Hinton Wood Products
A division of West Fraser Mills Ltd.

Caribou
Habitat Conservation Strategy

September 17, 2015
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Hinton Wood Products
A Division of West Fraser Mills Ltd.

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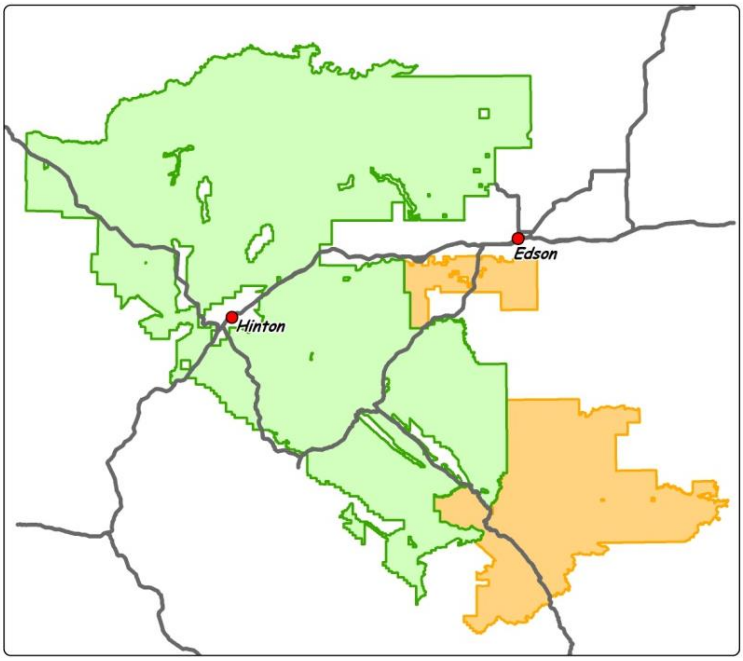
Preface

Hinton Wood Products and Edson Forest Products are Divisions of West Fraser Mills Ltd. Hinton Wood Products manages Forest Management Agreement 8800025 and Edson Forest Products manages Forest Management Agreement 9700032. The Forest Management Areas (FMA) associated with the Agreements border each other in west central Alberta. Each has a separate Forest Management Plan. A single Woodlands Department (hereafter, West Fraser) representing Hinton Wood Products and Edson Forest Products manages both FMA.

West Fraser is certified to the Sustainable Forestry Initiative[1] Standard, which requires signatories to have biodiversity conservation programs, especially for species at risk designated by relevant governments. The West Fraser Species at Risk (SAR) Guide (West Fraser 2014) describes species and ecological communities that are mandatory content to meet SFI requirements, plus additional species and communities that West Fraser includes as voluntary good practice. The SAR Guide is a document that provides identification and basic forest management direction for each species or community. The SAR Guide references a more detailed Species Conservation Strategy, which contains additional information about West Fraser habitat management to direct forest management and conservation.



Hinton Wood Products (green) and Edson Forest Products (yellow) Forest Management Areas.

West Fraser has one target related to Species Conservation Strategies:

1. Target #1 – Complete species conservation strategies for all species at risk (SARA and Alberta designations) within 6 months of designation, update strategies at least every 2 years and report on results of strategies annually.

Species conservation strategies are developed by West Fraser and reviewed, endorsed, and approved as a cooperative program between West Fraser and Alberta Environment and Sustainable Resource Development.

[1] http://www.sfiprogram.org/

Summary

Woodland Caribou in Alberta are designated as Threatened under both the Alberta Wildlife Act and the Canada Species at Risk Act. This strategy describes West Fraser caribou habitat conservation initiatives for the Hinton Wood Products Forest Management Area (FMA) located in west central Alberta. The first Caribou Habitat Conservation Strategy was dated May 17, 1999. This document (Version 6) is the fifth revision of the original Caribou Habitat Conservation Strategy. It forms part of the 2014 Forest Management Plan.

The northwest corner of the FMA along the Berland River contains about 3.6 % of the A la Peche caribou herd range and about 12.7 % of the Little Smoky caribou herd range. West Fraser and Alberta Environment and Sustainable Resource Development (AESRD) agreed to a timber harvest schedule for long-term caribou habitat supply within FMA caribou range which was approved in the 1999 Forest Management Plan. West Fraser deferred operations in caribou range in 2007 and is participating in the Government of Alberta (GOA) Range Plan process that commenced in August 2013 and was still not complete as of the current date of this document. West Fraser supports a proposal formulated by the Foothills Landscape Management Forum (FLMF) and this strategy is largely based on the FLMF proposal. West Fraser will make adjustments to this strategy to comply with direction in the Range Plan when it is approved. West Fraser will work with the FLMF, GOA, and others to develop cooperative caribou conservation initiatives and actions for the entire A la Peche and Little Smoky caribou ranges.

To ensure that there is sufficient time to finalize and implement the forthcoming Range Plan West Fraser has not scheduled any harvest in FMA caribou range during the first five years of the Spatial Harvest Sequence. West Fraser will review the direction specified in the Range Plan and make any necessary proposals or adjustments before any operations commence.

West Fraser first prepared the Berland Northwest Long Term Access Plan, which includes the FMA caribou range, in 1996. The LTAP identifies an efficient network of summer roads into the caribou range, which supports efforts to minimize road infrastructure. Since then West Fraser participated through the FLMF to develop the Berland Smoky Regional Access Development Plan. West Fraser supports the concept of net positive balance for footprint management put forth by the FLMF and will work to implement the concept in cooperation with the FLMF, Alberta and others if the concept is supported in the Range Plan. West Fraser will comply with the intent of IL 2013-01 Berland Smoky Integrated Planning Area – Direction for Access Development.

West Fraser will continue to participate in cooperative caribou conservation programs, support research, and use adaptive management to improve this caribou conservation strategy, which will be revised as appropriate.

Introduction

This document describes the West Fraser caribou (*Rangifer tarandus*) habitat conservation strategy for caribou range on the Hinton Wood Products FMA. The strategy is incorporated into the Hinton Wood Products Forest Management Plan. There are no caribou on the Edson Forest Products FMA.

Distribution

Caribou live in the arctic and mountain tundra and northern forests of North America, Scandinavia, and Russia. European caribou are called reindeer but all caribou and reindeer throughout the world are considered to be the same species. Three of 7 world caribou subspecies are found in Canada. The Peary Caribou (*Rangifer tarandus pearyi*) lives in the Arctic. The barren-ground caribou (*Rangifer tarandus groenlandicus*) summers in tundra habitat in Alaska, the Yukon, and the western portion of the Northwest Territories. Barren-ground caribou frequently migrate to muskegs and coniferous forests in winter. The southernmost subspecies, the woodland caribou (*Rangifer tarandus caribou*), is widely distributed across Canada.

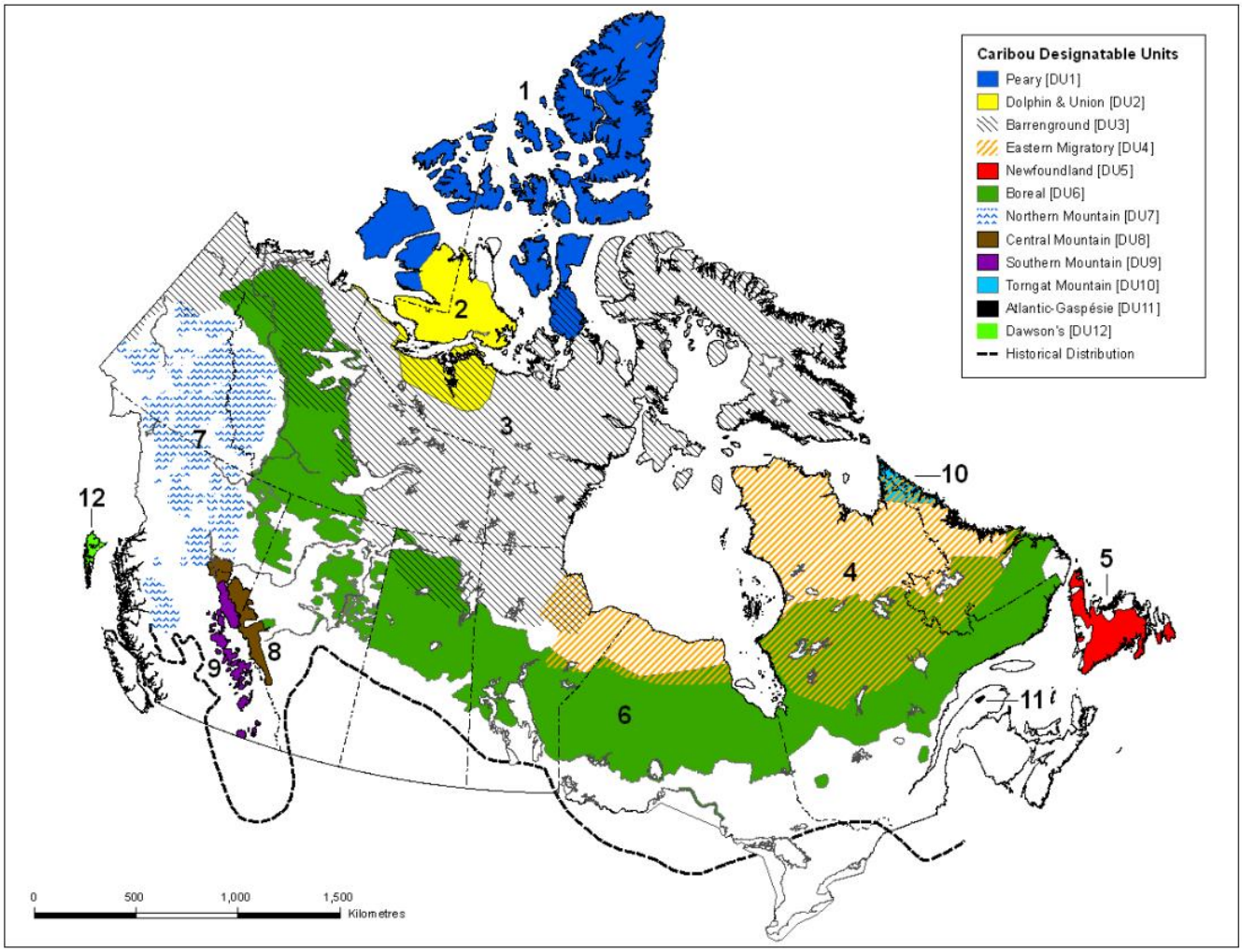


Figure 1 – *Designatable units for caribou (Rangifer tarandus) in Canada (from COSEWIC 2011)*

Woodland caribou are the only caribou subspecies in Alberta. Alberta divided caribou into two groups called ecotypes based on behavior differences. Caribou in the mountain ecotype occur in west central Alberta and usually migrate between alpine tundra summer range in the mountains and forested winter range in the foothills. However some mountain caribou live year round in the mountains and others live year round in the foothills. Caribou in the boreal ecotype occur mostly in northern Alberta and live year round in forested

habitats. Boreal caribou are usually associated with extensive forested and open wetland complexes, often called peatlands or muskegs.

The Alberta ecotypes are also part of separate caribou populations called Designatable Units (Figure 1) recognized by COSEWIC (2011). Mountain ecotype caribou are part of the Central Mountains Population[2] and boreal ecotype caribou are part of the Boreal Population.

There are 16 distinct caribou groups or sub-populations (herds) in Alberta (Figure 2). Caribou herd ranges usually do not overlap geographically and each caribou herd is managed separately. Further information about Alberta caribou is available at http://www.srd.gov.ab.ca/fw/status/reports/caribou/index.html.

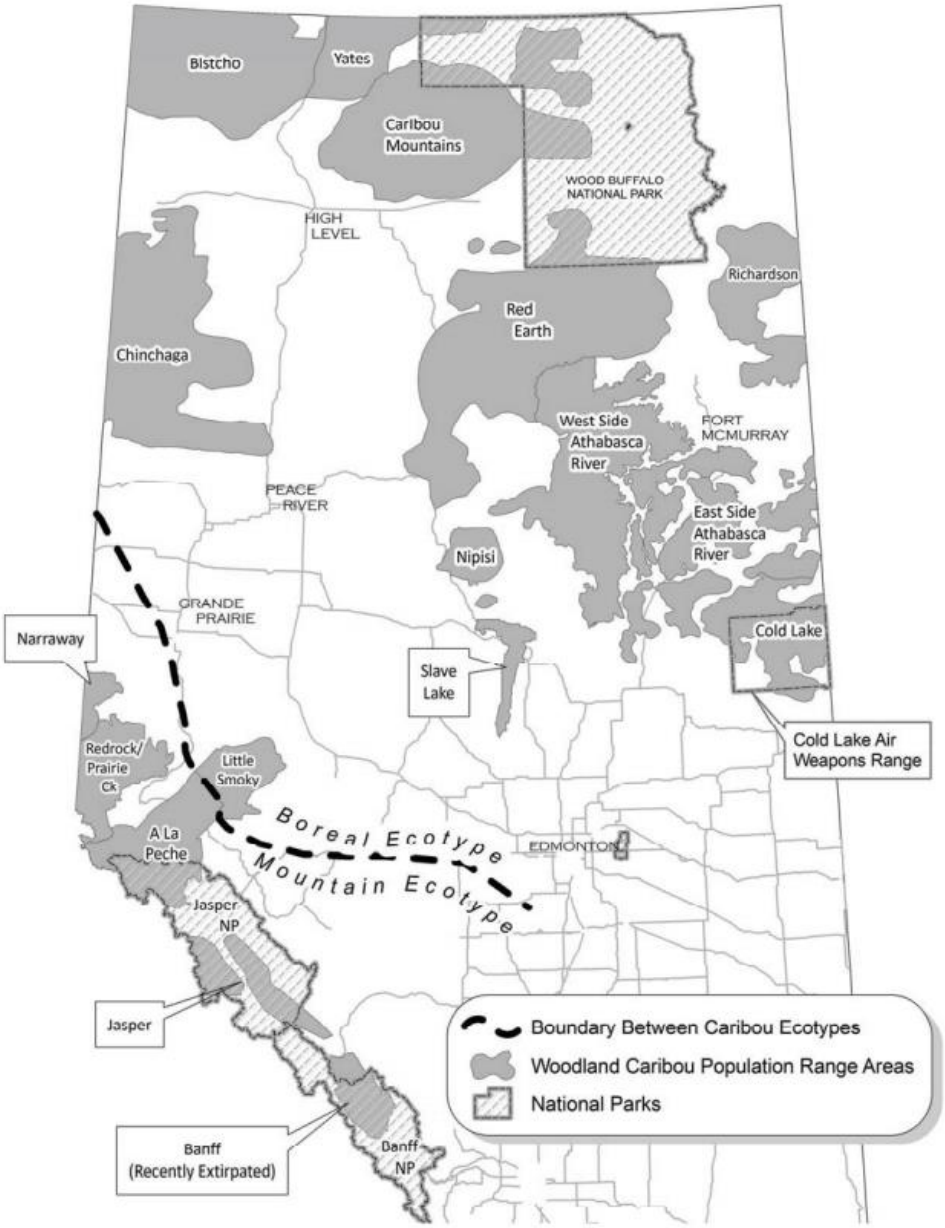


Figure 2 – *Woodland caribou distribution in Alberta including herd names and approximate range boundaries (from ASRD and ACA 2010).*

[2] The Central Mountains Population was formerly part of the Southern Mountains Population.

A la Peche Herd

The A la Peche caribou herd is a migratory mountain ecotype caribou herd with summer range in the Rocky Mountains and winter range in the Foothills (Figure 3). The summer range for migratory portions of the ALP herd is within Jasper National Park and Willmore Wilderness Park and occasionally small adjacent areas in British Columbia. The winter range overlaps portions of Willmore Wilderness Park, Forest Management Unit E8 (Foothills Forest Products), and the Alberta Newsprint, Canfor, and Hinton Wood Products FMAs (Brown and Hobson 1998). Prior to the winter of 1995-1996 it was thought that most A la Peche caribou exhibited annual migratory behavior. In the winter of 1995-1996 most radio-collared A la Peche caribou remained in mountainous summer range and did not migrate to the traditional winter range. Aerial surveys indicated that this pattern probably occurred in the winters of 1995–1996 and 1996–1997, and monitoring of radio-collared caribou confirmed that most A la Peche caribou did not travel to the winter range in the winters of 1997–1998 through 2013–2014. During these years both winter and summer caribou sightings continued along Highway 40 on the winter range. Based on collar records, there is a small group of caribou that remain in the Foothills portion of the ALP range year round, and there are some animals that still move back and forth between the traditional summer and winter ranges. Radio-collar data from female caribou in 2002–2010 and other observations suggest that perhaps 20-40 caribou remain on the winter range year-around.

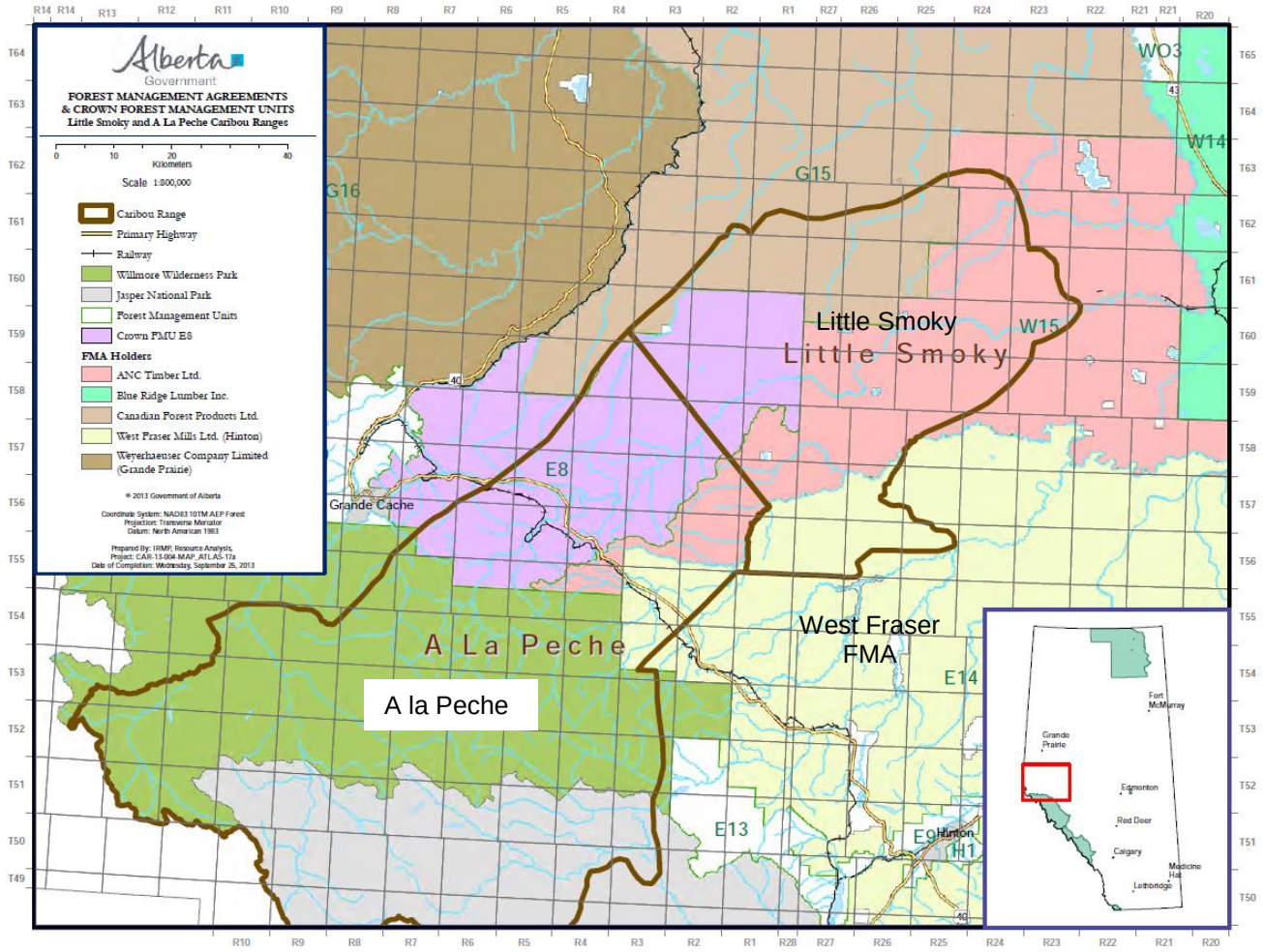


Figure 3 – *A la Peche and Little Smoky woodland caribou ranges in relation to forest industry tenure areas in west central Alberta (map produced by Alberta government 2014*

Little Smoky Herd

The Little Smoky caribou herd is a non-migratory boreal ecotype caribou herd with year around range in the Foothills (Figure 3). The range overlaps portions of Forest Management Unit E8 (Foothills Forest Products), and the Alberta Newsprint, Canfor, and Hinton Wood Products FMAs (Brown and Hobson 1998).

Population Size and Trend

Worldwide there are about 5 million caribou, and Canada has about 2 million caribou or 40% of the world total. Canada has about 180,000 forest-dwelling woodland caribou. Caribou, especially the woodland subspecies, are difficult to count and population size estimates for Alberta caribou have previously been based on professional judgment and presented as a range. In 1996 Alberta government biologists estimated 3,600-6,700 caribou in Alberta. About 600-750 of these were mountain ecotype caribou and the rest were boreal ecotype caribou.

Population size and trend estimates for individual caribou herds are more accurate but there is still considerable uncertainty about the estimates. The mark-recapture population size estimate method uses the proportion of marked (usually radio-collared, but can also use DNA extracted from caribou pellets) animals observed in an aerial count to estimate the proportion of unmarked caribou not counted. This method provides an estimate of the actual number of caribou present, and a 95% confidence interval for the estimate (this means that 95% of the time the actual number is within the confidence interval range). The minimum total count method counts all caribou observed and doesn't attempt to estimate how many animals were not counted. A variation of this method is to add individuals that were known to be present (e.g. a radio-collared animal) but not observed by the survey. The Alberta government also uses annual estimates of population trend, which are calculated using estimates of adult female survival from radio-collared females and estimates of calf survival from late winter aerial surveys. The resulting number is called Lambda. By definition a Lambda value of 1.0 indicates no change in adult female population size and values above or below 1.0 indicates increase or decrease, respectively.

A la Peche Herd

On a November 16, 1998 helicopter survey Alberta government biologists saw 19 of 20 marked A la Peche herd caribou and counted 147 caribou in total. The mark-recapture population estimate for the survey was 155, with a 95% confidence interval of 92-242 caribou. As 147 caribou were counted and one marked caribou was present but not observed the minimum total count for the survey was 148 and the actual number of caribou was likely between 148-242 caribou. Considering that radio-collared animals were not captured randomly and likely didn't represent the entire herd, Smith (2004) increased the calculated estimate (155) and used 200 caribou as the November 1998 A la Peche herd population estimate. There have been no newer A la Peche herd population size estimates.

The adult female Lambda population size trend of the A la Peche caribou herd has been relatively stable since 1989 (Figure 4). Trend estimates for the Little Smoky caribou herd since 1999 were more variable.

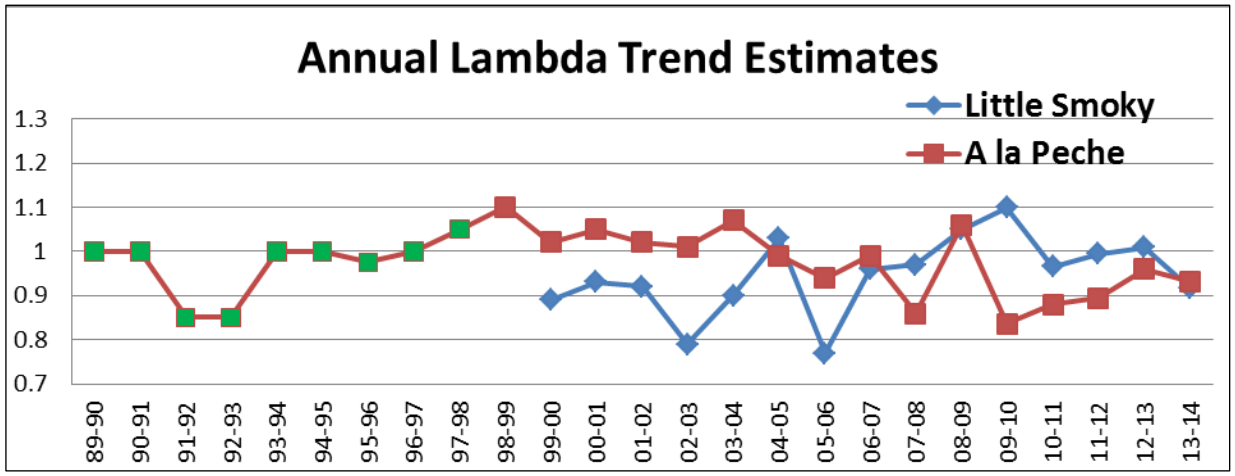


Figure 4 – *Estimated annual population trend (Lambda estimate) for the A la Peche caribou herd, 1989-1990 to 2013-2014 and the Little Smoky caribou herd 1999-2000 to 2013-2014*

Data for Figure 4 is from the Alberta Caribou Recovery Team (2005), Alberta and ACA (2010) and all data after 2010 is unpublished information provided by ESRD. A Lambda value of 1.0 indicates a stable population, values above 1.0 indicate a population increase and values below 1.0 indicate a population decrease. Confidence intervals for the estimates were not provided. Values for A la Peche herd from 1989-1990 to 1997-1998 (green squares) were estimated from Alberta Caribou Recovery Team (2005). See McLoughlin et al. (2003) and Smith (2004) for a description of the methods used. The low Lambda estimates for the ALP herd in 1991 and 1992 incorporate adjustments for mortality due to vehicle collisions on Provincial Highway 40 (at least 15 and 17 animals died in 1991 and 1992, respectively).

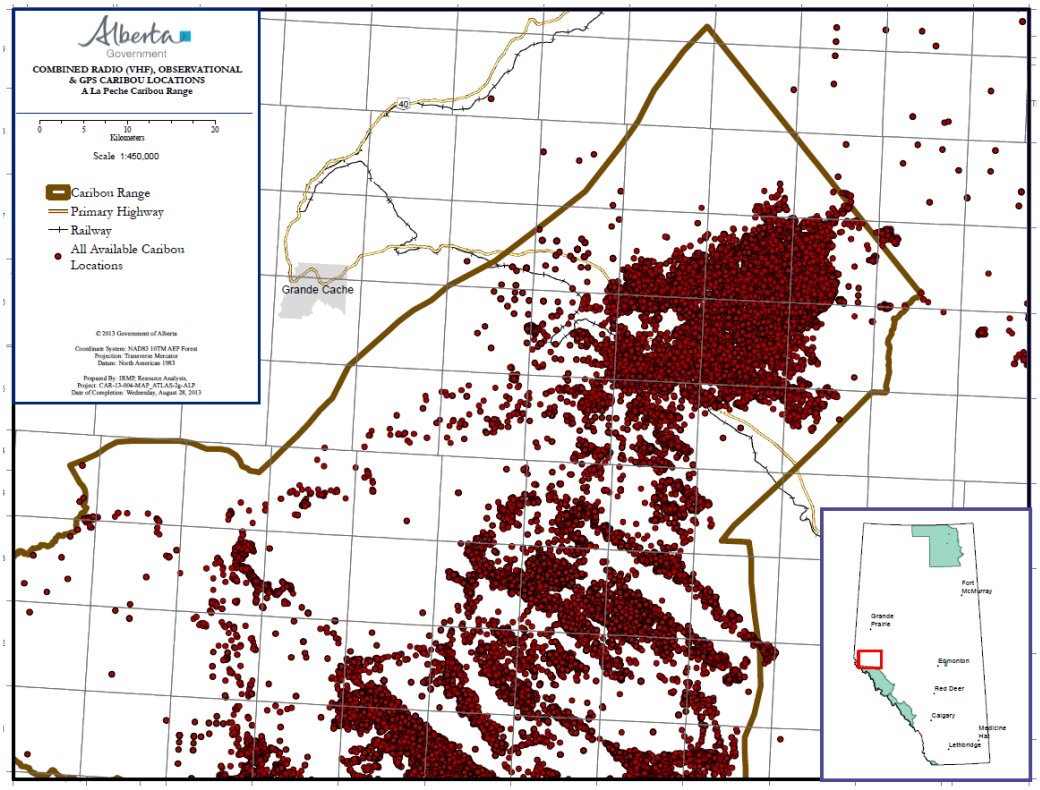


Figure 5 – *Combined radio (VHF), observational, and GPS locations for the A la Peche caribou herd, from Government of Alberta A la Peche Range Baseline Report (2014 draft). The map extent does not show the south portion of the range and caribou locations associated with the missing portions.*

Little Smoky Herd

There have not been any mark-recapture population estimates for the Little Smoky herd. The GOA collected fecal samples for DNA analysis in winter 2014-2015 but results were not available as of the date of this document.

The adult female Lambda population size trend of the Little Smoky caribou herd has been relatively variable since 1999 (Figure 4).

AESRD conducts aerial surveys in late winter to obtain age and sex composition data for each caribou herd. All caribou observed are counted, yielding a minimum total count for each survey. This is not a population size estimate because the proportion of the population that was not observed was not estimated. However it does provide an index from year to year (Figure 6) and is a second line of evidence to compare to other methods.

The available information on population size and trend for the A la Peche and Little Smoky caribou herds over the last 25 years is insufficient to make definitive conclusions. This is problematic because the Alberta government says both herds are currently declining. In 2005, the Little Smoky herd was ranked as "immediate risk of extirpation" (Alberta Caribou Recovery Team 2005). The only way to address the uncertainty is to implement objective mark-recapture population size estimates and repeat them at regular intervals. These estimates can then be compared to Lambda and minimum total count information. West Fraser believes that regular population size estimates are essential to support the recovery process.

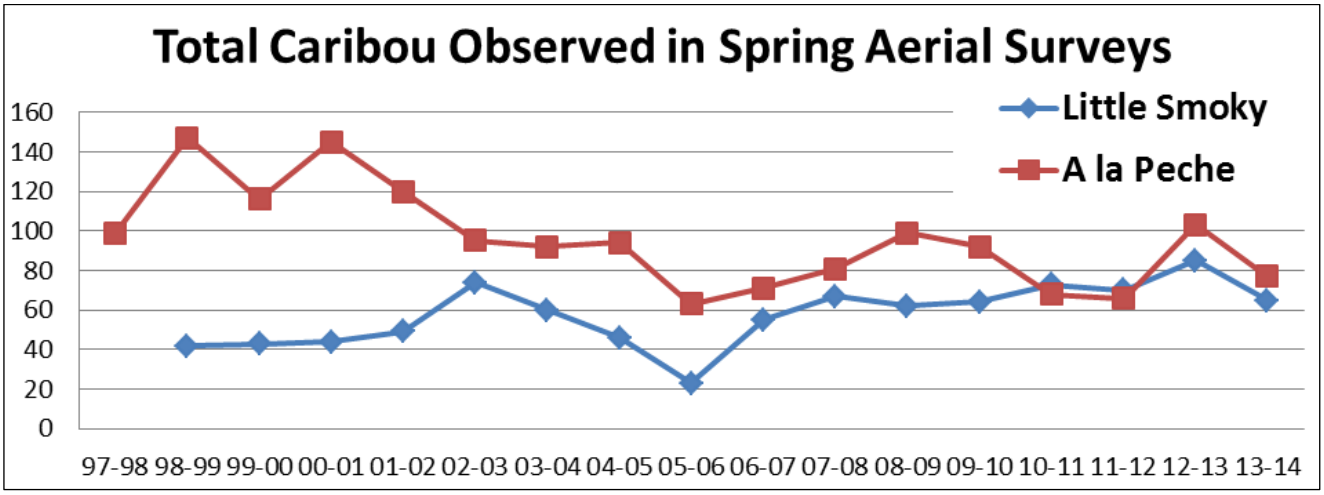


Figure 6 – *Total caribou observed in spring aerial surveys for the A la Peche caribou herd 1997-1998 to 2013-2014, and the Little Smoky caribou herd 1998-1999 to 2013-2014 (Alberta Caribou Recovery Team 2005, Alberta and ACA 2010, Alberta unpublished).*

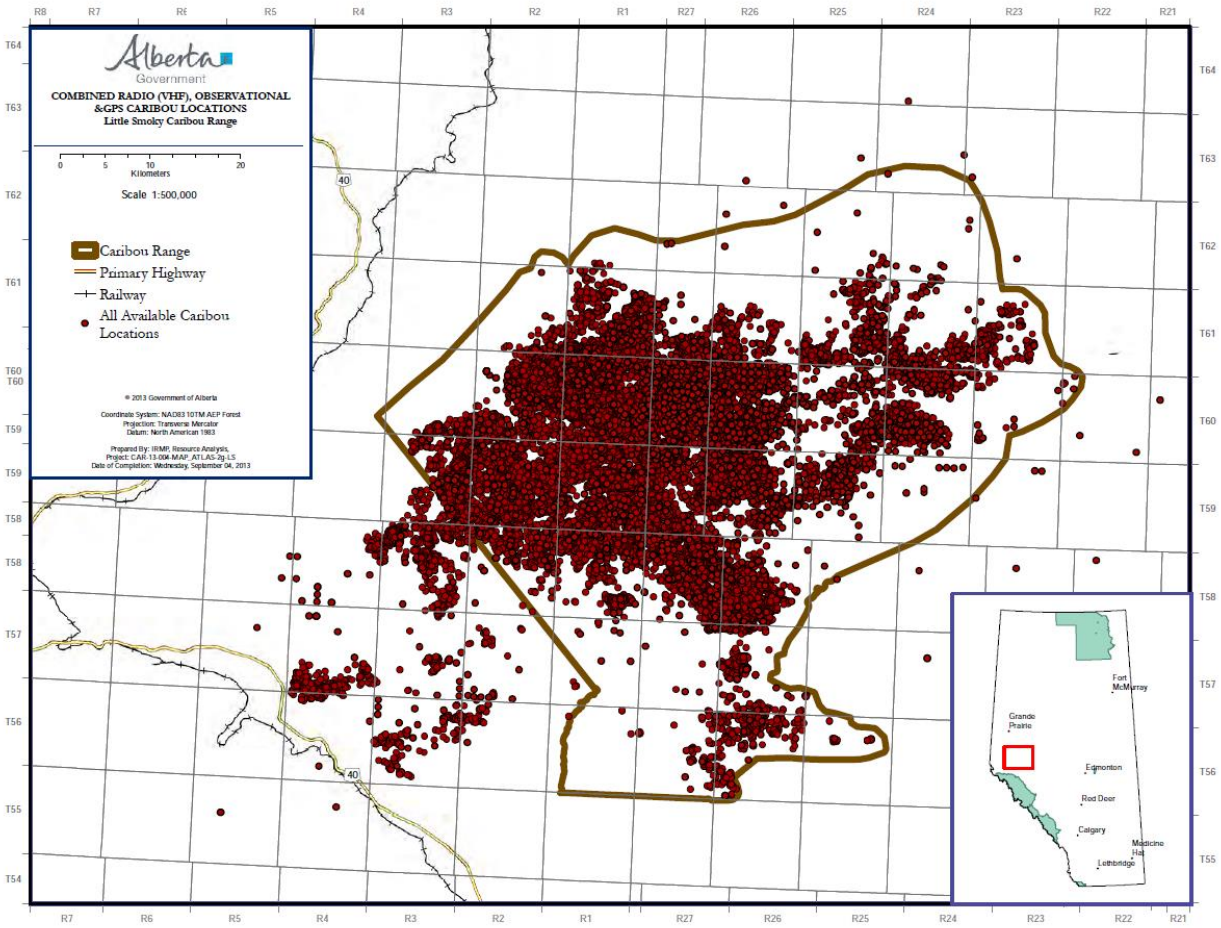


Figure 7 – *Combined radio (VHF), observational, and GPS locations for the Little Smoky caribou herd, from Government of Alberta Little Smoky Range Baseline Report (2014 draft).*

Conservation Status

Alberta designates species on a provincial basis and does not consider populations in provincial status designations. Woodland caribou are designated as Threatened in Alberta[3]. The 2001 Alberta designation was based on four conservation concerns:

- The Alberta population had declined by at least 20% in three caribou generations (20 years).
- There had been a long term reduction in provincial caribou distribution.
- The Alberta population was relatively small, fewer than 10,000 animals.
- Caribou are dependent on older forests and sensitive to human activity.

The Canada Species at Risk Act (SARA) designates the status of populations as well as species. The Southern Mountain and Boreal populations of woodland caribou were assessed by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and designated as Threatened in SARA Schedule 1[4] in 2002. The A la Peche caribou herd was part of the Southern Mountain population until COSEWIC split it into three populations (COSEWIC 2011) . The A la Peche caribou herd is now part of the Central Mountain population, which was assessed as *Endangered* by COSEWIC in 2014 but has not yet completed the SARA process and does not appear in Schedule 1. The Little Smoky caribou herd is part of the Boreal population. Further information about COSEWIC assessments and SARA caribou designations is available at http://www.speciesatrisk.gc.ca/.

[3] Alberta AR 143/97 Schedule 6. In October 2001, the Minister reaffirmed the status of caribou in Alberta as Threatened (a species likely to become endangered if limiting factors are not reversed).
[4] Species at Risk Act Schedule 1 May 2002.

Recovery Plans

There are four government recovery documents that relate to the caribou herds with range overlap on the West Fraser FMA:

1. The **Alberta woodland caribou recovery plan 2004/05-2013/14** was approved in 2005. The plan called for development of Landscape Plans to direct recovery for groups of caribou herds. Two Landscape Plans were developed but neither was approved.
2. The **West Central Caribou Landscape Plan** was submitted by the Alberta Caribou Committee to the Alberta government in 2008 but was not approved. A number of the recommendations were implemented.
3. The Environment Canada **Recovery Strategy for the Woodland Caribou (*Rangifer tarandus caribou*), Boreal population, in Canada** was approved in 2012. The Little Smoky caribou herd is part of the Boreal Population. The Recovery Strategy called for preparation of Range and Action Plans and triggered the ongoing Range Plan process for the A la Peche and Little Smoky herds
4. The Environment Canada **Recovery Strategy for the Woodland Caribou, Southern Mountain population (*Rangifer tarandus caribou*) in Canada** was approved in 2014. The A la Peche caribou herd is part of the Southern Mountain population, but note that the Southern Mountain population was split into three in 2011 and the A la Peche herd is now part of the Central Mountain population. Presumably the Central Mountain population will eventually have SARA Schedule 1 status and a separate Recovery Strategy will be prepared; in the interim the 2014 Recovery Strategy applies. Alberta had already included the A la Peche caribou herd in the provincial Range Plan process.

Limiting Factors

Caribou and their predators, especially wolves, have coexisted for many thousands of years. But co-existence is a relative term. In reality, predators and prey are always adapting to each other and to changing conditions in their environment. Right now wolves and other predators appear to have the upper hand all across the southern fringe of woodland caribou range in Canada. Most caribou herds in this broad belt are in trouble and many have been officially designated as Threatened.

The reasons for this Canada-wide pattern are complex and not fully understood. Human activities such as timber harvesting and oil and gas extraction create young forest and linear corridors through caribou range. Young forest is good for moose, elk, and deer, and the corridors make it easier for wolves to move around. Milder winters with less snow aren't good for caribou either, because caribou can still make a good living when harsh winters force moose, elk, and deer to move elsewhere, taking the wolves with them. Put another way, when caribou, moose, elk, deer, and wolves overlap, caribou appear too often on the wolf menu.

Natural events also influence caribou habitat and relationships with their predators. Forest fires have much the same effect as timber harvest – the young forest that regenerates following the disturbance isn't good caribou habitat. And now a new threat has arrived in Alberta – the mountain pine beetle. Left unchecked massive numbers of this tiny insect may kill most of the pine trees in Alberta and dramatically alter caribou habitat.

Underlying changes associated with human activity are more fundamental changes associated with climate. The southern limit of caribou distribution in North America has been receding northward since the end of the last ice age. More recent aspects of climate change are likely already influencing caribou conservation especially near the southern limit of caribou distribution:

- Expansion of white-tailed deer into caribou range.
- Higher prey population density supported by milder winters.
- Breakdown of spatial separation between caribou, predators, and prey in milder winters.
- Increases in natural disturbance rates (e.g. mountain pine beetle).

Changing climate may continue to accentuate these early changes and trigger others (e.g. increased forest fire disturbance, ecological changes that affect lichen viability, novel parasites and diseases, etc.). The combined effect may influence prospects for caribou recovery to self-sustaining status. Climate change effects will be monitored and considered as part of the adaptive management system.

Limiting factors applicable to Alberta caribou herds are described in the COSEWIC status report (Thomas and Gray 2002), the Alberta status reports (Dzus 2001, ASRD and ACA 2010), the Alberta Caribou Recovery Plan (Alberta Woodland Caribou Recovery Team 2005), the Boreal Population Recovery Strategy (Environment Canada 2012), and the Southern Mountain Population Recovery Strategy (Environment Canada 2014).

As part of the Alberta Caribou Recovery Plan process, a conceptual model of limiting factors (Hebert 2006) was developed for west central Alberta caribou herds. The model (Figure 8) was adopted in 2006 by the Alberta Caribou Committee to support caribou conservation planning by the West Central Caribou Landscape Planning Team. It was also adopted by the Government of Alberta to support in-progress development of a Range Plan for the A la Peche and Little Smoky herds (Government of Alberta 2014).

Strong scientific support identifies predation as the main proximal (direct) limiting factor for most if not all caribou populations in Alberta (Hebert 2006). At present potential limiting factors besides predation including human-caused mortality, food, disease/parasites, and climate are not considered to be significant for Alberta caribou herds. Various research results and other information provides guidance on the mechanistic interactions and linkages between caribou, predation, habitat and anthropogenic influences.

Key Indicators

Immediate consideration of six key indicators can simplify interpretation of the conceptual model. These six indicators are listed below, in approximate order of importance. Other indicators and linkages will potentially be defined and examined over time.

1. **Caribou** – Caribou population trend must be stable or increasing, and population size must be large enough to reduce the chance of herd extirpation. Population size targets must be developed. The Boreal Caribou Strategy interim targets are ≥ 100 caribou in each herd to reduce chances of extirpation and ≥ 300 caribou in each herd to achieve a self-sustaining population (Environment Canada 2012). Alberta has not yet set any population targets.
2. **Wolves** – Wolf density must be low enough to enable a stable or increasing caribou population trend. Research suggests wolf density significantly below 6.5 wolves/1,000 km^2 (Bergerud and Elliot 1986) is needed, particularly when trying to reverse caribou population decline. Wolves are considered the most important caribou predator, but bears (grizzly and black) and cougars are predators of caribou adults, and these species and other smaller predators including wolverine, coyote, lynx, golden eagle, and fox may kill caribou calves.
3. **Primary Prey** (moose, elk, deer, beaver) – Primary prey density must be low to contribute to low predator abundance, and hence reduced levels of predation on caribou. An ungulate biomass index score[5] (Keith 1983) of approximately 1,000 or less is needed to keep wolf density below levels required for stable to increasing caribou populations (Fuller 1989).
4. **Forest Age Class** – Forests with more mature/old seral stage coniferous habitat, and especially less young seral stage habitat and less deciduous forest cover, provide better habitat for caribou and poorer habitat for primary prey and predators. The Boreal Caribou Strategy target is ≥ 65% of each caribou range in an undisturbed condition, which is defined as habitat that is ≥ 40 years of age and ≥ 500 m from anthropogenic features[6] (Environment Canada 2012).

[5] Ungulate biomass index = number of individuals/species/1,000 km^2 x biomass score/species. Biomass scores moose = 6; elk = 3; caribou = 2, deer = 1.

[6] Environment Canada did not specify an age when anthropogenic features (e.g. cutblocks) would no longer be considered "disturbed". For convenience West Fraser assumed 40 years, which is the age Environment Canada used to switch burned areas from disturbed to undisturbed.

5. **Footprint** (human infrastructure: roads, wellsites, pipelines, seismic lines, powerlines, etc.) – Forests with more footprint are poorer for caribou and better for primary prey and wolves. The Boreal Caribou Strategy target is ≥ 65% of each caribou range in an undisturbed condition.
6. **Habitat Patterns** – Forests with large habitat patches (defined by age class and forest type) are better for caribou, and therefore poorer for primary prey and wolves. This indicator should be measured independently of the Footprint indicator to avoid duplication. An explicit operating hypothesis on the influence of patch size, and the mechanisms of influence, is needed. "Intactness" is a measure of how much habitat is in large habitat patches as compared to fragmented habitat in smaller patches. An intactness pattern measure was used as part of the West Central Alberta Caribou Landscape Plan (WCCLPT 2008).

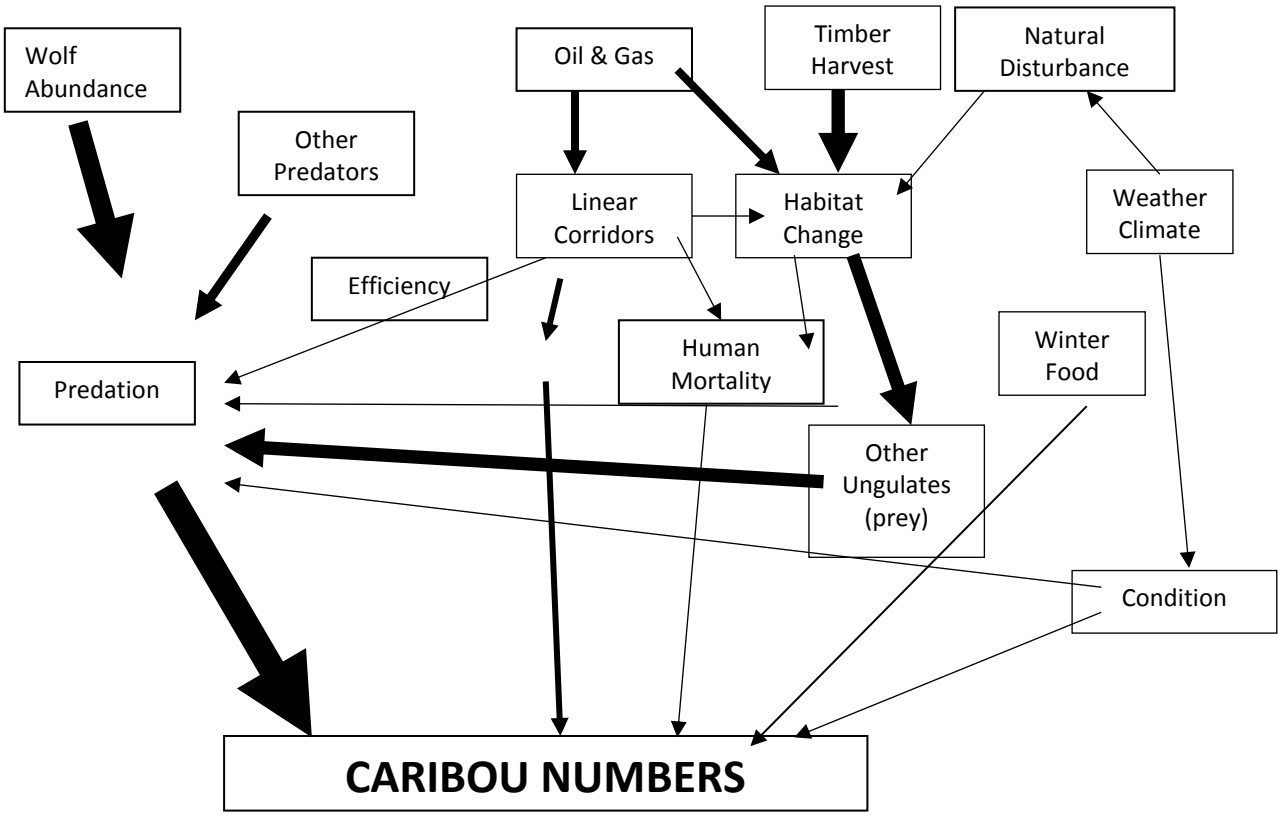


Figure 8 – *Conceptual limiting factors model for west central Alberta caribou herds (from Hebert 2006).*

Caribou Conservation – Adaptive Management Plans

The WCCLPT (2008) developed the West Central Caribou Landscape Plan, which recommended developing an Adaptive Management Plan (AMP) to guide recovery of six caribou herds in west central Alberta, including the A la Peche and Little Smoky caribou herds. The WCCLP was not approved by Alberta, although some of the recommendations have been implemented.

Alberta is in the process of developing a Range Plan for the A la Peche and Little Smoky herds and related Action Plan(s) for all Alberta caribou herds. West Fraser is participating in the process. West Fraser anticipates that either the Range Plan or the related Implementation Plan will include targets and strategies for each of the 6 key indicators described under the Limiting Factors section above. Once approved by Alberta, the Range Plan will be implemented through processes that will likely include established planning and approval processes and perhaps new mechanisms developed specifically for caribou conservation.

Alberta retains overall responsibility and authority for all of the six key indicators, and specific responsibility for indicators 1-3. Industry affects indicators 4-6 and has an obligation to submit development and restoration

plans that contribute to the AMP for indicators 4-6. Alberta approves industry plans and also directs industry actions through regulation and policy.

Coordination between Alberta actions for indicators 1-3 and industry/Alberta actions for indicators 4-6 is essential for overall conservation success. Coordination is needed within sectors (e.g. government departments, forest companies, oil and gas companies), between sectors (e.g. Alberta government and federal government, forest and energy sectors), and across all sectors and participants (e.g. governments, industry, Aboriginal, and other interested parties). West Fraser will participate in all aspects of caribou Range Plans that pertain to West Fraser tenures, obligations, and commitments.

The intent of the West Fraser caribou habitat conservation strategy is to describe West Fraser activities that will contribute to long-term conservation of the A la Peche and Little Smoky caribou herds. The primary focus of the strategy is to put in place conservation measures for the FMA while keeping future options open until the Range Plan is approved and/or additional cooperative strategies can be developed and more information is available to support caribou conservation. This caribou habitat conservation strategy will be reviewed and revised as new information is acquired, or at a minimum at two year intervals.

Cooperation and Process

Cooperative planning between industry, governments, Aboriginal communities, and other interested parties is crucial to the long-term success of caribou conservation for the A la Peche and Little Smoky caribou herds. West Fraser will continue to participate in developing cooperative caribou conservation strategies for the A la Peche and Little Smoky caribou herds and will consider any new information and attempt to adjust plans accordingly, consistent with current and future agreements and approvals reached between Alberta and West Fraser. West Fraser will also continue to participate in company-initiated and cooperative caribou monitoring and research programs.

A schedule under the master Data Sharing Agreement between West Fraser and Alberta will be developed to facilitate the exchange of caribou information.

West Fraser has participated in the following caribou conservation initiatives.

1. West-Central Alberta Caribou Technical Committee 1989–1992.
2. Alberta Provincial Caribou Conservation Strategy 1993–1996.
3. West-Central Alberta Caribou Standing Committee, including Operating Guidelines, Habitat, and Research Subcommittees 1993–2004.
4. Foothills Research Institute caribou research program 1993–present.
5. Alberta Caribou Committee 2004–2009 (the ACC has been inactive since 2009).
6. West Central Caribou Landscape Planning Team and Industrial Working Group 2004–2009.
7. Foothills Landscape Management Forum 2005–present.
8. Canadian Boreal Forest Agreement 2011–present.
9. Alberta Range Plan process for the A la Peche and Little Smoky herds 2013-present.

West Fraser will continue to participate in efforts to develop cooperative caribou conservation strategies. Any strategies or related products developed must be incorporated into the existing legal planning and approval process before they are applicable to or are implemented by West Fraser.

This caribou habitat conservation strategy is part of the Forest Management Plan. Version 1 of this strategy (dated May 17, 1999) was approved in July 1999 and is referenced in the 1999 Forest Management Plan, which was approved in December 2000. Version 1 remains the approved Version until Version 5 (this document) is approved as part of the next FMP.

Caribou Range Area

Portions of the A la Peche and Little Smoky caribou herd ranges overlap 63,025 ha (about 6.3% of the gross FMA area) of the FMA in the northwest corner of the Berland Working Circle (Table 1). The most consistently

used portion of the A la Peche range is along Highway 40 in compartment Berland 1. Most of the remaining A la Peche area has very low or no caribou use (Figure 5 and Figure 7). Periodic use by caribou occurs and the habitat may be important during certain years or seasons. Habitat that is not currently used or used occasionally also provides future flexibility if caribou shift range use because of changing habitat conditions or other environmental changes, and it may help caribou space away from predators.

Table 1 – *Area of the A la Peche and Little Smoky caribou ranges and proportions within the HWP's FMA*

Range	Total Area (ha)	FMA Area (ha)	FMA Area (% of range)
A la Peche	661,500	23,869	3.6
Little Smoky	308,380	39,156	12.7
Totals	969,880	63,025	6.5

Originally the A la Peche herd was thought to be the only caribou herd that used the FMA. The Little Smoky herd range jointly defined by Alberta Fish and Wildlife Division and West Fraser did not overlap with the FMA. Since then telemetry information has shown that Little Smoky caribou occasionally spend brief periods south of the Berland River in the Jesse Creek (Berland 21) area of the FMA, mostly during snow-free seasons (Figure 7). The FMA caribou range was subsequently subdivided into two portions corresponding to each herd. Note that telemetry information documented occasional interchange of animals between the two herds, which may indicate that they are not genetically distinct.

Over the last 27 years a handful of caribou observations have occurred on the FMA outside the recognized Caribou Range boundaries. These observations included radio-collared animals from the A la Peche and Little Smoky herds and others with unknown origins.

Alberta Government biologists used radio-collar data, sightings, and sign such as tracks and droppings to define the ranges of the A la Peche and Little Smoky herds (Figure 9). These areas have changed little since the early 1980s, apart from the decision to subdivide FMA caribou range between the herds. As part of the 2004 revision of the West Fraser Wildlife Zone Map, there was a minor adjustment to the Little Smoky range boundary on the east side to follow the Jim Clark road. Another minor adjustment came when additional areas east of the Jim Clark road were added to the Little Smoky herd range, without consultation, in 2013. West Fraser believes that the existing process of government making periodic non-transparent changes to caribou range boundaries is not appropriate. West Fraser would like to see a science-based and transparent process developed to determine range boundaries and regular review (e.g. every five years) with public input to account for new information.

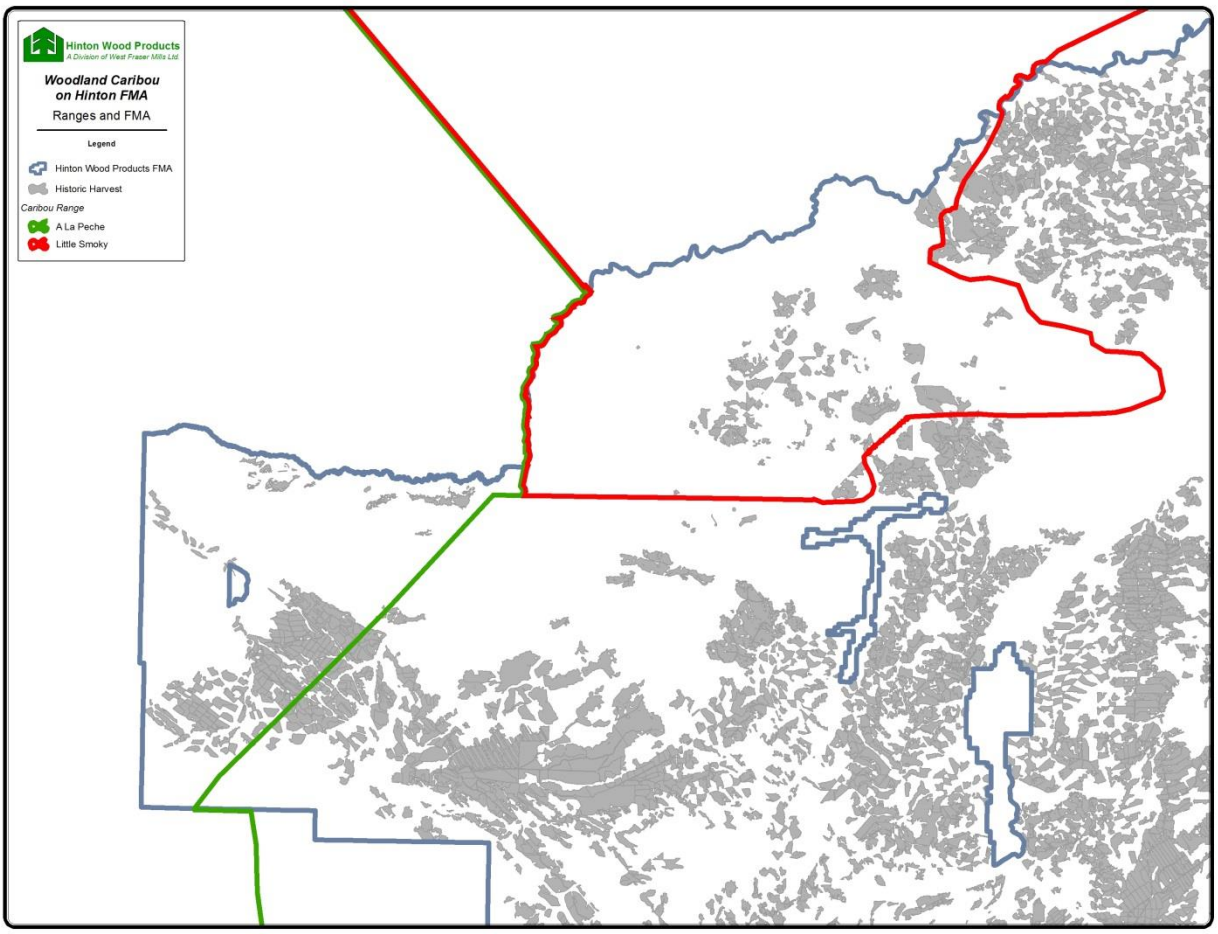


Figure 9 – *Map of the A la Peche and Little Smoky caribou ranges on the Hinton FMA with cumulative historic harvest*

Long-term caribou conservation success depends on effective management of the entire caribou range and consideration of certain key indicators addressing predation risk in surrounding areas.

Forest Management Plan - Long-Term Caribou Habitat Supply

1999 Forest Management Plan

For the 1999 FMP West Fraser developed an interim strategy for the FMA portion of the A la Peche and Little Smoky caribou herd ranges. At the time it was expected that the Alberta government would soon develop a coordinated long-term habitat supply plan for the caribou herds, and West Fraser plans would be adjusted if necessary to be consistent with the overall government direction. Long-term caribou habitat supply is principally influenced by natural disturbances (mainly fire), harvesting, and human surface infrastructure collectively called footprint. West Fraser and Alberta agreed to an FMP-level strategy to conserve caribou habitat, described below.

Major Strategy Elements in 1999 FMP

1. West Fraser kept future caribou habitat supply options open by reducing harvest rate within the caribou range and concentrating harvest operations to reduce area impacted. This resulted in deferral of approximately 1 million m^3 of timber harvest in the first 10 years of the FMP harvest schedule.
2. West Fraser directed conservation efforts at the entire caribou range with a core area being the highest priority for caribou conservation.

3. West Fraser was to set up harvesting during the first decade as a deliberate experiment and monitor caribou/habitat response through caribou monitoring/research programs. Experimental harvesting was to be designed to minimize risks to caribou.
4. West Fraser scheduled harvesting in the first decade to limit reduction of "mature/old forest", "fragmentation of caribou habitat", and reduction of "range effectiveness". Further definitions of these terms were to be developed through cooperative caribou conservation initiatives.
5. West Fraser would continue to participate with other companies and government agencies in efforts to develop a cooperative caribou conservation strategy for the entire A la Peche winter range.
6. When a cooperative conservation strategy was developed for the A la Peche caribou herd West Fraser was to review the caribou habitat conservation strategy and adjust it as appropriate to support caribou conservation goals, as mutually agreed to by West Fraser and Alberta.

In 1994 West Fraser voluntarily halted approved harvest in compartment Berland 1 at the request of AESRD. At the time there was no evidence of caribou use in the portion of FMA caribou range that is now identified as part of the Little Smoky Caribou range. West Fraser had conducted winter surveys looking for tracks and caribou for a number of years without finding any caribou sign, and no radio-collared animals had ever used the area. In 1997 West Fraser and AESRD came to an agreement to proceed with harvesting in compartments Berland 3, 7, 21, 22, 30, and 33 and harvest in these compartments was incorporated into the FMP.

The long-term caribou habitat conservation strategy provided an interim balance between caribou habitat values, timber values, and other values such as trapping, recreation, and oil, natural gas, and coal exploration and development. In keeping with legal requirements under the FMA, West Fraser maintained all timber-productive areas within caribou range as contributing to the 1999 FMP AAC. West Fraser also scheduled harvest of all timber within the range for harvest within the time remaining before expected stand breakup (loss of merchantable volume exceeds gain of merchantable volume), which is approximately 250 years of age. In keeping with an adaptive management approach, the contributing landbase and harvest schedule were to be revised if necessary, at such time as caribou habitat needs were better understood. Activities proposed in second and subsequent decades were to be re-considered in new versions of this strategy and in a new FMP before implementation.

1999 FMP Implementation Summary

A brief summary of the major strategy elements in the 1999 FMP and related events over the last 15 years is included below for context.

1. West Fraser kept future caribou habitat supply options open by reducing harvest rate within the caribou range. Consistent with the agreement between West Fraser and AESRD, a relatively small amount of harvesting occurred between 2001-2005 as part of efforts to complete 2nd pass in open compartments Berland 3, 30, and 33. First pass harvest was completed in compartment Berland 21 from 1998-2002 and commenced in compartment Berland 22 in 2005. In total 91 blocks and 2,579.8 ha were harvested (4.1%) of FMA caribou range (Table 2). In 2007 West Fraser deferred all further harvesting in FMA caribou range pending further development of government caribou range plans.

Table 2 – *Area harvested by compartment in FMA caribou range, 1998-2007.*

Compartment	Design	Blocks Cut	Area Cut	Years of Cut
Berland 3	2nd pass	8	106.4	2002-2007
Berland 7	1st pass	1	30.3	2006
Berland 21	1st pass	73	1,846.8	1998-2002
Berland 22	1st pass	3	346.6	2004-2005
Berland 30	2nd pass	2	211.7	2001-2002
Berland 33	2nd pass	4	38.0	2000-2001
Total		91	2,579.8	1998-2007

2. West Fraser did not harvest in the recognized core caribou range area.
3. West Fraser planned a large scale experimental harvest in cooperation with Alberta Newsprint Company and Foothills Forest Products. The Highway 40 project included proposed harvesting in compartment

Berland 1 designed to approximate a natural forest fire event. West Fraser did not implement the plan but is still committed to the project and will include it in the Spatial Harvest Sequence (SHS) in the new FMP.

4. West Fraser scheduled harvesting in the first decade to limit reduction of "mature/old forest", "fragmentation of caribou habitat", and reduction of "range effectiveness". Further definitions of these terms were to be developed through cooperative caribou conservation initiatives.
5. West Fraser continued working with other companies and government agencies in efforts to develop a cooperative caribou conservation strategy for the entire A la Peche winter range. These included the West Central Caribou Landscape Plan (2008) and the A la Peche and Little Smoky Range plan (2013-present). In 2005 West Fraser was a founding sponsor of the Foothills Landscape Management Forum, which was formed to work with the Alberta government on caribou conservation and Integrated Land Management. The FLMF has achieved several useful initiatives including the Berland Smoky Regional Access Development Plan and a proposed scenario for the Range Plan process. West Fraser supported caribou inventory, monitoring, and research over the years and most recently was a major sponsor of the new FRI Caribou Program which commenced in 2013.
6. West Fraser continually reviewed the caribou habitat conservation strategy and made adjustments to support caribou conservation goals.

2014 Forest Management Plan

West Fraser is participating in the ongoing Range Plan process for the A la Peche and Little Smoky caribou herds. As the process was not completed prior to submission of the 2014 FMP West Fraser developed an interim strategy that is consistent with the scenario proposed by the Foothills Landscape Management Forum and supported by the forest and energy sectors and the Aseniwuche Winewak Nation (AWN). When the Range Plan is approved this strategy will be reviewed and revised if necessary to comply with the Range Plan.

West Fraser proposed harvesting in FMA caribou range in the first 10 years of the Spatial Harvest Sequence. The existing deferral of harvesting in caribou range will remain in place until 2017, which means the earliest harvest in caribou range would recommence is the 2017 AOP. The schedule may be adjusted pending direction from the approved Range Plan.

Inventory

West Fraser completed two major habitat inventories for the FMA. The entire caribou range area was classified and mapped using both the Alberta Vegetation Inventory standard and the west-central Alberta ecological classification (Beckingham et al. 1996). Compartments and major roads are shown in Figure 10. The landbase allocation is shown in Figure 13. In cooperation with the FLMF, West Fraser also has an up to date and accurate digital database of all surface footprint and its current status in FMA caribou range (Figure 15).

Most current stands in FMA caribou range are mature to old fire-origin stands (Figure 14) dominated by lodgepole pine (Figure 11and Figure 12). There are three areas of young forest, in Berland 6 resulting from the Smith Creek fire in 1956, in Berland 3 resulting from logging from 1959–1983, and in Berland 21 and 22 resulting from logging from 1998–2007 (Table 1).

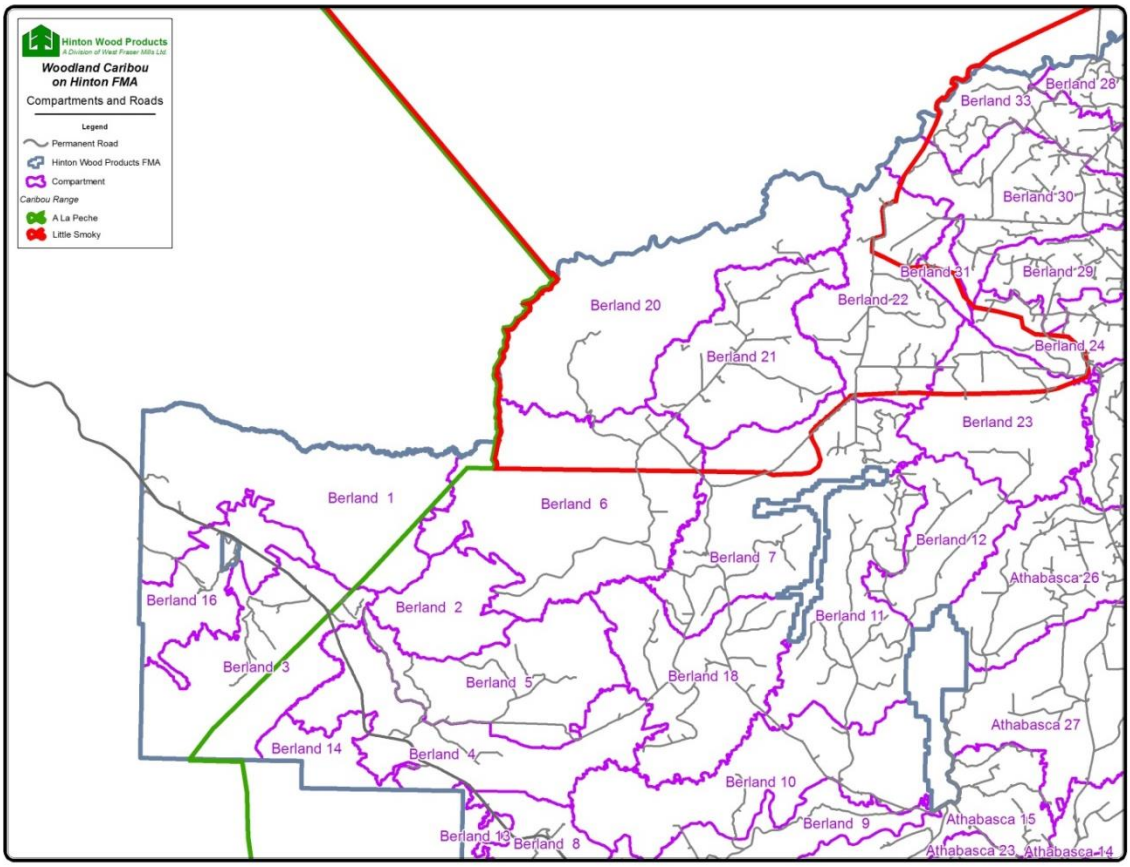


Figure 10 – *FMA caribou range showing compartments and existing permanent roads*

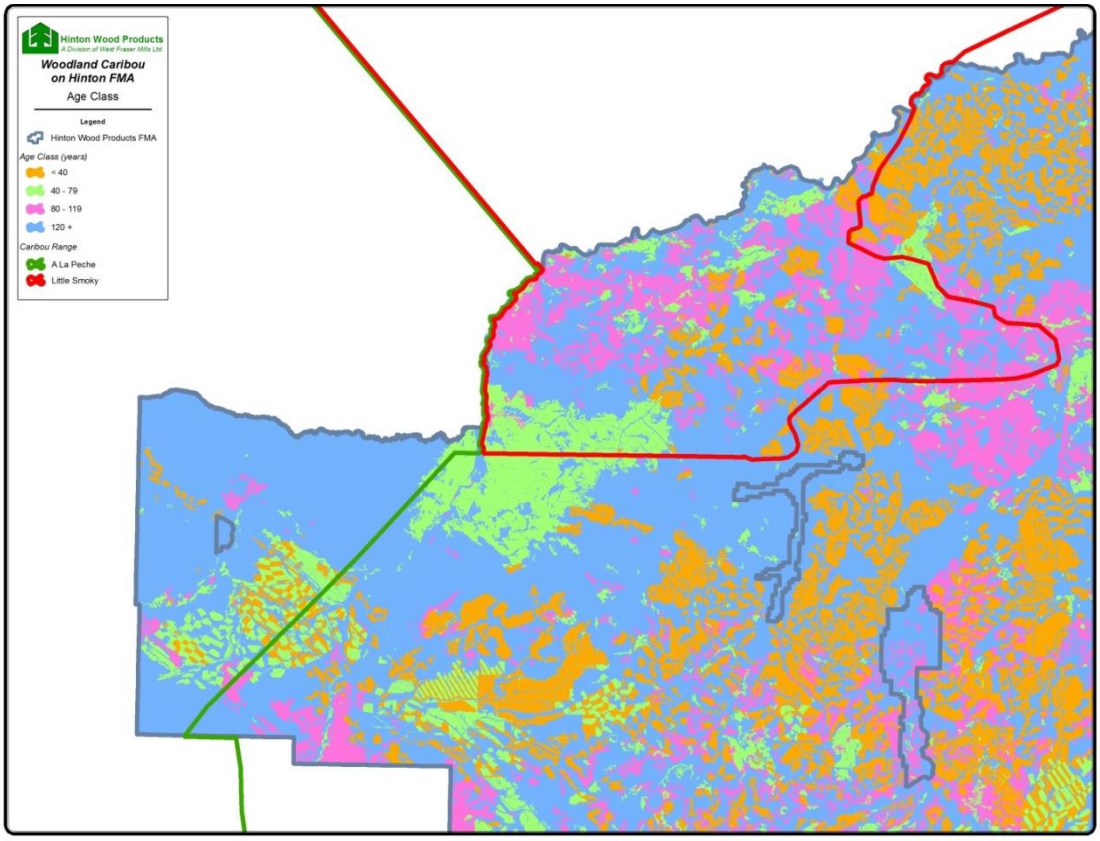


Figure 11 – *FMA caribou range showing current age class*

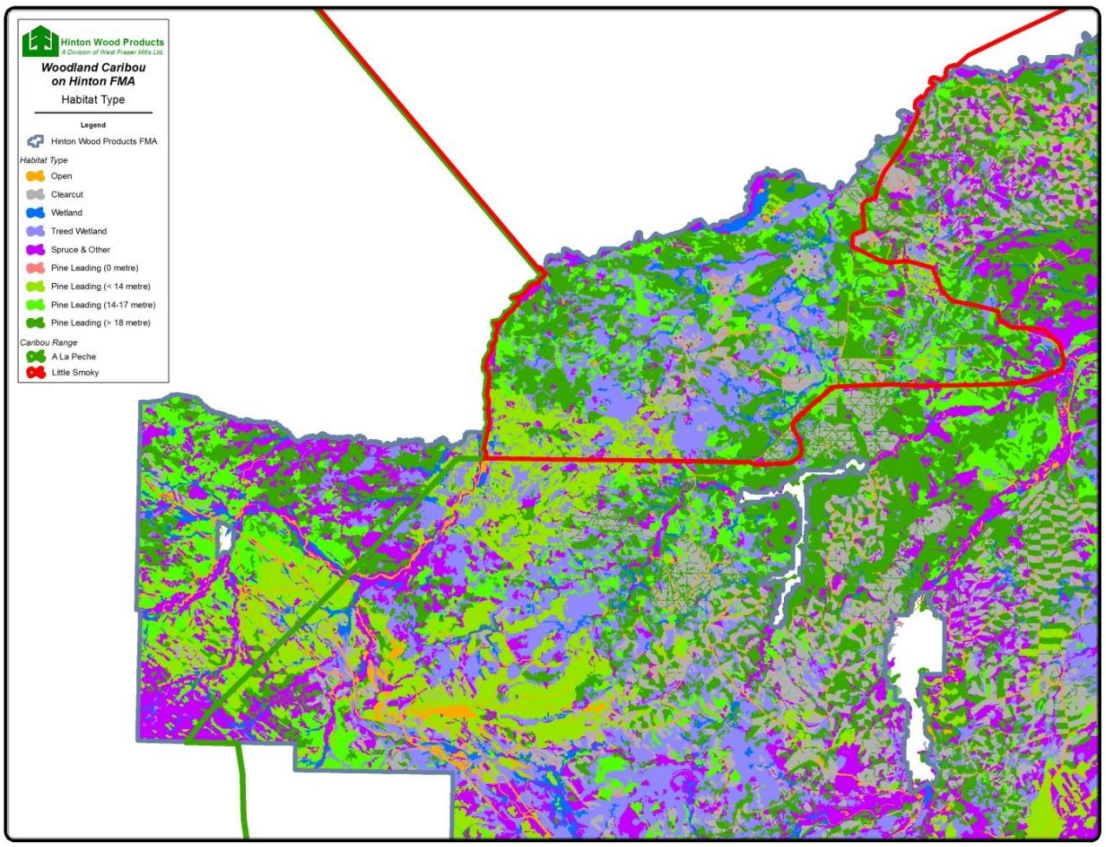


Figure 12 – *FMA caribou range showing major habitat categories*

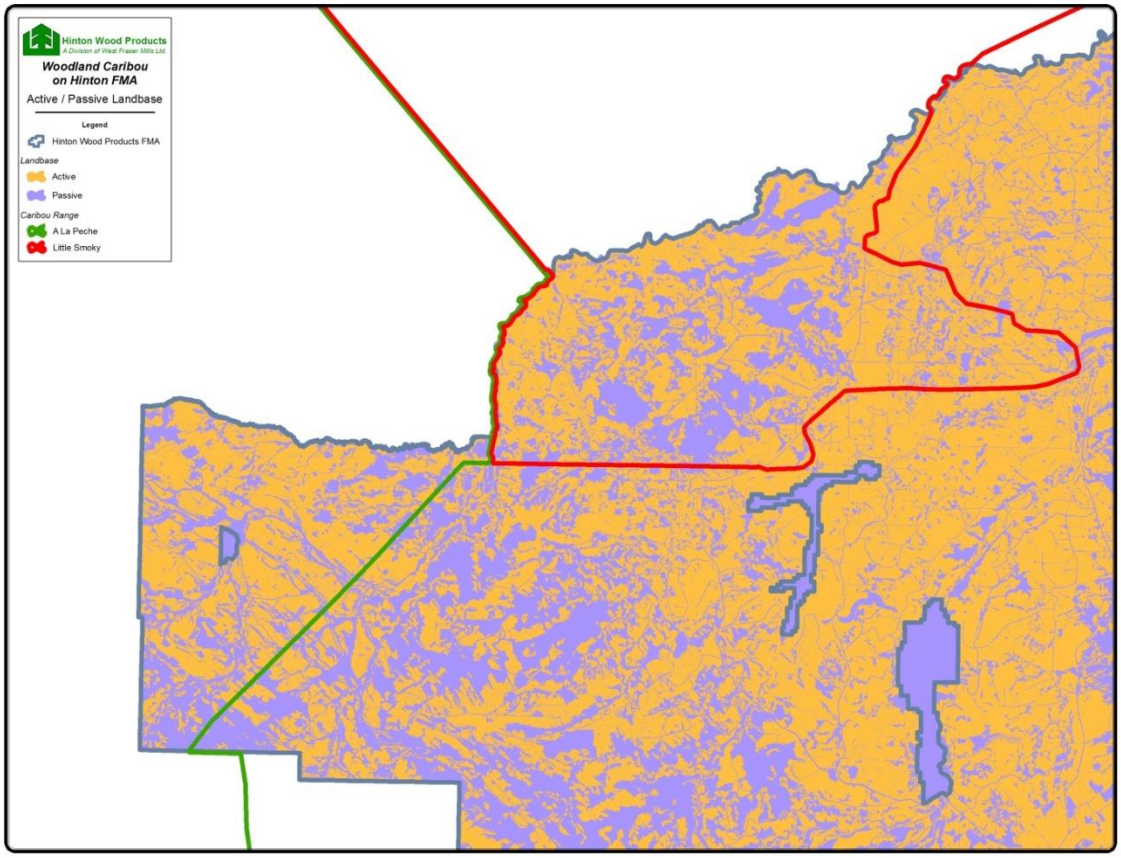


Figure 13 – *FMA caribou range showing active and passive landbase*

Table 3 – *Area in hectares of forest age class by major forest type in the Hinton Wood Products FMA caribou range based on 2012 inventory update*

Habitat Type	A la Peche Age Class in years, Area in ha				Little Smoky Age Class in years, Area in ha			
	< 40	40 - 79	80 - 119	120+	< 40	40 - 79	80 - 119	120+
Open	0.4	0.9	0.2	665.1	0.5	0.3	11.5	727.0
Clearcut	283.3	1.4	n/a	n/a	2,850.9	1.4	n/a	n/a
Open Wetland	0.9	2.4	0.1	1,192.9	2.0	0.8	2.5	1,736.3
Treed Wetland	1.7	75.2	6.4	1,189.6	15.4	2,011.1	1,947.2	5,650.3
Spruce & Other	64.9	427.7	37.1	6,303.9	64.3	512.0	578.3	1,384.2
Pine – 0 m	0.1	n/a	n/a	0.1	18.5	n/a	n/a	2.1
Pine <14 m	737.1	2,264.0	190.1	576.7	39.3	2,672.2	59.0	307.1
Pine 14-17 m	7.2	105.9	294.8	5,367.3	8.0	165.2	3,926.7	1,648.0
Pine >18 m	0.4	16.2	16.5	4,033.6	31.4	89.0	3,960.7	8,732.5
Total	1,095.9	2,893.6	545.2	19,329.2	3,030.3	5,452.0	10,485.8	20,187.5

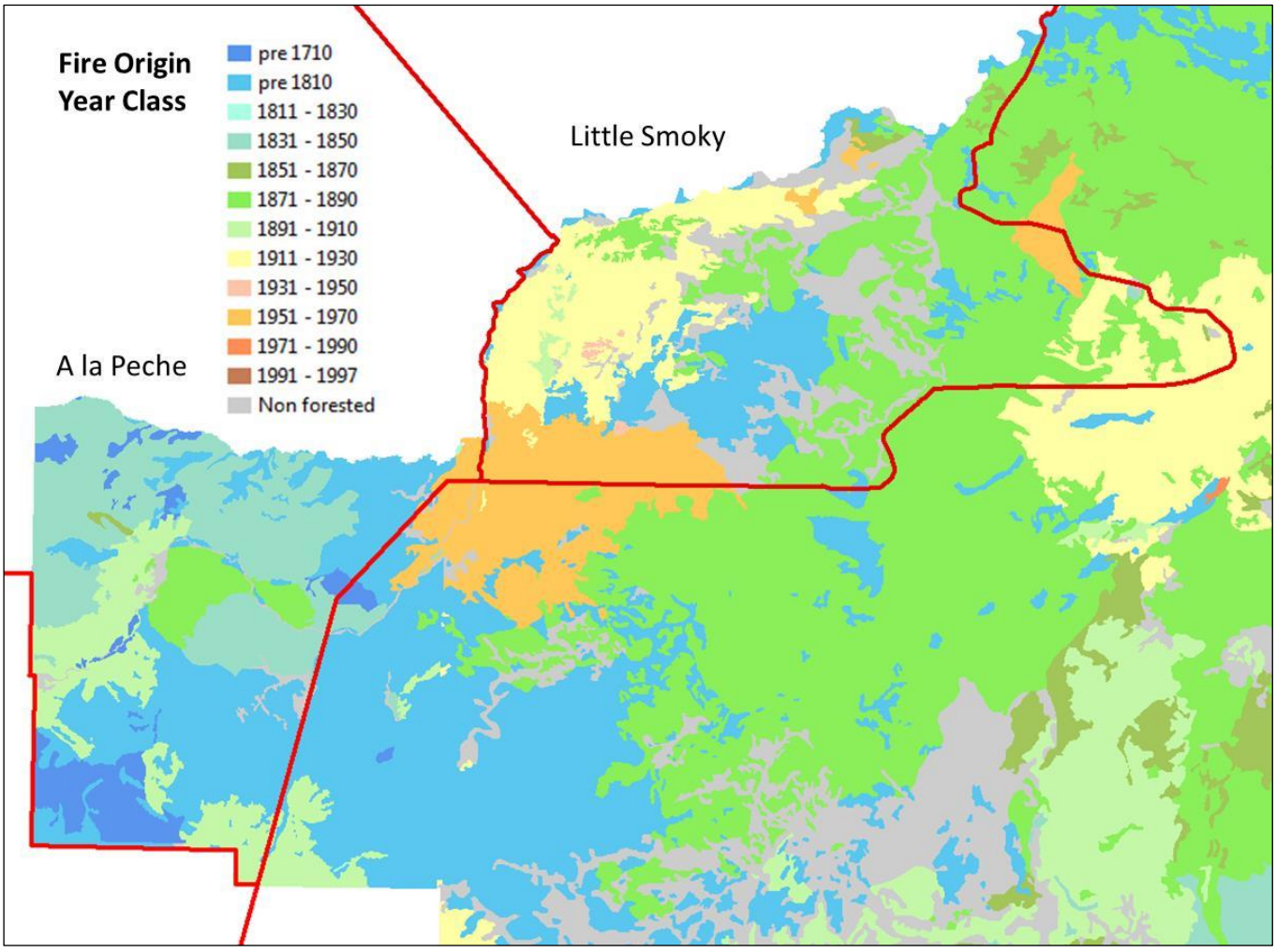


Figure 14 – *Fire origin year class for the A la Peche and Little Smoky caribou ranges on the HWP's FMA area. Data are from the West Fraser fire history inventory*

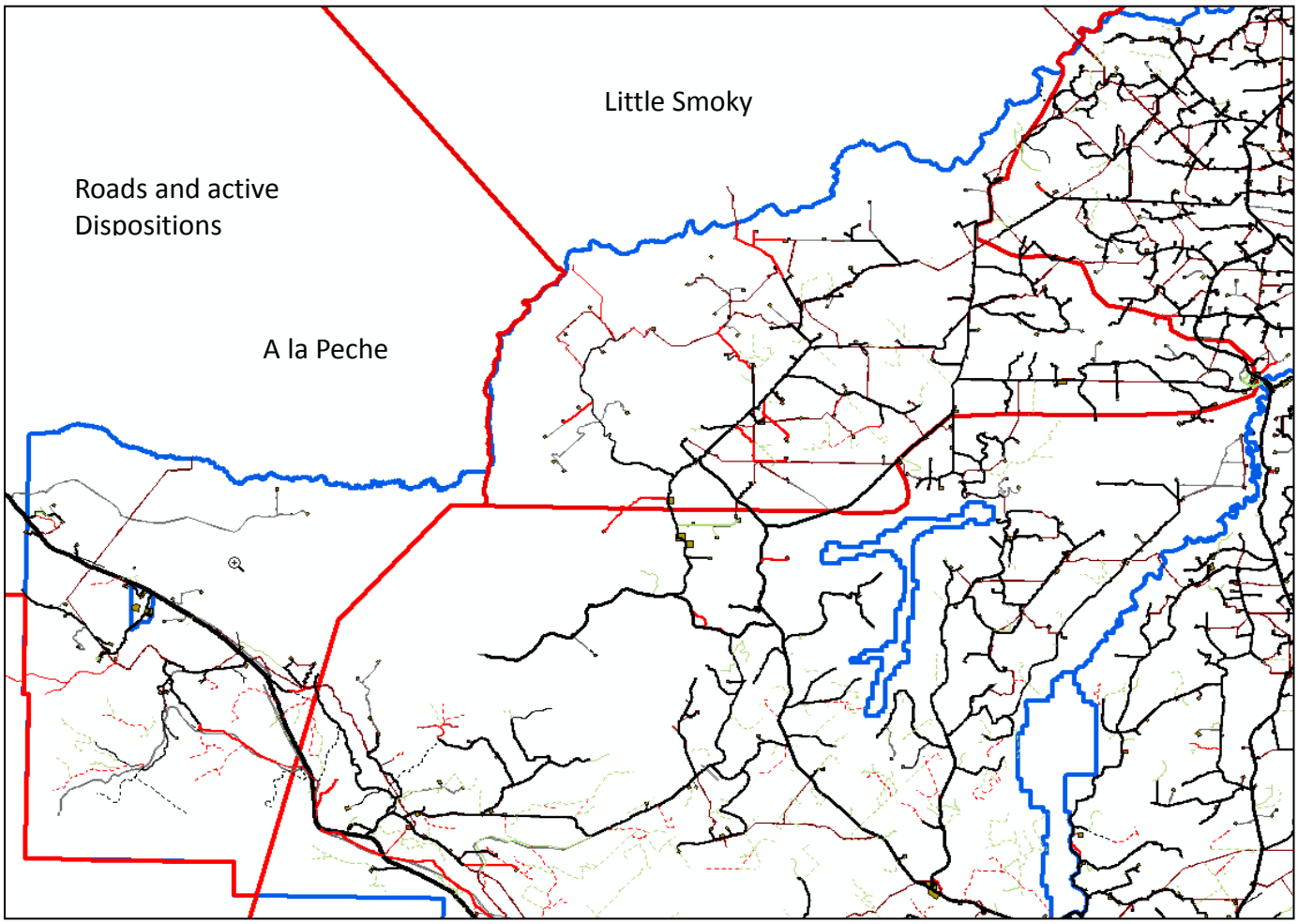


Figure 15 – *Surface footprint map for the A la Peche and Little Smoky caribou ranges on the Hinton Wood Products Forest Management Area. Data are from the West Fraser and Foothills Landscape Management Forum digital inventory layers as of October 8, 2014.*

The proposed SHS summary is shown in Table 4 (area by compartment) and Table 5 (% of range), with the first decade starting May 31, 2012. The schedule is presented as a percent of available timber volume for the contributing landbase within each compartment.

Table 4 – *70 year compartment area harvest schedule, commencing May 1, 2012, in the HWP caribou range*

D	A la Peche (by compartment)				Little Smoky (by compartment)										
	1	3	6	16	6	7	20	21	22	23	24	29	30	31	33
1	1,274	975	0	0	0	0	0	1,538	0	269	0	0	55	0	11
2	4,245	23	19	356	25	614	2,525	74	196	19	46	0	18	0	38
3	1,605	0	0	311	12	49	2,406	13	169	163	35	0	9	0	13
4	15	1	2	1,702	181	413	2,244	12	1,760	320	161	0	80	1	16
5	22	0	0	379	398	104	597	947	1,996	713	537	1	12	53	1
6	37	1,526	153	90	1,593	3	456	19	24	74	275	0	0	318	0
7	148	835	0	24	3	0	46	12	0	25	10	0	0	0	0

Table 5 – *70-year compartment percent harvest schedule, commencing May 1, 2012, in the HWP caribou range*

Cmpt #	Caribou range area (ha)			% Caribou range area Harvest by Decade						
	ALP	LSM	Total	1	2	3	4	5	6	7
1	12,141		13,079	10.5	35.0	13.2	0.1	0.2	0.3	1.2
3	6,831		9,696	14.3	0.3	0.0	0.0	0.0	22.3	12.2
6	363	4,230	14,673	0.0	0.9	0.3	4.0	8.7	38.0	0.1
7		2,027	10,636	0.0	30.3	2.4	20.4	5.1	0.1	0.0
16	4,529		4,529	0.0	7.9	6.9	37.6	8.4	2.0	0.5
20		12,920	12,920	0.0	19.5	18.6	17.4	4.6	3.5	0.4
21		8,439	8,439	18.2	0.9	0.2	0.1	11.2	0.2	0.1
22		6,976	8,547	0.0	2.8	2.4	25.2	28.6	0.3	0.0
23		2,081	7,560	12.9	0.9	7.9	15.4	34.3	3.5	1.2
24		1,469	4,880	0.0	3.1	2.4	11.0	36.6	18.7	0.7
29		1	5,201	0.0	0.0	0.0	0.0	60.7	0.0	0.0
30		394	7,977	14.0	4.5	2.3	20.4	3.0	0.1	0.0
31		489	890	0.0	0.0	0.0	0.1	10.8	64.9	0.0
33		131	4,425	8.4	29.3	10.0	12.4	0.4	0.0	0.0
Total	12,141		13,079	10.5	35.0	13.2	0.1	0.2	0.3	1.2

Caribou Habitat

There are several methods used to describe caribou habitat:

1. **Disturbed Habitat** – The Boreal Recovery Strategy (BRS; Environment Canada 2012) used a habitat concept called disturbance. Disturbed habitat was defined as the area of natural disturbances < 40 years old plus the area of all anthropogenic footprint including an additional surrounding area (buffer) of 500 m. The BRS target is to achieve 65% undisturbed habitat in each boreal caribou range (including the Little Smoky range).

2. **Intact Habitat** – The West Central Caribou Landscape Plan (WCCLP; WCCLPT 2008) used a habitat concept called intactness. Intact forest was defined as contiguous areas of coniferous forest > 80 years old and > 1000 ha that are not bisected by a road, pipeline, power line or major river. Seismic lines were not considered to be features that reduced intactness.

3. **Functional Habitat** – the Canadian Boreal Forest Agreement (CBFA; CBFA 2014) used a concept called functional habitat. Functional habitat was defined as habitat that is sufficiently old to provide winter forage, has comparatively small areas of young forest and anthropogenic footprint (i.e., corridors and clearings), and is of sufficient size to provide individual caribou with opportunities to space away from predators.

4. **Suitable Habitat** – West Fraser and others (e.g. de Cesare 2012) have developed other ways to characterize caribou habitat. These methods include Habitat Suitability Index (HSI; used by West Fraser in the 1999 FMP) and Resource Selection Function (RSF; e.g. deCesare et al. 2012) assessment and mapping.

5. **Effective Habitat** – The Alberta government introduced a concept called effective habitat to the ongoing A la Peche and Little Smoky Range Plan process. Effective habitat has characteristics which provide caribou with all of their ecological needs (i.e. food, shelter, ability to travel and disperse, ability to reproduce, and ability to avoid excessive levels of predation).

These habitat definitions are generally consistent about the major ecological functional aspects of caribou habitat. Foremost among the aspects is low predation risk. This is represented by distance from habitat areas (generally, open areas or forest < 40 years old) or landscape features (anthropogenic footprint) that act to increase predation risk, based on the assumption that caribou that are furthest from predators and primary prey have a lower predation risk. The second aspect is caribou food, primarily lichens which comprise the bulk of the winter diet. In summary, good caribou habitat has low predation risk and good caribou food resources.

Habitat that has low predation risk and low caribou food resources is also acceptable, provided that the mix of food and non-food producing habitat is sufficient to meet overall caribou nutrition needs. Alternatively, good caribou habitat is habitat that has caribou food and is not good primary prey habitat because it has low primary prey food. Predation risk is lower when there is spatial separation between caribou and primary prey/predators. Spatial separation can be provided by habitat, seasonal conditions (e.g. deep winter snow), distance, fencing, etc.

Habitat dynamics are an important aspect of habitat. Under natural disturbance regimes caribou habitat constantly changes in response to disturbances such as forest fires and recovery from disturbances. Over the long term disturbances are necessary to recruit and retire suitable caribou habitat. For example, terrestrial lichen abundance is not constant over time during the successional process after disturbances. Managing the quantity and quality of caribou habitat within the range of natural variation at the range level offers the best prospects for supplying caribou habitat over the long term. As of May 31, 2012 the proportion of the range that was >40 years old (corresponding to undisturbed habitat according to the BRS) was 88.5% in the Little Smoky range and 97.2% in the A la Peche range (Figure 16 and Figure 17). For the A la Peche range the unbuffered BRS target is within NRV, and the range would be expected to be at or above the unbuffered BRS target about 72% of the time over long periods. For the Little Smoky range the unbuffered BRS target is within NRV, and the range would be expected to be at or above the unbuffered BRS target about 51% of the time over long periods. It was not possible to duplicate the 500 m buffer calculation used in the BRS; however the effect of buffering areas <40 years old by 500 m to estimated BRS "disturbance" approximately triples the actual area <40 years old. This would have the effect of reducing the chances of actual disturbance levels remaining within NRV for significant proportions of time. The current situation reflects the history of both natural and harvest disturbance, including effective fire suppression and low rate of harvest over approximately the last 60 years.

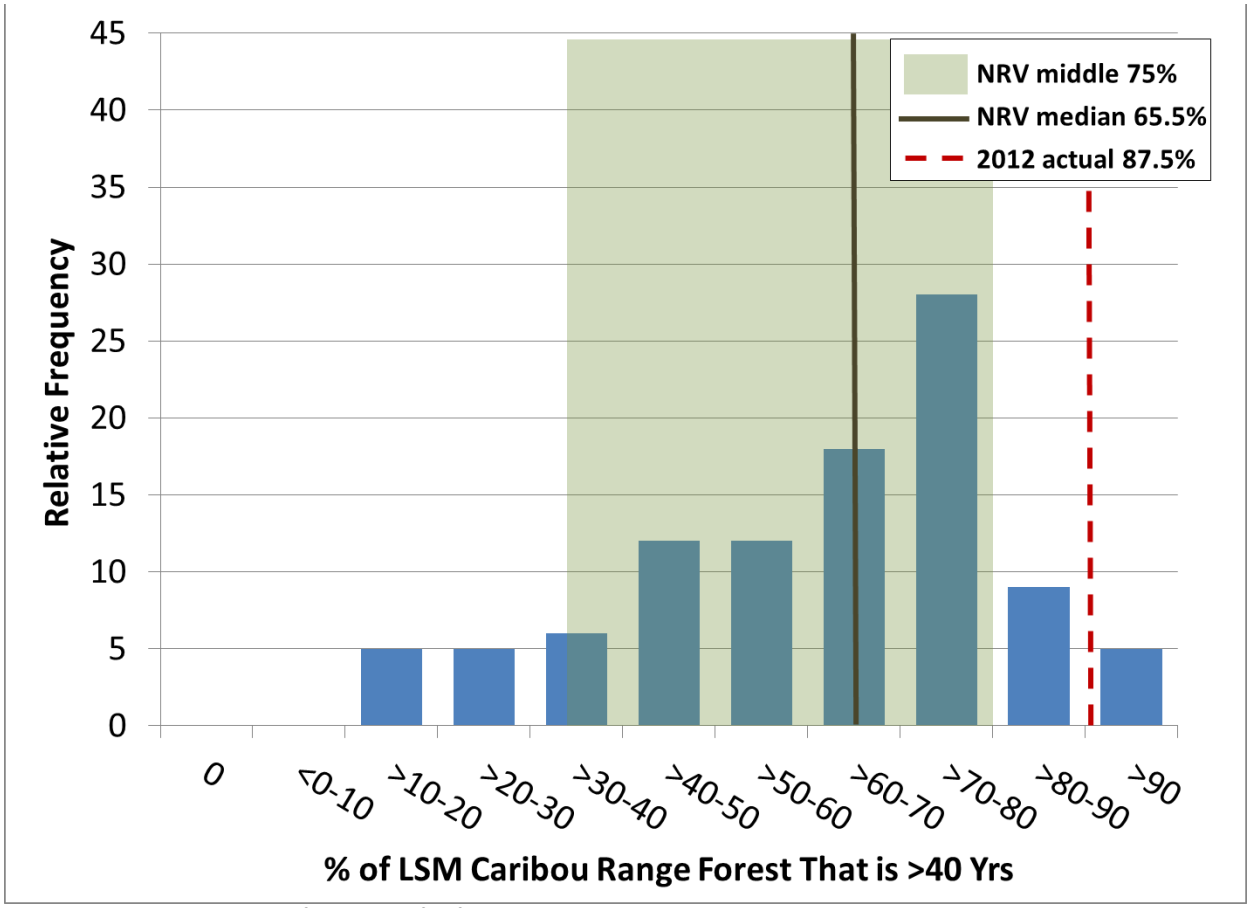


Figure 16 – *Natural range of variation for forest that is >40 years old in the Little Smoky caribou range. From natural disturbance analysis (see Appendix 2 in the 2014 DFMP).*

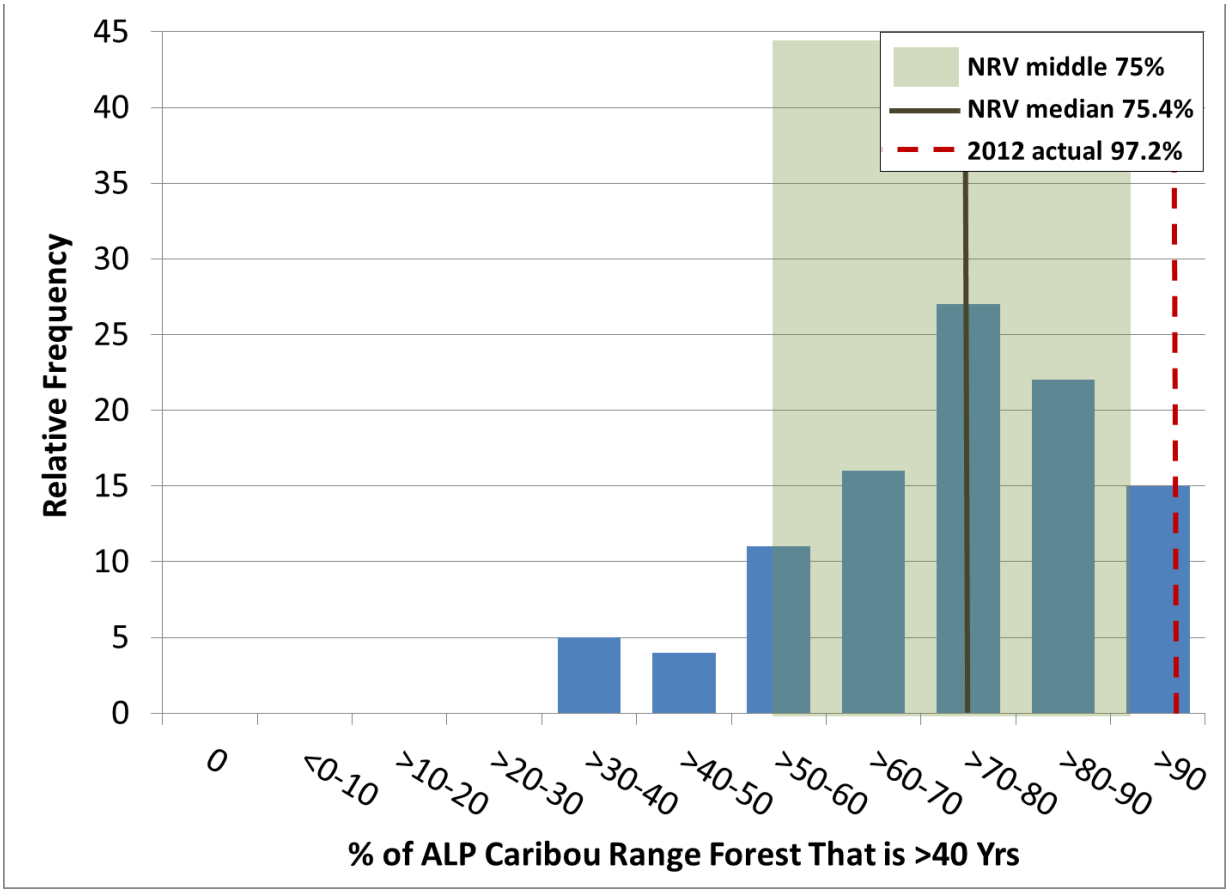


Figure 17 – *Natural range of variation for forest that is >40 years old in the A la Peche caribou range. From natural disturbance analysis (see Appendix 2 in 2014 DFMP).*

An agreed definition of habitat effectiveness has not yet been developed, nor, with the exception of the BRS, have habitat targets been set. The ultimate test of habitat effectiveness is caribou population persistence.

West Fraser's view is that effective habitat has:

- Low predation risk – habitat where risk of predation is low due to a combination of factors or actions. This could include predator control, predator access mitigation (e.g. line blocking), primary prey control (less food for predators), fencing (separate caribou from predators), habitat management, etc.
- High caribou food – habitat that has higher quantities of caribou food plant species (lichens especially some ground lichen species (shrub lichens, genera: *Cladina, Cladonia*, etc.) but also some tree lichens species (hair lichens, genera: *Bryoria, Usnea*, etc.].
- Low moose, elk, and deer food – habitat that has lower quantities of moose, elk, and deer food plant species.
- Additional functions including shelter, water, ability to travel and disperse, and ability to reproduce will likely be supported by actions to manage the three main functions. In other words, the other functions don't need to be managed or tracked individually.

West Fraser will continue to work with Alberta and others to define habitat effectiveness and set range-level targets. West Fraser will then ensure management of the FMA is consistent with overall direction set in the Range Plan and associated implementation plans. In the interim, the proposed harvest schedule creates a relatively stable future age class distribution.

Spatial Harvest Sequence

The proposed SHS for the first 10 years is shown in Figure 18. All of the proposed harvest either completes existing harvest events or builds on them. This will complete the disturbance events and start the restoration process for the areas. Harvest will not commence until at least May 1, 2017 and may change pending Range Plan direction.

For illustration the preliminary zone boundaries from the ongoing Range Plan process were included on the Figure 18 map. Zone 1 represents an area that contains a large proportion of caribou telemetry points and was identified as the highest priority caribou habitat within the range. West Fraser does not propose to layout or harvest any of the first 10 year SHS within Zone 1, pending final direction from the approved Range Plan.

The current area of "disturbed" forest due to forest <40 years old according to the BRS method is 21% of the A la Peche range and 31% of the Little Smoky range (Figure 19). At the end of the first decade the area of "disturbed" forest due to forest <40 years old according to the BRS method is 39% of the A la Peche range and 41% of the Little Smoky range (Figure 20).

The proposed SHS for the first 70 years is shown in Figure 21.

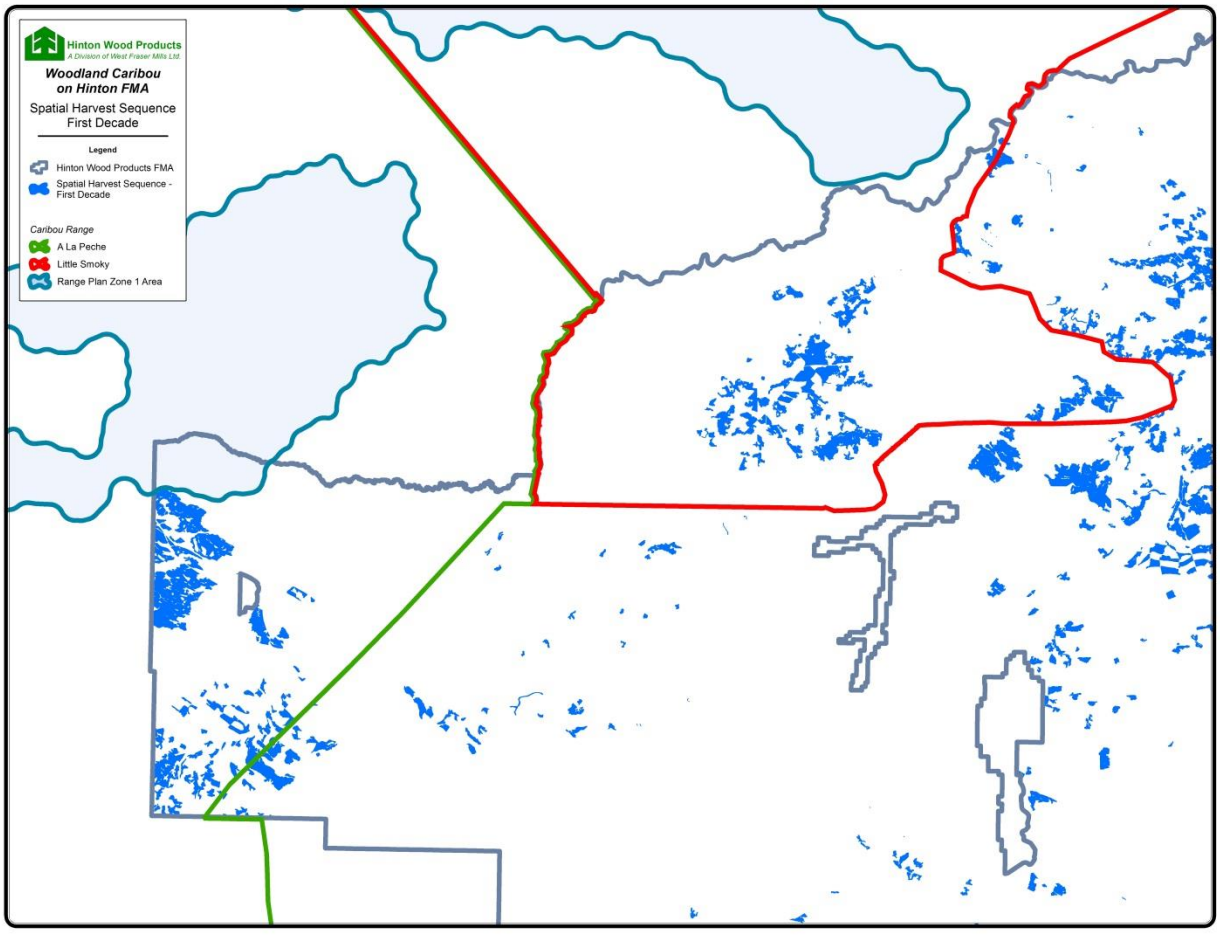


Figure 18 – *First decade spatial harvest sequence for the HWP FMA area caribou range*

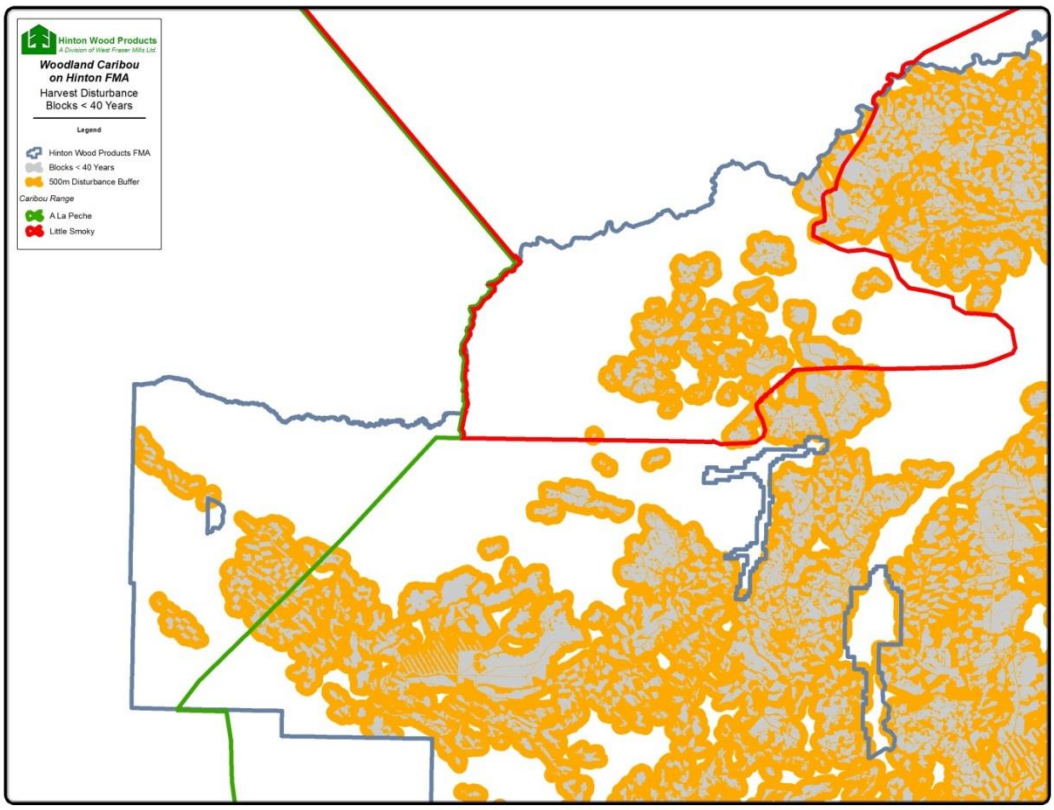


Figure 19 – *The current area of "disturbed" forest due to forest <40 years old according to the BRS method for the HWP FMA area caribou range*

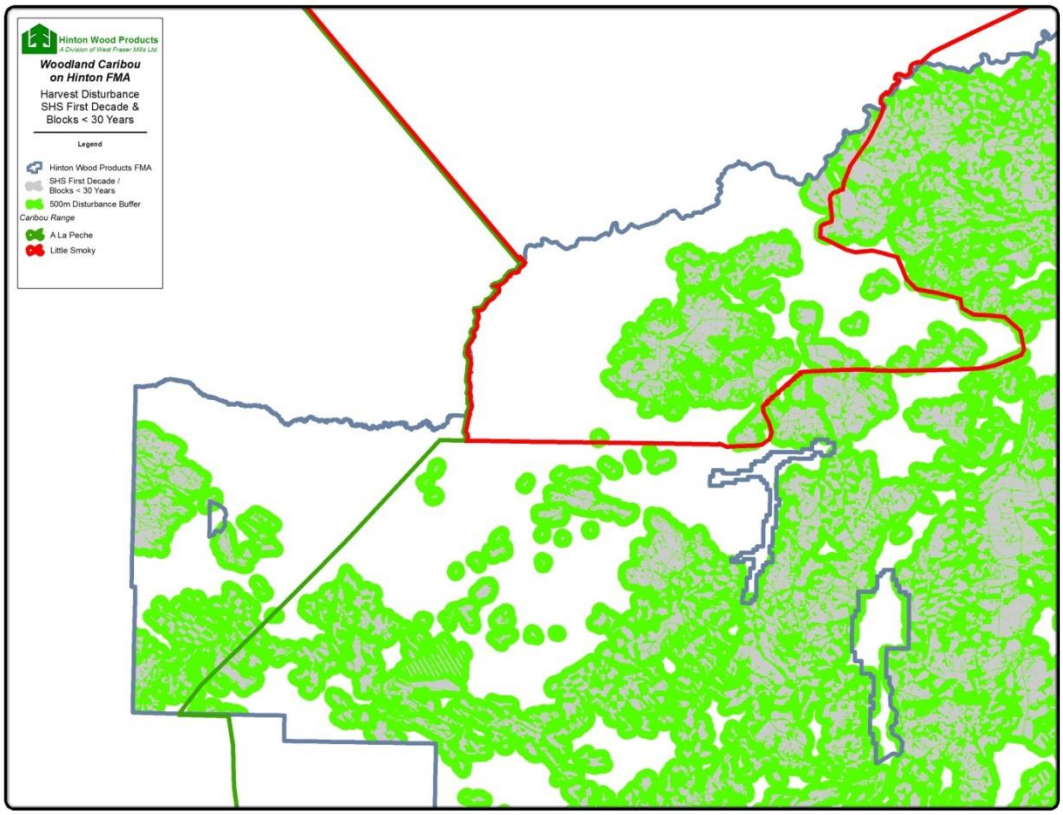


Figure 20 – *The area of "disturbed" forest after the first 10 years due to forest <40 years old according to the BRS method for the HWP FMA area caribou range*

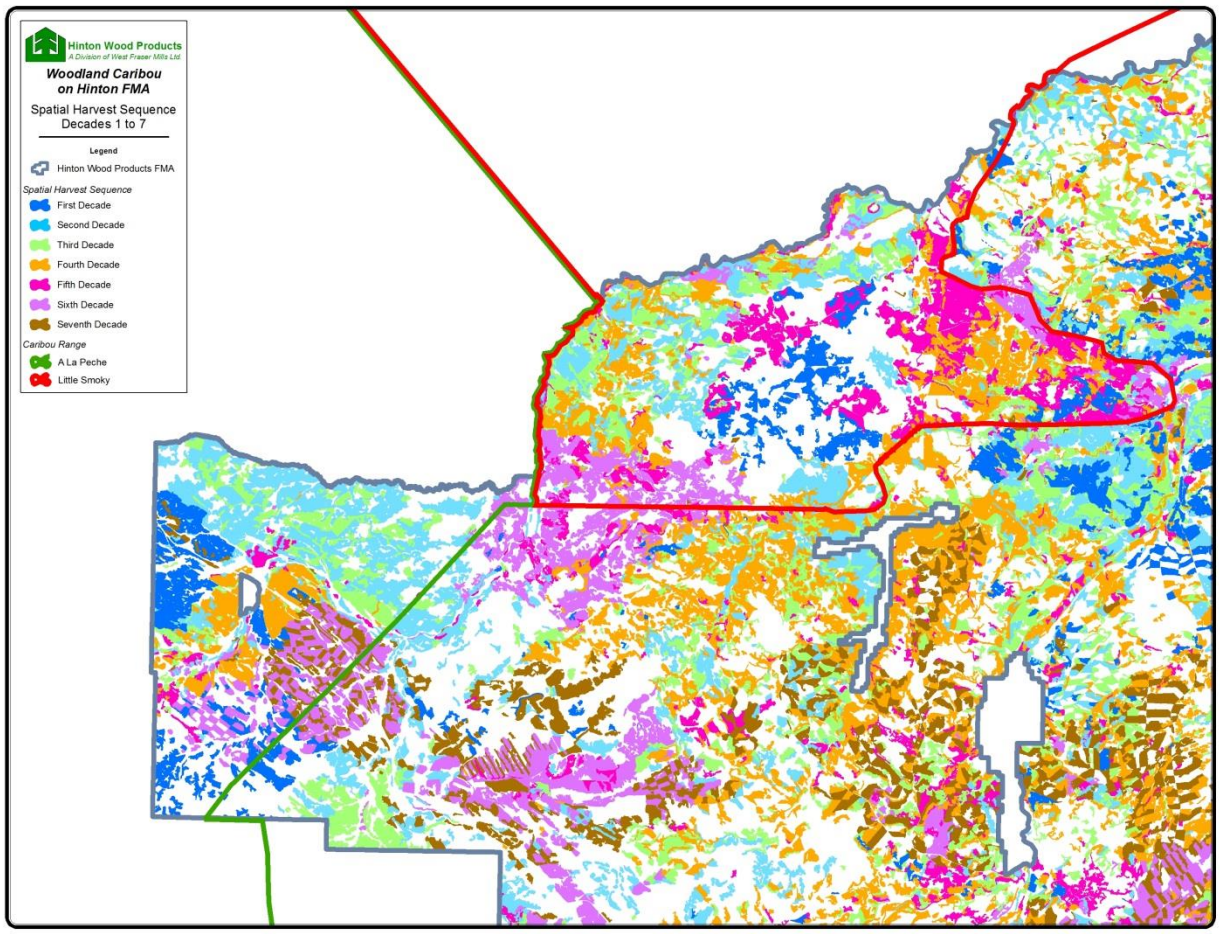


Figure 21 – *First seven decades spatial harvest sequence for the HWP FMA area caribou range*

Compartment Plans

Berland 1 – The most recent FHP for Berland 1 was approved in 1993. The original design was a 2-pass design for most of the compartment with a 3-pass design using smaller blocks in the area along Highway 40 that was recognized as used by caribou. West Fraser harvested 11 blocks from 1994–1996 in the 3-pass portion of the compartment and then voluntarily deferred further harvest at the request of ESRD. West Fraser monitoring (Applied Ecosystem Management 2001) and telemetry monitoring showed that caribou continued to use the area along Highway 40 where the blocks were cut.

West Fraser, Alberta Newsprint, and Foothills Forest Products cooperated to develop the Highway 40 Demonstration Project, which was a harvest design following EBM principles that clustered proposed harvest into a single large disturbance event. The West Fraser portion of the project overlapped and expanded the 1994–1996 blocks. West Fraser did not harvest any of the new design; however some of the Alberta Newsprint blocks were harvested. Current plans are to harvest the West Fraser portion of the project in years 5-10 of the SHS. Further harvest in Berland 1 is proposed for decades 2 and 3.

Berland 3 – The most recent FHP for Berland 3 was approved in 2002. Based on previous harvest activity, Berland 3 can be roughly divided into 3 sections from east to west. From 1959–1983, both passes were harvested in the eastern section, east of Moon Creek to both sides of Highway 40. In recent years scattered tracks, feces, and foraging crater observations show that caribou have occasionally used the regenerated stands in this section. Although within caribou range there is no history of known caribou use in the middle and western sections of Berland 3 and no caribou use sign was encountered during preparation of the FHP the winter snow-tracking program. First-pass cuts in the middle section were harvested from 1964–1967. Some

second-pass cuts in this section were harvested from 2002–2007. There was no previous harvest in the third section on the western side of Berland 3, which is mostly steep and inoperable.

Harvest in the compartment ended in 2007 when harvest was directed to reducing MPB susceptible stands. Current plans are to complete harvest of all merchantable timber in the compartment in years 5-10 of the SHS, and then to deactivate access to the extent possible considering ongoing access needs.

Berland 6 – The most recent FHP for Berland 6 was approved in 1997. One small block was harvested in 1997. Berland 6 is predominantly young forest originating from a forest fire in 1956. Current plans are to harvest in decades 4-6 of the SHS.

Berland 7 – The most recent FHP for Berland 7 was approved in 2004. One first-pass block was harvested in the caribou range portion of the compartment in 2006. One block was also harvested in 2006 in an area that was added to the Little Smoky caribou range after the block was harvested.

Berland 16 – The most recent FHP for Berland 16 was approved in 1997. Three blocks of a commercial thinning trial were harvested in from 1997–1999. Current plans are to recommence harvest in decades 2-5 of the SHS.

Berland 20 – There has been no historic harvest in Berland 20. Current plans are to commence harvest in decade 2 of the SHS and continue to harvest periodically for the next several decades.

Berland 21 – The most recent FHP for Berland 21 was approved in 1998. First-pass harvesting commenced in Berland 21 in late summer 1998 and was completed in 2002. West Fraser experimented with large cutblocks with residual patches in this compartment. The harvest design incorporated measures to maintain linkages between the large wetland systems within and adjacent to Berland 21 to support possible continued use of this area by caribou while harvested areas were regenerating. Telemetry information showed Little Smoky caribou use of the area, primarily in the wetlands, during summer after the harvesting was completed. Current plans are to complete harvest of all merchantable timber in the compartment in years 5-10 of the SHS, and then to deactivate access to the extent possible considering ongoing access needs. Deactivation opportunities may be limited as the energy sector is quite active in the area.

Berland 22 – The most recent FHP for Berland 22 was approved in 2001. First-pass harvesting commenced in 2002 and 13 blocks were harvested in the Little Smoky caribou range prior to suspension of harvesting in 2007. Current plans are to recommence harvest in decade 2 of the SHS.

Berland 23 – The most recent FHP for Berland 23 was approved in 2013. The Little Smoky caribou range was extended to encompass part of this compartment in 2013 after the FHP was approved. No blocks were harvested. Current plans are to harvest in decades 3-6 of the SHS.

Berland 24 – There has been no historic harvest in Berland 24. The Little Smoky caribou range was extended to encompass part of this compartment in 2013. Current plans are to harvest in decades 3-6 of the SHS.

Berland 30 – The most recent FHP for Berland 30 was approved in 1999. A very small portion of the western end of Berland 30 falls within the Little Smoky range. Harvest of two blocks in Berland 30 was completed in 2001–2002. Current plans are to complete harvest of all remaining merchantable timber in the compartment in years 5-10 of the SHS, and then to deactivate access to the extent possible considering ongoing access needs.

Berland 31 – There has been no historic harvest in Berland 31. Current plans are to commence harvest in decade 6 of the SHS.

Berland 33 – The most recent FHP for Berland 33 was approved in 1997. A very small portion of the western end of Berland 33 falls within the Little Smoky range. Harvest of four blocks in Berland 33 was completed in 2000–2001. Current plans are to complete harvest of all remaining merchantable timber in the compartment in years 5-10 of the SHS, and then to deactivate access to the extent possible considering ongoing access needs.

Long Term Access Plan

Roads are essential for timber management. As permanent roads remove small amounts (≤ 2%) of caribou habitat, physical habitat loss related to roads is likely to have little impact on caribou. Issues related to human use of roads are potentially more significant for caribou conservation. These include:

- Caribou mortality through vehicle collisions with caribou, related to use of roads for industrial activity and by secondary users.
- Caribou mortality through illegal human killing of caribou by poachers and mistaken-identity killing by hunters.
- Caribou mortality through legal human killing of caribou by status Indians.
- Increased caribou mortality by predators, if they use roads to increase their contact with caribou and then kill more caribou than they do otherwise.
- Sensory disturbance related to use of roads if disturbance indirectly increases caribou mortality (reduced fitness affecting survival, increased accident and/or predation rates).
- Reduced recruitment because of sensory disturbance related to use of roads, if disturbance indirectly reduces fitness of individuals or disrupts reproduction.

The management challenge is to plan, develop, and manage an efficient road network that meets human needs and addresses caribou conservation issues related to roads and associated human uses. The best way to meet this challenge is to develop and implement an access strategy, monitor human use and caribou response, and adjust the strategy as necessary. A Long Term Access Plan has been developed for the Berland working circle and can be found in Appendix 13 of the 2014 DFMP.

Access Strategy

West Fraser and Alberta reached mutual agreement on West Fraser access strategy for the FMA caribou range on July 30, 1998. West Fraser is continuing to implement the strategy and adjust direction following the principles of adaptive management. As part of this process West Fraser will comply with the intent of IL 2013-01 Berland Smoky Integrated Planning Area – Direction for Access Development.

The general approach is to construct an efficient permanent access network using graveled all-weather roads to access summer-operable ground. This supports business goals of supplying fresh wood to the Hinton mills on a year-around basis. To minimize permanent road development West Fraser will use temporary summer roads at the ends of the permanent road network and work with Alberta and other industries to develop and use common road corridors (i.e. the Berland Smoky Regional Access Development Plan). In cooperation with others, West Fraser will monitor the effectiveness of the strategy (see monitoring section). If necessary, additional measures will be taken to address access-related issues. The access management strategy is as follows:

- West Fraser will prepare and regularly update Long Term Access Plans that include FMA caribou range.
- Existing roads will be used when they meet the needs of the intended use.
- Where appropriate, extended skidding/forwarding, increased use of within-block temporary roads, and large blocks will be used to reduce permanent road infrastructure. This will occur mainly at the ends of the road network. Temporary roads will be reclaimed after operations have been completed.
- Unavoidable new permanent roads will be designed to avoid high quality caribou habitat (e.g. Jesse Creek wetlands) and meet needs for all current and anticipated future human uses.
- West Fraser will work with Alberta and others to identify and use common road corridors.
- The footprint of new permanent roads will be constructed to the minimum standard needed to ensure haul capability, safety, and environmental quality. Right-of-ways will be cleared to the minimum widths necessary to support construction and safe use, and right-of-ways will be reforested where safety considerations permit.
- West Fraser will work with Alberta and others to control human use of roads, where needed, to avoid or mitigate direct and indirect impacts of human use on caribou populations.

- Except for designated roads identified in the LTAP or FHP, access control measures or deactivation will be used to prevent 4x4-vehicle use on permanent Class 3 and 4a roads when they are inactive (not being used for ongoing operations or forest management purposes). Schedules based on events will be included in the LTAP or FHP for access control and road deactivation.
- Access control, deactivation, or reclamation measures will be installed as soon as possible after operations are completed. Temporary access control measures will be installed to prevent 4x4-vehicle access if the period between operations completion and the relevant action exceeds 1 month.
- Roads will remain open during operations periods unless there is a direct conflict between operations and caribou using the immediate area. If this occurs, each situation will be evaluated and appropriate response measures will be implemented. Access control measures will be used to limit public access on open roads if caribou are using an area and there is an identified conflict.
- Roads will not be plowed in winter unless they are being used.
- In cooperation with Alberta and others, existing access that is no longer needed will be identified and reclaimed. This will include roads, and seismic lines within blocks.
- Measures to reduce risk of vehicle-caribou collisions (daytime haul, reduced speeds, plowed escape trails, etc.) will be used when hauling or other road use overlaps with caribou presence. If a collision occurs, road use will be suspended until the incident has been reviewed and an appropriate response has been developed. This could include voluntary suspension of road use until caribou have left the area.
- In cooperation with Alberta, West Fraser will monitor the effectiveness of the access strategy and make adjustments to improve performance.

Berland Northwest Long Term Access Plan

The existing access network in FMA caribou range was developed on a road-by-road basis using established provincial road planning and approval processes. Under the current planning system, roads are planned, approved, and constructed according to an identified need, which is usually an industrial access for resource development. The first industry that needs access into a new area tends to develop roads to meet their own needs. Subsequent users develop additional roads to meet their particular needs, which may differ from those of the first user. This can lead eventually to a unnecessarily extensive ad hoc network of roads and other linear development that includes redundant roads and roads not constructed, maintained, or managed to meet current user needs and environmental considerations. Similarly, access for non-industrial users is usually not planned for and managed effectively. The result can have a significant cumulative effect on other resource values, including caribou conservation.

To address these issues, a Long Term Access Plan should be developed for each caribou range to rationalize the existing access network and select the best locations for new access. West Fraser will expand this concept to include a coordinated plan to manage both the access infrastructure and human uses of access. This will ensure that the access network in the area is efficiently designed and used to meet both human needs and caribou conservation goals.

In 1996 West Fraser developed the first version of the Berland Northwest Long Term Access Plan for FMA caribou range to identified West Fraser access requirements for FMA caribou range. West Fraser uses a long term planning framework and over a timber rotation needs some form of road access to all areas that contribute to the AAC on the FMA. All-weather permanent access to summer-operable ground is needed for harvesting, reforestation, and continuing access for forest management purposes. All-weather permanent access is also needed to provide emergency response capability, especially for forest fires and sour gas emissions. In general, the forest industry also requires the highest quality roads, and other industries can readily use forest industry roads for their purposes. The existing and proposed forest industry access network can serve as a template for access developed by other users, especially the petroleum and natural gas industry.

West Fraser prepared several versions of the Berland Northwest Long Term Access Plan and the most recent information was incorporated into the LTAP that was completed and submitted for approval with the 2014 DFMP (Appendix 13).

Berland Smoky Regional Access Plan

West Fraser proposed and was the lead organization for the founding of the Caribou Landscape Management Association in 2005 (now the Foothills Landscape Management Forum: FLMF). The FLMF proposed and developed an Integrated Industrial Access Plan for the A la Peche and Little Smoky caribou ranges, in collaboration with the Government of Alberta. The IIAP was partially approved and was the foundation for a more detailed Berland Smoky Regional Access Development Plan (RAD Plan) initiated and overseen by the Government of Alberta and delivered for approval by the FLMF. As part of RAD Plan approval the Government of Alberta issued IL 2013-01 Berland Smoky Integrated Planning Area – Direction for Access Development.

West Fraser is fully compliant with the intent and detail of IL 2013-01. West Fraser has not developed any new access within the RAD Plan area for at least 15 years and has worked closely with the energy sector and the Government of Alberta to ensure access developed by others follows proposed/approved corridors in the IIAP/RAD Plan documents. West Fraser will continue to comply with the intent and detail of IL 2013-01 and successor documents in regards to access in FMA caribou range.

Final Harvest Plans

Final Harvest Plans are developed according to the long-term operations schedule developed in the FMP and refined in the Development Plan. The 2014 FMP incorporates the long-term landscape-level caribou habitat conservation strategies described above. These and the SHS guide the preparation of individual FHPs. West Fraser biologists will participate in the development of each FHP to ensure consistency with landscape-level caribou habitat objectives established for FMA caribou range. Site-specific ecological features that provide important caribou habitat will be identified and protected (wetlands, licks, high-density lichen sites, etc.). Forested corridors along wetland complexes and watercourses will be used to facilitate landscape-level caribou movements. Harvest planning will incorporate measures to reduce compartment-level age fragmentation (large blocks, single pass, early harvest of 2nd pass, etc.) in areas where that is an objective. Harvest and renewal programs will be used to conserve terrestrial and arboreal lichen food resources for caribou and support continuing and/or future caribou use. West Fraser will identify suitable ecosites and stand types and design silviculture systems to manage lichen resources and prospects for caribou use. Specific measures proposed will depend on ecosite/stand characteristics and overall caribou habitat objectives. West Fraser will also experiment with harvest patterns and methods designed to support continued use of caribou in some areas such as the core A la Peche range, and patterns designed to produce suitable future caribou habitat in other areas.

West Fraser has supported several lichen ecology research projects. Our interpretation of the research results to date is that terrestrial lichens, which are the main food of caribou, may respond more positively to mechanical processes associated with harvesting and reforestation than chemical processes associated with forest fires. Thus, under appropriate conditions terrestrial lichens may regenerate at higher densities, and at faster rates following logging than following fire. This means that lichen abundance can potentially be increased on some ecosites over earlier or similar time periods when comparing harvesting and fire. There may also be opportunities to manage ecosites to maintain or enhance arboreal lichen production. West Fraser will continue to support lichen research and will experiment with silviculture methods to improve long-term lichen resources. West Fraser recognizes that these methods may in some instances adversely affect optimal timber supply strategies.

<u>Operations Timing</u>

Most A la Peche caribou previously migrated to the mountains west of the FMA during the spring and did not return until late fall, although a few caribou remained on the winter range all year. Human activities during the summer, when caribou are in the mountains, are least likely to result in direct disturbance impact to caribou. West Fraser will generally conduct forest operations during periods that have the least impact on caribou to mitigate direct impacts of forest operations on caribou. Summer operations will be emphasized to reduce overlap of operations and caribou range use. Winter operations will start and end as early as possible in the winter, but may be extended pending field confirmation of low winter severity or low caribou use in the

proposed operating area. Concentrating winter operations to keep the area of open access limited in extent will minimize open winter access in any given winter.

Stewardship Report – Monitoring, Research, and Adaptive Management

There is a growing body of knowledge about caribou and caribou conservation. Unfortunately, there are many examples of caribou declines or extirpations in areas where significant levels of human activity have overlapped with caribou populations. In these examples, little if any effort was expended to try to conserve caribou. Consequently, there is little experience with long-term caribou conservation in landscapes that also experience significant levels of human activity. Examples of caribou reoccupation of previously logged areas are now evident in Ontario and Manitoba and to a lesser extent for the Little Smoky and A la Peche caribou ranges. The challenge to managers is to develop and implement a caribou conservation strategy that will successfully integrate caribou conservation and human activities. In cooperation with others, West Fraser will use the process of adaptive management to meet this challenge. Assumptions and objectives will be specified and strategies will be developed to achieve objectives. West Fraser will monitor application of the strategies and progress towards achieving the objectives and will use the monitoring information to adjust the overall strategy. This process offers the best probability of successful integration of caribou conservation and human use. West Fraser is committed to continual improvement in sustainable forest management, which includes the successful conservation of all native species that occur on the FMA.

Human Use Monitoring

West Fraser monitored human use in caribou range using traffic counters, winter snowmobile transects, and helicopter surveys from 1998-2004. Formal human use monitoring was suspended in 2004. Subjectively since then, industrial use has increased and other human use has been relatively the same.

Caribou Monitoring

As part of the WCACSC research program, conventional VHF radio-collars were placed on A la Peche caribou starting in 1998. GPS radio-collars were deployed starting in 2000. Overall collared caribou use of FMA caribou range has consistently been relatively low compared to other portions of the caribou ranges.

Six roughly circular snowmobile transects were set up in November 1998 using existing roads, seismic lines, and trails to cover most of the FMA caribou range. Each transect took about 1 day to travel on snowmobile. An observer travelled each transect and recorded information about all species that crossed over the transect route (except grouse, snowshoe hares, squirrels, and small mammals). Few caribou tracks were observed. Information from the winters of 1998–2005 is contained in reports (Applied Ecosystem Management 1999, 2000, 2001; Gartner Lee 2003, Fiera 2005). Snowtracking was discontinued after extensive use of GPS collars came into play.

Aerial helicopter surveys of the FMA caribou range were conducted on December 14, 1998, January 19, 1999, and February 1, 1999. Caribou or caribou tracks were not recorded on any of the surveys, so aerial surveys were discontinued. ESRD maintains an annual program of late winter aerial surveys.

Research

West Fraser has participated in and funded several research projects to improve understanding of caribou and caribou habitat ecology:

1. West Fraser was an industrial sponsor and funder of 1990 research by Grande Prairie Regional College and the University of Alberta on lichen regeneration after harvest (Snyder and Woodard 1992).
2. West Fraser provided support to the Greater Jasper Caribou Ecosystem Project (Brown and Kansas 1994).
3. West Fraser conceived and funded 1993 research conducted by the Foothills Model Forest and University of Alberta (Kranrod 1996) on lichen response to harvesting and silviculture treatments. West Fraser also funded a contract with Applied Ecosystem Management Ltd. to re-measure the permanent lichen sample

plots established by Kranrod (Applied Ecosystem Management 2000a) and to document lichen regeneration in regenerated stands in Berland 3 (Applied Ecosystem Management 2000b).
4. West Fraser supported caribou research conducted by the Foothills Model Forest and the University of Alberta on the Weyerhaeuser FMA (Stepaniuk 1997).
5. West Fraser participated in a research project by the University of Alberta on lichen response to commercial thinning in lodgepole pine (Vitt 2000, Mooneyhan McClelland 2011).
6. From 1998-2002 West Fraser funded and participated in the West Central Alberta Caribou Standing Committee caribou research/monitoring program, which was coordinated through the University of Alberta. This program gathered a large amount of data and produced a number of reports (Kuzyk and Rohner 2000; Oberg et al 2000a, 2000b; Rohner 2000; Rohner and Demarchi 2000) and 7 theses (Oberg 2001, Kuzyk 2002, Szkorupa 2002, Smith 2004, Lessard 2005, Saher 2005, Neufeld 2006).
7. West Fraser initiated an experimental harvest program using large blocks with patch retention in Berland 21 in summer 1998 (Applied Ecosystem Management 1999, 2000, 2001).
8. West Fraser initiated a research project to assess the feasibility of assisting terrestrial lichen regeneration in harvested areas in 2001 (Kranrod and Anderson 2001).
9. West Fraser initiated a research project to assess the response of terrestrial lichens to thinning of regenerated stands in 2001 (Albright and Kranrod 2001).
10. West Fraser was a founding sponsor of the Foothills Landscape Management Forum in 2004. The FLMF is a group of forest and energy sector companies and one Aboriginal community working together and with the Government of Alberta on caribou conservation and integrated landscape management in west central Alberta.
11. West Fraser was a founding sponsor of the new Foothills Research Institute caribou research program in 2013.

West Fraser will continue to support research projects and experimental harvesting trials and use new knowledge to develop appropriate habitat management strategies for the FMA.

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Links

Alberta government caribou status
http://www3.gov.ab.ca/srd/fw/threatsp/wcar_stat.html

Alberta government caribou status report
http://www.srd.gov.ab.ca/fw/status/reports/caribou/index.html.

Alberta Caribou Committee
http://www.albertacaribouccommittee.ca/

Caribou general information
http://www.caribou-caribou.com/

Canadian Wildlife Service Hinterland Who's Who - Caribou
http://www.hww.ca/hww2.asp?pid=1&id=85&cid=8

Canadian Wildlife Service Species at Risk
http://www.speciesatrisk.gc.ca/

West Fraser
http://www.westfraser.com

West Central Alberta Caribou and Wolf Research
http://www.rr2.ualberta.ca/Research/Caribou/index.htm

Foothills Research Institute Caribou Research Program
https://foothillsri.ca/

Glossary

Caribou Special Management Area – Approximately 55,000 ha in the northwest corner of the Hinton Wood Products Forest Management Area that forms part of the A la Peche and Little Smoky caribou herd ranges.

Core Area – The Core Area is the portion of the Caribou Special Management Area that is used regularly by caribou.

Endangered – A species facing imminent extirpation or extinction.

Footprint – Human infrastructure including roads, trails, seismic lines, pipelines, powerlines, gravel pits, borrow areas, facility sites, etc.

Herd – A caribou "herd" refers to the animals that are habitually found within a defined area called a caribou range. In Alberta individual caribou within each herd generally have no, or infrequent, interaction with caribou in other herds.

Limiting Factor – A Limiting Factor is one that controls a process, such as organism growth or species population size or distribution. Caribou population size is controlled or limited by that essential environmental factor or combination of factors present in the least favorable amount.

Peripheral Area – The Peripheral Area is the portion of the Caribou Special Management Area that is not used or used occasionally by caribou (see Core Area).

Range – A defined geographic area within which most caribou from a herd are habitually found.

Threatened – A species likely to become Endangered if limiting factors are not reversed.

Threatened Species in Alberta – A species designated as Threatened under the Alberta Wildlife Act.

Threatened Species in Canada – A species or a population of a species designated as Threatened in Schedule 1 of the Canada Species at Risk Act.

Woodland caribou – The woodland caribou is the most southern caribou subspecies (*Rangifer tarandus caribou*) in Canada. Woodland caribou occur from British Columbia in the west to Newfoundland in the east. There are about 180,000 woodland caribou in Canada and many populations (sometimes also called herds) are at risk.