Government of
Northwest Territories

DRAFT

BATHURST CARIBOU RANGE PLAN

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Department of Environment
and Natural Resources

Draft

Bathurst Caribou Range Plan

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Prepared for engagement purposes.

Acknowledgements

The Bathurst Caribou Range Plan (BCRP) process is grateful to community members and members of the Working Group who provided generous contributions of time, knowledge, insight, guidance, and encouragement.

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Disclaimer

This is a living draft document released for the purposes of engaging with communities, leadership and decision makers on the current status and future direction of the Bathurst Caribou Range planning process.

The document does not represent the results of community consultation nor government policy direction.

Traditional knowledge shared throughout this document has been integrated from publicly available reports or other sources or provided exclusively for use in the BCRP process. Knowledge of indigenous peoples is intellectual property and is protected by international intellectual property rights on indigenous peoples. As such, Aboriginal peoples reserve the right to use and make public parts of their traditional knowledge as they deem appropriate from time to time. Use of this traditional knowledge by any other party does not infer comprehensive understanding of the knowledge, nor does it infer implicit support for activities or projects in which this knowledge is used in print, visual, electronic, or other media.

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1 Introduction

This document describes a Draft Bathurst Caribou Range Plan (BCRP or Range Plan) for the Bathurst barren-ground caribou herd. The Range Plan is based on knowledge sources and perspectives grounded in both Traditional Knowledge (TK)[1] and science. Three supporting documents provide greater detail on the approach, information and methods used to develop the Range Plan. These documents include information about the people who live within the range together with the herd, the caribou herd and its range, and important land use and economic activities occurring within the range:[2]

1. Traditional Knowledge of Caribou and Caribou People
2. Caribou Range Assessment and Technical Information
3. Land Use Scenarios and Economic Considerations

The Range Plan builds on a Discussion Document released in December 2016,[3] and considers the many written and verbal comments received from communities, industry, governments, Aboriginal governments and organizations and other groups.[4] The Range Plan also builds on recommendations and feedback from technical and traditional knowledge workshops held in June 2017.[5]

The Range Plan aims to balance the diverse interests of all governments, communities and stakeholders across the range in Nunavut, Northwest Territories (NWT) and northern Saskatchewan. Detailed consideration and discussion of ecological, cultural and socio-economic values shaped all recommendations as well as the underlying approach to the Range Plan. The Range Plan is advisory and all recommendations are non-binding.

This Range Plan and the supporting documents are available from the GNWT website at http://www.enr.gov.nt.ca/en/services/barren-ground-caribou/bathurst-caribou-range-plan.

Section 1 introduces the context for the BCRP – who is involved and what is being considered. Section 2 provides summary information on the Bathurst caribou range. Section 3 describes the range-scale management tools and framework for their application. Management recommendations are provided in Section 4, while adaptive management and monitoring is described in Section 5. Implementation considerations are presented in Section 6.

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[1] Throughout this document and the BCRP process, the term 'traditional knowledge' was adopted to mean what is also termed traditional ecological knowledge, indigenous knowledge, local knowledge and more, depending on the context. For more about this nomenclature debate, see Agrawal (1995), Stevenson (1996, 1999) or Houde (2007). In the Range Plan, traditional knowledge is understood to be a holistic term that includes ecological, environmental, social, cultural and spiritual understandings (e.g. Berkes 2008; Legat 2013).

[2] BCRP 2017a; BCRP 2017b; BCRP 2017c.

[3] BCRP 2016a.

[4] BCRP 2017d.

[5] BCRP 2017e; BCRP 2017f.

1.1 Background

Barren-ground caribou are defined in local languages and dialects as tuktu (Inuvialuktun, Inuinnaqtun, Inuktitut), ʔekwǫ́ (North Slavey), ʔetthǝ́n (Denesuline) and ekwǫ́ (Tłı̨chǫ). Caribou are an important part of the sub-arctic ecosystem and a cultural keystone species of critical socio-economic and cultural value for Aboriginal communities;[6] they are part of the social-natural landscape and recognized as sentient, intelligent and communicative animals.[7] It is through the practice of respect (following traditional laws and practices around behaviour, harvesting, knowledge accumulation and knowledge transfer) that caribou herds remain abundant and healthy and the relationship between caribou and Aboriginal people is maintained.[8]

The Bathurst herd annual range extends across the tundra and taiga biomes of Nunavut and the eastern NWT and in previous years, its winter distribution also reached into the boreal forests of northern Saskatchewan. Scientists know the Bathurst herd as a population of migratory barren-ground caribou that traditionally calves near Bathurst Inlet in the Kitikmeot Region (i.e., central Arctic) of Nunavut.[9] Aboriginal peoples, while distinguishing herds is typically less important, maintain a very detailed understanding of caribou movements across the landscape, key trails and locations that are important culturally for travelling, camping and harvesting or watching overall caribou health and well-being.[10]

The Government of the Northwest Territories (GNWT) Department of Environment and Natural Resources (ENR) sponsored the development of the BCRP in response to concerns expressed by northerners as well as recommendations from the Mackenzie Valley Environmental Impact Review Board (MVEIRB)[11] and Wek'èezhìı Renewable Resources Board (WRRB)[12] for government to take a leadership role in managing the cumulative impacts on Bathurst caribou.

The purpose of the Range Plan is to manage human-caused and natural (fire) disturbance in the Bathurst range and the effects on caribou, caribou habitat, and Caribou People.[13]

The Range Plan is also meant to complement management actions already in place for the herd such as traditional laws,[14] harvest restrictions and predator management considerations. It aims to provide

[6] Garibaldi 2009; BCRP 2016b; BCRP 2017e.
[7] Legat 2008; Beaulieu 2012; Sangris 2012; Parlee et al. 2013; EMAB 2014; TCS 2014; Trailmark 2015; TRTI 2016a; DNNLC 2016; LKDFN 2016; YKDFN 2016; BCRP 2016b; BCRP 2017e; Parlee 2017.
[8] Parlee et al, 2013.
[9] SARC 2017.
[10] Parlee et al. 2013.
[11] MVEIRB 2013; MVEIRB 2016.
[12] WRRB 2016b.
[13] The term "Caribou People" is used throughout the BCRP out of respect for the centrality of caribou to Aboriginal peoples across the range of the Bathurst herd. Herman Catholique of Łutsel K'e asserts "We are Caribou People you know. That is what they call us," (pers. comm. 2017). So important have caribou been to northern Aboriginal peoples that early explorers and anthropologists wrote about the Kivalliq Inuit as the "Caribou Eskimo[sic]" and the Athabasca Denesuline the "Caribou-Eaters" (Hearne 1795; Birket-Smith 1929; Hall 1989; Gordon 1996).

greater clarity for land use decision-making across the range and to serve as a starting point to heal the relationship between people and caribou.[15]

1.1.1 Why a Range Plan?

A Range Plan is needed for the Bathurst caribou herd for several key reasons: population levels have declined, human activities have increased across the range, the climate is changing with associated effects like increased wildfires, and the relationship between people and caribou has fundamentally changed.

Caribou used to be "everywhere and anywhere"; while Aboriginal people know caribou to cycle in abundance there has been a recent dramatic decrease in numbers of Bathurst caribou.[16] Community members report fewer caribou than seen in living memory, caribou in poor health, and a damaged relationship between people and caribou.[17] Further, as the relationship of respect between people and caribou fundamentally changed it further influenced caribou numbers, behaviour, movements, migrations and more.[18]

Results of photographic calving ground surveys show that the Bathurst herd declined from a historic peak of over 450,000 in 1986 to an estimated 20,000 caribou in 2015; a decrease of about 96% (Figure 1).

[14] Thorpe et al. 2001; Kendrick et al. 2005; TRTI 2016a; DNNLC 2016; LKDFN 2016; Parlee et al. 2013, 2017.
[15] TRTI 2016b; TCS 2016; BCRP 2016b.
[16] Whaèhdǫǫ̀ Nàowoò Kǫ̀ 2001; Thorpe et al. 2001; Kendrick et al. 2005; Parlee et al. 2005 and 2013; Legat et al. 2008; North Slave Métis Alliance 2012; Beaulieu 2012; Judas 2012; Sangris 2012; Barnaby and Simmons 2013; ACCWM 2014; NWMB 2015; Wray and Parlee 2013: TCS 2016; Parlee 2017.
[17] Parlee et al. 2013; TCS 2014, 2016; Trailmark 2015; BCRP 2016a, 2017a; TRTI 2016a; 2016b; DNNLC 2016; LKDFN 2016; YKDFN 2016; Parlee 2017.
[18] Kendrick et al. 2005; Parlee et al. 2013; BCRP 2016b; TRTI 2016a; TCS 2016; Parlee 2017.

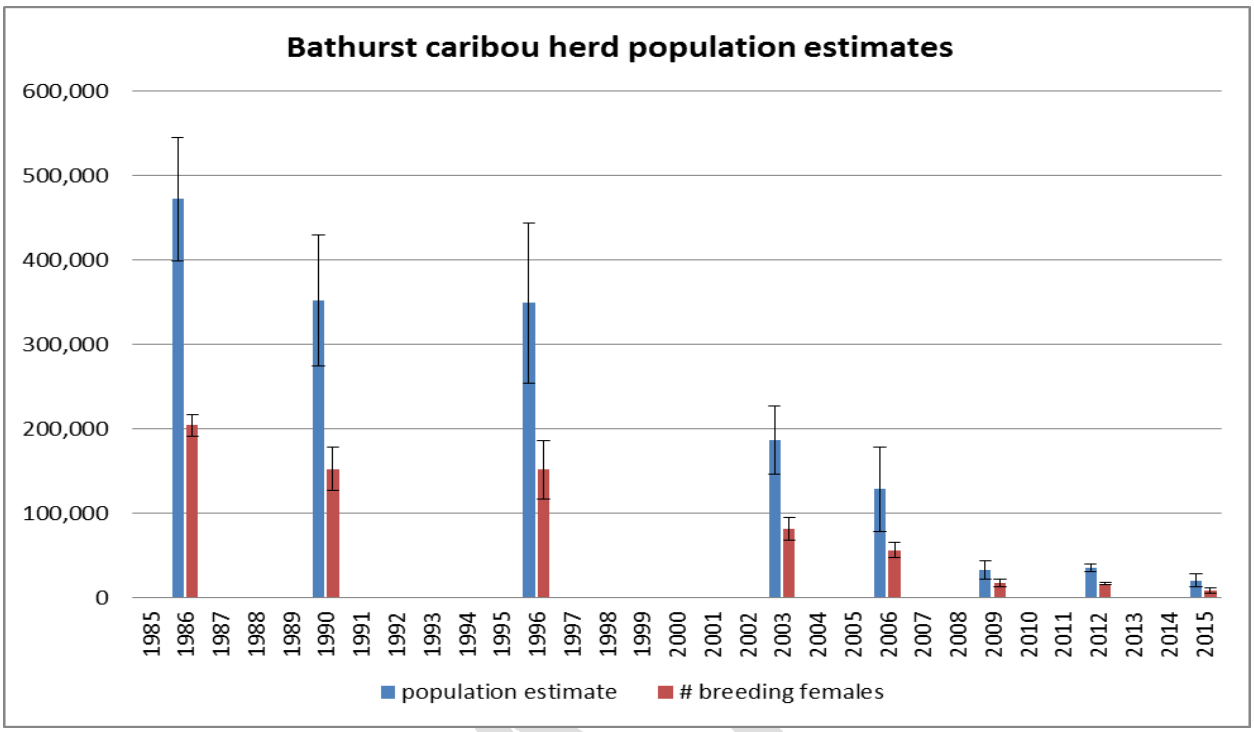

FIGURE 1. ESTIMATES OF BATHURST CARIBOU POPULATION SIZE AND NUMBER OF BREEDING FEMALE FROM 1986 - 2015.

As a result of the rapid decline in Bathurst caribou numbers, commercial guide outfitting and resident harvesting in the NWT have been closed since winter 2009. At that time, some Aboriginal communities voluntarily reduced harvest while others participated in a limited harvest, despite concerns that halting harvest may harm the relationship between people and caribou as well as overall community well-being.[19] Aboriginal hunting on the Bathurst herd has been substantially reduced in recent years and has been effectively closed since winter 2015. A total allowable harvest of zero for the Bathurst herd was recommended by the WRRB and accepted by government in spring 2016. Other recommendations included the consideration of predator management.[20]

In light of the decline in the Bathurst and other herds, barren-ground caribou have recently been assessed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) (Dec 2016) and the NWT Species at Risk Committee (SARC) (April 2017) as "threatened". Habitat changes due to climate, predation, industrial development and forest fires were identified as contributing cumulatively to impacts on barren-ground caribou according to both science and traditional knowledge.[21] If accepted

[19] As Elder Madelaine Drybones explains, elders have been known to slip into depression and lose their health without caribou, not only because they lack caribou meat in their diet, but also because they miss being with them (BCRP 2016b).
[20] WRRB 2016a.
[21] SARC 2017.

for listing (which is expected) there will be legal requirements for the development of a recovery strategy and the protection of critical habitat.

The Range Plan will complement community protocols (based on traditional laws and practices) and combines with current actions, concerns and considerations around harvest restrictions, predator management and habitat disturbance. Further, it will contribute toward any future required herd recovery strategies and habitat designations.

1.1.2 What is the Range Plan Addressing?

Many factors influence caribou and caribou habitat including the practice of respect, the status of the relationship between people and caribou, climate change, environmental conditions (and their effect on insects, parasites, wildfire, etc.), predators, harvest and land use (Figure 2).[22] While it is understood that these factors interact in many complex and cumulative ways, analysis undertaken as part of the range plan process suggests that the incremental effects of land disturbance are important, especially when caribou population levels are low and showing a declining trend, such as in recent years.[23]

The Range Plan is primarily addressing issues related to cumulative land disturbance. It complements and adds to other ongoing processes on the management and understanding of cumulative impacts on the herd. Management actions related to harvest are currently in place and are being assessed and considered for predators through co-management processes with Aboriginal governments.

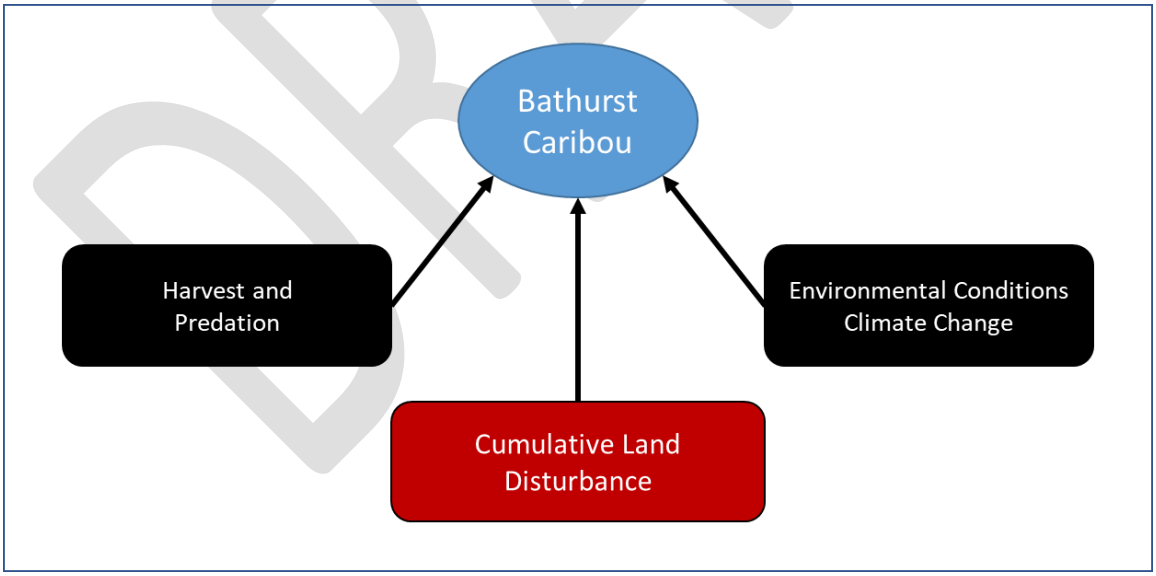

Figure 2: The Focus of the Bathurst Caribou Range Plan (in red)

[22] See supporting documents for further discussion and assessment of the relative importance of these factors that influence the Bathurst herd: BCRP 2017a and BCRP 2017b.
[23] BCRP 2017b.

Recognizing the complexities and scope of multiple factors affecting Bathurst caribou and habitat, recommendations are intended to provide guidance to communities, development proponents, and the many land and resource management authorities including Land Use Planning Boards, Environmental Impact Review Boards, Land and Water Boards, Renewable Resource Boards and Land Administrators (see Section 6). In addition, the recently established Bathurst Caribou Advisory Committee (BCAC), a body set up in partial fulfillment of S. 1211.2 of the Tłı̨chǫ Agreement, will oversee the management of the Bathurst caribou herd. As a starting point, it is currently updating the 2004 Bathurst Caribou Management Plan; a plan that will address and reconcile all the factors affecting the herd including harvest, predation, environmental conditions and land disturbance. The Range Plan will be submitted to the BCAC for consideration and inclusion in the overall Management Plan.

The Range Plan contributes to the Cumulative Effects Assessment Management and Monitoring Framework (CEAMMF) put forward by GNWT, ENR by providing the context with which to assess cumulative impacts to Bathurst caribou during the project specific review process.[24] Range-scale effects and management strategies are addressed in the Range Plan while project-scale operating practices are dealt with through project review as part of environmental assessment processes.

1.1.3 Where is the Range Planning Area?

Traditional knowledge tells us that caribou use of the landscape has always been dynamic, at times growing larger or smaller, depending on available food, herd numbers, wildfires, winter snow conditions, and the influence of caribou leaders on migratory routes.[25] For example, over the past decades, Inuit have watched the Bathurst herd calving ground shift from the east to the west side of Bathurst Inlet.[26] While recognizing the Bathurst range is always changing, a well-defined area within which the Range Plan would be implemented was required.

The Range Plan has adopted a planning boundary based on the overlapping area based on traditional knowledge as well as the annual range of the Bathurst herd derived from radio collared female caribou from 1996-2014 (as described by Nagy 2011) and modified slightly to account for recent observations (Figure 3). This boundary allows the Range Plan to accommodate herd recovery and growth relative to its current status. The areas used by Bathurst caribou since 1996 are the focus of planning efforts while the range extent, as identified from available TK, provides the context of more varied range use over a much longer time period.

The Range Plan is intended to be a living document and the range planning area may be revisited as environmental and land use conditions change.

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[24] ENR 2015.
[25] Hall 1989; Thorpe et al. 2001; Legat et al. 2001; Parlee et al. 2005; Wray 2011; Beaulieau 2012; Sangris 2012; Parlee et al. 2013; BCRP 2016b, 2017e; TRTI 2016a; LKDFN 2016; YKDFN 2016; Parlee 2017.
[26] Thorpe et al. 2001; Golder and KAA 2010; KIA 2012; TCS 2014.

FIGURE 3. THE BATHURST CARIBOU RANGE PLANNING AREA AND HISTORICAL RANGE EXTENT AS IDENTIFIED BY TRADITIONAL KNOWLEDGE

1.1.4 Who is Involved?

A Working Group (WG) made up of representatives from federal, territorial and Aboriginal governments, industry, Aboriginal and non-government organizations in the NWT, Nunavut and Saskatchewan is developing the Range Plan.[27] WG members represent their organizations' perspectives and interests in discussions. However, at this stage their participation does not imply their organizations' acceptance of the Range Plan recommendations. WG members also contributed their experience and, in most cases, their caribou expertise. Table 1 lists groups that participated in the WG and in the development of the Range Plan. The WG is supported by a project team of consultants and GNWT ENR staff.

In addition, task groups and workshops also contributed to the Range planning process. A Minerals Task Group was established to inform the evaluation of management implications to the mineral exploration and development industry. Traditional knowledge holders convened for two separate workshops to provide their expertise and feedback at various stages of the planning process and a technical workshop was held in June 2017 to follow-up on issues identified during the public engagement phase.

TABLE 1 PARTICIPATING MEMBERS OF THE BCRP WORKING GROUP.

1. Wek'èezhìı Renewable Resources Board (WRRB) 2. Tłı̨chǫ Government 3. Łutsel K'e Dene First Nation (LKDFN) 4. Yellowknives Dene First Nation (YKDFN) 5. NWT Métis Nation 6. North Slave Métis Alliance 7. Athabasca Denesuline 8. Kitikmeot Regional Wildlife Board 9. Kugluktuk Hunters and Trappers Organization 10. Kitikmeot Inuit Association 11. Nunavut Tunngavik Incorporated	12. NWT and Nunavut Chamber of Mines – Industry 13. NWT and Nunavut Chamber of Mines - Exploration 14. Government of Nunavut – Environment 15. GNWT - Department of Lands 16. GNWT - Department of Industry, Tourism and Investment (ITI) 17. GNWT - Department of Environment and Natural Resources (ENR) 18. Indigenous and Northern Affairs Canada - Nunavut 19. NWT Wildlife Federation 20. Barren-ground Caribou Outfitters Association 21. Canadian Parks and Wilderness Society

1.1.5 How was it done?

The general approach and steps taken by the BCRP Working Group and Project Team in developing the Range Plan involved four basic steps:

[27] A broader Steering Committee comprised of governments, Aboriginal and industry leadership endorsed and initiated the range planning process in 2014 and has provided guidance and input at key points in the process.

1. Gather Information - understanding the range (people, land use and caribou):

- Information was gathered on Bathurst caribou and caribou habitat, people, and land use through literature reviews, input of Working Group members and other experts, TK submissions from Aboriginal governments and organizations, and through TK and caribou science workshops. Aboriginal perspectives on caribou were mapped out to inform the BCRP framework and considered together with scientific research.

- The amount of current and potential future human-caused disturbance was estimated by creating a range-wide human development map and future development scenarios.

- Range assessment areas were created to better understand the different parts of the range and to support development of a cumulative land disturbance framework (see Sections 3 and 4 below).

2. Understand the major factors affecting caribou:

- Traditional knowledge and scientific perspectives on factors affecting caribou were considered and compared. Both similarities and differences in understandings were considered, drawing from each unique perspective.

- A caribou computer model was used to explore how different natural and human factors may affect biophysical elements of caribou populations (i.e., numbers and health). The model did not take into consideration how natural and human factors may affect socio-cultural elements of caribou populations.

3. Identify key issues and management concerns:

- Based on the above, key issues were prioritized within the scope of the Range Plan. Some of these were grounded solely in science or traditional knowledge whereas others evolved from multiple ways of knowing combined.

4. Explore management options to address those concerns:

- The BCRP Working Group followed elements of a structured decision-making approach to explore and evaluate management options.[28] The approach involved facilitated discussions and explicit consideration of the sometimes-competing values surrounding caribou, culture, economics, and environment. While sometimes uncomfortable, these conversations were necessary in order to move beyond blame, impatience and frustration and towards a tangible plan forward to address concerns about Bathurst caribou.

[28] See Gregory et al. 2012.

1.2 Principles, Goals and Objectives

1.2.1 What is Guiding the Range Plan?

Four main principles guided development of the Range Plan:

1. **Respect Caribou:** Recognize and acknowledge the intrinsic value and importance of caribou as inseparable from land, water, air and every other part of the northern ecological, cultural and socio-economic system; acknowledge respect as the basis for a sustainable relationship that connects people and caribou in the past, present, and future.
2. **Bring Together Traditional, Local and Scientific Knowledge:** Bring together and consider equally the multiple sources of knowledge to inform our collective understanding of and decisions regarding caribou, caribou habitat as well as the various factors affecting caribou, other wildlife and the land. As directed by Elders and other community members, we must work together.[29]
3. **Practice Guardianship, Stewardship and Management to Care for Caribou:** Regardless of whether one understands their role or relationship with caribou as one of guardianship, stewardship, or management, we must work together for the well-being of caribou. It is critical to actively engage youth in guardianship activities and establish learning opportunities with Elders.[30]
4. **Achieve Balance:** Consider and respect ecological (caribou), cultural, social and economic values in decision-making about range use. Acknowledge that achieving sustainable development across the range includes the recognition of multiple interests and uses of the range and will require tough choices about ecological, cultural and economic values to achieve balanced outcomes.

1.2.2 What is the Range Plan Trying to do?

The Range Plan is focused on managing disturbance to caribou and habitat to support recovery of the Bathurst herd. To achieve this, the land must be maintained in a condition such that it will continue to support caribou, and the amount and location of human activities considered.

BCRP MANAGEMENT GOAL:

***Ensure the Bathurst caribou herd annual range is in a resilient landscape condition*.**

[29] Bayha 2012; Beaulieau 2012; Sangris 2012; Parlee et al. 2013; TCS 2014, 2016; BCRP 2016b, 2017e.
[30] BCRP 2016b, 2017e; TCS 2016.

Landscape resilience is understood in the Plan as the ability of the annual range to sustain and provide migratory barren-ground caribou with adequate space and resources to meet their biological needs (i.e., food and nutrition, insect relief, predator avoidance, etc.) under changing environmental conditions, disturbance regimes, multiple stressors and uncertainties, including human land use.[31] We know from TK that respecting caribou means that habitat disturbance must be managed to improve the well-being of Bathurst caribou; to many people this also means maintaining caribou habitat to ensure the ability of the Bathurst herd to recover to over 400,000 and rebuilding a healthy spiritual relationship between people and caribou.[32] Aboriginal northerners feel substantial responsibility in their role as caribou guardians, stewards, managers, monitors and more.

To assist in achieving this goal, the plan includes four specific management objectives. The Range Plan recommendations (Section 4) are organized around these objectives.

OBJECTIVE 1: Ensure the integrity of important habitats.

Habitat integrity is the condition and function of habitats such that the natural processes within them are respected and unaffected by negative influences of human activities. Habitat is understood to include caribou, land, air and water as well as all the connections in between.[33]

Maintaining and respecting the integrity of important habitats will allow continued use of these areas by caribou, and for these habitats to continue to provide necessary energetic, security, or similar requirements to support a recovering Bathurst caribou population.

OBJECTIVE 2: Ensure connectivity between seasonal ranges.

The Bathurst caribou's use of space across its extensive annual range is a key adaptive behaviour that ensures the herd persists into the future. Community members have observed this cyclic use of space since time immemorial and understand the importance of linking caribou lands throughout the year. Respect for caribou means ensuring that they can move freely along ancient and well-worn migration trails allowing the herd to access important habitats, or shift range use in response to changing future environmental conditions including wildfire and predation.

OBJECTIVE 3: Ensure the amount of human-caused land disturbance is kept below certain levels.

While some traditional knowledge holders suggest that caribou can adapt to or get used to some levels and types of disturbance (especially when they are born into it), most

[31] Sensu Holling 1973. And see Standish et al. 2014.
[32] Legat 2008, 2013; Wray and Parlee 2012; BCRP 2016b, 2017e; TCS 2016.
[33] BCRP 2017e.

share conclusions with scientists that suggest human-caused disturbance has a negative incremental cumulative effect on caribou population performance.[34]

Despite the challenge of the task,[35] establishing cumulative land disturbance thresholds that are informed by caribou science and TK and reducing overall human disturbance below those limits provides a key fundamental step towards maintaining landscape resilience.

OBJECTIVE 4: Ensure the development, design and use of roads is managed with consideration to caribou.

Roads facilitate the construction and operation of mines and provide the transportation of goods and services to communities. The construction and use of winter and/or all-season roads and trails on the Bathurst caribou range is therefore fundamentally important for the economic and social development of the region.

However, newly constructed roads and trails into previously remote areas can also have unintended consequences, including noise, dust, barriers to movement and increased wildlife harvesting opportunities, which, for caribou, can have significant and lasting impacts particularly when traditional laws and other respectful practices are not followed.[36]

Effective siting, design and managing the human use of roads through inception to post-closure is therefore an important objective which requires consultation and collaboration among appropriate governments, boards, agencies, organizations, companies, communities and users.

[34] Parlee et al. 2005; EMAB 2012; Parlee et al. 2013; TCS 2014, 2016; TRTI 2016a; LKDFN 2016; YKDFN 2016.
[35] Johnson 2013.
[36] Thorpe et al. 2001; BHP 2007; Legat 2008; Golder and KAA 2010; Wray and Parlee 2012; Parlee et al. 2013; Trailmark 2015; BCRP 2016b, 2017e; TRTI 2016a, 2016b.

2 All About the Land of the Bathurst Caribou

2.1 Land Management and Land Use

The Bathurst herd annual range spans across approximately 390,000 km^2 of the Kitikmeot region in Nunavut and the North and South Slave regions of NWT within which several land use management and planning regimes either exist or are ongoing.[37] This range crosses the traditional and asserted territories of at least seven Indigenous groups.

In Nunavut, the Nunavut Land Claim Agreement (NLCA) establishes the land and wildlife management co-management system. The Draft Nunavut Land Use Plan (2016), which is currently under review, proposes new protected areas for caribou calving and post-calving areas, as well as identified freshwater crossings based on best available science and Inuit Qaujimajatuqangit (Figure 4).

In NWT, a Land Use Plan is in place for the Tłı̨chǫ Lands, while the LKDFN and YKDFN have initiated land use planning. The Athabasca Denesuline have also initiated land use planning within their traditional territory in the southern reaches of the range but the process has been stalled due to funding constraints. In support of land claim negotiations with the Akaitcho Dene, Athabasca Denesuline and NWT Métis Nation, interim land withdrawals have been established, within which mineral staking is not currently permitted. A large conservation area, Thaidene Nene, is also proposed around the East Arm of Great Slave Lake and Artillery Lake, presently monitored through the guardianship program Ni Hat'ni Dene Program (Figure 4).

Currently, almost all permanent human development is within the southern part of the range, centered around the City of Yellowknife, the Tłı̨chǫ and Łutsel K'e communities and around existing road infrastructure. Much of the Bathurst range is within the Slave Geological Province, which has a long history of mineral exploration and development. Gold was historically the most important commodity but the pursuit of diamonds in the Lac de Gras region in the early-1990s transformed the NWT economy. Several future mineral development and transportation concepts are being advanced, including new all-season road corridors in both Nunavut and NWT (including the Grays Bay Road and Port, Tłı̨chǫ All-Season Road and Slave Geological Province corridor; see Appendix 1). Concern has been expressed by the mineral development sector that the extensive area of protected/conservation and interim land withdrawal areas has triggered the significant decline in prospecting and exploration across the range. For most community members, caribou has long been their most valuable "resource" or "commodity".[38]

[37] The Nunavut portion of the Bathurst annual range accounts for approximately 75,000 km^2 (20%) of the total BCRP planning area.
[38] BCRP 2016b, BCRP 2017e

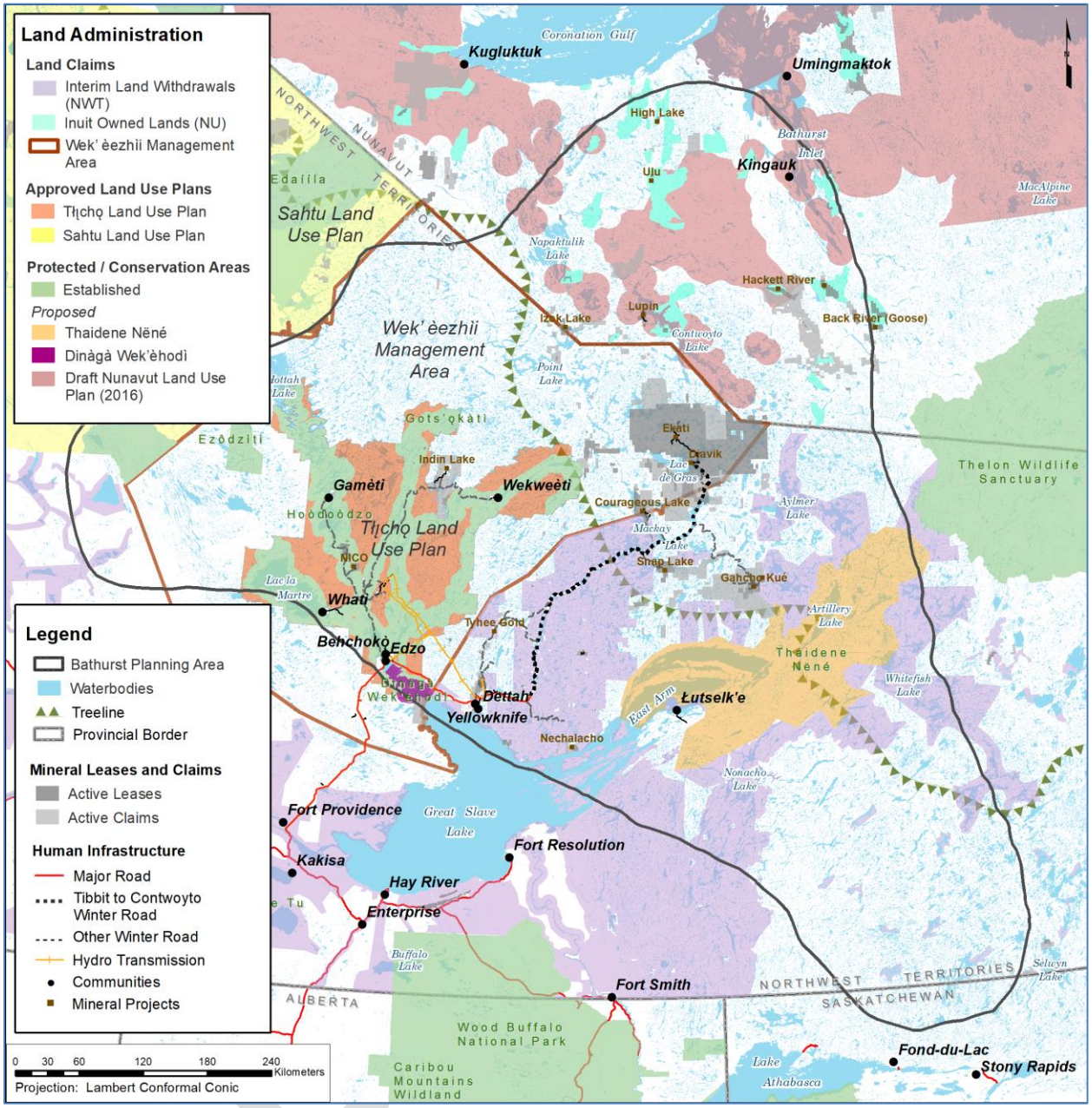

FIGURE 4 LAND ADMINISTRATION AND LAND USE DESIGNATIONS ACROSS THE BATHURST RANGE PLAN AREA.

2.2 Caribou Habitat and Range Use

The Bathurst range is characterized by extensive networks of hunting routes and lifeways of Caribou People, migration trails that are carved into the iconic rugged, rocky Canadian Shield landscape with its numerous lakes. The Nunavut and central NWT portion of the range occurs north of the treeline and is within the Tundra vegetation zone of the Southern Arctic Ecozone (Figure 5). Tundra habitats include a variety of vegetation communities including sedge meadows, wet and dry low shrub communities, dry

lichen areas, and sparsely vegetated rocky outcrops. The southern and western parts of the NWT range are within the Taiga (boreal forest) vegetation zone of the Taiga Shield ecozone. The Taiga is characterized by open canopy spruce and jack pine forests with lichen groundcover and sparsely vegetated rocky outcrops.

As TK tells us, wildfire is a major factor influencing the age and composition of taiga forests and the availability of "caribou food".[39] In general, scientific research suggests that barren-ground caribou are well adapted to fire in the Taiga ecosystem,[40] at the same time, TK tells us that caribou avoid burned areas and it take many decades for lichen and other forage to return such that burned areas cause shifts in migration routes (see Figure 5 for wildfire extent on the range). Recent research points toward the expectation in future years of larger and more intense wildfires due to climate change.[41]

Many of the Proposed Draft Plan recommendations are organized around the Tundra and Taiga biomes.[42] However, these biomes should not be considered as separate from caribou in that caribou are a key element of both the environmental and social elements of these two biomes.

[39] TRTI 2016a; DNNLC 2016; LKDFN 2016; YKDFN 2016.
[40] Miller 2000; Barrier and Johnson 2012.
[41] Flannigan et al. 2005.
[42] These biomes were selected, in part, to keep the focus on the BCRP on the land and how the land is used by caribou. Feedback from some community members was that the area should be divided along political boundaries. However, given the over-lap between asserted Aboriginal territories, it was not possible to divide the range in this manner.

FIGURE 5 TUNDRA AND TAIGA VEGETATION ZONES (BIOMES) WITHIN THE BATHURST RANGE, AND RECENT WILDFIRE ACTIVITY.

2.2.1 Seasonal Ranges and Migration Routes

Aboriginal people have typically divided the year into seasons centred around weather, moon phases, wildlife activity and other environmental factors. Accordingly, the BCRP divides the year into five general seasons of the Bathurst herd annual life cycle. Bathurst caribou live on the tundra primarily during the calving, post-calving, and summer periods, while the forested taiga has historically been their main home for the winter. The fall and spring seasons are generally migratory times, when caribou move between the calving and post-calving, summer, and winter ranges (Figure 6).

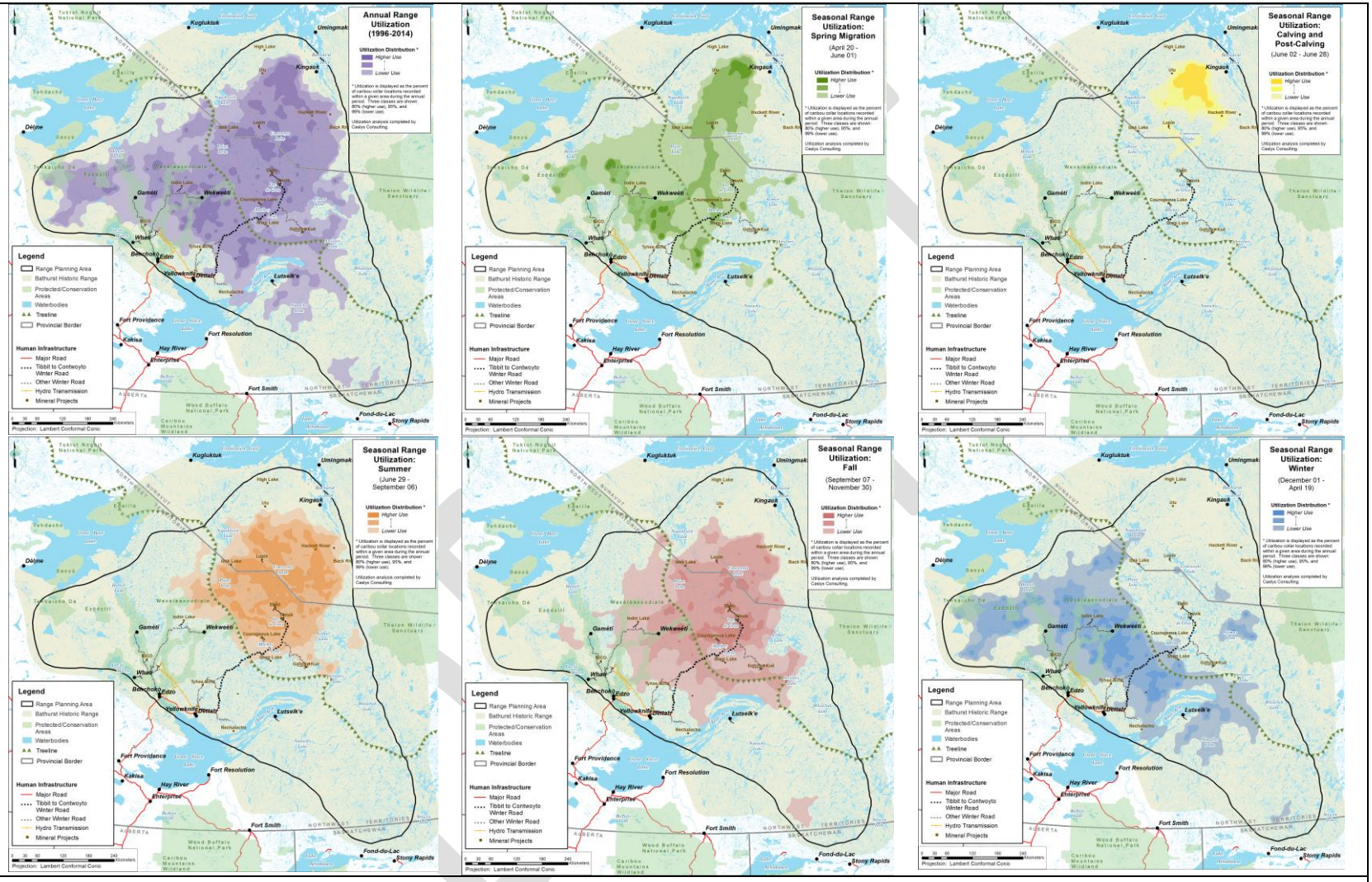

FIGURE 6 ANNUAL AND SEASONAL RANGES OF THE BATHURST CARIBOU HERD AS DEFINED BY SATELLITE TELEMETRY DATA FROM 1996 TO 2014.

Caribou People have long explained how Bathurst caribou migrate annually between calving areas in Nunavut and wintering areas in NWT. Figure 7 shows the general migration routes of Bathurst caribou as documented from TK research conducted by Dedats'eetsaa (Tłı̨chǫ Research and Training Institute), Yellowknives Dene First Nation and the Kitikmeot Inuit.[43]

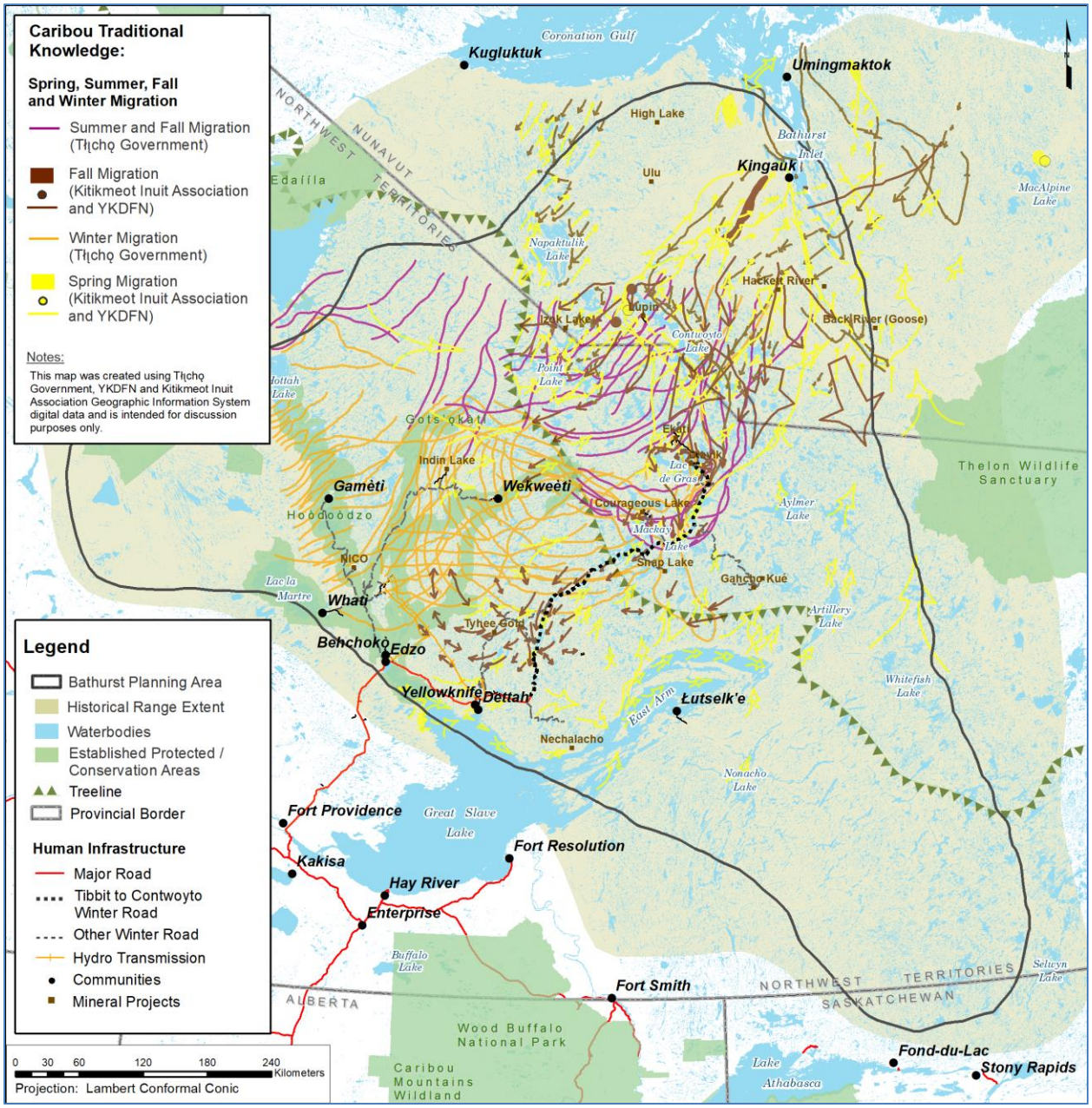

FIGURE 7 MIGRATION ROUTES IDENTIFIED BY TRADITIONAL KNOWLEDGE.

[43] These spatial data were provided directly to ENR for the purposes of the BCRP through data sharing agreements.

During these seasonal movements, caribou are funneled between large lakes on narrow "bridges" of land (called "taataa" by the Tłı̨chǫ) and swim or wade across rivers or lakes at water crossing locations on the summer and fall range. Crossings are most frequently located at narrows caused by peninsulas or other shoreline irregularities, or where there is water turbulence or exposed rocks and gravel bars in the water. Caribou People have a long history with these sites and have intimate knowledge of their characteristics and locations as they are important culturally for harvesting, camping and observing caribou. The Bathurst summer range in the central NWT Tundra contains the largest concentration of identified water crossings in the annual range. These features, land bridges and water crossings, are key to maintaining habitat connectivity between seasonal ranges.

2.2.2 Bathurst Centre of Habitation (Core Use Area)

For migratory barren-ground caribou, the center of habitation represents the most favorable and secure portions of a caribou population's range. The center of habitation is a core use or refuge area that includes important habitats and migration paths, which a caribou population occupies and uses when it is at low numbers in its natural cycle; it is the core use area from which caribou extend their seasonal movements and gradually use more areas and travel greater distances as the population increases in abundance.[44] The centre of habitation also aligns with traditional hunting areas and lifeways of Caribou People (see Figure 7 migration routes as a proxy for harvesting trails).

For the Bathurst herd, the contraction of its annual range – as reflected by collared cows since 1996 – coincides markedly with the numerical decline in population size (Figure 1). This contraction has resulted in the herd remaining far away from many Aboriginal communities.

For this range plan, we have defined the center of habitation based on the current core use area, which has been estimated based on the distribution of satellite collared caribou from 2015-2017, coupled with traditional knowledge of important migratory, geographic, and habitat features (Figure 8).

Because of the important role of the core use area in sustaining herds throughout cycles of low and high numbers, it is suggested that mitigating land use activities more stringently in the centre of habitation is necessary.[45]

More detail on caribou range use and the methodology for defining the centre of habitation for the Bathurst herd is provided in the supporting Science and Technical Information on Caribou document.[46]

[44] Skoog 1968; also see Bergerud et al. 2008; UPCART 2017.
[45] See UPCART 2017.
[46] BCRP 2017b.

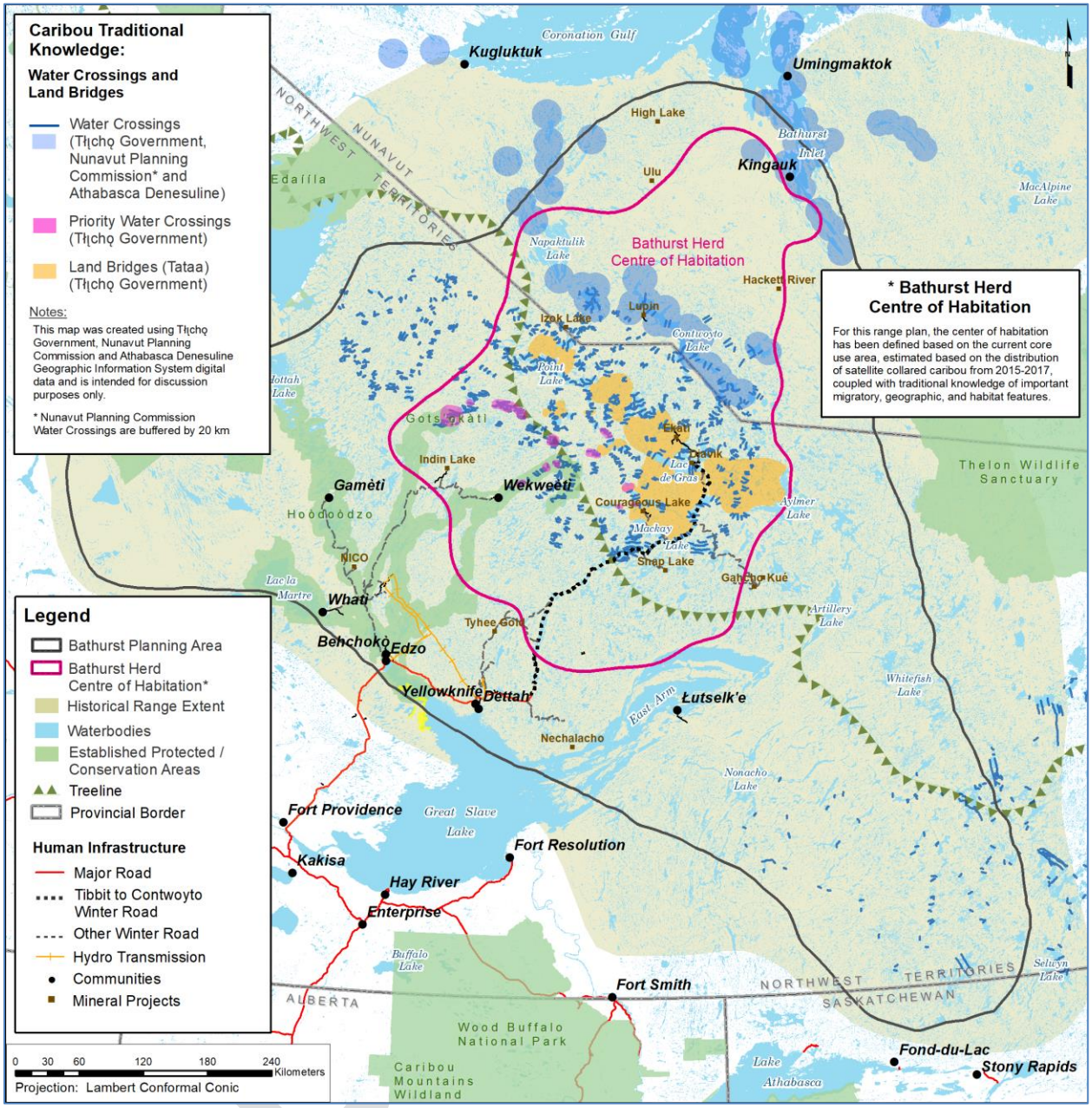

FIGURE 8. CENTRE OF HABITATION OF THE BATHURST CARIBOU HERD BASED ON THE 2015-2017 DATA FROM SATELLITE COLLARED ADULT FEMALES AND IMPORTANT MIGRATORY, GEOGRAPHIC AND HABITAT FEATURES AS IDENTIFIED BY TK.

3 Plan Components

For several years, environmental assessment boards, wildlife management boards, and Aboriginal governments have been requesting a way of managing and minimizing range-scale human-caused disturbance. Supporting background documents describe the results of information gathering, major factors affecting caribou, and key issues or management concerns.[47] Different management tools to address major concerns were considered and examined in the Interim Discussion Document.[48] Based on feedback on the Discussion Document and additional consideration of management tool effectiveness and implementation requirements as well as comments from both the technical and TK workshops of 2017, seven broad management tools have been refined along with a cumulative land disturbance framework (CLDF) with which to coordinate their application to assist in achieving the Range Plan goal and objectives.[49]

3.1 Cumulative Land Disturbance Framework

The BCRP Cumulative Land Disturbance Framework (CLDF) provides over-arching landscape-level management benchmarks that identify management responses based on the importance of habitat areas and the levels of habitat disturbance. This approach is consistent with approaches to cumulative effects management taken in other jurisdictions in Canada.[50]

Establishing disturbance thresholds in the CLDF on a regional scale will inform requirements for project assessment and mitigation, and can provide guidance for future land use planning as well as providing insight into whether these thresholds have been exceeded. For community members, the CLDF aims to answer the question often asked, "how much is enough?" when considering the amount of development and disturbance on caribou land.[51]

The tiered thresholds move from desirable conditions at low levels of land disturbance through cautionary and high-risk conditions at increasingly higher levels of disturbance. Management responses correspondingly progress from basic through enhanced to intensive (Table 2). The intention of using tiered thresholds with increasingly stringent management responses is to reduce, and ultimately reverse the negative trend of land disturbance effects as early as possible. Consequently, in the CLDF, all seven management tools get implemented at the desirable range status level, and two of the tools (Road Planning / Access Management and Offsetting / Compensatory Mitigation) have increased requirements at the cautionary range status level.

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[47] BCRP 2017a, 2017b; BCRP 2017c.
[48] BCRP 2016a.
[49] Input from members of the Working Group and submissions from Aboriginal groups and external interest groups factored heavily into the development of the Draft Range Plan (BCRP 2017d).
[50] BC Government 2016; Antoniuk et al. 2012; Francis et al. 2013; Gooding et al. 2013.
[51] BCRP 2016b.

TABLE 2 BCRP CUMULATIVE LAND DISTURBANCE FRAMEWORK

Amount of Disturbance	Status of Range	Management Response Level
High	**High Risk**	**INTENSIVE MANAGEMENT RESPONSE** Land activities resulting in new disturbance are allowed only when active disturbances are minimized, removed or reclaimed such that total disturbance remains below the high risk threshold.
Moderate	**Cautionary**	**ENHANCED MANAGEMENT RESPONSE (in addition to all recommendations in the BASIC level)** **Increased requirements for:** • **Road Planning / Management –** consider enhanced traffic management and design features. • **Offsetting / Compensatory Mitigation** - habitat offsets at higher ratio AND compensatory mitigation (e.g. financial and in-kind contributions to science and TK research and monitoring, guardianship programs).
Low	**Desirable**	**BASIC MANAGEMENT RESPONSE** **Community Guardianship –** support Aboriginal communities to monitor caribou and habitat conditions and support education regarding respectful harvest practice. **Habitat Conservation** – use legislation to protect the most important habitat areas: water crossings, land bridges, calving areas/post-calving. **Mobile Caribou Conservation Measures** – for land use activities that occur within the centre of habitation, implement Mobile Caribou Conservation Measures (i.e., restrict non-essential project activities when caribou are present) and associated monitoring, compliance and enforcement. **Road Planning / Access Management** – manage routing, timing of construction, design, and consolidation of routes across all users. **Offsetting / Compensatory Mitigation** – counteract, or make up for, residual impacts on caribou considering: • **Habitat Offsets** – at a minimum 1:1 ratio (restoration, enhancement, preservation) (include legacy land disturbance); OR • **Compensatory Mitigation** – if offsets are not feasible, use financial and in-kind contributions to science and TK research and monitoring, community guardianship programs. **Wildfire and Fuels Management** – identify large patches of undisturbed winter range annually for the GNWT wildfire Values at Risk database that is used to prioritize wildfire response. **Online Staking** – use online staking to reduce the potential for caribou disturbance during the early phases of mineral exploration and thus increase caribou well-being through respectful practices.

3.2 Management Tools

The following management tools and approaches, grounded in multiple ways of knowing, are suggested for managing human-caused and natural (fire) disturbance in the Bathurst range. Taken together and applied in a coordinated fashion through the CLDF, these tools are meant to achieve the goal and objectives of the Range Plan as stated in Section 1.2.

1. **Community Guardianship**
2. **Habitat Conservation**
3. **Mobile Caribou Conservation Measures**
4. **Road Planning and Management**
5. **Offsetting / Compensatory Mitigation**
6. **Wildfire and Fuels Management**
7. **Online Staking**

Some of these management tools are already being used, or have been used, to varying degrees in different parts of the Bathurst range, however, some are only applied to individual development projects through existing project review, approval and permitting processes. The Range Plan guides application of the tools in an integrated, coordinated and consistent manner across the range to manage disturbance in support of landscape resilience.

3.2.1 Community Guardianship

Aboriginal peoples are increasingly developing robust guardianship programs throughout their territories according to traditional laws and values as well as input from best available science.[52] These "made in the north" approaches build on generations of "watching" the land and are grounded in the ethic held by most Aboriginal peoples that they have a responsibility as caretakers of their lands, wildlife, air and more. As asserted by multiple community members throughout the BCRP process, Caribou People across the range of the Bathurst herd are best positioned to be guardians for overall caribou well-being.

Examples in Canada and Australia where government partnered with Aboriginal peoples to establish land-based programs on traditional territories as part of the national park system have shown huge successes in achieving a broad range of cultural, social, economic and environmental values and outcomes.[53] Guardianship programs such as those already in place for the Bathurst caribou could

[52] TNC 2016.
[53] SVA 2016; TNC 2016.

support Aboriginal people across the entire Bathurst range to monitor Caribou People as well as caribou well-being, condition, abundance and distribution alongside socio-cultural and environmental conditions (natural and human or industrial). Increased support for community guardianship programs that incorporate education regarding respectful harvest practice is universally and strongly supported by all WG members.

Current Status

Local examples such as the Tłı̨chǫ Boots on the Ground program,[54] Łutsel K'e Ni Hat'ni Dene (Watchers of the Land) and Dehcho K'ehodi (Taking Care of the Land) initiatives are guardianship models with significant caribou components that are relevant to the BCRP. In Nunavut, the NWMB is leading the Community-Based Monitoring Network empowering community members as stewards and monitors for their territory while the Kitikmeot Regional Wildlife Board is soon to be developing a caribou monitoring program in late 2017/2018. These more recent initiatives built upon much of the monitoring research initiated as part of the West Kitikmeot Slave Study in the 1990s.[55]

The federal government has committed 25 million dollars over the next 5 years in the 2017-2018 budget to support the establishment of a network of guardianship programs in Canada. It is unclear what amount, if any, might be available for programs in the NWT, Nunavut and Saskatchewan.

3.2.2 Habitat Conservation

Implementing habitat conservation measures for important habitat areas is the most direct way of avoiding habitat loss.

Protected areas, conservation areas or habitat designations are legally designated areas (established under legislation and land use plans) that define restrictions on the types of activities that can occur. These restrictions can range from full exclusion of human activity (typically protected areas) to identifying the types and timeframe of activity restrictions (typically conservation areas). An example of the inherent flexibility in some of these approaches in the NWT, conservation areas are currently being used to manage harvest of the Bathurst herd with boundaries being redefined every few weeks depending on the distribution of caribou.

Community members have long called for some level of habitat protection for caribou, particularly during sensitive times of the year or at key areas across the range. These more formal approaches would build upon traditional practices (e.g. feeding the land; avoiding calving grounds during the calving season).

[54] TRTI 2017a, 2017b.
[55] Thorpe et al. 2001; Parlee et al. 2001, 2005; Legat et al. 2001, 2002, 2008a, 2008b.

Caribou use of the landscape is dynamic on a seasonal basis and therefore fixed, permanent boundaries may not be the best way to protect important habitats. Flexibility will be required in considering the use and applicability of habitat protection tools on particularly sensitive seasonal ranges. However, some habitat features important to caribou are geographically defined and fixed such as water crossings and land bridges that might be suited to longer term fixed boundaries with activity restrictions within them. These habitat features, best identified through traditional knowledge, are key to facilitating movements between seasonal ranges and maintaining habitat connectivity.

Current Status

Existing protected areas and conservation areas on the range of the Bathurst herd are identified under the Tłı̨chǫ Agreement and the Tłı̨chǫ and Sahtu Land Use Plans. They have variable activity exclusions, some excluding all development and some allowing transportation and utility corridors. Together the land use protection zones in the Tłı̨chǫ land use plan encompass more than 23,000 km^2 of winter range area and contribute significantly towards maintaining habitat integrity in those areas.

The 2016 Draft Nunavut Land Use Plan (NLUP) specifies calving/post-calving, key migration corridors onto and off of the calving grounds and water crossings (with a 10km buffer) as conservation areas restricting all industrial activities. The Nunavut Planning Commission (NPC) is currently holding public hearings and revising the Draft Plan so it is uncertain what kind of protection, if any, will overlap the Bathurst range as the NPC develops the NLUP.

Relatively recently available habitat protection and conservation provisions under the *Wildlife Act* and NWT *Species at Risk Act* have, to date, not been utilized, but offer new tools for habitat conservation.

3.2.3 Mobile Caribou Conservation Measures

Implementing mobile caribou conservation measures (MCCM) in areas of the range where caribou are particularly sensitive and at a time when the herd is particularly vulnerable is a flexible way of minimizing caribou disturbance.

The purpose of developing MCCMs is to guide land use activities and operational practices in order to reduce sensory disturbance of caribou. MCCMs do not protect habitat from physical disturbance; habitat loss could still occur in areas where only MCCMs are used.

Activity restrictions that are triggered when caribou are in the area, such as MCCM, are generally preferred over fixed timing windows by industry as they are only required when caribou are in the vicinity. While providing increased flexibility, mobile measures also have higher monitoring requirements, and may introduce greater unpredictability to operational planning.

For success, detailed development of systems and prescriptions are required to prescribe how and when land use activity levels should be reduced or halted when wildlife is present or within an identified

distance. Community members have called for this type of management response,[56] and traditional cultural rules help provide some of the context for guiding land use activity related to caribou and caribou habitat.

While this type of guidance is already implemented on an individual project basis, establishing a consistent approach for managing/restricting the timing and location of human land use activity would establish clearer guidelines for industry and provide a basis for improved habitat management at a range scale. Again, compliance and enforcement are critical.

Current Status

MCCMs have not been applied to a great extent in the north or other jurisdictions in Canada and where they have been used their effectiveness was not assessed.[57] Some work has been done on developing a rigorous method for detecting, triggering and taking action as caribou approach a development,[58] as well as an analysis of the potential effectiveness of MCCM.[59] These documents provide a reasonable starting point to test implementation in an adaptive management framework. The Review of MCCMs commissioned by Government of Nunavut recommends the application of MCCMs on a trial basis to assess effectiveness "across one or more seasonal ranges of one of a few overlapping herds". The recommendation below will trigger the trial development and application of MCCMs on the Bathurst range.

3.2.4 Road Planning and Management

Roads with their associated human use and traffic are important issues in some areas of the Bathurst caribou range. Building on living memory of how small camps and other land disturbances affected caribou, traditional knowledge holders today have provided insight into the impacts of roads on caribou. Review of the TK literature indicates that linear features such as roads can affect the behaviour of caribou in many ways, including:[60]

- increasing noise, pollution and contaminants,
- altering migration routes and creating partial barriers to movement (e.g., steep snowbanks),
- enticing use for easy walking, predator lookouts, and escape from insects,
- creating dust that can affect eating,
- causing habitat loss and fragmentation.

[56] BCRP 2016b, 2017e.
[57] Atkinson, S. 2016.
[58] Poole and Gunn 2015.
[59] Atkinson, S. 2016.
[60] Kendrick et al. 2005; Parlee et al. 2005, 2013, 2015; EMAB 2012; Tłįchǫ Government 2013; Sangris 2012; Jacobsen 2013; Trailmark 2015; TRTI 2014; NWTMN 2016; AD 2016; TRTI 2016a, 2016b; LKDFN 2016; NSMA 2016: NSMNA 2016; YKDFN 2016; BCRP 2016b).

In addition, roads can provide increased access into previously remote areas of the range which can lead to sensory disturbance from road traffic, mortality from vehicle collisions and increased harvest opportunities as documented through both scientific research and traditional knowledge. Further, roads allow access for harvesters in a time where some community members are not following traditional laws around harvest practice and respecting one another's territories.[61] While currently there is no allowable harvest of the Bathurst herd, these concerns should be addressed in anticipation of an opening of harvest in the future.

Road planning and management can be effective in reducing both direct mortality and indirect sensory disturbance to caribou. It can address issues such as construction methods and route orientation to reduce barriers to movement, consolidating routes among multiple users to reduce fragmentation, and the use of seasonal roads vs. all-season roads to minimize/control the timeframe over which disturbance may occur. At a more strategic level, transportation corridor planning can examine route optimization to minimize impacts to caribou while still meeting transportation needs. Decreasing impacts on caribou from roads is one way to help restore respect for caribou.

Current Status

The NWT relies on seasonal roads in many parts of the range to access communities and mines. Warmer winters have resulted in shorter winter road seasons and constrained timeframes for getting materials to remote sites and communities. Upgrading winter to all-season roads may be necessary in the near-term to continue to meet the needs of NWT residents and industrial projects.

There are many examples of industrial operations on the Bathurst range taking approaches to manage and mitigate the impacts of roads on caribou. Road management plans are used to monitor caribou behaviour, suppress dust, and to guide routing, construction and traffic. Some mining companies have convened TK Panels comprised of expert knowledge holders to incorporate their guidance on how to design roads to best allow for caribou migration and movements and other factors (e.g., Diavik TK Panel).

Currently, the GNWT does not restrict access on public roads in the NWT and all roads – even those built for industrial purposes – are public.[62] Increased and uncontrolled access along with challenges around compliance and enforcement are particular concerns to community members, particularly when trying to exercise guardianship responsibilities.[63] However, limiting access on roads also challenges the Aboriginal right to access caribou and other species for traditional use. Due to road and trail access across the winter range, the Bathurst herd is considered to be one of the most accessible herds of barren-ground caribou in the NWT.

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[61] BCRP 2017e.
[62] The GNWT issues a license of occupancy for a developer to build a road but it does not provide ownership. Therefore, the developer has no legal right to gate or otherwise restrict access. See Section 4.1.1 of GNWT Technical Report to the Canadian Zinc Prairie Creek All Season Road Project (GNWT 2017a).
[63] BCRP 2017e.

3.2.5 Offsetting / Compensatory Mitigation

Offsetting and compensatory mitigation refers to the practice of taking action to compensate or make up for unavoidable residual impacts that remain after all reasonable mitigative actions have been taken. The principle of "no net loss" underpins offsetting and compensatory mitigation such that an equivalent positive action is taken to improve or at least maintain the current status of a particular value. This could be done through replacing, restoring, enhancing or preserving a particular value.[64]

Offsetting and compensatory mitigation approaches are being used in other jurisdictions in Canada to manage impacts to wildlife habitat.[65] Habitat offsets essentially refer to the trading of an amount of one habitat that will be lost for an equivalent amount of habitat elsewhere so that the total amount is maintained. Population level offsets can mean actions such as predator control/management, captive breeding programs; actions that may have direct effects on the population performance or numbers. Other types of offsets or compensatory mitigation may be financial contributions to funds that support research, habitat restoration/enhancement/reclamation or educational programs or monitoring/guardianship programs. Community input to evaluate key habitats and habitat qualities for offsetting will be extremely valuable.

Current Status

The development of a Compensatory Mitigation Plan for addressing concerns related to impacts on the Bathurst caribou herd was a recommendation from the MVEIRB on the DDEC Jay Project expansion which is the first application of this type of plan in the NWT. The intent of the plan is to offset or compensate any residual negative effect to Bathurst caribou as a result of the project.[66] Currently the plan consists of financial offsets to support research into: a) causes of the decline in the Bathurst herd; b) mechanisms of the zone of influence around development sites; c) assessment of the distribution of caribou within and outside industrial features including roads (geofence collar data); and, d) TK based monitoring programs.

Working Group members have highlighted that offsetting and compensatory mitigation measures could be used to deal with some of the legacy disturbances of past land use activity (e.g., abandoned structures, fuel caches, etc.)

3.2.6 Wildfire and Fuels Management

Wildfire is the most important natural disturbance factor across the forested taiga portion of the Bathurst range. The wildfire area burned must be tracked and assessed in conjunction with managing human-caused land disturbance.

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[64] See for example the Business and Biodiversity Offsets Programme: http://bbop.forest-trends.org/
[65] See for example BC Government 2014.
[66] DDEC 2017.

Caribou are adapted to the cycles of fire and regrowth; both being an important part of the natural cycle of renewal. However, with climate change, the frequency, intensity and size of wildfires will likely be increasing. Northerners have expressed many concerns regarding the amount of recent wildfire activity within the winter range, and the negative effect this could have on the ability of the range to support a stable or recovering caribou population. As a result, considering human land disturbance in combination with the changes in wildfire disturbance (above normal ranges) as cumulative stresses on caribou is warranted.

The primary mechanism for GNWT to consider caribou habitat in responding to wildfire is through their "Values at Risk" hierarchy. Human life and infrastructure/property are the top priorities that guide GNWT's decisions about fire response, but natural resource values (such as caribou habitat) can factor in as an additional priority. Fuels treatments such as prescribed burns and fire breaks can be used in some cases (and under the right conditions) to attempt to protect areas of interest and are recommended by Caribou People as a way to respect caribou. Caribou People note that increases in fire frequency and extent combined with constraints on fire suppression has threatened much caribou habitat particularly in the winter range.[67]

Current Status

Resources (i.e., people, equipment, airplanes, etc.) are limited, and resources directed to fighting fires in caribou habitat mean that other resources are needed to protect communities and property; many of the fires that would be most meaningful to caribou habitat are very large and remote, which are nearly impossible to control; lastly, fire is inevitable across most of the territory, and is an important part of the natural boreal forest ecosystem.

In recent years, ENR has worked with some NWT communities to identify areas of important winter caribou habitat, to include in their "Values at Risk" hierarchy of decision-making, but this has not been done for the entire winter range of Bathurst caribou and has primarily focused on areas near communities. Other approaches such as prescribed burns and revegetation have been used only rarely.[68] GNWT does not have a well-developed prescribed burning program and currently only conducts burns to protect communities. GNWT does not replant after fires because the burned areas are often too large to replant effectively, and because natural regeneration is often as successful or more successful than planted seedlings. Community members with a history of controlled burns could provide key insights to this process.

The large-scale application of these types of treatments are limited by the large expanse of the taiga forest in the NWT and the costs associated taking action in remote areas. Nonetheless, there may be

[67] Parlee et al 2013; TRTI 2016; DNNLC 2016; LKDFN 2016; BCRP 2016b, 2017e.

[68] While people talk about controlled burns being practiced by Caribou People in the past, it was not possible to find discussions of this through the literature review.

opportunities to take action in some years recognizing that the benefits of that action may be negated by fires in the future. Caribou People could provide key insights into key caribou habitat for priority protection.

3.2.7 Online Staking

Over the past century, the Bathurst range has experienced much mineral exploration activity resulting in multiple producing mines. In 1991, prospectors identified diamonds in the Lac des Gras region of the Slave Geological Province in the central Bathurst range, leading to a dramatic increase in the level of mineral exploration in the central NWT and the Kitikmeot region of Nunavut. During this period from the mid-1990s to late-2000s, active mineral claims covered most of the central and northern portion of the Bathurst herd range.[69] This large increase in exploration activity was the original source of the cumulative effects concerns for Bathurst caribou as voiced by community members, regulators and scientists.

A sustained level of mineral exploration is required to develop a mine, as fewer than 1 in 1,000 exploration projects generally result in a producing mine. Each stage of the mineral exploration and development cycle requires different types of jobs and has varying levels of economic contributions. Early exploration involves activities such as prospecting, staking a claim, ground and air-based geophysical work, exploratory drilling, etc. Activities requiring a land use permit or water licence will have terms and conditions to address issues of habitat disturbance. However, some of the earlier phases of work do not trigger the requirement for a permit or licence. It is these activities (not associated with a camp or specific location), especially those requiring aircraft support, that have led to concerns of sensory disturbance to caribou.

Current Status

In recent years, the level of mineral exploration has declined dramatically and active mineral claims and leases now occupy only approximately 5% of the Bathurst range planning area, with most occurring in the central NWT around the three producing diamond mines near Lac de Gras, and specific geological tracts in Nunavut. While the level of exploration has declined since the 1990s there remains concern over the impacts of these activities and the potential for another “rush” in staking presenting the potential for disturbance.

Online staking would eliminate the need for companies to physically position their claim stakes on the land, thus reducing the need to fly over large tracts of land. Online staking is not available currently under the Mining Regulations, in NWT and Nunavut but a new Mineral Resources Act in the NWT and new mining regulations in Nunavut are being drafted that may offer this opportunity.

[69] BCRP 2017b.

4 Management Recommendations

The BCRP prescribes the use of the management tools described above in an integrated manner through the CLDF to achieve the overall Range Plan goal and objectives.

Since the Bathurst Range spans multiple jurisdictions and implementation success is dependent on multiple management authorities, important considerations to note include:

- All management recommendations are subject to the legislated co-management processes that are in place and under development in each jurisdiction.
- Each jurisdiction has several potential legislative tools that could support implementation, the preference is to use flexible tools that support adaptive management as conditions change over time.
- All recommendations should be reviewed every five years to take into consideration the population status of the herd, changes in caribou distribution and range use, and other socio-economic and community factors.
- Existing land use legal rights are to be respected and managed on a case-by-case basis.

The CLDF recommendation is discussed first below, followed by recommendations for each of the management tools.

4.1 Interim Cumulative Land Disturbance Framework[70]

The interim CLDF disturbance thresholds reflect limits of acceptable change, based on consideration of multiple values and perspectives – ecological (caribou), cultural, social and economic (see Text Box 1 for further discussion of the rationale for setting the CLDF thresholds).

Recommendation 1

The Cumulative Land Disturbance Framework contained in this Range Plan should guide land and resource decision-making by all authorities involved in such decisions until Land Use Plans on the range are completed or revised. As Land Use Plans are completed and revised they should consider the CLDF and other guidance provided in the BCRP.

[70] The CLDF recommendations are considered as interim, to be updated and replaced as land claims, land use planning or other co-management arrangements provide the basis of incorporating the concept of cumulative land disturbance management across different parts of the Bathurst range area.

4.1.1 CLDF Boundaries and Management Thresholds

The CLDF spans the two major biomes within the range (tundra and taiga), which are further subdivided into smaller range assessment areas (RAAs) (Figure 9). The interim RAAs provide spatial units to assess and monitor the status of CLDF indicators (see Section 5). The five RAAs were created by considering traditional territories, human land use patterns, administrative boundaries, and Bathurst caribou range use and habitat conditions as described in the supporting technical document.[71]

FIGURE 9. BCRP CUMULATIVE LAND DISTURBANCE FRAMEWORK WITH TUNDRA AND TAIGA ZONES, AND INTERIM RANGE ASSESSMENT AREAS.

[71] BCRP 2017b.

Disturbance threshold levels for the CLDF are management thresholds, informed by TK, caribou biology and societal risk tolerance, and reflective of the application of the precautionary decision-making[72] to Bathurst herd management required given the low population status. Text Box 1 further describes the rationale for establishing the suggested cumulative disturbance threshold levels.

Text Box 1 Rationale for Establishing the BCRP CLDF Threshold Levels

The BCRP Cumulative Land Disturbance thresholds provide regulatory limits (sensu Kennett 2006) to manage the cumulative magnitude and extent of human footprints and development projects on the annual range of Bathurst caribou. The threshold levels serve as decision or management thresholds (sensu Martin et al. 2009), which reflect a balance of the ecological, cultural, and socio-economic values. As such, the threshold values are as much based on cultural considerations as they are on ecological considerations. The level of socio-cultural / ecological risk and landscape change that communities, governments and industry consider to be acceptable may change over time as values and circumstances change. Important considerations in the development of the CLDF thresholds include:

- The Bathurst caribou herd is currently considered to be in a state of serious conservation concern due to its small population size, continuing high rate of decline in breeding females, and the damaged relationship between people and caribou. This coupled with concerns of future uncertain climate change impacts, justifies a precautionary approach to management.
- Both the federal Committee on the Status of Endangered Wildlife in Canada and the NWT Species at Risk Committee recently assessed barren-ground caribou as “threatened”.
- All harvest – including hunting by Aboriginal people – has essentially ceased and a feasibility assessment of wolf management actions is being undertaken. These management actions focus on improving caribou survival.
- The linkages between habitat disturbance, land use activity and caribou population were evaluated based on computer modeling of future case land use scenarios (see the supporting document: Caribou Range Assessment and Technical Information). The reduction in herd productivity due to encounters with human disturbance resulted in a population effect that was additive to the direct mortality effects of predation and hunting.
- Aboriginal community members and TK holders have long stated that there is a link between increasing levels of industrial development on the range and declines in herd size. There have been many formal requests to implement land disturbance thresholds. With declining caribou populations, there have been parallel declines in the traditional economy, food security, connection to the land, and ultimately cultural identity.
- Implementation of the CLDF is considered to be a useful way to manage the cumulative and incremental impacts from land use at the range scale. At the same time, the CLDF provides management direction on acceptable levels of range disturbance and human activity that support sustainable development.

[72] GNWT 2017b; O’Riordon and Cameron 1994.

The CLDF tiers and threshold levels for the RAAs in the Tundra and Taiga biomes are presented in Table 3 and Table 4 respectively. All thresholds are based on the total estimated human-caused disturbance – direct footprint plus associated zone of influence (ZOI). Important considerations include:

- **ZOI:** ZOI assumptions and values used for the purposes of range planning should not be assumed to be appropriate for project-specific assessments. Details on ZOI assumptions are provided in the supporting Science and Technical Information document.[73]
- **Wildfire**: In the forested Taiga biome, RAA3/4/5, wildfire area burned is an important consideration that will be tracked as part of the monitoring and management system – see Section 5.

TABLE 3. TUNDRA BIOME CUMULATIVE LAND DISTURBANCE FRAMEWORK TIERS AND THRESHOLD LEVELS.

Risk to Caribou and/or Habitat	CLDF Disturbance Tier	RAA 1 Total Human-caused Land Disturbance Threshold Level	RAA 2 Total Human-caused Land Disturbance Threshold Level
High	High Risk	> 12,000 km^2	> 9,000 km^2
Moderate	Cautionary	6,000 km^2 – 12,000 km^2	4,500 km^2 - 9,000 km^2
Low	Desirable	< 6,000 km^2	< 4,500 km^2

TABLE 4. TAIGA BIOME CUMULATIVE LAND DISTURBANCE FRAMEWORK TIERS AND THRESHOLD LEVELS.

Risk to Caribou and/or Habitat	CLDF Disturbance Tier	RAA 3 Total Human-caused Land Disturbance Threshold Level	RAA 4 Total Human-caused Land Disturbance Threshold Level	RAA 5 Total Human-caused Land Disturbance Threshold Level
High	High Risk	> 19,000 km^2	> 20,000 km^2	> 25,000 km^2
Moderate	Cautionary	9,500 km^2 - 19,000 km^2	10,000 km^2 - 20,000 km^2	12,500 km^2 - 25,000 km^2
Low	Desirable	< 9,500 km^2	< 10,000 km^2	< 12,500 km^2

[73] BCRP 2017b.

4.1.2 Current Status of the Bathurst Caribou Range Relative to the CLDF

The estimated cumulative land disturbance status of each RAA is shown in TABLE 5 and FIGURE 10. The disturbance status of each area is calculated based on mapped development footprints and their associated estimated zones of influence.[74] Detailed methods and assumptions are provided in the supporting document, Caribou Range Assessment and Technical Information.[75]

TABLE 5. ESTIMATED STATUS OF EACH RANGE ASSESSMENT AREA BASED ON THE CLDF THRESHOLDS.

RANGE ASSESSMENT AREA (RAA)	RAA AREA	CURRENT DIRECT HUMAN DEVELOPMENT FOOTPRINT	TOTAL HUMAN-CAUSED DISTURBANCE (INCLUDES ZOI)	CURRENT WILDFIRE DISTURBANCE	CURRENT CLDF STATUS
AREA 1: NUNAVUT TUNDRA	75,902 km^2	20 km^2	1.4% (1,080 km^2)	20 km^2	**DESIRABLE**
AREA 2: NWT CENTRAL TUNDRA	56,134 km^2	70 km^2	11.8% (6,610 km^2)	5 km^2	**CAUTIONARY**
AREA 3: NWT WINTER RANGE - NORTHWEST	77,001 km^2	< 1 km^2	<1% (<1 km^2)	15,178 km^2	**DESIRABLE**
AREA 4: NWT WINTER RANGE - CENTRAL	84,858 km^2	90 km^2	16.6% (14,120 km^2)	30,839 km^2	**CAUTIONARY**
AREA 5: NWT WINTER RANGE - SOUTHEAST	95,127 km^2 *(approx.: 1/3 Tundra & 2/3 Taiga)*	< 1 km^2	<1% (88 km^2)	35,459 km^2	**DESIRABLE**

[74] At this time, the proposed cumulative land disturbance frameworks do not include early mineral exploration or other non-footprint based activities.
[75] BCRP 2017b.

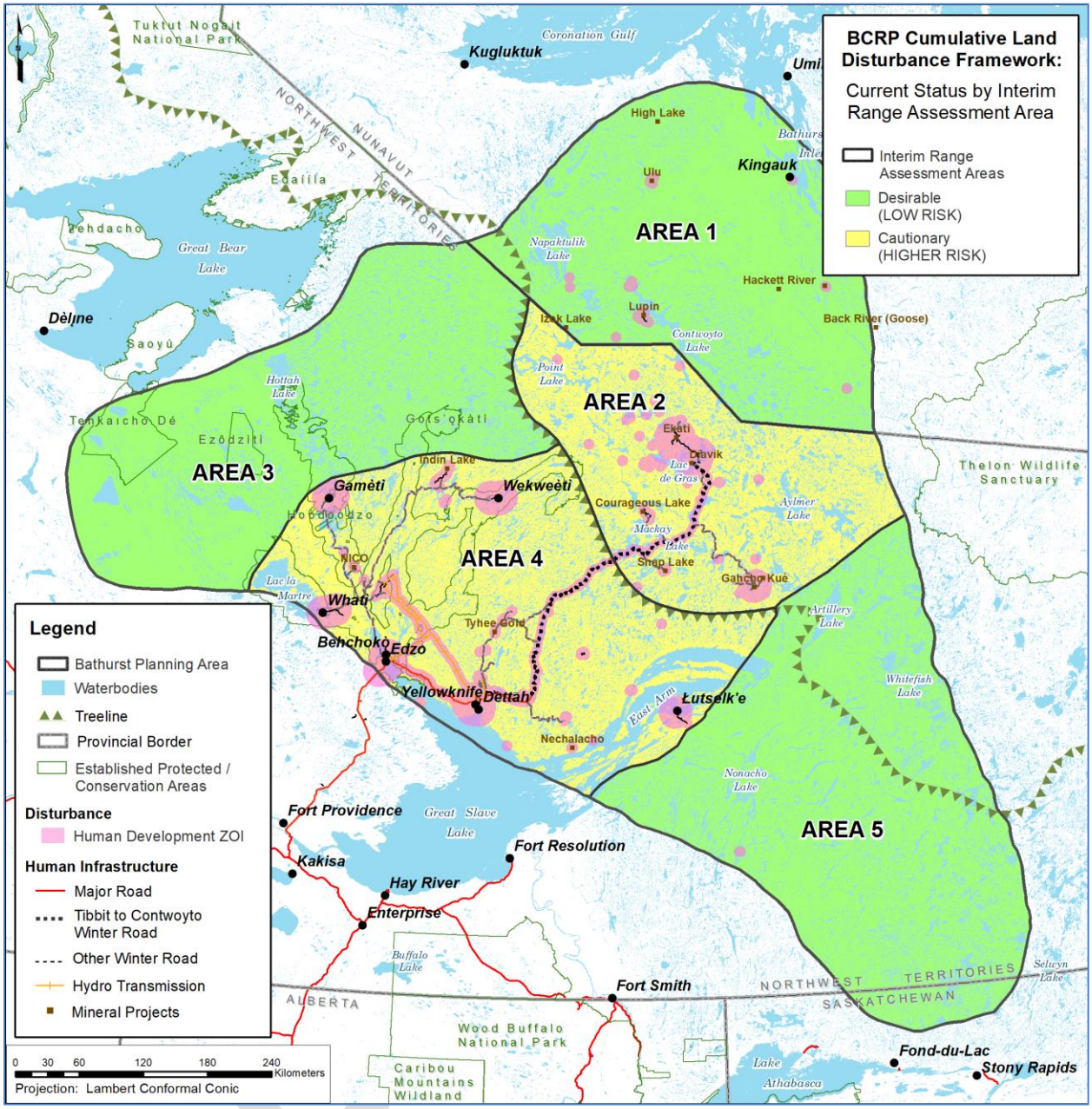

FIGURE 10. ESTIMATED STATUS OF EACH RANGE ASSESSMENT AREA BASED ON THE CLDF THRESHOLDS.

4.2 Management Response Recommendations

4.2.1 Community Guardianship

Recommendation 2

Support Aboriginal groups in the coordinated development and use of integrated Community Guardianship Programs across the range of the Bathurst herd. Such programs would watch and report on activity associated with industrial development and harvest in combination with the movements, abundance, health and condition of caribou and caribou habitat, the relationship between caribou and Caribou People and overall caribou well-being.

Aboriginal guardianship programs should be expanded, developed, funded and implemented. Funding opportunities could include governments, industry, and non-profit agencies. In addition to the existing initiatives outlined earlier, some recent examples to build on include: a) TK studies on the impacts of industrial development and road use on caribou health and behavioural response, and b) education regarding respectful land access and harvest practices. These programs will be grounded in watching overall caribou well-being and improving the relationship between caribou and Caribou People.

4.2.2 Habitat Conservation

Habitat conservation is proposed for those areas where habitats and/or caribou have been identified as particularly sensitive as well in areas to ensure range connectivity. Water crossings and land bridges have been identified as critical for maintaining connectivity between seasonal ranges, allowing caribou to move on the landscape. TK and science have suggested that calving and post-calving areas are the most sensitive time periods for caribou and the habitat is also sensitive to disturbance. Community members know this time as one to leave the caribou alone and to recognize the calving grounds as caribou nurseries.[76]

4.2.2.1 Water Crossings and Land Bridges

Recommendation 3

Using appropriate legislative tools, define the level of protection within an area specified around priority water crossings and land bridges as identified through TK and/or community direction. The legislative tools should allow for boundary adjustments when TK, science and other land users identify changes in caribou distribution and range use.

[76] Thorpe et al. 2001; Stewart et al. 2004; Sangris 2012; TRTI 2016a, 2016b.

Many water crossing locations have received long-term, relatively consistent use by caribou and Caribou People. Knowledge of these areas has also long guided community members in where to locate their camps and communities to support harvesting opportunities and, as such, TK holders are well positioned to locate these key features (Figure 11). Water crossings have also been identified through aerial surveys by project proponents during field studies to support development of their projects. Allowing for continued use of these locations by caribou is critical to maintaining connectivity within the range and practicing respect as part of caribou guardianship responsibilities.

Similarly, many communities talk about the importance of land bridges that connect different range areas. As with water crossings, maintaining land bridges relatively free of human infrastructure and disturbance is important to successful migration. The location of land bridges in RAA2 highlights the importance of this central tundra area for movement between the spring calving, post calving, summer and winter ranges. These land bridges are well known to caribou as well as Caribou People for being both environmentally and culturally important.

4.2.2.2 Calving and Post-Calving

Recommendation 4

Using appropriate legislative tools, define the level of protection within an area specified around the calving and post-calving areas of the Bathurst range.
The legislative tools should allow for boundary adjustments when TK, science and other land users identify changes in caribou distribution and range use.

The calving and post-calving range, largely in Nunavut, is considered by most to be the most important and sensitive part of the Bathurst range both from a traditional knowledge and scientific perspective. These areas are considered sacred, as the birthplace of the herd such that their protection supports an ethic of respect. Restricting these areas from development will ensure caribou are protected from sensory disturbance and the habitat is not altered or destroyed. As calving grounds shift over time it is important that boundaries are assessed on a regular basis and adjusted to continue to offer the protected needed.

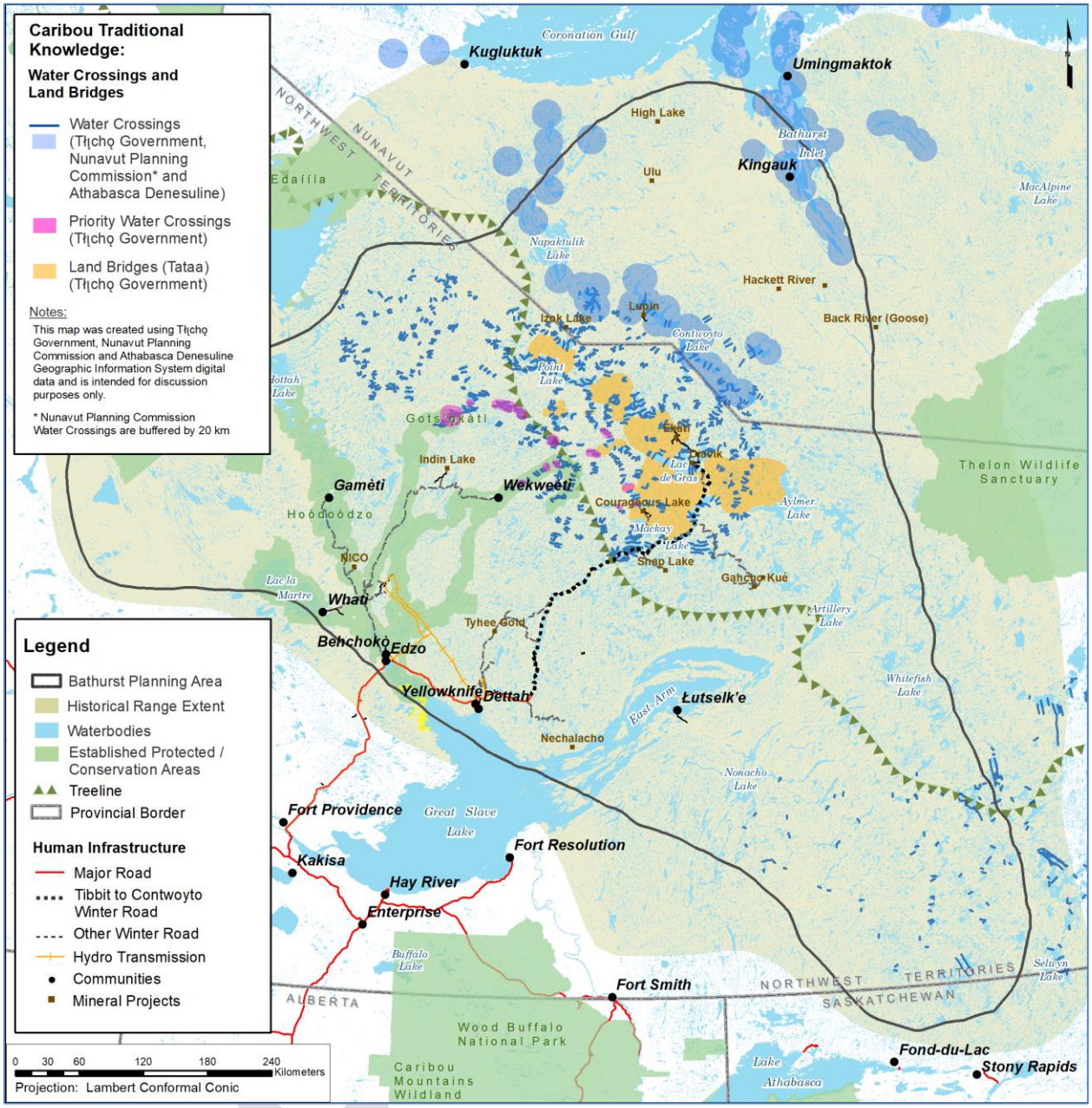

FIGURE 11. EXAMPLE OF LAND BRIDGE AREAS AND WATER CROSSINGS DERIVED FROM TK RESEARCH.

4.2.3 Mobile Caribou Conservation Measures

Recommendation 5

For land use activities requiring a land use permit within the centre of habitation for the Bathurst herd, implement MCCMs on a trial basis. Implementation should consist of three phases:

1. Planning (development of an approach that includes minimum standards for monitoring and mitigation);
2. Operation (coordination between government, industry and community guardians on monitoring and compliance); and
3. Review (an assessment of the effectiveness including consideration of costs, personnel requirements and achievement of desired outcomes).

Given the large geographic areas and dynamic range use patterns of caribou, Mobile Caribou Conservation Measures (MCCM) appear to provide the best combination of disturbance reduction effectiveness for caribou and operational flexibility for industry. The BCRP recommends a trial implementation of MCCM for projects triggering a land use permit that occur within the centre of habitation for the Bathurst herd.

The GN Review suggests that implementation proceed in three phases: planning (creating a MCCM framework), operation (application of MCCM at sites) and review (assessment and reporting on effectiveness).[77] Further, with a mobile zone already being prescribed to manage harvest on the Bathurst herd, it may be a herd level approach to monitoring that can be assessed for its applicability to the implementation of MCCMs to manage human impacts.

4.2.4 Road Planning and Management

Recommendation 6

When developing new roads in the Bathurst caribou range, take into consideration the needs of multiple purposes and users, seasonality of construction and use, routing and design to minimize impacts to caribou.

As industrial development proceeds and expands across the range, and as the need for all-season roads increases due to climate-change induced shortening of winter road seasons, the need for careful

[77] Atkinson 2016.

planning processes for road development will become paramount. The Tłı̨chǫ All-Season Road from Behchokǫ to Whatì is currently in Environmental Assessment. A spur road from Whatì to the NICO Fortune Minerals project will be the next phase to support development of the mine. GNWT is advancing feasibility and routing studies on an all-season portion of the Tibbett-Contwoyto winter road from Tibbett Lake to Lockhart Lake essentially replacing 150 km.

In the NWT, the recommendation for any new roads to develop a Wildlife Management and Monitoring Plan (WMMP) that addresses overall purpose, consolidation, routing and design will ensure consideration and mitigation of potential effects to Bathurst caribou.

At the cautionary tier of the CLDF, examples of additional management requirements that would further minimize the impacts of roads on caribou include:

- Enhanced traffic management requirements (e.g., convoying, etc.)
- Enhanced road design features (e.g., lower shoulder slopes, finer crushed rock, etc.).

4.2.5 Offsetting / Compensatory Mitigation

Recommendation 7

Use Offsetting / Compensatory Mitigation Plans that are scaled to project type, size, and CLDF status (desirable, cautionary). Such plans should consider:

- habitat restoration, enhancement, preservation (including legacy land disturbance); and
- financial and in-kind contributions to integrated science and TK research and monitoring programs on possible impact pathways and innovative ways to mitigate impacts.

Given the current status and trend of the Bathurst caribou herd even small impacts can be of concern with respect to the resilience of the herd. Offsetting is an approach used to compensate or make up for residual impacts that remain after all reasonable actions are taken to avoid and minimize impacts to caribou. The goal is to have no net effect on caribou (or a net benefit) through on-site and off-site mitigation practices such as replacing, restoring, enhancing or preserving habitat within the project area or in other parts of the range. [78] If habitat offsets are not achievable, methods of compensatory mitigation may be appropriate such as financial contributions to research and monitoring or looking at population level actions like predator management.

[78] ENR has contracted Poulton Environmental Strategies to investigate the potential effectiveness of a formal offset policy.

At the desirable tier of the CLDF, direct habitat offsets are the first priority. If offsets are deemed infeasible, compensatory mitigation measures should be used.

At the cautionary tier of the CLDF, examples of additional management requirements that would further offset or mitigate the impacts on caribou include:

- Applying higher ratios for habitat offsets (2:1, 4:1).
- Mandatory compensatory mitigation – financial contributions toward integrated research, monitoring and community guardianship.

4.2.6 Wildfire and Fuels Management

Recommendation 8

On an annual basis, identify large, strategically-located patches of mature (>50-year-old) forest in the central Bathurst winter range for the GNWT fire management "Values at Risk" database. Response to fires in these areas would be based on an analysis of the current fire load, fire environment, resource availability and similar considerations of the management options at the time of the fire event.

Winter habitat in the taiga has also been identified as of concern due to loss from recent large fires. Adding, on an annual basis, large, strategically-located patches of mature (>50-year-old) forest in the central Bathurst winter range to the GNWT fire management "Values at Risk" database will formally recognize the potential importance of these areas to a recovering population. It is recognized there are negative long-term consequences to complete fire suppression, but that the need to protect "caribou food" is an important concern expressed by community members.[79] This recommendation is intended as a 'stop gap' measure to aid in population recovery, and would be reviewed in the future.

4.2.7 Online Staking

Recommendation 9

During the development or amendment of legislation related to mineral resources development, consideration should be given to the feasibility of online staking to reduce sensory disturbance to caribou.

[79] BCRP 2016b.

Prospecting licenses authorize a person to do exploratory work in areas that are not excluded from this activity (such as protected areas, conservation areas, designated zones in land use plans, etc.). Mineral claim staking is one of the activities authorized under a prospecting permit. Currently the Mining Regulations in NWT and Nunavut require staking to be done in person such that posts are placed on the ground physically often utilizing aircraft to get to remote areas and from one potential claim area to another. Having the ability to conduct staking online will reduce any possibility of disturbance to caribou as a result of these activities and, thus, is more in keeping with respecting caribou.

Careful consideration should be given to the potential for unintended consequences of online staking. For example, much larger tracts of land may be staked if the cost of doing so is less, which could lead to subsequent exploration activity over larger areas. Also, prospecting activity itself has made valuable contributions to local economies.

5 Adaptive Management

Adaptive management in its simplest form is "learning from what you do and changing practices accordingly" [80] much like the Aboriginal ethic of "learning by doing". By acknowledging environmental change and uncertainty and the resulting need to observe, learn and respond, adaptive management is consistent with many TK practices and management systems.[81] In practice, adaptive management consists of:

- a structured, iterative process for planning and implementing management actions;
- a dedicated monitoring program to implement the plan, assess effectiveness, learn more about the system being managed; and,
- the update of plan elements and future management actions.

An adaptive management framework for the Range Plan will provide a link between a) annual activities focused on tracking and assessing disturbance levels and range use, and b) longer term activities that occur at 5-year intervals that comprise an approach to regular assessment, review and renewal of Range Plan elements (Figure 12).

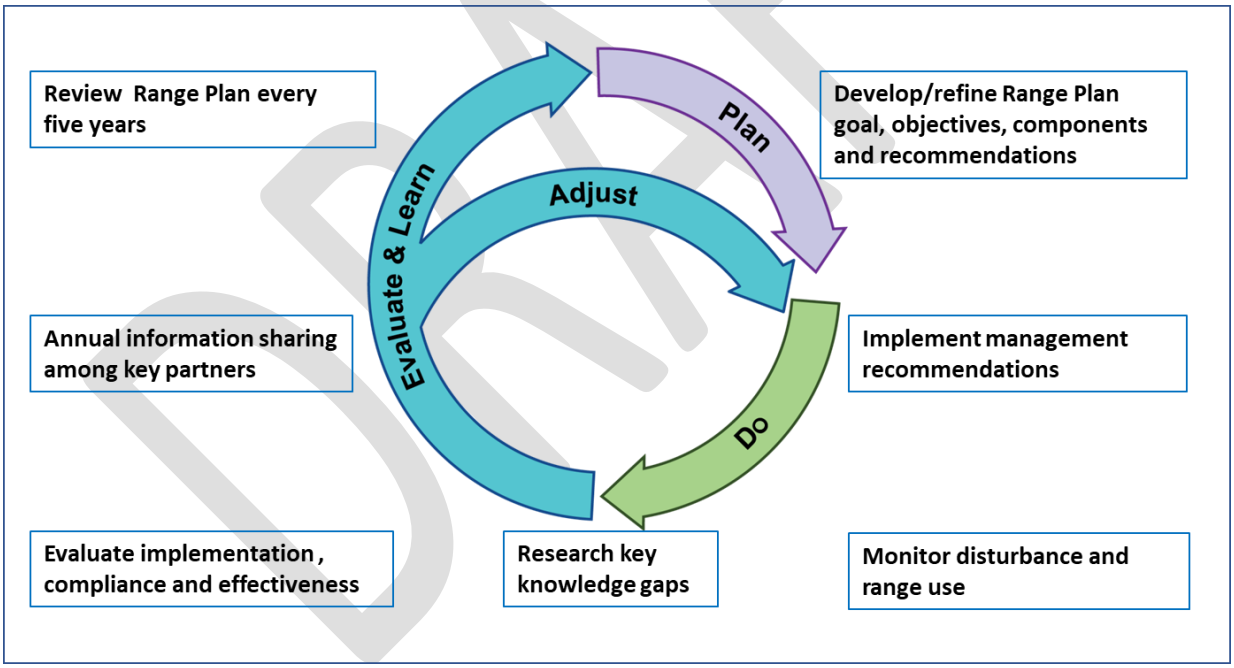

Figure 12. An Adaptive Management Framework for the Bathurst Caribou Range Plan.

[80] Stankey et al. 2005.
[81] Berkes et al. 2000.

5.1 Monitoring

To support the Range Plan adaptive management framework, several types of monitoring are required. This begins with basic monitoring of land disturbance and range use, coupled with monitoring to evaluate implementation, compliance and effectiveness of the Range Plan. [82]

5.1.1 Land Disturbance and Range Use

The implementation of disturbance thresholds across the range requires a process for regularly calculating and updating the amount of disturbance on the landscape. An annual disturbance tracking system requires consideration of a number of factors, including what methods are used to calculate and track disturbance (what counts, and how to measure it) and the spatial unit used to calculate the amount of disturbance. In addition, to implement MCCMs in the Enhanced management tier the centre of habitation will need to be defined and mapped. Lastly, tracking and reporting on size of fire, amount burned and intensity of burn will help assess any change in fire dynamics over time. All results will be publicly distributed and posted on a public website

1. For the BCRP disturbance will be tracked and updated annually by RAA based on the following methods:
    - Detection and tracking of new sources of disturbance that would be counted as increases to disturbance amounts:
        - ENR will track and report on amounts of new land disturbances through the Cumulative Impact Monitoring Program Inventory of Landscape Change - a web-based geographic information system.[83] This consists of reviewing land and water board public registries for any newly permitted activities and its associated footprint. The ZOI would be added according to the assumptions currently used in the disturbance mapping for the Range Plan

    - Detection and tracking of existing disturbances that have changed or shut down their activities would have their footprints and ZOI adjusted accordingly.

        - ENR will use land and water board public registries to determine any existing projects that have either changed (moved from operation to reclamation phase or from exploration to development phase) or shut-down their activities. Human disturbances that are no longer in use, have changed activity levels, or are restored or reclaimed, may have ZOI values applied in relation to the new activity level. Criteria would need to be established to determine when a restored or reclaimed disturbance is removed from the previously defined direct footprint.

[82] Bunnell and Dunsworth. 2009.
[83] http://www.enr.gov.nt.ca/en/services/cumulative-impact-monitoring-program-nwt-cimp/inventory-landscape-change-webviewer

- Calculation of total disturbance levels in each RAA and assessment of CLDF status based on that level.
    - ENR will calculate total disturbance (footprint and ZOI) for each RAA consistent with methods used for disturbance mapping in the Range Plan and based on the combination of new disturbances and existing disturbances that have either changed or shutdown.

2. Mapping the Centre of Habitation/ Core Use Area for implementation of the MCCMs:
    - Based on available science and TK, ENR will derive a map of the centre of habitation for the Bathurst herd for use in directing management actions. For Range Plan purpose and the first phase of implementation, the centre of habitation/core use area is defined as the annual range derived from satellite collar locations from 2015-2017 (using the 95% isopleth of a kernel density estimator) coupled with traditional knowledge of important migratory, geographic, and habitat features.
3. Tracking fire on an annual basis and comparing amount burned to the natural range of variation will be required to assess whether there are any changing trends in fire frequency, area burned and fire severity.
    - ENR will track and report on amount, and if possible, severity of fire. Fire disturbances will be estimated based on areas of mapped fire perimeters, plus remote sensing methodologies that can also estimate burn severity. New wildfire disturbances in the Bathurst caribou range will be tracked and mapped through coordination with ENR, Forest Management Division's current monitoring system.

      This approach is based on natural range of variation in fire over time and forest age-class with assumptions that the fire cycle in the Taiga portion of the Bathurst range is approximately 120 to 140 years, and that on average, at any given time approximately 35% of the forested area will be less than 50 years old.

5.1.2 Implementation

Have we done what we said we would? Implementation monitoring is done to determine whether Range Plan management recommendations were implemented as planned. Implementation monitoring provides information on what management recommendations were made and how they were implemented.

- ENR will report on the progress of implementing BCRP recommendations across jurisdictions. This will include a consideration of whether recommendations were implemented, to what extent, and if appropriate, when implementation is expected to occur.

5.1.3 Compliance

Have we done what we were told to do? Monitoring for compliance is done to track whether BCRP management recommendations that are made as part of regulatory oversight are followed. This would include compliance to land use permit terms and conditions, review board recommendations, conditions in project certificates and items in Wildlife Management and Monitoring Plans. As compliance monitoring is likely done by the respective management authorities through inspections, compliance monitoring through the BCRP may be a tracking exercise that integrates compliance records across the various authorities.

- ENR will, to the extent possible, report on compliance to Range Plan recommendations that were implemented. This will include reviewing inspection reports on the land and water board public registries and inspection reports associated with WMMPs.

5.1.4 Effectiveness

Did our actions achieve our objectives? Effectiveness monitoring is undertaken to assess whether the recommendations, and/or mitigation practices that were implemented operationally met their objectives – i.e., were the practices effective? For the BRCP, effectiveness monitoring would likely be undertaken by the responsible party that is implementing a management action or mitigation practice along with the respective management authority. Measures of effectiveness would have to be developed in concert with Aboriginal communities and others.

Effectiveness of mitigation actions needs to be assessed at different scales and also consider areas of clustered development (e.g., Lac de Gras). It will also require integrating project-specific scale monitoring with monitoring conducted at the range scale. Although, the ability to test and evaluate effectiveness will be difficult at the broader range scale, it is important to consider feasibility and how collective monitoring efforts will be coordinated and linked across scales.

- While further work is required to develop indicators (i.e., measures) for assessing effectiveness, ENR will, to the extent possible, work with partners to bring together information on site-specific mitigation and monitoring programs with broader scale information from scientific and TK sources on:
    - environmental conditions (i.e., climate, vegetation, fire);
    - herd demographics (i.e., size, trend, survival, recruitment);
    - health indicators (i.e., pregnancy, condition);
    - caribou movement patterns;
    - practicing respect for caribou;
    - caribou well-being; and,
    - status of the relationship between caribou and Caribou People.

5.2 Review

ENR will prepare an annual update of Range Plan implementation activities and monitoring undertaken by Range Plan partners. This update will be made available on a designated website, and could also be discussed at meetings with representatives from Nunavut, Aboriginal governments and organizations, co-management partners, industry and environmental organizations, similar to annual gatherings held by the Porcupine Caribou Management Board and the Advisory Committee for Cooperative Wildlife Management. Some key items that would be reviewed would include:

- Status of the relationship between caribou and Caribou People;
- herd population status
- disturbance levels to land and caribou (including fire);
- status of implementation of recommendations;
- summaries of key management decision and recommendations made in the Bathurst range;
- assessments of the effectiveness of mitigations; and
- perspectives from key partners, communities, and collaborators.

A formal review of the Range Plan will occur every 5 years and updated as needed to respond to community direction, changing environmental conditions, status and trend of the herd, any new stressors apparent on the range of the Bathurst herd, significant changes to wildlife management regimes (e.g. implementation of Nunavut Land Use Plan) and any new research and understandings relevant to the Plan. Elements of the range plan to be reviewed and renewed may include management objectives and land disturbance threshold levels, as well as methodologies and associated assumptions and criteria. Renewal of the Range Plan would be based on a review of results, which would be reflected by key management recommendations and decisions on land use and cumulative effects management made during the preceding 5-years.

In addition to regularly scheduled reviews, if any Range Assessment Area in the Bathurst Annual range should enter the critical tier of the CLDF, this should trigger a formal review of the overall Range Plan.

5.3 Research

Research is the formal investigation or experimentation to address knowledge gaps using scientific methodology and/or through participatory investigations based on traditional knowledge shared through oral traditions. The BCRP acknowledges and emphasizes the need to prioritize and conduct collaborative research to address key knowledge gaps regarding the impacts of disturbance to the land and to caribou themselves. With this perspective, a few knowledge gaps are highlighted below, which reflect some of the feedback from the BCRP Working Group; this is not a comprehensive list of recommended research topics. Additional work is needed to further explore and prioritize knowledge

gaps, and facilitate the undertaking of appropriate collaborative research projects, and advancing innovative strategies for funding.

5.3.1 Potential research topics

1. **Zone-of-influence (ZOI):** The ZOI associated with human development footprints is a key assumption for estimating and managing total disturbance on the Bathurst range. Although ZOI is not easily or directly measurable, it is a simple and intuitive way of accounting for the reduction in use of habitat that extends beyond a direct footprint. There is a need to improve and standardize methodologies for estimating ZOI that incorporates habitat type (e.g., tundra vs. taiga), development type (e.g., underground vs. open pit mine, industrial road vs. skidoo trail), etc. Research should focus understanding the factors that cause caribou avoidance patterns, and contribute to the variability in the caribou response. More work is required to understand ZOI in conjunction with knowledge that is grounded in TK.

2. **Annual range-wide land disturbance indicator / threshold:** The current CLDF is organized around thresholds for the five range assessment areas. Further research should be directed toward the need for and potential approaches to establishing an annual range-wide land disturbance indicator or threshold.

3. **Non-footprint based activity impacts:** Potential disturbance to caribou (and habitat) associated with non-footprint based activities (e.g., early mineral exploration, tourism, biological research) is an important and recurring concern of managers and communities. The current CLDF does not include early mineral exploration or other non-footprint based activities other than staking. Research is required to document and evaluate the potential impact of non-footprint based activities to caribou (and habitat). A first step will be to develop a systematic approach for identifying and monitoring non-footprint activities as definable sources of potential disturbance on the Bathurst range in time and space.

4. **Identification of important habitats**: It is generally recognized that some areas of the seasonal and annual ranges are more important to Bathurst caribou and Caribou People. Additional research is required to identify and estimate the importance and sensitivity of key areas and habitats for Bathurst caribou. An improved understanding may help provide better spatial and temporal resolution for identifying sensitive habitats and times for Bathurst caribou that can be incorporated into mitigation. New research on habitat use and importance may align with developing a working definition of critical habitat for barren-ground caribou.

5. **Wildfire effects:** Wildfire is key natural disturbance that influences winter range quality, quantity and heterogeneity for migratory barren-ground caribou. Research is required to address community concerns and perspectives regarding potential wildfire management to conserve important winter range areas, (e.g. controlled burns) to better understand the baseline ecological influence of wildfire burn rates and patterns, as well as considering implications of climate change scenarios.

6. **Fuels treatments and post-wildfire regeneration:** Feasibility studies are required into fuels treatments to protect older patches of forest and revegetation of burned areas. Such studies should directly assess the effectiveness, costs (both financial and human), logistics and the potential application of these approaches more broadly.

7. **Community guardianship programs** built upon traditional knowledge and people's ongoing relationship with caribou and the environment can provide key insights based on unique measures and indicators of caribou well-being. Future research should facilitate participatory active research with community programs as aimed at bridging inter-disciplinary collaborations with social and ecological sciences. In addition, ways to enhance community based monitoring networks across the range that based on TK, driven by Caribou People, and include significant youth engagement need to be better explored.

8. **Healing the People-Caribou relationship:** While community guardianship programs represent one way to foster respect and potentially support the relationship between people and caribou, more community driven research is needed to explore how this complex relationship can be healed.

6 Implementation

Successful implementation of the BRCP will require a genuine commitment from governments, organizations, industry, communities and individuals. Range Plan recommendations are generally intended to support and influence a variety of land use and wildlife management decision-making processes as well as guide community and industry based initiatives. These include:

1. Land use planning
2. Community guardianship programs
3. Wildlife management recommendations and actions (governments and renewable resource boards)
4. Environmental assessment
5. Regulatory processes
6. Industry protocols and best management practices

In its consideration from the outset, the Range Plan attempts to apply the concept of cumulative land disturbance management thresholds as the foundation for implementation.[84]

6.1 Communities Across the Bathurst Range

As guardians who have always cared for caribou within their asserted territories, Aboriginal peoples across the Bathurst range have a critical role in charting the best path forward for the Bathurst caribou. Already communities have taken bold steps along this path through their formalized guardianship programs. The GNWT, Tłı̨chǫ Government, and Government of Nunavut presently have legal responsibilities to act to protect barren-ground caribou, but much will be determined by the ways in which people "on-the-ground" in communities assert their roles, responsibilities, and rights to inspire actions to protect caribou.[85] Traditional law coupled with legal tools of governments today will largely determine the success of the Range Plan.

Specific actions that communities, organizations and individuals can take include:

- **Assert rights on governments and leadership at all levels.** Bottom up pressure and support is often required as a foundation action. This is true for all levels of government ranging from Aboriginal to territorial to federal.

- **Develop, promote and abide by traditional laws / community codes of conduct for harvest and land access.** At the most fundamental level, practicing respect begins with individual people who take responsibility for themselves and those around them.

[84] Kennett 2006.

[85] "We can't have rights without responsibility. If we assert rights to caring for land and monitoring the water and the fish, we have to do it too." (Stephanie Poole in SVA Consulting 2016: 18)

- **Participate in the further development, promotion and implementation of Community Guardianship programs**. Aboriginal community members are uniquely skilled and capable of working at the intersections between ecological, cultural, and compliance and effectiveness monitoring systems. At the same time, involvement in these programs can serve as the basis for educating all land users in the ways of respect.

- **Actively engage with governments, organizations and industry to support implementation of Range Plan recommendations**. As people with rights to their territories, Aboriginal peoples can assert their responsibilities to leverage their role as guardians and land stewards to get all parties on-board with the requirements for Range Plan implementation. Until rights, title and treaty issues are reconciled, this may be an important 'in the meantime' way of doing things.

6.2 Industry

Mineral exploration and development has been a significant part of the northern economy for many decades. The list of benefits to northerners is long, including employment, taxes, major infrastructure legacy developments (e.g., roads, hydroelectric facilities, etc.), and Impact Benefit Agreements directly with Aboriginal communities. Industry proponents know that, as leaders in the creation of a sustainable northern economy, they play a critical role in ensuring a resilient landscape for Bathurst caribou over the long term.

Specific actions that companies, organizations and all land development proponents can take include:

- **Embrace sustainability.** Mining sustainably starts during exploration, continues through operations, and ends during reclamation phases. Long term commitments to sustainability through the entire mineral development cycle should be demonstrated in all business and management plans.

- **Increase engagement with communities.** Embrace the role of working with communities and earning their trust. Support the development and implementation of Community Guardianship programs in all Impact Benefit Agreements.

- **Strive for environmental excellence**. Attaining full compliance with all land use regulations and requirements and publicly communicating results is just the starting point. Achieving excellence in environmental performance means investing in science and traditional knowledge aimed at finding innovative approaches to environmental protection, and encouraging and rewarding staff to achieve better conservation outcomes.

- **Actively engage with governments and communities to support implementation of Range Plan recommendations**. Demonstrate leadership and advocate the need for all partners to fulfill their responsibilities toward implementation.

6.3 Other Jurisdictions

The recommendations in the Range Plan are directed primarily at land use and wildlife management authorities in the NWT for implementation. Where the Range Plan makes recommendations in parts of the range that fall within other jurisdictions (i.e., Tłı̨chǫ lands, Nunavut, Saskatchewan) they are non-binding and provided as advisory for consideration under the co-management land and resource management processes of those jurisdictions.

Partners in Nunavut are currently in a particularly interesting and challenging position relative to the development and implementation of the Range Plan. They share the same interests in restoring respect for caribou and protecting caribou habitat while supporting local and territorial economic development, particularly in the Kitikmeot region. Their focus is appropriately set on the current development of the territory-wide Nunavut Land Use Plan. The BCRP has been developed in the spirit of the *Memorandum of Understanding: Cooperation on Managing Shared Populations of Caribou Between the GNWT and the GN* to "promote and advance common goals relating to the management and conservation of caribou".

6.4 GNWT Approach to Implementation

Within the integrated land and resource co-management system of the NWT, the Range Plan will rely on a variety of policy and legislative opportunities including many different bodies with authority for land use and wildlife management decisions including GNWT, Aboriginal governments, renewable resources boards, environmental review board and land and water board (see Table 6 for a list of the governing bodies in the NWT and their role).

At the broadest level, the GNWT will, as a whole, consider the BCRP when making decisions regarding land and resource use and the issuance of resource rights. Consideration will be given to developing a policy or framework that describes how different departments will integrate consideration of the Range Plan guidance and recommendations into their core decision-making mandates.

For those processes where the GNWT provides input – environmental assessment / impact reviews, land use plans, regulatory processes (land use permitting) – the GNWT will draw on the recommendations and guidance provided by the BCRP. Existing projects will continue operating under current permit terms and conditions, environmental agreements and Wildlife Effects Monitoring Programs (WEMP). As WEMPs come up for review and are approved under the NWT *Wildlife Act* as Wildlife Management and Monitoring Plans the recommendations in the BCRP will be considered. New projects triggering a land use permit will be reviewed with consideration to Plan recommendations.

For those implementation opportunities under direct GNWT authority, effective implementation of Range Plans will require the development of new guidelines and regulations. Specific opportunities for GNWT implementation action are described in the sub-sections below.

6.4.1 Habitat Conservation

The GNWT will continue to work with work with Aboriginal governments and organizations to identify important water crossings, land bridges and other land and habitat features across the range. Once identified, these places will be documented 'on-the-record' for use in all future land use planning and regulatory processes.

Recognizing that land use planning can take a long time, and that fixed land use designations can be difficult to modify once in place, the GNWT will explore the use of habitat protection provisions under the *Wildlife Act* and NWT *Species at Risk Act* to provide habitat conservation for identified high priority habitat areas. New legislation in the NWT offers the opportunity to flexibly designate the types of activities that would be allowed/excluded and the timeframe within which the restrictions would apply. The specific legislative provisions to be further explored include:

- Conservation area, s. 89 *Wildlife Act*
- Habitat protection under s. 93 *Wildlife Act*
- Habitat conservation under s. 152 *Species at Risk Act*
- Habitat Designation under s. 80 *Species at Risk Act*

6.4.2 Wildfire and Fuels Management

The Forest Fire Management Policy (53.04) establishes the "Values at Risk" hierarchy for allocating resources to fire suppressions and fuels treatment purposes. Wildlife Division, ENR will provide information on important large patches of undisturbed winter habitat for use in the "Values at Risk" decision-making hierarchy annually. These areas would best be identified in collaboration with Aboriginal governments and communities. No new policy or legislation is required.

Under the *Forest Management and Protection Act* currently under development there is a provision for fees to be collected under an Incidental Use Forest Licence. This fund could possibly be used to house compensatory financial contributions to support research into revegetation and fuel treatment feasibility.

6.4.3 Road Management and Planning

Opportunities currently exist to implement the road management and planning considerations related to seasonality of construction and use, routing and design to minimize impacts to caribou (Section 4.2.4) through the requirement of a WMMP under s. 95 of the *Wildlife Act*. The *Wildlife Act* stipulates that a WMMP is required when there is "concern over cumulative impacts on a species".

The *Draft Wildlife Management and Monitoring Plan Guidelines: Process Requirements* lists roads as a trigger for requiring a WMMP.[86]

6.4.4 Mobile Caribou Conservation Measures and Offsetting Compensatory / Mitigation

S. 95 of the *Wildlife Act* and the requirement for WMMPs when there is concern over cumulative impacts on a species could also be used to support implementation of Mobile Caribou Conservation Measures (Section 4.2.3) and Offsetting / Compensatory Mitigation (Section 4.2.5) recommendations in the Range Plan.

Regulations and guidelines are currently being developed to specify circumstances under which WMMPs are required and generally what they should contain. These regulations/guidelines could specify that Range Plans that identify areas with cumulative land disturbance concerns (i.e., land disturbance levels at the cautionary or high-risk levels) are a trigger for requiring a WMMP. In such cases, any project or land use activity requiring a land use permit could be required to implement mobile caribou conservation measures and/or offsetting / compensatory mitigation as part of a WMMP. Currently it is envisioned that the requirements for a WMMP would be tailored to the size of the project and GNWT would provide an example plan for smaller operators such that the regulatory burden is not broadened.

For implementing MCCMs in particular, the centre of habitation/area of core use will define where an industry site-specific plan will be required that may comprise part of a broader Wildlife Management and Monitoring Plan such as that required under the NWT *Wildlife Act*. The actual procedures for monitoring caribou distribution relative to a site, the criteria for triggering responses and the resulting mitigation responses would need to be detailed. It is anticipated that a mobile caribou conservation zone derived either through collar locations and/or aerial surveys, will be used as an initial trigger for site specific responses. But the GNWT will develop a guidance document on how the implementation and coordination of MCCMs will proceed in the NWT and outline the shared responsibilities among government and industry partners. This guidance will build on recent advances in thinking and experiences such as those presented at the Nunavut Wildlife Management Board Habitat Workshop in 2015.[87]

[86] This will apply to roads as defined by the *NWT Motor Vehicles Act*, as well as access roads and trails as defined by the federal Northern Land Use Guidelines (INAC 2017).
[87] Poole and Gunn 2015.

TABLE 6: AUTHORITIES IN NWT LAND AND RESOURCES CO-MANAGEMENT

Administrative Body & Authority	Role in Decision Making Process	Phase
Land Use Planning Boards (LUP Boards) Responsible for developing and monitoring implementation of a land use plan for respective settlement areas established through land claim agreements. LUP Boards are established in the Sahtu and Gwich'in regions. Tłı̨chǫ Government is responsible for land use planning on Tłı̨chǫ lands. A process for land use planning is Wek'èezhìı is outlined in the Tłı̨chǫ Agreement.	• Develop and monitor implementation of regional Land Use Plans (LUPs) in areas with settled land claim agreements. • Can carry out conformity checks, grant exceptions or amend the LUP. • Contain conformity requirements that guide the EA and regulatory processes • Screen applications referred by the LWBs for conformity with LUP.	LUP
Environmental Assessment / Impact Review Boards The Mackenzie Valley Environmental Impact Review Board (MVEIRB) conducts environmental assessment and environmental impact reviews of developments in the Mackenzie Valley.	• Conduct EAs and recommends approval (with or without mitigation measures) or rejection to responsible authorities. • Orders environmental impact review if a more comprehensive assessment is required. • The independent panel conducts the environmental impact review and similarly recommends approval (with or without mitigation measures) or rejection.	EA
Land and Water Boards (LWBs) Under the MVRMA (Mackenzie Valley, Sahtu, Gwich'in, and Wek'èezhìı Land and Water Boards), regulate the use of land and water, and the deposit of waste, through the issuing of Land Use Permits and Water Licences.	• Preliminary screener regardless of whether an EA is required, or not. Conducts public review on a proposed development (potential for significant adverse impacts may be a cause for public concern). • Screening for LUP conformity (refer to LUP Boards when necessary). • Issue Land Use Permits and Water Licences with terms and conditions.	Screening/ Regulatory
Regulators *other than LWBs* e.g. GNWT	• Preliminary screener regardless of whether an EA is required, or not. GNWT authorizations that require preliminary screening are listed in the *Preliminary Screening Requirement Regulations* (these regulations have not been amended to reflect current GNWT authorizations yet). Conducts public review on a proposed development (potential for significant adverse	Screening/ Regulatory

	impacts may be a cause for public concern). • Write lease, licence or permit terms and conditions for land and resource management activity (including timber harvesting, oil and Gas, and mineral development). Licences and permits include terms and conditions and other measures provided by the regulator/informed by EAs and EIRs. • The responsible Ministers make consensus decisions on recommendations, often with associated mitigation measures, from the Review Board. For projects not on federal land, the GNWT Minister of Lands signs the decision on behalf of all the responsible Ministers. • GNWT ENR approves Type A Water Licences, or Licences where a public hearing has been held.	
Renewable Resource Boards (RRBs) Regional authority responsible for managing wildlife habitat (forests, plants and protected areas) and commercial activities related to wildlife in the settlement region. In the Mackenzie Valley, renewable resource boards have been established through land claim agreements in the Gwich'in, Sahtu and Tłı̨chǫ regions. The Inuvialuit Game Council serves a similar function for the Inuvialuit region.	• Review proposals for wildlife management or wildlife management plans, consult with proposal submitting party and other managing bodies, and make final recommendations or determinations on the proposal. Each Party can accept, reject or vary recommendations.	Wildlife Management Plans
Land Administration: GNWT and respective Aboriginal Government.	• AGs make all land and resource decisions on privately owned lands with surface and sub-surface rights. The GNWT consults with AGOs on all other settled and unsettled lands. • GNWT ITI issues sub-surface mineral rights through the *Territorial Lands Act* as well as sub-surface oil and gas rights through the *Petroleum Resources Act* and the *Oil and Gas Operations Act*. • GNWT Lands issues tenures for quarrying, recreational leases, licenses of occupation and commercial leases…. and others. • GNWT ENR issues Forest Management Agreements, Timber Harvesting Licences and Timber Harvesting Permits. • Responsible for the disposal of land through sales agreements or leases. Applicants obtain the right to legally occupy the surface of land for a specific period of time from the land manager or land owner.	Issuance of Land Rights & Tenures

7 References Cited and Consulted

Agrawal, A. 2002. *Indigenous Knowledge and Politics of Classification.* International Social Science Journal 54 (173): 287-97.

Antoniuk, T.M, Dzus, E., and Nishi, J. 2012. *A methodological framework for caribou action planning in support of the Canadian Boreal Forest Agreement*. Canadian Boreal Forest Agreement Secretariat, Ottawa, ON.
Available at: http://cbfa-efbc.ca/wp-content/uploads/2014/12/CBFACaribou_guidelines_EN1.pdf

Atkinson, S. 2016. *Implementing Mobile Protection Measures for Caribou in Nunavut: Challenges, Costs and Effectiveness*. Iqaluit, Government of Nunavut.90pp.

Barrier, T.A., and C.J. Johnson. 2012. The influence of fire history on selection of foraging sites by barren-ground caribou. Ecoscience 19 (2): 177-188.

Bathurst Caribou Range Plan. 2016a. *Interim Discussion Document*.

Bathurst Caribou Range Plan. 2016b. *Report on Bathurst Caribou Range Plan Traditional Knowledge Workshop, March 30-31, 2016. Yellowknife, NWT*. Prepared by Natasha Thorpe and Joanne Barnaby.

Bathurst Caribou Range Plan. 2017a. Supporting Report: *Traditional Knowledge of Caribou and Caribou People*.

Bathurst Caribou Range Plan. 2017b. Supporting Report: *Caribou Range Assessment and Technical Information.*

Bathurst Caribou Range Plan. 2017c. Supporting Report: *Land Use Scenarios and Economic Considerations*.

Bathurst Caribou Range Plan. 2017d. *What We Heard; Comments Received on the BCRP Interim Discussion Document*.

Bathurst Caribou Range Plan. 2017e. *Respect Caribou, Manage People: Report on the 2017 Bathurst Caribou Range Plan Traditional Knowledge Workshop*. *June 5-6, 2017, Yellowknife.*

Bathurst Caribou Range Plan. 2017f. *Technical Workshop Summary. June 28-29, 2017, Yellowknife.*

Bayha, W. 2012. *Barren-ground caribou management in the Sahtu Region: Bridging traditional knowledge and science*. Rangifer, 32(20):37.

BC Government. 2014. *PROCEDURES FOR MITIGATING IMPACTS ON ENVIRONMENTAL VALUES (ENVIRONMENTAL MITIGATION PROCEDURES) Version 1.0.* May 27, 2014

BC Government. 2016. *Cumulative Effects Framework: Interim Policy for the Natural Resource Sector.* Available at: http://www2.gov.bc.ca/assets/gov/environment/natural-resource-stewardship/cumulative-effects/cef-interimpolicy-oct_14_-2_2016_signed.pdf

Beaulieau, D. 2012. *Dene traditional knowledge about caribou cycles in the northwest Territories*. Rangifer, 32 (20): 59-67.

Bergerud, A.T., S.N. Luttich, and L. Camps. 2008. *The Return of Caribou to Ungava*. Montreal and Kingston, Canada: McGill-Queens University Press.

Berkes, F., J. Colding, and C. Folke. 2000. *Rediscovery of Traditional Ecological Knowledge as Adaptive Management*. Ecological Applications 10(5): 1251-1262.

Berkes, F. 2008. Sacred Ecology. *Traditional Ecological Knowledge and Resource Management*. London: Taylor & Francis.

Beverly and Qamanirjuaq Caribou Management Board [BQCMB] (2011). *BQCMB Caribou Workshop February 2010- Detailed Report: Commentary from Workshop Participants about Challenges Facing the Beverly and Qamanirjuaq Caribou Herds and Some Possible Solutions.* M. Soublière. Stonewall, MB, Beverly and Qamanirjuaq Caribou Management Board.

BHP Billiton Diamonds Inc. 2007. *Caribou and Roads: Implementing Traditional Knowledge in Wildlife Monitoring at the Ekati Diamond Mine*. Project #820-2. Prepared by Rescan Environmental Services Ltd. 2006 Annual Report. September 2007.

Birket-Smith, K. 1929. *The Caribou Eskimos: Material and Social Life and Their Cultural Position*. Report of the Fifth Thule Expedition, 1921-24. Vol. 5, Pt. 2. Copenhagen, Denmark.

Bunnell, F. L., and G. B. Dunsworth. 2009. *Forestry and Biodiversity: Learning How to Sustain Biodiversity in Managed Forests.* UBC Press, Vancouver, BC

Condon, Richard G., with Julia Ogina and the Holman Elders. 1996. *The Northern Copper Inuit: A History*. Toronto: University of Toronto Press.

Dehcho First Nations. 2015. *Dehcho K'ehodi: Taking Care of the Land. Workshop Report*. Prepared by Joanne Barnaby for Decho First Nations.

Denesuline Né Né Land Corporation. 2016. *Athabasca Denesuline. Bathurst Caribou Range Plan – Traditional Ecological Knowledge Report*. 10 pp.

Dogrib Treaty 11 Council. 2001. *Caribou Migration and the State of their Habitat. Final Report*. Prepared for the WKSS. Yellowknife, NT. 86 pp.

Dominion Diamonds Ekati Corporation (DDEC). 2017. *Jay Project EA Annual Report*. Environment Department HSE RCD ENV 758. Yellowknife, 123p

Environment and Natural Resources (ENR) (GNWT). 2015. *Cumulative Effects Assessment, Monitoring and Management Framework*. April 23, 2017. Report to the Mackenzie Valley Environmental Impact Review Board.

Environmental Monitoring Advisory Board [EMAB]. 2012. *A Way of Life: Bridging Science and Aboriginal Knowledge in Caribou Monitoring at Diavik Diamond Mine*. SENES Consultants Limited. Yellowknife, NT.

Flannigan, M.D., B.D. Amiro, K.A. Logan, B.J. Stocks and B.M. Wotton. 2005. *Forest Fires and Climate Change in the 21st Century*. Mitigation and Adaptation Strategies for Global Change 11: 847–859.

Francis, S.R., T.M. Antoniuk, J. Nishi, and S. Kennett. 2013. *Range assessment as a cumulative effects management tool: A recommended approach for Yukon Environment*. Prepared for Yukon Environment, Regional Programs, Whitehorse, YT. May 31, 2013. 48 pp.

Garibaldi, Ann. 2009. *Moving from Model to Application: Cultural Keystone Species and Reclamation in Fort McKay, Alberta*. Journal of Ethnobiology 29(2): 323-338.

Golder Associates Ltd. and Kugluktuk Angoniatit Association. 2010. *Effects of Development on Barren-ground Caribou: Insight from IQ and an Ecological Model.* Report Number: 10-1328-0042.

Gooding, T., J. Kariyeva, and R. Anderson. 2013. *Cumulative effects assessment and management workshop reports: Advancing a framework for managing cumulative effects in the NWT*. Prepared for Government of the Northwest Territories by FORCORP, Edmonton, AB.

Gordon, B.C. 1996. *People of Sunlight People of Starlight: Barrenland Archaeology in the Northwest Territories of Canada*, Mercury Series, Paper 154, Hull Québec: Archaeological Survey of Canada, Canadian Museum of Civilization.

Government of the Northwest Territories (GNWT). 2017a. *Technical Report for Canadian Zinc Corporation's Prairie Creek All Season Road Project. EA1415 - 01*. Submitted to: Mackenzie Valley Environmental Impact Review Board. March 10, 2017.

Government of the Northwest Territories (GNWT). 2017b. *The GNWT Land Use and Sustainability Framework*.
Available at: http://www.lands.gov.nt.ca/en/land-use-and-sustainability-framework

Gregory, R., L. Failing, M. Harstone, G. Long, T. McDaniels and D. Ohlson. 2012. *Structured Decision Making: A Practical Guide to Environmental Management Choices.* Wiley-Blackwell, Chichester, U.K.

Holling, C. S. 1973. *Resilience and stability of ecological systems*. Annual Review of Ecology and Systematics 4:1-23.

Houde, N. 2007. *The six faces of traditional ecological knowledge: challenges and opportunities for Canadian co-management arrangements*. Ecology and Society 12(2): 34.

Indian and Northern Affairs Canada (INAC). 2017. *Northern Land Use Guidelines Volume 05 Access: Roads and Trails.*
Available at: https://www.aadnc-aandc.gc.ca/DAM/DAM-INTER-NWT/STAGING/texte-text/nlug5_1323108964042_eng.pdf

Johnson, C.J. 2013. *Identifying ecological thresholds for regulating human activity: Effective conservation or wishful thinking?* Biological Conservation 168: 57-65.

Judas, J. 2012. *Tłı̨chǫ stories for Ekwò management*. Rangifer 32(20): 49-51.

Kendrick, A., P. O. Lyver, and Łutsel K'e Dene First Nation. 2005. *Denésôliné (Chipewyan) Knowledge of Barren-Ground Caribou (Rangifer tarandus groenlandicus) Movements*. Arctic 58 (2):175-191.

Kennett, S. 2006. *From Science-based Thresholds to Regulatory Limits: Implementation Issues for Cumulative Effects Management*. Yellowknife, Environment Canada. 23pp.

Kitikmeot Inuit Association. 2012. *Inuit Traditional Knowledge of Sabina Gold & Silver Corporation's Back River (Hannigayok) Project.* Naonaiyaotit Traditional Knowledge Project (NTKP), Kitikmeot Inuit Association. Compiled by V. Banci and R. Spicker. Kugluktuk NU. December 7, 2012.

Legat, Allice, Sally Ann Zoe, and Madelaine Chocolate. 1995. *The Importance of Knowing*. In NWT Diamonds Project Environmental Impact Statement (Appendices). Yellowknife: BHP Diamonds Inc.

Legat A., Georgina Chocolate, B. Gon, S.A. Zoe, and M. Chocolate. 2001. *Relationship between caribou migration patterns and the state of caribou habitat* - Final Report from Dogrib Treaty 11 Council. Yellowknife: West Kitikmeot Slave Study Society.

Legat A., Georgina Chocolate, and Madelaine Chocolate, S. A. Zoe, Council Dogrib Treaty, and West Kitikmeot Slave Study. 2002. *Habitat of Dogrib traditional territory: placenames as indicators of biogeographical knowledge: final report*.

Legat A. 2008. *Walking Stories: Leaving Footprints. In Ways of Walking: Ethnography in Practice on Foot*, edited by T. Ingold and J. L. Vergunst. London: Ashgate Publishing.

Legat, A. Chocolate, G. and Chocolate, M. 2008. *Monitoring Caribou: The Relationship between Tłı̨chǫ Laws and Indicators of Change*. In Research Report: Tłı̨chǫ Government.

Legat A., Georgina Chocolate, and Madelaine Chocolate. 2008. *Monitoring the Relationship between People and Caribou: Tłı̨chǫ Laws and Indicators of Change.* Yellowknife: West Kitikmeot Slave Study Society.

Legat, A. C. Nitsiza and M. Chocolate-Pasquayak. 2010. *Using Tłı̨chǫ Knowledge to Monitor Barren-ground Caribou.* Yellowknife, Wek'èezhìı Renewable Resources Board. 24pp.

Legat, A. 2013. *Walking the Land, Feeding the Fire: Knowledge and Stewardship Among the Tłı̨chǫ Dene*. Tucson, AZ: University of Arizona Press.

Łutsel K'e Dene First Nation. 2001. *Ni Hat Ni - Watching the Land: Cumulative Effects Assessment and Management in the Denésǫłine Territory*. Yellowknife: West Kitikmeot Slave Study Society.

Łutsel K'e Dene First Nation. 2016. *Summary Report of Traditional Knowledge Research on Bathurst Caribou and Mining*. Prepared by Lauren King and Kelsey Dokis-Jansen. Submitted to Bathurst Caribou Range Plan. 18 pp.

Lyver, P. 2002. *Use of First Nations Dene Knowledge to Monitor Changes in Barren Ground (Rangifer tarandus groenlandicus) body condition*. Winnipeg: University of Manitoba.

Lyver, Phillip, and Łutsel K'e Dene First Nation. 2005. *Monitoring Barren-Ground Caribou Body Condition with Denésǫłine Traditional Knowledge*. Arctic 58(1):44-54.

Lyver, P. O., and A. Gunn. 2004. *Calibration of Hunters' Impressions with Female Caribou Body Condition Indices to Predict Probability of Pregnancy*. Arctic 57(3):233-241.

Mackenzie Valley Environmental Impact Review Board. 2013. *Report of Environmental Impact Review and Reasons for Decision: Gahcho Kué Diamond Mine Project, DeBeers Canada Inc*. Yellowknife, NT 207pp.

Mackenzie Valley Environmental Impact Review Board. 2016. *Report of Environmental Assessment and Reasons for Decision: Dominion Diamond Ekati Corp. Jay Project*. Yellowknife, NT 350pp.

Martin, J., M. C. Runge, J. D. Nichols, B. C. Lubow, and W. L. Kendall. 2009*. Structured decision making as a conceptual framework to identify thresholds for conservation and management*. Ecological Applications 19:1079-1090.

Miller, L. 2000. *Lichens, wildfire, and caribou on the taiga ecosystem of northcentral Canada*. Rangifer, Special Issue No. 12, 197-207

Moller, H., F. Berkes, P. O. Lyver, and M. Kislalioglu. 2004*. Combining science and Traditional Knowledge: monitoring populations for co-management.* Ecology and Society 9(3):2.

Nadasdy, P. 1999*. The politics of TEK: Power and the "integration" of knowledge*. Arctic Anthropology 36(1-2):1-18.

Nadasdy, P. 2003*. Hunters and bureaucrats: Power, knowledge, and Aboriginal-state relations in the southwest Yukon*. Vancouver: UBC Press.

Nagy, J. 2011. *Use of Space by Caribou in Northern Canada*. PhD Thesis, University of Alberta, Edmonton, AB 184pp.

O'Riordan, T. and J. Cameron. 1994. *Interpreting the Precautionary Principle.* Earthscan Publications Ltd.

Parlee B. and Łutsel K'e Dene First Nation 2000. *Traditional Ecological Knowledge in the Kache Kue Study Region.* Yellowknife: West Kitikmeot Slave Study Society.

Parlee, B. and Łutsel K'e Dene First Nation 2001a. *Traditional Ecological Knowledge in the Kache Kue Study Region – Final Report*. Yellowknife: West Kitikmeot Slave Study Society.

Parlee, B., and Łutsel K'e Dene First Nation. 2001b. *Final report: community-based monitoring*. Yellowknife: West Kitikmeot Slave Study Society.

Parlee, Brenda, Micheline Manseau, and Łutsel K'e Dene First Nation. 2005. *Using Traditional Knowledge to Adapt to Ecological Change: Denésôliné Monitoring of Caribou Movements*. Arctic 58(1):26-37.

Parlee, Brenda, J.D. O'Neil, and Łutsel K'e Dene First Nation. 2007. *"The Dene Way of Life": Perspectives on Health from Canada's North*. Journal of Canadian Studies 41(3):112-133.

Parlee, Brenda. 2012. *Finding Voice in a Changing Ecological and Political Landscape: Traditional Knowledge and Resource Management in Settled and Unsettled Land Claim Areas of the Northwest Territories, Canada*. Aboriginal Policy Studies 2(1):56-87.

Parlee, B., Thorpe, N., and T. McNabb. 2013. *Traditional Knowledge: Barren-ground Caribou in the Northwest Territories*. Unpublished study. Available at www.brendaparlee.ca. Accessed March 2016.

Parlee, Brenda. 2017. *When the Caribou do not Come…Indigenous Knowledge and Adaptive Management in the Western Arctic*. Vancouver: UBC Press.

Poole, K. and A. Gunn. 2015. *Mobile Caribou Conservation Measures for the Kivalliq Region, Nunavut*. Unpublished final report for the Kivalliq Inuit Association. Available at: http://www.nunavut.ca/files/Poole%20and%20Gunn%20KivIA%20Caribou%20Protection%20Measures%2012Nov15%20(2).pdf

Skoog, R. O. 1968. *Ecology of the caribou (Rangifer tarandus granti) in Alaska*. PhD Thesis, University of California, Berkeley. Berkeley, CA. 699 pp.

Sangris, F. 2012. *Renewing Our Traditional Laws through Joint Ekwǫ (caribou) Management, The 13th North American Caribou Workshop*. Rangifer 32(20): 75-80.

Senes Consulting Ltd. 2008. West Kitikmeot Slave Study State of Knowledge Report – 2007 Update. Prepared for West Kitikmeot Slave Study Society. Yellowknife, NWT. April 2008

Social Ventures Australia (SVA). 2016. *Analysis of the Current and Future Value of Indigenous Guardian Work in Canada's Northwest Territories*: Dehcho First Nations, Łutsel K'e Dene First Nation, Indigenous Leadership Initiative and Tides Canada. 53 pp.

Species at Risk Committee (SARC). 2017. *Species Status Report for Porcupine Caribou and Barren-ground Caribou (Tuktoyaktuk Peninsula, Cape Bathurst, Bluenose-West, Bluenose-East, Bathurst, Beverly,*

Ahiak, and Qamanirjuaq herds) (Rangifer tarandus groenlandicus) in the Northwest Territories. Species at Risk Committee, Yellowknife, NT.

Standish, R. J., R. J. Hobbs, M. M. Mayfield, B. T. Bestelmeyer, K. N. Suding, L. L. Battaglia, V. Eviner, C. V. Hawkes, V. M. Temperton, V. A. Cramer, J. A. Harris, J. L. Funk, and P. A. Thomas. 2014. *Resilience in ecology: Abstraction, distraction, or where the action is?* Biological Conservation 177:43-51.

Stankey, G.H., R.N. Clark, and B.T. Bormann. 2005. *Adaptive management of natural resources: theory, concepts and management institutions.* General Technical Report PNW-GTR-654. Portland OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 73p

Stevenson, M. G. 1996*. Indigenous knowledge in environmental assessment*. Arctic 49(3):278-291.

Stevenson, M. G. 1999. *What are we managing? Traditional systems of management and knowledge in cooperative and joint management*. Pages 161-169 in T. S. Veeman, D. W. Smith, B. G. Purdy, F. J. Salkie, and G. A. Larkin, editors. Proceedings of the 1999 Sustainable Forest Management Network Conference: science and practice: sustaining the boreal forest (Edmonton, 1999). Sustainable Forest Management Network and University of Alberta, Edmonton, Canada.

Stewart, Andrew M., Darren Keith, and Joan Scottie. 2004. *Caribou Crossings and Cultural Meanings: Placing Traditional Knowledge and Archaeology in Context in an Inuit Landscape*. Journal of Archaeological Method and Theory 11(2):183-211.

Terra Firma. 2004*. Fencing at the Diavik Diamond Mine - Report of Workshops Sponsored by the Environmental Monitoring Advisory Board*. Yellowknife: Environmental Monitoring Advisory Board.

The Nature Conservancy of Canada (TNC). *Indigenous Guardians Toolkit*. 2016. 189 pp. (www.indigenousguardianstoolkit.ca)

Thorpe, N. L. 2000. *Contributions of Inuit Ecological Knowledge to Understanding the Impacts of Climate Change on the Bathurst Caribou Herd in the Kitikmeot Region, Nunavut*, School of Resource and Environmental Management, Simon Fraser University.

Thorpe, N. and Kadlun, M. 2000. *Tuktu and Nogak Project - Inuit Knowledge about Wildlife in Bathurst Inlet: Focus on Caribou and Calving Areas - 1999/2000 Final Report*, Yellowknife.

Thorpe, N. L. with Eyegetok, S., Hakongak, N., and Qitirmiut Elders. 2001. *The Tuktu and Nogak Project: A Caribou Chronicle. Final Report to the West Kitikmeot Slave/Study Society*. Ikaluktuuttiak, NT. 2001.

Thorpe, N., N. Hakongak, S. Eyegetok and The Kitikmeot Elders. 2001. *Thunder on the Tundra: Inuit Qaujimjatuqangit of the Bathurst Caribou.* Tuktu and Nogak Project. Vancouver, BC. Douglas and McIntyre.

Thorpe Consulting Services Ltd. 2014. *The Caribou is the Boss of the Mine: Izok Corridor Project Caribou Inuit Qaujimajatuqangit Report.* Results from Interviews and a Workshop carried out in Qurluqtuq (Kugluktuk) in 2012. Prepared by N. Thorpe and K. Scott with contributions from M. Kakkianiun and G. Angulalik for MMG Ltd. Vancouver, BC. January, 2014.

Thorpe Consulting Services. 2016. *TK Panel Report, Session #9: Focus on Caribou*. May 13-16, 2016 at Diavik Diamond Mine, NT. 12 pp.

Tłįchǫ Research and Training Institute (Detas'eetsa). 2013. *Tłįchǫ Use and Knowledge of Ewaànıt'ıtı*. Tłįchǫ Government.

Tłįchǫ Research and Training Institute (Detas'eetsa). 2014. *K'àgòò tıJìiDeè: Traditional Knowledge Study for the Proposed All-Season Road to Whatì*. Tłįchǫ Government.

Tłįchǫ Research and Training Institute (Detas'eetsa). 2015. *K'ıchıı` (Whitebeach Point) Traditional Knowledge Study: For the Husky Oil Chedabucto Mineral Exploration*. Tłįchǫ Government.

Tłįchǫ Research and Training Institute (Detas'eetsa). 2016a. *A Summary Report of Tłįchǫ Traditional Knowledge of Ekwo (Barren-ground Caribou) for the Bathurst Caribou Range Plan*. Petter Jacobsen May 4, 2016. 66 pp.

Tłįchǫ Research and Training Institute (Detas'eetsa). 2016b. *Ekwò zò gha dzô nats'êdè "We Live Here For Caribou" Cumulative Impacts Study on the Bathurst Caribou*. Behchokǫ̀, NT. 51 pp.

Tłįchǫ Research and Training Institute (Detas'eetsa). 2017a. *We Watch Everything: A Methodology for Boots-on-the Ground Caribou Monitoring.* Behchokǫ̀, NT.

Tłįchǫ Research and Training Institute (Detas'eetsa). 2017b. *Boots on the Ground: Monitoring Results*. Behchokǫ̀, NT.

Tłįchǫ Research and Training Institute (Detas'eetsa). 2017c. *Prioritization of water crossings and land bridges.* [report under development]

Trailmark Systems Inc 2015. *Review of post-2010 Literature on Human Effects on Barren-Ground Caribou: Focus on Traditional Knowledge, Western Science and Caribou Protection Measures* Prepared for the Nunavut Wildlife Management Board.

Trailmark Systems Ltd. 2016. *Report on the Bathurst Caribou Range Plan TK Workshop*. Report prepared by Natasha Thorpe and Joanne Barnaby. Yellowknife, NT. March 30-31, 2016. 29 pp.

Ungava Peninsula Caribou Aboriginal Round Table (UPCART). 2017. *A Long Time Ago in the Future: Caribou and the People of Ungava (2017-2117)*. UPCART Management Strategy.

Wek'èezhìı Renewable Resources Board (WRRB). 2016a. *Report on a Public Hearing Held by the Wek'èezhìı Renewable Resources Board 23-24 February 2016 Yellowknife, NT & Reasons for*

Decisions Related to a Joint Proposal for the Management of the Bathurst ɬekwö (Barren-ground caribou) Herd: PART A.

Wek'èezhìı Renewable Resources Board (WRRB). 2016b. *Reasons for Decisions Related to a Joint Proposal for the Management of the Bathurst ɬekwö (Barren-ground caribou) Herd: PART B*.

Whaèhdôö Nàowoò Kö, and (Dogrib Treaty 11 Council). 2001*. Caribou Migration and the State of the Their Habitat*. Yellowknife: West Kitikmeot Slave Study Society.

Whaèhdôö Nàowoò Kö, and (Dogrib Treaty 11 Council). 2002*. Dogrib Knowledge on Placenames Caribou and Habitat*. Yellowknife: West Kitikmeot Slave Study Society.

Williams, T. M. and A. Gunn. 1982. Descriptions of Water crossings and their use by Migratory Barren-ground caribou in the Districts of Keewatin and Mackenzie, NWT. File Report no. 27. Yellowknife: NWT Wildlife Service.

Wray, K. (2011). *Ways We Respect Caribou: Hunting in Teetł'it It Zheh* (Fort McPherson, NWT), University of Alberta. M.A. Thesis.

Wray, K. and B. Parlee. 2012. *Ways we respect caribou: rules in use in Tetl'it Zheh*. Arctic. 65(4): 1.

Yellowknives Dene First Nation, Land and Environment. 2016. *Preliminary TK of the Yellowknives Dene First Nation to support the Bathurst Caribou Range Plan.* March 31, 2016. 23 pp.

Zoe, S. A., C. Football, M. Chocolate, A. Legat, Institute Dene Cultural, Committee Dogrib Renewable Resources, Council Dogrib Treaty, and Resources Northwest Territories. Dept. of Renewable. 1995. *Traditional methods used by the Dogrib to redirect caribou*.

Appendix 1

Future Transportation Concepts being considered in the Bathurst Range