Provincial Caribou Recovery Program
Herd Planning Disclaimer

The following herd plans are a result of Phase One planning and are an incomplete product. Additionally, the documents are 'living' reports and will be updated regularly as Phase Two progresses.

Phase Two planning is currently underway for some herds however still at its early stages of development; many plans reflect this as they are in different stages along their scheduled project continuum.

One of the cornerstone guiding principles to the Caribou Recovery Program (the Program) is to use consistent, fact-based approaches for all woodland caribou herds in the province. The Program has refined and adopted a new format to herd planning that will effectively:

- ❖ Provide a consistent approach to managing all woodland caribou herds in BC
- ❖ Recognize the unique circumstances of each herd
- ❖ Build from current (legacy) caribou management plans
- ❖ Consider First Nations' and stakeholder interests and ideas
- ❖ Be included in larger regional plans

Completed herd plans will describe the status of each herd, and the threats faced by that particular herd. The plans will take note of previous actions, and actions that are planned to take place in the future. As we implement the herd plans, the Program will carefully monitor to which extent and magnitude the caribou respond, and modify its actions as accordingly. Herd plans will help us document our decisions and discuss issues with First Nations and with stakeholders.

Phase One consisted of:

- ✓ Status of herd or sub-population
- ✓ Identified threats
- ✓ Literature
- ✓ Previous work completed

Phase Two will consist of input from:

- Engagement with Indigenous communities
- Provincial Caribou Science Team
- Stakeholders
- Decision-support tools

WOODLAND CARIBOU PLAN

Takla
Subpopulation

Northern Mountain Caribou

BRITISH COLUMBIA

Recommended Citation:

Photo credit: Doug Heard

EXECUTIVE SUMMARY

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1 BACKGROUND

1.1 INTRODUCTION TO THE PROGRAM

The Takla subpopulation is the northern mountain ecotype of woodland caribou (*Rangifer tarandus caribou*), in designatable unit seven (DU 7), and is within the Northern Mountain National Ecological Area (SMNEA). These herds are listed as *Threatened* by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC 2002, 2014) and appear on Schedule 1 of the Federal Species at Risk Act (SARA). They are blue-listed in British Columbia and are included in the Provincial Identified Wildlife Management Strategy (British Columbia Ministry of Water, Land and Air Protection 2004).

Range plans are required for all woodland caribou populations that are designated as threatened or endangered in Canada (Environment and Climate Change Canada 2016). The Takla subpopulation is blue-listed in BC, and current monitoring indicates that they are increasing (Grant 2017).

This document spans the divide between these disparate designations in British Columbia and Canada, compiling past research, knowledge and management actions into guidance for the management and recovery of the Takla Northern Mountain caribou subpopulation.

2 POPULATION DESCRIPTION

Relative to other western mountain caribou (DU 8 and 9), members of this DU are found in dry sub-boreal montane ecosystems and use pine-dominated habitats during winter. Most populations of Northern Mountain caribou are relatively small and sedentary, with individuals wintering in small groups. They generally use the calving strategy of moving to high elevations on open sub-alpine ridges, spacing away from other ungulates and predators (COSEWIC 2011, Government of British Columbia 2017).

2.1 DISTRIBUTION

The Takla subpopulation range area is between 1850 and 2122 km^2 surrounding Takla Lake within the Fort St. James, Morice and Lakes Timber Supply Areas (TSA). Mount Blanchett Park forms the northwest section of the range, running south along Hautete Lake, Natowite Lake and Tochcha Lake at the southern tip. From there, the range heads east to the north edge of Rubyrock Park, and east along Baptiste Creek. The eastern boundary runs north parallel to Middle River and Takla Lake to Leo Creek where it heads northeast through Purvis Lake to the west end of the Nation Lakes. The boundary then strikes northwest along the height of land to just north of Mount Blanchett Park (Figure 1).

A 2015 census estimated the Takla herd at 70 animals (Figure 2). The total count of 70 caribou was identical to the census in 2012 (Klohn Crippen Berger Ltd. 2012), but less than the census of 125 caribou in 2004 (Wilson et al. 2004). The decline between 2004 and 2012 represents a decline of 44%, or about 7% per year (Figure 2). Calf recruitment for three censuses (2004, 2012 and 2015) ranged from 17–20% calves in the population, which is usually indicative of a stable population (Seip and Cichowski

1996)(Figure 3). It is unclear why the Takla herd appears to have declined despite reasonably high calf recruitment (Skeena Region 2017).

The population decline was not equivalent among the different portions of the range. Over the period of the three censuses, numbers in the Sidney Williams and Mt. Blanchet areas were declining, and numbers in the Mitchell Range were increasing. If the movement patterns reported by Poole et al. (2000) are still valid, this may indicate that the Sidney Williams group has declined from 50 to 17 caribou, whereas the Mt. Blanchet/Mitchell Range group has declined from 75 to 53, but also exhibited a major redistribution from the Mt. Blanchet area to the Mitchell Range area. Alternatively, there may have been movement of caribou from Sidney Williams to the Mitchell Range as well (Skeena Region 2017).

Information on ecology and habitat use specific to Takla caribou is limited. Available information indicates that seasonal movements of Takla caribou are dependent on snow conditions, though in general, they spend the summer in high elevation alpine and subalpine habitats and move to lower elevation coniferous forests during the winter (COSEWIC 2002). Winter forage consists primarily of terrestrial lichen (COSEWIC 2002). Takla caribou have used lower elevation habitat around Takla Lake in the winter, but apparently no longer do (McNay et al. 2008).

Five biogeoclimatic (BEC) zones (Meidinger and Pojar 1991) occur in the range area. These BEC zones are generally described as follows:

- Boreal Altai Fescue Alpine (BAFA) is dominated mostly by rock, ice and snow with vegetation limited to shrubs, herbs, mosses, lichens and dwarf trees.
- Engelmann Spruce - Subalpine Fir (ESSF) is a forested mid-elevation zone occurring below the BAFA. Spruce and fir are the dominant species although lodgepole pine occurs on drier sites.
- Spruce Willow Birch (SWB) occurs at mid-elevations below the BAFA. The SWB supports open forests of predominantly white spruce, subalpine fir and deciduous shrubs.
- Sub-Boreal Spruce (SBS) zone occurs at lower elevations. Forests are predominantly spruce, fir and lodgepole pine.
- Boreal White and Black Spruce (BWBS) zone is found in the lower elevations. Frequent fires have resulted in extensive successional forests of lodgepole pine and trembling aspen. On gentle terrain, stands of white spruce and trembling aspen are interspersed with black spruce bogs (Brumovsky and McNay 2015).

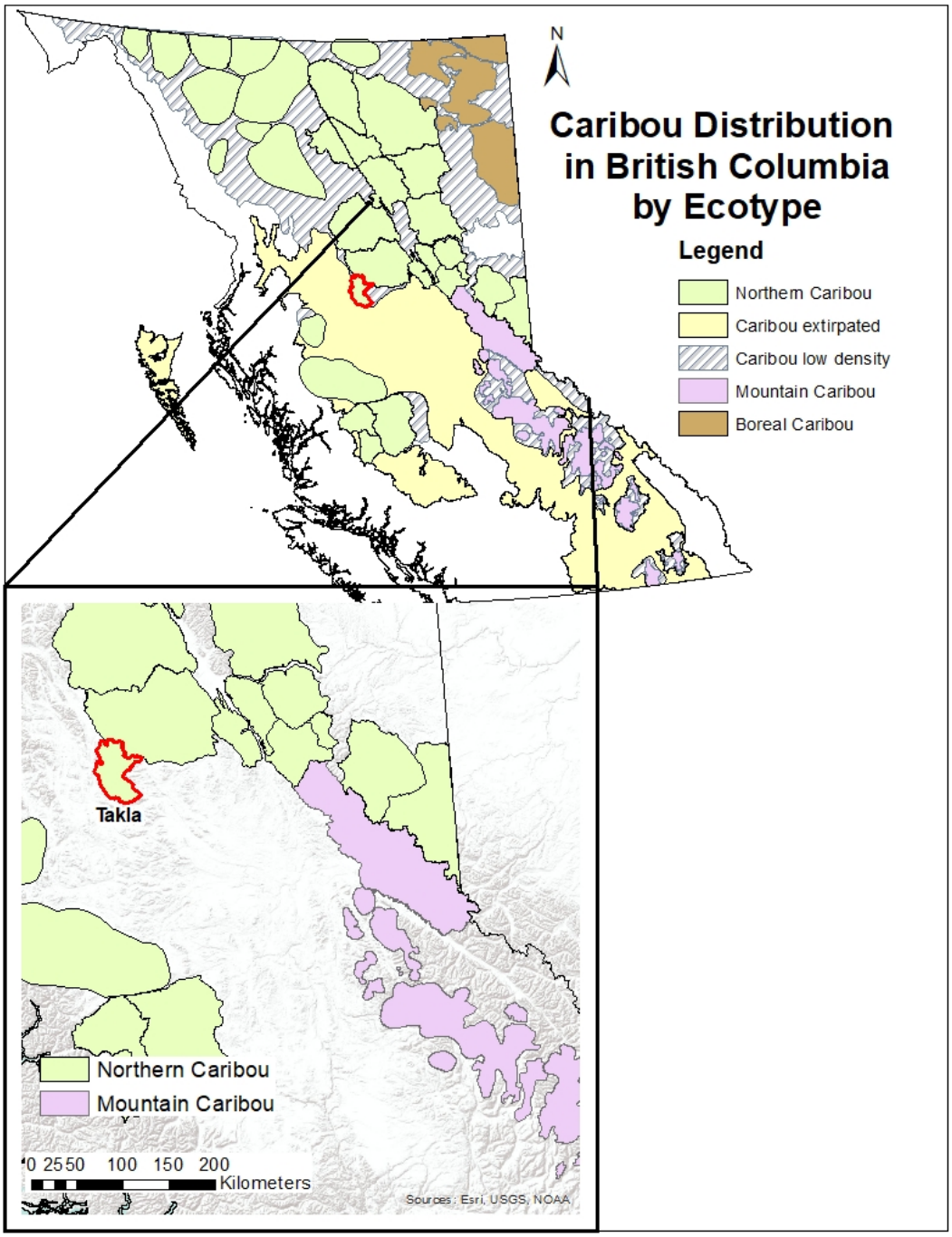

Figure 1: The location of the Takla subpopulation of woodland caribou. The 2122 km^2 range (inset: red outline) is within the Skeena and Omineca Regions.

2.2 Habitat and Behaviour

Unlike most northern caribou that are identified by spending winter in low-elevation forests cratering for terrestrial lichens in shallow snow, Takla caribou have been found to avoid low-elevation forests at all

times of the year (Poole et al. 2000). In all seasons, Takla caribou occupy forests but, relative to forest availability, they select forests only during spring calving (Poole et al. 2000). According to Poole et al. (2000) the presence of wolves in lowland forests and distribution of food across their range has resulted in this insular population occupying mountain habitats away from moose and wolves.

A telemetry study in the late 1990s showed that caribou in the Takla lake area can be found in alpine and subalpine habitats in every season and in forests predominantly in spring, summer and fall with a short winter tenure (Heard and Wainwright 1997).

2.3 Population Size and Trend

Reliable population counts and estimate for the Takla caribou subpopulation were first made in 2004 and sporadically since. This population has declined from 125 in 2004 to a low of 32 animals in 2017 with a slight recovery to 44 animals in 2018 (Figure 2).

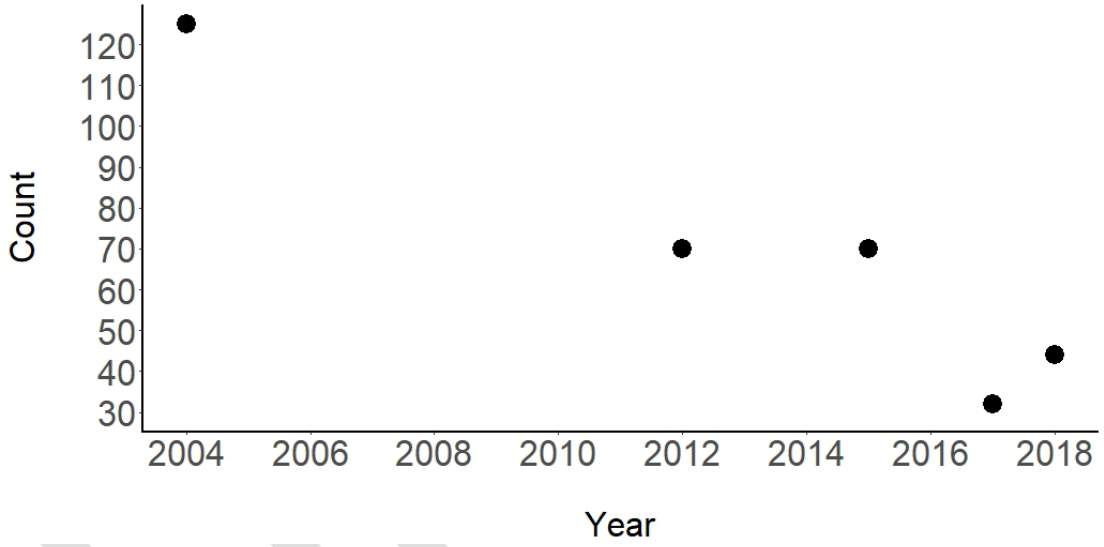

Figure 2: Caribou counts for the Takla caribou subpopulation. All counts were made by Government of British Columbia staff and summarized in Klaczek (2018).

Caribou recruitment, measured as percent of calves in the population observed during a spring census (Bergerud and Elliot 1986). The Takla caribou subpopulation has been above threshold (10–12% calves) and relatively stable until the 2017 and 2018 counts (Figure 3).

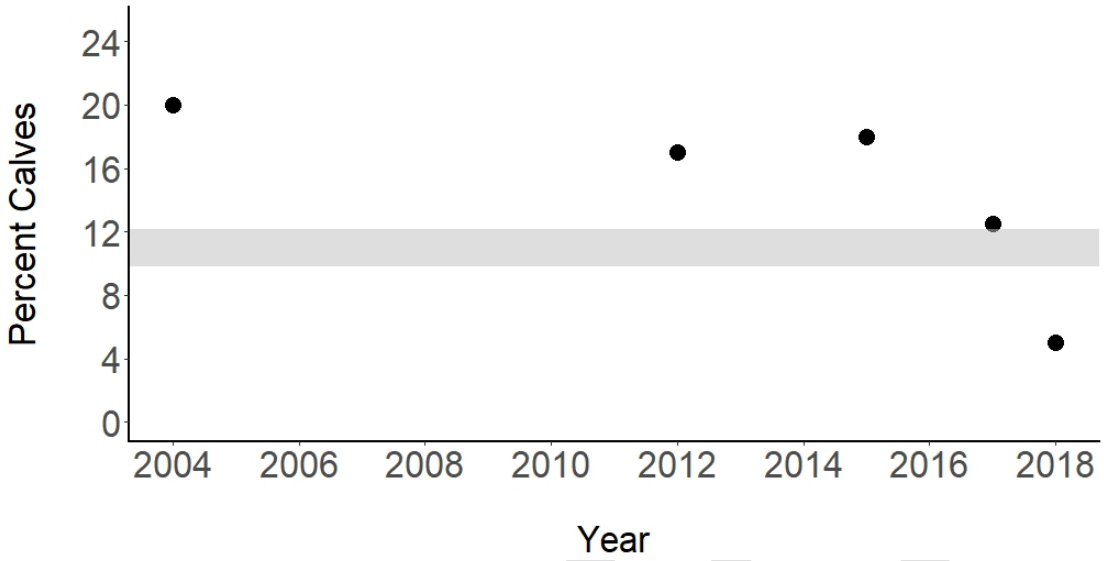

Figure 3: Caribou population recruitment measured in the Takla caribou subpopulation range. Recruitment is defined here as the percent of the estimated population that is in the calf cohort. Recruitment lower than approximately 10 to 12% is considered below a threshold that will balance natural mortality (grey band; Bergerud and Elliot 1986).

3 THREATS AND LIMITING FACTORS

Primary threats to caribou and their habitat have been noted by McNay et al. (2008), COSEWIC (2014) and a variety of independent studies (e.g. James et al. 2004, Wittmer et al. 2005b, Courtois et al. 2007, Seip et al. 2007, Wittmer et al. 2007). In this review, threats are treated in isolation, but this does not discount the likelihood that they interact. Cumulative effects assessment (Sorensen et al. 2008, Johnson et al. 2015) is beyond the scope of this plan, but elements such as predation, human activities, and climate change are known to affect one another. Work on boreal caribou has demonstrated the value in developing comprehensive range planning for woodland caribou that considers interacting threats (Angelstam et al. 2004, Environment Canada 2012b).

Here, the following threats are considered:

1. Predation
2. Food limitation
3. Human activities
    a. Industrial
    b. Recreational
    c. Other
4. Natural disturbance
5. Parasites and diseases
6. Climate change
7. Hunting and poaching
8. Small population size effects

3.1 PREDATION

GPS collar and radio telemetry studies indicate that the dominant, proximal cause of woodland caribou mortality is predation (Wittmer et al. 2013). Woodland caribou have evolved with their predators and have persisted despite millennia of predation (Bergerud 1988). While the predator species killing caribou vary regionally (wolf, black bear, grizzly bear, cougar), their impact on woodland caribou populations has increased as the result of three dominant processes: apparent competition mediated by alternative prey abundance (Hebblewhite et al. 2007), apparent competition mediated by expanding alternative prey distribution (Wittmer et al. 2007, DeCesare et al. 2010b, Latham et al. 2011a, Latham et al. 2011c), and enhanced predator access to woodland caribou habitat (Hayhurst 1983, Latham et al. 2011b). More generally, Bergerud (2007) has calculated that wolf densities greater than 6.5 wolves/1000 km^2 will result in woodland caribou declines. More recently, the federal recovery strategy identifies 3 wolves/1000 km^2 as a density target (Environment Canada 2014).

There are no direct measure of predation rates by wolves or other predators on Takla subpopulation caribou. Nevertheless, a number of models of caribou movements, distribution and habitat use assume that predation play significant roles (Poole et al. 2000, Brumovsky 2004, McNay 2009, Muhly 2016). Traditional knowledge from First Nations in the region points to an increase in the wolf population following the arrival of moose in the 1920s (McKay 1997, McNay et al. 2008). First Nations observations also indicated that caribou in the area use lakes in the summer to avoid wolves (McKay 1997, McNay et al. 2008).

3.2 FOOD LIMITATION

Woodland caribou are herbivores and rare among large mammals as lichen eaters (Johnson et al. 2004). While lichen makes up the bulk of their winter diet (Johnson et al. 2000, Parker et al. 2005), it is a smaller proportion of their summer diet (Denryter et al. 2017). And although habitat selection is predominantly thought to be influenced by predator avoidance, selected habitats must also be able to satisfy an individual's nutritional needs (Newsome et al. 2000, Brown et al. 2007). Trade-offs between these two fundamental demands (avoiding predators, finding food) raises the potential for woodland caribou to be food or energy limited as they seek predator refugia (Poole et al. 2000, Gustine et al. 2006). When it has been considered, estimates of caribou food abundance typically far exceeds population needs (Courtois et al. 2007).

There have been no direct foraging or nutrition studies on the Takla caribou subpopulation. However, long-term observations of Takla caribou movements suggest that they have shifted their seasonal movements to avoid wolf predation in low elevation forests. As seasonal habitat shifts from high elevation summer to low elevation winter habitats are common in northern caribou herds seeking access to food resources in those habitats. With access to food resources cut off due to predators, it could be inferred that food limitation is occurring (McNay et al. 2008, Heard and Zimmerman 2017).

The sharp reduction in the Takla caribou subpopulation size could suggest that, in the absence of a concomitant reduction in foraging habitat, more *per capita* food resources should be available.

3.3 HUMAN ACTIVITIES

Human activities have consequences for woodland caribou conservation throughout British Columbia. This section focusses on the consequences of human industrial, recreational and other (agriculture, highway, linear feature clearing) activities (Wolfe et al. 2000).

3.3.1 INDUSTRIAL

Industrial activities include forestry, mining, oil, gas and clean energy development. Caribou are affected by industrial activities both due to the presence of physical infrastructure as well as the resulting impacts on their habitat. A key concept to measure and understand industrial effects on caribou is the Zone of Influence (ZOI; Polfus et al. 2011). This is the area beyond the actual footprint of an industrial development or activity that affects caribou (Dyer et al. 2001). Zones of influence vary by activity and by the presence and absence of people.

3.3.1.1 FORESTRY

Woodland caribou are an old-growth forest dependent species (Bergerud 2000). Hence, forest management affects their distribution and population dynamics. Although mountain caribou populations live seasonally in treeless, alpine ecosystems, all spend some of the year in forests. For this reason, forestry and natural disturbances will affect woodland caribou populations through habitat destruction and fragmentation (Smith et al. 2000). Forestry effects include very general habitat loss that reduces the amount of old-growth forest, to reduction in forest-based food resources to creating more, early seral forest habitat for apparent competitors (see below) such as deer and moose (Simpson and Woods 1987, Cichowski 1989, Seip 1990, Stevenson 1991, Cumming 1992). Factors, such as the type of forest regrowth (Cichowski 1989) and the size of cutblocks (Edmonds and Bloomfield 1984), play a role in the effect of forestry practices on woodland caribou populations. The ZOI of cutblocks for woodland caribou in Newfoundland was found to be 15 km beyond the actual cut block (Chubbs et al. 1993). Hence, even an array of small forest cutblocks can have a significant influence on caribou habitat availability.

Beginning around 1973, there have been 280 km^2 of forest cutblocks created in the Takla caribou subpopulation area. This is 13% of the total range area. Forest harvesting peaked in the 1990's with a second surge beginning in 2010 through 2014. Cutblocks are not evenly distributed throughout their range, with a concentration in the southwest and fewer, scattered cutblocks in the northwest.

3.3.1.2 MINING

Mine sites deter caribou both for the activities that occur there when they are active as well a for the habitat they destroy. Mines have a 2 km ZOI when they are active, but this shrinks to the physical footprint of the mine site when mines are dormant, inactive or abandoned (Polfus et al. 2011).

There is a concentration of mineral claims in the southeastern corner of the Takla caribou subpopulation range where there is a large nickel deposit. There are also several other smaller deposits in the north and west of their range. The Indata gold and silver Claim (Rise Resources Inc.) has applied for a mine just to the east of the Takla caribou range and the Dome Mountain gold and silver mine is about 55 km to the southwest of their range area. The Granisle copper mines, immediately to the west of the Takla range, shut down in 1992, but there are no operating mines in this area.

3.3.1.3 OIL AND GAS

Oil and gas development threatens caribou populations through habitat destruction, human activity, access, habitat fragmentation and elevated predation (Dyer et al. 2001, Boutin et al. 2012, Hervieux et al. 2013). Given the spatial scope of oil and gas developments (well sites, access roads, pipelines, seismic lines) and the range of activities that take place in caribou habitat cumulative effects of this combined with other activities (e.g. forestry, hydroelectric) also play a large role in threatening resident caribou herds (Nitschke 2008). A study of the

consequences to caribou of being disturbed by oil and gas exploration found that individuals in active plays can lose more than 15% of body mass over winter attributed to noise displacement (Bradshaw et al. 1998).

An oil and gas pipeline runs along the southern edge of the Talka caribou subpopulation range. But there are no oil or gas fields in this area.

3.3.1.4 CLEAN ENERGY

Clean energy refers to hydroelectric dams and wind farms. Hydroelectric reservoirs in caribou range can destroy or fragment habitat and cut movement corridors. Research in southern British Columbia correlated hydroelectric development with declines in caribou populations (Simpson 1987b). Hydroelectric dams, during their construction and operation, have a ZOI that exceeds their footprint (Nellemann et al. 2003). Wind farm development can destroy caribou habitat, reduce forage availability, displace caribou and increase early-seral habitat that promotes growth of alternative prey populations (British Columbia Ministry of Environment 2014).

There are no clean energy projects within the Takla caribou subpopulation range.

3.3.1.5 OTHER

There are other small, human developments, in addition to those discussed above, in the Takla caribou subpopulation range. There are several, small recreational tenure on Natowite Lake, several residential leases, some communication tower sites, an electrical transmission line (just north of their range) and gravel quarries in their range.

3.3.2 RECREATION

Recreational use of caribou habitat refers largely to fall and winter activities, including snowmobiling, commercial heli-skiing, commercial cat-skiing and hunting. In some jurisdictions, winter tour skiing and mountaineering are also relevant recreational activities as is summer use with off highway vehicles (OHVs). Numerous studies have shown that wildlife generally and woodland caribou in particular avoid mechanized winter activities to varying degrees (Simpson 1987a, Simpson and Terry 2000, Mahoney et al. 2001, Wilson and Hamilton 2003, Borkowski et al. 2006, Seip et al. 2007, Kinley 2008, Harris et al. 2014). Despite records of displacement, no study has been able to draw a direct link between winter recreational use and woodland caribou population decline, largely because effects are chronic and be time-lagged.

3.3.2.1 SNOWMOBILE

Snowmobile use in caribou habitat can result in their displacement (Simpson 1987a, Webster 1997, Apps et al. 2001, Brade 2003, Kinley 2008). Studies in British Columbia and elsewhere have shown that caribou are far less likely to occupy winter habitats that are being used for recreational snowmobiling than equivalent habitats without snowmobile use (Mahoney et al. 2001, Seip et al. 2007). Mechanisms of displacement include caribou avoiding or fleeing snowmobiles while they are in use, or avoidance of snowmobile packed trails that facilitate access to caribou winter habitat by human hunters and natural predators (Bergerud 1988, James and Stuart-Smith 2000, Oberg 2001, Powell 2004, Polfus 2010, Whittington et al. 2011). A study of stress using hormone profiles in free-ranging caribou demonstrated that elevated fecal glucocorticoids in animals as far as 10 km from snowmobile activity, suggesting that caribou perceive snowmobiles in their habitat as a stressor (Freeman 2008).

Snowmobiling is limited by access to the Takla Lake area. Although there are no formal access restrictions in the area, road access into this area is only possible by resource (forestry) roads. Winter recreation is not common in this area compared to other mountain caribou habitats.

3.3.2.2 HELI-SKI / CAT-SKI

Helicopter skiing and cat skiing are backcountry recreational activities that enable off-piste skiers to access high mountain terrain using either a helicopter or a tracked snow-cat that shuttles them to the top of ski runs. This is a commercial activity with numerous operators in British Columbia represented under one umbrella organization, HeliCat Canada (HCC). In southern British Columbia, HCC partners with the British Columbia government and non-government organizations to monitor caribou and helicat ski operations and minimize operational impacts. Concentrations of glucocorticoid stress hormones are higher in caribou that live where commercial heli-skiing operates than in areas without heli-skiing (Freeman 2008).

There are no HCC accredited helicopter or cat-ski operators in the Takla caribou subpopulation range.

3.3.2.3 OTHER

Backcountry tour skiing and mountaineering are recreational activities that occur in caribou habitat and can have an impact on woodland caribou conservation. Backcountry skiing (a term embracing of backcountry ski touring, unsupported, off-piste skiing and snowmobile assisted off-piste skiing) and mountaineering bring their participants into alpine areas that overlap with mountain caribou populations at sensitive times of the year (rut, winter). Unexpected encounters between individuals and people who are not in a vehicle can be very stressful for caribou and they can show a very strong flight response (McKay 2007).

There is a ski hill (Murray Ridge Ski Hill) just north of Fort St. James and 80 km southeast of the Takla caribou subpopulation range. Road access limits winter ski access and summer hiking access to this area.

3.3.3 OTHER

Other human activities occur in caribou habitat and have the potential to harm caribou and / or affect caribou populations. Agriculture, transportation corridors, electrical transmission rights-of-way, oil and gas exploration and pipelines and hunting all have known effects on caribou populations (James and Stuart-Smith 2000, Wolfe et al. 2000).

3.3.3.1 AGRICULTURE

The effects of agriculture on caribou conservation are largely the result of conversion of low-elevation habitat to crops and pasture (habitat destruction) and the food subsidy they provide for alternative prey (deer, elk, moose). Habitat conversion is functionally similar to clearcut logging in that it removes overstory vegetation and can alter landscape properties like vegetation composition and local snow depth. Growing hay and grain crops within or adjacent to caribou range has the potential to directly increase the regional population size of deer, elk and moose that eat crops (Bowden 1985, Côté et al. 2004, Butler et al. 2008, Hatter et al. 2017) and indirectly their predators like bears and wolves. These, in turn, predate caribou, putting downward pressure on caribou populations (apparent competition).

Spread of disease and parasites from and to cattle is also a threat to woodland caribou from agricultural operations (Neiland et al. 1968, Trainer 1973, Wobeser 1976, Sifton 2001), and is discussed in section 3.5 (Parasites and Disease).

There are no farms or ranches in the range of the Takla caribou subpopulation, but there is a concentration of mixed farms near Vanderhoof, about 120 km to the southeast of the Takla range.

3.3.3.2 MAJOR HIGHWAY CORRIDORS

Where they occur in caribou habitat, highways have strong, negative effects on caribou populations (Curatolo and Murphy 1986, Apps and McLellan 2006, McFarlane et al. 2009). Vehicle activity on highways poses a movement barrier for caribou as they are either reluctant to approach a roadway or get killed trying to cross (Dyer et al. 2002, Rytwinski and Fahrig 2012). Habitat and population fragmentation results as populations are unable to move between ranges. Highways and roadways can also give people access to caribou range that increases the potential for disturbance. Linear disturbances, such as roadways have a large ZOI (Wolfe et al. 2000, Oberg 2001, Polfus et al. 2011, Whittington et al. 2011).

There are no major highways in the Takla caribou subpopulation range. Highway 16 (the Yellowhead Highway) is 55 kilometers to the south of its southern extent, highway 97 (the John Hart Highway) is 150 km to the east and highway 37 (the Dease Lake Highway) is 140 km to the west.

3.3.3.3 LINEAR FEATURES

Linear features are narrow land disturbances that tend to traverse entire ranges. They include seismic cut lines, pipelines, forestry roads and overhead power transmission rights-of-way. Linear features are not necessarily cleared to a roadway standard but enable both four-wheel-drive access and ease travel for predators and alternative prey (Oberg 2001, Hebblewhite et al. 2010a). One hypothesized effect is that linear features facilitate predator movement into and within prey habitat thereby increasing predator-prey overlap (DeMars and Boutin 2018).

An oil and gas pipeline runs along the southern boundary of the Takla caribou subpopulation range and there are electrical transmission corridors to the northwest. Particularly in the southwest of their range there has been much forestry resulting in a local abundance of resource roads connecting cutblocks. The original Pacific Great Eastern Railway (renamed the British Columbia Railway in the 1970s) line runs north-south through the Takla range along the eastern shore of Takla Lake (Wedley 1998). It is not currently operating.

3.3.3.4 HUNTING

The Takla caribou subpopulation overlaps 3 wildlife management units (WMU) all within the Omineca region (7-26,27,28). Most of the range is within the 7-27 unit. Within all of these WMUs there are hunting seasons for mule deer, white-tailed deer, moose and elk. Mountain goats can be hunted in 7-27 and 7-28. Caribou can no longer be hunted in the Takla caribou range and the last caribou killed by a hunter in this range was in 7-27 in 1978.

3.3.3.5 POACHING

Caribou poaching is an unregulated, indiscriminate and largely unknown source of mortality across their range. Animals are taken in any season, of any age or sex and in any number. This kind of additive mortality can have a profound impact on caribou populations in British Columbia (Johnson 1985) and interacts with habitat management and human access (Stevenson 1990) resulting in population declines.

There are no recorded incidents of caribou poaching in the Takla caribou population range since records were made publicly available in 2006.

3.4 NATURAL DISTURBANCE

Fire as a natural disturbance can have large-scale and long-lasting impacts on woodland caribou (Environment Canada 2014). Fire kills individuals, destroys habitat and changes predator-prey dynamics by

improving habitat for alternative prey and increasing wolf-caribou spatial overlap (Robinson et al. 2012). Fire suppression, on the other hand, has increased the possibility of very large and intense fires that could alter entire range areas (Environment Canada 2012a). Mountain pine beetle infestations are also natural disturbances with large-scale and long-term effects (Cichowski and Williston 2005).

Wildfire has not been a large, natural disturbance in the Takla caribou subpopulation range. Only 20 km^2 of burned area (1%) of the range has burned since records were first maintained in 1923. Much of the forested area in the Takla caribou subpopulation range has been affected by mountain pine beetle. Most of the infestation has been classified as light (1925 km^2) and only 131 km^2 is considered severely affected forest.

3.5 Parasites and Diseases

Caribou are generally susceptible to a range of native and introduced diseases and parasites found in other ungulate species. Brucellosis is a contagious disease of ruminants which can cause spontaneous abortions particularly among first time breeding females (Neiland et al. 1968). The bacteria causing brucellosis in caribou is primarily *Brucella suis* that also affects swine (Jones 2014). Caribou are highly susceptible to the meningeal worm (*Parelaphostrongylus tenius*) that is fatal in some, but not all, deer species (Anderson 1972, Trainer 1973). Early reports of woodland caribou declines in eastern Canada attributed it to their overlap with white-tailed deer who are meant to be the primary host of *P. tenuis* (Cringan 1956). Besnoitiosis is a disease caused by infection with the protozoan parasite *Besnoitia besnoiti* and is known in wildlife and livestock around the world (Walden et al. 2014). It can cause spontaneous abortions in pregnant females and infertility in males, but it is primarily expressed as facial hair loss in infected animals. It has been found in free-ranging woodland caribou in northern Saskatchewan in 1976 (Wobeser 1976), captive caribou (Glover et al. 1990).

Caribou are also susceptible to tape worms (*Echinococcus granulosus, E. multilocularis, Taenia ovis krabbei*), bot flies (Oestrinae), warble flies (Hypodermatinae), liver flukes (*Fascioloides magna*), lumpy jaw (*Actinomyces bovis*), muscle worms (*Parelaphostrongylus andersoni, P. odocoilei*), and winter tick (*Dermacentor albipictus*) (Miller et al. 2014b).

There is no reported occurrence of brucellosis or tuberculosis in British Columbia in any species. Severe symptoms of Besnoitiosis have not been found in caribou in British Columbia (Miller et al. 2014a). However, many of the other parasites can be found in woodland caribou in British Columbia with affects on individuals, but no reported population-effects on the Takla subpopulation. Chronic wasting disease, which has the potential for strong negative effects on this subpopulation, has not been detected in British Columbia in any species (Schwantje 2015).

3.6 Climate Change

For species such as woodland caribou that undergo seasonal migrations, have predators with seasonal cycles, respond to plant and insect phenology and are sensitive to snow depth and season length, climate change will have direct effects (Vors and Boyce 2009). With alpine tundra habitats predicted to shrink in a warming climate, the effects of climate change on caribou may be profound (Harding and McCullum 1997, Swift and Ran 2012). Natural resource industries, such as forestry and oil and gas are both vulnerable and have a role to play in climate change mitigation (Houghton et al. 2001). How they adapt may also have consequences for caribou (Racey 2005). Climate change adds much complexity to managing caribou for long-term recovery, including how it affects the distribution of alternative prey (Seip 2008, Dawe and Boutin 2016) and available food (Parker et al. 2009).

Climate change models for British Columbia suggest that areas in the Cariboo Mountains (south of the Takla range) will experience increased winter snow loads (Dawson et al. 2008, Griesbauer and Green 2010) that could affect food access and mobility for animals. Such a change could be positive for snow adapted, arboreal lichen eating caribou. This benefit could be negated by more frequent freeze-thaw cycles (Plummer et al. 2006) that will improve the ability to predators to move across frozen crusts as well as limit access to food for caribou (Gillett et al. 2004, Dawson et al. 2008). Predictions of forest type shifts due to climate change mediated by fires suggest that black spruce may be replaced by white spruce and lodgepole pine, affecting caribou habitat (Hebda 1997).

Although there are no data directly linking climate change to caribou populations in the Takla caribou subpopulation range, there are studies that predict forest habitat changes with climate in the Skeena Mountains. Woods et al. (2017) predicted that climate will become warmer and wetter, affecting five of six natural disturbances in forests in the British Columbia central plateau. This will affect habitat in the Takla caribou subpopulation range, particularly since they spend much of their year in forests. Rose and Burton (2011) found that climate change mediated forest dynamics in the central plateau area will change habitat corridors, potentially affecting caribou movements.

3.7 Small Population Size Effects

Small population effects include several threats to caribou that are unique to small (approximately less that 50 animals) and isolated subpopulations. These include reproductive and genetic isolation (McDevitt et al. 2009), predation (Sinclair et al. 1998, Abrams 2002), Allee effects where small groups are more vulnerable to predators (McLellan et al. 2010), risk of demographic bottlenecks where single-sex or male-dominated cohorts lead to population decline and increased chance that localized natural events such as avalanches (McClung 2001), fires or floods that kill a disproportionate number or key members of a small herd (Hebblewhite et al. 2010b). Movement barriers that prevent inter-population dispersal exacerbate small population effects by preventing small or extirpated populations of rescue (Gilpin 1990). Small population effects can be a particular hazard for species with slow growth rates (Laikre et al. 1997).

The Takla caribou subpopulation is small (fewer than 50; Figure 2) and has been declining since reliable counts have been made in 2004 (Skeena Region 2017). This means that it is susceptible to small population effects, but there has been no data collected demonstrating that this is the case.

The genetic viability of caribou subpopulations is dependant upon their size and dispersal (inter-population migration) ability (Weckworth et al. 2012). Small populations are subject to genetic drift that is a simple function of their small and unique gene pool as well as reduced gene flow (Boulet et al. 2007). Populations that are small and declining are particularly susceptible to genetic isolation (Laikre et al. 1997, Serrouya et al. 2012, Weckworth et al. 2012).

There have been no studies of the genetic diversity in the Takla caribou subpopulation, so it is not known whether their steep population decline or low numbers has had genetic consequences.

4 MANAGEMENT HISTORY

4.1 HABITAT

A use/availability study of collared caribou in the Takla subpopulation range to determine proportional habitat use among alpine, subalpine and forest types showed that they show no strong spring preference, select forests during calving, strongly select alpine habitats in summer, weakly select alpine habitats in early winter and strongly select alpine habitats in late winter (Poole et al. 2000). Of the forest types available in the Takla range (deciduous, pine and spruce-fir), open spruce-fir habitats are most strongly selected (Poole et al. 2000).

Habitat management in this area is overseen by the provincial government and implemented by the forestry industry through application of their Annual Allowable Cut. Active restoration takes place in the form of cutblock replanting that accelerates seedling establishment (Cichowski 1989, 1996). For their part, forestry regulations prescribe practices to manage resource use and protect forests that are caribou habitat (Seip 1998).

4.1.1 PROTECTION

Provincial park legislation does not automatically protect caribou habitat from forestry, mining and petroleum resource activities. When land is acquired for a provincial park, with it comes the mineral and coal leases as well as timber and related licences (with compensation) (1996a). Hunting is also prohibited (Government of British Columbia 1996b). Petroleum and natural gas tenures are permitted by the British Columbia Park Act (Section 33 1996a) but are not relevant in this subpopulation range.

Mount Blanchet Provincial Park lies entirely within the Takla caribou subpopulation range, and there are three Ungulate Winter Range designations in this area. The provincial park is approximately 250 km^2 and has been established to explicitly protect caribou wintering and calving areas (Government of British Columbia 2005). Hunting (albeit not for caribou) is permitted in the park under regulation.

Ungulate winter range 7-003 overlaps the Takla and Wolverine subpopulations, and protects more than 9700 km^2 of winter habitat in both subpopulation ranges by prescribing modified harvest regimes (Stevenson et al. 2003). Ungulate winter ranges 6-003 and 6-017 have been established to protect mountain goat habitat that only partially protects caribou range.

There are two proposed Wildlife Habitat Areas that overlap with the Takla caribou subpopulation range (6-336 and 6-289). These are both designed to protect grizzly bear hunting and denning habitat and their conditions do not explicitly protect habitat suitable for woodland caribou.

4.1.2 ENHANCEMENT AND RESTORATION

Large-scale habitat restoration and enhancement for caribou protection and recovery generally refers to oil and gas activities (well sites, seismic lines) rather than forestry. Habitat restoration is very expensive and rarely undertaken at a scale that is beneficial to caribou (Schneider et al. 2010, Dickie et al. 2017). Small-scale habitat restoration actions, like decommissioning roads, replanting seismic lines or installing movement and visual barriers along pipelines can be effective (MacNearney et al. 2016, Pigeon et al. 2016, DeMars and Boutin 2018). Nevertheless, it is considered an essential step for caribou recovery in the absence of protection required for natural habitat regrowth that can take tens of decades.

The largest habitat restoration effort required in the Takla range is to decommission and restore the 342 resource (forestry and mine) road segments in this area. Of the 1211 km of resource road, only 29 km (2%) has been retired and little restoration has been reported.

4.2 Recreation and Access Management

Road access to woodland caribou habitat elevates conservation threats including conflicts with motor vehicles, hunting pressure, habitat fragmentation and in some cases predation (James et al. 2004, Apps and McLellan 2006, Seip et al. 2007, Apps and Dodd 2017). A key element of caribou life history is to seek separation from competitors (moose, deer, elk) and their predators (Bergerud and Elliot 1986, Wittmer et al. 2007). Constructed access roads into woodland caribou habitat connects them to their threats and contributes to population declines (Dussault et al. 2012).

There are almost 1200 km of active resource (forestry and mining) roads in the Takla caribou subpopulation range providing access into their habitat. The conditions of the UWR (7-003) require access management and control strategies including integrated access to resource users and manage access to recreational vehicles (Stevenson et al. 2003). It is not clear how many of these objectives have been met. To date, recreation is not seen as a strong threat to the Takla caribou subpopulation (Skeena Region 2017).

4.2.1 Snowmobile

Snowmobile use is prohibited in Mount Blanchet Provincial Park (Government of British Columbia 2005). The UWR management plan calls for snowmobile use education and promotes responsible use. There are no snowmobile management areas or managed trails in this area (Stevenson et al. 2003).

4.2.2 Heli-ski / Cat-ski

Heliskiing and catskiing are not allowed in Mount Blanchet Provincial Park (Government of British Columbia 2005). Within the area of the UWR, the Heli- and catski industry is instructed to “design flight lines and activities to minimize contact with caribou” (Stevenson et al. 2003).

See section 3.3.2.2 for general threat information.

4.2.3 Other

With no nearby towns or major highways running through the Takla caribou subpopulation range and there are few other development or management issues in their range.

4.3 Predators

Unsustainable predation is acknowledged as a key, proximal mechanism of woodland caribou declines across Canada (Bergerud and Elliot 1986, Bergerud 1988, Environment Canada 2012b, 2014). Woodland caribou metapopulations have persisted despite ongoing predation from wolves, bears (black and grizzly) and cougars for millennia, but the existential impact of predators on caribou is a recent phenomenon. Human changes to habitats, fragmentation, movement barriers, dynamics of alternative prey and predator access to caribou habitat have led to conditions where caribou subpopulations are permanently extirpated.

Shrinking old-growth forest caribou habitat has forced caribou into increasingly smaller ranges, making their home range potentially more predictable to predators. Seasonal migratory routes track through predator rich areas

and bring them into closer proximity to alternative prey species that can sustain higher predator populations (Seip 1992, Apps et al. 2013). Road and seismic line clearing and winter trail packing makes travel for predators into caribou critical habitats more efficient, elevating predation (Dickie et al. 2016). And, finally, a shift in forest structure towards younger age classes has favoured moose, deer and elk at densities that can support greater predator densities. Not only does this shift bring woodland caribou into closer proximity to predators, but it also promotes greater predator abundance (Hebblewhite et al. 2007).

While habitat changes facilitate unsustainable predation, habitat regrowth and restoration occurs too slowly to recover woodland caribou in the short-term. As a result, direct predator management is a caribou recovery tool to ensure that populations persist long enough to benefit from habitat restoration efforts (Wilson 2009, Brook et al. 2014, Hervieux et al. 2014).

4.3.1 Wolf Management

Wolves are an important, year-round caribou predator. Caribou populations in northern British Columbia were shown to decline when wolf densities were 9–10/1000km^2 but increased at wolf densities from 1–4/1000km^2 (Bergerud and Elliot 1986). For this reason, target wolf densities that would enable caribou recovery are set to 6.5/1000km^2. In the absence of effective habitat or alternative prey management to achieve these densities, direct wolf management must be undertaken to achieve caribou conservation goals.

Direct wolf management has not been recommended for the Takla caribou subpopulation (Skeena Region 2017). A modeling and consultation exercise for northern caribou including the Takla subpopulation discussed wolf management (longer season, higher bag limits, increased trapping and wolf control) as a caribou recovery measure (McNay et al. 2008). To date, this has not been conducted.

4.3.2 Cougar Management

Cougars are rare in the range of the Takla caribou subpopulation range (McNay et al. 2008, Kuzyk et al. 2016b) and are not managed to recover the caribou population.

4.3.3 Other

Grizzly bears, black bears and wolverines are also woodland caribou predators (Seip 1992, Wittmer et al. 2005a). However, their protection status, seasonality and / or low predation rate and dependence on caribou as food does not warrant management to benefit caribou populations. In rare cases associated with intensive caribou management programs (captive breeding, maternity penning) bear or wolverine removal may be conducted.

Grizzly bears are at low to moderate density in the Takla caribou subpopulation range (Hamilton et al. 2004, Kuzyk et al. 2016b). Although the grizzly bear hunt has been suspended province wide, records from 1976 to 2013, 143 grizzly bears were reported as hunter (resident and non-resident) kills in the WMUs overlapping with the Takla caribou subpopulation range. During that same period, 1749 black bears were killed by hunters. Neither black nor grizzly bears are managed in this region specifically for caribou recovery.

4.4 Primary Prey

Moose, elk, white-tailed deer and mule deer (including black-tailed deer) share large, mammalian predators such as wolves, bears and cougars. In what is known as apparent competition (Holt 1977), an increase in one prey population will lead to a decrease in a second prey population. It appears as if these two, prey species are

competing with each other, but the decline of the second prey species is due to the boost that their shared predator population experiences because of the high density of the first prey species. Woodland caribou have avoided apparent competition by occupying habitats distant from other deer species. However, changes to their habitats, movement barriers and facilitated predator access have limited their access to continued isolation. Across their range, woodland caribou populations have been subject to apparent competition (DeCesare et al. 2010b, Wittmer et al. 2013). For this reason, managing primary prey, either directly through hunting quotas, or indirectly through habitat management, has become a caribou management action.

4.4.1 Moose Management

Throughout British Columbia, moose are a common and sustaining prey of wolves (Messier 1994). But their expanding range (Bergerud and Elliot 1986), a wolf numerical response to moose densities (Messier and Joly 2000) and apparent competition with woodland caribou mean that even moderate moose densities in or adjacent to caribou range poses a threat to caribou persistence (Seip and Cichowski 1996, Lessard et al. 2005, Serrouya et al. 2017). Moose densities respond positively to early seral forest habitat and negatively to human hunting, and moose numbers have been falling around the province in response to harvest pressure (Moose Management Technical Team 2015). Lessard et al. (2005) found that a 10% increase in the moose harvest could stabilize caribou populations.

Moose density in this area is estimated to be around 770/1000km^2, or high (Kuzyk et al. 2016b). From 1976 to 2013, over 10,500 moose were killed by resident and non-resident hunters in the WMUs overlapping with the Takla caribou subpopulation range. Hunting continues in this region and is the only moose management being conducted.

4.4.2 Deer Management

Managing deer populations in support of caribou conservation is a challenge. Both mule and white-tailed deer can support predator populations that have negative effects on caribou (Latham et al. 2011c). Both can transmit diseases that could be catastrophic were they to spread to caribou populations (see above; Habib et al. 2011). Where mule deer and white-tail deer ranges overlap, mule deer tend to decline, perhaps also due to apparent competition (Robinson et al. 2002). In British Columbia, there is active management to increase mule deer populations through habitat protection (British Columbia Ministry of Environment 2017) and manage white-tailed deer populations through hunting regulations (British Columbia Ministry of Forests, Lands and Natural Resource Operations 2015). Neither are strictly regulated by either predators or food. White-tailed deer populations respond strongly to food availability as well as hunting or predation (Fryxell et al. 1991, Messier 1991, Dumont et al. 2000). Mule deer are similar, but tend to be more vulnerable to predation, food availability, severe weather and loss of native winter habitat (Pierce et al. 2012, Forrester and Wittmer 2013, Bergman et al. 2015). Indeed, regulating deer density using hunter tags must counter some difficult trends (declining number of hunters, increase prey refugia from hunters and increased use of residential areas by deer) to be successful (Brown et al. 2000). Managing deer populations to a lower density will require managing artificial food sources (hay, grain), and access to high quality habitats as well as increased hunting pressure.

Both mule and white-tailed deer populations are at low density in the area of the Takla caribou subpopulation range (Kuzyk et al. 2016a). This is reflected in the hunter kills in this area, where since 1988 only 21 white-tailed deer and 37 mule deer were reported killed.

4.4.3 Other

Elk, like moose and deer, are wolf prey and could potentially facilitate apparent competition with caribou (DeCesare et al. 2010b).

Elk populations are at low density in the area around the Takla caribou subpopulation range (Kuzyk et al. 2016a). From 1981 to 2013, only 17 elk were killed by hunters in the WMUs overlapping with the Takla range, reflecting this low density.

4.5 Population Reinforcement

The International Union of Conserving Nations (IUCN) has established guidelines for reintroductions and related conservation translocations (IUCN Species Survival Commission 2012), of which population reinforcement is one tool. In this document, reinforcement is defined as an intentional movement and release of an organism into an existing population of conspecifics within its indigenous range. It differs from reintroduction in that the species has not been extirpated from that range (DeCesare et al. 2010a), but existing populations are being added to. The management tools described in this section are based on the assumption that caribou populations are being reinforced and not reintroduced.

4.5.1 Maternity Penning

Maternity penning (also known as maternal penning) is a technique to increase calf recruitment by capturing and temporarily penning pregnant females to protect them from predators. These females are held through parturition and for up to six weeks after calves are born. By this time calves are large and strong enough to better avoid predators, improving their survival probability and population recruitment. Thus, if young-of-the-year predation is a contributing factor to unsustainable population decline, maternity penning can be an effective mitigation (Hayek et al. 2016a). Maternity penning is an *in situ* method where the pen is constructed within their home range and animals are never moved outside of their home range.

There is no maternity penning in the Takla caribou subpopulation range, but there is an operation with the Klinse-za (Moberly) herd to the northeast of the Takla area (Hayek et al. 2016b). Maternity penning is not planned for the Takla subpopulation.

4.5.2 Captive Breeding

Captive breeding is a conservation method that captures both male and female animals and moves them permanently to a facility where they are bred under controlled conditions (IUCN Species Survival Commission 2012). The objective is to create a surplus of female calves in the breeding facility that can then be translocated to ranges to reinforce small populations. To be effective, recipient populations should have low adult female survival that this action can reverse. This is a *ex situ* approach that takes animals away from their home range and returns animals to ranges that may not be where they originate (Harding and McCullum 1997). A number of factors, such as source animals, animal husbandry, genetic bottlenecks, gene mixing with destination herds, status of destination herds, disease transmission, fate of male calves among others must be considered in such an effort (Dolman et al. 2015, Hayek et al. 2016a).

There are no captive breeding facilities that can reinforce the Takla caribou subpopulation. With their low numbers, declining trend and lack of predator and habitat management, they would be a poor candidate recipient herd and a poor donor herd.

4.5.3 TRANSLOCATION

Translocation is the reinforcement of small populations by moving animals directly from a sustainable population (Ray et al. 2015, Hayek et al. 2016a). The goal is to rapidly increase the numbers of animals of all ages and sexes in the target population (Miller et al. 2007, DeCesare et al. 2010c). Animals are captured in their home range, transported to the target range and either soft released in a temporary pen that offers an opportunity for individuals to adjust to their new surroundings, or hard released directly into the destination habitat.

Compared with other reinforcement methods, translocation is a relatively cost-effective approach to add animals to small populations. It has been tried successfully and unsuccessfully with caribou populations in Canada and British Columbia (Compton et al. 1995, Stronen et al. 2007, Hayek et al. 2016a).

There have been no translocations to or from the Takla caribou subpopulation range. Their low size makes them an inappropriate donor population, and their decreasing trend, high moose population, lack of habitat restoration and predator management make them a poor recipient population.

4.5.4 OTHER

The proximate cause of caribou population declines is predation. While predator management is a direct way to manage this threat, an alternative solution is predator exclusion fencing (Hayek et al. 2016a). In part, this approach is linked to direct predator management as any predators within an exclusion fence would be lethally removed, and it is linked to maternity penning as this is a form of small-scale, temporary predatory exclusion fencing. However, there are recent, and very large scale (thousands of hectares), proposals to erect predator exclusion fencing as a mitigation for caribou populations where habitat restoration is an unrealistic goal but the caribou population is critically low (Boutin and Merrill 2016, Cornwall 2016, Hebblewhite 2017, Proulx and Brook 2017).

To date, this conservation method has not been attempted anywhere, including in the range of the Takla caribou subpopulation (Antoniuk et al. 2016).

4.6 STEWARDSHIP/OUTREACH

Local communities and stewards are an essential part of caribou recovery. Management actions to recover very small populations are at times expensive, controversial and require the imposition of new and restrictive regulations (Hayek et al. 2016a). Gaining the social licence to conduct management actions like predator management, translocation, captive breeding and access restrictions requires outreach. Effective outreach programs to local communities and regional populations must accompany planning for management actions (Antoniuk et al. 2015). This includes information to municipal and regional administrations, business stakeholders, recreational groups, conservation organizations, farming organizations, hunting clubs among others (see below). Outreach must be timely, targeted and inclusive to be effective (Wilkinson 2010).

Stewardship is the active participation by citizens or citizen groups in conservation and recovery programs. For caribou this can take a number of forms ranging from ambassador programs where citizen volunteers promote caribou conservation at community events, habitat protection through conservation offsets (Robichaud and Knopff 2015) to fund-raising and operating reinforcement activities such as maternity pens.

The relatively poor access to the Takla caribou subpopulation range means that there are few opportunities for the public to engage with and learn about this herd. Takla Lake and Mount Blanchet Provincial Park are relatively popular destinations for anglers and recreational boaters. While this creates an opportunity to connect with the public, this is not an audience with an inherent interest in caribou.

There are however two venues where information can be displayed and stewards given an opportunity to participate in Takla caribou management. Linking the Takla herd with caribou subpopulations influenced by the WAC Bennett Dam provides an opportunity to reach out to the public with information and management action descriptions. As well, Fort St. James National Historic Site is immediately south of the Takla caribou range and would also provide a space where information on the Takla subpopulation could be presented and stewardship opportunities provided.

There are a number of First Nations and First Nation communities (see below) in and around the Takla caribou subpopulation range. First Nations have been stewards of caribou populations for millennia and continue to actively contribute to their contribution. Reinforcement efforts for this subpopulation should include First Nations stewards.

4.7 RESEARCH

Every caribou subpopulation in British Columbia requires some degree of management action; habitat protection or restoration, population reinforcement, alternative prey management or predator control. Yet few caribou subpopulations in British Columbia have sufficient, herd-specific information to enable confident management decisions. To fill these gaps, scientific research and traditional ecological knowledge must be gathered to fill critical gaps.

There have been decades of research into caribou biology and conservation. This body of work has informed scientists and policy makers of the key factors that contribute to caribou population dynamics, important threats and potential solutions. Key findings have been the proximate role of predation and apparent competition in caribou population fluctuations and the ultimate role of habitat destruction in caribou population declines. While their interactions are broadly understood, ongoing research to fine tune caribou responses to ecological stimuli and human disturbance including habitat fragmentation and primary prey density can improve our management.

There has been relatively little research conducted on the Takla caribou subpopulation. Ongoing monitoring (see below) should establish the population status of the herd, but research into animal habitat use, movements and mortality sources is needed to implement management towards population recovery of this small and declining herd (Skeena Region 2017).

The seasonal distribution of the Takla caribou subpopulation appears to have changed in the past 25 years and this may have implications on access to food resources (McNay et al. 2008, Heard and Zimmerman 2017). Research into their seasonal diet (use – availability) would be useful to establish recovery goals.

4.8 MONITORING

Ecological, population and industrial footprint monitoring is an essential activity for the conservation and recovery of woodland caribou. This work provides the information to enable the detection of conservation threats,

the effectiveness of management activities and the status of target populations. Although it cannot replace conservation action, it is an essential piece of the caribou recovery program.

Key monitoring factors for the Takla caribou subpopulation include collecting population and recruitment data as well as using collared animals to establish seasonal movement patterns, mortality rates and sources. While it is clear that this population is declining, the mechanism of the decline is unclear and monitoring these elements would help to identify effective recovery actions (Skeena Region 2017).

5 Implications to Other Wildlife

Changing population trends of woodland caribou will require manipulating the environment in ways that favour caribou ecology and life history at the expense of other wildlife. More old growth forest will benefit caribou but not moose or deer. Reducing adult female and calf mortality may require lethal wolf control. Maternity penning makes calves, common spring prey for black and grizzly bears, less vulnerable to these predators. None of these management actions can or will imperil other wildlife species, but will precipitate changes to their population density and/or distribution.

The limited management currently being undertaken in the Takla caribou subpopulation range means that other wildlife species are not being affected by the decline in the caribou subpopulation. Although wolf management is being considered, it has not been implemented. High moose densities in the area could lead to changes in moose harvest management to lower densities and benefit caribou recovery, but this would have to be considered along with the provincial moose strategy.

6 Implications to Other Values

The recovery and protection of woodland caribou populations will affect a range of human values and activities across caribou range (Scarfe 2006). These include recreational / commercial activities such as camping, snowmobiling and backcountry skiing, commercial resource extraction activities such as forestry, mining and oil and gas development as well as non-commercial resource uses such as hunting. Research shows that none of these activities will have to be halted to protect woodland caribou (Kruse et al. 1998, Hebblewhite et al. 2006, Hebblewhite 2017). However, changes to operations, seasonal restrictions and area closures will be required, locally affecting some recreational and commercial activities (Government of Alberta 2016).

Motorized recreational activities are not permitted in Lake Blanchet Provincial Park, limiting access to that part of the Takla caribou range for that user group. Similar restrictions are recommended for the other protection parcels in the range (OGMA, UWR, WHA). Caribou hunting has been suspended, but caribou protection has not abated moose hunting which continues to be popular in the region.

7 Partners / Neighbours

Partners are existing or potential groups that can contribute to woodland caribou management with expertise, funding, in-kind or moral support. Neighbours are groups within in the caribou subpopulation area that are currently not participating in caribou management but that could be affected by caribou management. They

include local governments, industry tenure holders, and recreation groups. Neighbours could potentially become future partners.

Below is a list of communities in and adjacent to Takla subpopulation range, organizations that have a clear interest in how this area is managed and businesses that have a commercial interest in the area. This may not be a complete list, particularly of distant organization with an inherent interest.

Communities: **First Nations**: Carrier (Tsay Keh Dene) and Sekani (Kwadacha) First Nations, Takla Lake Nation, Tl'azt'en Nation, Nak'azdli Band, Wet'suwet'en Nation (Broman Lake), Ts'il Kaz Koh Nation (Burns Lake), Lake Babine Nation, Yekooche Nation

Local: Burns Lake, Fraser Lake, Fort Fraser, Kitwanga, Hazelton, Takla Landing, Houston, McLeod Lake, Mackenzie

Regional: Prince George, Smithers, Vanderhoof, Chetwynd

Organizations: **Recreation**: Tourism Dawson Creek, Horse Council of British Columbia, Back Country Horsemen of British Columbia, British Columbia Snowmobile Federation (Rocky Mountain Riders, Pine Valley Trail Blazers, Prince George Snowmobile Club), Land Conservancy of British Columbia, Prince George Rod and Gun Club, Dawson Creek Sportsman's Club, Mackenzie Fish & Game, Outdoor Recreation Council of British Columbia, Quad Riders Association of British Columbia,

Protection: Western Canada Wilderness Committee, BC Spaces for Nature, Yellowstone to Yukon Initiative, British Columbia Ministry of Environment and Climate Change

Commercial: **Hunting and Trapping**: **Accommodation and Guiding**:

Forestry *(Active licences to cut)*: Takla Lake Limited Partnership, RedDog Logging, Pishon Gold Resources Ltd., Cliff Natural Resources

Forestry *(Woodlots)*: Lori Hoy

Agriculture: None

8 Recommended Actions (refer to (Skeena Region 2017))

8.1 Short Term (Within 6–12 Months)

- Plan and implement bi-annual surveys (population and recruitment).
- Reinforce links between caribou and moose management actions.
- Establish wolf monitoring program.
- Establish outreach and stewardship opportunities at Fort St. James NHS and WAC Bennett Dam interpretative centre.
- Engage First Nations communities in stewardship actions (e.g., reinforcement, predator management)

8.2 Medium Term (Within 12–24 Months)

- Review options for wolf management.
- Partner with federal, private and non-governmental organizations to plan for herd reinforcement.

8.3 Long Term (Within 24–48 Months)

- Maintain collars on 30% of population.
- Survey moose in Takla range.

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