

Science Update for the South Peace Northern Caribou (*Rangifer tarandus caribou* pop. 15) in British Columbia



Prepared by B.C. Ministry of Environment



January 2014

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Disclaimer

This document was developed to provide current science information on Northern Caribou in the South Peace of British Columbia. This science update has been prepared as advice to the responsible jurisdictions and organizations that may be involved in the management or recovery of the species. The British Columbia (B.C.) Ministry of Environment has received this advice as part of fulfilling its commitments under the *Accord for the Protection of Species at Risk in Canada*, and the *Canada–British Columbia Agreement on Species at Risk*.

Success in the management of this species depends on the commitment and cooperation of many different constituencies that may be involved in implementing management actions. The B.C. Ministry of Environment encourages all British Columbians to participate in the management of Northern Caribou in the South Peace.

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EXECUTIVE SUMMARY

All Caribou in British Columbia (B.C) belong to the woodland subspecies (*Rangifer tarandus caribou*), and are further classified into three ecotypes based on differences in habitat use, behaviour, and migration patterns. Approximately 17,000 northern ecotype Woodland Caribou (hereafter Northern Caribou, *Rangifer tarandus* pop. 15) reside in the province. This document focuses on seven herds belonging to this population found in the southern Peace region of B.C. (hereafter South Peace Northern Caribou). These herds are referred to as the Graham, Moberly, Scott, Burnt Pine, Kennedy Siding, Quintette, and Narraway. There are approximately 1,000 South Peace Northern Caribou in B.C.

The following summarizes the designations that apply to South Peace Northern Caribou (SPNC), which are designated as Threatened by the Committee on the Status of Endangered Wildlife in Canada (Thomas and Gray 2002). They are listed as Threatened in Canada on Schedule 1 of the *Species at Risk Act* (SARA). In B.C., the South Peace Northern Caribou are ranked S3 (special concern, vulnerable to extirpation or extinction) by the Conservation Data Centre and are on the provincial Blue list. The B.C. Conservation Framework ranks the South Peace Northern Caribou as a priority 2 under goal 2 (prevent species and ecosystems from becoming at risk). They are protected from capture and killing, under the B.C. *Wildlife Act*. Caribou are also listed as a “Category of Ungulate Species” for which an Ungulate Winter Range (UWR) may be legally established under Section 11(3) of the Government Actions Regulation of the *Forest and Range Practices Act* (FRPA). UWRs contain habitat necessary to meet the winter habitat requirements of an ungulate species. Caribou are also listed as a “Category of Species at Risk” for which a Wildlife Habitat Area (WHA) may be legally established under Section 11(1) of the Government Actions Regulation. WHAs for caribou may be established to protect habitat required for calving, rutting, matrix/connectivity, and mineral licks. UWRs and WHAs established under FRPA are also recognized under the *Oil and Gas Activities Act*. Recovery is considered to be biologically and technically feasible.

The seasonal habitat use patterns of South Peace Northern Caribou vary among herds, but generally in winter, they will select low-elevation forests (low-elevation winter habitat) and/or windswept alpine ridges (high-elevation winter habitat). In summer, certain herds use and select alpine and subalpine habitat, while other herds may use low-elevation boreal forest habitat. Use of high-elevation habitat provides some spatial separation between South Peace Northern Caribou and predators such as Grey Wolves (*Canis lupus*) because these wolves primarily use low-elevation forest where the density of other ungulate species is higher.

The primary cause of known adult mortality of South Peace Northern Caribou is predation, primarily wolf predation. Other species including bears, Wolverines (*Gulo gulo*), and eagles can be significant predators, particularly on calves. Any habitat change that compromises the spatial separation between caribou and their predators can compound this threat by increasing the risk of predation.

Forestry-related activities have impacted South Peace Northern Caribou and their habitat and are expected to do so into the future. Present-day energy production and mining are the most imminent industry-related threats to South Peace Northern Caribou and their habitat. Impacts

associated with forestry activities and energy and mining development include habitat loss, alteration and fragmentation, and displacement of caribou from preferred habitats. Alteration of habitat may include the reduction of the availability of forage and/or the facilitation of habitat into early-seral forest, which supports more abundant early-seral ungulates (e.g., moose) and their predators. Most linear corridors such as access roads, seismic lines, pipelines, and all-weather roads associated with energy production into the alpine increase South Peace Northern Caribou risk to predation and have the potential to displace caribou from preferred habitats. Effluents and pollutants associated with energy production may also pose a risk to South Peace Northern Caribou. The overall calculated and assigned threat impact that is observed, inferred, or suspected to be directly or indirectly effecting the ecology of South Peace Northern Caribou over the next 10 years is very high (75% population declines).

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1 SCOPE OF SCIENCE UPDATE

This document focuses on seven caribou herds found in the southern Peace region of B.C. (hereafter South Peace Northern Caribou): Graham, Moberly, Scott, Burnt Pine, Kennedy Siding, Quintette, and Narraway (refer to Section 4.2.3).¹

2 COSEWIC* SPECIES ASSESSMENT INFORMATION

Date of Assessment: May 2002

Common Name (population):^a Woodland Caribou (Southern Mountain population)^b

Scientific Name:^a *Rangifer tarandus caribou*

COSEWIC Status: Threatened

Reason for Designation: Local herds in the Southern Mountains population are generally small, increasingly isolated, and subject to multiple developments. Their range has shrunk by up to 40% and 13 of 19 herds are declining. The most southerly herds are likely to disappear. Many herds are threatened by decreasing habitat quantity and quality, harassment, and predation.

Canadian Occurrence: BC, AB

COSEWIC Status History: The Southern Mountain population was designated Threatened in May 2000. This population was formerly designated as part of the "Western population" (now de-activated). Status re-examined and confirmed in May 2002.

* Committee on the Status of Endangered Wildlife in Canada.

^a Provincial and COSEWIC borders differ with respect to populations and thus common and scientific names. This document follows the naming conventions of the British Columbia Conservation Data Centre, and as such the South Peace Northern Caribou herds are considered part of the northern population (*Rangifer tarandus* pop. 15) of Caribou in B.C. This 2002 COSEWIC (COSEWIC 2002) assessment refers to the Southern Mountain population as defined by the Southern Mountain National Ecological Area (SMNEA) and includes the seven herds of the South Peace Northern Caribou found in the south Peace area of B.C.

^b Note that in future COSEWIC status assessments of Woodland Caribou in Canada will use a new classification system (COSEWIC 2011). Under this new system of Designatable Units (DUs), the Graham herd, which occurs north of the Peace River, will be evaluated separately from the other six herds of the South Peace Northern Caribou found south of the Peace River. The Graham herd will be evaluated as part of the Northern Mountains DU, which includes herds throughout northern B.C. and into the Yukon. The other six herds will be evaluated as part of the Central Mountain DU, which also includes Woodland Caribou on the east side of the Rocky Mountains in Alberta. A review of the status of Woodland Caribou herds in B.C. using the new system of DUs is currently underway (2012–2013).

¹ Some earlier reports refer to the B.C. Narraway herd as the Belcourt herd, but more recently the Ministry of Environment has referred to them as the Narraway herd.

3 SPECIES STATUS INFORMATION

South Peace Northern Caribou ^{a, b}	
Legal Designation	
FRPA: ^c Species at Risk; Ungulate OGAA: ^c Species at Risk; Ungulate B.C. Wildlife Act : ^d Schedule A SARA : ^e Schedule 1 -Threatened (2003)	
Conservation Status ^f	
B.C. List: Blue B.C. Rank: S3 (2010) Global Rank: G5T5 (2012) Other Subnational Ranks : ^g AB: S1	
B.C. Conservation Framework (CF) ^h	
Goal 1: Contribute to global efforts for species and ecosystem conservation	Priority: ⁱ 4 (2009)
Goal 2: Prevent species and ecosystems from becoming at risk	Priority: 2 (2009)
Goal 3: Maintain the diversity of native species and ecosystems	Priority: 3 (2009)
Action Groups: Review Resource Use; Monitor Trends; Compile Status Report; Species and Population Management; Planning; Habitat Protection; Habitat Restoration; Private Land Stewardship	

^a Note that all designations apply to the South Peace Northern Caribou herds even though they may have been assessed at a population level (e.g., Northern Caribou, *Rangifer tarandus* pop. 15).

^b Data source: B.C. Conservation Data Centre (2014) unless otherwise noted.

^c Ungulate = a listed species for which an ungulate winter range is necessary for the winter survival of the species and requires special management attention to address the impacts of forest and range activities on Crown land under the *Forest and Range Practices Act* (FRPA; Province of British Columbia 2002) and/or the impacts of oil and gas activities on Crown land under the *Oil and Gas Activities Act* (OGAA; Province of British Columbia 2008). Species at Risk = a listed species that requires special management attention to address the impacts of forest and range activities on Crown land under FRPA (Province of British Columbia 2002) and/or the impacts of oil and gas activities on Crown land under OGAA (Province of British Columbia 2008) as described in the Identified Wildlife Management Strategy (Province of British Columbia 2004).

^d Schedule A = designated as wildlife under the B.C. *Wildlife Act*, which offers it protection from direct persecution and mortality (Province of British Columbia 1982).

^e Schedule 1 = found on the List of Wildlife Species at Risk under the *Species at Risk Act* (SARA).

^f S = subnational; N = national; G = global; T = refers to the subspecies level; X = presumed extirpated; H = possibly extirpated; 1 = critically imperiled; 2 = imperiled; 3 = special concern, vulnerable to extirpation or extinction; 4 = apparently secure; 5 = demonstrably widespread, abundant, and secure; NA = not applicable; NR = unranked; U = unrankable.

^g Data source: NatureServe (2014).

^h Data source: B.C. Ministry of Environment (2010).

ⁱ Six-level scale: Priority 1 (highest priority) through to Priority 6 (lowest priority).

4 SPECIES INFORMATION

4.1 Species Description

Caribou (*Rangifer tarandus*) are considered an ancient member of the deer family Cervidae (Banfield 1974). They are smaller than Moose (*Alces americanus*) and Elk (*Cervus canadensis*), standing 1.0–1.2 m high at the shoulder (Thomas and Gray 2002). They have dark brown coats with tan colouring around the neck, rump, and abdomen above the mid-line and below the back of the body. Unique to all caribou and not displayed in other cervid, is that, relative to their body size, their hooves are large and round. This allows caribou to crater for terrestrial lichens and displace their body weight more effectively when tracking over snow and wetland complexes (Thomas and Gray 2002).

There is some sexual dimorphism between male and female caribou. Males typically weigh 160–210 kg whereas females weigh 110–150 kg. Males display large antlers, but females may also display antlers, albeit smaller. This latter trait is unique among caribou and not evident in other cervids. Males will drop antlers generally post-rut like other cervids and female caribou that are pregnant will drop their antlers during or post-calving.

4.2 Populations and Distribution

4.2.1 Global and National

Caribou are circum-Arctic in their global distribution, specifically occupying the arctic, subarctic, and boreal biomes (Figure 1) (Banfield 1961; Edmonds 1991; Hummel and Ray 2008). In Canada, caribou have been classified into five subspecies, two of which have been identified in B.C. (Banfield 1974; Thomas and Gray 2002). The subspecies *Rangifer tarandus caribou*, or commonly known as Woodland Caribou, is the only extant subspecies in B.C. The other subspecies, *Rangifer tarandus dawsoni*, is endemic to Haida Gwaii, but has been extinct since the 1920s (Banfield 1974; Thomas and Gray 2002).

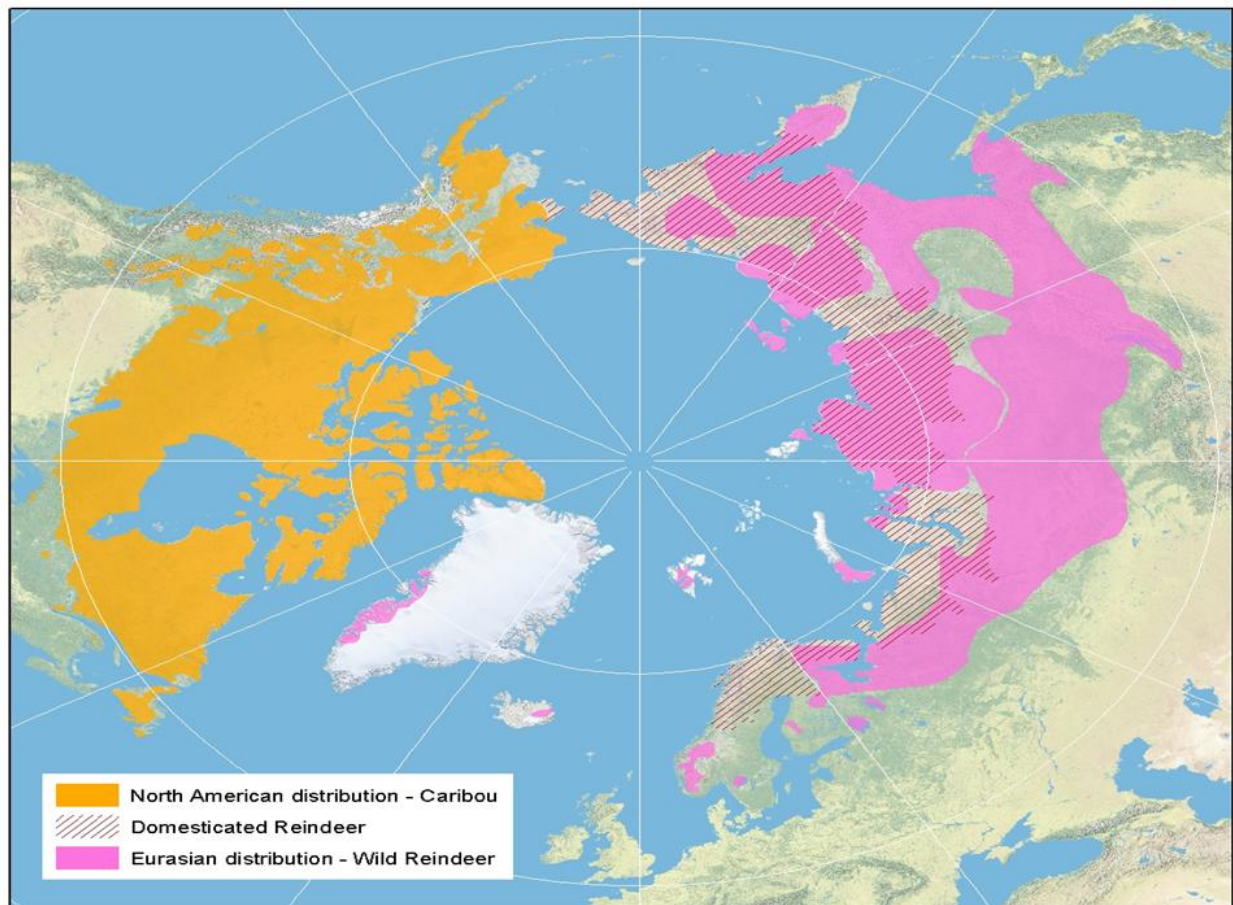


Figure 1. Global distribution of caribou and reindeer (from Hummel and Ray 2008). Note: Caribou and reindeer are of the same species, *Rangifer tarandus*.

The global range of the Woodland Caribou primarily occurs in North America and extends from Alaska to the northern United States and across all jurisdictions in Canada except Nova Scotia, New Brunswick, Prince Edward Island, and Nunavut (Edmonds 1991; Thomas and Gray 2002). The population of Woodland Caribou in Canada was estimated at 180,000–190,000 in 2000–2001 (Thomas and Gray 2002), of which approximately 20,000 occur in B.C.

4.2.2 British Columbia

Woodland Caribou in B.C. are classified into three ecotypes—Mountain, Northern, and Boreal—based on their ecology (Figure 2; Heard and Vagt 1998).² Woodland Caribou in B.C. are currently distributed across 52 populations or herds. Of the estimated 20,000 Woodland Caribou, approximately 17,000 are of the Northern ecotype (hereafter Northern Caribou, *Rangifer tarandus caribou* pop. 15) and reside in central to northwest B.C. This includes seven herds (approximately 1,000 Woodland Caribou) referred to as the South Peace Northern Caribou that are found in the southern Peace region of B.C.

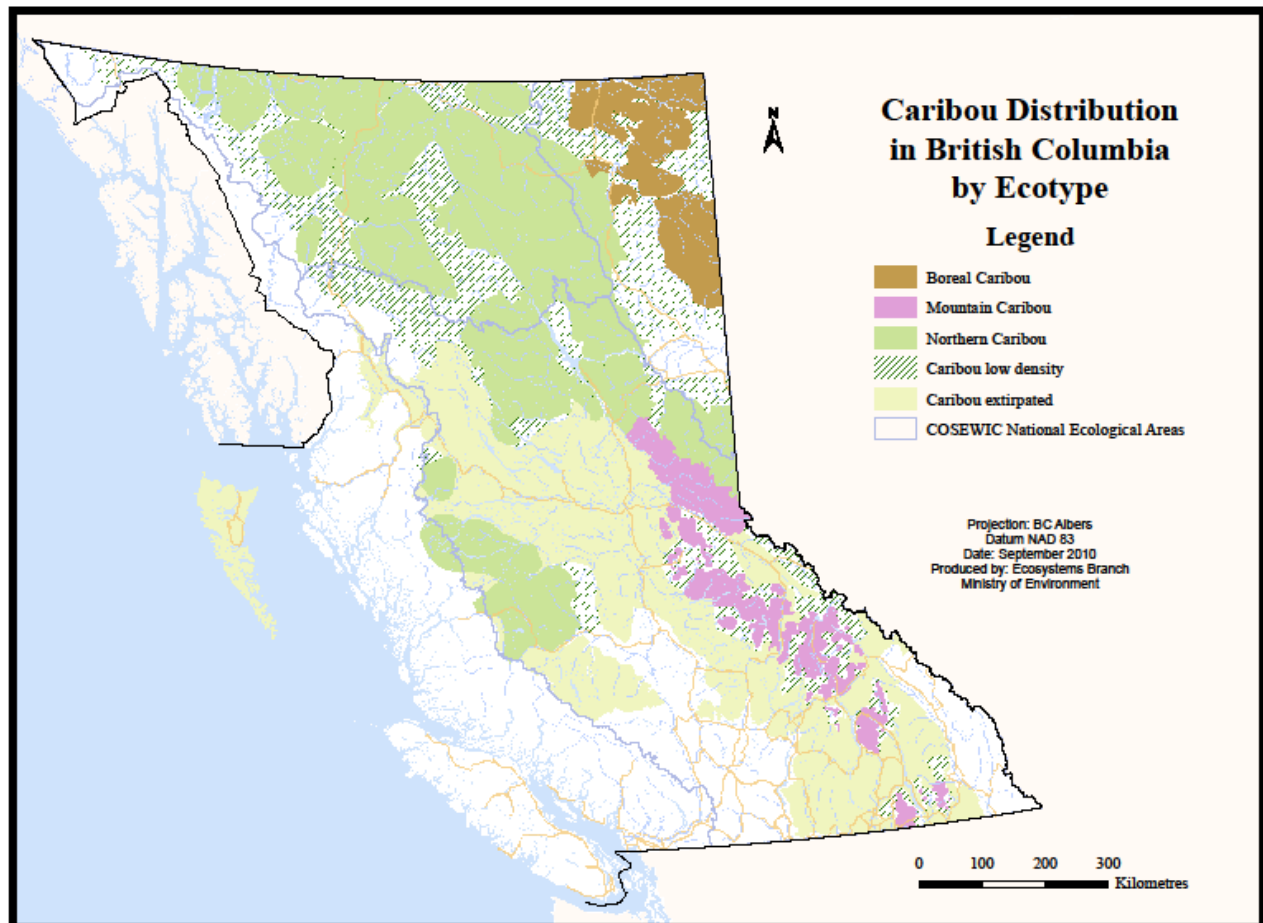


Figure 2. The three ecotypes of caribou in British Columbia.

² Recent evidence suggests that major valleys and population size may be better criteria used for classifying caribou in B.C. (Serrouya *et al.* 2012).

4.2.3 South Peace Northern Caribou

Distribution

The South Peace Northern Caribou (SPNC) resides in the south Peace area of the province within seven herd ranges: Graham, Moberly, Scott, Burnt Pine, Kennedy Siding, Quintette, and Narraway (Figure 3).³ Six of these herds occur exclusively within B.C. along with a portion of the Narraway herd known as the Bearhole-Redwillow animals. The remainder of the Narraway herd is shared with Alberta. Population information on that portion of the Narraway herd is available in the Alberta Woodland Caribou status report (Alberta Sustainable Resource Development and Alberta Conservation Association 2010).

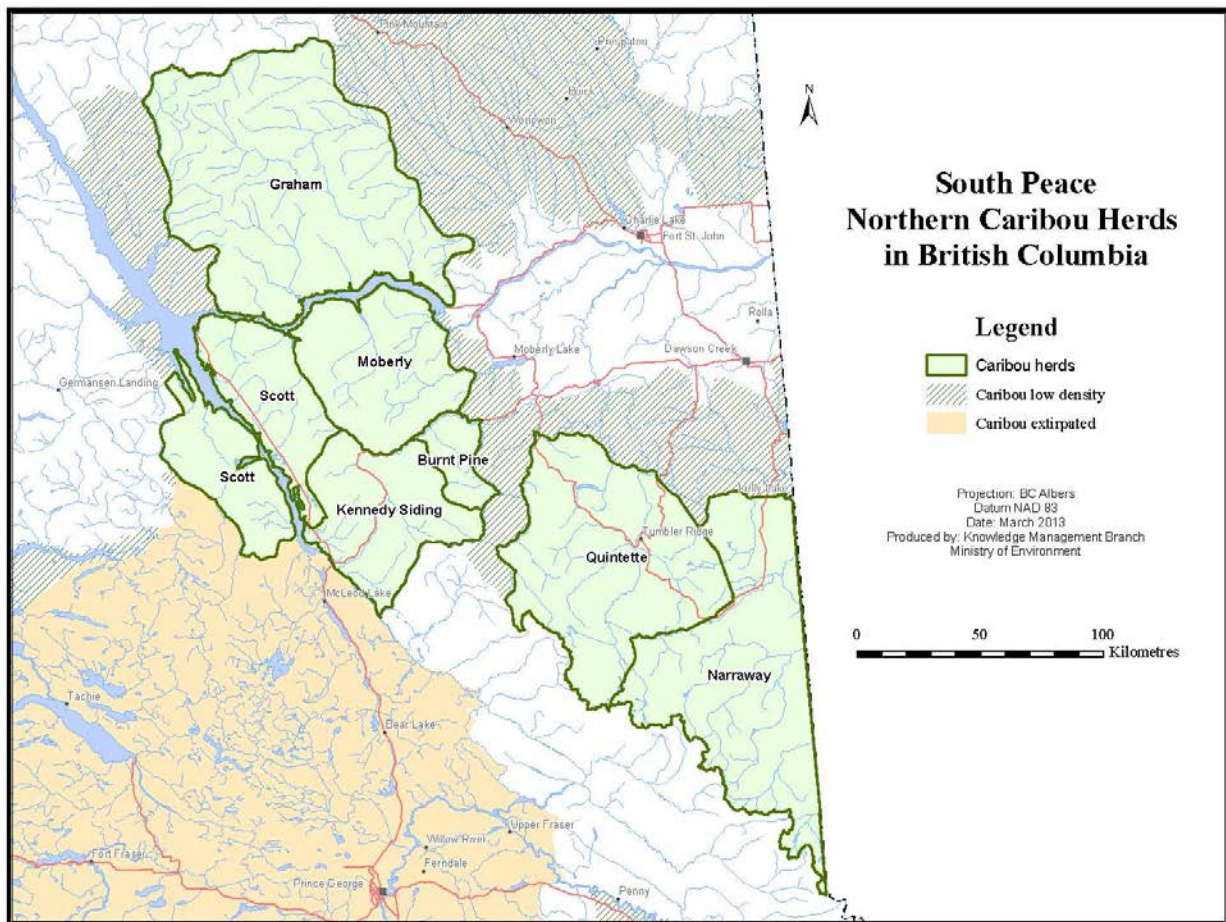


Figure 3. Distribution of South Peace Northern Caribou herds in British Columbia.

Herd Classification

How the herds of the SPNC have been classified/structured has changed in several ways. Heard and Vagt (1998) only recognized four distinct populations or herds in the south Peace in 1996: Moberly, Quintette, Kennedy Siding, and Graham. Since then, radio-telemetry information has

³ Some earlier reports refer to the B.C. Narraway herd as the Belcourt herd, but more recently the province has referred to them as the Narraway herd.

demonstrated that the Burnt Pine herd and the Scott herd have seasonal range use patterns that distinguish them from the other herds within the south Peace. Heard and Vagt (1998) did not include the Narraway herd in their analysis as it overlaps into Alberta, but telemetry data indicate that they primarily live within B.C.

Population Parameters

Population estimates of the SPNC are conducted periodically but are limited due to associated cost and climatic conditions that make population enumeration impracticable. The SPNC are censused in late winter (February – March) when they are on winter range using aerial inventory standards (B.C. Ministry of Sustainable Resource Management 2002). In some cases, censused areas may be modified to look for caribou elsewhere based on radio-telemetry and/or caribou habitat models that indicate potential use (Jones *et al.* 2007; Seip and Jones 2012a). Population estimates, calf recruitment,⁴ and adult survival rates have recently been determined for SPNC (Table 1) (Seip *et al.* 2012; Seip and Jones 2012a, 2013a). Currently there are estimated to be approximately 1,000 South Peace Northern Caribou (Table 1).

Caribou population trend can be determined by using vital caribou population rates such as calf recruitment and adult mortality rates, and/or observed changes in population abundance through time. If one assumes that adult mortality is limited to natural variation, then caribou populations are generally considered stable when recruitment rates (addition of calves 1 year old) are $\geq 15\%$ (Bergerud 1988, 1996; Seip and Cichowski 1996). In the South Peace as well as other areas in B.C., calving success and recruitment can increase for caribou if pregnant females seek areas at high elevations in mountainous terrain or on islands in lakes that are generally predator free compared to females that select areas below treeline that are predator rich (Seip and Cichowski 1996). For SPNC, recent calf recruitment rates (averaged over 10 years) and adult mortality rates have been determined for the Moberly, Burnt Pine, Kennedy Siding, Quintette, and Narraway (Table 1).

When using changes in population abundance and scaling the measure to account for effort over time, the population of SPNC herds are either down or decreasing (Table 1). This trend is consistent with the vital caribou population rates provided. In addition, five of seven SPNC herds have a population of fewer than 50 individuals (Table 1). This finding brings into question whether these herds are even viable over the next century, as is the case with southern mountain caribou (Wittmer 2004), suggesting SPNC are extremely vulnerable to extirpation. Note that the Burnt Pine herd is presumed to be extirpated.

⁴ The number offspring that survive annually.

Table 1. Population parameters for the South Peace Northern Caribou.

Herd year of estimate	Population estimate	Percent calf recruitment	Percent adult mortality	Population trend^a	Reference
Graham 1990 2009	1,761 708			Short term: Decreasing	Backmeyer 1990 Culling and Culling 2009
Moberly 1997 2012 2013	191 25 16	14.5 14	25.6 26.1	Short term: Decreasing	TERA Environmental Consultants 1997 Seip and Jones 2012a Seip and Jones 2013a
Scott 2007 2013	23 20–44			Current: Down?	Giguere and McNay 2007 Seip and Jones 2013a
Burnt Pine 2003 2012 2013	16 1 0	8.6	14.3	Presumed Extirpated	Seip and Jones 2012a Seip and Jones 2012a Seip and Jones 2013a
Kennedy Siding 1996 2002 2012	100 99–119 41	14.6	15.5	Short term: Decreasing	Heard and Vagt 1998 Seip 2002 Seip and Jones 2012a
Quintette 1996 2008 2012 2013	200 173–218 114–129	14.8 14	9.3 8.5	Short term: Decreasing	Heard and Vagt 1998 Seip and Jones 2008 Seip and Jones 2012a Seip and Jones 2013a
Narraway (Bearhole– Redwillow animals) 2008 2012 2013	35–150 21 24	9.5 8.8	22.2 19.4	Current: Down	Seip and Jones 2008 Seip and Jones 2012a Seip and Jones 2013a

^a Population trend is calculated and represented as Current trend (> 10% change in past 2 years): down, up, or ~ stable; Short term trend (> 20% change in 7 years): decreasing, growing, or ~ stable; Long term trend (> 20% change in 20 years): declining, increasing, or ~ stable; or Extirpated. Derived from Mountain Caribou Technical Advisory Committee (MCTAC 2002).

4.3 Needs of South Peace Northern Caribou

4.3.1 Species Biology

The SPNC feed primarily on terrestrial and arboreal lichens during the winter (Jones *et al.* 2004). To access terrestrial lichens the caribou use either high-elevation windswept ridges or low-elevation pine forests where snow depths are shallow enough to crater (i.e., dig, for terrestrial forage). Caribou are able to feed on arboreal lichens even when the snow is very deep. Arboreal lichens are most abundant for caribou feeding in old-growth subalpine forests, but are also found in low-elevation forests used by caribou (Jones *et al.* 2004). In summer, these caribou feed on a wide variety of shrubs, forbs, and grasses, which are likely not limiting.

Breeding generally occurs during October/November and the rut is short compared to other cervids. Gestation averages seven to eight months, and calves are born in late May to early June. Males and females sexually segregate outside of the breeding season. Females will maintain aggregated bands until calving season, when pregnant cows will segregate themselves from conspecifics to calve.

The primary cause of known adult caribou mortality of SPNC is predation, primarily Wolf (*Canis lupus*) predation (Seip 1991, Seip and Jones 2012a, 2013a). Calf survival for SPNC herds is generally quite low. Although predation is likely a cause of much of the calf mortality, the actual causes are not known. However, research in other areas has documented the importance of predation, including predation by grey wolves, on calf mortality (Seip 1991, Wittmer *et al.* 2005). Other predators including bears, Wolverines (*Gulo gulo*), and possibly eagles can also be major predators on caribou calves (Rettie and Messier 1998; Gustine *et al.* 2006).

The seasonal habitat use patterns of caribou tend to maintain spatial separation between caribou and grey wolves because grey wolves primarily live in valley bottoms and low elevations where they feed on moose and other ungulate species. However, grey wolves occasionally hunt at higher elevations, or encounter caribou that are using low elevations, and kill caribou. Factors that increase the number of grey wolves on caribou range, or increase the movements of grey wolves into caribou habitat, are likely to increase the encounter rate and the impact of grey wolf predation on the caribou population (Seip 1991).

4.3.2 Habitat and Ecological Requirements

Within the SPNC herd ranges, caribou concentrate their use in specific habitats within their range to obtain forage, cover, and avoidance from predators. Caribou use of these habitats varies seasonally (winter and summer) (Jones *et al.* 2007; Williamson-Ehlers 2012a, 2012b). Summer and winter habitats overlap, but typically in winter, SPNC will select low-elevation forests (low-elevation winter habitat) and/or windswept alpine ridges (high-elevation winter habitat) where snow cover is relatively shallow to crater and forage for terrestrial lichens (Northern Caribou Technical Advisory Committee 2004; Jones *et al.* 2007). The extent of low-elevation winter habitat used by SPNC is known and 114,691 hectares has been identified (Figure 4: Table 2). High-elevation winter habitat use by SPNC is also known and 567,318 hectares has been

identified (Figure 5; Table 2). The variation in the amount and when this habitat is used among SPNC is discussed below in greater detail for each herd.

Table 2. Amount of range and identified low- and high-elevation winter habitat for SPNC in B.C.

Herd	Range (ha)	Low-elevation winter habitat (ha)	High-elevation winter habitat (ha)
Graham	929,078	n/a	176,059
Moberly	329,121	0	68,177
Scott	221,502	0	129,620
Burnt Pine	71,015	0	20,586
Kennedy Siding	291,159	2,893	65,639
Quintette	607,805	0	71,276
Narraway	365,000	111,798	35,961
Total	2,818,680	114,691	567,318

In summer, most of the SPNC migrate towards the central core of the Rocky Mountains where they use alpine and subalpine habitat. The exception to this general pattern is that some caribou in the B.C. portion of the Narraway range remain in low-elevation boreal forest habitat throughout the summer (Figure 4). The result of this movement to the central core of the Rocky Mountains is that some of the east side herds can overlap with west side herds during the summer. Most of the caribou calve in mountainous habitats and this behaviour is thought to be in part a strategy to avoid predators. Use of high-elevation habitat during the summer provides some spatial separation between caribou and grey wolves because grey wolves live primarily at lower elevations and feed on other ungulate species.

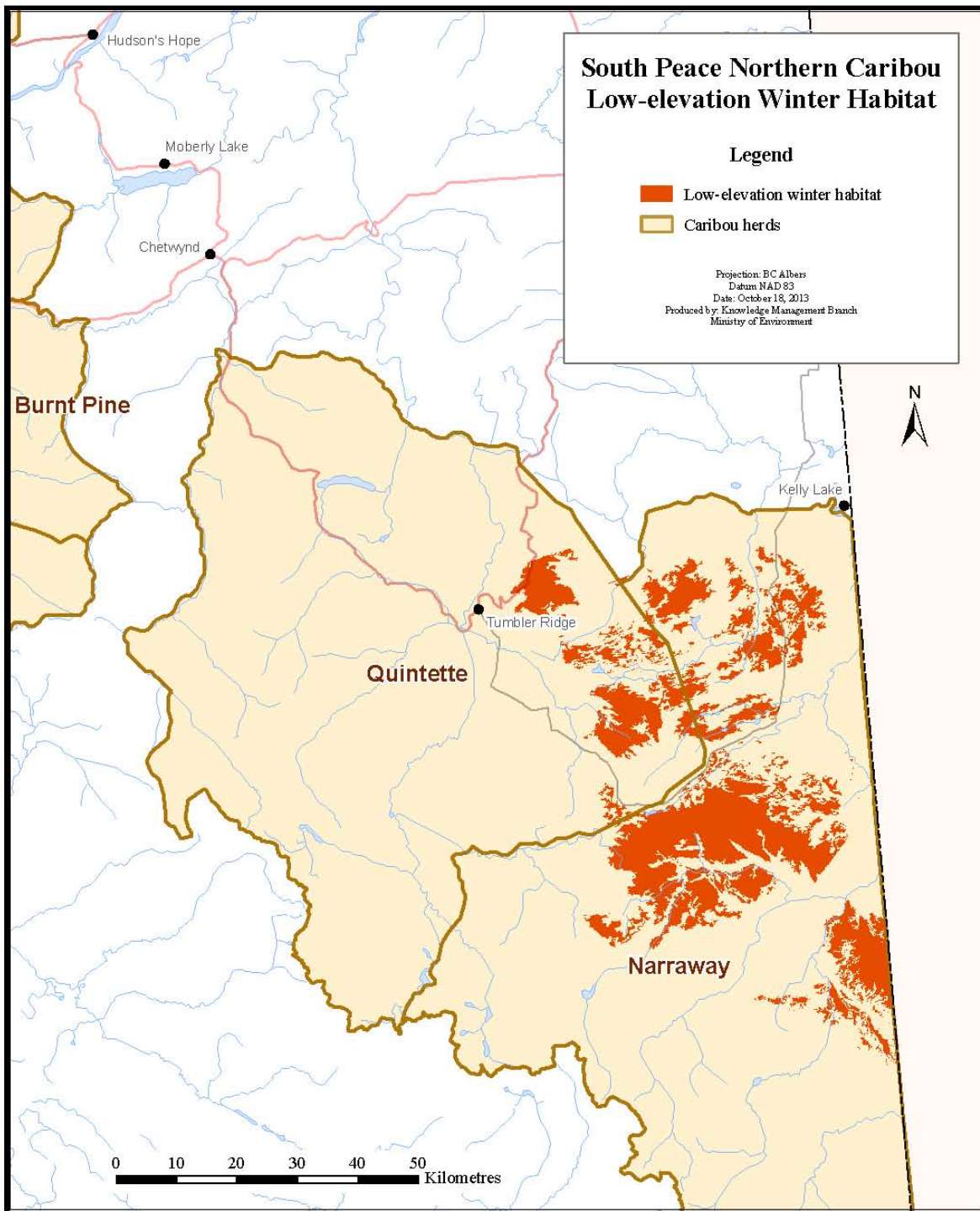


Figure 4. Distribution of identified low-elevation winter habitat for SPNC. Map does not include the relatively small proportion of identified low-elevation winter habitat for Kennedy Siding.

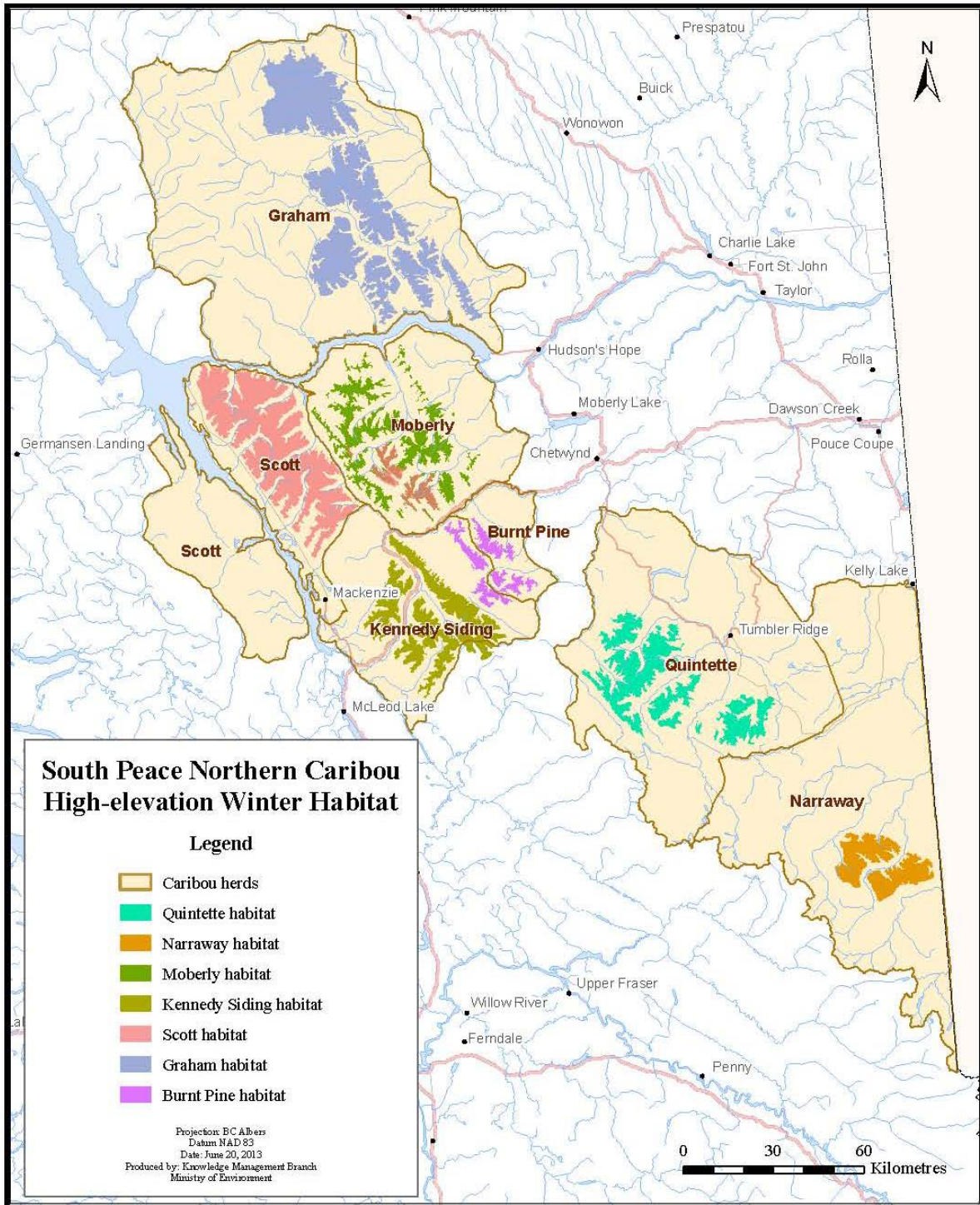


Figure 5. Distribution of identified high-elevation winter habitat for SPNC.

Graham

The Graham herd uses a combination of high- and low-elevation habitat in winter. A total of 176,059 hectares of high-elevation winter habitat has been identified for use (Table 2) (Seip and Jones 2012b). The amount of low-elevation habitat used in winter has not been identified, but is currently under investigation.

Results of telemetry studies from 1988 to 1994 and from 2001 to 2003 indicate that the Graham herd is comprised of migratory and resident populations (Culling *et al.* 2005). Resident caribou remain near winter range along the eastern foothills of the Rocky Mountains, while migratory animals typically move to more mountainous western areas in May, returning in the fall or early winter. Based on the GPS telemetry data and associated spring and fall calf survival surveys (2001 and 2002), Butler Ridge, in combination with Aylard and Husky Ridges and the Hackney Hills, provides high quality year-round habitat for the Graham herd.

There is no evidence of radio-collared caribou crossing the Peace Arm of the Williston Reservoir between the Graham herd on the north and the Moberly herd on the south over the past decade. Genetic data indicate that interchange between these two herds has always been limited (Serrouya *et al.* 2012), although traditional knowledge indicates that some caribou did move across the Peace River valley in the past. Any historical movement patterns that did occur have now been impeded by the flooding of the Peace River valley by the Williston Reservoir.

Moberly

The Moberly caribou herd occurs on the east side of the Rocky Mountains, between Peace Arm and the Pine River valley, which includes Highway 97. The caribou use windswept alpine slopes and adjacent subalpine forests on the eastern edge of the Rockies for winter habitat. Within the range of the Moberly herd, a total of 68,177 hectares of high-elevation habitat has been identified for winter use (Table 2) (Seip and Jones 2012c). Moberly caribou also use low-elevation habitat in winter. According to First Nations in the Moberly Lake area, this behaviour appears to be more common than previously reported. In summer, most of the Moberly caribou migrate west towards the central core of the Rocky Mountains, with some individuals crossing over to the west side. In summer, the caribou continue to occupy alpine and subalpine habitats.

Scott

The Scott herd is the least studied of the caribou herds of the SPNC and telemetry data are limited. Historically, some or all of the caribou that summered in the mountains on the east side of the Parsnip River migrated to early winter low-elevation range on the west side of the Parsnip River. After the Williston Reservoir was created, some caribou continued to maintain this pattern but over time this movement pattern has largely disappeared and now most or all of the caribou remain in the mountains on the east side of the reservoir. The Scott caribou live at high-elevations during the winter using both subalpine forests for arboreal lichen feeding, and alpine areas for terrestrial lichen feeding. Within the range of the Scott herd, 129,620 hectares of high-elevation winter habitat has been identified (Table 2) (Seip and Jones 2012d).

Burnt Pine

The Burnt Pine caribou range occurs on the east side of the Rocky Mountains between the Pine River to the north, and the Burnt River to the south. In the past, these caribou were considered to be part of the Moberly caribou herd, but telemetry data indicated little or no movement between

the ranges. The Burnt Pine herd numbered about 20 animals in the early 2000s, but gradually declined and is presumed extirpated by 2013.

This herd used windswept alpine and subalpine forests for winter habitat on the eastern edge of the Rockies. A total of 20,586 hectares of high-elevation winter habitat has been identified within the range of the Burnt Pine herd (Table 2) (Seip and Jones 2012e). There have been several observations of radio-collared caribou from Kennedy Siding using the Burnt Pine winter range in late winter after they left the low-elevation Kennedy Siding winter habitat. Therefore, caribou observed on the Burnt Pine winter habitat in late winter can potentially be animals from the Kennedy Siding herd. This interaction between Kennedy Siding and the Burnt Pine ranges provides some possibility that the Burnt Pine range could be recolonized by Kennedy Siding caribou in the future, especially if the Kennedy Siding herd became more abundant.

In summer, most of the animals moved to the west to occupy the central core of the Rocky Mountains. There was occasional overlap between Kennedy Siding caribou and Burnt Pine caribou on summer habitats.

Kennedy Siding

The Kennedy Siding herd migrates to a low-elevation pine-lichen winter habitat for the early winter period. The pine-lichen winter habitat is limited to a total area of 12,000 hectares, although the core use area is only about 3,000 hectares. The caribou feed on terrestrial and arboreal lichens as long as snow depths are shallow enough to allow cratering. The pine forest has recently been attacked by mountain pine beetle (*Dendroctonus ponderosae*) and most of the canopy trees are dead. However, the caribou continue to migrate to the early winter habitat and feed in the forest despite the mountain pine beetle attack.

Between late December and February, snow depth or hardness usually become unsuitable for cratering and the caribou migrate to late winter habitat at high elevations on the west side of the Rocky Mountains. The caribou primarily feed on arboreal lichens in old-growth subalpine forest, but also feed on terrestrial lichens on windswept alpine ridges. A total of 65,639 hectares of high-elevation winter habitat has been identified (Table 2) (Seip and Jones 2012f).

Quintette

The Quintette caribou live on the eastern side of the Rocky Mountains, generally between the Sukunka River and Kinuseo Creek. Most of the caribou winter on windswept alpine ridges and adjacent subalpine forests. However, some Quintette caribou occasionally use low-elevation forests during the winter, and use of low-elevation forests by Quintette caribou appears to have been more common several decades ago (Sopuck 1985). A total of 71,276 hectares of high-elevation winter habitat has been identified (Table 2) (Seip and Jones 2013b).

In summer, most of the caribou in this herd migrate west farther into the Rockies, with some moving to the west side of the Rockies into the range of the Hart Ranges mountain caribou population. However, some remain on the eastern edge and use the same areas that they used during the winter.

Narraway

The Narraway caribou herd uses low-elevation boreal forest habitat east of the Rocky Mountains. The Narraway herd consists of two subpopulations: the Bearhole-Redwillow group north of the Red Deer valley and the southern Narraway group to the south. Although these two groups are largely separate on the winter range, their seasonal movement patterns are similar and there is known to be some interchange based on animals that have been collared. Within the range of the Narraway herd, a total of 35,961 hectares of high-elevation winter habitat and 111,798 hectares of low-elevation winter habitat have been identified (Table 2) (Seip and Jones 2013c, 2013d). In fall, most caribou migrate to the eastern side of the Rocky Mountains where they winter in low-elevation forested that extends into Alberta. Here the caribou range widely over an extensive area and use pine–lichen forests, tamarack bogs, and mature spruce forests. The caribou feed on terrestrial and arboreal lichens in the pine–lichen forests, and arboreal lichens in the tamarack bogs and mature spruce forests. Some of the caribou in the southern Narraway herd use high-elevation alpine habitat during the winter.

In summer, most of the caribou migrate up to 100 km to summer ranges in the Rocky Mountains, with most using areas on the west side of the Rocky Mountains. The caribou primarily use subalpine forest habitat during the summer. However, the Bearhole-Redwillow group remains in the low-elevation boreal forest throughout the summer. Those individuals are likely the remnants of a Boreal Caribou population that historically would have been much more numerous and extended farther east throughout boreal forest habitat.

4.3.3 Ecological Role

At high densities, SPNC caribou in general may affect ecosystem function and structure by providing a valuable resource for predators. SPNC are the only large herbivore that is widely distributed in the high-elevation habitat and act as agents for plant and lichen diversity through the mechanisms of trampling and foraging. The SPNC have also been a significant resource for indigenous peoples for millennia. At lower densities, however, their ecological role is likely less apparent and understood.

4.4 Biological Limitations

Like all caribou, the SPNC have low reproductive rates because females only have one calf per year and females do not breed until they are at least two years of age. Caribou calf survival is generally low, averaging 30–50% for the first year. Predation is a major cause of SPNC mortality and evidence suggests that their behaviour is a response to reduce predation risk (D. Seip, pers. comm., 2012).

5 THREATS

Threats are defined as the proximate activities or processes that have caused, are causing, or may cause in the future the destruction, degradation, and/or impairment of the entity being assessed (population, species, community, or ecosystem) in the area of interest (global, national, or subnational) (Salafsky *et al.* 2008). For purposes of threat assessment, only present and future threats are considered.⁵ Threats presented here do not include biological features of the species or population such as inbreeding depression, small population size, and genetic isolation; or likelihood of regeneration or recolonization for ecosystems, which are considered limiting factors (Table 3).⁶

For the most part, threats are related to human activities, but they can be natural. The impact of human activity may be direct (e.g., destruction of habitat) or indirect (e.g., invasive species introduction). Effects of natural phenomena (e.g., fire, hurricane, flooding) may be especially important when the species or ecosystem is concentrated in one location or has few occurrences, which may be a result of human activity (Master *et al.* 2009). As such, natural phenomena are included in the definition of a threat, though should be applied cautiously. These stochastic events should only be considered a threat if a species or habitat is damaged from other threats and has lost its resilience, and is thus vulnerable to the disturbance (Salafsky *et al.* 2008). In such cases, these types of events would have a disproportionately large effect on the population/ecosystem compared to the effect they would have had historically.

⁵ Past threats may be recorded but are not used in the calculation of Threat Impact. Effects of past threats (if not continuing) are taken into consideration when determining long-term and/or short-term trend factors (Master *et al.* 2009).

⁶ It is important to distinguish between limiting factors and threats. Limiting factors are generally not human induced and include characteristics that make the species or ecosystem less likely to respond to recovery/conservation efforts.

5.1 Threat Assessment

The threat classification below for SPNC is based on the IUCN-CMP (World Conservation Union–Conservation Measures Partnership) unified threats classification system and is consistent with methods used by the B.C. Conservation Data Centre and the B.C. Conservation Framework. For a detailed description of the threat classification system, see the [CMP website](#) (CMP 2010).

Threats may be observed, inferred, or projected to occur in the near term. Threats are characterized here in terms of scope, severity, and timing. Threat “impact” is calculated from scope and severity. For information on how the values are assigned, see [Master *et al.*](#) (2009) and table footnotes for details. Threats to SPNC were assessed for B.C. (Table 3).

Table 3. Threat classification table for South Peace Northern Caribou in B.C.

Threat		Impact ^a	Scope ^b	Severity ^c	Timing ^d
1	Residential & commercial development	Negligible	Negligible	Extreme	High
1.1	Housing & urban areas	Negligible	Negligible	Extreme	High
1.2	Commercial & industrial areas	Negligible	Negligible	Extreme	High
1.3	Tourism & recreation areas	Negligible	Negligible	Serious	High
2	Agriculture & aquaculture	Negligible	Negligible	Slight	High
2.1	Annual & perennial non-timber crops	Negligible	Negligible	Slight	High
2.3	Livestock farming & ranching	Negligible	Small	Negligible	High
3	Energy production & mining	High	Large	Serious	High
3.1	Oil & gas drilling	Medium	Restricted	Serious	High
3.2	Mining & quarrying	Medium	Restricted	Extreme	High
3.3	Renewable energy	Medium	Restricted	Moderate	High
4	Transportation & service corridors	Negligible	Small	Negligible	High
4.1	Roads & railroads	Medium	Small	Extreme	High
4.2	Utility & service lines	Negligible	Small	Negligible	High
5	Biological resource use	High	Large	Extreme	High
5.1	Hunting & collecting terrestrial animals	Negligible	Large	Negligible	High
5.3	Logging & wood harvesting	High	Large	Extreme	High
6	Human intrusions & disturbance	Low	Large	Slight	High
6.1	Recreational activities	Low	Restricted	Slight	High
6.3	Work & other activities	Low	Restricted	Slight	High

Threat		Impact ^a	Scope ^b	Severity ^c	Timing ^d
7	Natural system modifications	Negligible	Small	Negligible	High
7.1	Fire & fire suppression	Negligible	Small	Negligible	High
8	Invasive & other problematic species & genes	High	Pervasive	Serious	High
8.2	Problematic native species	High	Pervasive	Serious	High
9	Pollution	Low	Small	Serious	High
9.2	Industrial & military effluents	Negligible	Negligible	Negligible	High
9.5	Air-borne pollutants	Negligible	Negligible	Negligible	High
9.6	Excess energy	Low	Small	Serious	High
10	Geological events	Negligible	Negligible	Extreme	High
10.3	Avalanches/landslides	Negligible	Negligible	Extreme	High
11	Climate change & severe weather	Not Calculated (outside assessment timeframe)	Pervasive	Slight	Low
11.1	Habitat shifting & alteration	Not Calculated (outside assessment timeframe)	Pervasive	Slight	Low
11.3	Temperature extremes	Not Calculated (outside assessment timeframe)	Pervasive	Unknown	Low
11.4	Storms & flooding	Not Calculated (outside assessment timeframe)	Pervasive	Unknown	Low

^a **Impact** – The degree to which a species is observed, inferred, or suspected to be directly or indirectly threatened in the area of interest. The impact of each threat is based on Severity and Scope rating and considers only present and future threats. Threat impact reflects a reduction of a species population or decline/degradation of the area of an ecosystem. The median rate of population reduction or area decline for each combination of scope and severity corresponds to the following classes of threat impact: Very High (75% declines), High (40%), Medium (15%), and Low (3%). Unknown: used when impact cannot be determined (e.g., if values for either scope or severity are unknown); Not Calculated: impact not calculated as threat is outside the assessment time (e.g., timing is insignificant/negligible [past threat] or low [possible threat in long term]); Negligible: when scope or severity is negligible; Not a Threat: when severity is scored as neutral or potential benefit.

^b **Scope** – Proportion of the species that can reasonably be expected to be affected by the threat within 10 years. Usually measured as a proportion of the species' population in the area of interest. (Pervasive = 71–100%; Large = 31–70%; Restricted = 11–30%; Small = 1–10%; Negligible < 1%).

^c **Severity** – Within the scope, the level of damage to the species from the threat that can reasonably be expected to be affected by the threat within a 10-year or 3-generation timeframe. Usually measured as the degree of reduction of the species' population. (Extreme = 71–100%; Serious = 31–70%; Moderate = 11–30%; Slight = 1–10%; Negligible < 1%; Neutral or Potential Benefit ≥ 0%).

^d **Timing** – High = continuing; Moderate = only in the future (could happen in the short term [< 10 years or 3 generations]) or now suspended (could come back in the short term); Low = only in the future (could happen in the long term) or now suspended (could come back in the long term); Insignificant/Negligible = only in the past and unlikely to return, or no direct effect but limiting.

5.2 Description of Threats

The overall province-wide Threat Impact for SPNC is Very High⁷ (75% declines). This overall threat considers the cumulative impacts of multiple threats. Details are discussed below under the Threat Level 2 headings (Table 3).

5.3 High Impact Threats

Details of Level 1 high impact threats are discussed below under the level 2 headings.

IUCN-CMP Threat 3. Energy Production & Mining

IUCN-CMP Threat 3.1. Oil & gas drilling

Seismic activities associated with oil and gas exploration have the greatest impact to SPNC compared to other oil and gas activities because they have a relatively larger footprint. Seismic activities can displace caribou from preferred habitat, destroy caribou habitat over the short- or long-term depending on the type of seismic activity, reduce the availability of forage, and increase the amount of early-seral habitat, which in turn increases ungulates and their predators. Seismic lines may also provide access for predators and humans.

Oil and gas development has occurred with SPNC range since the 1950s. Approximately 100,000 hectares of low-elevation SPNC habitat has been impacted by oil and gas activities. With the exception of the Graham herd area, more than 80% of this development has occurred within the last decade. Seismic activities have contributed to the vast majority of the disturbance in SPNC range (Table 4). Note that this description does not include impacts from associated linear developments such as roads and pipelines, but linear developments are included in the descriptions for mining and renewable energy (i.e., roads, drilling activities, transmission lines, etc.).

⁷ The overall threat impact was calculated following Master *et al.* (2009) using the number of Level 1 Threats assigned to this species where Timing = High or Moderate. This includes 2 High and 3 Low (Table 3). The overall threat considers the cumulative impacts of multiple threats.

Table 4. Area within SPNC range that has been disturbed by oil and gas activities since the 1950s in B.C. Data do not include disturbances associated with road developments and maintenance.

Herd	Disturbance type			Total (ha)	Percent of total (2003–2012)
	Well sites and facilities (ha)	Pipelines (ha)	Seismic (ha)		
Graham	7,424	518	3,794	14,636	67%
Moberly/ Burnt Pine	1,147	5	4,281	5,433	80%
Quintette	253	609	22,973	23,835	99%
Narraway	7,753	996	20,423	29,192	88%
Total	24,719	3,627	69,364	100,630	

IUCN-CMP Threat 3.2. Mining & quarrying

Mine exploration activities (e.g., drilling, road building, bulk sample pits) pose a threat to SPNC throughout most of their range. Exploration activities have a relatively small disturbance footprint but have the potential to impact large areas of habitat by providing access roads to the alpine. Access roads to the alpine can increase caribou risk of predation if predators use such roads. Mine exploration can also permanently destroy caribou habitat, reduce the availability of forage, increase the amount of early-seral habitat, and displace caribou to areas of higher predation risk and less preferred foraging.

Like exploration, mining activities have a relatively small disturbance footprint but have the potential to impact larger areas of habitat beyond the mining footprint, through activities such as road building and facility development. Mining can threaten SPNC by displacing them to areas of higher predation risk and less preferred habitat. The activity can result in longer term impacts on caribou until such time as the productivity of the habitat has been restored.

Currently, several coal mines extracting metallurgical (coking) coal are located within the Quintette and Narraway herds. These mines are expected to expand their operations to increase production. In addition, other mines in the area that have been dormant since 2000 may restart production. Future mine development and activities associated with mining is expected to impact SPNC and their habitat where it occurs.

IUCN-CMP Threat 3.3. Renewable energy

Several wind-park developments are in SPNC range and it is expected that several more will be developed based on the number of tenures designated for wind-park development. They are usually located along ridgelines and are associated with a network of maintenance roads and access corridors (e.g., transmission lines). Wind-park development can destroy caribou habitat, reduce the availability of forage, and increase the amount of early-seral habitat. Also, activities along roads and near windmill sites have the potential to displace caribou from preferred habitats to areas of higher predation risk.

Most of the approximately 6% (203,299 hectares) of SPNC range that has been tenured for wind energy occurs within identified low-elevation habitat (Table 5). Wind-park development in low-

elevation habitat has less of an impact on SPNC. Approximately 23% of the tenured areas occur in high-elevation winter habitat of SPNC (Table 5). If all these tenures are developed for wind energy, the impacts are expected to be more severe.

Table 5. Area within SPNC range and high-elevation winter habitat that has been tenured for wind energy development in B.C.

Herd	Wind energy tenures in SPNC range	Proportion of wind energy tenures in high-elevation winter habitat	
	Area (hectares)	Area (hectares)	%
Burnt Pine	26,242	8,684	33
Graham	32,390	13,032	40
Kennedy-Siding	2,970	2,386	80
Moberly	26,376	1,540	0.06
Narraway	36,353	4,675	13
Quintette	76,732	16,996	22
Scott	2,235	0	0
Total	203,299	47,314	23

IUCN-CMP Threat 5. Biological Resource Use

IUCN-CMP Threat 5.1. Hunting & collecting terrestrial animals

Resident hunting of SPNC was closed in 2002–2003 in the Narraway herd, and in 2003–2004, in all other herds except for the Graham herd. First Nations have hunted caribou for subsistence for more than a millennium (B.C. Ministry of Environment, Lands and Parks 1997). However, Saulteau and West Moberly First Nations have restricted the hunting of SPNC by members since the 1970s (West Moberly First Nations Land Use Department 2009).

The Graham herd is the only SPNC herd that is hunted in a small portion of its range. The Graham herd experiences an open season with a 5-point bull harvest (Aug. 15–Oct. 15) in management unit (MU) 7-37 and a 5-point bull harvest (Sept. 1 – Sept. 30) in MU 7-58 (bow hunting only). Hunting of caribou in MU 7-57 is permitted north of the Halfway River. There may be some movement of Graham caribou into Pink Mountain caribou range north of the Halfway River. Considering that Pink Mountain caribou are hunted, this may have an impact on Graham herd populations. The average number of caribou hunted in the Graham herd ranged from 1 to 5 animals per year between 1976 and 2010 (Table 6). MU 7-43, which overlaps the majority of the Graham caribou range, is closed to hunting.

Improved access into SPNC range may increase the risk of poaching and increase caribou mortality and population declines.

Table 6. South Peace Northern Caribou hunting statistics for management units in the Graham herd from 1976 to 2010.

	Management Unit		
	7-37	7-57	7-58
Maximum harvest (year)	28 (1983)	19 (1993)	2 (2002)
Average long-term harvest (years)	5 (1976– 2010)	5 (1978–2010)	1 (1985–2010)

IUCN-CMP Threat 5.3. Logging & wood harvesting

Forest harvesting can impact winter habitat of SPNC caribou at both the stand and landscape level (Cichowski 2008). At the stand level, harvesting can reduce the availability of forage, both through physically disturbing the slow-growing terrestrial lichens and removing the arboreal-lichen host-trees, and through modifying the microclimate. Terrestrial lichens are poor competitors against vascular plants. As such, they tend to dominate in regions where nutrients or water are in short supply. Harvesting or otherwise altering the overstory canopy can modify the conditions such that vascular plants and bryophytes out-compete the lichen, thus decreasing the availability of forage for northern caribou.

Although terrestrial lichens are a crucial factor for SPNC in winter, it is recognized that the availability of lichens is not a limiting factor for caribou (Seip and Cichowski 1996), and may not be the primary mechanism in which landscape disturbance may impact caribou habitat. Rather, at the landscape level, forest harvesting results in a patchwork of forest seral stages which may have two equally adverse impacts on caribou populations. First the patchwork increases the availability of early-seral habitat, which leads to a population increase of early-seral ungulates that are the primary prey species for many predators. Such imbalances to the predator–prey dynamics can lead to increased predation on caribou (Seip 1991, 1992). Second, the patchwork can lead to avoidance, and possibility abandonment, of that portion of the winter range by caribou (Smith *et al.* 2000). Caribou populations, particularly those with a low-elevation winter habitat, are thought to persist at low densities to maximize access to forage and minimize predation (Bergerud and Page 1987). Abandoning a portion of the winter range forces caribou to concentrate in a smaller area or move to less suitable habitat, which increases their risk to predation.

Industrial forestry activities in SPNC range began in the 1970s (Figure 5). Before that time, the relatively low-value pine forests and the long distances and high delivered wood costs made harvesting in the area economically unfeasible. The improved road access and advanced log processing technology in the decades since have increased the value of the low-elevation forests in SPNC range. Forest harvesting had the largest total impact on SPNC range between 2000 and 2009 (Figure 5).

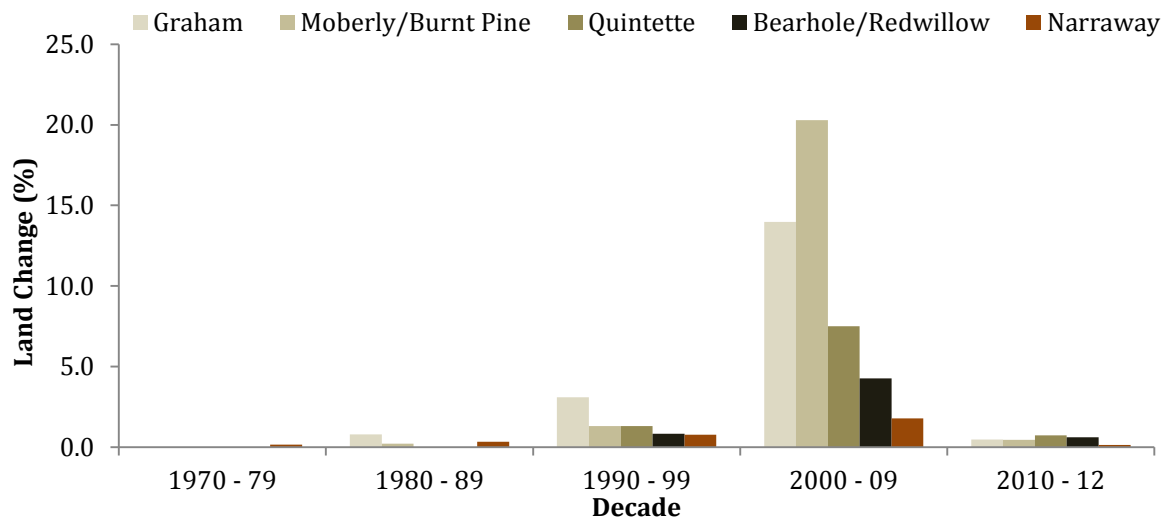


Figure 5. Land change in B.C. as a result of forestry within SPNC range. Data provided for the Graham, Moberly/Burnt Pine, Quintette, Bearhole-Redwillow, and Narraway herds.

Based on data from vegetation resource inventories and the forest tenure database for the Dawson Creek Forest District, 142,757 hectares of low-elevation SPNC habitat has been harvested (Table 7). A further 84,981 hectares has been converted to early-seral habitat through other natural or anthropogenic processes, and now potentially acts as an attractant to early-seral ungulates.

Efforts to ameliorate the impacts of forest harvesting on caribou habitat and population dynamics include the forest management prescriptions provided by General Wildlife Measures (GWMs) (i.e., management prescriptions) for low-elevation UWRs (see Section 7.3.1), and general recommendations outlined under landscape level plans (see Sections 7.1 and 7.2). Several companies have voluntarily stopped forest harvesting activities in the Narraway herd range due to the combined pressures of caribou habitat protection and economic feasibility. Some companies also committed to vegetation management to minimize early-seral browse production (e.g., on previously harvested areas within SPNC range). The exception is area within the Moberly herd range where concerns were raised by First Nations about the use of herbicide.

Table 7. Area of early-seral (< 50 years old) forests, listed by disturbance type, within the South Peace Northern Caribou range in B.C. Data are in hectares.

Herd	Early-seral (< 50 yrs) forest by disturbance type					Total
	Harvesting	Burns	Insects	Non-biotic injury	Unknown	
Narraway	12,522	545	8,491	1,831	6,267	29,656
Quintette	10,339	1,428	1,214	1,818	7,680	22,479
Burnt Pine	15,747				282	16,029
Kennedy siding	13,666	609	209	3,637	2,366	20,487
Moberly	18,809	732	4,650	33	6,439	30,663
Scott	46,951	358	3,324		5,057	55,690
Graham	24,723	1,991	876	4,883	20,261	52,734
Total	142,757	5,663	18,764	12,202	48,352	227,738

IUCN-CMP Threat 8. Invasive & Other Problematic Species & Genes

IUCN-CMP Threat 8.2. Problematic native species

The SPNC have exhibited declines in numbers over the past decade. The proximate cause of this mortality is primarily related to increased levels of predation associated with wolves. Other predators including bears, wolverines, and eagles can affect caribou numbers (Rettie and Messier 1998; Gustine *et al.* 2006).

The seasonal habitat use patterns of caribou tend to maintain spatial separation between caribou and wolves because grey wolves primarily live in valley bottoms and low elevations where they feed on moose and other ungulate species. However, grey wolves occasionally hunt at higher elevations, or encounter caribou that are using low elevations, and kill caribou. Factors that increase the number of grey wolves on caribou range, or increase the movements of grey wolves into caribou habitat are likely to increase the encounter rate and the impact of Grey Wolf predation on the caribou population.

Caribou and grey wolves (and other predator and prey species) co-existed in the south Peace for thousands of years following the last glaciation. However, within the past few decades, the SPNC have exhibited a dramatic decline in numbers apparently due to unsustainable levels of wolf predation in combination with other mortality factors. This period of decline corresponds to a period of significant habitat change due to industrial activities, especially forest harvesting (Williamson-Ehlers *et al.* 2013). The proposed mechanism of decline is that industrial activities have modified the landscape in a way that has increased the number and distribution of early seral ungulates, which in turn have increased the density and distribution of grey wolves within caribou range (Seip 1992). In areas where the wolf population is sustained by moose or deer, wolves could extirpate local caribou populations. This is because there is no negative feedback on wolf populations as caribou populations decline (Seip 1991, 1992). This process has been observed and documented for other caribou herds in B.C. (Wittmer *et al.* 2005), and is generally understood for woodland caribou herds throughout North America.

To date, industrial habitat modification has occurred primarily at low elevations, which directly impacted caribou living at low elevations, and indirectly impacted caribou living at high-elevations by altering the predator-prey system. There is evidence that caribou use of low-elevation habitat was more common in the past, but now most caribou are restricted to high elevations. For example, in the early 1980s, many of the Quintette caribou used low-elevation habitat for part of the winter (Sopuck 1985) but more recently Quintette caribou are largely restricted to alpine habitat in winter (Jones *et al.* 2007). There is now increasing industrial activity occurring and proposed on high-elevation habitats, which will further threaten the ongoing survival of those caribou that have had some refuge at higher elevations.

Pine beetle may also impact SPNC by removing extensive areas of pine forest and reducing the amount of forage availability and/or cover for SPNC to separate from other ungulates and predators.

5.4 Low Impact Threats

Details of Level 1 low impact threats are discussed below.

IUCN-CMP Threat 6. Human Intrusion & Disturbance

IUCN-CMP Threat 6.1. Recreational activities

Winter recreation activities pose a greater threat to caribou compared to summer recreation activities (Simpson and Terry 2000). Specifically, the creation of winter compacted trails from snowmobiling can increase predation risk to caribou (James and Stuart-Smith 2000) and displace caribou from preferred habitats (Seip *et al.* 2007). Displacement may also result in increased predation risk.

IUCN-CMP Threat 6.3. Work and other activities

Work and other activities related to industrial activities can remove SPNC habitat by creating all-weather roads and other access (e.g., seismic lines) into caribou range. Industrial activities also displace caribou.

IUCN-CMP Threat 9. Pollution

IUCN-CMP Threat 9.2. Industrial & military effluents

Mining activities can introduce selenium into streams, rivers, and lakes at higher levels than would occur naturally. At certain levels selenium can become toxic, having adverse effects on wildlife, and thus potentially impacting SPNC. Pipeline leaks and flare stack leaks associated with petroleum and natural gas development can introduce toxins into the environment and potentially impact SPNC.

IUCN-CMP Threat 9.5. Air-borne pollutants

Sour gas from natural gas development may impact the health of SPNC.

IUCN-CMP Threat 9.6. Excess energy

Lights, sounds, and heat (flare stacks) associated with industrial development that generally operates 24 hours per day may impact SPNC and their habitat.

6 MANAGEMENT PLANNING

In November 2012, the Province endorsed the Peace Northern Caribou Plan. That endorsement and subsequent management direction have been articulated in a provincial implementation plan entitled *Implementation Plan for the Ongoing Management of South Peace Northern Caribou* (*Rangifer tarandus caribou pop. 15*) in *British Columbia* (B.C. Ministry of Environment 2012).

The goal of this plan is to increase the South Peace Northern Caribou to 1,200 animals within 21 years.

7 EXISTING MANAGEMENT

7.1 Resource Use

Resident hunting of SPNC was closed in 2002–2003, except for portions of the Graham caribou range. The Graham herd has a 5-point bull harvest in MUs 7-37 and 7-58 (bow hunting only) (Table 6). The average number of Graham caribou harvested ranged from 1 to 5 animals per year between 1976 and 2010, with maximum annual harvests of between 2 and 28 animals (Table 6). Most of the Graham caribou range is not subject to hunting.

7.2 Land and Resource Management Plans

The distribution of SPNC occurs within the management areas of the Peace Forest District and the Mackenzie Forest District (Scott herd range is within the Mackenzie FD, and the west side of the Kennedy Siding and Graham herd ranges) and are included in three Land and Resource Management Plans (LRMPs) that include the Fort St. John LRMP (Fort St. John LRMP Working Group 1997), the Dawson Creek LRMP (Province of British Columbia 1999), and the Mackenzie LRMP (Province of British Columbia 2000). Each LRMP adopts a general approach to land management for SPNC. This approach is outlined in the following sections.

7.2.1 The Fort St. John LRMP

The Fort St. John LRMP adopts the general management direction of ensuring that the habitat needs for Red- and Blue-listed, and regionally significant species are provided for.

Recommended general strategies include:

- identifying and mapping high capability ungulate wintering areas;
- incorporating the maintenance of high capability ungulate wintering habitat (e.g., thermal and escape cover, suitability of forage and browse) into landscape level plans;
- establishing wildlife habitat areas and ungulate winter ranges at the landscape level to protect critical wintering habitat; and
- planning and developing new access routes that avoid direct disturbance within, or close to, high capability ungulate wintering habitat.

Strategies specific to caribou include:

- generating inter-agency development plans for all resource developments that may negatively affect critical medium and high capability caribou habitat;
- identifying and mapping medium and high capability caribou habitat;
- identifying and designating critical caribou habitat areas as wildlife habitat areas under legislation;

- maintaining connectivity (migration/travel) corridors between important seasonal habitats; and
- encouraging the use of silvicultural systems that minimize negative impacts of medium and high capability caribou habitat.

Additional plans that support the Fort St. John LRMP include the Graham River Integrated Resource Management Plan (GRIMP). The GRIMP plan is part of the sustainable forest management plan developed for the Fort St. John Practices Code Pilot Project (FSJPP). It was developed jointly between the B.C. Ministry of Environment, B.C. Ministry of Forests and Range, and Canadian Forest Products Ltd. The plan included commitments made by participating FSJPP licensees to concentrate harvesting in certain areas or clusters at any one time. This cluster-harvesting was designed to limit the extent of disturbance to wildlife, recreational, and other non-timber values over the entire Graham drainage at any one time.

7.2.2 Dawson Creek LRMP

The Dawson Creek LRMP cites a broad objective to manage critical high- and low-elevation caribou habitat to assist in sustaining viable, healthy populations. The plan recommends the following strategies in support of that objective:

- identify and map critical ungulate habitat, and incorporate into landscape unit level and operational planning;
- identify and map connectivity corridors and/or forest ecosystem networks and incorporate into landscape unit level planning ;
- identify, map and consider designating critical habitat components as wildlife habitat areas under legislation.

Additional plans for managing caribou within the Dawson Creek LRMP are in the Dunlevy Creek Management Plan (DCMP). The DCMP is a local-level plan that provides management direction for resource development within management zones of high wildlife habitat and wilderness recreation values in the Dunlevy Creek area (Graham caribou herd range). The DCMP provides specific recommendations for industrial development on mid- and high-elevation caribou winter range. Specific management recommendations for caribou include:

- coordination of resource development activities among tenure holders;
- coordination of access through the development of designated primary access routes;
- deactivation and/or rehabilitation of portions of designated access routes to inhibit uncontrolled access;
- construction of secondary access to the lowest standard possible;
- use of directional drill technology from adjacent areas to access oil and gas resources underlying ungulate winter range;
- emulation of natural disturbance regimes during forest development;
- orientation of harvest openings/patches to achieve connectivity at a landscape level;
- timing restrictions for geophysical activities within critical ungulate winter ranges; and
- road access prohibitions above 1400 m on critical ranges (Aylard and Butler ridges)

7.2.3 Mackenzie LRMP

The Mackenzie LRMP includes a specific caribou management strategy. The strategy maintains the broad objective to manage and perpetuate caribou and caribou habitats within the Mackenzie LRMP area. Area-specific caribou management strategies recognize the impacts of increased access for human and grey wolves provided by linear corridors, unnatural patch sizes, intensive and regular fire suppression, and increased caribou/human interactions during critical life phases (e.g., calving, late winter periods). Strategies to minimize these impacts focus on minimizing landscape fragmentation; minimizing disturbance of calving sites and high quality caribou habitat; and implementing joint approval of forest development plans by, at that time, the Ministries of Forests, Environment, and Lands and Parks. General recommendations include:

- plan for long-term availability of suitable habitat to maintain viable caribou populations through landscape unit planning;
- minimize impact from recreational activities/use where caribou and caribou habitats are sensitive to such use;
- manage recreational snowmobile access to winter habitat;
- restrict introduction of animals that may pose a health risk to caribou;
- consider the establishment of wildlife habitat areas for special caribou habitat sites;
- plan location or design of major access routes to minimize disturbance to high value caribou habitat;
- consider unroaded access methods for mineral exploration;
- enhance terrestrial lichen retention and recovery through reforestation and stand tending practices on sites that are potential forested winter habitat; and
- establish a biologists' Technical Committee for Caribou Management to advise on further inventory, research, and monitoring of caribou and caribou habitat and on a refined and adaptive caribou management direction.

7.2.4 Prince George LRMP

The Prince George LRMP includes caribou-specific objectives, which include a general objective to manage caribou habitat to provide opportunity for population levels to increase. Specific objectives include:

- maintain the integrity of caribou movement corridors; and
- in areas with caribou movement corridors, plan winter logging to minimize the amount of plowed roads.

7.3 Muskwa-Kechika Management Area

The Muskwa-Kechika Management Area (M-KMA) overlaps with the northern half of Graham caribou range. The M-KMA encompasses 6.4 million hectares and is an area for which pre-tenure planning is required before industrial development to protect and maintain the ecological integrity, function, and habitat values within the management area. The *Muskwa-Kechika Management Area Act* was established to provide recognition of the significance and uniqueness of the M-KMA in terms of its wilderness, abundance and diversity of wildlife (e.g., caribou),

culture and heritage values, and resource values. The *Muskwa-Kechika Management Area Act* defines road and access management as integral to achieving the intent of the M-KMA, and states that “the long-term objective is to return lands to their natural state as development activities are completed” (Province of British Columbia 1998).

7.4 Designated Areas

The following are Crown land designations under statute or policy can be considered to directly or indirectly contribute to the management of SPNC and their habitat.

7.4.1 Ungulate Winter Ranges and Wildlife Habitat Areas

Ungulate Winter Range (UWR) and Wildlife Habitat Area (WHA) designations have been established under the Government Actions Regulation (GAR) of the FRPA and are considered under the Environmental Protection and Management Regulation (EPMR) of the OGAA.

The spatially defined UWRs and WHAs established for SPNC are legal designations for managing important caribou habitat. Under FRPA, UWRs and associated General Wildlife Measures (GWMs) provide a measure of protection of habitats required by caribou during the winter, and WHAs and associated GWMs provide a measure of protection for vulnerable habitat elements (e.g., rutting, calving, and matrix/connectivity habitats, and mineral licks).

Under OGAA, the GWMs associated with established UWRs and WHAs under FRPA do not apply. Rather Section 6 of the EPMR applies to ensure that oil and gas operating areas are not located within a WHA or UWR unless the operating area will not have a material adverse effect on the ability of the habitat within the area to provide for the survival of the species. In addition, oil and gas activities outside these operating areas must be carried out at a time and in a manner than does not result in physical disturbance to SPNC caribou or their habitat.

There are 49 WHAs currently established in B.C. for SPNC covering a total area of 235,401 hectares (Table 8) (B.C. Ministry of Environment 2013a). Thirty-nine of the WHAs reflect the importance of calving and rutting habitats and have been established as areas of no disturbance with restrictive management regimes. The GWMs under FRPA stipulate no new roads be developed and no forest cover be removed within the WHAs. The other 10 WHAs have been designated as important matrix/connectivity habitat and have less restrictive management measures. The management associated with these areas allows for harvesting, while maintaining a network of forest cover and minimizing adverse impacts to terrestrial lichen communities. The GWMs for these areas also recommend coordinated access planning.

There are 88 UWRs currently established in B.C. for SPNC covering a total of 583,800 hectares (Table 8) (B.C. Ministry of Environment 2013b). UWR U-9-002 covers a total of 535,152 hectares in the south Peace and provides high-elevation winter range protection for the Scott, Moberly, Burnt Pine, Quintette, and Narraway herds in the Dawson Creek Timber Supply Area and Tree Farm Licence #48. Two large polygons under U-9-002 and one polygon under U-7-003 are considered low-elevation winter range in the Narraway herd covering 205,940 hectares

(Table 8). UWR U-9-002, U-7-003, U-7-001, and U-7-009 in the Mackenzie and Prince George Forest Districts also provide habitat protection for Kennedy Siding and Burnt Pine herds. UWR U-9-004 is in the Fort St. John and Mackenzie Timber Supply Areas and Timber Farm Licence #48 (Table 8). Approximately 83% (61,323 ha) of this UWR designation is within high-elevation winter habitat for the Graham herd.

The GWMs under FRPA for high-elevation UWR polygons recommend no new roads be developed and no forest cover be removed. In addition, the GWMs include a timing restriction (November 1 to April 30) during which primary forest activities will not result in a material adverse disturbance of caribou. The GWMs for low-elevation polygons within U-9-002 (SPC – 009 & 018) allow for harvesting, while requiring the maintenance of equivalent or larger leave areas, the maintenance of key lichen communities, restricted construction of all season access roads, and the use of coordinated access planning.

Table 8. Wildlife Habitat Areas (WHAs) and Ungulate Winter Ranges (UWRs) designated for South Peace Northern Caribou as of June 2013.

Herd^a	WHAs		Area of high-elevation winter habitat within WHAs^c	UWRs		Area of high-elevation winter habitat within UWRs^c
	Units	Area (ha)		Units	Area (ha)	
Narraway	9-067 to 9-072	50,959	34,978	U-9-002 (SPC ^d -019, 020)	32,082	31,947
	9-073, 9-144, 9-145	16,732		U-7-003 (P ^d -011), U-9-002 (SPC-009, 018)	173,858	
	Total	67,691			205,940	
Quintette	9-058 to 9-066	58,059	43,898	U-9-002 (SPC-013 to 017, 034, 039, 042, 046, 047)	67,822	51,055
Quintette - Narraway				U-9-002 (SPC-009)	81,069	
Total		58,059			148,891	
Kennedy Siding			6,757	U-7-001 (1), U-7-003 (P-003, 028, 062), U-7-009 (PP ^d -001 to 004)	90,295	42,332
Total					90,295	
Burnt Pine - Kennedy	9-055 to 9-057	8,812	5,078	U-7-009 (PP-001), U-9-002 (SPC-008, 010, 048)	11,495	13,928
Burnt Pine				U-9-002 (SPC-007, 010, 011, 048)	7,950	
Total		8,812			19,445	
Moberly	9-050, 9-051, 9-053	25,426	1679	U-9-002 (SPC-001 to 004, 035, 036, 037, 044, 045)	36,391	37,148
Moberly	9-052	159		-		
Moberly - Scott	9-054	513		U-9-002 (SPC-004 to 006, 035, 043)	9,203	
Total		26,098			45,594	
Graham	9-032 to 9-045, 9-102, 9-103, 9-106	71,152		U-9-004 (GR ^d -000 to 040)	64,640	

Herd^a	WHAs		Area of high-elevation winter habitat within WHAs^c	UWRs		Area of high-elevation winter habitat within UWRs^c
	Units	Area (ha)		Units	Area (ha)	
Graham	9-046 to 9-049, 9-104, 9-105	3,589		U-9-004 (GR-010, 017, 024, 028, 029)	8,995	
Total		74,741	43,850		73,635	61,323
Scott^b				U-9-002		
Total			5,845			9,203
Overall Total	49	235,401	142,085	88	583,800	246,936

^a Shared herd names (e.g., Moberly-Scott) indicates WHAs and UWRs overlap both herds.

^b The area of WHA and UWR designated for the Scott herd are included in the totals contributing to the Moberly herd because a proportion of the Scott herd winters in the Moberly range.

^c Determined area is an approximation.

^d SPC = South Peace Caribou; P = Prince George; PP = Pine Pass; GR = Graham.

7.4.2 Parks and Protected Areas

There are 14 provincial parks and protected areas within SPNC range covering 366,026 hectares (Table 9). Parks and protected areas are Crown lands designated under the B.C. *Parks Act* or by the *Protected Areas of British Columbia Act*. These lands are afforded protection from industrial resource extraction through the legal provisions of the *Parks Act* and thus contribute to the management of SPNC and their habitat. Only five parks overlap SPNC high-elevation winter habitat. These include Butler Ridge Provincial Park (Graham herd); Heather–Dina Lakes Park (Scott herd); Bocock Peak and Klin-se-za Provincial Parks (Moberly herd); and Pine Le Moray Park (Burnt Pine and Kennedy Siding herds) (Table 9). Descriptions of parks and protected areas within SPNC range are provided below.

Butler Ridge Provincial Park

Butler Ridge Provincial Park is on the north shore of Williston Lake’s Peace Arm. The park extends for approximately 15 km from south to north and has been identified as caribou habitat. The park itself includes 5,848 hectares of high-elevation winter habitat for the Graham herd (Table 9).

Bocock Peak Provincial Park

Bocock Peak Provincial Park is a remote, high-elevation park located on the continental divide in the headwaters of the Peace River. It was established in recognition of the distinct karst limestone cave systems in the area and it also protects wildlife habitat. This 1,143-hectares park includes 670 hectares of high-elevation winter habitat for the Moberly herd (Table 9).

Heather-Dina Lakes Provincial Park

Heather-Dina Lakes Provincial Park is a newly designated park that is located along the eastern edge of Williston Lake, approximately 25 km north of Mackenzie. It is characterized by mature, mixed forests, with many small lakes. The park includes the 284-hectares Heather Lakes Ecological Reserve, which was originally established to protect stands of old trembling aspen. This 5,823-hectares park includes approximately 385 hectares of high-elevation winter habitat for the Scott herd (Table 9).

Klin-se-za Provincial Park

Klin-se-za Provincial Park was established in recognition of the profound spiritual significance and traditional use values to the First Nations people of northeastern British Columbia. The area is the centre of spiritual prophecies that shape the belief system and culture of the First Nations, and has been relied upon for traditional hunting, gathering of medicinal plants, and food and wildlife resources. This 2,671-hectare park includes approximately 2,100 hectares of high-elevation winter habitat for the Moberly herd (Table 9).

Pine Le Moray Provincial Park

The Pine Le Moray Provincial Park is located 70 km southwest of Chetwynd and borders Highway 97 and the Pine River valley to the north. It is characterized by mountainous areas of

high-elevation Engelmann spruce–subalpine fir forests and wind-swept alpine terrain. Although the protected area was established in recognition of the high value backcountry and wilderness recreation, the area overlaps important habitat for many fish and wildlife species, including approximately 14,201 hectares of high-elevation winter habitat for the Burnt Pine and Kennedy Siding herds.

Table 9. Parks and protected areas within and adjacent to South Peace Northern Caribou range.

Herd ^a	Name of park and protected lands	Area of park and protected area (ha)	Area of park and protected area within:	
			Herd range (ha)	High-elevation winter habitat ^b (ha)
Narraway	Bearhole Lake Park	12,708	2,728	
	Bearhole Lake Protected Area	5,054	5,054	
	Kakwa Park	171,977	65,745	
	Monkman Park	62,896	18,289	
	Wapiti Lake Park	16,837	16,809	
	Total	269,472	108,625	0
Narraway – Hart	Close-to-the-edge Park	414	414	
	Close-to-the-edge Protected Area	288	288	
	Kakwa Park	171,977	39,312	
	Monkman Park	62,896	17,415	
	Wapiti Lake Park	16,837	28	
Narraway – Quintette	Bearhole Lake Park	12,708	9,980	
	Total	265,120	67,437	0
Quintette	Gwillim Lake Park	32,458	29,546	
	Hole in the Wall Park	137	97	
	Monkman Park	62,896	391	
	Sukunka Falls	423	340	
Quintette - Hart	Monkman Park		453	
	Total	95,914	30,827	0
Burnt Pine – Kennedy Siding	Pine Le Moray Park	43,289	43,230	14,163
Burnt Pine – Scott	Pine Le Moray Park		46	38
Kennedy Siding	Bijoux Falls Park	35	35	
	Total	43,324	43,311	14,201
Moberly	Bocock Peak Park	1,143	1,143	670
	Klin-se-za Park	2,671	2,671	2,100
Moberly – Scott	Pine LeMoray Park	43,289	13	
	Total	47,103	3,827	2,770

Herd ^a	Name of park and protected lands	Area of park and protected area within:		
		Area of park and protected area (ha)	Herd range (ha)	High-elevation winter habitat ^b (ha)
Scott	Heather-Dina Lakes Park (includes Heather Lakes Ecological Reserve)	5,823	5,267	385
	Total	5,823	5,267	385
Graham	Butler Ridge Park	6,845	6,751	5,848
	Graham - Laurier Park	99,982	99,982	
	Total	106,827	106,733	5,848
Overall Total		833,583	366,026	20,521

^a Shared herd names (e.g., Moberly-Scott) indicate park and protected areas overlap both herds.

^b Determined area is an approximation.

7.4.3 Old Growth Management Areas

Old Growth Management Areas (OGMAs) are legal Crown land designations established under the *Land Act* that can be considered to contributing to the management of SPNC and their habitat. There are 240 spatially defined legally established OGMAs in the south Peace region of B.C., with 179,741 hectares overlapping with SPNC range (Table 10). A total of 13,849 hectares OGMAs are within high-elevation winter habitat of SPNC (Table 10).

Table 10. Old Growth Management Areas (OGMAs) within South Peace Northern Caribou range.

Herd ^a	Area of OGMA within:		
	Area of OGMA (ha)	Herd range (ha)	High-elevation winter habitat ^b (ha)
Narraway	70,145	60,778	669
Narraway – Quintette	16,471	14,648	
Total	86,616	75,426	669
Quintette	59,708	44,988	1,079
Total	59,708	44,988	1,079
Burnt Pine – Kennedy Siding	928	928	2
Total	928	928	2
Kennedy Siding	16,923	12,169	3,943
Kennedy Siding – Moberly	8,987	4,892	
Kennedy Siding – Moberly-Scott	12,309	5,934	
Total	38,219	22,995	3,943
Moberly	16,519	13,507	1,593
Total	16,519	13,507	1,593
Scott – Kennedy Siding	1,201	721	
Scott – Moberly	10,257	9,701	416
Scott	11,941	11,068	5,739
Total	23,399	21,490	6,156
Graham	981	407	
Total	981	407	407
Overall total	226,370	179,741	13,849

^a Shared herd names (e.g., Moberly-Scott) indicate OGMAs overlap both herds.

^b Determined area is an approximation.

7.4.4 Other Designations

As per the Province's recent endorsement of the implementation plan for SPNC (B.C. Ministry of Environment 2012), several other land use designations in addition to those identified above have been established to manage SPNC and their habitat. These designations include (1) Resource Review Areas (RRAs) under B.C.'s petroleum and natural gas tenuring policies; (2) mineral and placer No Registration Reserves (NRRs) under the *Minerals Tenure Act*; (3) coal reserves under the *Coal Act*; and (4) Section 17 Land Act Reserves under the *Land Act*. These designations and the area that they contribute to the management of SPNC are provided in Table 11.

Table 11. RRAs, mineral and placer NRRs, Coal Reserves, and Section 17 *Land Act* reserves designated for SPNC.

Herd	Area under RRA ^a	High-elevation winter habitat within RRA	Area under coal reserve	High-elevation winter habitat within coal reserve	Area of placer reserve	High-elevation winter habitat within placer reserve	Area of mineral reserve	High-elevation winter habitat within mineral reserve	Area of Section 17 reserve	High-elevation winter habitat within Section 17 reserve
Graham	111,558	74,093	90,879	77,320	816	724	90,868	77,320	157,145	157,145
Burnt Pine	17,234	14,639	1,490	6,532	24,919	20,367	24,919	20,388	4,923	11,834
Moberly	126,355	51,557	43,358	27,422	89,630	46,390	89,630	46,390	63,837	48,287
Kennedy Siding	153,786	64,556	76,633	46,773	116,229	47,076	116,229	47,076	44,759	44,759
Scott	172,662	129,722	136,325	126,646	136,107	129,337	136,107	129,337	68,177	115,254
Quintette	85,215	34,686	6,051	4,287	631,256	73,136	715,503	132,712	51,471	51,471
Narraway	48,755	32,399	12,333	10,302	152,860	24	191,496	32,434	30,875	30,875

^a All areas are in hectares.

Note: Data do not consider overlap between reserves and herds.

7.5 Wildlife Timing Windows

Wildlife timing windows are best management guidelines to reduce wildlife and habitat impacts from industrial activity. Timing windows for caribou provide information to avoid and minimize impacts to caribou during times of sensitive behaviours such as calving, post-parturition, rutting, and winter. Generally late winter to summer is considered a *critical* period for caribou, whereas the fall is considered *cautionary*. In 2003, the B.C. Oil and Gas Commission developed timing windows for northern ecotype caribou in the Peace region (Oil and Gas Commission 2003). In 2004 the B.C. Ministry of Environment formalized and made broadly available regional timing windows for fish and wildlife. These timing windows were updated and an associated rationale document was drafted and made public in 2009 (Table 12) (B.C. Ministry of Environment 2009).

Table 12. Peace region timing windows for the northern ecotype of Woodland Caribou.

Caribou behaviour and season	Timing	Risk category	Management direction
Calving/Post-parturition Late winter	January 15 to July 15	Critical	Development activities are not appropriate during this timeframe. Aerial activities should adhere to guidelines. If working within a critical window is unavoidable, proponent should discuss alternatives, and potential for mitigation and monitoring plans.
Rutting Early winter	September 15 to January 14	Caution	Proponents should minimize development activities during these timeframes.
Summer	July 16 to September 14	Low	Restrictions would not normally apply. Where ground conditions permit, plan development activities within these timeframes.

8 KNOWLEDGE GAPS

There is a considerable body of literature on the ecology, population dynamics, and effects of disturbance on northern ecotype caribou. Knowledge gap analyses have been completed by Stevenson and Hatler (1988), Sleep (2007), Cichowski (2007), and Whittaker and Wiensyck (2007). Identified knowledge gaps appear to concentrate into four general topic areas: (1) habitat (habitat availability, seasonal forage supply, energetic relationships, nutrition); (2) predation (vulnerability of caribou to predation, impact of development on predator–prey dynamics, role and population dynamics of alternate prey species, overlap of caribou with other ungulate species); (3) Inventory (gathering current data, particularly on sensitive or declining herds, defining herd boundaries); and (4) area disturbed and cumulative impacts of that disturbance on caribou ranges. Additional emerging research themes relate to administrative and financial requirements surrounding population management and herd augmentation activities such as wolf control and or maternal penning.

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