

APPENDIX A: 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. 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 certain strategies may also inadvertently lead to environmental effects beyond the intended benefits, or have negative impacts upon other species. 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 strategy itself, but are also summarized below in this statement.

Boreal caribou are an umbrella species for the older-growth boreal forest at large. There are many species that share the same habitat requirements as boreal caribou and will benefit from the recovery actions outlined in this recovery strategy. This recovery strategy will benefit the environment and biodiversity as a whole by promoting the recovery of boreal caribou and by protecting and enhancing habitat.

The management measures outlined in this recovery strategy are those required to halt boreal caribou local population declines and to assist in stabilizing and recovering local populations. With respect to broader environmental impacts, certain management tools, most notably predator (e.g. wolves, bears) and alternate prey (e.g. moose, deer) management, may be required in areas with unnaturally high rates of predation on boreal caribou.

Short-term (i.e. 5-10 years) predator and alternate prey suppression has been used in wildlife management across North America over the past decades, with predator and alternate prey species generally demonstrating fairly rapid recovery once the measures have ceased.

The recovery strategy acknowledges that predator and alternate prey management may be required in some ranges to help stop boreal caribou declines and stabilize local populations that are at risk of extirpation. Where applied, predator and alternate prey management should be used as an interim management tool, in conjunction with other management tools (e.g. habitat restoration and management) to prevent extirpation and achieve population growth. Effective indirect predator management techniques (such as actions to limit the access of predators to boreal caribou) should be considered prior to undertaking direct predator and alternate prey management. When a predator or alternate prey management program is being planned, the conservation status of all affected species must be considered. Where implemented, the effects of mortality management activities on boreal caribou local populations should be monitored.

This recovery strategy will contribute to the achievement of the goals and targets of the *Federal Sustainable Development Strategy for Canada*. In particular, the strategy directly contributes to the Government of Canada's commitment to restore populations of wildlife to healthy levels, protect natural spaces and wildlife, and protect the natural heritage of our country.

APPENDIX B: ENGAGEMENT WITH ABORIGINAL PEOPLE IN THE DEVELOPMENT OF THE RECOVERY STRATEGY FOR BOREAL CARIBOU

Once a species is listed as extirpated, endangered or threatened under SARA, a recovery strategy must be developed. Recognizing the important traditional, cultural, and spiritual role of boreal caribou in the lives of Aboriginal people, Environment Canada sought considerable involvement from Aboriginal communities in the development of the recovery strategy for boreal caribou.

Two rounds of engagement were undertaken, with a focus on seeking input and sharing information with Aboriginal communities. In addition, Environment Canada supported processes to gather Aboriginal Traditional Knowledge (see Appendix C). These two components were essential in the development of this document. Nationally, Environment Canada contacted over 260 Aboriginal communities located within and adjacent to the current distribution of boreal caribou during both rounds of engagement to invite them to participate in Environment Canada's process to develop the recovery strategy for boreal caribou.

Round 1 Meetings (2009-2011)

In the first round of engagement on the recovery strategy, Environment Canada contacted 271 Aboriginal communities and 161 of them participated. Engagement at this early stage in the development of the recovery strategy provided Aboriginal communities the opportunity to share comments, opinions, and information about boreal caribou. Environment Canada used this information to inform the development of the key elements of the recovery strategy, including: i) Population and distribution objectives for boreal caribou; ii) Threats to boreal caribou and their habitat; and iii) Identification of boreal caribou critical habitat.

The information that Environment Canada received from Aboriginal communities and from stakeholder meetings, meetings with the provinces and territories, scientific studies, and Aboriginal Traditional Knowledge studies were used to draft the proposed recovery strategy (Environment Canada, 2011a).

Round 2 Meetings (2011-2012)

In the second round of engagement, Environment Canada contacted 265¹ Aboriginal communities and 87 of those participated; in addition, Environment Canada received 25 formal submissions from Aboriginal communities and organizations. This round of engagement provided the opportunity for comments and dialogue on the proposed recovery strategy that was posted on the Species at Risk Public Registry on August 26, 2011. The required 60-day public comment period was extended by an additional 120 days until February 22, 2012 to allow time for Aboriginal communities to better participate in the engagement process and provide comments on the proposed recovery strategy prior to finalization.

¹ During the first round of engagement, 6 Aboriginal communities indicated they did not require any further follow-up throughout this process. This accounts for the discrepancy in the number of Aboriginal communities contacted during round 1 and 2.

Environment Canada considered all feedback received from Aboriginal communities, along with the over 19,000 comments received from government, industry, environmental organizations, and the public when finalizing this recovery strategy (Environment Canada, 2012). Changes made to the proposed recovery strategy were a direct result of the feedback received during the public comment period, including the input received from Aboriginal communities and organizations.

APPENDIX C: ABORIGINAL TRADITIONAL KNOWLEDGE SUMMARY REPORTS ON BOREAL CARIBOU

SARA specifies that “... the traditional knowledge of the Aboriginal peoples of Canada should be considered (...) in developing and implementing recovery measures.” In the summer of 2009, Environment Canada made a commitment to ensure that Aboriginal Traditional Knowledge from across the range of boreal caribou would inform the development of the recovery strategy. This commitment came from the recognition that Aboriginal people possess significant and unique knowledge about boreal caribou biology, population trends, distribution, and threats facing the species, which could support recovery planning.

Environment Canada staff in each province/territory within the boreal caribou range began the process to have Aboriginal Traditional Knowledge inform the recovery strategy by contacting Aboriginal provincial and territorial organizations, Tribal Councils, and Aboriginal consultants/facilitators to determine their interest in helping to gather Aboriginal Traditional Knowledge. Additionally, each Aboriginal community within and adjacent to the range of boreal caribou was contacted and followed up with, inviting them to participate in the process of developing the recovery strategy. As a result of these efforts, one of three basic processes was followed in the participating communities:

1. Local or regional Aboriginal organizations interviewed knowledge holders;
2. Regional or local workshops coordinated by Aboriginal facilitators were held; or
3. Aboriginal Traditional Knowledge sharing was done in partnership with other initiatives (e.g. projects funded by Aboriginal Funds for Species at Risk).

All Aboriginal contractors/communities/organizations that participated prepared summary reports based on interviews with knowledge holders. Environment Canada’s Boreal Caribou Working Group received all summary reports and reviewed these in detail to highlight information that could inform the recovery strategy. Knowledge provided that would be more applicable at the action planning stage was also identified and flagged by Environment Canada’s Boreal Caribou Working Group. The purpose of this step was to identify where and how the Aboriginal Traditional Knowledge could support the recovery strategy and the subsequent range and/or action plans.

Each Aboriginal Traditional Knowledge summary report received contains unique and geographically specific information that is representative of the knowledge and experiences shared by knowledge holders (Boreal Caribou ATK Reports, 2010-2011). Aboriginal Traditional Knowledge with respect to boreal caribou life history, habitat use, population status, threats facing the species, and conservation measures was used to inform the recovery strategy. In addition, Aboriginal knowledge holders shared considerable detailed local knowledge about boreal caribou, which may be used to support range and/or action plans, if and where consent for such use is granted. In all cases, Environment Canada reconfirmed the intention of the use of Aboriginal Traditional Knowledge in this document with knowledge holders.

APPENDIX D: SCIENTIFIC ASSESSMENTS OF CRITICAL HABITAT FOR BOREAL CARIBOU

2008 Scientific Review

In 2007, Environment Canada launched a science-based review with the mandate to identify boreal caribou critical habitat to the extent possible, using the best available information, and/or prepare a schedule of studies to complete this task. The results were summarized in a report entitled *Scientific Review for the Identification of Critical Habitat for Woodland Caribou (Rangifer tarandus caribou), Boreal Population, in Canada* (hereinafter referred to as the 2008 Scientific Review).

Identifying critical habitat for boreal caribou was framed as an exercise in decision analysis and adaptive management. Establishment of a systematic, transparent and repeatable process was central to the approach. The resultant Critical Habitat Framework was anchored by synthesis and analysis of available quantitative data and published scientific information on boreal caribou population and habitat ecology.

The 2008 Scientific Review established boreal caribou ranges as the appropriate scale at which to identify critical habitat, and applied a probabilistic approach to assessing the adequacy of the current range conditions to support a self-sustaining local population based on three lines of evidence: percent total disturbance, local population growth and local population size. Of the 57 local populations or units of analysis delineated at the time, 30 were assessed as ‘Not Self-Sustaining’ (integrated probability of less than 0.5), 17 as ‘Self-Sustaining’ (integrated probability of greater than 0.5), and 10 as “as likely as not self-sustaining” (integrated probability equal to 0.5).

Additional Scientific Activities

The 2008 Scientific Review established a foundation for the assessment of critical habitat; however, Environment Canada identified key areas for further exploration to improve the science foundation to inform the identification of critical habitat:

1. Implications to critical habitat identification of variation in approaches applied by provincial and territorial jurisdictions to delineate ranges.
2. Relative impacts of different disturbances and habitat types, and their configurations, on the ability of ranges to support self-sustaining local populations, and resultant critical habitat identification.
3. Identification of disturbance management thresholds for self-sustaining local populations.
4. Influence of future range conditions on disturbance management thresholds given the dynamic nature of disturbance in a given range.

The purpose of addressing these knowledge gaps was to further inform the identification of critical habitat for boreal caribou, using the best available information. To this end, Environment Canada undertook the work presented in the *Scientific Assessment to Inform the Identification of*

Critical Habitat for Woodland Caribou (Rangifer tarandus caribou), Boreal Population, in Canada, 2011 Update (herein referred to as the 2011 Scientific Assessment).

2011 Scientific Assessment: Concepts and Methodology

Similar to the 2008 Scientific Review, the 2011 Scientific Assessment was designed to provide a probabilistic evaluation of critical habitat relative to the set of conditions (demographic and environmental) for each range. The framework and components developed in the 2008 Scientific Review were expanded and enhanced through a suite of scientific activities including: enhanced disturbance mapping; habitat selection analysis; buffer analysis; meta-analysis of boreal caribou local population and habitat conditions; assessment of current conditions to support self-sustaining boreal caribou local populations using indicators of two ecological components of sustainability (stable or positive population growth and long-term persistence); representation of future conditions through application of a simple habitat dynamics model and; development of a methodology for establishing risk-based, range-specific disturbance management thresholds based on best available information.

Information to Support the Identification of Critical Habitat

The information to inform the identification of boreal caribou critical habitat provided in the 2011 Scientific Assessment for each range consists of the following four components:

1. The delineation and location of the range, and certainty in range delineation.
2. An integrated risk assessment based on multiple lines of evidence from three indicators, and application of hierarchical decision rules to evaluate the probability that current conditions on a range will support a self-sustaining local population. The result is expressed as a likelihood statement relative to achieving the population and distribution objectives.
3. Information to support the identification of disturbance management thresholds. Specifically, a consistent methodology for deriving such thresholds is provided, along with examples of their potential application, and discussion of their interpretation relative to the criteria and indicators evaluated.
4. A description of the biophysical attributes, defined as the habitat characteristics required by boreal caribou to carry out life processes necessary for survival and recovery. The results from the habitat selection analyses and other published reports were used to summarize biophysical attributes by ecozone.

The related goals of assessing the ability of ranges to support self-sustaining local populations, and establishment of disturbance management thresholds, must acknowledge uncertainties arising from the availability and reliability of information about current local population condition, as well as how local populations might respond to additional and often interacting stressors. The probabilistic approach applied in the 2011 Scientific Assessment explicitly incorporated the effects of uncertainties and data quality in the assessment process. This approach is consistent with the concept of adaptive management, which expresses probable outcomes as hypotheses. Monitoring and evaluation of realized outcomes informs adaptations of management strategies over time.

Key Findings

The information and analyses presented in the 2011 Scientific Assessment addresses limitations identified with implementation of the work presented in the 2008 Scientific Review. However, neither the approach nor the results of the 2011 assessment represent a fundamental shift from the 2008 Scientific Review's conclusion that range is the appropriate geographic delineation for critical habitat description. Further, the amount of total disturbance within a range remains the primary criteria for identifying critical habitat to meet a goal of self-sustaining local populations of boreal caribou.

Highlights of the application of the conceptual framework and associated analyses supporting the 2011 assessment include:

1. Nearly 70% of the variation in boreal caribou recruitment across 24 study areas spanning the full range of boreal caribou distribution and range condition in Canada was explained by a single composite measure of total disturbance (fire + buffered anthropogenic), most of which could be attributed to the negative effects of anthropogenic disturbance.
2. Of the 57 identified boreal caribou ranges in Canada at the time, 17 (30%) were assessed in the 'self-sustaining' category, 7 (12%) in the "as likely as not self-sustaining category", and 33 (58%) in the 'not self-sustaining' category.
3. Range-specific disturbance management thresholds can be derived from a generalized disturbance-population growth function in conjunction with range-specific information. A methodology was developed to extend the critical habitat description for consideration of disturbance management thresholds when acceptable risks are defined by managers.

In addition to these highlights, several important observations related to the availability of information emerged, and recommendations related to these are advanced:

1. Most boreal caribou ranges in Canada have not been fully described owing to a lack of standardized animal location data and poor understanding of movement within and between ranges. While a total of 57 ranges were still recognized at the time by provincial and territorial jurisdictions in Canada, changes to the delineation of boreal caribou ranges have been made since the 2008 Scientific Review, by various jurisdictions, based on different criteria. The issue of appropriate delineation of transboundary ranges remains unresolved.
2. Demographic data are lacking for many boreal caribou ranges in Canada. Monitoring and assessment programs to provide data on local population size, local population trend, recruitment and adult mortality are required to improve understanding of factors affecting boreal caribou survival and recovery, to increase certainty in assessment results, and to monitor response of local populations to recovery actions and to assess progress towards meeting the population and distribution objectives for boreal caribou across Canada.

In conclusion, significant advances were made to the conceptual and methodological design in the 2011 Scientific Assessment to address some key uncertainties or limitations identified in the 2008 Scientific Review. These advances improved the robustness of the results with respect to providing a scientific basis to inform the identification of critical habitat for boreal caribou across Canada.

APPENDIX E: IDENTIFYING DISTURBANCE MANAGEMENT THRESHOLDS

This Appendix is derived from Environment Canada's Scientific Assessment (2011b), and has been adapted for the purposes of this recovery strategy. A methodology was developed for consideration of disturbance management thresholds (Environment Canada, 2011b) and is herein described. Establishing disturbance management thresholds requires a recovery goal and an acceptable level of risk from a management perspective.

The recovery goal for boreal caribou is to achieve self-sustaining local populations in all boreal caribou ranges throughout their current distribution in Canada, to the extent possible. Environment Canada (2011b) expressed this recovery goal as the likelihood of observing a mean lambda (population growth) over a 20-year period of a stable or increasing population and the likelihood of the population size remaining above a quasi-extinction threshold of 10 reproductively active females over a 50 year period. The likelihood of the population remaining stable or increasing over 20 years was based on two indicators: population trend and disturbance level within a boreal caribou range. In order to assess the influence of disturbance level on the population trend, a study was completed to develop a relationship that expresses the probability of a population being stable or increasing at varying levels of total range disturbance (see Figure E-1). This relationship was derived by combining information on the negative effects of disturbance on boreal caribou recruitment with a national mean annual adult survival rate for mature females. This relationship was used to inform the range condition required to meet the recovery goal which is a core element of the identification of critical habitat in this recovery strategy.

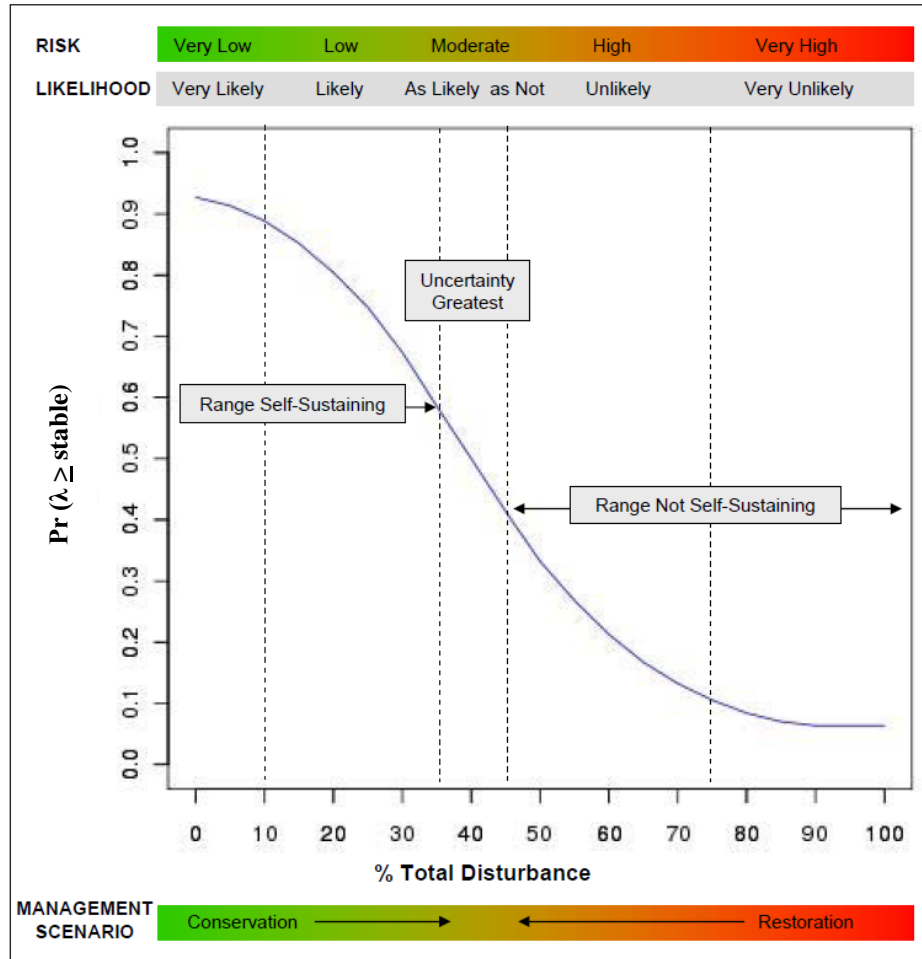


Figure E-1. Disturbance management thresholds: The probability of observing stable or positive growth ($\lambda \geq \text{stable}$) of boreal caribou local populations over a 20-year period at varying levels of total range disturbance (fires ≤ 40 years + anthropogenic disturbances buffered by 500 m). Certainty of outcome, ecological risk, and management scenarios are illustrated along a continuum of conditions.

The disturbance values associated with the likelihood of achieving a self-sustaining local population can be used to express the relative risk of not achieving a self-sustaining local population (see Table E-1). At this point, a given management objective or target must be specified in order to determine what is an acceptable level of risk from a management perspective.

Table E-1. Intervals of total range disturbance associated with varying levels of certainty in outcome and assigned risk relative to achieving stable or positive population growth.

Probability of Sustained Stable or Positive Growth ¹	Likelihood of Desired Outcome	Disturbance Interval	Level of Risk
≥ 90%	Very Likely	≤ 10%	Very Low
< 90 to ≥ 60%	Likely	> 10 to 35%	Low
< 60 to ≥ 40%	As Likely as Not	> 35 to 45%	Moderate
< 40 to ≥ 20%	Unlikely	> 45 to 75%	High
< 10%	Very Unlikely	>75%	Very High

¹ Intervals adapted from the International Panel on Climate Change 2005; time frame for assessing mean growth rate is 20 years.

A disturbance management threshold marks the point below which (i.e. at lower levels of disturbance) range conditions are likely to meet the recovery goal with an acceptable level of risk, and above which the outcome is either highly uncertain or unacceptable. In this recovery strategy a 0.6 or 60% probability of self-sustainability (i.e. population growth is stable/increasing) is applied resulting in a maximum disturbance management threshold of 35% total disturbance (or 65% undisturbed habitat as referenced throughout the recovery strategy) (see Figure E-1). A probability of 1.0 or 100 % is ideal, however, unrealistic since 0% total disturbance is virtually impossible even without anthropogenic disturbances. The maximum disturbance management threshold of 35% at 0.6 or 60% probability of self-sustainability is a reasonable starting point providing a likely certainty of recovery, given the available information on boreal caribou at this time. It is important to emphasize that this is a maximum disturbance management threshold because there is still a risk (0.4 or 40%) that local populations will not be self-sustaining. Local populations that have greater than 35% total disturbance (or less than 65% undisturbed habitat) will first be recovered to the 35% disturbance management threshold (i.e. to achieve 65% undisturbed habitat). The disturbance management threshold may be altered in the future as more information becomes available on the associated level of risk for boreal caribou local populations to meet the recovery goal outlined in this strategy.

APPENDIX F: SUMMARY OF BOREAL CARIBOU LOCAL POPULATION CONDITION AND HABITAT CONDITION

Table F-1 provides a summary of boreal caribou local population condition and habitat condition for each of the 51 boreal caribou ranges. Boreal caribou distribution (see Figure 2) and population and habitat condition information is based on the best available information including observational and telemetry data, and biophysical analyses, provided by provincial and territorial jurisdictions (Environment Canada, 2011b). As a result of limited information on many of the ranges in Canada, only three transboundary ranges (a range that extends across a provincial or territorial boundary) have been defined: Northwest Territories range (NT1), Chinchaga range (AB1), and Lac Joseph range (NL1). As more refined information is being continually collected by jurisdictions, range delineation and population demographic information will be updated and may result in revisions to range boundaries and possibly more transboundary ranges. The assessment of self-sustainability may change when ranges that cross jurisdictional boundaries are combined. Range boundaries and integrated risk assessments will be updated annually based on new or more refined evidence provided by the provincial and territorial jurisdictions. In some cases, local population size estimates and trend data are based primarily on professional judgment and limited data, and not on rigorously collected field data.

The Range Type lists the different classification of local populations based on updated range boundaries for boreal caribou provided by jurisdictions, which were subsequently classified into three types reflecting the level of certainty in range boundaries: Conservation Units (CU - low certainty), Improved Conservation Units (ICU- medium certainty), and Local Population (LP - high certainty).

Risk assessment is the status of self-sustainability of the local populations where SS=self-sustaining; NSS = not self-sustaining; NSS/SS = as likely as not self-sustaining.

Further explanation on disturbance is provided in Section 4.2.1.

Table F-1. Boreal caribou local population condition and habitat condition information.

Range Identification	Range Name	Range Type	Population Size Estimate	Population Trend	Disturbed Habitat (%)			Risk Assessment
					Fire ¹	Anthropogenic ²	Total ³	
Northwest Territories								
NT1	Northwest Territories	ICU	6500	not available ⁴	24	8	31	SS
British Columbia								
BC1	Maxhamish	LP	300	not available	0.5	57	58	NSS
BC2	Calendar	LP	290	not available	8	58	61	NSS
BC3	Snake-Sahtahneh	LP	360	declining	6	86	87	NSS
BC4	Parker	LP	40-60	not available	1	57	58	NSS
BC5	Prophet	LP	50-100	not available	1	77	77	NSS
Alberta								

Range Identification	Range Name	Range Type	Population Size Estimate	Population Trend	Disturbed Habitat (%)			Risk Assessment
					Fire ¹	Anthropogenic ²	Total ³	
AB1	Chinchaga (incl. BC portion)	LP	250	declining	8	74	76	NSS
AB2	Bistcho	LP	195	declining	20	61	71	NSS
AB3	Yates	LP	350	stable	43	21	61	NSS
AB4	Caribou Mountains	LP	315-394	declining	44	23	57	NSS
AB5	Little Smoky	LP	78	declining	0.2	95	95	NSS
AB6	Red Earth	LP	172-206	declining	30	44	62	NSS
AB7	West Side Athabasca River	LP	204-272	declining	4	68	69	NSS
AB8	Richardson	LP	150	not available	67	22	82	NSS
AB9	East Side Athabasca River	LP	90-150	declining	26	77	81	NSS
AB10	Cold Lake	LP	150	declining	32	72	85	NSS
AB11	Nipisi	LP	55	not available	6	66	68	NSS
AB12	Slave Lake	LP	65	not available	37	63	80	NSS
Saskatchewan								
SK1	Boreal Shield	CU	not available	not available	55	3	57	Unknown ⁵
SK2	Boreal Plain	CU	not available	not available	26	20	42	NSS/SS
Manitoba ⁶								
MB1	The Bog	ICU	50-75	stable	4	12	16	NSS/SS
MB2	Kississing	ICU	50-75	stable	39	13	51	NSS
MB3	Naosap	ICU	100-200	stable	28	26	50	NSS
MB4	Reed	ICU	100-150	stable	7	20	26	SS
MB5	North Interlake	ICU	50-75	stable	4	14	17	NSS/SS
MB6	William Lake	ICU	25-40	stable	24	10	31	NSS
MB7	Wabowden	ICU	200-225	stable	10	19	28	SS
MB8	Wapisu	ICU	110-125	stable	10	14	24	SS
MB9	Manitoba North	CU	not available	not available	23	16	37	NSS/SS
MB10	Manitoba South	CU	not available	not available	4	13	17	SS
MB11	Manitoba East	CU	not available	not available	26	3	29	SS
MB12	Atikaki-Berens	ICU	300-500	stable	31	6	35	SS

Range Identification	Range Name	Range Type	Population Size Estimate	Population Trend	Disturbed Habitat (%)			Risk Assessment
					Fire ¹	Anthropogenic ²	Total ³	
MB13	Owl-Flinstone	LP	78	stable	25	18	39	NSS/SS
Ontario⁷								
ON1	Sydney	ICU	not available	stable	28	33	58	NSS
ON2	Berens	ICU	not available	not available	34	7	39	NSS/SS
ON3	Churchill	ICU	not available	not available	6	28	31	SS
ON4	Brightsand	ICU	not available	not available	18	28	42	NSS/SS
ON5	Nipigon	ICU	300	stable	7	25	31	SS
ON6	Coastal	CU	492	not available	0	16	16	SS
ON7	Pagwachuan	ICU	not available	not available	0.9	26	27	SS
ON8	Kesagami	ICU	492	declining	3	36	38	NSS
ON9 ⁸	Far North	CU	not available	not available	14	1	15	SS
Quebec								
QC1	Val d'Or	LP	30	declining	0.1	60	60	NSS
QC2	Charlevoix	LP	75	stable	4	77	80	NSS
QC3	Pipmuacan	ICU	134	stable	11	51	59	NSS
QC4	Manouane	ICU	358	stable	18	23	39	NSS/SS
QC5	Manicouagan	ICU	181	increasing	3	32	33	SS
QC6 ⁸	Quebec	CU	9000	stable	20	12	30	SS
Newfoundland and Labrador								
NL1 ⁹	Lac Joseph	LP	1282	declining	7	1	8	NSS/SS
NL2	Red Wine Mountain	LP	97	declining	5	3	8	NSS
NL3 ⁹	Mealy Mountain	LP	1604	declining	0.4	1	2	NSS/SS

¹ Fire disturbance is any area where a fire has occurred in the past 40 years (without buffer).

² For anthropogenic disturbance, a 500 meter buffer is applied to all linear and polygonal disturbances.

³ For total disturbance, both anthropogenic and fire disturbances that overlap are not counted twice in the total.

⁴ Some trend data exists for local study areas within Northwest Territories, but it is insufficient to establish a range-level trend.

⁵ The high fire in combination with very low anthropogenic disturbance estimates for northern Saskatchewan's Boreal Shield range (SK1) represent a unique situation that falls outside the range of variability observed in the data that informed the disturbance model used by Environment Canada (2011b) as a component of the integrated risk assessment framework. The probability of self-sustaining is reported as "unknown" due to the uniqueness of the disturbance regime and the uncertainty about the status of the population. Nevertheless, the high fire (55%) observed for northern Saskatchewan's Boreal Shield range (SK1) warrants caution with respect to additional anthropogenic disturbance. This is further explained below under the heading: "Detailed Explanation for Integrated Risk Assessment for Boreal Shield (SK1)".

⁶ The Government of Manitoba is in the process of updating their range boundaries. This will result in an update to current range delineations, as well as a revision of their self-sustainability status following integrated risk assessment of any new range boundaries.

⁷ A total of 5000 boreal caribou were reported for Ontario in 2008 (Ontario Woodland Caribou Recovery Team, 2008).

⁸ The range is likely made up of several populations for which the self-sustainability status may vary. New data is currently being collected by the provincial jurisdiction for this range. This may result in an update to the range delineation and/or the identification of new ranges, as well as a revision of their self-sustainability status following integrated risk assessment of new ranges or new range boundaries.

⁹ The Government of Newfoundland and Labrador has provided data that indicates a recent decline for Mealy Mountain and Lac Joseph. The data provided does not meet the criteria of lambda reported for 3 years or more in the last 10 years as defined in the assessment process but does provide evidence for caution. Therefore, even though the habitat condition for these two ranges indicates "very likely" to be self-sustaining, they have been assigned a status of "as likely as not" based on this reported decline. These populations should be carefully monitored and a re-assessment completed.

Detailed Explanation for Integrated Risk Assessment for Boreal Shield (SK1)

The integrated assessment applied in the 2011 Science Assessment was based on three lines of evidence: i) population trend, ii) population size and iii) habitat condition (as defined by amount of total disturbance). If data was not available for one of the lines of evidence the assessment was still based on lines of evidence with available data. A measure of disturbance was available for all boreal caribou ranges.

There is no trend data or population data for SK1. There were population estimates provided by Saskatchewan for four previously defined management units across the boreal shield based on estimated area of habitat and average density of caribou, however, no formal surveys have been carried out in SK1. Disturbance was measured using same methods applied to all ranges and as described in Environment Canada (2011b).

The probability of a self-sustaining status for the habitat condition was dependent on a relationship between total disturbance and recruitment developed through a meta-analysis of study areas across Canada. The range of conditions for anthropogenic and fire disturbance in the meta-analysis is representative of the range of disturbance values for caribou ranges assessed across Canada with the exception of SK1. SK1 disturbance is comprised of 3% buffered anthropogenic and 55% fire resulting in total non-overlapping disturbance of 57%. For SK1, the proportion of total disturbance that is anthropogenic is outside of the data range (5% for SK1 as compared to 12% to 100% for meta-analysis study areas). The highest percent fire in the meta-analysis data set is represented in two of the 24 study areas with 41 and 42 % fire with 8% and 23% anthropogenic disturbance respectively.

As such, the uncertainty associated with application of the model to SK1 is greater than for the remaining 50 Ranges. Therefore the meta-analysis model was not applied to SK1 to provide an integrated assessment or to inform the identification of critical habitat.

In the absence of the application of the disturbance model to provide an integrated assessment, the probability of self-sustaining for SK1 has been reported as "unknown", but caution with respect to additional anthropogenic disturbance is warranted based on the following:

- At this time there are no trend data for SK1 to indicate if caribou numbers are stable, increasing or declining and there are no reliable population estimates.

- The meta-analysis (and past analysis in the published literature) has demonstrated that it is the cumulative effects of anthropogenic disturbance with fire that contribute to the relationship between disturbance and caribou recruitment. Although several models were tested in Environment Canada (2011b) that separated anthropogenic and fire disturbance, the top model (using Akaike's Information Criterion - AIC) was the total disturbance (one variable) model. It is conceivable that additional data from high fire - low anthropogenic study areas could result in a two variable model performing better and allowing greater differentiation of the relative contributions of fire and anthropogenic effects.
- Although caribou adapt to fire by shifting use to unburned areas until burned areas recover, this adaptation strategy is dependent on alternate undisturbed areas being available for caribou use. Examination of the trend in cumulative area burned does demonstrate an increase in rate of burn since the 1970's as compared to previous period (1945-70). Review of literature that has examined evidence for changes in fire regimes in the boreal due to climate change indicates that the area burned by forest fires in Canada has increased over the past four decades, at the same time as summer season temperatures have warmed (Van Wagner, 1988; Skinner et al., 1999, 2002; Podur et al., 2002; Stocks et al., 2003; Gillet et al., 2004).
- Given that SK1 has a high level of fire disturbance (55%) that contributes to the high level of total disturbance (57%), caution is warranted in terms of additional anthropogenic disturbance until trend data is available for SK1. Population trend data showing a stable or increasing trend based on lambda measured for 3 years within a 10 year period would result in an assignment of self-sustaining for SK1. Data collected in the interim could, nevertheless, still be used to inform the potential risk of not meeting the recovery goal of self-sustainability.
- Continuous improvement of the meta-analysis will be pursued to increase an understanding of factors such as relative contributions of fire and anthropogenic effects on patterns of disturbance, impacts on quality of remaining habitat, etc. Collection of recruitment data from a sample of "high fire - very low anthropogenic" study areas, collected over a minimum of 2 years from radio collared adult females, would expand the range and amount of data for the meta-analysis to include conditions representative of SK1 and may provide greater understanding of the relative contributions of fire and anthropogenic disturbances. The updated model (with the additional data) could then be applied to SK1 to provide the habitat condition indicator as a component of the integrated assessment and to inform critical habitat identification.

APPENDIX G: DETAILS ON THE IDENTIFICATION OF CRITICAL HABITAT FOR BOREAL CARIBOU

Table G-1 provides a summary of boreal caribou habitat condition for each of the 51 boreal caribou ranges. Boreal caribou distribution (see Figure 2) and habitat condition information is based on the best available information including observational and telemetry data, and biophysical analyses, provided by provincial and territorial jurisdictions (Environment Canada, 2011b). As a result of limited information on many of the ranges in Canada, only three transboundary ranges (a range that extends across a provincial or territorial boundary) have been defined: Northwest Territories range (NT1), Chinchaga range (AB1), and Lac Joseph range (NL1). As more refined information is being continually collected by jurisdictions, range delineation and population demographic information will be updated and may result in revisions to range boundaries and possibly more transboundary ranges. The assessment of self-sustainability may change when ranges that cross jurisdictional boundaries are combined. Range boundaries and integrated risk assessments will be updated annually based on new or more refined evidence provided by the provincial and territorial jurisdictions.

As described in Section 7.1.1, the identification of critical habitat for boreal caribou is comprised of three components for each range: i) Location of habitat; ii) Amount of habitat; and iii) Type of habitat.

Table G-1. Boreal caribou critical habitat information.

Range Identification	Location	Amount					Type
	Range Name	Total Range Area (ha)	Disturbed Habitat (%)			Total Undisturbed Habitat (%)	Biophysical Attributes (see corresponding ecozone table in Appendix H)
			Fire ¹	Anthropogenic ²	Total ³		
Northwest Territories							
NT1	Northwest Territories	44,166,546	24	8	31	69	Taiga Plain
							Boreal Plain
							Southern Arctic
							Taiga Cordillera
British Columbia							
BC1	Maxhamish	710,105	0.5	57	58	42	Taiga Plain
BC2	Calendar	496,393	8	58	61	39	Taiga Plain
BC3	Snake-Sahtahneh	1,198,752	6	86	87	13	Taiga Plain
BC4	Parker	75,222	1	57	58	42	Taiga Plain
BC5	Prophet	119,396	1	77	77	23	Taiga Plain
Alberta							
AB1	Chinchaga (incl. BC portion)	3,162,612	8	74	76	24	Taiga Plain,
							Boreal Plain
AB2	Bistcho	1,436,555	20	61	71	29	Taiga Plain
AB3	Yates	523,094	43	21	61	39	Taiga Plain

Range Identification	Location	Amount					Type
	Range Name	Total Range Area (ha)	Disturbed Habitat (%)			Total Undisturbed Habitat (%)	Biophysical Attributes (see corresponding ecozone table in Appendix H)
			Fire ¹	Anthropogenic ²	Total ³		
AB4	Caribou Mountains	2,069,000	44	23	57	43	Taiga Plain
							Boreal Plain
AB5	Little Smoky	308,606	0.2	95	95	5	Montane Cordillera
							Boreal Plain
AB6	Red Earth	2,473,729	30	44	62	38	Boreal Plain
AB7	West Side Athabasca River	1,572,652	4	68	69	31	Boreal Plain
AB8	Richardson	707,350	67	22	82	18	Boreal Shield(West)
							Boreal Plain
AB9	East Side Athabasca River	1,315,980	26	77	81	19	Boreal Plain
AB10	Cold Lake	672,422	32	72	85	15	Boreal Plain
AB11	Nipisi	210,771	6	66	68	32	Boreal Plain
AB12	Slave Lake	151,904	37	63	80	20	Boreal Plain
Saskatchewan							
SK1	Boreal Shield	18,034,870	55	3	57	43	Taiga Shield
							Boreal Shield(West)
SK2	Boreal Plain	10,592,463,	26	20	42	58	Boreal Plain
Manitoba							
MB1	The Bog	446,383	4	12	16	84	Boreal Plain
MB2	Kississing	317,029	39	13	51	49	Boreal Shield(West)
MB3	Naosap	456,977	28	26	50	50	Boreal Shield(West)
							Boreal Plain
MB4	Reed	357,425	7	20	26	74	Boreal Shield(West)
							Boreal Plain
MB5	North Interlake	489,680	4	14	17	83	Boreal Plain
MB6	William Lake	488,219	24	10	31	69	Boreal Plain
MB7	Wabowden	628,938	10	19	28	72	Boreal Shield(West)
							Boreal Plain
MB8	Wapisu	565,044	10	14	24	76	Boreal Shield(West)

Range Identification	Location	Amount					Type
	Range Name	Total Range Area (ha)	Disturbed Habitat (%)			Total Undisturbed Habitat (%)	Biophysical Attributes (see corresponding ecozone table in Appendix H)
			Fire ¹	Anthropogenic ²	Total ³		
MB9	Manitoba North	6,205,520	23	16	37	63	Boreal Shield (West)
							Boreal Plain
MB10	Manitoba South	1,867,255	4	13	17	83	Boreal Plain
MB11	Manitoba East	6,612,782	26	3	29	71	Boreal Shield (West and West Central)
MB12	Atikaki-Berens	2,387,665	31	6	35	65	Boreal Shield (West Central)
MB13	Owl-Flinstone	363,570	25	18	39	61	Boreal Shield (West Central)
Ontario							
ON1	Sydney	753,001	28	33	58	42	Boreal Shield (West Central)
ON2	Berens	2,794,835	34	7	39	61	Boreal Shield (West Central)
ON3	Churchill	2,150,490	6	28	31	69	Boreal Shield (West Central)
ON4	Brightsand	2,220,921	18	28	42	58	Boreal Shield (West Central)
ON5	Nipigon	3,885,026	7	25	31	69	Boreal Shield (West and West Central)
ON6	Coastal	376,598	0	16	16	84	Boreal Shield (Central)
ON7	Pagwachuan	4,542,918	0.9	26	27	73	Hudson Plain
							Boreal Shield (Central)
ON8	Kesagami	4,766,463	3	36	38	62	Hudson Plain
							Boreal Shield (Central)
ON9	Far North	28,265,143	14	1	15	85	Hudson Plain
							Boreal Shield (West, Southeast, Central)
Quebec							
QC1	Val d'Or	346,861	0.1	60	60	40	Boreal Shield (Southeast)
QC2	Charlevoix	312,803	4	77	80	20	Boreal Shield (Southeast)

Range Identification	Location	Amount					Type
	Range Name	Total Range Area (ha)	Disturbed Habitat (%)			Total Undisturbed Habitat (%)	Biophysical Attributes (see corresponding ecozone table in Appendix H)
			Fire ¹	Anthropogenic ²	Total ³		
QC3	Pipmuacan	1,376,899	11	51	59	41	Boreal Shield (East)
QC4	Manouane	2,716,449	18	23	39	61	Boreal Shield (East)
QC5	Manicouagan	1,134,129	3	32	33	67	Boreal Shield (East)
QC6	Quebec	62,156,186	20	12	30	70	Boreal Shield (Central, East)
Newfoundland and Labrador							
NL1	Lac Joseph	5,802,491	7	1	8	92	Taiga Shield
							Boreal Shield (East)
NL2	Red Wine Mountain	5,838,594	5	3	8	92	Taiga Shield
							Boreal Shield (East)
NL3	Mealy Mountain	3,948,463	0.4	1	2	98	Taiga Shield
							Boreal Shield (East)

¹ Fire disturbance is any area where a fire has occurred in the past 40 years (without buffer).

² For anthropogenic disturbance, a 500 meter buffer is applied to all linear and polygonal disturbances.

³ For total disturbance, both anthropogenic and fire disturbances that overlap are not counted twice in the total.

APPENDIX H: BIOPHYSICAL ATTRIBUTES FOR BOREAL CARIBOU CRITICAL HABITAT

Biophysical Attributes

Aboriginal Traditional Knowledge (Boreal Caribou ATK Reports, 2010-2011), habitat selection analyses, and scientific published reports (Environment Canada, 2011b) were used to summarize biophysical attributes required by boreal caribou to carry out life processes necessary for survival and recovery. Results are provided by ecozone and ecoregion in order to capture the ecological variation across the distribution of boreal caribou.

Boreal Caribou Ranges by Ecozone and Ecoregion

Boreal caribou are distributed in the boreal forest across eight ecozones in Canada including: Taiga Plain, Montane Cordillera, Taiga Shield, Boreal Plain, Boreal Shield, Hudson Plain, Southern Arctic, and Taiga Cordillera. The largest ecozone, Boreal Shield, is further divided into five ecoregions: Boreal Shield West, Boreal Shield West Central, Boreal Shield Central, Boreal Shield East, and Boreal Shield South East (see Figure H-1).

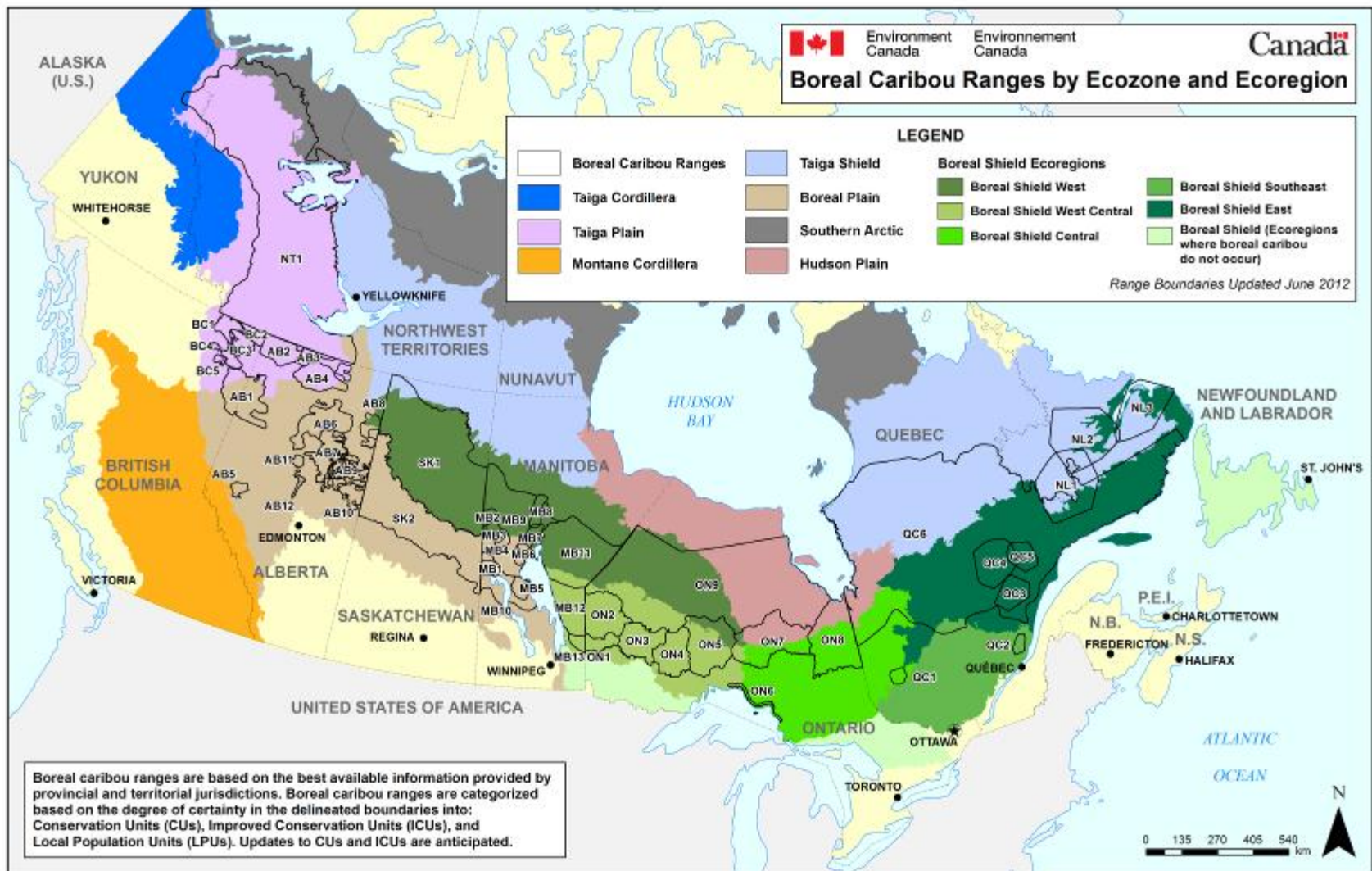


Figure H-1. Boreal caribou distribution across ecozones and ecoregions in Canada.

Biophysical Attribute Descriptions

The biophysical attributes for boreal caribou critical habitat are categorized by the types of habitat used by boreal caribou in accordance with seasonal and life-stage activity which include broad scale, calving, post-calving, rutting, wintering, and travel. This information is provided in the following tables by ecozone and ecoregion.

Biophysical attributes will vary both between and within boreal caribou ranges. As the biophysical attributes presented in this recovery strategy were developed at a national scale by ecozone and ecoregion, and not by local population, it is anticipated that each provincial and territorial jurisdiction may have or will develop over time, a more refined description of the biophysical attributes required for each range. Biophysical attributes specific to boreal caribou ranges in Labrador have been provided by the jurisdiction and are included in Table H-6 below.

Table H-1. Biophysical attributes for boreal caribou critical habitat in the Taiga Plain ecozone.

Type of habitat	Description
Broad scale	Mature forests (jack pine, spruce, and tamarack) of 100 years or older, and open coniferous habitat. Large areas of spruce peat land and muskeg with preference for bogs over fens and upland and lowland black spruce forests with abundant lichens, and sedge and moss availability. Flatter areas with smaller trees and willows, hills and higher ground.
Calving	Open coniferous forests, tussock tundra, low shrub, riparian, recent burned areas, south and west aspects and hills and higher locations. Muskegs, marshes, staying close to water sources. Caribou observed on small islands of mature black spruce or mixed forests within peat lands, in old burns at the edge of wetlands, in alder thickets with abundant standing water and on lake shores.
Post-calving	Muskegs or areas with access to muskegs, open meadows on higher ground, close to water (lakes and rivers) and mixed bush areas. Open coniferous forests with abundant lichens, low shrub, riparian, tussock tundra, sparsely vegetative habitat, recent burns and west aspects. Old burns and neighbouring remnant unburned forests selected in late spring and early summer.
Rutting	Open coniferous and mixed wood forests, low shrub, riparian, tussock tundra, recent burns and west aspect. Still use muskegs that harbor ground lichen and sedges, mixed bush areas, areas of higher ground. Regenerating burns and sparsely vegetated habitat.
Winter	Open coniferous forests (black spruce and pine) that provide adequate cover with abundant lichens, riparian areas. Caribou observed in muskeg areas in early winter. Spruce-lichen forests, fire regenerated, sparsely vegetated habitat, herbaceous and tall shrub habitat and sphagnum moss with scattered spruce. As snow depth increases, they remain more often in areas of dense pine or thickly wooded black spruce, with hanging lichen and remains access to open, mixed vegetation for ground forage.
Travel	Females show high fidelity to calving sites among years (i.e. within 14.5 km). Many caribou shift the pattern of use based on seasonal preferences, in large multi-habitat areas. Rates of movement increase during the rut and are greatest in winter.

Table H-2. Biophysical attributes for boreal caribou critical habitat in the Montane Cordillera ecozone.

Type of habitat	Description
Broad scale	Upland lodge pole pine, mixed conifer lodgepole pine/black spruce and treed muskeg areas with abundant lichens. Open, pine dominated stands of 80 years or more.
Calving	Areas closer to cut-blocks with a high proportion of larch are selected during calving. Lower mountain peaks.
Post-calving	Homogeneous areas of conifer dominated stands.
Rutting	No information on rutting habitat currently available.
Winter	Caribou use areas with a high proportion of larch and pine forests during winter.

Table H-3. Biophysical attributes for boreal caribou critical habitat in the Taiga Shield ecozone (see Table H-6 for biophysical attributes more specific to Labrador ranges).

Type of habitat	Description
Broad scale	Upland tundra dominated by ericaceous shrubs (<i>Ericaceae</i> spp.), lichen, grasses and sedges. Lowland tundra composed of peat land complexes (muskeg and string bogs), wetlands (swamps, marshes), lakes, rivers and riparian valleys. Dense mature jack pine and black spruce stands with balsam fir and tamarack present and open conifer forests with abundant lichens.
Calving	String bogs, treed bogs, small open wetlands (< 1 km ²), large muskeg, marshes along water bodies. Barren grounds. Calving on peninsulas and islands increases with amount of open water.
Post-calving	Forested wetlands. Hilly areas, coastal sites, along shorelines of water bodies (rivers, lakes, creeks), marshes with lichen availability.
Rutting	Open wetlands, swamps. Mature forests, mountainous terrain with forests of black spruce, tamarack and pine trees with abundant lichen.
Winter	Forested areas are used in years of low snow accumulation; otherwise winter habitat selection reflects general avoidance of deep snow, including use of tundra habitat at higher elevations in mountainous regions and bogs along lakes or oceans. Forested wetlands. Tundra uplands and sand flats in proximity to water. Barren grounds. Bog edges, glacial erratics and bedrock erratics with lichen and lakes. Some use of mature white spruce and fir stands as alternative to habitat with arboreal lichens. Mix of mature forest stands, mountainous terrain with forests of black spruce, tamarack and jack pine with abundant lichen.
Travel	Connectivity between selected habitat types important given reported patterns of movement among caribou. Some animals have been reported to travel up to distances of approximately 200 km, although the majority of animals appear to move shorter distances. Females show fidelity to post-calving sites returning to within 6.7 km of a given location in consecutive years.

Table H-4. Biophysical attributes for boreal caribou critical habitat in the Boreal Plain ecozone.

Type of habitat	Description
Broad scale	Late seral-stage (> 50 years old) conifer forest (jack pine, black spruce, tamarack), treed peat lands, muskegs or bogs, use dry islands in the middle of muskegs, with abundant lichens. Hilly or higher ground and small lakes. Restricted primarily to peat land complexes. Higher elevations (~1135 m). Selected old (>40 years) burns.
Calving	Bogs and mature forests selected for calving as well as islands and small lakes. Peat lands and stands dominated by black spruce and lowland black spruce stands within muskeg are used for calving.
Post-calving	Forest stands older than 50 yrs. Upland black spruce/jack pine forests, lowland black spruce, young jack pine and open and treed peat lands and muskeg are also selected during summer. Use lichen and low muskeg vegetation. In some areas, sites with abundant arboreal lichen are selected during summer.
Rutting	Mature forests. Upland black spruce/jack pine forests, lowland black spruce, young jack pine and open and treed peat lands and muskeg during summer.
Winter	Treed peat lands, treed bog and treed fen and open fen complexes with > 50% peat land coverage with high abundance of lichens. Use of small lakes, rock outcrops on lakes for lichen access. Mature forest > 50 years old. Upland black spruce/jack pine forests, lowland black spruce, young jack pine and open and treed peat lands.

Table H-4a. Biophysical attributes for boreal caribou critical habitat in the Boreal Shield West ecoregion.

Type of habitat	Description
Broad scale	Conifer/tamarack-dominated peat land complexes, muskegs or bogs, use dry islands in the middle of muskegs and upland moderate to dense mature conifer forests (jack pine, black spruce, tamarack) with abundant lichens. Hilly or higher ground, lots of smaller lakes in area.
Calving	Peat lands, stands dominated by black spruce, mature forest stands and treed muskeg all used for calving. Caribou will use islands, small lakes, lakeshores during calving.
Post-calving	Wooded lakeshores, islands, sparsely treed rock, upland conifer-spruce and treed muskeg are used in summer. Sites with a high abundance of arboreal lichen are important for foraging in some areas. Dense conifer and mixed forest are also used.
Rutting	Dense and sparse conifer and mixed forests. Open riparian habitats are also used during the rut.
Winter	Mature upland spruce, pine stands and treed muskeg. Jack pine dominated forests. Caribou select sparse and dense conifer, mixed forests and treed bogs. In some areas caribou will select habitat with greater visibility and further away from forest edges.
Travel	Some males move > 100 km during the rutting season. Traditional travel routes between summer and winter ranges occur in large peat land complexes. Caribou migrate in a north to south pattern.

Table H-4b. Biophysical attributes of boreal caribou habitat in the Boreal Shield West Central ecoregion.

Type of habitat	Description
Broad scale	Mature conifer uplands and conifer/tamarack dominated lowlands. Conifer/tamarack-dominated peat lands, muskegs with abundant arboreal lichens, upland mature conifer forests stands with abundant terrestrial lichen and rocky areas with sparse trees. Elevations of 300 m. Intermediate values of Normalized Difference Vegetation Index ¹ . Selection for old (>40 years) burns.
Calving	Forested wetlands/treed bog, old burns, sparse conifer and dense spruce. Need lichen availability. Peat lands, raised hillrocks with large muskeg areas, forested islands and shorelines of large lakes selected during calving. Jack pine or jack pine/black spruce forests also used for calving.
Post-calving	Peat land with forested islands, islands, and shorelines selected during summer. Mature, dense forest stands.
Rutting	Semi-open and open bogs and mature conifer uplands selected during rutting. Terrestrial lichens and arboreal lichens, sedges and bog ericoids (<i>Andromeda glaucophylla</i> , <i>Chamaedaphne calyculata</i> , <i>Kalmia polifolia</i> , and <i>Ledum groenlandicum</i>) are important sources of forage.
Winter	Mature coniferous stands. Areas with a high proportion of lakes (> 5-100 ha) with convoluted shorelines. Caribou forage in areas with high lichen abundance and fewer shrubs in jack pine and black spruce stands with low tree densities, low basal areas and short heights. Caribou select open bogs, intermediate to mature jack pine rock ridges, jack pine habitats with lichens and lakes, but move to jack pine ridges in mature conifer stands with lichen when winter conditions prevent foraging in bogs. Arboreal lichens, terrestrial lichens, sedges and ericaceous species are an important source of forage.
Travel	Travel mainly in conifer forests, avoiding open habitats (e.g. lakes, disturbed areas, etc.) when migrating from summer to winter habitat. Use frozen lakes for travel during winter/spring, in some instances to reach islands for calving. Spring migration is not restricted to specific travel routes. Some move at a range of 100 km during the rutting season. Caribou moved 8-60 km away after logging operations were begun.

Table H-4c. Biophysical attributes for boreal caribou critical habitat in the Boreal Shield Central ecoregion.

Type of habitat	Description
Broad scale	Late seral-stage black spruce-dominated lowlands and jack pine dominated uplands. Open black spruce lowlands. Low-density late seral-stage jack pine or black spruce forests and black spruce/tamarack-dominated peat lands with abundant terrestrial and moderate arboreal lichens. Caribou also use areas with dry to moist sandy to loamy soils and shallow soils over bedrock. Elevations of 300 m. Intermediate values of Normalized Difference Vegetation Index ¹ . Selection for old (>40 years) burns.
Calving	Open canopies of mature black spruce and mesic peat land with ericaceous species for calving are selected for calving in the Claybelt region. Females with calves selected areas with more abundant ericaceous shrubs and terrestrial lichens during the summer compared to females without calves.
Winter	Large areas of contiguous forests dominated by black spruce. Open conifer forests or forests with lower tree densities where terrestrial and arboreal lichen are abundant and there is significant less snow (e.g. shorelines) are also selected.

Table H-4d. Biophysical attributes for boreal caribou critical habitat in the Boreal Shield East ecoregion (see Table H-6 for biophysical attributes more specific to Labrador ranges).

Type of habitat	Description
Broad scale	Conifer-feather moss forests on poorly-drained sites and mature conifer uplands with abundant terrestrial lichen. Black spruce, jack pine and balsam fir stands present with abundant lichen. Water bodies and wetlands (swamps, marshy areas with tamarack). Mountains or rolling hills. Elevations of 300 m. Intermediate values of Normalized Difference Vegetation Index ¹ . Selection for old (>40 years) burns.
Calving	Open wetlands, peninsulas and islands. Sedges, ericaceous species, bryophytes, alder and larch selected in spring. Balsam fir, dense black spruce stands, spruce-fir forests older than 40 years, and dry bare land with high lichen densities. Mature conifer stands, as well as wetlands (marshes, peat moss areas). Higher altitudes used for calving in this area rather than lake or water bodies.
Post-calving	Open and forested wetlands (marshes, swamps), and continued use of peninsulas and islands. Hilly areas, coastal sites, shorelines (rivers, lakes, creeks). Aquatic plants, dwarf birch (<i>Betula glandulosa</i>), deciduous shrubs, ericaceous species and moss.
Rutting	Open wetlands selected, swamps. Terrestrial and arboreal lichens, forbs, sedges, mosses and coniferous and deciduous shrubs. Balsam fir stands, dense spruce stands, mature and regenerating conifer stands, other forest stands (tamarack, pine) with abundant lichens, wetlands (swamps) and dry bare lands.
Winter	Forested wetlands. Some use of upland-tundra for loafing. Mountainous terrain. Dry bare land, wetlands, mature conifer forests with lichen, balsam fir stands, dense spruce stands, and mixed spruce-fir forests older than 40 years selected in southern areas. Observed along frozen bodies of water. Use of mature forests protected from harvesting increases probability of encounters with wolves that select the same habitats in winter. Shallow snow depths selected in late winter.
Travel	Caribou move greater distances during the rutting season.

Table H-4e. Biophysical attributes for boreal caribou critical habitat in the Boreal Shield Southeast ecoregion.

Type of habitat	Description
Broad scale	Late seral-stage black spruce-dominated lowlands and jack pine-dominated uplands, Balsam fir stands, marshlands and abundant lichen.
Calving	Open, medium-closed conifer forests. Elevations of 300 m. Intermediate values of Normalized Difference Vegetation Index ¹ . Selection for old (>40 years) burns.
Rutting	Dense and open mature conifer forests of spruce, tamarack, jack pine and young conifer forests between 30 – 50 years old.
Winter	Open stands of balsam fir, balsam fir-black spruce, black spruce, black-spruce-tamarack and jack pine stands older than 70 yrs. Dry bare lands, 30-50 year old stands of balsam fir or fir-black spruce, as well as 50 year old jack pine stands, and arboreal and terrestrial lichens.

Table H-5. Biophysical attributes for boreal caribou critical habitat in the Hudson Plain ecozone.

Type of habitat	Description
Broad scale	Habitats selected generally to reduce predation risk. Shrub rich treed muskeg and mature conifer forests abundant in lichens. Shorelines of deep lakes and rivers (birch trees). Poorly drained areas dominated by sedges, mosses and lichens, as well as open black spruce and tamarack forests. Elevations of 150m. Intermediate levels of ruggedness ¹ and Normalized Difference Vegetation Index ² .
Calving	Mature conifer stand with and without lichens and muskegs. Preference for higher altitudes compared to habitat use during other periods.
Post-calving	Fens, bogs and lakes.
Rutting	Wetlands and conifer stands with lichen. Mature and regenerating conifer stands are also used, albeit to a lesser degree. Caribou use hills in the lowlands, treed islands in muskegs with several different tree species.
Winter	Dense and mature conifer forests with lichens and wetlands. Peat lands dominated by open bogs and terrestrial lichens. Large patches of intermediate and mature black spruce, shrub-rich treed muskeg and mixed conifer stands all used in late winter.
Travel	Movements greatest in fall/winter when caribou transition from calving to winter habitat. Long range movements are greater in areas with high moose densities, presumably to reduce predation risk.

¹ Vector ruggedness is a metric used to capture variability in slope and aspect.

² Normalized Difference Vegetation Index (NDVI) is an index that provides a standardized method of comparing vegetation greenness between satellite images.

NOTE: A small portion of boreal caribou critical habitat in the northern portion of the Northwest Territories range falls within the Southern Arctic ecozone and the Taiga Cordillera ecozone. Currently, there is no information available on boreal caribou habitat use or biophysical attributes in either of these ecozones. Biophysical attributes in the Taiga Plain ecozone are used to describe the type of habitat needed for the identification of critical habitat for boreal caribou in the Southern Arctic and Taiga Cordillera ecozones.

Biophysical attributes specific to Labrador ranges, containing detailed information as made available by the jurisdiction.

Table H-6. Biophysical attributes of boreal caribou critical habitat in the Taiga Shield ecozone and Boreal Shield East ecoregion, specific to Labrador ranges.

Type of habitat	Description
Broad scale	<p>Subarctic and boreal forests. Tundra and low shrubs at high elevations. Numerous lakes, peatlands (string, plateau and basin bogs, ribbed and ladder fens) and peatland complexes of several wetland types adjacent and contiguous to each other, broad river valleys. Lichen woodlands, new and regenerating burns. Intermediate values of Normalized Difference Vegetation Index¹.</p> <p><u>Lac Joseph (NL1)</u> Mid and low subarctic forests characterized by open coniferous forests, eskers and upland plateaus. Black spruce dominant; jackpine and trembling aspen occur sporadically. Poorly-drained sites characterized by extensive ribbed fen-string bog complexes bordered by black-spruce sphagnum stands. Well drained sites and river uplands often containing open lichen woodlands. Lakes comprising approximately 15% of range, including Lac Joseph, Lake Ashuanipi and Atikonak Lakes.</p> <p><u>Red Wine Mountain (NL2)</u> High boreal forest and alpine areas in addition to low subarctic forest. Boreal forest portions contain productive, close-canopied boreal forests, with deep river valleys. Black spruce predominant, while some balsam fir, white birch, and trembling aspen also occur. Dominant topographical feature are the Red Wine Mountains (600m- 900m asl), and an extensive upland boreal plateau consisting of a mosaic of extensive string bogs and open conifer forest (400 m asl). Alpine areas with tundra vegetation; larch and black spruce on lower valley slopes.</p> <p><u>Mealy Mountain (NL3)</u> Extensive tree-less coastal barrens and offshore islands with tundra-like vegetation, and extensive string bogs and open pools of water, with hummocks dominated by scrub spruce and Labrador tea on the Eagle River Plateau. Mid-boreal forest characterized by closed-canopied black spruce and balsam fir forests. Eskers which occasionally support ribbons of lichen woodland. Dominant topographical feature is the Mealy Mountain range (1000m asl), containing alpine areas with tundra vegetation.</p>
Calving	<p>Muskegs, lakes and islands, peninsulas of large lakes, or combinations of these features. Mature, dense conifer stands (>90 years) with a sphagnum, forb or shrub understory, particularly when in proximity to wetlands or lakes.</p>
Post-calving and summer	<p>Immediately post calving: wetlands and areas with open water, and adjacent areas of mature, dense coniferous forest. Summer (July through September) and early fall: broader array of vegetation communities in the vicinity of their calving areas, including mature coniferous forests with a shrub or moss/forb understory, treed bogs and some open-canopied woodlands with an extensive shrub understory. Open and forested wetlands (muskeg, treed bogs) and continued use of peninsulas and islands, shorelines (rivers, lakes, creeks). Riparian plants, dwarf birch (<i>Betula glandulosa</i>), willow, ericaceous shrubs, forbs grasses and sedges for forage.</p>
Rutting	<p>Wetlands and areas with open water, and adjacent areas of mature, dense coniferous forest. Mature coniferous forests with a shrub or moss/forb understory, treed bogs and some open-canopied woodlands with an extensive shrub understory. Open and forested wetlands (muskeg, treed bogs) and continued use of peninsulas and islands, shorelines</p>

Type of habitat	Description
	(rivers, lakes, creeks). Riparian plants, dwarf birch (<i>Betula glandulosa</i>), willow, ericaceous shrubs, forbs and sedges for forage.
Winter	Early winter (November through January): lichen woodlands and lichen-shrub woodlands. Occasional use of wetlands. Late winter: lichen woodlands, ice-covered water bodies (for rest and as a refuge), and regenerating burns (with shrub and <i>Cladina mitis</i> understory) in some cases. Extensive use of coastal barrens in Mealy Mountain range. Some use of Alpine areas in Red Wine Mountain and Mealy Mountain range.
Travel	During spring and fall migration, select open habitats that are easy to travel through. In particular, during spring migration select for (frozen) wetlands and burns, and during fall migration added open lichen woodlands to the latter cover classes. Most females travel up to 20 km from winter areas to calving sites, but can move by as much as 120 km.

¹ *Normalized Difference Vegetation Index (NDVI) is an index that provides a standardized method of comparing vegetation greenness between satellite images.*

APPENDIX I: MITIGATION TECHNIQUES TO AVOID DESTRUCTION OF CRITICAL HABITAT

Mitigation of the adverse effects that may result from a proposed project on boreal caribou could include different techniques. These techniques include avoiding destruction of undisturbed habitat or biophysical attributes necessary for the species to carry out life processes, reducing noise or pollution, or minimizing disturbance by adapting its shape or adjusting the timing of the disturbance. Table I-1 provides examples of considerations and possible mitigation techniques when planning development within a boreal caribou range.

Table I-1. Examples of considerations when planning development within a boreal caribou range and possible mitigation techniques.

Considerations when planning development	Examples of possible mitigation techniques
Threshold of disturbance in the short- and long-term	Minimize the footprint of development, consider locations where habitat is already disturbed; restore habitat to provide continual availability of undisturbed habitat over time.
Ecological factors	Avoid destruction of biophysical attributes (see Appendix H).
Spatial configuration	Minimize disturbance by adapting its shape (small polygon vs. linear).
Sensory disturbances	Mitigation of noise, light, smells, vibrations to prevent harassment of boreal caribou.
Pollution	Mitigate pollution through scrubbers or other techniques. Some types of pollution may be especially of concern (e.g. air pollution that increases acidity may affect lichens on which boreal caribou depend for food).
Timing of disturbance	Certain types of disturbance could occur only in seasons when boreal caribou are not using the area or do not respond negatively to the activity.
Induced effects	New access roads in previously undisturbed areas may induce further disturbance by opening territory to more development, recreational users, etc. This could be prevented by an access management plan that could include limiting access, decommissioning roads, etc.
Corridors that support predator movement	Impact may be reduced by using techniques that prevent use of corridor by predators (no compaction of snow, immediate replanting of trees, etc.).
Increases in predator and/or alternate prey populations	Mortality management techniques may be considered where the killing of predators would be a final, necessary option implemented temporarily, along with habitat restoration.

APPENDIX J: CRITICAL HABITAT FACTSHEETS



Illustration © Judie Shore

CRITICAL HABITAT FACTSHEETS: NORTHWEST TERRITORIES

Critical Habitat Identification: Northwest Territories Range (NT1)

The identification of critical habitat for boreal caribou is described by three components for each range: i) Location of habitat; ii) Amount of habitat; and iii) Type of habitat.

i) Location: Where critical habitat is found.

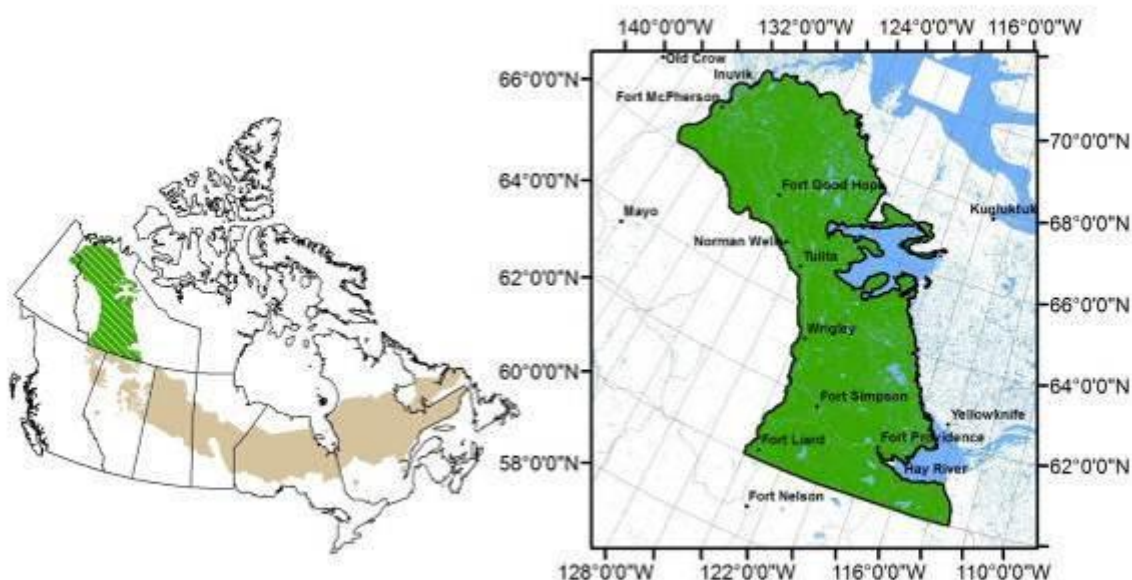


Figure J-1. Key map of the general location of the range.

Figure J-2. The geographic boundary within which critical habitat is located.

ii) Amount: Quantity of critical habitat.

Total Range Area (ha)	Disturbed Habitat (%)			Total Undisturbed Habitat (%)	Amount of Critical Habitat
	Fire	Anthropogenic	Total		
44,166,546	24	8	31	69	At least 65% undisturbed habitat

iii) Type: Biophysical attributes of critical habitat.

Ecozone(s) ¹ :	Taiga Plain
	Boreal Plain
	Southern Arctic
	Taiga Cordillera

¹ See Appendix H

CRITICAL HABITAT FACTSHEETS: BRITISH COLUMBIA

Critical Habitat Identification: Maxhamish Range (BC1)

The identification of critical habitat for boreal caribou is described by three components for each range: i) Location of habitat; ii) Amount of habitat; and iii) Type of habitat.

i) Location: Where critical habitat is found.

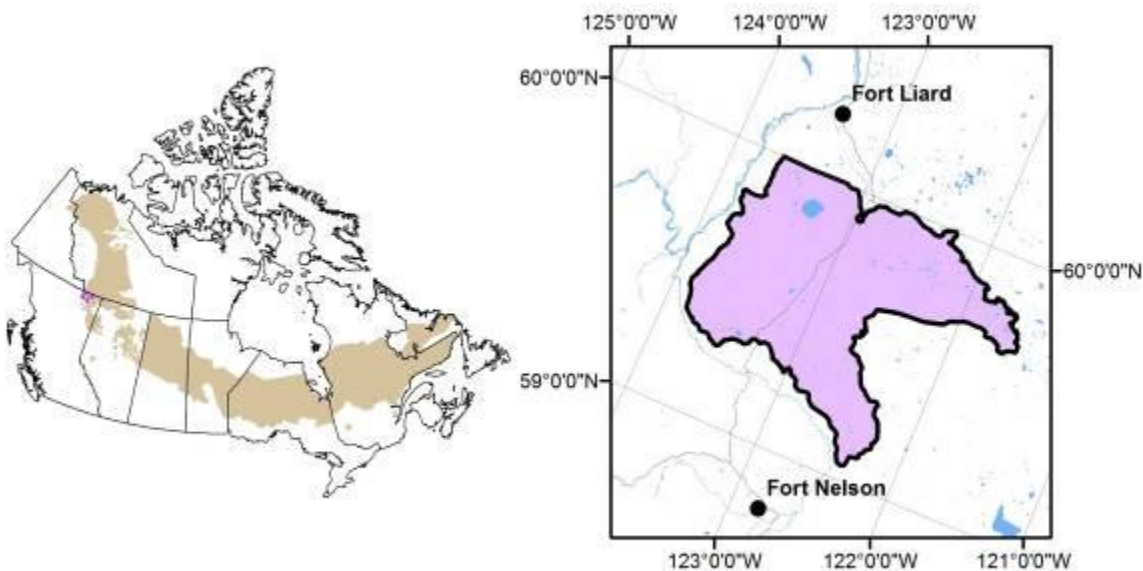


Figure J-3. Key map of the general location of the range.

Figure J-4. The geographic boundary within which critical habitat is located.

ii) Amount: Quantity of critical habitat.

Total Range Area (ha)	Disturbed Habitat (%)			Total Undisturbed Habitat (%)	Amount of Critical Habitat
	Fire	Anthropogenic	Total		
710,105	0.5	57	58	42	Existing habitat that would contribute to at least 65% undisturbed over time.

iii) Type: Biophysical attributes of critical habitat.

Ecozone(s) ¹ :	Taiga Plain
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¹ See Appendix H

Critical Habitat Identification: Calendar Range (BC2)

The identification of critical habitat for boreal caribou is described by three components for each range: i) Location of habitat; ii) Amount of habitat; and iii) Type of habitat.

i) Location: Where critical habitat is found.



Figure J-5. Key map of the general location of the range.

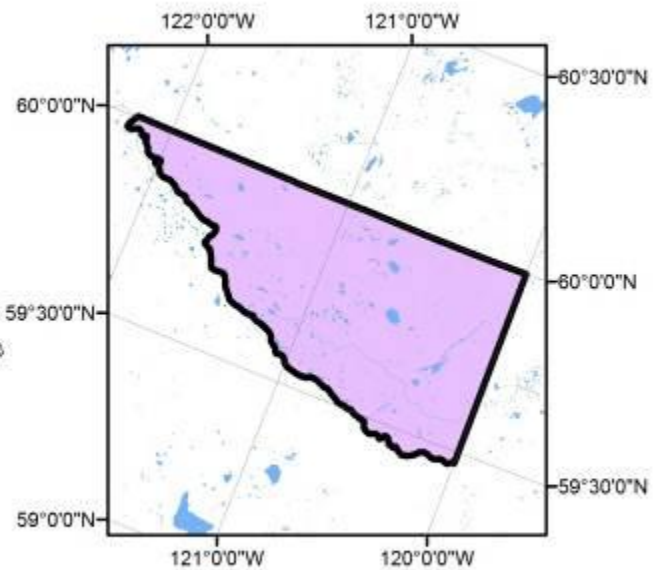


Figure J-6. The geographic boundary within which critical habitat is located.

ii) Amount: Quantity of critical habitat.

Total Range Area (ha)	Disturbed Habitat (%)			Total Undisturbed Habitat (%)	Amount of Critical Habitat
	Fire	Anthropogenic	Total		
496,393	8	58	61	39	Existing habitat that would contribute to at least 65% undisturbed over time.

iii) Type: Biophysical attributes of critical habitat.

Ecozone(s) ¹ :	Taiga Plain
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¹ See Appendix H

Critical Habitat Identification: Snake-Sahtahneh Range (BC3)

The identification of critical habitat for boreal caribou is described by three components for each range: i) Location of habitat; ii) Amount of habitat; and iii) Type of habitat.

i) Location: Where critical habitat is found.

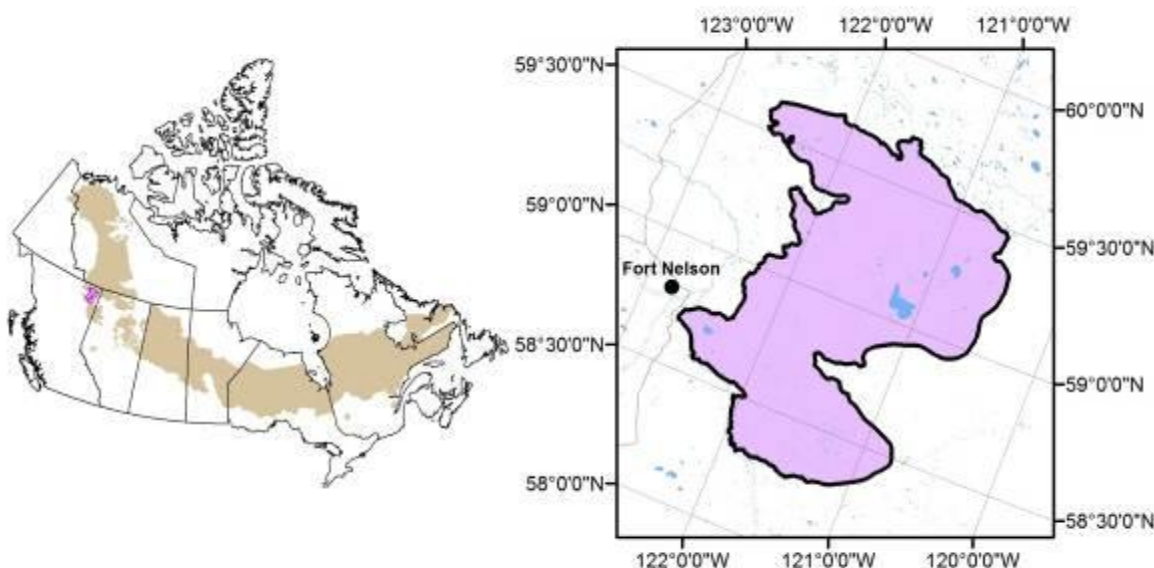


Figure J-7. Key map of the general location of the range.

Figure J-8. The geographic boundary within which critical habitat is located.

ii) Amount: Quantity of critical habitat.

Total Range Area (ha)	Disturbed Habitat (%)			Total Undisturbed Habitat (%)	Amount of Critical Habitat
	Fire	Anthropogenic	Total		
1,198,752	6	86	87	13	Existing habitat that would contribute to at least 65% undisturbed over time.

iii) Type: Biophysical attributes of critical habitat.

Ecozone(s) ¹ :	Taiga Plain
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¹ See Appendix H

Critical Habitat Identification: Parker Range (BC4)

The identification of critical habitat for boreal caribou is described by three components for each range: i) Location of habitat; ii) Amount of habitat; and iii) Type of habitat.

i) Location: Where critical habitat is found.



Figure J-9. Key map of the general location of the range.

Figure J-10. The geographic boundary within which critical habitat is located.

ii) Amount: Quantity of critical habitat.

Total Range Area (ha)	Disturbed Habitat (%)			Total Undisturbed Habitat (%)	Amount of Critical Habitat
	Fire	Anthropogenic	Total		
75,222	1	57	58	42	Existing habitat that would contribute to at least 65% undisturbed over time.

iii) Type: Biophysical attributes of critical habitat.

Ecozone(s) ¹ :	Taiga Plain
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¹ See Appendix H

Critical Habitat Identification: Prophet Range (BC5)

The identification of critical habitat for boreal caribou is described by three components for each range: i) Location of habitat; ii) Amount of habitat; and iii) Type of habitat.

i) Location: Where critical habitat is found.

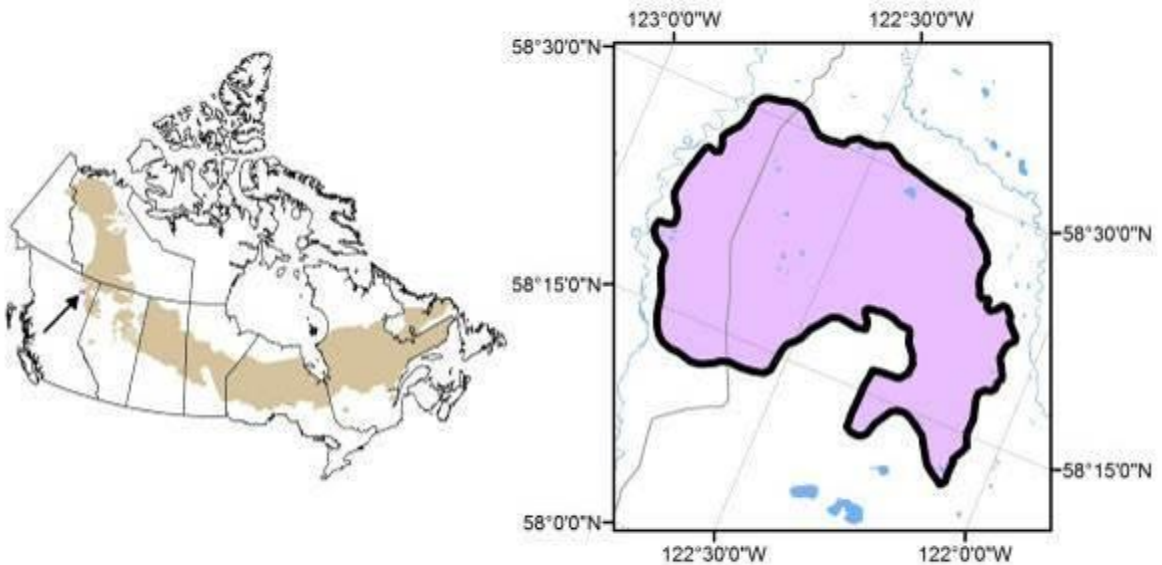


Figure J-11. Key map of the general location of the range.

Figure J-12. The geographic boundary within which critical habitat is located.

ii) Amount: Quantity of critical habitat.

Total Range Area (ha)	Disturbed Habitat (%)			Total Undisturbed Habitat (%)	Amount of Critical Habitat
	Fire	Anthropogenic	Total		
119,396	1	77	77	23	Existing habitat that would contribute to at least 65% undisturbed over time.

iii) Type: Biophysical attributes of critical habitat.

Ecozone(s) ¹ :	Taiga Plain
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¹ See Appendix H

CRITICAL HABITAT FACTSHEETS: ALBERTA

Critical Habitat Identification: Chinchaga Range (incl. BC portion) (AB1)

The identification of critical habitat for boreal caribou is described by three components for each range: i) Location of habitat; ii) Amount of habitat; and iii) Type of habitat.

i) Location: Where critical habitat is found.



Figure J-13. Key map of the general location of the range.

Figure J-14. The geographic boundary within which critical habitat is located.

ii) Amount: Quantity of critical habitat.

Total Range Area (ha)	Disturbed Habitat (%)			Total Undisturbed Habitat (%)	Amount of Critical Habitat
	Fire	Anthropogenic	Total		
3,162,612	8	74	76	24	Existing habitat that would contribute to at least 65% undisturbed over time.

iii) Type: Biophysical attributes of critical habitat.

Ecozone(s) ¹ :	Taiga Plain
	Boreal Plain

¹ See Appendix H

Critical Habitat Identification: Bistcho Range (AB2)

The identification of critical habitat for boreal caribou is described by three components for each range: i) Location of habitat; ii) Amount of habitat; and iii) Type of habitat.

i) Location: Where critical habitat is found.

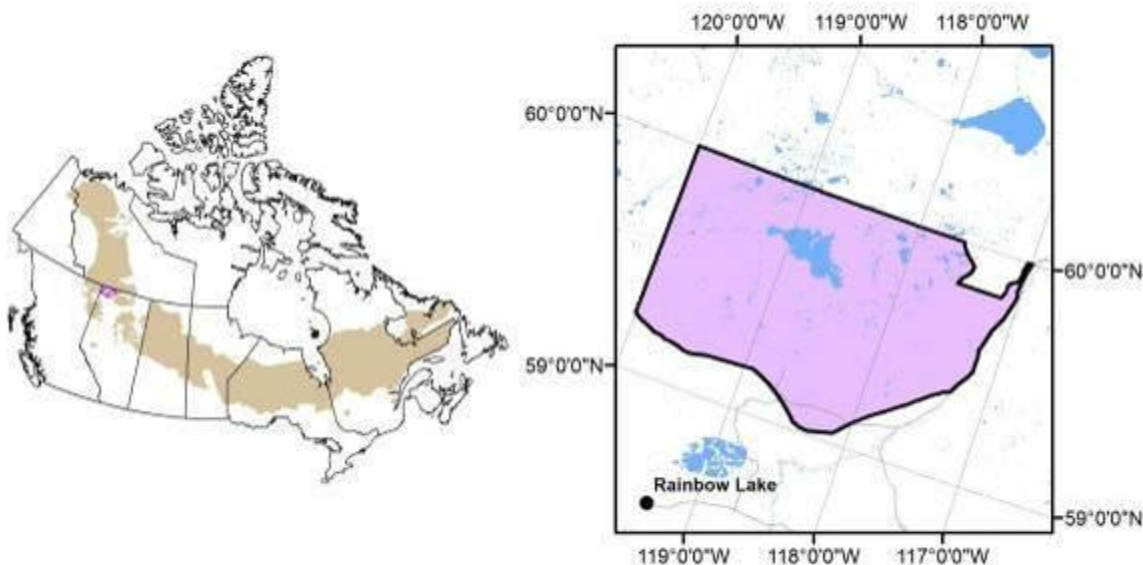


Figure J-15. Key map of the general location of the range.

Figure J-16. The geographic boundary within which critical habitat is located.

ii) Amount: Quantity of critical habitat.

Total Range Area (ha)	Disturbed Habitat (%)			Total Undisturbed Habitat (%)	Amount of Critical Habitat
	Fire	Anthropogenic	Total		
1,436,555	20	61	71	29	Existing habitat that would contribute to at least 65% undisturbed over time.

iii) Type: Biophysical attributes of critical habitat.

Ecozone(s) ¹ :	Taiga Plain
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¹ See Appendix H

Critical Habitat Identification: Yates Range (AB3)

The identification of critical habitat for boreal caribou is described by three components for each range: i) Location of habitat; ii) Amount of habitat; and iii) Type of habitat.

i) Location: Where critical habitat is found.



Figure J-17. Key map of the general location of the range.

Figure J-18. The geographic boundary within which critical habitat is located.

ii) Amount: Quantity of critical habitat.

Total Range Area (ha)	Disturbed Habitat (%)			Total Undisturbed Habitat (%)	Amount of Critical Habitat
	Fire	Anthropogenic	Total		
523,094	43	21	61	39	Existing habitat that would contribute to at least 65% undisturbed over time.

iii) Type: Biophysical attributes of critical habitat.

Ecozone(s) ¹ :	Taiga Plain
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¹ See Appendix H

Critical Habitat Identification: Caribou Mountains Range (AB4)

The identification of critical habitat for boreal caribou is described by three components for each range: i) Location of habitat; ii) Amount of habitat; and iii) Type of habitat.

i) Location: Where critical habitat is found.



Figure J-19. Key map of the general location of the range.

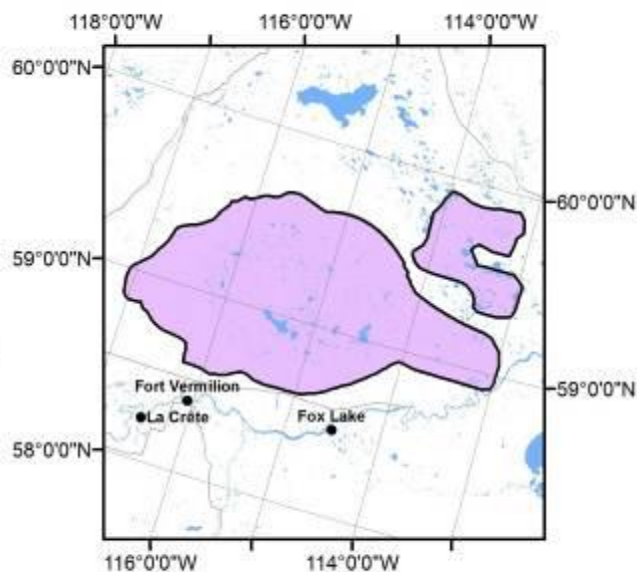


Figure J-20. The geographic boundary within which critical habitat is located.

ii) Amount: Quantity of critical habitat.

Total Range Area (ha)	Disturbed Habitat (%)			Total Undisturbed Habitat (%)	Amount of Critical Habitat
	Fire	Anthropogenic	Total		
2,069,000	44	23	57	43	Existing habitat that would contribute to at least 65% undisturbed over time.

iii) Type: Biophysical attributes of critical habitat.

Ecozone(s) ¹ :	Taiga Plain
	Boreal Plain

¹ See Appendix H

Critical Habitat Identification: Little Smoky Range (AB5)

The identification of critical habitat for boreal caribou is described by three components for each range: i) Location of habitat; ii) Amount of habitat; and iii) Type of habitat.

i) Location: Where critical habitat is found.

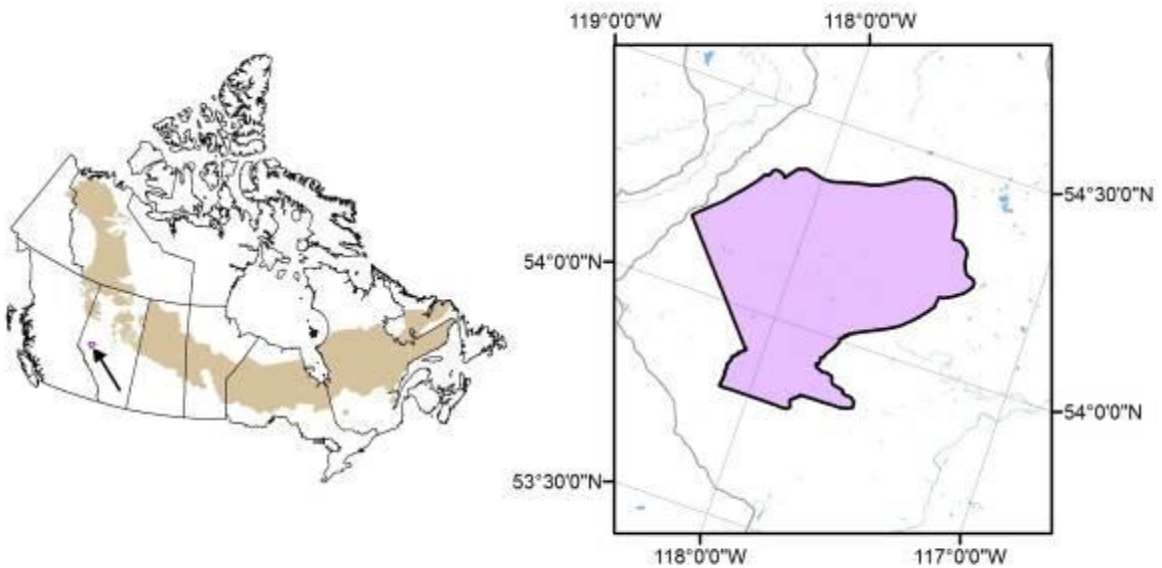


Figure J-21. Key map of the general location of the range.

Figure J-22. The geographic boundary within which critical habitat is located.

ii) Amount: Quantity of critical habitat.

Total Range Area (ha)	Disturbed Habitat (%)			Total Undisturbed Habitat (%)	Amount of Critical Habitat
	Fire	Anthropogenic	Total		
308,606	0.2	95	95	5	Existing habitat that would contribute to at least 65% undisturbed over time.

iii) Type: Biophysical attributes of critical habitat.

Ecozone(s) ¹ :	Montane Cordillera
	Boreal Plain

¹ See Appendix H

Critical Habitat Identification: Red Earth Range (AB6)

The identification of critical habitat for boreal caribou is described by three components for each range: i) Location of habitat; ii) Amount of habitat; and iii) Type of habitat.

i) Location: Where critical habitat is found.



Figure J-23. Key map of the general location of the range.



Figure J-24. The geographic boundary within which critical habitat is located.

ii) Amount: Quantity of critical habitat.

Total Range Area (ha)	Disturbed Habitat (%)			Total Undisturbed Habitat (%)	Amount of Critical Habitat
	Fire	Anthropogenic	Total		
2,473,729	30	44	62	38	Existing habitat that would contribute to at least 65% undisturbed over time.

iii) Type: Biophysical attributes of critical habitat.

Ecozone(s) ¹ :	Boreal Plain
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¹ See Appendix H

Critical Habitat Identification: West Side Athabasca River Range (AB7)

The identification of critical habitat for boreal caribou is described by three components for each range: i) Location of habitat; ii) Amount of habitat; and iii) Type of habitat.

i) Location: Where critical habitat is found.



Figure J-25. Key map of the general location of the range.

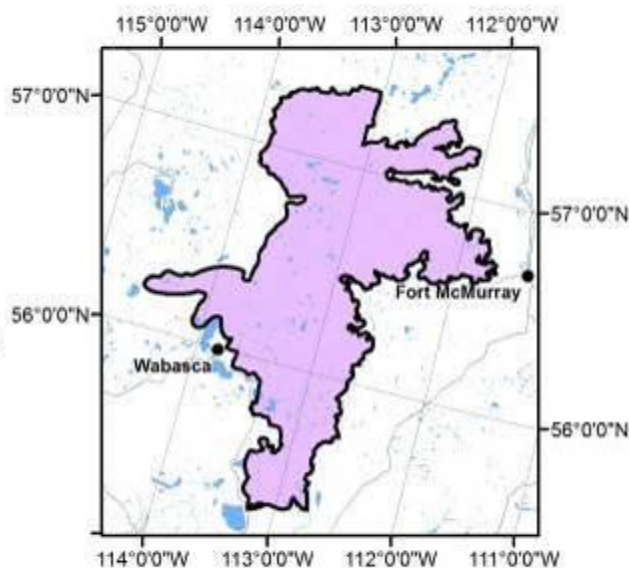


Figure J-26. The geographic boundary within which critical habitat is located.

ii) Amount: Quantity of critical habitat.

Total Range Area (ha)	Disturbed Habitat (%)			Total Undisturbed Habitat (%)	Amount of Critical Habitat
	Fire	Anthropogenic	Total		
1,572,652	4	68	69	31	Existing habitat that would contribute to at least 65% undisturbed over time.

iii) Type: Biophysical attributes of critical habitat.

Ecozone(s) ¹ :	Boreal Plain
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¹ See Appendix H

Critical Habitat Identification: Richardson Range (AB8)

The identification of critical habitat for boreal caribou is described by three components for each range: i) Location of habitat; ii) Amount of habitat; and iii) Type of habitat.

i) Location: Where critical habitat is found.

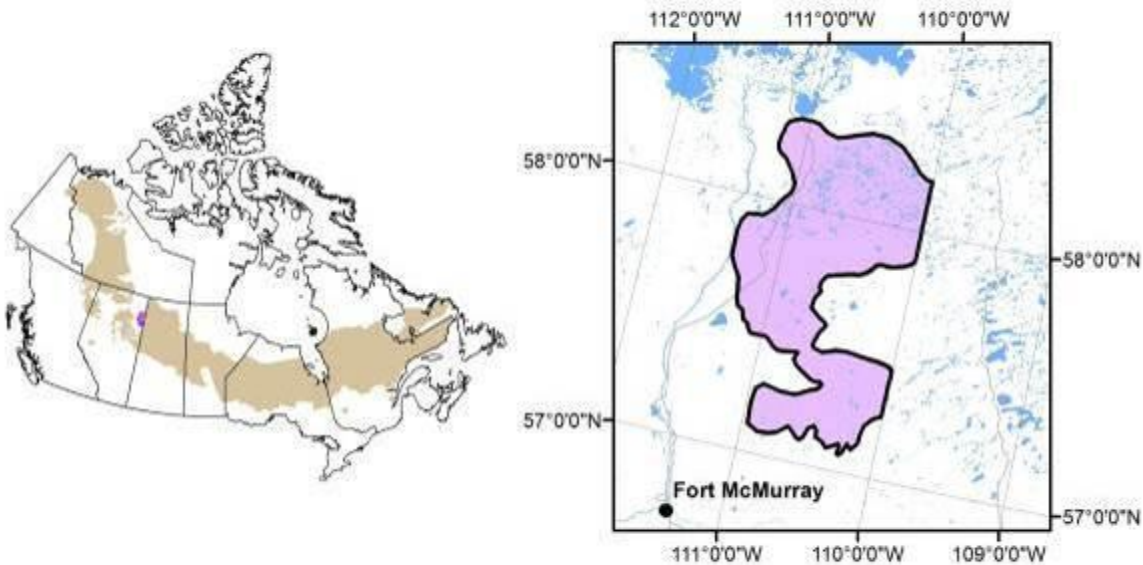


Figure J-27. Key map of the general location of the range.

Figure J-28. The geographic boundary within which critical habitat is located.

ii) Amount: Quantity of critical habitat.

Total Range Area (ha)	Disturbed Habitat (%)			Total Undisturbed Habitat (%)	Amount of Critical Habitat
	Fire	Anthropogenic	Total		
707,350	67	22	82	18	Existing habitat that would contribute to at least 65% undisturbed over time.

iii) Type: Biophysical attributes of critical habitat.

Ecozone(s)¹:	Boreal Shield
	Boreal Plain
Ecoregion(s)¹:	Boreal Shield (West)

¹ See Appendix H

Critical Habitat Identification: East Side Athabasca River Range (AB9)

The identification of critical habitat for boreal caribou is described by three components for each range: i) Location of habitat; ii) Amount of habitat; and iii) Type of habitat.

i) Location: Where critical habitat is found.

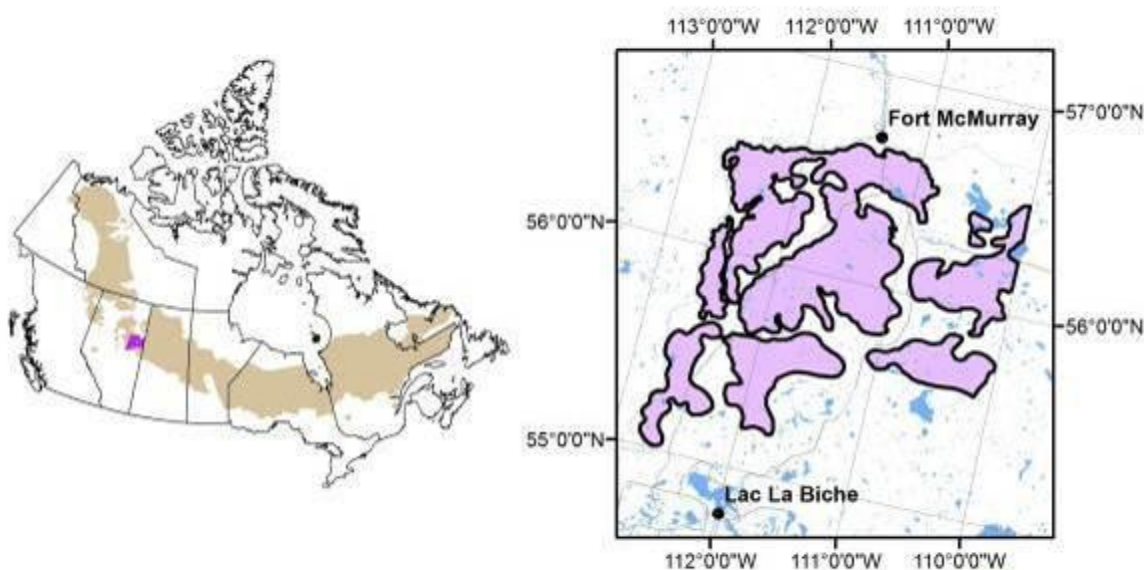


Figure J-29. Key map of the general location of the range.

Figure J-30. The geographic boundary within which critical habitat is located.

ii) Amount: Quantity of critical habitat.

Total Range Area (ha)	Disturbed Habitat (%)			Total Undisturbed Habitat (%)	Amount of Critical Habitat
	Fire	Anthropogenic	Total		
1,315,980	26	77	81	19	Existing habitat that would contribute to at least 65% undisturbed over time.

iii) Type: Biophysical attributes of critical habitat.

Ecozone(s) ¹ :	Boreal Plain
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¹ See Appendix H

Critical Habitat Identification: Cold Lake Range (AB10)

The identification of critical habitat for boreal caribou is described by three components for each range: i) Location of habitat; ii) Amount of habitat; and iii) Type of habitat.

i) Location: Where critical habitat is found.

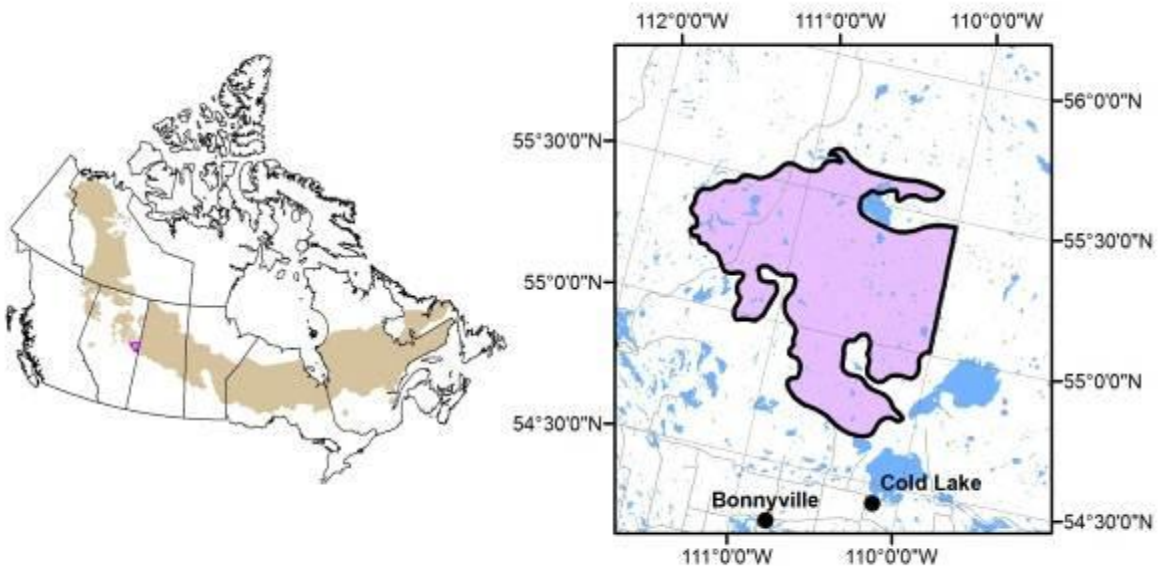


Figure J-31. Key map of the general location of the range.

Figure J-32. The geographic boundary within which critical habitat is located.

ii) Amount: Quantity of critical habitat.

Total Range Area (ha)	Disturbed Habitat (%)			Total Undisturbed Habitat (%)	Amount of Critical Habitat
	Fire	Anthropogenic	Total		
672,422	32	72	85	15	Existing habitat that would contribute to at least 65% undisturbed over time.

iii) Type: Biophysical attributes of critical habitat.

Ecozone(s) ¹ :	Boreal Plain
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¹ See Appendix H

Critical Habitat Identification: Nipisi Range (AB11)

The identification of critical habitat for boreal caribou is described by three components for each range: i) Location of habitat; ii) Amount of habitat; and iii) Type of habitat.

i) Location: Where critical habitat is found.

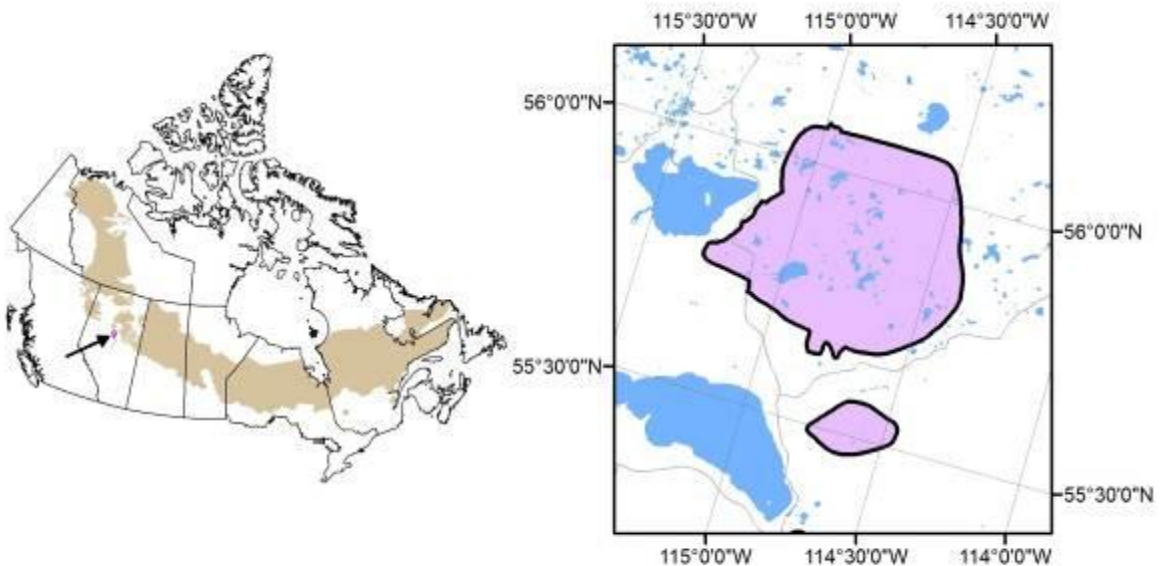


Figure J-33. Key map of the general location of the range.

Figure J-34. The geographic boundary within which critical habitat is located.

ii) Amount: Quantity of critical habitat.

Total Range Area (ha)	Disturbed Habitat (%)			Total Undisturbed Habitat (%)	Amount of Critical Habitat
	Fire	Anthropogenic	Total		
210,771	6	66	68	32	Existing habitat that would contribute to at least 65% undisturbed over time.

iii) Type: Biophysical attributes of critical habitat.

Ecozone(s) ¹ :	Boreal Plain
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¹ See Appendix H

Critical Habitat Identification: Slave Lake Range (AB12)

The identification of critical habitat for boreal caribou is described by three components for each range: i) Location of habitat; ii) Amount of habitat; and iii) Type of habitat.

i) Location: Where critical habitat is found.

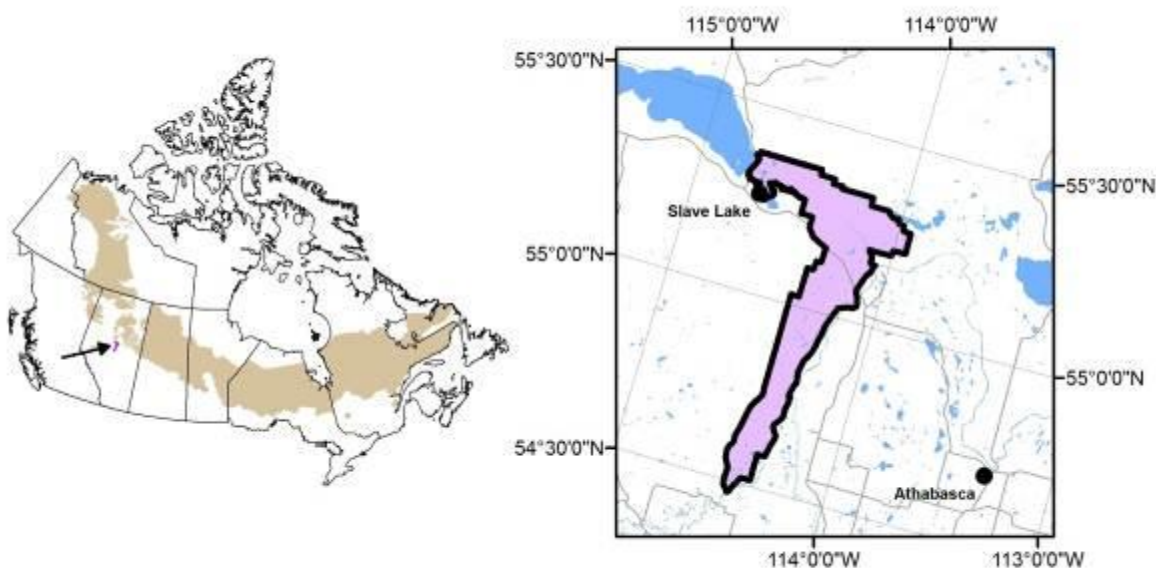


Figure J-35. Key map of the general location of the range.

Figure J-36. The geographic boundary within which critical habitat is located.

ii) Amount: Quantity of critical habitat.

Total Range Area (ha)	Disturbed Habitat (%)			Total Undisturbed Habitat (%)	Amount of Critical Habitat
	Fire	Anthropogenic	Total		
151,904	37	63	80	20	Existing habitat that would contribute to at least 65% undisturbed over time.

iii) Type: Biophysical attributes of critical habitat.

Ecozone(s)¹:	Boreal Plain
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¹ See Appendix H

CRITICAL HABITAT FACTSHEETS: SASKATCHEWAN

Critical Habitat Identification: Boreal Shield Range (SK1)

A schedule of studies is required under SARA where available information is inadequate to identify critical habitat. The schedule of studies outlines the essential studies required to identify the critical habitat necessary to meet the population and distribution objectives for boreal caribou set in this recovery strategy.

There is evidence suggesting that fire does cause stress on boreal caribou populations when the proportion of the range disturbed by fire is high and precaution around the additional effects of anthropogenic disturbance in boreal caribou ranges with high fire is necessary. However, additional population trend data is required to understand the relationship between disturbance and boreal caribou survival in ranges with high fire and very low anthropogenic disturbance. This disturbance relationship occurs in northern Saskatchewan's Boreal Shield range (SK1).

The following schedule of studies is required to complete the identification of critical habitat in the Boreal Shield Range in northern Saskatchewan.

Table J-1: Schedule of studies required to complete the identification of critical habitat in the Boreal Shield range (SK1) in northern Saskatchewan

Description of Activity	Rationale	Timeline
Collect population information (size, trend, etc.) for a minimum of 2 years in SK1 where population condition is unknown.	The effect of a high fire and very low anthropogenic disturbance habitat condition on the SK1 local population is unknown. These activities will provide the necessary information to identify critical habitat.	Population data collected and critical habitat identified for SK1 by end of 2016.
Update disturbance model in Environment Canada's Scientific Assessment (2011b) by including population information for SK1 to incorporate situations of high fire and very low anthropogenic disturbance.		
Identification of critical habitat in SK1.		

Critical Habitat Identification: Boreal Plain Range (SK2)

The identification of critical habitat for boreal caribou is described by three components for each range: i) Location of habitat; ii) Amount of habitat; and iii) Type of habitat.

i) Location: Where critical habitat is found.



Figure J-37. Key map of the general location of the range.

Figure J-38. The geographic boundary within which critical habitat is located.

ii) Amount: Quantity of critical habitat.

Total Range Area (ha)	Disturbed Habitat (%)			Total Undisturbed Habitat (%)	Amount of Critical Habitat
	Fire	Anthropogenic	Total		
10,592,463	26	20	42	58	Existing habitat that would contribute to at least 65% undisturbed over time.

iii) Type: Biophysical attributes of critical habitat.

Ecozone(s) ¹ :	Boreal Plain
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¹ See Appendix H

CRITICAL HABITAT FACTSHEETS: MANITOBA

Critical Habitat Identification: The Bog Range (MB1)

The identification of critical habitat for boreal caribou is described by three components for each range: i) Location of habitat; ii) Amount of habitat; and iii) Type of habitat.

i) Location: Where critical habitat is found.

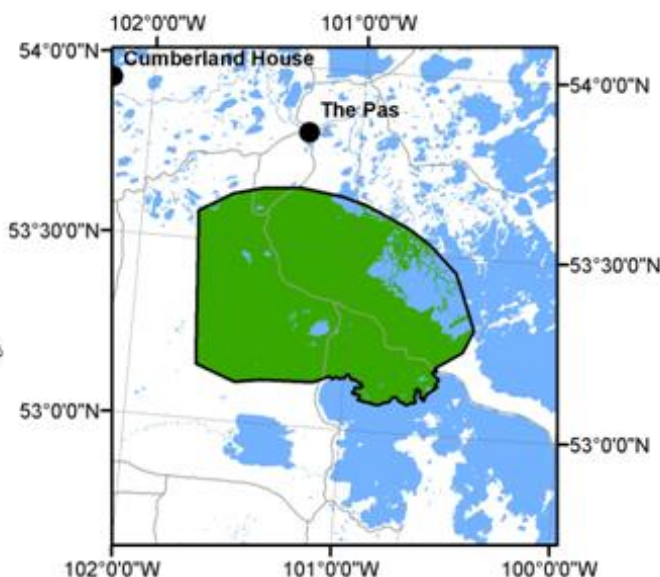


Figure J-39. Key map of the general location of the range.

Figure J-40. The geographic boundary within which critical habitat is located.

ii) Amount: Quantity of critical habitat.

Total Range Area (ha)	Disturbed Habitat (%)			Total Undisturbed Habitat (%)	Amount of Critical Habitat
	Fire	Anthropogenic	Total		
446,383	4	12	16	84	At least 65% undisturbed habitat

iii) Type: Biophysical attributes of critical habitat.

Ecozone(s) ¹ :	Boreal Plain
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¹ See Appendix H

Critical Habitat Identification: Kississing Range (MB2)

The identification of critical habitat for boreal caribou is described by three components for each range: i) Location of habitat; ii) Amount of habitat; and iii) Type of habitat.

i) Location: Where critical habitat is found.

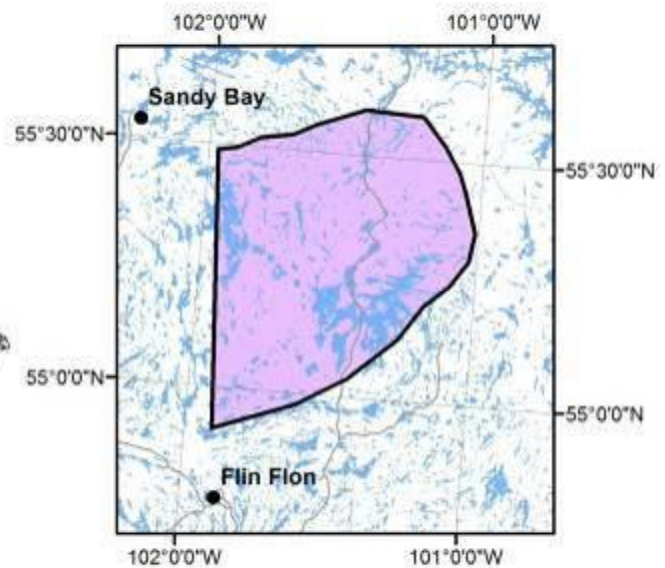


Figure J-41. Key map of the general location of the range.

Figure J-42. The geographic boundary within which critical habitat is located.

ii) Amount: Quantity of critical habitat.

Total Range Area (ha)	Disturbed Habitat (%)			Total Undisturbed Habitat (%)	Amount of Critical Habitat
	Fire	Anthropogenic	Total		
317,029	39	13	51	49	Existing habitat that would contribute to at least 65% undisturbed over time.

iii) Type: Biophysical attributes of critical habitat.

Ecozone(s)¹:	Boreal Shield
Ecoregion(s)¹:	Boreal Shield (West)

¹ See Appendix H

Critical Habitat Identification: Naosap Range (MB3)

The identification of critical habitat for boreal caribou is described by three components for each range: i) Location of habitat; ii) Amount of habitat; and iii) Type of habitat.

i) Location: Where critical habitat is found.

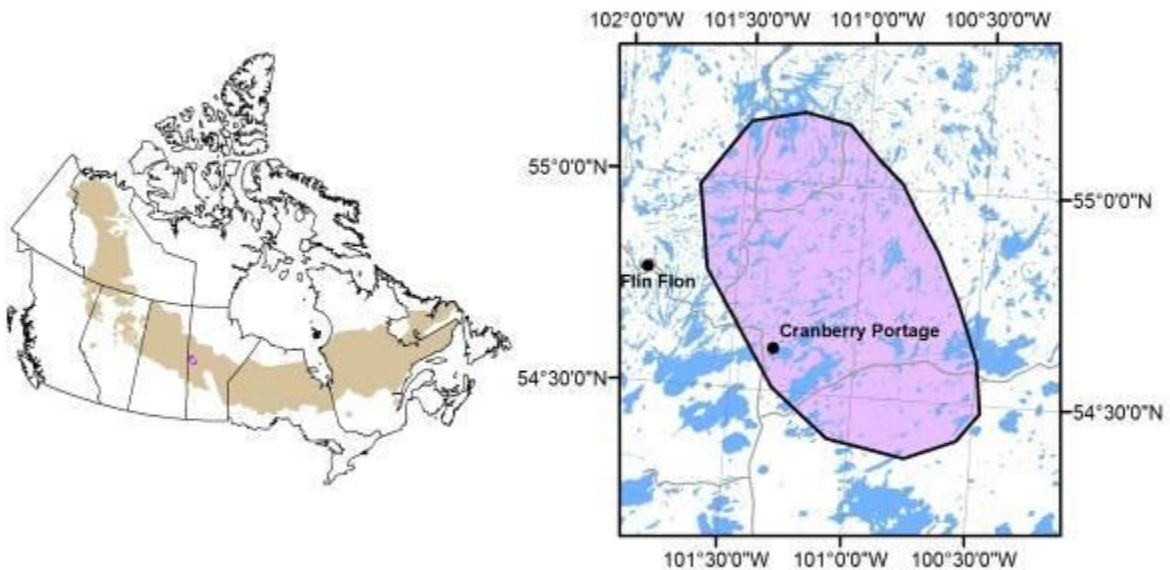


Figure J-43. Key map of the general location of the range.

Figure J-44. The geographic boundary within which critical habitat is located

ii) Amount: Quantity of critical habitat.

Total Range Area (ha)	Disturbed Habitat (%)			Total Undisturbed Habitat (%)	Amount of Critical Habitat
	Fire	Anthropogenic	Total		
456,977	28	26	50	50	Existing habitat that would contribute to at least 65% undisturbed over time.

iii) Type: Biophysical attributes of critical habitat.

Ecozone(s)¹:	Boreal Shield
	Boreal Plain
Ecoregion(s)¹:	Boreal Shield (West)

¹ See Appendix H

Critical Habitat Identification: Reed Range (MB4)

The identification of critical habitat for boreal caribou is described by three components for each range: i) Location of habitat; ii) Amount of habitat; and iii) Type of habitat.

i) Location: Where critical habitat is found.



Figure J-45. Key map of the general location of the range.

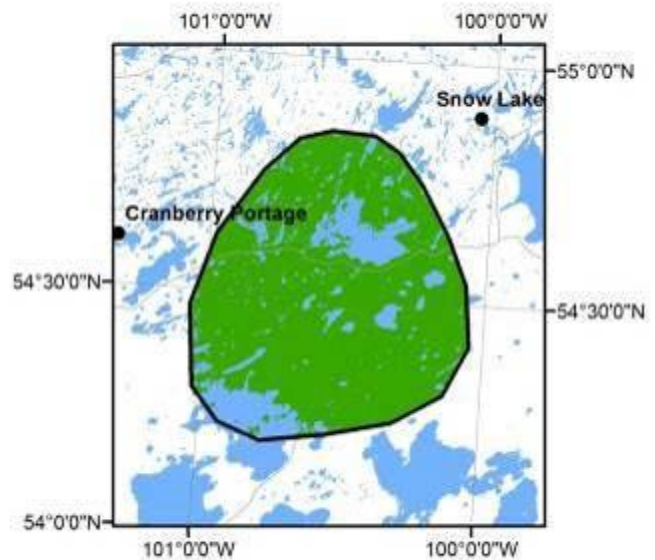


Figure J-46. The geographic boundary within which critical habitat is located.

ii) Amount: Quantity of critical habitat.

Total Range Area (ha)	Disturbed Habitat (%)			Total Undisturbed Habitat (%)	Amount of Critical Habitat
	Fire	Anthropogenic	Total		
357, 425	7	20	26	74	At least 65% undisturbed habitat

iii) Type: Biophysical attributes of critical habitat.

Ecozone(s)¹:	Boreal Shield
	Boreal Plain
Ecoregion(s)¹:	Boreal Shield (West)

¹ See Appendix H

Critical Habitat Identification: North Interlake Range (MB5)

The identification of critical habitat for boreal caribou is described by three components for each range: i) Location of habitat; ii) Amount of habitat; and iii) Type of habitat.

i) Location: Where critical habitat is found.



Figure J-47. Key map of the general location of the range.

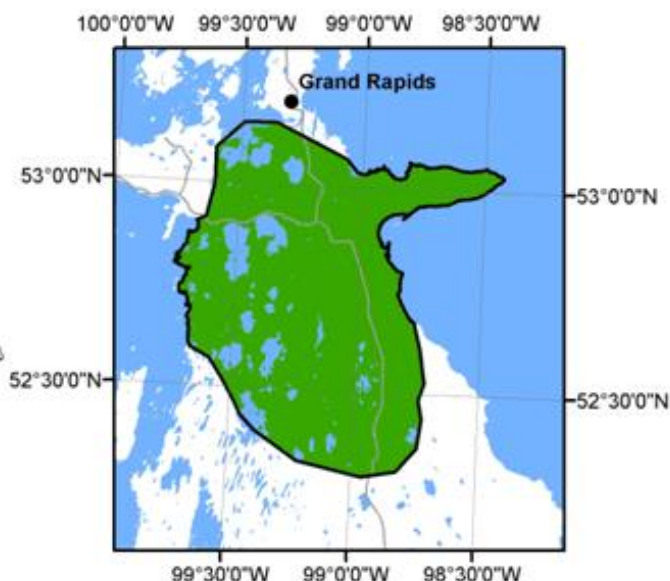


Figure J-48. The geographic boundary within which critical habitat is located.

ii) Amount: Quantity of critical habitat.

Total Range Area (ha)	Disturbed Habitat (%)			Total Undisturbed Habitat (%)	Critical Habitat Undisturbed
	Fire	Anthropogenic	Total		
489,680	4	14	17	83	At least 65% undisturbed habitat

iii) Type: Biophysical attributes of critical habitat.

Ecozone(s) ¹ :	Boreal Plain
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¹ See Appendix H

Critical Habitat Identification: William Lake Range (MB6)

The identification of critical habitat for boreal caribou is described by three components for each range: i) Location of habitat; ii) Amount of habitat; and iii) Type of habitat.

i) Location: Where critical habitat is found.



Figure J-49. Key map of the general location of the range.

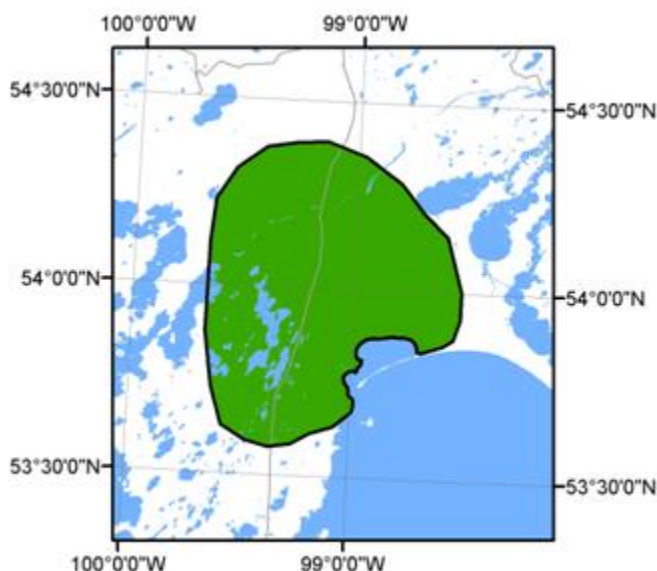


Figure J-50. The geographic boundary within which critical habitat is located.

ii) Amount: Quantity of critical habitat.

Total Range Area (ha)	Disturbed Habitat (%)			Total Undisturbed Habitat (%)	Amount of Critical Habitat
	Fire	Anthropogenic	Total		
488,219	24	10	31	69	At least 65% undisturbed habitat

iii) Type: Biophysical attributes of critical habitat.

Ecozone(s) ¹ :	Boreal Plain
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¹ See Appendix H

Critical Habitat Identification: Wabowden Range (MB7)

The identification of critical habitat for boreal caribou is described by three components for each range: i) Location of habitat; ii) Amount of habitat; and iii) Type of habitat.

i) Location: Where critical habitat is found.

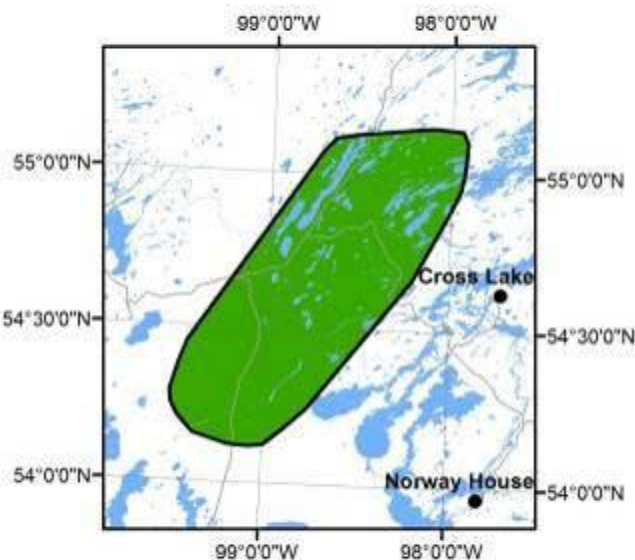


Figure J-51. Key map of the general location of the range.

Figure J-52. The geographic boundary within which critical habitat is located.

ii) Amount: Quantity of critical habitat.

Total Range Area (ha)	Disturbed Habitat (%)			Total Undisturbed Habitat (%)	Amount of Critical Habitat
	Fire	Anthropogenic	Total		
628,938	10	19	28	72	At least 65% undisturbed habitat

iii) Type: Biophysical attributes of critical habitat.

Ecozones(s)¹:	Boreal Shield
	Boreal Plain
Ecoregion(s)¹:	Boreal Shield (West)

¹ See Appendix H

Critical Habitat Identification: Wapisu Range (MB8)

The identification of critical habitat for boreal caribou is described by three components for each range: i) Location of habitat; ii) Amount of habitat; and iii) Type of habitat.

i) Location: Where critical habitat is found.

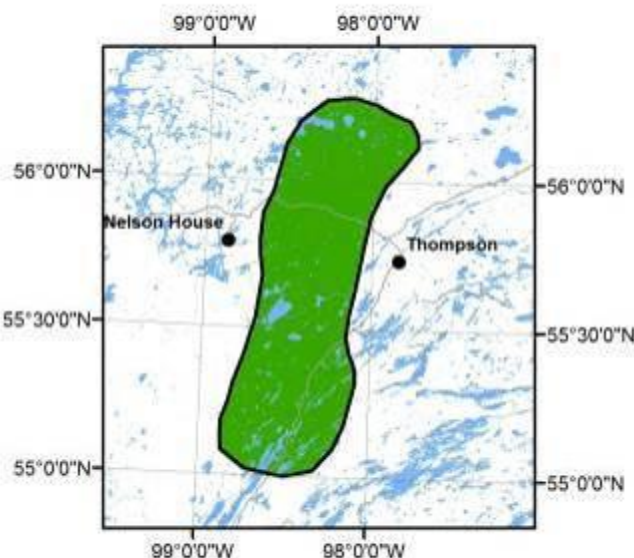


Figure J-53. Key map of the general location of the range.

Figure J-54. The geographic boundary within which critical habitat is located.

ii) Amount: Quantity of critical habitat.

Total Range Area (ha)	Disturbed Habitat (%)			Total Undisturbed Habitat (%)	Amount of Critical Habitat
	Fire	Anthropogenic	Total		
565,044	10	14	24	76	At least 65% undisturbed habitat

iii) Type: Biophysical attributes of critical habitat.

Ecozone(s)¹:	Boreal Shield
Ecoregion(s)¹:	Boreal Shield (West)

¹ See Appendix H

Critical Habitat Identification: Manitoba North Range (MB9)

The identification of critical habitat for boreal caribou is described by three components for each range: i) Location of habitat; ii) Amount of habitat; and iii) Type of habitat.

i) Location: Where critical habitat is found.

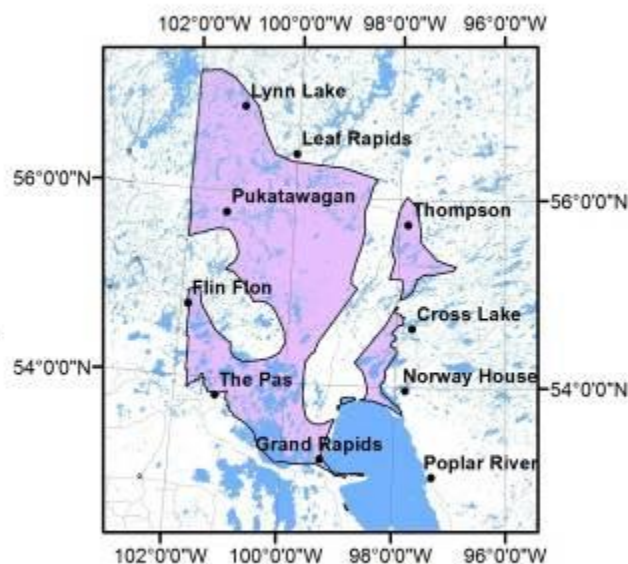


Figure J-55. Key map of the general location of the range.

Figure J-56. The geographic boundary within which critical habitat is located.

ii) Amount: Quantity of critical habitat.

Total Range Area (ha)	Disturbed Habitat (%)			Total Undisturbed Habitat (%)	Amount of Critical Habitat
	Fire	Anthropogenic	Total		
6,205,520	23	16	37	63	Existing habitat that would contribute to at least 65% undisturbed over time.

iii) Type: Biophysical attributes of critical habitat.

Ecozone(s)¹:	Boreal Shield
	Boreal Plain
Ecoregion(s)¹:	Boreal Shield (West)

¹ See Appendix H

Critical Habitat Identification: Manitoba South Range (MB10)¹

The identification of critical habitat for boreal caribou is described by three components for each range: i) Location of habitat; ii) Amount of habitat; and iii) Type of habitat.

i) Location: Where critical habitat is found.



Figure J-57. Key map of the general location of the range.

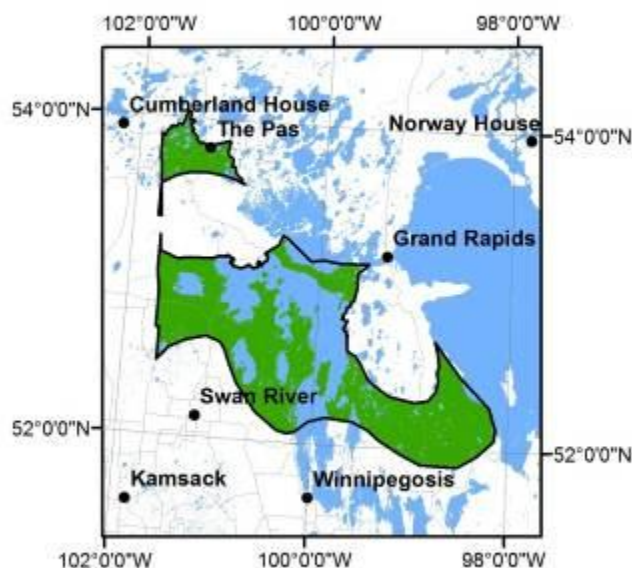


Figure J-58. The geographic boundary within which critical habitat is located.

ii) Amount: Quantity of critical habitat.

Total Range Area (ha)	Disturbed Habitat (%)			Total Undisturbed Habitat (%)	Amount of Critical Habitat
	Fire	Anthropogenic	Total		
1,867,255	4	13	17	83	At least 65% undisturbed habitat

iii) Type: Biophysical attributes of critical habitat.

Ecozone(s) ² :	Boreal Plain
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¹ The Government of Manitoba is in the process of updating their range boundaries. This will result in an update to current range delineations, as well as a revision of their self-sustainability status following integrated risk assessment of any new range boundaries.

² See Appendix H

Critical Habitat Identification: Manitoba East Range (MB11)

The identification of critical habitat for boreal caribou is described by three components for each range: i) Location of habitat; ii) Amount of habitat; and iii) Type of habitat.

i) Location: Where critical habitat is found.



Figure J-59. Key map of the general location of the range.



Figure J-60. The geographic boundary within which critical habitat is located.

ii) Amount: Quantity of critical habitat.

Total Range Area (ha)	Disturbed Habitat (%)			Total Undisturbed Habitat (%)	Amount of Critical Habitat
	Fire	Anthropogenic	Total		
6,612,782	26	3	29	71	At least 65% undisturbed habitat

iii) Type: Biophysical attributes of critical habitat.

Ecozone(s)¹:	Boreal Shield
Ecoregion(s)¹:	Boreal Shield (West)
	Boreal Shield (West Central)

¹ See Appendix H

Critical Habitat Identification: Atikaki-Berens Range (MB12)

The identification of critical habitat for boreal caribou is described by three components for each range: i) Location of habitat; ii) Amount of habitat; and iii) Type of habitat.

i) Location: Where critical habitat is found.

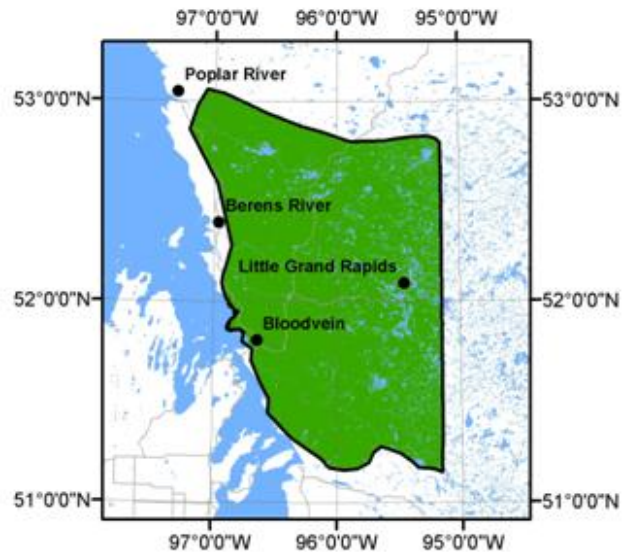


Figure J-61. Key map of the general location of the range.

Figure J-62. The geographic boundary within which critical habitat is located.

ii) Amount: Quantity of critical habitat.

Total Range Area (ha)	Disturbed Habitat (%)			Total Undisturbed Habitat (%)	Amount of Critical Habitat
	Fire	Anthropogenic	Total		
2,387,665	31	6	35	65	At least 65% undisturbed habitat

iii) Type: Biophysical attributes of critical habitat.

Ecozone(s) ¹ :	Boreal Shield
Ecoregion(s) ¹ :	Boreal Shield (West Central)

¹ See Appendix H

Critical Habitat Identification: Owl-Flinstone Range (MB13)

The identification of critical habitat for boreal caribou is described by three components for each range: i) Location of habitat; ii) Amount of habitat; and iii) Type of habitat.

i) Location: Where critical habitat is found.



Figure J-63. Key map of the general location of the range.



Figure J-64. The geographic boundary within which critical habitat is located.

ii) Amount: Quantity of critical habitat.

Total Range Area (ha)	Disturbed Habitat (%)			Total Undisturbed Habitat (%)	Amount of Critical Habitat
	Fire	Anthropogenic	Total		
363,570	25	18	39	61	Existing habitat that would contribute to at least 65% undisturbed over time.

iii) Type: Biophysical attributes of critical habitat.

Ecozone(s)¹:	Boreal Shield
Ecoregion(s)¹:	Boreal Shield (West Central)

¹ See Appendix H

CRITICAL HABITAT FACTSHEETS: ONTARIO

Critical Habitat Identification: Sydney Range (ON1)

The identification of critical habitat for boreal caribou is described by three components for each range: i) Location of habitat; ii) Amount of habitat; and iii) Type of habitat.

i) Location: Where critical habitat is found.

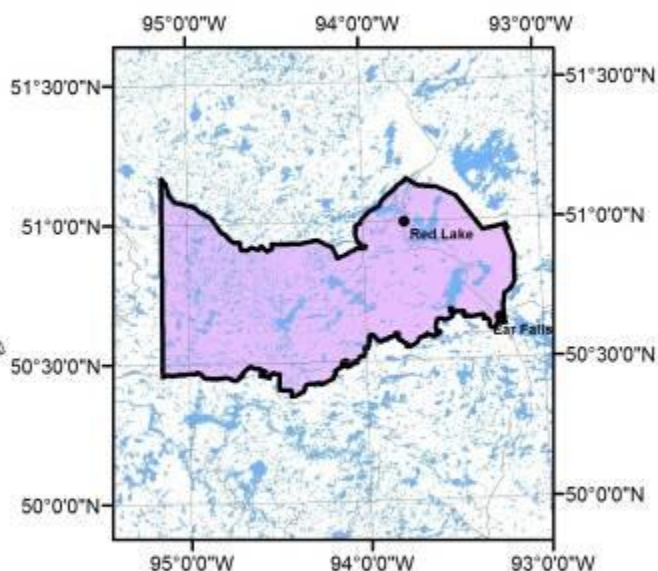


Figure J-65. Key map of the general location of the range.

Figure J-66. The geographic boundary within which critical habitat is located.

ii) Amount: Quantity of critical habitat.

Total Range Area (ha)	Disturbed Habitat (%)			Total Undisturbed Habitat (%)	Amount of Critical Habitat
	Fire	Anthropogenic	Total		
753,001	28	33	58	42	Existing habitat that would contribute to at least 65% undisturbed over time.

iii) Type: Biophysical attributes of critical habitat.

Ecozone(s)¹:	Boreal Shield
Ecoregion(s)¹:	Boreal Shield (West Central)

¹ See Appendix H

Critical Habitat Identification: Berens Range (ON2)

The identification of critical habitat for boreal caribou is described by three components for each range: i) Location of habitat; ii) Amount of habitat; and iii) Type of habitat.

i) Location: Where critical habitat is found.



Figure J-67. Key map of the general location of the range.

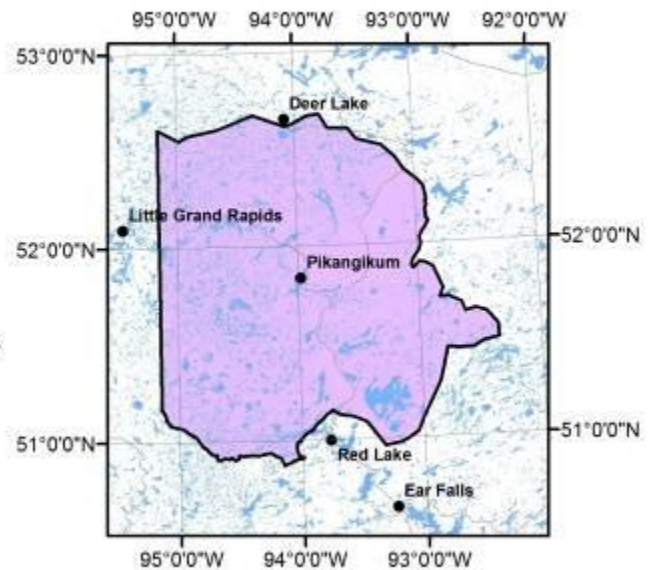


Figure J-68. The geographic boundary within which critical habitat is located.

ii) Amount: Quantity of critical habitat.

Total Range Area (ha)	Disturbed Habitat (%)			Total Undisturbed Habitat (%)	Amount of Critical Habitat
	Fire	Anthropogenic	Total		
2,794,835	34	7	39	61	Existing habitat that would contribute to at least 65% undisturbed over time.

iii) Type: Biophysical attributes of critical habitat.

Ecozone(s)¹:	Boreal Shield
Ecoregion(s)¹:	Boreal Shield (West Central)

¹ See Appendix H

Critical Habitat Identification: Churchill Range (ON3)

The identification of critical habitat for boreal caribou is described by three components for each range: i) Location of habitat; ii) Amount of habitat; and iii) Type of habitat.

i) Location: Where critical habitat is found.

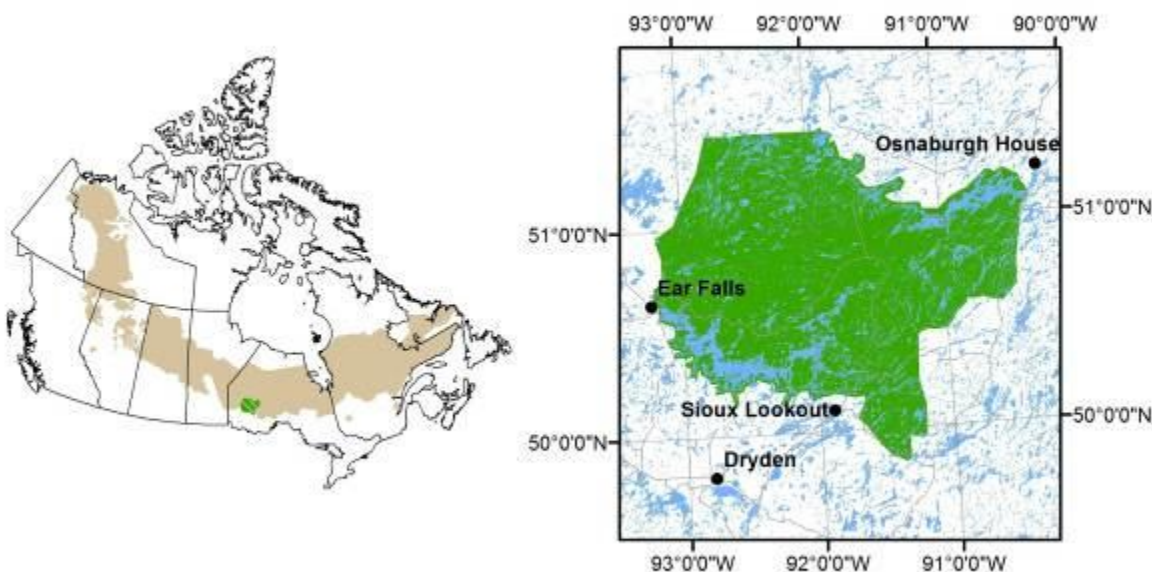


Figure J-69. Key map of the general location of the range.

Figure J-70. The geographic boundary within which critical habitat is located.

ii) Amount: Quantity of critical habitat.

Total Range Area (ha)	Disturbed Habitat (%)			Total Undisturbed Habitat (%)	Amount of Critical Habitat
	Fire	Anthropogenic	Total		
2,150,490	6	28	31	69	At least 65% undisturbed habitat

iii) Type: Biophysical attributes of critical habitat.

Ecozone(s)¹:	Boreal Shield
Ecoregion(s)¹:	Boreal Shield (West Central)

¹ See Appendix H

Critical Habitat Identification: Brightsand Range (ON4)

The identification of critical habitat for boreal caribou is described by three components for each range: i) Location of habitat; ii) Amount of habitat; and iii) Type of habitat.

i) Location: Where critical habitat is found.



Figure J-71. Key map of the general location of the range.



Figure J-72. The geographic boundary within which critical habitat is located.

ii) Amount: Quantity of critical habitat.

Total Range Area (ha)	Disturbed Habitat (%)			Total Undisturbed Habitat (%)	Amount of Critical Habitat
	Fire	Anthropogenic	Total		
2,220,921	18	28	42	58	Existing habitat that would contribute to at least 65% undisturbed over time.

iii) Type: Biophysical attributes of critical habitat.

Ecozone(s)¹:	Boreal Shield
Ecoregion(s)¹:	Boreal Shield (West Central)

¹ See Appendix H

Critical Habitat Identification: Nipigon Range (ON5)

The identification of critical habitat for boreal caribou is described by three components for each range: i) Location of habitat; ii) Amount of habitat; and iii) Type of habitat.

i) Location: Where critical habitat is found.

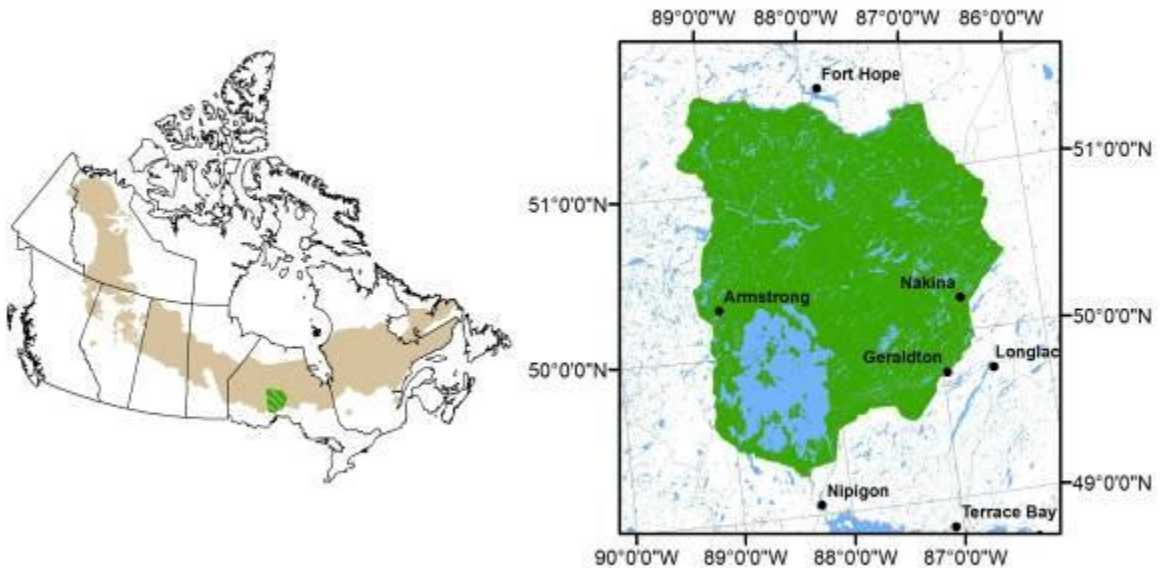


Figure J-73. Key map of the general location of the range.

Figure J-74. The geographic boundary within which critical habitat is located.

ii) Amount: Quantity of critical habitat.

Total Range Area (ha)	Disturbed Habitat (%)			Total Undisturbed Habitat (%)	Amount of Critical Habitat
	Fire	Anthropogenic	Total		
3,885,026	7	25	31	69	At least 65% undisturbed habitat

iii) Type: Biophysical attributes of critical habitat.

Ecozone(s)¹:	Boreal Shield
Ecoregion(s)¹:	Boreal Shield (West)
	Boreal Shield (West Central)

¹ See Appendix H

Critical Habitat Identification: Coastal Range (ON6)

The identification of critical habitat for boreal caribou is described by three components for each range: i) Location of habitat; ii) Amount of habitat; and iii) Type of habitat.

i) Location: Where critical habitat is found.

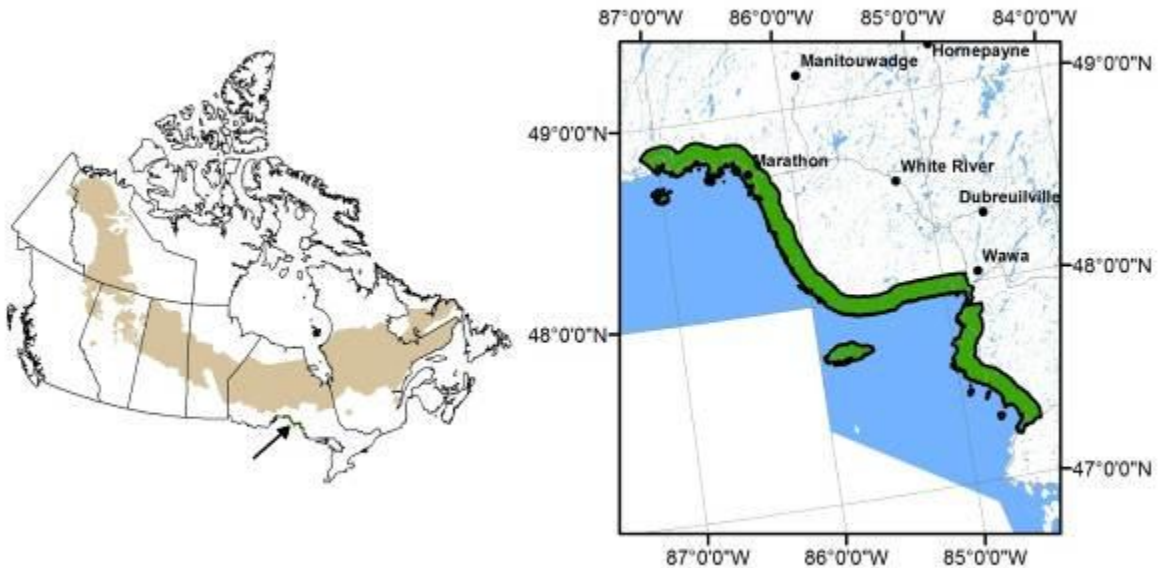


Figure J-75. Key map of the general location of the range.

Figure J-76. The geographic boundary within which critical habitat is located.

ii) Amount: Quantity of critical habitat.

Total Range Area (ha)	Disturbed Habitat (%)			Total Undisturbed Habitat (%)	Amount of Critical Habitat
	Fire	Anthropogenic	Total		
376,598	0	16	16	84	At least 65% undisturbed habitat

iii) Type: Biophysical attributes of critical habitat.

Ecozone(s)¹:	Boreal Shield
Ecoregion(s)¹:	Boreal Shield (Central)

¹ See Appendix H

Critical Habitat Identification: Pagwachuan Range (ON7)

The identification of critical habitat for boreal caribou is described by three components for each range: i) Location of habitat; ii) Amount of habitat; and iii) Type of habitat.

i) Location: Where critical habitat is found.



Figure J-77. Key map of the general location of the range.



Figure J-78. The geographic boundary within which critical habitat is located.

ii) Amount: Quantity of critical habitat.

Total Range Area (ha)	Disturbed Habitat (%)			Total Undisturbed Habitat (%)	Amount of Critical Habitat
	Fire	Anthropogenic	Total		
4,542,918	0.9	26	27	73	At least 65% undisturbed habitat

iii) Type: Biophysical attributes of critical habitat.

Ecozone(s)¹:	Hudson Plain
	Boreal Shield
Ecoregion(s)¹:	Boreal Shield (Central)

¹ See Appendix H

Critical Habitat Identification: Kesagami Range (ON8)

The identification of critical habitat for boreal caribou is described by three components for each range: i) Location of habitat; ii) Amount of habitat; and iii) Type of habitat.

i) Location: Where critical habitat is found.



Figure J-79. Key map of the general location of the range.



Figure J-80. The geographic boundary within which critical habitat is located.

ii) Amount: Quantity of critical habitat.

Total Range Area (ha)	Disturbed Habitat (%)			Total Undisturbed Habitat (%)	Amount of Critical Habitat
	Fire	Anthropogenic	Total		
4,766,463	3	36	38	62	Existing habitat that would contribute to at least 65% undisturbed over time.

iii) Type: Biophysical attributes of critical habitat.

Ecozone(s)¹:	Hudson Plain
	Boreal Shield
Ecoregion(s)¹:	Boreal Shield (Central)

¹ See Appendix H

Critical Habitat Identification: Far North Range (ON9)¹

The identification of critical habitat for boreal caribou is described by three components for each range: i) Location of habitat; ii) Amount of habitat; and iii) Type of habitat.

i) Location: Where critical habitat is found.



Figure J-81. Key map of the general location of the range.

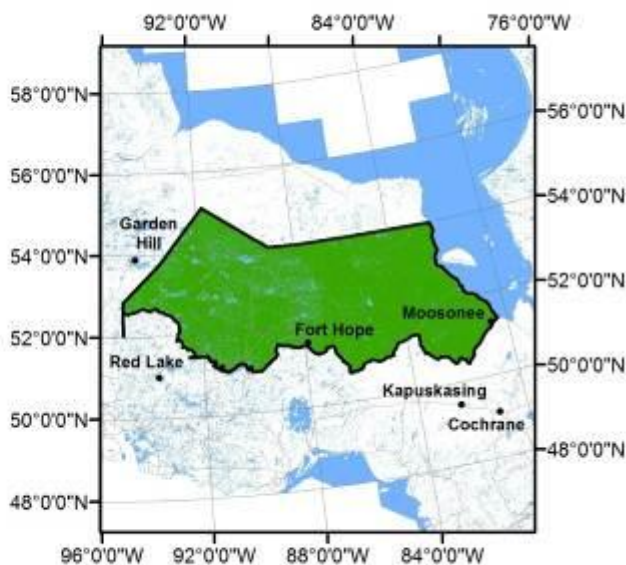


Figure J-82. The geographic boundary within which critical habitat is located.

ii) Amount: Quantity of critical habitat.

Total Range Area (ha)	Disturbed Habitat (%)			Total Undisturbed Habitat (%)	Amount of Critical Habitat
	Fire	Anthropogenic	Total		
28,265,143	14	1	15	85	At least 65% undisturbed habitat

iii) Type: Biophysical attributes of critical habitat.

Ecozone(s) ² :	Hudson Plain
	Boreal Shield
Ecoregion(s) ² :	Boreal Shield (West)
	Boreal Shield (Southeast)
	Boreal Shield (Central)

¹ The range is likely made up of several populations for which the self-sustainability status may vary. New data is currently being collected by the provincial jurisdiction for this range. This may result in an update to the range delineation and/or the identification of new ranges, as well as a revision of their self-sustainability status following integrated risk assessment of new ranges or new range boundaries.

² See Appendix H

CRITICAL HABITAT FACTSHEETS: QUEBEC

Critical Habitat Identification: Val d'Or Range (QC1)

The identification of critical habitat for boreal caribou is described by three components for each range: i) Location of habitat; ii) Amount of habitat; and iii) Type of habitat.

i) Location: Where critical habitat is found.

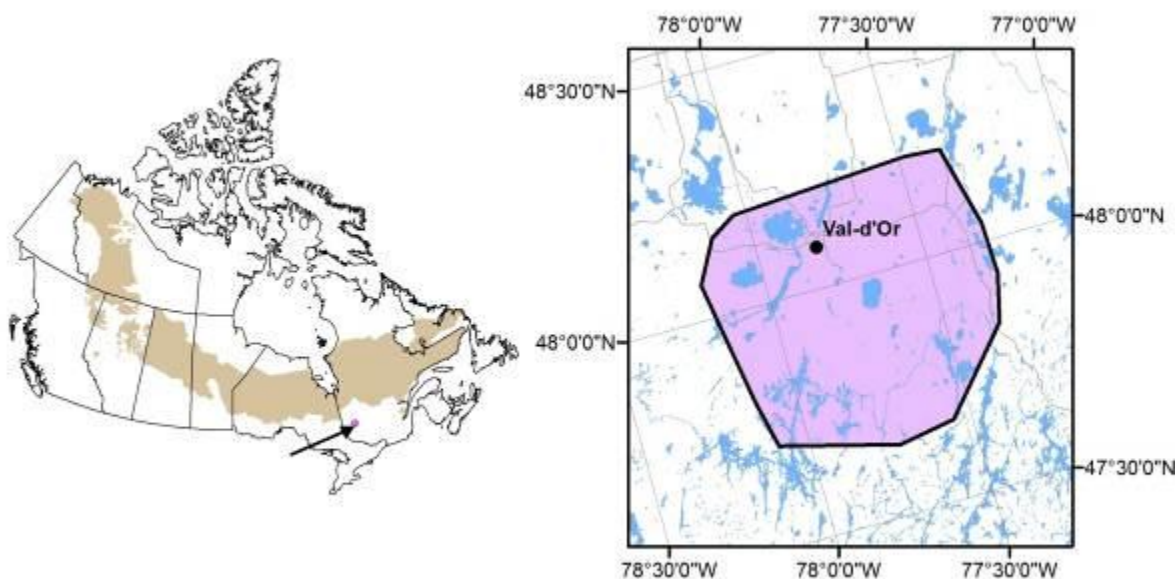


Figure J-83. Key map of the general location of the range.

Figure J-84. The geographic boundary within which critical habitat is located.

ii) Amount: Quantity of critical habitat.

Total Range Area (ha)	Disturbed Habitat (%)			Total Undisturbed Habitat (%)	Amount of Critical Habitat
	Fire	Anthropogenic	Total		
346,861	0.1	60	60	40	Existing habitat that would contribute to at least 65% undisturbed over time.

iii) Type: Biophysical attributes of critical habitat.

Ecozone(s)¹:	Boreal Shield
Ecoregion(s)¹:	Boreal Shield (Southeast)

¹ See Appendix H

Critical Habitat Identification: Charlevoix Range (QC2)

The identification of critical habitat for boreal caribou is described by three components for each range: i) Location of habitat; ii) Amount of habitat; and iii) Type of habitat.

i) Location: Where critical habitat is found.

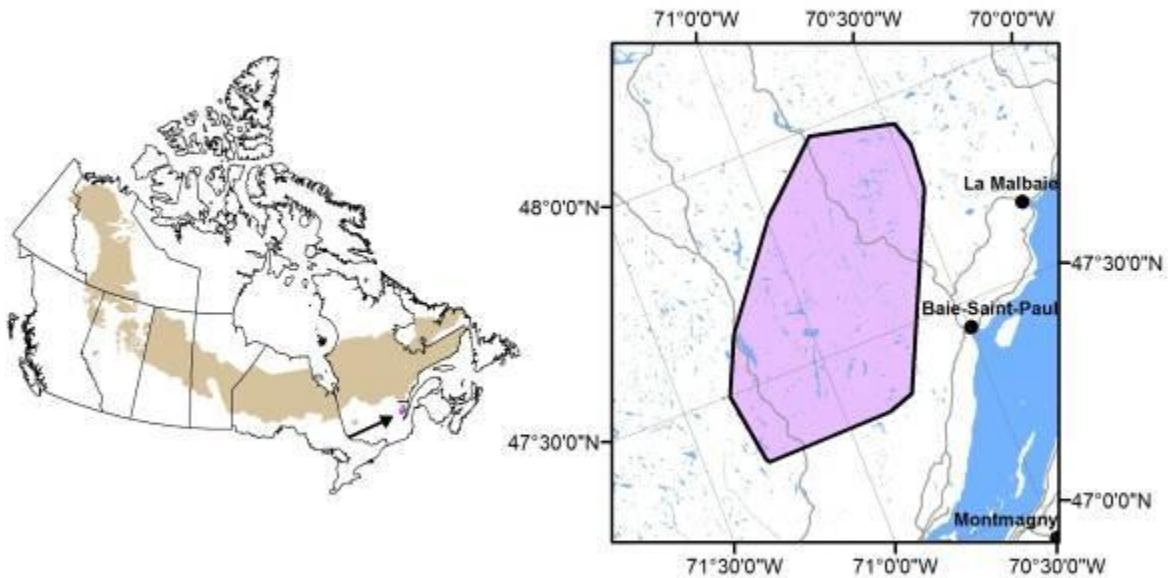


Figure J-85. Key map of the general location of the range.

Figure J-86. The geographic boundary within which critical habitat is located.

ii) Amount: Quantity of critical habitat.

Total Range Area (ha)	Disturbed Habitat (%)			Total Undisturbed Habitat (%)	Amount of Critical Habitat
	Fire	Anthropogenic	Total		
312,803	4	77	80	20	Existing habitat that would contribute to at least 65% undisturbed over time.

iii) Type: Biophysical attributes of critical habitat.

Ecozone(s)¹:	Boreal Shield
Ecoregion(s)¹:	Boreal Shield (Southeast)

¹ See Appendix H

Critical Habitat Identification: Pipmuacan Range (QC3)

The identification of critical habitat for boreal caribou is described by three components for each range: i) Location of habitat; ii) Amount of habitat; and iii) Type of habitat.

i) Location: Where critical habitat is found.

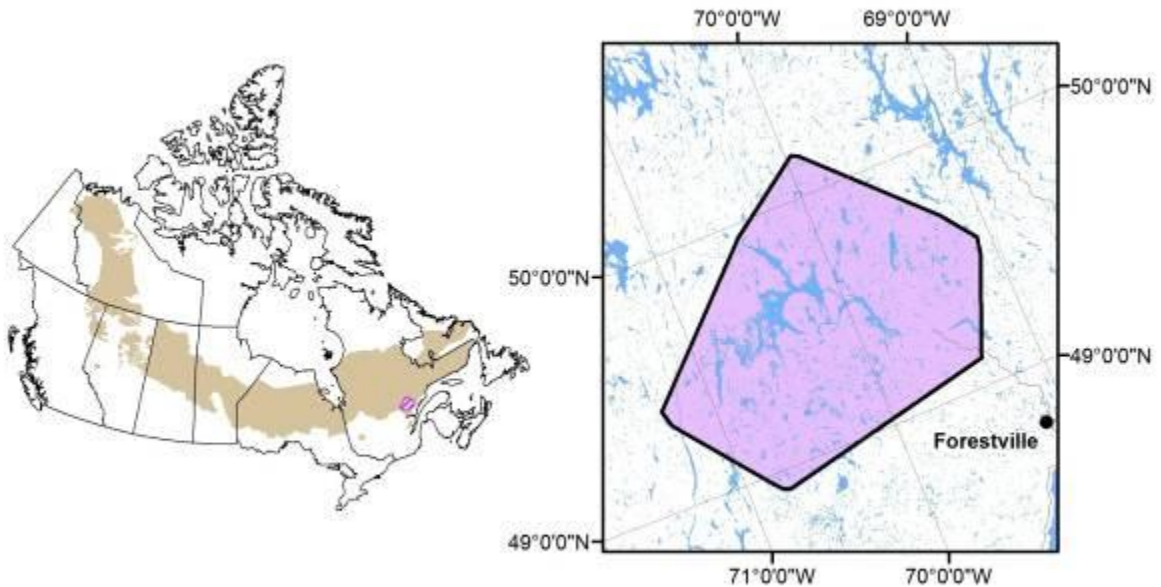


Figure J-87. Key map of the general location of the range.

Figure J-88. The geographic boundary within which critical habitat is located.

ii) Amount: Quantity of critical habitat.

Total Range Area (ha)	Disturbed Habitat (%)			Total Undisturbed Habitat (%)	Amount of Critical Habitat
	Fire	Anthropogenic	Total		
1,376,899	11	51	59	41	Existing habitat that would contribute to at least 65% undisturbed over time.

iii) Type: Biophysical attributes of critical habitat.

Ecozone(s)¹:	Boreal Shield
Ecoregion(s)¹:	Boreal Shield (East)

¹ See Appendix H

Critical Habitat Identification: Manouane Range (QC4)

The identification of critical habitat for boreal caribou is described by three components for each range: i) Location of habitat; ii) Amount of habitat; and iii) Type of habitat.

i) Location: Where critical habitat is found.

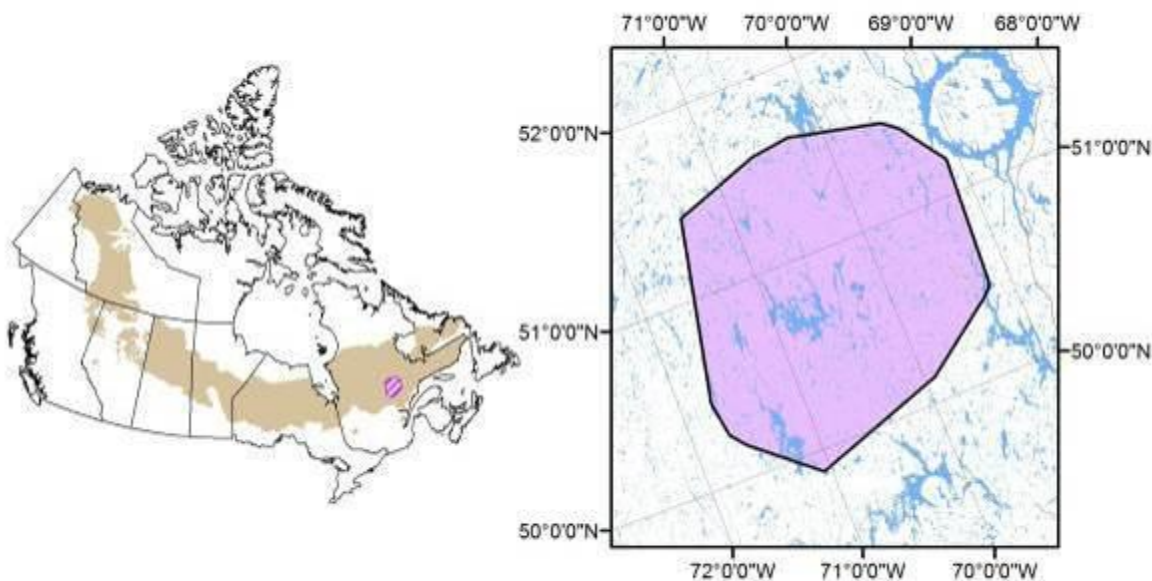


Figure J-89. Key map of the general location of the range.

Figure J-90. The geographic boundary within which critical habitat is located.

ii) Amount: Quantity of critical habitat.

Total Range Area (ha)	Disturbed Habitat (%)			Total Undisturbed Habitat (%)	Amount of Critical Habitat
	Fire	Anthropogenic	Total		
2,716,449	18	23	39	61	Existing habitat that would contribute to at least 65% undisturbed over time.

iii) Type: Biophysical attributes of critical habitat.

Ecozone(s)¹:	Boreal Shield
Ecoregion(s)¹:	Boreal Shield (East)

¹ See Appendix H

Critical Habitat Identification: Manicouagan Range (QC5)

The identification of critical habitat for boreal caribou is described by three components for each range: i) Location of habitat; ii) Amount of habitat; and iii) Type of habitat.

i) Location: Where critical habitat is found.



Figure J-91. Key map of the general location of the range.

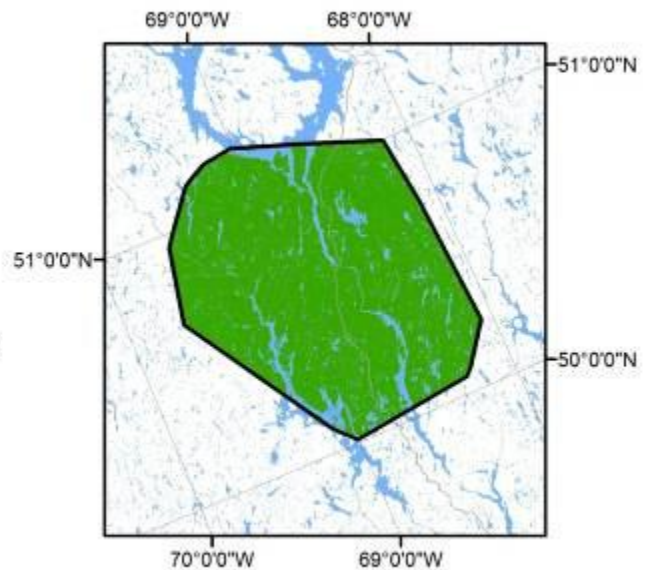


Figure J-92. The geographic boundary within which critical habitat is located.

ii) Amount: Quantity of critical habitat.

Total Range Area (ha)	Disturbed Habitat (%)			Total Undisturbed Habitat (%)	Amount of Critical Habitat
	Fire	Anthropogenic	Total		
1,134,129	3	32	33	67	At least 65% undisturbed habitat

iii) Type: Biophysical attributes of critical habitat.

Ecozone(s)¹:	Boreal Shield
Ecoregion(s)¹:	Boreal Shield (East)

¹ See Appendix H

Critical Habitat Identification: Quebec Range (QC6)¹

The identification of critical habitat for boreal caribou is described by three components for each range: i) Location of habitat; ii) Amount of habitat; and iii) Type of habitat.

i) Location: Where critical habitat is found.



Figure J-93. Key map of the general location of the range.



Figure J-94. The geographic boundary within which critical habitat is located.

ii) Amount: Quantity of critical habitat.

Total Range Area (ha)	Disturbed Habitat (%)			Total Undisturbed Habitat (%)	Amount of Critical Habitat
	Fire	Anthropogenic	Total		
62,156,186	20	12	30	70	At least 65% undisturbed habitat

iii) Type: Biophysical attributes of critical habitat.

Ecozone(s)²:	Boreal Shield
Ecoregion(s)²:	Boreal Shield (Central)
	Boreal Shield (East)

¹ The range is likely made up of several populations for which the self-sustainability status may vary. New data is currently being collected by the provincial jurisdiction for this range. This may result in an update to the range delineation and/or the identification of new ranges, as well as a revision of their self-sustainability status following integrated risk assessment of new ranges or new range boundaries.

² See Appendix H

CRITICAL HABITAT FACTSHEETS: NEWFOUNDLAND AND LABRADOR

Critical Habitat Identification: Lac Joseph Range (NL1)

The identification of critical habitat for boreal caribou is described by three components for each range: i) Location of habitat; ii) Amount of habitat; and iii) Type of habitat.

i) Location: Where critical habitat is found.



Figure J-95. Key map of the general location of the range.

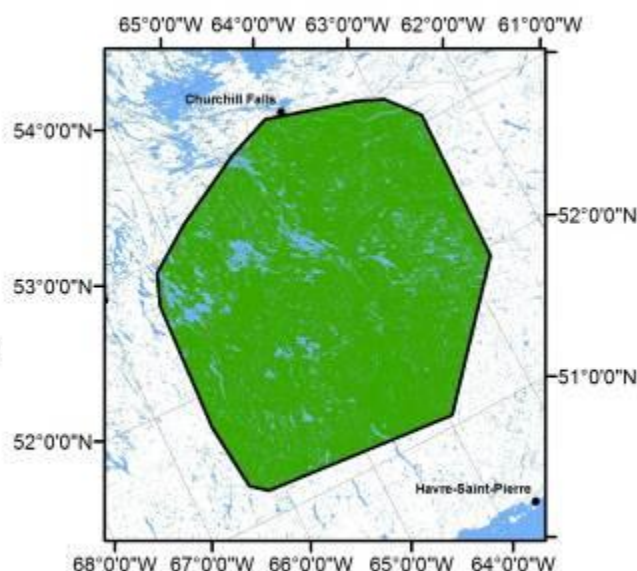


Figure J-96. The geographic boundary within which critical habitat is located.

ii) Amount: Quantity of critical habitat.

Total Range Area (ha)	Disturbed Habitat (%)			Total Undisturbed Habitat (%)	Amount of Critical Habitat
	Fire	Anthropogenic	Total		
5,802,491	7	1	8	92	At least 65% undisturbed habitat

iii) Type: Biophysical attributes of critical habitat.

Ecozone(s)¹:	Taiga Shield
	Boreal Shield
Ecoregion(s)¹:	Boreal Shield (East)

¹ See Appendix H

Critical Habitat Identification: Red Wine Mountain Range (NL2)

The identification of critical habitat for boreal caribou is described by three components for each range: i) Location of habitat; ii) Amount of habitat; and iii) Type of habitat.

i) Location: Where critical habitat is found.



Figure J-97. Key map of the general location of the range.

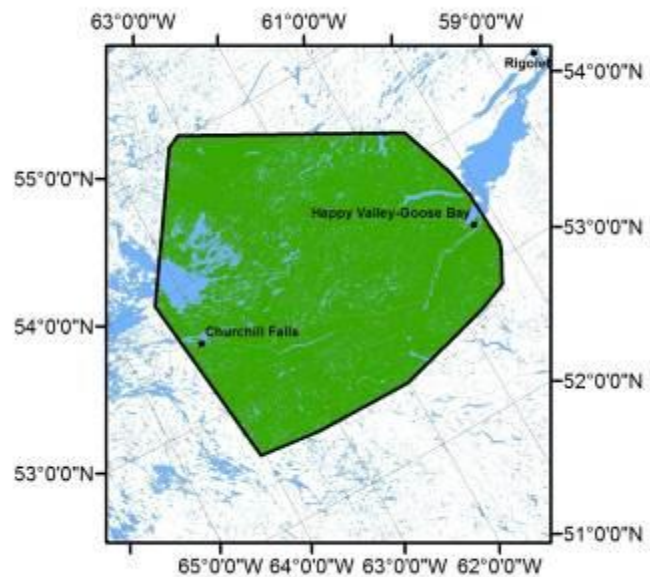


Figure J-98. The geographic boundary within which critical habitat is located.

ii) Amount: Quantity of critical habitat.

Total Range Area (ha)	Disturbed Habitat (%)			Total Undisturbed Habitat (%)	Amount of Critical Habitat
	Fire	Anthropogenic	Total		
5,838,594	5	3	8	92	At least 65% undisturbed habitat

iii) Type: Biophysical attributes of critical habitat.

Ecozone(s)¹:	Taiga Shield
	Boreal Shield
Ecoregion(s)¹:	Boreal Shield (East)

¹ See Appendix H

Critical Habitat Identification: Mealy Mountain Range (NL3)

The identification of critical habitat for boreal caribou is described by three components for each range: i) Location of habitat; ii) Amount of habitat; and iii) Type of habitat.

i) Location: Where critical habitat is found.



Figure J-99. Key map of the general location of the range.

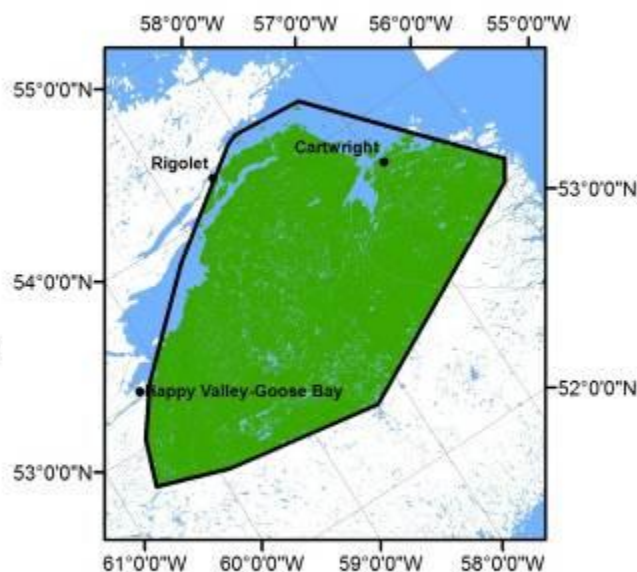


Figure J-100. The geographic boundary within which critical habitat is located.

ii) Amount: Quantity of critical habitat.

Total Range Area (ha)	Disturbed Habitat (%)			Total Undisturbed Habitat (%)	Amount of Critical Habitat
	Fire	Anthropogenic	Total		
3,948,463	0.4	1	2	98	At least 65% undisturbed habitat

iii) Type: Biophysical attributes of critical habitat.

Ecozone(s)¹:	Taiga Shield
	Boreal Shield
Ecoregion(s)¹:	Boreal Shield (East)

¹ See Appendix H