plan. To that end, the Service is in the process of expanding coordination with Canadian partners.

A. Type and Quality of Available Information to Date:

United States

- 1985: Management Plan / Recovery Plan for South Selkirk Caribou subpopulation (USFWS 1985)
- 1994: Revised Recovery Plan for the South Selkirk subpopulation ([USFWS 1994](#))
- 2019: South Selkirk Caribou Management Plan (Selkirk Caribou International Working Group [SCITWG] 2019), discussing recovery needs within the South Selkirk Caribou Management Area in British Columbia, Washington, and Idaho.

Canada

- 2007: Provinces and territories are the lead jurisdictions for the management and recovery of southern mountain caribou on non-federal lands in Canada. British Columbia's current approach is presented in the Mountain Caribou Recovery Implementation Plan (MCRIP), which was approved in 2007 and provides management guidance for subpopulations referred to in the Canadian Recovery Strategy as the "Southern Group."
- 2014: Recovery Strategy for the Woodland Caribou, Southern Mountain population (Canadian Recovery Strategy; [Environment Canada 2014](#))
- 2017: [Canada-British Columbia Southern Mountain Caribou \(Central Group\) Protection Study](#) (henceforth, "Joint Protection Study 2017")

Important information gaps:

- Lack of comprehensive and current data on subpopulation trends, size, structure, and distribution limits our ability to inform, prioritize, and monitor the success of specific recovery actions.
- Unrefined estimates of historical distribution and abundance make it difficult to define appropriate density estimates and subpopulation targets.
- Lack of knowledge regarding southern mountain caribou health and condition, including causes of mortality, hampers the ability to appropriately address the threats with recovery actions. Research is needed to determine if potential nutritional limitations are contributing to reduced health and survival of southern mountain caribou.
- Insufficient information on how to best manage matrix critical habitat to sustain recruitment and reduce adult mortality in matrix ranges (*i.e.*, habitat areas that contribute to the predator-prey system, but are not core caribou habitat areas).

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- Incomplete data on the effectiveness of alternative management actions (*e.g.*, maternal penning, predator management/control, and augmentation) in stabilizing or increasing southern mountain caribou subpopulation growth rates.
- Limited data on the status of other ungulate and predator populations limits the effectiveness of alternative management actions (*e.g.*, predator/alternate prey control).
- An incomplete understanding of the extent, distribution, and possible consequences of southern mountain caribou sensory disturbance, particularly during sensitive periods (*e.g.*, seasonal range migrations, calving) limits our ability to reduce sensory disturbance (*e.g.*, aircraft traffic, snowmobiles, all-terrain vehicles, tourism, research, and the equipment associated with industrial exploration and development).

Treatment of uncertainties:

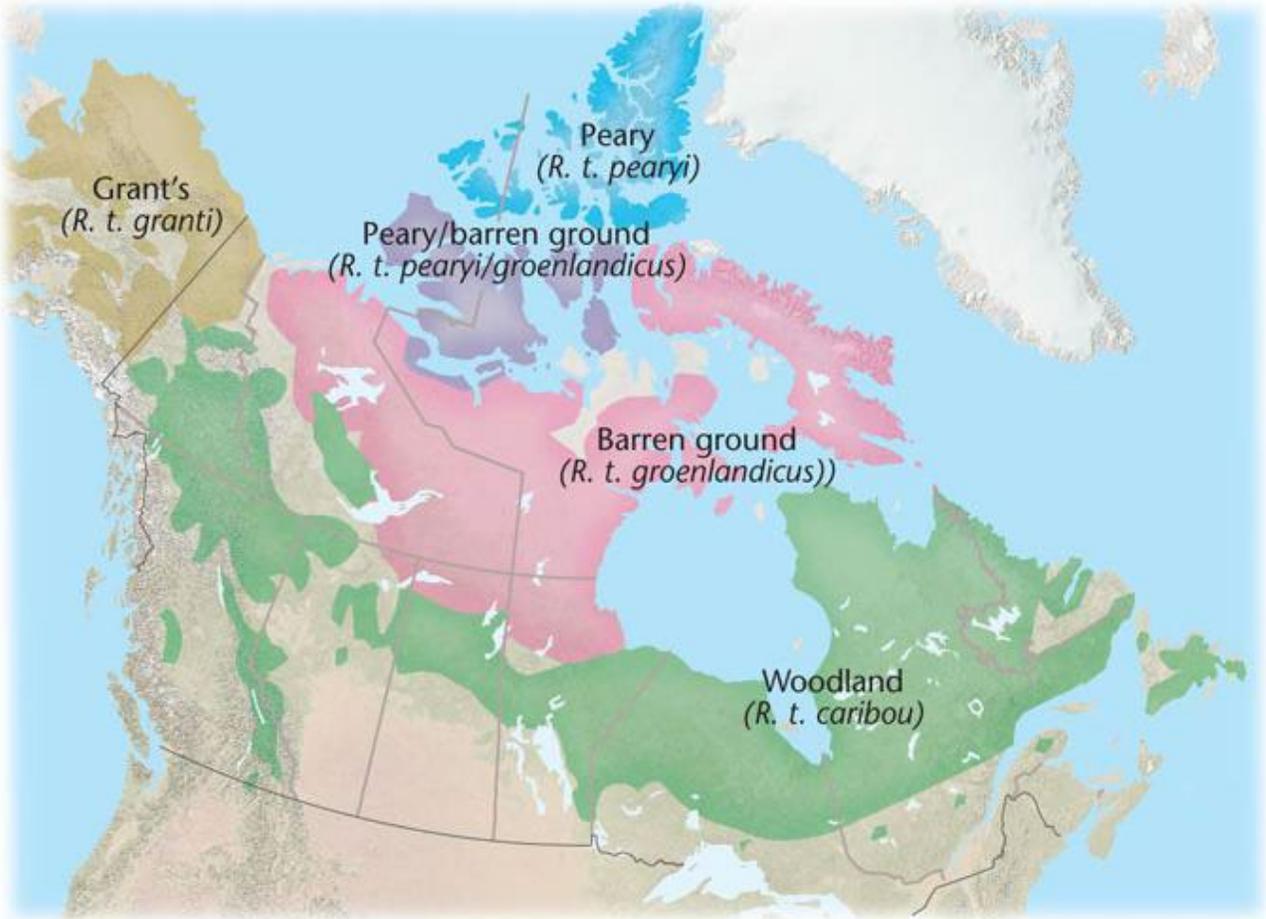
Currently, there is uncertainty regarding whether regulatory mechanisms in place are protective of southern mountain caribou and their habitat in British Columbia, and if deemed insufficient, what mechanisms under Canada's Species at Risk Act (SARA) will be used to achieve effective protection, and what will be the level of community and industry support for management decisions. Furthermore, there are uncertainties about how to manage and restore habitat to ensure that seasonal range conditions and predator densities promote the long-term persistence of southern mountain caribou. The habitat within those ranges will need to exist in an appropriate spatial configuration including large areas of contiguous undisturbed habitat such that southern mountain caribou can move throughout their seasonal range and potentially access neighboring ranges (and cross the United States - Canada border) when needed. Herd-specific or regional action plans will need to inform broader land-use planning, and account for the amount, type, and distribution of forest recruitment and retirement cycles, planned disturbances, areas where conservation is prioritized, and where future habitat is to be restored (*e.g.*, to undisturbed suitable condition or for connectivity). Consideration will need to be given to how climate change might affect threats to southern mountain caribou including the trajectory of habitat recovery and restoration.

B. Brief Life History:

Species description and life history of the southern mountain caribou are summarized in the final listing rule (USFWS 2019). There are four extant recognized subspecies of caribou in North America (Banfield 1961) (Figure 1), of which woodland caribou (*Rangifer tarandus caribou*) is the southernmost, having historically ranged throughout most of southern Canada and portions of the United States. Currently, southern mountain caribou, a discrete subset of woodland caribou, are the only population with the potential to occur in the contiguous United States (recently occupied habitat in northeastern Washington and northern Idaho; ephemeral use by transient individuals in northwestern Montana) (Figure 2).

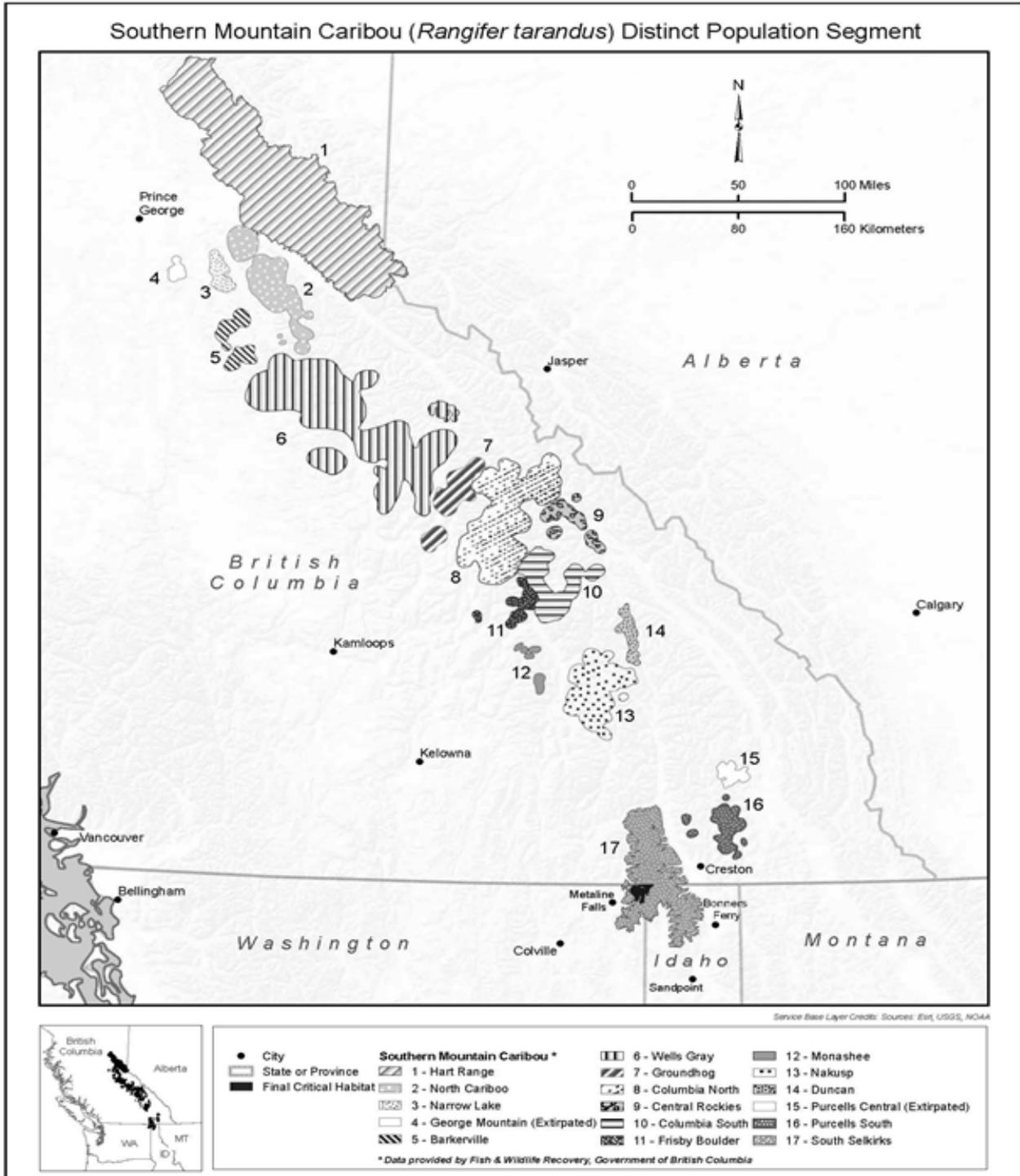
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Figure 1. Extant caribou (*Rangifer tarandus*) subspecies, after Banfield (1961), as depicted by Committee on the Status of Endangered Wildlife in Canada (COSEWIC) (2011).



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Figure 2. Distribution of the 17 subpopulations of southern mountain caribou. Boundaries depicted were provided to the Service by COSEWIC.



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Southern mountain caribou occur west of the continental divide in the inland temperate rainforest ecosystem (COSEWIC 2011) which extends from east-central British Columbia to the inland northwestern United States and is characterized by the presence of arboreal lichens (Stevenson and Hatler 1985, Antifeau 1987, Rominger and Oldemeyer 1989, Mountain Caribou Technical Advisory Committee [MCTAC] 2002) and deep winter snowpack. For more detailed description of this ecological setting and the species' seasonal foraging and habitat requirements, please see Simpson *et al.* (1987), Kinley and Apps (2007), and USFWS (2019, pp. 52602-52603).

C. Limiting Life History Characteristics:

Aspects of southern mountain caribou biology that limit its recovery potential include low productivity and calf survivorship (COSEWIC 2002, Cichowski *et al.* 2004, Shackleton 2010), as discussed in further detail by USFWS (2019, pp. 52625-52626). .

Southern mountain caribou require large ranges of relatively undisturbed, interconnected habitat where they can separate themselves (horizontally and by elevation) from predators; modify their geographic use in response to various natural and human-caused habitat disturbances and human activities; and access their preferred food sources. Currently, southern mountain caribou exist in several discrete subpopulations, but prior to recent habitat fragmentation and population declines they were likely more widely and evenly distributed. Because mountain caribou do not appear to be able to disperse effectively over long distances, and subpopulations are becoming increasingly fragmented and isolated, particularly in the southern portion of the DPS (Wittmer 2004, van Oort *et al.* 2011, Serrouya *et al.* 2012), this may not constitute a functioning metapopulation with active immigration and emigration among the subpopulations (USFWS 2019, p. 52611).

D. Primary Threats:

Southern mountain caribou are declining primarily due to the synergistic effects of habitat alteration (*i.e.*, habitat loss and fragmentation) and changing predator-prey dynamics (Poole and Serrouya 2003; MCST 2005; Wittmer *et al.* 2005a, 2005b, 2007; Courtois *et al.* 2007; Stotyn *et al.* 2007; Littell *et al.* 2009; Bowman *et al.* 2010; Latham *et al.* 2011; Serrouya *et al.* 2015a). Predation risk has increased due to human modification of habitat that can increase abundance of other ungulates as well as their predators in areas where caribou were formerly less vulnerable to predation, as discussed in further detail by USFWS (2019, pp. 52621-52623).

Habitat assessments for southern mountain caribou have typically focused on early/late winter habitats; however, subpopulations are declining faster than lichen-rich forests. Mounting evidence suggests that nutrient limitations across seasons may be contributing to the reduced health and fitness of southern mountain caribou (Boutin and Merrill 2016). The spring and summer periods likely pose the greatest nutritional demands on southern mountain caribou due to the animals' need to restore body condition towards the end of winter, the late gestation, parturition, and lactation needs of females, males needing sufficient body condition and fat reserves before the rut, and calves needing to grow quickly and be sufficiently conditioned to

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survive the following winter. Warming temperatures across all seasons have the potential to reduce southern mountain caribou access to high quality forage (SCITWG 2019). Furthermore, forage and nutrient limitations in one season could carry over to subsequent seasons. Consecutive years of such patterns could potentially lead to a decline in southern mountain caribou abundance and distribution.

Movement patterns, predation risk, and human disturbance of southern mountain caribou are also affected by development, roads, recreational use, and forest harvest (Simpson 1987; Smith *et al.* 2000; Duchesne *et al.* 2000; Simpson and Terry 2000; Reimers *et al.* 2003; Cichowski *et al.* 2004; MCST 2005; Wittmer *et al.* 2005b, 2007, Courtois *et al.* 2007; Freeman 2008), as discussed in further detail by USFWS (2019, pp. 52612-52615). Small isolated populations increase the risk of stochastic events and loss of genetic diversity (Serrouya *et al.* 2012, Weckworth *et al.* 2012).

E. Current Biological Status of the Species:

Overview:

Because there are no reliable historical estimates of the number of southern mountain caribou and their distribution (Spalding 2000), it is difficult to precisely estimate their historical range for a comparison to their current range. Hatter (pers. comm. as cited in Spalding 2000) estimated that the range of southern mountain caribou had declined by approximately 60 percent when considering both the Canadian and United States range of the population. A more recent analysis suggested that as of 2017 the existing subpopulations encompassed approximately 25 percent of southern mountain caribou historical distribution in Canada and between 0.3 and 0.8 percent of the estimated historical distribution of in the United States (SCITWG 2019). Further evidence of the decline in southern mountain caribou is supported by population surveys. Surveys of the subpopulations in the southern mountain caribou DPS estimated that in 1995 the entire population was approximately 2,554 individuals (Hatter *et al.* 2004). By 2014, this number had decreased to approximately 1,540 individuals (Environment Canada 2014; 1,356 mature individuals according to COSEWIC 2014, p. 41). The Joint Protection Study (2017) estimated southern mountain caribou population at 1,205 individuals (see data for the Southern Group in [Table 1](#) of the Joint Protection Study (2017), which also gives the status [increasing, stable, declining, extirpated] of each subpopulation). Since that estimate, the population size is believed to have further decreased and additional subpopulations have been extirpated. Given these data, the rate of population decline appears to be accelerating, a trend that is expected to continue as subpopulation sizes continue to decrease (Wittmer *et al.* 2005b).

Historically, southern mountain caribou existed in an interconnected population, but recently this population has been fragmented into 17 isolated subpopulations¹ (Figure 2), some of which are

¹ The number of subpopulations and their names encompassed within the southern mountain caribou DPS conforms to Canada's southern mountain designated unit (DU) 9 as identified pursuant to COSEWIC (2011 and 2014, entire).

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likely to no longer persist. Subpopulations at the southern extent of the range are among the six considered as confirmed or probably extirpated. The last known caribou from the South Selkirks and four caribou from the South Purcells were translocated to the larger Columbia North subpopulation using a soft release approach in early 2019. Southern mountain caribou were last reported to cross the border in late 2018 when a bull and cow were sighted near Moyie Lake in Montana. Prior to that, radio-tracking data indicated that a collared bull entered Washington for about 10 days in late 2014.

According to the most recent status assessment in the Joint Protection Study (2017), only two of the extant southern mountain caribou subpopulations (Groundhog and Narrow Lake) were documented as either increasing or stable. The nine other extant subpopulations within the DPS were declining, including two of the potentially more resilient subpopulations, which are located at the northern end of the DPS: the Hart Ranges and the North Cariboo Mountains (Hatter 2006). Six of the 11 extant subpopulations (groupings as defined by COSEWIC 2014) were estimated to consist of fewer than 50 individuals, 3 consist of between 50 and 250 individuals, and 2 consist of between 250 and 400 individuals (Joint Protection Study 2017).

F. Conservation Actions to Date:

Habitat Protection and Winter Recreation

In the United States, both the Idaho Panhandle National Forest (IPNF) and Colville National Forest (CNF) have land resource management plans (LRMPs) that incorporate management objectives and standards for caribou. Pursuant to their respective LRMPs, both the IPNF and CNF have implemented extensive measures to protect caribou and caribou habitat on lands under their jurisdiction, both within the area designated as critical habitat as well as within the larger South Selkirk Caribou Management Area (SCITWG 2019). Forest Service efforts to protect the southern mountain caribou DPS and its habitat in the United States include:

- Retaining mature to old-growth cedar/hemlock and subalpine spruce/fir stands.
- Analyzing forest management actions on a site-specific basis to consider potential impacts to caribou habitat.
- Avoiding road construction through mature old-growth forest stands unless no other reasonable access is available.
- Placing emphasis on road closures and habitat mitigation based on caribou seasonal habitat needs and requirements.

Although the number is the same (17), the subpopulation groupings and names used in the Canadian Strategy and the Joint Protection Study (2017) were based on the Government of British Columbia's Mountain Caribou Recovery Implementation Plan (MCRIP), which differ somewhat from COSEWIC's (2014) delineations. For example, the north and south Wells Gray subpopulations referred to in British Columbia's MCRIP were combined into a single Wells Gray subpopulation in COSEWIC. Additionally, the Central Selkirks subpopulation identified in British Columbia's MCRIP was divided between the Duncan and Nakusp subpopulations in COSEWIC.

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- Controlling wildfires within southern Selkirk Mountains woodland caribou management areas to prevent loss of coniferous tree species in all size classes.
- Managing winter recreation in the CNF in Washington, with specific attention to snowmobile use within the Newport/Sullivan Lake Ranger District.
- Working closely with the Service, the IPNF is currently updating their winter recreation strategy to address the effects of snowmobiling on southern mountain caribou.

In 2008, British Columbia protected approximately 2,200,000 ha (5,436,320 ac) of high-suitability caribou habitat (Winter Ungulate Range) from future logging and road building. Additional efforts to protect southern mountain caribou and their habitat in British Columbia include:

- Closure to snowmobiling of 1 million hectares (ha) (2,471,054 acres [ac]) of high-elevation caribou habitat.
- Development and implementation of operating procedures for helicopter and snowcat skiing.
- Cessation of the setting of early season ski tracks that lead into caribou winter range, and periodic seasonal trail and road closures in national parks.
- Development of cooperative stewardship agreements with recreational stakeholders.
- Incorporation of strategies to minimize recreational disturbance to caribou in provincial park management plans (Environment Canada 2014).

Approximately 135,908 ac (55,000 ha) of private land within the British Columbia portion of the southern Selkirk Mountains caribou recovery area were purchased by the Nature Conservancy Canada (NCC) for sustainable ecosystem management, including the conservation of southern mountain caribou. This purchase was made with the support of the Government of Canada in what has been described as the largest single private conservation land acquisition in Canadian history (USFWS 2008).

Augmentation

Between 1987 to 1990 and 1996 to 1998, 103 caribou were translocated (60 into Idaho and 43 into Washington/British Columbia) to augment the South Selkirk subpopulation. Donors from Southern Mountain stock had greater rates of survival than caribou from the Northern Mountain ecotype. The influx of translocated animals appears to have contributed to temporary increases in the overall number of caribou in the British Columbia portion of the southern Selkirk Mountains (*i.e.*, translocated caribou that survived joined the resident herd). Despite these augmentations, a steady decline that began in 2009 ultimately resulted in the extirpation of the South Selkirk subpopulation in both the United States and Canada (SCITWG 2019).

More recently (in 2012), the South Purcells subpopulation in British Columbia was augmented with 19 caribou of the Northern Mountain ecotype (Gordon 2012). This action was largely unsuccessful as translocated animals failed to join the resident herd and the majority died within

the first year. A second year of planned translocations was abandoned due to the lack of success of first-year transplants.

The Canadian Recovery Strategy (Environment Canada 2014) and the recent independent panel review of recovery actions for southern mountain caribou (Boutin and Merrill 2016) have cautioned against further augmentation attempts for two primary reasons:

- Augmentations are likely to fail if the current conditions driving caribou population declines remain unchanged (*i.e.*, habitat fragmentation and predation).
- Augmentation is generally more successful if animals of the same ecotype are used.

Currently, none of the extant southern mountain caribou subpopulations in British Columbia are stable enough to contribute animals to additional augmentations.

Captive breeding is one option for supplying caribou for translocation without depleting wild source populations. According to the Joint Protection Study (2017), British Columbia continues to examine caribou subpopulations for their suitability as founder herds for a facility-based approach to captive breeding. However, the province has not committed to constructing a large, in-situ enclosure.

Maternal Penning

The goal of maternal penning projects is to increase herd sizes by temporarily capturing pregnant female caribou and placing them in a predator-free enclosure until they calve and raise their calf to approximately 6 weeks old, at which time they are released.

In British Columbia, two maternity penning projects, Klinse-Za and Revelstoke, were initiated in 2014 for a 5-year trial duration (Serrouya *et al.* 2015b, McNay *et al.* 2016). In 2018, SCITWG planned an additional maternal penning project (SCITWG 2017) for the South Selkirk subpopulation on the Nature Conservancy of Canada's "Darkwoods" property in the southern Selkirk Mountains, British Columbia. The pen was not utilized due to logistical issues not yet resolved.

Results from the Klinse-Za pen (Moberly subpopulation) indicate that maternity penning is effective when a relatively large proportion of females are penned combined with predator control outside of the pen. The program is ongoing.

Results from the Revelstoke pen (Columbia North subpopulation) have been mixed. While the annual penned calf survival rate from 2014 to 2018 was higher (44 percent) than the survival rate of calves born in the wild (23 percent in 2014 and up to 36 percent in 2018), the objective of increasing the subpopulation size has not been met, likely due to an insufficient number of pregnant cows penned (Serrouya and McLellan 2016). A final report will indicate the overall results, recommendations, and proposed next steps for this conservation tool.

An unanticipated benefit of the Klinse-Za and Revelstoke maternal penning projects has been an increased survival rate of penned versus wild females, which may be the result of supplemental feeding (Boutin and Merrill 2016). Based on lessons learned from these projects, the success of implementing maternal penning depends on high adult survival (approximately 80 to 85 percent) and reducing early-season calf mortality. This technique is most useful in small populations in which a larger proportion of cows in the total population can be captured and protected in the pen (Chisana Caribou Recovery Team 2010).

Maternal penning is not a helpful recovery technique where there is low adult survival (*i.e.*, less than 80 percent) or when calf mortality is spread evenly throughout the year. Maternal penning also is not a replacement for habitat protection nor should it be used in situations where there are high, unregulated predation rates (Boutin and Merrill 2016).

Predator Control in Canada

Lethal control of predators has largely focused on wolves and cougars because predation from these species is likely in excess of baseline rates of predation from other species (*e.g.*, bears) (USFWS 2019, p. 52621). The Canadian Recovery Strategy (Environment Canada 2014) recommends a density of less than 3 wolves per 1,000 square kilometers (km²) (8 per 1,000 square miles[mi²]) be maintained within caribou matrix range. Density relationships between cougars and caribou population dynamics have not been as clearly defined. Because individual cougars can specialize on a particular prey species, management recommendations have focused on identifying and removing those individuals found to be preying on caribou (Wilson 2009, Serrouya and McLellan 2016). Such an approach will require either maintaining a sample of radio-collared caribou to assess causes of mortality or a remote camera-monitoring program conducted within caribou core areas.

Over the last 2 decades, predator management in British Columbia has primarily focused on liberalizing hunting and trapping seasons and quotas. Furthermore, aerial wolf removal has been conducted annually since 2014. The removal program was designed for a 5-year duration. Preliminary results indicate that wolf removal has contributed to success in the Klinse-Za maternity penning project and an increase in the Moberly subpopulation. Results remain somewhat inconclusive. Following completion of the 5-year project in 2019, results in the South Peace and South Selkirks are being reviewed.

A wolf sterilization pilot project was undertaken in the Quesnel Highlands Local Population Unit (LPU) of the Southern Group from 2001 to 2012. Sterilization of adult male and female wolves effectively stopped reproduction, strongly limiting the rate of increase of wolf populations; however, there was no change in Quesnel Highland caribou recruitment (Hayes 2013).

Data from Alberta suggest that wolf control on its own can stabilize declining caribou populations, but may not necessarily result in population increases (Hervieux *et al.* 2014). These

results have important implications for the long-term recovery of southern mountain caribou, suggesting that without meaningful actions to decrease the suitability of an area to wolves, wolf control will need to be continued indefinitely. Predator control is socially controversial (Boertje *et al.* 2010) and it is likely that public support for a long-term predator control program will be limited. Thus, predator control should be viewed as a short-term tool for stabilizing southern mountain caribou subpopulations until the effects of longer-term management actions (*e.g.*, ungulate population management and habitat restoration) are realized.

Prey Control in Canada

Managing the abundance and distribution of other ungulate species (*i.e.*, moose, elk, and deer) has been identified as a management tool to reduce predation rates on southern mountain caribou. To date, two moose reduction experiments have occurred in the southern mountain caribou range in British Columbia, but there have been no reported actions directed at reducing elk or deer densities to promote southern mountain caribou recovery.

The Revelstoke experiment (Columbia North, Columbia South, and Frisby-Boulder subpopulations) used liberalized hunting to reduce moose numbers by 80 percent (1.58 per km² [4.1 per mi²] in 2003 to less than 0.3 per km² (0.8 per mi²) in 2014; Serrouya *et al.* 2017). This decline led to a reduction in wolves from over 30 per 1,000 km² (78 per 1,000 mi²) to about 14 per 1,000 km² (36 per 1,000 mi²) by 2014. From 2003 to 2014, the Columbia North caribou subpopulation stabilized, while similarly sized caribou subpopulations adjacent to but outside the moose reduction area declined (*i.e.*, Wells Gray and Central Selkirks).

Similar to the Columbia North subpopulation experiment, a moose reduction experiment in the Parsnip caribou herd range (Hart Ranges subpopulation; Steenweg 2011) resulted in a 66 percent decline in moose density. Wolf populations remained relatively stable during the experiment, although evidence suggested an increased emigration rate. Effects on the caribou population were difficult to assess due to limited monitoring, but recent evidence suggests population stability (reviewed in Boutin and Merrill 2016).

Various approaches all suggest that caribou populations are more likely to persist in systems where moose density is less than 0.3 per km² (0.8 per mi²) (Bergerud and Elliot 1986, Messier 1994, Bergerud 1996, Wilson 2009, Serrouya *et al.* 2011). Moose, however, are not the only prey species that may influence caribou populations. In multi-prey systems, Fuller's (1989) equation may be the most useful for defining targets for other ungulate species.

II. Interim Recovery Program

A. Recovery Priority Number:

Recovery priority numbers are assigned to a species based on degree of threat, recovery potential, taxonomic status, and conflict with economic activity (USFWS 1983). The southern mountain caribou DPS, which includes the South Selkirk subpopulation and an additional 16 subpopulations that are located wholly in British Columbia, is recognized as a subspecies with a high degree of threat, high recovery potential, and is in conflict with economic activity associated with timber harvest and recreation, resulting in a recovery priority number of 3C.

According to the 2014 Canadian Recovery Strategy (Environment Canada), “recovery of Southern Mountain Caribou is technically and biologically feasible” based on the following:

1. Southern mountain caribou are capable of reproducing and are available to improve subpopulation growth rates and abundance.
2. For subpopulations where sufficient suitable habitat is currently unavailable, sufficient habitat could be made available through habitat management and/or restoration.
3. The primary threats to southern mountain caribou (*i.e.*, unnaturally high predation rates as a result of human-caused and natural habitat alteration) can be mitigated through land-use planning, habitat management and habitat restoration, in conjunction with predator and alternate prey management when necessary.
4. Recovery techniques (*e.g.*, protection and management of forested habitat, habitat restoration, predator and alternate prey management, hunting regulations, and stewardship initiatives) are available to achieve the population and distribution objectives for southern mountain caribou.

B. Interim Recovery Strategy:

Current evaluations underway between Canada and British Columbia on the effectiveness of their legislation and management actions taken to date to recover southern mountain caribou may result in amendments to the federal recovery strategy and provincial plans. These potential amendments provide the Service with an opportunity to expand our collaboration with Canada to develop a binational recovery strategy for southern mountain caribou that meets the statutory requirements of both SARA and the Endangered Species Act. During recovery planning, the Service considers what a species needs to maintain viability through an assessment of its resilience, representation, and redundancy. A brief description of how these terms may apply to the recovery of southern mountain caribou is provided below.

- **Resiliency**² – The Canadian Recovery Strategy (Environment Canada 2014) defines an LPU to be self-sustaining when it “demonstrates stable or positive population growth over the

² Resiliency describes the ability of a species to withstand stochastic disturbance. Resiliency is positively related to population size and growth rate, and may be influenced by connectivity among populations. Generally speaking,

short term (≤ 20 years), and is large enough [> 100 individuals] to withstand random events and persist over the long term (≥ 50 years), without the need for ongoing active management intervention” (Environment Canada 2014). The LPUs take into account the historically larger size and interconnectedness among subpopulations (*i.e.*, metapopulation structure), and although the strategy recommends a minimum target of 100 animals per LPU, it also suggests that larger sizes may be desired (*e.g.*, greater than 300 animals where that may be possible). Long-term resiliency for southern mountain caribou depends on achieving a robust and redundant metapopulation structure, which allows for increases in subpopulation size and genetic diversity. Ideally, each metapopulation would consist of sufficiently large and/or interconnected subpopulations (*e.g.*, an effective size between 250 and 500 animals) that, together, would be considered resilient and capable of withstanding any foreseeable near-term impacts (*e.g.*, fire, disturbance).

- **Representation**³ – Connectivity among resilient subpopulations enables southern mountain caribou to adapt to changing conditions over time (*e.g.*, climate change). Southern mountain caribou would be well-represented when a sufficient number of metapopulations would be re-established and maintained across the DPS. While the Canadian Recovery Strategy (Environment Canada 2014) strives to recover all LPUs, some subpopulations may never achieve self-sustaining status because permanent land use changes (*e.g.*, valley bottom development) and climate change may prevent landscapes from returning to historical conditions conducive to the persistence of southern mountain caribou.
- **Redundancy**⁴ – In terms of southern mountain caribou, redundancy would refer to multiple resilient metapopulations (*e.g.*, 2 to 3 depending on an effective population size of 500 to 750 animals) comprised of multiple subpopulations whose ranges are regionally configured to endure catastrophic events.

To ensure long-term viability of southern mountain caribou, we will need to increase the redundancy, resiliency, and representation of the species. To achieve this, the following broad-scale management actions implemented in concert with one another should be implemented:

populations need abundant individuals within habitat patches of adequate area and quality to maintain survival and reproduction in spite of disturbance.

³ Representation describes the ability of a species to adapt to changing environmental conditions overtime. It is characterized by the breadth of genetic and environmental diversity within and among populations.

⁴ Redundancy describes the ability of a species to withstand catastrophic events. It is about spreading risk among multiple populations to minimize the potential loss of the species from catastrophic events. Redundancy is characterized by having multiple, resilient populations distributed within the species’ ecological settings and across the species’ range.

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1. Increase the abundance and distribution of southern mountain caribou.
2. Maintain the genetic integrity (diversity/characteristics) of southern mountain caribou.
3. Maintain appropriate habitat quality and quantity so that it is able to support the long term viability of southern mountain caribou.
4. Inform, educate, and involve the public in implementation activities.
5. Adaptively manage implementation activities.

A recent review by Boutin and Merrill (2016) emphasized that given current population sizes and trends of southern mountain caribou, multiple management actions would need to be simultaneously implemented to recover southern mountain caribou. Because population declines of southern mountain caribou are ultimately driven by landscape alteration, the principal strategy for recovery is the protection and restoration of suitable caribou habitat. However, protecting and restoring habitat is a long-term process and will be insufficient to prevent the short-term extirpation of most, if not all, of southern mountain caribou subpopulations (Schneider *et al.* 2010, Wittmer *et al.* 2010). Because of continued declines in most subpopulations and their current small population sizes, alternative measures are currently underway for improving southern mountain caribou population dynamics, including experimental maternal penning and directly decreasing predators (wolves) and alternate prey (moose) in an attempt to increase calf and adult survival. These actions may help in the short-term to stabilize some of the subpopulations.

C. Action Plan:

While habitat in the United States is currently considered unoccupied, there are two ways in which southern mountain caribou individuals may be present there: (1) a transient individual crosses the international border; or (2) there is a management decision to reintroduce caribou back into the southern Selkirk Mountains. Transient presence in the United States would involve individuals that might temporarily feed and shelter in the United States, but would likely not be breeding nor establishing a home range. As subpopulations recover in British Columbia, there may be a binational intention to reestablish southern mountain caribou subpopulations at the southern extent of the range, where individuals would likely move between countries as they have done historically. While this is not likely to occur in the near future, the retention of high-elevation, late-successional forests in the United States is essential to future reestablishment and achieving current targets for the southern Selkirk Mountains (*e.g.*, 90 to 100 caribou; MCRIP 2007, Environment Canada 2014, SCITWG 2019). The Service will actively coordinate with Canada to evaluate how habitat protection and potential reestablishment of southern mountain caribou in the United States contributes to resiliency, representation, and redundancy across the entire DPS.

Specific on-the-ground management activities that contribute to the implementation of each of the five broad-scale management actions identified above have been outlined in various

documents including the 2014 Canadian Recovery Strategy (Environment Canada) and the 2019 international South Selkirk Caribou Management Plan (SCITWG). High-priority activities are summarized below.

1. Increase the abundance and distribution of southern mountain caribou.
 - Manage predators and primary prey.
 - Manage access and timing of recreational activities in occupied caribou habitat to minimize trails and caribou displacement.
 - Conduct annual censuses.
 - Maintain radio-collars on a certain proportion of each subpopulation for monitoring habitat use and determining causes of mortality.
 - Consider maternal penning for subpopulations of appropriate size and when habitat conditions for that subpopulation are adequate.
2. Maintain the genetic integrity (diversity/characteristics) of southern mountain caribou.
 - Identify, maintain, and/or restore travel corridors within and between subpopulations.
 - Plan for future augmentation and/or reintroduction opportunities (*i.e.*, if/when caribou are available from a viable source). Augmentation or reintroduction should only occur when the site proposed for reintroduction is suitable for occupancy (*i.e.*, the primary threats have been ameliorated).
 - Consider a captive breeding program.
3. Maintain habitat to support the long-term viability of southern mountain caribou.
 - Monitor habitat conditions, including the amount of currently disturbed and undisturbed habitat, and amount of habitat being restored.
 - Manage habitat to meet life history requirements of southern mountain caribou.
 - Undertake landscape-level protection and planning that considers current and future southern mountain caribou habitat requirements.
4. Inform, educate, and involve the public in implementation activities.
 - Provide regular updates on the status of subpopulations, research, and recovery activities.
 - Evaluate opportunities to manage lands for multiple uses consistent with southern mountain caribou recovery.
 - Coordinate with interested stakeholders to identify multiple-use land management and recreational opportunities compatible with caribou recovery and share information.
5. Adaptively manage implementation activities.
 - Conduct research to identify and evaluate factors limiting southern mountain caribou (see section above on Important Information Gaps).
 - Prioritize recovery of each subpopulation based on risk factors, such as long-term population viability (*e.g.*, population size, trend, and connectivity with adjacent subpopulations), threats (*e.g.*, level of predation), and habitat condition, protection, and resilience to climate change.

III. Preliminary Steps for Recovery Planning

The Service intends to develop a binational southern mountain caribou recovery plan in coordination with federal, First Nation, and provincial agencies in Canada, and Federal, State, and Tribal agencies in the United States. Recovery planning will follow a revised process termed Recovery Planning and Implementation (RPI), adopted by the Service in 2016 (<https://www.fws.gov/endangered/esa-library/pdf/RPI.pdf>).

The Idaho Fish and Wildlife Office will lead the Service's coordination with Canada on recovery planning. Collectively, the United States and Canada will determine the recovery vision and criteria, and develop recovery actions that will most effectively achieve those criteria. Existing management plans or action plans will be utilized as appropriate. Groups or experts consulted may include academicians or managers who are authorities on caribou ecology and management, forest health and restoration, and population/conservation biology. Primary authorship of the recovery plan will be the responsibility of Service and Canadian Wildlife Service staff, but State and provincial wildlife management agencies, as well as Tribes and First Nations, will be involved in all phases of the planning and implementation processes. Input and review from stakeholders including local communities, industry, and conservation organizations will be sought during the public comment period for the draft recovery plan.

Recovery Planning Milestones:

A draft recovery plan will be completed within 18 months of initiation and a final recovery plan should be completed 1 year after release of the public review draft. These timelines may be affected by available resources and regional priorities.

Approved: _____



Regional Director,

U.S. Fish and Wildlife Service

NOV 27 2019

Date _____

Citation:

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