Range Plan for Woodland Caribou in Saskatchewan

Boreal Plain Ecozone – SK2 East Caribou Administration Unit

October 2025

saskatchewan.ca/woodland-caribou

Saskatchewan

Message from the Minister

I am pleased to release the SK2 East Range Plan for woodland caribou. The SK2 East Range Plan is the third range plan developed in Saskatchewan. It is based on the approaches created for the SK2 Central and SK2 West range plans but tailored to the situation and conditions of SK2 East.

This range plan represents several years of hard work by Ministry of Environment staff, other government ministries and colleagues, and most importantly, the many participants of the SK2 East range planning process.

A draft plan underwent a formal public review process in fall 2021. Comments were received from the forestry, energy, mining and peat harvesting industries, outfitters, Métis locals, conservation organizations and local municipalities. Comments included concerns about restricting land use activities and limiting economic development, uncertain implementation, a lack of information on woodland caribou population and habitat use, and many technical points regarding methods, modelling and forecasting. We thank all those who provided written comments.

This plan incorporates several changes to address the comments received, including modifications to caribou habitat management area boundaries, revised scenario analyses and revisions to the range plan document and appendices. The Ministry of Environment continues to work closely with industry, communities and other stakeholders and Rightsholders to implement Saskatchewan's range plans.

Saskatchewan's approach to woodland caribou range planning is to create healthy forest landscapes for woodland caribou and other species, while balancing these needs with a robust economy and high quality of life for Saskatchewan residents. We believe this plan has achieved that necessary balance. We look forward to working with all Rightsholders and stakeholders to implement the SK2 East Range Plan, and more broadly all of Saskatchewan's range plans, across our northern forests.

Minister of Environment,

The Honourable Travis Keisig

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Background

Boreal woodland caribou (woodland caribou) range across the boreal region of Canada. In Saskatchewan, woodland caribou can be found at low densities across much of Saskatchewan's northern forests. Woodland caribou are sensitive to habitat and sensory disturbance, and in some parts of their range woodland caribou populations are declining.

In 2002, boreal woodland caribou (woodland caribou) were recommended for "threatened" status by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). Caribou were listed as "threatened" under the federal *Species at Risk Act* (SARA) when it was proclaimed in 2003. As required under SARA, Canada developed the *Recovery Strategy for the Woodland Caribou Boreal Population in Canada* (the recovery strategy). The recovery strategy was released in October 2012 and amended in 2020.

Saskatchewan is responsible for managing woodland caribou on provincial and private lands, and as a signatory to the *Accord for the Protection of Species at Risk in Canada*, has a responsibility to prepare range plans for woodland caribou. Range plans provide a path forward for effective landscape management in northern Saskatchewan. Saskatchewan's *Conservation Strategy for Woodland Caribou in Saskatchewan* outlines the province's approach to range planning, which focuses on landscape-scale habitat management that provides benefits to multiple species.

Saskatchewan's approach to range planning recognizes the variation of wildfire regimes, ecological conditions, land use activity and human-caused disturbance across Saskatchewan's boreal forest. Based on Saskatchewan's major ecological regions, two caribou conservation units are recognized in Saskatchewan – Boreal Shield (SK1) and Boreal Plain (SK2). The Boreal Plain is subdivided into three administrative units – SK2 West, Central and East (Figure E1). The location of the SK2 East administrative unit (SK2 East) is highlighted. The goal of Saskatchewan's range plans is to achieve and maintain a self-sustaining woodland caribou population by managing habitat availability, while acknowledging Traditional land use and allowing for continued economic activity in northern Saskatchewan.

Figure E1. Ecozones and boreal woodland caribou range in Saskatchewan.

SK2 East Range Plan Summary

Planning Process

The SK2 East Range Plan is the third range plan developed in Saskatchewan. It is based on the approaches developed for the SK2 Central and SK2 West range plans but tailored to the situation and conditions of SK2 East. The SK2 East planning process was initiated in 2017. A planning table was established with representatives from affected First Nation and Métis communities, industry and other stakeholders and through a series of meetings, a draft plan was produced. The draft range plan was released for public review in October 2021.

This final range plan incorporates written comments received during the public review and subsequent discussions, including modifications to caribou habitat management area boundaries to accommodate near-term planned forest harvesting interests, revised scenario analyses and revisions to the range plan document and appendices. A companion document, *SK2 East Draft Range Plan Review Summary*, contains more information about the draft plan review comments and how they were incorporated or addressed, to the extent practicable, in this final plan.

Overview of the SK2 East Administrative Unit

At 25,338 square kilometres, SK2 East is a diverse region bordering on Manitoba (Figure E2). Significant features include the Pasquia and Porcupine Hills, Saskatchewan River (Cumberland) Delta, Suggi Lowlands, and Boreal Shield (SK1) transition. SK2 East is in Treaty 4, 5, 6 and 10 territory and home of the Métis. Major communities include Hudson Bay, Cumberland House, Elbow Lake, Red Earth, Shoal Lake and Sturgeon Landing. SK2 East includes several large protected and conserved areas including Seager-Wheeler Lake Ecological Reserve, Lobstick Lake Ecological Reserve and Wildcat Hills Provincial Park. Forestry is currently the major industrial land use activity, with mineral exploration and development increasing in the north. Traditional land use, recreation and outfitting remain important land uses.

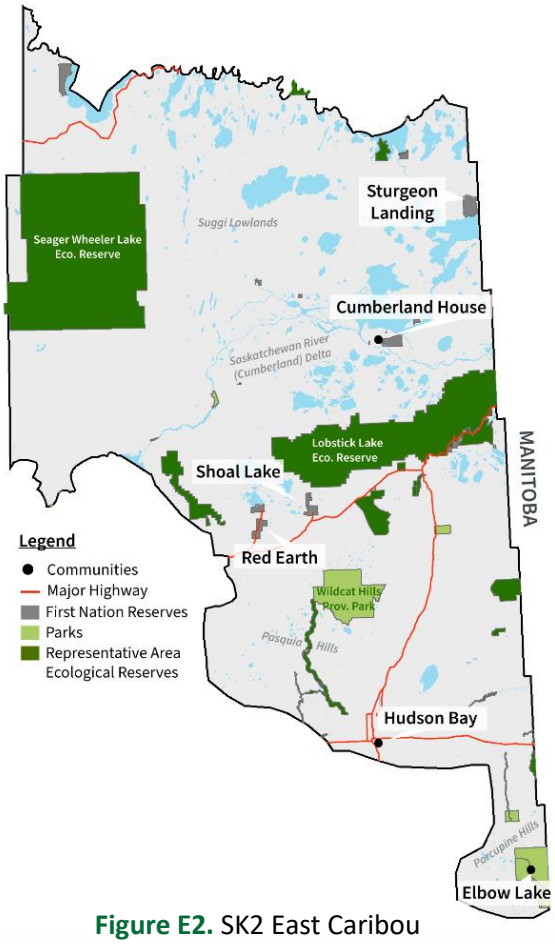


Figure E2. SK2 East Caribou Administrative Unit.

Woodland Caribou Habitat and Population Status

SK2 East provides the physical connection between caribou habitats in Saskatchewan and Manitoba. It has a large amount of high-value habitat and the lowest levels of human-caused disturbance and wildfire within Saskatchewan's boreal plain (SK2). Overall, SK2 East currently meets the federal recovery strategy target of maintaining a minimum of 65 per cent undisturbed habitat (Figure E3). The southern part of SK2 East has higher levels of land use and human-caused disturbance than the Cumberland delta and areas to the north. Caribou population numbers are uncertain, but based on disturbance trends, local knowledge and recent monitoring efforts, caribou appear to be declining.

Disturbance in SK2 East:

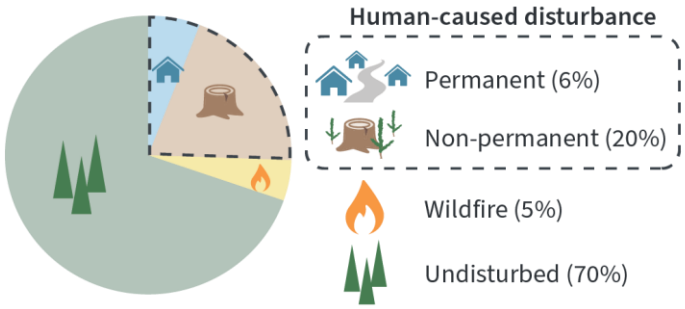


Figure E3. SK2 East habitat disturbance assessment results.

Management Strategies

The SK2 East range plan identifies five primary management strategies to reduce landscape and sensory disturbance and improve habitat conditions for woodland caribou and other species:

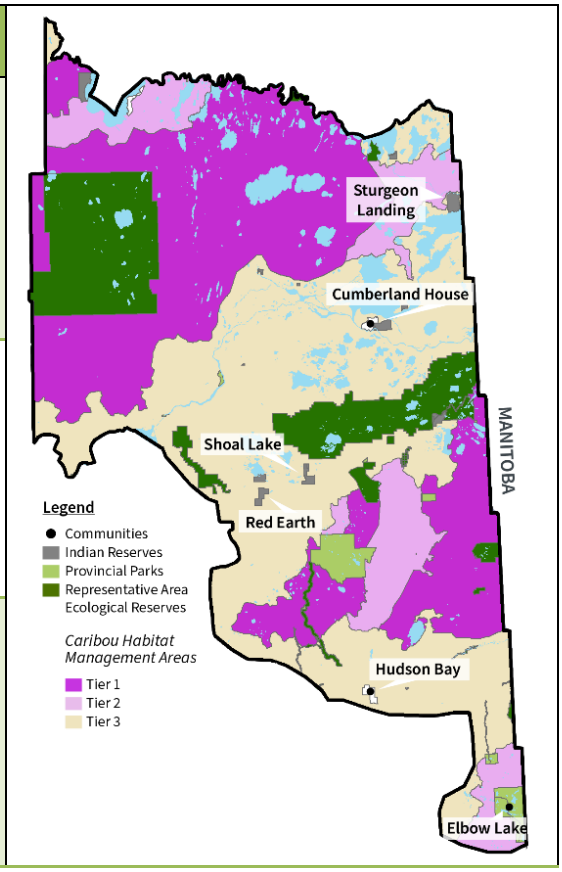
- Avoid and/or minimize new habitat or sensory disturbance in important caribou areas;
- Harvest forests strategically to create and maintain larger patches of old forest;
- Reclaim and restore old disturbances to create habitat;
- Manage access to reduce caribou exposure to people and predators; and
- Mitigate new disturbances by restoring habitat through offsetting in other areas.

These management strategies are supported by existing statutes and can be implemented within the context of existing legislation.

Caribou habitat management areas (CHMAs) identify zones ("tiers") with similar importance to caribou, potential risks and primary strategies for caribou conservation (Figure E4). These areas are not permanent—they will be updated as habitat conditions, land use and caribou populations change over time.

Figure E4. SK2 East CHMAs with associated management intent and strategies.

CHMA Tier	Management Intent	Area (km²) and Per cent	Management Strategies
Tier 1	Maintain important habitat	8,711 km² (34 per cent)	• Limit new disturbances. • Mitigate new disturbances. • Reduce the number of roads and trails.
Tier 2	Restore disturbed habitat	2,669 km² (11 per cent)	• Reclamation and restoration. • Mitigate new disturbances. • Reduce the number of roads and trails.
Tier 3	Maintain connectivity	10,264 km² (41 per cent)	• Maintain habitat connections (e.g. natural forest pattern harvesting).



The management strategies identified in this plan, and their application through the CHMAs, are designed to manage or reduce habitat disturbance while acknowledging Traditional land use and allowing for continued economic activity. The SK2 East Range Plan does not restrict Traditional use and access by Aboriginal and treaty Rightsholders, which includes hunting, trapping and harvest of caribou.

Landscape Management Goals

The focus of Saskatchewan's range plans is the creation of healthy forest landscapes for woodland caribou and other species. Managing the amount of human-caused disturbance, altering the pattern of human-caused disturbance, and maintaining adequately sized patches of undisturbed high-value woodland caribou habitat of appropriate ages, while maintaining connectivity between these areas, is central to this approach. Specific landscape management goals and targets for SK2 East are:

- **Landscape Management Goal 1:** Maintain the total amount of disturbance in SK2 East below 35 per cent.
- **Landscape Management Goal 2:** Maintain greater than or equal to 85 per cent of high potential woodland caribou habitat in a condition unaffected by human-caused disturbance.
- **Landscape Management Goal 3:** Maintain adequate connectivity between different areas of SK2 East and adjacent caribou administrative units, conservation units and Manitoba ranges.

- **Landscape Management Goal 4:** Implement forest harvest event sizes to more closely emulate natural forest patterns.
- **Landscape Management Goal 5:** Reduce the total amount of non-permanent linear features in Tier 1 and Tier 2 CHMAs.

Range Plan Implementation

Analysis conducted to support the SK2 East Range Plan suggests it will be possible to achieve the range plan goals while maintaining similar levels of land use activity. However, industrial, recreational and other users of Saskatchewan's northern forests may be required to modify their practices and activities.

Implementation will require sustained effort and a long-term view. Ongoing, effective reclamation of new roads and trails created to support resource exploration and development will be key to achieving the range plan goals. The direct benefits of habitat reclamation and restoration will not be realized for many years, but their early and continued implementation are essential to long-term landscape integrity and connectivity of woodland caribou habitat.

Saskatchewan will periodically report on range plan implementation, habitat condition, population trends and protection measures. Based on the principles of adaptive management, this information will inform periodic review and updates to Saskatchewan's range plans, including SK2 East. To support plan reviews, Saskatchewan is committed to ongoing monitoring, assessment and research to inform management actions and the achievement of population and landscape objectives and targets. Monitoring and research priorities will be completed in collaboration with appropriate researchers, communities and agencies.

1.0 Recovery Planning in Saskatchewan

In 2002, boreal woodland caribou were recommended for "threatened" status by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC, 2014) and were listed as "threatened" under the *Species at Risk Act* (SARA) when it was proclaimed in 2003. As required under SARA, the federal government developed the *Recovery Strategy for the Woodland Caribou Boreal Population in Canada* (the recovery strategy), which was released in October 2012 (Environment Canada, 2012) and amended in 2020 (ECCC, 2020). The recovery strategy outlines the minimum amount of undisturbed habitat needed in a boreal caribou range for a local population to be self-sustaining.

Figure 1. Ecozones and boreal woodland caribou range in Saskatchewan.

Boreal woodland caribou range in Saskatchewan is divided into two areas based on ecozones: the Boreal Shield (SK1) and the Boreal Plain (SK2) (Figure 1). These two areas notably differ in their amount of natural and human-caused disturbances. The amended federal recovery strategy indicated the Boreal Plain (SK2) is at risk from high levels of habitat disturbance and identified 65 per cent undisturbed habitat as the disturbance management threshold which provides a 60 per cent probable chance for the caribou population to be self-sustaining. Distinct from the Boreal Plain (SK2), the Boreal Shield (SK1) was identified as requiring at least 40 per cent undisturbed habitat for a self-sustaining caribou population. The Boreal Shield (SK1) has a high amount of natural disturbance (i.e. wildfire) and a low amount of human-caused disturbance (i.e. development), with a stable caribou population (McLoughlin et al., 2019).

Range plans are intended to outline how caribou ranges will be managed to increase and maintain suitable habitat for woodland caribou. Saskatchewan, as signatory to the *Accord for the Protection of Species at Risk in Canada* is responsible for managing woodland caribou on provincial and private lands and has a responsibility to prepare a provincial range plan for woodland caribou under the federal recovery strategy. Woodland caribou in Saskatchewan were assessed provincially as "threatened" in 2000 (Godwin and Thorpe, 2000). In response to the assessment, the Saskatchewan Ministry of Environment worked with First Nations and Métis communities and a variety of stakeholders to develop a provincial *Conservation Strategy for Boreal Woodland Caribou* (Saskatchewan Ministry of Environment, 2014).

The goal of the Saskatchewan woodland caribou conservation strategy is to:

Sustain and enhance woodland caribou populations, and maintain the ecosystems they require, throughout their current range.

The conservation strategy was developed to act as the basis for a landscape management approach for boreal ecosystems with benefits to caribou and other species of concern. As part of this strategy, the province completed a risk assessment and determined that, due to relatively high levels of human-caused habitat disturbance and fragmentation, woodland caribou populations in the Boreal Plain (SK2) were at higher risk of decline and potential extirpation (i.e. complete loss of the species in the area) compared to those in the Boreal Shield (SK1).

Based on the provincial risk assessment, Saskatchewan prioritized recovery efforts and range planning in the Boreal Plain (SK2) with range planning for the Boreal Shield (SK1) being initiated afterwards. Concurrent with the SK2 range planning, habitat type, degree of disturbance, as well as caribou population data for the Boreal Shield (SK1) was gathered to support future range plan development. Range assessment and range planning activities that have contributed to this range plan reflect many actions identified in Saskatchewan's *Conservation Strategy for Boreal Woodland Caribou*.

Throughout this document **"woodland caribou"** and **"caribou"** refer to **"boreal woodland caribou"**.

2.0 Range Plan Development Process

This range plan provides a path forward for effective landscape management to ensure sufficient quality habitat for a self-sustaining woodland caribou population. Healthy and self-sustaining populations of caribou would accommodate rights-based Traditional harvest within Saskatchewan. Range plans also provide the necessary information for the federal government to understand the measures, tools, and targets for managing woodland caribou habitat in Saskatchewan and ensuring its effective protection. Woodland caribou are a wide-ranging species and range plans will provide a foundation for landscape-level habitat management with benefits for other boreal species.

The goal of the Saskatchewan Woodland Caribou Range Plan is to:

Achieve and maintain a self-sustaining woodland caribou population by managing habitat availability, while acknowledging Traditional land use and allowing for continued economic activity in northern Saskatchewan.

The Government of Saskatchewan considers the woodland caribou range assessment and planning processes to be part of a broad landscape management strategy for provincial Crown lands in caribou habitat. Saskatchewan's approach is to reduce human-caused disturbance, create disturbance patterns which are more like natural disturbances, maintain patches of undisturbed high-value caribou habitat, and ensure connectivity across and between caribou ranges while creating and maintaining healthy forest landscapes for woodland caribou and other species.

At the same time, Saskatchewan's range planning process is an important part of maintaining natural systems and functions essential to achieving the objectives of Saskatchewan's Growth Plan including:

- Delivering on Saskatchewan's climate change plan by sustaining ecosystem integrity and resilience;
- Enhancing the sustainability of Saskatchewan's nature resource exports;
- Conserving Saskatchewan's water and land resources; and
- Ensuring that economic growth sustains a high quality of life for Saskatchewan families and communities.

2.1 Guiding Principles of Range Planning

Saskatchewan's range plans are guided by four key principles:

- **Collaboration, consultation, engagement, and transparency:** Range plans are developed with the participation of diverse land use interests including First Nations and Métis communities, industry, northern municipalities, non-governmental organizations and other stakeholders. The participation of land users together allows for effective information sharing, helps guide range plan development, builds collaborative relationships, deepens the understanding of potential interests, concerns, and solutions of the interested parties, and develops a shared commitment to the outcomes.
- **Balanced approach:** Range plans work to ensure self-sustaining caribou populations while supporting Saskatchewan's Growth Plan so that needs of the present can be met without limiting future opportunities. Ongoing management activities related to past and current industry activities support future development and restoration planning to ensure range plan objectives are met.
- **Best available information:** Range plans are developed using the best available information, including Indigenous local and Traditional knowledge, and western science. Range plans will be reviewed and refined as new information becomes available, through continued monitoring, research and analyses.
- **Leverage current tools and processes but create new as required:** Range plans will seek to use currently available legislation, policies and processes to achieve desired outcomes. There is recognition that it will take time to meet the desired outcomes, and that new adaptive management tools will be developed and implemented as required. Industry, First Nation and Métis communities and stakeholder groups will be engaged to ensure there are opportunities to provide input during these processes.

2.2 Saskatchewan's Range Planning Framework

2.2.1 Caribou Conservation Units

Saskatchewan's boreal woodland caribou range is divided into two caribou conservation units (Figure 2), based on the boundaries of boreal ecozones (Acton et al., 1998). The SK1 Caribou Conservation Unit encompasses the rocky shield, sandy plains and varying topography of the Boreal Shield ecozone. The SK2 Caribou Conservation Unit includes the more productive mixed-wood forests of the Boreal Plain ecozone, including large areas of low-lying peatlands. While these two conservation units represent important differences in ecological conditions (e.g. habitat types, wildfire regimes, landforms) and human land use and management (e.g. overall levels and types of land use, wildfire management), the boundary between SK1 and SK2 does not represent a woodland caribou population boundary. Caribou move freely between the two areas and the distribution of woodland caribou within the SK1 and SK2 caribou conservation units is relatively continuous, without discrete ranges (Priadka et al., 2018). Based on this information, Saskatchewan has not defined local caribou population ranges, as suggested in the federal recovery strategy. Instead, Saskatchewan has developed caribou administrative units as the basis for a landscape approach to managing caribou and caribou habitat.

2.2.2 Caribou Administrative Units

The large size of the SK2 Caribou Conservation Unit (i.e. 109,717 km^2) presents challenges for range assessment and range planning. Across Saskatchewan's Boreal Plain, there is large variation in ecological conditions, habitat types, land use, and natural disturbance regimes. To better reflect this variation, three smaller caribou administrative units (CAUs) within SK2 were developed: SK2 East, SK2 Central, and SK2 West (Figure 3).

The CAUs should not be considered discrete caribou population boundaries—landscape level genetic analysis has shown no evidence of individual populations (Priadka et al., 2018). The three CAUs were defined based on the following considerations:

- Large enough to be meaningful for management of woodland caribou given their ecology and life history;
- Represent important ecological differences from east to west;
- Follow forest management agreement or term supply licence area boundaries for effectiveness of administration; and
- Represent a geographic area that is manageable for developing and implementing a range plan.

The three CAUs, SK2 East, SK2 Central and SK2 West, were evaluated to compare population status, disturbance levels, habitat characteristics and the potential level of risk to maintaining a sustainable caribou population. Based on these results, Saskatchewan implemented a staged approach to range planning, beginning with SK2 Central and subsequent planning for SK2 West and East, respectively. Range planning in SK1 was initiated following completion of the SK2 range plans.

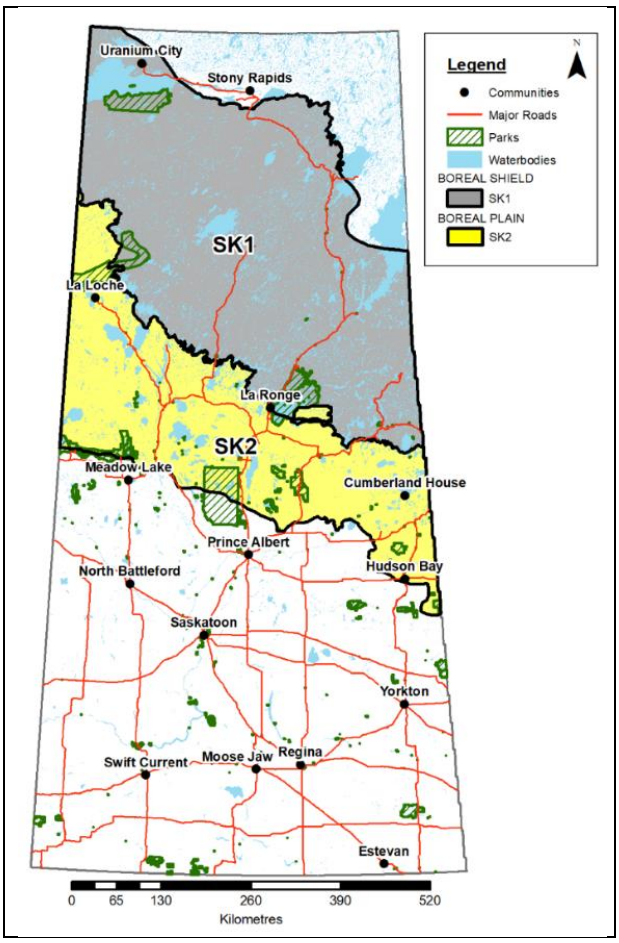


Figure 2. The Caribou Conservation Units of Saskatchewan.

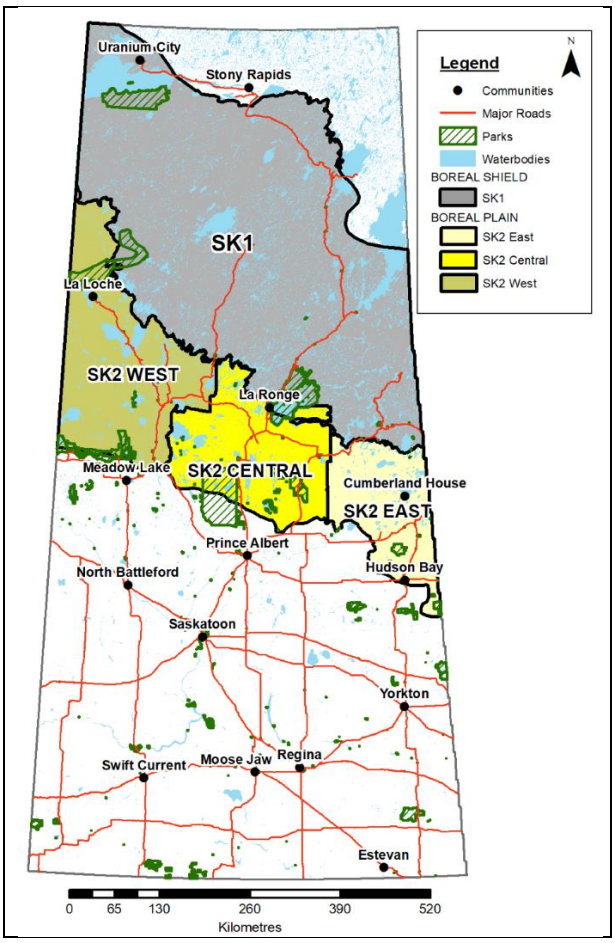


Figure 3. The Caribou Administrative Units associated with the SK2 Caribou Conservation Unit.

Note: Caribou conservation and administrative units are available for viewing on the Hunting, Angling and Biodiversity Information of Saskatchewan (HABISask) online mapping application: https://gisappl.saskatchewan.ca/Html5Ext/?viewer=habisask

and for download on the Species at Risk GeoHub page: https://environment-saskatchewan.hub.arcgis.com/pages/species-at-risk

2.3 Range Planning Process

Saskatchewan's range plans are developed through a two-phase process involving range assessment and range planning. The range assessment phase provides an understanding of the status of and the risks to woodland caribou. It is an information gathering and evaluation process to guide planning and decision making. Range assessments characterize risks to maintaining a sustainable caribou population across different areas of Saskatchewan's woodland caribou range. The range planning phase includes developing range plans that guide how land use will be managed through time to optimize woodland caribou habitat and natural resource use. This includes establishing management objectives and strategies, as well as approaches for monitoring and adaptation. Implementation of these strategies follows range plan development. Range planning sets a path for prioritizing planning areas, as well as demonstrating a landscape planning framework with woodland caribou as a focus.

2.3.1 Opportunities for Participation

Saskatchewan's range planning process has been designed to provided opportunities for First Nation and Métis communities and stakeholders to engage in and contribute to the planning process. Key elements of this approach include:

- Identifying industries, non-government organizations, associations, municipalities, and First Nation and Métis communities that may have interests in the particular caribou administrative unit.
- Establishing a planning table consisting of representatives from First Nation and Métis communities, industry, non-governmental organizations, and municipalities to provide an opportunity for effective dialogue.
- Engaging with planning table participants and others at locally held meetings and other forums to present and discuss the program intent, the desired outcomes, current disturbance levels, future disturbance scenarios, and possible management strategies to facilitate desired outcomes.
- Engaging with participants to understand the implications of management strategies on communities, organizations and industry.
- Engaging and consulting with First Nations and Métis communities to understand potential implications of management strategies on Treaty and Aboriginal rights and to accommodate those potential impacts where practicable.
- Developing practical and effective management strategies with input from communities and interest groups, with ongoing dialogue during their implementation.

2.3.2 Planning and Working Collaboratively

Saskatchewan's range plans involve planning table participation from agencies and groups with shared responsibility for woodland caribou populations in adjacent jurisdictions (i.e. Alberta, Manitoba and Northwest Territories), federal agencies with leases of Provincial Crown lands (i.e. Primrose Lake Air Weapons Range), or designated federal lands (i.e. Prince Albert National Park). Collaboration continues with adjacent jurisdictions and with partner agencies during range plan implementation.

Local and Traditional knowledge are important parts of Saskatchewan's range planning process. Indigenous people have lived on the land for millennia, and whose knowledge, practices and beliefs in woodland caribou range support sustainability. Traditional knowledge and involvement from Indigenous peoples in the range planning process improves understanding of current and past caribou habitat as well as variation in local caribou populations. Inclusion of local and traditional knowledge in range plan implementation improves understanding and supports informed, local input.

In the SK2 East planning area, local and Traditional knowledge and western science contributed to an enhanced understanding of important caribou habitat and population information. The ministry strives to integrate both perspectives when making range planning decisions, and during range plan implementation.

2.4 SK2 East Range Plan

The SK2 East range plan was developed through a series of planning table meetings from June 2019 to October 2021. A draft plan was presented to the planning table in October 2021, followed by a 60-day public review period from October 27, 2021, to December 26, 2021. The review period was extended until January 13, 2022, to provide additional time for review. Eleven planning table organizations submitted comments on the draft range plan.

A separate document, *Draft SK2 East Range Plan Review Summary* (Saskatchewan Ministry of Environment, 2025), discusses the themes and comments received during the draft plan review period, including changes made to the range plan. The approved SK2 East Range Plan incorporates several changes to address the comments received.

3.0 Caribou Population Status

Genetic similarities and differences in caribou populations in Saskatchewan are based more on geographic distance than on social behavior that would support identification of independent populations of caribou (Priadka et al., 2018). This study also confirmed that discrete caribou population boundaries do not exist across Saskatchewan. Given this situation, population monitoring has been conducted at the administrative unit level.

Saskatchewan initiated population monitoring in the SK2 East Caribou Administrative Unit using a study area in the north-west of SK2 East (Figure 4). Caribou fecal pellets were collected over a three-year period (2020 to 2022) to provide genetic information and estimate population size and trend.

Landscape features (i.e. large waterbodies and human-caused disturbance) can affect the population structure by causing barriers to movement (Priadka, 2018). Caribou population structure analyses show a closer genetic relationship between the southern part of SK2 East and the caribou in Manitoba's Bog population (Priadka et al., 2018), than to the rest of SK2 East. This is likely the result of separation due to the lower quality of caribou habitat in the Cumberland Delta. The ministry looks to work closely with Manitoba to better assess this group of caribou in the future.

To evaluate the status of caribou populations across Canada, ECCC (2020) used an integrated risk assessment approach in the national recovery strategy that incorporated three lines of evidence:

- Caribou population trends;
- Caribou population size; and
- Habitat condition based on total disturbance levels.

At the time the population assessment was completed, data were not available in Saskatchewan for caribou population trends or size, so habitat disturbance levels were used as an index of these parameters (Table 1). The federal recovery strategy identified Saskatchewan's Boreal Plain (SK2) woodland caribou sub-population to be "as likely as not self-sustaining," meaning that there is a high level of uncertainty of population status.

Table 1. ECCC (2020) boreal woodland caribou population and habitat condition assessment for the entire SK2 Caribou Conservation Unit.

Range Identification	Range Name	Range Type	Population Size Estimate	Population Trend	Disturbed Habitat (%)			Risk Assessment[4]
					Fire[1]	Human-caused[2]	Total[3]	
SK2	Boreal Plain	Conservation unit	Not available	Not available	30	20	45	Not self-sustaining / self-sustaining

[1] Wildfire disturbance is any area where a wildfire has occurred in the past 40 years (without buffer).
[2] For human-caused disturbance, a 500 metre buffer is applied to all linear and polygonal (area) disturbances.
[3] For total disturbance, human-caused and wildfire disturbances that overlap are counted once in the total.
[4] Environment Canada, 2020.

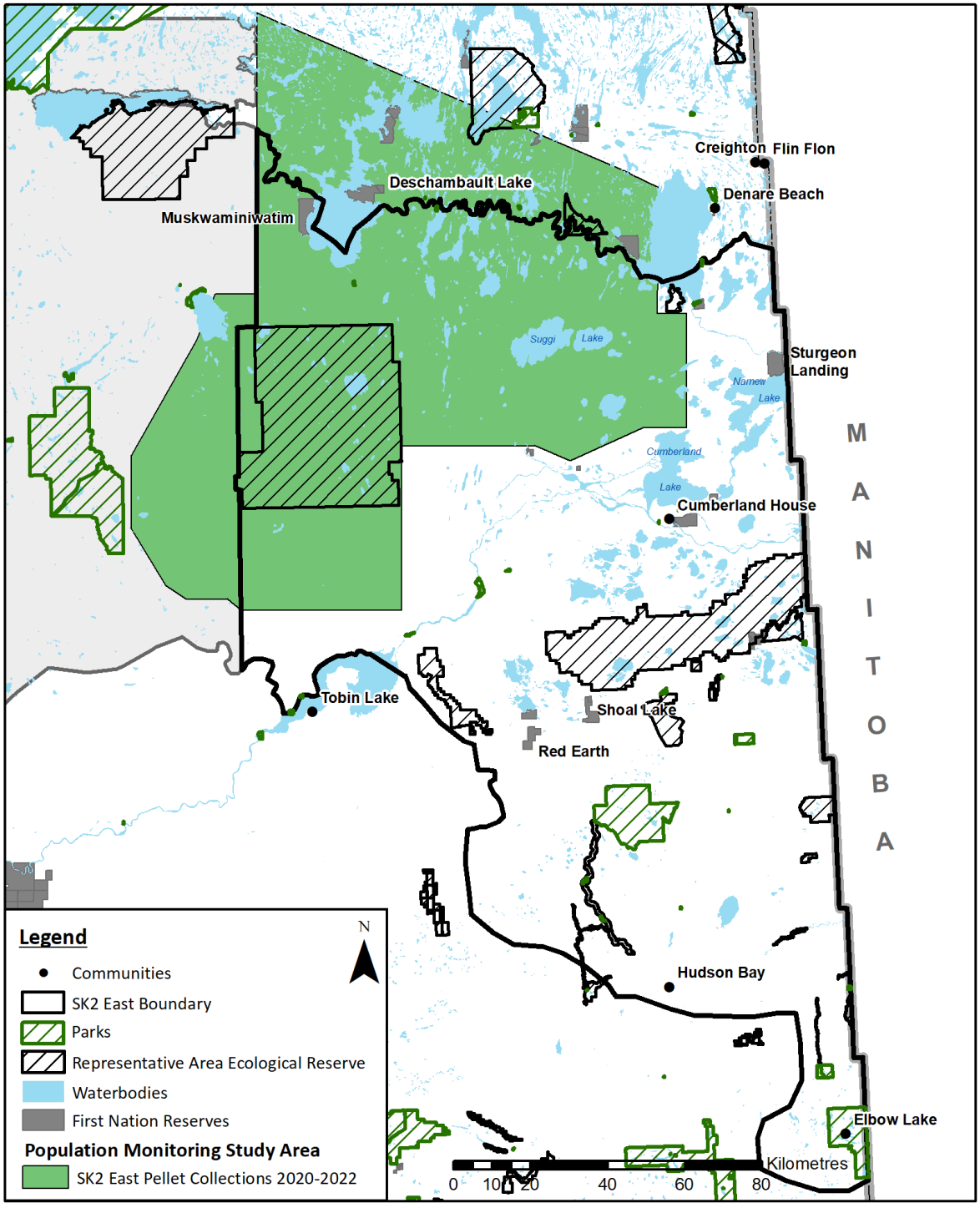


Figure 4. Population monitoring study area within the SK2 East Caribou Administrative Unit.

4.0 Current Habitat Condition and Important Areas for Woodland Caribou

4.1 Overview of SK2 East Caribou Administrative Unit

Most of SK2 East falls within the Mid-boreal Lowlands, Mid-boreal Uplands and Boreal Transition ecoregions, with a small portion occurring within the Churchill River Upland and Interlake Plain. SK2 East is characteristic of Saskatchewan's Boreal Plain ecozone with low rolling forested hills and plains interspersed by many wetlands (e.g. fens, bogs and marshes of different classes) and lakes. Approximately half of SK2 East is upland forest, with the remaining area comprised of wetland and open water (Table 2).

Table 2. Summary of the SK2 East Caribou Administrative Unit land base.

Land Class[1]	Area (km²)	Area (%)
Upland[2]	11,750	46
Wetland	11,721	46
Water	1,866	7
Total	25,338	100

[1] Land class categories are based on ecosite mapping developed by the Ministry of Environment, Government of Saskatchewan.

[2] The Saskatchewan forest inventory identifies that the timber harvest land base covers 5,554 km² or 22 per cent of the SK2 East area.

SK2 East provides an important physical connection between woodland caribou in the eastern portions of the SK2 and SK1 Caribou Conservation Units and the Manitoba caribou population, as it has a relatively large proportion of high-value upland (e.g. pine-lichen forest) and lowland (e.g. peatland) caribou habitat. Of the three SK2 caribou administrative units, SK2 East has the lowest levels of both human-caused disturbance and wildfire.

The southern part of SK2 East has a long history of commercial forest harvesting activities, resulting in an extensive network of permanent and non-permanent roads. These features account for a large part of the total human-caused disturbance. Forestry continues to be a primary land use sector and is expected to increase in activity in the future.

Two forest licences have been issued in SK2 East: the Weyerhaeuser-Dunkley Forest Management Agreement (FMA) in the Pasquia Porcupine Timber Supply Area (TSA) and the Mee-Toos Area-based Term Supply Licence (TSL) in the North East TSA (Figure 5). Under the *Forest Management Planning Standard* of the *Saskatchewan Environmental Code* (the code), licensees are required to develop and implement a management strategy using best available information to mitigate the negative effects of forest management activities on long-term caribou habitat. Forest management plans are adapted to meet the objectives and targets of the corresponding approved woodland caribou range plan within their licence areas (Government of Saskatchewan, 2017). Licensees holding FMAs and TSLs develop their annual forest operating plans based on direction provided in the *Forest Operating Plan Standard* of the code (Government of Saskatchewan, 2022). Forest operation activities for all licensees are based on the *Forest Operations Standard* (Government of Saskatchewan, 2020), which is made an approval condition of their operating plans.

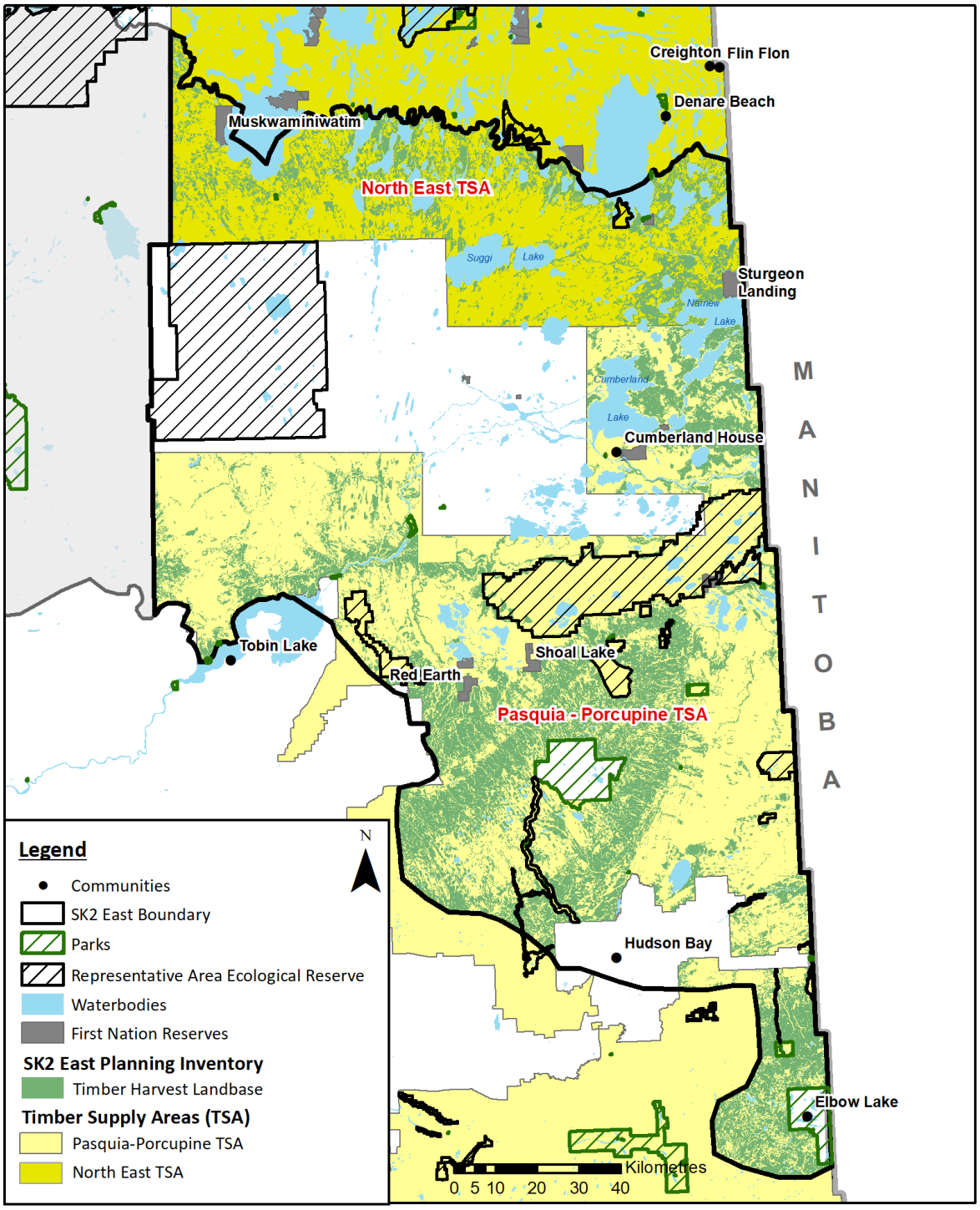


Figure 5. Forestry land tenure (Timber Supply Areas) in the SK2 East Caribou Administrative Unit.

In addition to forestry, SK2 East has long-standing interests in mineral exploration and development. The northern portion of SK2 East has deposits or showings of diamonds, gold and other base metals, while oil shale, coal and helium are located in the southern portion (Figure 6). Previous extraction activities in or near SK2 East have included silica sand at the Hanson Lake Silica Sand Deposit and the Red Deer River Quarry, peat moss from the Ravendale Bog, and base metals from the Hanson Lake Mine. Other industrial activity in the caribou administrative unit includes sand and gravel extraction. As the mineral resource potential in SK2 East is generally considered to be high, future exploration and extraction demand is expected.

SK2 East is predominantly provincially administered land, with small areas of federal and municipal land (Table 3).

Table 3. Summary of SK2 East land administration.

Land Category	Agency/Type	Area (km²)	Area (%)
Provincial Crown Lands[1]	Ministry of Environment Crown Lands[2]	21,289	84
	Ministry of Agriculture Crown Lands	463	2
	Sub-Total	**21,752**	**86**
Parks and Conservation Areas	Parks	383	2
	Representative Area Ecological Reserves	3,032	12
	Sub-Total	**3,415**	**14**
Municipal and Private Land	Towns/Villages/Resort Areas/Other Private Lands[3]	33	<1
Federal Lands	First Nation Reserves and Treaty Land Entitlement	138	<1
	Total	**25,338**	**100**

[1] Provincial Crown Lands includes 342 km² of Wildlife Habitat Protection land and <1 km² of Wildlife Refuge.
[2] Ministry of Environment Crown Lands is an estimated value.
[3] Other private lands represent a very small proportion of SK2 East.

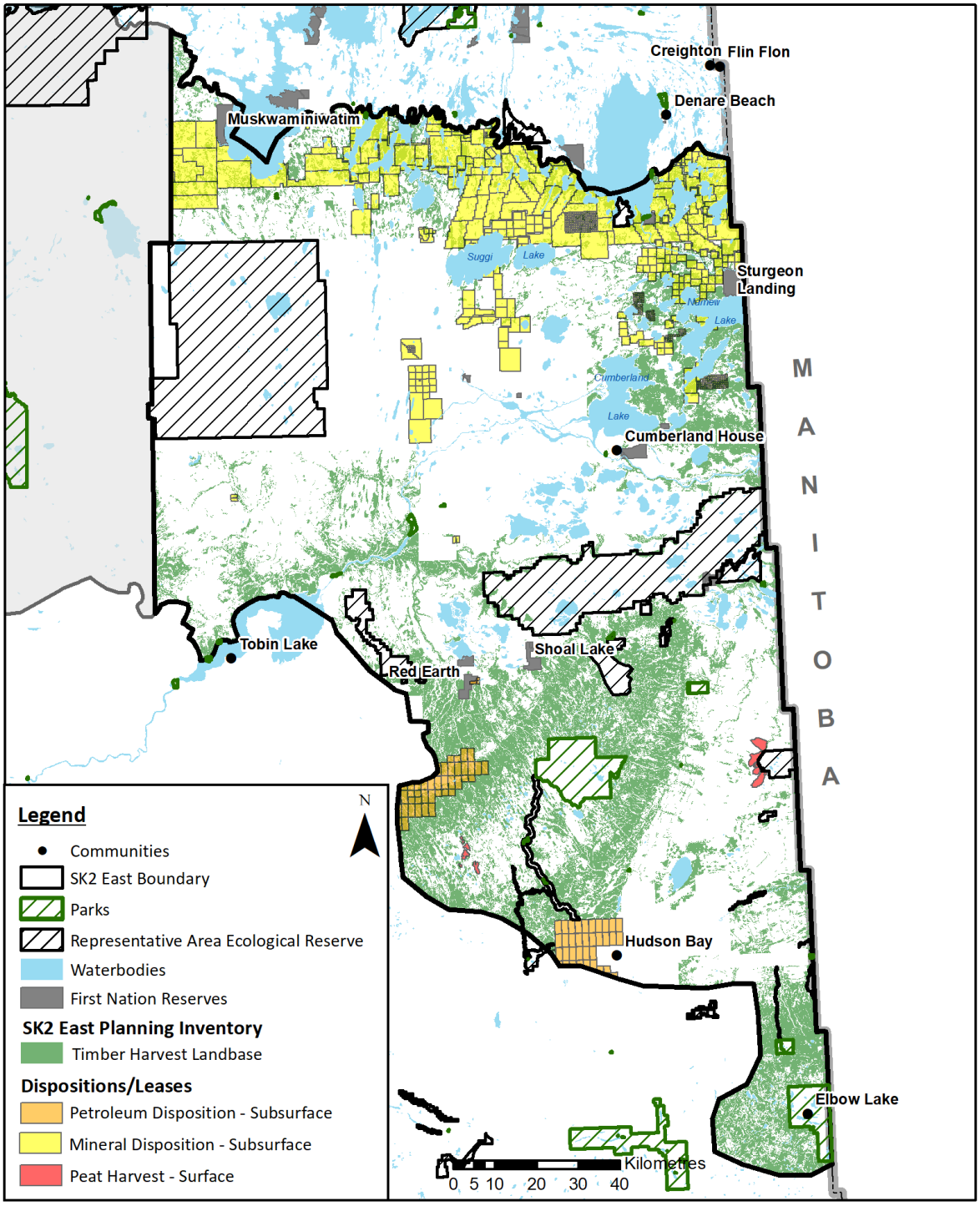


Figure 6. Overview of land use allocations and resource dispositions in SK2 East (current 2019).

4.2 Important Considerations for Woodland Caribou

In the SK2 Caribou Conservation Unit the highest quality woodland caribou habitat is found in two very different ecosystems. High value woodland caribou habitat includes upland, open jack pine forest with very high lichen coverage (i.e. greater than 20 per cent) and black spruce treed bogs. These ecosystems align with Traditional knowledge-holders identification of important habitats (Carriere, 2010). Most wetland types, as well as other jack pine-dominated and black spruce dominated forests, provide moderate quality habitat.

The quality of woodland caribou habitat in the Boreal Plain (SK2) in Saskatchewan was evaluated using three approaches:

i. Ranking ecosites and mapping habitat potential;
ii. Considering the current suitability of potential habitats; and
iii. Habitat modelling based on Indigenous traditional knowledge.

Suitable caribou habitat exists in areas where high and moderate value habitat is found intermixed in large, contiguous patches with little forest fragmentation. Unlike barren-ground caribou, woodland caribou are not migratory between calving and wintering areas but can travel large distances within their home range. Low value habitats for caribou include pure hardwood and hardwood dominated mixed wood forests, and white spruce dominated forests. These high nutrient, moist ecosites tend to provide forage and additional habitat values for other ungulates (i.e. deer, moose, and elk) and are generally used less frequently by caribou. These ecosites may provide connectivity for caribou between suitable habitat patches. The life-cycle habitat needs for caribou, described as biophysical attributes and identified in the federal recovery strategy (ECCC, 2020), are presented in Appendix A.

Woodland caribou naturally exist at low densities in low productivity habitats, needing sufficient amounts of these habitats for populations to be self-sustaining. Females normally only have one calf, resulting in slow population growth. Cows have the highest energetic demands during late pregnancy and lactation (Parker et al., 2009). During the calving and post-calving period, cows also reduce movement and select habitats to reduce predation risk to vulnerable calves, possibly forgoing the best foraging opportunities (Kelly, 2020; Viejou et al., 2018), despite their energetic needs. In Saskatchewan, Rettie and Messier (2011) observed female caribou also had smaller seasonal ranges and moved less during the post-calving and summer seasons, consistent with a predator-avoidance strategy for calving and calf-rearing.

4.2.1 Habitat Potential

Habitat potential refers to the ability or capability of a habitat type to support a wildlife species for its various life cycle requirements. Potential does not consider the current state of the habitat (e.g. recently burned, harvested or under industrial development), but looks at its optimal state.

Woodland caribou habitat potential has been identified within the SK2 Caribou Conservation Unit using Saskatchewan's forest ecosite classification. The forest ecosites represent information about a site's tree species, plant-abundance and soil and site characteristics (McLaughlan et al., 2010). Caribou habitat potential was ranked by a panel of experts (Roddy, 2013) who individually evaluated the ecosite's

potential to provide forage, refuge and calving habitat. Forage value was rated based on the availability of lichen and other plant species, which are palatable to caribou (Thomas and Armbruster, 1996). Refuge value was rated based on the availability of plant species which provide food value for other ungulates (i.e. moose, deer, elk). If these food sources are not present, the ecosite has potential to provide refuge for caribou from predators. A study of caribou habitat use during the calving season in SK2 Central (Dyke, 2009) showed strong selection for treed muskegs, but avoidance of jack pine, mixed hardwood stands and roads. Rettie and Messier (2000) found preferential selection of open and treed peatlands and black spruce/jack pine forests by caribou. Black spruce-dominated ecosites were assessed as having the highest calving and post calving habitat value (Appendix A). Based on this information, forest ecosites were mapped showing their caribou habitat potential value as low, moderate or high (Figure 7). Refer to Appendix A: Determination of Caribou Habitat for further information about habitat potential and how it was determined.

The high habitat potential class, which includes open jack pine forests with very high lichen cover (i.e. greater than 20 per cent) and black spruce treed bogs, makes up approximately 7 per cent of SK2 East. Over 60 per cent of SK2 East falls into the moderate habitat potential class, which includes most wetland types, as well as other jack pine-dominated and black spruce-dominated forests. The low habitat potential class accounts for 20 per cent of the SK2 East. These sites include pure hardwood and hardwood-dominated mixed wood forests, and white spruce-dominated forests. Unsuitable areas and water make up the remaining area in SK2 East (Table 4).

Table 4. Area summary of caribou habitat potential classes in the SK2 East Caribou Administrative Unit.

Habitat Potential Class	Area (km^2)	Area (%)
Low	5,110	20
Moderate	15,526	61
High	1,866	7
Unsuitable [1]	987	3
Total [2]	**23,488**	**93**

[1] The unsuitable habitat potential class is primarily composed of agricultural lands at the southern boundary of the SK2 East Caribou Administrative Unit around the community of Hudson Bay.

[2] The total SK2 East area covers 25,338 km^2, with the remaining area composed of water.

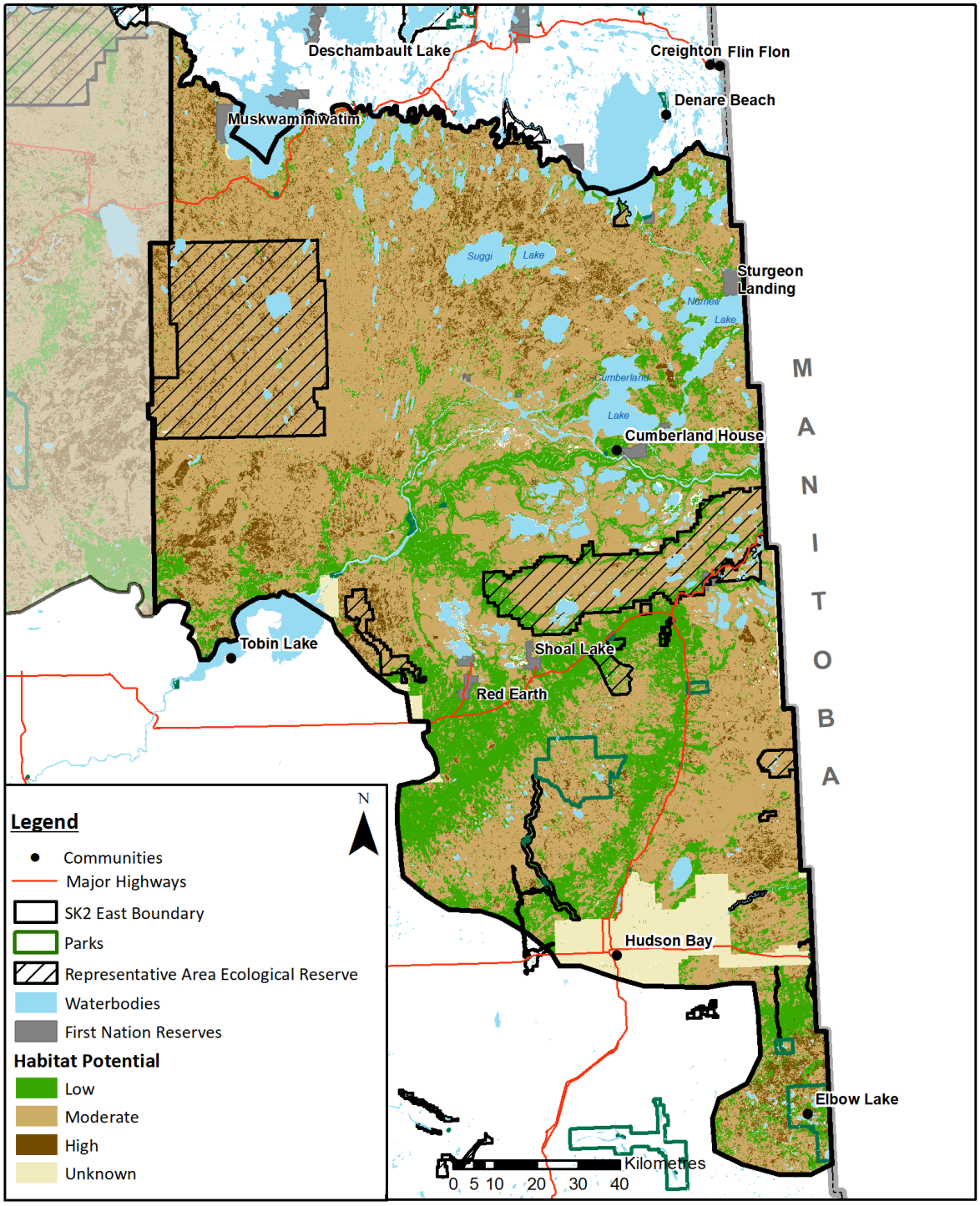


Figure 7. Caribou habitat potential in the SK2 East Caribou Administrative Unit.

Note: The caribou habitat potential layer is available for viewing on the Hunting, Angling and Biodiversity Information (HABISask) web application: https://gisappl.saskatchewan.ca/html5ext/?viewer=habisask
and for download in raster format on the Species at Risk GeoHub page:
https://environment-saskatchewan.hub.arcgis.com/pages/species-at-risk

This approach to defining habitat potential provides similar results to outcomes of habitat modelling based on Indigenous traditional knowledge done by Mamun and Brook (2017; Figure 8). Both methods define similar landscape-scale patterns of higher and lower quality caribou habitat.

Critical habitat for woodland caribou is defined in the federal recovery strategy as: i) maintaining a minimum of 65 per cent of a caribou range as undisturbed habitat; and ii) habitat with biophysical attributes required by boreal caribou to carry out life processes (ECCC, 2020). Areas of high or moderate habitat potential for woodland caribou in Saskatchewan that are 50 years or older meet the biophysical attributes identified in the federal recovery strategy (ECCC, 2020; Table 5). In SK2 East, 24 per cent of the area does not contain forest types that provide necessary biophysical attributes as defined by ECCC (2020).

Table 5. Area summary of caribou habitat potential classes and potential biophysical status[1] in SK2 East.

Habitat Potential Class	Area (km²)	Area (%)
Potential Biophysical		
High	1,863	7
Moderate	15,473	61
Sub Total	**17,336**	**68**
Non-Biophysical		
Low	5,015	20
Unsuitable	501	2
Permanent Disturbance	554	2
Sub Total	**6,070**	**24**
Total	**23,406**	**100**

[1] Refer to Appendix A for biophysical attribute detail.

[2] Potential biophysical is habitat that would have the required biophysical attributes defined by ECCC (ECCC, 2020).

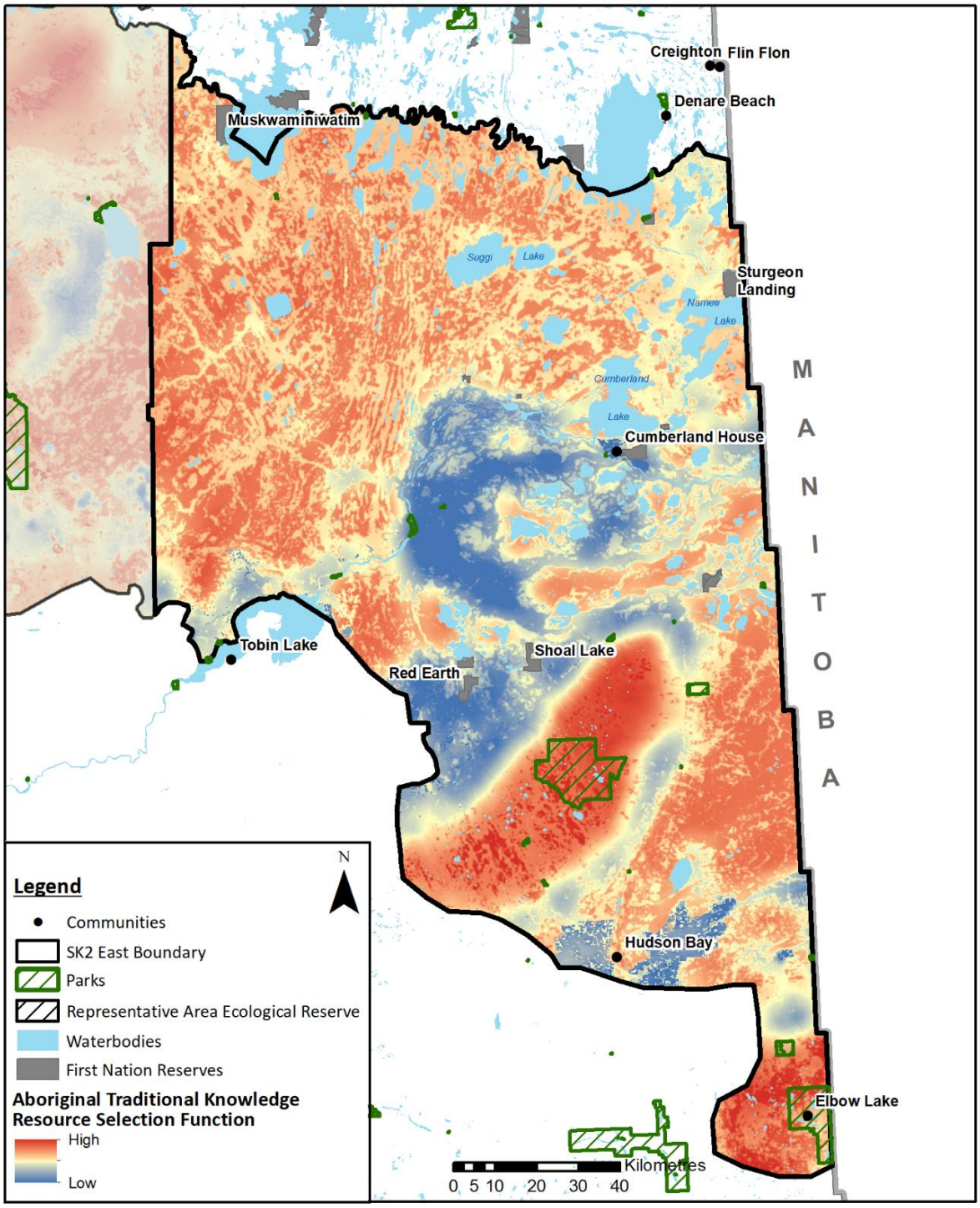


Figure 8. Aboriginal Traditional knowledge resource selection function of woodland caribou habitat for SK2 East (Mamun and Brook, 2017).

4.2.2 Patterns of Habitat Use

Data from radio collared caribou from the early 1990s indicated that caribou in the SK2 Central area preferred peatlands and black spruce dominated stands compared to all other habitat types (Rettie and Messier, 2000). An additional telemetry-based study in the mid-2000s showed that caribou selected treed muskegs and mature jack pine and avoided hardwoods, young conifer, recent cut blocks and linear features (Arlt, 2009). Late winter habitat use assessments done on the Mistik Forest Management Agreement area, in SK2 West, showed that caribou used tamarack and black spruce dominated wetlands in the south (Proulx, 2013) and also used jack pine dominated habitats further north (Proulx and Gillis, 2017).

To understand geographic patterns of caribou habitat use in SK2 East, caribou location information has been compiled from a combination of data sources since 1970. Woodland caribou location information from incidental sightings (e.g. report a caribou database; Saskatchewan Conservation Data Centre), industry reporting, First Nation and provincial government surveys, telemetry data (Manitoba Hydro), and fecal pellet collections has been collated. Because caribou have large home ranges and a single observation location does not accurately represent habitat use across the full landscape, observations were summarized on a 15 km x 15 km grid, the approximate size of a caribou home range (Rettie and Messier, 2001; Dyke, 2009). If a caribou observation occurred within a grid square, it was assumed that caribou used all or part of the square. The caribou observation map (Figure 9) represents knowledge to date on caribou locations and habitat use in SK2 East. Without long-term and systematic surveys, the absence of caribou observations in Figure 9 should not be interpreted necessarily as an absence of caribou, but rather a lack of survey effort to detect caribou. Resource users and outdoor enthusiasts are encouraged to submit their sightings of woodland caribou on the report a caribou sighting webpage (http://biodiversity.sk.ca/ReportaCaribou.php).

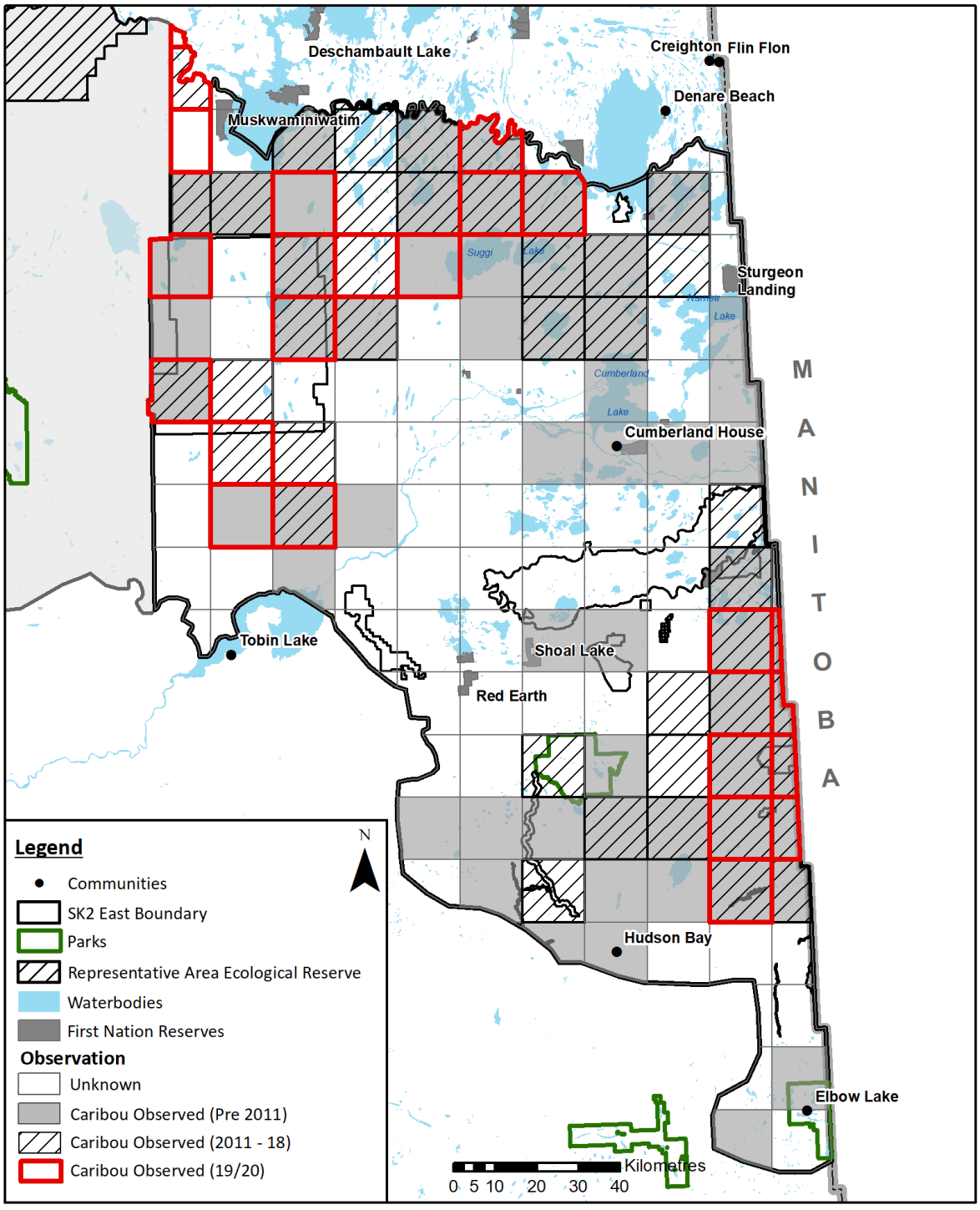


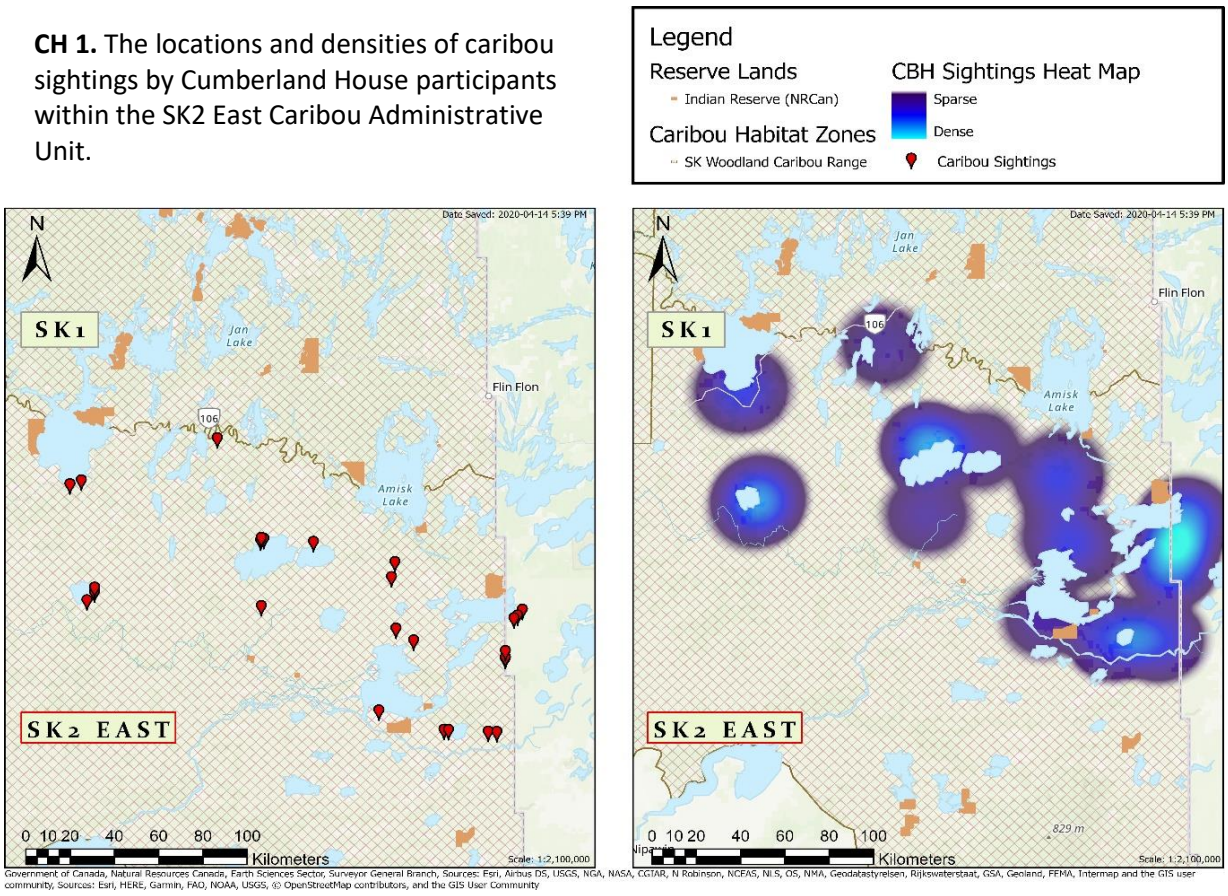
Figure 9. Areas with woodland caribou observations in the SK2 East Caribou Administrative Unit from 1966 to 2020, summarized by a 15 km x 15 km grid (includes data from Manitoba Agriculture and Resource Department, 2020).

Woodland caribou sightings, critical habitat indicators, current and potential habitat and threats to caribou were documented in ***Woodland Caribou of Cumberland House*** – *An examination into the contexts surrounding the woodland caribou in the Cumberland House region*. This resource was compiled by Prince Albert Model Forest, with the foundational information derived from interviews with community members from Cumberland House First Nation, the Village of Cumberland House and Métis Nation Saskatchewan, Region 1.

Overwhelmingly, Cumberland House participants indicated a decline in woodland caribou numbers in the area. As such, caribou sightings have been decreasing since past years. Despite this, many caribou sightings have been made in recent years and compiled.

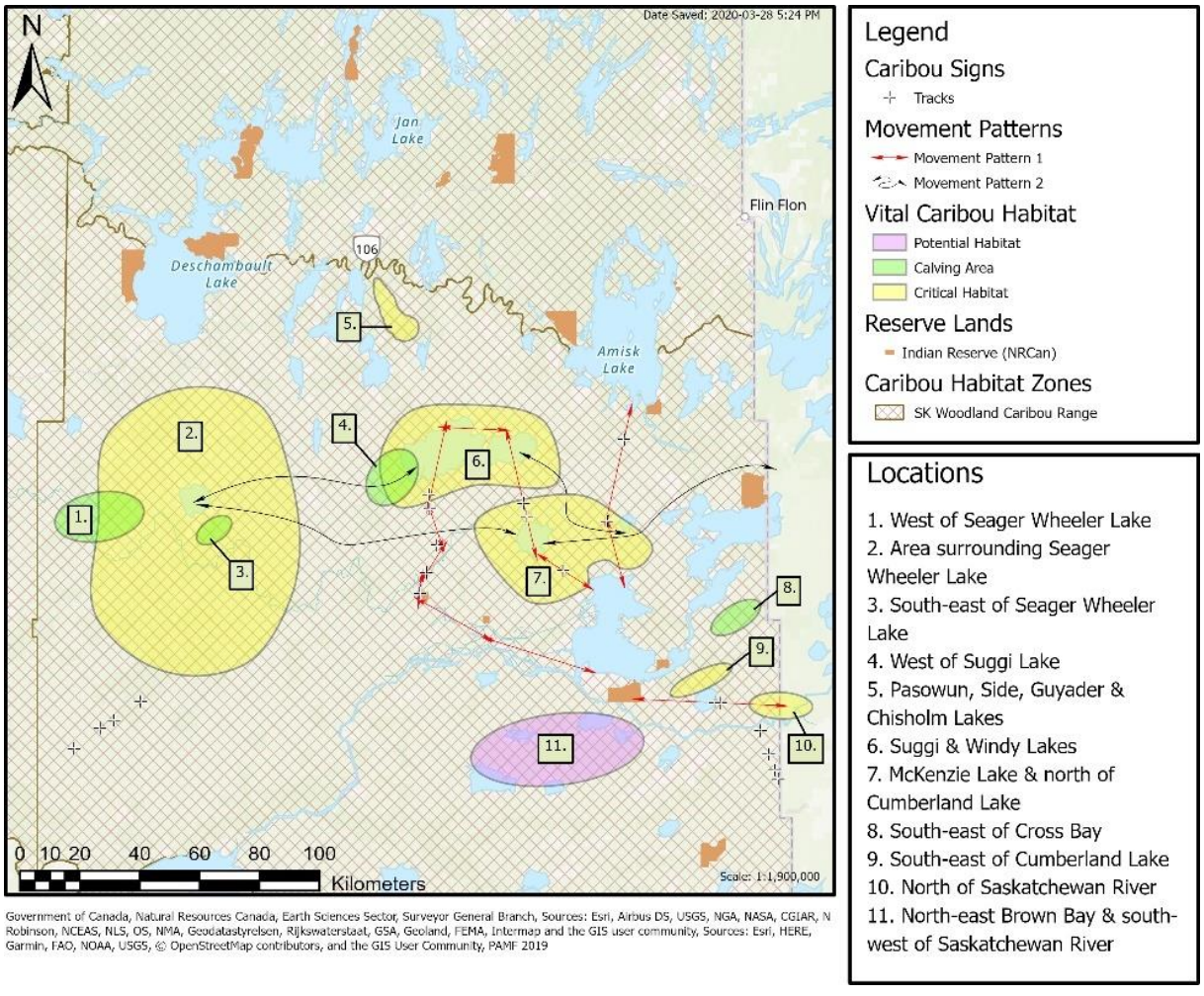
Map Insert CH 1 shows locations caribou were sighted in the Cumberland House area (SK2 East), as well as the relative density of sightings in each location. During Cumberland House interviews, participants were asked to report the location, season, year, and number of caribou of any sightings that could be remembered. This was done to ascertain any areas frequented by caribou and give an indication as to the whereabouts of general caribou general activity, thus suggesting areas of critical habitat (Prince Albert Model Forest, 2021, page 4).

CH 1. The locations and densities of caribou sightings by Cumberland House participants within the SK2 East Caribou Administrative Unit.



Map Insert CH 2 shows the different types of habitat vital to caribou, as shown by the participants of Cumberland House. Locations where participants saw signs of caribou, like tracks, are also included to provide a better understanding of locations caribou tend to frequent. Because there was not as many sightings recorded in the Cumberland House region, vital caribou habitat could not be determined from sighting densities. However, enough interview and mapping data was available to provide numerous areas of vital caribou habitat. During interviews, the area surrounding Suggi and Windy Lakes (6) was often referenced in relation to crucial caribou habitat. As seen in Figure 4, this area is home to calving grounds (4), critical habitat and has two separate migration routes which run through it. Due to the two separate calving grounds and critical habitat surrounding Seager Wheeler Lake (1, 2, 3), this location is also of paramount importance. It should be noted that this map is not comprehensive of all vital caribou areas, and only represents the knowledge held by the interviewed participants of Cumberland House. (Prince Albert Model Forest, 2021, page 10)

CH 2. Different types of locations vital to the caribou in the CBH region (SK2 East).



4.2.3 Habitat Connectivity

Habitat connectivity at multiple scales is important for woodland caribou as it facilitates movement in response to disturbance, resource needs, and allows gene flow. Habitat fragmentation can separate caribou into pockets of genetically distant animals. As such, there is a need to allow for woodland caribou movement between large patches of intact habitat (Priadka et al., 2018).

Currently, research and modelling are in progress to identify and prioritize potential movement corridors in SK2 through the creation of a fine-scale decision-support tool. This project will use previously developed habitat and disturbance datasets (natural and human-caused), to determine linkages between clusters of high-quality habitat using connectivity modelling techniques. The resulting product will help inform management decisions for resource development and identify priority areas for restoration.

4.3 Impacts of Habitat Disturbance

4.3.1 Changes on the Landscape

The boreal forest is made up of relatively young trees, compared to forests growing in more temperate climates. On boreal landscapes, wildfire is the leading cause of natural change, along with insect and disease infestations, windthrow and other natural disturbances. Boreal forests continually renew themselves through these natural disturbances.

Over the last several decades, human activity has altered the landscape in the Boreal Plain more than any other mechanism, often resulting in large-scale changes. Forest harvesting and its associated post-harvest reforestation activities can play a similar role to natural disturbances in maintaining a mosaic of young and old forest. Other human-caused landscape alterations include land conversion where forests are cleared for agriculture, municipalities, or infrastructure such as highways. Wildfire suppression has also changed the landscape as natural wildfires are suppressed to protect human value (communities, etc.), resulting in older forest areas at higher risk of burning and burning at increased intensity.

4.3.2 Effects of Disturbance on Caribou

Natural and human-caused disturbances affect caribou habitat in the short and medium term because of the alteration of mature forests used by caribou. New growth that follows wildfires or forest harvesting is often of limited habitat value to woodland caribou because it lacks lichens, the primary food source of caribou, and overstory protection. According to Elders, wildfires are considered a key disturbance to caribou, either through direct mortality of calves or even adults and through habitat changes (Mamun and Brook, 2017). Predation risk for caribou may also increase in young forests that provide habitat for other ungulates and their predators. In the longer term, regeneration after wildfire or forest harvesting can renew habitats which are of importance to woodland caribou.

Fragmentation of habitat on the landscape caused by forest harvesting, roads, geophysical lines, cut lines and other linear developments impacts the ability of caribou to make optimum use of the available resources within their range. Both area-based disturbances (e.g. forest harvesting) and linear features (e.g. roads and trails) often create smaller habitat patches than caribou require and affect the

connectivity between quality habitats. Forest harvesting was also identified by Elders as being a being a significant disturbance for caribou (Mamun and Brook, 2017). In addition, linear features increase the risk of predation on caribou due to increased ease of access for predators and by changing caribou movement, exposing them to predation (Mckay et al., 2021). Mamun and Brook (2017) also noted that Elders connected human-caused disturbance to increases in wolves and potentially to increased caribou mortality. Improperly constructed or maintained roads through wetlands that do not allow sufficient flow of water can impact wetland function, resulting in caribou habitat loss or degradation.

Woodland caribou responses to human disturbance and activity may increase predation risk and alter the ability of caribou to meet their nutritional and energetic demands. Human activity has been observed to cause avoidance behaviour that can result in shifts in caribou habitat use. For example, Dyer et al. (2001) observed caribou avoided a variety of human disturbances in Alberta, with avoidance distance increasing (250 metres to 1000 metres) with the level of human activity at the site. Avoidance distances were greatest in the winter and during the calving period. Similarly, MacNeary et al. (2021) observed caribou avoided well sites in Alberta by greater distances when noise disturbance was greater (up to 1000 metres). These avoidance responses may lead to caribou spending more time outside of preferred habitats, resulting in increased predation risk or decreased foraging opportunities. Caribou responses to human activity can also be energetically expensive because of increased movement or changes in behaviour in the presence of humans. Snowmobile use in areas where caribou are resting in winter was identified as a significant risk by Elders (Mamun and Brook, 2017). In Alberta, exposure to sensory disturbance caused caribou to move faster and cross habitat boundaries more often than non-exposed caribou (Bradshaw et al., 1997), with consequences for body condition with repeated exposure (Bradshaw et al., 1998). The presence of human activity can also reduce foraging opportunities by increasing vigilance behaviour, as observed in the responses of woodland caribou to hikers and ecotourism in Quebec (Lesmerises et al., 2017, Duschesne et al., 2000). Traditional knowledge-holders advised that road development, tourism, forest harvesting and snowmobile use were thought to cause changes in caribou migration, increase human access and traffic into woodland caribou habitat, influence food abundance or quality, impact woodland caribou calving or mating, and decrease woodland caribou populations (Carriere, 2010).

Woodland caribou are most sensitive to human-caused disturbance during times of high energy demand and higher predation risk. Additional energetic constraints and predation risk during these sensitive periods can result in increased mortality of calves and adult females. Although predation of calves and adult females is considered the proximate cause of recent caribou population declines (ECCC, 2020), chronic stress and depleted body condition can lead to increased vulnerability to predation, as predators tend to select low-condition ungulate prey (Shave et al., 2019).

Small populations of caribou can become isolated if the landscape is divided by barriers that they will not cross. Such populations lack the diversity necessary for long-term survival, eventually leading to local population extirpation. Caribou in the Pasquia Hills have become somewhat isolated due to disturbance levels between the Pasquia Hills and Pasquia Bog, although some movement is still known to occur. When human-caused changes occur over a large scale and encroach upon the southern range

boundary, they can lead to caribou range retraction as evidenced over the last century (Trottier, 1988; Arsenault, 2003; Schmid, n.d.).

4.4 Disturbance Assessment

Human-caused disturbance and wildfire perimeters less than 40 years old are used in Saskatchewan's woodland caribou habitat disturbance assessments, consistent with the ECCC (2020) integrated risk assessment. The federal recovery strategy identified that total habitat disturbance (i.e. burned areas less than 40 years old and human-caused disturbance buffered by 500 metres) provides the best link to caribou population status from studies of 24 caribou populations across Canada (Environment Canada, 2012). The link between population status and disturbance was re-confirmed with subsequent analysis of 46 caribou populations (Johnson et al., 2019). Disturbance reported in this range plan follows the ECCC methodology using datasets developed by the Ministry of Environment.

Human-caused disturbances include both linear and area-based disturbances. Linear features include roads, fireguards, power lines and railways. Area-based disturbance features include forest harvest blocks, gravel pits, mine sites or settlements. Human-caused disturbances can be further classified as permanent or non-permanent. Permanent disturbances (lasting on the landscape for more than 50 years) include municipal and industrial infrastructure, graded and paved roads, and long-term forest and mineral resource roads. Non-permanent disturbances include forest harvest blocks, fireguards and short-term access roads. The total human-caused disturbance footprint is measured by adding a 500 metre buffer to human-caused disturbances. Once disturbed habitat recovers, the buffer is removed and the whole area is counted in the undisturbed habitat calculation. For reporting to ECCC, the 500 metre buffer is not factored into the calculation of undisturbed habitat until the disturbed habitat it buffers becomes undisturbed (Environment and Climate Change Canada, 2011). A 500 metre buffer is not applied to wildfire disturbance.

4.4.1 SK2 East Disturbance Levels

The Ministry of Environment has compiled disturbance mapping in SK2 East that is consistent with the Environment and Climate Change Canada approach to human disturbance mapping (Appendix B: SK2 East Disturbance Mapping).

As of 2021, the total **undisturbed habitat** in SK2 East: **69%**

Approximately 26 per cent of SK2 East is affected by human-caused disturbance and the associated 500 metre buffer (Table 6).

Table 6. Disturbance levels in the SK2 East Caribou Administrative Unit as assessed by Saskatchewan Ministry of Environment (2021).

Disturbance	Area (km^2)	Area (%)
Human-caused Disturbance[1]		
Permanent	1,612	6
Non-Permanent	5,068	20
Total	**6,680**	**26**
Wildfire[2]		
Total	**1,113**	**4**
Disturbance Summary		
Total Disturbed	7,793	31
Total Undisturbed	17,545	69
Total SK2 East area	**25,338**	**100**

[1] Human-caused disturbance includes 500 metre buffer.

[2] Wildfire disturbance is based on 1982 to 2021 wildfire records. Human-caused and wildfire disturbance are based on the non-overlapping area of each, with human-caused disturbance taking priority over wildfire disturbance. Waterbodies (as identified in the CanVec 1:50,000 dataset) were removed from the wildfire perimeter polygons and do not contribute to the total wildfire disturbance.

There are approximately 6,657 km of non-permanent roads and fireguards in SK2 East (Appendix B). Forest harvesting, transportation and agriculture activities have resulted in concentrations of human-caused disturbance in the southern part of SK2 East and created a landscape with relatively small undisturbed patches existing within the matrix of roads, forest harvest blocks, and cropland (Figure 10). To a lesser extent, mineral exploration and development and forest harvesting and associated road networks have led to a concentration of human disturbance in the northeastern portion of SK2 East. Large patches of undisturbed habitat still remain in the central and northwestern parts of SK2 East (Figure 10).

There is large variation in the location and extent of area burned across the Boreal Plain (SK2), reflecting spatial differences in wildfire regimes. The western part of the province (SK2 West) has a more frequent wildfire return period than does the eastern portion of the province (SK2 East). The total area burned per decade from 1982 to 2021 has ranged from one per cent to five per cent of the SK2 East area (Figure 11).

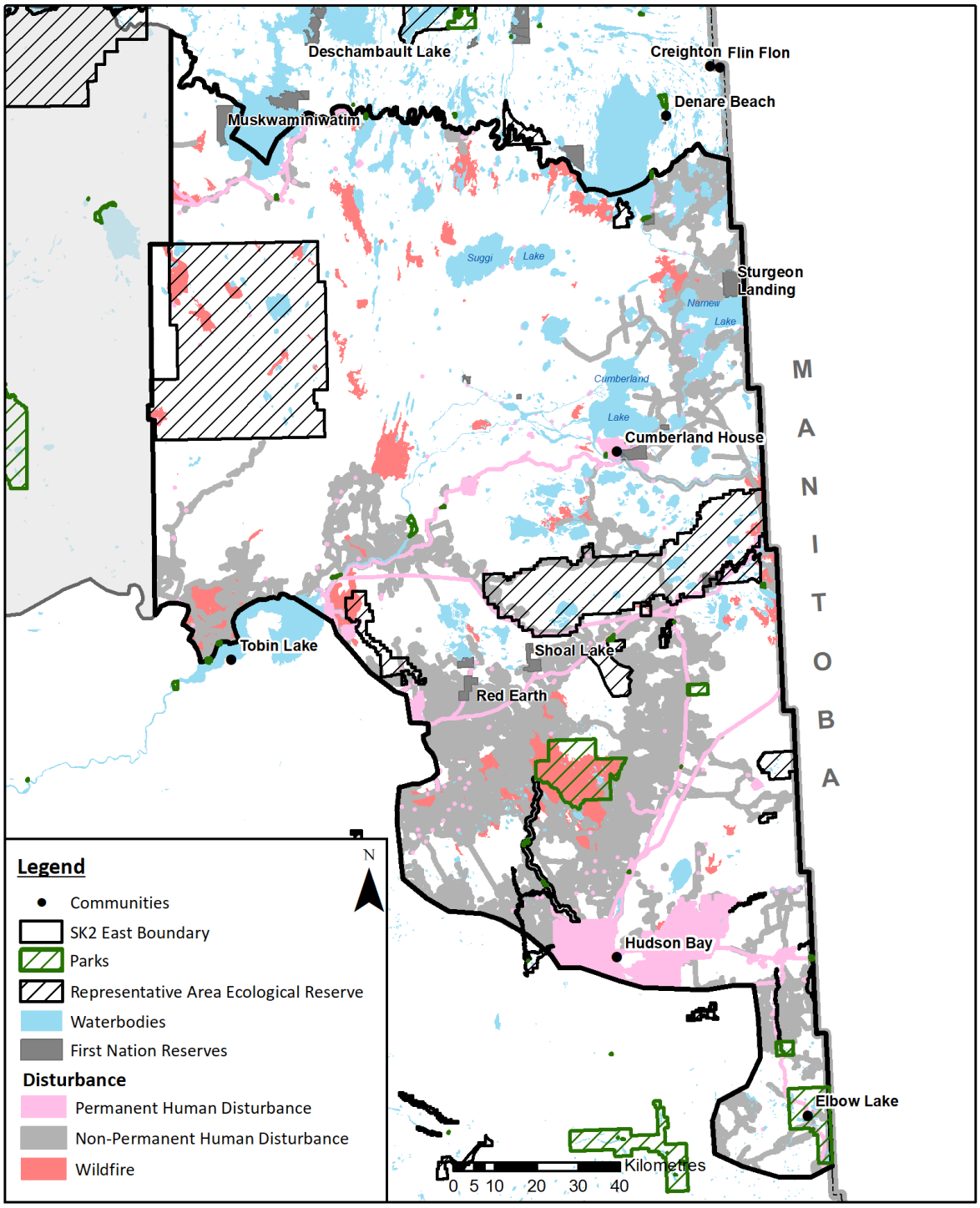


Figure 10. The extent of human-caused disturbance and wildfire in the SK2 East Caribou Administrative Unit based on the 2021 Saskatchewan Ministry of Environment updated disturbance mapping assessment.

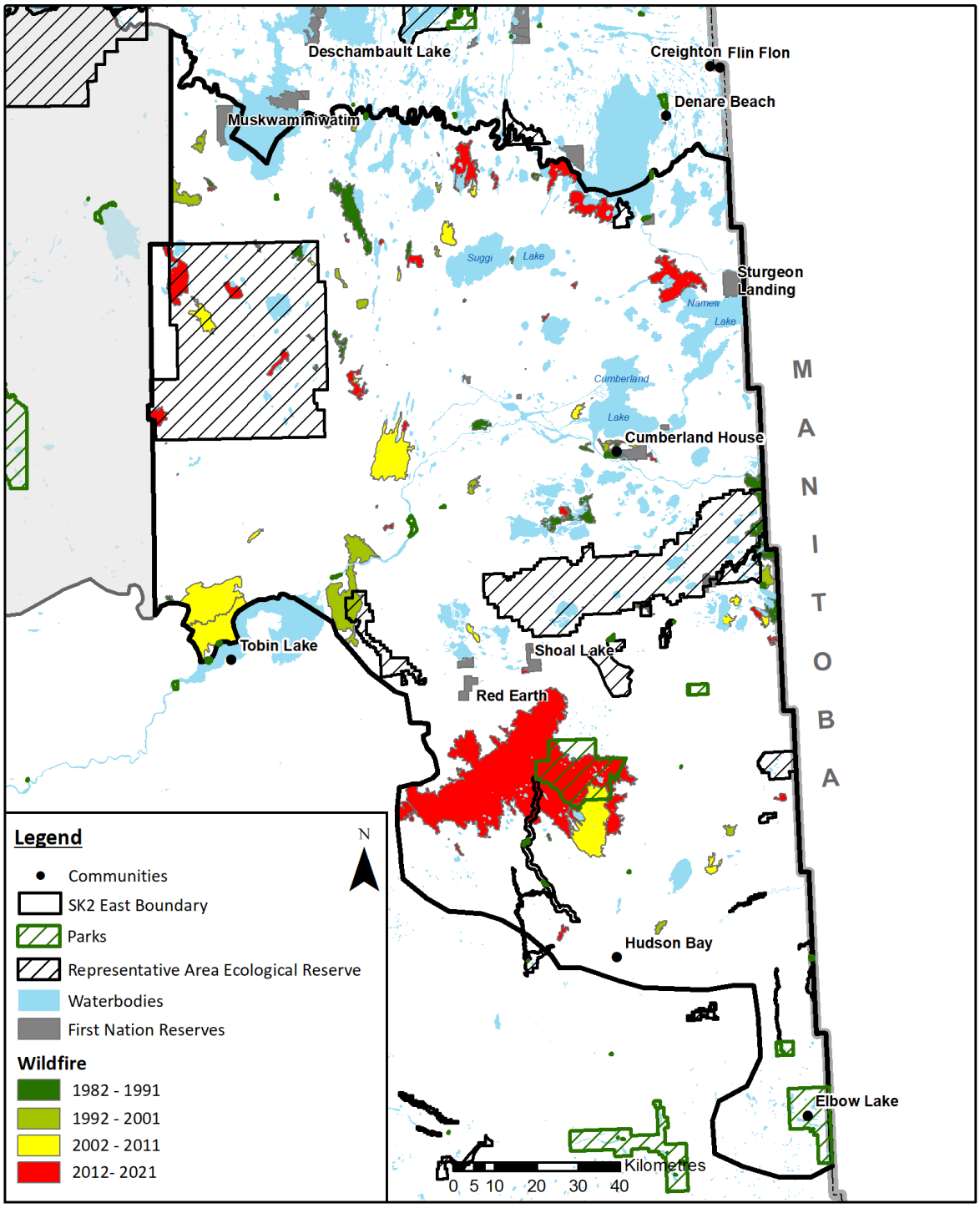


Figure 11. Wildfire history from 1982 to 2021 in the SK2 East Caribou Administrative Unit.

4.4.2 Disturbance by Habitat Potential Class

Human-caused disturbance has disproportionally affected areas of low habitat potential, as these low habitat potential ecosites have the highest value for forest harvesting (Figure 11). The relatively high proportion of undisturbed habitat in the moderate and high potential classes is expected to remain relatively undisturbed from human activities as these classes contain a greater proportion of wetland and forest types that are considered non-timber productive.

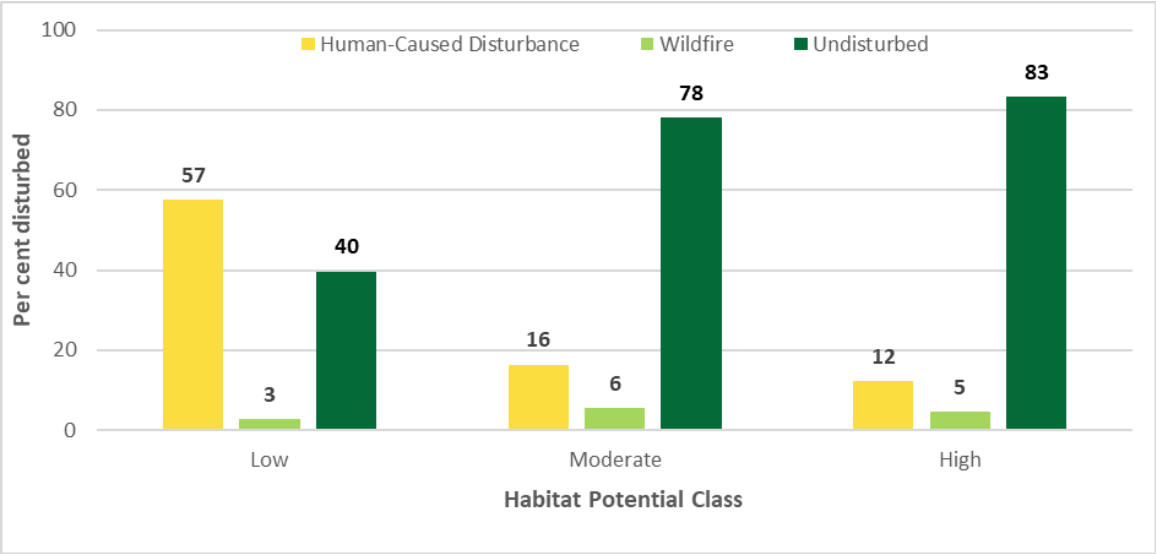


Figure 12. Per cent of disturbed and undisturbed area by habitat potential class.

4.4.3 Current Habitat Condition

The current distribution of undisturbed high and moderate potential habitat is a fragmented landscape of suitable habitat patches, somewhat isolated from others (Figure 12). The high level of fragmentation, especially evident in the southern part of SK2 East, requires the careful management of the remaining large patches of suitable habitat, while other disturbed areas are restored or mature into suitable habitat in the future.

Although wildfire has contributed to the fragmentation of suitable caribou habitat in SK2 East in this disturbance analysis, the habitat value of wildfires for woodland caribou is still an active area of research. In Saskatchewan's Boreal Shield, research has shown that caribou use unburned residual patches of forest within wildfire boundaries as calving habitat, especially those areas dominated by bogs and fens (Skatter et al., 2017). However, in the Boreal Plain in Alberta, Konkolics et al. (2018) found that even though wildfire boundaries may contain a large proportion of unburned residual patches, habitat selection studies suggested that caribou avoided burned landscapes, including the residual patches, and that this avoidance persisted for up to 30 years after the wildfire. These different responses may be a result of the high level of overlap between human-caused disturbances and wildfire that is more common in the Boreal Plain than the Boreal Shield.

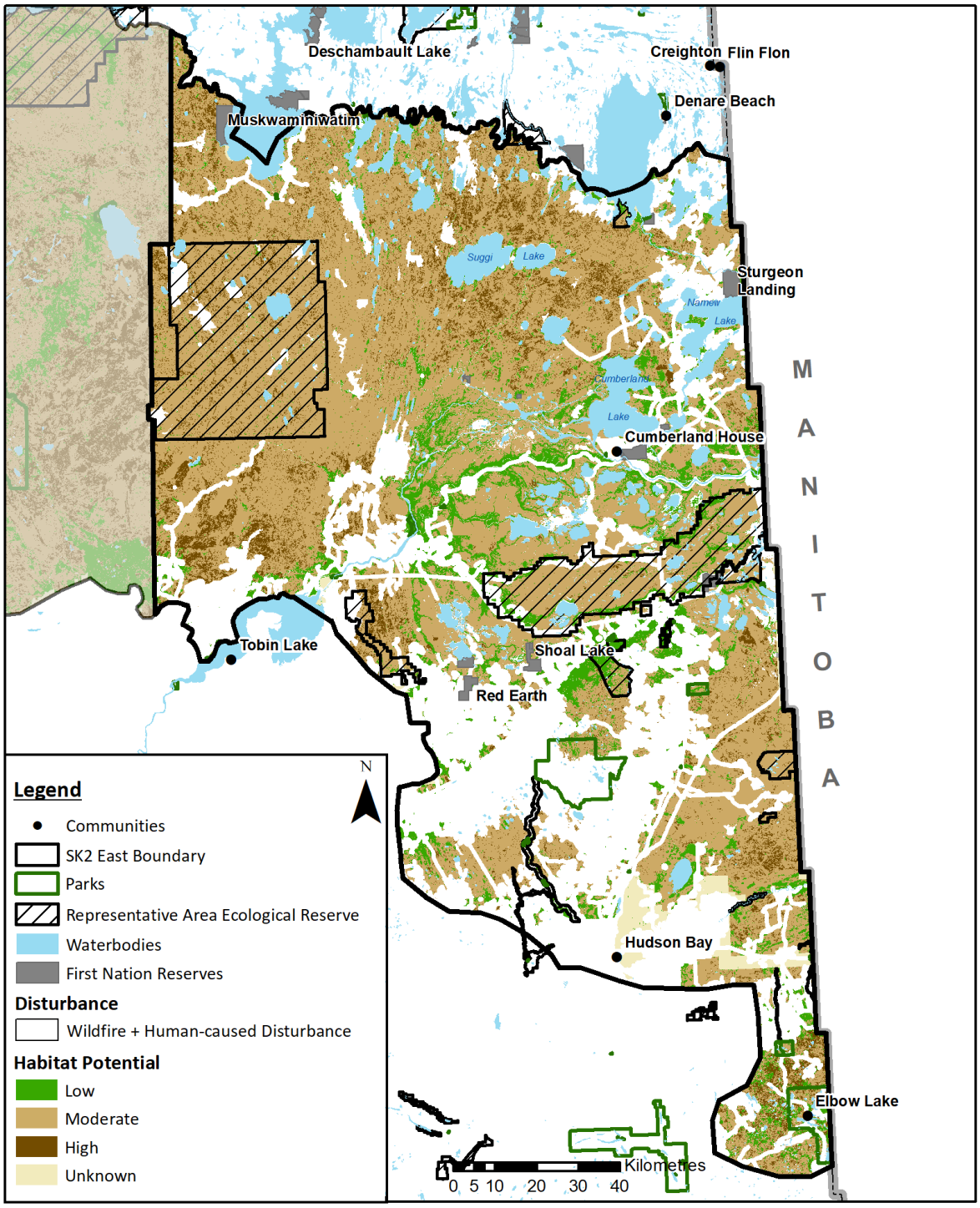


Figure 13. Current habitat condition: the distribution of undisturbed habitat and habitat potential class across the SK2 East Caribou Administrative Unit.

Note: Undisturbed habitat are areas not disturbed by human-caused disturbance, plus a 500 metre buffer, or disturbed by wildfire less than 40 years old.

4.5. Other Risk Factors

In addition to the availability of undisturbed habitat, other risk factors may affect the likelihood of caribou conservation and recovery. Climate change research to date points to future challenges for the conservation of woodland caribou. Ongoing and future changes in temperature and precipitation lead to caribou habitat degradation and loss directly through their effects on boreal plant growth and survival and indirectly through the action of natural disturbances, like wildfire (Price et al., 2020; Masood et al., 2017, Gauthier et al., 2014).

Climate change has also led to increases in white-tailed deer populations across the northern extent of their range (Dawe and Boutin 2016). Less severe winters with reduced snow depth are expected to continue to result in higher deer numbers in the southern boreal forest into the future (Laurent et al 2020). Increased prey numbers will in turn support larger wolf populations and an associated increase in predation risk for caribou (McLoughlin et al., 2003; Racey, 2005; Barber et al., 2018; Seip, 1992).

The expansion and growth of white-tailed deer populations into the boreal forest also increases the risk of transmission of diseases and parasites that may be fatal to caribou. Chronic wasting disease (CWD) in game farms and wild members of the deer family (cervids) in Saskatchewan poses a risk of disease spillover into woodland caribou (Arifin et al., 2020). Since 2005, CWD has been present in populations of wild white-tailed deer within several kilometres of the SK2 Caribou Conservation Unit and the infection rate continues to increase (Figure 14). Active game farms containing CWD positive animals are located close to caribou range and the introduction of a population-limiting disease such as CWD may hinder recovery of woodland caribou and contribute to further population decline.

Questions remain regarding potential routes of introduction and transmission dynamics of CWD in the boreal forest. Currently, a study is underway to evaluate habitat selection and movements of white-tailed deer into Saskatchewan's caribou range, which should aid in understanding potential routes of disease transmission to woodland caribou, including identification of areas of overlap in habitat (P. McLoughlin, University of Saskatchewan, personal communication, April 12, 2020).

Caribou also face risks associated with the northwesterly spread of meningeal worm, or brainworm, (*Parelaphostrongylus tenuis*), into their range (Figure 14). Brainworm is a common and non-fatal parasite of white-tailed deer in eastern North America but is lethal to moose, caribou and elk. The prevalence of this parasite is increasing in Saskatchewan with a westward expansion in the boreal transition zone (McLellan et al., unpublished data).

This range plan cannot directly address climate change effects on caribou habitat but does provide direction for actions that will maintain or increase overall habitat resilience, including the creation and maintenance of larger areas of undisturbed suitable habitat, to assist in achieving self-sustaining caribou populations. Addressing existing disease and parasite risks will help the caribou populations in Saskatchewan be more resilient to the effects of climate change.

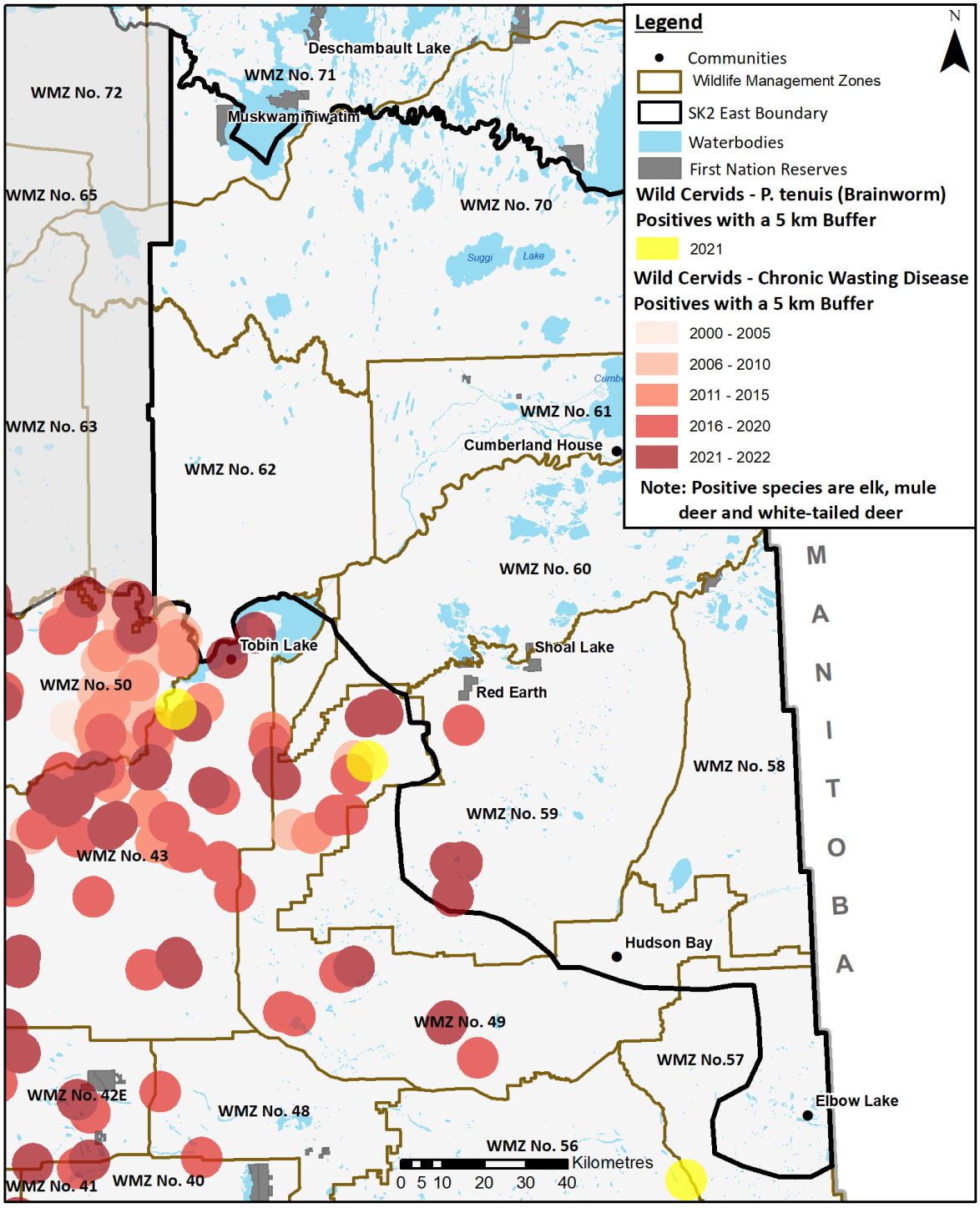


Figure 14. Positive locations of chronic wasting disease (CWD) (Ministry of Environment, 2022) and *P. tenuis* (brainworm) (McLellan et al., unpublished data) in proximity to the SK2 East Caribou Administrative Unit.

5.0 Habitat Management

The woodland caribou range assessment and planning processes are part of a broader landscape planning strategy for provincial Crown lands. This approach recognizes the variation of wildfire regimes, ecological conditions, land use activity and human-caused disturbance across Saskatchewan's boreal forest.

5.1 Caribou Habitat Management Areas

Provincial Crown lands within the SK2 East area have been divided into three caribou habitat management areas (CHMAs): Tier 1, 2 and 3 (Figure 15). Different management objectives and strategies are identified for each tier. The identification of Tier 1, 2 and 3 CHMAs is based on their relative importance to, and known use by caribou, current habitat condition, as well as other selection criteria that is provided in Table 7. Although protected areas such as parks and ecological reserves are not a part of the CHMAs, their role in the management of caribou habitat is also highlighted in Table 7. Appendix C provides a detailed description of each of the CHMAs including habitat potential and disturbance attributes.

Management concepts associated with the CHMAs include:

- The currently identified CHMAs are intended to be in place for a period of 20 years, after which time they will be re-evaluated.
- The delineation of the CHMAs considered numerous factors including habitat potential based on ecosite-habitat relationships and Indigenous Traditional knowledge, level and type of disturbance, caribou occupancy/utilization, connectivity, risk of northwards range retraction, and forest industry operating plans.
- On average, Tier 1 CHMAs have the greatest proportion of high value habitat potential, while Tier 3 has the highest proportion of low value habitat potential area. Tier 2 includes a high proportion of high and moderate value habitat potential area; however, this tier includes more human-caused and wildfire disturbance than Tier 1 (Table 7).
- The future location and classification of CHMAs may change on the landscape in response to habitat disturbance recovery, wildfire, changes in land use, and woodland caribou population trends, and will be updated periodically to reflect these changes.
- CHMAs considering maintaining or enhancing connectivity within SK2 East and between SK2 East and SK2 Central and other jurisdictions. For example, high value habitat potential patches within Tier 3, depending on their landscape context and configuration, are likely to provide important linkages between large patches of undisturbed habitat in Tiers 1 and 2.
- Saskatchewan currently has many of the regulatory instruments in place (Section 6.2) to implement the management strategies of avoidance, reclamation and restoration, offsets, forest harvest patterns and access management across all three tiers of the CHMAs. Additional policy may be developed to support the implementation of range plans.

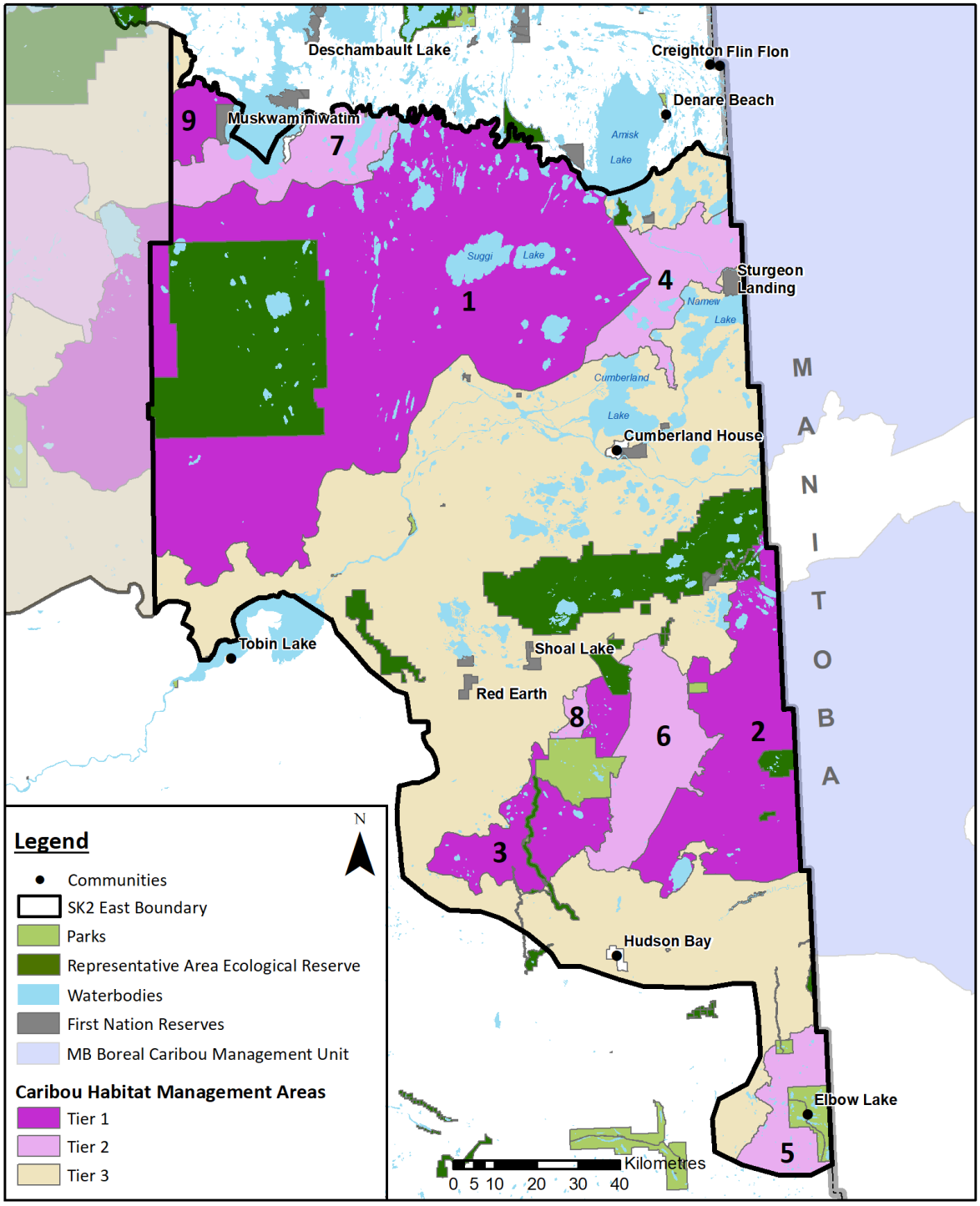


Figure 15. Location of caribou habitat management areas on provincial Crown lands in the SK2 East Caribou Administrative Unit.

Note: Caribou habitat management area shapefiles are available to view on HABISask at:
https://gisappl/saskatchewan.ca/html5ext/?viewer=habisask
and available for download via the Species at Risk GeoHub page:
https://environment-saskatchewan.hub.arcgis.com/pages/species-at-risk

Table 7. Caribou habitat management area selection criteria, management objectives and strategies for provincial Crown land in the SK2 East Caribou Administrative Unit[1].

CHMA Tier/ Other Area	Area (km^2)	Area (per cent)	Criteria for Selection	Management Objectives	Management Strategies[2]
Tier 1	8,711	34	Areas of high-moderate caribou habitat potential with high levels of observed caribou use and low levels of human-caused disturbance.	• Caribou habitat retention • These areas are preferred deferral or avoidance areas for industrial developments or other land uses	• Avoidance • Reclamation and restoration • Access management • Offsets
Tier 2	2,669	11	Areas of high-moderate caribou habitat potential with observed caribou use and higher levels of wildfire and human-caused disturbance.	• Caribou habitat restoration	• Avoidance • Reclamation and Restoration • Natural forest pattern harvesting • Access management • Offsets
Tier 3	10,264	41	Areas of caribou habitat between Tier 1 and Tier 2 areas.	• Maintain connectivity across the landscape	• Natural forest pattern harvesting • Reclamation and restoration • Access management • Offsets
Representative Area Ecological Reserves	3,032	12	Caribou habitat retention.	• Caribou habitat retention • Maintain connectivity across the landscape	• Avoidance • Access management • Offsets (if needed for access or other purposes, would be required at the same level as Tier 1 areas)

[1] A map showing areas of caribou use in the SK2 East Caribou Administrative Unit is presented in Figure 7.
[2] Refer to Section 5.3 – Management Strategies.

Table 7. (*continued*) Caribou habitat management area selection criteria, management objectives and strategies for provincial Crown land in the SK2 East1 Caribou Administrative Unit.

CHMA Tier/ Other Area	Area (km^2)	Area (%)	Criteria for Selection	Management Objectives	Management Strategies[1]
Parks	345	1	Maintain habitat connectivity	• Caribou habitat retention • These areas are preferred deferral or avoidance areas for industrial developments or other land uses	• Avoidance • Forest harvest patterns (as required, for vegetation/fuel management) • Reclamation and restoration • Access management Offsets (as required for park infrastructure, access, etc.; would be required at the same level as Tier 2 areas)
Total[3]	**25,136**	99		•	•

[1] The remining one per cent of the SK2 East Caribou Administrative Unit is comprised of federal lands (e.g. First Nation Reserves), municipal lands and small parcels of private or leased lands.

5.1.1 Other Provincial Lands

In addition to the designated CHMAs, other categories of provincial Crown lands have management and protection features associated with them. Provincial parks are managed by the Ministry of Parks, Culture and Sport and designated under *The Parks Act*. Ecological reserves are managed by the Ministry of Environment and designated under *The Provincial Lands Act, 2016*. Each of these provincial Crown land categories offer varying levels of protection and criteria that identify the circumstances and conditions under which they may be entered and the activities that may be conducted on them. Details for each are identified under the respective act and regulations.

5.1.2 Federal Lands

Federal lands such as First Nation Reserves are not within Saskatchewan's management authority and may have different management objectives, but account for approximately 138 km^2 (0.6 per cent) of SK2 East. Where integration, co-operation, and collaboration are possible, the ministry will endeavour to coordinate habitat management strategies with those on adjacent provincial Crown lands and Federal lands. Responsible management authorities will determine specific management objectives and strategies for these areas. Efforts will be made to coordinate the objectives and strategies developed within this plan as closely as possible with adjacent lands.

[1] Refer to Section 5.3 – Management Strategies.

5.2 Management Strategies

Saskatchewan has identified several management strategies that will be combined to reduce landscape disturbance and achieve the established landscape management goals while allowing for economic development in Saskatchewan's north. These management strategies are based on a hierarchy of mitigation levels. Mitigation is a process for managing development impacts through a progression of actions to avoid, minimize and offset adverse effects, followed by monitoring to ensure goals are met over time. The priority should be to use all reasonable measures to avoid and minimize development impacts. This is not always practical and compensation actions (e.g. offsets) may be required to compensate for the effects of some developments. The five main strategies are:

i. Avoid and/or minimize new habitat or sensory disturbance in important caribou areas;
ii. Use forest harvest patterns strategically to create and maintain older patches of forest;
iii. Reclaim and restore old disturbance to create habitat;
iv. Manage access to reduce caribou exposure to people and predators; and
v. Mitigate new disturbances by restoration habitat through offsetting in other areas.

Each management strategy is supported by existing provincial legislation. Management strategies are deployed strategically across the landscape to maintain or improve the amount and connectivity of suitable caribou habitat, while reducing habitat fragmentation and disturbance. Reclamation and restoration of disturbances, implementation of natural forest patterns in forest management and access management are all strategies which help minimize development impacts. These management strategies not only benefit woodland caribou, but many other boreal species that share the similar habitat requirements (Environment Canada, 2012).

The five management strategies, their intent and actions for their implementation are described in Table 8. Steps or actions required to implement each strategy are identified in Section 6.

5.2.1 Avoid and/or Minimize New Disturbance

Avoidance means minimizing human disturbance in important areas for caribou (e.g. high habitat potential, important areas for connectivity, etc.). The intent is to avoid preventable human-caused impacts on caribou and caribou habitat. Avoidance is the first mitigation strategy identified under Section 3-8(1)(b) of *The Crown Resource Land Regulations, 2019*.

Identification of important CHMAs (i.e. Tier 1) provides future economic development projects the information needed to choose alternative development locations, where feasible. In cases where development is proposed in Tier 1 CHMAs, they will be subject to more detailed assessment prior to approval. Additionally, more stringent operating conditions may be required, and greater planning effort is expected.

Table 8. Summary of SK2 East Caribou Administrative Unit range plan management strategies.

Management Strategy	Purpose/Intent	Actions
Avoid and/or Minimize New Disturbance	Minimizing human disturbance in areas with characteristics or features that make them uniquely important to the maintenance of caribou, their movement, or other habitat requirements. The intent is to avoid preventable human-caused impacts on caribou and caribou habitat.	<u>All Activities</u> • Reduce the intensity of and/or conduct human activities outside the sensitive timing window of late winter, calving and post-calving (April 1 to July 31). • Evaluate the risks associated with activities and develop viable alternatives to creating new disturbance. • Areas to be avoided are anticipated to be dynamic in nature and the relevance of these areas may change over time. • Avoidance of important CHMAs (i.e. Tier 1) should be considered for all proposed activities on provincial Crown land.
Forest Harvest Patterns	Through forest harvesting, create natural forest patterns that more closely approximate the range of variation of natural disturbances, both in distribution and scale.	<u>Forest Harvesting</u> • Use natural forest pattern harvest design to more closely emulate landscape patterns created by natural disturbances, both in distribution and scale, reducing road network requirements. • In areas previously harvested using smaller-cut/leave patterns, focus new harvest in former leave areas to develop more natural forest patterns which support full road reclamation and reforestation.
Reclamation and Restoration	Return disturbed or altered habitat resulting from human activities to its former condition as functional caribou habitat.	<u>Linear Features</u> • In areas with high levels of historical human-caused disturbance, reclaim and restore non-permanent roads, in coordination with activities proposed in 20-year Forest Management Plans. <u>Linear and Area-based Features</u> • Carry out managed reclamation of new human-caused habitat disturbance.
Access Management	Reduce amount of human-caused disturbance. Alter and manage the pattern, locations, and frequency of human access. Reduce sensory disturbance for caribou.	<u>Linear Features</u> Create access management plans to: • Identify suitable areas and or linear features for active reclamation and restoration. • Prevent human access to restored features to ensure they remain on the path to restoration. • Coordinate future access. • Control access to manage sensory disturbance where required.
Offsets	Reduce levels of human-caused habitat disturbance by compensating with restoration of areas outside of the immediately planned disturbance.	<u>Linear and Area-based Features</u> • When land use creates new habitat disturbance, an offset will be required. Places of higher importance for caribou will require greater offsets.

5.2.1.1 Sensitive Timing Window

In cases where complete avoidance of important habitats is not feasible, avoidance of activities during the late winter, calving and post-calving sensitive timing window (i.e. April 1 to July 31) may be required. Female caribou have very high energetic demands during late pregnancy and lactation (Parker et al., 2009)—any sensory disturbance during this period may have considerable impacts on their survival as well as the calf. Mitigation requirements will be developed for authorized industrial activities in caribou range that occur during the sensitive timing window. Engagement with industry will help to identify appropriate and effective approaches to mitigating sensory disturbance during the sensitive period. Engagement with other land users will also be conducted to raise awareness about the potential consequences of sensory disturbance to caribou during this period.

5.2.1.2 Application

- Avoidance is the purposeful altering of plans, operations or activities to avoid and maintain caribou habitat and its connectivity.
- Avoidance is important in managing sensory disturbance during late winter, calving and post-calving sensitive timing window.
- Avoidance of important CHMAs (i.e. Tier 1) should be considered for all proposed regulated activities on provincial Crown land.

5.2.1.3 Considerations

- Avoidance provides the greatest degree of habitat protection because development and human activities and their associated impacts occur in areas of lower importance, or during times of reduced sensitivity for caribou.
- Areas to be avoided are anticipated to be dynamic in nature and they may change over time as disturbance occurs, or due to the natural vegetation succession.
- When avoidance is not feasible, greater planning, mitigation and monitoring will be required.
- Some types of wetlands are important caribou habitat (refer to Section 4.2.2 – Patterns of Habitat Use). Enhancing wetland conservation through deliberate avoidance can achieve multiple provincial priorities beyond caribou conservation, including enhancing climate change resiliency and mitigation, reducing flooding, improving water quality and contributing to broader biodiversity goals.

5.2.2 Forest Harvest Patterns

In Saskatchewan's boreal region, the commercial forest is a large provincial natural resource of significant economic and ecological value. Saskatchewan's commercial forests are disturbance-adapted ecosystems, with wildfire being the largest driver of change. With focused forest planning and implementation, forest harvesting and its associated post-harvest reforestation activities can create similar forest disturbances and renewal.

At a strategic or landscape level, the *Saskatchewan Environmental Code - Forest Management Planning Standard* (Government of Saskatchewan, 2023) outlines the natural forest pattern (NFP) requirements, aiming to achieve forest harvest events that more closely emulate disturbance patterns created by

wildfire events. A harvest event is a cluster of several harvest areas that are considered as a single disturbance event, similar to a wildfire. The NFP approach to forest harvesting also retains large areas of mature, undisturbed habitat by reducing the overall forest harvest footprint.

With NFP harvest, newly harvested areas will create larger, contiguous areas of future caribou habitat and ensure the completion of forest renewal and road reclamation activities. Within harvest events, standing forest structure is retained, like the standing forest structure remaining after a wildfire, serving important ecological functions as the harvested area regenerates. This retention provides habitat for numerous species including cavity nesters, and deadwood-dependent invertebrates, amphibians, lichens, fungi, and micro-organisms as well as acting as a seed source for regenerating forest. The *Forest Operating Plan Standard* (Government of Saskatchewan, 2022) provides direction to licensees for harvest event planning and design, which is used to meet natural forest pattern harvesting objectives. This includes aggregating harvest blocks to concentrate disturbance, minimizing the amount and lifespan of new roads being constructed, as well as managing harvest entry and completion to reduce the length of time a harvest event remains active. Through the annual planning of forest management activities, licensees propose how the longer-term landscape level objectives and targets set out in their forest management plans will be achieved.

Emulating natural forest patterns also aligns with steps identified in Saskatchewan's *Prairie Resilience* strategy by providing the province with another mechanism to:

> "Ensure natural and commercially forested lands are managed in a manner that enhances the removal and storage of carbon from the atmosphere while allowing for sustainable harvesting, respecting normal forest cycles and wildfire preparedness;" and
>
> "Maintain or restore landscape integrity to optimize ecological goods and services, enhance resilience to extreme weather events and manage the risk to biodiversity." (Government of Saskatchewan, 2017).

For further information on natural forest pattern harvesting, refer to the *Forest Management Planning Standard* and the *Forest Operating Plan Standard* of the *Saskatchewan Environmental Code*
https://publications.saskatchewan.ca/#/home

5.2.2.1 Application

- The natural forest pattern harvesting approach has been embedded in all new Forest Management Plans, which directs forest harvest operations for forest management areas and area-based timber supply licences. It will also be promoted as the conventional approach for application in other areas of forest harvesting or where vegetation management is required (e.g. provincial parks for vegetation or fuel management).
- Consolidating forest harvest around existing cut blocks reduces forest fragmentation in areas previously harvested using a cut/leave pattern, while supporting reclamation of existing roads and early completion of forest renewal.

5.2.2.2 Considerations

- Given multiple land user interests, objectives, and scales of operation, it may be challenging to fully implement aggregation of harvest blocks and natural forest harvest pattern-based strategies in all areas. For example, implementation of larger harvest event sizes may sometimes conflict with other land uses like outfitting or trapping.
- Natural forest pattern-based harvest strategies may also be used to support business objectives of various stakeholders. For example, where feasible, forest industry working with outfitters to balance large harvest areas with short to medium-term non-harvest areas, can help to address business needs of outfitters. Harvest event size classes, described in each proponent's forest management plan, provide for this flexibility.

5.2.3 Reclamation and Restoration

For caribou range planning, road reclamation and restoration describe the process of addressing these sites, disturbed by human activities, so they are set on a path to become caribou habitat as quickly as possible. Restoration success is measured using the natural state of Saskatchewan's forest ecosystems described in *Field Guide to the Ecosites of Saskatchewan's Provincial Forests* (McLaughlan et al., 2010) as a benchmark. Ecosites of the Boreal Plain (SK2) have been stratified by habitat potential for woodland caribou and are presented in Appendix A, Table 1.

Reclamation and restoration are relevant for human-caused linear and area-based disturbances, whether they are older, legacy features or more recent. These activities will be prioritized in areas that provide the most benefit to caribou, considering the level and nature of human-caused disturbance, habitat potential and habitat connectivity. The earliest possible reclamation of recent human-caused disturbance is necessary to maintain a sufficient extent and connectivity of caribou habitat across the landscape and to prevent ongoing human use of the disturbed feature.

5.2.3.1 Linear Features

Linear features, and their associated 500 metre buffer, are responsible for most of the human-caused disturbance in the SK2 East area. Reducing the number of linear features through reclamation and restoration reduces habitat fragmentation and creates larger patches of undisturbed habitat. Undesirable human and/or predator access to suitable caribou habitat using these linear features is also reduced.

In SK2, many of the linear features are associated with historical forest harvesting activities and have resulted in a large number of legacy access roads and trails, many of which have become part of the established, informal transportation network. While new resource roads are subject to modern reclamation standards, these legacy linear features have not yet been fully addressed.

Most of the non-permanent linear features in SK2 East are associated with forest harvesting. Since the early 2000s there has been direction regarding road reclamation requirements and timeframes. Currently, the *Forest Operations Standard* (Government of Saskatchewan, 2020) outlines that in-block (class 4) and inter-block (class 3) roads must be reclaimed by licensees within a set timeframe, returning

them to their pre-existing hydrological functions and site productivity. Additionally, revegetation and reforestation of inter-block roads are required.

Several other land uses also contribute to non-permanent linear-based disturbance in SK2 East. These include roads and trails that provide access to agricultural activities, mineral exploration sites, material extraction activities (e.g. gravel and peat moss harvesting), and other commercial activities, such as outfitting lodges and cabins. Guidance on habitat restoration and reclamation in Saskatchewan is available from several sources (Government of Saskatchewan, 2008; SMEGAC, 2016; Saskatchewan Ministry of Environment, 2004). Additional guidance documents are being developed to support caribou habitat recovery.

5.2.3.2 Area-based Features

In SK2 East, forest harvest blocks are the main source of human-caused area-based disturbance. Since 1999, *The Forest Resources Management Act* requires licensees to complete forest renewal consistent with current regulations and terms of their licences. The success of forest industry reforestation efforts is assessed under the *Forest Regeneration Assessment Standard* of the *Saskatchewan Environmental Code* (Government of Saskatchewan, 2012). The Ministry of Environment's Forest Service Branch has addressed previously "not sufficiently regenerated" harvest blocks resulting from harvesting activities conducted prior to 1999.

Settlements, recreational sites, agricultural activities, old forest mills, mineral exploration sites, material extraction activities (e.g. gravel and peat moss harvesting), and other commercial activities, such as outfitting lodges, also contribute to area-based disturbance in SK2 East.

5.2.3.3 Application

- The reclamation and/or restoration of non-permanent human-caused disturbances on Crown land, is generally required as a condition of new permits, licences, leases or other dispositions authorizing the occupation or use of the land under *The Crown Resource Land Regulations* of *The Provincial Lands Act*.
- Reclamation and restoration of human-caused legacy habitat disturbance will be achieved through various programs and mechanisms that may be community-led, industry-led, government-led or combinations thereof.
- Implementation of consistent restoration standards for new and legacy habitat disturbance is expected to accelerate forest regeneration and ensure areas that can be considered restored as undisturbed caribou habitat achieve that status as quickly as possible.
- The Ministry of Environment is assessing the revegetation status of linear features in key areas, including a subset of Tier 2 areas in SK2. When coupled with information on suitable caribou habitat and stakeholder access considerations, this assessment will help identify where restoration of linear features is required and appropriate and provides benefit to caribou.

5.2.3.4 Considerations

- Expectations and reclamation standards currently differ among various land-use activities. For example, the *Forest Regeneration Assessment Standard* (Government of Saskatchewan, 2012) used by the forest sector, identifies survey protocols and standards to assess tree regeneration requirements by tree species, free-to-grow height and stocking in existing harvest blocks. Other resource industries, such as mineral exploration, are expected to implement Beneficial Management Practices (SMEGAC, 2016) and project-specific reclamation activities requested by the ministry.
- Definitions for what constitutes reclaimed and restored caribou habitat (i.e. undisturbed) are not currently well-defined:
  - Environment Canada (2011) defines wildfires greater 40 years in age as undisturbed.
  - Definitions for linear features are not currently available.
- Linear features in SK2 East include those with an existing industry reclamation liability and legacy features. The Ministry of Environment is reviewing its inventory of linear features to clarify the number, location, and extent of legacy linear features that will require additional financial investment to reclaim. In addition, the ministry is developing approaches to assess the revegetation status of linear features using remotely sensed data to identify features that could be prioritized for active restoration and those that are already recovering and/or could be left for natural regeneration.
- Successful restoration of linear features will require public, Rightsholders and stakeholder awareness, engagement and support to reduce or limit motorized vehicle use on reclaimed roads and trails.

5.2.4 Access Management

Access management refers to minimizing the amount of new linear features such as roads and trails and their ongoing use, with the objective of reducing or managing human access into an area. Access management supports the reclamation of disturbed sites by allowing and promoting revegetation to desired species and hastens the recovery of habitat. It also encourages consolidation of proposed and existing access in a geographic area.

For future projects, access management planning should be part of the planning process for the full lifespan of projects. Effective access management planning includes planning and coordinating access, reclamation and restoration for all stages of a project, and ensuring project-related access is appropriately removed from the land base as early as possible. In some cases, access management planning may also include implementing short-term access control measures to address sensory disturbance or other concerns during critical time periods. These measures can include gates, berms or other temporary measures to control access for a specific period. Although these measures have some value for short term access control, permanent road and trail reclamation is preferred and is typically required.

For existing projects and proposed new access, access management planning should be applied to identify linear features suitable for reclamation and coordinate industrial and recreational access. Access

management planning is carried out with the input of local users and includes engagement with the public and stakeholders, in addition to the duty to consult process undertaken with First Nations and Métis communities.

5.2.4.1 Application

- Over time, access management considerations will be integrated into all provincial decision-making in SK2 East. Targeted access management planning may be strategically implemented to maximize habitat connectivity and habitat recovery.
- Appropriate mitigation direction for sensory disturbance to caribou during the sensitive timing window will be developed through engagement with industry and other land users. Seasonal operating requirements for industry will be a component of the mitigation approach. Engagement with recreational land users will be needed to raise awareness of the importance of the sensitive timing window for caribou.
- The ministry has completed a cross jurisdictional scan of best management practices related to various industry activities occurring in caribou habitat. The results of this scan are being reviewed with industry to develop standardized, practical and effective mitigation approaches for industrial activities in caribou range that balance the risk to caribou and caribou habitat with operational requirements. These approaches will be integrated into permit conditions for authorized industrial activities.

5.2.4.2 Considerations

- Access management is critical to supporting successful caribou habitat restoration initiatives, including restoration of roads and trails that are unused or infrequently used.
- To be effective, access management and restoration planning will require detailed mapping of linear features (e.g. roads and trails), and the use and re-vegetation status of those features, as well as ongoing monitoring.
- Access management is an important aspect of range plan implementation. Engagement with First Nations, Métis communities and stakeholder groups will be essential to the success of these strategies. Once access management plans are at an approval stage, the duty to consult with First Nations and Métis communities will be triggered.

5.2.5 Offsets

Mitigation is the process of reducing or lessening the negative consequences associated with industrial developments on the landscape. Residual effects are the environmental impacts predicted to remain after all practical avoidance, minimization, and mitigation options have been implemented.

Offsets are applied as part of a mitigation framework to reduce the overall amount of human-caused disturbance by restoring habitat in another location. Offsets can help balance economic and environmental objectives by maintaining future economic opportunities. This approach has been successfully used by other jurisdictions and most recently in Saskatchewan within the potash and peat harvesting industries.

In woodland caribou range, offsets will be applied to new projects deemed a development under *The Environmental Assessment Act* and may apply to both new linear and area-based disturbances. To reduce or alter the pattern of existing human-caused disturbance, especially in important caribou habitat, areas of existing disturbance may be targeted for restoration in the mitigation process. New disturbances in areas of higher importance to caribou will require greater offsets. Identification of higher importance areas, within caribou range planning areas, will provide proponents certainty as to the expectations and opportunities for avoidance and/or offset requirements.

5.2.5.1 Application

- To date, offsets have been required when a project is deemed a development under *The Environmental Assessment Act*. The need for offsets is being presented during range planning to ensure that all stakeholders are aware the ministry is applying this tool as a caribou habitat conservation and recovery measure. As part of mitigation planning, work is being done by the ministry to examine potential benefits of conservation banking for offsetting, including a monitoring component. Industry, First Nations and Métis communities, and other groups will be engaged during the development of a mitigation and offset process to ensure there is an opportunity to provide input in its development and/or application.
- Where possible, restoration associated with an offset will target high priority areas for caribou habitat restoration. In SK2, Tier 2 areas will be prioritized for offset activities where possible, to help ensure these areas are on a path to become suitable caribou habitat as soon as possible.
- While many industries are currently responsible for reclamation and reforestation which aids in minimizing adverse effects, it does not remove all impacts. The intent of habitat offsets is to address the long-term residual effects of the development after mitigation efforts have been made. Direct offset costs are the responsibility of the proponent initiating the development.
- Specific offset requirements and methods for their calculation are in development. Concepts being considered include:
    - Offset requirements will be based on areas of habitat importance to caribou and habitat management objectives. In SK2, proposed developments in Tier 1 CHMAs would result in the highest offset requirements, while activities in Tier 3 the lowest (see Section 5.1 for description of the CHMA tiers).
    - Saskatchewan anticipates using a risk-based formula approach that incorporates the spatial extent (direct and indirect) and intensity of the disturbance, the location of the offset, and the time lag and uncertainty of restoration success.
    - A monetary compensation system for industry to offset unavoidable impacts in lieu of delivering habitat offsets, which would fund restoration activities.

5.2.5.2 Considerations

- While reclamation activities to meet offset requirements can be performed relatively rapidly, it will take many decades for restoration activities to produce suitable caribou habitat. As a result, the benefits of habitat offsets will not be realized for many years.
- Supporting tools and processes for tracking and identifying offset opportunities and completed reclamation activities will be required. The information being developed to support linear feature restoration, including clarifying legacy features and their revegetation status, will assist identifying opportunities for offsets.

5.3 Landscape Management Goals in SK2 East

To provide suitable habitat conditions supporting the recovery and long-term sustainability of the woodland caribou population across the provincial range, Saskatchewan is managing habitat at the landscape level. Ultimately, the measured population size and trend of woodland caribou in SK2 East will provide the best indication of the effectiveness of Saskatchewan's landscape management goals. An adaptive management approach, and longer-term population monitoring, will allow Saskatchewan to respond to changes in caribou population status and assess the effectiveness of current management options.

Saskatchewan has identified five landscape management goals for SK2 East:

Landscape Management Goal 1:

- Maintain the total amount of disturbance in SK2 East below 35 per cent.

Landscape Management Goal 2:

- Maintain greater than or equal to 85 per cent of high potential woodland caribou habitat in a condition unaffected by human-caused disturbance**.**

Landscape Management Goal 3:

- Maintain adequate connectivity between SK2 East and adjacent Caribou Administrative Units and jurisdictions.

Landscape Management Goal 4:

- Implement forest harvest event sizes to more closely emulate natural forest patterns.

Landscape Management Goal 5:

- Reduce the total amount of non-permanent linear features in Tier 1 and Tier 2 CHMAs.

The management strategies identified in this plan are designed to meet these landscape management goals and reduce disturbance to woodland caribou habitat while allowing for continued economic activity. The range plan recognizes that some management activities may not result in improvements to caribou habitat for many years. Implementation of the range plan's strategies were modelled over a 50-year period. CHMAs are expected to remain in place for a minimum period of 20 years. The SK2 East range plan is anticipated to be reviewed and revised approximately every five to ten years.

5.3.1 Projecting Potential Land Use Impacts on Caribou Habitat into the Future

Using historical information and forecasted land use, analyses of different scenarios were completed to understand the potential future impacts of human activities on woodland caribou habitat and the relative benefit of the management strategies outlined in Section 5.2. The scenario analyses were conducted over a 50-year time horizon. Beyond 50 years, uncertainty in the main assumptions relating to forest harvest utilization, other industrial developments and wildfire is too high to provide confidence in modelled habitat disturbance results. While these scenarios are coherent and plausible, wildfire, market fluctuations, current linear feature regeneration status and human dimensions all complicate future projections. Given these many factors, it should be expected that the projected disturbance levels and geographic locations of disturbance depicted in the modelled scenarios will deviate from a realized outcome in 50-years. Ongoing tracking of disturbance levels and monitoring of caribou population status and trend will be required to assess success in meeting the landscape management goals and the degree to which the selected strategies are effective for managing a self-sustaining caribou population in SK2 East.

The scenario analyses considered a range of land uses and included different assumptions about forest harvest utilization, mineral resource development, and restoration of non-permanent linear features. Two scenarios were selected to be presented in the range plan. Land Use Scenario A and Land Use Scenario B explore different forest harvest utilization rates under a lower and higher rate of road reclamation. In Land Use Scenario A and B, all other land use and wildfire assumptions were maintained constant. The following text boxes provide an overview of the forest harvest, mineral development and linear feature reclamation assumptions associated with Land Use Scenario A and B. Detailed scenario assumptions for the two land use scenarios are listed in Table 9. Additional SK2 East scenarios and their results are presented in Appendix D.

Land Use Scenario A

Forest Harvest Utilization (F1 forest harvest scenario)

- 80% for the Pasquia Porcupine TSA
- 25% for the North East TSA

Mineral Development (M1 mineral development scenario)

- One new silica sand mine site, one new base metal processing site, three new base metal extraction sites, and two new peat harvest sites.

Linear Feature Reclamation

Moderate (R2) reclamation scenario

- Only class 3 and 4 roads are reclaimed unless they intersected a new harvest block.

Low (R3) reclamation scenario

- Only class 4 roads are reclaimed unless they intersected a new harvest block.

Land Use Scenario B

Forest Harvest Utilization (F2 forest harvest scenario)

- 100% for the Pasquia Porcupine TSA
- 50% for the North East TSA

Mineral Development (M1 mineral development scenario)

- One new silica sand mine site, one new base metal processing site, three new base metal extraction sites, and two new peat harvest sites.

Linear Feature Reclamation

Moderate (R2) reclamation scenario

- Only class 3 and 4 roads are reclaimed unless they intersected a new harvest block.

Low (R3) reclamation scenario

- Only class 4 roads are reclaimed unless they intersected a new harvest block.

Wildfire disturbance was not modelled spatially due to difficulties in predicting the locations and intensities of future wildfire. Instead, the projected area disturbed by wildfire was added to the forecast human disturbance in each decade based on the average rate of historical wildfires. The impacts of climate change on wildfire were not directly assessed in this analysis, but climate change may result in an increased amount of wildfire disturbance in the Boreal Plain. However, the magnitude of that increase and how wildfire suppression activities or other wildfire risk mitigation activities in the commercial forest may respond are uncertain.

Table 9. Detailed assumptions for Land Use Scenario A and B assessed in the SK2 East Caribou Administrative Unit.

Land Use Sector	Land Use Scenario Assumptions
Forestry	Forestry is expected to remain as the dominant land use activity in SK2 East for the coming decades. The potential effect of different levels of forest harvest utilization on habitat disturbance was a key factor explored in the future scenarios. **Forest Harvest Utilization** Based on existing mill capacity and historic forest product market conditions, the forest industry in SK2 East is forecast to maintain or increase current levels of utilization. For the range plan, two forest harvest utilization scenarios were examined. Forest harvest utilization scenarios are further discussed in Appendix D. Forest Harvest Scenario F1: In scenario F1 different forest harvest utilization was projected for the two timber supply areas (TSA) based on recent forest harvest levels in the proportion of each TSA within woodland caribou range, plus a moderate level of growth: • Harvest utilization for the Pasquia Porcupine TSA was forecast at 80 per cent. • Harvest utilization for the North East TSA was forecast at 25 per cent. Forest Harvest Scenario F2: Timber harvest licenses allow for up to 100 per cent utilization of the licensee allocation. To understand the potential outcomes of higher levels of forest harvest allocation, an exploratory forest harvest scenario of 100 per cent utilization for the Pasquia Porcupine TSA and 50 per cent utilization for the North East TSA was also examined. **Forest Harvest Patterns** Updated data supported modelling of harvest event planning in the North East TSA. For this range plan, harvest event planning was not able to be modelled in the Pasquia Porcupine TSA but will be explored at the next FMP review. Implementation of harvest event planning is expected to result in reduced disturbance levels. Guiding Principles have been integrated into the Forest Operating Plan Standard (Government of Saskatchewan, 2022) and will be implemented for all future commercial forest harvesting. **Location of Forest Harvest** For the two scenarios, most future forest harvesting is expected to continue to occur in low and moderate potential caribou habitat. In the 50-year scenario, most forest harvesting is expected to continue to occur in Tier 3. Harvesting in Tier 2 areas was limited to the first 20 years of the modelled scenarios, while harvest was excluded from the Tier 1 areas over the entire 50-year scenario period.

Table 9. *(continued)* Detailed assumptions for Land Use Scenario A and B assessed in the SK2 East Caribou Administrative Unit.

Land Use Sector	Land Use Scenario Assumptions
Mineral Exploration and Development	Some parts of SK2 East have high mineral potential. Saskatchewan's critical minerals strategy (Government of Saskatchewan, 2023) is likely to increase new mineral exploration and development in the region. In the scenarios, mineral interest was assumed to continue to be focused on the northern part of SK2 East, with ongoing peat interests in the south. **Mineral Exploration** Mineral exploration is required to find and confirm economic mineral resources. These activities are not modelled in the SK2 East scenarios due to insufficient data but are recognized as an ongoing activity and source of non-permanent habitat disturbance in parts of the region. **Mineral and Peat Development** In SK2 East, the following number and types of mines that could be developed over the next 50 years (M1 mineral development scenario) is considered plausible: • One silica sand mine; • Three base metal extraction mines; • One base metal processing site; and • Two peat harvest sites.
Linear Features	SK2 East has a well-developed network of all-season roads, including several paved highways and a rail line. Except for new access roads required for forestry, mineral exploration, and similar activities, a major expansion of the public road network is not anticipated. The amount and location of new access roads will be dependent on the location, intensity and operating practices related to forest harvesting and mineral exploration and development. **Permanent Linear Features** All permanent linear features such as numbered highways, major improved bush roads, municipal roads, transmission lines and rail lines were maintained. No new features were modelled for the 50-year scenario period. **Non-Permanent Linear Features** Non-permanent linear features include access roads and mineral exploration trails, inter-block forestry roads and in-block forestry roads. The reclamation of non-permanent linear features is a key strategy to manage caribou habitat and is an important factor influencing the amount of future human-caused disturbance. Two non-permanent linear feature scenarios were examined: • Moderate (R2) Reclamation Scenario - Class 3 (inter-block) and Class 4 (in-block) roads are reclaimed unless they intersected a new harvest block. • Low (R3) Reclamation Scenario - Class 4 (in-block) roads are reclaimed unless they intersected a new harvest block.

Table 9. *(completed)* Detailed assumptions for Land Use Scenario A and B assessed in the SK2 East Caribou Administrative Unit.

Land Use Sector	Land Use Scenario Assumptions
Linear Features *(Cont.)*	A limited number of new forestry-related roads were added to the landscape based on information obtained by the Ministry of Environment from the forest licensee tactical plan for the Pasquia Porcupine TSA.
Settlements	SK2 East includes several existing communities, villages and recreational cottage subdivisions. While community growth is expected for existing settlements, the establishment of new communities or new major recreational subdivisions is not anticipated.
Recreation	Multi-season motorized and non-motorized recreation is an important activity in SK2 East. These activities are anticipated to remain at current levels or potentially increase. The extensive road and trail network in SK2 East receives high levels of summer and winter use. Effects of changing intensity of recreational activity was not considered in this analysis.
Wildfire	Wildfire was not modelled spatially. Instead, the amount of wildfire disturbance outside of human-caused disturbances over the last 20 years was calculated and then added on a per decade basis to future projections. New wildfire disturbance was added at a constant average burn rate of 26 km^2/year or 0.2 per cent of SK2 East per year. The majority of SK2 East falls within the primary and secondary timber areas and will continue to be in the high value commercial forest full response wildfire management zone. A similar level of wildfire suppression effectiveness was assumed for the 50-year scenario.
Other Land Uses	The location and intensity of all other land uses are projected to occur in similar locations and amounts as the current situation for the duration of the 50-year scenario period. These land uses were not simulated. While development of small linear and area-based disturbances are small contributions to overall disturbance levels in an area the size of SK2 East, there may be localized effects on caribou habitat and connectivity that are not reflected in these scenarios.
Reclamation Time	A 40-year recovery period was assumed for all human and wildfire disturbances to be considered undisturbed caribou habitat.

5.3.2 Scenario Analyses and Projected Landscape Management Goals

Saskatchewan's focus is on managing human-caused disturbance—altering the pattern of human-caused disturbance while maintaining adequately sized and well-connected patches of undisturbed caribou habitat across, and between, Caribou Administrative Units and jurisdictions. The intent is to provide sufficient habitat availability in woodland caribou range, similar to what might occur in a natural wildfire regime. By managing the spatial pattern and amount of disturbance, the goal is to create healthy forest landscapes for caribou and other boreal species.

The specific SK2 East landscape management goals, and how the land use scenario analyses affect the goals, are described below.

Landscape Management Goal 1: Maintain the total amount of disturbance in SK2 East below 35 per cent.

In SK2 East, Saskatchewan aims to maintain the total disturbance level below the 35 per cent recovery strategy habitat disturbance threshold. Actions related to meeting this goal include:

- Avoiding new habitat disturbance in areas of important caribou habitat;
- Using a natural forest pattern-based harvesting approach to emulate natural forest patterns and reduce road access infrastructure; and
- Coordinating, planning and reclaiming new access linear features, and reclaiming legacy mineral exploration and forestry-related linear features.

In SK2 East the current level of human-caused disturbance is approximately 26 per cent. Under Land Use Scenario A, the level of human-caused disturbance is expected to marginally increase to between 28 and 32 per cent, depending on the level of linear feature reclamation achieved (Figure 16). The projected amount of total disturbance (i.e. wildfire and human-caused with a 500 metre buffer) at 50 years into the future is expected to range between 30 and 33 per cent, similar to the current disturbance level of 31 per cent.

The long-term effects of non-permanent linear disturbance reclamation and natural forest pattern-based harvest strategies are expected to be realized near the middle and end of the 50-year scenario period, as indicated by the plateau or decline in disturbance levels after year 40 (Figure 16). Maps illustrating how the SK2 East landscape may change from existing and new human-caused disturbance and reclamation over the 50-year scenario period are provided in Appendix D.

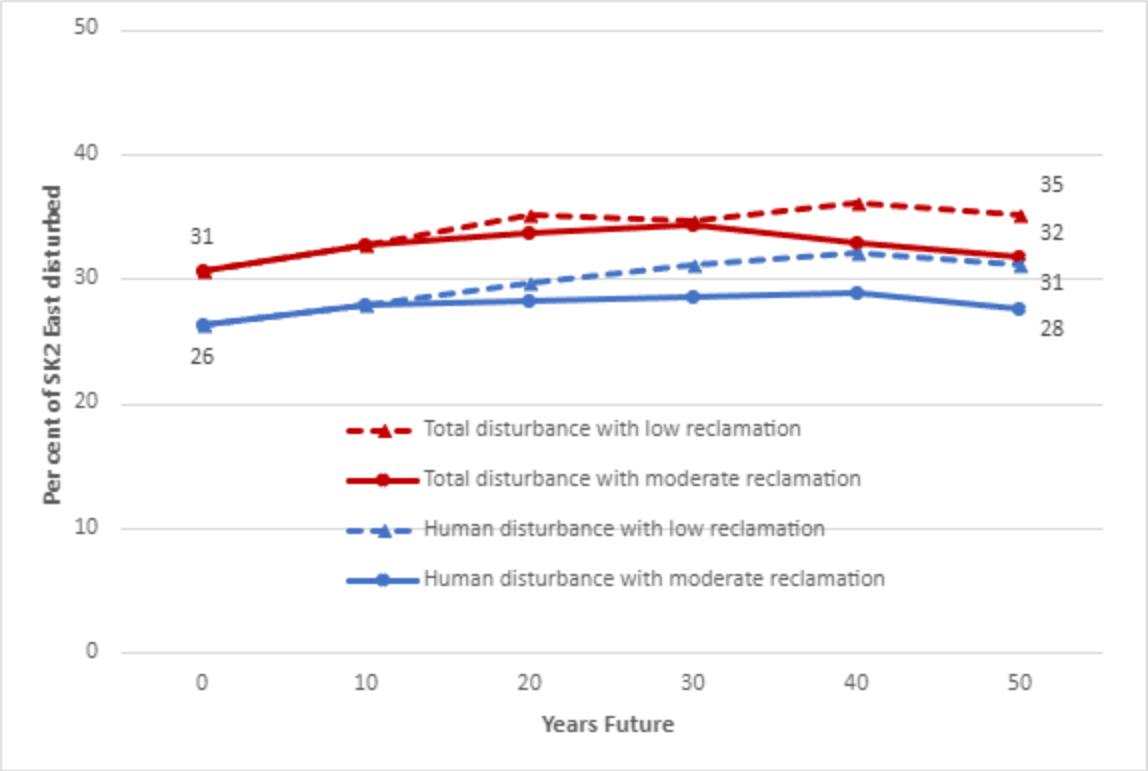


Figure 16. Projected total and human-caused disturbance in the SK2 East Caribou Administrative Unit resulting from **Land Use Scenario A** (assumed utilization of forest harvest allocation: 80 per cent in Pasquia Porcupine TSA and 25 per cent in North East TSA) and either moderate or low linear feature reclamation.

Land Use Scenario B explores increasing utilization of the SK2 East forest harvest allocation. Increasing forest harvest utilization to 100 per cent for the Pasquia Porcupine TSA and 50 per cent for the North East TSA is expected to result in an increased level of human-caused disturbance, gradually increasing from 26 per cent to between 33 and 35 per cent (Figure 17). In Land Use Scenario B, reclamation of non-permanent linear features becomes increasingly important to reduce the amount of total disturbance. Even with moderate reclamation of non-permanent linear features, in 50 years the amount of total disturbance (i.e. wildfire and human-caused with a 500 metre buffer) is projected to increase to 37 per cent (Figure 17).

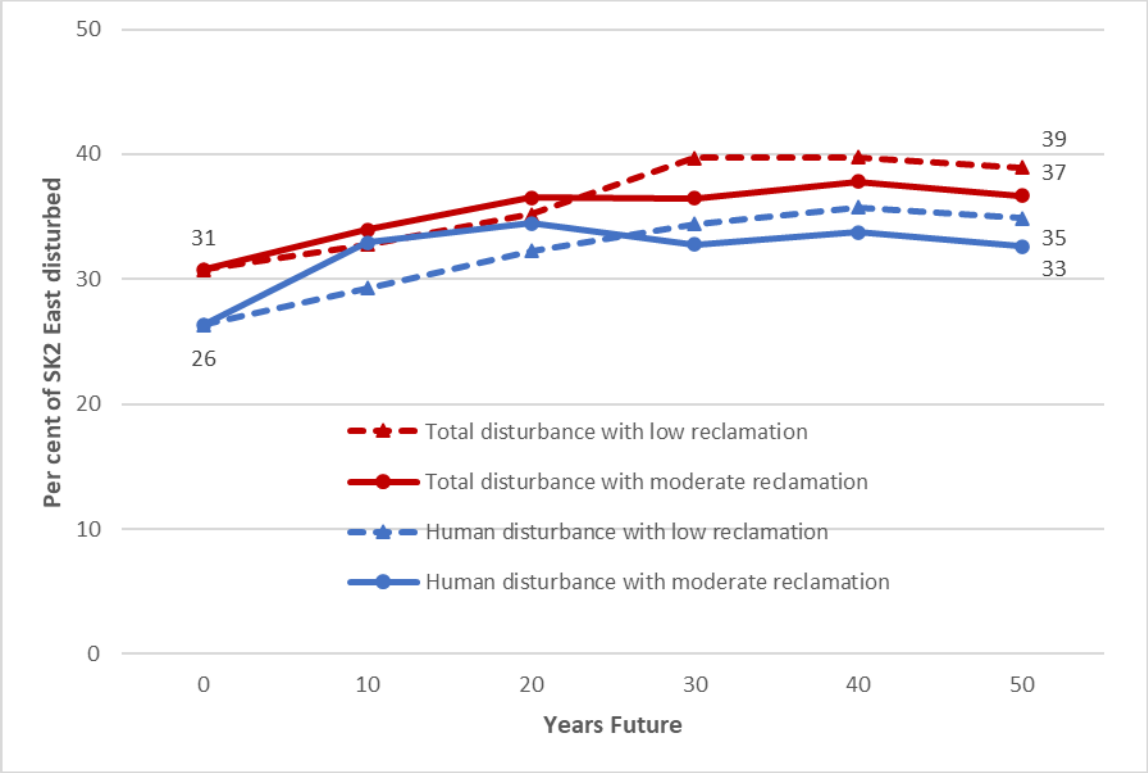


Figure 17. Projected total and human-caused disturbance in the SK2 East Caribou Administrative Unit resulting from Land Use **Scenario B** (assumed utilization of forest harvest allocation: 100 per cent in Pasquia Porcupine TSA and 50 per cent in North East TSA) and either moderate or low linear feature reclamation.

Landscape Management Goal 2: Maintain greater than or equal to 85 per cent of high potential woodland caribou habitat in a condition unaffected by human-caused disturbance.

High potential woodland caribou habitat occurs throughout SK2 East in Tier 1, Tier 2 and Tier 3 areas, although in higher proportions in Tier 1 and Tier 2 areas. High potential habitat provides necessary forage and refuge habitats used during the sensitive late-winter, calving, and post-calving periods. These habitat types need to remain in large, connected patches throughout the SK2 East landscape to support low-density caribou use and predator avoidance.

In SK2 East, the ministry intends to maintain greater than 85 per cent of high potential habitat in a condition unaffected by human-caused disturbance. Achieving this management goal will ensure that areas of important caribou habitat remain in a condition largely undisturbed from human activities. To be effective, this habitat objective should be considered in conjunction with other landscape objectives for connectivity, forest harvest patterns, and reclamation of legacy, non-permanent roads.

Currently, more than 85 per cent of high potential habitat in SK2 East is unaffected by human-caused disturbance. Based on the scenario modelling results from Land Use Scenario A, the projected amount of high potential habitat unaffected by human-caused disturbance would be maintained at between 86 and 88 per, depending on the amount of linear feature reclamation (Figure 18). Future moderate habitat

potential is projected to decrease slightly from the current amount of 84 per cent undisturbed. Based on assumed locations of forest harvesting and other land use activities, most human-caused disturbance is expected to continue to occur in low habitat potential.

These results suggest that, with appropriate management actions (e.g. reclamation of linear features), the goal of maintaining or increasing the amount of high habitat potential unaffected by human-caused disturbance above 85 per cent can be met in SK2 East. The ministry is developing approaches for prioritizing restoration activities to target areas with the greatest potential benefit for caribou. Considerations include habitat potential, landscape context, patch size and connectivity (e.g. providing linkages for caribou movement–see Landscape Management Goal 3). Input and participation from Indigenous and local communities will be an important component of restoration planning and prioritization.

Based on results of Land Use Scenario B, increasing utilization of the forest allocation in the Pasquia Porcupine and North East TSAs is likely to result in gradual declines in the amount of undisturbed habitat in each of the three habitat potential classes over the 50-year scenario period (Figure 19). Under Land Use Scenario B, undisturbed high potential habitat is expected to decline below the 85 per cent target after 50 years, regardless of the amount of linear feature reclamation.

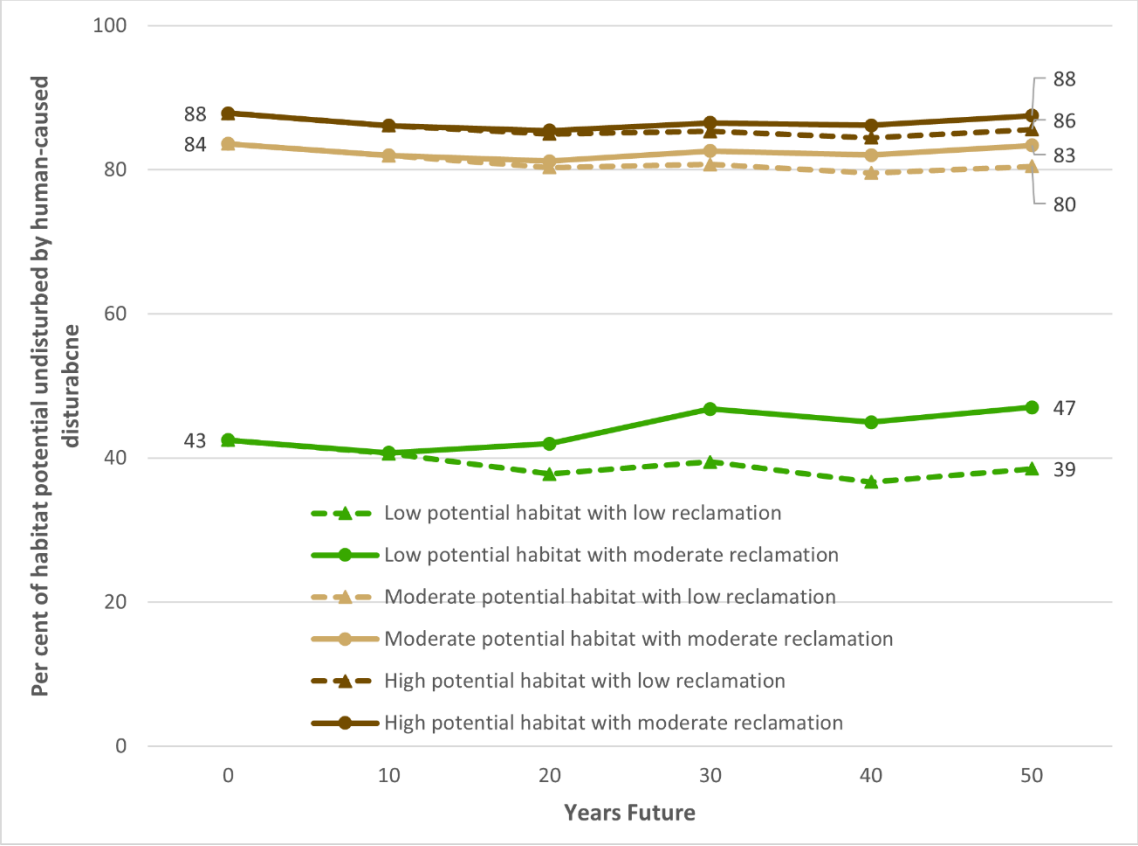


Figure 18. Projected human-caused disturbance in each habitat potential class (low, moderate and high) in the SK2 East Caribou Administrative Unit resulting from **Land Use Scenario A** (assumed utilization of forest harvest allocation: 80 per cent in Pasquia Porcupine TSA and 25 per cent in North East TSA) and either moderate or low linear feature reclamation.

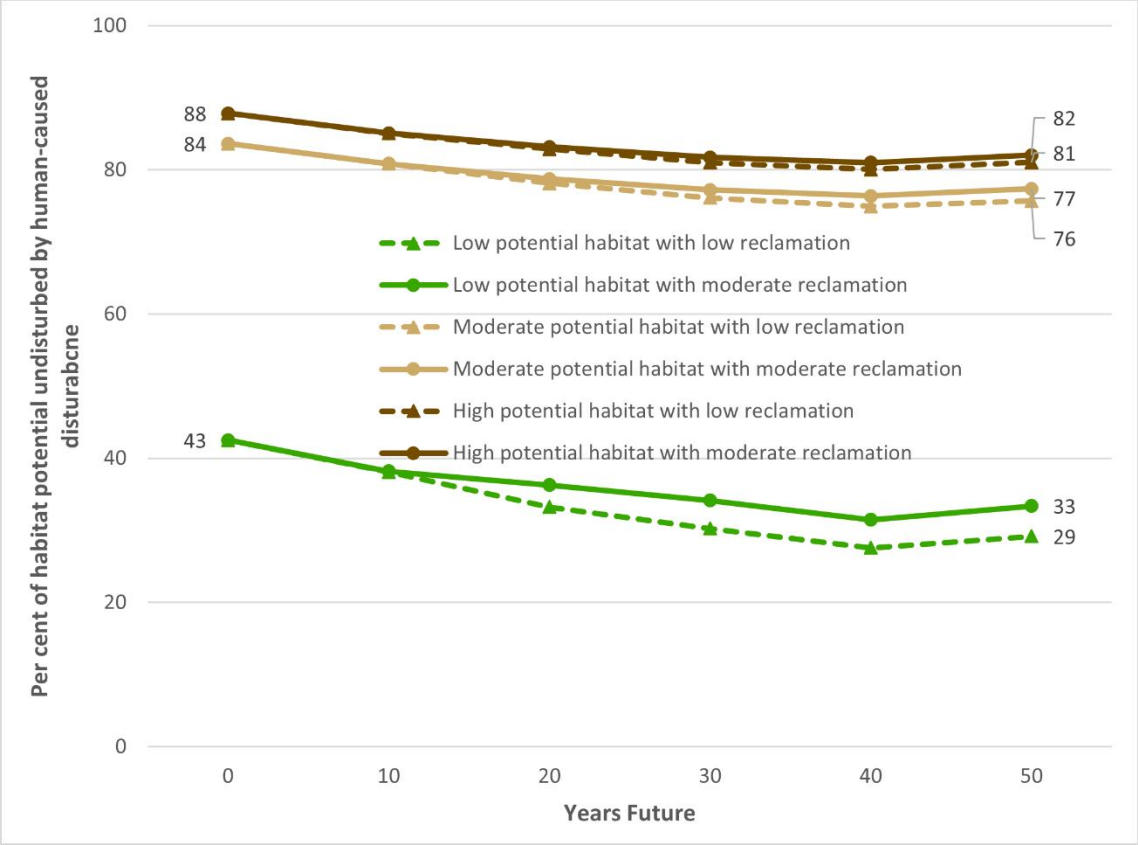


Figure 19. Projected human-caused disturbance in each habitat potential class (low, moderate and high) in the SK2 East Caribou Administrative Unit resulting from **Land Use Scenario B** (assumed utilization of forest harvest allocation: 100 per cent in Pasquia Porcupine TSA and 50 per cent in North East TSA) and either moderate or low linear feature reclamation.

Landscape Management Goal 3: Maintain adequate connectivity between different areas of SK2 East and adjacent caribou administrative units, conservation units and Manitoba ranges.

To support a relatively continuous woodland caribou population across eastern and northern Saskatchewan, maintaining adequate landscape-level connectivity within SK2 East and adjacent caribou administrative units and jurisdictions is required. The future land use scenarios examined for the range plan do not address landscape connectivity. Research and modelling to identify potential caribou movement corridors and where impediments to potential movement occur on the landscape is ongoing. A more complete understanding of landscape connectivity for caribou will be needed for managing the Tier 3 areas, which are intended to provide essential connectivity between Tier 1 and Tier 2 areas. Connectivity modelling and existing map products such as ecosites, caribou habitat potential, and natural and human-caused disturbance are being used to map potential and existing caribou habitat connectivity. The results will be useful for:

- Identifying priority areas where mitigation offsets and reclamation would be most beneficial for restoring landscape connectivity for caribou; and

- Identifying areas where future development or land use activities may impair connectivity.

This research will complement genetic analyses by identifying potential mechanisms leading to genetic isolation. Although much of the genetic structure in Saskatchewan caribou is a result of the distance between animals, landscape features which can impede movement and affect population structure include large water bodies, roads and forest harvest blocks (Priadka et al., 2018). In some areas, management actions to improve connectivity are anticipated to focus on human-caused disturbance which has impeded caribou movement and affected population structure. Reducing human disturbance around natural landscape features that constricts movement will help reduce the compounding effect of natural barriers on connectivity.

In SK2 East, CHMA 6 (Figure 15) provides important connectivity between Tier 1 areas in the Pasquia Hills and the Pasquia Bog. CHMA 6 is being prioritized for initial linear feature reclamation and restoration efforts to improve movement corridors. Forest harvest operations are expected to be completed in key portions of CHMA 6 within the next 5 to 10 years, providing near-term habitat restoration opportunities.

Landscape Management Goal 4: Implement forest harvest event sizes to more closely emulate natural forest patterns.

Like other jurisdictions, historical forest harvesting in Saskatchewan was generally completed using a traditional two-pass (cut and leave) harvest system of relatively small harvest blocks (ranging from 40 ha to 100 ha in size) with adjacent unharvested areas. In the southern part of SK2 East, where there is a long history of commercial forestry, this two-pass harvesting pattern resulted in a fragmented landscape with relatively small forest openings and a large network of legacy access roads.

Based on the concepts of the natural range of variation, Saskatchewan has implemented natural forest pattern-based harvest requirements that aim to have forest harvesting more closely emulate wildfire in scale and pattern. The natural forest pattern-based harvesting approach, outlined in the *Forest Management Planning Standard* (Government of Saskatchewan, 2023), requires that forest management plans identify a distribution of harvest event sizes that more closely approximate natural patterns of disturbance. Event size classes are defined in the *Forest Management Planning Standard* and presented in Table 10. The *Forest Operating Plan Standard* (Government of Saskatchewan, 2022) provides direction for operational planning of natural forest pattern events.

Table 10. Forest Management Planning Standard harvest event size classes for the purposes of planning and reporting.

Harvest Event Size Classes	Size Range (ha)
Category 1	0 - 100
Category 2	101 - 1,500
Category 3	1,501 - 3,500
Category 4	3,501 - 8,000
Category 5	> 8,000

The forest management plan for the Pasquia Porcupine TSA identifies the current harvest event size distribution targets for the TSA (Table 11). The difference in harvest event size target ranges is a function of the preferred management scenario in the forest management plan, which considers the natural size distribution of forest stands and wildfire events in the TSA. The aggregation and sequencing of multiple smaller adjacent harvest events can begin to more closely approximate larger events, resulting in a less fragmented harvest pattern over time. Individual wildfires are more likely to create events/openings in the Category 4 and 5 event size ranges. The current Pasquia Porcupine FMP expires on March 31, 2025, at which time a new revised FMP will be required. It is expected that the new Pasquia Porcupine FMP will align with this range plan and new event size distribution targets will be established, which may differ from the current targets listed in Table 11.

Table 11. Harvest event size distribution targets for Weyerhaeuser Company Ltd. and Dunkley Lumber Ltd., in the SK2 East Caribou Administrative Unit (current 2024).

Licence	Size Range (ha)	Event Size Distribution Target (%)
Pasquia Porcupine Forest Management Agreement	5-100	17
	101-1,500	68
	1,501-3,500	10
	3,501-8,000	5
	> 8,000	0

SK2 East has a large network of approximately 6,657 km of non-permanent linear features, concentrated in the southern part of caribou administrative unit. Many of the non-permanent roads were created many years ago to facilitate temporary access for resource use and were not purposefully reclaimed. Many of these features are past their intended lifespan, are no longer required for their original purpose, and are considered legacy roads. The liability (responsibility for maintenance and/or reclamation), re-vegetation status and level of human activity associated with many legacy roads is currently uncertain.

Landscape Management Goal 5: Reduce the total amount of non-permanent linear features in Tier 1 and Tier 2 CHMAs.

Saskatchewan is working to decrease the total amount of non-permanent legacy roads through targeted reclamation and access management planning. Tier 1 and Tier 2 CHMAs will be initially prioritized for these activities.

Given uncertainties regarding the vegetation status of non-permanent linear features, it is currently difficult to project the level of reclamation that can be achieved. However, the scenario results presented above indicate the potential importance of road and trail reclamation in reducing the amount of human-caused disturbance in SK2 East. In the scenarios examined, the difference between low and moderate reclamation results in a two to four per cent difference in total human-caused disturbance after 50-years. While this amount may appear relatively minor, the spatial pattern of these reductions will strongly influence the size of undisturbed habitat patches over time, if successful road reclamation can be achieved in harvest events. The assumptions and projections about reclamation activity,

reclamation lag time, amount of future forest road requirements, and the modern reclamation standards associated with new features suggests a declining trend in total non-permanent road length over the 50-year scenario time frame (see Appendix D for more info).

Enhanced inventory information and stakeholder and Rightsholder engagement is required prior to developing specific targets for road reclamation in SK2 East. Tools for assessing habitat connectivity and access reclamation priority are being developed, such as Light Detection and Ranging (LiDAR) imaging within a subset of Tier 2 areas in SK2 East and will guide prioritization of reclamation activities on linear features where benefits are greatest for caribou and the need for reclamation and likelihood of reclamation success is high. The assessment of revegetation status will also allow for greater certainty in projections of when some disturbances could be removed from the disturbance assessment as they transition to restored habitat.

The northern portion of SK2 East has the largest areas of undisturbed habitat and a low amount of human-caused disturbance. With increasing interest in forest management and potential future resource exploration and development in this part of SK2 East, effective planning and project-level mitigation will be required to maintain large areas of undisturbed habitat and habitat connectivity.

6.0 Legislation and Regulations

Identifying the legislative tools available to Saskatchewan that enable protection of habitat for woodland caribou provides certainty of the province's ability to manage activities on the landscape to ensure there is sufficient, connected habitat, capable of supporting a self-sustaining woodland caribou population.

Saskatchewan has many legislative tools, standards and practices to support caribou habitat protection in a manner that contributes to the long-term viability of the woodland caribou population, continued economic development, and supports Traditional land uses. Many of these tools, standards and practices are enabled through key pieces of legislation including *The Environmental Management and Protection Act, 2010, The Forest Resources Management Act, The Provincial Lands Act, 2016* and their associated regulations.

6.1 Range-Specific Activities Likely to Result in the Alteration of Caribou Habitat

Habitat loss is variable and can be non-permanent or permanent, short to long-term, and large or small. It may be caused by wildfire, forest harvesting, other resource extraction, or through the construction of roads, trails, seismic lines and other linear features. Additionally, functional habitat loss may occur when woodland caribou stop using suitable habitat because of adjacent activities or disturbances.

Habitat alteration is the degradation of habitat, either permanently or temporarily, such that it would not serve its function when needed by boreal woodland caribou. Alteration may result from a single activity, multiple activities at one point in time, or from the cumulative effects of one or more activities over time. Activities that are likely to result in the alteration of habitat, include, but are not limited to, the following:

- Any activity resulting in the **direct loss** of woodland caribou habitat (e.g. conversion to agriculture, forestry cut blocks, mines, industrial and infrastructure development);
- Any activity resulting in the **degradation** of habitat leading to a reduced, but not total loss of both habitat quality and availability for woodland caribou (e.g. pollution, drainage, and flooding); and
- Any activity resulting in the **fragmentation** of habitat by man-made linear features (e.g. road development, seismic lines, pipelines, and hydroelectric corridors) (Environment Canada, 2012).

Current and foreseeable activities in the SK2 East Caribou Administrative Unit likely to result in the alteration of woodland caribou habitat are presented in Table 12.

Table 12. Current and foreseeable activities likely to result in the alteration of woodland caribou habitat.

Activity	Direct loss[1] of habitat	Degradation[2] of habitat	Fragmentation[3] of habitat
Short Term			
Exploration (test wells or geophysical lines[4])	✓		✓
Forest harvest blocks	✓	✓	✓
Transportation – minor roads and trail	✓		✓
Wildfire	✓	✓	✓
Long Term			
Conversion of habitat to agriculture	✓		✓
Electrical power transmission lines	✓		✓
Mining development – peat	✓		✓
Mining development – other	✓		✓
Oil and gas development	✓		✓
Pipelines	✓		✓
Pollution - mining development		✓	
Pollution - oil and gas development		✓	
Urban/community development	✓		✓
Tourism - snowmobile or ATV trail development	✓		✓

[1] Direct loss suggests loss or conversion of habitat to a condition that results in functional habitat loss, ranging from short to long term.
[2] Degradation suggests a deterioration of habitat quality and availability.
[3] Fragmentation suggests activity caused separation of otherwise functional habitat.
[4] Geophysical lines vary in terms of their established width, subsequent effect on habitat, and degree to which they are mapped in the disturbance layer.

6.2 Management of Caribou Habitat on Crown Land

The Provincial Lands Act, 2016 works in conjunction with *The Environmental Management and Protection Act, 2010* and *The Forest Resources Management Act* to reinforce the strength of these two statutes and provides strong legislative authorities for future land use in areas under woodland caribou range plans. Combined, these three statues and their associated regulations, listed below, provide management direction, enforcement and compliance tools, and strong protection against activities likely to disturb caribou habitat on provincial land, as well as supporting the management strategies identified in this plan.

- *The Forest Resources Management Act*
  - *The Forest Resources Management Regulations*
  - *The Forest Resources Management (Saskatchewan Environmental Code Adoption) Regulations*
  - *Saskatchewan Environmental Code*
- *The Provincial Lands Act, 2016*
  - *The Crown Resource Land Regulations, 2019*
- *The Environmental Management and Protection Act, 2010*
  - *The Environmental Management and Protection (General) Regulations*

- *The Environmental Management and Protection (Saskatchewan Environmental Code Adoption) Regulations*
- *Saskatchewan Environmental Code*

Saskatchewan's legislation provides considerable protection and conservation measures for both habitat and species. Other statutes that support desired habitat management outcomes are identified in Table 13.

Specific sections of legislation describing measures relevant to woodland caribou conservation identified in *The Forest Resources Management Act*, *The Environmental Management and Protection Act, 2010*, *The Provincial Lands Act, 2016*, and *The Wildlife Act, 1998* are presented in Appendix E. The sections have been selected as examples of being the most relevant, least duplicative and cover the authority, responsibility, compliance, and protection of both habitat (e.g. land) and species. For brevity, the associated regulations and *Saskatchewan Environmental Code* have been omitted. Legislation is periodically updated to maintain relevancy; readers are advised to refer to the most recent copy of the legislation at https://publications.saskatchewan.ca/#/home Saskatchewan Publications.

The specific legislation, regulations and other environmental controls used for environmental and woodland caribou habitat protection are unique to the conditions and considerations of the various types of land-use permitting or environmental assessment in Saskatchewan. Regulators responsible for permitting and/or assessment or approval of industrial activities and other land uses in Saskatchewan's provincial forests draw from the appropriate environmental and regulatory controls depending upon the scale, type, location, or other factors associated with the proposed activity. The measures outlined in Appendix E provide examples of those controls.

The management strategies identified in this plan are supported by existing statutes and can be implemented within the context of existing legislation, and associated regulations/standards and policies (Table 13 and Table 14). These legislative tools provide planning direction for industry proponents working in caribou habitat as well as compliance and enforcement tools in cases of non-compliance.

Table 13. Statute relevance to activities likely to result in the alteration of woodland caribou habitat on provincial land.

Activities \ Provincial Statute	The All Terrain Vehicles Act	The Environmental Assessment Act	The Environmental Management and Protection Act, 2010	The Forest Resources Management Act	The Mineral Resources Act, 1985	The Crown Minerals Act	The Oil and Gas Conservation Act	The Provincial Lands Act, 2016	The Parks Act	The Snowmobile Act	The Water Power Act	The Wildlife Habitat Protection Act	The Wildfire Act	The Wildlife Act, 1998
Extent of critical habitat affected	local	local	all	all	all	all	all	extensive	local	all	local	local	all	all
Direct loss of habitat														
Conversion to agriculture				X				X	X			X		X
Forest harvesting				X					X			X		
Human-caused wildfire												X	X	
Mining development - peat		X	X	X				X	X			X		
Mining development - oil and gas		X	X	X	X	X	X	X	X			X		
Mining development - other		X	X	X	X	X	X	X	X			X		
Urban / community development								X						
Degradation of habitat														
Human-caused wildfire									X				X	
Pollution - mining development		X	X	X				X	X			X		
Pollution - oil and gas development		X	X	X			X	X	X			X		
Drainage - peat development		X	X	X				X	X			X		
Flooding - hydroelectric power development		X	X	X				X	X		X	X		
Habitat fragmentation by human linear features														
Road / trail development		X	X	X				X	X			X		X
Snowmobile / ATV trail development	X			X				X	X	X		X		
Seismic / exploration / geophysical lines			X	X	X	X	X	X	X			X		
Pipelines			X	X	X	X	X	X	X			X		
Electrical power transmission lines		X	X	X				X	X			X		

Table 14. Provincial statutes supporting management strategies.

Management Strategy	Supporting Legislation/Tools
Avoid and/or Minimize New Disturbance	*The Forest Resources Management Act* *The Forest Resources Management Regulations* *The Provincial Lands Act, 2016* *The Crown Resource Land Regulations, 2019* *The Parks Act* *The Wildlife Act, 1998*
Forest Harvest Patterns	*The Forest Resources Management Act* *The Forest Resources Management Regulations* *Forest Management Planning Standard* (*Saskatchewan Environmental Code*) *Forest Operating Plan Standard* (*Saskatchewan Environmental Code*) *Forest Operations Standard (The Forest Resources Management Act)* *The Parks Act*
Reclamation and Restoration	*The Crown Resource Land Regulations, 2019* *The Environmental Assessment Act* *The Forest Resources Management Act* *Forest Operating Plan Standard* (*Saskatchewan Environmental Code*) *Forest Regeneration Assessment Standard* (*Saskatchewan Environmental Code*) *The Forest Resources Management Regulations* *The Parks Act* *The Provincial Lands Act, 2016*
Access Management	*The All-Terrain Vehicles Act* *The Crown Resource Land Regulations, 2019* *The Environmental Assessment Act* *The Forest Resources Management Act* *The Forest Resources Management Regulations* *Forest Wetland and Watercourse Crossing Standard* (Saskatchewan Environmental Code) (in progress) *The Operation of All Terrain Vehicles on Crown Land Prohibition Regulations* *The Parks Act* *The Provincial Lands Act, 2016* *The Snowmobile Act* *The Snowmobile Regulation, 1998*
Offsets	*The Crown Resource Lands Regulations, 2019* *The Environmental Assessment Act* *The Provincial Lands Act, 2016* *Roads on Provincial Forest Lands Standard* (*Saskatchewan Environmental Code*) (in progress)

6.3 Steps Being Taken by the Government of Saskatchewan

Saskatchewan has identified several actions to support the effective implementation of the management strategies identified in this plan (Table 15).

Parts of the woodland caribou range in Saskatchewan fall under federal jurisdiction (e.g. Prince Albert National Park) and will require federal plans to complement actions being taken by the province to ensure habitat is maintained for woodland caribou.

Table 15. Actions proposed to further support effective implementation of SK2 East management strategies.

Action	Intent / Purpose	Timeline	Status
Finalize and implement the Forest Management Planning Standard	Provide standards for forest harvest patterns in forestry sector operations to support long term caribou habitat and restoration.	Completed 2017 Revise 2023	 Revision Complete Late 2023
Develop standard caribou mitigation measures to be included as Crown land permit conditions for industrial projects	Avoid or minimize sensory disturbance during the sensitive timing period and avoid or minimize impacts to caribou habitat.	2022	On-going (initial measures developed for forestry, mineral exploration and seismic exploration)
Develop and implement a habitat mitigation framework for Crown lands	Provide regulated land users with a habitat mitigation framework that defines principles for habitat mitigation and offsets.	2020	In development
Undertake access management planning in CHMAs	Work with land users to build awareness and identify opportunities for non-permanent road closures and reclamation, and develop access management plans, where required.	On-going	On-going
Enhance existing processes and tools to capture and manage disturbance features	Improve data capture and management processes for human disturbance feature status and tracking.	2020	In development
Finalize and implement Harvest Event Planning in *Forest Operating Plan Standard*	Provide operational direction on harvest event planning for FMA and area-based TSL holders. Develop *Harvest Event Planning – Guiding Principles* to reduce forest fragmentation and roads.	2022	Complete

Table 15. (*continued*) Actions proposed to further support effective implementation of SK2 East management strategies.

Action	Intent / Purpose	Timeline	Status
Finalize and implement forest road reclamation requirements in *Forest Operations Standard*	Provide operational direction on forest road reclamation requirements.	2020	Complete

6.4 Range Plans as Evidence of Caribou Habitat Protection

The legislative tools and regulations supporting the SK2 East range plan can provide effective habitat protection. These legislative tools are also applicable for the western and central portions of the Boreal Plain (SK2) and the Boreal Shield (SK1) ecozones.

In addition to the numerous regulatory instruments available for the protection of woodland caribou and their habitat, this plan identifies and outlines principles, activities and management strategies that work toward the long-term recovery of Saskatchewan's woodland caribou population in SK2. The SK2 East range plan contains the following key caribou habitat measures:

- Identifies large areas of the most intact and important habitats as Tier 1 CHMAs, where forest harvesting is deferred for a minimum of 20-years, and where other enhanced measures will apply; and
- Identifies, as Tier 2 CHMAs, priority areas for habitat restoration planning and actions.

Scenario analyses conducted to support this range plan illustrate the potential importance of various disturbance factors and management strategies in achieving the landscape management goals. Through the combined application of management strategies identified in this plan, the scenario analyses suggest that the federal recovery strategy target of 65 per cent undisturbed habitat can be maintained for SK2 East Caribou Administrative Unit over the 50-year analysis period. The range plan habitat management strategies will improve overall landscape integrity and resilience, providing benefits for caribou and other wildlife species. However, the benefits of some habitat management strategies, such as reclamation and restoration, and forest harvest patterns, will take many years to be realized. Early and continued implementation of reclamation and restoration activities are essential to long-term landscape integrity and connectivity of woodland caribou habitat.

7.0 Monitoring

As part of an adaptive management approach, Saskatchewan will continue to monitor population trends, habitat condition, protection measures and range plan implementation.

7.1 Population Monitoring

Tracking longer-term population trends is needed to evaluate the effectiveness of management strategies and support decision-making. Future caribou population monitoring will be completed using a variety of methods, which may include genetic sampling using capture/mark/recapture, telemetry, surveys and local and traditional knowledge to estimate population size, trend and occupancy. In 2020 Saskatchewan initiated population monitoring in the SK2 East Caribou Administrative Unit using a study area in the north-west of SK2 East (Figure 4). Caribou fecal pellets were collected over a three-year period (2020 to 2022) to provide genetic information and estimate population size and trend. Results are expected in 2025. Future monitoring is anticipated to occur every five to 10 years, or sooner. In 2025 Saskatchewan will begin advancing a longer-term caribou population monitoring strategy to examine monitoring methods, frequency and priority for the SK1 and SK2 conservation units. Current caribou population indicators are listed in Table 16.

The Report a Woodland Caribou sighting database[1] compiled through the Saskatchewan Conservation Data Centre tracks caribou occurrence information to help understand woodland caribou distribution throughout SK1 and SK2. Caribou observations are submitted by members of the public, industry and other organizations. Further population and distribution monitoring approaches will be considered as they become available.

Table 16. Caribou population indicators and timelines.

Indicator	Timeline
Population size	Baseline assessment for northern SK2 East: 2025 Future: To be determined
Population demographic rates and growth (lambda/adult survival and recruitment)	Baseline assessment for northern SK2 East: 2025 Future: To be determined
Occupancy	Annual updates

7.2 Habitat Condition Monitoring

Saskatchewan will continue monitoring and reporting caribou habitat condition and suitability using disturbance metrics (e.g. the area of caribou range affected by human-caused disturbance and wildfire), and areas being reclaimed or restored to assess if landscape management goals are being met (Table 17). Habitat condition will be further informed as new information and methods become available.

[1] http://www.biodiversity.sk.ca/ReportaCaribou.php

Habitat indicators will be supported by information management systems and processes to track and report condition and assist in decision-making, providing Saskatchewan with a means to assess:

- Changes in suitable caribou habitat since range plan implementation;
- Changes in the amounts and types of disturbance since range plan implementation;
- Amount of linear and area-based disturbances reclaimed; and
- Amount of habitat restoration (through active reclamation or natural revegetation).

Table 17. Habitat condition indicator monitoring.

Measure	Indicator	Description
Human-caused disturbance	Human land use footprints (permanent and non-permanent) and buffers.	Area of human-caused direct and indirect disturbance, both permanent and non-permanent.
Wildfire disturbance	Wildfire perimeter boundaries.	Area of wildfire disturbance.
Total disturbed area	Total area of non-overlapping human-caused and wildfire disturbance.	Total area of caribou direct and indirect habitat disturbance.
Locations of areas reclaimed or naturally revegetating	Footprint reclaimed (i.e. areas in the early stages of revegetation and on a trajectory to becoming mature forest habitat).	Reclaimed habitat areas, both linear and area based.
Caribou habitat restored	Restored footprint (i.e. areas that have reached a mature forest habitat condition [> 40 years old]).	Disturbed area restored to suitable caribou habitat.

7.3 Protection Measures Monitoring

Saskatchewan will monitor protection measures that support protection of caribou habitat to verify that range plan management strategies are incorporated into conditions and decision-making processes. Initial protection measure indicators for monitoring are listed in Table 18.

Table 18. Protection measures indicator monitoring.

Protection Measure	Tool	Indicator
The Forest Resources Management Act	Forest management agreements Forest management plans Forest operating plans	Forest management agreements, plans and operating plans consider and incorporate identified range plan management strategies.
The Forest Resources Management Act	Forest product permits	Permits issued under *The Forest Resources Management Act* consider and incorporate identified range plan management strategies.
The Environmental Assessment Act	Environmental assessment approvals	Approvals issued under *The Environmental Assessment Act* consider and incorporate identified range plan management strategies.

Table 18. *(continued)* Protection measures indicator monitoring.

Protection Measure	Tool	Indicator
The Provincial Lands Act, 2016	Permits and dispositions	Permits and dispositions related to boreal Crown resource land consider and incorporate identified range plan management strategies.

7.4 Research

Saskatchewan is committed to ongoing assessment and integration of research into range planning to support adaptive management and to inform habitat indicators and targets. Since the drafting of the initial range plan for the SK2 Central Caribou Administrative Unit, considerable progress has occurred in understanding woodland caribou and caribou habitat in Saskatchewan and beyond. Advancements in woodland caribou research contribute to improved decision-making.

With input from stakeholders and Rightsholders, Saskatchewan will identify woodland caribou-related research gaps and priorities. Opportunities will also be explored to pursue priority research projects in collaboration with stakeholders and Rightsholders, including identifying research topics and opportunities for research funding and delivery.

8.0 Reporting and Range Plan Updates

8.1 Reporting on Range Plan Implementation and Monitoring

Saskatchewan will periodically report on range plan implementation actions, habitat condition, population trends and protection measures. Some elements, such as habitat condition and population trends, require longer reporting cycles and are dependent on the frequency of population monitoring studies. Updates on range plan implementation activities will be reported more frequently.

Effective application of the management strategies identified in this range plan requires collaboration and cooperation across government and with many stakeholders and Rightsholders. Regulatory instruments and policies necessary to implement the strategies require alignment and consistent application by responsible ministries. To ensure alignment across the Government of Saskatchewan, the Ministry of Environment will work closely with the Ministry of Energy and Resources, Ministry of Government Relations, Saskatchewan Public Safety Agency, and other groups. Other stakeholders and Rightsholders may have important roles in implementation actions such as habitat restoration and caribou monitoring.

8.2 Range Plan Updates

The SK2 East range plan will be reviewed and updated periodically, with an anticipated frequency of five to ten years. The plan review and update cycle is an important part of Saskatchewan's adaptive management framework for range plan implementation. Periodic population and habitat condition monitoring will be timed to support range plan reviews, to the extent practicable. Coordination with other major planning exercises (e.g. Forest Management Plan renewals), will also be considered. Progress toward the range plan landscape management goals and other measures will be examined during the range plan review process. Range plan management strategies will be reviewed and revised as required, to improve habitat and population outcomes, or to adjust for changing land use situations. Range plans may also be updated following new landscape disturbance which significantly exceeds the norm or as new information on important areas for woodland caribou becomes available.

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Glossary

The following terms are defined in accordance with their use in this document.

Biophysical attributes: Habitat characteristics required by boreal caribou to carry out life processes (see Appendix A in the recovery strategy) (Environment Canada, 2012).

Caribou administrative unit: Smaller defined unit within a caribou conservation unit. These areas are delineated based on administrative considerations and do not represent individual populations.

Caribou conservation unit: A type of caribou range with low certainty in the delineated boundary because of a lack of information (Environment Canada, 2012).

Caribou range: A geographic area occupied by a group of boreal woodland caribou that are subject to similar factors affecting their demography and used to satisfy their life history processes (e.g. calving, rutting and wintering) (Environment Canada, 2012).

Critical habitat: The habitat that is necessary for the survival or recovery of a wildlife species that is listed in the federal *Species at Risk Act* and that is specifically identified as the species' critical habitat in the federal recovery strategy or in an action plan for the species.

Disturbance (habitat): Habitat that has been affected either directly or indirectly by human or natural disturbances. Human activities such as forest harvesting or agriculture, or natural disturbances such as wildfire, either temporarily or permanently remove or alter habitat, resulting in a direct habitat disturbance. Indirect or functional habitat disturbance results when animals use habitats differently or they alter their behaviour adjacent to the direct disturbance.

Disturbed habitat: Habitat showing: i) human-caused disturbance visible on Landsat satellite imagery at a scale of 1:50,000, including habitat within a 500 metres buffer of the human-caused disturbance; and/or ii) fire disturbance in the last 40 years, as identified in data from each provincial and territorial jurisdiction (without buffer) (Environment Canada, 2012).

Fragmentation (habitat): The process by which habitats are increasingly divided into smaller units. Habitat fragmentation results in increased isolation of habitat patches, reduced habitat areas, and smaller habitat patches with reduced interior area relative to edge.

Harvest Volume Schedule: The maximum sustainable timber volume that can be harvested each year, as determined or approved by the minister, and includes a timber depletion schedule (Government of Saskatchewan, 2020).

Human development footprint: The area directly disturbed by human development and land use activities (e.g. roads, gravel pits, residential lots, agricultural fields, etc.). The human development footprint results in the physical loss or alteration of wildlife habitat.

Non-permanent disturbance: Habitat disturbance such as seismic lines and forest harvest that do not currently possess but have the potential to possess the biophysical attributes of critical habitat for boreal caribou.

Glossary continued

Occupancy: A population measure that indicates whether at least one individual of a species occurs at a site or in a defined area. Occupancy is usually determined through surveys or data on species presence. Occupancy alone does not provide information on a species' population size or population density.

Permanent disturbance: Existing features found within a range, such as industrial and urban developments, permanent infrastructure, and graded or paved roads that do not currently possess, nor have the potential to possess, the biophysical attributes of critical habitat for boreal caribou (Environment Canada, 2012).

Range assessment: A process that examines habitat conditions and population trends for a wildlife species and identifies key risk factors affecting the viability of the species.

Range plan: A document that demonstrates how the habitat condition within a given range will be managed over time and space to ensure that critical habitat for boreal caribou is protected from destruction with the aim of ensuring that each local population will either continue to be self-sustaining or become self-sustaining over time (Environment Canada, 2012).

Self-sustaining local population: A local population of boreal caribou that on average demonstrates stable or positive population growth over the short-term (≤20 years) and is large enough to withstand stochastic events and persist over the long-term (≥50 years), without the need for ongoing active management intervention (Environment Canada, 2012).

Threatened (population status): Under the federal *Species at Risk Act*, a status of threatened means "a wildlife species that is likely to become an endangered species if nothing is done to reverse the factors leading to its extirpation or extinction".

Undisturbed habitat: Habitat not showing any: i) human-caused disturbance visible on Landsat satellite imagery at a scale of 1:50,000, including habitat within a 500 metre buffer of the human-caused disturbance; and/or ii) fire disturbance in the last 40 years, as identified in data from each provincial and territorial jurisdiction (without buffer). Disturbance within the 500 metre buffer would result in a reduction of the undisturbed habitat.[1] (Environment Canada, 2012).

[1] This specific definition of disturbance was used in Environment Canada's 2011 scientific assessment to develop the disturbance-recruitment relationship upon which the categories of risk for the disturbance thresholds were derived.