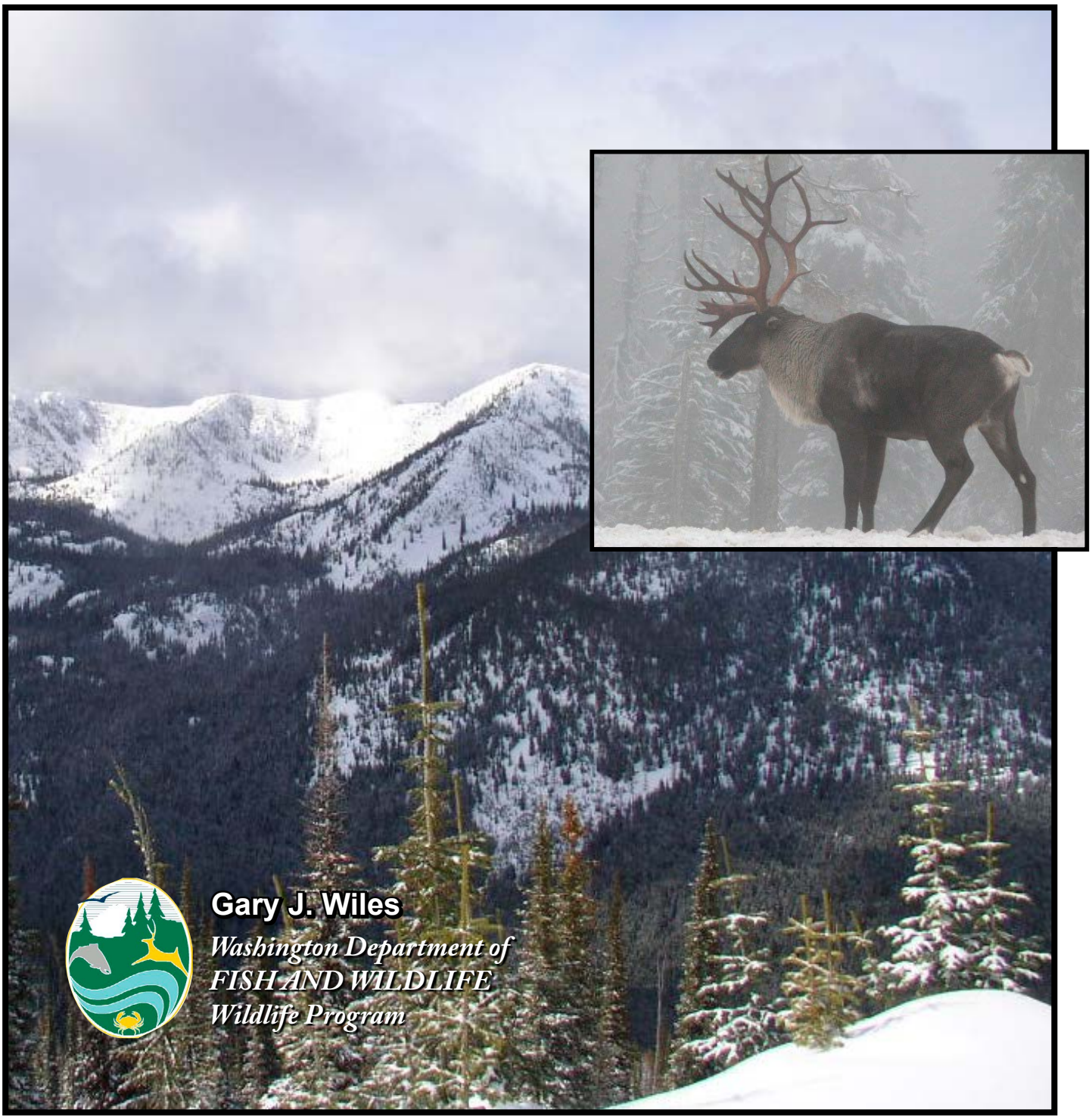
STATE OF WASHINGTON January 2017

Periodic Status Review for the Woodland Caribou



Gary J. Wiles

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FISH AND WILDLIFE
Wildlife Program

The Washington Department of Fish and Wildlife maintains a list of endangered, threatened, and sensitive species (Washington Administrative Codes 232-12-014 and 232-12-011). In 1990, the Washington Wildlife Commission adopted listing procedures developed by a group of citizens, interest groups, and state and federal agencies (Washington Administrative Code 232-12-297). The procedures include how species listings will be initiated, criteria for listing and delisting, a requirement for public review, the development of recovery or management plans, and the periodic review of listed species.

The Washington Department of Fish and Wildlife is directed to conduct reviews of each endangered, threatened, or sensitive wildlife species at least every five years after the date of its listing. The reviews are designed to include an update of the species status report to determine whether the status of the species warrants its current listing status or deserves reclassification. The agency notifies the general public and specific parties who have expressed their interest to the Department of the periodic status review at least one year prior to the five-year period so that they may submit new scientific data to be included in the review. The agency notifies the public of its recommendation at least 30 days prior to presenting the findings to the Fish and Wildlife Commission. In addition, if the agency determines that new information suggests that the classification of a species should be changed from its present state, the agency prepares documents to determine the environmental consequences of adopting the recommendations pursuant to requirements of the State Environmental Policy Act.

This document is a periodic status review for the woodland caribou in Washington. It contains a review of information pertaining to the status of woodland caribou in Washington. It was reviewed by species experts and was available for a 90-day public comment period from September 24 through December 23, 2016. All comments received were considered during the preparation of the final periodic status review. The Department intends to present the results of this periodic status review to the Fish and Wildlife Commission at a meeting on January 13, 2017, in Vancouver.

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Periodic Status Review for the Woodland Caribou in Washington

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EXECUTIVE SUMMARY

Woodland caribou (*Rangifer tarandus caribou*), a subspecies of caribou, occur across the boreal regions of North America and are comprised of eight recognized populations. The southern mountain caribou population consists of 17 subpopulations, or herds, with the South Selkirk subpopulation being one of these. This subpopulation occurs in the southern Selkirk Mountains of southeastern British Columbia, northeastern Washington (in Pend Oreille County), and northern Idaho, and is the only caribou herd that ranges into the contiguous U.S.

Southern mountain caribou are distinguishable from other populations of woodland caribou by their inhabitation of mountainous areas with deep snow accumulations and their winter diet of primarily arboreal lichens. These caribou prefer large areas of late successional conifer forests throughout the year and migrate seasonally to different elevations and forest types to seek food and suitable calving sites.

Overall abundance of southern mountain caribou has declined 45% since the late 1980s and was estimated at 1,544 animals during 2008-2014. Eleven of the 17 subpopulations show declining trends, nine hold fewer than 50 animals, and two have been extirpated since 2003. The South Selkirk subpopulation was considered abundant and possibly numbered in the hundreds in the late 1800s, but decreased to an estimated 25-100 caribou between 1925 and the mid-1980s. Numbers ranged between 33 and 51 animals from 1991 to 2009 despite being supplemented with 103 caribou in two separate multi-year translocations in the late 1980s and 1990s. Most recently, the subpopulation declined rapidly from 46 to 12 caribou between 2009 and 2016. The percent of calves in the subpopulation during late winter surveys averaged 9.9% per year from 2004 to 2016, which is below the estimated 12-15% needed to maintain a stable population with high adult survival. Additionally, the South Selkirk subpopulation is isolated from neighboring subpopulations, with probably no immigration occurring in recent decades.

Predation is considered the most immediate threat to the South Selkirk subpopulation. Although robust caribou populations are able to withstand some level of natural predation, any amount of predation on the now very small South Selkirk subpopulation is likely to greatly affect its future sustainability. In addition, past conversion of old-growth forests to earlier successional stages has brought higher densities of deer, moose, and elk and their predators (i.e., wolves, cougars, and bears) into closer proximity to herd members, resulting in greater predation risk to caribou. Other threats to the subpopulation are highway collisions, human disturbance associated mostly with winter backcountry recreation, small population size coupled with isolation, and climate change.

The small size and ongoing decline of the South Selkirk subpopulation has increased its risk of extirpation. It is therefore recommended that woodland caribou remain a state endangered species in Washington.

INTRODUCTION

This periodic status review summarizes the biology, population status, threats, and recent management actions directed at the single small subpopulation of woodland caribou (*Rangifer tarandus*) that occurs in Washington, British Columbia, and Idaho and is known as the South Selkirks herd. It also assesses whether the species should retain its current endangered status under state law or be reclassified to another status. Because woodland caribou were placed on the Washington Department of Fish and Wildlife's (WDFW) original list of endangered and threatened species in 1982, a status review has not been previously published by the agency.

SPECIES BACKGROUND

Figure 1. Female woodland caribou (photo by Thomas Hartmann, Wikimedia Commons).

Description. Male woodland caribou are larger than females, weighing 160-225 kg (350-500 lb) and 110-150 kg (240-330 lb) on average, respectively (Banfield 1961, Paquet 1997, Thomas and Gray 2002, Miller 2003). Both sexes have shoulder heights of 1.1-1.4 m (3.6-4.6 ft). Body, leg, and head coloration is dark brown, contrasting with a whitish neck, shoulders (sometimes extending to the flanks), rump, undertail, and patches above the hooves. Overall coloration becomes paler during the winter and spring. Adult males develop a distinctive white mane during the breeding season (rut). Adult males have large multi-pointed antlers reaching up to 90-120 cm (3-4 ft) in length and include a vertically flattened brow tine and sometimes palmate bez tines and upper beams. Caribou are the only species in the deer family in which females regularly have antlers, although some individuals may have just a single antler or none at all. Female antlers are smaller and simpler than those of males, reaching 30-45 cm (1-1.5 ft) in length (Figure 1). Antlers are shed from November to April in males and from May to June in females (USFWS 1994). Caribou have large, rounded hooves and large, widely-separated dew claws that allow them to cross deep snow and wetlands.

Taxonomy, populations, and distribution. Caribou are members of the deer family (Cervidae) and are distributed across much of the boreal and tundra regions of northern North America and northern Eurasia (where they are known as reindeer). Taxonomy is in need of revision (COSEWIC 2014), but 10 to 14 subspecies are currently recognized, five of which are native to North America, including one that is extinct (Banfield 1961, Grubb 2005, Mattioli 2011). The subspecies *R. t. caribou*, or woodland caribou, is currently distributed from Washington and Idaho northward to southern Yukon, and eastward through Ontario to Newfoundland and Labrador, but occurred as far south as Minnesota, Michigan, northern New England, and the Canadian maritime provinces until the 1800s or first half of the 20th century (Banfield 1961, Miller 2003).

Woodland caribou are separable into eight geographically distinct populations, or "designatable units" (COSEWIC 2011). The three westernmost populations are known as (1) southern mountain caribou (distributed mainly through the Cariboo, Monashee, Purcell, and Selkirk Mountains from

east-central British Columbia to northeastern Washington, northern Idaho, and formerly northwestern Montana), (2) central mountain caribou (distributed along the eastern Rocky Mountains in east-central British Columbia and west-central Alberta), and (3) northern mountain caribou (distributed from central British Columbia to Yukon) (COSEWIC 2014; Appendix A). Southern mountain caribou are distinguished from other western populations by their inhabitation of mountainous areas with deep snow accumulations and winter diet of primarily arboreal lichens (COSEWIC 2011, 2014). Seventeen subpopulations, or herds, of southern mountain caribou are currently recognized, one of which is the South Selkirk subpopulation (COSEWIC 2014).

The recovery area of the South Selkirk subpopulation covers portions of Pend Oreille County in Washington, Boundary and Bonner counties in Idaho, and the Regional District of Central Kootenay in British Columbia (Figure 2). In the U.S., the distribution includes parts of the Colville and Idaho Panhandle National Forests, state of Idaho lands, and scattered private parcels. The recovery area measures 3,810 km^2 (1,471 mi^2), with 2,028 km^2 (783 mi^2; 53.2%) present in British Columbia, 1,223 km^2 (472 mi^2; 32.1%) in Idaho, and 559 km^2 (216 mi^2; 14.7%) in Washington (Appendix B).

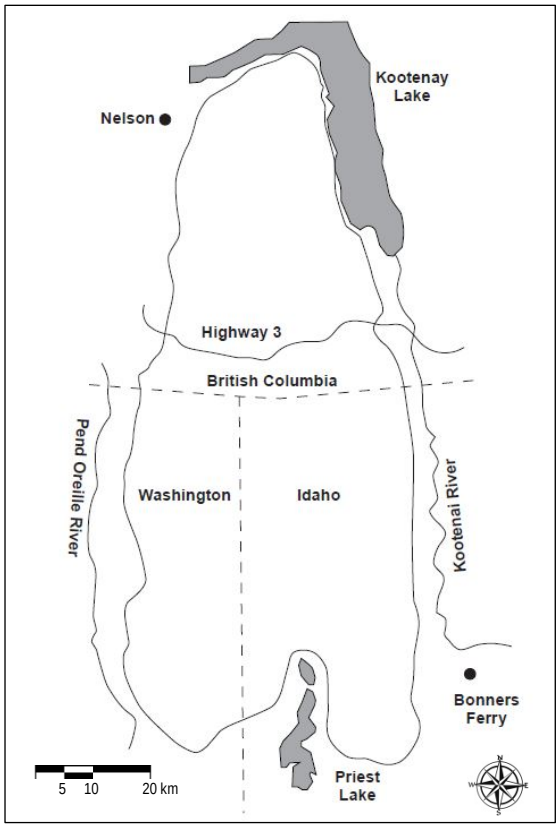

Figure 2. Approximate recovery area of the South Selkirk caribou subpopulation (adapted from GAO 1999).

Legal status. The South Selkirk subpopulation of woodland caribou was emergency listed as endangered under the U.S. Endangered Species Act in 1983, with a final listing determination made in 1984. Endangered listings of the woodland subspecies were approved under state law in Washington in 1982 (WAC 232-12-014) and Idaho in 1977 (USGAO 1999). At the federal level in Canada, the status of southern mountain caribou, including the South Selkirk subpopulation, was changed from threatened to endangered by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) in 2014, but the population remains listed as threatened under the Species at Risk Act (reclassification to endangered is pending a review and decision by Canada's Environment Minister [USFWS 2015]). In British Columbia, the population carries a provincial status of "S1," meaning that it is considered critically imperiled, and is on the provincial "red list" signifying that it is endangered or threatened.

NATURAL HISTORY

Habitat. Historically, southern mountain caribou inhabited landscapes characterized by contiguous old-growth forests with low levels of natural disturbance (Seip 1998). The population exhibits distinct seasonal habitat preferences that vary in elevation, with large areas of late successional conifer forests occupied throughout the year (Apps et al. 2001, Apps and McLellan 2006,

Environment Canada 2014). Selected habitats are generally conducive to avoiding predators and humans, and frequently provide abundant growth of arboreal lichens, which are the primary food in winter. Connectivity within and between caribou ranges is another important habitat feature.

The South Selkirk subpopulation occupies seasonally different elevations and forest types (Freddy 1974, Scott and Servheen 1985, Rominger and Oldemeyer 1989, Servheen and Lyon 1989, USFWS 1994, 2012a, Kinley and Apps 2007). Steep terrain is usually avoided in favor of subalpine basins with gentler topography (Scott and Servheen 1985, Kinley and Apps 2007). In early winter (mid-October to mid-January), the caribou inhabit stands of Engelmann spruce (*Picea engelmannii*) and subalpine fir (*Abies lasiocarpa*) with open to moderate canopy closure (26-50%) and old-growth stands of western hemlock (*Tsuga heterophylla*) and western redcedar (*Thuja plicata*) with heavy canopy closure (76-100%) at elevations of 1,360-1,970 m (4,460-6,465 ft). Trees with large amounts of arboreal lichen are an important feature of occupied areas. In late winter (mid-January to mid-April), the subpopulation uses ridgetops and slopes exceeding 1,660 m (5,450 ft) with mature to old-growth spruce and subalpine fir forests with open to moderate canopy closure and large loads of arboreal lichen.

In spring (mid-April to early July), South Selkirk caribou return to mid-elevation spruce and subalpine fir forests with greening forage (Freddy 1974, Scott and Servheen 1985, Rominger and Oldemeyer 1989, Servheen and Lyon 1989, USFWS 1994, 2012a, Kinley and Apps 2007), mostly using areas with a mix of open and dense forest canopies. During the calving season in late spring (late May to early July), reproductive females occupy high ridgetops and slopes with non-forested areas bordering old-growth conifer forests. In summer (early July to mid-October), high elevation basins and other sites with lush forage (e.g., riparian strips, meadows, seeps) in mature and old stands of spruce and subalpine fir are typically selected. Servheen and Lyon (1989) reported regular use of cutover forests in the spring, but more recent information suggests this habitat is avoided year-round (Kinley and Apps 2007; N. Merz, pers. comm.; L. DeGroot, pers. comm.).

Social organization. Unlike migratory caribou that can occur in large herds of up to 500,000 animals (Mattioli 2011), woodland caribou form relatively small groups. Group size in the South Selkirk subpopulation ranges from single females during calving up to about 25 animals during the rut and late winter (Figure 3; USFWS 2012a). Males usually occur in smaller groups (typically 2-5 animals) than females, but occasionally are solitary (L. DeGroot, pers. comm.). During the rut, males seek out groups of females and immatures (Scott 1985). Membership within groups is somewhat fluid, with individuals of both sexes usually switching among

Figure 3. Members of the South Selkirk caribou subpopulation during the 2012 winter census (photo by Leo DeGroot, B.C. Ministry of Forests, Lands and Natural Resource Operations).

groups over time (Cichowski et al. 2004).

Reproduction. Rutting activity occurs from late September to late October, peaking from early to mid-October (Johnson and Miller 1979, USFWS 1994). During the rut, dominant males defend small groups of 6-10 females and calves, and mate with multiple females (Cichowski et al. 2004). Most females do not breed until 2.5 years old, although some yearlings may conceive if in good body condition (Miller 2003). Pregnancy rates among mountain caribou are high, typically exceeding 90% (Seip and Cichowski 1996, Wittmer et al. 2005a), suggesting that populations are not nutritionally limited. Almost all pregnancies produce a single calf, with births taking place from late May to early July (USFWS 2012a; L. DeGroot, pers. comm.). Calves are able to stand and follow their mothers within 5-7 hours of birth. Caribou have lower productivity than other North American cervids because of their single calves and generally later age of first reproduction.

Diet. In early winter, the diet of South Selkirk caribou includes shrubs (especially Oregon boxleaf [*Paxistima myrsinites*]), conifers, and forbs, but begins shifting to arboreal hair lichens (*Bryoria* spp. and *Alectoria sarmentosa*) as snowpack accumulates and hardens (Scott and Servheen 1985, Rominger and Oldemeyer 1990). By late winter, when caribou can walk on top of deep snows, foods consist almost entirely of arboreal lichens (Rominger et al. 1996), which are obtained from accessible tree branches, windfallen branches and trunks, and as litterfall off the snow surface. During spring and summer, the diet comprises a variety of grasses, sedges (*Carex* spp.), rushes (*Juncus* spp.), forbs, arboreal lichens, horsetails, shrub and tree leaves, and conifer needles and bark (Freddy 1974, Scott and Servheen 1985, Rominger et al. 2000). An exception to this pattern are reproductive females during the calving period, who return to snow-covered ridgetops and resume feeding on arboreal lichens for 4-6 weeks (Scott and Servheen 1985).

Movements. Mountain caribou and other woodland caribou do not undertake the long annual migrations involving large numbers of animals as noted among tundra-dwelling caribou. Instead, mountain caribou are usually sedentary within their subpopulation ranges and move seasonally among different habitats and elevations (Paquet 1997, Simpson et al. 1997, Apps et al. 2001). Seasonal movements of the South Selkirk subpopulation are described in the Habitat section (pp. 2-3). Fidelity to seasonal ranges among years varies from 50 to 78% (Wakkinen and Slone 2010).

Annual home ranges of southern mountain caribou typically range in size from about 90 to 600 km^2 (35 to 232 mi^2) (Paquet 1997). Within the South Selkirk subpopulation, annual home ranges of resident animals averaged 131-173 km^2 (range = 62-254 km^2) (51-67 mi^2 [range = 24-98 mi^2]) (Scott and Servheen 1985). Seasonal home ranges varied from 1 to 44 km^2 (0.4 to 17 mi^2) among resident animals (Scott and Servheen 1985) and from medians of 8 to 64 km^2 (3 to 25 mi^2) among translocated individuals (Wakkinen and Slone 2010). Daily movements by translocated animals were highest in the spring and lowest in the late winter. Median distances moved between the centers of successive seasonal home ranges measure 6-8 km (4-5 mi), although longer distances between ranges are sometimes recorded (median distance = 13-15 km [8-9 mi]; Wakkinen and Slone 2010).

Recent analyses have detected very little movement of southern mountain caribou among neighboring subpopulations, indicating that many herds are now isolated (van Oort et al. 2011, Serrouya et al. 2012). Interchange among resident members of the South Selkirk subpopulation and the two nearest herds, the Purcells-South (48 km [30 mi] away) and Nakusp (97 km [60 mi] away) subpopulations, has never been detected since research began in the 1980s, although some

translocated individuals traveled from the South Selkirk herd to both neighboring herds (USFWS 2008).

Population demographics. Female caribou generally live 10-15 years and males 8-12 years (USFWS 1994). Calf mortality is highest (≥40%) during the first few months of life, then continues at lower rates during the remainder of the first year (Seip and Cichowski 1996, COSEWIC 2014). By late winter, calves represent just 1-23% (average = 12%) of southern mountain caribou subpopulations (Wittmer et al. 2005a). In populations with high adult survival, calves generally must constitute 12-15% of a herd to maintain a stable trend (Bergerud 1996), but higher recruitment levels are needed in herds with lower adult survival. On average, calves represented 9.9% (range = 4.3-17.2%) of the South Selkirk subpopulation during late winter counts from 2004-2016 (Appendix C). In southern mountain caribou subpopulations, mean annual survival among adult females varies from 55-96% (average = 83%; Wittmer et al. 2005a, COSEWIC 2014). Similar annual survival rates (range = 65-94%, average = 74%) occurred among female and male caribou translocated to the South Selkirk herd (Compton et al. 1995).

Predation by wolves (*Canis lupus*), cougars (*Puma concolor*), and bears (*Ursus americanus*, *U. arctos*) is a major cause of mortality among southern mountain caribou (Kinley and Apps 2001, Wittmer et al. 2005a, COSEWIC 2014). Cougars and wolves have been the most important predators of the South Selkirk subpopulation in recent decades (Compton et al. 1995, Almack 2002, DeGroot 2016). Other causes of death among southern mountain caribou include malnutrition, vehicle collisions, other accidents (e.g., avalanches, falls), and poaching (USFWS 1994, Wittmer et al. 2005a). Diseases and parasites are not considered significant sources of mortality (COSEWIC 2014).

POPULATION AND HABITAT STATUS

Global. Many populations of woodland caribou, including southern and central mountain caribou, have significantly declined in abundance and distribution since Euro-American contact, especially in the southern portions of the range (Thomas and Gray 2002, Festa-Bianchet et al. 2011, Ray et al. 2015). In British Columbia, caribou numbers have fallen from possibly 30,000-35,000 animals in the 1800s (Spalding 2000) to an estimated 16,700 to 18,200 animals in 2014, with the occupied range of all populations combined contracting by about a third (COSEWIC 2014).

Southern mountain caribou abundance has declined 45% since the late 1980s and 27% since 2002, with the most recent counts (from 2008-2014) of the 17 subpopulations totaling an estimated 1,544 animals, including 1,354 mature individuals (i.e., yearlings and adults; COSEWIC 2014). Eleven of the subpopulations show recent declining trends, three are stable, one is increasing, and two have been extirpated since 2003 (COSEWIC 2014). The two largest subpopulations hold 459 and 392 caribou each, whereas 13 subpopulations contain fewer than 250 animals, nine hold fewer than 50 animals, and seven have fewer than 15 animals (COSEWIC 2014, DeGroot 2016). Most of the smaller and more isolated subpopulations occur in the southern portion of the population's range (Wittmer et al. 2005a, COSEWIC 2014). The probabilities of extinction or quasi-extinction (i.e., declining to ≤20 animals) exceed 20% within the next 20-45 years for many of the remaining subpopulations (Hatter 2006, Wittmer et al. 2010). Southern mountain caribou once ranged as far south as the Salmon River in Idaho (Evans 1960) and northwestern Montana (Banfield 1961). The

last confirmed record of resident animals in Montana was in 1958, although a few unconfirmed reports persisted until the mid-1980s (Manley 1986, USFWS 1994).[1] The historical occurrence of caribou in Washington extended as far west as Okanogan County (Taylor and Shaw 1929), but it is unknown which subpopulation these animals belonged to. Overall, as much as 60% of the historical range of southern mountain caribou is no longer occupied (I. Hatter, pers. comm. in Spalding 2000: 40).

South Selkirk subpopulation past. Records from the 1800s indicate that caribou were abundant in the general area of this subpopulation (Seton 1927, Layser 1974), with possibly "hundreds" of animals once present around Priest Lake, Idaho (Flinn 1956). Occurrence in Washington apparently declined rapidly, with several authors reporting caribou as being sparse or extirpated in the state for several decades after a major forest fire in 1915 (Taylor and Shaw 1929, Booth 1947, Dalquest 1948), although the reports obtained by Layser (1974) suggest somewhat greater presence during this period. Two estimates of the subpopulation placed total numbers at only about 100 animals in the 1950s (Flinn 1956) and probably fewer than 50 animals from 1925 to 1971 (Freddy 1974).

Reliable census data were not obtained until the implementation of aircraft into surveys. This method, in combination with ground surveys, resulted in subpopulation estimates of about 25 caribou in 1973-1974 (Freddy 1974) and 26-28 caribou annually from 1983 to 1985, when nearly all animals were detected in British Columbia (Scott and Servheen 1985). Translocation of 60 caribou into the subpopulation from 1987 to 1990 (see Subpopulation Augmentation) increased herd size to 47 by 1991 and temporarily established a second group of animals in Idaho (Appendix C; Warren et al. 1996).

South Selkirk subpopulation present. Annual surveys of the subpopulation have been conducted since 1991, with survey activities typically occurring between mid-February and early April depending on weather and snow conditions. Surveys begin with one or more fixed-wing aircraft flights of the herd's range to determine distribution and to make an initial count of animals (Wakkinen et al. 1996, Resources Inventory Committee 2002). This is followed soon after by a helicopter flight to confirm the count and classify individuals by age class.

Subpopulation size ranged from 39 to 51 caribou during 1991-1999 (Appendix C). Translocations of 11-19 animals annually from 1996 to 1998 (see Subpopulation Augmentation) helped maintain numbers during this period. Numbers fell to 33-36 caribou during 2000 to 2006, increased to 43-46 animals from 2007 to 2010, then declined rapidly to just 12 caribou by 2016. The proportion of calves in the subpopulation during late winter surveys has been relatively low in recent years, averaging 9.9% per year from 2004 to 2016 (Appendix C), which is below the estimated 12-15% needed to maintain a stable population with high adult survival.

Translocations resulted in about half of the subpopulation occurring in Idaho and Washington during winter surveys in 1991-1993 and more than half in 1998 (Appendix C). However, occurrence in the U.S. declined sharply thereafter, with nearly all winter survey detections made in British Columbia after 1999 and none made in five of the six years since 2011. This distribution pattern

[1] Five translocated animals from the Purcells South subpopulation in southeastern British Columbia briefly visited northwestern Montana in 2013 (Person 2013).

generally reflects the year-round occurrence of the subpopulation, with the remaining animals now spending little time in Washington or Idaho during any part of the year. However, occasional sightings of one or a few animals continue to occur annually south of the international border (SCITWG, unpublished meeting notes).

Of the 381,015 ha (941,507 ac) occurring within the subpopulation's range, 95% is owned by government agencies or conservation groups (Appendix B), most of which is managed with caribou needs in mind. Most of the existing habitat in Washington and Idaho is considered to be in relatively good condition for caribou, with about 65% of the forest now more than 100 years old (L. Allen, pers. comm.). A number of management measures are currently directed at protecting the herd's habitat in the U.S. and British Columbia (see Habitat Protections). One important remaining concern, however, is the general lack of suitable habitat at lower elevations, which prevents connectivity with other subpopulations.

FACTORS AFFECTING CONTINUED EXISTENCE

Adequacy of existing regulatory mechanisms. The South Selkirk subpopulation receives major protections through its endangered or threatened classifications under federal (U.S., Canada), state, and provincial laws. These make it illegal to take (defined as harassing, hunting, capturing, killing, or attempting to harass, hunt, capture, or kill) members of the subpopulation or to import these animals or products derived from them. A petition to delist the herd under the U.S. Endangered Species Act was found not warranted by the U.S. Fish and Wildlife Service (USFWS) in 2014 (USFWS 2012b, 2014). At the same time, the USFWS proposed to amend the listing of U.S. caribou to a distinct population segment (DPS) comprised of all southern mountain caribou subpopulations (including the South Selkirk herd) and proposed to list the DPS as threatened (USFWS 2014). A final decision on this proposal is pending.

A 2011 USFWS proposal to designate 151,985 ha (375,562 ac) of critical habitat for caribou in Washington and Idaho under the Endangered Species Act was reduced in a final decision to 12,145 ha (30,010 ac) of national forest lands at or above 1,524 m (5,000 ft) elevation (USFWS 2011, 2012a). Following a federal judge's ruling, the USFWS reopened its critical habitat decision for an additional 30 days of public comment beginning on April 19, 2016 (USFWS 2016), and is currently evaluating those comments.

Under section 7 of the Endangered Species Act, all U.S. federal agencies must ensure that any actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of a listed species, or destroy or adversely modify its designated critical habitat. U.S. federal agencies must therefore consult with the USFWS to avoid and minimize impacts of their activities on the South Selkirk subpopulation. In practice, any federal action proposed in the herd's recovery area is reviewed by the USFWS to avoid or minimize impacts to caribou.

Habitat loss, degradation, and fragmentation. Since the late 1800s, many of the old-growth forests required by southern mountain caribou have been subjected to substantially increased levels of disturbance caused by timber harvest and associated road building, other human development (e.g., human settlement, farming, utility corridors), wildfires, and insect outbreaks (Cichowski et al. 2004, USFWS 2014). These interacting factors have caused widespread mixing of mature and old-growth forests with younger-aged stands and far greater fragmentation of forest habitats, especially

at lower and mid-elevations. These conditions, to which southern mountain caribou are not adapted, often result in significantly increased amounts of predation on caribou, as well as less total habitat and reduced availability of arboreal lichens, an essential winter food (Stevenson et al. 2001, Apps and McLellan 2006, Wittmer et al. 2007). Fragmentation of forests can also isolate caribou subpopulations from one another by creating unfavorable habitat for dispersal, thereby causing a breakdown in the metapopulation dynamics needed to sustain subpopulations (van Oort et al. 2011). Once altered, forestlands need numerous decades to return to the late successional conditions most suitable for caribou.

Logging occurred in significant portions of the range of the South Selkirk subpopulation between the early 1900s and the 1970s (and until the 1990s in British Columbia), with harvest activities beginning in the lowlands and expanding to higher elevations (Evans 1960, Johnson 1976). Harvest has greatly declined throughout the herd's range in more recent decades because of a greater management emphasis on habitat protection for caribou and other species. Forest fires and insect outbreaks have also played a role in altering forest characteristics (Evans 1960, USFWS 2014). Fires impacted much of the herd's range during the 1800s, but have decreased in occurrence since the implementation of modern fire suppression efforts in the 1930s, although large burns still take place on occasion (e.g., 32,000 ha [79,100 ac] in 1967, 8,000 ha [19,800 ac] in 2003; Layser 1974, Allen 1999, USFWS 2014). Allen (1999) reported increasing amounts of most types of late successional forest within the range of the South Selkirk subpopulation in Idaho during the 20th century, trends that presumably applied to Washington as well. Protections implemented in British Columbia (USFWS 2012a) have also led to improved forest conditions for the herd.

Predation. A critical survival strategy of mountain caribou is to spread out in low densities over large areas of their high elevation habitat, where other ungulates and their predators are absent or rare (Bergerud and Elliot 1986, Seip and Cichowski 1996). A major outcome of widespread timber harvest and increased fire frequency in the old-growth forest landscapes inhabited by mountain caribou is the creation of extensive areas of the early successional forests favored by moose (*Alces alces*), deer (*Odocoileus* spp.), elk (*Cervus elaphus*), and, in turn, their predators (MCTAC 2002). This has brought higher densities of wolves, cougars, and bears into closer proximity to caribou, thereby increasing the likelihood of incidental predation on caribou (Bergerud and Elliot 1986, Seip 1992). This shift in predator-prey dynamics has become the most important factor in the decline of many mountain caribou subpopulations and results in unsustainable levels of predation on caribou, especially in summer (Seip 1992, Wittmer et al. 2005b, 2007, Apps et al. 2013). Creation of linear openings (e.g., roads, seismic lines, utility corridors) through older forest has further contributed to this problem by allowing easier travel and hunting by wolves (James and Stuart-Smith 2000, Whittington et al. 2011, Apps et al. 2013). In addition, the impacts of predation on herd viability are exacerbated as subpopulations decline to small sizes.

Habitats in or adjacent to the range of the South Selkirk subpopulation support a variety of other ungulates (in order of abundance, white-tailed deer [*O. virginianus*], mule deer [*O. hemionus*], moose, elk, and bighorn sheep [*Ovis canadensis*]), as well as cougars, wolves, black bears, and grizzly bears (Clarke 2002, 2003, Katnik 2002, Robinson et al. 2002, Becker et al. 2016; D. Base, pers. comm.; B. Hoenes, pers. comm.). Studies between the 1980s and early 2000s revealed that most attributed caribou mortality was caused by predation (Compton et al. 1995, Almack 2002). Cougars caused the majority (12 of 16) of documented predator kills during this period, with bears responsible for the other four losses (Compton et al. 1995, Almack 2002). Clarke (2002, 2003) and Katnik (2002) found

that a few cougars extended their summer and early fall home ranges to higher elevations in response to similar seasonal movements by deer. This resulted in some overlap of distributions between cougars and caribou, allowing some opportunistic predation on caribou. Wolves have expanded into the subpopulation's range since 2008, with an estimated 24-26 wolves in five packs overlapping with the herd in British Columbia by 2014 (DeGroot 2016). Increased wolf abundance strongly coincides with the herd's decrease since 2009, with at least two caribou mortalities linked to wolves during this period (DeGroot 2016).

Highway mortality. The South Selkirk herd is one of several mountain caribou subpopulations that are vulnerable to mortality from automobile collisions (COSEWIC 2014). The South Selkirk herd's range is bisected by B.C. Highway 3, a well-traveled road built in 1963 over Kootenay Pass just north of the international border. A 7-km stretch of the highway extends through the herd's core habitat on both sides of the pass. Caribou regularly cross the highway throughout the year (Johnson and Todd 1977, USFWS 1994) as they move between the northern and southern portions of their range. Vehicle collisions with caribou have been documented over the years (e.g., Layser 1974, Johnson 1985), with four animals killed or injured since 2009 (three killed in the winter of 2008-2009 and one injured and dying soon after in 2015). Despite some steps to increase driver awareness of caribou, there is a continued risk of mortality. One factor related to this is the continued use of winter road salt on the highway, which attracts herd members to roadside margins.

Recreational activities. Backcountry recreational activity, especially in winter, has the potential to disturb and displace mountain caribou from preferred habitats and to increase their risk of predation and exposure to avalanches (Seip and Cichowski 1996, Simpson and Terry 2000, Cichowski et al. 2004, Seip et al. 2007, COSEWIC 2014, USFWS 2014). Disturbance and displacement can increase stress and energy expenditure among caribou (Reimers et al. 2003, Freeman 2008) and potentially reduce feeding and body condition, whereas hardpacked winter trails can allow wolves and other predators greater access to caribou (COSEWIC 2014). In recent decades, winter activities (e.g., snowmobiling, skiing, heli-skiing, snowshoeing) have expanded to many of the remote areas required by caribou (Seip et al. 2007). Accessibility via forest road networks is a key component facilitating snowmobile activity in caribou winter habitat. Concerns about snowmobile presence affecting the South Selkirk subpopulation date back to at least the early 1970s (Layser 1974) and instances of displacement of herd members by snowmobiles have been documented (Anonymous 2004). Snowmobiling and other forms of winter backcountry recreation occur much less frequently in the Washington portion of the herd's range (M. Borysewicz, pers. comm.) than in the Idaho portion, where a substantial increase in snowmobile use and other winter activity happened from the late 1990s to 2009 (Wakkinen et al. 2009).

Small subpopulation size and isolation. Small isolated subpopulations of caribou, such as the South Selkirk herd, face higher risks of extirpation from stochastic events (e.g., disproportionate effects from predation, fires, and avalanches; skewed sex ratios; difficulty in finding the other sex during the rut; loss of habitat traditions; loss of group vigilance for predators [COSEWIC 2014]) as well as reduced genetic diversity (Serrouya et al. 2012, Weckworth et al. 2012) that can cause inbreeding depression and reduced fitness. Although analyses of the South Selkirk subpopulation indicate it has a high level of genetic diversity likely resulting from prior translocations (Zittlau 2004, Serrouya et al. 2012), its small size means that it may experience founder effects upon recovery.

Climate change. Climate change will likely affect mountain caribou populations in a number of ways (Price et al. 2013, USFWS 2014). Warmer temperatures, changes in precipitation, greater fire severity and occurrence, and increased tree mortality from insects, disease, and drought stress will probably alter habitat availability and quality for caribou. The possibility of reduced snowpack and earlier snowmelt could also reduce caribou access to arboreal lichens. These factors may also produce better habitat and milder winter conditions for deer, moose, and elk, resulting in higher predator densities and increased predation risk for caribou.

Hunting and poaching. Excessive harvest probably contributed to many caribou herd declines in British Columbia until the 1970s (Seip and Cichowski 1996, Spalding 2000). The South Selkirk subpopulation, long hunted by Native American tribes in the area, experienced increased hunting levels after Euro-American settlement in the late 1800s and early 1900s, including some commercial harvest (Layser 1974). Full legal protection of the subpopulation from hunting took place in 1913 in Washington and Idaho (Darwin 1913; SCITWG, unpublished draft report) and in 1957 in British Columbia (Scott 1985). However, poaching of animals and some accidental harvest through misidentification with deer and elk continued until the 1990s, when greater public outreach was undertaken to prevent these problems (Nickelsen 1938, USFWS 1984, 1994, Johnson 1985; SCITWG, unpublished draft report). There have been no known cases of illegal hunting or accidental harvest within the herd since 1997 (SCITWG, unpublished draft report).

Disease and parasites. Caribou are susceptible to various diseases and parasites, but none are known to significantly impact mountain caribou populations (Miller 2003, COSEWIC 2014). The meningeal worm (*Parelophostrongylus tenuis*), which limits caribou occurrence in areas with white-tailed deer (*Odocoileus viginianus*) in eastern North America, is not known to exist in the Selkirk Mountains or in British Columbia (Foreyt and Compton 1991, COSEWIC 2014).

Avalanches. Avalanches can be a source of caribou mortality in areas of mountainous terrain and high snowfall (Environment Canada 2014). Avalanches are a regular occurrence in the southern Selkirk Mountains, but are not known to have killed members of the South Selkirk subpopulation (SCITWG, unpublished draft report).

MANAGEMENT ACTIVITIES

Recovery of the South Selkirk subpopulation is a multi-partner effort involving agencies, tribes/First Nations, and conservation groups in both the U.S. and British Columbia. Intensive management of the herd is necessary to prevent its extirpation (MCTAC 2002) and will require the use of multiple conservation tools.

Conservation planning. A U.S. federal recovery plan was prepared for the subpopulation in 1985 and updated in 1994 (USFWS 1985, 1994). Similar recovery strategies have been developed for the entire southern mountain caribou population in British Columbia, including the South Selkirk herd (e.g., MCTAC 2002, Environment Canada 2014). The International Mountain Caribou Technical Committee worked on recovery planning and information sharing for the South Selkirk subpopulation from 1971 to 2011. In 2015, the USFWS contracted with the Kootenai Tribe of Idaho to lead a technical working group to help revise the U.S. federal recovery plan and recommend immediate management actions and research initiatives for recovering the herd. The

working group, known as the Selkirk Caribou International Technical Work Group (SCITWG), is comprised of tribal, federal, state, provincial, and county representatives.

Habitat protections and management. In Washington and Idaho, measures protecting habitat for the South Selkirk subpopulation began in the late 1970s and are ongoing (L. Allen, pers. comm.). These include (1) preserving mature to old-growth cedar/hemlock and subalpine spruce/fir stands, (2) reviewing site-specific forest management actions and their potential impacts on caribou habitat, (3) avoiding road construction through old-growth forest stands unless no other reasonable access is available; (4) conducting road closures and habitat mitigation based on caribou seasonal habitat needs and requirements, and (5) controlling wildfires to prevent loss of caribou habitat (USFWS 2014). In 2012, the USFWS designated 12,145 ha (30,010 ac) of national forest lands as federal critical habitat for caribou in Washington and Idaho (USFWS 2012a), but a court ruling in 2015 reopened the decision pending further public comment (see Adequacy of Existing Regulatory Mechanisms). The Salmo-Priest Wilderness (17,542 ha [43,348 ac]) in Washington overlaps in part with critical habitat and also carries stringent habitat protections. Forest plans developed in the 1980s for the Colville and Idaho Panhandle national forests called for suppression of wildfires that threatened caribou habitat (IPNF 1987, CNF 1988). Recent revisions or draft revisions to these plans allow fires to more broadly fulfill their natural ecological roles, but call for either full suppression of fires where the long-term recovery of caribou may be adversely affected (CNF 2016) or managing fires as needed to maintain caribou habitat over the long-term (IPNF 2015). Some timber harvest (e.g., thinning, selection harvest of immature stands) is allowed on national forest lands in the subpopulation's recovery area to enhance habitat conditions for caribou. Timber harvest also continues on Idaho state lands and private lands within the herd's range in Idaho and Washington. Although the Idaho Department of Lands has no policies specifically protecting caribou habitat on its lands, it does consult with the Idaho Department of Fish and Game on proposed timber sales affecting wildlife.

British Columbia has also taken significant steps in recent years to protect the forestlands used by the subpopulation from logging. Timber harvest in this area was restricted in the late 1990s and was terminated in 2007 (SCITWG, unpublished draft report). At present, 146,622 ha (362,311 ac) of provincial Crown lands and 55,000 ha (135,908 ac) of adjacent habitat owned by the Nature Conservancy of Canada are protected for the herd (NCC 2015; SCITWG, unpublished draft report). The province attempts to aggressively suppress fires in caribou habitat (L. DeGroot, pers. comm.). Establishment of critical and matrix habitat (as defined in Environment Canada 2014) for the herd within British Columbia is currently underway (L. DeGroot, pers. comm.).

Predator management. Predator reduction programs and liberalized hunter harvest of other ungulates have shown some success in increasing or stabilizing the sizes of mountain caribou subpopulations (COSEWIC 2014, Hervieux et al. 2014, Hayek et al. 2016). The first of these measures has been attempted for the South Selkirk herd through the culling of 11 and 9 wolves in the British Columbia portion of the herd's range in the winters of 2014-2015 and 2015-2016, respectively (DeGroot 2016). British Columbia and Idaho provide liberal hunting and trapping seasons for wolves, whereas wolves are protected in Washington. However, under Washington's wolf conservation and management plan (Wiles et al. 2011:116), wolf abundance can be locally reduced where wolves are determined to be a primary limiting factor on at-risk ungulate populations, such as the South Selkirk subpopulation. All three jurisdictions allow harvest of cougars and black bears within the herd's range, but none have expanded hunting opportunities for deer, moose, or elk

specifically to benefit caribou (D. Base, pers. comm.; W. Wakkinen, pers. comm.; T. Szkorupa, pers. comm.).

Other approaches that may reduce predation are maternal penning, predator exclusion fencing, and long-term habitat restoration (e.g., Hayek et al. 2016). Maternal penning involves capturing pregnant female caribou in late spring and holding them in a secure enclosure (typically 3-7 ha [7-17 ac] in size) with natural habitat until their calves become less vulnerable to predators at one to several months of age. With predator exclusion fencing, caribou are kept in larger enclosures (multiple km^2 in size) of natural habitat for several years or more to protect them from predation; this method remains untested in the wild. Both techniques are currently being assessed for the South Selkirk subpopulation (SCITWG, unpublished meeting notes). Ongoing management of forest toward old-growth conditions should also benefit the herd by gradually reducing the early successional forest habitat preferred by other ungulates, thereby resulting in lower predator abundance.

Recreation management. Reductions in public access through permanent road closures, gate closures, and restrictions on snowmobile and other motorized use have been used to protect southern mountain caribou from recreational disturbance. In Washington and Idaho, the South Selkirk subpopulation has benefited from various year-round or seasonal restrictions on human activity since the 1980s, which were enacted to protect either caribou or grizzly bears, or through designation of the Salmo-Priest Wilderness. Between 2005 and 2007, a court injunction restricted snowmobiles and trail grooming on 96,957 ha (239,588 ac) of U.S. Forest Service lands to protect caribou (USFWS 2014). This closure will remain in effect until the U.S. Forest Service develops a formal winter recreation plan for the area. The agency also conducts winter patrols to monitor closed roads and areas, and to inform recreationists about the needs of wintering caribou. In the British Columbia portion of the range, most of the Nature Conservancy of Canada property (55,000 ha (135,908 ac) and two areas of provincial Crown lands (26,000 ha [64,246 ac]) representing most of the habitat currently used in winter are closed to snowmobiles (L. DeGroot, pers. comm.).

Reduction of highway mortality. Warning signs and electronic billboards have been installed along B.C. Highway 3 on both sides of Kootenay Pass since the 1990s to make drivers more aware of caribou, thereby reducing the risk of collisions (USFWS 1994). Currently, discussions are underway with highway managers to assess additional protective measures, such as improved signs and use of wildlife motion detection systems. Options such as fencing, wildlife crossing structures, switching to non-salt de-icers, and lowering the speed limit (currently 100 kph [62.5 mph]) are currently considered impractical because of human safety concerns, severe winter conditions at the pass, or high costs.

Reduction of accidental shooting mortality. Colville National Forest staff conduct fall patrols to inform hunters about the presence of caribou to prevent accidental harvest through misidentification with deer and elk (M. Borysewicz, pers. comm.).

Subpopulation augmentation. Two multi-year sets of augmentations using caribou from British Columbia have been conducted to supplement the South Selkirk herd. The Idaho Department of Fish and Game led the first set using southern and northern mountain caribou, with 60 animals translocated to Idaho in 1987-1990 (Table 1; Servheen 1987, 1988, Compton et al. 1990, 1991, 1995). From 1996 to 1998, WDFW moved an additional 43 animals (all southern mountain caribou) to Washington and British Columbia (Audet and Allen 1996, Almack 1998, 2000, 2002).

Translocated individuals generally experienced low survival rates due in part to high levels of predation and there was some dispersal of animals beyond the range of the subpopulation (Compton et al. 1995, Warren et al. 1996, Almack 2002). Although the augmentations resulted in only modest temporary increases in subpopulation size, they likely succeeded in extending the longevity of the subpopulation (USGAO 1999, USFWS 2008) and expanding its genetic diversity (Zittlau 2004, Serrouya et al. 2012).

Table 1. Numbers of caribou translocated to the range of the South Selkirk subpopulation from 1987 to 1998 (from Wakkinen and Slone 2010).

Year	No. of caribou released	Release site
1987	24	Idaho – Ball Creek
1988	24	Idaho – Ball Creek
1990	12	Idaho – Ball Creek
1996	19	Washington – Gypsy Meadows
1997	13	Washington – Sullivan Creek
1998	11	Br. Columbia – Kootenay Pass

Surveys. Subpopulation size is monitored annually through late winter surveys made by the Kootenai Tribe of Idaho, Kalispel Tribe of Indians, Idaho Department of Fish and Game, and British Columbia Ministry of Forests, Lands, and Natural Resource Operations (e.g., DeGroot 2016; see Population and Habitat Status).

CONCLUSIONS AND RECOMMENDATION

The South Selkirk subpopulation of southern mountain caribou (a distinct form of woodland caribou) occurs within a recovery area measuring 3,810 km^2 (1,471 mi^2) in the southern Selkirk Mountains of southeastern British Columbia, northern Idaho, and northeastern Washington. Herd size has greatly declined since the late 1800s and has probably totaled no more than 100 individuals since the 1920s. Numbers ranged from 33 to 51 caribou between 1991 and 2008, but have fallen rapidly from 46 animals in 2009 to just 12 animals in 2016, putting the subpopulation in danger of extirpation. Additionally, the herd has experienced relatively low annual calf survival rates, with calves comprising an average of 9.9% of the subpopulation between 2004 and 2016. The herd has failed to recover despite major habitat protection efforts and two multi-year translocations since the late 1980s. Predation, mainly by wolves, cougars, and bears, is considered the greatest immediate threat to the subpopulation, with the decline since 2009 strongly associated with the expanded presence of wolves in the herd's range. Other significant threats include highway mortality, disturbance from winter backcountry recreation, isolation from other neighboring subpopulations, chance events associated with the herd's small size, and climate change. For these reasons, it is recommended that woodland caribou remain listed as a state endangered species in Washington.

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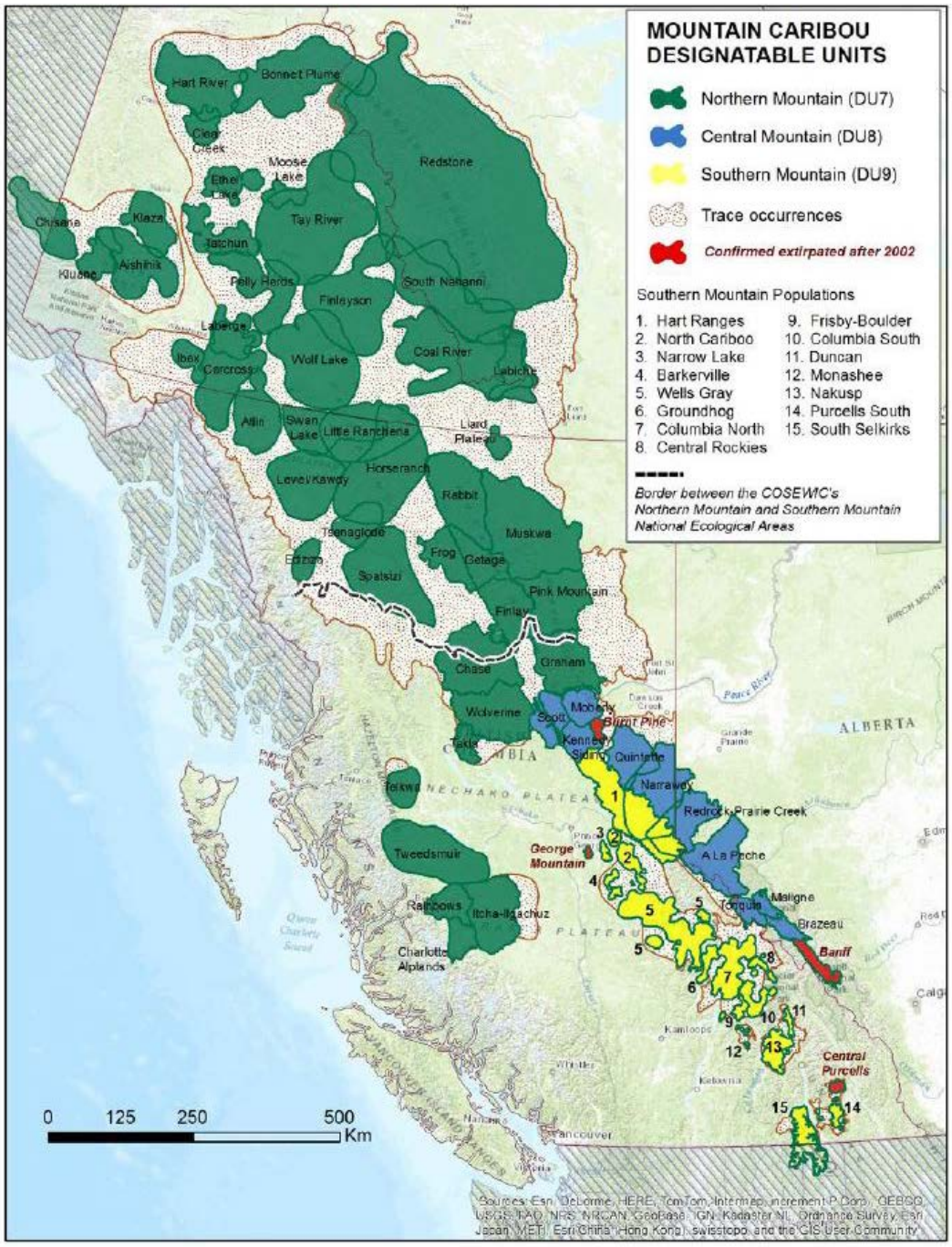
Appendix A. Distribution of currently recognized southern, central, and northern mountain caribou subpopulations in western North America (from COSEWIC 2014). The 15 surviving southern mountain caribou subpopulations are shown in yellow.



Appendix B. Current land management jurisdictions within the range of the South Selkirk caribou subpopulation (SCITWG, unpublished draft report). Not all lands represent potential caribou habitat.

State or province	Land ownership entity	Size (hectares/acres)	Percent of total
Idaho	Idaho Panhandle National Forests	89,280 / 220,615	23.4
	Idaho Department of Lands	26,878 / 66,416	7.1
	Private	6,119 / 15,120	1.6
Washington	Colville National Forest	39,663 / 98,010	10.4
	Idaho Panhandle National Forests	13,033 / 32,206	3.4
	Private	3,235 / 7,994	0.8
	U.S. total	178,208 / 440,361	46.8
British Columbia	Crown lands[1]	118,454 / 292,706	31.1
	Nature Conservancy of Canada	51,095 / 126,258	13.4
	West Arm Provincial Park	21,830 / 53,944	5.7
	Stagleap Provincial Park	1,203 / 2,972	0.3
	Private	10,225 / 25,267	2.7
	B.C. total	202,807 / 501,147	53.2
	Total area	381,015 / 941,507	100

[1] Includes forest management unit or Crown timber agreement lands, community forest, and various reserves.

Appendix C. Numbers of caribou and calf recruitment in the South Selkirk subpopulation during annual late winter censuses, 1991-2016. Data are taken from the 2004-2016 annual census reports and the draft Southern Mountain Caribou Recovery Plan being prepared by the Selkirk Caribou International Technical Work Group (SCITWG).

	Number of caribou counted			Calf recruitment	
Year	British Columbia	Idaho and Washington	Total	Number of calves	% calves in subpopulation[a]
1991	21	26	47	7	14.9
1992	23	24	47	3	6.4
1993	28	23	51	7	13.7
1994	32	13	45	5	11.1
1995	39	10	49	8	16.3
1996	27	12	39[b]	8	20.5
1997	30	9	39[b]	7	17.9
1998	14	31	45[b]	-[c]	-[c]
1999	42	6	48	-[c]	-[c]
2000	31	3	34	6	17.6
2001			no census[d]		no census[d]
2002	32	2	34	9	26.5
2003	40	1	41[e]	4	10.0[f]
2004	30	3	33	2	6.7[f]
2005	33	2	35[g]	-[c]	-[c]
2006	36	1	37	6	17.2[f]
2007	41	2	43	4	9.3
2008	43	3	46	5	10.9
2009	43	3	46	5	10.9
2010	41	2	43	3	7.0
2011	36	0	36	3	8.3
2012	23	4	27	1	4.3[f]
2013	27	0	27	4	14.8
2014	18	0	18	1	5.6
2015	14	0	14	1	7.1
2016	12	0	12	2	16.7

[a] Calf counts may have become more accurate beginning in about 2004, when the use of high quality digital photography was incorporated into the annual censuses (L. DeGroot, pers. comm.). It is unknown whether this has changed the percentage of calves detected in the subpopulation.
[b] Years in which augmentations of the subpopulation occurred (see Table 1). Augmentations were conducted after the late winter census in all three years, thus census results were not affected until the following year.
[c] No animals were classified by age group.
[d] Survey not conducted due to inadequate snow levels.
[e] Some double counting probably occurred, thus the count result is not reliable.
[f] Not all animals were classified by age group, thus recruitment estimates are not based on the total count.
[g] Not a complete count, thus count results are considered minimal.

Appendix D. WDFW responses to public comments received during the 90-day public review period for the draft *Periodic Status Review for the Woodland Caribou in Washington* conducted from September 24 to December 23, 2016. The comments presented here are summaries of the remarks provided by one or more people.

Report Section	Comment and Response
General comments	1. I support the continued listing of woodland caribou as a state endangered species in Washington.
	Thank you for your comment. WDFW recommends that woodland caribou should remain on the state list of endangered species for the reasons given in the periodic status review.
	2. I support efforts to recover the caribou subpopulation in Washington.
	WDFW appreciates the public's concern over caribou and its desire to have the subpopulation recover.
Management activities	3. I believe that excessive predation is the main conservation problem confronting the South Selkirk caribou herd. I therefore support stronger predator management as a way to recover these caribou. My biggest concern is related to wolves and I think their numbers should be reduced in areas where the caribou live. Washington should work with British Columbia and Idaho to manage wolves and other predators for the benefit of caribou. I also recommend that wolves be delisted in Washington. Without reductions in predator abundance, I believe that other recovery actions for the herd are doomed.
	As described in the report, predation by wolves, cougars, and bears is considered the greatest immediate threat to the now very small South Selkirk caribou subpopulation. The province of British Columbia, where the herd now resides nearly all of the time, has performed lethal control of 20 wolves during the winters of 2014-2015 and 2015-2016 specifically for the benefit of the South Selkirk herd. In addition, the province has general hunting and trapping seasons for wolves, cougars, and black bears. Idaho also has hunting and/or trapping seasons for all three species, whereas Washington allows hunting of cougars and black bears. Although wolves are protected as a state endangered species in Washington, there is a provision in WDFW's wolf conservation and management plan that allows for wolves to be locally reduced where they have been determined to be a primary limiting factor for an at-risk ungulate population, such as the South Selkirk caribou herd. Currently, most predator control actions are being taken on the British Columbia side of the border because this is where the herd spends nearly all of its time. Predator control in Washington may have little if any benefit to the herd. The Selkirk Caribou International Technical Work Group (SCITWG) is currently developing a recovery plan for the herd that may make further recommendations for predator control actions. WDFW is a participant in the SCITWG and will seriously consider any management recommendations that appear in the recovery plan.
	4. To protect and restore this highly threatened subpopulation of caribou, it is important to protect large areas of intact old growth forests that are currently subject to destruction by logging at alarming rates. These forests are irreplaceable and are necessary to the survival of this species.
	As described more fully in the report, a number of steps have already been taken to protect the habitat of the South Selkirk caribou subpopulation. Thus, on the U.S. side of the border, there is very little harvest of the mature to old-growth forests used by the herd. In Washington and Idaho, habitat protection measures were initiated for the herd

Report Section	Comment and Response
	beginning in the late 1970s by the U.S. Forest Service and other natural resource management agencies. These measures include development of regulatory mechanisms to protect caribou habitat on public lands, controlling wildfires to prevent loss of caribou habitat, and designation of federal critical habitat for caribou. British Columbia has also taken significant steps in recent years to protect much of the forestland used by the subpopulation.

WASHINGTON STATE STATUS REPORTS, PERIODIC STATUS REVIEWS, RECOVERY PLANS, AND CONSERVATION PLANS

Status Reports

2015 Tufted Puffin
2007 Bald Eagle
2005 Mazama Pocket Gopher, Streaked Horned Lark, and Taylor's Checkerspot
2005 Aleutian Canada Goose
2004 Killer Whale
2002 Peregrine Falcon
2000 Common Loon
1999 Northern Leopard Frog
1999 Olympic Mudminnow
1999 Mardon Skipper
1999 Lynx Update
1998 Fisher
1998 Margined Sculpin
1998 Pygmy Whitefish
1998 Sharp-tailed Grouse
1998 Sage-grouse
1997 Aleutian Canada Goose
1997 Gray Whale
1997 Olive Ridley Sea Turtle
1997 Oregon Spotted Frog
1993 Larch Mountain Salamander
1993 Lynx
1993 Marbled Murrelet
1993 Oregon Silverspot Butterfly
1993 Pygmy Rabbit
1993 Steller Sea Lion
1993 Western Gray Squirrel
1993 Western Pond Turtle

Periodic Status Reviews

2016 Bald Eagle
2016 Peregrine Falcon
2016 Marbled Murrelet
2016 American White Pelican
2016 Lynx
2016 Taylor's Checkerspot
2016 Columbian White-tailed Deer
2016 Streaked Horned lark
2016 Killer Whale
2016 Greater Sage-grouse
2016 Northern Spotted Owl
2016 Snowy Plover
2016 Western Gray Squirrel
2015 Brown Pelican
2015 Steller Sea Lion

Recovery Plans

2012 Columbian Sharp-tailed Grouse
2011 Gray Wolf
2011 Pygmy Rabbit: Addendum
2007 Western Gray Squirrel
2006 Fisher
2004 Sea Otter
2004 Greater Sage-Grouse
2003 Pygmy Rabbit: Addendum
2002 Sandhill Crane
2001 Pygmy Rabbit: Addendum
2001 Lynx
1999 Western Pond Turtle
1996 Ferruginous Hawk
1995 Pygmy Rabbit
1995 Upland Sandpiper

Conservation Plans

2013 Bats

Status reports and plans are available on the WDFW website at:
http://wdfw.wa.gov/publications/search.php

References Reviewed for the *Periodic Status Review for the Woodland Caribou in Washington*

Table B presents the 107 references cited in the *Periodic Status Review for the Woodland Caribou in Washington*. Each reference is categorized for its level of peer review pursuant to section 34.05.271 RCW, which is the codification of Substitute House Bill 2661 that passed the Washington Legislature in 2014. A key to the review categories under section 34.05.271 RCW is provided in Table A.

Individual papers cited in the *Periodic Status Review for the Woodland Caribou in Washington* cover a number of topics discussed in the report, including information on: 1) the species' taxonomy, distribution, and biology; 2) habitat requirements; 3) population status and trends; 4) conservation status and protections; 5) management activities; and 6) factors affecting the continued existence of the species.

Table A. Key to 34.05.271 RCW Categories:

Category Code	34.05.271(1)(c) RCW
i	(i) Independent peer review: review is overseen by an independent third party.
ii	(ii) Internal peer review: review by staff internal to the department of fish and wildlife.
iii	(iii) External peer review: review by persons that are external to and selected by the department of fish and wildlife.
iv	(iv) Open review: documented open public review process that is not limited to invited organizations or individuals.
v	(v) Legal and policy document: documents related to the legal framework for the significant agency action including but not limited to: (A) federal and state statutes; (B) court and hearings board decisions; (C) federal and state administrative rules and regulations; and (D) policy and regulatory documents adopted by local governments.
vi	(vi) Data from primary research, monitoring activities, or other sources, but that has not been incorporated as part of documents reviewed under the processes described in (c)(i), (ii), (iii), and (iv) of this subsection.
vii	(vii) Records of the best professional judgment of department of fish and wildlife employees or other individuals.
viii	(viii) Other: Sources of information that do not fit into one of the categories identified in this subsection (1)(c).

Table B Reference	34.05.271 RCW Review Category
Allen, L. R. 1999. The effects of 115 years of vegetation change on woodland caribou habitat in the Selkirk Mountains of Idaho. M.S. thesis, University of Idaho, Moscow, Idaho.	i
Almack, J. A. 1998. Mountain caribou recovery in the southern Selkirk Mountains of Washington, Idaho, and British Columbia. Progress report, October 1995–September 1998. Washington Department of Fish and Wildlife, Olympia, Washington.	ii
Almack, J. A. 2000. Mountain caribou recovery in the southern Selkirk Mountains of Washington, Idaho, and British Columbia. Progress Report, October 1998–March 2000. Washington Department of Fish and Wildlife, Olympia, Washington.	ii
Almack, J. A. 2002. Mountain caribou recovery in the southern Selkirk Mountains of Washington, Idaho, and British Columbia. Progress Report, January 1-December 31, 2001. Washington Department of Fish and Wildlife, Olympia, Washington.	ii
Anonymous. 2004. Situation summary and management strategy for mountain caribou and winter recreation on the Idaho Panhandle National Forests. Unpublished report.	viii
Apps, C. D. and B. N. McLellan. 2006. Factors influencing the dispersion and fragmentation of endangered mountain caribou populations. Biological Conservation 130:84-97.	i
Apps, C. D., B. N. McLellan, T. A. Kinley, and J. P. Flaa. 2001. Scale-dependent habitat selection by mountain caribou, Columbia Mountains, British Columbia. Journal of Wildlife Management 65:65–77.	i
Apps, C. D., B. N. McLellan, T. A. Kinley, R. Serrouya, D. R. Seip, and H. U. Wittmer. 2013. Spatial factors related to mortality and population decline of endangered mountain caribou. Journal of Wildlife Management 77:1409-1419.	i
Audet, S. and H. Allen. 1996. Selkirk Mountains woodland caribou herd augmentation in Washington, a cooperative interagency plan. U.S. Fish and Wildlife Service, Spokane, Washington, and Washington Department of Fish and Wildlife, Olympia, Washington.	i, ii
Banfield, A. W. F. 1961. A revision of the reindeer and caribou, genus *Rangifer*. National Museum of Canada Bulletin 177:1-137.	i
Becker, S. A., T. Roussin, W. Jones, E. Krausz, S. Walker, S. Simek, D. Martorello, and A. Aoude. 2016. Washington gray wolf conservation and management 2015 annual report. Pages WA-1 to WA-24 *in* Northern Rocky Mountain wolf recovery program 2015 interagency annual report. U.S. Fish and Wildlife Service, Helena, Montana.	ii
Bergerud, A. T. 1996. Evolving perspectives on caribou population dynamics, have we got it right yet? Rangifer, Special Issue 9:95-116.	i
Bergerud, A. T. and J. P. Elliot. 1986. Dynamics of caribou and wolves in northern British Columbia. Canadian Journal of Zoology 64:1515–1519.	i
Booth, E. S. 1947. Systematic review of the land mammals of Washington. Ph.D. thesis, State College of Washington, Pullman, Washington.	i
Cichowski, D., T. Kinley, and B. Churchill. 2004. Caribou, *Rangifer tarandus*. *In* Accounts and measures for managing identified wildlife. British Columbia Ministry of Environment, Victoria, British Columbia.	viii
Clarke, R. 2002. South Selkirk cougar ecology and predation progress report. Columbia Basin Fish & Wildlife Compensation Program, Nelson, British Columbia.	vi
Clarke, R. 2003. Characteristics of a hunted population of cougar in the South Selkirk Mountains of British Columbia. Columbia Basin Fish & Wildlife Compensation Program, Nelson, British Columbia.	vi
CNF (Colville National Forest). 1988. Colville National Forest land and resource management plan. Colville National Forest, Colville, Washington.	i

CNF (Colville National Forest). 2016. Draft Colville National Forest proposed land and resource management plan. Colville National Forest, Colville, Washington.	i
Compton, B. B., P. Zager, and L. Allen-Johnson. 1990. Selkirk Mountains caribou transplant: October 1989-September 1990. Annual Report, Threatened and Endangered Species Project E-7-2, Idaho Department of Fish and Game, Boise, Idaho.	vi
Compton, B. B., P. Zager, and L. Allen-Johnson. 1991. Selkirk Mountains caribou transplant: June 1990-May 1991. Threatened and Endangered Species Project E-7-3, Idaho Department of Fish and Game, Boise, Idaho.	vi
Compton, B. B., P. Zager, and G. Servheen. 1995. Survival and mortality of translocated caribou. Wildlife Society Bulletin 23:490-496.	i
COSEWIC. 2011. Designatable units for caribou (*Rangifer tarandus*) in Canada. Committee on the Status of Endangered Wildlife in Canada, Ottawa, Ontario.	i
COSEWIC. 2014. COSEWIC assessment and status report on the caribou *Rangifer tarandus*, northern mountain population, central mountain population, and southern mountain population, in Canada. Committee on the Status of Endangered Wildlife in Canada, Ottawa, Ontario.	i
Dalquest, W. W. 1948. Mammals of Washington. University of Kansas Publications, Museum of Natural History 2:1-444.	i
Darwin, L. H., compiler. 1913. Laws relating to game and game fish. Chief Game Warden and State Fish Commissioner, State of Washington, Bellingham, Washington.	i
DeGroot, L. 2016. 2016 caribou census: South Selkirk Mountains. British Columbia Ministry of Forests, Lands and Natural Resource Operations, Nelson, British Columbia.	vi
Environment Canada. 2014. Recovery strategy for the woodland caribou, southern mountain population (*Rangifer tarandus caribou*) in Canada (proposed). Species at Risk Act Recovery Strategy Series, Environment Canada, Ottawa, Ontario.	i
Evans, H. F. 1960. A preliminary investigation of caribou in northwestern United States. M.S. thesis, University of Montana, Missoula, Montana.	i
Festa-Bianchet, M., J. C. Ray, S. Boutin, S. D. Côté, and A. Gunn. 2011. Conservation of caribou (*Rangifer tarandus*) in Canada: an uncertain future. Canadian Journal of Zoology 89: 419–434.	i
Flinn, P. 1956. Caribou of Idaho. Idaho Fish and Game Department, Boise, Idaho.	vi
Foreyt, W. J. and B. B. Compton. 1991. Survey for meningeal worm (*Parelaphostrongylus tenuis*) and ear mites in white-tailed deer from northern Idaho. Journal of Wildlife Diseases 27:716-718.	i
Freddy, D. J. 1974. Status and management of the Selkirk caribou herd, 1973. M.S. thesis, University of Idaho, Moscow, Idaho.	i
Freeman, N. L. 2008. Motorized backcountry recreation and stress response in mountain caribou (*Rangifer tarandus caribou*). M.S. thesis, University of British Columbia, Vancouver, British Columbia.	i
Grubb, P. 2005. Order Artiodactyla. Pages 637-722 *in* D. E. Wilson and D. M. Reeder, editors. Mammal species of the world: a taxonomic and geographic reference. 3rd edition. Johns Hopkins University Press, Baltimore, Maryland.	i
Hatter, I. 2006. Mountain caribou 2006 survey results, subpopulation trends, and extinction risks. Pages 4-22 *in* J. Morris, editor. Multidisciplinary approaches to recovering caribou in mountain ecosystems. Columbia Mountains Institute of Applied Ecology, Revelstoke, British Columbia.	i
Hayek, T., N. Lloyd, M. R. Stanley-Price, A. Saxena, and A. Moehrenschlager. 2016. An exploration of conservation breeding and translocation tools to improve the conservation status of boreal caribou populations in western Canada: pre-workshop document. Centre for Conservation Research, Calgary Zoological Society, Calgary, Alberta.	viii
Hervieux, D., M. Hebblewhite, D. Stepnisky, M. Bacon, and S. Boutin. 2014. Managing wolves (*Canis lupus*) to recover threatened woodland caribou (*Rangifer tarandus caribou*) in Alberta. Canadian Journal of Zoology 92:1029-1037.	i
IPNF (Idaho Panhandle National Forests). 1987. Forest plan: Idaho Panhandle National Forests. Idaho Panhandle National Forests, Coeur d'Alene, Idaho.	i

IPNF (Idaho Panhandle National Forests). 2015. Land management plan, 2015 revision: Idaho Panhandle National Forests. Idaho Panhandle National Forests, Coeur d'Alene, Idaho.	i
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