

Action Plan for the Klinse-Za Herd of Woodland Caribou (*Rangifer tarandus caribou*) in Canada

Woodland Caribou



2013

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PREFACE

Under the *Species at Risk Act* (S.C. 2002, c.29) (SARA) the federal competent ministers are responsible for the preparation of action plans for species listed as Extirpated, Endangered, and Threatened for which recovery has been deemed feasible and are required to report on progress within five years. The federal, provincial, and territorial government signatories under the Accord for the Protection of Species at Risk (1996) agreed to establish complementary legislation and programs that provide for effective protection of species at risk throughout Canada.

Under SARA, action plans provide detailed recovery planning to support the strategic direction set out in the recovery strategy for the species, including measures to achieve the population and distribution objectives in the recovery strategy, measures to address the threats and monitor the recovery of the species, and measures to protect critical habitat. The socio-economic impacts of implementation are also evaluated. Project-specific or herd-specific action plans may be created for a species that address other areas of recovery implementation. The action plan is considered one in a series of documents that are linked and should be taken into consideration together, those being the COSEWIC status report, the recovery strategy, and the action plan.

The principle focus of the Action Plan for the Klinse-Za Herd of Woodland Caribou (*Rangifer tarandus caribou*) in Canada (the “Action Plan”) is on the Klinse-Za caribou herd (the “Klinse-Za herd”), which is among the herds subject to the Recovery Strategy for Woodland Caribou (*rangifer tarandus caribou*), Southern Mountain Population (the “Recovery Strategy”).¹

The Minister of the Environment is the competent minister for the recovery of the Southern Mountain Population of woodland caribou. It is intended that this Action Plan be incorporated by the Minister into the Recovery Strategy pursuant to section 44(2) of SARA, and that this plan be adopted as or incorporated into an action plan as per section 51 of SARA. It has been prepared in cooperation with West Moberly First Nations.

Success in the recovery of this species depends on the commitment and cooperation of many different constituencies that will be involved in implementing the directions and actions set out in this Action Plan and will not be achieved by Environment Canada, or any other jurisdiction alone. All Canadians are invited to join in supporting and implementing this action plan for the benefit of the Klinse-Za herd of woodland caribou and Canadian society as a whole.

Implementation of this Action Plan is subject to appropriations, priorities, and budgetary constraints of the participating jurisdictions and organizations.

¹ Note that the Klinse-Za caribou herd has been previously referred to as the “Moberly caribou herd” by the governments of BC and Canada.

ACKNOWLEDGMENTS

Dale Seip (British Columbia Ministry of Forests, Lands and Natural Resource Operations) and Elena Jones (ESJ Wildlife Consulting) provided unpublished data and radio-telemetry locations. Chris Ritchie (Ministry of Forests, Lands and Natural Resource Operations) provided unpublished reports. Viktor Brumovsky (Wildlife Infometrics Inc.) assisted with developing the caribou habitat models and Viktor Brumovsky and Micheline Snively (Wildlife Infometrics Inc.) produced the maps. Teena Demeulemeester (formerly the Senior Forestry Officer in the Land Use Department of West Moberly First Nations) managed funds for the development of the supporting documentation and provided general logistic support. A special thanks to Elders Max Desjarlais and Catherine Dokkie, and other members of West Moberly First Nations, whose traditional ecological knowledge formed the basis to this Action Plan. Without their invaluable guidance this Action Plan would not have been possible. Lastly, we would like to thank the Elders of Saulneau First Nations for reviewing and verifying the approach. Funding for this Action Plan was provided by the Government of Canada's *Aboriginal Fund for Species at Risk*, British Columbia's *Forest Investment Account*, the *New Relationship Trust* of First Nations of British Columbia, and West Moberly First Nations.

EXECUTIVE SUMMARY

Woodland Caribou (*Rangifer tarandus caribou*), Southern Mountain Population were listed as a “threatened” species under Schedule 1 of the *Species at Risk Act* in 2003 and, although recovery planning is currently underway, there is no published recovery strategy or action plan for these caribou. The Klinse-Za herd is one of the constituent herds to be recovered pursuant to the Recovery Strategy; it has been in population decline for the past two decades with only 23 (or fewer) animals currently in existence.

This Action Plan was constructed to address all of the herd area known and mapped in recent times as the Klinse-Za herd and sufficient area surrounding that herd to encompass what is understood by Aboriginal people to represent the true historic extent (baseline condition) of the herd prior to population decline (current condition). The population and distribution objectives for the Klinse-Za herd are for a stable or increasing population of at least 654 caribou distributed throughout their range, with connectivity to adjacent areas. The number of caribou chosen as the population objective is the weighted average population density of the northern caribou ecotype in British Columbia factored by the total amount of critical habitat calculated for the Klinse-Za herd Action Plan area.

The critical habitat necessary to meet these population and distribution objectives within the Action Plan area was identified in the draft Recovery Strategy for the Klinse-Za herd planning document and brought forward for use in this Action Plan. Critical habitat was the total amount of seasonal ranges determined from a deductive mapping method used to rate the potential of the land to supply life requisites for caribou under the conditions that would have existed prior to anthropogenic disturbance. This mapping method is important in recovery planning, and more specifically in this application for the Klinse-Za herd, because the focus is on recovering a population that is a remnant of its previous existence in terms of spatial distribution, numbers, and behaviors. Maps of habitat potential were developed to depict the amount and spatial arrangement of winter range at both low-elevation (LER, 146,959 ha) and high-elevation (HEWR, 213,040 ha) topographic positions. Calving and summer range (CSR) area was estimated to potentially be 330,492 ha. The total amount of critical habitat in the Plan area is 503,846 ha. This approach incorporates traditional ecological knowledge of Indigenous knowledge holders.

The strategies, approaches, and actions identified in this Action Plan are designed to stop the population decline that is currently occurring and to restore population numbers in the short term. Habitat protection measures including disturbance thresholds are recommended in order to provide effective protection of critical habitat to achieve the population and distribution objectives in the long term. Based on population modeling, recovery of the Klinse-Za herd is not anticipated to be recovered before at least two decades. It is anticipated that once critical habitat has been restored and protected, population management measures can be relaxed and will not be undertaken in the longer term.

A multi-criteria decision approach was used as a preliminary step to help guide the priority for implementation of individual recovery actions. It was noted that other ancillary actions are also required. Implementation of priority actions was recommended as follows:

1. Reduce mortality (reduce wolves and pen pregnant cows during the natal period) to caribou on and around Klinse-Za and augment the Klinse-Za herd with members from adjacent herd areas;
2. Establish thresholds for maximum levels of disturbance to critical habitat (0% HEWR, 5% CSR, 10% LER, and 20% matrix habitat) and adopt specific range plans to restore already disturbed land and protect against new disturbance where necessary to meet thresholds for disturbance; and
3. Establish a Stewardship Team to initiate implementation and management of this Action Plan and to coordinate actions with other planning initiatives.

The Action Plan area includes sacred land to the Dunne-za, Cree, and Sauleau peoples of the surrounding area, which is known as Klinse-Za to the Dunne-za and The Two Mountains That Sit Together to the Sauleau. First Nations have a Treaty right to hunt caribou in accordance with their traditional seasonal round, which is protected by section 35(1) of Canada's *Constitution Act, 1982*. First Nations have not been able to meaningfully exercise this right for approximately forty years due to the decline in caribou populations and distribution. The governments of Canada and British Columbia ("BC") agree that caribou are inherently valuable and share the interest in effectively protecting the species and its habitat for the benefit of the Canadian society as a whole.

This Action Plan builds on previous actions taken by Canada, BC, and local First Nations to protect and recover caribou in the region. The successful recovery of the Kline-Za herd as outlined in this Action Plan will provide a harvestable surplus of caribou to be reincorporated into the traditional seasonal round of First Nations. The sustainable level of caribou in the Klinse-Za herd will foster ecological integrity and will be beneficial to all Canadians. It will also advance the constitutional imperative of "reconciliation" between non-Aboriginals and Aboriginal peoples.

Costs associated with implementing the Action Plan are expected to be borne predominantly by the governments of Canada and BC, although there may be opportunities to delegate some costs to industry stakeholders operating within the Action Plan area. Industry will benefit from plan implementation by receiving a higher degree of certainty about land and resource use. There will not be any direct socioeconomic effects on the general public residing outside of the Action Plan area.

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1. RECOVERY ACTIONS

1.1 Scope of the Action Plan

1.1.1 Planning Context

Woodland Caribou (*Rangifer tarandus caribou*), Southern Mountain Population were listed as a “threatened” species under Schedule 1 of the *Species at Risk Act* in 2003. A Recovery Strategy, which under SARA was to be prepared by 2007, is currently under development. The Klinse-Za herd is one of the constituent herds to be recovered pursuant to the Recovery Strategy. This Action Plan may be incorporated into the Recovery Strategy pursuant to s. 44(2) of SARA, and/or may become or be incorporated into an Action Plan for the species under s. 51 of SARA.

This Action Plan follows, and is substantially based upon, a caribou-centric land use strategy and the traditional ecological knowledge of Aboriginal peoples that was developed for the same location and extent (Cichowski et al. 2012). The strategy document is the technical support for this Action Plan and should be referred to when necessary.

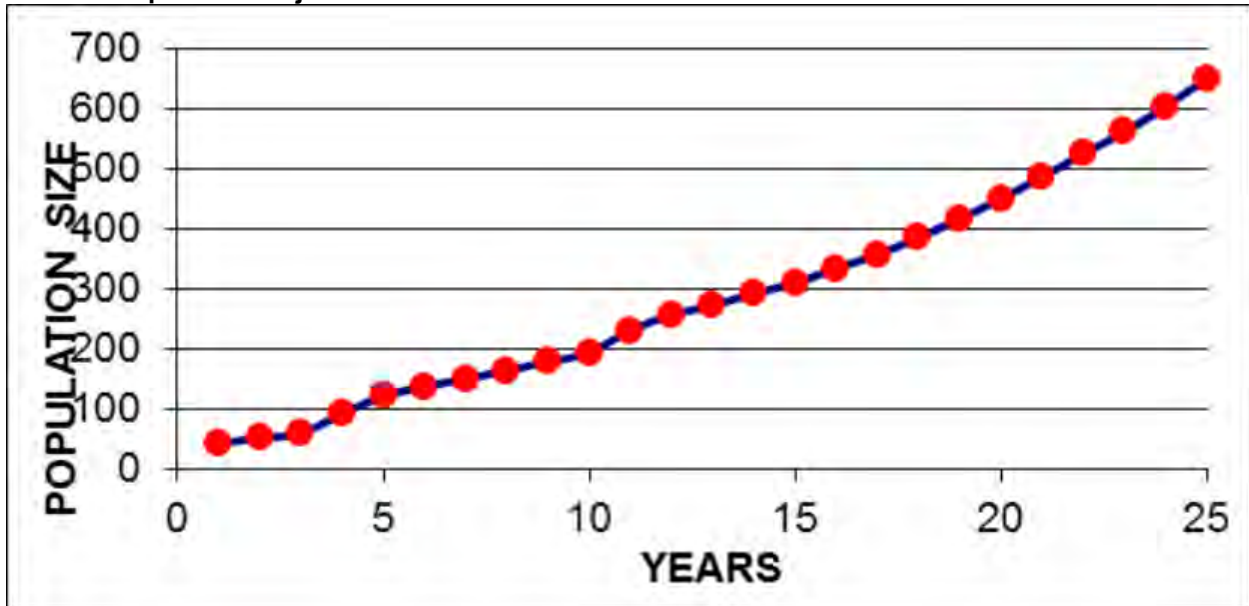
Caribou in the Klinse-Za herd have undergone a significant population decline, at least in the last two decades, and the continued existence of the herd is threatened by unsustainable levels of natural resource development and predation (factors leading to the decline). The population estimate based on the most recent survey conducted (April 2012) is 23 caribou in the Klinse-Za herd area (Unpubl. data; D. Seip; British Columbia Ministry of Forests, Lands, and Natural Resource Operations, Prince George, BC). This is below the minimum population size of 100 caribou recommended in the Recovery Strategy for Northern Caribou in the Southern Mountains National Ecological Area in British Columbia (NCTAC 2004) and is well below the population goal in this Action Plan. It also represents >80% population decline since the minimum count of 189 caribou in 1995 (Wood 1995). The current level of predation has resulted from extensive modification of habitat resulting in an abundance of early seral plant communities, which supports more prey than would be present otherwise, and a road infrastructure which allows for increased encounter rates between predators and caribou (broader range of, and more efficient, search for prey).

This Action Plan addresses all of the Klinse-Za herd area known and mapped in recent times (as the Moberly caribou herd) and sufficient area surrounding that herd to encompass what is understood by Aboriginal people to represent the true historic extent (baseline condition) of the herd prior to population decline (current condition). Having undergone severe population decline in the recent past, it is probable that the Klinse-Za herd no longer is composed of all behavior types and is now primarily represented by more sedentary and less wide-ranging individuals than would have occurred in historic times (Spalding 2000). The extent for this Action Plan is also purposefully designed to address opportunities for genetic exchange and other natural population interaction (e.g., dispersal events) between caribou in the Klinse-Za herd and caribou in adjacent herds (Figure 1).

1.1.2 Population and Distribution Objectives

The population and distribution objectives for this Action Plan are to achieve, within 3 generations (or 21 years), a stable or increasing population of at least 654 caribou distributed throughout their range, with connectivity to adjacent occupied areas.

Table 1: Population Objectives for the Klinse-Za Herd



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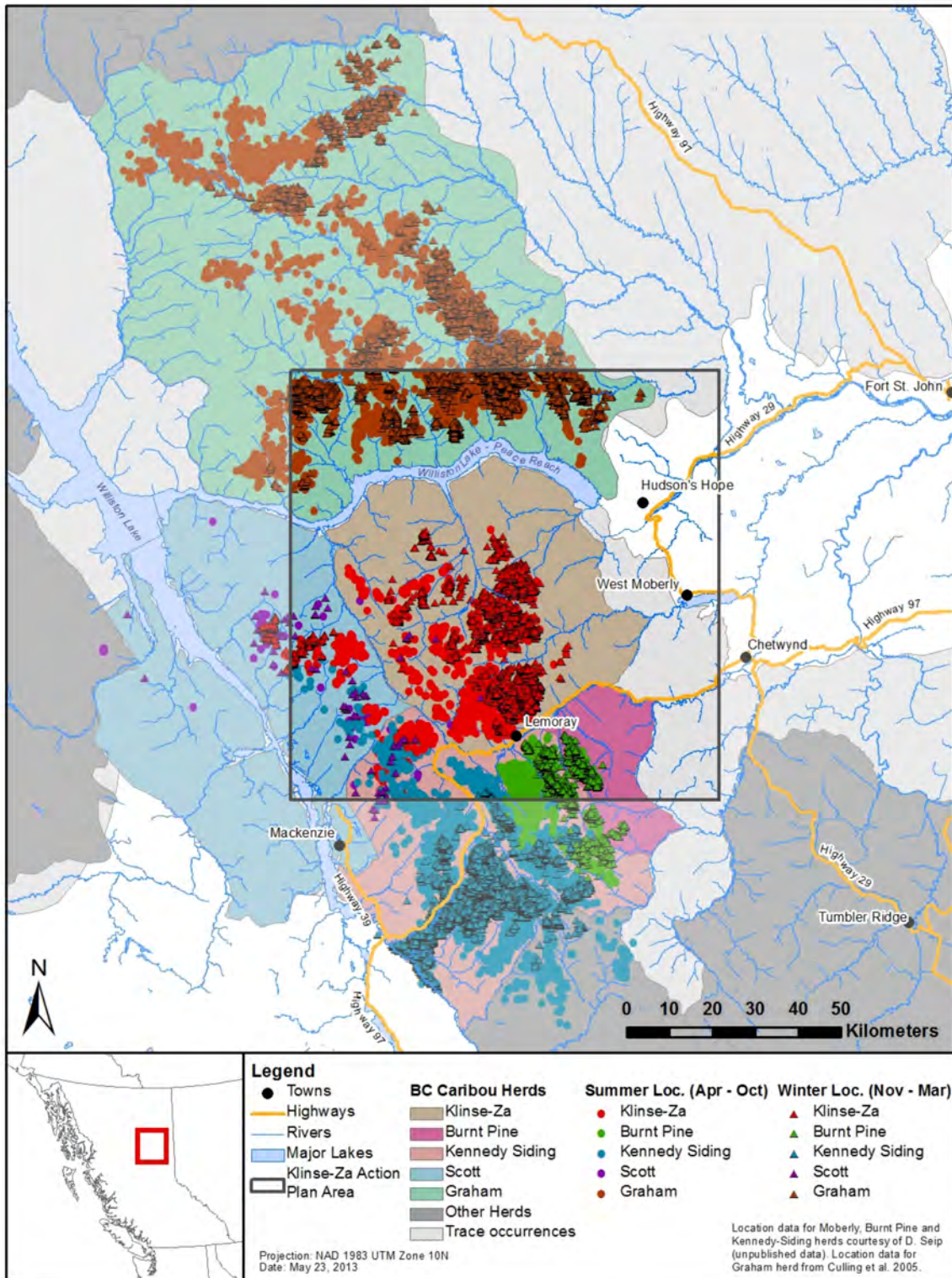


Figure 1. Provincial herd boundaries for, and radio-telemetry locations of, woodland caribou within and around the Action Plan area for the Klinse-Za herd.

Radio locations are from May 2002 to April 2011; Seip and Jones 2011.

Population modeling has demonstrated that it would be unrealistic to expect recovery of the Klinse-Za herd any sooner than two decades from present (i.e., where modeling was based on maximum reproductive potential, mortality rates that are reduced from current rates, and an initiating population size of the current herd). Population and distribution objectives were calculated from the density of woodland caribou populations of the northern ecotype in BC factored by the total amount of non-overlapping potential habitat in the Action Plan area. The weighted average density (estimated in 2008 as 130/1,000km²; data from McNay and Hamilton 2010) and total habitat (503,846 ha; see Section 1.2.1) therefore yield 654 caribou.

It is anticipated that, once the Klinse-Za herd is recovered to a self-sustaining level and the population and distribution objective has been met, caribou will once again become available to harvest for sustenance and spiritual purposes for First Nations. At a population size of 654 caribou, the annual allowable harvest from the Klinse-Za herd would be approximately 20 animals.

The remaining sections of this Action Plan will identify the critical habitat that must be protected to achieve these objectives, the various threats that might lead to the destruction of critical habitat, and the set of recovery actions needed to reduce and manage those threats as a means to recover the Klinse-Za herd to a self-sustaining level at least equal to the population and distribution objectives.

1.2 Critical Habitat

According to the Species at Risk Act s.49(1)(a), this Action Plan must identify critical habitat, to the extent possible, based on the best available information and consistent with the recovery strategy, and examples of activities that are likely to result in the destruction of critical habitat.

▣

SARA defines “habitat” as:

- a) *In respect of aquatic species, spawning grounds and nursery, rearing, food supply, migration and any other areas on which aquatic species depend directly or indirectly in order to carry out their life processes, or areas where aquatic species formerly occurred and have the potential to be reintroduced; and*
- b) *In respect of other wildlife species, the area or type of site where an individual or wildlife species naturally occurs or depends on directly or indirectly in order to carry out its life processes or formerly occurred and has the potential to be reintroduced.*

SARA defines “critical habitat” as:

The habitat that is necessary for the survival or recovery of a listed wildlife species and that is identified as the species’ critical habitat in the recovery strategy or in the action plan for the species.

[SARA, ss.2(1)]

1.2.1 Identification of the species' critical habitat

The identification of critical habitat for woodland caribou in recovery strategies has recently been undertaken at the level of local caribou population (Environment Canada 2012). The critical habitat necessary to meet population and distribution objectives for the Klinse-Za herd population within this Action Plan area was identified by Cichowski et al. (2012) using a Bayesian modeling technique (McCann et al. 2006). Traditional ecological knowledge of Elders was incorporated in the model (e.g., the lower elevation habitat). This method has been successfully used in recovery planning before (McNay et al. 2008, Sutherland et al. 2007). The modeling approach is deductive (rather than inductive) and thereby allows for identification of habitat necessary for an animal to perform its life functions regardless of whether or not the habitat is currently being used due to the decline in the population and distribution. This is important in recovery planning, and more specifically in this application for the Klinse-Za herd, because the focus is on recovering a population that is a remnant of its previous existence in terms of spatial distribution, numbers, and behaviors (Spalding 2000, WMFN 2009). At a herd size of 23, there are simply not enough animals to expect them to occupy all the currently suitable range. Furthermore, there is unlikely to be the behavioral representation within the herd to indicate all potential habitats that would have been used by the herd historically (i.e., the small remaining population is that portion of the herd that has been best able to survive in the currently disturbed landscape). The modeling of potential habitat for this Action Plan therefore identifies the landscape conditions that will be necessary to provide the basic life requisites for caribou (i.e., abundant forage, reduced snow depths in winter, relative security from predators, etc.). The modeling was conducted under hypothetical conditions where historic disturbances (e.g., forest logging, road construction) to the land were removed to represent a potential landscape scenario more characteristic of functional habitat.

The relative importance of some caribou life requisites varies seasonally. The potential habitat identified in this Action Plan therefore includes habitat used during four critical seasons: rut, winter, calving, and summer (Cichowski et al. 2012). Critical habitat for the Klinse-Za herd occurs wherever these life requisites occur on the landscape during those seasons (Figure 2). For management purposes, and because of the similarity in range conditions, we grouped results for rut with winter and results for calving with summer. Winter habitat can occur at both high-elevation and low-elevation geographic positions while calving and summer range occurs only at high-elevation³ (Figure 2). Three zones of caribou range can therefore be depicted: (1) low-elevation range (LER, 61,573 ha), (2) high-elevation winter range (HEWR, 213,040 ha), and (3) calving and summer range (CSR, 330,429 ha) (Table 2). Management unit polygons were drawn around LER (Appendix A) totaling 146,959 ha; also, most HEWR (i.e., 183,954 ha) is overlapped with other range types (Table 2). Among other factors (for details see McNay et al. 2009), HEWR was located where we expected low snow depths and abundant terrestrial forage lichens. LER included areas where terrestrial and arboreal forage lichens would be abundant (for details see McNay et al. 2006). The total non-overlapping potential habitat in the Action Plan area is approximately 503,846 ha (Table 2). The remaining 496,154 ha of land represents a fourth zone in the Action Plan area and is referred to as matrix habitat. Although anthropogenic activities in matrix habitat could adversely affect caribou, the matrix habitat is not considered to

³ Note that the original depictions of seasonal ranges from Cichowski et al. (2012) were modified to allow for a clearer identification of individual management units (Appendix A).

be part of critical habitat but is considered a necessary component of caribou habitat in the Action Plan area. The assessment and management of cumulative effects in the matrix habitat must be done from an ecosystem-based approach. Measures to protect critical habitat are identified section 1.3 of the Action Plan.

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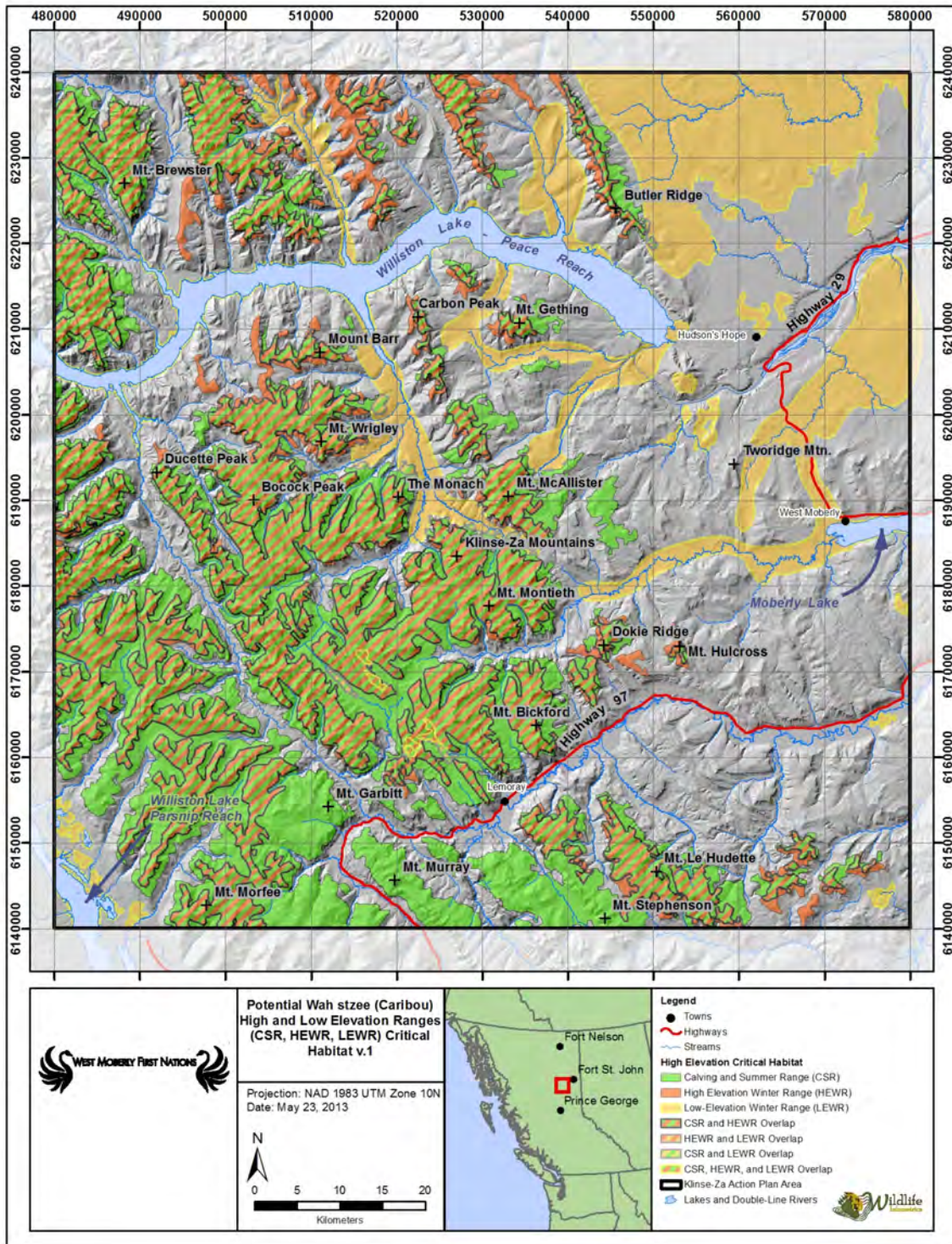


Figure 2. Potential seasonal ranges for caribou in the Action Plan area.

Table 2. The amount of area (ha) of high-elevation winter range (HEWR), calving and summer range (CSR), and low-elevation range (LER) within the Klinse-Za herd Action Plan area and percent of those areas that have been exposed to some form of anthropogenic disturbance (in parentheses).

	HEWR	CSR	LER	Total
Non-overlapping area	29,086 (13.9)	144,850 (17.0)	144,100 (57.7)	318,036 (22.2)
CSR and HEWR overlap	182, 951 (5.9)			185,810 (2.2)
CSR and LER overlap		1,856 (29.1)		
HEWR and LER overlap	168 (0)			
All ranges overlap	835 (1.4)			
Total	213,040 (7.0)	330,492 (10.9)	146,959 (57.0)	503,846 (24.4)

1.2.2 Examples of activities likely to result in destruction of critical habitat

Activities that threaten destruction of critical habitat for caribou include:

- Disturbance to the components or ranges that detrimentally affect any requirements for life; and/or,
- Disturbance that leads to displacement from preferred ranges.

Disturbance to components of range includes, but is not limited to:

- Damage to and/or destruction of forage lichens (e.g., removal of terrestrial lichens during exploration activities and/or the construction of project infrastructure or removal of trees that provide support for arboreal lichens);
- Changes in snow interception and thermal cover due to changes in the forest canopy (e.g., removal of trees);
- Increased barriers to movement (i.e., two spatial scales are contemplated; loss of foraging habitat and/or isolation from other herds) that could result from project infrastructure (e.g., above ground pipes, intensively used roads, camp/plant facilities, fencing, reservoirs, berms, etc.) or portions of landscapes managed for other resource purposes (e.g., dense, even-aged forests of specific types and geographic position, agricultural areas, etc.); and,
- Loss of contiguous habitat for caribou to use.

Range can also be altered detrimentally if changes lead to increased risk of mortality (e.g., alteration of matrix habitat adjacent to critical habitat that leads to abundant predators) or the inability for individual caribou to breed or raise their calves successfully due to the occurrence of anthropogenic activity that displaces caribou from their range. Potential threat factors and activities in the Action Plan area include:

- Natural disturbances (e.g., fire, forest insects, avalanches) and climate change;

- Resource exploration and development activities (e.g., forest, minerals, coal, hydro-electric, wind power, and oil and gas – activities include use of helicopters, construction, and normal operation of onsite equipment and disturbances to land) during all stages of natural resource development (e.g., planning, exploration, construction, operations, reclamation, decommissioning, and ecological restoration);
- Recreational activities (e.g., snowmobiling, heli-skiing, all-terrain vehicles, hiking);
- Natural resource activities of non-First Nations (e.g., hunting, trapping, guide-outfitting);
- Habitat enhancement for other ungulate species;
- Settlements and agriculture, including the associated land uses (e.g., cattle grazing, residential housing, urban/rural amenities and services) and infrastructure (e.g., power lines, roads);
- Management to limit large natural disturbances and their effects (e.g., fire suppression, salvage harvesting); and,
- Development of roads and other linear infrastructure (e.g., utility and service lines, seismic lines, pipelines, railways) associated with management of the factors above.

The timing and effects of threats to the Klinse-Za herd are presented in Table 3. McNay and Hamilton (2010) recently completed an evaluation of threats for caribou in British Columbia based on methods endorsed by the International Union for the Conservation of Nature (Master et al. 2009). The most significant threats identified for the Action Plan area were oil and gas activities, wind energy production, mining, transportation and service corridors, problematic native species (wolves), and climate change (Table 4).

Because the duration and types of threats to caribou vary depending on the type of anthropogenic disturbance, the ultimate effect on caribou populations comes from the accumulation of the individual effects spatially and temporally. In Figure 3, the area of combined anthropogenic disturbance in the Action Plan area is depicted, including a 250 meter buffer (on each side of the disturbance)⁴. The 250 meter buffer is intended to take into account avoidance of disturbances by caribou. Although avoidance distances vary with disturbance type and season, and some exceed 250 meters (Smith et al. 2000, Dyer et al. 2001, Oberg 2001), the 250 meter buffer provides an index to track cumulative effects of industrial development (Sorenson et al. 2008). Most development is located in the eastern portion of the study area and represents 361,450ha or 36% of the plan area and 24.4% of critical habitat (Figure 3, Table 2).

1.3 Proposed Measures to Protect the Klinse-Za Herd

The strategies, approaches, and actions of this Action Plan are designed to stop the population decline and restore population numbers in the short term while ensuring effective protection of critical habitat in the short and long term. As critical habitat is restored and protected, population management measures can be relaxed and likely will not need to be undertaken in the longer term.

⁴ It has been recommended that the use of a 500m buffer is more appropriate (EC 2011) although that has been debated (Boutin and Arienti 2008, Sleep and Loehle 2010). With a 500m buffer, the amount of area influenced by anthropogenic disturbance without fire was found to be 46% (Pers. Comm.; Lucy Reiss; Environment Canada, Kelowna, BC; August 29, 2012). Our data results for the same extent with the 500m buffer differed only by 1%.

1.3.1 Emergency Population Management Measures

The management measures to be undertaken in this Action Plan are provided in Table 5. Because the Klinse-Za herd is unlikely to be self-sustaining at its current population size of 23 animals, and because of the apparent high rate of recent population decline (Cichowski et al. 2012), emergency measures are required to stabilize the herd. The emergency measures are broadly categorized under the general objective to stop/reverse the current population decline which will be achieved by two approaches: (1) reducing caribou mortality and, provided that reduction can be demonstrated, (2) augmenting the population with adult caribou trans-located

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Table 3. Timing of threats by human activities on Klinse-Za herd life requisites.

Life Requisite	Threat	Fire	Mountain Pine Beetles (Epidemic)	Climate Change	Winter logging	Summer Logging	Oil and Gas Exploration	Oil and gas extraction	Mining exploration	Mineral extraction	Wind farms	Winter recreation	Summer recreation
Terrestrial lichens - forest	Reduction due to physical disturbance (including permanent structures)	SM ¹			SM	SM	SM	SML	SM	SML	SML	SM	SM
	Reduction due to increased competition from other vegetation in response to dead trees		S										
	Reduction due to increased competition resulting from increased site productivity			ML									
Terrestrial lichens – alpine	Reduction due to physical disturbance (including permanent structures)	SM					SM	SML	SM	SML	SML	SM	SM
	Reduction due to increased competition resulting from increased site productivity			ML									
Arboreal lichens	Reduction due to removal of trees	SM	M		SM	SM	SM	SML	SM	SML	SML		
	Increase due to increased ventilation and light		S										
Winter habitat	Displacement from high quality habitat during activities				S		S	SML	S	SML	SML	S	
	Potential displacement from high quality habitat due to habitat disturbance	SM	SM		SM	SM	SM	SML	SM	SML	SML		
	Loss of canopy for snow interception (travel, habitat selection)	SM	SM		SM	SM	SM	SML	SM	SML	SML		

Life Requisite	Threat	Fire	Mountain Pine Beetles (Epidemic)	Climate Change	Winter logging	Summer Logging	Oil and Gas Exploration	Oil and gas extraction	Mining exploration	Mineral extraction	Wind farms	Winter recreation	Summer recreation
	Blowdown/Coarse Woody Debris (travel, habitat selection)	M	M		S	S	SM		SM		SM		
	Potentially high density regenerating stands (travel)	ML		L	ML	ML	ML		ML				
	Potential use of plowed roads (travel)				S	S	S	SML	S	SML	SML		
Summer habitat	Displacement from high quality habitat during activities (noise, etc.)					S	S	SML	S	SML	SML		S
	Potential displacement from high quality habitat due to habitat disturbance	SM	SM		SM	SM	SM	SML	SM	SML	SML		
	Loss of canopy for thermal regulation (cooling)	SM	SM		SM	SM	SM	SML	SM	SML	SML		
	Blowdown/Coarse Woody Debris (travel, habitat selection)	M	M		S	S	SM		SM		SM		
	Potentially high density regenerating stands (travel)	ML		L	ML	ML	ML		ML				
	Use of roads (travel)				SM	SM	SM	SML	SM	SML	SML		
Migration	Displacement from high quality habitat during activities (noise, etc.)				S	S	S	SML	S	SML	SML		S
	Potential displacement from high quality habitat due to habitat disturbance	SM	SM		SM	SM	SM	SML	SM	SML	SML		
	Loss of canopy for snow interception (travel, habitat selection)	SM	SM		SM	SM	SM	SML	SM	SML	SML		

Life Requisite	Threat	Fire	Mountain Pine Beetles (Epidemic)	Climate Change	Winter logging	Summer Logging	Oil and Gas Exploration	Oil and gas extraction	Mining exploration	Mineral extraction	Wind farms	Winter recreation	Summer recreation
	Blowdown/Coarse Woody Debris (travel, habitat selection)	M	M		S	S	SM		SM		SM		
	Potentially high density regenerating stands (travel)	ML		L	ML	ML	ML		ML				
Calving success	Displacement from high quality calving habitat during activities					S	S	SML	S	SML	SML		S
	Displacement due to habitat disturbance in preferred habitats	SM	SM		SM	SM	SM	SML	SM	SML	SML		
Predator avoidance	Potential increase in moose forage resulting in potential increase in predators and predation risk	SM	SM	ML	SM	SM	SM	ML	SM	ML	L		
	Potential displacement to habitats with greater predation risk during activity				S	S	S	SML	S	SML	SML	S	S
	Potential displacement to habitats with greater predation risk due to habitat disturbance in preferred habitats	SM	SM	ML	SM	SM	SM	SML	SM	SML	SML		
	Increased predator efficiency due to roads/linear corridors				SM	SM	SM	SML	SM	SML	SML		
	Increased predator efficiency due to plowed roads/compacted trails				S		S	SML	S	SML	SML	SML	
Avoidance of other mortality risks	Potential displacement to habitats with greater risks of accidents (e.g. avalanches, falls) due to habitat disturbance in preferred habitat	SM	SM	ML	SM	SM	SM	SML	SM	SML	SML		

Life Requisite	Threat	Fire	Mountain Pine Beetles (Epidemic)	Climate Change	Winter logging	Summer Logging	Oil and Gas Exploration	Oil and gas extraction	Mining exploration	Mineral extraction	Wind farms	Winter recreation	Summer recreation
	Potential displacement to habitats with greater risks of accidents (e.g. avalanches, falls) during activities				S	S	S	SML	SM	SML	SML	S	S
	Increased vehicle collisions				SM	SM	S	SML	S	SML	SML		
	Increased mortality from hunting and poaching due to increased access				SM	SM	S	SML	S	SML	SML		
	Potential increase in parasites and diseases			ML									

¹ S=Short term, M=Mid term, L=Long term

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Table 4. Threat ratings for the Klinse-Za herd population (from McNay and Hamilton in prep.).

	Threat	Impact	Scope	Severity	Timing
1	Residential & commercial development	Low	Small	Extreme	Low
1.1	Housing & urban areas	Low	Small	Extreme	Low
1.2	Commercial & industrial areas	Low	Small	Extreme	Low
1.3	Tourism & recreation areas	Low	Small	Slight	Low
2	Agriculture & aquaculture	Low	Small	Slight	
2.1	Annual & perennial non-timber crops	Low	Small	Slight	Low
2.2	Wood & pulp plantations				
2.3	Livestock farming & ranching	Low	Restricted	Moderate	Low
3	Energy production & mining	Very High	Pervasive	Extreme	
3.1	Oil & gas drilling	High	Pervasive	Serious	High
3.2	Mining & quarrying	High	Large	Extreme	High
3.3	Renewable energy	High	Large	Serious	Moderate
4	Transportation & service corridors	High	Large	Serious	
4.1	Roads & railroads	High	Large	Serious	High
4.2	Utility & service lines	Low	Restricted	Moderate	High
5	Biological resource use	Medium	Large	Moderate	
5.1	Hunting & collecting terrestrial animals	Low	Large	Slight	Low
5.2	Gathering terrestrial plants	Low	Small	Slight	Low
5.3	Logging & wood harvesting	Low	Restricted	Moderate	High
6	Human intrusions & disturbance	Medium	Restricted	Serious	
6.1	Recreational activities	Medium	Restricted	Serious	High
6.3	Work & other activities	Low	Restricted	Moderate	High
7	Natural system modifications	Low	Restricted	Moderate	
7.1	Fire & fire suppression	Low	Restricted	Moderate	Moderate
7.2	Dams & water management /use	Low	Small	Extreme - Serious	High
7.3	Other ecosystem modifications	Low	Restricted	Moderate	High
8	Invasive & other problematic species & genes	High	Pervasive	Serious	
8.1	Invasive non-native/alien species				
8.2	Problematic native species	High	Pervasive	Serious	High
9	Pollution				
10	Geological events	Low	Small	Slight	
10.3	Avalanches/landslides	Low	Small	Slight	Low
11	Climate change & severe weather	Very High - High	Pervasive	Extreme - Serious	
11.1	Habitat shifting & alteration	Very High - High	Pervasive	Extreme - Serious	Moderate
11.2	Droughts				
11.3	Temperature extremes	High	Pervasive	Unknown	Moderate

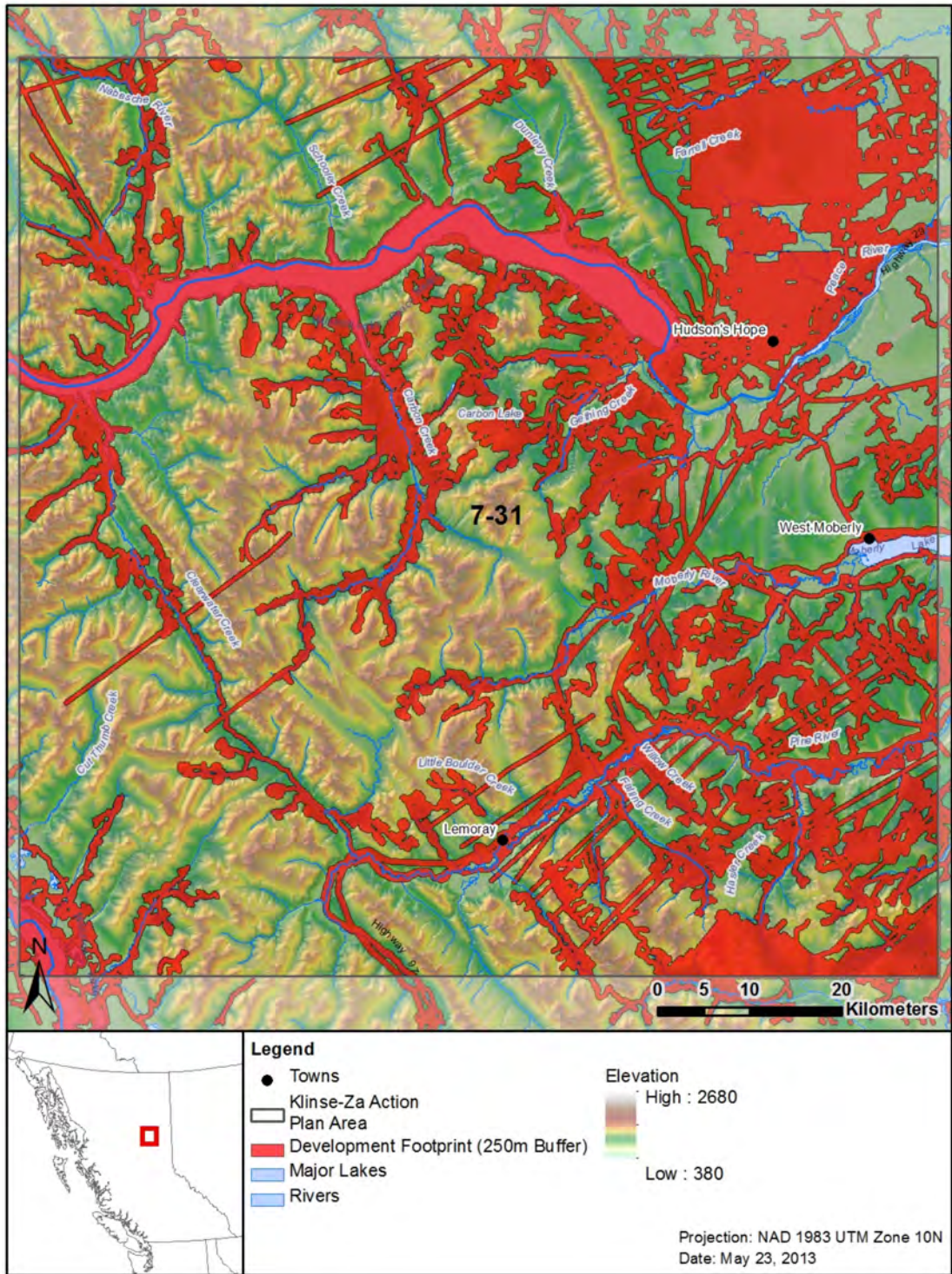


Figure 3. Anthropogenic disturbance currently occurring in the Action Plan area.

Table 5. Recovery measures for the Klinse-Za herd and their priority and timeline for implementation.

#	Recovery Measures	Priority	Threats or concerns addressed	Timeline
Broad Strategy: Stop/reverse current population decline				
Approach: Reduce caribou mortality				
1	Reduce wolf numbers to <math><4/1,000\text{km}^2</math> leaving sterile, alpha pairs	High	Predation on calves and adults	Immediate and continuous until habitat has been restored and there is weight of evidence that the herd can be self-sustaining
2	Reduce other predators (bears, wolverines)	Moderate	Predation on calves and adults	Only if actions of higher priority have been ineffective; discontinue if weight of evidence that the herd cannot be self-sustaining
3	Pen calves (likely needs to be preceded by collaring remaining adult females)	High	Neo-natal mortality	As soon as is practical and as often as funds will allow but not less than once in 3 years
4	Shepherding to protect calves/adults	High	Calf & adult mortality	Immediate and continuous if sufficient cows can be found and technique is demonstrated to have efficacy
5	Direct reduce populations of primary prey	Low	Predator population size and distribution	Only if actions of higher priority have been ineffective; discontinue if weight of evidence that the herd cannot be self-sustaining
Approach: Augment the population				
6	Transplant radio-collared adult caribou	High	Lack of genetic diversity	Provided that actions 1 and 2 have resulted in success
7	Transplant radio-collared adult caribou from a captive breeding facility	Low	Lack of genetic diversity	Provided that actions 1 and 2 have resulted in success
Broad Strategy: Ensure effective protection of critical habitat to support the population objective				

Approach: Restore habitat				
8	Manual brushing to advance forest regeneration	Moderate	Spatial location and abundance of habitat for primary prey	As soon as is practical and once strategic analysis and operational plans have been completed (see action 20)
9	Herbicide to advance forest regeneration	Low	Spatial location and abundance of habitat for primary prey	As soon as is practical and only if actions of higher priority have been ineffective
10	Deactivate (mounding/recruit CWD/planting) linear features	Moderate	Encounter rates between predators and caribou	As soon as is practical and once strategic analysis and operational plans have been completed (see action 20)
Approach: Protect habitat				
11	Strategically aggregate new development and post-harvest burning to separate moose/wolves from caribou	Moderate	Spatial overlap of predator/prey systems	As soon as is practical and once strategic analysis and operational plans have been completed (see action 21)
12	Create land long-term “reserves” in all un-tenured portions of HEWR, and in sufficient portions of CSR and LER to facilitate management within identified disturbance thresholds	Moderate	Long-term protection from threats	As soon as is practical
13	Permitted development must retain terrestrial lichens and avoid improving access to predators	High	Loss of forage; predation	Immediate
Broad Strategy: Avoid displacing animals from critical habitat				
Approach: Restrict industrial and recreational activities				
14	Prohibit all new industrial and recreational activities within HEWR.	High	Displacement from range	Immediate and ongoing until 60% of population objective is achieved
15	Prohibit all new industrial and recreational activities within CSR during calving season	High	Displacement from range	Immediate and ongoing until 60% of population objective is achieved
Broad Strategy: Assess effectiveness of broad strategies				
Approach: Establish and monitor selected indicators				
16	Monitor population size and composition in late-March		Response indicator	Annually until 60% of the population goal is

				reached and every 3 rd year thereafter.
17	Monitor calf survival (June/October/March)		Response indicator	Annually until 60% of the population goal is reached and every 3 rd year thereafter.
18	Assess implementation and effectiveness of the action plan		Basis for adaptation	Within two years of implementation
Broad Strategy: Implement a caribou-based coordinated management approach				
Approach: Co-ordination and direction				
19	Create a management team to oversee coordination of efforts to protect critical habitat for caribou in the area			As soon as practical
20	Commit funding to deliver caribou recovery actions in the area			As soon as practical
Approach: Technical feasibility assessments				
21	Determine timing and cause of poor calf survival		Low juvenile recruitment	As a part of action #3
22	Assess potential for restoring caribou ranges at low elevations (strategic/operational)		Historic alteration of habitat	Before actions #8-10
23	Assess potential for strategically aggregating new development and post-harvest burning to separate moose/wolves from caribou		Historic alteration of habitat	Before action #11
24	Assess effectiveness of current conservation measures and need for new measures needed to implement identified disturbance thresholds		Basis for adaptation	As part of action #12
25	Establish a range plan to determine how disturbance thresholds will affect specific land and resource activities. Establish a cumulative effects assessment plan to monitor and manage current and future industrial and recreational activities within disturbance thresholds		Displacement from range	As a component of actions #11-15

from an adjacent herd area or potentially from a captive breeding facility. Actions to reduce mortality to caribou include: reducing wolf numbers, reducing other predators (primarily bears and/or wolverines), penning pregnant cows so that their calves are protected from predators when born, shepherding to protect recently born calves, by reducing populations of primary prey that are attracting an abundance of predators (where technically feasible and in line with the traditions, customs, and practices of local First Nations), or by a combination of these actions. Population augmentation is deemed to be necessary for two reasons: (1) the current population size is so small that the rate of increase under even the most optimal conditions will be very slow, and (2) the extremely small genetic pool in the current population may only lead to a destabilizing condition of inbreeding depression.

1.3.2 Current Habitat Protection

Parks (40,333 ha or 4% of the plan area) provide partial protection for 1,407 ha of LER, 18,949 ha of CSR, and 5,469 ha of HEWR. Although there are other areas designated for conservation of caribou range through measures such as Ungulate Winter Range and Wildlife Habitat Areas, these administrative measures do not provide effective protection from key threats identified in the plan area such as industrial disturbance from mining, pipelines, and oil and gas development, or from recreational activities (e.g., snowmobiling). The measures proposed to protect critical habitat will address some of the key existing management gaps that have contributed to the population decline of the Klinse-Za herd.

1.3.3 Protection of Critical Habitat

In order to achieve the long term population and distribution objectives, critical habitat must not only be identified, but effectively protected. Based on the best available scientific data and traditional ecological knowledge, there is a strong relationship between habitat disturbance and the stability of local caribou populations. As the quantity and/or severity of disturbance increases, there is increasing risk of population decline (Environment Canada 2011).

For this Action Plan, and based on the importance of the seasonal ranges, critical habitat will be protected by ensuring disturbance remains below the following thresholds:

- Lower-Elevation Range: maximum disturbance threshold of 10%;
- High-Elevation Winter Range: no disturbance (i.e., 0%) due to significance;
- Calving and Summer Range: maximum disturbance of 5% where activities must only occur during the least-risk time period of July and August; and,
- Matrix Habitat Range: recommended cumulative effect disturbance of 20% determined by an ecosystem-based approach.

Protecting critical habitat from disturbance in accordance with these thresholds will require actions to: (1) restore currently disturbed habitat and (2) protect habitat from new anthropogenic disturbance. Actions to restore disturbed habitat may employ the use of manual brushing or herbicides to reduce inter-vegetative competition from early seral species and advance the regeneration rate of later seral species. It is also recommended that actions be taken to deactivate linear features in an attempt to minimize or reduce encounter rates between caribou and

predators (McKenzie et al. 2012). Habitat protection from existing or new disturbance can be achieved by strategically allocating new development away from caribou especially if that development leads to the creating of early seral habitats for primary prey.

Critical habitat protection can be directly accomplished by designating areas within which certain human activities representing a threat to caribou recovery are prohibited or subjected to appropriate management standards. This Action Plan's approach to the designation and management of disturbance thresholds has been undertaken recently for woodland caribou, boreal population (Environment Canada 2012).

Another series of complementary management measures recommended in this Action Plan address the need to avoid displacement of caribou from critical habitat. The recommended approach is to aggregate industrial and recreational activities away from HEWR and into previously disturbed portions of CSR and LER, and to prohibit all activity within CSR during sensitive periods or in places where caribou are deemed most sensitive (i.e., calving and rut).

1.3.4 Range Plans

Range plans are required to provide more detailed articulation and guidance respecting how the critical habitat disturbance thresholds set out in this plan will be achieved in space and time. The range plan for the Klinse-Za herd will specify how particular land and resource activities within the Action Plan area will be guided by the habitat protection measures identified in this Action Plan. Direction with respect to avoidance and mitigation of impacts will also be included. Range plans will be incorporated into the Action Plan as site-specific implementation plans. They should be undertaken collaboratively by the governments of British Columbia, Canada, and the First Nations, and when appropriate with the participation of industry, non-governmental organizations, local residents, and other stakeholders.

1.3.5 Cumulative Effects Assessment

Management of adverse effects from industrial projects and other human activities will require a coordinated approach to ensuring cumulative effects within the Action Plan area remain within identified disturbance thresholds. Cumulative effects assessment has been found an integral component of caribou recovery (Environment Canada 2012) and will facilitate achievement of the following plan objectives:

- Apply an ecosystem-based approach;
- Assess the impact of all disturbances (anthropogenic and natural; direct and indirect);
- Monitor habitat conditions, including the amount of current disturbed and undisturbed habitat, and amount of habitat being restored;
- Account for past, present, and possible future anthropogenic actions and activities⁵ that may possibly result in direct (e.g., physical disturbances) or indirect (e.g., sensory disturbance) adverse impacts; and,

⁵ "Future" anthropogenic actions and activities include those that are "certain" (high probability of proceeding – very little if any uncertainty), "reasonably foreseeable" (medium probability of proceeding – some uncertainty), and "hypothetical" (low probability of proceeding – considerable uncertainty) (see, e.g.: Hegmann *et al.* 1999:208).

- Assess the distribution of disturbance in the Action Plan area.

1.4 Measures to be Taken and Implementation Schedule

Due to the critical state of the Klinse-Za herd, emergency measures are required to stabilize the herd as soon as it is biologically practicable. Wolves are deemed the most imminent threat of mortality; direct measures to reduce wolf numbers is ranked as the highest priority action to implement. A key element of this action would be the shifting of land use practices in accordance with the traditional seasonal round by one or more First Nations in the Action Plan area. This action could be implemented immediately and, depending on how it is conducted, there could be a relatively immediate effect. However, reduction of wolves as a sole action has not always demonstrated the expected response in caribou populations, especially in recent trials (Pers. Comm.; Dave Hervieux; Alberta Environment and Sustainable Resource Development, Edmonton, AB; Sept. 28, 2012), and is known to have only relatively temporary effects when the expected response has been obtained (Hayes et al. 2003). In other trials of wolf reductions that failed to obtain positive results, compensatory predation from other predators was postulated; but reducing predators other than wolves is technically challenging and has lower social acceptability and so did not rank as an immediate priority. The action to reduce other predators could be revisited after a period of 4-5 years, depending on the relative success of higher ranking recovery actions.

A more favorable action to counter the effect of other predators is penning to protect calves during the calving season, which ranked second in priority to implement. Other studies, however, have shown that penning to protect calves without reducing predators may not be effective (Smith and Pittaway 2008). These observations from other trials are strong evidence to suggest that these two top priorities should be implemented together, and the timeline for doing so is as soon as it is biologically practicable.

Another immediate action to address population recovery is to augment the Klinse-Za herd with adult caribou from other more healthy herds. However, this is an extremely difficult action to undertake and, as seen in a recent trial, can lead to very ineffective results⁶ (Pers. Comm.; Chris Pasztor; British Columbia Ministry of Forests, Lands, and Natural Resource Operations, Victoria BC; Sept. 28, 2012). The recommendation here is that this action be undertaken if (and only subsequent to) the measures to reduce wolves and the penning of calves are demonstrated to be successful.

Shepherding was not ranked high as an immediate action to implement mostly due to the relative uncertainty about its likelihood for success. The number of shepherds that would be required, coupled with the amount of land that they could need to cover, and the amount of disturbance that would be needed in order to affect predators, may also displace caribou from their preferred habitats. Further down the list of priority for actions affecting population recovery was reductions of moose (and/or other primary prey of wolves). This indirect approach to reducing wolf numbers has yet to demonstrate the expected favorable results for caribou in two trials that

⁶ Some lessons learned from this augmentation attempt were: consider behavior of the donor herd in relation to the recipient herd, consider managing predators in the recipient herd area prior to release, consider “soft” release procedures where the released animals have a greater chance to react with and learn from local animals.

have been implemented in British Columbia⁷. The intensity of response, time to effect, and social acceptability were all ranked moderate from a general public perspective and very low from a First Nations' perspective.

The next series of actions that ranked high behind wolf reductions and penning were actions that are relatively less expensive, easy to implement, and potentially have less impact on many stakeholders: protection of terrestrial lichens, avoidance of new predator access, and restrictions on human activity within calving range during the calving period. These actions would be relatively easy to implement, and together with other recommended habitat protection measures, are expected to result in a high level of response by caribou over the long term. Other actions that have value for achieving recovery goals over the long term include, for example, manual brushing and deactivation of linear corridors.

The recovery action expected to have the longest lasting and most effective returns for caribou are the measures to ensure protection of habitat within identified disturbance thresholds. This will require range plans to articulate how the identified thresholds will apply to existing and future resource development and recreational activity, as well as a framework for assessing the cumulative impact of new development and activity within the Action Plan area. Actions to restore and protect critical habitat will require a strategic realignment of land use practices and priorities in a way that benefits caribou. This planning process should be undertaken collaboratively by the governments of British Columbia, Canada, local First Nations, and, when appropriate, with the participation of industry, non-governmental organizations, local residents, and other stakeholders.

The objectives of this Action Plan are only achievable if identified critical habitat is restored and effectively protected. Habitat protection measures are assigned a lower priority as an initial step in this Action Plan only due to the need for immediate action to stabilize and augment population in the short term, and because some habitat protection measures will require additional planning prior to implementation.

Succinctly, the recovery actions in order of priority for implementation are: (1) wolf reductions and calf penning, (2) protection of terrestrial lichen, (3) avoidance of calving areas during calving, (4) restoration of early seral habitats, (5) deactivation of linear features, (6) implementation of range plan and cumulative effects assessment plan. Shepherding, translocations, and reduction of other predators are to be revisited in 3-5 years. Reductions of primary prey, use of herbicides, and captive breeding may not, individually or collectively, be actions that are implemented.

1.5 Other Ancillary Actions

Other ancillary actions are required as a component of implementing this Action Plan. First, a Stewardship Team must be formed to coordinate the overall implementation, management, and integration with other existing plans in relation to the Klinse-Za herd, including identification of

⁷ See Serroya and Heard video presentations at <http://www.landusekn.ca/resource/14th-north-american-caribou-workshop-fort-st-john-september-2012-presentation-videos> (accessed February 04, 2013).

necessary funding. Implementation will include coordination with the Recovery Strategy planning process and other appropriate plans.⁸

Second, appropriate monitoring programs would be immediately required to allow for assessment of the broad strategies pertaining to stabilizing of the Klinse-Za herd population. Actions identified to support this strategy are to:

- Monitor population size and composition of the Klinse-Za herd in late March, at least annually, until 60% of the population goal has been reached and then every 3 years thereafter;
- Monitor calf survival in late June, October, and March every year until 60% of the population goal has been reached and then every 3 years thereafter; and,
- Assess implementation and effectiveness of this action plan.

The recommended monitoring will provide feedback on the progress towards meeting the population and distribution goal and recovery of the Klinse-Za herd.

Third, range plans and the cumulative effects assessment framework must be developed to translate the disturbance thresholds for critical habitat into a detailed direction for government officials from British Columbia, Canada and First Nations, in addition to locally affected stakeholders when appropriate. Strategic planning and policy development are needed to re-align existing land use priorities and practices in accordance with the recovery actions recommended to achieve population and distribution objectives.

2. SOCIO-ECONOMIC EVALUATION

The Action Plan includes a wide range of measures to protect, recover, and augment the Klinse-Za Herd of Woodland Caribou (*Rangifer tarandus caribou*) in a portion of *Dunne-za hanané* (land of the Beaver People), also known as northeastern British Columbia, Canada.

Within the Action Plan area is a place called Klinse-Za that has been sacred to the Mountain Dunne-za people since time immemorial. The name of these mountains to the Sauteau people is The Two Mountains that Sit Together (Treaty 8 Tribal Association 1992). The mountains, which are generally referred to as Twin Sisters, are a sacred place for the Dunne-za, Cree, and Sauteau peoples of the region. These First Nations, as stewards of the land, are responsible for ensuring that the traditional laws with respect to Klinse-Za (The Two Mountains that Sit Together) are respected. Elders in the early 1970s passed a traditional law that placed a moratorium on harvesting caribou for cultural purposes until such a time that the species was once again healthy (Muir and Booth 2012; WMFN 2009). The rights of these First Nations to hunt caribou in accordance with their traditional seasonal round is protected by Treaty No. 8, and these rights are recognized and affirmed under section 35(1) of Canada's *Constitution Act, 1982*.

⁸ Note that the Peace Northern Caribou Plan developed by the Provincial Government of British Columbia has not been considered at this time due to its failure to satisfy the requirements of SARA (see: Hammond 2012), including the incorporation of traditional ecological knowledge, the identification of critical habitat to the extent possible, and the failure to adequately consult or accommodate the Treaty rights of West Moberly First Nations in design, development, and implementation of that plan.

In 2002, the Government of Canada enacted the *Species at Risk Act* (SARA) with the legislative objective of preventing “wildlife species from being extirpated or becoming extinct, to provide for the recovery of wildlife species that are... threatened as a result of human activity...” (SARA 2002:8). Caribou are defined as “threatened” under Schedule 1 of SARA, meaning the species “is likely to become endangered if nothing is done to reverse the factors leading to its extirpation or extinction” (SARA 2002:6). The BC government recognizes the importance of wildlife conservation (MOE 2011a) and considers caribou to be a “priority” species to conserve (MOE 2011b). In 2005, Canada and BC signed the *Canada-British Columbia Agreement on Species at Risk* under which they agreed to enact corresponding legislation and approaches that will effectively protect species at risk, including legal designation of species that have been listed as “threatened”, such as caribou, and provide them with “immediate legal protection” (Canada-BC Agreement 2005:13-14). Habitats for listed species are also to be protected by BC laws that should complement SARA and other appropriate federal laws. Recovery planning was to be completed within two years for species such as caribou and implemented in a “timely fashion” with “effective enforcement” (Canada-BC Agreement 2005:14).

Implementation of this Action Plan would continue the actions taken by First Nations, BC, and Canada to date. Protection of habitat in high elevation summer, winter, and calving areas as well as low elevation winter habitat is needed. Management of cumulative effects within the matrix habitat is also required. Further resources are needed to operationalize these measures. This includes funding to implement measures that require immediate and significant levels of investment in order for the benefits of this Action Plan to be realized over the long-term. The order of primary costs for the implementation of this Action Plan are: (1) the reduction of wolves, (2) the construction and operation of a maternal penning program, (3) translocation of adults, (4) reduction of other predators, (5) deactivation of roads, and (6) the deferral of development and recreational activities within critical habitat. Some forms of developments and recreational activities in and around critical habitat could be limited while the Klinse-Za Herd is recovering.

The implementation of the Action Plan would benefit a broad set of values. The species is, first and foremost, inherently valuable to the global community. As stated in the Preamble to SARA: “wildlife, in all its forms, has value in and of itself and is valued by Canadians for aesthetic, cultural, spiritual, recreational, educational, historical, economic, medical, ecological and scientific reasons.” The socio-economic benefits of implementing this Action Plan are thus instrumental to retaining the significant place that caribou have as inherently valuable creatures and members valued by Canadian society. First Nations would in general receive a benefit with the return of a culturally sustainable herd of caribou that could be reincorporated into their seasonal round and traditional economy. Impacts to the health of spiritual traditions and customs of the First Nations are likely to receive a significant benefit. Recovery of the Klinse-Za herd to harvestable levels will ease pressures on the harvest of other valued species and restore a deeply significant component of First Nations culture, spirituality, diet, and other unique customs related to the harvest of caribou. The successful implementation of the Action Plan would also provide an invaluable opportunity to interpret and present the importance of reconciling Indigenous cultural values that are interconnected with the ecosystems alongside the values held by all Canadians, to visitors to the region and particular to the Klinse-Za Park, a provincial park

geographically located in the centre of the Action Plan area. This would tangibly advance the constitutional imperative of “reconciliation” between non-aboriginal and Aboriginal peoples.

Conservation measures in this Action Plan would positively impact the ecological integrity of the Action Plan area. It would enhance biodiversity and the sustainable management of the land and natural resources for future generations. Livelihoods of the general public as a whole would benefit from a healthy ecosystem that includes contributions from species at risk to the natural capital of the region. Implementation of this Action Plan has value for enhancing public confidence in the government of Canada and BC. By carrying out the planning measures promised in SARA, the federal government will demonstrate it has made good on its word. Given the value that caribou have to Canadians as an iconic species – their image being found on the Canadian twenty-five cent coin – the fulfillment of these commitments would be of major benefit to the Canadian public and government alike.

With the implementation of the Action Plan there are likely distributional impacts to several groups. First Nation governments, and the memberships they represent, are currently bearing adverse impacts to their mode of life as a result of a meaningful, harvestable surplus of caribou being largely removed from their traditions, customs, and practices. These costs, which are direct and significant, are expected to continue for a minimum of two decades; the Action Plan, and specifically the biology of the species, is such that a considerable amount of time is required for the recovery and augmentation of the Klinse-Za herd.

The governments of Canada and BC are expected to shoulder most of the direct financial costs for implementing the Action Plan, particularly because the BC government has benefited significantly from the tax and related revenue it has and does receive as a result of authorizing the industrial development activities which contribute significantly to caribou decline. It may also be possible for BC and Canada to offset some of these costs by requiring private sector stakeholders to contribute financially where their projects have historically, are, or will have adverse effects on caribou in the Action Plan area. Another benefit to the governments of Canada and BC for implementing this Action Plan is that it may reduce potential liability to First Nations whose constitutionally protected rights to hunt caribou would be lost if significant recovery efforts are not undertaken immediately to reverse current population declines. It is likely that industry would see short-term and long-term benefits from plan implementation by obtaining a higher degree of certainty respecting land and resource use within the Action Plan area. Through this Action Plan, First Nations, Canada, BC, industry, local stakeholders, and other non-governmental organizations would also be provided an opportunity to develop strategic partnerships for collaborative actions to protect, recover, and augment the Klinse-Za herd and other caribou herds in the region. Apart from the BC government’s primary role in financing caribou recovery, the Action Plan will not likely have any direct socio-economic effects on the general public living outside of the Action Plan area.

3. ASSOCIATED PLANS

This action plan follows, and is substantially based upon, a caribou-centric land use strategy that was developed for the same location and extent (Cichowski et al. 2012). Other relevant plans are:

- “A Strategy for the Recovery of Northern Caribou in the Southern Mountains National Ecological Area in British Columbia” which was completed in 2004 but has not yet been approved by government (Northern Caribou Technical Advisory Committee 2004).
- “A Recovery Action Plan for Northern Caribou Herds in North-central British Columbia” which focuses on the Wolverine, Chase, Takla and Scott herds and covers the western portion of the plan area (McNay et al. 2008).
- “A Strategy for Management of Caribou in British Columbia” which provides a broad, strategic outlook on the direction(s) that could be taken to respond to the need for effective management of caribou populations and their habitat throughout the province (McNay and Hamilton, in prep.).
- “Recovery and Augmentation Plan for Woodland Caribou in the Central Rocky Mountains of British Columbia” (Seip et al. 2010).
- Burnt Pine Caribou Augmentation Plan (Backmeyer 2011).

4. REFERENCES

- Backmeyer, R. 2011. Burnt Pine Caribou Augmentation Plan. Ministry of Forests, Lands and Natural Resource Operations, Fort St. John, B.C. Unpublished Report. 13p.
- Boutin, S. and C. Arienti. 2008. BCC equation reanalysis – final report. Unpubl. Rep., Univ. of Alberta. Edmonton, AB.
- Canada-BC Agreement. 2005. Canada-British Columbia Agreement on Species at Risk. Department of the Environment and the Parks Canada Agency and the Department of Fisheries and Oceans for the Government of Canada, and the Ministry of Water, Land, and Air Protection for the Provincial Government of British Columbia.
- Cichowski, D., R.S. McNay, and B. Muir. 2012. A plan for sustaining Wah tzee (caribou) in the Moberly area of British Columbia. West Moberly First Nations, Moberly Lake, British Columbia. 161pp.
- Dyer, S. J., J. P. O'Neill, S. M. Wasel, and S. Boutin. 2001. Avoidance of industrial development by woodland caribou. *Journal of Wildlife Management* 65:531-542.
- EC (Environment Canada). 2011. Scientific assessment to inform the identification of critical habitat for woodland caribou (*Rangifer tarandus caribou*), boreal population, in Canada: 2011 update. Ottawa, Ontario, Canada.
- EC (Environment Canada). 2012. Recovery Strategy for the Woodland caribou *Rangifer tarandus caribou*, Boreal population, in Canada. *Species at Risk Act Recovery Strategy Series*. Environment Canada, Ottawa. Xi + 138pp.
- Hegmann, G., Cocklin, C., Creasey, R., Dupuis, S., Kennedy, A., Kingsley, L., Ross, W., H., Spaling, H., and Stalker, D. 1999. Cumulative Effects Assessment Practitioners Guide. Prepared by AXYS Environmental Consulting Ltd. and the CEA Working Group for the Canadian Environmental Assessment Agency, Hull, Quebec.
- Hammond, B. Manager of Ecosystem Conservation for the Canadian Wildlife Service, Pacific and Yukon Region of the Government of Canada, letter to Matt Austin, Project Director of the Peace Northern Caribou Plan for the Ministry of Forests, Lands and Natural Resource Operations, Provincial Government of British Columbia, September 7, 2012.
- Hayes, R.D., R. Farnell, R.M.P. Ward, J. Carey, M. Dehn, G. Kuzyk, A.M. Baer, C.L. Gardner, and M. O'Donoghue. 2003. Experimental reduction of wolves in the Yukon: ungulate responses and management implications. *Wildl. Monogr.* 152:1-35
- Master, L., D. Faber-Langendoen, R. Bittman, G.A. Hammerson, B. Heidel, J. Nichols, L. Ramsay, and A. Tomaino. 2009. NatureServe conservation status assessments: factors for assessing extinction risk. NatureServe, Arlington, VA.

- McCann, R.K., B.G. Marcot, and R. Ellis. 2006. Bayesian belief networks: applications in ecology and natural resource management. *Canadian Journal of Forest Research* 36:3053-3062.
- McKenzie, H.W., E.H. Merrill, R.J. Spiteri, and M.A. Lewis. 2012. How linear features alter predator movement and the functional response. *Interface Focus* 2:205-216.
- McNay, R.S., and D.L. Hamilton. 2010. A strategy for management of caribou (*Rangifer tarandus caribou*) in British Columbia. Unpub. Rep., Prepared for Ministry of Environment, Prince George, B.C.
- McNay, R.S., V. Brumovsky, R. Sulyma, and L. Giguere. 2009. Delineating high-elevation Ungulate Winter Range for woodland caribou in north-central British Columbia. Wildlife Infometrics Inc. Report No. 299. Wildlife Infometrics Inc., Mackenzie, British Columbia, Canada
- McNay, R.S., D. Heard, R. Sulyma and R. Ellis. 2008. A recovery action plan for northern caribou herds in north-central British Columbia. FORREX Forest Research Extension Society, Kamloops, B.C. Series 22. 94p.
- McNay, R.S., B.G. Marcot, V. Brumovsky, and R. Ellis. 2006. A Bayesian approach to evaluating habitat for woodland caribou in north-central British Columbia. *Canadian Journal of Forest Research* 36:3117-3133.
- MOE (Ministry of Environment). 2011a. British Columbia's Conservation Framework. Website: <http://www.env.gov.bc.ca/conservationframework/>. Last visited on December 22, 2011. Provincial Government of British Columbia: Victoria, British Columbia.
- MOE (Ministry of Environment). 2011b. Website: <http://www.env.gov.bc.ca/wld/speciesconservation/index.html>. Last visited on December 22, 2011. Provincial Government of British Columbia: Victoria, British Columbia.
- Muir, B. R. and Booth, A.L. 2012. An environmental justice analysis of caribou recovery planning, protection of an Indigenous culture, and coal mining development in northeast British Columbia. *Environment, Development and Sustainability* 14(4):455-476.
- NCTAC (Northern Caribou Technical Advisory Committee). 2004. A Strategy for the Recovery of Northern Caribou in the Southern Mountains National Ecological Area in British Columbia. Version 1.0. Ministry of Water, Land and Air Protection, Victoria, B.C. 108p.
- Oberg, P. R. 2001. Responses of mountain caribou to linear features in a west-central Alberta landscape. M.Sc. Thesis, University of Alberta, Edmonton, AB.

- Seip, D., C. Ritchie, J. Kuzyk, G. Suther, R. Backmeyer, R. Willson, and B. Muir. 2010. Recovery and Augmentation Plan for Woodland Caribou (*Rangifer tarandus caribou*) in the Central Rocky Mountains of British Columbia. Ministry of Environment, Prince George, B.C. Unpublished Report. 23p.
- Sleep, D. and C. Loehle. 2010. Validation of a demographic model for woodland caribou. *Journal of Wildlife Management*, 74:1508-1512
- Smith, K.G. and L. Pittaway. 2008. Little Smokey woodland caribou calf survival enhancement project. 12th North American Caribou Workshop. *Rangifer Special Issue No. 19*:97-102
- Smith, K. G., E. Janet Ficht, D. Hobson, T. Sorensen, and D. Hervieux. 2000. Winter distribution of woodland caribou in relation to clear-cut logging in west-central Alberta. *Can. J. Zool.* 78:1433-1440.
- Sorenson, T., P.D. McLoughlin, D. Hervieux, E. Dzus, J. Nolan, B. Wynes, and S. Boutin. 2008. Determining sustainable levels of cumulative effects for boreal caribou. *Journal of Wildlife Management* 72: 900-905.
- Spalding, D. J. 2000. The early history of woodland caribou (*Rangifer tarandus caribou*) in British Columbia. B.C. Ministry Environ., Lands and Parks, Wildl. Branch, Victoria, B.C. Wildl. Bull. No. B-100. 61 pp.
- Sutherland, G.D., D.T. O'Brien, S.A. Fall, F.L. Waterhouse, A.S. Harestad, and J.B. Buchanan. 2007. A framework to support landscape analysis of habitat supply and effects on populations of forest dwelling species: A case study based on the northern spotted owl. Tech. Rep. 038, British Columbia Min. of Forests, Research Br., Victoria, BC.
- Treaty 8 Tribal Association. 1992. "The Two Mountains That Sit Together". Unpublished report, Treaty 8 Tribal Association, Fort St. John, BC.
- WMFN (West Moberly First Nations). 2009. "I Want to Eat Caribou Before I Die." Unpublished report, West Moberly First Nations Land Use Department, Moberly Lake, BC.
- Wood, M. 1995. South Peace Arm Stone's sheep and woodland caribou inventory, March 1995. Peace/Williston Fish and Wildlife Compensation Program, Report No. 49. 9p.

APPENDIX A: MODIFICATIONS MADE TO ORIGINAL SEASONAL RANGE MAPPING

Modeled ranges for Calving and Summer Range, High-elevation Winter Range, and Low-elevation Range (CSR, HEWR, LER; respectively) were generalized while still in raster format using a two-step process. The first step highlights areas of higher modeled value using a one-cell (i.e., cells were 1ha) circular maximum filter while the second step smoothed the result into polygons with a 3-cell circular majority filter. HEWR and CSR then had all polygons below a threshold size of 400ha deleted. Finally, HEWR polygons were grouped into management units based on clusters of polygons separated by large valleys. In cases where a HEWR polygon was so large that it was larger than several average management units it was split into smaller management units in places where the polygon was narrow or otherwise easily identifiable via topography. LER polygons, on the other hand, were grouped manually into management units using the following guidelines:

- Management unit polygons were only to be drawn in several regions identified by professional judgment;
- Management units must be below 1300m elevation; and
- LER polygons outside of the regions identified in the first step were only retained if they were both <1300m in elevation and >150ha in area.

APPENDIX B: EFFECTS ON THE ENVIRONMENT AND OTHER SPECIES

A strategic environmental assessment (SEA) is conducted on all SARA recovery planning documents, in accordance with the *Cabinet Directive on the Environmental Assessment of Policy, Plan and Program Proposals* and the Species at Risk Act Policies: Overarching Policy Framework (Government of Canada, 2009). The purpose of a SEA is to incorporate environmental considerations into the development of public policies, plans, and program proposals to support environmentally sound decision-making.

Recovery planning is intended to benefit species at risk and biodiversity in general. However, it is recognized that implementation of action plans may inadvertently lead to environmental effects beyond the intended benefits. The planning process, based on national guidelines, directly incorporates consideration of all environmental effects, with a particular focus on possible impacts upon non-target species or habitats. The results of the SEA are incorporated directly into the action plan itself, but are also summarized below in this statement.

Decades of anthropogenic disturbance has led to extensive modification of the landscape in which the Klinse-Za herd has historically occupied. Some of this disturbance that has led to the precarious condition of the herds population is irreparable (e.g., the Williston Reservoir) while other disturbances will take decades to restore. Until restoration of critical habitat is achieved, it is anticipated that intrusive and intensive measures will need to be taken to stop the current decline of the Klinse-Za herd, and that these measures will have significant effects on the environment and on other wildlife species. The effect on the environment is intended to be mostly positive in that restoration and deactivation efforts (actions #8 and 10) will return critical habitat to a condition that is more representative of habitat conditions for caribou. In the long-term this will limit the total amount and quality of habitat for primary prey species such as moose, elk, and deer that will occur in some portions of the plan area. It is the intent though (action #11) that habitat for these species will be managed in a way that the species remain abundant but spatially separated (i.e., 50 or more kms) from caribou range. In the short-term, recovery actions are intended to significantly reduce the density of wolves but not totally eliminate them from the plan area. It is expected that, in the longer term, there will be no need for active management of wolf populations and that wolves will continue to occupy caribou range at low densities and will occur at much higher densities away from caribou range. It is not expected that the actions of this plan will have significant effects on other predators such as bear or wolverine and there is no expectation that the actions will have significant effects on other aspects of the environment such as air quality, water quality, soil conditions, incidences of insects, or the probability of vegetation or animal pathogens.