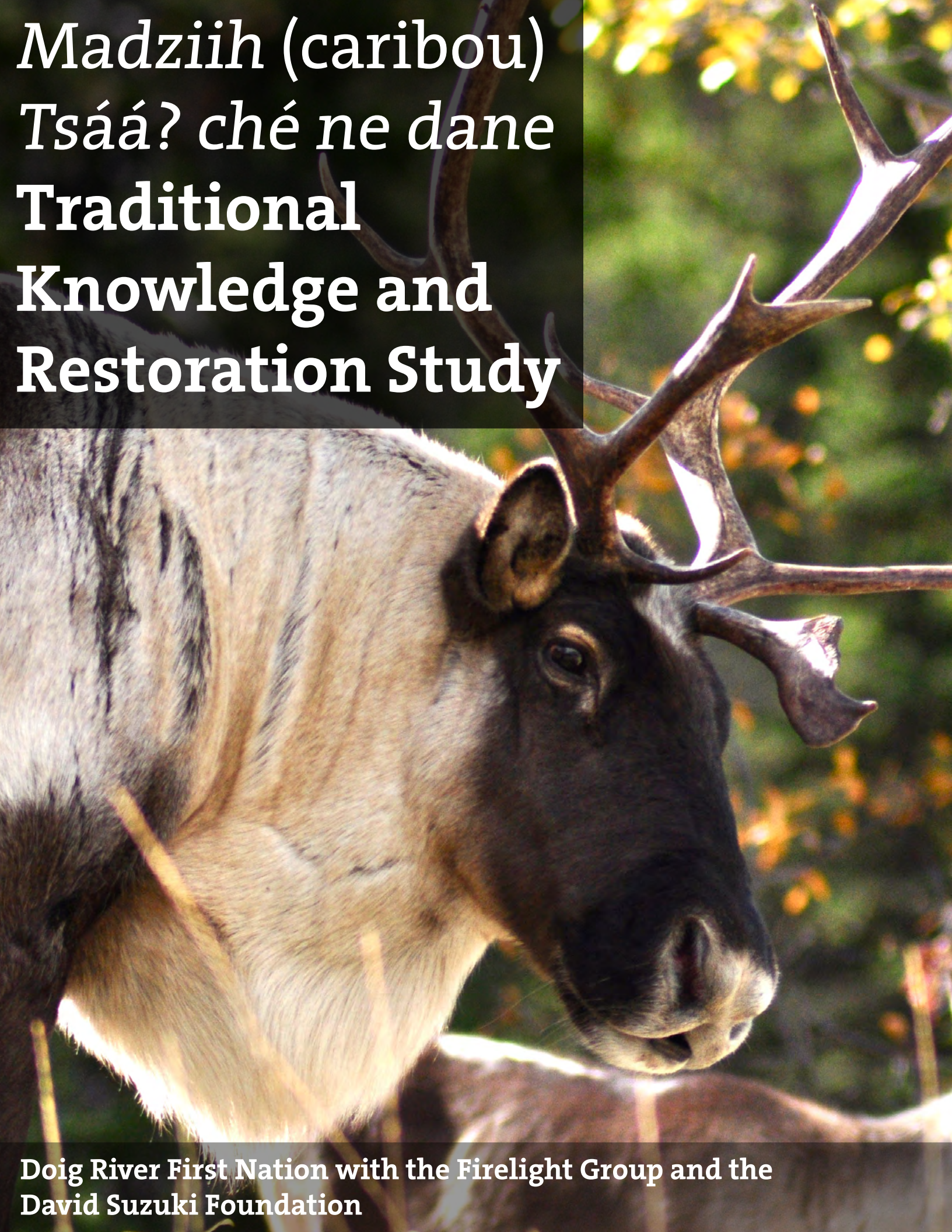
Madziih (caribou) *Tsáá? ché ne dane* Traditional Knowledge and Restoration Study



Doig River First Nation with the Firelight Group and the David Suzuki Foundation

Madziih (caribou) Tsáá? ché ne dane Traditional Knowledge and Restoration Study

DRFN Report

December 2016

ISBN: 978-1-988424-02-6

Acknowledgements

Thanks and acknowledgements go to DRFN members, Elders, knowledge-holders, land users, staff and leadership who contributed. This report could not have been completed without their support and expert knowledge. This report was commissioned by the David Suzuki Foundation, with generous support from the Sitka Foundation.

Text and figures prepared by: Susan Leech (MSc, RPBio), Carolyn Whittaker (MSc) with Firelight Research Inc. (the Firelight Group or Firelight), Doig River First Nation and David Suzuki Foundation. Sections 1.1 and 1.2 were written
by Rachel Plotkin, David Suzuki Foundation (DSF), with Susan Leech and Carolyn Whittaker. Additional data collection and editorial support provided by Peter Bates and Mathew Murray for the Firelight Group.

Maps prepared by: Andrew Thompson, the Firelight Group, and Gord Haines, DRFN.

Internal Peer Review by: Craig Candler, PhD, the Firelight Group and Jane Calvert, DRFN.

Cover photo credit: Mathew Murray

Suggested Citation: Leech, S.M., Whittaker, C. and the Doig River First Nation, 2016. Madziih (caribou) Tsáá? ché ne dane Traditional Knowledge and Restoration Study. Report prepared for DRFN and the David Suzuki Foundation by the Firelight Group December 2016. 60 pp.

Disclaimer

The information contained in this report is provided for use by the Doig River First Nation (DRFN) and is based on limited research conducted as part of the Doig River First Nation Caribou Traditional Ecological Knowledge Study. This report is based on the understandings of the authors, and is not a complete depiction of the dynamic and living system of use and knowledge maintained by DRFN Elders and members.
The information contained herein should not be construed as to define, limit or otherwise constrain the treaty and aboriginal rights of Doig River First Nation or other First Nations or Aboriginal peoples.

The recommendations in the report are those of the community members and are not necessarily endorsed by the David Suzuki Foundation.

David Suzuki Foundation

DOIG RIVER FIRST NATIONS
TAANCHE WADANE

the firelight group

Executive summary

People of the Doig River First Nation (DRFN) have lived in the area around their present day reserve for millennia, using traditional practices to develop a vibrant culture and economy from the lands and waters on which they depend. Hunting and trapping practices include harvesting *madziih* (caribou) when populations are sustainable and according to DRFN protocols. Caribou is an important animal within DRFN's traditional seasonal round and a vital part of the cultural and spiritual practices of the DRFN community.

One of three woodland caribou ecotypes in British Columbia, boreal caribou populations are in steep decline across Canada, and the area around the DRFN reserve is no exception to this trend. This area, known by the federal and provincial governments as the Chinchaga range, is occupied by a herd of boreal caribou that Doig members are consistently and intimately familiar with through generations of tracking and hunting. Because of ongoing population declines, which are caused by habitat loss and associated increases in predation risks, boreal caribou are listed as threatened under Canada's Species at Risk Act (SARA). The federal government has prepared a Boreal Caribou Recovery Strategy[1] that identifies key threats and habitat-protection measures for this ecotype of woodland caribou. Under the SARA, responsibility officially lies with the federal government to ensure that provinces are taking appropriate actions to restore boreal caribou populations within identified ranges across Canada.

As government has a responsibility to protect wildlife, so too do Indigenous cultures have a deep-rooted responsibility to steward the land and maintain constitutionally protected aboriginal rights and interests.[2] In many instances, Indigenous governments are reclaiming this responsibility from provincial and federal authorities that have neglected it.

The Doig River First Nation is putting forward this *madziih* Traditional Knowledge and Restoration Study, based on DRFN traditional ecological knowledge (TEK), as a step toward reclaiming this responsibility for caribou in the Chinchaga range. For the past 20 years, as *madziih* populations dwindled in the area, DRFN members reduced their harvest to the point that they now observe a self-imposed ban on harvesting these animals. Because of steep population declines in the Chinchaga range and elsewhere, DRFN members are no longer able to fully exercise their treaty right to harvest *madziih*, and Elders are not able to pass on caribou knowledge or stewardship practices to younger generations.

With this study, DRFN is asserting its right to play a leadership role in reversing caribou declines in the Chinchaga range. Through interviews and focus groups with DRFN knowledge-holders, this study uses traditional knowledge to describe cultural rules surrounding *madziih* hunting practices, seasonally important *madziih* habitat areas — including movement corridors, calving grounds, rutting areas and wintering sites — and observed impacts to important *madziih* habitat areas. This knowledge, which encompasses a time scale and depth of understanding that are impossible to capture using short-term, western science-based approaches such as telemetry (radio-collaring), forms the basis for identifying priority actions to restore caribou populations within the Chinchaga range. DRFN has also asserted the need to manage cumulative effects more effectively and has expressed interest in overseeing monitoring and implementation efforts on the ground.

Based on traditional knowledge, DRFN has identified the following 14 management recommendations for boreal caribou in the Chinchaga range:

1. Immediately institute a "rest" period, including a complete halt to industrial development (minimum of 10 years) for at least two-thirds of the Chinchaga historical range in B.C.

2. Extend the Chinchaga range south to include the observed habitat areas just south of DRFN's reserve.

3. Impose a complete ban on all industrial activity in important calving habitat for boreal caribou in the Chinchaga range, especially during the critical late-winter and early-spring period.

4. Fence "man-made licks" (contaminated sites created from industrial development) and institute a DRFN-managed monitoring and maintenance schedule in priority areas, particularly Peejay and Milligan Creek.

5. Restore abandoned and orphaned well sites in priority areas identified as important caribou habitat.

6. Impose significant fines on industry for observed oil and gas leaks and spills in all oil and gas areas, with funds going toward a DRFN-led cleanup and monitoring program.

7. Direct immediate restoration efforts at linear corridors, including roads, rights-of-way and seismic lines, within priority areas. Areas should be replanted and restored to states as they were prior to development.

8. Institute a wolf-trapping program in Milligan Core (and other areas with high wolf populations), in a way that is consistent with DRFN traditional stewardship practices, supports the transmission of traditional knowledge, skills and practice from Elders to youth and supports DRFN land-users to implement the program in key areas.

9. Contingent on the implementation of significant restoration efforts, establish a maternal penning program in at least one important area within the Milligan Core.

10. Impose a moratorium on forest harvesting, including in priority areas of Chinchaga range, such as the Milligan Core. This moratorium should be in place until mature forest cover has increased to an established minimum required for maintaining boreal caribou winter habitat in the area.

11. Establish new ungulate winter ranges for boreal caribou, based on combined DRFN knowledge and short-term telemetry data on winter use.

12. Introduce rest areas (areas closed to hunting) to reduce harassment to caribou associated with hunting other animals. DRFN members suggest co-management of resident and non-resident hunters by First Nations and the provincial government.

13. DRFN opposes population control of other ungulate species in caribou habitat rest areas, as this will further disturb caribou and will not increase caribou populations.

14. Establish a DRFN community-based monitoring program to ensure that management recommendations outlined above are followed, and consistent monitoring of caribou populations and health occur within the Chinchaga range.

These management recommendations focus on British Columbia. As described in this report, DRFN strongly believes the British Columbia government is not doing enough to protect and restore boreal caribou habitat in the Chinchaga range. Although some protective measures have been enacted through the Boreal Caribou Implementation Plan, oil and gas development has occurred at a rapid pace within identified winter ranges and calving habitat, and forestry activities have continued largely unchecked. Many of the measures used in British Columbia to protect boreal caribou habitat contain exceptions or provisions that allow industrial activity to continue, despite the ongoing threat to boreal caribou populations. In 2012, the amount of undisturbed habitat available to boreal caribou in the Chinchaga range was twenty-four per cent, well below the minimum 65 per cent undisturbed threshold recommended for each range in the Boreal Caribou Recovery Strategy. With continued approval
of industrial development and minimal to non-existent efforts to restore habitat, the amount of undisturbed habitat has only decreased since that time.

There is an urgent need to take immediate steps to restore boreal caribou habitat within the Chinchaga range. As this report describes, DRFN is well positioned to lead these restoration efforts, using traditional knowledge as the basis for moving forward. DRFN puts forth this initial framework in good faith, with the intention of working with provincial and federal governments, as well as other First Nations governments, to ensure the end result is meaningful restoration of habitat for *mazdiih* and protection of treaty rights for future generations.

Table of Contents

Figures

Tables

1.1 Introduction

Across Canada, boreal woodland caribou populations are threatened with extinction. In some places, they have already disappeared.[3] Caribou are a cornerstone of Indigenous culture, and First Nations communities have been disproportionately affected by the loss of boreal caribou as a source of physical and cultural sustenance. In northeastern B.C., the Doig River First Nation (DRFN) is facing a turning point in its relationship to boreal caribou. Hunting of caribou and other species has been integral to DRFN as much for its role in strengthening cultural knowledge and relationships as for providing nutrition and a way of life that has existed since time immemorial,[4] but caribou populations are no longer stable enough to hunt.

Today, travelling across the landscape with Doig River Elders and knowledge-holders, one hears vivid stories about clearcuts that used to be hunting camps, well sites that used to be calving grounds, and farms and fields where caribou could always be found in the past.

DRFN is ideally placed to define priority areas for restoring and recovering boreal caribou populations within the Chinchaga range in DRFN territory. This report is one step toward that goal and is an example of how Indigenous communities across Canada can play leadership roles in restoration efforts, beginning by leading conversations based on traditional ecological knowledge about where restoration areas for caribou should be prioritized.

The status of caribou in DRFN lands

The Doig River First Nation is a Dane-Zaa or Beaver community that has existed since time immemorial in an area north of the Peace River that now falls within Treaty No. 8. DRFN has felt huge impacts from the uptake of private land and industrial development on its traditional hunting, gathering, and cultural practices — including the ability to hunt *madziih* (caribou in the Beaver language). The area that Doig members consider their hunting grounds[5] is home to a number of different *madziih* herds, each with different habits and habitat needs. Western scientists have divided these herds into three ecotypes: boreal caribou, northern caribou and mountain caribou.[6,7] All three caribou ecotypes in the Treaty 8 area of B.C. are faced with ongoing — and in some cases, steep — declines; caribou in some ranges are threatened with extirpation (local extinction).[8]

This report focuses on the Chinchaga boreal caribou herd, the herd DRFN members are most consistently and intimately familiar with; in particular, the caribou that live in a core habitat area defined by western scientists and policy-makers as the Milligan Core, an area critically important for caribou survival (Figure 1).

Over the past 20 years, Doig members have reported that all *madziih*, including *madziih* in the Chinchaga range and within the Milligan Core, have been declining, and they are concerned about the continued existence of *madziih* in their traditional hunting territory.[9] Doig members used to harvest *madziih* regularly, particularly when food was scarce on traplines in the winter, but have limited harvesting over the past 20 years because of concerns related to the decline. This has had a significant impact on DRFN's treaty rights and interests related to their preferred diet.

Doig Elders have clearly expressed that they want to eat *madziih* again before they die, and that they want future generations to be able to practice the same rights related to hunting and trapping caribou and other species with confidence and security.

Caribou habitat

For most of Canada's species at risk, the primary means to facilitate survival and recovery is habitat maintenance and restoration. This is because for 84 per cent of Canada's species at risk, the primary cause of decline is habitat loss and degradation.[10] Caribou are no exception; they depend on healthy, intact ecosystems, the loss and fragmentation of which has led to their imperilled status. High levels of habitat disturbance make it harder for caribou to avoid predation. To date, boreal caribou have lost more than half of their historic extent of occurrence in Canada.[11]

The B.C. government's 2009 assessment of the Milligan Core, put the extent of habitat loss and degradation at more than 92 per cent.[12] In other words, in 2008, more than 92 per cent of caribou habitat in the Milligan Core was impacted by forestry, oil and gas or other impacts, and only eight per cent of caribou habitat in the area remained suitable for boreal caribou. Eight years on, the situation has only gotten worse — habitat loss and degradation continue to eat away at the Milligan Core, leading to reduced occurrence of *madziih* and increased predation success by wolves and bears (D03, July 2016).[13]

For caribou to recover in DRFN's hunting grounds and across the rest of Canada, significant restoration efforts, along with the protection of remaining undisturbed habitat, must occur, so that caribou can once again dwell in the intact landscapes they need to avoid predators and survive. DRFN is well positioned to lead restoration projects in preferred hunting/trapping areas and to monitor the effectiveness of restoration efforts.

1.2 Protecting caribou: Government processes and regulations

As noted above, loss of caribou in this region represents an infringement of DRFN's constitutionally protected treaty right to hunt preferred species and maintain cultural practices, including knowledge transmission, in preferred areas. DRFN is pressing for urgent protection and restoration of habitat to reverse caribou decline throughout their historic range. Under species at risk and wildlife legislation, federal and provincial governments have the legal and regulatory responsibility to recover caribou. They have been entrusted with the responsibility to manage Canadian landscapes and watersheds such that they sustain wildlife, and, in instances where wildlife populations become at-risk, to facilitate recovery.

The federal government has determined that recovery of every boreal caribou herd in Canada is both biologically and technically feasible:[14] these caribou populations can be recovered if there is the political will and sufficient resources to do so.

The federal Boreal Woodland Caribou Recovery Strategy was released under the federal Species at Risk Act (SARA) in 2012. It identifies targets for maintaining undisturbed habitat and restoring degraded/fragmented habitat to a state that is suitable to support caribou survival. For boreal caribou,

undisturbed habitat within a range must be maintained or restored to a minimum of 65 per cent, although this only allows for a 60 per cent probability of persistence.[15]

Under the SARA, the recovery strategy should be followed by action plans that put recovery measures into place and chart paths toward on-the-ground recovery. For boreal caribou, components on which to build action plans are laid out clearly in the Boreal Caribou Recovery Strategy, including requirements for range plans, in which provinces must outline how they will meet habitat maintenance and restoration requirements. Provinces must complete range plans for each boreal caribou range by October 2017. Ultimately, the federal minister of environment and climate change is responsible for approving these plans. The minister can adopt an existing plan as long as it meets federal requirements.

What does recovery look like?

Recovery for a species at risk can be an unclear target. Sometimes governments set what appear to be arbitrary numbers as recovery targets with no clear rationale (e.g., 100 caribou, as proposed in the Recovery Strategy for Southern Mountain Caribou).[16] Environment Canada commissioned a report on what constitutes recovery as input into the Boreal Caribou Recovery Strategy. The author frames recovery in an ecological context, citing as a recovery target:

> *...multiple populations across the species' natural range, in representative ecological settings, with replicate populations in each setting that are self-sustaining, genetically robust, ecologically functional, connected, and resilient to climate and other changes."*[17]

The federal government's definition of a self-sustaining caribou population is the following:

Milligan Core Status

Under the BC Oil and Gas Research and Innovation Society (BC OGRIS), considerable investment has been made since 2012 to determine the status of boreal caribou in defined ranges in B.C., including the Chinchaga range. Much of the effort has gone into collaring caribou and collecting telemetry data. Boreal caribou telemetry data collected by BC OGRIS from 2012 to 2015 are shown in Figure 2.

As of 2015, based on 28 collared caribou in the Chinchaga Range:

- A total of 189 caribou were observed in the entire Chinchaga range
- 144 of these caribou were in the Milligan Core
- 12 of the 144 caribou observed in the Milligan Core were NOT with collared animals, suggesting that some caribou occurrences are not being captured through telemetry data.
- In 2015, the Chinchaga Range had a late winter calf-cow ratio of 9:100; the Milligan Core had a calf-cow ratio of 6:100. A generally accepted measure of caribou population stability is a late winter ratio of 28.9 calves/100 cows (Environment Canada 2008).[70]

To our knowledge, no reassessment has been done since 2009 of the amount of habitat impacted by anthropogenic disturbance in the Chinchaga range. In 2009, more than 92 per cent of the Milligan Core was subject to anthropogenic impact. This level needs to be brought down to a maximum of 35 per cent.

To get to the required level of impact as defined under the Boreal Caribou Recovery Strategy, **significant restoration efforts** need to be made in boreal caribou habitat within the Chinchaga Range, and the Milligan Core in particular.

> *A local population of boreal caribou that on average demonstrates stable or positive population growth over the short-term (≤20 years), and is large enough to withstand stochastic events and persist over the long-term (≥50 years),* ***without the need for ongoing active management intervention.***[18] (Emphasis added.)

In other words, caribou populations once recovered should be sufficiently resilient to threats that loom on their horizon *without* human intervention measures such as predator control and maternal penning.

The objective of restoring the ecosystem to its historic baseline is captured in the *West Moberly Action Plan for the Klinse-Za Herd of Woodland Caribou* (hereafter referred to as the Klinse-Za Action Plan), which states that:

> *This Action Plan was constructed to address all of the herd area known and mapped in recent times as the Klinse-Za herd and sufficient area surrounding that herd to encompass what is understood by Aboriginal people to represent the true historic extent (baseline condition) of the herd prior to population decline (current condition);* and
>
> *The sustainable level of caribou in the Klinse-Za herd will foster ecological integrity and will be beneficial to all Canadians.*[19]

Recovery targets should also incorporate harvesting targets into population objectives so that traditional harvest can occur without negatively affecting the population. This too was accomplished in the Klinse-Za Action plan, in which successful recovery includes a "harvestable surplus of caribou to be reincorporated into the traditional seasonal round of First Nations."[20]

Based on responses from DRFN knowledge-holders, DRFN goals for restoration include:

- a long-term goal of achieving a caribou population, distributed across their historic range and within preferred harvesting areas, that allows all DRFN members to fully practice treaty rights, including harvest and cultural practices; and
- a short-term goal of caribou populations that sustain limited harvest for cultural and subsistence purposes.

The leadership role of Indigenous peoples in advancing restoration

As government has a responsibility to wildlife, so too do Indigenous governments have a responsibility to steward the land, and to maintain treaty rights. In many instances, Indigenous governments are reclaiming this responsibility from the hands of provincial and federal authorities that have neglected it.

Indigenous rights are tied to key values such as healthy wildlife populations, which depend on maintaining habitat and avoiding fragmentation. Where habitat has been degraded or lost, populations of culturally important animals such as caribou have declined to the extent that the practice of indigenous rights can no longer be sustained.

Canada's Indigenous peoples have a leadership role to play in advancing restoration efforts. Their

historical and ongoing relationships with caribou provide a traditional knowledge baseline often far more detailed and place-based than that of western science.

Indigenous communities can play a leadership role both outside and alongside government-led processes. As identified above, this is already happening: in 2013, the West Moberly First Nation released its own *Action Plan for the Klinse-Za Herd of Woodland Caribou in Canada*, which incorporates science, traditional knowledge, cultural values and a socio-economic analysis, and successfully applies the precautionary principle to caribou conservation.[21]

The federal Species at Risk Act acknowledges Aboriginal peoples' role in the conservation of species and recognition of Aboriginal traditional knowledge. The Act created the National Aboriginal Council on Species at Risk (NACOSAR) to advise the environment minister and Canadian Endangered Species Conservation Council on administration of the Act. The Act also created a subcommittee on Aboriginal traditional knowledge to provide input to the assessment process of species status reports completed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC).

Further, the Act mandates that action plans should be developed in cooperation with every Aboriginal organization that will be directly affected.[22]

1.3 Goals of this report

This report illustrates that, due in part to the rich TEK held by the community, Doig River First Nation is well placed to play a leadership role in advancing caribou habitat restoration. It uses interviews with Elders and knowledge-holders who have travelled the land with parents and grandparents to identify priority areas for caribou restoration.

The report is based on research conducted with the Doig River First Nation as part of the *Madziih* Traditional Ecological Knowledge Study. The study documents DRFN traditional knowledge and use of *madziih* in living memory, providing a baseline of DRFN caribou use and traditional ecological knowledge in the Treaty 8 area.

In 2013, DRFN conducted a one-day caribou workshop with limited financial support from the federal government. Its purpose was to collect community Aboriginal Traditional Knowledge (ATK) that could be used to inform the protection of caribou and potentially assist with a boreal caribou national recovery strategy. An agreement between the provincial government and DRFN to secure further funding for a comprehensive study could not be reached, and the DRFN cited several concerns regarding the funding relationship and research expectations, including:

> *... the desire of provincial staff to micromanage the research (suggested question sets, editorial rights); the addition of data specifically on moose and wolves which seemed to DRFN to be a desire for predetermined results; a disagreement over intellectual property and control of data; the seeming unrealistic expectations about the nature of ATK (as a potential cure all for caribou decline); the need for assurances that the project would be a success before the research was undertaken (something no scientist or social scientist can guarantee when beginning research) and, the goal of putting this project and ATK 'on trial' for its utility (as the basis for which other First Nations would or would not be funded).*[23]

Despite the concerns expressed above, the earlier study was an important step in documenting impacts to *madziih* populations in DRFN's hunting grounds. This report builds on this earlier work, with the following specific objectives:

- record information about *madziih* seasonally important habitat areas and features in DRFN hunting grounds;
- develop an understanding of historic *madziih* distributions and population levels, timing of declines and reasons for *madziih* declines, based on DRFN TEK;
- prepare recommendations for how to advance *madziih* restoration within DRFN hunting grounds (in relation to the Chinchaga range), for DRFN to take forward to the Province of B.C. and the federal government, and to use in guiding their own restoration efforts.[24]

The data for this report are sourced from existing traditional use studies, including interview data and findings from previous studies, and interviews conducted specifically for this project in July 2016.[25]

This report is Phase 1 of a two-phase study. Phase 2 of this work will include implementation of pilot projects to restore *madziih* populations in priority areas within DRFN hunting grounds. Recommended next steps for restoring *madziih* populations in the Chinchaga range are included in Section 5 of the report.

Figure 1. Caribou Ranges in Relation to DRFN.

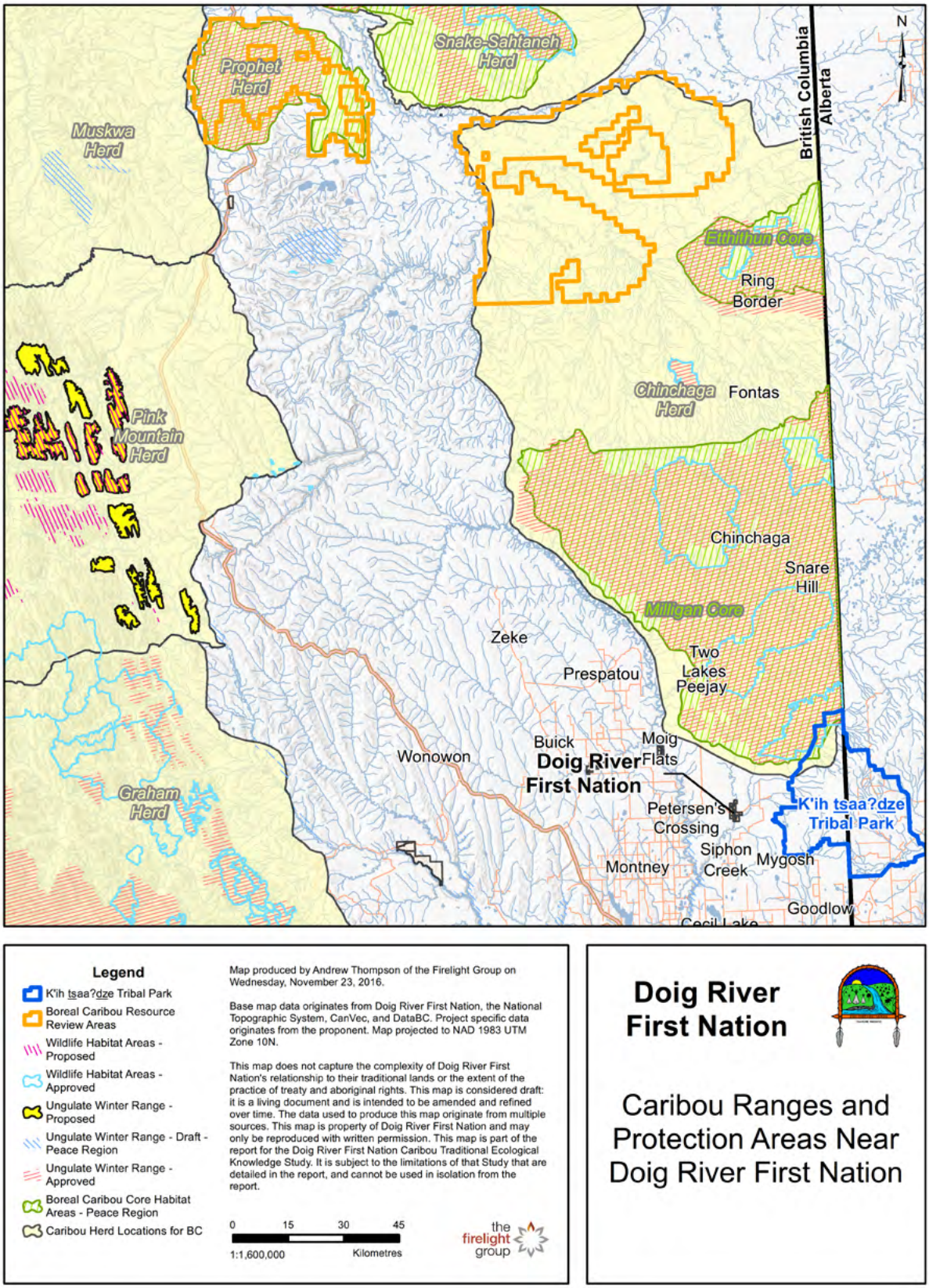
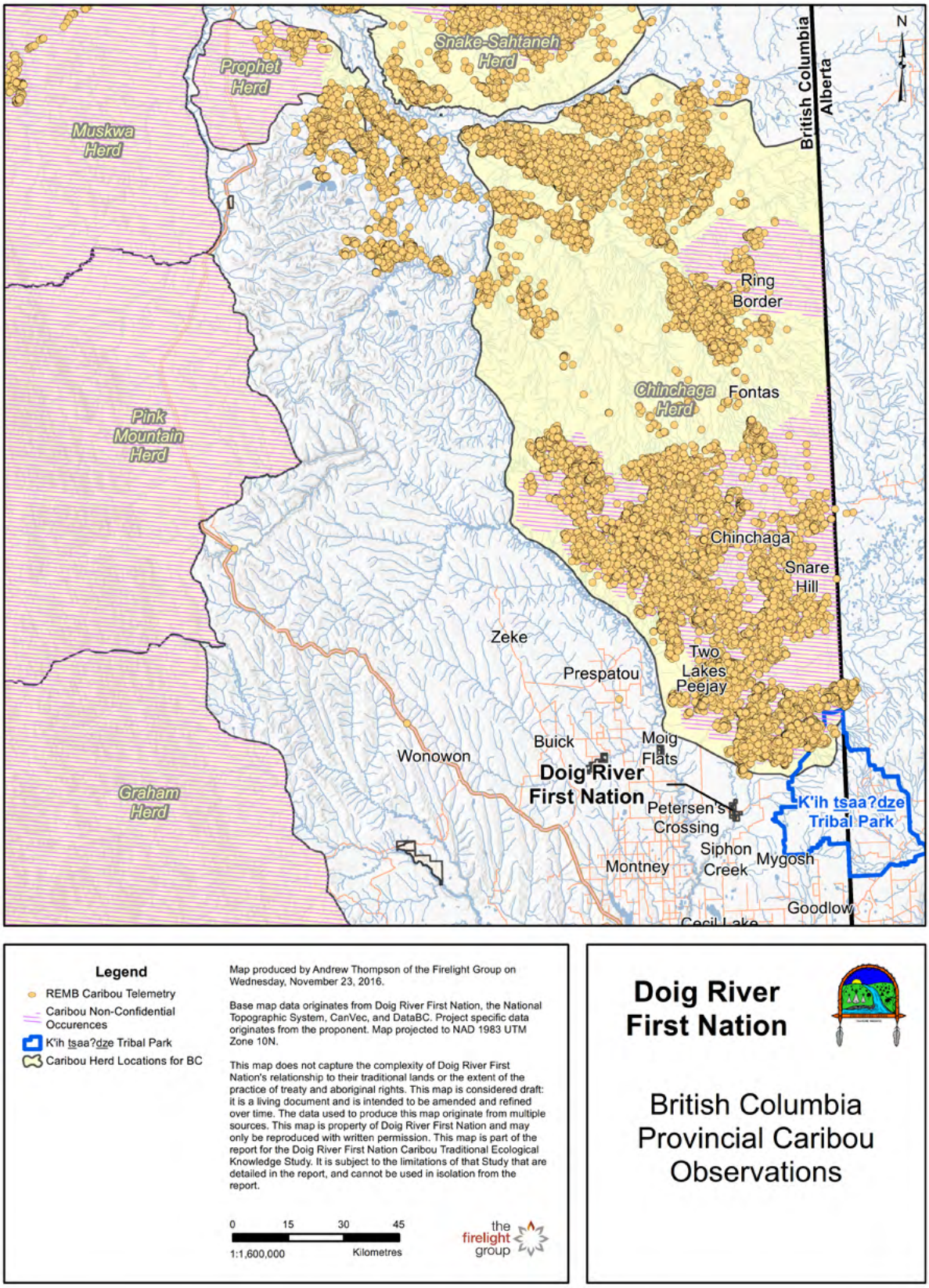


Figure 2. Boreal caribou telemetry data collected by BC Oil and Gas Research and Innovation Society



2.1 Geographic area and description of caribou in Treaty 8 B.C.

Treaty 8 includes approximately 3.9 million hectares of predominantly mixed boreal forests and wetlands in British Columbia's northeast. DRFN traditional knowledge indicates that this was once prime habitat for caribou and that, historically, caribou were plentiful.

> *My grandma raised in Milligan Creek area, old Fontas. All these native people live on the caribou, us too, everybody. Before, hardly any moose in Fontas, that's why they go, people live on bear, back when [DRFN member's] dad was a young man, in Fontas area, over at Ring Border, a few moose there they go kill, a lot of caribou, people lived on caribou. (D02, 27 July 2016)*[26]

According to knowledge-holders, *madziih* historically ranged throughout the Peace Region, with areas of higher density occurring in what are now considered by resource managers to be habitat cores for various herds. Based on DRFN knowledge, boreal caribou were historically plentiful to the north and east of DRFN's current reserve site, likely ranging further south and west compared to their current distribution. Previous traditional knowledge studies have identified caribou as far south as Mygosh, which is south of the reserve.[27] Traditional knowledge suggests that boreal caribou may have mixed during the winter with northern mountain caribou from adjacent herds in the Pink Mountain area.

Like elsewhere in the boreal, survival needs for caribou in DRFN's preferred hunting areas are particularly acute in two seasons: winter (for all caribou) and spring (for calves). Knowledge-holders confirm that, unlike other caribou types in B.C., boreal caribou in the northeast do not migrate to specific habitat areas in the winter, but instead use large peatland complexes to forage for terrestrial lichens, and to a lesser extent arboreal lichens, sedges and shrubs.[28] Moreover, knowledge-holders verify that in spring, cows depend on large, intact peatland areas to stash their calves away from predators until they are able to travel with them.

DRFN knowledge-holders have observed declines in boreal caribou populations in many areas between the 1970s and 1990s. The timing of their decline correlates with increases in industrial development, particularly as the oil and gas industry burgeoned in the area, adding to existing and ever-increasing pressure from agriculture, hydroelectric projects, mining and forestry. As Table 1 shows, changes over time in DRFN's area of interest have contributed to the expansion of an industrial footprint that continues in the region.

Both telemetry data from western science studies and observations from traditional knowledge-holders indicate that fragmentation of peatland habitat has led to increases in calf mortality, as predators such as wolves and black bears can easily find stashed calves during their most vulnerable period. As fewer calves make it into adulthood, the number of caribou has declined dramatically. Recent telemetry data show that recruitment of calves into the Chinchaga herd is well below the level needed to maintain the population.[29,30] Impacts of fragmentation on winter habitat also take a toll, as adult caribou may be more likely to fall prey to wolves.[31] The combined effect is dire: at small sizes, caribou populations are susceptible to catastrophic events that could result in complete loss of caribou in an area.

Table 1. Timeline of cumulative effects on caribou habitat within DRFN territory		
Late 1700s - early 1800s	Doig River First Nation active in the fur trade, bison populations in decline in the Peace River region.	
1899–1950 *Bison decline, oil and gas exploration, road building and agriculture*		
May 13, 1900	Fort St. John Beaver Band (DRFN & BRFN) sign Treaty 8	Dane-zaa lived a semi-nomadic lifestyle, heavily reliant on moose. Subsistence (hunting, trapping, fishing, berry-picking) resources were at times severely diminished, but Dane-zaa continued to hunt both large and small game animals including caribou, moose, deer, grizzly bear, black bear, elk, sheep, grouse and waterfowl.
1900s	First agricultural settlers	
1920s	Oil and gas exploration begins; not commercially developed due to limited road access	
1926	Trapline system regulation imposed	
1940	Band surrenders the mineral rights in original Montney Reserve (IR 172) for development of petroleum and natural gas	
1942	Alaska Highway constructed	
1945	Band surrenders IR 172 to Canada; developed as farmland under the Veteran's Land Act	
1950–1990 *A time of change: agriculture, forestry, oil and gas and hydro projects*		
1950s–1970s	DRFN members moved into permanent settlements	Dane-zaa move to permanent settlements with lower engagement in the seasonal round and reduced ability to rely on subsistence hunting and trapping. There is a steady increase in oil and gas exploration and development.
	Forestry development and agricultural expansion	
	Great Pacific Railway constructed	
1952	John Hart Highway constructed	
1968	WAC Bennett Dam and Williston Lake reservoir built	
1977	Fort St. John Beaver Band split to DRFN and Blueberry River First Nation (BRFN)	
1980	Peace Canyon Dam built	
1980s	Agriculture expands and land privatization increases	
1990–2015 *Oil and gas, agriculture, forestry, drought, hydro projects, bison return*		
1998	Mineral claims for IR172 settled between federal Crown and Doig River and Blueberry First Nations	With an unprecedented expansion of oil and gas developments, cumulative effects have an impact on DRFN rights, cultural practices and values, including caribou.
1999	Wood bison introduced in the Fontas area	
2002	Peejay oil spill just north of Doig River First Nation	
2009	Doig and Blueberry First Nations enter mineral value negotiations	
2011	DRFN reach agreement in principle with Canada regarding mineral rights in replacement reserves.	
2014	Site C dam approved by province	
2015	Widespread drought and fires in northeastern B.C.	
	Site C Dam construction begins	

2.2 Why is a DRFN caribou TEK baseline important?

The importance of traditional ecological knowledge (TEK) for species at risk recovery

Traditional knowledge systems provide important perspectives on environmental conditions and trends over time.[32] The information and perspectives available through a well-conducted TEK study focus on specific areas and concerns, and are built on a multi-generational foundation of experience that is not available to biophysical science-based researchers.[33] The traditional knowledge system must be considered within the appropriate cultural context and on equal footing with data from western science, and deeply respected for the longer-term perspectives it brings.

The importance of TEK in understanding impacts from industrial development on First Nations culture, values and ways of life cannot be overstated. The practice of oral transmission of TEK means that each new generation builds upon the knowledge of their parents, grandparents and generations that preceded them. Through ongoing use of the land, DRFN members continue to practice and gather TEK on the health, distribution and ecology of culturally important animals. Every observation builds on the observations of generations before, and comes with a depth of place-based knowledge and context. Ongoing use of the land means that monitoring the abundance and health of caribou populations, and observing changes in habitat use, continue to the present day. DRFN knowledge of caribou is much more extensive and nuanced than what is available through formal scientific methods such as telemetry, which shows current distribution over a limited range and time frame.

2.3 Summary of methods

2.3.1 Data collection

TEK collected by the Firelight Group (Firelight) for this study consists of four forms of data:

- Data compiled from past DRFN studies, including spatial and non-spatial data.
- Mapped site-specific data (e.g., kill sites, visual sightings and signs, mineral licks, migration routes) and habitat areas (e.g., known calving areas, rutting areas, over-wintering habitat, or other important habitat areas). Site-specific data are mapped at a scale equivalent to 1:50,000 or finer using Google Earth. Larger habitat areas were generally mapped more coarsely at a scale higher than 1:50,000; habitat areas mapped at this scale include an identifier in the polygon label to indicate the scale of original mapping.
- Quotes from participants that were collected through semi-structured interviews conducted either individually or in small group settings and focused on living memory and personal experience. Data from interviews were analyzed to identify patterns and themes. Outlier observations (i.e., observations represented by one individual) were not included unless verified with a larger group.
- Final recommendations and findings that were verified in a DRFN community meeting.

Existing data from previous studies

Firelight compiled existing TEK on caribou from previous studies, including the preliminary study described in the introduction, a series of traditional use studies conducted by Firelight between 2010 and 2015 (specific to proposed development projects), and an earlier moose study conducted from December 2015 to June 2016 with DRFN knowledge-holders. Data from the moose study were particularly useful because DRFN participants frequently spoke about the characteristics of caribou habitat and changes in caribou abundance, including reasons for these changes, at the same time as they discussed impacts to moose populations.[34] The moose study included a field component, in which two Firelight interviewers and an ecologist travelled with knowledge-holders to three important hunting areas, one of which included the range of the Chinchaga caribou herd. Because of the observed interactions between moose and caribou in western science studies (i.e., the observation that increasing early seral habitat in turn increases moose populations, which leads to higher predator populations and higher mortality rates for caribou), it was important to discuss both species together from a traditional knowledge perspective.

Individual interviews

Three days of one-on-one or very small group semi-structured interviews were conducted in Doig River (13 interviews including 15 participants).[35] These interviews were based on a standardized interview guide and followed standards of free, prior, and informed consent.[36] Interviews are coded by individual identification numbers (e.g., D03 refers to one specific DRFN member as per Firelight's master list of DRFN members). Interviews were documented in notes and using a digital audio recorder. As noted above, site-specific caribou features and important habitat areas were mapped with each participant whenever possible, using direct-to-digital methods.[37] DRFN leadership and lands staff identified key caribou knowledge-holders to prioritize for individual interviews.

DRFN data from monitoring

As an additional information source, monitoring data from DRFN members, which includes dates and locations at which caribou were observed, were included as site-specific data; observations sometimes also include the number of bulls, cows and calves observed in a group. DRFN members have collected this information since 2014. The data are useful for confirming caribou locations in areas that have been monitored by Doig members, but are not representative of caribou distribution in all areas.

Data collected for this study were limited due to funding constraints. With additional resources, DRFN could expand the number of individual interviews to elaborate finer-scale individual information and add focus groups for verification. Additional interviews would expand the understanding of cultural uses and practices, caribou-related terms in the Dane-Zaa language, seasonal variation in caribou behaviour, timelines of impacts and changes in caribou harvesting and consumption.

2.3.2 Data analysis

Qualitative data

Qualitative data from interviews were analyzed for important DRFN TEK based on the following themes, and are summarized in the report under these themes:

- Caribou kinds and distributions, based on DRFN TEK;
- Cultural uses and importance of caribou, including DRFN terms for caribou and historic hunting practices;
- Barriers to hunting caribou, including comparison between the number of caribou hunted historically and now;
- Caribou habitat use through the seasons (descriptions);
- Important habitat areas (place names/descriptions);
- Status of caribou: historic and current distribution;
- Threats to caribou populations;
- Management and habitat restoration recommendations for caribou.

Site-specific data and habitat areas

Western scientific ecological classifications are used to characterize the areas identified by DRFN knowledge-holders as important to caribou in different seasons, and to facilitate shared discussions of how best to restore caribou habitat. To characterize TEK-based seasonal habitat of boreal caribou using western scientific ecological classifications, mapped caribou site-specific data and habitat areas were overlain with data from Ducks Unlimited Canada, which mapped wetland types and distribution throughout the area using Landsat data (Ducks Unlimited Enhanced Wetland classification; 30x30 m pixel resolution). As per a recent study characterizing habitat use by and impacts of anthropogenic features on woodland caribou, these data were collapsed into seven categories that are biologically meaningful to caribou (see Table 2, as per Table 1 from Wilson & Demars 2015).[38]

Table 2. Habitat types used to describe boreal caribou habitat (from DUCs wetland data)

Habitat type	Enhanced wetland classification class	Description
Treed bog	Treed bog, open bog, shrubby bog	Black spruce - *Sphagnum* moss - dominated bogs with no hydrodynamic flows.
Nutrient-poor fen	Graminoid-poor fen, shrubby-poor fen, treed-poor fen	Low nutrient peatland soils influenced by groundwater flows. Treed-poor fens dominate, composed of black spruce, tamarack and bog birch, *Betula pumila*; 25-60% tree cover.
Nutrient-rich fen	Graminoid-rich fen, shrubby-rich fen, treed-rich fen	Low nutrient peatland soils influenced by groundwater flows. Shrubby fens dominate, composed of bog birch, willow (*Salix* spp) and alder (*Alnus* spp).
Conifer swamp	Conifer swamp	Tree cover >60% dominated by black or white spruce. Occur on peatland or mineral soils.
Deciduous swamp	Shrub swamp, hardwood swamp	Mineral soils with pools of water often present. At least 25% of tree cover is deciduous (paper birch [*Betula papyrifera*] and balsam poplar [*Populus balsamifera*]).
Upland conifer	Upland conifer	Mineral soils with tree cover >25%. Dominant tree species: black spruce, white spruce, pine.
Upland deciduous	Upland deciduous	Mineral soils with tree cover >25% and >25% deciduous trees. Dominant tree species: aspen and paper birch.
Other	Upland other, cloud shadow, anthropogenic, burn, aquatic	Uplands: mineral soils with tree cover <25%. Anthropogenic: urban areas, houses, roads, and cutblocks. Burns: recent burns where vegetation is limited. Aquatic: includes a continuum of aquatic classes from low-turbidity lakes to emergent marshes with aquatic vegetation.

Using the classification system above, each of the habitat areas identified by DRFN members is characterized, focusing on seasonally important habitat (e.g., characteristics of calving, rutting and winter survival habitat).

Next steps for advancing caribou habitat restoration

Section 5 of this report provides a brief overview of how the British Columbia government is regulating development in boreal caribou habitat, with a focus on current conditions in the Chinchaga range and the Milligan Core. Information from this study and from previous studies is used to identify priority areas for caribou habitat restoration and other management actions for boreal caribou, based on input received from Doig knowledge-holders.

SECTION 3 CULTURAL IMPORTANCE OF CARIBOU TO DOIG RIVER FIRST NATION

3.1 Caribou kinds and distribution based on TEK

This report focuses on the woodland caribou boreal ecotype and the associated range of the Chinchaga herd. This ecotype faces urgent need in terms of immediate habitat protection and restoration, as much of the area is already highly degraded and at risk of additional industrial development.[39] According to DRFN knowledge-holders, without immediate action, local populations could face extirpation.

Figure 1 shows the current delineation of caribou herds by provincial/federal government within DRFN's hunting areas; Figure 2 shows boreal caribou telemetry data collected by the BC Oil and Gas Research and Innovation Society (BC OGRIS) from 2012 to 2015. DRFN knowledge-holders recognize the different ecotypes of caribou and their varying habits throughout the seasons. Doig members and knowledge-holders from other nations have argued that the range boundaries drawn by western scientists — which are based on a limited set of telemetry data — do not address changes in caribou population patterns or distribution related to First Nations use over time. Historically, DRFN knowledge-holders observed that boreal caribou occurred widely across the area, south of the reserve at Doig River, and were especially prevalent in areas around Peejay, Chinchaga, Hunter Lakes and Ring Border. These areas contained many large tracts of good caribou habitat (e.g., muskeg with mixed forest stands of jack pine, spruce, lots of lichen and other forage, and wet areas for calving). As part of BC OGRIS's efforts to collect boreal caribou telemetry data, and the continued development of British Columbia's boreal caribou implementation plan (B.C. Ministry of Environment, 2011),[39] the province has proposed an update to the ranges of boreal caribou herds, but it has not yet been finalized.

3.2 Caribou terms and hunting practices

During interviews, DRFN knowledge-holders discussed the cultural and spiritual importance of boreal caribou to Doig members. Part of this process included documenting terms used to refer to caribou, such as specific parts of caribou, caribou habitat and important food to caribou (Table 3). Although English is the dominant language used by DRFN members in interviews, many families also speak *Dane-Zaa Záágé*[40] (Beaver). Where possible, both languages were used to document key terms related to caribou. Table 3 includes selected examples of terms and does not reflect the depth of *Dane-Zaa* language related to caribou. The loss of cultural practices related to caribou is associated with a loss of transmission of knowledge, language and culture:

> *... the loss of language means the loss of culture and the knowledge systems that are encompassed by and through a language.*[41]

Table 3. Selected Dane-Zaa Záágé and English terms related to caribou	
***Dane-Zaa Záágé* (Beaver)**	**English**
madziih	caribou
azis	hide
ts'ibe	muskeg
daahdǫ dzǫ	caribou lichen
chii tǫʔ	"leaves under the water;" grasses/roots eaten at edge of lakes; eaten in spring
k'aazuudle	cattails at edge of lakes; eaten in winter
adáágе	moose lick
yaadze	little one / calf

Historically, DRFN people often hunted and processed *madziih* for subsistence in the winter and spring at an approximate average of at least two animals per family per year in the 1950s/1960s (D01, 25 July 2016).[42] Due to their former abundance in large herds, and ease of harvest, caribou were an important and predictable food animal, especially when other animals, like moose, were more scarce.[43] In winter, DRFN trappers often hunted caribou if food caches were depleted or running low. As such, the *madziih* helped sustain winter trapping practices that were critical to many families' livelihoods. Historically, caribou hunting areas were often accessed by dog team in winter, and pack horses or wagons along old trails in the spring and summer.

> *I remember when I was a little kid, we used to go with wagon, the horse team wagon, my grandpa and grandma, my sisters and little brother. I used to hate it, it was so long. We used to go from Petersen Crossing, we'd go up through here, and they used an old wagon trail... and I remember my grandpa killed two caribou somewhere up near Peejay. (D23, 27 July 2016)*[44]

> *Then when hard time comes in the wintertime, with no moose around or nothing, then they come back to it, that's how our people survived. It's just like canning, canning stuff. And when at Snare Hill, they had a hard time in there, they run out of everything. I believe it was in February, so they see this whole herd of caribou, Snare Hill, so they, this one hunted, they put all the snares all around where the caribou's gonna go on their trail, on their trail, and then they went around and all chased them caribou towards the snares and they got them. They got caribous and people survived on that until springtime when animals start coming out. (D01, 25 July 2016)*

When DRFN members hunted *madziih*, they often did so in the winter or early spring when the animal was fattest. According to DRFN knowledge, caribou typically travel shorter distances in winter compared to the longer journeys that characterize their summer movement, resulting in leaner animals in the summer. Caribou harvest and processing also provided opportunities for cultural sharing and strengthening family and communal bonds, as meat was processed in groups and shared among the community, especially with Elders. Focus group participants from the DRFN moose study[45] noted that such forms of reciprocity and distribution were, and continue to be, critical to the preservation of an Indigenous social economy.[46] In the following interview excerpt, a DRFN Elder remembers her father engaging in these practices:

D31: He'd go with horses! We lived in Petersen Crossing, and he'd take his pack horse, two pack horse, and his horse, he'd take food, he'd go up to Milligan Creek, I don't know how far he'd go. And about three days later he'd come back, and got two caribou on the horse.

Interviewer: Did he go every year?

D31: Yeah. Sometimes he'd go twice in the springtime.

Interviewer: But he could only bring back two?

D31: Yeah, he don't want to kill too many. Two is good enough, he said. And then if somebody go with him, they get some too.

Interviewer: And do they share with many people?

D31: Yeah, he'd bring the caribou back and give piece to everybody, mostly Elders, so they can have fresh, fresh meat. (D31, 25 July 2016)[47]

Following a successful hunt, DRFN interview participants describe processing *madziih* in similar fashion to other animals, using all parts of the animal for food and other subsistence and cultural purposes. Caribou meat was eaten fresh and dried. In fact, caribou dry meat is coveted — considered by some to be the best dry meat among moose, elk and deer.

They say that the best dry meat you ever ate, the caribou dry meat. (D40, 27 July 2016)[48]

Oh yeah, I like caribou. Caribou dry meat, so good, I like that. Hide too, when you make hide, so good, good hide. And caribou meat, so good dry meat. (D31, 25 July 2016)

Multiple DRFN participants spoke of the caribou's bone marrow, noting that it too is the best among other animals and often eaten with dry meat.

They're like moose, like I already told you, they're just like moose, and we never waste no parts from the caribou. And people like caribou marrow…You eat it with caribou meat or caribou dry meat. Always hear the Elders say, caribou have the best marrow. (D03, 26 July 2016)

For Doig members, caribou serves non-food purposes as well. Caribou hides are exceptionally warm and frequently used for sleeping, especially in winter when the caribou hide could be an essential piece of equipment. One member recalled laying the hide on spruce boughs with the fur facing upwards to use as bedding during a winter camp as a child. The hides are considered very strong and are also used to make moccasins, vests, gloves and beadwork.

I think for the bedding, like for, like mattress. Mattress. They clean it really good, wash it probably, wash it somehow, and kinda tan it, the hair down, they dry it nice, they done a lot of work on it, and then they use it for mattress… they sleep on it, it's warm. (D30, 27 July 2016)[49]

The hides are the strongest of any animals. Even really thin, you make moccasins, you'll never wreck it,

it's really, really strong, dad always wear it... I remember mom made a vest for my dad, a long time ago. I don't know, it must be before me, because it's kind of old, dad used to put it on, and dad said he used to wear that in rodeos. (D26, 26 July 2016)[50]

They use it for making vests, vests and nice beaded gloves. (D23, 27 July 2016)

3.3 Barriers to caribou harvest

Prior to 1950, there were relatively few industrial impacts on the landscape in DRFN hunting territory and DRFN members relied primarily on wild food to meet cultural and subsistence needs. Several Elders and land users shared stories of family caribou harvests in the 1950s, '60s and '70s, when the animal was still widely distributed in larger herds, at least as far south as the main reserve at Doig River (D26, 26 July 2016; D03, 25 July 2016). During those times it was reportedly common for one family to harvest one or two caribou per year to share among relatives.

Today, boreal caribou is still a culturally important species for DRFN Elders and land users. However, DRFN members no longer feel able to exercise their treaty right to harvest the animal, and Elders are not able to pass on caribou knowledge or stewardship practices to younger generations.

All participants reported that caribou population numbers are declining, and have been since at least the 1990s, based on frequency of sightings and observations of herd size. Interview results suggest that several factors are contributing to this decline across DRFN hunting territory, including the cumulative impacts of industrial development, particularly contamination and habitat fragmentation from industrial activity and the ensuing increased levels of predation, as well as climate change (see Section 4.3: Threats to caribou sustainability). These impacts are directly impeding DRFN harvesting practices, and are threatening an important traditional food animal and a substantial body of DRFN traditional knowledge and practice.

While still legally entitled to hunt, DRFN members are self-regulating and choosing to abstain from caribou harvesting.

I trapped the last couple of years. I see quite a bit of caribou where I trap. I could have got them, shot them and whatnot, but I, you know, there's not too many. We don't see too many around anymore, so we don't bother them, just let them go. (D23, 27 July 2016)

We start finding out about caribou start going down, is about maybe 20 years ago, maybe a little more than 20 years ago, we know that the number start going down, that's when we quit shooting caribou. We like caribou meat, but we don't shoot it cause we want it to come back. That's about 20 years since I last shoot caribou. (D03, 26 July 2016)

Well, even the community, the members here, I know hunters, nobody has got a caribou in a while through here. They see it, but they let it pass by. Even the other communities, I hear, like in Blueberry, what I hear from relatives, they pass them by. (D57, 27 July 2016)[51]

Members are not hunting caribou today out of hope that populations will recover. Many DRFN members affirmed that the community will hunt caribou again when it can be done sustainably.

> *Oh yeah. Once they start coming back up again, and multiply again, people will start [hunting caribou again]. That's why, now since last 10 years, 20 years, 30 years, since caribou start declining, nobody around here get any caribou, cause we want to see them come back up again. (D01, 25 July 2016)*
>
> *Interviewer: If [caribou] come back up, do you think people will hunt them again?*
>
> *D28: Oh yeah, we'll eat them if they come back up.*
>
> *Interviewer: Would you like to eat one again?*
>
> *D28: Before I die anyway, I'm 75 already. You can't buy them in the store, too. (D28, 25 July 2016)*[52]

All study participants wished for caribou to return and suggested that a harvesting level of two caribou per family per year[53] for fresh and dry meat and for hide, would allow for ongoing subsistence and cultural use.

SECTION 4 SEASONAL HABITAT USE, DISTRIBUTION AND THREATS

4.1 Mapped caribou-related sites and habitat areas

To identify and characterize important caribou habitat based on DRFN knowledge, all recorded DRFN caribou-related information was mapped in relation to the Chinchaga range and the Milligan Core, using the enhanced wetland data coverage from Ducks Unlimited Canada as the base layer (Figure 3). DRFN caribou information includes caribou-harvesting sites, areas where caribou or caribou signs have been observed (including data from DRFN caribou monitoring), caribou migration corridors and caribou habitat areas. Data were split into site-specific mapping, habitat areas for caribou mapped with knowledge-holders in July 2016, and data from DRFN caribou monitoring (2014-2016). Figure 3 also shows the location of the *K'ih tsaa?dze* Tribal Park (KTP).

For some mapped data, knowledge-holders provided specific information about the season of use. In other cases, they identified certain areas as important to boreal caribou in all seasons. To further examine the habitat characteristics of seasonally important habitat areas (in particular, calving areas and overwintering areas), the mapped caribou data were divided into separate colours defined by season (Figure 4). Due to the focus on seasonal habitat use, this map does not include DRFN monitoring data. By overlaying the enhanced wetland data coverage with the seasonally important habitat polygons, habitat types were analyzed in seasonally important habitat areas, to support qualitative information provided by DRFN members about the ecological characteristics of seasonally important habitat.

4.2 Boreal caribou seasonal habitat use

During interviews conducted for this study, Doig knowledge-holders identified specific habitat types and areas as most important for recovering *madziih* populations in the Chinchaga range. For seasonal habitat use, the qualitative description from Doig knowledge-holders was supplemented with observed ecosystem types in these areas, based on the enhanced wetland dataset. Descriptions of the types of ecosystems most often used for calving, summer foraging, rutting and winter survival are provided below. While this analysis is a good starting point, future work should include a more detailed analysis of the overlap between these habitat areas and the DUC's enhanced wetland data, and field verification of the findings to identify specific fine-scale habitat features important in each season.

Figure 3. DRFN caribou observations in relation to Ducks Unlimited enhanced wetland classification

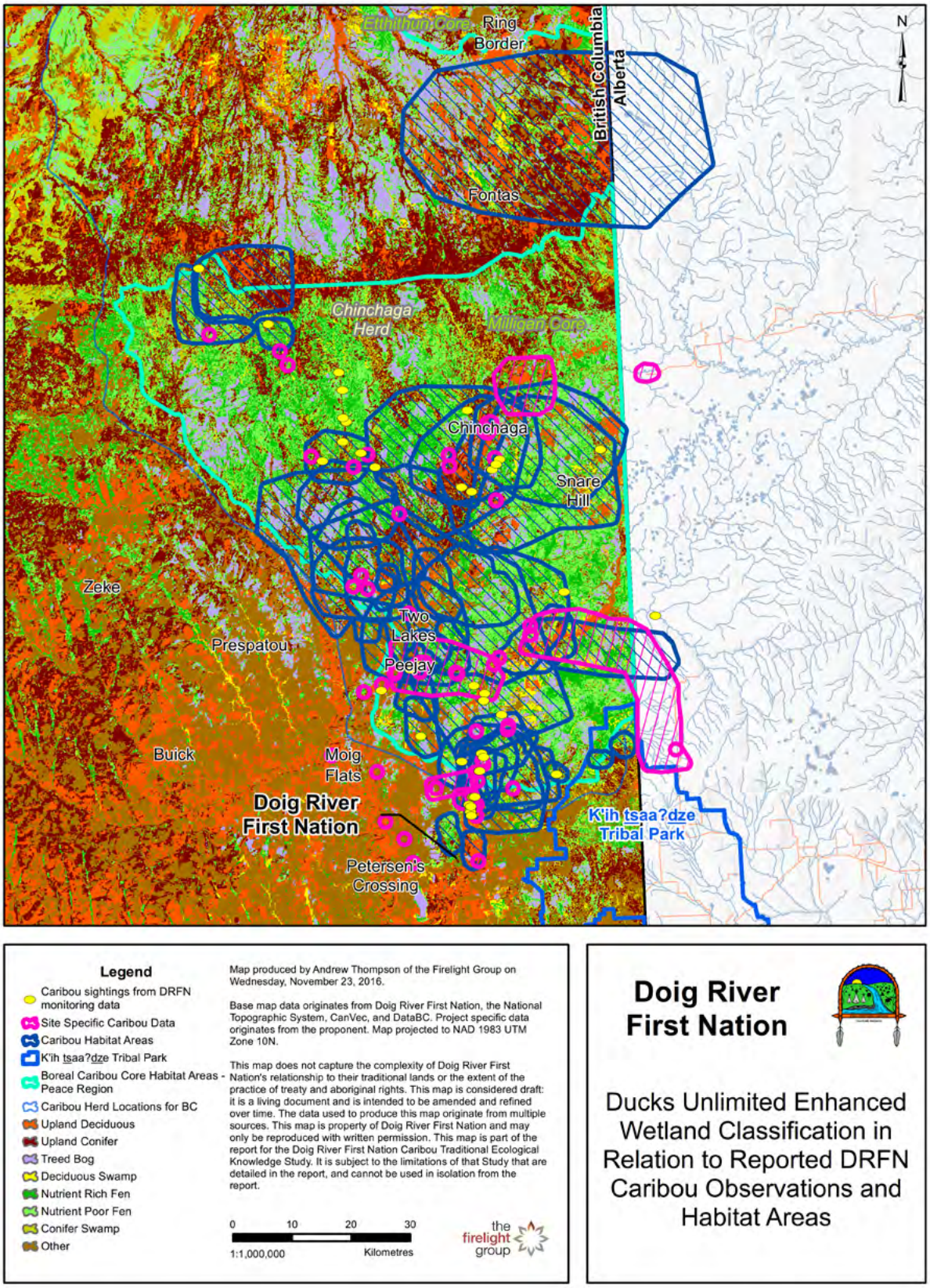
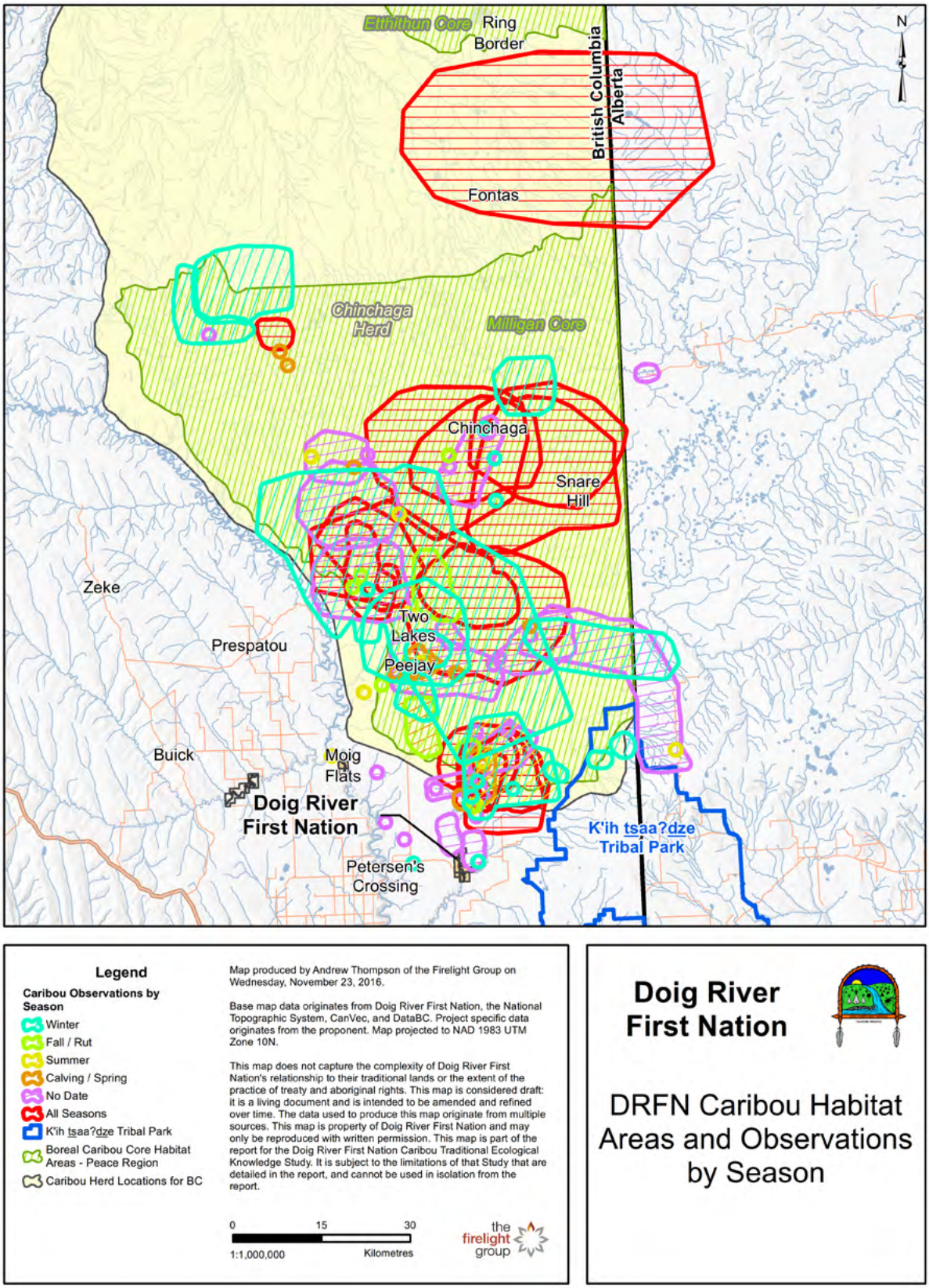


Figure 4. DRFN caribou observations by season



4.2.1 Chinchaga known range, observed range contraction and movement corridors

> *They [interviewee's parents] used to go from Big Camp, from Doig and Petersen Crossing, they go right up to Big Camp, they camp there, Moig Flats area, it's about here somewhere. There used to be a bunch of cabins here but they all burnt when that big fire came through. They go up Two Lakes, up to Two Lakes, right there, there were cabins there, and they would travel up, they would trap all the way up to Chinchaga, Chinchaga Lakes. They'd trap all this area, old timers did. Through here, there's a, there's a bunch of old cabins, just the foundations. In those times, there were no roads, nothing. Everything just wild. Not even a seismic line. (D23, 27 July 2016)*

Doig knowledge-holders identified that caribou range starts just north of Doig Reserve and extends, at least historically, all the way north to the Northwest Territories. Knowledge-holders note that while declines are prevalent in the south (Milligan Core), there are still a lot of tracks in Ring Border area.

> *D03: Everywhere used to be good, everywhere in Peejay area. That's caribou country, from the last hundreds of years I guess.*
>
> *Interviewer: How far down does caribou country go from Peejay?*
>
> *D03: Down even close to here, those years when there's lots of caribou. Like I said, there's not enough caribou to come all the way this way now.*
>
> *Interviewer: But in the old days, they used to come all the way down to Doig?*
>
> *D03: All the way down, yeah... Well wherever there's the muskeg, the muskeg and the timber mix, if you go there you will track caribou. (D03, 26 July 2016)*

Based on the mapped habitat areas for boreal caribou near Doig (Figures 3 and 4), it appears that the current and historical range of boreal caribou extends further south than the current provincially and federally defined range. It is worth noting that many of the observations of caribou south of the current range boundary from DRFN monitoring data indicate that these caribou were not wearing collars. DRFN knowledge-holders noted that boreal caribou do not range as far south as they used to in the past (e.g., D01, July 2016), indicating that some range contraction has occurred. Based on DRFN knowledge, the area delineated as the Chinchaga range should be extended south of Doig's reserve. The western extent of the Chinchaga range appears to align well with the observations of DRFN knowledge-holders. The northern extent appears to run beyond the Milligan Core, but within the area still considered to be part of the Chinchaga range.

In terms of the timing of range contractions and decreases in caribou numbers, some knowledge-holders noted declines in caribou in the Peejay, Milligan Creek and Nancy Creek areas in the late 1970s/early 1980s (e.g., D01, July 2016; D28, July 2016). Other knowledge-holders observed large declines in caribou numbers in the Milligan Creek area between the 1970s and 1990s (e.g., D23, July 2016; D51, July 2016). Smaller and less frequently encountered herds (six to eight individuals) were observed in the 1990s. Many knowledge-holders observed noticeable declines by the 1990s:

In the '70s, about '74 or '75, me and my kids and my husband, we drive up to Milligan, close to Milligan Hills, up there. Just like a horse in the wintertime when they paw at the snow so they can eat grass, just lots, just lots. And then we see some, they were close to muskeg, just lots over there. That's the last time I seen a lot of caribou. And then about, there must be, I don't know, after that I think they're going down, but I never go back over there with my husband. And that's, me, that's the last time I see lots of caribou over there. After that, we went about, I think in the '90s we see a few at the Peejay area, and Milligan Creek, Peejay area, we see a few, must be about six or eight, and then after that I hardly go over there. (D31, 25 July 2016)

During interviews, Doig knowledge-holders noted the importance of maintaining movement corridors for boreal caribou (e.g., D01, D17, D21, D57, July 2016).[54] In the Chinchaga area, upland forested areas with big trees may be important connectivity corridors for caribou (D57). Important movement corridors identified during interviews included the following:

- Along the Milligan Creek Road; caribou cross over the Milligan during spring and fall movements (D17)
- Ed Nick's Road, over to Moig Flats and up to Peejay (D21)
- Along Alberta border north of KTP, encompassing parts of the Osborn River, northwest to eastern part of Peejay: this is a north-south movement corridor for one herd of under 30 animals (D57)
- East of Peejay; moving east-west; sightings near the flare pit east of Peejay; sightings in the clover fields in fall sometimes (D57)

Knowledge-holders observed that all caribou herds are likely connected. The importance of this connectivity between different caribou herds has been observed in other TEK studies, and the conservation implications of genetic flow between caribou herds are largely unknown.

There may be other specific movement corridors or seasonal movements that could be identified in detailed fieldwork with DRFN knowledge-holders. The important point that DRFN knowledge-holders made during this study is that, although the boreal caribou ecotype is considered non-migratory, both seasonal and daily movements for caribou can be large, and there is a need to ensure that important habitat areas identified by Doig knowledge-holders remain connected.

4.2.2 Characterizing DRFN important habitat areas for boreal caribou (Chinchaga range)

[Re: Snare Hill]: Hundreds of years ago, it's still [good] today... it's close to Chinchaga, only about 10 miles away from Chinchaga... they're always there. Today, they're still there all through that area, there's always caribou, never miss out. Throughout centuries they've been there, and up in Milligan Creek area too, they've been there, on west of Peejay, all year round, they're always there. (D01, 25 July 2016)

4.2.2.1 Year-round habitat needs

Qualitative descriptions of year-round habitat needs

Caribou they don't stay in timber or bush they stay in the muskeg or where there is poplar. So caribou [is found] in big woods. [They eat] Labrador tea and those white things in muskeg, kind of grey on spruce tree they look like hair that's what they eat... (ID 001, Aasen, 2013)

Certain ecosystems were highlighted as most important for caribou during all seasons; these were muskeg (both "dry" and "wet") and forested areas with large spruce and pine trees. Mineral licks are also important through all seasons except winter, and should be protected from impacts.

In all seasons, caribou are known to feed on lichens. They will also supplement this food source with other foods, more so from spring to fall than during the winter. Identified foods beyond lichen included grasses, young leaves, Labrador tea, various types of grasses and cattails growing near water and in shallow water, berries and clover.

Places and ecological descriptions of important habitat areas for caribou

Pass the cabin that way before that in middle at 52 there is some between Doig bridge and four corners, where you kill lots of marten that's where they have good feed all winter. (ID 005, Aasen, 2013)

Yeah, it's important. My dad do, I remember when we lived in Peterson's Crossing, he said, 'I gotta go hunt caribou up in Milligan Creek,' that way. I don't know how far he go, sometimes he killed two. He take pack horses over there and he come back, sometimes he killed two and bring all the meat back. He said, 'I like caribou.' They... there's lots over there at that time, lots. (D31, 25 July 2016)

The following places, shown in Figure 3, were identified as having important habitat for boreal caribou across all seasons:

- Peejay, including east and south of Peejay to Doig River
- Between Doig River and Osborn River, north of Doig reserve
- Weasel Area, near West Milligan Creek
- North to Chinchaga, Milligan Creek, Milligan Hills, Nancy Creek, Big Arrow, Weasel area

- Milligan Creek, Peejay, Ladyfern, Chinchaga, Hunter Lakes, Wendy Lakes
- Chinchaga Lakes area including Ladyfern and Drake Road
- Osborn area
- Ring Border
- Ed Nick's Road area

One interviewee reported that the Chinchaga Lakes, Hunter Lakes and Milligan Creek areas are connected and make up a large caribou habitat/corridor area (D17, 25 July 2016).

These areas are shown in Figure 3. Table 4 below describes the main ecological classifications for each of the habitat areas identified as important for all seasons by DRFN knowledge-holders, based on the habitat categories described in Table 1.

Table 4. Ecological description of habitat areas important for all seasons

Polygon location	Ecological description
North of Milligan Core; Ring Border area	Mosaic of habitat types, including treed bogs, upland deciduous and coniferous, nutrient-rich fen, nutrient-poor fen, and deciduous swamps.
Northwest: Wendy Lakes area	Largely nutrient-rich and nutrient-poor fens.
Polygons near Chinchaga / Chinchaga Lakes / Ladyfern / Drake Road	Largely nutrient-rich and nutrient-poor fens; small amount of treed bog, upland conifer and deciduous forests,
Milligan / Milligan Creek / Nancy Creek / Weasel Area (northwest of Peejay)	Mosaic of treed bog, nutrient-poor fen, some nutrient-rich fen, smaller portion of upland deciduous and conifer forests.
Two Lakes / Peejay area	Mostly nutrient-poor fens with some upland deciduous and coniferous forests, as well as treed bog and nutrient-rich fens.
North of DRFN reserve, in area referenced as Ed Nick's Road and Osborn	Mostly nutrient-poor fens, with some treed bog and nutrient-rich fens.

4.2.2.2 Boreal caribou calving habitat

Qualitative description of calving habitat

DRFN knowledge-holders noted that calving in the Chinchaga range can occur from March to May, depending on timing of the rut. The calving window is important, as caribou are most sensitive to disturbance at this time, and knowledge-holders assert that industrial disturbance should be minimized during this window. Caribou calve in wet areas (as described by knowledge-holders: near beaver dams, swampy areas, rivers, lakes and muskeg). Females are thought to calve in shallow water (four to six inches deep) to suppress the scent of birth. During calving, DRFN knowledge-holders have observed cows eating diamond willow for pain relief.

Important foods during spring include lichen, roots, new greens and leaves in the muskeg. Knowledge-holders identified specific grass and plant species growing at edges of water bodies as important. Areas where new greens appear earlier (e.g., south-facing slopes) may be most important during the early part of spring.

> *D31: Mostly, my dad said, in the springtime, they [speaks beaver with D29]…that's when they hang around in muskeg, they eat those plants, plants on the muskeg. The roots, they eat roots. That's why they hang around in muskeg.*
>
> *[…]*
>
> *Interviewer: Is there a special name for the plants?*
>
> *D31: [Speaks in beaver with D29] 'ts'ibe dak'ale' [Beaver for "the white stuff on the muskeg"].*
>
> *D31: And then they eat, they eat in those…in the lakes, around the lakes there's plants in the water, they eat those [in beaver] 'chii tǫ?' [Beaver for "leaves under the water"]. They eat those. That's why caribou get fat faster than moose…cause moose they gotta wait till everything turn green, and caribou they eat those roots and whatever plants that are growing in the water, they eat those. (D31, 25 July 2016)*

Knowledge-holders note that human and industrial activity surrounding calving areas is stressful and detrimental to caribou calving. They also note that calves are very vulnerable to predation from wolves and bears. Along with muskeg, mature forests (mixed stands with spruce) were noted as important for predator avoidance, as described by a knowledge-holder who had also worked in caribou collaring:

> *I think they'll sense that danger's coming, their nose is pretty… they hide, you know, in the spruce, they really hide under a tree, they stand still [under big spruce trees]. (D40, 27 July 2016)*

Places and ecological descriptions of important habitat areas for caribou

The following places were identified as important spring / calving habitat areas for caribou:

- Just northeast of Doig reserve, many late-winter and early-spring caribou sightings (D51)
- Calving near Ed Nick's Road area, north of main reserve, and on both sides of the Doig River (D40, D21)
- Chinchaga Lakes area (calves seen there by D01 in 2014)
- Peejay area and south of Peejay (D21)

Polygons specifically identified as spring habitat for caribou are shown in Figure 4. Some of the polygons identified as "good for caribou all year round" in Figure 4 include important caribou calving habitat. Table 5 describes the main ecological classifications for each of the habitat areas identified specifically as important spring/calving habitat by DRFN knowledge-holders.

Table 5. Ecological description of habitat areas important for caribou spring calving

Polygon location	Ecological description
Wendy Lakes area	Largely nutrient-rich and nutrient-poor fens.
Milligan / Milligan Creek / Nancy Creek / Weasel area	Largely nutrient-rich and nutrient-poor fens.
Two Lakes / Peejay area	Mostly nutrient-poor fens; some treed bog and nutrient-rich fens; small amount of upland deciduous and coniferous forest.
North of DRFN reserve (Ed Nick's Road)	Mostly nutrient-poor fens, with some treed bog and nutrient-rich fens.

4.2.2.3 Boreal caribou summer habitat

Qualitative description of summer habitat

DRFN knowledge-holders identified lakes, marshes, swamps and thick, dark muskeg habitat (i.e., with denser trees) as important for caribou during the summer.

An important driver of habitat selection in summer is escaping bugs: both wet areas (D03) and open areas with wind (D01) were identified as important for avoiding insect harassment. Lakes provide relief from the heat and bugs, and are important escape strategies for avoiding wolves and bears. Knowledge-holders noted that the caribou foraging diet in summer is much more varied than in winter (e.g., D02).

Places and ecological descriptions of important summer habitat areas for caribou

The following areas were identified as important summer habitat:

- The Alberta border area, north of KTP: this is part of the east-west corridor connecting this area to east of Peejay (D23, D57)
- Ed Nick's Road area (D57)
- Peejay and north of Peejay (Milligan, Nancy Creek, Weasel areas) (several knowledge-holders)
- Chinchaga (several knowledge-holders)
- Fontas (D01)

Polygons specifically identified as summer habitat for caribou are shown in Figure 4. As with spring/calving habitat, some of the polygons identified as "good for caribou all year round" in Figure 4 include important caribou summer habitat. Because summer habitat for caribou is less specific and caribou are known to travel longer distances in this season, a detailed ecological description of the few polygons identified specifically as summer habitat has not been included.

4.2.2.4 Boreal caribou fall/rutting habitat

Qualitative description of fall habitat

DRFN knowledge-holders noted that the rut can occur from the end of September to November. During this time, caribou are often seen in herds, and bulls are sometimes seen foraging in fields.

Places and ecological descriptions of important fall habitat areas for caribou

Good fall/rutting habitat areas identified by Doig members included the following:

- Milligan Creek / Nancy Creek area; lone bulls are often seen during the rut. This is a wet, muskeg area (D57, D21)
- Ed Nick's Road and Osborn area (D03)
- Muskeg and fields in the Peejay area

These areas are shown in Figure 4. As above, some of the polygons identified as "good for caribou all year round" in Figure 4 include important caribou fall habitat. Table 6 below describes the main ecological classifications for each of the habitat areas identified specifically as important fall habitat by DRFN knowledge-holders.

Table 6. Ecological description of habitat areas important for caribou fall habitat	
Polygon location	**Ecological description**
Polygon north of Two Lakes / Peejay (near Milligan)	Largely upland deciduous and coniferous forests, some treed bog and smaller portion of poor fens.
Polygon south of Peejay	Largely classified as "other", which is a catch-all for a series of open areas, some natural and some anthropogenic (see Table 2). Also includes some treed bog and poor fen habitat.

4.2.2.5 Boreal caribou winter habitat

Qualitative description of winter habitat

> *There is one more thing, I just want to say, is that, when they have done all that logging area, 'cause the caribou even up in the mountains, I've seen it, that when these big timber, wintertime, deep snow they go in there, there's spruce trees got them lichens in there, they eat that. I've seen a lot of evidence on that. And when they clean up these in there, that's when the caribou herd went down lots. Since the '80s, that's when I seen with my own experience... (ID 009, Aasen, 2013)*

To access lichen during the winter, caribou forage in mature spruce and pine stands, where they are sheltered from storms and where snow depth is shallow. They often seek out lichen at the base of trees, which are clear of snow. DRFN knowledge-holders noted that caribou avoid logged areas in winter. Knowledge-holders have consistently observed caribou pawing through the snow to access food during winter — primarily ground lichens but other plants as well. According to traditional knowledge, caribou are fattest in winter, possibly because they travel less compared to the longer-distance movements in summer. A mosaic of habitat types including muskeg and large spruce and pine were consistently identified as being most important for boreal caribou in the winter.

One Doig member also mentioned *k'aazuudle* (Beaver for cattails) as an important winter food source.

> *D31: [In the winter] They eat those, in muskeg, those plants. They paw like that.*
>
> *Interviewer: They dig for them in the winter?*
>
> *D31: Yeah. And then they, in the lakes, what do you call those, in the lakes there's those, those grass, the thick grass around the lakes, they eat those, and the roots of those grass, that's what they eat...I mean those thick grass, those big grass that grow around the lake, those they dried up and they're tall, they're tall, about this tall. And those caribou and moose eat those. [k'aazuudle—Beaver for cattails] (D31, 25 July 2016)*

Places and ecological descriptions of important winter habitat areas for caribou

Good winter habitat areas for caribou include the following:

- Peejay area north to Milligan and Nancy Creek (D40, D23, D51)
- Weasel area: northwest of Peejay (D29)
- Ed Nick's Road area: just north of main DRFN reserve, from Doig River and Ed Nick's Road, north and east to Osborn River (D57)
- Some sightings in pockets of muskeg and mature spruce in the north of KTP (D57)
- East of Peejay, north of KTP: muskeg and spruce (D23)
- Chinchaga area (several knowledge-holders)
- Milligan area and north to Fontas (several knowledge-holders)
- Hunter Lakes and north of Hunter Lakes (area also identified as Wendy Lakes); an area containing muskeg and spruce (D26)

Quotes from the earlier DRFN caribou study[55] support mapped data from these more recent interviews:

> *Deep snow, late September there is lots, not many snow, so they walk good and eat in there, good place for wintering, and a caribou is up Milligan area, Fontas where the muskeg is. That's where the caribou stay on the muskeg, because they got to feed in there. White moss is what they eat and Labrador tea. (Elder ID 001, Aasen, 2013)*

> *Past the cabin, [east] from Peejay, that area, on muskeg good feeding area for caribou. Between the Doig and east Peejay, Nancy Creek, in that area lots of feeding in that area for winter, so every winter he is there, one is the west Milligan, at Pickell area, good feeding area too. (Elder ID 001, Aasen, 2013)*

Many of the areas mentioned above are shown in Figure 4. As per other seasonal information, the "all season" polygons are also good winter habitat for boreal caribou. Table 7 below describes the main ecological classifications for each of the habitat areas identified as important winter habitat by DRFN knowledge-holders.

Table 7. Ecological description of habitat areas important for caribou winter habitat	
Polygon location	**Ecological description**
Northwest: Wendy Lakes area	Nutrient-rich and nutrient-poor fens mixed with upland deciduous and coniferous forest
Polygons near Chinchaga / Chinchaga Lakes	Largely nutrient-rich and nutrient-poor fens; small amount of upland deciduous
Large polygon and several smaller polygons covering Milligan / Milligan Creek / Nancy Creek / Weasel / Big Arrow / Peejay	Mosaic of habitat; more upland areas in the centre of the large polygon, which are identified as important winter habitat for caribou in this area
North of KTP	Mostly treed bog, poor and rich fen with a stretch of older forest through middle (likely corresponding to the route of the Doig River)
North of DRFN reserve, in area referenced as Ed Nick's Road and Osborn	Mosaic of habitat types; fewer large trees than some other areas

4.3 Threats to *madziih* sustainability

Doig traditional ecological knowledge largely supports the delineation of the Chinchaga range, and the Milligan Core within it, as an area that has been suitable for *madziih* for centuries, beginning from just south of the Doig reserve to as far as the muskeg/forest mixed habitat extends northward, and to the east and west. Knowledge-holders consistently identify the time between the 1970s and 1990s as the period during which *madziih* populations declined to unacceptably low levels, particularly in the Milligan Core. As this area was historically the focus of DRFN caribou hunting, notably during late winter trapping, the loss of caribou in this region represents an important infringement of DRFN's treaty-protected right to hunt preferred species and maintain cultural practices, including knowledge transmission, in preferred areas.

During interviews and in previous studies, knowledge-holders identified a number of reasons why *madziih* populations have declined in the Milligan Core since the 1970s, and particularly since the early 1990s. These reasons are discussed in brief below. Management recommendations for specific threats in specific areas, as identified by DRFN members during interviews, are summarized in Section 5.2.

It should be noted that each of the threats discussed by DRFN members acts cumulatively with other impacts in the area, including agricultural development, hydroelectric dams, mining tenures and other proposed and existing developments. This section focuses on the threats to *madziih* sustainability that can be most immediately addressed by specific management actions in the Milligan Core and other priority areas and the Chinchaga range as a whole.

4.3.1 Oil and gas development and mining

Interviewer: You said in the 1950s there was more caribou here again, down closer to Doig?

D28: Yeah they start coming back in the 1950s, '60s, '70s, '80s were the last time, after that I don't know where they went. I think that there were hardly any, any oil companies before. There were hardly any, only a winter road to Peejay, and they come in from [inaudible 40:18] to go to Peejay-Milligan Creek, Nancy Creek, all that area. After the oil companies moved in, these caribou used to live off the oil spill eh, you know where that…after that they're all gone. I think they died from that, I'm pretty sure. If they fenced it right around right from the beginning, we could have seen a lot of caribou. Even the moose, the moose died from them too. (D28, 25 July 2016)

The cumulative effects of past, present and future development projects on caribou populations and health are a primary concern of Doig members.[56] In the 1990s, oil and gas development expanded at a rapid rate throughout the caribou habitat areas in the Milligan Core, particularly in the Peejay area and Ladyfern, where oil and gas "went crazy" (huge development pressure; 500-person oil and gas camps built) in the late 1990s (D17, July 2016). Caribou are drawn to the oil and gas leases as "man-made licks"; they eat the salt-laden soil around the pits, raising contamination concerns among Doig members. Many abandoned and currently inactive well sites require cleanup, especially in Peejay. Doig members stated that any other contaminated sites should also be fenced and cleaned up. Doig members recommend that all of these sites should be fenced with a 10-foot-high fence: "You don't need a million dollar fence; caribou just need to be discouraged and they'll return to the natural licks" (D01, 25 July 2016). Similar observations of impacts from oil and gas development were noted in the previous DRFN caribou study:

Abandoned wells should be reclaimed and trees planted. The reason for that caribou herd went down of the oil spills and contaminated soils and plants. Abandoned wells should be reclaimed and trees planted. Caribou habitat is all broken up; we have a wolf problem too. (Elder ID 002, Aasen, 2013)

Oil spills are also a significant concern to Doig members, who have observed large spills that went unreported in important hunting areas:

[2002 the Canadian Natural Resources Limited oil spill area, just east of Peejay] There was a big oil spill in that area (over 1,000 barrels spilled into the muskeg), and they tried to dig it out and just got more, just full of water and oil. And they tried to fence it off, just one side, and all those animals come from other side and they drink that, and those ducks… they tried to fix it, they did some, but I don't know if it's really good now, because that muskeg is pretty big and all that oil spill, how many years? They never tell us, they try to hide it. And one of our guys went up there, somehow they found out that there's an oil spill in there, so they bring all those companies to the table here, told them, there's an oil spill, what are you guys doing about it, there's lots of tracks coming to that spill. So they took Elders over there and we seen it, and they we tried to make them clean it up all, but lots already went in underneath, other way. (D31, 25 July 2016)

Too much oil spill and clear cuts, moose and caribou they lick that and they all die, so not too many around. There used to be lots. Clear cuts everywhere so the caribou don't have shelter from predator like wolf. (ID 005, Aasen, 2013)

4.3.2 Roads, linear corridors and predators

> *Interviewer: When did you see [the caribou] go down? When did they start going down?*
>
> *D21: Probably in the '80s. When they started opening up all these roads, and it's so easy for the wolves to get at them.*
>
> *Interviewer: So the roads are a problem for the access for the wolves?*
>
> *D21: Yeah. (D21, 26 July 2016)*[57]

Prior to 1970, there were few roads north of DRFN's reserve. As the road network increased, access was opened for all of the resource-based industries and the industrial footprint continued to expand. DRFN members observed caribou fatalities on the roads during the early stages of resource exploration when their populations were still large; Doig knowledge-holders described seeing large herds of caribou on roads (D01, 25 July 2016).

Some knowledge-holders identified that roads are a major problem because they increase human activity in an area and fragment habitat (D01). To avoid predation — particularly during calving season — caribou rely on dispersing widely in largely intact muskeg and forest habitat. Roads and other linear corridors (e.g., seismic lines, transmission lines and pipeline rights-of-way) make it much easier for wolves to access caribou:

> *We have to look back would be back then they said amount of caribou was quite a few and like north region here so would be more back then because there was less roads and stuff like that only winter ice roads back then...when you open an area it's open for predators, to what you call, better travel for them and stuff like that. Back 20 years ago there wasn't much activity back then. So they only had ice road back then they built for the hunter till the full exploration went ahead and then open up quite a few roads too, we have to look at that too. (ID 032, Aasen, 2013)*
>
> *The roads bring more wolves into the area and make it easy for them in the deep snow, it allows them to travel long distances. (Elders Focus Group, DRFN Moose Study, December 2015)*

A recent analysis of average linear disturbance, including roads, transmission lines and seismic lines (not including pipelines) in an adjacent community's traditional territory revealed an average of 2.88 kilometres of linear disturbance per square kilometre, with much higher linear densities (in the range of 12.1 to 24 km per km^2) in some parts of the Milligan Core.[58] Several studies show that increasing linear disturbance has a negative association with caribou population levels. Consensus is growing that linear disturbances of 1.2 to 2 km/km^2 generally result in declines in boreal caribou populations, as predators are able to hunt more efficiently.[59]

> *Well one thing about it, all these old, what do you call 'em, roads, decommission them. That's what I mentioned to the Oil and Gas Commission. Some of these old roads that... Well if they could put, plant the trees back in, that would help. Even 10 years' time, if you looked down the road after they replant, 10 years, it sure makes a lot of difference. Even these cutblocks, after they tree plant, and you, what do you*

call 'em, the natural growth of that poplar, within five years, you can't even see nothing. Like, some of the areas where I hunted, they logged it, and the new growth that came back up, within five years, you can't even look, you can't see, even if you stand on, get on a big tree stand or something, you can't see nothing, that's one good thing about it.... Like decommission, but plant the trees back in... I'd like to see some of these pipeline corridors, and big open areas, be planted back. (D57, 27 July 2016)

Boreal caribou's main predators are bears and wolves, and knowledge-holders have observed increasing wolf populations in DRFN preferred hunting areas (DRFN Moose Study, 2016). As noted above, wolves in particular are much more efficient hunters when linear corridors are present, because corridors increase access into areas that are otherwise difficult to get to (e.g., wet muskeg areas), increase sight lines, improve travel speed and search efficiency, and increase encounter rates.

DRFN members have hunted and trapped wolves and other furbearers for millennia, and these activities have traditionally constituted livelihoods. With the decline of the fur market, community members are interested in finding ways to restore its economic viability.

Wolf population has really come back up...Put a bounty on the wolf, just take some out. Maybe just in this northeast region, maybe take out about a hundred. This is why the trapping is very important. Trapping is very important to keep the animals level, take some out, leave some for seeds, and they always will be here. This is what our people always say. (D01, July 2016)

According to many knowledge-holders (including D01, D28, D57, D29, D31 and D71), Peejay, Weasel and areas to the north, including Chinchaga, now have too many wolves for caribou to be able to survive and thrive.

The last few years, I don't see, I don't see hardly any calves, caribou calves. You know, here and there. I think because the wolves or bear. Cause they're easy to get, yeah? Bear can just, couple leaps, he'll be on him, the calf. (D23, July 2016)

That time, not many wolves she said [D29], so it was safe for those mother animals to raise their babies. But now, sure lots of bears and wolves, you can't protect those, it's hard to protect them now. Lots of roads too, so they run around all over the place on the roads... [Talks momentarily with D29 in Beaver] They not only die from those bears or wolves, they die from those oil wells. They eat the dirt, or they drink that water, whatever, but from the well. (D31, July 2016)

To bring them back up, I believe it's, we have to have wolf control back here. There's big packs, lots, a few packs of wolves hanging around and making big circles, making big loop right into the Alberta side, to the border. If we thin them down, then the population, I believe, will go right up. A pack of wolves, like 10 or more, they have to have about four or five caribou in less than a week, to keep them going. Those calves are the ones they go after. (D57, July 2016)

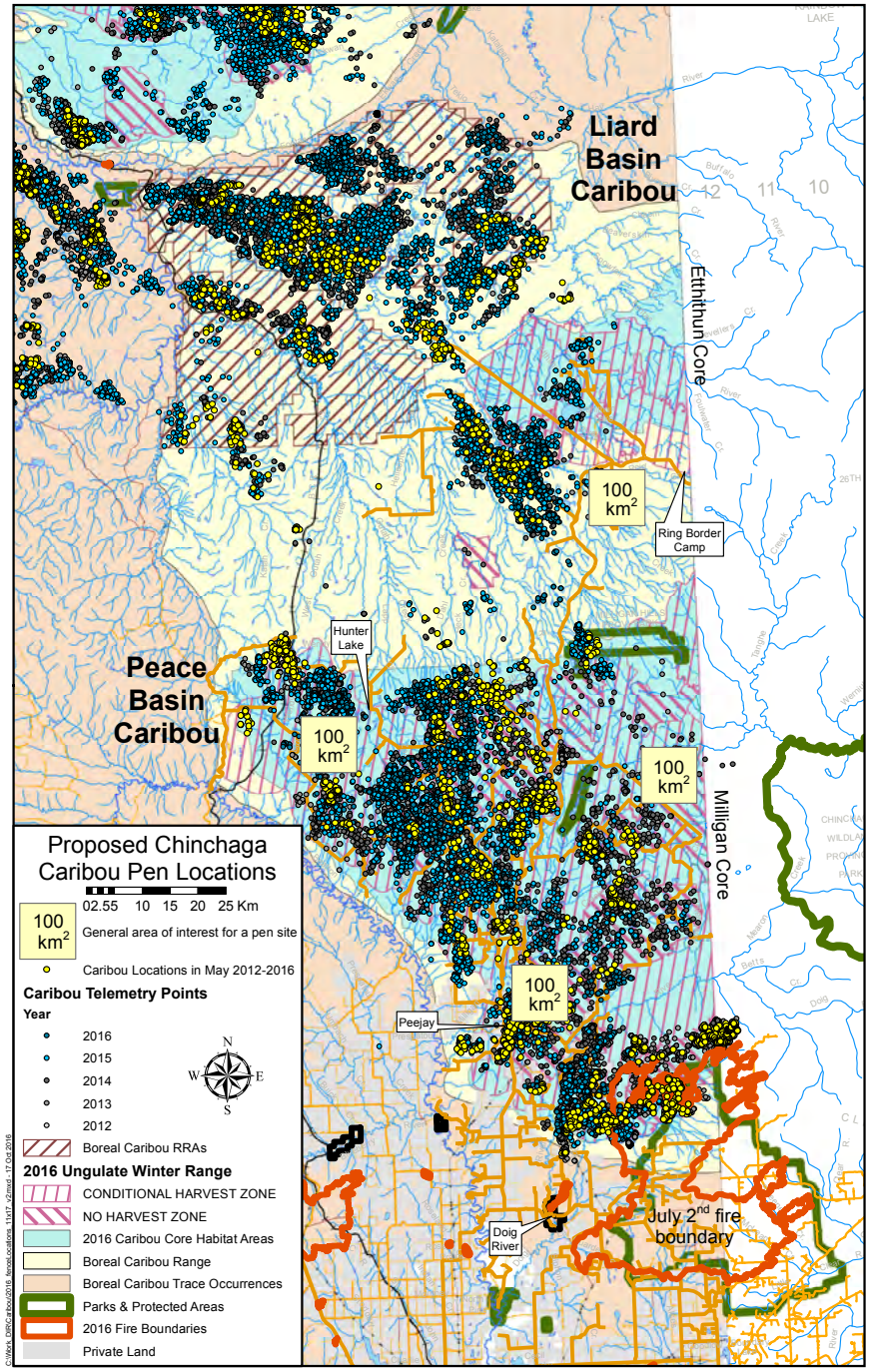
The Elders who understand how to trap wolves would like to provide workshops for youth on how to use the right trapping methods to catch them. Knowledge-holders also suggested implementing a short-term maternal penning program in the Milligan Core. DRFN staff have developed a map for identifying potential maternal penning areas (see Figure 5).

4.3.3 Forestry

DRFN knowledge-holders have stated during focus groups and interviews (in this and earlier studies) that the animals they rely on depend on the forest to survive. A healthy forest cover with a range of ages and a sufficient amount of old forest habitat are critical to sustaining DRFN's way of life.[60]

As noted in Section 4.2.2, mature forests are important for caribou, in all seasons but especially winter. These forests provide cover from predators in all seasons. In cold winters, caribou forage around the base of big trees where the snow depth is shallow or absent.

Figure 5. DRFN proposed locations for short-term maternal pens in the Milligan Core



When there's big temperatures, the lichens, they eat that, and then the big spruce trees, underneath there there's hardly any snow, and so they forage around there. (D01, 25 July 2016)

A recent analysis of forest cover in the vicinity of DRFN reveals that little intact forest landscape exists in the area, due to the combined effects of industrial development (including forestry), farming and other private land development, and fires.[61] TEK confirms that curtailing forest harvesting to restore levels of mature forest to a level within the natural range of variability for this ecosystem type is essential for providing boreal caribou with important overwintering habitat and escape terrain (DRFN moose study, 2015).

4.3.4 Hunters, noise and access

DRFN knowledge-holders observe that boreal caribou, while curious, are also wary of humans and will avoid areas with high human activity, including noise from industrial development and traffic and gunshots associated with hunting (D28, July 2016; D03, July 2016). Increasing roads and linear corridors has provided access to resident and non-resident hunters into areas that were historically only hunted by DRFN members. Hunting activity is now very high during the open season for moose.[62]

4.3.5 Drought, climate change and water withdrawals

According to DRFN knowledge-holders, the climate has been gradually changing with warmer temperatures and winters that are not as cold. The past couple of years have been very dry (D01, 3 Dec 2015).[63] DRFN members have linked the drought to increases in parasites, particularly flies and ticks, in some animals (e.g., moose). The effect on caribou is not clear; historically caribou populations were healthy, but because they have not been harvested for the past few decades, there is little current DRFN knowledge of disease and parasite loads on caribou in the Chinchaga range.

I mean there's been a drought too, so the feed might not be good enough... last five years. This will be the fifth year... No water, no rain... Well last winter was rough. It was cold and lots of snow... even the snow is different.... Well it's more, like used to be you could pack snow down, but now it's more crystallized, so it's not stable. (D55, 2 Dec 2015)

Lick sites are often near natural springs or wet areas. These licks are affected by climate change and the drought.

Licks where there was spring water were dry last year. There is no rain, and when it rains the ground is too hard so the water runs off (Elders Focus Group, Moose Study December, 2015).

Climate change is also a factor in the extent of forests killed by pine beetles in the Treaty 8 area, and drying of the forests increases the risk of forest fires. DRFN members note that fires effect lichen loads, particularly in mature spruce forests, for a long time (e.g., D28, 25 July 2016).

An important link likely exists between drying of lick sites and water withdrawals for industry. DRFN members did not suggest any management actions associated with this threat, but the issue warrants further study.

4.3.6 Interactions between caribou and other ungulates

DRFN knowledge-holders did not note any significant negative interactions between caribou and other ungulates, as they are understood to use different habitat. While some knowledge-holders have a negative association with bison, which were re-introduced in the early 1990s and have expanded in the Fontas and Milligan areas, caribou and bison interactions are not well understood. When asked whether imposing management actions to decrease the number of deer and moose in areas that are important to caribou would help increase caribou populations, DRFN knowledge-holders were consistently opposed to this idea (DRFN Moose Study, 2016).

4.3.7 Cumulative impacts and the need for monitoring

Declines of *madziih* in the Chinchaga range and elsewhere are the result of cumulative effects, which have pushed the population to the brink of extinction. Doig members have strong emotions about the impacts development has had over the past 20 years on the lands and waters that are important to them, and are deeply motivated to lead monitoring and restoration efforts in the Chinchaga range, to benefit caribou and other animals and plants living in the area.

Doig members identified an important role for their community in monitoring recovery of caribou populations. Doig members know the land and are already monitoring for caribou, but need resources to sustain monitoring long-term.

> *I'm going up there [Hunter Lakes] anyway. When I go to those areas, if I see tracks I get off and to check what it is. If it's caribou, I'll try to count how many caribou tracks it is and then see if I can see a calf, a newborn calf track, that's what I usually do. (D03, 26 July 2016)*

SECTION 5 DRFN FRAMEWORK FOR RESTORING CARIBOU IN THE CHINCHAGA RANGE

5.1 Government regulations to protect boreal caribou in the Chinchaga range

As noted in the introduction to this report, the onus for protecting boreal caribou in the Chinchaga range falls to the provinces of British Columbia and Alberta, with the federal government having the power to step in if adequate protection measures are not enacted to recover the population.[64] The Boreal Caribou Recovery Strategy clearly states that, despite the high level of impact to the Chinchaga range, recovery of caribou in this area is feasible.[65]

Recovery must include achieving population levels that allow for a sustainable DRFN subsistence harvest to occur, and that allow for the population to be maintained in the area without the need for ongoing active management intervention.

The DRFN government has repeatedly emphasized that they have a critical role to play in identifying current shortfalls in recovery efforts for boreal caribou, and ensuring that these shortfalls are corrected. DRFN has a long history of stewardship of the animals and land. Historically, First Nations interacted with the land and wildlife and were a part of healthy functioning ecosystems that are now highly disturbed, due in large part to industrial development. This has critically impaired DRFN members' ability to practice their treaty rights.

5.1.1 Current government-led recovery efforts in British Columbia

Protection for boreal caribou habitat in British Columbia is guided by the Boreal Caribou Implementation Plan (BCIP)[66], which is currently being revised to incorporate new data and information resulting from five years of study, the bulk of which was funded through the BC Oil and Gas Research and Innovation Society (BC OGRIS; formerly the Science and Community Environmental Knowledge or SCEK Fund). The government has promised to consult deeply with First Nations on revisions to the BCIP. It remains to be seen how well they will incorporate recommendations from First Nations communities or include First Nations communities at decision-making tables. The basic management regimes that govern industrial activities and habitat protection measures in caribou habitat are outlined below.

Boreal caribou habitat and forestry

At the present time, forestry activities proposed within boreal caribou habitat are managed through the Forest and Range Practices Act by establishing Ungulate Winter Ranges (UWRs) and through other habitat protection measures enabled through the Act, including establishing Wildlife Habitat Areas (WHAs). Forestry companies must adhere to the timing windows and restricted activities established through UWRs and wildlife habitat areas.

The Milligan Core is currently afforded a certain degree of protection from an existing Ungulate Winter Range[67] and four Wildlife Habitat Areas[68] (shown in Figure 1). The UWR restricts the construction of new access structures, timber harvesting/silviculture activities, activities that disturbed caribou during the late winter period (defined as February 1 to April 15), and the development of recreation sites and

trails. Similar restrictions — with fewer exceptions — are included in the WHA orders. As depicted in Figure 1, a new WHA is proposed to cover much of the Milligan Core. Unfortunately, in practice these protective measures have done little to prevent ongoing forest harvesting in this area. DRFN's initial review of the revised Boreal Caribou Implementation Plan (2016) indicates that the province may allow forest harvesting to continue in this area, with little consideration of its impacts on caribou survival or the rights of DRFN members.

Boreal caribou habitat and oil and gas development

Under the Oil and Gas Activities Act, environmental protections for WHAs and UWRs are addressed through the Environmental Management and Protection Regulations (EMPR), which rely on Interim Operating Procedures (IOPs) to prevent a "material adverse effect" to boreal caribou. Under the EMPR, oil and gas companies are required to follow these government environmental objectives (only relevant provisions are shown):

a) that operating areas not be located within any of the following:

    i) a wildlife habitat area, unless an operating area will not have a material adverse effect on the ability of the wildlife habitat within the wildlife habitat area to provide for the survival, within the wildlife habitat area, of the wildlife species for which the wildlife habitat area was established;

    ii) an ungulate winter range, unless an operating area will not have a material adverse effect on the ability of the wildlife habitat within the ungulate winter range to provide for the survival, within the ungulate winter range, of the ungulate species for which the ungulate winter range was established (...)

b) that oil and gas activities on an operating area outside of a wildlife habitat area be carried out at a time and in a manner that does not result in physical disturbance to high priority wildlife or their habitat, including disturbance during sensitive seasons and critical life-cycle stages (...)

d) that oil and gas activities not damage or render ineffective a wildlife habitat feature.

To DRFN staff knowledge, all proponents who have proposed activities within UWRs and WHAs established for boreal caribou in British Columbia have successfully argued that no material adverse effect will occur to boreal caribou, *even when levels of disturbance are well above the acceptable level of risk defined by the Boreal Caribou RS and other key documents*. This is because the working definition of "material adverse effect" does not incorporate a consideration of the current context and existing cumulative effects on caribou.

According to the latest caribou population metrics available through BC OGRIS, the provisions in the current IOPs for boreal caribou have not been effective for reversing caribou population declines. Stronger provisions are urgently needed, and immediate efforts must be made to implement restoration in core caribou habitat.

5.1.2 Recovery efforts in Alberta

After a decade of inactivity, the Alberta government announced in June 2016 its intent to adopt a set of recommendations for a made-in-Alberta caribou-protection strategy, which includes complete protection for a significant portion of the Chinchaga range, extending the existing Chinchaga Wildlife Provincial Park by 347,600 hectares (quintupling the existing park size) and preserving almost 25 per cent of the range.[70] DRFN Member rights are held in BC and Alberta. While this report focuses on the gaps in caribou management in the BC portion of the Chinchaga range, the DRFN and other First Nation governments should have a leadership role to play in impacted areas in Alberta as well as in BC.

5.2 DRFN recommendations for caribou restoration and management in the Chinchaga range

Based on the identified threats to caribou in the Chinchaga range, particularly the Milligan Core, DRFN has developed the following framework for boreal caribou recovery in this area, including 14 management recommendations that should be enacted, within the Chinchaga range as a whole and within specific areas of interest. Because concrete actions to recover boreal caribou are urgently needed in British Columbia, the recommendations are framed within the context of B.C.'s approach to managing boreal caribou.

Table 8. Doig River First Nation framework for boreal caribou recovery in the Chinchaga range

Management recommendation	Existing or proposed legislative tool	Desired outcome	Additional research
1. Immediately institute a "rest" period, including a complete halt to industrial development (minimum of 10 years) for at least two-thirds of the Chinchaga historical range in B.C.	Boreal Caribou Implementation Plan	No further industrial impacts in at least two-thirds of boreal caribou habitat for at least 10 years	Proposed from north of the reserve including the community pasture to the area north of Chinchaga. May also be appropriate within other areas (e.g., Snare Hill). Prioritize: - Areas with relatively low linear and anthropogenic disturbance; - Areas with high observations of caribou (telemetry and DRFN)

Management recommendation	Existing or proposed legislative tool	Desired outcome	Additional research
2. Extend the Chinchaga Range south to include the observed habitat areas just south of DRFN's reserve.	Boreal Caribou Implementation Plan	Ensure management actions and recommendations encompass full range	Collaboration with provincial government to have range boundaries redrawn to incorporate DRFN TEK
3. Impose a complete ban on all industrial activity in important calving habitat for boreal caribou in the Chinchaga range, especially during the critical late-winter and early-spring period.	Boreal Caribou Implementation Plan Wildlife Habitat Areas	No further impacts to fine-scale calving habitat for boreal caribou for a minimum of 10 years, to allow other areas to move towards a recovery trajectory.	Additional work should be done to identify and map fine-scale calving habitat within the Chinchaga range, and develop specific guidelines for industry, including avoidance, restoration requirements and offsets that would be established under the revised Boreal Caribou Implementation Plan.
4. Fence "man-made licks" (contaminated sites created from industrial development) and institute a DRFN-managed monitoring and maintenance schedule in priority areas, particularly Peejay and Milligan Creek.	Under the Boreal Caribou Implementation Plan (BCIP), new operating procedures for protecting boreal caribou habitat. For existing and abandoned wells, possibly under the Environmental Management and Protection Regulations (EMPR; regulations for managing abandoned wells)	Effectively eliminate contamination risk for boreal caribou in Chinchaga range.	Government to take the lead in mapping all well sites and status in collaboration with DRFN; fund fencing and maintenance program through industrial fees
5. Restore abandoned and orphaned well sites in priority areas identified as important caribou habitat.	Possibly under the Environmental Management and Protection Regulations	Contribute to achieving a minimum of 65 percent suitable habitat within 20 years	Map of abandoned well sites needed, as well as collaborative work with DRFN to select priority areas for piloting restoration

Management recommendation	Existing or proposed legislative tool	Desired outcome	Additional research
6. Impose significant fines on industry for observed oil and gas leaks and spills in all oil and gas areas, with funds going toward DRFN-led cleanup and monitoring program.	Revised Boreal Caribou Implementation Plan and follow-up revisions to the Environmental Management and Protection Regulations	Offset impacts of spills by ensuring money is available for cleanup and monitoring	Gap analysis on existing leaks and spills that may be unaddressed
7. Direct immediate restoration efforts at linear corridors, including roads, rights-of-way and seismic lines, within priority areas. Areas should be replanted and restored to the same state they were in prior to development.	Revised Boreal Caribou Implementation Plan. It is critical that DRFN take the lead on these restoration activities, including identifying key species and habitat features to be prioritized	Contribute to achieving a minimum of 65 percent suitable habitat within 20 years	Select priority areas for restoration using the following criteria: - High amount of linear and anthropogenic disturbance; - High observations of predators in the area; - High number of non-active well sites Establish baseline conditions based on old aerial photography or existing records.
8. Institute a wolf-trapping program in Milligan Core (and other areas with high wolf populations), in a way that is consistent with DRFN traditional stewardship practices, supports the transmission of traditional knowledge, skills and practice from Elders to youth and supports DRFN land users to implement the program in key areas.	Can be imposed under the Wildlife Act	Ongoing continuity of practice of treaty trapping or harvesting rights to reduce predation pressure on boreal caribou in Chinchaga range	Develop training program with Elders; enact within Milligan Core

Management recommendation	Existing or proposed legislative tool	Desired outcome	Additional research
9. Contingent on implementation of significant restoration efforts, establish a maternal penning program in at least one important area within the Milligan Core.	Funding through Habitat Stewardship Program or Aboriginal Fund for Species at Risk	Short-term measure to reduce predation effects on boreal caribou habitat in Chinchaga range for five years.	DRFN to lead plan for maternal penning program
10. Impose a moratorium on forest harvesting including priority areas of Chinchaga range, such as the Milligan Core. This moratorium should be in place until mature forest cover has increased to an established minimum required for maintaining boreal caribou winter habitat in the area.	Possible under the Forest and Range Practices Act (FRPA) but will require significant political will to achieve; may require additional harvest outside of Chinchaga range to enable. May be possible under BCIP through establishing resource review areas in the Chinchaga range	Contribute to achieving a minimum of 65 percent suitable habitat	Further work to fully identify and refine areas that are known to be important winter habitat, through field- and map-based characterization of these areas and development of habitat suitability model. Identification of priority areas for moratorium, based on identified winter habitat
11. Establish new ungulate winter ranges for boreal caribou, based on combined DRFN knowledge and short-term telemetry data on winter use.	Under Forest and Range Practices Act	Contribute to achieving a minimum of 65 percent suitable habitat; important for ensuring permanent protection of priority winter habitat areas	As above; identification of areas for establishing UWRs through field and map-based efforts

Management recommendation	Existing or proposed legislative tool	Desired outcome	Additional research
12. Introduce rest areas (areas closed to hunting) to reduce harassment to caribou associated with hunting other animals. DRFN members suggest co-management of resident and non-resident hunters by First Nations and provincial government.	Hunting regulations; government-to-government agreement with British Columbia	Short-term effort to reduce pressure on caribou, until habitat recovery can take effect	Identify priority areas for closures with DRFN members, based also on the DRFN Had'aa Management Strategy
13. DRFN opposes population control of other ungulate species in caribou habitat rest areas, as this will further disturb caribou and will not increase caribou populations.	Ensure this recommendation is not contained within revised BCIP	Avoiding unnecessary impacts to other harvested species (moose, deer, etc.)	Further research is required on the interactions between introduced bison and caribou in the Chinchaga range.
14. Establish a DRFN community-based monitoring program to ensure that management recommendations outlined above are followed, and consistent monitoring of caribou populations and health occur within the Chinchaga range.	Through BCIP and possibly government-to-government agreement giving responsibility for this work to DRFN; possibly in partnership with other First Nations	Monitoring to ensure that recommendations are followed and outcomes are achieved	Secure long-term resources

5.3 Next steps

The recommended actions outlined above are intended as an initial framework to guide restoration activities within the Chinchaga range. Some of the recommendations will require additional research (e.g., further work to identify priority areas for restoration based on linear corridor extent; further work to identify specific wetland habitats associated with calving, and map these areas across the Chinchaga range as a whole).

Additional next steps identified through this study include:

- DRFN to be included in any provincial or federal decision processes related to caribou protection, action plans or restoration efforts for the Chinchaga range;
- DRFN to identify important caribou plants and others in Beaver terms (part of on-territory monitoring and documenting baseline);
- Province and federal government to undertake and support research on the interactions between bison and caribou to better understand potential impacts of bison re-introduction in the Chinchaga caribou range.

5.4 Conclusion

This report summarizes DRFN TEK about boreal caribou in the Chinchaga range, and provides an initial framework for managing boreal caribou recovery and habitat restoration in the range. Doig members put forth this initial framework in good faith, with the intention of working with provincial and federal governments to ensure these recommendations are enacted. Further work is anticipated to refine the initial framework and provide specific action plans for initiating work on these recommendations.

Many of the management recommendations provided in this initial framework could be enacted within existing regulations, including increasing protected areas for boreal caribou (through UWRs and WHAs), reducing the allowable forest harvest to give high-valued boreal caribou winter habitat (i.e., mature and old spruce and pine forests) a chance to recover, revised and strengthened operating procedures for oil and gas companies working in boreal caribou range, and changes to hunting regulations to impose rest periods on specific areas. Other recommendations could be addressed through the ongoing revisions to the Boreal Caribou Implementation Plan, including the urgent need for restoration in the Milligan Core, and the short-term measure of maternal penning to increase calf survival.

Doig members have a strong and vital role to play in boreal caribou recovery within the Chinchaga range. As stated by one participant:

> *They need some people to clean up all those pumpjack areas, those the ones, the ones they condemn, they shut down. Doig needs money, so we can clean it up ourselves. That way we make sure it's done right. If we don't do that we let the company go, they clean a little bit of oil, it's done already — it's not finished. (D28, 25 July 2016)*

DRFN community holders have a depth of knowledge about boreal caribou in the Chinchaga range that goes back many generations. However, the depth and importance of this knowledge has largely been ignored in provincial recovery efforts to date. This report clearly illustrates that recovery of caribou and restoration of caribou habitat must include First Nations communities at the decision-making table, with adequate resources to support their leadership and the development, implementation and monitoring of caribou restoration plans. DRFN intends to play a leadership role in efforts in the Chinchaga range, to ensure that the end result is meaningful restoration of habitat for *mazdiih* and protection of treaty rights for future generations.

1 Environment Canada, 2012. *Recovery Strategy for the Woodland Caribou (*Rangifer tarandus caribou*),*

Boreal Caribou Population, in Canada. Species at Risk Act Recovery Strategy Series, Environment Canada, Ottawa. pp. xi and 138.

2 The existing Aboriginal and treaty rights of the Aboriginal peoples of Canada are recognized and affirmed in Section 35(1) of Canada's Constitution, 1982. URL: http://laws-lois.justice.gc.ca/eng/const/page-16.html

3 Hummell, M., and J. Ray, 2008. *Caribou and the North: A Shared Future.* Dundurn Press, Toronto, 2008.

4 David Suzuki Foundation and the Assembly of First Nations, 2013. *The Cultural and Ecological Value of Boreal Woodland Caribou Habitat*. Joint Report by the Assembly of First Nations and the David Suzuki Foundation. p. 7.

5 Hunting grounds refers to preferred areas where DRFN members historically harvested caribou and would most likely continue to if adequate quality and quantity of animals return.

6 We have chosen to use the term *western science* in this report because it is a commonly used and understood term, we recognize that *conventional science* or *academic science* are likely more correct and less imbued with colonial assumptions.

7 Thomas, D.C., and D.R. Gray, 2002. *Update COSEWIC status report on the woodland caribou Rangifer tarandus caribou in Canada, in COSEWIC assessment and update status report on the Woodland Caribou Rangifer tarandus caribou in Canada*. Committee on the Status of Endangered Wildlife in Canada. Ottawa. pp. 1-98.

8 Johnson, C.J, L. Ehlers, and D. Seip, 2015. "Witnessing extinction – Cumulative impacts across landscapes and the future loss of an evolutionarily significant unit of woodland caribou in Canada." *Biological Conservation.* 2015, Volume 186. pp. 176-186.

9 Aasen, W., 2013. *Doig River First Nation's Boreal Caribou Workshop: Methodology and Preliminary Findings*. Report prepared for the Doig River First Nation, 2013.

10 Venter, O., N. Brodeur, L. Nemiroff , B. Belland , I.J. Dolinsek, and J.W. Grant, 2006. "Threats to Endangered Species in Canada," *Bioscience*, 2006.

11 Hummell, M., and J. Ray, 2008. *Caribou and the North: A Shared Future*. Dundurn Press, Toronto, 2008. p. 229.

12 Goddard, A. D., 2009. *Boreal Caribou in Northeastern British Columbia: Biological Rationale, Data Summary, and Literature Review*. BC Ministry of Environment Peace Region Technical Report, May 2009. p. 25.

13 D03, Interview transcript, caribou study, 26 July 2016, Doig River First Nation. Interviews conducted for this report are cited by the identification number of the participant and the date (month, year) of the interview, all transcripts are the property of DRFN. Only the first reference to a transcript is cited.

14 Environment Canada, 2012. *Recovery Strategy for the Woodland Caribou (*Rangifer tarandus caribou*), Boreal Caribou Population, in Canada*. Species at Risk Act Recovery Strategy Series, Environment Canada, Ottawa. p. vi: "Recovery of all boreal caribou local populations across Canada is technically and biologically feasible."

15 Environment Canada, 2012. *Recovery Strategy for the Woodland Caribou (*Rangifer tarandus caribou*), Boreal Caribou Population, in Canada*.. Species at Risk Act Recovery Strategy Series, Environment Canada, Ottawa. p. vii: "This recovery strategy identifies 65 per cent undisturbed habitat in a range as the disturbance management threshold, which provides a measurable probability (60 per cent) for a local population to be self-sustaining. This threshold is considered a minimum threshold because at 65 per cent undisturbed habitat there remains a significant risk (40 per cent) that local populations will not be self-sustaining."

16 Environment Canada, 2014. *Recovery Strategy for the Woodland Caribou (*Rangifer tarandus caribou*), Southern Mountain Population, in Canada*. Species at Risk Act Recovery Strategy Series, Environment Canada, Ottawa.

17 Ray, J. C., 2014. *Defining Habitat Restoration For Boreal Caribou in the Context of National Recovery: A Discussion Paper*. Prepared under contract to Environment Canada and Climate Change Canada. December 2014.

18 Environment Canada, 2012. *Recovery Strategy for the Woodland Caribou (*Rangifer tarandus caribou*), Boreal Caribou Population, in Canada*. Species at Risk Act Recovery Strategy Series, Environment Canada, Ottawa. p.47.

19 McNay, R.S., D. Cichowski, and B.R. Muir, 2013. *Action Plan for the Klinse-Za Herd of Woodland Caribou (*Rangifer tarandus caribou*) in Canada*. West Moberly First Nations, West Moberly Lake, British Columbia. pp. iii and iv. URL: http://ow.ly/MxGjx

20 Ibid.

21 Ibid.

22 *Species at Risk Act*, section 48.1. URL: http://laws-lois.justice.gc.ca/PDF/S-15.3.pdf

23 Aasen, W., 2013. *Doig River First Nation's Boreal Caribou Workshop: Methodology and Preliminary Findings*. Report prepared for the Doig River First Nation, 2013.

24 DRFN members have historically harvested caribou in the Pink Mountain area, among other areas.

25 All raw data and confidential information is wholly owned by DRFN.

26 D02, Interview transcript, caribou study, 27 July 2016, Doig River First Nation

27 Jane Calvert, Land and Resource Manager, Doig River First Nation, December 2015.

28 Rowe, M., 2007. *Boreal Caribou and Wolf Movement and Habitat Selection Within the Chinchaga Range.* B.C. Ministry of Environment Peace Region Technical Report, June 2007. p. 33.

29 Counts conducted by researchers funded through BC OGRIS show calf-cow ratios of between nine and 14 calves for 100 cows from 2014 to 2015, which is dramatically lower than the minimum calf-cow ratio of 29 calves for 100 cows needed to maintain population levels.

30 BC Ministry of Forests, Lands and Natural Resource Operations, 2015. "Boreal Caribou in Northeastern BC." Presentation by Joelle Scheck on behalf of Megan Watters (FLNRO), June 2015.

31 Environment Canada, 2012. *Recovery Strategy for the Woodland Caribou (*Rangifer tarandus caribou*), Boreal Caribou Population, in Canada*. Species at Risk Act Recovery Strategy Series, Environment Canada, Ottawa. pp. xi and 138.

32 In English, Indigenous knowledge (IK), traditional ecological knowledge (TEK) and Aboriginal traditional knowledge (ATK) are all similar terms that have to do with the knowledge systems of Indigenous communities. TEK is more common in the academic literature, ATK is the term used in policy related to the *Canadian Environmental Assessment Act* and the Species at Risk Act, and IK is most common at the international level. For the purpose of this report we have chosen to use the term TEK to refer to broadly to the dynamic system of Dane-Zaa knowledge and management.

33 Candler, C., S. M. Leech, and C. Whittaker, 2013. *Sakâw Mostos (Wood Bison): Mikisew Cree First Nation Indigenous Knowledge Study*. Firelight Research Inc. Confidential Report to the Mikisew Cree First Nation.

34 Leech, S.M., and C. Whittaker with the Firelight Group and Doig River First Nation, 2016. *DAAGE ZǪ NĘ DĘ AAH ʔ (Take Only What You Need): A Dane-Zaa Approach to* Hadaa *(moose) Stewardship*. Report prepared for the Doig River First Nation, October 2016.

35 Sample size was limited due to the funding constraints for this project.

36 Gibson, G. and G. Zezulka, with the Boreal Leadership Council, 2015. *Understanding successful approaches to free, prior and informed consent in Canada. Part I.* Report commissioned by the Boreal Leadership Council, September 2015. p. 23.

37 Deroy, S. and The Firelight Group, 2016. *Direct-to-Digital Mapping Methodology: a hands-on guidebook for applying Google Earth.* Firelight Group Report, January 2016. p. 24.

38 Wilson, S. F., and C. A. Demars, 2015. *A Bayesian Approach to Characterizing Habitat Use By and Impacts of Anthropogenic Features On Woodland Caribou (*Rangifer tarandus caribou*) in Northeast British Columbia.* Canadian Wildlife Biology and Management, 2015, Volume 4, No. 2. pp. 107-118.

39 Ministry of Environment, 2011. *Implementation plan for the ongoing management of Boreal Caribou (*Rangifer tarandus caribou *pop. 14) in British Columbia*. Victoria, BC. p. 17.

40 First Peoples Language Map of BC. URL: http://maps.fphlcc.ca/dane-zaa accessed October 28, 2016.

41 First People's Cultural Council, 2014. Report on the Status of B.C. First Nations Languages 2014. URL: http://www.fpcc.ca/files/PDF/Language/FPCC-LanguageReport-141016-WEB.pdf

42 D01, Interview transcript, caribou study, 25 July 2016, Doig River First Nation

43 Aasen, W., 2013. *Doig River First Nation's Boreal Caribou Workshop: Methodology and Preliminary Findings*. Report prepared for the Doig River First Nation, 2013.

44 D23, Interview transcript, caribou study, 27 July 2016, Doig River First Nation

45 Leech, S.M., and C. Whittaker, with the Firelight Group and Doig River First Nation, 2016. *DAAGE ZǪ NĘ DĘ AAH ʔ (Take Only What You Need): A Dane-Zaa Approach to* Hadaa *(moose) Stewardship*. Report prepared for the Doig River First Nation, October 2016.

46 Kuokkanen, R., 2011. "Indigenous Economies, Theories of Subsistence, and Women: Exploring the Social Economy Model for Indigenous Governance." *American Indian Quarterly*, Vol. 35, No. 2. pp 215-140.

47 D31, Interview transcript, caribou study, 25 July 2016, Doig River First Nation.

48 D40, Interview transcript, caribou study, 27 July 2016, Doig River First Nation.

49 D30, Interview transcript, caribou study, 27 July 2016, Doig River First Nation.

50 D26, Interview transcript, caribou study, 26 July 2016, Doig River First Nation.

51 D57, Interview transcript, caribou study, 27 July 2016, Doig River First Nation.

52 D28, Interview transcript, caribou study, 25 July 2016, Doig River First Nation.

53 This is an estimate based on the condition that other species of traditionally harvested foods are available in adequate abundance and quality (including porcupine, deer, moose, beaver, rabbit, birds, etc.).

54 D01, D17, D21, D57, Interview transcripts, caribou study, July 2016, Doig River First Nation.

55 Aasen, W., 2013. *Doig River First Nation's Boreal Caribou Workshop: Methodology and Preliminary Findings*. Report prepared for the Doig River First Nation, 2013.

56 Aasen, W., 2013. *Doig River First Nation's Boreal Caribou Workshop: Methodology and Preliminary Findings*. Report prepared for the Doig River First Nation, 2013.

57 D21, 26 July 2016, Doig River First Nation (as above).

58 Macdonald, E., 2016. *Atlas of Cumulative Landscape Disturbance in the Traditional Territory of the Blueberry River First Nations, 2016*. Ecotrust Canada and the David Suzuki Foundation, June 2016. Also see: Níh boghodi*: We are the Stewards of our Land: An Athabasca Chipewyan First Nation (ACFN) stewardship strategy for* thunzea, et'thén *and* dechen yághe jere *(woodland caribou, barren-ground caribou, and wood bison)* (ACFN and Firelight, 2012) which cites a threshold of 1.5km/km2 in Alberta. URL: http://www.thefirelightgroup.com/ecology.

59 For example, risk ratings based on Antoniuk et al. (2007); High: > 1.2 km/km^2 , Moderate 1.2 – 0.6 km/km^2 ; Low: < .06 km/km^2; cited in Athabasca Landscape Team, 2009. Athabasca Caribou Landscape Management Options Report. 115 pp. url: http://salmoconsulting.com/2012/11/10/athabasca-caribou-landscape-management-options-report-2009/. Work in support of the Dehcho Land Use Planning Committee suggests 1.8 km/km^2 as a critical level in boreal caribou general habitat:http://www.dehcholands.org/docs/reports/Contractor%20Reports/Cumulative%20Effects%20Report/Cumulative%20Effects_LUP%20Report.pdf (under community review).

60 Leech, S.M., and C. Whittaker, with the Firelight Group and Doig River First Nation, 2016. DAAGE ZǪ NĘ DĘ AAH ʔ *(Take Only What You Need): A Dane-Zaa Approach to* Hadaa *(moose) Stewardship*. Report prepared for the Doig River First Nation, October 2016.

61 Macdonald, E., 2016. *Atlas of Cumulative Landscape Disturbance in the Traditional Territory of the Blueberry River First Nations, 2016*. Ecotrust Canada and the David Suzuki Foundation, June 2016. p. 85.

62 Leech, S.M., and C. Whittaker, with the Firelight Group and Doig River First Nation, 2016. DAAGE ZǪ NĘ DĘ AAH ʔ *(Take Only What You Need): A Dane-Zaa Approach to* Hadaa *(moose) Stewardship*. Report prepared for the Doig River First Nation, October 2016.

63 D01, Interview transcript, moose study, 3 Dec 2015, Doig River First Nation.

64 Species at Risk Act, sections 58, 80. URL: http://laws-lois.justice.gc.ca/PDF/S-15.3.pdf

65 Environment Canada, 2012. *Recovery Strategy for the Woodland Caribou (*Rangifer tarandus caribou*), Boreal Caribou Population, in Canada*. Species at Risk Act Recovery Strategy Series, Environment Canada, Ottawa. p. vi.

66 BC Ministry of Environment, 2011. *Implementation plan for the ongoing management of Boreal Caribou (*Rangifer tarandus caribou *pop. 14) in British Columbia*. Victoria, BC. p. 17.

67 UWR order number U-9-009; http://www.env.gov.bc.ca/wld/documents/uwr/RATA_U-9-009_Order.pdf.

68 WHA orders number 9-089 to 9-092; http://www.env.gov.bc.ca/cgi-bin/apps/faw/wharesult.cgi?search=wlap_region&wlap=Peace.

69 Denhoff, E., 2016. *Setting Alberta on the Path to Caribou Recovery*. Report to the Alberta Government, dated May 30, 2016. p. 51.

70 Environment Canada. 2008. *Scientific Review for the Identification of Critical Habitat for Woodland Caribou (*Rangifer tarandus caribou*), Boreal Population, in Canada*. August 2008. Ottawa: Environment Canada. 72 pp. plus 180 pp Appendices.

Mathew Murray

David Suzuki Foundation

DOIG RIVER FIRST NATIONS
TAAHCHE WADANE

the firelight group