



Cypress Hills Interprovincial Park

ECOSYSTEM-BASED MANAGEMENT PLAN



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Cypress Hills Interprovincial Park

ECOSYSTEM-BASED MANAGEMENT PLAN

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Prepared for:

*Saskatchewan Ministry of Parks, Culture
and Sport*

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Approval Form

The Ecosystem-based Management Plan for Cypress Hills Interprovincial Park (2020) is hereby approved for use by the Ministry of Parks, Culture and Sport in the management of the ecosystem and landscape of Cypress Hills Interprovincial Park.



March 11, 2020

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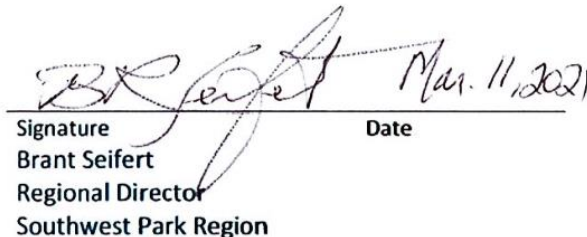
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EXECUTIVE SUMMARY

Cypress Hills Interprovincial Park (CHIPP) is a 183 square kilometre Natural Environment Park within the southwestern corner of Saskatchewan. The park encompasses the unique geological features and elevation of the Cypress Hills formation. The area contains a mix of Boreal and Montane forest elements as well as Prairie grassland elements. The area is surrounded by agricultural and pasture lands.

The park is made up of a mix of natural forests and grasslands, which is classified into nine ecosites. Upland ecosites include plains rough fescue grassland on silty clay loam, lodgepole pine-dominated stands on sandy clay, white spruce stands on silty clay, aspen stands on clay loam, aspen-white spruce mixedwoods on silty clay soils, and aspen-lodgepole pine mixedwoods on clay loam. The area also contains some low-land rich fens. The Centre Block boasts a variety of recreational activities while the West Block is relatively primitive and un-developed.

The park supports a rich amount of biodiversity with many species endemic or rare to the area. Biodiversity includes 790 vascular plants, 227 birds, 52 mammals, four amphibians, and five reptiles. Habitat for the diversity of animal species depends on the diversity of vegetation types. The park landscape is shaped by both natural and anthropogenic disturbances. The natural disturbance regime is dominated by wildfire, however fire suppression has limited this disturbance and there have been minimal large fires since the last landscape-level wildfire of 1885 and 1889.

The human history includes First Nations' use and European settlement. The area is also of historical and cultural significance with the fur trade and Royal Canadian Mounted Police. Recreation became the dominant land use with the creation of the park in 1931. The footprint of development on CHIPP is relatively heavy but largely concentrated within the Centre Block. The park contains over 600 campsites, over 200 cottages, and over 225 kilometres of roads and trails. The park is also used for sport fishing, livestock grazing, and hunting (i.e. West Block).

This ecosystem-based management plan provides strategic directions for the maintenance, protection and restoration of natural landscape, ecosystem and species diversity of CHIPP. This, in turn, enhances visitor experience as well as public appreciation and understanding. Within the plan, areas of concern are given context, management goals and objectives are identified, and corresponding recommendations are provided. The management plan is designed to provide a long term and comprehensive framework to guide both park operations and park services in using natural resources in sustainable manner. The plan identified two main ecosystem-based management goals:

- ▶ Goal 1 - Maintain a safe outdoor environment while enhancing aesthetic, educational, recreational, and interpretive opportunities within the park
- ▶ Goal 2 - Restore natural disturbances while maintaining the natural landscape, ecosystem, and species diversity of CHIPP

Major recommendations include:

- ▶ Ensure effective evacuation in the event of a wildfire
- ▶ Implement fuel treatments for threat reduction (e.g. FireSmart, fuel modifications, mechanical harvesting, prescribed fire)
- ▶ Risk tree management and renewal within core areas
- ▶ Incorporate minimal, low-impact management practices on recreational trails and non-core areas

- ▶ Develop educational and interpretive material for park patrons and stakeholders on the concepts of ecosystem-based management planning as well as other management planning (e.g. forest conservation management plan)
- ▶ Develop educational and interpretive material on specific topics related to ecosystem-based management
- ▶ Incorporate management goals and objectives from the associated forest conservation management plan and fire management plan
- ▶ Increase the area of young forest in CHIPP by renewing patches of mature to old forests, mainly using mechanical harvesting
- ▶ Reassess range health condition and develop grassland management plan to manage native grassland components to mitigate the impacts of climate change, forest and shrub encroachment, and minimize the invasion of non-native plant species
- ▶ Incorporate the ecosystem-based management plan when considering park zoning and developments
- ▶ Focus any development of large-scale recreational or other facilities to areas with existing developments or already disturbed lands in order to prioritize continued protection of the natural capital of the park
- ▶ Protect unique ecosystems (e.g. fescue grasslands, some old-growth forests, open rock faces) or habitats of high importance to wildlife (e.g. bird breeding colonies, rare and species at risk habitat) from all developments
- ▶ Reduce the length of roads and trails by closing and reclaiming any that are found to be unnecessary and minimize the development of any new roads or trails
- ▶ Minimize livestock grazing access to sensitive areas (e.g. riparian areas along Battle Creek)
- ▶ Annually conduct an inventory of non-native or invasive species incidents
- ▶ Develop management plans and control programs for non-native plant invasions with priority to core areas, trails, sensitive areas, forest renewal blocks, and fescue grasslands
- ▶ Conduct an inventory of rare and endangered species in the park and gather information on their habitat and any threats to them
- ▶ Conduct a survey of native grasslands and identify areas of unique or rare species compositions, non-native plant invasions, areas of woody and shrub encroachment
- ▶ Incorporate First Nations and Métis communities in projects related to the management of park's ecosystems and visitor experience
- ▶ Enter or maintain current relationships with NGOs, industry or other government agencies to conduct projects related to the park's ecosystems
- ▶ Monitor and report on ecosystem representation and disturbance regimes within the park
- ▶ Conduct a risk assessment of core-area trees and vegetation

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1 PURPOSE, APPROACH, AND PROCESS

1.1 PURPOSE OF PLAN

The purpose of this plan is to provide a foundation for ecosystem-based management of Cypress Hills Interprovincial Park (CHIPP), in accord with current standards, policies and the guideline of ecosystem-based management plans provided by Parks Division. This plan is intended to address issues related to management of the park's terrestrial ecosystems. The emphasis of the plan is on the general directions for ecosystem management, rather than on day-to-day operational issues. It is expected that the ecosystem-based management plan will provide a building block for revision of the overall Park Management Strategy.

The rationale for developing ecosystem-based management of CHIPP is as follows:

- ▶ Ecosystems are the natural units for management in CHIPP –scaled to humans; not too big, not too small (e.g., forest stand, grassland patch, streams, lake zone, etc.)
- ▶ Threats posed by human activities are many: alterations to historic fire and grazing regimes, introduction of non-native or invasive plants, insects, and diseases, climate change, mechanical disturbance in the core area, etc.
- ▶ Management actions are needed to mitigate/relieve these threats and to maintain natural landscape, vegetation biodiversity, and ecological processes. These actions include: forest harvesting, prescribed burns, management of tree and shrub encroachment into grasslands, management of non-native plants, tree risk and tree regeneration in the core area and treatment areas, etc.
- ▶ Planning is required to give context to threats to the park ecosystems, and our responses to those threats. Contexts to be addressed include: social, economic, ecological, and landscape contexts.

1.2 PLANNING APPROACH

Ecosystem-based management has become the dominant paradigm for protected areas in North America. Ecosystem-based management has been defined by the Canadian Boreal Forest Agreement (CBFA) as follows: *“A management system that attempts to emulate ecological patterns and processes, with the goal of maintaining and/or restoring natural levels of ecosystem composition, structure and function within stands and across the landscape.”* Saskatchewan Environment summarized this paradigm in a set of principles for their operations (SERM 1999):

- ▶ Focus on the large spatial and long temporal scales.
- ▶ Concentrate on ecosystem health and integrity.
- ▶ Make decisions based on science-based and traditional knowledge and human values.
- ▶ Involve those who will be affected by decisions, or who have an interest in the outcome.
- ▶ Use adaptive management by learning from experience.
- ▶ Look at the big picture.
- ▶ Base planning units on natural boundaries when appropriate.
- ▶ Design with nature.

Ecosystem-based management differs from traditional resource management in several ways. It is based on the ecosystem concept, in which ecosystems are viewed as open, evolving, complex systems with dynamic interactions between system components – including human, ecosystem features and ecological processes. An integral part of ecosystem-based management is that the human system is viewed as part of the ecosystem. Land managers are expected to consider the whole interconnected system, not just individual species, resources or issues. They have to take the long-term view (recognize that ecosystems are constantly changing) and the landscape view (recognize that ecosystems interact with their surroundings).

In addition to the shift in understanding, there is a shift in values. One of the goals of ecosystem-based management plan is maintaining ecosystem integrity. This includes conserving the biodiversity of the area under consideration, including genetic diversity, species diversity, and ecosystem/landscape diversity. These comprise the “natural capital” of the area, which is valued alongside the human-created capital such as campsites and roads. Uses and management must meet the test of sustainability, meaning that they cannot reduce the opportunities of future generations. Development which leads to a permanent reduction in natural capital (e.g. eliminating some components of biodiversity, or degrading soil and water systems) would fail this test. Ecosystem-based management is knowledge-intensive, integrated and holistic science. Because it is based on understanding of the ecosystems being managed, it requires ecological inventory and research. Choosing management actions requires knowledge of ecological structure and processes. But because this knowledge is rarely adequate for decision making, plans should include research and monitoring, so that each management action leads to improved understanding. Plans are subject to revision as understanding improves.

1.3 PLANNING PROCESS

This plan was based mainly on a review and analysis of existing information. The project team initially met with Parks Division - Parks Operations staff and Parks Landscape Protection Unit staff at CHIPP to discuss issues and information sources. Parks Division provided records from previous work on vegetation management and other issues at CHIPP. The project team worked through the available information, bringing in scientific literature as appropriate, and consulting with Parks Division staff on specific issues. Duty to consult and public consultation processes will also be implemented to achieve comments and feedback before the approval of the plan.

2 KEY ISSUES AND PRIORITIES

2.1 KEY BIODIVERSITY ISSUES

2.1.1 RESTORATION OF A MORE NATURAL DISTURBANCE REGIME TO PARK ECOSYSTEMS

In order to support a wide range of biodiversity within the Cypress Hills Interprovincial Park, significant areas of forest in various age classes as well as grasslands must be maintained. Historical natural disturbances and the current stand age distribution show that most of the park's forests are at the mature to over-mature stage. Minimal renewal has occurred since the last major natural disturbance of a landscape-level fires in both 1885 and 1889. This is the result of forest fire suppression and an absence of forest renewal. The renewal of some of the mature to old forest within the park through harvesting is preferred and while the renewal of grasslands through managed grazing, haying or prescribed fire is preferred to best replicate grassland natural disturbances. The retention and protection of limited mature to old forest areas is also important as they contain critical biodiversity value.

2.1.2 MAINTAINING THE DIVERSITY OF NATURAL LANDSCAPES, ECOSYSTEMS, AND SPECIES

The natural capital of the Cypress Hills Interprovincial Park arises from the unique landforms and the natural mixture of forest and grasslands within a predominately prairie landscape. The park would not exist without this natural capital.

The diversity of the terrestrial ecosystems found within Cypress Hills Interprovincial Park are defined by the provincial classification system of ecosites by McLaughlan, Wright, and Jiricka (2010). Ecosite mapping shows that at least nine ecosites are important in the park and incorporate elements from Cypress Upland and Prairie ecoregions as well as low-land Boreal Plain elements. These ecosites differ in species composition, tree cover, understory vegetation, and soil properties. A diverse range of ecosites will need to be fully represented to maintain the natural capital of CHIPP. To accomplish this, forest areas of different age classes and grasslands will need to be maintained and managed (see [Section 2.1.1](#)).

However, it is important to identify long-term management challenges. Climate change is expected to cause vegetation changes within the coming century. It is expected that the expansion of moist mixed grasslands and decline of forested areas, specifically lodgepole pine dominated areas will be the result. The long-term maintenance of current ecosystems in the face of climate change is not feasible. Conservation and management practices should recognize this transition and allow it to occur while minimizing ecological degradation.

The invasion of non-native plant species is one of the most serious threats to the ecological integrity and natural capital of the park. The presence and abundance of non-native species will be a key factor in the level of ecological degradation resulting from climate change. The park is host to many rare plant species and communities. Non-native species introductions and expansion result from threats such as: habitat fragmentation, development, incidental and purposeful introduction of invasives, and alteration of historic fire and grazing regimes. Managing the threat of invasive species is a critical issue in maintaining the natural capital of Cypress Hills Interprovincial Park.

2.1.3 CONSERVATION OF UNIQUE ECOSYSTEMS AND RARE SPECIES

Most of the ecosites found within Cypress Hills are not found elsewhere within Saskatchewan. The lodgepole pine and rough fescue sites provide unique ecosystems within the park. The lodgepole pine and mixed-wood forests of the hills provide forest biodiversity to a primarily grassland dominated area of the province. However, as climate change impacts the area it is expected to cause a shift to a warmer, drier climate over the coming century, the lodgepole pine forests are expected to convert to an aspen or grass dominated landscape type. During this conversion it is expected that the current grassland patches on the plateau within the park will be overtaken by neighboring tree expansion and the grassland surrounding the area spread upwards into the hills (Thorpe 2011).

A large number of rare plants and animals are documented to occur within CHIPP. Ensuring the diversity and health of park's ecosystems in management decisions, as mentioned above (see [Section 2.1.2](#)), will provide the habitats needed by these rare species.

2.1.4 CONSERVING ANIMAL POPULATIONS AND SPECIES ACROSS CHIPP

The flora of the Cypress Hills Interprovincial Park support a wide range of animal species, including forest, scrubland, grassland and wetland avian species, ungulates, and furbearers. The diverse habitat requirements of the park's fauna highlights the need to maintain a varied range of ecosites and age classes within management plans (see [Section 3.6](#)).

2.2 LANDSCAPE AND ECOSYSTEM MANAGEMENT ISSUES

2.2.1 FRAGMENTATION

Habitat fragmentation is a threat to the park's natural ecosystems. Sources of anthropogenic habitat fragmentation within Cypress Hills Interprovincial Park include roads, trails, utility corridors, fence lines, and recreational developments. Fragmentation degrades both the quality and quantity of natural areas. Fragmentation can introduce invasive species into natural areas, impede wildlife movements, as well as reduce the quantity of interior undisturbed habitat. The natural capital of CHIPP depends on the area of natural ecosystems as well as their spatial distribution. From the perspective of habitat value, large, unfragmented areas hold more ecological value when compared to smaller habitat areas or large areas with high amounts of fragmentation.

The park maintains obligations to provide visitors with recreational facilities. In the interest of increasing visitor numbers there is an interest in developing more recreational facilities. However, it is important to evaluate the benefit of additional developments to the environmental cost to the natural capital. Increasing the number of developments may reduce the quantity and value of the park's natural setting, scenery, and biodiversity, which are the primary attractants of park visitors.

Cypress Hills Interprovincial Park maintains a low developmental footprint within the West Block of the park. Services, trails, roads and fencing lines are limited within this area. The ratio of developments to natural areas is 2.0 percent within the West Block. In contrast to the West block, the Centre Block has a higher developmental footprint. As mentioned in Present-day Resource Use Activities (see [Section 3.5.1](#)) the Centre Block contains a wide array of recreational developments. The ratio of developments to natural areas is 9.2 percent within the Centre Block. In order to minimize further fragmentation in the future, new developments should be planned with a minimal ecological footprint or limited entirely.

Proper restoration and reclamation of disturbed or decommissioned areas will also aid in reducing fragmentation within the park.

2.2.2 CORE AREA VEGETATION MANAGEMENT

Recreational developments within the core area of Cypress Hills Interprovincial Park play an important role in accommodating visitors. Natural and introduced vegetation within these core areas present management concerns. Visitor safety is the primary concern in regard to core area vegetation management. Trees that pose a risk to visitor safety (i.e. snags, dead standing) require rapid detection and mitigation. Long-term vegetation management issues involve the forest as a whole.

The large forest stands within CHIPP are considered mature or over-mature. In the absence of disturbances such as fire and harvesting they will succumb to mortality factors (i.e. insects, disease) and become risk-trees and increase forest fuel loads. The associated Forest Conservation Management Plan (FCMP) will help identify priority areas to be renewed within CHIPP backcountry areas but will also address core areas within the park.

Parks Division operates a core risk tree program to address risk trees across the provincial parks, which is managed by the Landscape Protection Unit (LPU). Core area vegetation management plans are also conducted across our provincial parks and help manage the forests within the core area. A new core area silviculture program has been under development by Parks Division and is being managed through implementation of silviculture programs within priority regeneration areas in various provincial parks. 5000 lodgepole pine are presently in the nursery and are due for planting in 2021 within priority core areas.

2.2.3 PARK EXPANSION, RE-DESIGNATION, VEGETATION MANAGEMENT, AND CONSERVATION

The park is comprised of the West and Centre Blocks of the Cypress Hills formation and is surrounded by private agricultural land. At the time of this report, no park expansion plans have been indicated beyond the current boundary. Currently, the West Block remains relatively undeveloped and provides a back-country experience for visitors, while the Centre Block is well developed for front-country camping experiences. Expansion within the Centre Block has occurred as new campgrounds are developed and the old are decommissioned. Decommissioning, regenerating, and recommissioning campgrounds, such as Pine Hill, is beneficial to the overall management strategy as it provides an opportunity to mitigate risk tree hazard and re-balance the age-class distribution of areas within the park and is an excellent education opportunity for visitors, as it demonstrates that forests can be regenerated. Small harvest areas within the Centre Block, designed as fuel breaks, as well as Park firewood harvest blocks, have also contributed re-balancing the forest age-class distributions.

2.2.4 ASSESSING THE ECOSYSTEM EFFECTS OF RESOURCE EXTRACTION ACTIVITIES

Cypress Hills Interprovincial Park is minimally impacted by resource extraction. Forest harvesting and one gravel pit within the Centre Block are the two resource extraction activities occurring within the park. Historically, coal and gravel/cobble mining occurred within the Alberta side of the West Block. Currently no mining or oil and gas extraction activities occur within CHIPP.

2.3 INTERPRETATION AND INFORMATION MANAGEMENT ISSUES

2.3.1 INTERPRETATION OF NATURAL VEGETATION AND LANDSCAPES, SPECIES AT RISK, AND MANAGEMENT ACTIONS

There is a need to increase education and communication to the public and stakeholders about the benefit of Ecosystem-based Management in the park. A number of themes can be communicated to the public through an Ecosystem-based Management Plan, including:

- ▶ The diversity of ecosystems in CHIPP through Saskatchewan ecosite classifications.
- ▶ The importance and role of diversity within ecosystems including age-class variety within forest stand and how that diversity provides habitat for a wide range of fauna.
- ▶ The role of fire as a natural disturbance including the successional stages that follow after fire in an area; and prescribed fire treatments that can be used to re-introduce fire to a landscape in a controlled manner.
- ▶ The expected effects of climate change on the park's ecosystems.
- ▶ The importance of the unique vegetation communities (i.e. rough fescue and lodgepole pine) including rare and endemic species, and their response to climate change.
- ▶ The threat from introduced invasive species and their effects on the park's ecosystems.
- ▶ The threats from habitat fragmentations and the effects on animal habitats and invasive species expansion.
- ▶ Impacts of development on park ecosystems and natural areas.

2.3.2 PARKS ECOSYSTEM DATABASE: THE MANAGEMENT AND USE OF NATURAL RESOURCE DATA

The success and effectiveness of an Ecosystem-based Management Plan requires consistent monitoring and revisions. The management and storage of collected data in an organized fashion is critical for utilizing the data in a valuable manner. A Web-GIS based system – Park Ecosystem Database (PED) is being constructed by Parks Division – Landscape Protection Unit to manage information on all ecosystem management projects in Saskatchewan park lands. The PED is the repository of all the known biological and ecological data on the parks. Data currently available or future collections from CHIPP should be entered into PED which will be the geospatial dataset to manage ecological data into the future.

3 LANDSCAPE AND ECOLOGY OF THE PARK

3.1 REGIONAL LANDSCAPE AND ADMINISTRATIVE CONTEXT

Cypress Hills Interprovincial Park (CHIPP) is located within the Cypress Upland Ecoregion (**Figure 1**) and is surrounded by the Mixed Grassland Ecoregion. The Cypress Upland occupies 623,633 hectares within in the Prairie Ecozone (Thorpe 2011) with 503,000 hectares within Saskatchewan (Government of Saskatchewan 2019). The Cypress Upland is considered an outlier of the Montane Vegetative Zone that occurs on the lower slopes of the Rocky Mountains and is a unique representation within the Prairie Ecozone. The region contains two ecodistricts, the Cypress Slope on the northern slopes containing moraine and the Cypress Hills themselves.

The Cypress Hills rise form a plateau approximately 550 meters above the surrounding grasslands. The area is comprised of three distinct blocks (Acton *et al.* 1998) and occupies approximately 165 kilometres east to west and 60 kilometres north to south or about 10,000 square kilometres (Phipps and O’Kennon 2007). The West block stretches across the provincial border into Southeastern Alberta and Southwestern Saskatchewan. The Centre block is exclusively within Southwestern Saskatchewan (Acton *et al.* 1998).

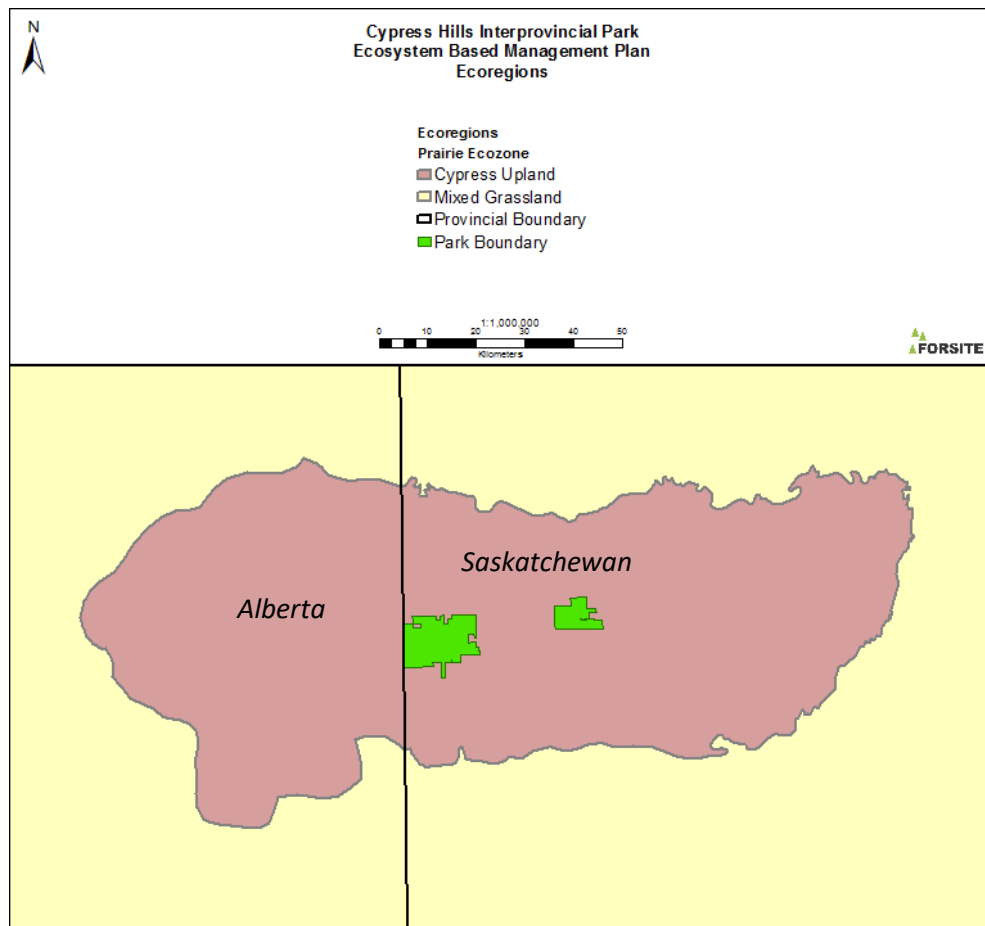


Figure 1 Location of Cypress Hills Interprovincial Park in Relation to Ecoregions of Saskatchewan.

Prior to current interprovincial park status, much of the Saskatchewan side was designated a federal forest reserve in 1906, the transition of the reserve to Province of Saskatchewan in 1931, and then re-designated a provincial park in 1931 after the Natural Resource Transfer Agreement. The West Block was added in 1976 under the park's auspices, and then Cypress Hills Interprovincial Park was established in 1989 after the Interprovincial Park Agreement between Government of Saskatchewan and Government of Alberta. The park is the first interprovincial park to be founded in Canada. In 2000 the Saskatchewan and Alberta governments amended the Interprovincial Park Agreement to formally include Fort Walsh National Historic Site and the Government of Canada. The federal and two provincial governments work together to manage and protect the area (Cypress Hills Provincial Park: History, 2017). Cypress Hills Interprovincial Park is one of 35 provincial parks in Saskatchewan.

The Cypress Hills Interprovincial Park encompasses the West and Centre blocks while the East block is primarily private land (Acton *et al.* 1998; Shorthouse 2010). The Saskatchewan extent of the park encompasses 45 and 138 square kilometres for the Centre and West blocks, respectively and is presented in **Figure 2**.

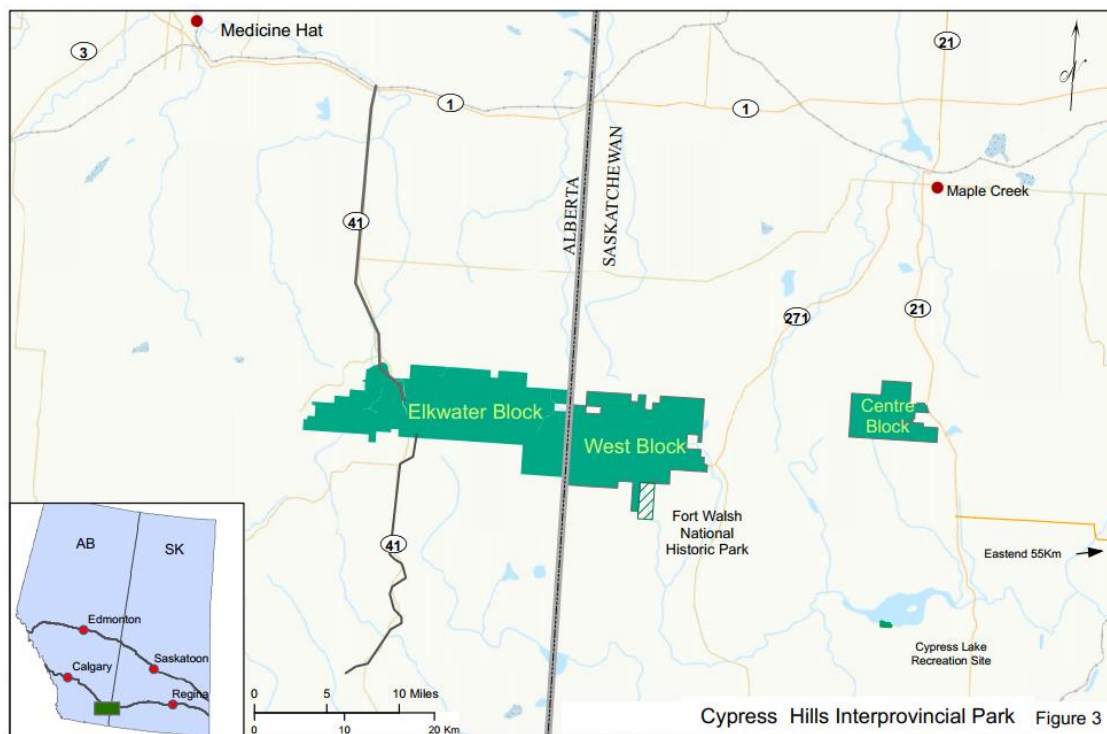


Figure 2 Cypress Hills Interprovincial Park (Saskatchewan Parks Map: Cypress Hills Area).

The Cypress Hills Interprovincial Park is surrounded by different types of land administrations and are presented in **Figure 3**. The park is primarily surrounded by private land which is used for agricultural crops or grazing. There are three First Nation reserves located on the southern and eastern sides of the West Block. Fort Walsh, a National Historic Site located on the southern edge of the West Block and is managed by the Federal Government. The nearest settlement within Saskatchewan is Maple Creek (population 2,084 in 2016 census), located approximately 30 kilometres north of the Centre Block. The nearest major

city within Saskatchewan is Swift Current (population 16,604 in 2016 census), located approximately 167 kilometres northeast of the Centre Block.

A closer examination of adjacent land use within a radius of five kilometres of the park is presented in **Figure 4**. Main land use types include forest, shrubland, grassland, and croplands. Within a five kilometre radius of the park boundary the area is primarily grassland or shrubland (approximately 76 percent). Other land use types surrounding the park include forest (11 percent), cropland (10 percent), water (one percent), and urban or developed (one percent). Transitions between the forested areas of the hills and the shrubland, grassland, and agricultural lands below tend to be a gradual (**Figure 5** and **Figure 6**).

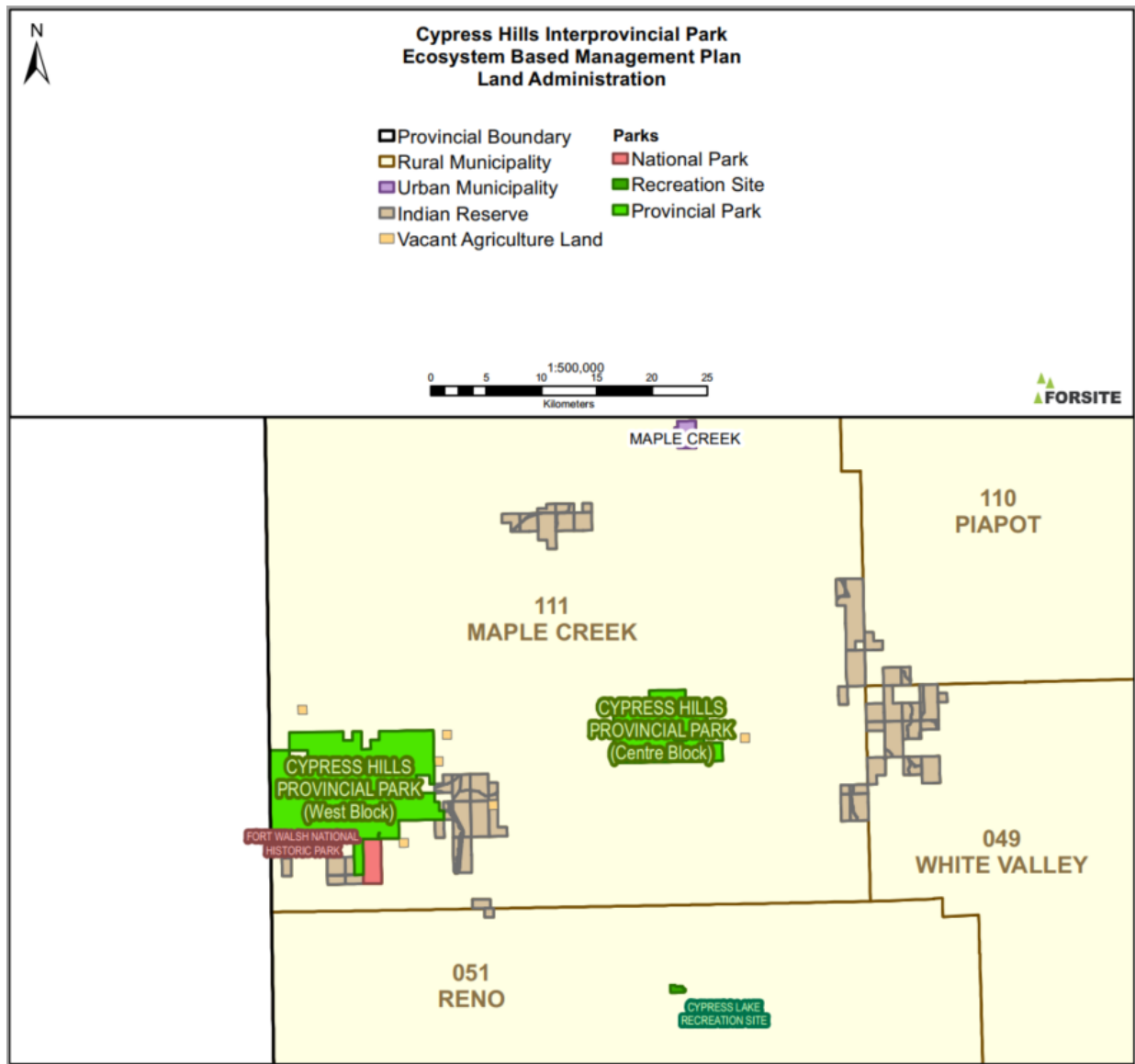


Figure 3 Land Administration in the Region of CHIPP.

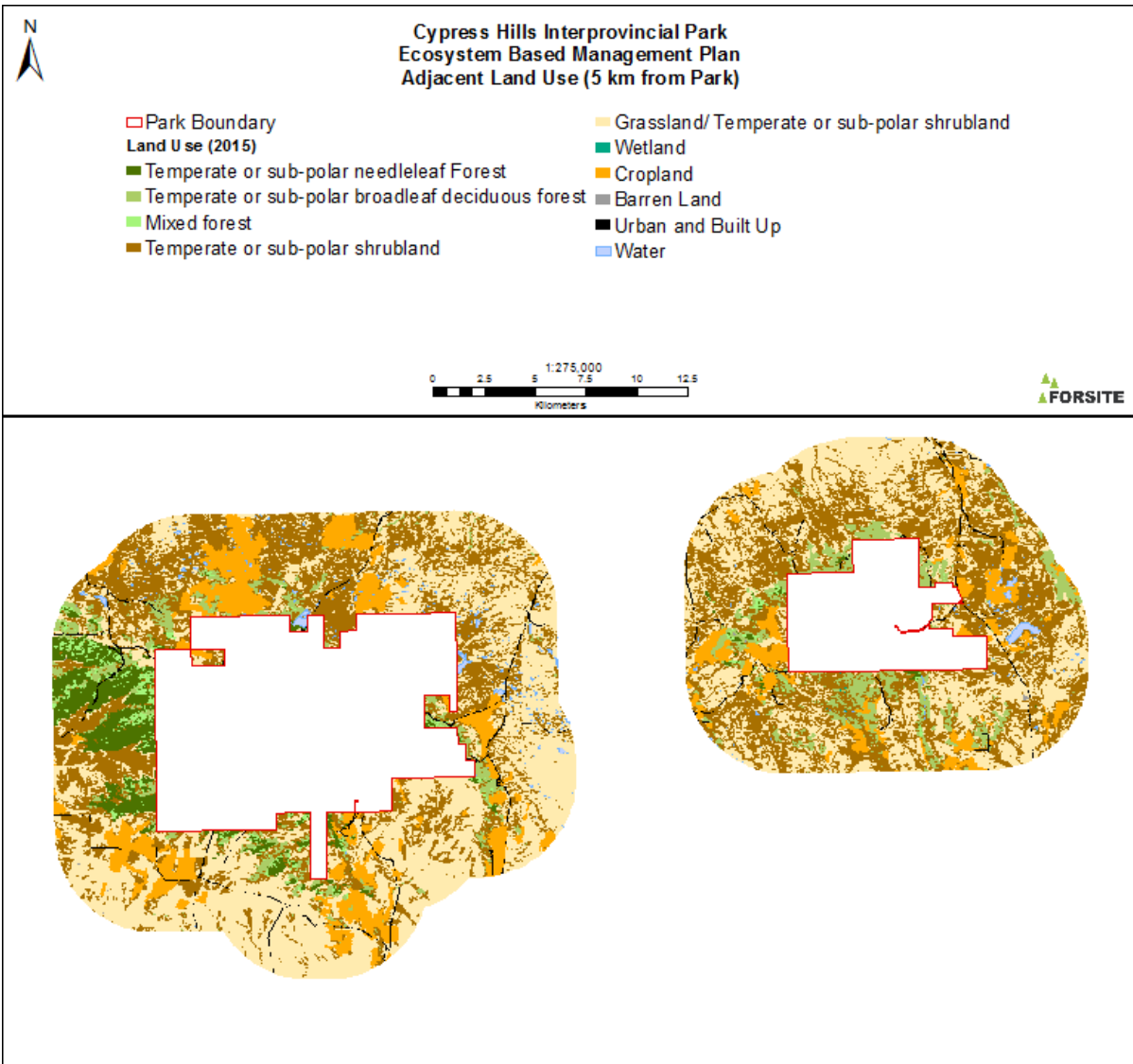


Figure 4 Land Use Management Adjacent to CHIPP within a Radius of Five Kilometres.



Figure 5 Land Cover Types of Mixed Forest and Shrubland within the Hills Transitioning to Crop or Grazing Land.



Figure 6 Land Cover Types of Mixed Forest and Shrubland Within the Hills Transitioning to Crop or Grazing Land.

3.2 PHYSICAL SETTING

3.2.1 CLIMATE

The climate of Cypress Hills Interprovincial Park is similar to the montane and mixed-grass ecoregions. However, the elevation difference of the Cypress Upland ecoregion provides slightly cooler temperatures and higher volumes of precipitation in comparison to the surrounding grasslands (Phipps and O’Kennon 2007).

Meteorological data has been collected via a weather station within the Centre Block can be compared to nearby data collected in locations within the surrounding the mixed-grass ecoregion (**Table 1**). Mean annual temperature within Cypress Hill Centre Block averaged 3.0° Celsius while Maple Creek averaged 5.6° Celsius (Phipps and O’Kennon 2007). Mean temperatures in July and January were 16.0° and -12.1° Celsius, respectively. Historical mean minimum temperature values for the Centre Block of CHIPP can be seen in **Figure 7**. Summers typically have 52 frost-free days and a total of 1288 growing degree days¹ (Acton *et al.* 1998).

Table 1 Mean Monthly Temperature (°C) Based on the 1981-2010 Climate Normal for Cypress Hills and Surrounding Grassland (Environment Canada, 2019).

	J	F	M	A	M	J	J	A	S	O	N	D	Mean
Cypress Hills, SK (1196m)	-9	-7.2	-2.9	3.5	8.7	12.7	15.9	15.3	9.6	4	-3.5	-8	3.26
Maple Creek, SK (764m)	-8.5	-5.8	-0.2	6.5	11.7	16.1	19.9	19.2	13	6.6	-2	-7.1	5.78
Shaunavon, SK (914m)	-9.7	-6.4	-2.3	5.4	11.2	15.4	18.6	18.3	11.8	5.4	-3.1	-8.7	4.66
Medicine Hat, AB (717m)	-8.4	-5.5	0.1	7	12.4	16.7	20	19.3	13.2	6.9	-1.8	-7	6.08
Foremost, AB (892m)	-7	-4.8	0	6.4	11.6	15.8	18.8	18.7	12.8	6.5	-1.8	-6.3	5.89

¹ The sum of growing degree-days is a measure of the length and warmth of the growing season, and is calculated by summing the daily deviations above a base temperature of 5 degrees Celsius over the whole year.

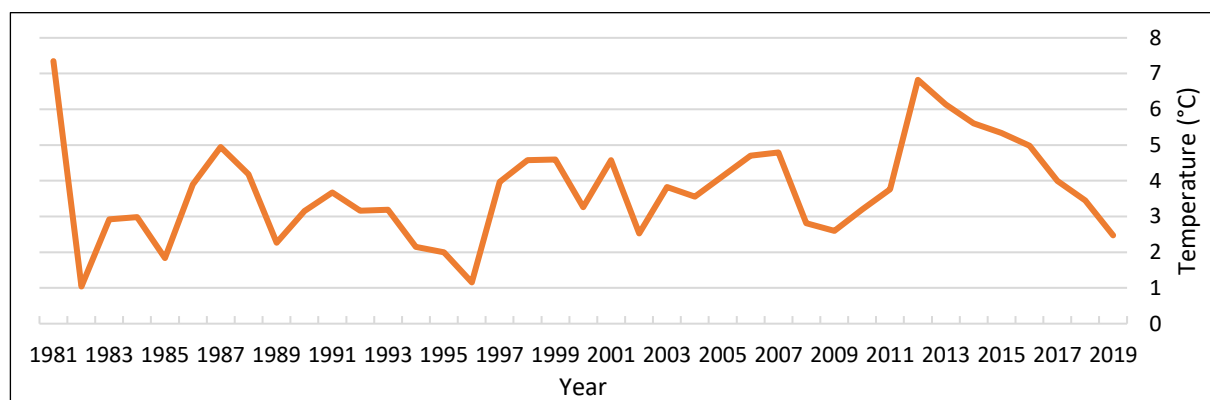


Figure 7 Historical Mean Temperature of CHIPP (Environment Canada, 2019).

Annual precipitation for Cypress Hill Centre Block and surrounding locations can be seen in **Table 12**. The Centre Block experiences higher volumes of precipitation than the surrounding grasslands. Total annual precipitation within Cypress Hill Centre Block equaled 606.8 millimetres while Maple Creek equaled 375.3 millimetres (Phipps and O’Kennon 2007). Snowfall averages from 1981 to 2010 within the Cypress Hills Centre Block were 127.2 centimetres with an average of 55 days of snow present (Government of Canada: Canadian Climate Normals).

Table 2 Monthly Precipitation (mm) for Cypress Hills and Surrounding Grasslands (Phipps and O’Kennon, 2007).

	J	F	M	A	M	J	J	A	S	O	N	D	Total
Cypress Hills, SK (1196m)	35.1	28.1	41.9	40.5	76.8	63.8	69.6	47.5	58.2	36.7	35.1	40.7	606.8
Maple Creek, SK (764m)	25.8	17.1	18.9	30.5	45.7	57.8	45.6	35.4	38.0	18.2	17.9	24.2	375.3
Medicine Hat, AB (717m)	17.8	10.2	16.4	25.2	42.5	57.5	40.8	29.7	36.8	15.1	15.0	20.0	304.0
Shaunavon, SK (914m)	18.8	12.8	23.3	24.9	57.2	68.5	52.4	36.4	31.1	18.4	16.9	26.0	384.6
Willow Creek, SK (861m)	12.4	7.8	16.0	15.6	47.1	60.6	41.3	30.9	32.3	16.3	17.0	16.6	313.8

The climatic moisture index (CMI) as created by Hogg (1994) for the Cypress Upland Ecoregion and surrounding grasslands can be seen in **Figure 8**. The climatic moisture index closely relates to the distribution of forests versus grasslands. The Cypress Hills area show a climatic moisture index value of negative 225 to 0. Index values are calculated as annual precipitation minus annual potential evapotranspiration². Grassland values are generally negative while forest values are generally positive, indicating that forested regions have excess of precipitation over potential evapotranspiration. A rise in the moisture index within Cypress upland is attributed to the gain in elevation. The surrounding Mixed Grassland Ecoregion has a CMI of negative 325 to negative 225 (Thorpe 2007).

² Potential evapotranspiration is an estimate of the amount of evaporation that would occur if there is always an ample supply of soil moisture and depends mostly on temperature.

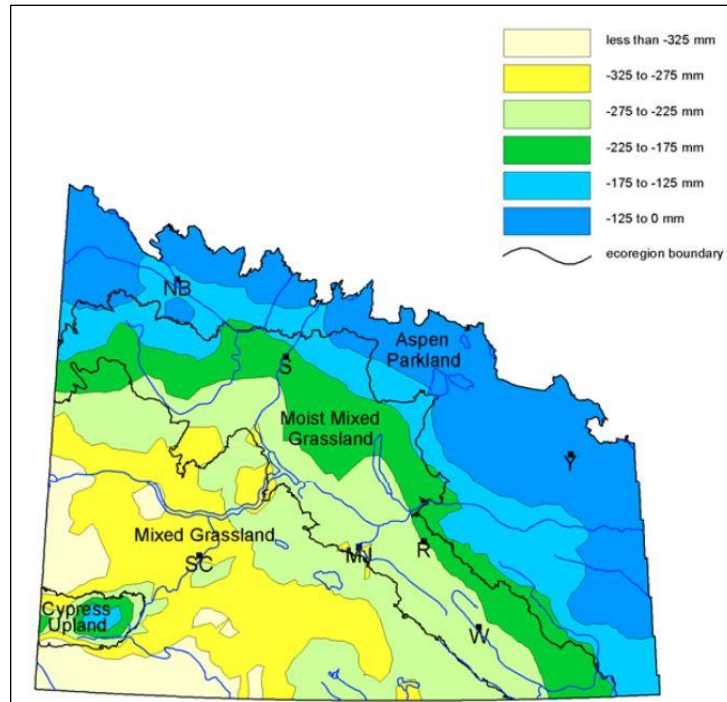


Figure 8 Climatic Moisture Index for the 1961-1990 Period in the Prairie Ecozone including Cypress Upland Ecoregion (Thorpe 2007).

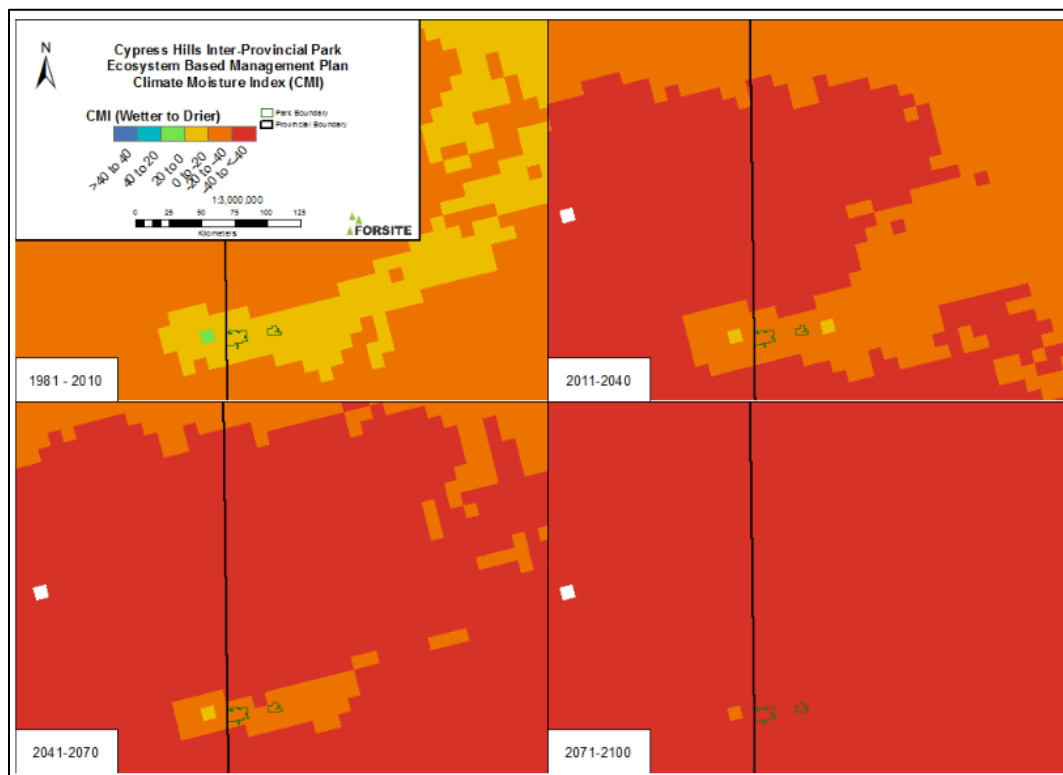


Figure 9 Climatic Moisture Index for the 1981-2010 Period and predicted from 2011-2100 in the Prairie Ecozone including Cypress Upland Ecoregion (NRCan 2011).

Climate change is expected to have a major impact within the Prairie Ecozone. Temperatures are expected to rise substantially, while precipitation and the distribution of precipitation throughout the seasons are only expected to change slightly. However, changes to evapotranspiration and soil temperature will affect moisture availability (Thorpe 2011). Natural Resources Canada models that the climate moisture index will continue to transition to a drier condition through to 2100 as shown in **Figure 9** (NRCan 2011).

The prairies have exhibited an average annual temperature increase of about 1° Celsius over the last 100-year period (Cutforth *et al.* 2004). Cypress Hills has exhibited an average annual increase of 0.55° Celsius within the same time period (Zhang *et al.* 2000 as cited by Widenmaier and Strong 2010). Both temperature increases fall within the ranges of climatic warming (0.5-1.5° C) for the geographical locations (Zhang *et al.* 2000).

Modelled climate change scenarios for Cypress Hills Interprovincial Park were determined by Wang *et al.* (2016) and can be seen in **Figure 10**. Wang *et al.* (2016) used a variety of tools and techniques to derive climatic scenarios until 2085. Four Representative Concentration Pathways (RCP) were created and published within the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (2014). One of the four pathways, RCP 4.5, was utilized to assess long term climate conditions in CHIPP. RCP 4.5 is a climate change scenario that predicts greenhouse gas emissions will peak around the year 2040 and then begin to decline. Consequently, the scenario predicts that global mean temperatures will rise 1.4 degrees Celsius between years 2046 and 2065, with a further rise of 1.8 degrees Celsius between years 2081 and 2100. This scenario serves as a most likely scenario by 2100. By comparing the long-term climate data to the projected data, RCP 4.5 is suggesting that the climate will continue to warm and show an increase in precipitation within CHIPP.

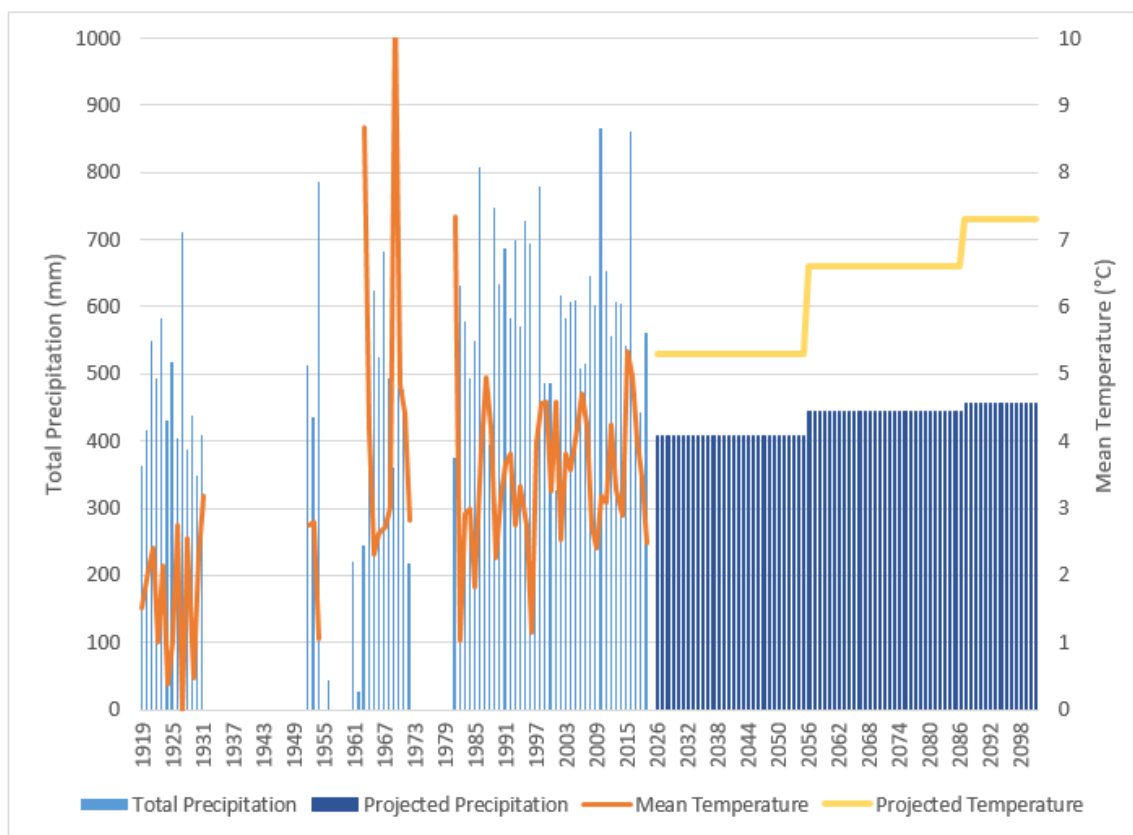


Figure 10 Historical (1919-2019) and Projected (2020-2100) Mean Temperature and Precipitation for Cypress Hills Interprovincial Park based on Climate Model RCP 4.5 (Environment Canada, 2019).

There are some discrepancies with the data Wang et al. (2016) used when compared to the daily records (climatedata.ca (2019)) and averaged monthly and annual values reported by Environment Canada (2019) datasets. This results in an average over the 100 years of 0.19 degrees Celsius cooler, and -116 millimetres drier than reported.

A changing climate within the park are expected to have various effects on the area, particularly on vegetation. Changes include vegetation zones shifting northwards, increases in low-production years such as droughts, increased invasion and establishment of non-native species (Thorpe 2011), and frost-free seasons will continue to increase duration (Cutforth *et al.* 2004), to name a few. Changes in vegetation zonation for warm and cool climate scenarios in comparison to historical zonation have been determined by Thorpe (2011) and are represented in **Figure 11**, **Figure 12**, and **Figure 13**.

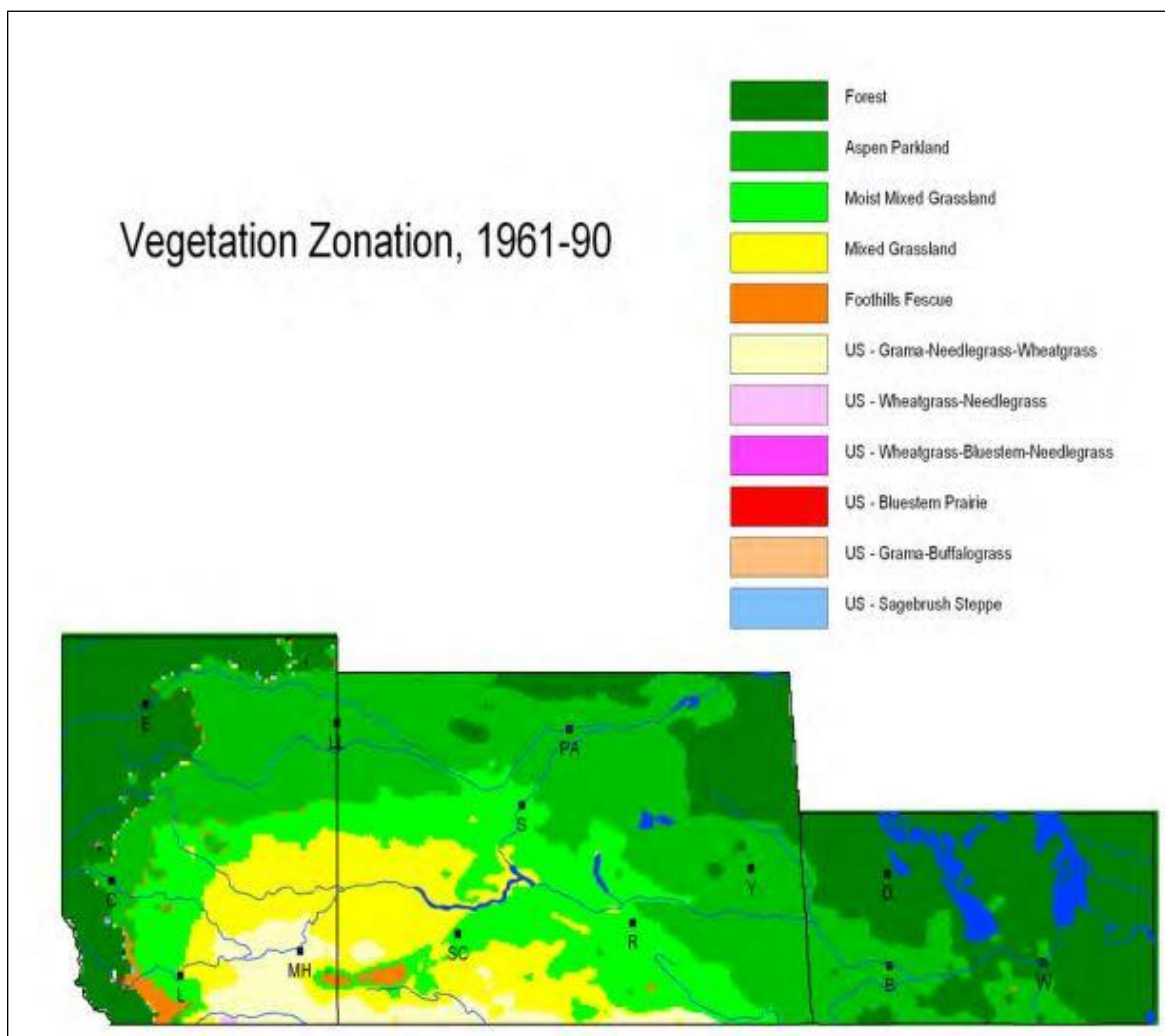


Figure 11 Baseline Vegetation Zonation based on Historical Climate Data for 1961-1990 (Thorpe 2011).

Historical vegetation zonation shows the Cypress Upland as mix of Foothills Fescue occupying the plateaus with Moist Mixed Grassland surrounding. The warm climatic scenario shows the Cypress area transitioning to a Grama-Needlegrass-Wheatgrass dominate vegetation zone with Foothills Fescue and Moist Mixed Grassland vegetation types no longer existing in the area. The cool climatic scenario shows the Cypress area transitioning to small island remnants of the Moist Mixed Grassland surrounded by a Grama-Needlegrass-Wheatgrass vegetation zone with the previous Foothills Fescue vegetation type no longer existing in the area. Both scenarios show a shift in the grassland to a grassland community similar to what is currently found in Montana or Wyoming (Thorpe 2011).

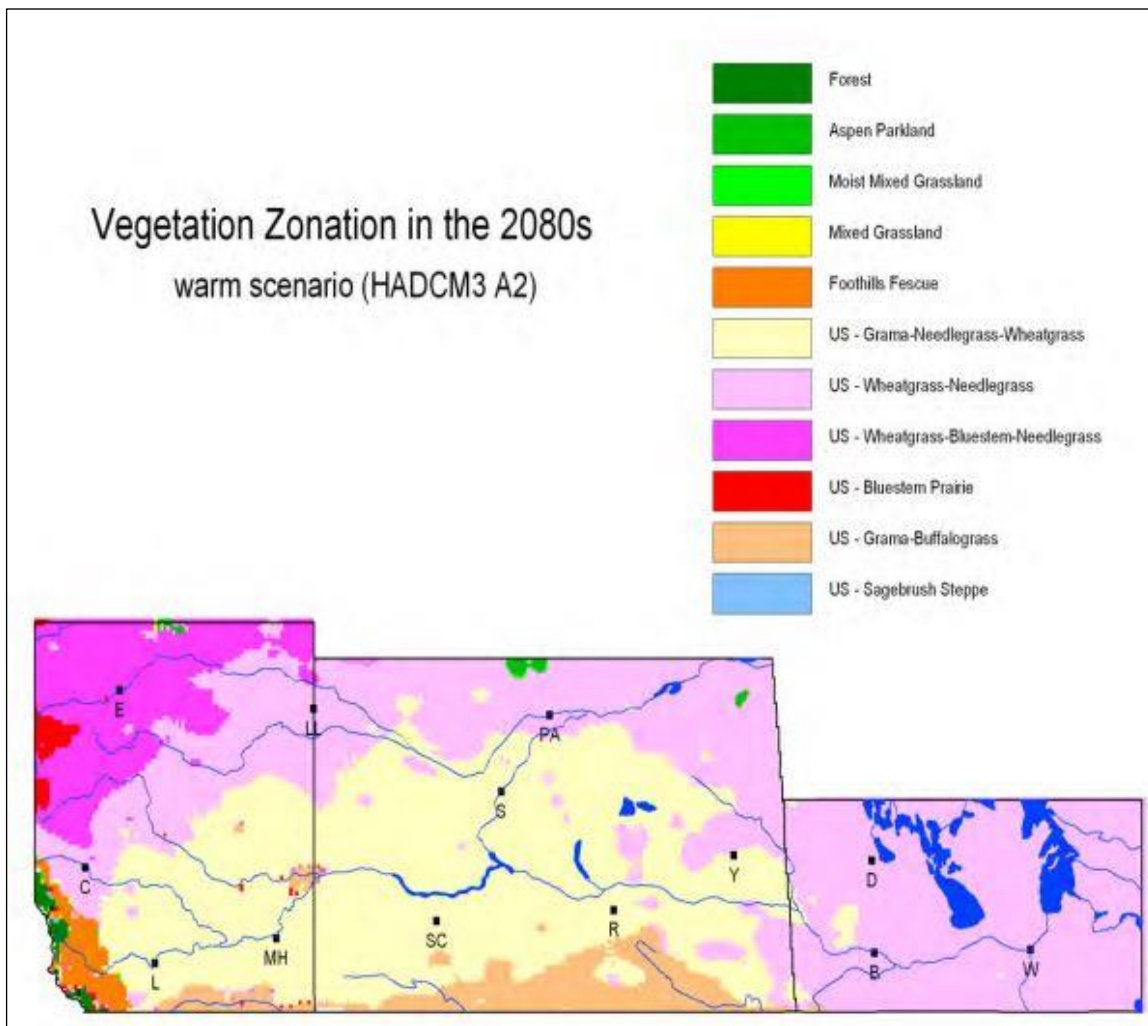


Figure 12 Predicted Vegetation Zonation based on a Warm Climate Scenario for 2080 (Thorpe 2011).

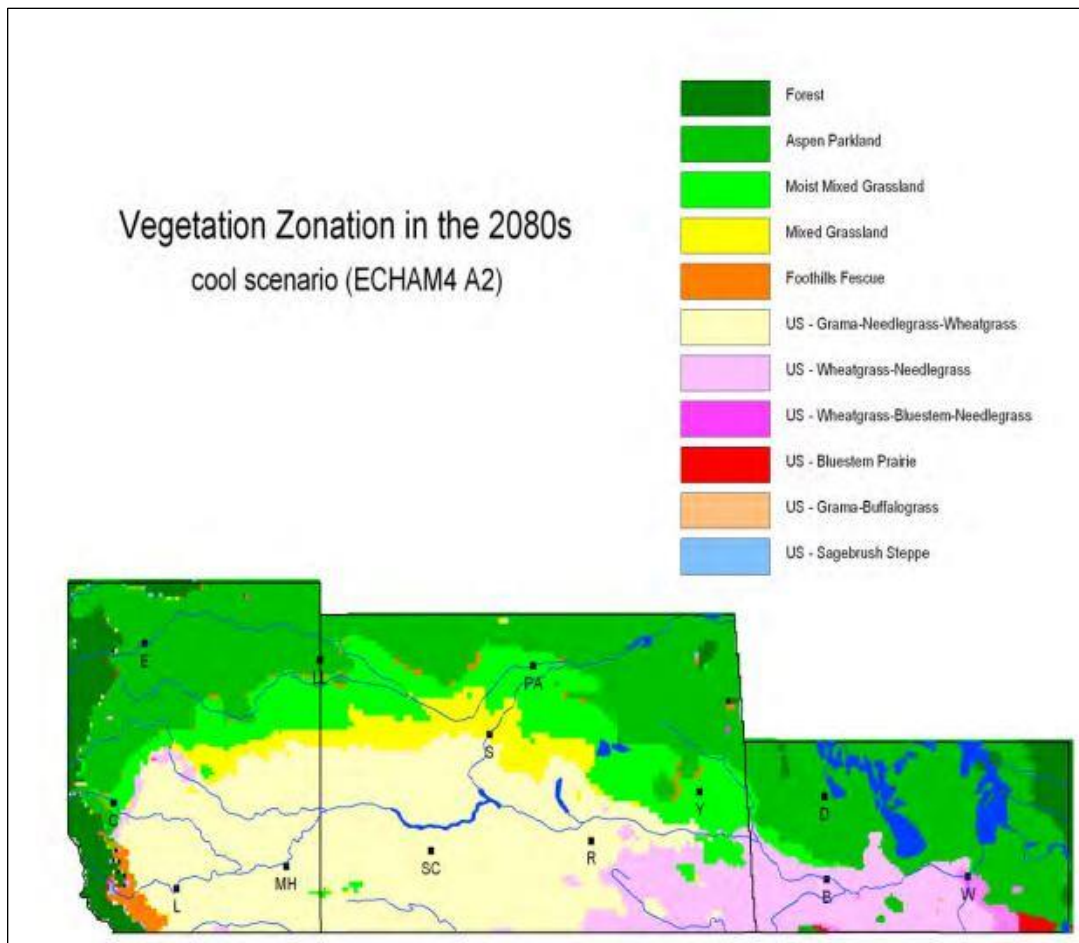


Figure 13 Predicted Vegetation Zonation based on a Cool Climate Scenario for 2080 (Thorpe 2011).

Climate change is going to have an apparent effect on the CHIPP region. No model can precisely predict the outcomes by 2100, and RCP 4.5 might not reflect the region. Vegetation will need to respond to these changes. If climatic conditions favour a warmer scenario than modelled, the vegetation will become more dominated by grasslands. However, if climatic conditions favour a cooler and wetter scenario, forest landscapes will dominate the landscape. According to current estimates, RCP 4.5 is a scenario that is the most likely outcome, and temperatures in the region will continue to warm, and precipitation will remain low. Therefore, plant communities in CHIPP cannot easily be predicted for 2050 or later. However, based on the current models, a trend toward a grassland dominated landscape is a likely outcome.

3.2.2 LANDFORMS AND SOILS

The Cypress Upland are comprised of a series of landforms that are unique within the province, with the exception of the Wood Mountain area (Acton *et al.* 1998). The Cypress Upland formation consists of a series of plateaus rising approximately 550 metres above the surrounding plains. The elevation of the plateaus ranges from 1310 to 1465 metres above sea level as they extend from the east to the west (Nolan *et al.* no date). The Cypress Hills are the highest point of elevation between the Rocky Mountains and Labrador (Alberta Parks Geology Fact Sheet). Generalized landforms in CHIPP are shown in **Figure 14**. The plateaus transition into the plains below through gradual slopes on the east and southerly sides while the north and westerly sides transition abruptly through steep slopes, escarpments, and coulees.

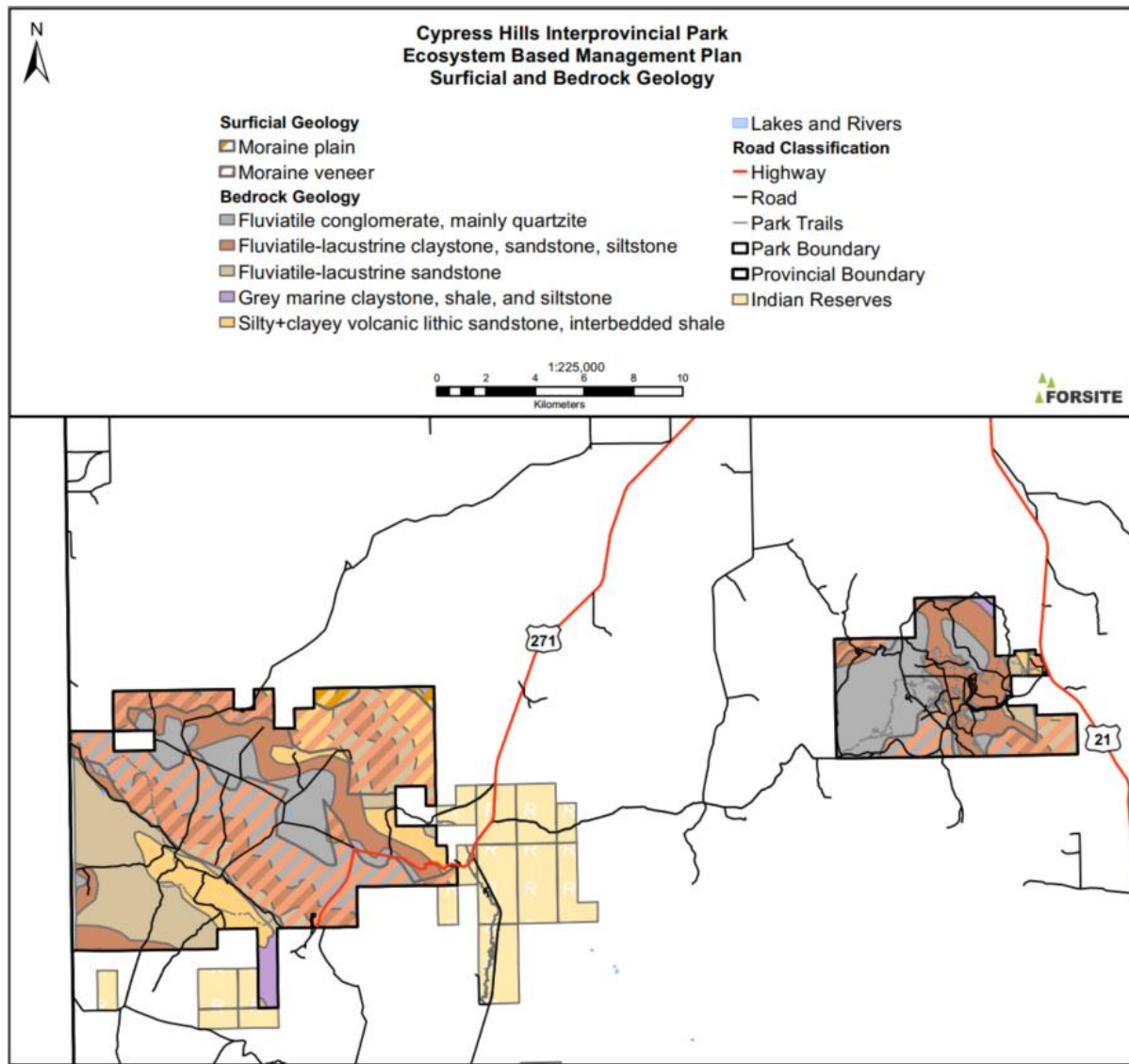


Figure 14 Generalized Landforms within Cypress Hills.

The Cypress Hills were formed through millions of years of sedimentary deposition followed by millions of years of erosion. The Cypress Hills are comprised of sedimentary rocks in distinct layers. Each layer, known as a formation, was formed under different geological conditions and time. The formations that makeup the Hills and can be seen in **Figure 15**. The geology and landforms of the Cypress Hills date back more than 70 million years.

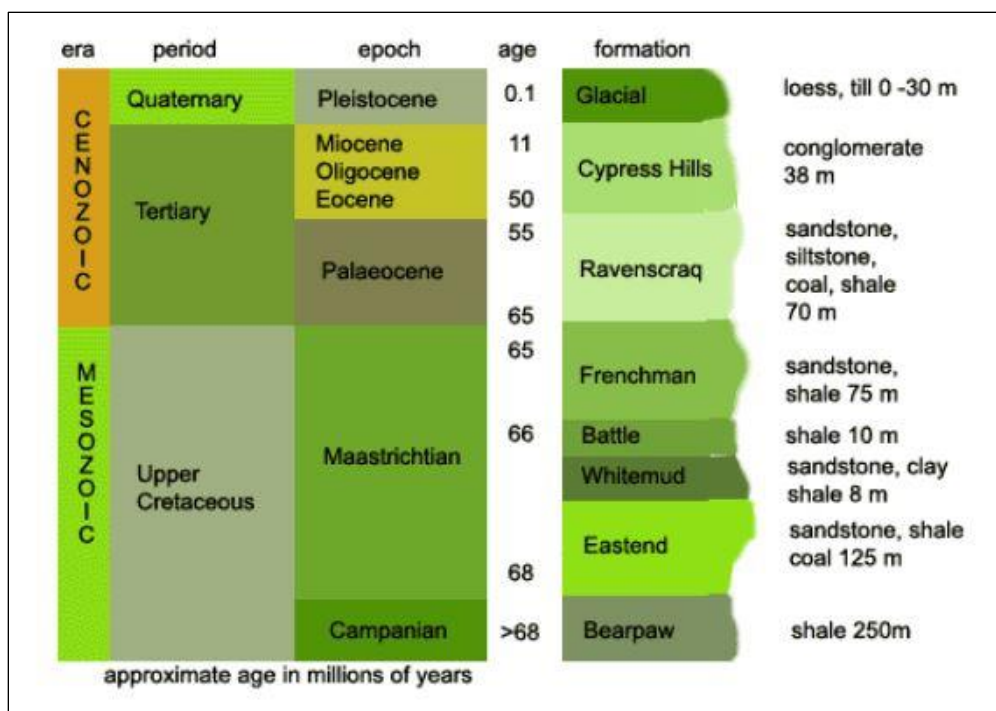


Figure 15 Sedimentary Formations of Cypress Hills (Alberta Parks Geology Fact Sheet).

The base of the Cypress Hills was formed during the Late Cretaceous, when most of Saskatchewan and Alberta was covered by the shallow Bear Paw Sea. The sediments from the Bear Paw Sea formed the dark grey flaky shales that created the base of the Cypress Hills formation. The middle layers of the formation are made up of primarily depositional sandstone and shales with some layers containing clays, siltstones, and coal. These deposits range in depth from eight metres to 125 metres in thickness and were formed between 68 million and 50 million years ago.

Beginning approximately 50 million years ago new river systems deposited a layer cobbles and gravels on top of the existing formations (Alberta Parks Geology Fact Sheet). These quartzite gravels and cobbles created a thick top layer of conglomerate, named the Cypress Hills Formation, which was resistant to erosion. The conglomerate formed a “cap” that protected the softer underlying sediments (Acton *et al.* 1998).

During the repeated glaciations of the Pleistocene Epoch the Cypress Hills were surrounded by continental ice sheets. During the most recent glaciation, the Wisconsin Glacial Episode, the Laurentide and Cordilleran sheet surrounded the Cypress Hills (Jungerius 1969). Although surrounded, the glaciers did not completely cover the formation. The top 100 metres of the plateau was left exposed above the surrounding ice. Large amounts of silt, sand, and gravel, known as glacial till, were deposited on top of the plateau during glacial retreat and melt. The north slopes of the Cypress Hills exhibit prominent hummocky moraines while the gentle slopes of the southern edges suggest they may have been partially covered by the glaciation as glacial erratics can be found (Acton *et al.*, 1998). Glacial melt waters carved the valleys which are found throughout the area. Aeolian processes further deposited a thick layer of fine silts, loess, atop the formation.

In the years since the glacial retreat the Cypress Hills continue to be re-shaped. Erosive forces from heavy rains continue to deepen the coulees and ravines while mass wasting and slumping deteriorate the escarpments (Alberta Parks Geology Fact Sheet).

As mentioned above, a thick layer of loess covers the top of the Cypress Hills formation. This loess layer ranges from 0.3-2.4 metres in depth. The soils of Cypress Hills are distinctive from the surrounding prairie grassland soils. Dominate soil types include Dark Brown and Black Chernozemic soils and Gray and Dark Gray-Luvisolic soils (Nolan *et al.*, no date). Chernozemic soils were found under grassland and shrubby areas while Luvisolic soils were found under aspen (*Populus tremuloides*), lodgepole pine (*Pinus contorta*), and white spruce (*Picea glauca*) forested areas (Nolan *et al.*, no date; Jungerius, 1969)

Chernozemic soils typically develop under grasslands due to fine root decay and present an organic surface horizon (A1 horizon) with a dark colour. The distinctions between Black, Dark Brown, and Brown groups are based on colour which is associated with the relative dryness of the soil. Brown soils are associated with more arid conditions while Black soils are associated with less arid conditions. Luvisolic soils typically develop under forested areas and present a thin organic surface horizon (A1 horizon) atop a light coloured horizon (A2 horizon) where clays have leached from followed by a clay-rich third horizon (Jungerius 1969).

Jungerius (1969) found that soil types within Cypress Hills' area were predominantly made up of one soil type, however, multi-soil types can also be found. Minor fluctuations in climatic conditions have caused the grassland-forest boundary to shift over time. This variability in vegetation distribution produces noticeable soil characteristics. When the forest encroaches on grasslands soils the accumulation of forest litter degrades organics within the Chernozemic soils leading to lighter A1 horizon colours and a mixed appearance of light grey and dark material. Alternatively, when grasslands encroach on forested lands the characteristic dark Chernozemic A1 horizon develops while the previous lighter-coloured A2 horizon from the previous forest will remain relatively unadulterated.

Other soil types found within Cypress Hills include eluviated dystic Brunisols and Regosols, gleyed Chernozems, gleyed eutric Brunisols, and terric Humisols (Nolan *et al.* no date).

Chernozemic

Chernozemic soils typically develop under grasslands due to fine root decay and present an organic surface horizon (A1 horizon) with a dark colour. The distinctions between Black, Dark Brown, and Brown groups are based on colour which is associated with the relative dryness of the soil. Brown soils are associated with more arid conditions while Black soils are associated with less arid conditions. Chernozemic soils occur on all soil textures ranging from clays to sands (University of Saskatchewan, no date).

Luvisols

Luvisolic soils are a dominant soil group of the forests within Saskatchewan. They are abundant in elements such as calcium and magnesium. They typically have a grayish, sandy or silty Ae horizon overlying a B horizon that has higher clay content than either the Ae or the C horizon. The C horizon of the Luvisolics usually contains calcium carbonate (lime). When scarified the surface Ae horizon is exposed and the soils often have a grayish appearance and hence this region is known as the Gray soil zone in Saskatchewan. Luvisolic soils typically develop under forested areas and present a thin organic surface horizon (A1 horizon) atop a light coloured horizon (A2 horizon) where clays have leached from followed by a clay-rich third horizon (Jungerius 1969; University of Saskatchewan, no date).

Brunisols

Brunisolic soils are boreal forest soils that primarily develop in sandy glacial sediments. Sand is resistant to transformation by weathering and these soils have undergone very limited soil formation. The diagnostic horizon is the Bm horizon, which has undergone only slight chemical change from the original parent material although it may have a bright red colour compared to the underlying C horizon. The sandy glacial sediments contained little or no calcium carbonate and hence carbonate rich C horizons are rare in the Brunisolic soils.

Eutric Brunisol soils occur primarily on glacio-fluvial sand parent materials in Central Saskatchewan of the boundary with the Canadian Shield. The pH of the soils is neutral or basic (i.e., greater than 5.5). The sand deposits may also occur as small inclusions in the glacial till uplands in this region (University of Saskatchewan, no date).

Regosols

Regosolic soils lack significant soil formation and occur typically on very young surfaces (such as sand dunes or river floodplains) or unstable surfaces (such as slope positions that experience high rates of soil erosion). Regosolic soils either completely lack a B horizon or have a thin B less than 5 cm thick. In rolling or hummocky agricultural landscapes in Saskatchewan, the soils on the knolls have often been heavily eroded by tillage and the calcium carbonate-rich C horizon become mixed by tillage into the A horizon. This Apk horizon often directly overlies the C horizon. In sand dunes or recent river floodplain deposits, there may be no A horizon and the C horizon extends to the surface of the soil (University of Saskatchewan, no date).

Organic – Humisols and Mesisols

Water-saturated conditions in forested regions of Saskatchewan commonly lead to the formation of layers of organic matter or peat. Where the high organic content (i.e., > 17% organic carbon) layer is greater than 60-cm thick (if fibrous) or 40-cm thick (if it is more decomposed), the soils are classified into the Organic Order. In Saskatchewan Organic soils occur in two main types of peatlands. Fens are dominated by sedges and brown mosses, and the water is high in dissolved base ions (e.g. calcium, magnesium); bogs are dominated by sphagnum and woody peat and the water has a low base content. Humisols are a more advanced stage of decomposition and does not retain its fibrous material. Mesisols are in an intermediate stage of decomposition between fibric and humic (University of Saskatchewan, no date).

3.2.3 HYDROLOGY

The Cypress Hills serve as an essential regional water source. Increased precipitation within the area aids in replenishing ground water sources and maintaining various waterbodies and tributaries. The unique land formations, particularly the conglomerate, display high soil permeability. The hills allow soil moisture to percolate and be released slowly through springs (Alberta Tourism, Parks and Recreation 2009).

The hydrology of Cypress Hills is comprised of permanent, intermittent and ephemeral streams, springs, man-made reservoirs, small natural waterbodies, and one natural lake (**Figure 16**). The majority of northern slopes of the hills drain into the South Saskatchewan River watershed while most of the western, eastern, and southern slopes drain towards the Milk River watershed and onward to the Missouri River (Nolan *et al.* no date).

Main lotic systems within the Cypress Hills West Block include Battle Creek, Nine Mile Creek, Graburn Creek, and Fort Walsh Creek. Battle Creek is a permanent creek that flows southeastward through the

centre of the West Block into Montana and into the Milk River. Nine Mile Creek, Graburn Creek, and Fort Walsh Creek are tributaries of Battle Creek. Other smaller creeks within the West Block include Storm Creek, Crichton Creek, Benson Creek, Beaver Creek, McAlpine Creek, Ross Creek and Adams Creek (Alberta Tourism, Parks and Recreation 2009). The Centre Block contains Boiler Creek, Lone Pine Creek, and Sucker Creek which all flow southward into the Milk River watershed. (Nolan *et al.* no date).

Four major lentic waterbodies are found within the Cypress Hills: Elk Water Lake, Reesor Lake, Spruce Coulee Reservoir, and Loch Leven. Elkwater Lake is located within the West Block, Alberta. It is the only natural lake and is approximately 231 hectares in size. The outlet flow is controlled and flows into Ross Creek. Reesor Lake (reservoir) is approximately 51 hectares in size and is located within the West Block, Alberta. The lake is dammed and controlled at the outlet. The outlet flows into a second smaller water body which become a tributary of the Battle Creek, together the lakes are known as “Twin Lakes”. Spruce Coulee Reservoir is a small waterbody within the Alberta West Block. The man-made reservoir is approximately 21 hectares in size and drains into McAlpine Creek (Alberta Tourism, Parks and Recreation 2009). Loch Leven is located within the Centre Block, Saskatchewan. Loch Leven is approximately seven hectares in size and three metres deep. The loch is man-made, spring-fed, and receives water from Loch Lomond, which drains into Lone Pine Creek (McMartin and Dumalski, 2008). The reservoirs and loch are high-use recreational sites during peak tourist season (Nolan *et al.* no date; McMartin and Dumalski, 2008). It has been discussed that Adams Lake, a small man-made reservoir on the northeast edge of the West Block currently managed by Ducks Unlimited, may be decommissioned (CHIPP, 2019). However, the lake area has been identified as a biodiversity hotspot which is habitat for many wildlife species and species at risk such as trumpeter swans, American white pelicans, Common Nighthawk, Sprague’s Pipit, salamander, Leopard Frog, and bullsnakes. Additionally, Adams Lake is the only water body in the West Block for water retention and flood control that can also be used as an effective source of water for fighting wildfire by helicopter in this block. Therefore, the maintenance of Adams Lake, its riparian area and surrounding habitats is required to not only ensure the integrity of park landscape but also conserve suitable wildlife habitats and species at risk (CHIPP, 2019).

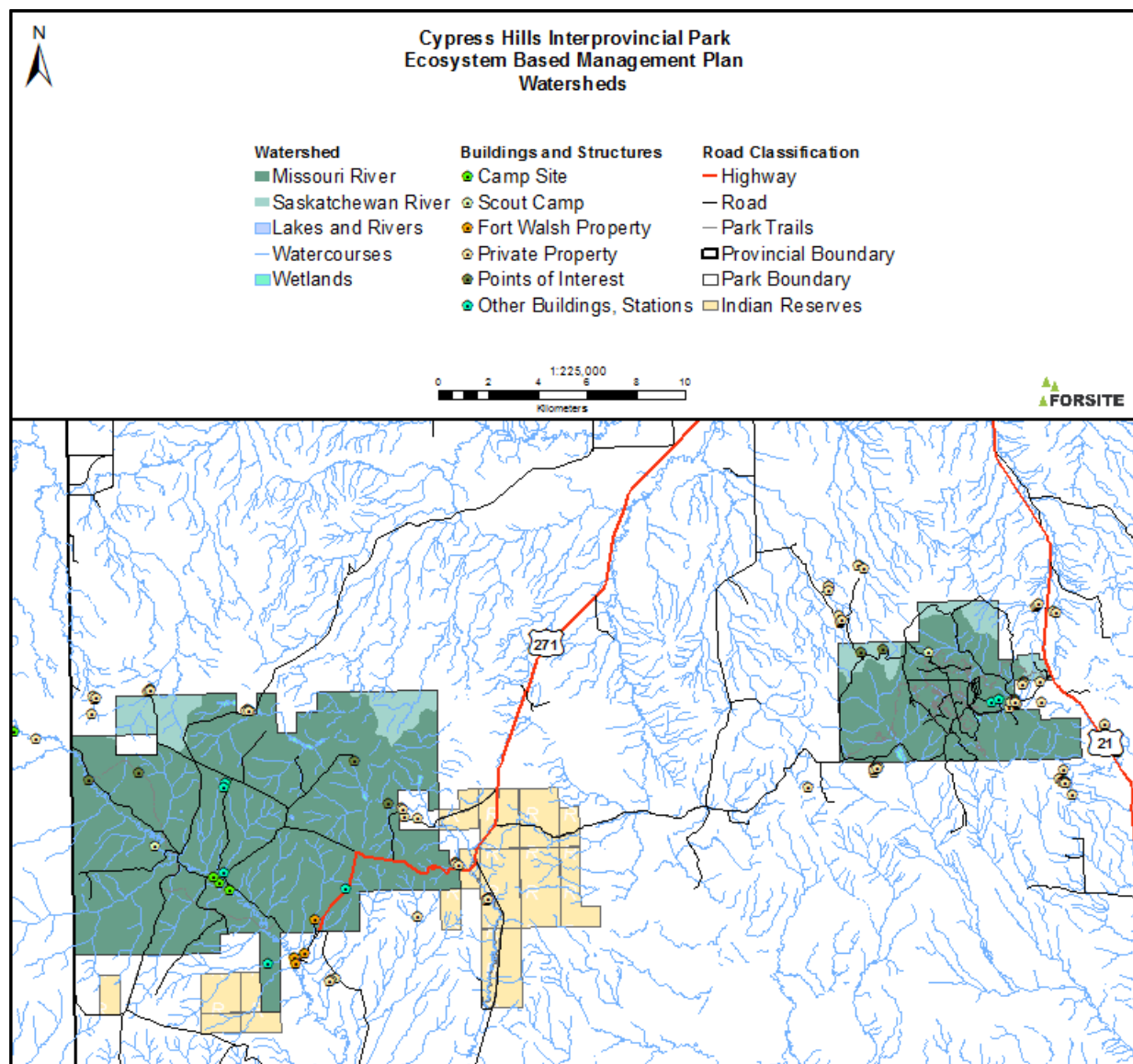


Figure 16 Major Hydrological Features of CHIPP.

3.3 HISTORY OF HUMAN USE OF PARK ECOSYSTEMS

The Cypress Hills have been a place of human and cultural significance both historically and pre-historically. Archeological investigations have revealed that the hills have been utilized by humans for shelter, water, and food sources for more than 8,500 years. (Alberta Parks: History 2017 and Nolan *et al.* no date).

European exploration of the area first occurred in 1754 by explorer and trader Anthony Henday. This was followed by an expedition in 1800/1801 by traders based at Chesterfield House on the South Saskatchewan River just north of the Cypress Hills. The purpose of the expedition was to gather pine resin used to caulk canoes. The Cypress Hills were later visited by Captain John Palliser in 1859.

By the 1860's Métis bison hunters or "hivernants" were over-wintering in the shelter offered by the Cypress Hills. By the 1870's it was reported by Catholic missionaries that there were approximately 200 families of Métis living in three semi-permanent village sites scattered across the Cypress Hills, each with its own consecrated Catholic chapel. The archaeological remains of one of these village sites is located within the boundaries of the park's West Block.

The name "Cypress Hills" is an anglicization of the Métis name for the area, "les montagnes des cypres", which translates as "Jack Pine Mountains". Other Indigenous groups have also had different names for the Cypress Hills over the course human history, including (translated); Pine Hills, Sweet Pine Hills, Beautiful Highlands, Grizzly Bear Hills, Thunder Breeding Hills, and The Sleeping Buffalo just to name a few.

By the early 1870's a small and short lived Hudson's Bay Company trading post was established by Isaac Cowie at the east end of the Cypress Hills. This post met competition from an increasing number of small independent American traders who had been pushed into Canada by the enforcement of laws in Montana Territory prohibiting alcohol as a fur trade commodity.

Tensions related to the "American Whiskey Trade" here in Canada came to a head in the Cypress Hills on June 1st, 1873 when a number of Nakoda were killed by a group of American whiskey traders and wolf hunters following a drunken misunderstanding related to a missing horse.

The event came to be known as the "Cypress Hills Massacre", and added urgency to existing concerns about "lawlessness" in the west, and Canada's sovereignty over its newly acquired Northwest Territories. The Cypress Hills Massacre subsequently served as a catalyst in hastening the organization and dispatch of the new North West Mount Police (NWMP) to western Canada.

In 1875 the NWMP established Fort Walsh in the Cypress Hills near the site of the Cypress Hills Massacre. The presence of the fort was intended to put an end to the American whiskey trade in the area, express Canada's sovereignty along the border with the United States, enforce the Queen's law in the west, and to prepare the Northwest Territories for settlement.

Fort Walsh became headquarters of the NWMP in 1878 in response to the Lakota refugee crisis and the presence of Sitting Bull in Canada following the 1876 Battle of the Little Bighorn in Montana Territory. The fort also played a role with Nez Perce refugees following the 1877 New Perce war in the United States.

As the Cypress Hills area was one of the last places in Canada where the declining population of plains bison could still be found in any numbers, the hills and Fort Walsh became a focal point for Indigenous peoples during the final years of the hunting of the bison. Subsequently, Fort Walsh was also where six adhesions were signed to Treaties #4 & #6.

As starvation grew in the Cypress Hills area with the decline of the bison, the Dominion Government established two short lived instructional farms in the Cypress Hills intended to teach Indigenous groups to become farmers.

Upon the extirpation of the bison from Canada after 1879, the return of Lakota & Nez Perce refugees to the United States, and the settlement of Canadian First Nations on reserves away from the Cypress Hills; Fort Walsh's importance started to decline and NWMP Headquarters was subsequently moved in 1882 to Regina, the new capital of the Northwest Territories. Fort Walsh was abandoned by the NWMP in 1883

in favour of a new barracks site at the new community of Maple Creek adjacent to the newly arrived Canadian Pacific Railway.

By the 1880's cattle ranching started taking up the rich grasslands around the Cypress Hills recently vacated by the bison herds. Small family ranching operations as well as large corporate open-range ranches with vast lease holds were established in the vicinity of the Cypress Hills. However, hard winters in the late 1890's and early 1900's spelled the end for the golden age of open-range ranching in the Cypress Hills area.

By 1910 the Cypress Hills area was experiencing its "settlement boom" as large numbers of homesteaders started flooding into the area. Although the range began to be fenced, and ranching leaseholds became smaller, ranching continued in the Cypress Hills and remains to this day the most prominent agricultural industry in the Cypress Hills and area.

In 1906 the government passed the *Dominion Forest Reserves Act*, establishing 21 permanent forest reserves throughout the country, including in the Cypress Hills. In 1911 the *Dominion Forest Reserves and Parks Act* was passed and the Cypress Hills Forest Reserve was further expanded.

The location that is now known as the West Block Ranger Station served as the headquarters for the Cypress Hills Forest Reserve, and simple buildings were erected to house Forest Reserve staff and to support operational requirements.

Although First Nation groups settled on Reserves away from the Cypress Hills by the mid-1880's, a small group of Cree led by Chief Nekaneet remained in the Cypress Hills, surviving by their own resourcefulness, until a Reserve in the Cypress Hills was granted in 1913. The landholdings of Nekaneet First Nation in the Cypress Hills area expanded with the "Treaty Land Entitlement" process in the 1990's. This same process saw Carry The Kettle First Nation & Little Pine First Nation later acquiring land in the West Block of the Cypress Hills.

In December of 1918, area ranchers came together to form the Cypress Hills Stockmen's Association for the purposes entering into a grazing agreement with the Forest Reserve. The organization continues to operate in the West Block to this day as an important part of the park's management of the West Block grassland ecosystem.

Given intense pressures placed on animal populations in the Cypress Hills in the late 19th & early 20th centuries, many of the larger animal species had been extirpated from the area (such as bison, elk, bears, & wolves), or their populations were low. Beginning in 1914 a pronghorn antelope reserve was established in the Cypress Hills area which became Menissawok National Park in 1922. However, with the recovery of antelope populations, the park closed in 1930, and was delisted in 1947. Other animal species were re-introduced, or introduced, such as elk in the 1930's and moose in the 1940's.

Following the transfer of natural resources control from the Dominion Government to the provinces in 1930, the Province of Saskatchewan assumed responsibility for the former Cypress Hills Dominion Forest Reserve. By Order-in-Council on December 19th, 1931 the Centre Block of the Cypress Hills became one of six areas in Saskatchewan designated as "Provincial Parks". The "core area" for the new Provincial Park in the Cypress Hills was the Centre Block, and "relief camp" workers of the Great Depression were employed to construct Loch Leven and early park infrastructure. The West Block continued to be managed

by the Province of Saskatchewan as a forest/grazing reserve until it formally became part of Cypress Hills Provincial Park in 1976.

In 1989 the “Cypress Hills Interprovincial Park Memorandum of Understanding” was signed establishing Cypress Hills Interprovincial Park as Canada’s first and only interprovincial park at the time. Fort Walsh National Historic Site of Canada signed an adhesion to the original agreement in the year 2000. The agreement is an inter-jurisdictional commitment in principle between the three separate parks, & their respective agencies, to working cooperatively on the management of the unique ecosystem and visitor experience service offer of the two Provincial Parks and the National Historic Site that make up the park lands of the Cypress Hills.

3.4 NATURAL DISTURBANCE REGIMES

3.4.1 WILDFIRE

Fire has played an important role in the ecology of the Cypress Hills. The forest and grasslands of the area have evolved with centuries of fire events of varying intensities. However, recent fire suppression activities have created ecological and safety issues. Fire is considered a natural disturbance and aids in resetting ecological succession, nutrient cycling, insect, disease and fungal control, understory species control, and soil development of the montane forest and grasslands. Many forest and grassland species have adapted to fire with some depending on it for rejuvenation or reproduction, such as lodgepole pine and species associated with lodgepole pine (Government of Alberta 2011). Lodgepole pine reseeds from serotinous cones which open during a fire or mechanical interaction. Stand regeneration from fire creates even-aged forests, like those found within Cypress Hills. It has been found that mature lodgepole pine trees have some ability to survive fire directly, evidence of this is found in the fire scars of living trees (Strauss 2002 as cited by Saskatchewan Parks 2005)

Therefore, fire is an important management tool to consider within the park (Saskatchewan Parks 2005). Historical records and tree data show that the Cypress Hills area were regulated by low intensity ground/surface fires originating from the grasslands and high intensity crown fires. Low intensity fires were frequent while high intensity fires were infrequent (Government of Alberta 2011). Widenmaier and Strong (2010) found that the forest fire frequency of the Cypress Hills between the years of 1740 to 2000 was approximately 45 years, with a range of 24 to 65 years.

The vegetation communities and distribution found within the park are a product of historical fires. Historically, two major fire events have occurred within Cypress Hills. Landscape-level burns occurred in 1885 and 1889 (**Table 3**). The 1885 fire began in Manyberries, Alberta and spread into the park and became a crown fire. Salvage and logging occurred after the fire of 1885 which was said to have left the forest reduced to just a few isolated trees. The fires of 1885 and 1889 is considered to be the stand originating fire for the current lodgepole forests of the park (Saskatchewan Parks 2005).

Table 3 Historical Wildfires within Cypress Hills and Surrounding Area (Strauss 2002 as cited by Saskatchewan Parks 2005).

Date of Fire	Location/Origin	Approximate Size	Estimated Type
1740	Horseshoe Canyon, AB	Unknown	Surface
1810	Horseshoe Canyon, AB	Unknown	Ground
1854	Crickton Creek, AB; Willow Creek, AB	Unknown	Crown
1867	Willow Creek, AB	Unknown	Crown
1877	Willow Creek, AB	Unknown	Surface
1885	Crickton Creek, AB; Upper Nine-Mile Creek; Graburn Creek; Cypress Hills	Majority of Forest	Crown
1889	Cypress Hills; Horseshoe Canyon	Majority of Forest	Crown
1893	Upper Nine-Mile Creek	Small Fire	Surface
1902	Willow Creek, AB	Small Fire	Surface
1907	Crickton Creek	Small Fire	Surface
1910	Upper Nine-Mile Creek	Small Fire	Surface
1919	Graburn Creek	434 ha	Crown
1934	Willow Creek	608 ha	Crown
1949	Graburn Creek	Small Fire	Surface

Fire suppression began following the Dominion Forest Reserves and Parks Act of 1911. Fire guards were created in the 1950s to prevent fires from spreading between the grasslands and forests (Government of Alberta 2011). Recent fire history between the years of 1969 and 2007 show a total of 63 fires within the Alberta side of the West Block. The Saskatchewan Ministry of Environment Wildfire Branch was involved in two fires in 2003 in the southwest of the Cypress Hills area. The fire originating at the Old Wive's Pasture burned 900 hectares and the Arena Pasture fire burned 1400 hectares. Both fires began within community pastures and spread due to dry conditions. No major damage to infrastructure resulted from either fire. Recent fire history within the Centre and West Blocks are presented in **Table 4**. Total area burned since 2000 within the Centre Block equals 1.71 hectares. Of the 13 fires recorded for the Centre Block only one was caused by lighting (0.04 hectares in 2000). The remaining 12 fires that occurred within the Centre Block were from anthropogenic sources, their locations are presented in **Figure 17**. Two total known fires since 2000 within the West Block equal 0.11 hectares. Both fires were caused by lighting and their locations are presented in **Figure 18**. Anthropogenic sources, including recreational land users, account for most recent fires within the park (approximately 87 percent) according to statistics from the Alberta side of Cypress Hills. Lightning is the second cause of fire ignitions at approximately 11 percent, however this becomes higher in dry, warm periods (Alberta Tourism, Parks and Recreation 2009).

Table 4 Recent fires (post year 2000) within West and Centre Blocks of CHIPP including size and origin type.

	Year	Source	Size (ha)
Centre Block			
	2000	Human	0.54
	2000	Lightning	0.04
	2001	Human	0.34
	2002	Human	0.02
	2004	Human	0.01
	2005	Human	0.02
	2006	Human	0.1
	2007	Human	0.02
	2008	Human	0.01
	2011	Human	0.01
	2012	Human	0.4
	2014	Human	0.1
	2017	Human	0.1
Total			1.71
West Block			
	2011	Lightning	0.01
	2014	Lightning	0.1
Total			0.11

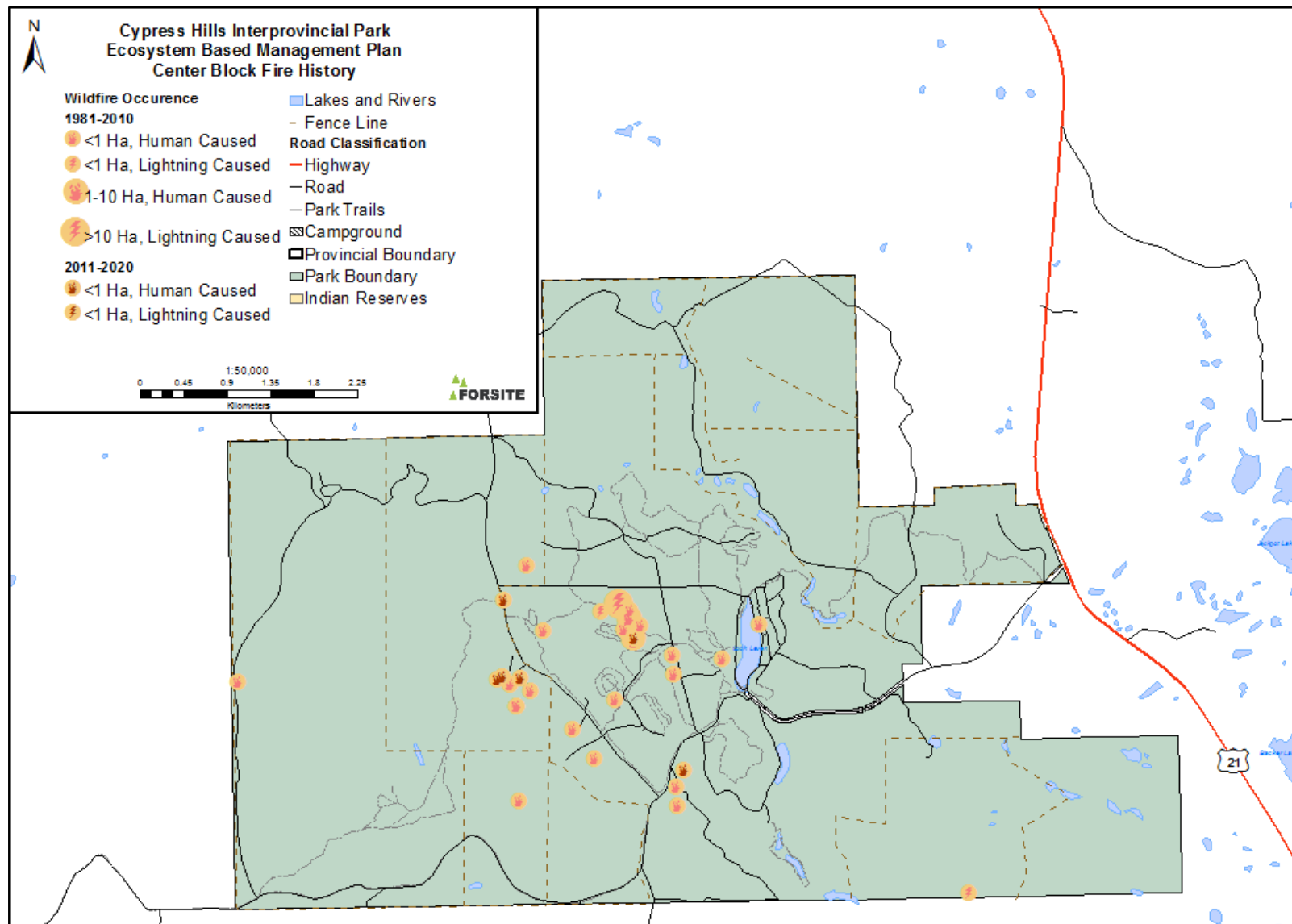


Figure 17 Map of Recent Fire Occurrences within Centre Block, CHIPP.

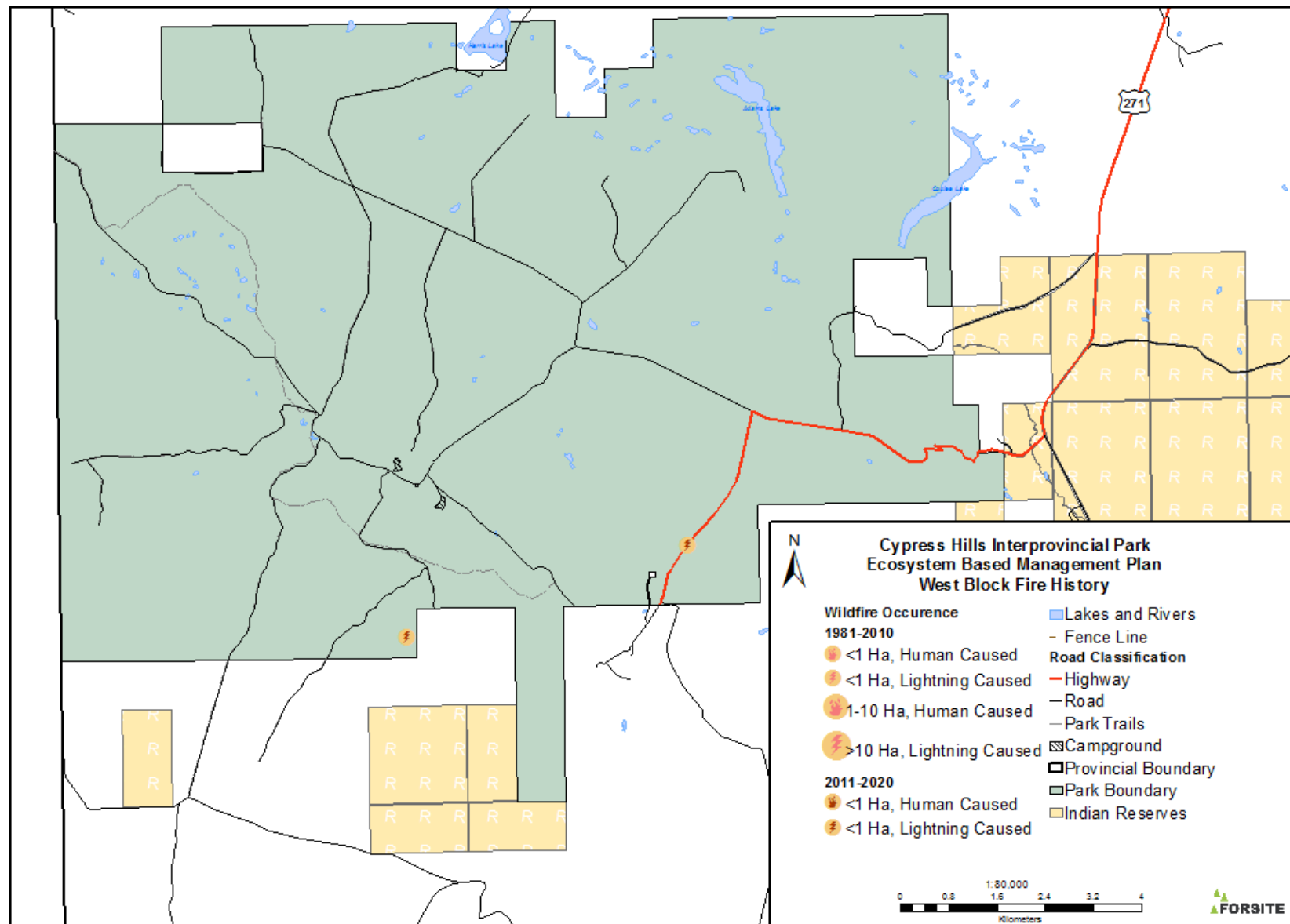


Figure 18 Map of Recent Fire Occurrences within West Block, CHIPP.

Wildfire plays an important role and creates challenges for ecosystem-based management plans. As mentioned prior, fire plays an important role in both the montane and grassland ecosystems of the Cypress Hills. Maintaining or emulating fire as a natural disturbance within the park will help to maintain the park's natural succession and biodiversity (see [Section 3.5.4](#)). Challenges with fire as a natural disturbance management tool include planning (pre-fire), fire suppression activities, and treatments post-fire. The Saskatchewan Parks "Provincial Park Resource Management and Recreational Activities Guidelines" (2003) outlines that:

- ▶ A wildfire management plan should be prepared for each park identifying areas in terms of their fire protection priority.
- ▶ "Firesmart" techniques are recommended for developed areas (e.g. harvesting/thinning to reduce continuity of fuels).
- ▶ Areas with low priority to the protection of human values and a fire is considered to provide ecological benefits, fires should be allowed to burn naturally.
- ▶ Low-impact fire control methods should be preferred and used whenever possible; fires should be contained using natural barriers such as water or roads; fireguards and roads should be kept to the minimum extent consistent with safety; minimal use of foam and fire retardant near water; fireguards and roads should avoid environmentally sensitive areas; these disturbances should be reclaimed to their original condition after the fire is out; windrows of knocked over trees should be reduced and broken up.
- ▶ Salvage logging of burned timber is not allowed unless recommended for vegetation management purposes.

The recommendation for CHIPP is an aggressive response to fire starts within the Centre Block based on the relatively high density of developments, high visitor numbers, over-mature forest stand age, and its proximity to private and agricultural lands surrounding it. Fuel management using "Firesmart" harvesting to reduce fuels around developed areas in the Centre Block has been applied in some places, such as the cottage subdivisions, major thoroughfares, and campgrounds (Government of Saskatchewan 2017) and this should be continued to implement in the future to protect human values at risk. The West Block contains significantly less developments and visitor numbers. However, the West Block contains cultural and ecological values to protect as well as values of adjacent private lands. Forest harvesting at landscape level in the West Block could be an alternative approach to stimulate natural disturbance of wildfire. Detailed recommendations regarding wildfire preparedness for both the West and Centre Blocks are discussed within the associated Forest Conservation Management Plan.

Other fire suppression activities within the park have included thinning, the creation of fire guard creations, minimizing ladder fuels, restricting access during high risk periods (e.g. road closures, area closures), and fire bans. Prescribed fire is a management option which can be utilized to emulate natural wildfire disturbances in a controlled manner, where deemed safe to do so. However, given the high risk of wildfire in CHIPP, prescribed burns or "allowed to burn naturally" policy is not recommended at landscape level for the park. Small to medium prescribed burns to maintain grassland health, reduce woody plant encroachment, or assist natural regeneration after forest harvesting could be used under safe environmental conditions.

The Saskatchewan Park's has a "Prescribed Fire Policy" (2009). This policy describes how prescribed fire can be applied on park lands such as:

- ▶ Maintaining and improving ecosystem health and biodiversity
- ▶ Promoting nutrient recycling and energy flows

- ▶ Returning park lands closer to their historical fire regimes
- ▶ Managing insects and disease infestations
- ▶ Managing the control and spread of invasive alien plant species
- ▶ Renewal of native grasslands/forestlands
- ▶ Reduction of fuel loading – reducing wildfire hazards
- ▶ Restoration and maintenance of rangelands

Implementing prescribed fires into a park setting requires planning detailing the goals, responsibilities, procedures, and monitoring of fire operations. The seasonality of prescribed grassland burns can produce different management effects and should be taken into consideration when planning (Saskatchewan Parks 2005). Prescribed fire within the Centre Block would require a high level of control and planning as the area contains a large amount of values at risk. There was one small prescribed burn (about 6 ha) in the west boundary of Centre Block in May 2003 to control brome grass invasion. A prescribed burn was also conducted in Alberta side in the early 2000's to control shrubby cinquefoil. However, detailed locations and descriptions about these burns are unavailable (Glen Longpre, per communication).

3.4.2 INSECTS AND DISEASE

At a provincial level, the surveillance, monitoring, and management of insects and disease are completed by the Saskatchewan Ministry of Environment. Information on most of the key pests found in Saskatchewan forests is available on the Ministry of Environment website (Government of Saskatchewan 2018). At the time of preparing this plan, the main concern for CHIPP is mountain pine beetle (MPB). There are affected patches sporadically throughout the park. The spread of MPB has a greater chance of increasing if treatment of the old age pine stands does not occur (Taylor & Carroll, 2003).

The Mountain Pine Beetle (MPB) (*Dendroctonus ponderosae*) has been a species of concern within British Columbian and Alberta forests. The beetle is known for causing significant mortality within pine forests and has been confirmed to attack jack pine forests within Alberta. The spread of Mountain pine beetle within Saskatchewan's boreal forests is a related concern to resource managers.

Since the MPB outbreak during the mid 1980s, the Ministry has been monitoring MPB populations using both pheromone traps and bait tree traps. Aerial surveys followed up by ground surveys were also conducted to map and determine areas of MPB activity in CHIPP. Monitoring and controlling of MPB in CHIPP were active during the period from 1980 to 1985 and from 2006 to the present. There was very little activity in terms of monitoring for MPB in CHIPP between 1986 and 2005 as the regional MPB outbreak had essentially collapsed and the number of beetles collected in CHIPP was extremely small (Rory McIntosh ENV per communication, 2020). From 1980 to 1985, total 4107 lodgepole pine trees were identified as infested trees. The outbreak was picked in 1982 with 2222 infested trees that increased from 126 trees in 1980. The outbreak was then slow down in 1984 and 1985 with 84 and 3 infested trees, respectively.

Monitoring has been continued within CHIPP for the last 16 years (2006-2020). During this time period surveys have identified approximately 3600 MPB infested trees. Results from the surveys from 2006 to 2020 are presented below in Figure 19.

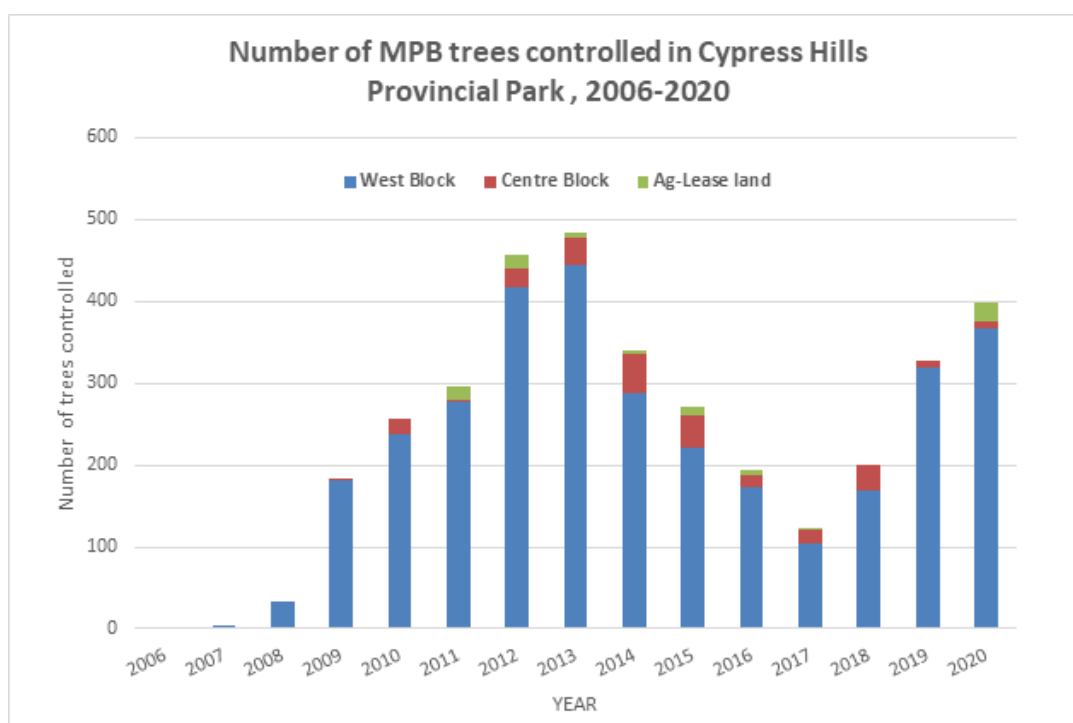


Figure 19 Mountain Pine Beetle Affected Trees within the Cypress Hills Area (Government of Saskatchewan 2020).

Survey results found and controlled two infested trees in 2006. The number of infested trees increased between the years 2007 and 2013. The highest number of infested trees (n=477) were found in 2013. The number of infested trees found during surveys decreased between 2014 and 2017. Recently, the number of infested trees found during surveys (2018 and 2020) has been increasing. 328 attacked trees were identified in 2019 that was increased to 398 trees in 2020 (i.e. 366 in West Block, 10 in Centre Block & 22 on leased crown land).

In response to infested trees, the Ministry of Parks, Culture and Sport (PCS) conducts a fall and burn program based on the systematic survey of the Ministry of Environment. This program removes attacked trees and helps limit the spread of the beetle within the park (Government of Saskatchewan 2018). Known MPB locations within CHIPP can be seen in **Figure 20 and 21**.

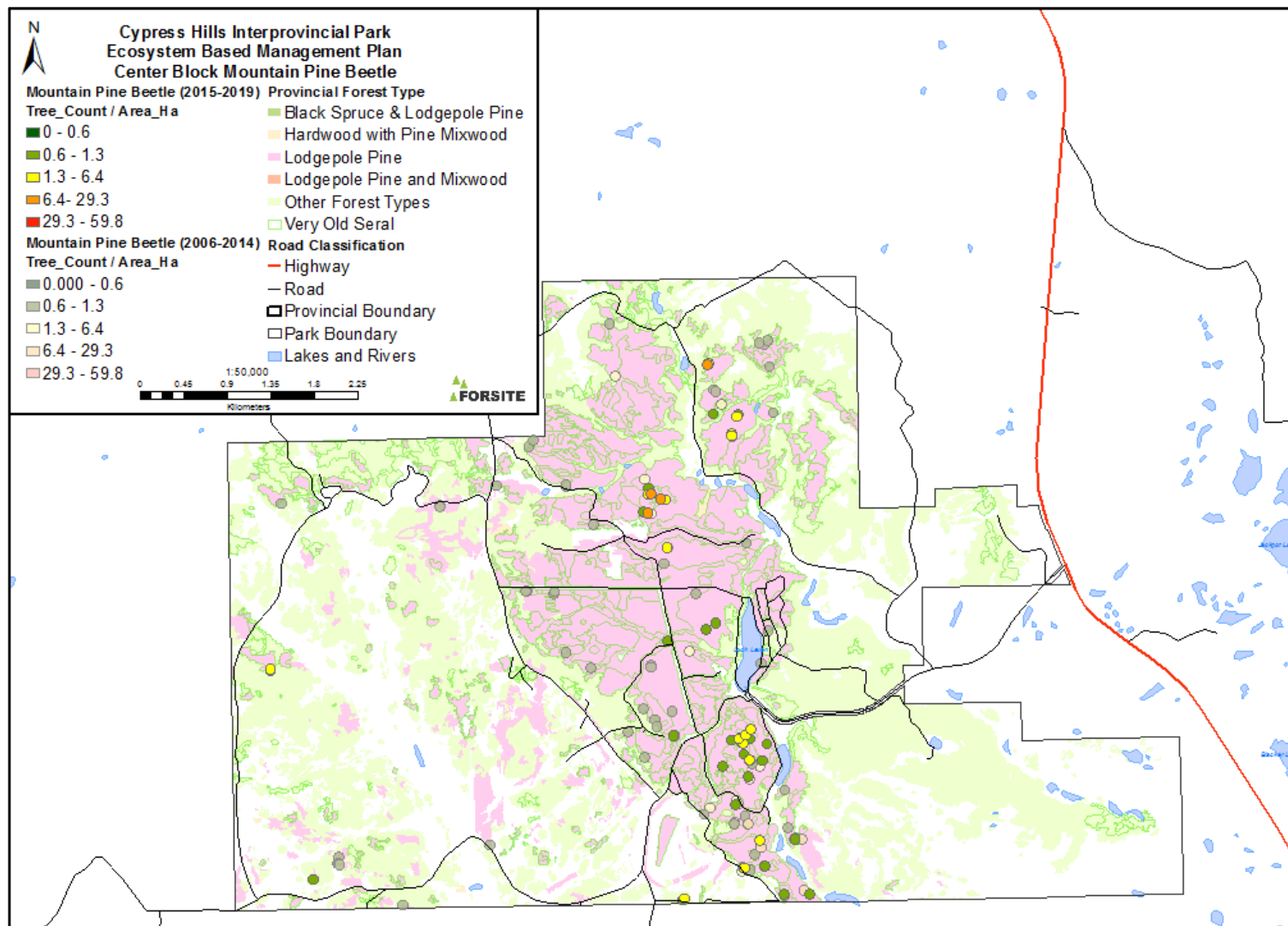


Figure 20 Areas Affected by MPB within Centre Block, CHIPP.

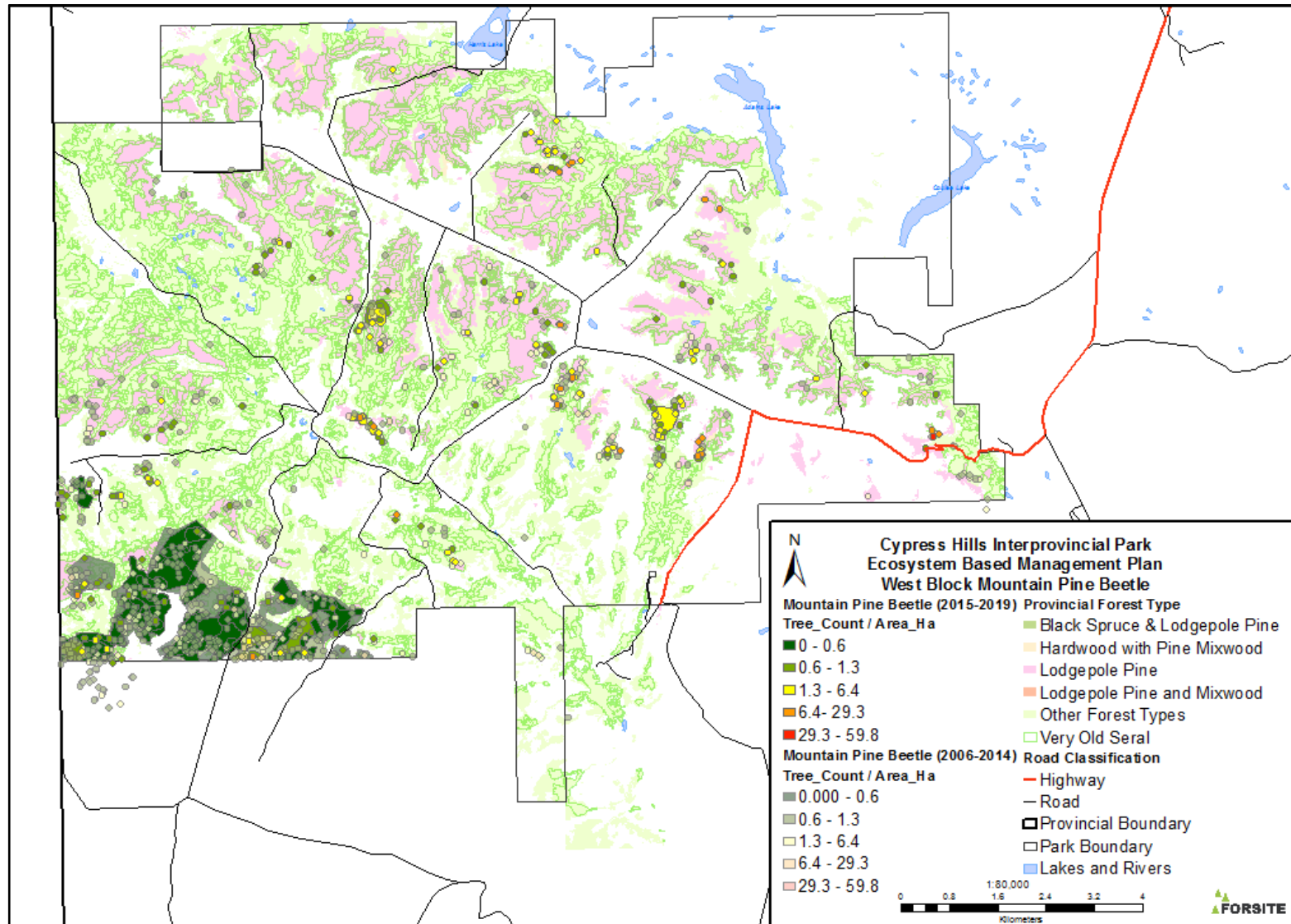


Figure 21 Areas Affected by MPB within West Block, CHIPP.

Other insects and diseases are also being monitored within the park. The extent of the forest tent caterpillar (*Malacosoma disstria*.) outbreaks, a defoliator of hardwood trees, was mapped between 2013 and 2018. Additionally, a total of 352 trees were found to contain the *Ips* spp. beetle, 19 trees contained root rot, 34 had lodgepole pine beetle, 19 with stem disease, and 29 trees were found with sawyer beetle. These occurrences were noted throughout the years of mountain pine beetle surveys and were supplied without specific dates of occurrences (Poniatowski 2020). Western spruce budworm (*Choristoneura freemani*) and *Armillaria* spp. are other forest pests which are of concern in CHIPP and will need to be monitored through time. More details can be found in the FCMP.

3.4.3 WINDTHROW AND OTHER DAMAGE

Windthrow is another common disturbance in mature forest stands (see associated Forest Conservation Management Plan for details on forest status within CHIPP). The damage from windthrow is typically less than what would be affected by fire (Thorpe and Godwin 2012). However, windthrow can create increased risk management concerns especially in the developed core areas. In addition to risks to visitor safety and values, the resulting dead standing or dead and down timber increase fuel loading thus increasing the threat of catastrophic wildfire (Government of Saskatchewan 2017). To date, windthrow damage within CHIPP has been noted within the West Block. The extent is approximately 208 hectares with majority of the damage being classified as “light” or as one to 25 percent of total area damaged. The dates of the windthrow damage has been listed as “undefined” in the forest inventory data (SFVI 2018-2019 data).

The Cypress Hills area supports several large native herbivores (e.g. moose, elk, white-tailed deer, mule deer, pronghorn antelope, and historically, plains bison) as well as smaller herbivorous mammals such as rodents and lagomorphs. The park also supports domestic cattle grazing. Together these animals feed on a variety of plant material, including browsing on shrubs, aspen suckers, and young saplings (Thorpe and Godwin 2012; Saskatchewan Parks 2005). Grazing has been found to both promote and inhibit woody plant growth (Sankey et al. 2006a). The effects of animal grazing and browsing are not thought to have a large impact on tree survivability as tree encroachment onto fescue grasslands has been increasing. The expansion of forested area within CHIPP (Alberta side of West Block) has increased by approximately 768 hectares between 1950 and 2007 (Widenmaier and Strong 2010).

3.5 PRESENT DAY USE AND COMPOSITION OF PARK VEGETATION

3.5.1 PRESENT DAY RESOURCE USE ACTIVITIES

3.5.1.1 RECREATIONAL DEVELOPMENT

Recreational infrastructure has been developed in the years prior to the establishment of the provincial park in 1931 (e.g. cottages, Loch Lomond and Loch Leven Lakes) and has continued thereafter. Today, the Centre and West Blocks contain a variety of developments, both public and private, exist within the park. The Centre Block contains 19 public campgrounds (12 individual and seven group camping), one staff campground, and one decommissioned campground (i.e. Pine Hill) currently scheduled to reopen by 2022 (**Figure 22** and **Figure 23**). Pine Hill campground was decommissioned and harvested in 2011-2012. The campground was scarified and naturally regenerated shortly after decommissioning. The majority of the campgrounds within the Centre Block offer amenities such as electrical hookups, water, sewer, washroom and shower facilities, and paved access. The West Block contains two primitive campgrounds and one

equestrian campground. Together the campgrounds provide over 600 campsites (**Table 5**). There are no proposed campground developments planned for 2020. In addition to the Park camping facilities, the Centre Block also contains privately owned accommodations. The Resort at Cypress Hills provides guests with opportunities to rent hotel rooms, cabins or townhouses. Additionally, the Resort offers conference rooms and a restaurant. Two privately owned campgrounds also operate within the Park (Wild Raspberry and Shady Nook) and provide 74 leased sites. Privately owned cabins are also located within the Centre Block. There are 202 cabins within the Centre Block, primarily located on the East side of Loch Leven with some cabins on the west side of the Loch Leven and Loch Lomond as well.

Other recreational developments within the park include numerous public amenities, privately owned businesses, and non-profit organizations. The park provides swimming opportunities through a small man-made lake named Loch Leven and developed swimming facilities. The Loch Leven lake offers a small beach area, playground, and changing facilities. The swimming pool contains one outdoor pool as well as an indoor hot tub and sauna. The Cypress Hills Community Centre accommodates large gatherings such as corporate events and weddings. The Community Centre was rebuilt in 2015 after the original building became structurally unsound and collapsed in 2011 and is owned by The Friends of Cypress Hills Park Inc. The Cypress Hills Observatory was created in 2011 and contains a dome observatory, three telescopes, and a 60-person classroom. The park also provides an amphitheater for visitors.

There are several privately owned businesses within the park. The park contains a nine-hole golf course and driving range. There are two small takeout restaurants and one dine-in restaurant, not including the restaurant at the Resort Hotel. Other amenities include small mini-golf course, fuel and propane station, cafeteria, watercraft and bike rental, Segway tours, and a grocery/fast food and gift store. Horseback riding and zip line facilities are also available. Four private institutional camps utilize the Centre Block and have permanent facilities established. These camps include Shagabec (established 1960), Pine Crest (established 1968), Camp Harding (established 1974), and Cypress Camp (formerly Cypress Bible Camp established 1975A former Boy Scout camp in the Centre Block, established in 1957. Currently Scouts Canada utilizes the West Block but practices no trace back-country camping.

Fort Walsh National Historic Site, adjacent to the CHIPP West Block, offers public interpretive programming about history of the North West Mounted Police fort and trading post in the Cypress Hills through the use of the period furnished buildings and interpreters dressed in period costume. The site also features a Visitor Reception Centre with a recently updated interpretive exhibit, video theatre, and small concession.

Table 5 Major recreational developments in CHIPP, Saskatchewan.

Campgrounds (public, group, and staff)				
Name	Number of Sites	Name	Number of Sites	
Meadows	143	Ranger Campground	9	
Aspen	32	Equestrian	17	
Rainbow	70	West Block Campground	24	
Terrace	90	Valley Trail (group)	5	
Lodgepole	25	Sleepy Hollow (group)	30	
Warlodge	79	Sunset (group)	14	
Deer Hollow	35	Hidden Valley (group)	15	
Pine Hill	Decommissioned	Lone Pine (group)	20	
Dark Sky	15	Loch Leven (group)	7	
Ridge	3	Shady Pines (group)	14	
Staff Campground	>12			
		TOTAL	>657	
Cottage Subdivisions (leased)				
Cottages	202			
		TOTAL	202	
Private Resorts				
Resort at Cypress Hills		Private RV		
Hotel Rooms	33	Wild Raspberry	50	
Town Houses	20	Shady Nook	24	
Cabins	13			
		TOTAL	140	

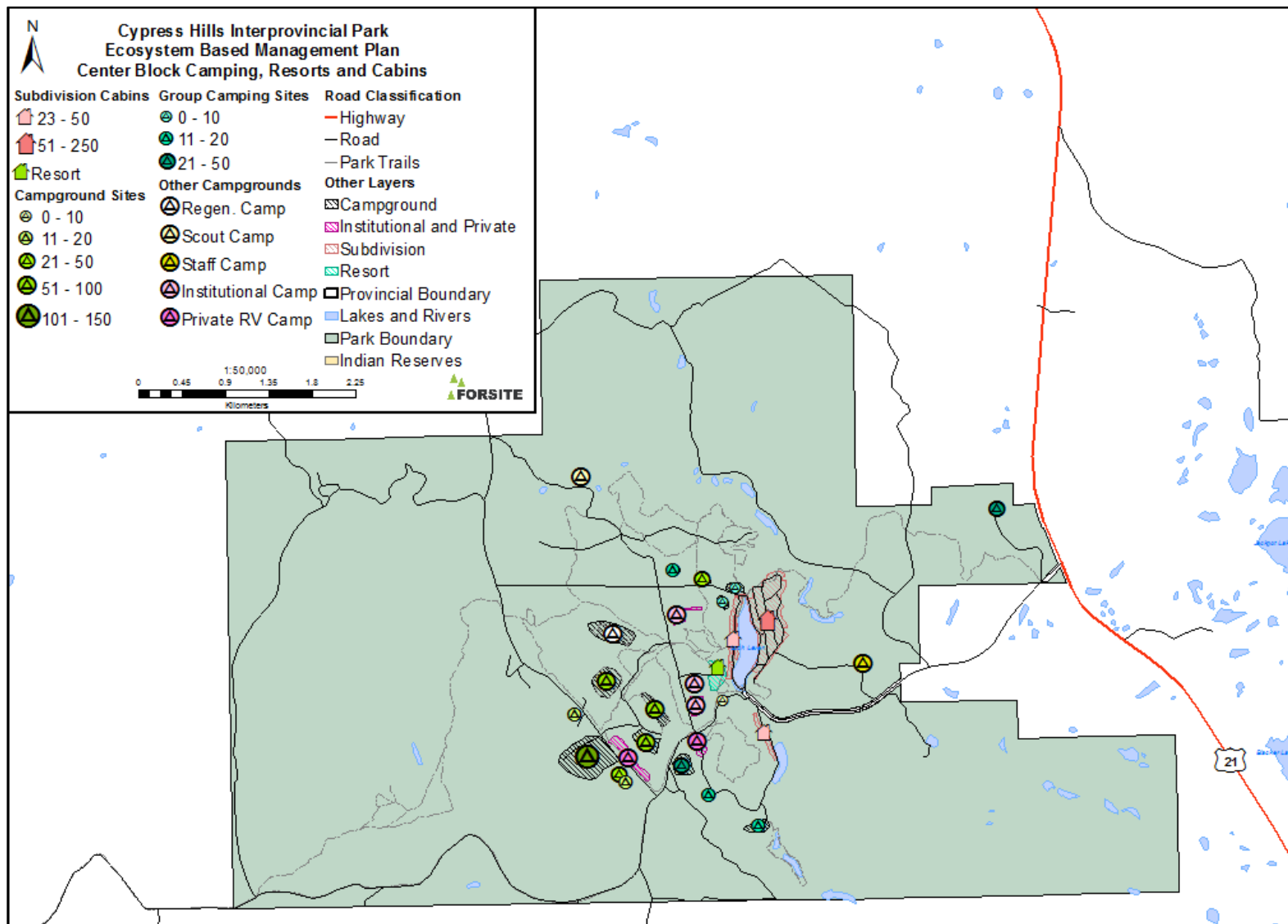


Figure 22 Map of Campgrounds, Cabins, and Resorts within Centre Block, CHIPP.

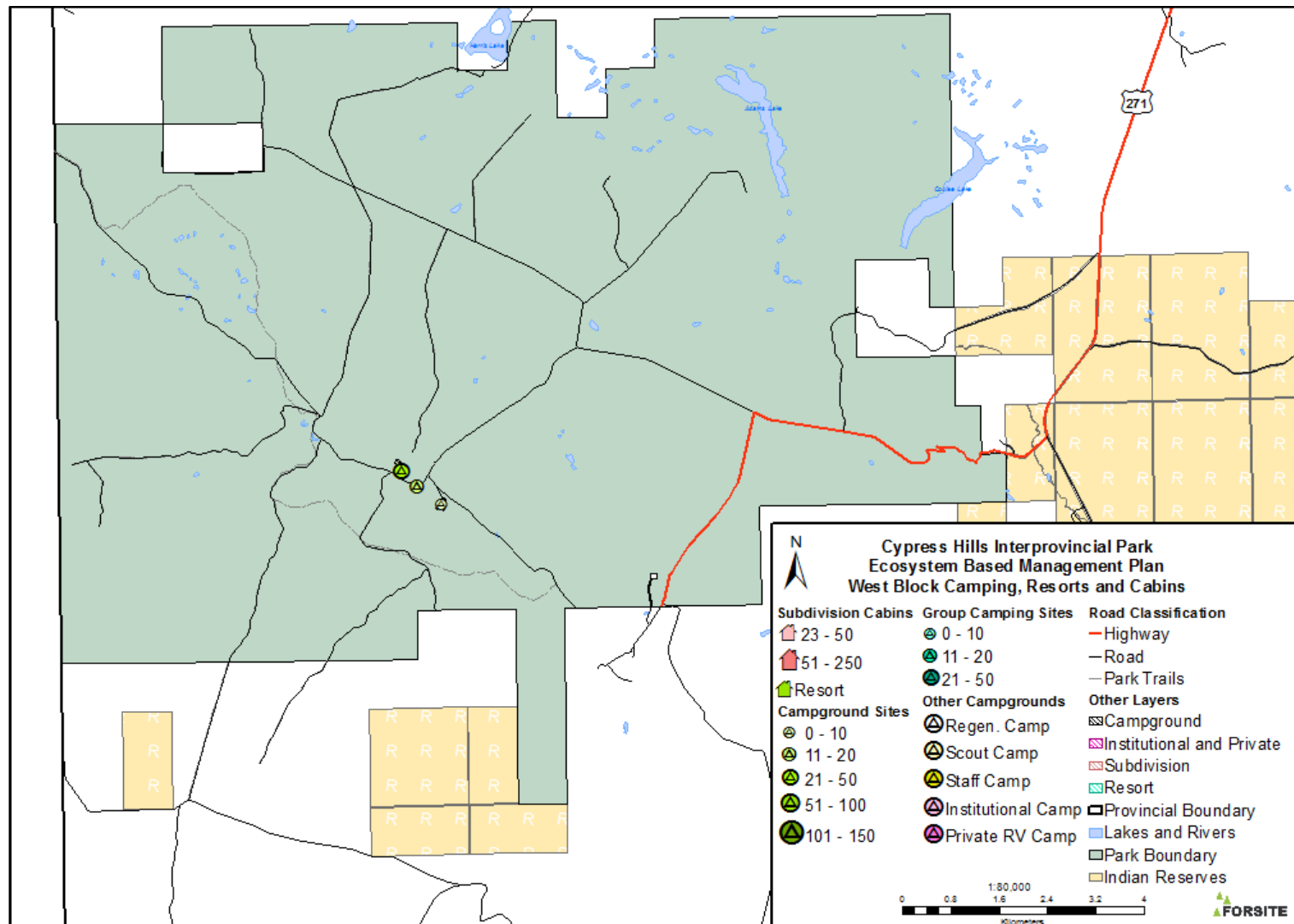


Figure 23 Map of Campgrounds, Cabins, and Resorts within West Block, CHIPP.

3.5.1.2 LINEAR DEVELOPMENT

Roads and trails represent an important form of development within park land. Total length of roads and trails within the park is 133.2 kilometres, or 56.3 kilometres and 76.9 kilometres for the Centre and West Blocks, respectively. The area of the roads and trails with an assumed rights-of-way (ROW) is approximately 458.5 hectares which represents approximately three percent of the total area within the park (**Table 6**). The Centre Block of the park is accessed via Highway 21 and Highway 221 South from Maple Creek. The main access road into the park is paved. The majority of roads within the Centre Block are paved. The West Block is primarily accessed from Highway 271, a paved highway, southwest from Maple Creek. The West Block can also be accessed from the Alberta side of the park via the Battle Creek Road, a fair-weather gravel road. The West Block can also be accessed from the Centre Block through the Gap Road (Gap Trail), a 21 kilometre fair weather gravel/dirt road connecting the two blocks through agricultural and pasture lands. Another linear development in CHIPP includes fencing lines to contain livestock within the disposition areas in the Central Block with the total length of 57 km.

Linear features such as roads, trails, fences, power/gas lines, and ROWs are a leading contribution to habitat fragmentation. Large habitat areas that have been fragmented show a reduced core area of ten percent or more, while small habitat areas will have a core area reduction of up to fifty percent. In addition to habitat fragmentation, linear features alter plant composition causing an increase in invasive or non-native species and a decrease in abundance of native species. This is of particular concern within CHIPP, as invasive species is one of threats to the ecosystem. Physical disturbances also include pollutants (e.g. particulates, dust, and chemicals), alteration of the soil pH, noise, impediments to wildlife movement, and soil compaction. These disturbances extend inward from the linear feature 20 to 30 metres, which in turn contribute to the “edge effect” or degradation of the core habitat. Different classes of roads have higher or lower impacts on the surrounding habitat. Dirt roads have the lowest impact, however they have a high level of soil compaction and risk of erosion due to bare ground. Paved roads and their ROWs have the highest habitat impact (Gieselman *et al.* 2013).

Table 6 Length and Area of linear developments in CHIPP.

Type of Linear Feature	Length (km)	Assumed ROW width (m)	ROW Area (ha)
Centre Block			
Highways	0	60	0
Other Roads – Paved	23.88	30	71.64
Other Roads – Unpaved	32.46	30	97.38
Trails*	40.52	5	18.11
Fences	57	5	28.5
West Block			
Highways	8.30	60	49.8
Other Roads – Paved	0.04	30	0.12
Other Roads – Unpaved	68.54	30	205.62
Trails*	51.63	5	7.19
Total	282.37		478.36
approx. land area of park	18320 ha		
percent of land area in roads and trails	3%		

*Area was calculated after removing trails that also overlapped with Highway and Road ROW

The province and Parks Division have previously outlined activities to mitigate or minimize linear feature disturbance. The “Provincial Park Resource Management and Recreational Activities Guidelines” (2003) state that:

- ▶ Vehicle use on roads and trails can lead to environmental damage, increased hunting pressure, and opening up of previously inaccessible areas;
- ▶ An inventory and assessment of roads and trails should be completed;
- ▶ Necessary roads and trails (i.e. resource management use or access routes to park facilities) should be designated;
- ▶ Roads and trails that are not necessary should be reclaimed;
- ▶ Seeding with a native seed mix on excessively disturbed lands with high erosion prone soils due to clearing trees for fence lines may be required;
- ▶ Fence lines must not be affixed to trees;
- ▶ All topsoil removed for construction of the right-of-way, or access to the right-of-way, must be stockpiled for use in post-construction site remediation, and;
- ▶ The site remediation must be top dressed with topsoil from the site and sown with a seed mix approved by the Landscape Protection Unit and consist of native plant species typical of the ecosystems being remediated.

The Centre Block contains a high density of roads and trails. As described in the Guidelines listed above, an inventory and assessment should be completed. Unnecessary roads and trails should be decommissioned and reclaimed to native vegetation, while preventing further access. Roads and trails should also be included in monitoring for invasive plant species.

Figure 24 and **Figure 25** depicts the overall linear developmental footprint within the Centre and West Blocks of CHIPP. All types of developments discussed above are included in the analysis. Linear features were combined and calculated to determine linear development density (i.e. length of linear features in kilometers per square kilometer) (**Figure 26**). The overall developmental footprint does not account for the different weight of environmental impacts of the various features (i.e. fence lines compared to roads and trails) but measures as a whole. As mentioned previously the Centre Block has a much higher developmental footprint when compared to the West Block. Restricting further developments, especially in the West Block, will aid in protecting the park’s natural capital.

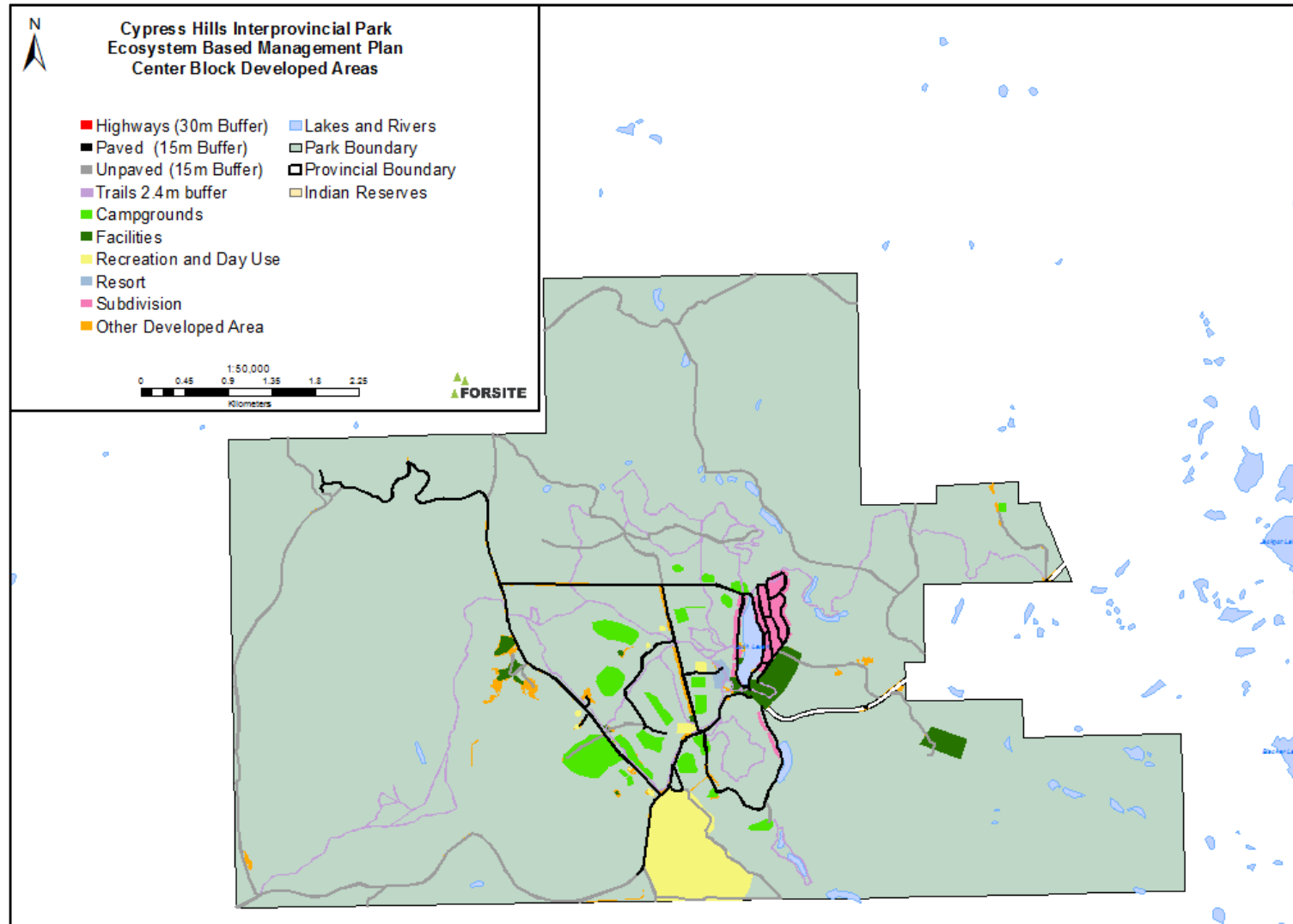


Figure 24 Overall Developmental Footprint within Centre Block, CHIPP.

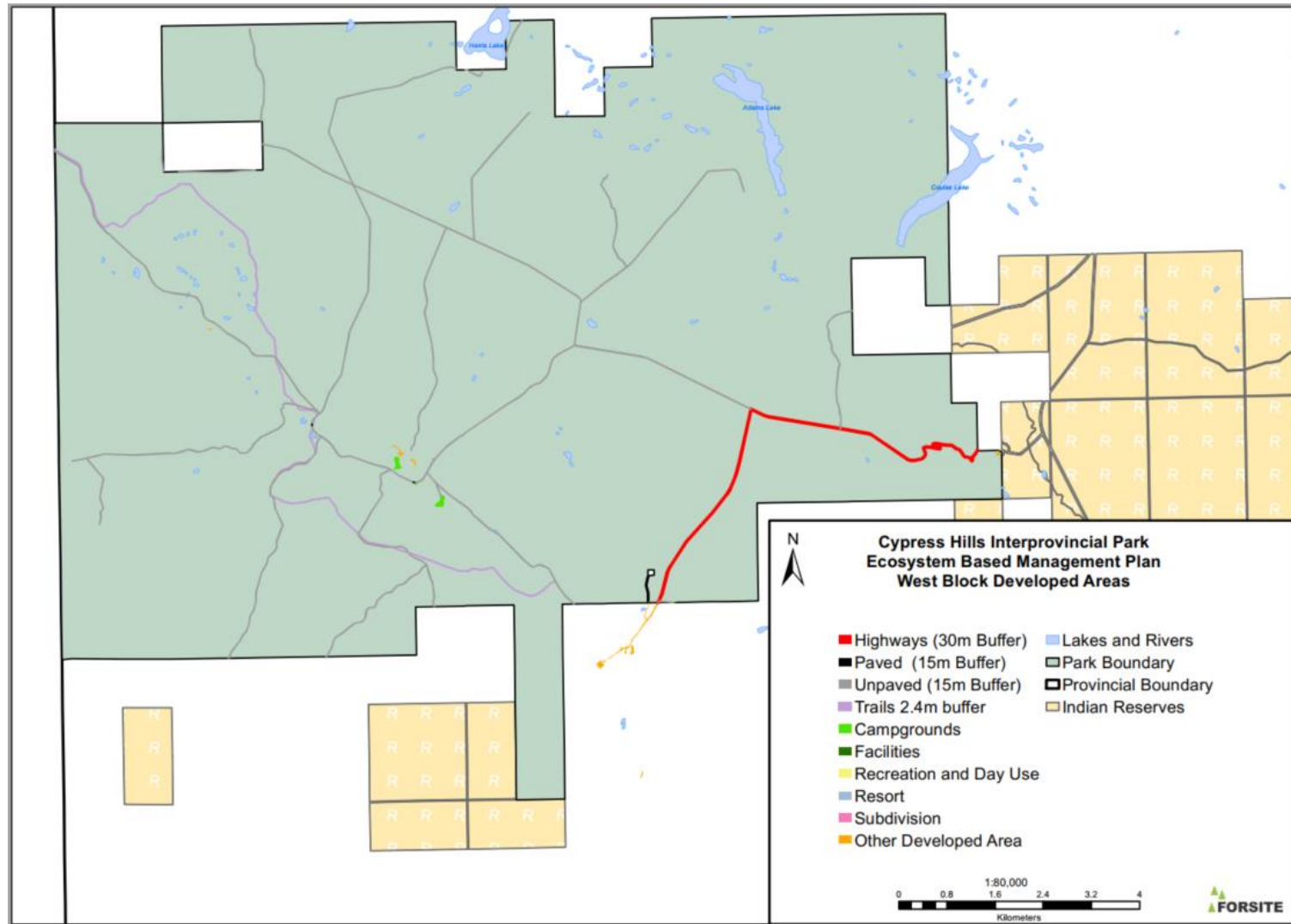


Figure 25 Overall Developmental Footprint within West Block, CHIPP.

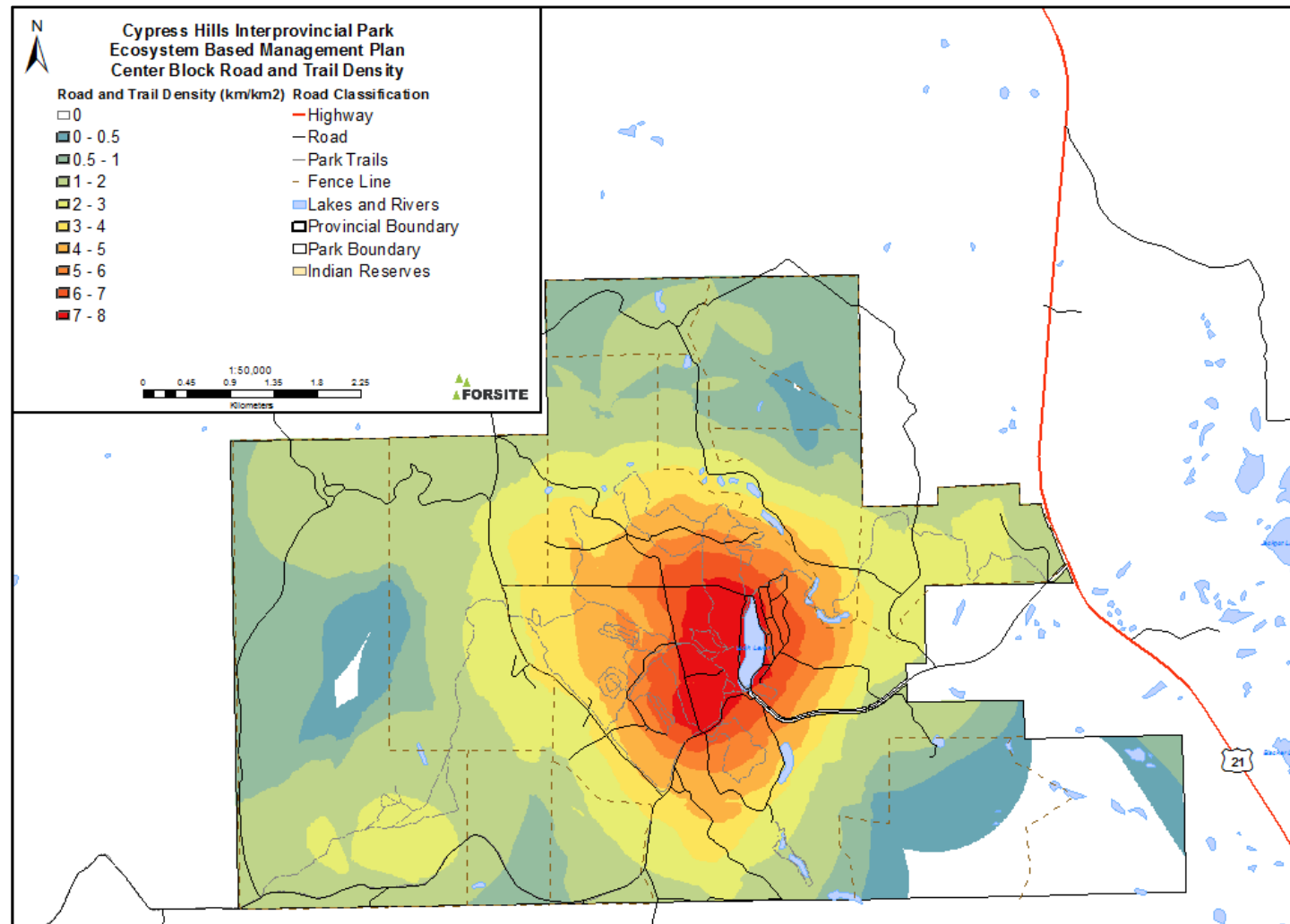


Figure 26a Road and trail density in Centre Blocks, CHIPP.

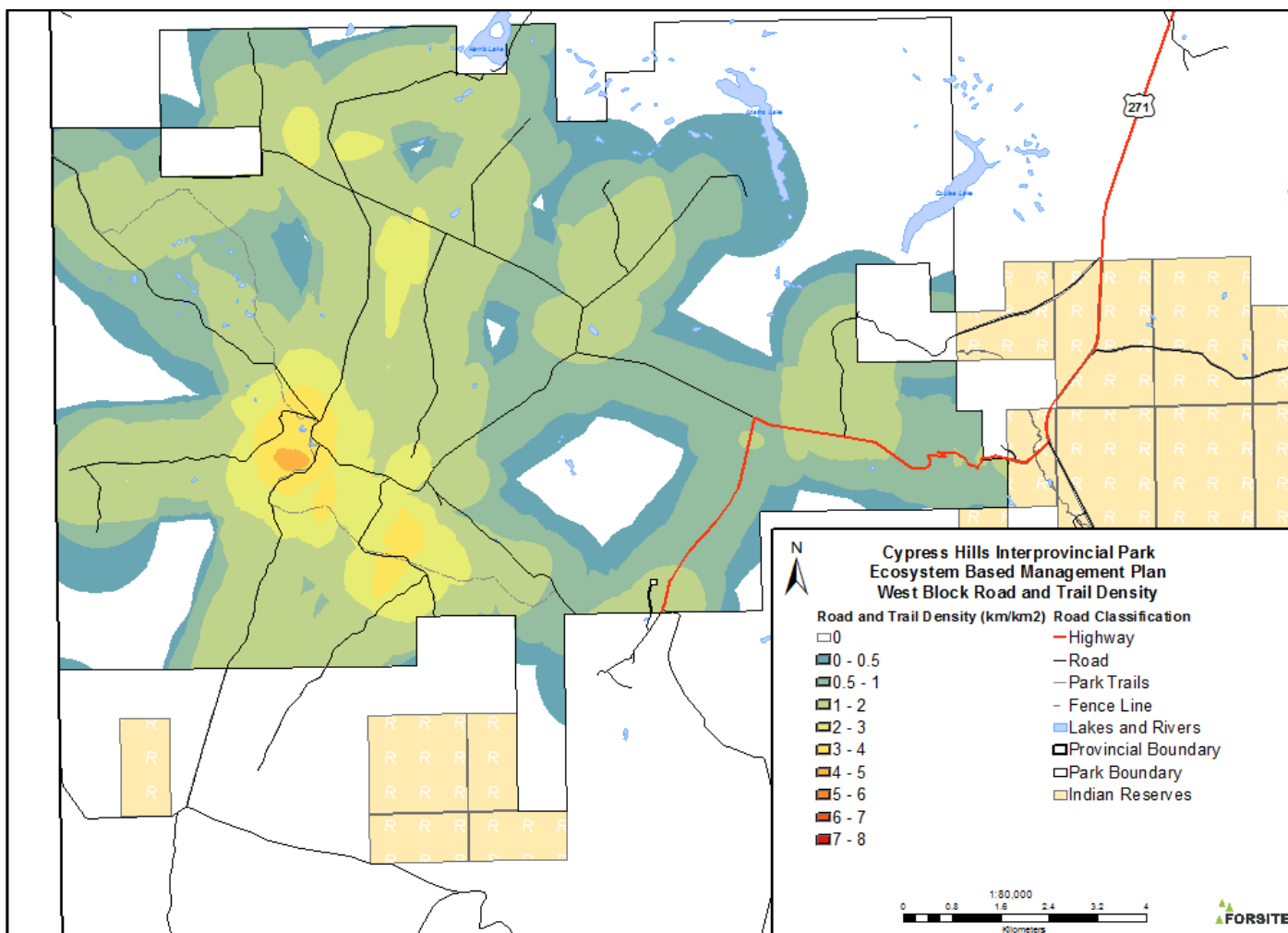


Figure 27b Road and trail density in West Blocks, CHIPP.

A wide variety of recreational activities (see [Section 3.5.1.4](#)) are supported by the recreational developments discussed. The network of trails is utilized by hikers, cyclists, birdwatchers, and within the West Block, hunters and visiting equestrian riders. The Centre Block contains 40.5 kilometres of trails, while the West Block contains 51.6 kilometres of trails. Included within the totals mentioned, the Trans-Canada Trail travels through both the Centre and West Blocks for a total of 13.7 kilometres.

ATV use is not permitted within the Centre or West Blocks. An exception is ATVs are allowed for the retrieval of legally harvested big game within the West Block, but must remain on designated roads or trails. Maintaining limited use of ATVs within the park will aid in reducing soil erosion and compaction, vegetation damage, impediments to wildlife movements, road-kill, noise disturbance, air and water pollution, and the introduction of non-native species (Wright and Dodge 2010). Snowmobiling is permitted in the Centre Block in a designated area when snow conditions are conducive. This is managed cooperatively between the park and the Cypress Hills Snowmobile Club.

3.5.1.3 GRAVEL PITS

The Centre Block contains one gravel pit currently in use. The pit is utilized and operated by the Park exclusively. One historical gravel pit was located within the park but has since been decommissioned and reclaimed. The monitoring of disturbed areas for invasive plant species establishment, included gravel pits, should be completed regularly.

3.5.1.4 RECREATIONAL ACTIVITIES

Recreational developments within the park have led to a variety of activities for resource users. The Centre Block is more developed and offers more modern activities compared to the more primitive West Block. Both blocks offer a variety of hiking trails including the sections of Trans-Canada Trail, cycling paths, bird and wildlife viewing and angling. In 2004, the provinces of Saskatchewan and Alberta and the Government of Canada, in partnership with the Royal Astronomical Society of Canada signed a declaration to designate the Cypress Hills Interprovincial Park as a dark-sky preserve (i.e. 39,500 hectare). The preserve is a sanctuary from artificial light to maintain the nocturnal environment for wildlife in as pristine a manner as possible. It is also a great place for stargazers to view the stars. There is no lighting throughout most of the Cypress Hills dark-sky preserve. Alberta and Saskatchewan have worked to reduce light pollution in Elkwater and the core area of Saskatchewan. Additionally, the West Block allows sport hunting during appropriate seasons and equestrian camping. The Fort Walsh National Historic Site offers guided and interpretive tours, period attire, and children's programming.

Furthermore, the Centre Block offers swimming lessons, mini-golf, golf, boating and canoeing, geocaching, horseback riding, and zip lining. The observatory also provides astronomy educational programs. Winter activities within the Centre Block include cross-country skiing, ice fishing on Loch Leven, snowshoeing, tobogganing, and skating.

3.5.1.5 HUNTING AND OUTFITTING

Cypress Hills provides hunting opportunities for trophy and consumptive users. Hunting is not permitted within the Centre Block of the park. The West Block allows hunting and is located within Wildlife Management Zone 7W and Game Bird Management Unit 1. Big game hunting seasons are for white-tailed deer, elk, pronghorn antelope, and mule deer. Game bird seasons are for ring-necked pheasants, sharp-tailed grouse, gray (Hungarian) partridge, and ruffed grouse. The West Block is also utilized by First Nations hunters. ATV use is allowed for the retrieval of legally harvested big game only and must remain on

designated roads or trails. There are no commercial wildlife outfitters or fur harvest trapping within CHIPP (Government of Saskatchewan 2019).

3.5.1.6 SPORT FISHING

Cypress Hills provides fishing opportunities for appreciative or consumptive anglers. The park is a popular destination for trout anglers. Waterbodies within the park are stocked by the province with brook trout, brown trout, and rainbow trout. Angling is primarily through light tackle or by fly-fishing. Battle Creek within the West Block and Loch Leven within the Centre Block are popular fishing locations. Fishing season opens in the southern zone on May 5th through March 31st. Loch Leven is regulated under “Special Regulations” and is limited to two trout species with the waterbody closed to angling from April 1st through May 31st and October 1st through November 30th (Government of Saskatchewan 2018).

3.5.1.7 FOREST HARVESTING

Forest harvesting within the West and Centre Blocks in recent decades has been limited. Recent harvests within the West Block include approximately 400 hectares of mature lodgepole pine harvested around 1992 (Saskatchewan Parks 2005) and 15.6 hectares harvested since 2009 (SFVI inventory). Recent harvests within the Centre Block include several small cuts for firewood since 1996, totalling approximately 120 hectares and is presented in **Table 7** (Data provided by Parks Division – Landscape Protection Unit).

Table 7 Centre Block Harvest Volumes since 1996.

Year of Harvest	Area Harvested (ha)
1996-2000	57.7
2003-2006	36.5
2007-2011	4.7
2012-2016	11.3
2017-2018	7.6
2018-2019	2.1
Total	119.8

Policies within the Parks Division are restrictive to commercial timber harvesting. The Saskatchewan Parks “Provincial Park Resource Management and Recreational Activities Guidelines” (2003) outlines that:

- ▶ Harvesting of forests can be used to achieve vegetation management goals;
- ▶ Harvesting for strictly commercial purposes will not be allowed, however commercial operations will be allowed to reach vegetation management goals;
- ▶ Personal use firewood is only allowed to be harvested if it meets vegetation management goals, and must be accessed via an existing trail, road ROW, or utility easement during winter only;
- ▶ Gathering of dead/down wood for personal-use firewood will be allowed provided it meets the park’s vegetation management objectives, but only at approved locations and using designated trails;
- ▶ Harvesting of Christmas trees is only permitted for vegetation management purposes (e.g. utility corridors, fire breaks, encroachment of pine trees into native grassland); and
- ▶ Burned or wind-thrown timber is not allowed to be salvaged except to ensure public safety or to protect infrastructure; small-scale fuelwood salvaging for use within the park is allowed.

Salvage harvesting has been limited due to evidence of the ecological value of dead standing trees and snags. They provide important habitat for small mammals and cavity-nesting birds. Additionally, they

contribute to available coarse woody debris and nutrient cycling. Coarse woody debris is important to invertebrates, lichens and mosses, and as habitat for white spruce seedlings to establish on

Recent forest management plans include the “Cypress Hills Fuel Management Plan” for the core area and Centre Block (Government of Saskatchewan 2017) and the “Cypress Hills Interprovincial Park Forest and Fire Management Plan” (Government of Saskatchewan 2005). Both plans include suggestions to reduce fire risk and regenerate the forest through harvesting. The “Cypress Hills Fuel Management Plan” places a priority on removing white spruce understory within mature lodgepole pine stands and thinning understory white spruce within mixed wood or aspen stands within the core area. The Cypress Hills Interprovincial Park Forest and Fire Management Plan prioritized an aggressive forest renewal strategy over ten years (2005-2015). The plan proposed a maximum harvest size of 25 hectares per site for a total of 576 hectares in Centre Block and 442 ha in West Block over the course of the plan. Retention was allotted for age-class distribution, sensitive areas, and road or riparian buffers while emulating a natural disturbance (i.e. fire). To date, however; minimal implementation has occurred from the 2005 Forest and Fire Management Plan. Plan components are being reconsidered within the associated Forest Conservation Management Plan.

3.5.1.8 LIVESTOCK GRAZING AND HAYING

Historically, the area was grazed exclusively by native grazing species (e.g. plains bison). However, as settlement and hunting pressures increased, the populations of native grazers declined (Government of Saskatchewan 2008). European ranchers began settling the area in the mid-1800s and introduced livestock grazing into the Cypress Hills area (Cypress Hills Provincial Park: History, 2017). Cattle grazing is accepted as an appropriate management practice in CHIPP because, in theory, it is considered a reasonable substitute for bison grazing.

Today, grazing within the park is managed through permits and agreements. *The Park’s Act* permits livestock grazing on park lands with written consent from the Minister. Grazing within the park is permitted from one to six-month periods depending on permit holder between the months of May and December. Currently permits are one year in length but five year permits are expected to be implemented soon (Parks Division 2020). The owner of the livestock is responsible for the management and containment of the animals. In the Centre Block, permitted patrons operate as independents without a formalized grazing association and are responsible to monitor their livestock in their permitted area throughout grazing season. Each permit area in Centre Block is fenced separately. A partnership can be formed for fencing repairs whereas the park may provide the materials and the patron provides the labour (Melody Nagel-Hisey, per communication 2020). As of 2020 there were 7 individual grazing dispositions issued in the Centre Block within 8 grazing areas (**Figure 28**). In the West Block, grazing program is permitted to Cypress Hills Stock Association (CHSA), who provide permits to their patrons (i.e. 4 permit holders) (Table 8). The range is managed and monitored by the park supervisor and the contracted range rider with help from the patrons when requested. There is no internal fencing in the West Block and cattle are re-distributed by the range rider when necessary.

Table 8 Grazing Dispositions within CHIPP for Year 2020.

Location	Size of Grazing Area (ha)	Grazing Season	Number of AUM	Number of Individual Permit Holders	Number of Grazing Association Permit Holders
Centre Block	2,655	Jun 2 - Oct 15	1661	7	-
West Block	13,468	May 24 – Oct 15	7561	4	1

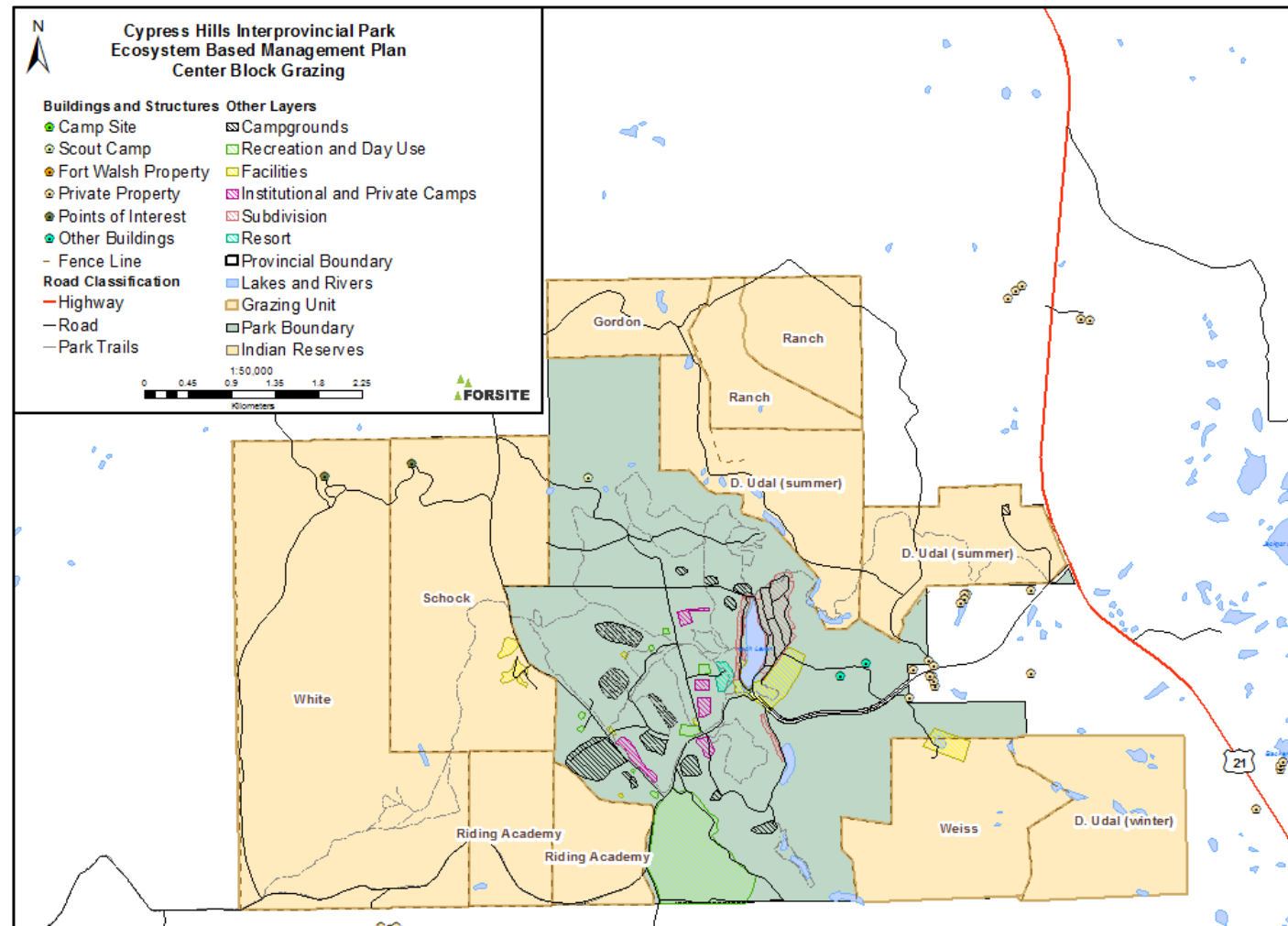


Figure 28 Permitted Grazing Areas for 2020 within Centre Block, CHIPP.

The 2008 Centre Block Vegetation and Range Resource Inventory and the 2011 West Block Range Re-Assessment can be used as baselines for the range health and stocking rate assessment in CHIPP. During these assessments range health was surveyed within the grasslands, forest, and riparian areas. Permanent transects established in the previous assessments (i.e. 2000 assessment for the Centre Block and 2003 for the West Block) were re-surveyed. Range health was determined by “health indicators” and quantified into three categories of “healthy”, “healthy with problems” or “unhealthy”. Grassland and forest health indicators included: species composition, litter, bare soil and erosion, noxious weeds, and vegetation community structure. Riparian health indicators included: vegetation cover, noxious weeds, disturbance species, shrub regeneration, browse, and removal, streambank stability, bare soil, dead/decadent trees or shrubs, alteration of streambank and floodplain, and channel incisement. Range health condition was recommended to re-assess in 2017 and 2016 for the Centre and West Block, respectively. However, to date these assessments have not been conducted.

According to the 2008 Centre Block range resource inventory, healthy with problem was average range health rating in seven out of ten grazing permits. Rating of unhealthy range health was observed for the Kevin Zorn permit. There was a significant increase in exotic species such as Kentucky bluegrass, Timothy, and smooth brome in the 2008 assessment compared to that of the 2000 assessment in all grazing permits. Elk grazing has impacted certain grazing permits and lowered range condition scores.

The results of the 2011 West Block Range Reassessment are presented in **Figure 29**. The results show that 54 percent of grassland sites, 79 percent of forest sites, and 13 percent of riparian sites were determined to be “healthy”. A total of 39 percent of grassland sites, 14 percent of forest sites, and 50 percent of riparian sites were determined to be “healthy with problems”. Most terrestrial sites were mostly functioning with only 7 percent of grassland sites and 7 percent of forest sites being deemed “unhealthy”. However, a total of 38 percent of riparian sites were determined to be “unhealthy”. Flooding was determined to be partly responsible for the low riparian health scores. Five noxious weed species were documented in the West Block over the course of the range re-assessment, including Canada thistle, ox-eye daisy, yellow toad-flax, bull thistle, and common burdock. Only Canada thistle was common in all sampling plots, while other noxious weeds were observed in only a few or less locations.

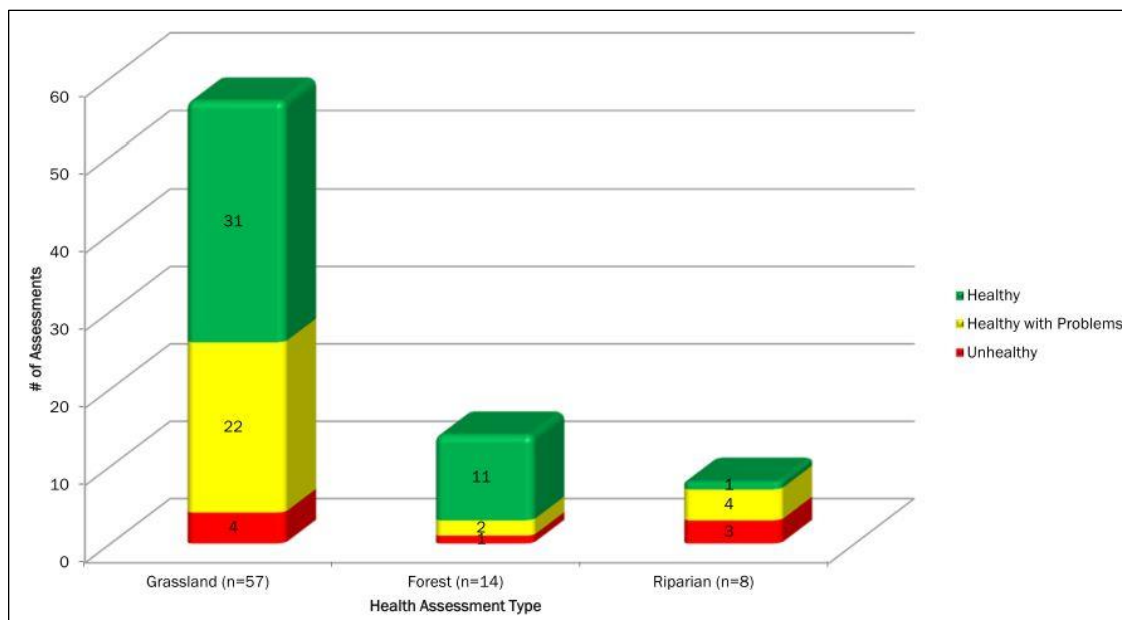


Figure 29 Range health assessment in West Block in 2010 (Photo provided by CHIPP).

Even though cattle grazing has been used for long time to substitute for bison grazing to achieve ecological purposes, particularly grassland bird diversity, the similarity of bison and cattle grazers and appropriateness of a continuous summer seasonal grazing system in CHIPP have often been questioned (Hull, 2002). Behaviourally, bison spend less time grazing than cattle and engage more often in non-grazing social interactions. Bison engage in activities like wallowing and rubbing on trees that are not performed by cattle (Knapp et al. 1999, Hartnett et al. 1997, Pumb and Dodd 1993, Wuerthner 1998). Wallowing, pawing and other similar non-grazing bison behavior results in micro-environmental effects creating heterogeneity. This may lead to enhanced plant species richness (Hartnett et al. 1997). The movement patterns between bison and cattle are also different. Bison spends more time on open grassland for grazing, whereas cattle prefer forest edges and lush riparian vegetation (Wuerthner 1998, Knapp et al. 1999). Cattle also use a significant lower proportion of upland habitat and favour floodplain habitat (Pinchak et al. 1991, Smith et al. 1992). Therefore, cattle grazing often causes more damages to riparian and lowland areas. In contrast to cattle grazing patterns, bison were found to graze at higher elevations and further distances from water, spending significantly less time at a water source (Van Vuren, 1982). Bison have been observed to roam widely across the landscape and have been characterized as “highly mobile” animals compared to cattle (Wuerthner 1998). Cattle are morphologically less well adapted for long distance movement and are consequently more sedentary by nature (Wuerthner 1998). As a result, the potential for local overgrazing is higher for cattle than bison. Due to this spatial and temporal variability between bison and cattle grazing, developing range management strategies for ecological equivalency in protected areas like CHIPP requires understanding of historical bison use patterns, natural fire cycles, fire-grazer-plant ecology dynamics, rugged terrain, wildlife biodiversity, and exotic species encroachment.

In order to emulate natural disturbances of historical fire and bison grazing, patches of grazed and ungrazed vegetation in various stages of recovery, increasing the variety of habitats for a greater diversity of native species, is recommended for long term resilience and sustainability using cattle grazing. Management actions that encourage changes to livestock distribution, utilization, and seasonality using herding, fencing, water sources, and salt and mineral blocks, will allow these grazing patterns to change over time, reducing the occurrences of unwanted ecological damage and negative impacts for recreational users. Management that encourages flexibility by applying periodic disturbance followed by rest during the growing season will allow soil, plant, and animal communities to recover. Actions such as livestock grazing, and mowing or haying are utilized as land management tools as part of integrated pest and fuel management plans to reduce the establishment and spread of invasive species and risk of large wildfires and improve habitat for wildlife and species at risk. Selective herbicides will be applied at strategic times of the year following planned disturbances to maximize efficacy to control invasives and reduce impact on native species. Effects of strategic interventions are monitored by field inspections integrated with remote sensing; recorded in a centralized database to be incorporated into future park ecosystem related management plans. Planning, delivery, and monitoring of livestock grazing are collaborative with stakeholders working together to improve the benefits and address any negative outcomes of livestock grazing within CHIPP.

Haying by local ranchers has been utilized within several areas within the West Block of the park, with the practice periodically employed and dating back decades. Haying can be used as a management tool for fescue grasslands to reduce shrubby cinquefoil growth and accumulated vegetative litter. Reduction of

litter aids to increase palatability for grazers, reducing areas of avoidance and maintaining even grazing distribution (Godwin and Thorpe 1994). There is no evidence in the scientific literature that shrubby cinquefoil is maintaining the presence of fescue or other native grasses in grassland ecosystems. However, Hull et al. (2002) found that a moderate reduction of shrubby cinquefoil will likely positively impact grassland bird species (i.e. Sprague's Pipits, Baird's Sparrows, and Upland Sandpipers). Dale et al. (1997) provided a series of recommendations, including "delaying mowing or haying until July 15 or later to maintain habitat attractiveness for grassland bird species and allow adequate productivity in years of normal breeding phenology. However, to provide habitat for those bird species that preferred the dense cover of idle hay and to further increase overall avian productivity, Dale et al. recommend that most individual fields should be mowed or hayed only in alternative years and that the remainder be left idle for a minimum of 3 years.

Haying in West Block was done in traditional areas, and when permitted is usually done by August 15 or 30 to allow some regeneration to occur before the first frosts occur. Total area of haying is 28 hectares for a total tonnage of approximately 161 (Parks Division 2020). No haying has occurred in West Block since 2016 due to drought condition. An assessment on the effects of haying in controlling shrubby cinquefoil and reducing fuel loads and development of haying plan is necessary for CHIPP, particularly in the West Block. Mapping of shrubby cinquefoil density and its changes overtime would be useful to prioritize areas for haying. As previously discussed, high fire hazard conditions are a serious concern in the park, in 2018 the West Block was closed to the public completely for several weeks in July and August due to the extreme fire hazard conditions. It was closed again in 2019 for several days while an out of control grass fire blazed just north of the West Block. Therefore, vegetation management using livestock grazing, and mowing or haying are critical to addressing the high risk of wildfire in the park.



Figure 30 Fencing between grazing areas within CHIPP (Photo provided by CHIPP).

3.5.2 PRESENT DAY VEGETATION

3.5.2.1 VEGETATION CLASSES AND FOREST TYPES

Approximately 10,424 hectares (56.9 percent) of park land supports forest vegetation. The remaining 7,895 hectares (43.1 percent) of the park is composed of wetlands, poorly-drained lowlands, grass or shrublands. Within Saskatchewan, the Provincial Forest Inventory delineates areas into two broad types of ecosystems: productive forest land (i.e. the uplands) and non-productive lands (i.e. wetlands, scrubland, grasslands). From a forestry perspective these two types of classifications are sufficient, however from an ecosystem-based management approach the classification of “non-productive” fails to recognize the ecological values these areas provide (e.g. flora and fauna biodiversity, rare plant habitat, water cycling and storage, nutrient cycling, as well as aesthetics).

The Provincial Forest Types (PFTs) found in the Cypress Hills range from hardwood, mixedwood, and coniferous stands and can be seen in **Figure 31** and **Figure 32**. Lodgepole pine dominated softwood stands (JLP) are found to be the most abundant stand type in CHIPP at 3,906 hectares (**Table 9**). The most common hardwood dominated stand type was found to be trembling aspen stands (TAB) at 2,940 hectares. The most common softwood dominated stand type aside from JLP was found to be white spruce dominated softwood stands (WSF) at 3,000 hectares. Mixed wood stands found within the park include hardwood with spruce mixedwood (HSM), spruce dominated mixedwood stands (SMW), and hardwood with pine mixedwood (HPM). The pure coniferous forests within CHIPP are lodgepole pine.

In addition to utilizing the Provincial Forest Types classification of Cypress Hills, an ecosystem-based management approach includes details of the site’s ecological conditions. Detailed site conditions include ecosite classification, vegetation and forest types, site relationships, as well as site responses to disturbances and time. Detailed classifications of ecosites found within CHIPP are presented in the following [Section 3.5.2.2](#).

Table 9 Area by Provincial Forest Type (PFT) in CHIPP.

Provincial Forest Type	Description of PFT	Total Area (ha)
JLP	Jack or lodgepole pine dominated softwood stands	3,906
WSF	White spruce or balsam fir dominated softwood stands	3,000
TAB	Trembling aspen or white birch dominated hardwood stands	2,940
HSM	Hardwood with Spruce Mixedwood	392
SMW	Spruce Dominated Mixedwood Stands	117
HPM	Hardwood with Pine Mixedwood	45
BSL	Black spruce or tamarack/larch dominated softwood stands	25
AOH	Any other hardwood dominated not dominated by TAB	0
Total Forested		10,425
Total Non-Forested		7,895
Total		18,320

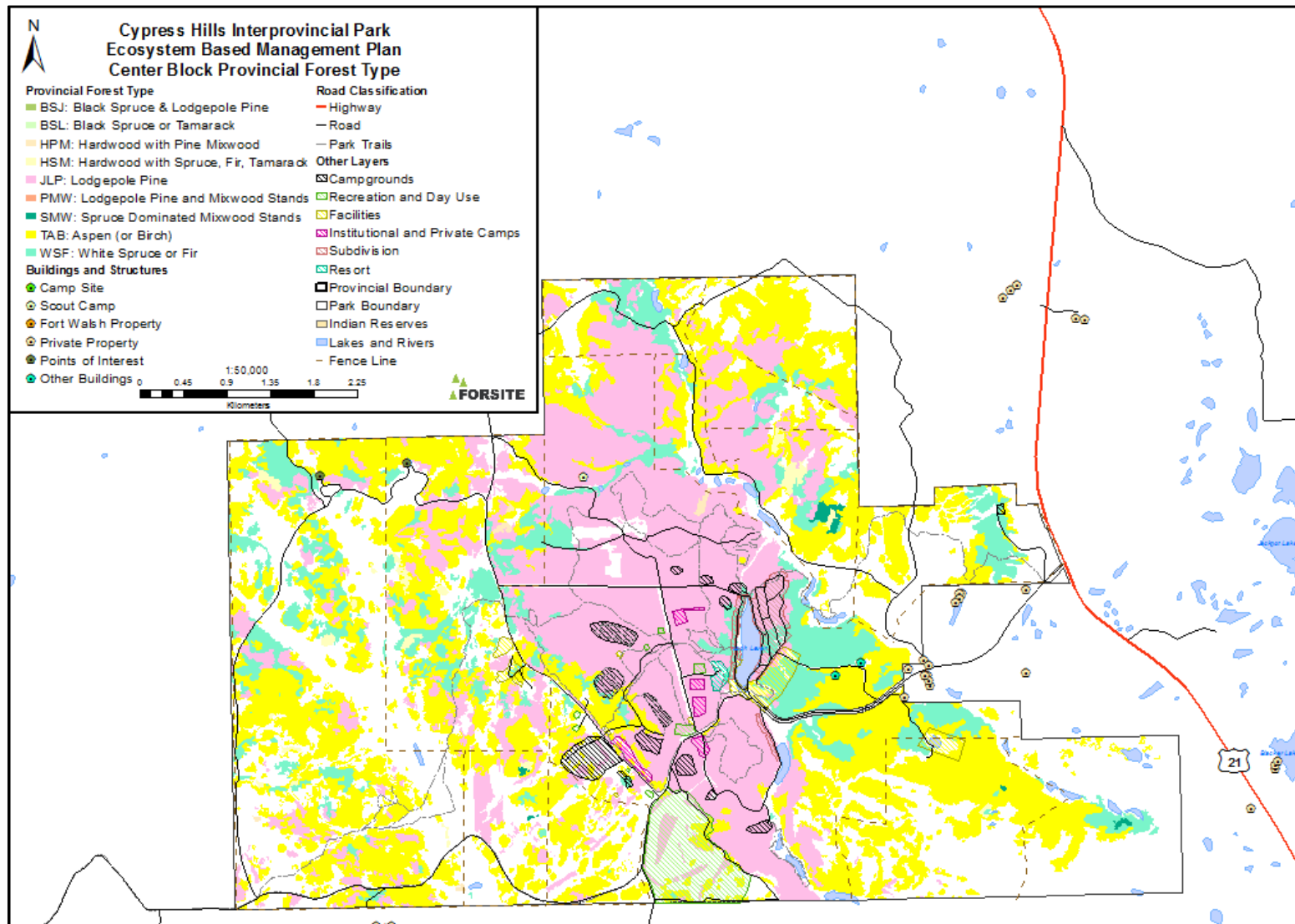


Figure 31 Provincial Forest Types in Cypress Hills Interprovincial Park Center Block.

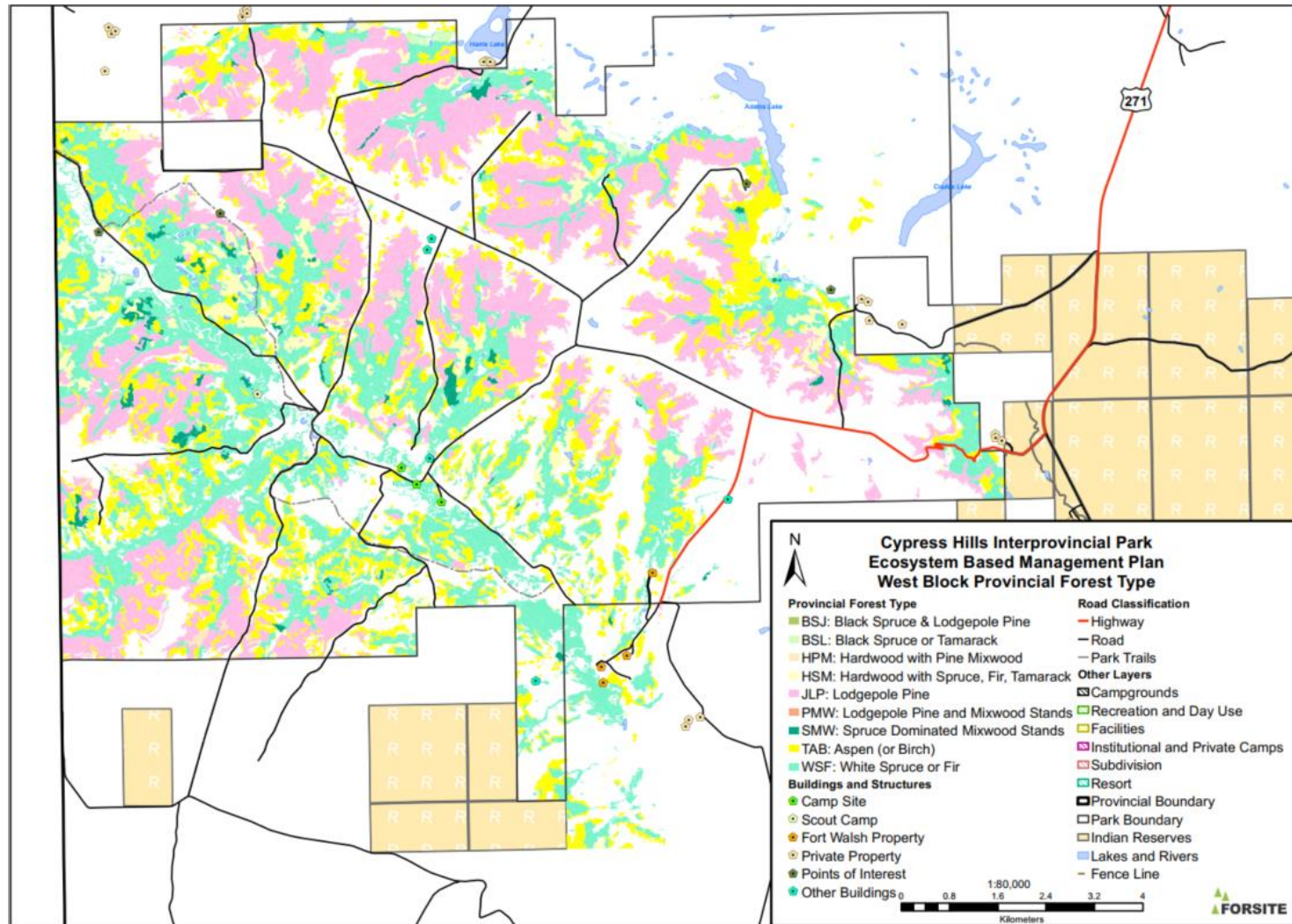


Figure 32 Provincial Forest Types in Cypress Hills Interprovincial Park West Block.

3.5.2.2 ECOSITE CLASSIFICATION

The descriptions of present-day vegetation within Cypress Hills Interprovincial Park presented are from pre-constructed data based on Saskatchewan Forest Vegetation Inventory (SFVI) forest cover maps and the Forest Ecosite Classification for Saskatchewan system created by McLaughlan *et al.* (2010). A summary of ecosites and their areas within CHIPP is presented within **Table 10**. The ecosites of CHIPP and other mapped types can be seen in **Figure 33** and **Figure 34**.

Table 10 Summary of CHIPP Ecosites and Other Mapped Types.

Ecosite	Description in CHIPP	Area (ha)
Upland Grassland		
PR 01	Plains rough fescue and timber oat-grass on fresh* silty clay loam	7,147
Lodgepole pine softwood and mixedwood types		
PR 02	Lodgepole pine and grass on fresh sandy clay	3,421
PR 03	Trembling aspen and lodgepole pine on fresh clay loam	209
Hardwood types		
PR 04	Trembling aspen on fresh clay loam	2,536
White spruce softwood and mixedwood types		
PR 06	White spruce with grasses on fresh silty clay	1,893
PR 07	Trembling aspen and white spruce on fresh silty clay	2,531
BP 18	White spruce treed swamp on shallow peatlands (wet to moderately wet sites)	34
Shrubby, herbaceous, graminoid bogs and fens		
BP 25	Willow dominated nutrient rich fens on shallow, wet organic soils	54
PR 09	Graminoid fen on very moist clay	199
Other types		
burns	recently burned areas ¹	(2)
logged	recently harvested areas ¹	(136)
cleared	cleared for agriculture, usually seeded to tame grass	21
developed	developed areas such as roads, subdivisions, and campgrounds	179
water	lakes and streams	97
Total		18,320

* "fresh" refers to sites that are intermediate to dry and moist/wet sites – sites of moderate moisture regime.

¹ area included within associated ecosite of origin, excluded from total

Forested ecosites and the average percentage of tree species are presented in **Table 11**. Data was extracted from the SFVI database.

Table 11 Average Percentages of Tree Species over the Area Mapped in Each Forested Ecosite.

Ecosite	Description	Lodgepole pine	Trembling aspen	Balsam poplar	White spruce	Black spruce
PR01	Plains rough fescue and timber oat-grass on fresh silty clay loam	78%	5%	0%	17%	0%
PR02	Lodgepole pine and grass on fresh sandy clay	95%	3%	0%	2%	0%
PR03	Trembling aspen and lodgepole pine on fresh clay loam	28%	56%	0%	17%	0%
PR04	Trembling aspen on fresh clay loam	*	96%	*	0%	0%
PR06	White spruce with grasses on fresh silty clay	1%	2%	*	97%	0%
PR07	Trembling aspen and white spruce on fresh silty clay	16%	32%	*	51%	0%
BP18	Black (or white) spruce treed swamp on shallow peatlands (wet to moderately wet sites)	0%	0%	*	39%	61%
BP25	Willow dominated nutrient rich fens on shallow, wet organic soils	0%	0%	0%	0%	0%
PR09	Graminoid fen on very moist clay	0%	0%	0%	0%	0%

*incidental amounts

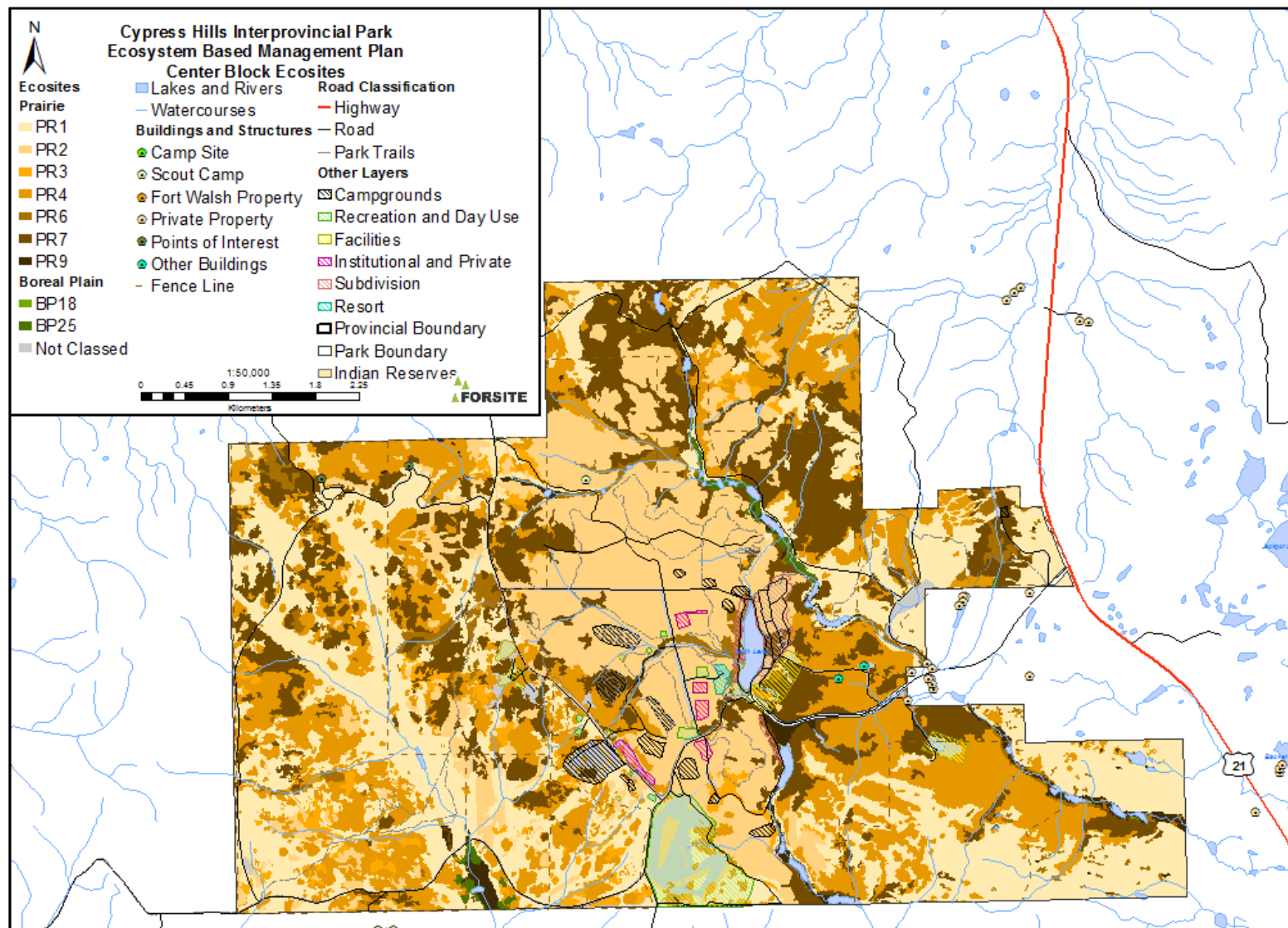


Figure 33 Ecosites of Cypress Hills Interprovincial Park, Centre Block.

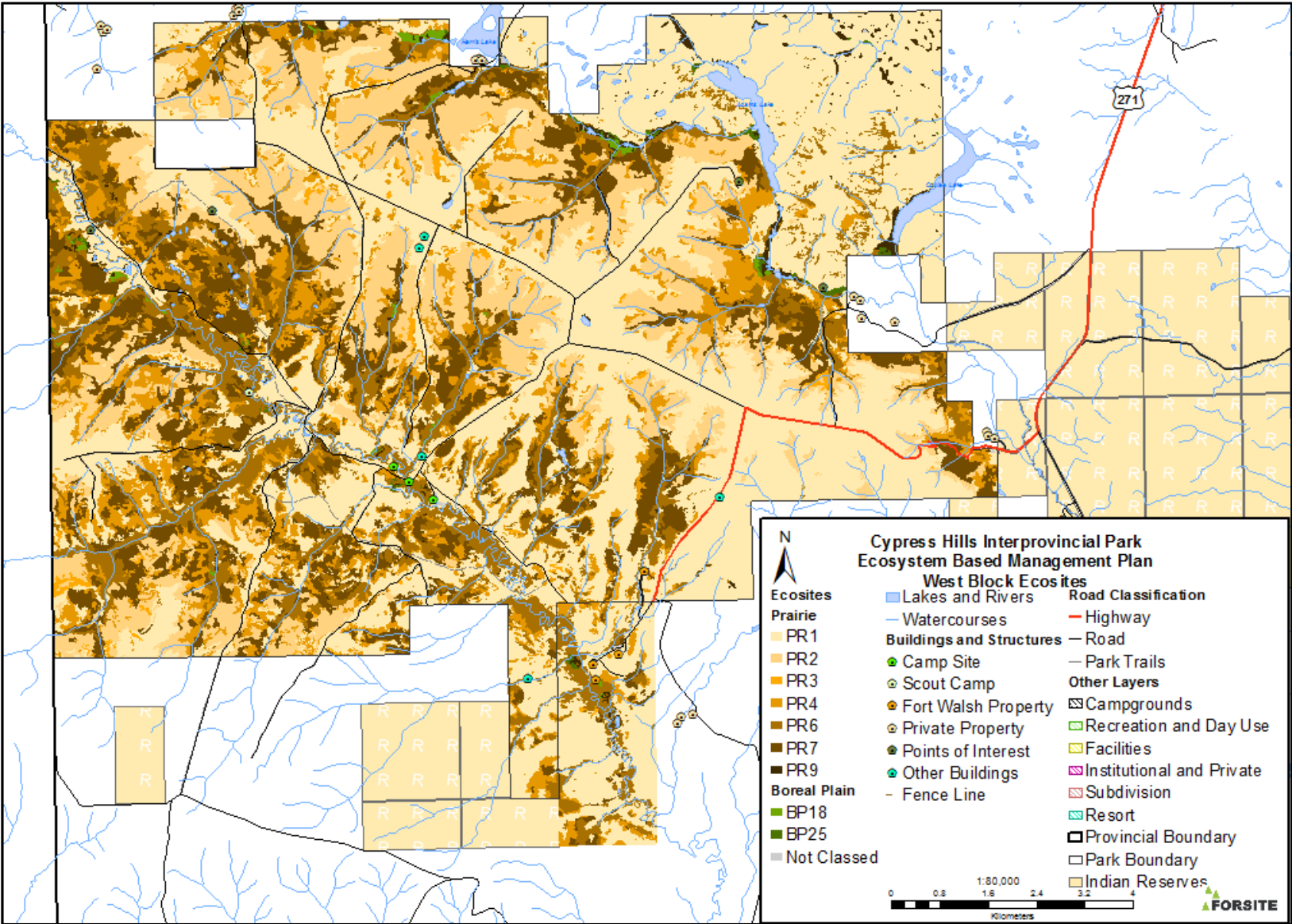


Figure 34 Ecosites of Cypress Hills Interprovincial Park, West Block.

PR01 - Plains rough fescue and timber oat-grass on fresh silty clay loam

The ecosite type PR01 is exclusively found within the plateaus of Cypress Hills (**Figure 35**) and encompasses approximately 39 percent of the total park. The ecosite is dominated by grassland species specifically plains rough fescue with timber oat-grass and other wheatgrasses present. There is no productive forest within this ecosite type. Light shrub cover includes cinquefoil species, prickly rose, western snowberry and low prairie rose. Historically, sites would succumb to fire every 25-50 years thus inhibiting woody cover. Recent fire suppression has caused an encroachment of forest ingress into these grasslands, converting them into low-density forest stands similar to PR04 and PR06. This ecosite in CHIPP also becomes progressively shrubbier due to the absence of periodic burning, mowing or inappropriate grazing regimes. Sites are well drained and fresh. Sites are dominated by Luvisolic and Brunisolic soil developments with minor amounts of Chernozems. Parent material is glacio-fluvial or glacio-lacustrine.



Figure 35 Native Fescue Grassland Ecosite (PR01) from West Block (Photo Credit: J. Hunter, 2017)

PR02 - Lodgepole pine and grass on fresh sandy clay

The ecosite type PR02 is exclusively found within the west and central plateaus of Cypress Hills, as lodgepole pine does not occur anywhere else within the province (**Figure 36**). The ecosite is dominated by lodgepole pine with a minimal understory of grasses and encompasses approximately 19 percent of the total park. Pine needles litter the forest floor within this ecosite type. Minimal shrub cover includes bearberry, Saskatoon, and prickly rose. Rare species include pine-drops, pine-sap, and mountain lady-slipper. Incidental occurrences of trembling aspen and white spruce may be found. Historically, sites would regenerate from fire. Recent fire suppression has caused stands to become over 120 years old. In the absence of stand-regenerating fire this ecosite type is likely to convert to an aspen or white spruce dominated type. Sites are well to rapidly drained and fresh or moderately fresh. Sites are dominated by gray luvisols and eutric brunisols soil types. Parent material is glacio-fluvial or morainal.

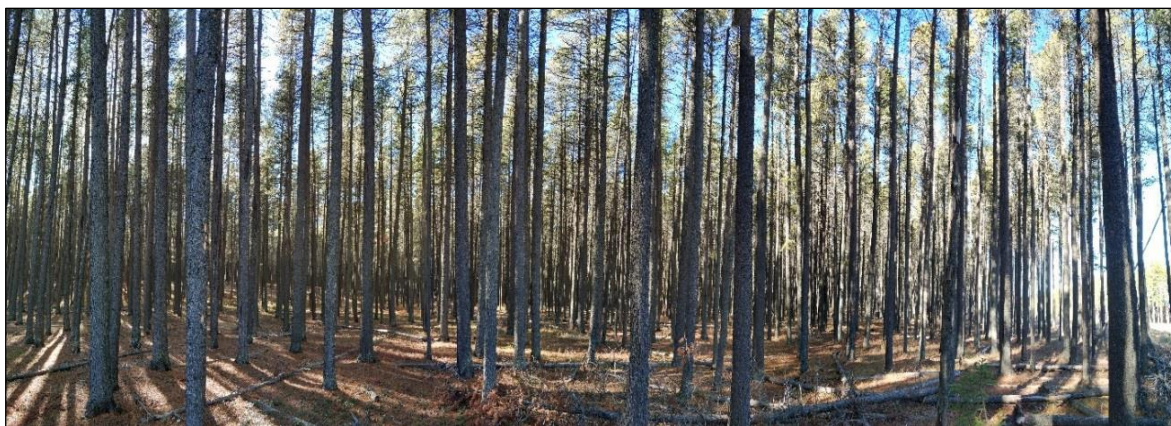


Figure 36 Lodgepole Pine and Grass Ecosite (PR02) (Field photo supplied by CHIPP)

PR03 - Trembling aspen and lodgepole pine on fresh clay loam

The ecosite type PR03 is a mixed wood site dominated by trembling aspen with lodgepole pine and white spruce and encompasses approximately 1 percent of the total park. Light shrub cover includes bearberry, western snowberry, and prickly rose. There is a rich herbaceous cover including grasses, wild strawberry, American vetch, creamy pea-vine, and fairybells. Species from the montane ecozone are represented here. Due to the lack of large disturbances in CHIPP for long time, there is a tendency for PR03 ecosite to greater dominance of white spruce as it is shade tolerant species in early successional stages. Similar situation can be observed on PR02 ecosite. Sites are well drained and fresh. Sites are dominated by gray luvisol soil types. Parent material is glacio-fluvial.

PR04 - Trembling aspen on fresh clay loam

The ecosite type PR04 (**Figure 37**) is dominated by trembling aspen with sparse shrubs making up the majority of the understory vegetation. This ecosite types and encompasses approximately 14 percent of the total park. Sparse shrub cover includes cinquefoil species, prickly rose, western snowberry, and bearberry. Herbaceous cover is predominately grasses. Due to heavy leaf litter cover, minimal bryophytes and lichens are present. Sites are moderately to rapidly drained and fresh to moderately fresh. Sites are dominated by gray luvisols and eutric brunisols soil types. Parent material is glacio-fluvial or lacustrine.



Figure 37 Trembling Aspen Ecosite (PR04) (Field photo supplied by CHIPP).

PR06 - White spruce with grasses on fresh silty clay

The ecosite type PR06 is a white spruce dominated type (**Figure 38**) and encompasses approximately 10 percent of the total park. White spruce also dominates the understory; however small amounts of trembling aspen may be present. The presence of trembling aspen could indicate the succession of this ecosite to mixedwood or hardwood cover in the event of a stand-replacing disturbance such as fire or logging. Shrub cover includes raspberry, Canada buffaloberry, prickly rose, western snowberry, and northern gooseberry. Herbaceous layer is dominated by grasses and fairybells. Sites are well drained and fresh. Sites are dominated by gray luvisols soil types. Parent material is glacio-fluvial.



Figure 38 White Spruce with Grasses Ecosite (PR06) (Field photo supplied by CHIPP).

PR07 - Trembling aspen and white spruce on fresh silty clay

The ecosite type PR07 is a classic mixedwood type and may favour either white spruce or trembling aspen dominance (**Figure 39**) however, dominance is close to even. This ecosite type encompasses approximately 14 percent of the total park. White spruce and trembling aspen also dominate the understory, however other cover includes raspberry, prickly rose, chokecherry, western snowberry, and Saskatoon. Herbaceous layer is dominated by grasses, anemone, western Canada violets, and fairybells. If climate becomes warmer and drier, this ecosite is more likely to be converted to grassland as fire become more frequent. Rare species from the montane ecozone include western purple virgin's-bower. Sites are well to imperfectly drained and fresh to very moist. Sites are dominated by gray luvisols, eutric brunisols, and black chernozemic soil types. Parent material is glacio-fluvial or glacio-lacustrine.



Figure 39 Trembling Aspen and White Spruce Ecosite (PR07) (Field photo supplied by CHIPP).

PR09 - Graminoid fen on very moist clay

The ecosite type PR09 is the only type of graminoid fen found within Cypress Hills. This ecosite type encompasses less than one percent of the total park. The ecosite is dominated by herbaceous cover including sedges, grasses, and bedstraw. Common forbs include cow parsnip and wild mint. There is no forest productivity and minimal shrub cover within this ecosite type. Sites are very poorly drained, very moist and anaerobic. This ecosite type is strongly influenced by water levels. Sites are dominated by humic gleysol soil developments. Parent material is lacustrine.

BP18 - White (or black) spruce treed swamp on wet humic organics

The ecosite type BP18 is commonly found within the Boreal Plain but can be found within Cypress Hills in low riparian areas. This ecosite type encompasses less than one percent of the total park. The ecosite is dominated by spruce species, specifically white spruce within Cypress Hills. Light shrub cover includes Labrador tea and willows. Sites are rich in herbs and bryophytes. Exposed surface water may be visible. Sites are poorly to very poorly drained and very moist to very wet. Sites are dominated by organic soil developments (humisol, mesisol, and fibrisol) or gleysol and humic gleysol soil developments. Parent material is organic or lacustrine.

BP25 – Willow shrubby rich fen on wet humic soil

The ecosite type BP25 is commonly found within the Boreal Plain but can be found within Cypress Hills in low riparian areas. This ecosite type encompasses approximately less than one percent of the total park. The ecosite is dominated by willow species. There is no forest productivity within this ecosite type. Other cover includes dwarf birch, northern gooseberry, sedges and grasses. Sites are poor to very poorly or imperfectly drained and very moist to very wet. Sites are dominated by organic soil developments (humisol, mesisol, and fibrisol) or gleysol soil developments. Parent material is organic, fluvial or morainal.

Other mapped types occupying relatively small areas include:

- ▶ Water including lakes, sloughs, streams, and beaches.
- ▶ Recently burned areas.
- ▶ Areas that have been cleared for agriculture at some time in the past.
- ▶ Developed areas, including roads, campgrounds, cottage subdivisions, and park administrative areas.

3.5.3 SUMMARY OF OVERALL PARK FLORA

Cypress Hills contains a variety of vascular plant species that represent both the Montane and Mixedgrass Natural Subregions. The area also contains several species and variants that are endemic to the area. The Montane regions are characterized by lodgepole pine (*Pinus contorta* var. *latifolia*), American pinesap (*Monotropa hypopithys*), white spruce (*Picea glauca*), trembling aspen (*Populus tremuloides*), red-osier dogwood (*Cornus stolonifera*), bunchberry (*Cornus canadensis*), stiff clubmoss (*Lycopodium annotinum*), and Western Canada violet (*Viola canadensis* var. *rugulosa*). While the Mixedgrass prairie is characterized by plain rough fescue (*Festuca campestris*), cinquefoil (*Dasiphora fruticosa* and *Potentilla* spp.), rose (*Rosa* spp.), silverberry (*Elaeagnus commutata*), Idaho fescue (*Festuca idahoensis*), June grass (*Koeleria macrantha*), porcupine grass (*Hesperostipa curtisetia*), blue grama (*Bouteloua gracilis*), pasture sage (*Artemisia frigida*), wild bergamont (*Monarda fistulosa* var. *menthifolia*), golden-bean (*Thermopsis rhombifolia*), and green needle grass (*Nassella viridula*), to name a few representative species (Alberta Wilderness Association, no date; Shorthouse 2010).

A list of vascular plant species within Cypress Hills Interprovincial Park has been constructed from various sources (Cypress Hills Interprovincial Park: Plants, 1993; Klassen, no date; Alberta Tourism, Parks and Recreation 2009; SCDC All Taxa, 2019; SCDC Cypress Upland, 2019; Wright, 2010; observation list by NPSS) and can be found in Appendix 1. The list is comprised of a total of 790 species from 88 families. The most represented families by species counts are the Asters, Grasses, Sedges, Roses, Legumes, and the Buttercups; together these families represent 388 of the 790 total species. Other families are represented to a lesser extent with many containing only one or two different species (**Table 12**).

Table 12 List of Vascular Plant Families with the Number of Species Recorded in Each (see [Appendix 1](#)).

FAMILY	# SPP	FAMILY	# SPP
ASTERACEAE (Aster Family)	120	EQUISETACEAE (Horsetail Family)	8
POACEAE (Grass Family)	87	PRIMULACEAE (Primrose Family)	8
CYPERACEAE (Sedge Family)	65	DRYOPTERIDACEAE (Wood Fern Family)	8
ROSACEAE (Rose Family)	47	PYROLACEAE (Wintergreen Family)	7
FABACEAE (Legume Family)	39	GROSSULARIACEAE (Currant Family)	6
RANUNCULACEAE (Buttercup Family)	30	CAPRIFOLIACEAE (Honeysuckle Family)	6
BRASSICACEAE (Mustard Family)	26	SAXIFRAGACEAE (Saxifrage Family)	6
ORCHIDACEAE (Orchid Family)	19	VIOLACEAE (Violet Family)	6
SCROPHULARIACEAE (Figwort Family)	18	GERANIACEAE (Geranium Family)	5
CHENOPODIACEAE (Goosefoot Family)	18	BETULACEAE (Birch Family)	4
CARYOPHYLLACEAE (Pink Family)	18	ERICACEAE (Heath Family)	4
SALICACEAE (Willow Family)	17	RUBIACEAE (Madder Family)	4
APIACEAE (Carrot Family)	16	PINACEAE (Pine Family)	4
BORAGINACEAE (Borage Family)	15	POLEMONIACEAE (Phlox Family)	4
POLYGONACEAE (Buckwheat Family)	14	PLANTAGINACEAE (Plantain Family)	4
JUNCACEAE (Rush Family)	14	JUNCAGINACEAE (Arrow-grass Family)	3
OPHIOGLOSSACEAE (Adder's Tongue Family)	13	OROBANCHACEAE (Broom Rape Family)	3
ONAGRACEAE (Evening-Primrose Family)	13	LYCOPODIACEAE (Club-Moss Family)	3
LILIACEAE (Lily Family)	10	MONOTROPACEAE (Indian-pipe Family)	3
LAMIACEAE (Mint Family)	10	ELAEAGNACEAE (Oleaster Family)	3

POTAMOGETONACEAE (Pondweed Family)	10	PORTULACACEAE (Purslane Family)	3
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Families with two species:

ALISMATACEAE (Water-plantain Family), AMARANTHACEAE (Amaranth Family), APOCYNACEAE (Dogbane Family), BALSAMINACEAE (Touch-Me-Not Family), CACTACEAE (Cactus Family), CALLITRICHACEAE (Water-Starwort Family), CAMPANULACEAE (Bellflower Family), CONVOLVULACEAE (Morning-Glory Family), CORNACEAE (Dogwood Family), CRASSULACEAE (Stonecrop Family), CUPRESSACEAE (Cypress Family), EUPHORBIACEAE (Spurge Family), FUMARIACEAE (Fumitory Family), GENTIANACEAE (Gentian Family), HYDROPHYLLACEAE (Water-leaf Family), IRIDACEAE (Iris Family), LEMNACEAE (Duckweed Family), LENTIBULARIACEAE (Bladderwort Family), LINACEAE (Flax Family), NYCTAGINACEAE (Four-O'clock Family), SPARGANIACEAE (Bur-Reed Family), URTICACEAE (Nettle Family)

Families with one species:

ACERACEAE (Maple Family), ANACARDIACEAE (Sumac Family), ARALIACEAE (Ginseng Family), BERBERIDACEAE (Barberry Family), CAPPARACEAE (Caper Family), CLUSIACEAE (St. John's-Wort Family), CUSCUTACEAE (Dodder Family), ELATINACEAE (Waterwort Family), HALORAGACEAE (Water-milfoil Family), HIPPURIDACEAE (Mare's-Tail Family), HYDROCHARITACEAE (Tape-Grass Family), LOASACEAE (Blazingstar Family), MALVACEAE (Mallow Family), MARSILEACEAE (Water-Clover Family), NAJADACEAE (Water-Nymph Family), PTERIDACEAE (Maidenhair-Fern Family), SANTALACEAE (Sandalwood Family), SELAGINELLACEAE (Spike-Moss Family), SMILACACEAE (Greenbrier Family), SOLANACEAE (Potato Family), TYPHACEAE (Cattail Family), VERBENACEAE (Verbena Family), VISCACEAE (Christmas Mistletoe Family), ZANNICHELLIACEAE (Horned Pondweed Family)

Of the vascular plant species found within Cypress Hills most are herbaceous forbs and graminoids (**Table 13**). A total of 77 different species of shrubs have been listed. The genera Hawthorn and Salix represent the largest number of shrub species (n=11 and n=13, respectively). Ten different tree species are listed including lodgepole pine (*Pinus contorta*), white spruce (*Picea glauca*), black spruce (*Picea mariana*), trembling aspen (*Populus tremuloides*), balsam poplar (*Populus balsamifera*), Manitoba maple (*Acer negundo*), paper birch (*Betula papyrifera*), and narrowleaf cottonwood (*Populus angustifolia*). Historical occurrences include hybrid cottonwood (*Populus x brayshawii*) as occurring within Cypress Hills however, its presence has not been recently verified (Saskatchewan Conservation Data Centre, 2019).

Table 13 Number of Vascular Plant Species by Growth Form.

Growth Form	Number of Species
Trees	10
Shrubs	77
Graminoids (grass-like herbs)	166
Forbs (broad-leaved herbs)	538

Additionally, a 24-hectare plantation of hybrid pine (lodgepole pine X jack pine) was established in 1959 within Center Block. In winters 2018 and 2020, the stand containing the hybrids were harvested for park firewood, with all tops and debris burned. This stand, as well as several others were genetically tested by the LPU through the University of Alberta in 2017. Additionally, a 4.7-hectare plantation of jack pine from the 1990s was also identified, felled and burned by 2018-2019 by Parks Division.

The vascular plant list created contains species that are non-native, invasive or introduced. The designation of non-native/invasive/introduced species was determined through various sources including the Saskatchewan Prairie Conservation Action Plan (2008), Alberta Invasive Species Council (no date), Saskatchewan Forage Council: Invasive Plant Species Identification (no date), Wheatland County (2017), Saskatchewan Forage Council: Forage and Reclamation (no date), and the Saskatchewan Conservation Data Centre (2019). A total of 63 species are listed with an S-rank of “SNA”, approximately eight percent of the total. The designation of “SNA” is defined as: “conservation status is not applicable to the species (e.g. it may have been determined to have been introduced in Saskatchewan)” by Saskatchewan Conservation Data Centre (2019). Of the plants designated as “SNA” 43 species are confirmed to be non-native, invasive or introduced, approximately 5.5 percent of the total. The number of species listed as “SNA” and non-native, invasive or introduced can be found organized by family group in **Table 14**. The vascular plant lists do not include ornamental plantings that may or may not be found in the park core area or lease areas.

The Aster, Grass, Legume, and Mustard families comprise the largest number of non-natives. Commonly found non-natives include: common burdock (*Arctium minus*), Canada thistle (*Cirsium arvense*), ox-eye daisy (*Leucanthemum vulgare*), common dandelion (*Taraxacum officinale*), crested wheat grass (*Agropyron cristatum* ssp. *Pectinatum*), oat (*Avena sativa*), smooth brome (*Bromus inermis*), timothy (*Phleum pratense*), common caragana (*Caragana arborescens*), clover (*Trifolium* spp.), and common plantain (*Plantago major*).

The Canadian Biodiversity Strategy (Environment Canada 1995) states that to preserve and prevent further destruction of natural ecosystems, non-native species must be controlled or eliminated. Invasion by non-native species lowers diversity of native species. Non-natives are aggressive and competitive; they invade, displace, and out compete native species. (Moen, 1998). Additionally, non-native species can introduce diseases, parasites, and cause hybridization. Invasions can result in habitat degradation or destruction as well as the decrease or extinction of native or endemic populations. On a larger scale the introduction of non-native species can lead to the transformation or degradation of whole ecosystems (Environment Canada 1995).

Table 14 Number of Non-native, Invasive or Introduced Vascular Plant Species by Family (see [Appendix 1](#)).

Family	Number of Species	
	Non-native/Invasive /Introduced	S-rank “SNA”
ASTERACEAE (Aster Family)	13	17
POACEAE (Grass Family)	9	13
FABACEAE (Legume Family)	5	7
BRASSICACEAE (Mustard Family)	4	5
CHENOPODIACEAE (Goosefoot Family)	2	5
CARYOPHYLLACEAE (Pink Family)	3	4
POLYGONACEAE (Buckwheat Family)	-	2
AMARANTHACEAE (Amaranth Family)	1	1
BORAGINACEAE (Borage Family)	1	1
CONVOLVULACEAE (Morning-Glory Family)	1	1
LAMIACEAE (Mint Family)	1	1
PLANTAGINACEAE (Plantain Family)	1	1
RANUNCULACEAE (Buttercup Family)	1	1
SCROPHULARIACEAE (Figwort Family)	1	1

GERANIACEAE (Geranium Family)	-	1
PORTULACACEAE (Purslane Family)	-	1
CYPERACEAE (Sedge Family)	-	1

Grassland ecosystems are the most endangered ecosystem on the planet (Peart 2008). North American grassland area has decreased by and estimated 99 percent since European settlement (Samson and Knopf, 1994). An estimation in 2015 showed that only about 3.3 million hectares of native grasslands remain in Saskatchewan that downs from roughly 5 million hectares at just the turn of the century ago (Doke Sawatzky, 2018; Hammermeister et al. 2001).

Factors such as prairie cultivation, urban sprawl, grazing pressure, recreational development, fire suppression, resource extraction, fragmentation, pollution, and invasion by non-native species are the main threats to remnant prairie parcels (Moen 1998; Samson and Knopf 1994; Environment Canada 1995). Most non-native plants are European or Asian in origin. The original establishment of non-natives are from a variety of sources. Many non-natives were intentionally cultivated and are commonly found in ditches, roadsides, disturbed areas, gravel pits, trails, adjacent agriculture fields, shelterbelts, and as historical erosion control vegetation (Moen 1998; Samson and Knopf 1994).

Non-native species threaten the native fescue grassland of Cypress Hills (Alberta Parks 2017b). Invasive species of high concern within the park include: ox-eye daisy (*Chrysanthemum leucanthemum*), toadflax (*Linaria vulgaris*), white sweet-clover (*Melilotus albus*), tall buttercup (*Ranunculus acris*), timothy (*Phleum pratense*), Kentucky bluegrass (*Poa pratensis*), Canada bluegrass (*Poa compressa*), smooth brome (*Bromus inermis*), Absinthe (*Artemisia absinthium*), Russian knapweed (*Acroptilon repens*) and scentless chamomile (*Tripleurospermum inodorum*). These species have been identified by park staff. Invasive species has been found primarily along road sides, trails, and in areas of high use such as the park's core area (HABISask, Alberta Tourism, Parks and Recreation 2009, Chu and Mackasey, 2020). Gieselman *et al.* (2013) found that the highest changes in species composition occurred within 20 to 30 metres from edges of disturbances and that paved roads within grassland areas show the most significant shifts in species communities from native to non-native. Noted occurrences of non-natives seen in **Figure 40** are concentrated primarily along roads and trails (HABISask). Invasive species such as smooth brome and caragana are of significant management concerns as they are adapted at forming monodominant stands which inhibit native species. Kentucky bluegrass has been found to be equally significant in abundance, however it is not as well adapted to outcompeting established native vegetation as the previously mentions species (Thorpe and Godwin 2012).

Recommendations for the management, monitoring, and control of invasive species have been made through the Saskatchewan Parks "Provincial Park Resource Management and Recreational Activities Guidelines" (2003) and are as follows:

- ▶ Non-native plant and animal species should not knowingly be introduced onto park land.
- ▶ Efforts should be made to naturalize developed areas of parks, using native plantings wherever possible to replace non-native plant species.
- ▶ Native vegetation should be used to revegetate disturbed areas in parks such as road rights-of-way and construction sites.
- ▶ Information should be made available to cottagers and lessees in parks explaining the Ministry's position on the introduction of non-native species. Alternative native plant materials should be suggested.

- ▶ Control measures for noxious weeds should be selected on the basis of their ability to minimize environmental impact on park land. The use of herbicides should be avoided wherever possible.
- ▶ Park lands should be periodically evaluated to identify areas affected by invasive non-native plants and to monitor progress in controlling these plants.
- ▶ Ecosystem or vegetation management plans should include strategies to prevent new invasions of non-native plants, to control existing non-native plant populations and to restore invaded areas to native vegetation.

Historically, the park has utilized herbicide spraying and handpicking to control the spread of invasives. Herbicide was utilized in years 2015, 2017, and 2018, in an area of approximately 12.6 hectares with detailed locations unavailable (Chu and Mackasey 2020). The use of herbicides within the park must be weighed for benefit versus risk. The threat of a non-native invasion to native species and the natural biodiversity of the ecosystem may be greater than that of possible adverse chemical effects herbicides may have on the environment. The floral compositions of Cypress Hills are unique and a valuable asset to the natural capital and biodiversity of CHIPP. The risk of new non-native colonization or the spread of current non-native species is a present and future management concern where the benefit versus risk of aggressive control options, such as herbicides, must be given serious consideration.

In addition to historical management practices (i.e. herbicide and handpicking) and recommended practices laid out by the “Provincial Park Resource Management and Recreational Activities Guidelines” other invasive species management tools include prescribed burns, and utilizing grazing, mowing, or haying. Mechanical management practices must be implemented prior to invasive species reaching seeding. The seasonality of native grasses and the timing of prescribed burning must be considered to ensure appropriate species are being targeted (Saskatchewan Parks 2005). However, disturbances like fire, grazing, and mowing can also encourage establishment of invasive species as invasive species are generally adapted to colonizing disturbed land when seed sources are available. Therefore, an integrated approach such as a combination of herbicide, biological, and mechanical treatments (i.e. prescribed burn, grazing, mowing or haying) could be very effective to reduce the invasion of non-native species.

Thorpe and Godwin (2012) suggested other practices to limit non-native species establishment opportunities can include:

- ▶ Eliminating livestock grazing.
- ▶ Unnecessary roads and trails should be closed and reclaimed.
- ▶ Landscaping, erosion control, and reclamation should be completed using only native species.
- ▶ Heavy equipment should be washed to remove seed-bearing mud before entering the park.

A current inventory of known and new invasive or non-native species locations should be conducted. The species types as well as the extent and proportion of the invasion within CHIPP will be necessary when creating management strategies and to ensure recreational and developmental activities do not further spread these species. Discrete patches of non-native species, where control is likely to be achieved, should be a management focus.

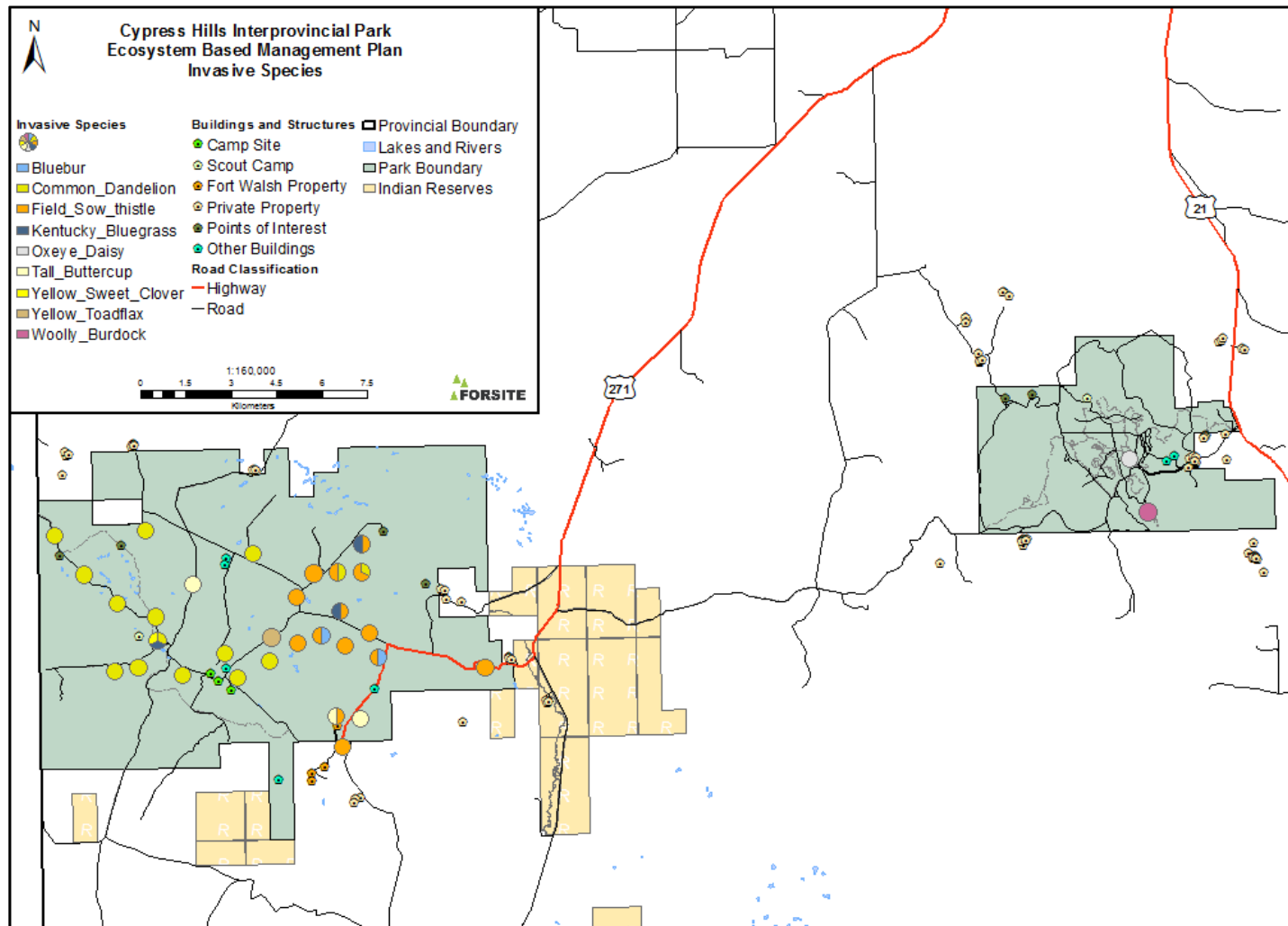


Figure 40 Known Invasive Species Locations within CHIPP (Source: HABISask).

3.5.4 ECOLOGICAL DISTURBANCE AND AGE-SINCE-LAST-DISTURBANCE PROFILES

The forests and the grasslands of the Cypress Hills originate from stand-replacing disturbances such as wildfire. Similar to the Boreal forest and the Montane Cordillera, fire plays an important role in stand regeneration (Arsenault 2003; Saskatchewan Parks 2005). The last landscape level fire disturbances within Cypress Hills were in 1885 and 1889 (See [Section 3.4.1](#)). The forests within show four major stand origins at approximately 1880, 1920, 1940, and recent regeneration since 2000 (**Figure 41**).

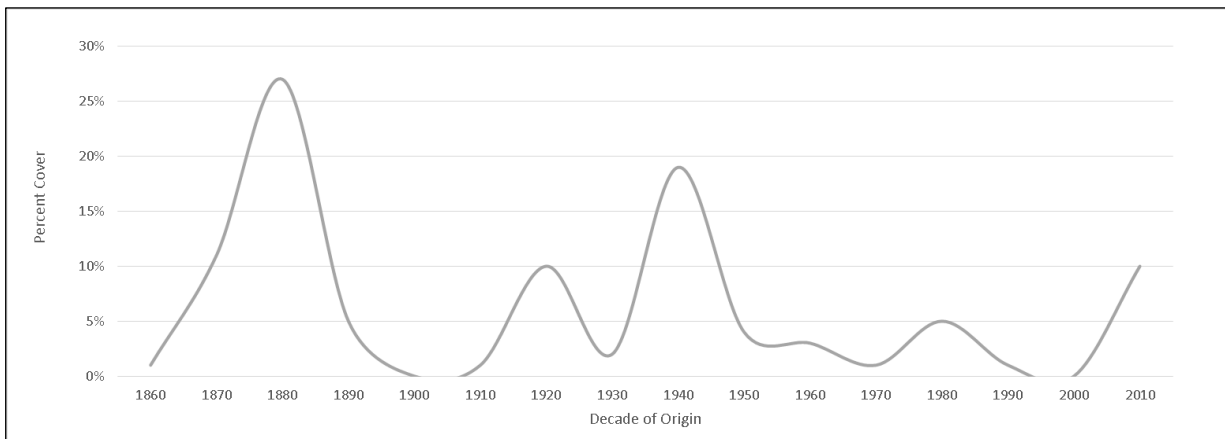


Figure 41 Decade of Origin for All Forest Stands in CHIPP Summarized from SFVI Database.

The lodgepole pine have a main decade of origin of 1880. Trembling aspen stands have main decades of origin of 1870 and 1940. White spruce stands show main decades of origin in 1940 and 1980 as well as recently post-2000. Black spruce represent a negligible proportion of the total forest stands at 0.1 percent or 25 hectares.

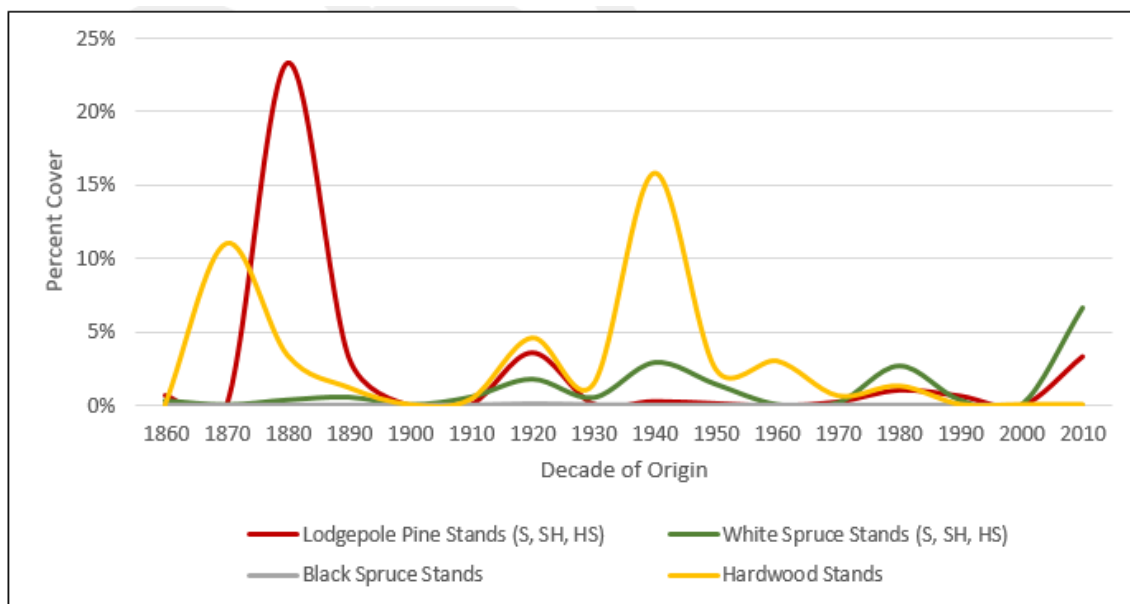


Figure 42 Decade of Origin for Main Forest Stand Types in CHIPP Summarized from SFVI Database.

This distribution can be compared to the fire history discussed in [Section 3.4.1](#). The peak in the 1880s coincides with the last landscape level crown fire within the park in the years 1885 and 1889. The cohort from these events represents approximately 27 percent of the park's forest, of which pine represent 23 percent, while hardwood and white spruce represent approximately three and less than one percent.

Stands originating within the 1920s account for approximately 10 percent of the total stands within the park. Of this cohort, hardwood represents approximately five percent, lodgepole pine represents four percent and white spruce represents less than two percent. It is likely that these stand origins coincide with the new forest protections provided by the establishment of the *Dominion Forest Reserves and Parks Act* (1911), which protected this area as a federal forest reserve. Two smaller fires also originated during this period near Willow Creek (608 hectares) and Graburn Creek (434 hectares).

Stands originating within the 1940s account for approximately 19 percent of the total stands within the park. Of this cohort, hardwood represents approximately 16 percent, white spruce represents less than three percent and lodgepole pine represents less than one percent. It is likely that these stand origins coincide with the additional forest protections and increased fire suppression activities provided by the establishment of the area as a Provincial Park in 1931. The origin of hardwood stands most likely represents forest encroachment onto fescue grasslands.

Stand origination between the years 1950 and 2000 account for approximately 14 percent of the total forest. Hardwood and white spruce stands originating during this period are most likely due to forest encroachment onto the fescue grasslands as a result of fire suppression activities. The expansion of forested area onto the fescue grasslands has been studied within the Alberta portion of the West Block. In this study forested area onto grasslands have increased by approximately 768 hectares between 1950 and 2007 (Widenmaier and Strong 2010). Approximately 10 percent of stands originate post-2000. Of this cohort white spruce accounts for approximately seven percent and lodgepole pine represents approximately three percent. The stands originating from this cohort most likely represent small harvests that have occurred within recent years.

Currently, approximately 80 percent of the park's forest originate prior to 1950. The resulting stands, 70 years old and greater, are classified as "mature", "old", and "very old", while approximately 20 percent of the forest is classified as "immature" or "young". Detail assessment on the forest age cohorts will be conducted in the associated Forest Conservation Management Plan to define the need for forest renewal in CHIPP.

3.5.5 RARE AND UNUSUAL VEGETATION AND PLANT SPECIES

The Cypress Hills area contains several rare vascular plants species and ecological communities. The unique geological history of the hills has created a floral oasis containing species found within the Montane Cordillera, Boreal Plains, and Prairies. The landscape is a unique mixture of mixed wood and lodgepole pine forest and plateaus of fescue grassland (Acton *et al.* 1998).

As mentioned prior, the grassland ecosystems of the planet are the most endangered ecosystem (Peart 2008). It is estimated that less than five percent of natural fescue grassland area remains today (Widenmaier and Strong, 2010). The fescue plateaus of the Cypress hills are the primary habitat to several rare plant species including: few-flowered oat grass, tall pussytoes, Rocky Mountain rush, nodding onion, blue-leaved cinquefoil, kitten-tails, and mountain timothy (Harms 2003; Alberta Tourism, Parks and Recreation 2009).

In addition to the grasslands, forested areas also contain many rare species. Within the lodgepole pine forests species such as pine sap, pine drops, mountain wild parsnip, and shining-leaved meadow-sweet can be found. Chilean sweet-cicely, western meadow-rue, and orchids such as the giant rattlesnake-plantain, heart-leaved twayblade, northern twayblade, and white bog Adder's-mouth can be found within the aspen, spruce, and mixedwood forests. Rocky areas, outcrops, cobbles, and gravels or areas of active or semi-stable sand dunes provide habitat for mountain meadow parsley, bur ragweed, brown-bracted pussytoes, Oregon woodsia, dwarf fleabane, and small-leaved alumroot. In addition to rare and unusual plant species listed above, the Cypress hills is home to 19 different species of orchids (Klassen, no date; Observation list by NPSS, Wright 2010; Cypress Hills Interprovincial Park: Plants, 1993). Known locations of rare plants can be found in **Figure 43** and **Figure 44**.

A full list of rare plants and their associated conservation status designations can be found in **Table 15**. Various sources were used to comprise the rare plant list including: Alberta Wilderness Association, no date; Saskatchewan Parks 2005; Saskatchewan Conservation Data Centre, 2019; COSEWIC.

The park also contains a wide variety of hawthorn species, with many endemic to the area. A study by Phipps and O'Kennon (2007) have identified several new species of hawthorn (*Crataegus* spp.) within the Cypress Hills area. The Cypress Hills contain 13 distinct species of *Crataegus*. This is 10 or 11 more than found within literature. New species include *Crataegus cupressocollina*, *C. aquacervensis*, *C. rivuloadamensis*, *C. rivulopugnensis*, *C. purpurella*, *C. rubribracteolata*, *C. ursopedensis* and *C. sheila-hippisiae* var. *saskatchewanensis*. *Crataegus sheridana* although known to science for over 100 years as a synonym, has been identified and classified as a distinct species. Six species are found to be locally common within the Cypress Hills with four taxa (*C. sheridana*, *C. sheila-hippisiae*, *C. cupressocollina* and *C. purpurella*) found predominately within the Saskatchewan side of the park.

A detailed investigation and re-inventory of rare and species-at-risk flora should be conducted. Current data reflecting the locations and quantity of these species within CHIPP will be necessary when creating management strategies and to ensure recreational and developmental activities do not impact these species.

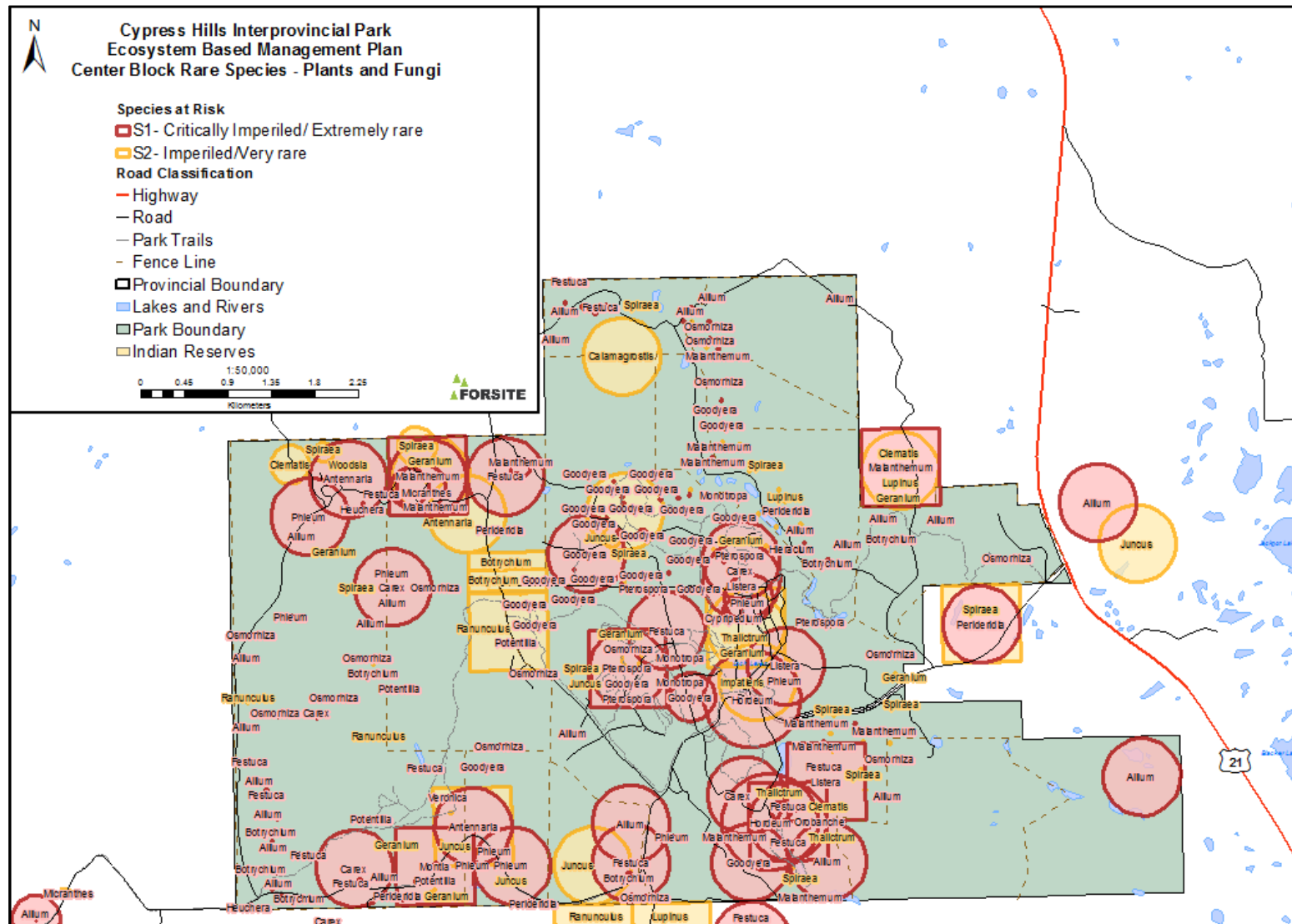


Figure 43 Know Locations of Rare Plant Species Occurring within Centre Block, CHIPP (uncertainty observations were removed) (Source: HABISask).

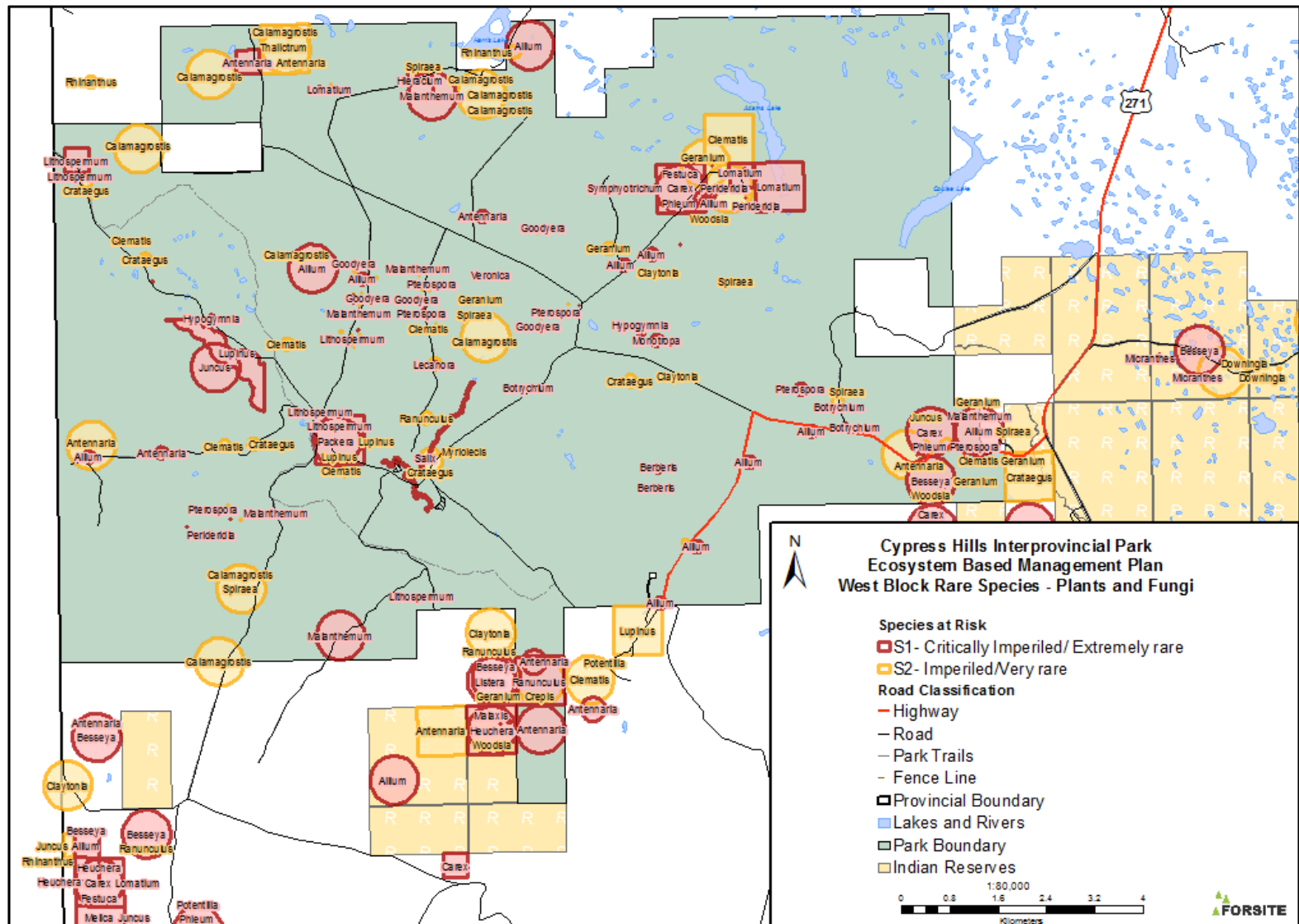


Figure 44 Know Locations of Rare Plant Species Occurring within West Block, CHIPP (uncertainty observations were removed) (Source: HABISask).

Table 15 Rare Vascular Plant Species within CHIPP.

Conservation rankings by the Saskatchewan Conservation Data Centre are shown as an S-Rank (S1=extremely rare; S2=rare; S3=rare-uncommon). Federal conservation rankings are listed in COSEWIC. Provincial conservation rankings under Saskatchewan Species at Risk are found in SARA. Additionally, Harms (2003) has listed species as endangered, threatened or vulnerable. Habitat notes based on references (Alberta Tourism, Parks and Recreation 2009). Nomenclature has been updated to reflect the Saskatchewan Conservation Data Centre, 2019 vascular plant list.

END Endangered THR Threatened VUL Vulnerable - Not listed U Unable to locate information						
Family	Scientific Name	Common Name	S-Rank	COSEWIC	SARA	Habitat
Apiaceae CARROT FAMILY	<i>Lomatium cous</i>	Parsley, mountain meadow	S1	-	-	cobbly or rocky, east-facing slopes
	<i>Lomatium dissectum</i> var. <i>multifidum</i>	Wild parsnip, mountain	S1	-	-	fine soils, north-facing slopes, forested areas in dominated by aspen, lodgepole pine, or white spruce
	<i>Osmorhiza berteroi</i>	Sweet-cicely, Chilean	S1	-	-	white spruce and lodgepole pine woods on upper ravine slopes
	<i>Perideridia gairdneri</i> ssp. <i>borealis</i>	Squawroot, Northern Gairdner's	S1	-	-	moist woods on cobbly slopes and hillsides
Asteraceae ASTER FAMILY	<i>Ambrosia acanthicarpa</i>	Bur Ragweed	S2	-	VUL	dry, active to semi-stabilized sand dunes
	<i>Antennaria anaphaloides</i>	Pussytoes, tall	S1	-	-	loamy soil in open fescue prairie
	<i>Antennaria corymbosa</i>	Pussytoes, flat-topped	S1	-	-	open woods and prairies in dry to moist soil, fescue prairie
	<i>Antennaria umbrinella</i>	Pussytoes, brown-bracted	S2	-	-	dry, open, gravelly slopes
	<i>Erigeron radicans</i>	Fleabane, dwarf	S3	Not at Risk (1996)	-	sandy dry soil or eroded, often cobbly grassland slopes and flats
	<i>Crepis atriobarba</i>	Hawk's-beard, dark	S2	-	-	open grassland slopes
	<i>Hieracium albiflorum</i>	Hawkweed, white-flowered	S1	-	-	dry or gravelly soils in woods or grasslands
	<i>Packera pseud aurea</i>	Butterweed, stream-bank	S1	-	-	meadows, thickets, and open woodlands
	<i>Shinnersoseris rostrata</i>	Skeleton-weed,	S2	NR	VUL	dry, sandy soil in semi-active to

		beaked annual				stabilized sand dunes
	<i>Symphyotrichum eatonii</i>	Aster, Eaton's	S1	Not at risk	None	moist, springy thickets and woods
	<i>Tetraneuris acaulis</i> var. <i>acaulis</i>	Stemless Tetraneuris	S2	-	-	dry grassland hillsides
Balsaminaceae TOUCH-ME-NOT FAMILY	<i>Impatiens noli-tangere</i>	Touch-me-not, yellow	S2	-	U	U
Boraginaceae BORAGE FAMILY	<i>Cryptantha kelseyana</i>	Kelsey's Cryptantha	S2	-	-	dry silty grasslands, southeast-facing slopes
	<i>Lithospermum ruderales</i>	Gromwell, woolly	S1	-	-	dry soil on south-facing grassland slopes
Brassicaceae MUSTARD FAMILY	<i>Rorippa tenerrima</i>	Cress, slender yellow	S2	-	-	shores of small ponds, riverbanks
	<i>Transberingia bursifolia</i> ssp. <i>virgata</i>	Cress, slender mouse-ear	S1	THR, END	END	silty, sandy, or clay soils on eroded or grazed grassland slopes and flats
Campanulaceae BELLFLOWER FAMILY	<i>Downingia laeta</i>	Downingia, great-basin	S2	-	-	alkaline or saline mudflats, roadsides and cultivated field depressions
Cyperaceae SEDGE FAMILY	<i>Carex hoodii</i>	Sedge, Hood's	S1	-	-	open, grassy banks and slopes
	<i>Carex petasata</i>	Sedge, Caespitose	S1	-	-	dry grassland slopes and open aspen woods
	<i>Carex raynoldsii</i>	Sedge, Raynold's	S1	-	-	open wooded or grassy ravine slopes
Dryopteridaceae WOOD-FERN FAMILY	<i>Woodsia oregana</i> ssp. <i>oregana</i>	Oregon Woodsia	S2	-	-	granitic or calcareous cliffs, outcrops, and rocky slopes
Fabaceae PEA FAMILY	<i>Lupinus argenteus</i>	Lupine, silvery	S2	-	U	U

Geraniaceae GERANIUM FAMILY	<i>Geranium richardsonii</i>	Geranium, wild white	S2	-	-	wooded ravines, open woods, meadows and thickets
	<i>Geranium viscosissimum</i>	Geranium, sticky purple	S2	-	-	moist, wooded, shrubby or grassy slopes
Juncaceae RUSH FAMILY	<i>Juncus confusus</i>	Rush, few-flowered	S2	-	-	ravine slopes, low meadows, open shores
	<i>Juncus ensifolius</i>	Rush, dagger	S2	-	-	shores and springy areas
	<i>Juncus saximontanus</i>	Rush, Rocky mountain	S1	-	-	moist meadows, lake shores, springy places, and high fescue grasslands
Juncaginaceae ARROW-GRASS FAMILY	<i>Lilaea scilloides</i>	Flowering Quillwort	S1	-	-	sloughs and mudflats
Lentibulariaceae BLADDERWORT FAMILY	<i>Utricularia minor</i>	Bladderwort, lesser	S2	-	U	U
Liliaceae LILY FAMILY	<i>Allium cernuum</i> var. <i>cernuum</i>	Onion, nodding	S1	-	-	fescue grassland
	<i>Maianthemum racemosum</i> ssp. <i>amplexicaule</i>	Spikenard, false	S1	-	-	moist woods and thickets
Monotropaceae INDIAN-PIPE FAMILY	<i>Monotropa hypopithys</i>	Pinesap, American	S1	-	-	lodgepole pine woods, regionally restricted in Saskatchewan
	<i>Pterospora andromeda</i>	Pine-drops	S1	-	-	lodgepole pine woods with mossy understory
Onagraceae EVENING PRIMROSE FAMILY	<i>Oenothera flava</i>	Evening-primrose, low yellow	S3	-	-	moist clay flats in depressions, slough bottoms, creek shores, and roadside ditches,

Ophioglossaceae ADDER'S TONGUE FAMILY	<i>Botrychium lanceolatum</i> <i>ssp. lanceolatum</i>	Triangle Grape-fern	S2	-	-	open woods and grassy slopes
	<i>Botrychium lunaria</i>	Common Moonwort	S1	-	-	widely distributed, locally sparse; Cypress Hills
	<i>Botrychium</i> <i>matricariifolium</i>	Chamomile Grape- fern	S1	-	-	open woods, dry bogs, grassland depressions, moist prairie, lake shores, and north-facing outcrops
Orchidaceae ORCHID FAMILY	<i>Goodyera oblongifolia</i>	Rattlesnake-plantain, giant	S1	-	-	moist shady coniferous woods
	<i>Listera borealis</i>	Twayblade, northern	S1	-	-	wet, mossy spruce woods
	<i>Listera cordata</i>	Twayblade, heart- leaved	S2	-	-	wet, mossy spruce woods
	<i>Malaxis monophyllos</i> <i>var. brachypoda</i>	Orchid, white bog Adder's-mouth	S1	-	-	moist, shaded coniferous woods
Orobanchaceae BROOM RAPE FAMILY	<i>Orobanche uniflora</i> var. <i>occidentalis</i>	Broomrape, small	S1	-	-	Willow thickets and mudflats
Poaceae GRASS FAMILY	<i>Alopecurus magellanicus</i>	Foxtail, alpine	S1	-	-	moist woods and thickets
	<i>Danthonia unispicata</i>	Oat grass, few- flowered	S3	-	-	moist draws in upland fescue and tall mixed-grass prairies
	<i>Festuca idahoensis</i>	Fescue, Idaho	S1	-	-	grassland or open wooded slopes
	<i>Hordeum</i> <i>brachyantherum</i> ssp. <i>brachyantherum</i>	Barley, meadow wild	S1	-	-	moist creek valleys, prairie depressions, and ditches
	<i>Melica bulbosa</i>	Grass, onion	S1	-	-	wooded slopes
	<i>Phleum alpinum</i>	Timothy, mountain	S1	-	-	moist meadows, hillsides and shores
	<i>Trisetum wolfii</i>	Oats, beardless	S1	-	-	moist, grassy ravines and sloughs
Polemoniaceae PHLOX FAMILY	<i>Linanthus</i> <i>septentrionalis</i>	Desert-gold, northern	S1	-	-	moist to dry prairie depressions

Portulacaceae PURSLANE FAMILY	<i>Claytonia lanceolata</i>	Spring beauty, lance-leaved	S2	-	-	woods, clearings, shrublands, and prairie ravines
	<i>Montia linearis</i>	Spring-beauty, linear-leaved	S1	-	-	moist springy pool margins and grasslands
Ranunculaceae BUTTERCUP FAMILY	<i>Clematis occidentalis</i>	Clematis, purple	S2	-	-	climbing over shrubs on wooded slopes
	<i>Myosurus apetalus</i> var. <i>borealis</i>	Mousetail, awned	S2	-	-	clayey, usually alkaline or calcareous, slough edges, mudflats and prairie depressions
	<i>Ranunculus inamoenus</i> var. <i>inamoenus</i>	Buttercup, graceful	S1	-	-	moist grassy ravine slopes, lakeshores, and open woods
	<i>Thalictrum occidentale</i>	Meadow-rue, western	S2	-	-	in aspen or pine woods
Rosaceae ROSE FAMILY	<i>Crataegus douglasii</i>	Hawthorn, Black-fruited	S2	-	-	shore shrub-thickets and open woods
	<i>Potentilla glaucophylla</i> var. <i>glaucophylla</i>	Cinquefoil, Blue-leaved	S1	-	-	upland fescue prairie slopes
	<i>Potentilla lasiodonta</i>	Cinquefoil, Sandhills	S2	-	U	U
	<i>Spiraea lucida</i>	Shining-leaved Meadow-sweet	S2	-	-	open lodgepole pine or aspen woods, mostly above shores
Salicaceae WILLOW FAMILY	<i>Populus angustifolia</i>	Cottonwood, narrowleaf	S2	-	-	small creek valleys
Saxifragaceae SAXIFRAGE FAMILY	<i>Heuchera parvifolia</i>	Alumroot, small-leaved	S1	-	-	gravelly, grassy, or shrubby slopes and ridges
	<i>Lithophragma glabrum</i>	Prairie Star	S2	-	-	moist ravine slopes
Scrophulariaceae FIGWORT FAMILY	<i>Besseyia wyomingensis</i>	Kitten-tails	S1	-	-	upland fescue grassland slopes
	<i>Rhinanthus minor</i> ssp. <i>minor</i>	Yellow-rattle	S2	-	U	U
	<i>Veronica serpyllifolia</i> ssp. <i>humifusa</i>	Speedwell, northern thyme-leaved	S1	None	None	open woods and clearings

3.5.6 CORE AREA VEGETATION

The core area of Cypress Hills Centre Block has seen a substantial development of facilities including campgrounds, recreational facilities, cottages, and businesses (see [Section 3.5.1](#)). These facilities are needed to accommodate and to provide visitor experiences for recreational users. Vegetation management within the core area of the park is required to maintain visitor safety and satisfaction. It is important that management practices preserve the natural feel and aesthetics of the environment and minimize developmental impacts.

Most areas within the core of the park are surrounded by natural vegetation. Most campgrounds within the park have been created within the natural forest stands (e.g. Lodgepole Campground, **Figure 45**) or are adjacent to the forest stands (e.g. Meadows Campground). Forested campgrounds provide the visitor with shade, shelter, and a natural experience. However, as the forest is aging there is more concerns about risk trees, insect and disease and fire hazard threatening the safety of park visitors in these campgrounds. Natural forest succession causes these forests to mature, reach their climax community, succumb to mortality factors, and eventually, begin renewal. It is not acceptable to allow natural forest succession processes to proceed unmanaged in the core area or other high use areas of the park such as campgrounds (Thorpe and Godwin 2012).



Figure 45 Lodgepole Campground, Centre Block (Saskatchewan Provincial Parks, no date).

Core area vegetation management issues include both long-term and short-term concerns. Short term concerns include dealing with hazardous vegetation that have the potential to cause injury, death or damage to property. The Saskatchewan Parks Division created a policy in 2003 for “dealing with hazardous vegetation”. Additionally, the Saskatchewan Ministry of Parks, Culture and Sport (no date) has outlined a framework for “Dealing with Risk/Hazardous Vegetation in Core Areas of Provincial Parks and Recreation

Sites”. Within this framework policies, management goals, assessment procedures, and guidelines are defined.

According to these policies and frameworks:

- ▶ There is a duty of the Park Manager’s to preserve the park’s natural environment while ensuring public and employee safety for property and from physical injury;
- ▶ Tree maintenance or removal are acceptable when required for human safety, to protect infrastructure, to accommodate approved development, and for managing forest health;
- ▶ Trained staff will conduct annual assessments in high use areas such as campsites, picnic sites, day use areas, and parking lots as per the “Core Area Risk Management Field Form” found within “Dealing with Risk/Hazardous Vegetation in Core Areas of Provincial Parks and Recreation Sites”; and
- ▶ Risk assessment should lead to remedial action based on the risk rating including: pruning, cabling, tree removal, removing or moving at-threat targets, and/or excluding visitors from hazardous sites.



Figure 46 Mature Spruce Tree Adjacent to Campsite, Meadows Campground (Saskatchewan Provincial Parks, no date).

The long term vegetation management issue is overall forest stand renewal. Forest stand renewal can be accomplished through natural processes or prescribed renewal treatments. Stand regeneration through natural disturbances (i.e. fire) are not desirable or feasible in a core area setting. Prescribed treatments may not be aesthetically pleasing, such as tree harvesting within campgrounds (Thorpe and Godwin 2012).

Over-mature lodgepole pine within the core area is of concern. Mature spruce and aspen exist within the core area as well (**Figure 46**). Mature forests are more susceptible to disease, insect infestation, mechanical damage, etc. (Harris 1984). Mature aspen are more vulnerable to heart-rot which increases wind-throw risks (Thorpe and Godwin 2012). The maturity of the lodgepole pine are the primary reason for the invasion of the Mountain Pine Beetle. If treatments are not applied the number of risk trees will

increase and forest will still succumb to natural mortality factors leading to greater risk of wind-throw and wildfire (Thorpe and Godwin 2012, Harris 1984).

A core area vegetation management plan would begin with an inventory of stands within the core area followed by harvest treatments prioritized based on stand needs. Prioritization would be reflective of stand type, stand age, current forest health (i.e. damage, insects, and disease), objectives for visitor accommodations, and visitor safety concerns. Harvest and treatment seasonality should occur within non-peak seasons (i.e. winter) to minimize visitor impacts and ecological damage. The Forest Conservation Management Plan, 2020 will explore these options in more detail.

Invasive species within the park have been discussed within [Section 3.5.3](#). Non-native plant species can be found as ornamentals in landscaping and decoration within privately owned areas, leases, and cottages. Non-natives, when used in an ornamental manner typically do not pose a threat to native vegetation. However, monitoring programs and approval by Park Manager should be established to prevent the introduction of a potentially invasive non-native species. Ideally, ornamentals should be eliminated or reduced within the core area and an emphasis on utilizing native species within landscaping should be encouraged. This will help affirm the park's commitment maintaining and conserving natural species communities. The LPU has developed a list of acceptable plants and trees which may be planted in both the core area and leased areas of the park, which has been placed in [Appendix 2](#)

Reducing or managing the environmental impacts of recreational users within the core area presents additional challenges. Vegetation can become trampled and growth impeded in areas where visitors create unofficial pathways through forested areas (i.e. shortcuts through campsites/campgrounds, etc.). Diminished vegetation can also contribute to soil instability, compaction, and/or erosion potential. It can be beneficial to create an inventory of these disturbances to identify locations of concern, quantify the number and extent of the disturbances, and prioritize reclamation or remedial efforts.

A provincial Core Area Silviculture Program is under development by Parks Division and will help address regeneration strategies and silvicultural requirements of various park areas across our provincial parks.

3.6 PRESENT-DAY USE AND COMPOSITION OF PARK ANIMAL COMMUNITIES

3.6.1 ANIMAL COMMUNITIES AND THEIR RELATIONSHIPS WITH VEGETATION

Vegetation is typically the focus of an ecosystem-based management plan, as it creates the habitats and supports the fauna of the area. Cypress Hills Interprovincial Park supports approximately 227 bird species (162 breeding, year-round, or potentially breeding and 64 non-breeding, visitor or migrant species), 52 mammals, four amphibians, and five reptiles. Complete lists of species are given in [Appendices 3, 4, and 5](#).

The relationship between animal communities and the vegetation of Cypress Hills Interprovincial Park is focused on bird communities. Birds make up the largest and most diverse community of vertebrates. Bird communities are also easily studied during breeding and non-breeding seasons, thus making them ideal and common study subjects. A large majority of birds who utilize the ecosites of CHIPP are passerines from the Order Passeriformes, or commonly known as perching birds or song-birds. However, other Orders were included in community analysis.

Several sources were combined to determine habitat preferences of breeding birds of CHIPP. Habitat preferences were then related to ecosites and areas available within the park as well as the surrounding grasslands and agricultural areas. Sources included: Kirk *et al.* (1996), Fisher *et al.* (2004), Edworthy *et al.* (2011), Schieck *et al.* (1995), Canadian Wildlife Federation (no date), Janousek *et al.* (2019), Hobson and Bayne (2000), All About Birds (2020), Government of Canada (2019), and Saskatchewan Breeding Bird Atlas (no date).

Analysis of bird communities within the park includes primarily breeding and year-round species, however some non-breeding, visitor, and migrant species were also included depending on their conservation status or if they are habitat specialists.

Certain species in CHIPP were found to be associated with coniferous, deciduous or grassland dominated systems and are presented in **Table 16**.

Table 16 Bird Species Associated with Deciduous-dominated, Coniferous-dominated stands, and Grassland areas for CHIPP.

Coniferous-dominated	Deciduous-dominated	Grassland
American Three-toed Woodpecker	American Redstart	American Kestrel
Clark's nutcracker	Baltimore Oriole	Baird's Sparrow
MacGillivray's Warbler	Black-billed Cuckoo	Bobolink
Northern Goshawk	Black-capped Chickadee	Brewer's Blackbird
Pacific Wren	Broad-winged Hawk	Brown-headed Cowbird
Pine Siskin	Brown Thrasher	Burrowing Owl
Red Crossbill	Bullock's Oriole	Cedar Waxwing
Red-breasted Nuthatch	Common yellow-throat	Chestnut-collared Longspur
Red-tailed Hawk	Downy Woodpecker	Common Poorwill
Sharp-shinned Hawk	Least Flycatcher	Dickcissel
Swainson's Thrush	Ovenbird	Eastern Kingbird
Townsend's Warbler	Red-eyed Vireo	Ferruginous Hawk
Western Tanager	Red-tailed Hawk	Grasshopper Sparrow
White-winged Crossbill	Ruffed Grouse	Horned Lark
Yellow-rumped Warbler	Song Sparrow	House Wren
	Tennessee Warbler	Killdeer
	Veery	Lark Bunting
	Warbling Vireo	Lark Sparrow
	White-breasted Nuthatch	LeConte's Sparrow
	Yellow Warbler	Long-billed Curlew
	Yellow-bellied Sapsucker	McCown's Longspur
		Northern Harrier
		Prairie Falcon
		Red-tailed Hawk
		Rock Wren
		Savannah Sparrow
		Say's Phoebe
		Sharp-tailed Grouse
		Short-eared Owl
		Sprague's Pipit
		Swainson's Hawk
		Upland Sandpiper
		Vesper Sparrow
		Western Kingbird
		Western Meadowlark

Habitat preferences by ecosites available within CHIPP for breeding bird species are presented in **Table 17**. Many of the species listed above are found in more than one ecosite. Several generalist species occur within the park and utilize a wide variety of ecosite types. Notable generalists who utilize six or more of the ecosite types include the American goldfinch, black-headed grosbeak, dark-eyed junco, golden-crowned kinglet, house wren, red-naped sapsucker, ruby-crowned kinglet, violet-green swallow, and the western wood-pewee. While stand type is not specific the orange-crowned warbler, hermit thrush, tree swallow, and cedar waxwing prefer younger growth forests (Schieck *et al.* 1995).

Habitat specialists of the lodgepole pine (PR02) dominated stands include the red crossbill, pine siskin, Clark's nutcracker, and the non-breeding use by pine grosbeak. Other species that utilize the pine forests

include the red breasted nuthatch, chipping sparrow, American three-toed woodpecker, and Townsend's warbler. The yellow-rumped warbler and golden-crowned kinglet also prefer old to very old age pine forests and are known canopy nesters. The lodgepole pine forests of Cypress Hills are at risk of mountain pine beetle infestations. Janousek *et al.* (2019) and Edworthy *et al.* (2011) found that the incidence of mountain pine beetle influences cavity nesters and other bark-foraging species (e.g. American three-toed woodpecker). Cavity nesters (e.g. red breasted nuthatch) were found to utilize beetle killed trees at higher rate for 10 years post outbreak (e.g.). Although habitats are general, dark-eyed juncos were also most commonly associated with pine stands (Kirk *et al.* 1996).

Other coniferous-favouring species can be found within the white-spruce dominated stands (PR06 and BP18). This includes species such as: white-winged crossbill, western tanager, Macgillivray's warbler, pacific wren, western tanager, evening grosbeak, sharp-shinned hawk, and northern goshawk. The Swainson's thrush prefers old coniferous forests and nesting within the lower vegetation layers. The non-breeding brown creeper and blackpoll warbler are also most commonly associated with old-growth coniferous stands (Kirk *et al.* 1996, Schieck *et al.* 1995). The olive-sided flycatcher, a potential visitor of CHIPP, are typically associated with younger growth coniferous forests (Schieck *et al.* 1995).

Mixedwood sites include trembling aspen and lodgepole pine (PR03), trembling aspen and white spruce (PR07). The mixedwood forests are preferential to the greatest diversity of species found within CHIPP. Mixedwood species include least flycatcher, mountain bluebird, Bullock's oriole, Baltimore oriole, black-capped chickadee, Tennessee warbler, veery, red-eyed vireo, white-breasted nuthatch, yellow warbler, warbling vireo, and song sparrow. Hobson and Bayne (2000) also found avian species richness was highest in mixedwood stands with mature or old spruce trees. This is found to be a result of abundance and preference for mixedwood and not a result of mixing from deciduous and coniferous preferential species. Trembling aspen and lodgepole pine sites (PR03) with a low canopy cover were favoured as roosting sites for the common nighthawk and northern saw-whet owl. The common nighthawk specifically, utilizes trembling aspen- lodgepole pine sites that are found on north facing slopes during day-roosting and are known to reuse favor sites repeatedly. The common nighthawk also requires open prairie for ground nesting (Fisher *et al.* 2004) and they are quite often found in young harvest blocks.

Deciduous dominated stands include the trembling aspen ecosite PR04. Species associated with young deciduous stands include the ruffed grouse, rose-breasted grosbeak, and common yellow-throat. Species associated with mature or older growth deciduous stands include the ovenbird, black-billed cuckoo, yellow warbler, and the least flycatcher. Old forest cavity nesters within deciduous forest types include: White-breasted Nuthatch, Hairy Woodpecker, Downy Woodpecker, and the Yellow-bellied Sapsucker (Schieck *et al.* 1995).

Grassland and shrubland bird species can be found within the plateaus of the park in the rough fescue grasses of ecosite PR01. A large number of breeding birds are found to utilize this ecosite. Grassland species include the bobolink, brown-headed cowbird, grasshopper sparrow, horned lark, LeConte's sparrow, long-billed curlew, and McCown's longspur. The common poorwill prefers shrublands with barren ground for nesting. The chestnut-collared longspur is preferential to grazed grasslands. Grasslands specialist species, those that require undisturbed native grasslands, include the Baird's Sparrow, lark bunting, and Sprague's pipit. The Sprague's pipit is discussed in detail within [Section 3.6.3](#).

Marsh habitats (PR09 and BP25) were utilized by American avocet, marbled godwit, marsh wren, red-winged blackbird, sora, Virginia rail, Wilson's snipe, yellow-headed blackbird, and the great blue heron. Other water birds can be found within the open waters of the park's reservoirs and lakes.

Many of the species listed utilize old or mature age class forest. Fire suppression and an absence of harvesting within the park have caused many stands to enter these age-classes (see [Section 3.5.4](#)). The use of these stands by bird species highlights the need for maintaining a variety of ecosites within these age classes while management treatments renew stands to younger age classes. Particular care to the management of the native grasslands should be emphasized, as they support a large number of specialist bird species. Additionally, management decisions should consider the inclusion of other necessary habitat features (e.g. snags for cavity nesters).

Table 17 Distribution of Breeding Bird Species in Relation to Ecosites and Other Areas in CHIPP.

Species	Forested						Non-forested			Other	
	Coniferous			Mixedwood		Deciduous	Dry	Wet		Water	Developed
	PR02	PR06	BP18	PR07	PR03	PR04	PR01	PR09	BP25		
Alder Flycatcher							X				
American Avocet								X	X		
American Coot										X	
American Goldfinch	X		X	X	X	X	X				
American Redstart				X	X	X					
American Robin				X	X	X					X
American Three-toed Woodpecker	X	X	X	X	X						
American White Pelican										X	
American Wigeon										X	
Baird's Sparrow							X				
Baltimore Oriole				X	X	X					
Bank Swallow										X	
Barn Swallow					X	X	X				X
Belted Kingfisher										X	
Black Tern								X	X		
Black-billed Cuckoo				X	X	X					
Black-capped Chickadee				X	X	X					
Black-headed Grosbeak	X	X	X	X	X	X					
Blue-winged Teal										X	
Bobolink							X				
Brewer's Blackbird							X				
Brewer's Sparrow							X				
Brown Thrasher						X	X				
Brown-headed Cowbird							X				
Bullock's Oriole				X	X	X					
California Gull										X	
Canada Goose										X	
Canvasback										X	
Cedar Waxwing	X	X	X	X	X	X	X				

Species	Forested						Non-forested			Other	
	Coniferous			Mixedwood		Deciduous	Dry	Wet		Water	Developed
	PR02	PR06	BP18	PR07	PR03	PR04		PR09	BP25		
Chestnut-collared Longspur							X				
Chipping Sparrow			X	X	X						
Cinnamon Teal										X	
Clark's nutcracker	X	X									
Clay-coloured Sparrow							X				
Cliff Swallow			X	X	X		X			X	
Common Grackle			X	X	X		X				
Common Merganser										X	
Common Nighthawk	X	X	X	X	X	X	X				
Common Poorwill							X				
Common Tern								X	X	X	
Common Yellowthroat							X				
Dark-eyed Junco	X	X	X	X	X	X					
Dickcissel							X				
Double-crested Cormorant										X	
Downy Woodpecker				X	X	X					
Dusky Flycatcher			X	X	X						
Eared Grebe										X	
Eastern Kingbird							X				
Evening Grosbeak	X	X	X	X	X	X					
Franklin's Gull										X	
Golden-crowned Kinglet	X	X	X	X	X	X					
Grasshopper Sparrow							X				
Gray Catbird			X	X	X		X				
Great Blue Heron								X	X		
Green-winged Teal										X	
Hairy Woodpecker	X	X	X	X	X	X					
Hermit Thrush			X	X	X						
Horned Grebe										X	
Horned Lark							X				
House Wren	X	X	X	X	X	X	X				
Killdeer							X				
Lark Bunting							X				
Lark Sparrow							X				

Species	Forested						Non-forested			Other	
	Coniferous			Mixedwood		Deciduous	Dry	Wet		Water	Developed
	PR02	PR06	BP18	PR07	PR03	PR04	PR01	PR09	BP25		
Lazuli Bunting			X	X	X		X				
Least Flycatcher				X	X						
LeConte's Sparrow							X				
Lesser Scaup										X	
Loggerhead Shrike							X				
Long-billed Curlew							X				
MacGillivray's Warbler	X	X	X	X	X						
Mallard										X	
Marbled Godwit								X	X	X	
Marsh Wren								X	X	X	
McCown's Longspur							X				
Mountain Bluebird				X	X		X				
Mourning Dove			X	X	X						X
Northern Flicker	X		X	X	X						
Northern Mockingbird							X				
Northern Pintail										X	
Northern Rough-winged Swallow										X	
Northern Shoveler										X	
Orange-crowned Warbler	X	X	X	X	X	X					
Ovenbird				X	X	X					
Pacific Wren	X	X	X	X	X						
Pied-billed Grebe										X	
Pine Siskin	X	X	X	X	X						
Red Crossbill	X	X	X								
Red-breasted Nuthatch	X	X	X	X	X						
Red-eyed Vireo				X	X	X					
Redhead										X	
Red-naped Sapsucker	X	X	X	X	X	X					
Red-necked Grebe										X	
Red-winged Blackbird								X	X		
Ring-billed Gull										X	
Ring-necked Duck										X	

Species	Forested						Non-forested			Other	
	Coniferous			Mixedwood		Deciduous	Dry	Wet		Water	Developed
	PR02	PR06	BP18	PR07	PR03	PR04	PR01	PR09	BP25		
Rock Wren							X				
Ruby-crowned Kinglet	X	X	X	X	X	X					
Ruddy Duck										X	
Ruffed Grouse				X	X	X					
Savannah Sparrow							X				
Say's Phoebe							X				
Sharp-tailed Grouse							X				
Song Sparrow				X	X	X					
Sora								X	X	X	
Spotted Sandpiper										X	
Spotted Towhee							X				
Sprague's Pipit							X				
Swainson's Thrush	X	X	X	X	X						
Tennessee Warbler				X	X	X					
Townsend's Warbler	X	X	X	X	X						
Tree Swallow										X	
Trumpeter Swan										X	
Turkey Vulture			X	X	X		X				
Upland Sandpiper							X				
Veery				X	X	X					
Vesper Sparrow							X				
Violet-green Swallow	X	X	X	X	X	X					
Virginia Rail								X	X		
Warbling Vireo				X	X	X					
Western Grebe										X	
Western Kingbird							X				
Western Meadowlark							X				
Western Tanager	X	X	X	X	X						
Western Wood-pewee	X	X	X	X	X	X					
White-breasted Nuthatch				X	X	X					
White-winged Crossbill	X	X	X							X	
White-winged Scoter										X	
Willet										X	
Wilson's Phalarope										X	

Species	Forested						Non-forested			Other	
	Coniferous			Mixedwood		Deciduous	Dry	Wet		Water	Developed
	PR02	PR06	BP18	PR07	PR03	PR04	PR01	PR09	BP25		
Wilson's Snipe								X	X		
Yellow Warbler				X	X						
Yellow-bellied Sapsucker				X	X	X					
Yellow-breasted Chat							X				
Yellow-headed Blackbird								X	X		
Yellow-rumped Warbler	X	X	X	X	X						

3.6.2 UNGULATES AND FURBEARERS

3.6.2.1 UNGULATES

The ungulate population within the region of CHIPP is diverse. Five species of ungulates can be found within or near the park: elk, moose, mule deer, white-tailed deer and pronghorn antelope. Introductions to species, habitat, and ecosite use within CHIPP for moose, mule deer, white-tailed deer and pronghorn antelope are found below. The Cypress Hills Interprovincial Park has determined that elk is a species of significance. Therefore, detailed information regarding species, history, habitat, and ecosite use for elk of the area are included below. Historically, plains bison (*Bison bison bison*), a native bovid, were also found within the park. Bison have been extirpated from the park area since approximately 1880.

3.6.2.1.1 Elk

The current elk (*Cervus canadensis*) populations of Cypress Hills are the product of re-introduction into the area in 1938. Similar to the plains bison, the elk of the area were extirpated. The last occurrence of elk was noted in 1909 (Alberta Wilderness Association, no date). The reintroduction of elk has been successful. A lack of predators has allowed the populations to expand. Since 1978 the population has supported an annual hunting harvest to maintain manageable numbers. The Alberta portion of the park manages populations to a threshold level of 700 animals (Alberta Parks 2017), while Saskatchewan's population sits around 1,100 individuals (Hegel 2004).

The range of elk within the province of Saskatchewan extends throughout the southern fringe of the Boreal forest, North of Prince Albert, as well as within Cypress Hills, Duck Mountain, and Moose Mountain Provincial Parks. However, exact distribution is largely unknown. Provincial population is estimated at 15,000 in 2014 (Patterson 2014). At a Global and national level elk are listed as "secure" (G5), while Saskatchewan populations are listed as "apparently secure" (S4). Elk are not listed under COSEWIC or SARA.

Habitat preferences of elk vary but they have a preference for locations adjacent to protected areas and display high site and range fidelity. Summer habitats include wooded areas and hill sides while open grasslands are preferred for winter habitats. Elk are both browsers and grazers. Their diverse diet is comprised of woody vegetation including shrubs and tree saplings as well as grasses and sedges. Within woodland habitats they prefer areas with moderate amounts of mixed-wood and deciduous forests including shrub, herbaceous vegetation, and young tree shoots (Patterson 2014).

Elk are sensitive to anthropogenic disturbances. Avoidances are noted near high road density areas and are observed up to 200-500 metres away (McCorquodale 2013). Disturbances such as hunting, roads, and land use activities have an inverse relationship to movement, indicating they are stressors. Animal movements tends to increase in closer proximity to the disturbance, this is thought to be due to hypervigilance in response to noises. As a result, energy expenditures can increase by up to ten percent. Together the effects of anthropogenic disturbances cause trends toward a more changed behavior, especially during rutting and courtship season as well as decreased probability of being in an area (Clair and Forrest 2009).

Disturbances such as forest harvesting, landscaping, and wildfire have different effects on elk habitat. Forest harvesting removes existing cover and forage. Forage tends to abundantly return in one to two years post-harvest, while visual cover returns when understory is around two metres high and thermal

cover returns at approximately 10 metres tall. Harvesting can have detrimental effects on habitat when slash is left at depths greater than 30 centimetres or when obstacles are in high abundance (Nyberg, no date). Landscaping activities, such as pruning around facilities and campgrounds reduces visual cover. Wildfire and prescribed burning can have immediate negative effects on forage availability. Habitat preferences of elk as determined by Patterson (2014), Edge *et al.* (1988), McLaughlan *et al.* (2010), and Nyberg (no date) have interpreted elk to relate to ecosites available within CHIPP and are presented in **Table 18**.

Threats to the elk populations include habitat loss and degradation, disturbances, disease, and hunting pressure. Habitat loss and degradation is primarily through agricultural expansion, however roads, corridors, grazing, and energy/mining exploration also impact elk habitat and therefore population numbers. Disturbances such as forest harvesting, fire and fire suppression as threaten populations. Hunting and the spread of Chronic Wasting Disease further contribute to population threats.

Table 18 Elk Habitat Preferences Based on Ecosites Available within CHIPP.

Ecosite	Description in CHIPP	Primary Foraging	Secondary foraging	Thermal
Upland grassland				
PR 01	Plains rough fescue and timber oatgrass		X	
Lodgepole pine softwood and mixedwood types				
PR 02	Lodgepole pine and grass		X	
PR 03	Trembling aspen and lodgepole pine	X		
Hardwood types				
PR 04	Trembling aspen	X		
White spruce softwood and mixedwood types				
PR 06	White spruce with grasses		X	X
PR 07	Trembling aspen and white spruce	X		X
BP 18	Black (or white) spruce treed swamp			
Shrubby, herbaceous, graminoid bogs and fens				
BP 25	Willow dominated nutrient rich fens		X	
PR 09	Graminoid fen			
Other types				
burns	recently burned areas		X >10 yrs	
logged	recently harvested areas		X >1-2 yrs	X >2-10 yrs
cleared	cleared for agriculture, usually seeded to tame grass			
developed	developed areas such as roads, subdivisions, and campgrounds			
water	lakes and streams			
marsh	fens/meadows with sedges and grasses (wet sites)		X	

3.6.2.1.2 Moose

Moose (*Alces alces*) are Saskatchewan's largest ungulate. Range extends throughout the boreal forest and southern parts of the province. Historically, moose were absent from the mixed-grass ecoregion but have since expanded their range into this area while adapting to the agricultural presence. Moose were introduced to the Cypress Hills in the 1940s after World War II. Preferred habitats are woodlands dominated by spruce, pine, or aspen, forest edges, and agricultural areas such as fields. Important moose habitat includes suitable foraging and diverse thermal cover. Moose require adequate thermal cover for protection from both cold and hot weather, with hot weather being more limiting than cold. Summer thermal habitats include wet sites which facilitate cooling while winter thermal requirements include coniferous cover to limit radiative heat loss. Ideal forage habitats are early successional forests up to 20

years old. Moose are generalist herbivores with different summer and winter forage preferences. Winter forage includes twigs from a variety of deciduous shrubs, conifers, and deciduous trees. Summer forage includes leaf material from a variety of deciduous shrubs and trees, aquatic macrophytes, and herbs/forbs (Timmerman and McNicol 1988; Government of Saskatchewan 2015; Government of Saskatchewan 2019b). Habitat preferences of moose as determined by Timmerman and McNicol (1988), Godwin and Thorpe (2012), and McLaughlan *et al.* (2010), have interpreted to relate to ecosites available within CHIPP and are presented in **Table 19**.

Table 19 Moose Habitat Preferences Based on Ecosites Available within CHIPP.

Ecosite	Description in CHIPP	Primary Foraging	Secondary foraging	Thermal
Upland grassland				
PR 01	Plains rough fescue and timber oatgrass		X	
Lodgepole pine softwood and mixedwood types				
PR 02	Lodgepole pine and grass		X	
PR 03	Trembling aspen and lodgepole pine	X	X	
Hardwood types				
PR 04	Trembling aspen	X	X	
White spruce softwood and mixedwood types				
PR 06	White spruce with grasses		X	X
PR 07	Trembling aspen and white spruce	X	X	X
BP 18	Black/white spruce treed swamp (moderately wet)		X	X
Shrubby, herbaceous, graminoid bogs and fens				
BP 25	Willow dominated nutrient rich fens	X		X ¹
PR 09	Graminoid fen		X	
Other types				
burns	recently burned areas	X		
logged	recently harvested areas	X		
cleared	cleared for agriculture, usually seeded to tame grass			
developed	developed areas such as roads, subdivisions, and campgrounds		X	
water	lakes and streams	X	X	X ¹
marsh	fens/meadows with sedges and grasses (wet sites)	X	X	X ¹

¹ indicates summer thermal cover

3.6.2.1.3 Pronghorn

Pronghorn (*Antilocapra americana*) are a unique species within Saskatchewan and the only member of the family Antilocapridae. Range extends throughout the southwestern portion of Saskatchewan. Preferred habitats are semi-arid prairies and farmlands. Important habitat includes suitable foraging and thermal bedding. They require a mixture of grasses, sedges, forbs, and low-growing shrubs, they have also adapted to utilize agricultural crops, particularly pulse crops or tame hay. Pronghorn are susceptible to extreme environmental conditions and see high mortality events in harsh winters. Competition with domestic grazers is also a limiting factor for pronghorn (Government of Saskatchewan 2015; Schwartz and Nagy 1976). Primary habitat for pronghorns is located in the adjacent grasslands surrounding CHIPP.

3.6.2.1.4 White-tailed deer

White-tailed deer (*Odocoileus virginianus*) are Saskatchewan's most abundant and widely distributed ungulate. The deer are a sought-after game species, with "trophy" animals being common. Range extends throughout Saskatchewan from the southern parts of the province into the northern boreal forest. Preferred habitats are open woodlands, farmlands, brushy areas, and forest edges bordering grasslands

or fields. Important white-tailed deer habitat includes suitable foraging and thermal cover. They require adequate thermal cover for protection during storms, cold weather, and deep snow. White-tailed deer are both browsers and grazers. Their diverse diet is comprised of woody vegetation and forbs, they have also adapted to utilize agricultural crops, particularly alfalfa (Government of Saskatchewan 2015; Government of Saskatchewan 2019b). Habitat preferences of white-tailed deer as determined by Rothley, K. D. (2001), Godwin and Thorpe (2012), McLaughlan *et al.* (2010), and Hiller *et al.* (2009) have interpreted to relate to ecosites available within CHIPP and are presented in **Table 20**.

Table 20 White-tailed Deer Habitat Preferences Based on Ecosites Available within CHIPP.

Ecosite	Description in CHIPP	Primary Foraging	Secondary foraging	Thermal
Upland grassland				
PR 01	Plains rough fescue and timber oatgrass	X		
Lodgepole pine softwood and mixedwood types				
PR 02	Lodgepole pine and grass		X	
PR 03	Trembling aspen and lodgepole pine	X	X	
Hardwood types				
PR 04	Trembling aspen	X	X	
White spruce softwood and mixedwood types				
PR 06	White spruce with grasses		X	X
PR 07	Trembling aspen and white spruce	X		X
BP 18	Black (or white) spruce treed swamp	X		X
Shrubby, herbaceous, graminoid bogs and fens				
BP 25	Willow dominated nutrient rich fens		X	
PR 09	Graminoid fen		X	
Other types				
burns	recently burned areas	X		
logged	recently harvested areas	X		
cleared	cleared for agriculture, usually seeded to tame grass		X	
developed	developed areas such as roads, subdivisions, and campgrounds		X	
water	lakes and streams			
marsh	fens/meadows with sedges and grasses (wet sites)		X	

3.6.2.1.5 Mule deer

Mule deer (*Odocoileus hemionus*) are a sought-after game species and are primarily found in the prairie and parklands of Saskatchewan including the Cypress Hills area, but their range extends to the northern forest fringe of the boreal forest. Preferred habitats are rolling hills and open terrain, mixed-forest edges, and foothills. Important mule deer habitat includes suitable foraging and thermal cover. They require adequate thermal cover for protection during storms, cold weather, and deep snow. Deep snow negatively impacts their ability to find forage. They are primarily browsers of woody vegetation; however, they have adapted to utilize agricultural crops (Government of Saskatchewan 2015; Government of Saskatchewan 2019b). Habitat preferences of mule deer as determined by Loft *et al.* (1991), McLaughlan *et al.* (2010), Godwin and Thorpe (2012), and Collins (1981) have interpreted to relate to ecosites available within CHIPP and are presented in **Table 21**.

Table 21 Mule Deer Habitat Preferences Based on Ecosites Available within CHIPP.

Ecosite	Description in CHIPP	Primary Foraging	Secondary foraging	Thermal
Upland grassland				

PR 01	Plains rough fescue and timber oatgrass			
Lodgepole pine softwood and mixedwood types				
PR 02	Lodgepole pine and grass		X	
PR 03	Trembling aspen and lodgepole pine	X		X
Hardwood types				
PR 04	Trembling aspen	X		X
White spruce softwood and mixedwood types				
PR 06	White spruce with grasses		X	X
PR 07	Trembling aspen and white spruce	X		
BP 18	Black (or white) spruce treed swamp		X	
Shrubby, herbaceous, graminoid bogs and fens				
BP 25	Willow dominated nutrient rich fens			
PR 09	Graminoid fen			
Other types				
burns	recently burned areas			
logged	recently harvested areas			
cleared	cleared for agriculture, usually seeded to tame grass		X	
developed	developed areas such as roads, subdivisions, and campgrounds	X		
water	lakes and streams	X		
marsh	fens/meadows with sedges and grasses (wet sites)	X		

3.6.2.2 FURBEARER SPECIES

A total of 19 species of mammals listed as furbearers in Saskatchewan (Gollop 2006) are found within or in the vicinity of CHIPP and are listed in **Table 22**. The park falls within Wildlife Management Zones 7E which contains the Centre Block and 7W which contains the West Block (**Figure 47**). Trapping within the park boundaries is by written permission of the Park Manager only. However, private land adjacent to the park is available for fur harvesting with right-of-access permission from the landowner. The provincial government maintains harvest records of furbearers along with the area in which they were harvested. These documents provide a rough record of the relative abundance of furbearing animals in the adjacent areas around the park. Summary of fur harvest data between seasons 2007/2008 and 2017/2018 for wildlife management zones 7E and 7W are presented in **Table 23**.

Table 22 Furbearers of Cypress Hills Interprovincial Park.

¹ Listed under SARA or COSEWIC ² Extirpated from area but within historical range

SCIENTIFIC NAME	COMMON NAME	SCIENTIFIC NAME	COMMON NAME
<i>Lepus americanus</i>	Snowshoe Hare	<i>Canis latrans</i>	Coyote
<i>Lepus townsendii</i>	White-tailed Jack Rabbit	<i>Canis lupus occidentalis</i> ²	Grey Wolf
<i>Sylvilagus nuttallii</i>	Nuttall's Cottontail	<i>Vulpes vulpes</i>	Red Fox
<i>Martes americana</i>	Marten	<i>Vulpes velox</i> ^{1 2}	Swift Fox
<i>Vison vison</i>	Mink	<i>Mephitis mephitis</i>	Striped Skunk
<i>Mustela erminea</i>	Short-tailed Weasel	<i>Felis concolor</i>	Mountain Lion
<i>Mustela frenata longicauda</i>	Long-tailed Weasel	<i>Lynx rufus</i>	Bobcat
<i>Mustela nivalis</i>	Least Weasel	<i>Castor canadensis</i>	American Beaver
<i>Taxidea taxus taxus</i> ¹	Badger	<i>Ondatra zibethicus</i>	Muskrat
<i>Procyon lotor</i>	Raccoon	<i>Tamiasciurus hudsonius</i>	Red Squirrel

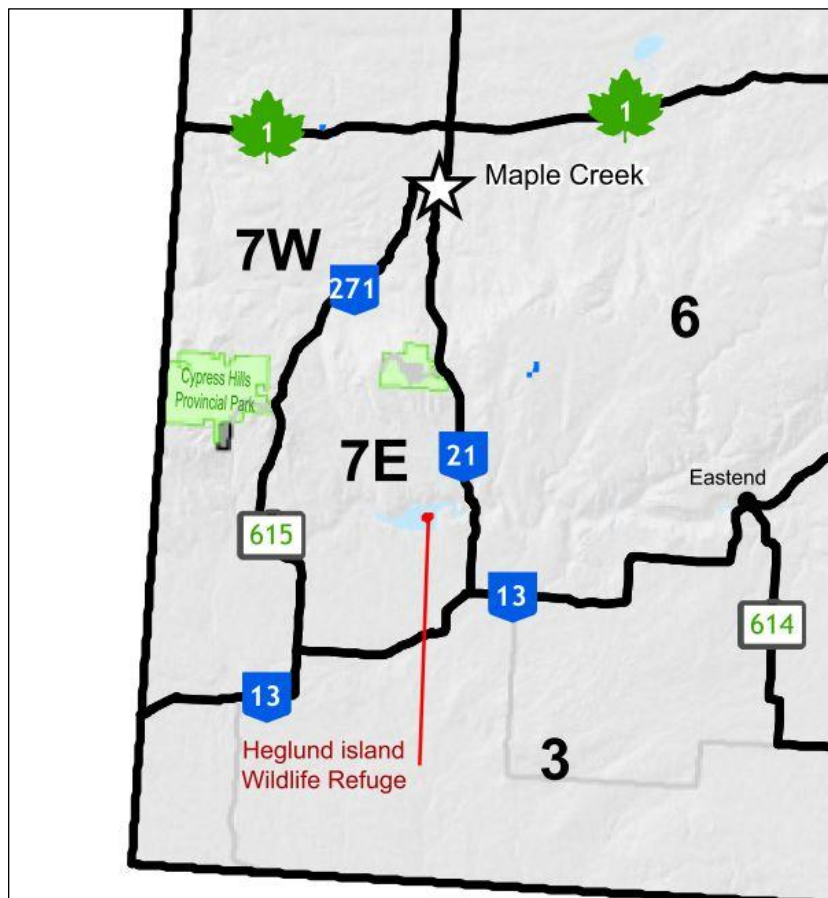


Figure 47 Wildlife Management Zones of the Cypress Hills Area.

A total of 11 species have been trapped in the vicinity of the Cypress Hills Interprovincial Park. Most commonly trapped species included coyote, American beaver, and muskrat at an average of 308, 73, and 14 per year, respectively. High coyote trapping rates may be due to season dates set to “Open Season” as well as increased market demand (Jacobs 2019; Government of Saskatchewan 2019). Rarely trapped species included weasel species, bobcat, and striped skunk at an average of 0.3, 0.2, and 0.2 per year, respectively. Possession and/or sale of pelts/parts are only allowed under permit (Government of Saskatchewan 2019). One bear was listed as harvested from zone 7 in the 2014-2015 season however, this is presumed to be an error by the Ministry of Environment: Fish, Wildlife, and Lands Branch (Koback 2020).

Mandatory reporting of mountain lion (or cougar) harvests is required. There was no cougar that has been reported on harvesting from 2007 to 2018 within the park boundary. However, there was a significant increase in tracks and sightings of cougars in the Cypress Hills in the period from 2000 to 2009 with the density of about 6.5-8.25 cougars/100 km² (Bacon, 2010). In 2006, confirmation was attained when a family of 3 cougars was photographed on a wildlife camera set up inside CHIPP in Alberta site, and another family of 3 was snared outside the park boundary (Bacon, 2010). Recently, cougar tracks and sightings were also observed by the park staff (Melody Nagel-Hisey, Val Lewis & Royce Pettyjohn per comm., 2020) in both West and Centre Blocks. The Cypress Hills likely serves as a jumping-off point for further expansion eastward to other small patches of forest in the prairies such as Moose Mountain Provincial Park in

Saskatchewan, and Duck Mountain Provincial Park and Riding Mountain National Park in Manitoba. Regulations in both Alberta and Saskatchewan allow private landowners to shoot cougars on their land to protect the owner's or occupant's property, including livestock (The Wildlife Regulations, 1981; Alberta Sustainable Resource Development, 2007). This may provide a challenge for the cougar population to persist in the region. Indeed, from 2004 to 2009 there were 12 reported mortalities of cougars outside the park boundaries in Alberta and Saskatchewan combined (Bacon, 2010). Even though cattle grazing inside the park during the summer and on adjacent land year-round are easily available prey items for cougars, there was no evidence of livestock depredation in over 300 kill sites and 250 scat samples observed by Bacon's study in 2010. Cougars prefer wild ungulates such as white-tailed deer and mule deer, and they also avoid areas in the park that have a high human presence (Bacon, 2010). To avoid a potential source of conflict among cougar, livestock and humans, key habitat features and corridors of cougars should be identified. Those key areas can be managed to allow for continued cougar dispersal, as well as allowing for precautionary measures to be taken to avoid livestock depredation and other conflicts with humans (Chetkiewicz et al. 2006; Bacon 2010). Public outreach and education about cougar habitat, biology, safety precautions and management regulations should be continued. This will boost tolerance of cougars and reduce negative human-wildlife encounters (Messmer et al. 2001, Bacon 2010).

The use of fur-harvest data to determine or estimate population abundances should be interpreted with caution. Fur-harvest numbers depend not only on animal abundance but on trapping effort and market value.

Habitat and other important information regarding the furbearers within the Cypress area are presented in **Table 24**.

Table 23 Number of Furs Harvested by Species within Fur Conservation Areas Adjacent to CHIPP (WMU 7W and 7E) for the period from 2007/2008 to 2017/2018.

Furbearer	Fur Management Zone			Total	Average/Year
	7(E+W)	7W	7E		
Snowshoe Hare	-	-	-	-	-
White-tailed Jack Rabbit	-	-	-	-	-
Nuttall's Cottontail	-	-	-	-	-
American Beaver	730	-	-	730	73
Muskrat	141	-	-	141	14.1
Red Squirrel	-	-	-	-	-
Coyote	2990	81	10	3081	308.1
Grey Wolf	-	-	-	-	-
Red Fox	75	8	2	85	8.5
Raccoon	39	-	1	40	4
Mountain Lion	-	-	-	-	-
Bobcat	2	-	-	2	0.2
Striped Skunk	2	-	-	2	0.2
Marten	-	-	-	-	-
Mink	44	-	-	44	4.4
Weasel (all species)	3	-	-	3	0.3
Badger	78	-	1	79	7.9
Bear ¹	1	-	-	1	0.1
Total				4208	

¹ 2014-2015 fur harvest statistic data, believed to be an error by Koback (2020)

Table 24 Habitat Information for Furbearers Occurring within CHIPP or the Vicinity (after Rock et al. 1997 as cited by Thorpe and Godwin 2012; Udvardy 1977; Canadian Wildlife Federation, no date).

Species	Prime Habitat	Notes
American Beaver	Streams, rivers, marshes, lakes, and ponds near aspen stands provide the best habitat.	Aspen dominated areas are favoured. Aspens, willow, and birch are preferred food sources.
Muskrat	Marshes, lake edges, or streams with water depths ranging from 1 to 2 metres	Emergent vegetation is the main food source.
Red Squirrel	Prime habitat is pine or spruce dominated forest.	Was extirpated and reintroduced to the Cypress Hills area. Coniferous seed are a preferred food source red squirrels, but will also eat mushrooms, nuts, berries, as well as birds and eggs.
Snowshoe Hare	Forested areas with a dense understory for cover and herbaceous vegetation for forage.	Cover can be young trees or tall shrubs which provide protection from predators and a source of food.
White-tailed Jack Rabbit	Prefers open habitats such as grassland, grazed lands, agricultural areas or barren lands.	Primary forage is grass, clover, and vegetation. Nests are built on the surface ground.
Nuttall's Cottontail	Wooded, rocky or brushy areas with sagebrush present.	Cypress Hills falls within the northern tip of the range. Diet is comprised of sagebrush, grasses, and juniper berries.
Marten	Old growth coniferous, mixedwood areas, and riparian areas.	Small rodents, grouse, hare, as well as bird eggs, amphibians, and berries make up the diet of this species.
Mink	Areas near streams, rivers, marshes, lakes, and ponds provide the best habitat.	Diverse prey include muskrat, rabbits, mice, amphibians, birds, chipmunks, snakes, and fish.
Short-tailed Weasel	Variable habitats including open forests, forest edges, brushy areas, grasslands, wetlands, and farmlands.	Diet is predominately small mammals such as voles and mice but will also eat young rabbits, frogs, snakes, shrews, insects, birds, and eggs.
Long-tailed Weasel	Variable prairie habitats including grasslands, parklands, open woodlands, and farmland preferably near water.	Diet is predominately small mammals such as voles and mice but will also eat rabbits, chipmunks, shrews, insects, birds, and eggs.
Least Weasel	Open habitats such as grassy and brushy fields, marshes, meadows, and floodplains. Utilizes abandons dens of other mammals such as mice, gopher, and ground squirrel.	Diet is predominately small mammals such as voles and mice but will also eat shrews, insects, birds, and eggs.

Badger	Open plains and prairies, farmlands, and occasionally edges of woodlands	Are a species of concern in Canada and listed at “special concern” under both SARA and COSEWIC
Coyote	Abundant within plains, prairies, and open or semi-wooded areas. Require denning sites.	The coyote benefits from increased small mammal and ungulate populations associated with logging as well as the extirpation of larger predators.
Grey Wolf	The forested areas that create the most suitable habitat for the large ungulates are the prime habitats for the wolf.	Extirpated from Cypress area, traditional range includes Cypress. As moose population expands into southern Saskatchewan wolves have been sighted as far south as Swift Current. Prey is typically large ungulates but will include smaller prey when available.
Red Fox	Forested areas or near forested areas with available denning sites.	Logging and fires create the abundance of small mammals that foxes rely on. The fox is an opportunistic, generalist carnivore taking a wide variety of prey including insects, birds, and berries.
Swift Fox	Short or mixed grass prairie and arid sites on level terrain or gently rolling hills. With a supply of small mammals, ground nesting birds, and insects for food.	Are a protected species in Canada and listed at “threatened” under both SARA and COSEWIC. Associated closely with other prairie species including black-tailed prairie dog and badger.
Raccoon	Habitat generalist however, prime habitat includes deciduous forests near wet areas, floodplain areas, and farmlands. Prairie habitat include wooded and wetland areas.	Generalist with requirements for food, water, and a protected area for denning being critical.
Striped Skunk	Habitats include open areas of mixed forest and grasslands. Have become accustomed to living in proximity to humans.	More open areas are favoured as they provide the best foraging opportunities. Have an omnivorous diet with a wide variety of foods. Typically utilize abandoned denning sites of other mammals.
Mountain Lion	Forest fragments of foothills, mountains, and interior plateaus with abundant cover.	Found in areas with abundant prey (white-tailed deer and mule deer), CHIPP is known for a high density of mountain lions. Cover is utilized for stalking prey, establishing den sites, and camouflage.
Bobcat	Southern fragmented forest (coniferous, deciduous or mixed), farmlands, shrubby areas, or arid lands	Hare and rabbit make up majority of diet but will include other smaller mammals, reptiles, and birds.

3.6.3 ANIMAL SPECIES-AT-RISK

Complete lists of birds, mammals, and reptiles/amphibians are given in Appendices 3, 4, and 5. Federally listed animal species-at-risk (i.e. species listed within the *Species at Risk Act* or under the Committee on the Status of Endangered Wildlife in Canada) that occur or have potential to occur within CHIPP are given in **Table 25**. There is no critical habitat that has been identified for federally listed species within CHIPP. Habitat requirements for these species are also given.

There is one federally listed mammal that has known occurrences within CHIPP and two additional mammal species with the potential to occur: little brown myotis and potentially the American badger and swift fox. The little brown myotis is discussed in detail below. The American badger may be found along the forested edges of the park and is listed as “special concern” under the Species at Risk Act (SARA) and by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). While not currently found within the park, the historical range of the swift fox extends into the park. The swift fox was extirpated from Canada in the 1930s and then reintroduced in 1983 through a captive breeding program into the area south of the West Block. The status of the swift fox is currently “threatened” by both SARA and COSEWIC.

A total of 24 bird species that are listed by SARA or COSEWIC have potential to be found breeding within CHIPP. Detailed information regarding the Sprague’s Pipit (*Anthus spragueii*) life history and habitat has been added below. An additional four species have breeding ranges adjacent to CHIPP and may utilize the park. Ranges for the sage thrasher (*Oreoscoptes montanus*) and mountain plover (*Charadrius montanus*) are located immediately south of the park, the piping plover (*Charadrius melodus*) range overlaps the park, and red-headed woodpecker (*Melanerpes erythrocephalus*) may be found in the eastern or southern areas near the park. Three species of federally listed birds may utilize the park during migration: Canada warbler (*Cardellina canadensis*), red-necked phalarope (*Phalaropus lobatus*), and rusty black bird (*Euphagus carolinus*). In addition to current at-risk bird species, the greater prairie chicken (*Tympanuchus cupido*) historically utilized the Cypress Hills and surrounding area but has been extirpated from Canada since approximately 1987.

The Cypress Hills provides habitat for two amphibians and one reptile that are considered at-risk. The northern leopard frog (*Lithobates pipiens*) and the barred tiger salamander (*Ambystoma mavortium*). Both species are listed as “of special concern” by SARA and COSEWIC. The bullsnake (*Pituophis catenifer sayi*) is listed as “of special concern” by COSEWIC and is currently listed as “under consideration” for SARA.

A non-vertebrate species of note when considering management decisions includes the Black Hills Mountain Snail (*Oreohelix cooperi*). The gastropod has not been officially designated by COSEWIC or SARA but final assessment reports are due to be examined in April 2020. Life history and habitat information regarding *Oreohelix cooperi* has been detailed below.

3.6.3.1 LITTLE BROWN MYOTIS

The little brown myotis (*Myotis lucifugus*) is an animal species of concern when applying management issues within Cypress Hills Interprovincial Park (**Figure 48**). *Myotis lucifugus* is a small to medium sized, insectivorous bat widely distributed within the Canadian provinces extending southward into the United States and north-central Mexico as well as Alaska and Yukon Territory. Mating typically occurs in the fall with delayed fertilization occurring in the spring. Females produce one offspring per year. The animals are listed as “endangered” under COSEWIC and SARA (2013 and 2014 respectively). The designation of

“endangered” was in response to an emergency assessment in 2013. The emergency assessment was completed as a reaction to sharp population declines within eastern Canada. White-nose syndrome (*Pseudogymnoascus destructans*), a fungal pathogen has decimated eastern populations by up to 95 percent (Environment Canada, 2015). In Saskatchewan, the animals are listed by the Saskatchewan Conservation Data Centre (2019) as apparently secure for both breeding and migratory (S4B, S4N) however this designation does state that “some cause for long term concern due to declines or other factors” is applicable. The animals are also protected under the Saskatchewan Wildlife Act (updated 2015).



Figure 48 Little Brown Myotis (Photo credit: Bill Kraus, Canadian Wildlife Federation, no date).

Terrestrial habitats include forests, grasslands, shrublands, sub-urban and urban areas. Several specific habitat types are needed for the little brown myotis. The bats require overwintering sites (i.e. hibernacula). Overwintering sites generally include underground openings such as tunnels, caves, abandoned mines, or wells. To date, no overwintering sites are known in Canada. Entrance openings are typically at least 30 centimetres in diameter with the chamber continuing for 30 metres or more. The animals are not typically found in cave/mine sites that are prone to flooding (BC Ministry of Environment 2016). The animals may overwinter in buildings or as small groups under root wads of trees and stumps. *Myotis lucifugus* have been known to fly hundreds of kilometres to return to suitable hibernating locations.

Summer roosting habitat includes rock crevices, raised bark, foliage, and tree cavities. Mature to over-mature forest with tall snags in early or middle decay with larger diameters provide roosting habitat. Rock crevices are typically shallow (less than 10 metres deep) and have some airflow. Roosts are typically found in southern to southwestern aspects to maximize solar heating (BC Ministry of Environment, 2016). Foraging is often associated with open habitats such as ponds, roads, open canopies (less than 50 percent canopy closure), and riparian areas along lake and streams. Prey may also be utilized within forests and more closed canopies.

Specific external habitat features have yet to be characterized in any study, but characteristics thought to be beneficial include amount of entrance shelter (i.e. canopy cover or rock faces), watercourse proximity to roosting sites (i.e. within two kilometres of site), watercourse length (i.e. greater than ten kilometres) as well as total chamber length (Randall and Broders 2014).

As mentioned above the white-nose syndrome is the most pressing threat to the population as well as to other bat populations. The cryophilic fungus is likely to impact the entire population between years 2025 to 2028. The pathogen has been expanding its range 200-250 kilometres per year. Expansion of the pathogen is due to direct contact between infected bats as well as surface transfer of spores including accidental transfer spore between hibernacula. Spores are known to survive for long periods of time in the soil.

Suitable hibernacula are a limiting factor for bats. The animals are dependent on specific microclimatic conditions especially during hibernation. Any activity that makes a hibernaculum inaccessible or alters the temperature, humidity, airflow or other microclimatic characteristic may destroy or degrade the site. This includes reactivation or decommissioning of potential hibernacula structures. Currently, hibernacula locations are not known within Saskatchewan (Environment Canada 2015). It is critical that appropriate decontamination protocol for clothing, shoes, and equipment be followed prior to inspecting any potential hibernacula or roosting sites (Western College of Veterinary Medicine, 2017). Currently, white-nose syndrome has not been detected within Saskatchewan (Canadian Wildlife Health Cooperative 2019).

Other threats include habitat loss and degradation (e.g. destruction or degradation of hibernacula, maternity roosts, and foraging areas), disturbance or harm (e.g. recreational, scientific, and industrial disturbance), pollution, and climate change (Environment Canada, 2015).

Industrial disturbances in the area of CHIPP include wind turbines. There are two known wind farm locations in the vicinity of CHIPP: Cypress Wind with 16 turbines and Sunbridge with 17 turbines established near Gull Lake, Saskatchewan. Wind turbines pose risks to bats from direct collisions with blades or change in air pressure behind blades causing barotrauma. It is estimated that approximately $15.5 (SD \pm 3.8)$ bats die per year per turbine in Canada based on recent mortality studies, with little brown myotis accounting for 13 percent of all bat mortalities. Other anthropogenic sources of disturbance include roads and the use of pesticides and herbicides. As traffic increases, noise disturbance can reduce flight activity and foraging by interrupting a bats ability to echolocate. Pesticide and herbicide use in adjacent agricultural practices or within the park can negatively impact bat populations. Bats are highly susceptible to bioaccumulation due to longevity of life and food intake to sustain their high metabolic rates. Exposure to these contaminants can be a consequence from feeding on aquatic emergent insects who have been exposed to chemical run off.

Currently, the species recovery strategy is to maintain current populations and increase them where possible. Regrettably, a lack of data is inhibiting critical habitat identification, as well as variances in habitat requirements across the range. Typically, only female roosting and hibernating habitats are considered critical habitat, as they have greatest impact on species repopulation.

Recovery strategies within CHIPP could include limiting access and disturbance to areas that may contain hibernacula and or other habitat sites (e.g. roosting). In particular, riparian areas along Battle Creek in West Block is one of important habitats for little brown myotis that should be avoided for any disturbances (Dr. Mark Brigham, per communication). Management or restoration could potentially increase sufficient habitat and may even locate suitable wintering habitat (hibernacula) in the Prairies that is free of white-nose syndrome spores.

3.6.3.2 SPRAGUE'S PIPIT

An avian species of concern within the Cypress Hills Interprovincial Park is the Sprague's Pipit (**Figure 49**). Sprague's Pipit (*Anthus spragueii*) is listed as Threatened under both COSEWIC and SARA. It has experienced long-term declines since 1980, with no evidence of recovery (Environment Canada, 2012). As a result, Sprague's Pipit is protected under the *Migratory Birds Convention Act* and the *Saskatchewan Wildlife Act*. The species splits its time between Canada and the southern US/northern America, for breeding and overwintering purposes, respectively. The birds arrive in Canada between late April and early May. Ground nesting begins with clutches laid in late May and early June (Government of Canada, 2011). The species is a good indicator of prairie health as they are highly sensitive to anthropogenic changes. The Sprague's Pipit has potential to be used as an indicator species to flag other rare and endangered grassland species such as the long-billed curlew (*Numenius americanus*), McCown's longspur (*Rhynchophanes mccownii*), and the swift fox (*Vulpes velox*) (Government of Canada, 2017).

Within its breeding habitat, it is most commonly associated with the Moist Mixed and Mixed Grassland Ecoregions of the Prairie Ecozone (Shorthouse, 2010). The preferred habitat for Sprague's Pipit is described as large patches (greater than 65 hectares) of flat or gently rolling native prairie grassland in fair to excellent condition, with limited invasive species (Environment Canada 2012). Vegetation preferences include moderately tall (10 to 30 centimetres) herbaceous vegetation (Grilz et al. 2014). The birds are typically found away from development (Environment Canada, 2012) as these features are associated with the encroachment of invasive species.



Figure 49 Sprague's Pipit (Photo credit: Jay MacGowan, All About Birds, 2020).

Potential locations of the Sprague's Pipit can be narrowed down through geo-spatial selection of appropriate and undesirable habitat features. Potential habitat would include native grassland patches greater than 29 hectares in size (Environment Canada, 2012). Further narrow selection criteria by

discarding unsuitable habitat areas (e.g. woody vegetation patches, open sand dunes, riparian areas, waterbodies, non-native grassland, grazing/haying/other cultivated lands, patches fragmented with cropland), roads greater than two metres, oil and gas infrastructure buffered to 60 metres (Environment Canada, 2012), and any other existing infrastructure (e.g. buildings, fence lines).

Major threats include limited reproductive success due to predation (COSEWIC 2010). Predation has been linked to habitat patch size as predation increased when the ratio of edge to interior was higher. Other threats include habitat loss, degradation, and fragmentation (Government of Canada, 2011).

Habitat improvements can include vegetation management. Moderate grazing, haying or mowing that ensure “High Fair” to “Good” range condition is thought to keep vegetation at preferred height and density for Sprague’s Pipit as well as other grassland bird species (Hull, 2002). Similarly, prescribed fire can be utilized at some small areas and under suitable weather conditions to reduce woody vegetation encroachment (i.e. trees and shrubs) as well as reduce litter accumulation. Environment Canada (2012) found that populations increased approximately two to seven years after a fire. Proposed management treatments should be conducted outside of the nesting and fledging window (end of April through August) to prevent any negative population impacts.

3.6.3.3 BLACK HILLS MOUNTAIN SNAIL

The Black Hills Mountain snail (*Oreohelix cooperi*) is another animal species of consideration when applying management issues within Cypress Hills Interprovincial Park (Weaver *et al.* 2006). *Oreohelix cooperi* is a small (**Figure 50**) hermaphroditic, ovoviviparous, land snail (Anderson *et al.* 2005). It is known to only occur within Canada on the western butte (i.e. West Block) of Cypress Hills where it is associated with the Cypress Hills Formation (COSEWIC 2019). Outside of the Cypress Hills the snail is only found in small isolated areas within the sky islands of Wyoming and South Dakota (Dempsey *et al.* 2018, Weaver *et al.* 2006). The animals have been recognized by South Dakota as a species of concern and an indicator species within the Black Hills National Forest (Anderson 2005).

Habitats include steep slopes and cliffs associated with the Cypress Hills formation. *Oreohelix cooperi* is typically found along dry, slopes and ridgelines with a southern aspect. Preferred substrates include loose calcareous gravels, conglomerate rock or sand and sandstones (Anderson 2005). Known habitats have a slight basic soil pH ranging between 7.6 and 8.01. Preferred elevation is between 1178 and 1450 metres. The study results show significant elevation/temperature influence on average shell size. Dempsey *et al.* (2018) found that the dominant vegetation species within preferred habitats include sparse numbers of juniper (*Juniperus* spp.) and other low-profile shrubs (i.e. *Potentilla* spp.). The animals over-winter within soil litter. They also utilize the soil and litter to escape warm summer temperatures.

The animals require a layer of leaf litter but are thought to be a generalist detritivore and herbivore, with no specific requirements for food. It has been found that both body size and population numbers increase in cooler, moist areas with greater leaf litter-fall. Anderson *et al.* (2005) studied the effect of population elevation level including associated ambient temperature and the influence on average shell size. *Oreohelix cooperi* has no set requirement for vegetation, slope, aspect or moisture content (Weaver *et al.* 2006). However, they are not typically found in grazed areas.

The typical range of *Oreohelix cooperi* is less than one metre and up to ten metres a year. The animals survive undesirable conditions, including hot summer temperatures, by burrowing and entering a state of dormancy (Weaver *et al.* 2006). Due to limited mobility they are unable to escape changing ecological conditions and are forced to adapt in place or face extinction.

Years of fire suppression within Cypress Hills has caused an increased fuel load accumulation and wildfire risk. Due to their reliance on the leaf litter layer the Cypress Hills populations of *Oreohelix cooperi* are at risk should a fire burn to the mineral soil. Management considerations should be in place to reduce fuel load and wildfire hazard in CHIPP for protecting known and suitable habitats of *Oreohelix cooperi*.



Figure 50 Black Hills Mountain Snail (Photo credit: Anderson 2005).

Table 25 Federally Listed Animal Species-at-risk that Occur within CHIPP or Have the Potential to Occur in CHIPP.

Federal status according to COSEWIC and SARA, and provincial status according to SKCDC (S1=extremely rare; S2=rare; S3=rare-uncommon, S4=common; S5=very common; for migratory species, rating with modifier B applies to the breeding population in SK, modifier N applies to the non-breeding population, and modifier M applies to the transient population).

Common Name	Scientific Name	COSEWIC*	SARA*	SKCDC**	Habitat	Notes
Amphibians						
Northern Leopard Frog	<i>Lithobates pipiens</i>	Special Concern	Special Concern	S3	Permanent or semi-permanent wetlands 1.5-2.0 m deep, neutral pH and lacking fish, fresh meadow, shallow marsh or un-mowed pasture, streams, creeks, and rivers	Adversely affected by habitat conversion such as wetland drainage, eutrophication, game fish production, pesticide contamination, habitat fragmentation, collection, and susceptibility to disease.
Barred Tiger Salamander	<i>Ambystoma mavortium</i>	Special Concern	Special Concern	S4	Grasslands, parkland, subalpine meadows, and semi-deserts with sandy or friable (crumbly) soils surrounding semi-permanent to permanent water bodies lacking predatory fish	Threats include habitat loss and fragmentation, fish stocking, and emerging diseases, migration routes disrupted, roadkill mortality.
Reptiles						
Bullsnake	<i>Pituophis catenifer sayi</i>	Special Concern	Under Consideration	S4	Short- and mixed-grass prairie, brushy and sandy areas, badlands scarps and fissures, sinkholes, rocky outcrops, south-facing exposures	Population threats from habitat loss and roadkill, scarcity of communal wintering dens, which may be scarce on the landscape. Additional vulnerability due to low abundance, late maturity, and low rate of productivity.

Mammals

Little Brown Myotis	<i>Myotis lucifugus</i>	Endangered	Endangered	S4B,S4N	Hibernacula for over wintering (i.e. caves, buildings or abandoned mines), summer and breeding requiring trees, rock crevices, buildings, bat houses	Emergency assessment and designation due to White-nose Syndrome (fungal disease) within Canada that has caused a 94% decline in eastern myotis and other bat species populations.
Swift fox	<i>Vulpes velox</i>	Threatened	Threatened	S3	Short or mixed grass prairie and arid sites on level terrain or gently rolling hills.	Extirpated from Canada in 1930s, re-introduced to area south of CHIPP in 1983. Historic range extends into CHIPP. Current threats include habitat loss from agriculture, development, roads, predation from coyotes and golden eagles, trapping, vehicle collisions, poisoning.
American Badger	<i>Taxidea taxus taxus</i>	Special Concern	Special Concern	S3	Open plains and prairies, farmlands, and occasionally edges of woodlands	Population threats from road-kill and habitat loss and degradation resulting from housing development, forest in-growth and encroachment, and agriculture.

Birds

Baird's Sparrow	<i>Ammodramus bairdii</i>	Special Concern	Special Concern	S4B	Native mixed-grass and fescue grasslands with sparse shrub cover	Breeding population potential within CHIPP. Population threats from native prairie habitat loss due to agriculture.
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Bank Swallow	<i>Riparia riparia</i>	Threatened	Threatened	S5B,S5M	Areas with vertical banks including riverbanks, lake and ocean bluffs, aggregate pits, road cuts, and stock piles of soil, foraging in grasslands and open areas	Breeding population potential within CHIPP. Threats include loss of breeding and foraging habitat, destruction of nests during aggregate excavation, collision with vehicles, widespread pesticide use affecting prey abundance, and reduced survival or reproductive potential due to impacts of climate change.
Barn Swallow	<i>Hirundo rustica</i>	Threatened	Threatened	S5B,S5M	Open forests, shrublands, grasslands, use of urban, agricultural, and artificial structures (e.g. bridges, buildings)	Breeding population potential within CHIPP. The causes of the recent population decline are not well understood but may be due to declines in insect populations, foraging habitat, or artificial nesting sites.
Bobolink	<i>Dolichonyx oryzivorus</i>	Threatened	Threatened	S5B	Typically found in tall-grass prairie, restored sites, no till crops, wet prairie areas, generally not as abundant in short-grass prairie	Breeding population potential within CHIPP. Threats include incidental mortality from agricultural operations, habitat loss and fragmentation, pesticide exposure and bird control at wintering roosts.

Burrowing Owl	<i>Athene cunicularia</i>	Endangered	Endangered	S2B,S2M	Open sparse grasslands with available burrows created by associated species (black-tailed prairie dogs, American badgers, coyotes, foxes, and ground squirrels)	Breeding population potential within CHIPP. Population declines due to loss of grassland habitat and suitable burrows compounded by a reduction in prey populations, and concurrent increases in predation, vehicle collisions, expansion of renewable energy, and severe weather events.
Canada Warbler	<i>Cardellina canadensis</i>	Threatened	Threatened	S5B	Most abundant in old-age wet, mixed deciduous-coniferous forest with a well-developed shrub layer, also found in riparian shrubs	Potential CHIPP visitor during migration seasons. Reasons for decline are unclear, but loss of primary forest on the wintering grounds in South America is a potential cause.
Chestnut-collared Longspur	<i>Calcarius ornatus</i>	Endangered	Threatened	S5B	Native short- or mixed- grass prairie with an area of at least 40 hectares is generally required for breeding	Breeding population potential within CHIPP. Primary threat is degradation and fragmentation of native grasslands as well as loss of habitat in the core wintering region of northern Mexico.
Common Nighthawk	<i>Chordeiles minor</i>	Special Concern	Threatened	S4B,S4M	Wide range of open areas with limited vegetation including: sparse or harvested forests, scrub, grasslands, rocky outcrops or barrens	Breeding population potential within CHIPP. Reasons for declines are not well known, but include reduction in populations of aerial insects due to agricultural and other

						pesticides, as well as and changes in weather events.
Ferruginous Hawk	<i>Buteo regalis</i>	Threatened	Threatened	S4B,S4M	Native grasslands away from urbanization or agriculture	Sensitive to habitat loss and are a grassland species specialist.
Greater Prairie Chicken	<i>Tympanuchus cupido</i>	Extirpated	Extirpated	SX	Large expanses (5000-6000 ha) of tall or mixed native grasslands	Extirpated from Canada. Historically abundant on prairie grasslands. Habitat loss and degradation and hybridization with the Sharp-tailed Grouse contributed to its extirpation.
Horned Grebe	<i>Podiceps auritus</i>	Special Concern	Special Concern	S5B	Fresh water or brackish small semi-permanent or permanent ponds, marshes, and shallow bays on lake borders with emergent vegetation	Breeding population potential within CHIPP. Threats include degradation of wetland breeding habitat, droughts, increasing populations of nest predators (mostly in the Prairies), and oil spills on their wintering grounds in the Pacific and Atlantic Oceans.
Long-billed Curlew	<i>Numenius americanus</i>	Special Concern	Special Concern	S3B,S4M	Native short-grass and mid-grass prairie for breeding	Breeding population potential within CHIPP. Threats include habitat loss and degradation from urban encroachment, cultivation of marginal native habitat and oil and gas development. Increased frequency of droughts associated with climate change, and

						increase in predators associated with habitat fragmentation.
McCown's Longspur	<i>Rhynchophanes mccownii</i>	Threatened	Threatened	S3B	Short-grass prairie, non-native pastures, closely grazed mixed-grass prairie, and some cultivated fields with sparse or bare patches	Breeding population potential within CHIPP. Population declines due to loss and degradation of grassland habitats within both its breeding and wintering grounds.
Mountain Plover	<i>Charadrius montanus</i>	Endangered	Endangered	S1B	Flat areas of native mixed grassland with naturally short vegetation and bare ground or due to heavy grazing or recent burns	Known range south of CHIPP potential for species to visit or utilize area. Threats include conversion of native grasslands to croplands, agricultural practices and the management of domestic livestock.
Olive-sided Flycatcher	<i>Contopus cooperi</i>	Special Concern	Threatened	S4B,S4M	Forest habitat is either coniferous or mixed wood preferably in or near wetland areas	Breeding population potential within CHIPP and potential for species to utilize during migration. Greatest threat is loss of wintering habitat in South America. Local threats include climate change, quality of nesting habitat, and abundance of insect prey.
Peregrine Falcon	<i>Falco peregrinus anatum</i>	Not at Risk	Special Concern	S1B,S4M, S2N	Diverse local habitats including open forests, prairies, and urban areas, nesting structures 50-200m in height	Breeding population potential within CHIPP and potential for species to utilize during migration. Currently there are no significant threats to the

						species. Historically, pesticides and pollution played a role in declining populations.
Piping plover	<i>Charadrius melodus</i>	Endangered	Endangered	S3B	Nesting just above high water mark on lakes or ponds	Known breeding range near CHIPP and potential for species to visit area or utilize during migration. Major threats from predation, human disturbance, and declines in habitat extent and quality.
Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>	Endangered	Threatened	S1B,S1M	Open deciduous or deciduous dominant mixed-wood forests but also found in grasslands, riparian and urban areas with standing dead trees	Known breeding range near CHIPP. Population declines due to reduced quality of breeding habitat, particularly the loss of standing dead trees needed for nesting, fly-catching, and food caching. Other threats include increased competition for nest sites from native and non-native bird species.
Red-necked Phalarope	<i>Phalaropus lobatus</i>	Special Concern	Special Concern	S4B,S3M	Use of lakes and ponds, especially saline lakes with abundant aquatic invertebrates during migration	Potential CHIPP visitor during migration seasons. Population declines due to habitat degradation associated with climate change and susceptibility to pollutants and oil exposure on migration and during the winter.

Rusty Blackbird	<i>Euphagus carolinus</i>	Special Concern	Special Concern	S4B	During migration primary habitat needed is wooded wetlands or forested lands near water	Potential CHIPP visitor during migration seasons. Threats include loss and degradation of breeding wetland habitat, mercury contamination, and environmental conditions including warming, acidification, and drying climates.
Sage Thrasher	<i>Oreoscoptes montanus</i>	Endangered	Endangered	S1B	Shrublands and grasslands dominated with sagebrush	Known breeding range south of CHIPP potential for species to visit or utilize area. Major threat is habitat loss due to agricultural conversion.
Short-eared Owl	<i>Asio flammeus</i>	Special Concern	Special Concern	S3B,S2N	Utilizes a variety of open habitats including grasslands, pastures, and occasionally agricultural fields.	Breeding population potential within CHIPP. Major threats include habitat loss and degradation on its breeding grounds in southern Canada and poisoning due to pesticide use.
Sprague's Pipit	<i>Anthus spragueii</i>	Threatened	Threatened	S3B	Habitat requirements include large tracts of intact native grasslands	Breeding population potential within CHIPP. Population declines due to habitat loss, degradation (e.g. grazing, haying, agriculture), and/or fragmentation.

Western Grebe	<i>Aechmophorus occidentalis</i>	Special Concern	Special Concern	S5B	Lakes and ponds with emergent vegetation, stable water levels and prey fish	Breeding population potential within CHIPP. Colonization during breeding increases susceptibility to threats such as oil spills, water level fluctuations, and fisheries bycatch, as well as declines in prey availability.
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* www.registrelep-sararegistry.gc.ca, accessed 20-January-2020

** www.biodiversity.sk.ca, accessed 20-January-2020

4 ECOSYSTEM-BASED MANAGEMENT GOALS AND OBJECTIVES

4.1 GOAL 1

Maintain a safe outdoor environment while enhancing aesthetic, educational, recreational, and interpretive opportunities within the park.

- ▶ Objective 1. Manage wildfire risk at the wildland-urban interface while protecting human life and infrastructure
- ▶ Objective 2. Manage high risk vegetation in core areas and high-use areas by identifying and removing hazardous risk trees through harvests and regeneration
- ▶ Objective 3. Manage overall park vegetation to ensure a safe and natural environment while maintaining the natural aesthetics for park patrons
- ▶ Objective 4. Provide enhanced education and interpretation opportunities of park vegetation, known threats (i.e. non-native species, insect, disease and wildfire hazard), landscapes, ecosystems, and species

4.2 GOAL 2

Restore natural disturbance regimes while maintaining the natural landscape, ecosystem, and species diversity of CHIPP.

- ▶ Objective 1. Restore natural disturbance regimes and broaden forest age-class distributions to the park ecosystem
- ▶ Objective 2. Create management recommendations based on the impacts of current activities within the park as well as proposed activities or developments
- ▶ Objective 3. Maintain ongoing inventory of the park's biological and ecological resources
- ▶ Objective 4. Foster relationships and partnerships with stakeholders, First Nation and Métis communities, non-governmental organizations and governmental agencies to enhance conservation efforts within the park
- ▶ Objective 5. Monitor the state of the environment within CHIPP as well as the outcomes of the management actions implemented from the ecosystem-based management plan

5 ECOSYSTEM-BASED MANAGEMENT RECOMMENDATIONS AND IMPLEMENTATION

5.1 GOAL 1

Maintain a safe outdoor environment while enhancing aesthetic, educational, recreational, and interpretive opportunities within the park.

5.1.1 OBJECTIVE 1

Manage wildfire risk at the wildland-urban interface while protecting human life and infrastructure.

Recommendations:

- ▶ Ensure effective evacuation in the event of a wildfire
 - Initiate strategic evacuation analysis of the Centre Block
 - Confirm existing primary evacuation routes within the core area, Centre Block, and West Block through a structured conversation with emergency management organizations/individuals
 - Develop prescriptions for improvements to the routes and treatments adjacent to the routes in order to improve their robustness and effectiveness as key evacuation routes in the case of wildfire
 - Collaborate with third- parties in the development of an emergency notification system to support effective evacuation
 - Design and implement a mock evacuation of the West Block to understand challenges and limitations of the current evacuation situation
 - Develop a coordinated communication, education and signage program to ensure the improved awareness and contribute to increased odds for successful implementation of evacuation in the Centre Block
 - Include proactive planning of evacuation risks not only for the Centre Block but also the West Block
- ▶ Implement fuel treatments for threat reduction (e.g. fuel modifications, mechanical thinning, prescribed fire or other treatments)
 - Improve robustness of identified evacuation routes through fuel modifications (e.g. removal of overgrown trees along Battle Creek Road in the West Block & fuel modification along the evacuation route in the Centre Block)
 - Incorporate significant fuel modifications (mechanical thinning, hand treatments, etc.) to remove fuel loading, particularly in core areas
 - Develop and maintain a system of fuel modification corridors across the Centre Block
 - Fully implement fuel modifications within the Fuel Modification Zones (See the associated Forest Conservation Management Plan)
 - Implement fuel treatments around specific areas of high-density infrastructure
 - Implement the Wildland Urban Interface Program with cottagers and business owners in CHIPP

- Work with SaskPower to identify priority line sections for hazard reduction efforts
- ▶ Possible Implementation of Safety Zones

5.1.2 OBJECTIVE 2

Manage high risk vegetation in core areas and high-use areas by identifying and removing hazardous risk trees through harvests and regeneration.

Recommendations:

- ▶ Risk tree management:
 - Continue implementing standard assessment protocols for risk trees within core areas (see Section 5.2.3)
 - i) Implement remedial action for high-risk trees: pruning, cabling, tree removal; moving the target; or excluding visitors from hazardous sites
 - Develop a vegetation management plan for core-area forests (e.g. campgrounds):
 - i) Map stand composition and age from the SFVI forest inventory
 - ii) Incorporate field assessments of stand composition and health from the core area inventory (see Section 5.2.3)
 - iii) Prioritize stands for harvesting – dependant on age and health status
 - iv) Develop regeneration plan for different forest types in core area
 - v) Protect renewed stands until trees are mature enough to withstand recreational traffic
- ▶ Rehabilitate areas of physical damage identified by core area inventory (see Section 5.2.3) (e.g. trampled areas in campgrounds and trails)
- ▶ Utilizing native plant species as landscaping material and removal of existing exotic ornamentals in core areas and high-use areas

5.1.3 OBJECTIVE 3

Manage overall park vegetation to ensure a safe and natural environment while maintaining the natural aesthetics for park patrons.

Recommendations:

- ▶ General vegetation management for non-core areas is addressed under Goal 2
- ▶ Assess and manage high-risk trees in non-core areas and low-use areas (i.e. trails, day-use areas)
- ▶ Incorporate minimal, low-impact management practices on recreational trails and non-core areas (i.e. only the amount of tree removal and mowing needed for visitor use and safety)
- ▶ Include recreational trails in road/trail inventory and assessment and develop access management plan (see Section 5.2.3)
- ▶ Ensure the inclusion of recreational trails and non-core areas in exotic plant inventory, treatment and management (see Section 5.2.3)

5.1.4 OBJECTIVE 4

Provide enhanced education and interpretation opportunities of park vegetation, known threats (i.e. invasive or non-native species), landscapes, ecosystems, and species.

Recommendations:

- ▶ Develop educational and interpretive material for park patrons and stakeholders on the concepts of ecosystem-based management planning as well as other management planning (e.g. forest conservation management plan & management options)
- ▶ Develop educational and interpretive material on specific topics related to ecosystem-based management, such as:
 - The diversity of ecosystems and ecosites in CHIPP
 - The role of ecosystem and forest age-class diversity in providing habitats for a range of fauna and flora
 - The natural role of fire in forests of the park; successional stages following fire; and treatments such as prescribed burning to renew ecosystems and landscapes, specifically fescue grasslands
 - Circumstances under which ecologically appropriate forest harvest may be used to emulate natural fire disturbances and advantages of harvesting to achieve ecological purposes
 - Climate change and its expected effects on the park's ecosystems including tree encroachment onto fescue grasslands
 - The threats of non-native and invasive plant species including origins, mechanisms of dispersion, and their effect on natural ecosystems within the park
 - The threat of fragmentation and development
 - The list of species at risk and biodiversity hotspots found within the park, their general locations or habitat preferences, and their role in natural environment

5.2 GOAL 2

Restore natural disturbance regimes while maintaining the natural landscape, ecosystem, and species diversity of CHIPP.

5.2.1 OBJECTIVE 1

Restore natural disturbance regimes and broaden forest age-class distributions to the park ecosystem.

Recommendations:

- ▶ Incorporate management goals and objectives from the associated forest conservation management plan
- ▶ Increase the area of young forest in CHIPP by renewing patches of mature to old forests, mainly using mechanical harvesting
 - Where managed wildfires or prescribed fire is not an option, utilize plans developed in the Forest Conservation Management Plan for forest regeneration using forest harvesting

- ▶ Conduct range health assessment and develop grassland management plan to manage native grassland components to mitigate the impacts of climate change, woody vegetation encroachment, and minimize the invasion of non-native plant species
 - Periodically conduct range health assessment (i.e. once per 3-5 years) to determine appropriate grazing regimes
 - Develop a prescribed burn program to restore fescue grasslands in the West Block
 - Identify areas of forest encroachment and high density of shrubs on fescue grasslands for ecological restoration and threat reduction
 - Implement a research program on an integrated approach (e.g. prescribed burn, herbicide, mowing and haying) to control exotic species
 - Implement a research program on the effects of management practices (e.g. prescribed burning, grazing, haying, mowing and mulching) in the park for the benefit of rare or endangered species
 - Include ongoing monitoring to ensure objectives are met and for the purpose of continuous improvement
- ▶ While fire was the historical natural disturbance regime for renewal in the park, in specific areas (e.g. - fescue grasslands), combinations of fire, mowing and grazing are acceptable treatments. Timber-harvesting can be used for forest renewal in the core area (see Forest Conservation Management Plan) and other situations
 - Implement prescribed fire as a hazard reduction tool following mechanical treatment. Process will start as a pilot or test approach
- ▶ General fire management practices:
 - Whenever possible fires should be contained using natural barrier such as water or roads
 - Fireguards and roads should be kept to the minimum extent consistent with safety
 - Foam and fire retardant should not be used near water
 - Fireguards and roads should avoid environmentally sensitive areas, and should be closed and reclaimed as soon as after the fire is out
 - No salvage logging after fire except for the purpose of ecological restoration and maintenance
- ▶ In general, treat insects and diseases as part of the natural disturbance regime:
 - There may be a requirement to control insect and disease attacks in core-area stands, where needed for shade, soil protection, or aesthetics
 - Continue working with the forest health staff of the Ministry of Environment, Forest Service regarding ongoing detection and management of Mountain Pine Beetle in CHIPP. Currently both Ministries have an MOU which addresses roles of each agency, whereby the Ministry of Environment undertakes surveillance and the design of forest management prescriptions that may be adopted to control or minimize insects and disease within the Park forest lands. Parks Division is responsible for the implementation of control measures.

5.2.2 OBJECTIVE 2

Create management recommendations based on the impacts of current activities within the park as well as proposed activities or developments.

Recommendations:

- ▶ Incorporate the ecosystem-based management plan when considering park zoning and developments
- ▶ Focus any development of large-scale recreational or other facilities to areas with existing developments or already disturbed lands in order to prioritize continued protection of the natural capital of the park
- ▶ Protect unique ecosystems or habitats of high importance to wildlife from all developments.
 - Conserve and maintain the healthy of fescue grasslands, mixed forest, Battle Creek and riparian zones
 - Protect and maintain ecological integrity in those areas that represent unique park landscapes and accommodate a variety of ecological features and species, including Nine Mile Watershed, Adams Lake/Conglomerate Cliffs, and Coulee Lake
 - Continue to work with Duck Unlimited Inc. to promote rehabilitating Adams Lake's control structure and turning its good state to CHIPP to maintain for ecological goods and services
 - Other unique areas will be identified in ongoing inventory and research
- ▶ Roads and Trails:
 - Reduce the length of roads and trails by closing and reclaiming any that are found to be unnecessary based on the road and trail inventory
 - Minimize the development of any new roads or trails
 - Include roads and trails in the exotic plant inventory
- ▶ Gravel pit:
 - Ensure that any existing or new gravel borrow pits in the park do not cause further degradation of park native grassland remnants
 - Source gravel from out of the park when possible
- ▶ Livestock grazing:
 - Attempt to emulate the historic grazing regime by creating a mosaic of successional stages in park grassland structure, function, and composition that change in space and time
 - Encourage changes to livestock distribution, utilization, and seasonality by herding, fencing, water sources, and salt and mineral blocks should be utilized
 - Manage vegetation using livestock grazing, and mowing or haying are critical to addressing the high risk of wildfire in the park and an essential part of an integrated pest management program to control invasive species and protect sensitive areas and species at risk
- ▶ Exotic plant species management:
 - Adopt a general park policy of low tolerance for exotic species in all situations.
 - Develop control programs for non-native plant invasions identified by exotic plant inventory, priority areas include: core areas, trails, sensitive areas, and invasions onto fescue grasslands
 - Use integrated management approach to control invasive species and seed disturbed areas within the park using native species

5.2.3 OBJECTIVE 3

Maintain ongoing inventory of the park's biological and ecological resources.

Recommendations:

- ▶ Conduct a survey of native grasslands and identify areas of unique or rare species compositions, non-native plant invasions, and areas of woody encroachment
- ▶ Conduct inventories and maintain accurate information on rare and endangered species;
- ▶ Assess the occurrence in the park of SARA-listed plant and animal species and gather information on their habitats and any threats to them
- ▶ Continue to update on the inventory of species richness and biodiversity for the park
- ▶ Maintain past and future vegetation data for CHIPP into easily accessible databases (e.g. PED)

5.2.4 OBJECTIVE 4

Foster relationships and partnerships with stakeholders, First Nation and Métis communities, non-governmental organizations and governmental agencies to enhance conservation efforts within the park.

Recommendations:

- ▶ Incorporate First Nations and Métis communities in projects related to the management of park's ecosystems and visitor experience. Possible topics include:
 - Integrated use of traditional knowledge on decision making and management of ecological values and services in the park area
 - Collaborate on the protection, conservation, and presentation of historic and cultural sites within the park
 - Conduct inventory of interpretive programs and products that reflect First Nation and Métis heritage, culture and perspectives within CHIPP
 - Develop mechanisms that can improve and broaden partnerships and working relationships among First Nations and Métis groups in the park area
- ▶ Enter or maintain current relationships with NGOs, stakeholders, industry or other government agencies to conduct projects related to the park's ecosystems such as:
 - Canadian Forest Service and Ministry of Environment, Forest Service on management of insects and diseases, fire management, etc.
 - Ministry of Environment and Saskatchewan Public Safety Agency
 - Adjacent universities and colleges with natural resource research-based programs
 - Nature Saskatchewan
 - Wildlife Conservation Society
 - Native Plant Society of Saskatchewan
 - Prairie Conservation Action Plan
 - South of the Divide Conservation Action Program
 - Prairie Regional Adaptation Collaborative
 - Tourism Saskatchewan
 - Grazing Associations, Cottage Owner's Association, Commercial Lessee and Businesses

- Fort Walsh National Historic Site and CHIPP Alberta.
- Royal Astronomical Society and Town of Maple Creek

5.2.5 OBJECTIVE 5

Monitor the state of the environment within CHIPP as well as the outcomes of the management actions implemented from the ecosystem-based management plan.

Recommendations:

- ▶ Monitoring of ecosystem representation and disturbance regime:
 - Utilize the most current forest inventory mapping and incorporate updates
 - Monitor and identify any ecosite changes
 - Analyze forest age distribution and identify any changes in proportions of young, mature, and old forest from the current values
 - Record and report on impacts of natural disturbances (e.g. wildfire, windstorm, insect, and disease) as well as anthropogenic disturbances (e.g. forest harvesting and prescribed fire)
- ▶ At regular intervals conduct a survey of plant and wildlife communities to ensure the success of park ecosystem management and apply any adjustment of management activities if necessary
- ▶ At regular intervals conduct a survey of land-use change in the park and surrounding area, identifying changes such as recreational developments, roads and trails, land clearing, grazing use, and forest harvesting
- ▶ Non-native or invasive plant inventory:
 - Conduct an inventory of non-native or invasive species incidents to include species, location, extent on invasion, ecosite, and proximity to rare species
 - Inventory should include sample areas of:
 - i) roadsides
 - ii) gravel pit and landfill
 - iii) grazing units
 - iv) campgrounds
 - v) cottage subdivisions
 - vi) any other development areas
 - Repeat the exotic plant inventory at regular intervals, as well as recording incidental observations on an ongoing basis
- ▶ Road and trail inventory:
 - Assess all roads and trails for function and current use
 - Designate roads and trails that are required for access to park facilities, resource management activities, or recreational activities (e.g. hiking trails)
 - Decommission and reclaim non-essential roads and trails
- ▶ Core area inventory:
 - Conduct a risk assessment of core-area trees

- Conduct a survey of the health and status of core area forests
- Record locations and severity of environmental damage from recreational activities

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APPENDIX 1: Vascular Plants of Cypress Hills Provincial Park

Sources are Cypress Hills Interprovincial Park: Plants (1993), Klassen (no date), Alberta Tourism, Parks and Recreation (2009), Saskatchewan Conservation Data Centre: All Taxa (SCDC 2019), Saskatchewan Conservation Data Centre: Cypress Upland (SCDC 2019), Wright (2010), and observations by NPSS. Nomenclature and S-ranking has been updated following Saskatchewan Conservation Data Centre: All Taxa (SCDC 2019).

SCIENTIFIC NAME	COMMON NAME	GROWTH-FORM	ORIGIN	S-RANK
ACERACEAE (Maple Family)				
<i>Acer negundo</i>	Maple, Manitoba	Tree	Native	S5
ALISMATACEAE (Water-Plantain Family)				
<i>Alisma triviale</i>	Water-plantain, broad-leaved	Forb	Native	S4
<i>Sagittaria cuneata</i>	Arrowhead, arrow-leaved	Forb	Native	S4
AMARANTHACEAE (Amaranth Family)				
<i>Amaranthus blitoides</i>	Prostrate Amaranth	Forb	Native	SNR
<i>Amaranthus retroflexus</i>	Red-root Pigweed	Forb	Non-native	SNA
ANACARDIACEAE (Sumac Family)				
<i>Rhus aromatica</i>	Sumac, fragrant	Shrub	Native	S5
<i>Toxicodendron rydbergii</i>	Poison ivy	Shrub	Native	S4
APIACEAE (Carrot Family)				
<i>Cicuta maculata</i>	Water-hemlock	Forb	Native	S4
<i>Cymopterus acaulis</i> var. <i>acaulis</i>	Cymopterus, plains	Forb	Native	S5
<i>Heracleum maximum</i>	Parsnip, cow	Forb	Native	S4
<i>Lomatium cous</i>	Parsley, mountain meadow	Forb	Native	S1
<i>Lomatium dissectum</i> var. <i>multifidum</i>	Wild parsnip, mountain	Forb	Native	S1
<i>Lomatium foeniculaceum</i>	Wild parsley, hairy-fruited	Forb	Native	S5
<i>Lomatium macrocarpum</i>	Wild parsley, long-fruited	Forb	Native	S5
<i>Musineon divaricatum</i>	Parsley, prairie	Forb	Native	S4
<i>Osmorhiza berteroi</i>	Sweet-cicely, Chilean	Forb	Native	S1
<i>Osmorhiza depauperata</i>	Sweet-cicely, spreading	Forb	Native	S4

<i>Osmorhiza longistylis</i>	Sweet-cicely, smooth	Forb	Native	S5
<i>Perideridia gairdneri</i>	Squawroot	Forb	Native	S1
<i>Perideridia gairdneri</i> ssp. <i>borealis</i>	Squawroot, Northern Gairdner's	Forb	Native	S1
<i>Sanicula marilandica</i>	Snakeroot	Forb	Native	S4
<i>Sium suave</i>	Parsnip, water	Forb	Native	S4
<i>Zizia aptera</i>	Alexanders, heart-leaved	Forb	Native	S4
APOCYNACEAE (Dogbane Family)				
<i>Apocynum androsaemifolium</i>	Dogbane, spreading	Forb	Native	S4
<i>Apocynum cannabinum</i> var. <i>hypericifolium</i>	Hemp, Indian	Forb	Native	S4
ARALIACEAE (Ginseng Family)				
<i>Aralia nudicaulis</i>	Sarsaparilla, wild	Forb	Native	S4
ASTERACEAE (Aster Family)				
<i>Achillea millefolium</i>	Yarrow, common	Forb	Native	S5
<i>Agoseris glauca</i>	False dandelion, yellow	Forb	Native	S4
<i>Almutaster pauciflorus</i>	Few-flowered Aster	Forb	Native	S3
<i>Ambrosia acanthicarpa</i>	Bur Ragweed	Forb	Native	S2
<i>Ambrosia artemisiifolia</i> var. <i>elatior</i>	Ragweed, annual	Forb	Native	S5
<i>Ambrosia trifida</i> var. <i>trifida</i>	Ragweed, great	Forb	Non-native?	SNA
<i>Anaphalis margaritacea</i>	Everlasting, pearly	Forb	Native	S3
<i>Antennaria anaphaloides</i>	Pussytoes, tall	Forb	Native	S1
<i>Antennaria corymbosa</i>	Pussytoes, flat-topped	Forb	Native	S1
<i>Antennaria dimorpha</i>	Pussytoes, low	Forb	Native	S2
<i>Antennaria microphylla</i>	Pussytoes, small-leaved	Forb	Native	S4
<i>Antennaria neglecta</i>	Pussytoes, broad-leaved	Forb	Native	S4
<i>Antennaria parvifolia</i>	Everlasting, small-leaved	Forb	Native	S4
<i>Antennaria pulcherrima</i>	Everlasting, showy	Forb	Native	S4
<i>Antennaria rosea</i> ssp. <i>pulvinata</i>	Pussytoes, rosy	Forb	Native	S4
<i>Antennaria umbrinella</i>	Pussytoes, brown-bracted	Forb	Native	S2
<i>Arctium minus</i>	Burdock, common	Forb	Non-native	SNA
<i>Arctium tomentosum</i>	Burdock, woolly	Forb	Non-native	SNA

<i>Arnica chamissonis</i>	Arnica, leafy	Forb	Native	S4
<i>Arnica cordifolia</i>	Arnica, heart-leaved	Forb	Native	S3
<i>Arnica fulgens</i>	Arnica, shining-leaved	Forb	Native	S4
<i>Arnica sororia</i>	Arnica, twin	Forb	Native	S2
<i>Artemisia biennis</i>	Sagewort	Forb	Non-native?	SNA
<i>Artemisia campestris ssp. pacifica</i>	Sagewort, western plains	Forb	Native	S4
<i>Artemisia cana</i>	Sagebrush, hoary	Shrub	Native	S5
<i>Artemisia dracunculus</i>	Tarragon	Forb	Native	S4
<i>Artemisia frigida</i>	Sage, pasture	Forb	Native	S5
<i>Artemisia longifolia</i>	Sage, long-leaved	Forb	Native	S4
<i>Artemisia ludoviciana</i>	Sage, prairie	Forb	Native	S5
<i>Bidens cernua</i>	Beggar-ticks, nodding	Forb	Native	S4
<i>Carduus nutans</i>	Thistle, nodding	Forb	Non-native	SNA
<i>Cirsium arvense</i>	Thistle, Canada	Forb	Non-native	SNA
<i>Cirsium drummondii</i>	Short-stemmed Thistle	Forb	Native	S3
<i>Cirsium undulatum</i>	Thistle, wavy-leaved	Forb	Native	S4
<i>Cirsium vulgare</i>	Thistle, bull	Forb	Non-native	SNA
<i>Conyza canadensis</i>	Horseweed	Forb	Native	S4
<i>Coreopsis tinctoria</i>	Tickseed, common	Forb	Native	S5
<i>Crepis atriobarba</i>	Hawk's-beard, dark	Forb	Native	S2
<i>Crepis intermedia</i>	Hawk's-beard, small-flowered	Forb	Native	SH
<i>Crepis occidentalis</i>	Hawk's-beard, western	Forb	Native	S3
<i>Crepis occidentalis ssp. costata</i>	Hawk's-beard, large-flower	Forb	Native	S3
<i>Crepis runcinata ssp. hispidulosa</i>	Hawk's-beard, smooth	Forb	Native	S1
<i>Crepis tectorum</i>	Hawk's-beard, annual	Forb	Non-native	SNA
<i>Cyclachaena xanthiifolia</i>	Ragweed, false	Forb	Native	S4
<i>Dieteria canescens</i>	Aster, hoary tansy	Forb	Native	S5
<i>Ericameria nauseosa</i>	Rabbitbrush	Shrub	Native	S5
<i>Erigeron acris var. kamtschaticus</i>	Fleabane, bitter	Forb	Native	S4
<i>Erigeron annuus</i>	Fleabane, daisy	Forb	Non-native	SNA
<i>Erigeron caespitosus</i>	Fleabane, tufted	Forb	Native	S4

<i>Erigeron compositus</i>	Compound Fleabane	Forb	Native	S3
<i>Erigeron glabellus</i>	Fleabane, smooth	Forb	Native	S5
<i>Erigeron lonchophyllus</i>	Fleabane, low-meadow	Forb	Native	S4
<i>Erigeron philadelphicus</i>	Fleabane, Philadelphia	Forb	Native	S4
<i>Erigeron pumilus</i>	Fleabane, shaggy	Forb	Native	S4
<i>Erigeron radicans</i>	Fleabane, dwarf	Forb	Native	S3
<i>Erigeron strigosus</i>	Fleabane, daisy	Forb	Native	S3
<i>Eurybia conspicua</i>	Aster, showy	Forb	Native	S4
<i>Gaillardia aristata</i>	Gaillardia, great-flowered	Forb	Native	S4
<i>Gnaphalium palustre</i>	Cudweed, western marsh	Forb	Native	S5
<i>Grindelia squarrosa</i>	Gumweed	Forb	Native	S5
<i>Gutierrezia sarothrae</i>	Broomweed	Forb	Native	S4
<i>Helianthus annuus</i>	Sunflower, common annual	Forb	Native	S4
<i>Helianthus nuttallii</i> ssp. <i>rydbergii</i>	Sunflower, common tall	Forb	Native	S4
<i>Helianthus pauciflorus</i> ssp. <i>subrhomboides</i>	Sunflower, rhombic-leaved	Forb	Native	S4
<i>Heterotheca villosa</i> var. <i>minor</i>	Aster, hoary golden	Forb	Native	S5
<i>Hieracium albiflorum</i>	Hawkweed, white-flowered	Forb	Native	S1
<i>Hieracium umbellatum</i>	Hawkweed, narrow-leaved	Forb	Native	S4
<i>Hymenopappus filifolius</i>	Tufted Hymenopappus	Shrub	Native	S3
<i>Hymenopappus filifolius</i> var. <i>polycephalus</i>	Tufted Hymenopappus	Shrub	Native	S3
<i>Hymenoxys richardsonii</i>	Rubber-plant, Colorado	Forb	Native	S3
<i>Lactuca biennis</i>	Lettuce, tall blue	Forb	Native	S3
<i>Lactuca serriola</i>	Lettuce, prickly	Forb	Non-native	SNA
<i>Leucanthemum vulgare</i>	Daisy, ox-eye	Forb	Non-native	SNA
<i>Liatris punctata</i> var. <i>punctata</i>	Blazingstar, dotted	Forb	Native	S5
<i>Lygodesmia juncea</i>	Skeleton-weed	Forb	Native	S5
<i>Madia glomerata</i>	Tarweed	Forb	Native	S4
<i>Matricaria discoidea</i>	Pineapple-weed	Forb	Non-native?	SNA
<i>Mulgedium pulchellum</i>	Lettuce, common blue	Forb	Native	S4
<i>Nothocalais cuspidata</i>	Prairie False-dandelion	Forb	Native	S3
<i>Packera indecora</i>	Ragwort, rayless	Forb	Native	S4

<i>Packera pauciflora</i>	Ragwort, Few-flowered	Forb	Native	S2
<i>Packera paupercula</i>	Groundsel, balsam	Forb	Native	S4
<i>Packera plattensis</i>	Ragwort, prairie	Forb	Native	S1
<i>Packera pseudoaurea</i>	Butterweed, stream-bank	Forb	Native	S1
<i>Petasites frigidus</i> var. <i>nivalis</i>	Coltsfoot, vine-leaved	Forb	Native	S4
<i>Petasites frigidus</i> var. <i>palmatus</i>	Coltsfoot, palmate-leaved	Forb	Native	S4
<i>Petasites frigidus</i> var. <i>sagittatus</i>	Coltsfoot, arrow-leaved	Forb	Non-native?	SNA
<i>Pyrrocoma lanceolata</i>	Goldenweed, lance-leaved	Forb	Native	S4
<i>Ratibida columnifera</i>	Coneflower, prairie	Forb	Native	S4
<i>Rudbeckia hirta</i> var. <i>pulcherrima</i>	Susan, black-eyed	Forb	Native	S4
<i>Senecio integerrimus</i> var. <i>exaltatus</i>	Ragwort, lamb-tongue	Forb	Native	S4
<i>Senecio integerrimus</i> var. <i>scribneri</i>	Ragwort, Scribner's entire-leaf	Forb	Native	S1
<i>Shinnersoseris rostrata</i>	Skeleton-weed, beaked annual	Forb	Native	S2
<i>Solidago gigantea</i>	Goldenrod, late	Forb	Native	S4
<i>Solidago lepida</i>	Goldenrod, western Canada	Forb	Native	S5
<i>Solidago missouriensis</i>	Goldenrod, low	Forb	Native	S5
<i>Solidago mollis</i>	Goldenrod, velvety	Forb	Native	S4
<i>Solidago nemoralis</i> ssp. <i>decemflora</i>	Goldenrod, gray	Forb	Native	S4
<i>Solidago rigida</i> ssp. <i>humilis</i>	Goldenrod, stiff	Forb	Native	S4
<i>Solidago simplex</i>	Goldenrod, Mt. Albert	Forb	Native	S4
<i>Sonchus arvensis</i>	Sow-thistle, field	Forb	Non-native	SNA
<i>Stenotus armerioides</i>	Goldenweed, thrifty	Forb	Native	S4
<i>Symphyotrichum ascendens</i>	Aster, western	Forb	Native	S3
<i>Symphyotrichum boreale</i>	Aster, northern	Forb	Native	S4
<i>Symphyotrichum ciliolatum</i>	Aster, Lindley's	Forb	Native	S5
<i>Symphyotrichum eatonii</i>	Aster, Eaton's	Forb	Native	S1
<i>Symphyotrichum ericoides</i> var. <i>pansum</i>	Aster, tufted white prairie	Forb	Native	S5
<i>Symphyotrichum falcatum</i> var. <i>commutatum</i>	Aster, creeping white prairie	Forb	Native	S4
<i>Symphyotrichum laeve</i> var. <i>geyeri</i>	Aster, Greyer's	Forb	Native	S5
<i>Symphyotrichum lanceolatum</i> var. <i>hesperium</i>	Aster, western willow	Forb	Native	S4
<i>Taraxacum erythrospermum</i>	Dandelion, red-seeded	Forb	Non-native	SNA

<i>Taraxacum officinale</i>	Dandelion, common	Forb	Non-native	SNA
<i>Tephrosieris palustris</i>	Ragwort, marsh	Forb	Native	S4
<i>Tetranneuris acaulis</i> var. <i>acaulis</i>	Stemless Tetranneuris	Shrub	Native	S2
<i>Townsendia exscapa</i>	Townsendia, low	Forb	Native	S4
<i>Townsendia hookeri</i>	Hooker's Townsendia	Forb	Native	S1
<i>Tragopogon dubius</i>	Goat's-beard, yellow	Forb	Non-native	SNA
<i>Xanthisma grindelioides</i>	Tansy-aster, rayless	Forb	Native	S4
<i>Xanthisma spinulosum</i>	Goldenaster, spiny	Forb	Native	S4
<i>Xanthium strumarium</i>	Cocklebur	Forb	Native	S4
BALSAMINACEAE (Touch-Me-Not Family)				
<i>Impatiens capensis</i>	Touch-me-not, spotted	Forb	Native	S4
<i>Impatiens noli-tangere</i>	Touch-me-not, yellow	Forb	Native	S2
BERBERIDACEAE (Barberry Family)				
<i>Berberis repens</i>	Creeping Oregon-grape	Forb	Native	S1
BETULACEAE (Birch Family)				
<i>Betula glandulosa</i>	Birch, dwarf	Shrub	Native	S4
<i>Betula occidentalis</i>	Birch, water	Shrub	Native	S4
<i>Betula papyrifera</i>	Birch, paper	Tree	Native	S5
<i>Corylus cornuta</i>	Hazelnut, beaked	Shrub	Native	S4
BORAGINACEAE (Borage Family)				
<i>Cryptantha celosioides</i>	Oreocary, Clustered	Forb	Native	S2
<i>Cryptantha fendleri</i>	Cryptantha, Fendler's	Forb	Native	S2
<i>Cryptantha kelseyana</i>	Kelsey's Cryptantha	Forb	Native	S2
<i>Cryptantha spiculifera</i>	Snake River Cat's-eye	Forb	Native	S4
<i>Hackelia deflexa</i>	Stickseed, northern	Forb	Native	S4
<i>Hackelia floribunda</i>	Stickseed, large-flowered	Forb	Native	S5
<i>Heliotropium curassavicum</i>	Heliotrope, spatulate-leaved	Forb	Native	S4
<i>Lappula occidentalis</i>	Sheepbur, flat-spine	Forb	Native	S4
<i>Lappula squarrosa</i>	Blue-bur	Forb	Non-native	SNA
<i>Lithospermum incisum</i>	Puccoon, narrow-leaved	Forb	Native	S4

<i>Lithospermum ruderae</i>	Cromwell, woolly	Forb	Native	S1
<i>Onosmodium molle</i> var. <i>occidentale</i>	Western False Gromwell	Forb	Native	S2
<i>Plagiobothrys scouleri</i> var. <i>hispidulus</i>	Allocary, Scouler's	Forb	Native	S5
BRASSICACEAE (Mustard Family)				
<i>Arabis pycnocarpa</i> var. <i>pycnocarpa</i>	Rockcress, hairy	Forb	Native	S4
<i>Barbarea orthoceras</i>	Cress, American winter	Forb	Native	S5
<i>Boechea grahamii</i>	Rockcress	Forb	Native	S4
<i>Boechea retrofracta</i>	Rockcress, reflexed	Forb	Native	S4
<i>Boechea stricta</i>	Rockcress, Drummond's	Forb	Native	S4
<i>Capsella bursa-pastoris</i>	Shepherd's-purse	Forb	Non-native	SNA
<i>Cardamine pensylvanica</i>	Cress, bitter	Forb	Native	S4
<i>Descurainia pinnata</i> ssp. <i>Brachycarpa</i>	Mustard, short-fruited tansy	Forb	Native	S4
<i>Descurainia sophia</i>	Flixweed	Forb	Non-native	SNA
<i>Draba nemorosa</i>	Whitlow-grass, yellow	Forb	Native	S4
<i>Draba reptans</i>	Whitlow-grass, Carolina	Forb	Native	S1
<i>Erysimum asperum</i>	Wallflower, western	Forb	Native	S4
<i>Erysimum cheiranthoides</i>	Mustard, wormseed	Forb	Non-native?	SNA
<i>Erysimum inconspicuum</i>	Wallflower, shy	Forb	Native	S4
<i>Eutrema salsugineum</i>	Cress, saltwater	Forb	Native	S4
<i>Lepidium densiflorum</i>	Pepper-grass, common	Forb	Native	S4
<i>Lepidium ramosissimum</i>	Pepper-grass, branched	Forb	Native	S4
<i>Physaria arenosa</i> ssp. <i>arenosa</i>	Bladderpod, great plains	Forb	Native	S4
<i>Physaria spatulata</i>	Bladderpod, spatulate	Forb	Native	S3
<i>Rorippa curvipes</i>	Cress, curved yellow	Forb	Native	S3
<i>Rorippa palustris</i>	Cress, bog yellow	Forb	Native	S3
<i>Rorippa tenerrima</i>	Cress, slender yellow	Forb	Native	S2
<i>Sisymbrium altissimum</i>	Mustard, tumbling	Forb	Non-native	SNA
<i>Thlaspi arvense</i>	Stinkweed	Forb	Non-native	SNA
<i>Transberingia bursifolia</i> ssp. <i>virgata</i>	Cress, slender mouse-ear	Forb	Native	S1
<i>Turritis glabra</i>	Mustard, tower	Forb	Native	S4

CACTACEAE (Cactus Family)

<i>Escobaria vivipara</i>	Cactus, pincushion	Forb	Native	S4
<i>Opuntia polyacantha</i>	Prickly-pear	Forb	Native	S4

CALLITRICHACEAE (Water-Starwort Family)

<i>Callitriche hermaphrodita</i>	Water-starwort, northern	Forb	Native	S4
<i>Callitriche palustris</i>	Water-starwort, vernal	Forb	Native	S4

CAMPANULACEAE (Bellflower Family)

<i>Campanula rotundifolia</i>	Harebell	Forb	Native	S5
<i>Downingia laeta</i>	Downingia, great-basin	Forb	Native	S2

CAPPARACEAE (Caper Family)

<i>Peritoma serrulata</i>	Spiderflower	Forb	Native	S4
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CAPRIFOLIACEAE (Honeysuckle Family)

<i>Linnaea borealis</i>	Twinflower	Shrub	Native	S4
<i>Lonicera villosa</i>	Honeysuckle, mountain-fly	Shrub	Native	S4
<i>Symphorocarpus albus</i>	Snow berry	Shrub	Native	S4
<i>Symphorocarpus occidentalis</i>	Snowberry, Western	Shrub	Native	S5
<i>Viburnum edule</i>	Cranberry, low-bush	Shrub	Native	S4
<i>Viburnum opulus</i>	Cranberry, high-bush	Shrub	Native	S4

CARYOPHYLLACEAE (Pink Family)

<i>Cerastium arvense ssp. strictum</i>	Mouse-ear chickweed, field	Forb	Native	S5
<i>Cerastium beeringianum</i>	Chickweed, Bering Sea	Forb	Native	S1
<i>Cerastium fontanum ssp. vulgare</i>	Mouse-ear chickweed, common	Forb	Non-native?	SNA
<i>Cerastium nutans</i>	Mouse-ear chickweed, long-stalked	Forb	Native	S4
<i>Eremogone congesta var. lithophila</i>	Sandwort, rocky-round	Forb	Native	S3
<i>Minuartia rubella</i>	Sandwort, boreal	Forb	Native	S3
<i>Moehringia lateriflora</i>	Sandwort, blunt-leaved	Forb	Native	S4
<i>Paronychia sessiliflora</i>	Whitlowwort, low	Forb	Native	S3
<i>Sagina decumbens</i>	Pearlwort, trailing	Forb	Native	SH

<i>Silene csereii</i>	Catchfly, smooth	Forb	Non-native	SNA
<i>Silene drummondii</i>	Catchfly, Drummond's	Forb	Native	S4
<i>Silene menziesii</i>	Catchfly, Menzies'	Forb	Native	S3
<i>Silene noctiflora</i>	Catchfly, night-flowering	Forb	Non-native	SNA
<i>Stellaria borealis</i>	Stitchwort, northern	Forb	Native	S4
<i>Stellaria crassifolia</i>	Stitchwort, fleshy	Forb	Native	S4
<i>Stellaria longifolia</i>	Stitchwort, long-leaved	Forb	Native	S4
<i>Stellaria longipes</i>	Starwort, long-leaved	Forb	Native	S4
<i>Stellaria media</i>	Chickweed, common	Forb	Non-native	SNA

CHENOPODIACEAE (Goosefoot Family)

<i>Atriplex gardneri</i>	Atriplex, Nuttall's	Shrub	Native	S5
<i>Atriplex prostrata</i>	Saltbush, creeping	Forb	Non-native?	SNA
<i>Atriplex truncata</i>	Saltbush, wedge-scale	Forb	Native	S2
<i>Axyris amaranthoides</i>	Pigweed, Russian	Forb	Non-native?	SNA
<i>Bassia scoparia</i>	Summer-cypress	Forb	Non-native?	SNA
<i>Chenopodium album</i> var. <i>album</i>	Lamb's quarters	Forb	Non-native	SNA
<i>Chenopodium desiccatum</i>	Goosefoot, dry	Forb	Native	S3
<i>Chenopodium fremontii</i> var. <i>fremontii</i>	Goosefoot, Fremont's	Forb	Native	S4
<i>Chenopodium glaucum</i> var. <i>salinum</i>	Goosefoot, Rocky-mountain	Forb	Native	S4
<i>Chenopodium hians</i>	Goosefoot, gaping	Forb	Native	SH
<i>Chenopodium incanum</i>	Goosefoot, hoary	Forb	Native	SH
<i>Chenopodium leptophyllum</i>	Goosefoot, narrowleaf	Forb	Native	S4
<i>Chenopodium simplex</i>	Goosefoot, giant-seed	Forb	Native	S4
<i>Chenopodium watsonii</i>	Goosefoot, Dakota stinking	Forb	Native	S3
<i>Krascheninnikovia lanata</i>	Winter-fat	Forb	Native	S4
<i>Monolepis nuttalliana</i>	Goosefoot, spear-leaved	Forb	Native	S4
<i>Salsola kali</i>	Russian-thistle	Forb	Non-native	SNA
<i>Sarcobatus vermiculatus</i>	Greasewood	Shrub	Native	S5

CLUSIACEAE (St. John's-Wort Family)

	<i>Hypericum majus</i>	St. John's Wort, large Canada	Forb	Native	S4
CONVOLVULACEAE (Morning-Glory Family)					
	<i>Calystegia sepium ssp. angulata</i>	Bindweed, hedge	Forb	Native	S3
	<i>Convolvulus arvensis</i>	Bindweed, field	Forb	Non-native	SNA
CORNACEAE (Dogwood Family)					
	<i>Cornus canadensis</i>	Bunchberry	Shrub	Native	S4
	<i>Cornus stolonifera</i>	Dogwood, red-osier	Shrub	Native	S4
CRASSULACEAE (Stonecrop Family)					
	<i>Sedum lanceolatum</i>	Stonecrop, lance-leaf	Forb	Native	S3
CUPRESSACEAE (Cypress Family)					
	<i>Juniperus communis</i>	Juniper, common	Shrub	Native	S5
	<i>Juniperus horizontalis</i>	Juniper, creeping	Shrub	Native	S4
CUSCUTACEAE (Dodder Family)					
	<i>Cuscuta gronovii var. latiflora</i>	Dodder, large-flower	Forb	Native	S1
CYPERACEAE (Sedge Family)					
	<i>Amphiscirpus nevadensis</i>	Bulrush, Nevada	Graminoid	Native	S3
	<i>Carex aquatilis</i>	Sedge, water	Graminoid	Native	S4
	<i>Carex atherodes</i>	Sedge, awned	Graminoid	Native	S4
	<i>Carex athrostachya</i>	Sedge, long-bracted	Graminoid	Native	S5
	<i>Carex atratiformis</i>	Sedge, Raymond's	Graminoid	Native	S4
	<i>Carex aurea</i>	Sedge, golden	Graminoid	Native	S4
	<i>Carex backii</i>	Sedge, Back's	Graminoid	Native	S5
	<i>Carex bebbii</i>	Sedge, Bebb's	Graminoid	Native	S4
	<i>Carex brevior</i>	Sedge, fescue	Graminoid	Native	S5
	<i>Carex brunnescens</i>	Sedge, brownish	Graminoid	Native	S4
	<i>Carex canescens</i>	Sedge, hoary	Graminoid	Native	S4
	<i>Carex capillaris</i>	Sedge, hair-like	Graminoid	Native	S4
	<i>Carex concinna</i>	Sedge, beautiful	Graminoid	Native	S3
	<i>Carex deflexa</i>	Sedge, bent	Graminoid	Native	S4

<i>Carex deweyana</i>	Sedge, Dewey's	Graminoid	Native	S5
<i>Carex diandra</i>	Sedge, two-stamened	Graminoid	Native	S4
<i>Carex disperma</i>	Sedge, two-seeded	Graminoid	Native	S4
<i>Carex douglasii</i>	Sedge, Douglas	Graminoid	Native	S5
<i>Carex eburnea</i>	Sedge, bristle-leaved	Graminoid	Native	S3
<i>Carex filifolia</i>	Sedge, thread-leaved	Graminoid	Native	S5
<i>Carex foenea</i>	Sedge, hay	Graminoid	Native	S4
<i>Carex garberi</i>	Sedge, Garber's	Graminoid	Native	S3
<i>Carex gynocrates</i>	Sedge, northern bog	Graminoid	Native	S4
<i>Carex hoodii</i>	Sedge, Hood's	Graminoid	Native	S1
<i>Carex hookeriana</i>	Sedge, Hooker's	Graminoid	Native	S4
<i>Carex inops ssp. heliophila</i>	Sedge, sun	Graminoid	Native	S5
<i>Carex interior</i>	Sedge, inland	Graminoid	Native	S4
<i>Carex lacustris</i>	Sedge, lakeshore	Graminoid	Native	S4
<i>Carex leptalea</i>	Sedge, bristle-stalked	Graminoid	Native	S5
<i>Carex microptera</i>	Sedge, small-wing	Graminoid	Native	S4
<i>Carex obtusata</i>	Sedge, blunt	Graminoid	Native	S4
<i>Carex pachystachya</i>	Sedge, thick-spike	Graminoid	Non-native?	SNA
<i>Carex peckii</i>	Sedge, white-tinged	Graminoid	Native	S4
<i>Carex pellita</i>	Sedge, woolly	Graminoid	Native	S4
<i>Carex petasata</i>	Sedge, Caespitose	Graminoid	Native	S1
<i>Carex praegracilis</i>	Sedge, graceful	Graminoid	Native	S4
<i>Carex prairea</i>	Sedge, prairie	Graminoid	Native	S4
<i>Carex praticola</i>	Sedge, northern meadow	Graminoid	Native	S4
<i>Carex pseudocyperus</i>	Sedge, cyperus-like	Graminoid	Native	S3
<i>Carex raynoldsii</i>	Sedge, Raynold's	Graminoid	Native	S1
<i>Carex rossii</i>	Sedge, Ross'	Graminoid	Native	S4
<i>Carex saxatilis</i>	Sedge, rocky ground	Graminoid	Native	S3
<i>Carex saximontana</i>	Sedge, Rocky Mountain	Graminoid	Native	S3
<i>Carex siccata</i>	Sedge, dry-spike	Graminoid	Native	S4
<i>Carex simulata</i>	Sedge, copycat	Graminoid	Native	S4

<i>Carex sprengelii</i>	Sedge, Sprengel's	Graminoid	Native	S5
<i>Carex stipata</i>	Sedge, awl-fruited	Graminoid	Native	S4
<i>Carex tenera</i>	Sedge, slender	Graminoid	Native	S4
<i>Carex torreyi</i>	Sedge, Torrey's	Graminoid	Native	S4
<i>Carex trisperma</i>	Sedge, three-fruited	Graminoid	Native	S3
<i>Carex umbellata</i>	Sedge, umbellate	Graminoid	Native	S4
<i>Carex utriculata</i>	Sedge, Northwest Territory	Graminoid	Native	S4
<i>Carex viridula</i>	Sedge, green	Graminoid	Native	S4
<i>Carex xerantica</i>	Sedge, whit scaled	Graminoid	Native	S4
<i>Eleocharis acicularis</i>	Spike-rush, needle	Graminoid	Native	S4
<i>Eleocharis erythropoda</i>	Spike-rush, bald	Graminoid	Native	S4
<i>Eleocharis palustris</i>	Spike-rush, creeping	Graminoid	Native	S4
<i>Eleocharis quinqueflora</i>	Spike-rush, few-flowered	Graminoid	Native	S4
<i>Eleocharis uniglumis</i>	Spike-rush, one-glumed	Graminoid	Native	S3
<i>Eriophorum angustifolium</i>	Cotton grass, tall	Graminoid	Native	S4
<i>Schoenoplectus acutus</i>	Bulrush, hard-stemmed	Graminoid	Native	S4
<i>Schoenoplectus pungens</i>	Rush, three-square	Graminoid	Native	S4
<i>Schoenoplectus tabernaemontani</i>	Bulrush, soft stem	Graminoid	Native	S4
<i>Scirpus microcarpus</i>	Bulrush, small-fruited	Graminoid	Native	S4
DRYOPTERIDACEAE (Wood-Fern Family)				
<i>Athyrium filix-femina</i>	Fern, Northern Lady	Forb	Native	S3
<i>Cystopteris fragilis</i>	Bladder fern, fragile	Forb	Native	S4
<i>Cystopteris montana</i>	Bladder fern, mountain	Forb	Native	S1
<i>Dryopteris carthusiana</i>	Shield fern, narrow spinulose	Forb	Native	S4
<i>Dryopteris cristata</i>	Shield fern, crested	Forb	Native	S3
<i>Gymnocarpium dryopteris</i>	Oak fern	Forb	Native	S4
<i>Woodsia oregana ssp. cathcartiana</i>	Oregon Woodsia	Forb	Native	S3
<i>Woodsia oregana ssp. oregana</i>	Oregon Woodsia	Forb	Native	S2
ELAEAGNACEAE (Oleaster Family)				
<i>Elaeagnus commutata</i>	Silverberry	Shrub	Native	S4
<i>Shepherdia argentea</i>	Buffalo-berry, thorny	Shrub	Native	S4

	<i>Shepherdia canadensis</i>	Buffalo-berry, Canada	Shrub	Native	S4
ELATINACEAE (Waterwort Family)					
	<i>Elatine triandra</i>	Water-wort, longstem	Forb	Native	S2
EQUISETACEAE (Horsetail Family)					
	<i>Equisetum arvense</i>	Horsetail, common	Forb	Native	S5
	<i>Equisetum fluviatile</i>	Horsetail, swamp	Forb	Native	S4
	<i>Equisetum hyemale</i> var. <i>affine</i>	Scouring-rush, common	Forb	Native	S4
	<i>Equisetum laevigatum</i>	Scouring-rush, smooth	Forb	Native	S4
	<i>Equisetum scirpoides</i>	Scouring-rush, dwarf	Forb	Native	S4
	<i>Equisetum sylvaticum</i>	Horsetail, woodland	Forb	Native	S4
	<i>Equisetum variegatum</i> ssp. <i>variegatum</i>	Scouring-rush, variegated	Forb	Native	S4
	<i>Equisteum pratense</i>	Horsetail, meadow	Forb	Native	S4
ERICACEAE (Heath Family)					
	<i>Arctostaphylos uva-ursi</i>	Bearberry, common	Shrub	Native	S4
	<i>Rhododendron groenlandicum</i>	Labrador tea, common	Shrub	Native	S4
	<i>Vaccinium caespitosum</i>	Blueberry, dwarf	Shrub	Native	S4
	<i>Vaccinium myrtilloides</i>	Blueberry, common	Shrub	Native	S4
EUPHORBIACEAE (Spurge Family)					
	<i>Chamaesyce glyptosperma</i>	Spurge, ridge-seeded	Forb	Native	S5
	<i>Chamaesyce serpyllifolia</i>	Sandmat, thyme-leaf	Forb	Native	S4
FABACEAE (Pea Family)					
	<i>Astragalus agrestis</i>	Milk vetch, field	Forb	Native	S4
	<i>Astragalus americanus</i>	Milk vetch, American	Forb	Native	S5
	<i>Astragalus australis</i>	Milk vetch, Indian	Forb	Native	S3
	<i>Astragalus bisulcatus</i>	Milk vetch, two-grooved	Forb	Native	S4
	<i>Astragalus canadensis</i>	Milk vetch, Canadian	Forb	Native	S4
	<i>Astragalus crassicaupus</i>	Ground plum	Forb	Native	S4
	<i>Astragalus drummondii</i>	Mille vetch, Drummond's	Forb	Native	S4
	<i>Astragalus gilviflorus</i>	Milk vetch, cushion	Forb	Native	S5
	<i>Astragalus laxmannii</i> var. <i>robustior</i>	Milk vetch, Laxmann's	Forb	Native	S4

<i>Astragalus lotiflorus</i>	Milk vetch, low	Forb	Native	S4
<i>Astragalus missouriensis</i>	Milk vetch, Missouri	Forb	Native	S4
<i>Astragalus pectinatus</i>	Milk vetch, narrow-leaved	Forb	Native	S4
<i>Astragalus purshii</i> var. <i>purshii</i>	Milk vetch, Pursh's	Forb	Native	S3
<i>Astragalus spatulatus</i>	Milk vetch, tufted	Forb	Native	S3
<i>Astragalus tenellus</i>	Milk vetch, loose-flowered	Forb	Native	S4
<i>Astragalus vexilliflexus</i> var. <i>vexilliflexus</i>	Milk vetch, bent-flowered	Forb	Native	S3
<i>Caragana arborescens</i>	Caragana, common	Shrub	Non-native	SNA
<i>Dalea candida</i>	Prairie-clover, white	Forb	Native	S5
<i>Dalea purpurea</i>	Prairie-clover, purple	Forb	Native	S4
<i>Glycyrrhiza lepidota</i>	Licorice, wild	Forb	Native	S4
<i>Hedysarum alpinum</i>	Broom, sweet	Forb	Native	S4
<i>Hedysarum boreale</i>	Sweet-vetch, boreal	Forb	Native	S4
<i>Lathyrus ochroleucus</i>	Cream-colored vetchling	Forb	Native	S4
<i>Lathyrus venosus</i>	Peavine, wild	Forb	Native	S4
<i>Lupinus argenteus</i>	Lupine, silvery	Forb	Native	S2
<i>Lupinus parviflorus</i> ssp. <i>parviflorus</i>	Lupine, lodgepole	Forb	Native	S1
<i>Lupinus pusillus</i> ssp. <i>pusillus</i>	Lupine, small	Forb	Native	S3
<i>Medicago lupulina</i>	Medic, black	Forb	Non-native?	SNA
<i>Melilotus albus</i>	Sweet-clover, white	Forb	Non-native	SNA
<i>Melilotus officinalis</i>	Sweet-clover, yellow	Forb	Non-native	SNA
<i>Oxytropis campestris</i> var. <i>spicata</i>	Point-vetch, northern yellow	Forb	Native	S4
<i>Oxytropis deflexa</i> var. <i>sericea</i>	Oxytrope, blue pendant-pod	Forb	Native	S4
<i>Oxytropis monticola</i>	Locoweed, late yellow	Forb	Native	S4
<i>Oxytropis splendens</i>	Locoweed, showy	Forb	Native	S4
<i>Pedimelum argophyllum</i>	Pea, silvery scurf	Forb	Native	S5
<i>Thermopsis rhombifolia</i>	Golden-bean	Forb	Native	S5
<i>Trifolium pratense</i>	Clover, red	Forb	Non-native	SNA
<i>Trifolium repens</i>	Clover, white	Forb	Non-native	SNA
<i>Vicia americana</i>	Vetch, American purple	Forb	Native	S5
<i>Vicia cracca</i>	Vetch, tufted	Forb	Non-native?	SNA

FUMARIACEAE (Fumitory Family)

<i>Corydalis aurea</i>	Corydalis, golden	Forb	Native	S4
<i>Corydalis sempervirens</i>	Corydalis, pink	Forb	Native	S4

GENTIANACEAE (Gentian Family)

<i>Gentiana affinis</i>	Gentian, oblong-leaved	Forb	Native	S4
<i>Gentianella amarella ssp. acuta</i>	Dwarf-gentian, autumn	Forb	Native	S4

GERANIACEAE (Geranium Family)

<i>Erodium cicutarium ssp. Cicutarium</i>	Stork's-bill	Forb	Non-native?	SNA
<i>Geranium bicknellii</i>	Geranium, Bicknell's	Forb	Native	S4
<i>Geranium carolinianum</i>	Geranium, Carolina wild	Forb	Native	S3
<i>Geranium richardsonii</i>	Geranium, wild white	Forb	Native	S2
<i>Geranium viscosissimum</i>	Geranium, sticky purple	Forb	Native	S2

GROSSULARIACEAE (Currant Family)

<i>Ribes americanum</i>	Currant, wild black	Shrub	Native	S4
<i>Ribes aureum</i>	Currant, golden	Shrub	Native	S3
<i>Ribes hudsonianum</i>	Currant, northern black	Shrub	Native	S4
<i>Ribes lacustre</i>	Currant, bristly black	Shrub	Native	S4
<i>Ribes oxycanthoides</i>	Gooseberry, bristly	Shrub	Native	S4
<i>Ribes triste</i>	Currant, swamp red	Shrub	Native	S4

HALORAGACEAE (Water-Milfoil Family)

<i>Myriophyllum sibiricum</i>	Water-milfoil, Siberian	Forb	Native	S5
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HIPURIDACEAE (Mare's-Tail Family)

<i>Hippuris vulgaris</i>	Mare's-tail, common	Forb	Native	S4
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HYDROCHARITACEAE (Tape-Grass Family)

<i>Elodea bifoliata</i>	Water-weed, two-leaf	Forb	Native	S3
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HYDROPHYLLACEAE (Waterleaf Family)

<i>Ellisia nyctelea</i>	Waterpod	Forb	Native	S4
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	<i>Phacelia franklinii</i>	Scorpionweed, Franklin's	Forb	Native	S4
IRIDACEAE (Iris Family)					
	<i>Sisyrinchium montanum</i> var. <i>montanum</i>	Blue-eyed grass, common	Forb	Native	S4
	<i>Sisyrinchium mucronatum</i>	Blue-eyed-grass, mucronate	Forb	Native	S3
JUNCACEAE (Rush Family)					
	<i>Juncus alpinoarticulatus</i>	Rush, northern green	Graminoid	Native	S4
	<i>Juncus balticus</i>	Rush, Baltic	Graminoid	Native	S4
	<i>Juncus bufonius</i>	Rush, toad	Graminoid	Native	S4
	<i>Juncus castaneus</i>	Rush, Chestnut	Graminoid	Native	SH
	<i>Juncus confusus</i>	Rush, few-flowered	Graminoid	Native	S2
	<i>Juncus ensifolius</i>	Rush, dagger	Graminoid	Native	S2
	<i>Juncus interior</i>	Rush, inland	Graminoid	Native	S3
	<i>Juncus longistylis</i>	Rush, long-styled	Graminoid	Native	S4
	<i>Juncus nevadensis</i>	Rush, Nevada	Graminoid	Native	S3
	<i>Juncus nodosus</i>	Rush, knotted	Graminoid	Native	S4
	<i>Juncus saximontanus</i>	Rush, Rocky mountain	Graminoid	Native	S1
	<i>Juncus tenuis</i>	Rush, slender	Graminoid	Native	S5
	<i>Juncus vaseyi</i>	Rush, big-head	Graminoid	Native	S4
	<i>Luzula multiflora</i>	Wood-rush, field	Graminoid	Native	S3
JUNCAGINACEAE (Arrow-Grass Family)					
	<i>Lilaea scilloides</i>	Flowering Quillwort	Forb	Native	S1
	<i>Triglochin maritima</i>	Arrow-grass, seaside	Forb	Native	S4
	<i>Triglochin palustris</i>	Arrow-grass, slender	Forb	Native	S4
LAMIACEAE (Mint Family)					
	<i>Dracocephalum parviflorum</i>	Dragonhead, American	Forb	Native	S4
	<i>Galeopsis tetrahit</i> var. <i>tetrahit</i>	Hemp-nettle, common	Forb	Non-native	SNA
	<i>Lycopus americanus</i>	Water-horehound	Forb	Native	S4
	<i>Lycopus asper</i>	Water-horehound, western	Forb	Native	S4
	<i>Mentha canadensis</i>	Mint, wild	Forb	Native	S4
	<i>Monarda fistulosa</i> var. <i>menthifolia</i>	Bergamot, wild	Forb	Native	S4

<i>Physostegia parviflora</i>	Dragonhead, false	Forb	Native	S4
<i>Scutellaria galericulata</i>	Skullcap, marsh	Forb	Native	S4
<i>Stachys pilosa</i> var. <i>pilosa</i>	Hedge-nettle, hairy	Forb	Native	S4
<i>Teucrium canadense</i> var. <i>occidentale</i>	Germander, hairy	Forb	Native	S3
LEMNACEAE (Duckweed Family)				
<i>Lemna minor</i>	Duckweed, Lesser	Forb	Native	S1
<i>Lemna trisulca</i>	Duckweed, ivy-leaved	Forb	Native	S4
LENTIBULARIACEAE (Bladderwort Family)				
<i>Utricularia minor</i>	Bladderwort, lesser	Forb	Native	S2
<i>Utricularia vulgaris</i>	Bladderwort, common	Forb	Native	S4
LILIACEAE (Lily Family)				
<i>Allium cernuum</i> var. <i>cernuum</i>	Onion, nodding	Forb	Native	S1
<i>Allium stellatum</i>	Onion, pink-flowered	Forb	Native	S4
<i>Allium textile</i>	Onion, prairie	Forb	Native	S4
<i>Maianthemum racemosum</i> ssp. <i>amplexicaule</i>	Spikenard, false	Forb	Native	S1
<i>Maianthemum stellatum</i>	Solomon's-seal, starflower false	Forb	Native	S4
<i>Prosartes trachycarpa</i>	Fairybells	Forb	Native	S4
<i>Streptopus amplexifolius</i>	Twisted-stalk, clasping-leaved	Forb	Native	S3
<i>Triantha glutinosa</i>	Asphodel, sticky	Forb	Native	S4
<i>Zigadenus elegans</i> ssp. <i>elegans</i>	Deathcamas, mountain	Forb	Native	S4
<i>Zigadenus venenosus</i> var. <i>gramineus</i>	Camas, white	Forb	Native	S4
LINACEAE (Flax Family)				
<i>Linum lewisii</i> var. <i>lewisii</i>	Flax, wild blue	Forb	Native	S4
<i>Linum rigidum</i> var. <i>rigidum</i>	Flax, large-flower yellow	Forb	Native	S5
LOASACEAE (Blazingstar Family)				
<i>Mentzelia decapetala</i>	Eveningstar	Forb	Native	S3
LYCOPODIACEAE (Club-Moss Family)				
<i>Diphasiastrum complanatum</i>	Club-moss, trailing	Forb	Native	S4
<i>Lycopodium annotinum</i>	Club-moss, stiff	Forb	Native	S4

	<i>Lycopodium dendroideum</i>	Ground-pine	Forb	Native	S4
MALVACEAE (Mallow Family)					
	<i>Sphaeralcea coccinea</i>	Mallow, scarlet	Shrub	Native	S5
MARSILEACEAE (Water-Clover Family)					
	<i>Marsilea vestita</i>	Pepperwort	Forb	Native	S3
MONOTROPACEAE (Indian-Pipe Family)					
	<i>Monotropa hypopithys</i>	Pinesap, American	Forb	Native	S1
	<i>Monotropa uniflora</i>	Indian-pipe	Forb	Native	S4
	<i>Pterospora andromeda</i>	Pine-drops	Forb	Native	S1
NAJADACEAE (Water-Nymph Family)					
	<i>Najas flexilis</i>	Naiad, flexible	Forb	Native	S3
NYCTAGINACEAE (Four-O'clock Family)					
	<i>Mirabilis albida</i>	Umbrella-wort, pale	Forb	Native	S4
	<i>Mirabilis linearis</i>	Umbrella-wort, narrow-leaved	Forb	Native	S3
ONAGRACEAE (Evening Primrose Family)					
	<i>Chamerion angustifolium</i>	Fireweed, narrow-leaf	Forb	Native	S4
	<i>Epilobium brachycarpum</i>	Willow-herb, paniced	Forb	Native	S5
	<i>Epilobium campestre</i>	Evening-primrose, smooth spike	Forb	Native	S3
	<i>Epilobium ciliatum</i> ssp. <i>glandulosum</i>	Willow-herb	Forb	Native	S4
	<i>Epilobium leptophyllum</i>	Willow-herb, narrow-leaved	Forb	Native	S4
ONAGRACEAE (Evening Primrose Family)					
	<i>Epilobium palustre</i>	Willow-herb, marsh	Forb	Native	S4
	<i>Gaura coccinea</i>	Scarlet Gaura	Forb	Native	S4
	<i>Neoholmgrenia andina</i>	Evening-primrose, upland	Forb	Native	S1
	<i>Oenothera biennis</i>	Evening-primrose, yellow	Forb	Native	S4
	<i>Oenothera caespitosa</i>	Evening-primrose, gumbo	Forb	Native	S3
	<i>Oenothera flava</i>	Evening-primrose, low yellow	Forb	Native	S3
	<i>Oenothera nuttallii</i>	Evening-primrose, white	Forb	Native	S5
	<i>Taraxia breviflora</i>	Short-flower Suncup	Forb	Native	S2

OPHIOGLOSSACEAE (Adder's Tongue Family)

<i>Botrychium ascendens</i>	Triangle-lobe Moonwort	Forb	Native	S1
<i>Botrychium hesperium</i>	Western Moonwort	Forb	Native	S2
<i>Botrychium lanceolatum</i>	Triangle Grape-fern	Forb	Native	S2
<i>Botrychium lanceolatum ssp. lanceolatum</i>	Triangle Grape-fern	Forb	Native	S2
<i>Botrychium lunaria</i>	Common Moonwort	Forb	Native	S1
<i>Botrychium matricariifolium</i>	Chamomile Grape-fern	Forb	Native	S1
<i>Botrychium michiganense</i>	Michigan Moonwort	Forb	Native	S1
<i>Botrychium pallidum</i>	Pale Moonwort	Forb	Native	S1
<i>Botrychium paradoxum</i>	Peculiar Moonwort	Forb	Native	S1
<i>Botrychium pedunculatum</i>	Stalked Moonwort	Forb	Native	SH
<i>Botrychium simplex</i>	Least Grape-fern	Forb	Native	S2
<i>Botrychium virginianum</i>	Rattlesnake Fern	Forb	Native	S4
<i>Sceptridium multifidum</i>	Leathery Grape-fern	Forb	Native	S3

ORCHIDACEAE (Orchid Family)

<i>Amerorchis rotundifolia</i>	Orchid, round-leaved	Forb	Native	S4
<i>Calypso bulbosa var. americana</i>	Fairy Slipper	Forb	Native	S3
<i>Coeloglossum viride</i>	Bog orchid, long-bracted green	Forb	Native	S4
<i>Corallorhiza maculata</i>	Coralroot, spotted	Forb	Native	SH
<i>Corallorhiza striata</i>	Coralroot, striped	Forb	Native	S3
<i>Corallorhiza trifida</i>	Coralroot, early	Forb	Native	S4
<i>Cypripedium montanum</i>	Lady's-slipper, mountain	Forb	Native	S1
<i>Cypripedium parviflorum var. pubescens</i>	Lady's-slipper, yellow	Forb	Native	S2
<i>Cypripedium passerinum</i>	Lady's-slipper, sparrow's-egg	Forb	Native	S3
<i>Goodyera oblongifolia</i>	Rattlesnake-plantain, giant	Forb	Native	S1
<i>Goodyera repens</i>	Rattlesnake-plantain, lesser	Forb	Native	S5
<i>Listera borealis</i>	Twayblade, northern	Forb	Native	S1
<i>Listera cordata</i>	Twayblade, heart-leaved	Forb	Native	S2
<i>Malaxis monophyllos var. brachypoda</i>	Orchid, white bog Adder's-mouth	Forb	Native	S1
<i>Platanthera aquilonis</i>	Orchid, northern green	Forb	Native	S4
<i>Platanthera dilatata</i>	Scentbottle	Forb	Native	S3

	<i>Platanthera obtusata</i>	Bog orchid, small northern	Forb	Native	S4
	<i>Platanthera orbiculata</i>	Orchid, large roundleaf	Forb	Native	S3
	<i>Spiranthes romanzoffiana</i>	Lady's-tresses, hooded	Forb	Native	S4
OROBANCHACEAE (Broom Rape Family)					
	<i>Orobanche fasciculata</i>	Broom-rape, clustered	Forb	Native	S4
	<i>Orobanche ludoviciana</i>	Broom-rape, Louisiana	Forb	Native	S3
	<i>Orobanche uniflora</i> var. <i>occidentalis</i>	Broomrape, small	Forb	Native	S1
PINACEAE (Pine Family)					
	<i>Picea glauca</i>	Spruce, white	Tree	Native	S5
	<i>Picea mariana</i>	Spruce, black	Tree	Native	S5
	<i>Pinus banksiana</i>	Pine, jack	Tree	Native	S5
	<i>Pinus contorta</i> var. <i>latifolia</i>	Pine, lodgepole	Tree	Native	S4
PLANTAGINACEAE (Plantain Family)					
	<i>Plantago elongata</i>	Plantain, slender	Forb	Native	S4
	<i>Plantago major</i>	Plantain, common	Forb	Non-native	SNA
	<i>Plantago patagonica</i>	Plantain, Pursh's	Forb	Native	S4
	<i>Plantago patagonica</i> var. <i>spinulosa</i>	Plantain, spinulose	Forb	Native	S2
POACEAE (Grass Family)					
	<i>Achnatherum hymenoides</i>	Rice grass, Indian	Graminoid	Native	S4
	<i>Achnatherum nelsonii</i> ssp. <i>dorei</i>	Needle grass, Columbia	Graminoid	Native	S3
	<i>Achnatherum richardsonii</i>	Needle grass, Richardson	Graminoid	Native	S3
	<i>Agropyron cristatum</i> ssp. <i>pectinatum</i>	Wheat grass, crested	Graminoid	Non-native	SNA
	<i>Agrostis exarata</i>	Redtop, spike	Graminoid	Native	S4
	<i>Agrostis scabra</i>	Grass, hair	Graminoid	Native	S4
	<i>Agrostis stolonifera</i> var. <i>palustris</i>	Bent, spreading	Graminoid	Non-native?	SNA
	<i>Alopecurus aequalis</i>	Foxtail, short-awn meadow	Graminoid	Native	S4
	<i>Alopecurus carolinianus</i>	Foxtail, Carolina	Graminoid	Native	S2
	<i>Alopecurus geniculatus</i>	Foxtail, water	Graminoid	Native	S4
	<i>Alopecurus magellanicus</i>	Foxtail, alpine	Graminoid	Native	S1

<i>Anthoxanthum hirtum</i> ssp. <i>arcticum</i>	Grass, sweet	Graminoid	Native	S4
<i>Avena sativa</i>	Oat	Graminoid	Non-native	SNA
<i>Beckmannia syzigachne</i>	Grass, slough	Graminoid	Native	S4
<i>Bouteloua gracilis</i>	Gramma, blue	Graminoid	Native	S5
<i>Bromus carinatus</i> var. <i>marginatus</i>	Brome, California	Graminoid	Native	S4
<i>Bromus ciliatus</i>	Brome, fringed	Graminoid	Native	S4
<i>Bromus inermis</i>	Brome, smooth	Graminoid	Non-native	SNA
<i>Bromus tectorum</i>	Brome, downy	Graminoid	Non-native	SNA
<i>Calamagrostis canadensis</i>	Bluejoint	Graminoid	Native	S4
<i>Calamagrostis montanensis</i>	Reed grass, plains	Graminoid	Native	S5
<i>Calamagrostis purpurascens</i>	Reed grass, purple	Graminoid	Native	S3
<i>Calamagrostis rubescens</i>	Grass, pine reed	Graminoid	Native	S2
<i>Calamagrostis stricta</i>	Reed grass, northern	Graminoid	Native	S5
<i>Calamovilfa longifolia</i>	Reed grass, long-leaved	Graminoid	Native	S5
<i>Catabrosa aquatica</i>	Grass, brook	Graminoid	Native	S4
<i>Cinna latifolia</i>	Wood-grass, slender	Graminoid	Native	S4
<i>Danthonia californica</i> var. <i>americana</i>	Oat grass, California wild	Graminoid	Native	S3
<i>Danthonia intermedia</i>	Oatgrass, timber	Graminoid	Native	S4
<i>Danthonia parryi</i>	Oat grass, Parry's	Graminoid	Native	SH
<i>Danthonia spicata</i>	Oat grass, poverty	Graminoid	Native	S4
<i>Danthonia unispicata</i>	Oat grass, few-flowered	Graminoid	Native	S3
<i>Deschampsia cespitosa</i>	Hair grass, tufted	Graminoid	Native	S4
<i>Distichlis spicata</i>	Grass, alkali	Graminoid	Native	S5
<i>Elymus albicans</i>	Wheat grass, Montana	Graminoid	Native	S5
<i>Elymus canadensis</i>	Wild rye, Canada	Graminoid	Native	S4
<i>Elymus elymoides</i> ssp. <i>elymoides</i>	Squirrel-tail, common	Graminoid	Native	S3
<i>Elymus glaucus</i>	Wild rye, blue	Graminoid	Native	S3
<i>Elymus repens</i>	Rye, creeping wild	Graminoid	Non-native?	SNA
<i>Elymus trachycaulus</i>	Wheat grass, slender	Graminoid	Native	S5
<i>Eremopyrum triticeum</i>	Wheat grass, false annual	Graminoid	Non-native?	SNA
<i>Festuca campestris</i>	Fescue, prairie	Graminoid	Native	S1

<i>Festuca hallii</i>	Fescue, plains rough	Graminoid	Native	S3
<i>Festuca idahoensis</i>	Fescue, Idaho	Graminoid	Native	S1
<i>Festuca rubra</i>	Fescue, red	Graminoid	Non-native	SNA
<i>Festuca saximontana</i>	Fescue, Rocky mountain	Graminoid	Native	S5
<i>Glyceria borealis</i>	Manna grass, northern	Graminoid	Native	S4
<i>Glyceria grandis</i>	Manna grass, American	Graminoid	Native	S4
<i>Glyceria striata</i>	Manna grass, fowl	Graminoid	Native	S4
<i>Helictotrichon hookeri</i>	Oat grass, Hooker's	Graminoid	Native	S5
<i>Hesperostipa comata</i>	Grass, needle and thread	Graminoid	Native	S5
<i>Hesperostipa curtipendula</i>	Grass, porcupine	Graminoid	Native	S5
<i>Hordeum brachyantherum</i> ssp. <i>brachyantherum</i>	Barley, meadow wild	Graminoid	Native	S1
<i>Hordeum jubatum</i>	Barley, foxtail	Graminoid	Non-native	S5
<i>Koeleria macrantha</i>	Grass, June	Graminoid	Native	S5
<i>Leymus cinereus</i>	Wild-rye, giant	Graminoid	Native	S1
<i>Leymus innovatus</i>	Wild-rye, hairy	Graminoid	Native	S4
<i>Melica bulbosa</i>	Grass, onion	Graminoid	Native	S1
<i>Muhlenbergia cuspidata</i>	Muhly, plains	Graminoid	Native	S4
<i>Muhlenbergia glomerata</i>	Muhly, bog	Graminoid	Native	S5
<i>Muhlenbergia racemosa</i>	Muhly, marsh	Graminoid	Native	S4
<i>Muhlenbergia richardsonis</i>	Muhly, mat	Graminoid	Native	S4
<i>Nassella viridula</i>	Needle grass, green	Graminoid	Native	S5
<i>Oryzopsis asperifolia</i>	Rice grass, white-grained mountain	Graminoid	Native	S4
<i>Pascopyrum smithii</i>	Wheat grass, western	Graminoid	Native	S5
<i>Phalaris arundinacea</i>	Canary grass, reed	Graminoid	Native	S4
<i>Phleum alpinum</i>	Timothy, mountain	Graminoid	Native	S1
<i>Phleum pratense</i>	Timothy	Graminoid	Non-native	SNA
<i>Poa annua</i>	Blue grass, annual	Graminoid	Non-native	SNA
<i>Poa arida</i>	Blue grass, plains	Graminoid	Native	S4
<i>Poa compressa</i>	Blue grass, Canada	Graminoid	Non-native	SNA
<i>Poa cusickii</i> ssp. <i>pallida</i>	Blue grass, Cusick's	Graminoid	Native	S4
<i>Poa interior</i>	Blue grass, inland	Graminoid	Native	S4
<i>Poa palustris</i>	Blue grass, fowl	Graminoid	Native	S4

<i>Poa pratensis</i>	Blue grass, Kentucky	Graminoid	Non-native	SNA
<i>Poa secunda</i>	Blue grass, Canby	Graminoid	Native	S5
<i>Pseudoroegneria spicata</i>	Wheat grass, bluebunch	Graminoid	Native	S2
<i>Puccinellia nuttalliana</i>	Salt-meadow grass, Nuttall's	Graminoid	Native	S4
<i>Schedonorus pratensis</i>	Fescue, meadow	Graminoid	Non-native?	SNA
<i>Schizachne purpurascens</i>	Oat grass, purple	Graminoid	Native	S4
<i>Schizachyrium scoparium</i>	Bluestem, little	Graminoid	Native	S4
<i>Sphenopholis intermedia</i>	Wedge grass, slender	Graminoid	Native	S4
<i>Sphenopholis obtusata</i>	Wedge grass, prairie	Graminoid	Native	S4
<i>Trisetum spicatum</i>	Trisetum, spike	Graminoid	Native	S3
<i>Trisetum wolfii</i>	Oats, beardless	Graminoid	Native	S1
<i>Vulpia octoflora</i>	Fescue, six-weeks	Graminoid	Native	S3
POLEMONIACEAE (Phlox Family)				
<i>Collomia linearis</i>	Collomia, narrow-leaved	Forb	Native	S4
<i>Linanthus septentrionalis</i>	Desert-gold, northern	Forb	Native	S1
<i>Navarretia saximontana</i>	Pin-cushion plant, Rocky mountain	Forb	Native	S3
<i>Phlox hoodii</i>	Phlox, moss	Forb	Native	S5
POLYGONACEAE (Buckwheat Family)				
<i>Eriogonum flavum</i>	Umbrella-plant, yellow	Forb	Native	S4
<i>Eriogonum pauciflorum</i> var. <i>pauciflorum</i>	Buckwheat, Few-flowered Wild	Forb	Native	S3
<i>Fallopia convolvulus</i>	Buckwheat, wild	Forb	Non-native?	SNA
<i>Fallopia scandens</i>	Buckwheat, Climbing False	Forb	Native	S3
<i>Persicaria amphibia</i>	Smartweed, water	Forb	Native	S4
<i>Persicaria lapathifolia</i>	Persicaria, pale	Forb	Native	S4
<i>Polygonum achoreum</i>	Knotweed, striate	Forb	Native	S4
<i>Polygonum aviculare</i> ssp. <i>buxiforme</i>	Knotweed, Common	Forb	Native	S4
<i>Polygonum confertiflorum</i>	Knotweed, dense-flowered	Forb	Native	S3
<i>Polygonum douglasii</i>	Knotweed, Douglas	Forb	Native	S4
<i>Rumex acetosella</i>	Sorrel, sheep	Forb	Non-native?	SNA

	<i>Rumex fueginus</i>	Dock, golden	Forb	Native	S5
	<i>Rumex occidentalis</i>	Dock, western	Forb	Native	S4
	<i>Rumex triangulivalvis</i>	Dock, Triangular-valved	Forb	Native	S5
PORTULACACEAE (Purslane Family)					
	<i>Claytonia lanceolata</i>	Spring beauty, lance-leaved	Forb	Native	S2
	<i>Montia linearis</i>	Spring-beauty, linear-leaved	Forb	Native	S1
	<i>Portulaca oleracea</i>	Purslane	Forb	Non-native?	SNA
POTAMOGETONACEAE (Pondweed Family)					
	<i>Potamogeton alpinus</i>	Pondweed, alpine	Forb	Native	S4
	<i>Potamogeton foliosus</i>	Pondweed, leafy	Forb	Native	S4
	<i>Potamogeton friesii</i>	Pondweed, Fries'	Forb	Native	S4
	<i>Potamogeton gramineus</i>	Pondweed, various-leaved	Forb	Native	S4
	<i>Potamogeton richardsonii</i>	Pondweed, Richardson's	Forb	Native	S4
	<i>Potamogeton strictifolius</i>	Pondweed, upright narrow-leaved	Forb	Native	S3
	<i>Stuckenia filiformis ssp. alpina</i>	Pondweed, northern slender	Forb	Native	S4
	<i>Stuckenia pectinata</i>	Pondweed, sago	Forb	Native	S4
	<i>Stuckenia vaginata</i>	Pondweed, sheathed	Forb	Native	S4
PRIMULACEAE (Primrose Family)					
	<i>Androsace septentrionalis</i>	Pygmyflower	Forb	Native	S5
	<i>Dodecatheon conjugens</i>	Shooting star, cylindric-fruited	Forb	Native	S3
	<i>Dodecatheon conjugens var. viscidum</i>	Shooting star, Bonneville	Forb	Native	S3
	<i>Dodecatheon pulchellum</i>	Shooting star, saline	Forb	Native	S4
	<i>Lysimachia ciliata</i>	Loosestrife, fringed	Forb	Native	S4
	<i>Lysimachia maritima</i>	Sea-milkwort	Forb	Native	S4
	<i>Lysimachia thysiflora</i>	Loosestrife, tufted	Forb	Native	S4
	<i>Primula incana</i>	Primrose, mealy	Forb	Native	S4
PTERIDACEAE (Maidenhair-Fern Family)					
	<i>Pellaea glabella ssp. occidentalis</i>	Western Smooth Cliff-brake	Forb	Native	S1
PYROLACEAE (Wintergreen Family)					

<i>Chimaphila umbellata</i>	Prince's-pine, western	Shrub	Native	S3
<i>Moneses uniflora</i>	Wintergreen, one-flowered	Forb	Native	S4
<i>Orthilia secunda</i>	Wintergreen, one-sided	Forb	Native	S4
<i>Pyrola aserifolia</i>	Wintergreen, common pink	Forb	Native	S4
<i>Pyrola chlorantha</i>	Wintergreen, greenish-flowered	Forb	Native	S4
<i>Pyrola elliptica</i>	Shineleaf, common	Forb	Native	S4
<i>Pyrola minor</i>	Wintergreen, lesser	Forb	Native	S4

RANUNCULACEAE (Buttercup Family)

<i>Actaea rubra</i>	Baneberry, red and white	Forb	Native	S4
<i>Anemone canadensis</i>	Anemone, Canada	Forb	Native	S4
<i>Anemone cylindrica</i>	Anemone, long-fruited	Forb	Native	S4
<i>Anemone multifida</i>	Anemone, cut-leaved	Forb	Native	S4
<i>Anemone patens</i> var. <i>multifida</i>	Prairie crocus	Forb	Native	S5
<i>Aquilegia brevistyla</i>	Columbine, small-flowered	Forb	Native	S4
<i>Clematis ligusticifolia</i>	Western Virgin's-bower	Shrub	Native	S4
<i>Clematis occidentalis</i>	Clematis, purple	Shrub	Native	S2
<i>Delphinium bicolor</i>	Larkspur, low	Forb	Native	S3
<i>Delphinium bicolor</i> ssp. <i>bicolor</i>	Flat-head Larkspur	Forb	Native	S3
<i>Myosurus apetalus</i> var. <i>borealis</i>	Mousetail, awned	Forb	Native	S2
<i>Myosurus apetalus</i> var. <i>montanus</i>	Bristly Mousetail	Forb	Native	S2
<i>Myosurus minimus</i>	Mousetail, least	Forb	Native	S3
<i>Ranunculus abortivus</i>	Buttercup, smooth-leaved	Forb	Native	S4
<i>Ranunculus acris</i>	Buttercup, tall	Forb	Non-native	SNA
<i>Ranunculus aquatilis</i> var. <i>diffusus</i>	Water crowfoot, white	Forb	Native	S4
<i>Ranunculus cardiophyllus</i>	Buttercup, heart-leaved	Forb	Native	S2
<i>Ranunculus cymbalaria</i>	Buttercup, seaside	Forb	Native	S4
<i>Ranunculus flammula</i> var. <i>ovalis</i>	Spearwort, creeping	Forb	Native	S4
<i>Ranunculus flammula</i> var. <i>reptans</i>	Buttercup, creeping	Forb	Native	S4
<i>Ranunculus glaberrimus</i> var. <i>ellipticus</i>	Buttercup, sagebrush	Forb	Native	S5
<i>Ranunculus gmelinii</i>	Water crowfoot, small yellow	Forb	Native	S4
<i>Ranunculus inamoenus</i> var. <i>inamoenus</i>	Buttercup, graceful	Forb	Native	S1
<i>Ranunculus macounii</i>	Buttercup, Macoun's	Forb	Native	S4

<i>Ranunculus pedatifidus</i> var. <i>affinis</i>	Buttercup, northern	Forb	Native	S3
<i>Ranunculus rhomboideus</i>	Buttercup, prairie	Forb	Native	S4
<i>Ranunculus sceleratus</i> var. <i>multifidus</i>	Buttercup, celery-leaved	Forb	Native	S4
<i>Thalictrum dasycarpum</i>	Meadow-rue, tall	Forb	Native	S4
<i>Thalictrum occidentale</i>	Meadow-rue, western	Forb	Native	S2
<i>Thalictrum venulosum</i>	Meadow-rue, veiny	Forb	Native	S4
ROSACEAE (Rose Family)				
<i>Agrimonia striata</i>	Agrimony	Forb	Native	S4
<i>Amelanchier alnifolia</i>	Saskatoon	Shrub	Native	S5
<i>Chamaerhodos erecta</i>	Rose, little ground	Forb	Native	S4
<i>Comarum palustre</i>	Cinquefoil, marsh	Forb	Native	S4
<i>Crataegus aquacervensis</i>	Hawthorn, Elkwater	Shrub	Native	SNR
<i>Crataegus castlegarensis</i>	Hawthorn, Castlegar	Shrub	Native	SNR
<i>Crataegus chrysocarpa</i>	Hawthorn, northern	Shrub	Native	S4
<i>Crataegus cupressocollina</i>	Hawthorn, Cypress Hills	Shrub	Native	SNR
<i>Crataegus douglasii</i>	Hawthorn, Black-fruited	Shrub	Native	S2
<i>Crataegus macracantha</i>	Hawthorn, succulent	Shrub	Native	
<i>Crataegus purpurella</i>	Hawthorn, Loch Lomond	Shrub	Native	SNR
<i>Crataegus rivuladamensis</i>	Hawthorn, Adams Creek	Shrub	Native	SNR
<i>Crataegus rivulopugnensis</i>	Hawthorn, Battle Creek	Shrub	Native	SNR
<i>Crataegus rubibracteolata</i>	Hawthorn, red bracteole	Shrub	Native	?
<i>Crataegus sheila-hippsiae</i> var. <i>saskatchewanensis</i>	Hawthorn, Saskatchewan	Shrub	Native	SNR
<i>Crataegus sheridana</i>	Hawthorn, Great Plains	Shrub	Native	SNR
<i>Crataegus ursopedensis</i>	Hawthorn, Bear Paw	Shrub	Native	SNR
<i>Dasiphora fruticosa</i>	Cinquefoil, shrubby	Shrub	Native	S4
<i>Drymocallis arguta</i>	Cinquefoil, white	Forb	Native	S5
<i>Fragaria virginiana</i>	Wild strawberry	Forb	Native	S5
<i>Geum aleppicum</i>	Avens, yellow	Forb	Native	S4
<i>Geum macrophyllum</i> var. <i>perincisum</i>	Avens, large-leaved yellow	Forb	Native	S4
<i>Geum rivale</i>	Avens, purple	Forb	Native	S4
<i>Geum triflorum</i> var. <i>ciliatum</i>	Avens, three-flowered	Forb	Native	S5
<i>Potentilla anserina</i>	Silverweed	Forb	Native	S4

<i>Potentilla bipinnatifida</i>	Cinquefoil, bipinnate	Forb	Native	S4
<i>Potentilla concinna</i>	Cinquefoil, early	Forb	Native	S2
<i>Potentilla glaucophylla</i> var. <i>glaucophylla</i>	Cinquefoil, Blue-leaved	Forb	Native	S1
<i>Potentilla gracilis</i> var. <i>fastigiata</i>	Cinquefoil, Nuttall's	Forb	Native	S4
<i>Potentilla hippiana</i>	Cinquefoil, woolly	Forb	Native	S5
<i>Potentilla lasiodonta</i>	Cinquefoil, Sandhills	Forb	Native	S2
<i>Potentilla litoralis</i>	Cinquefoil, prairie	Forb	Native	S4
<i>Potentilla norvegica</i>	Cinquefoil, rough	Forb	Native	S4
<i>Potentilla plattensis</i>	Cinquefoil, low	Forb	Native	S4
<i>Potentilla pulcherrima</i>	Cinquefoil, soft	Forb	Native	S4
<i>Potentilla rivalis</i>	Cinquefoil, brook	Forb	Native	S4
<i>Potentilla supina</i> ssp. <i>paradoxa</i>	Cinquefoil, Bushy	Forb	Native	S3
<i>Prunus pensylvanica</i>	Cherry, pin	Shrub	Native	S4
<i>Prunus virginiana</i>	Cherry, choke	Shrub	Native	S5
<i>Rosa acicularis</i>	Rose, prickly	Shrub	Native	S5
<i>Rosa arkansana</i>	Rose, prairie	Shrub	Native	S5
<i>Rosa woodsii</i>	Rose, common wild	Shrub	Native	S5
<i>Rubus arcticus</i>	Raspberry, dwarf	Shrub	Native	S4
<i>Rubus idaeus</i>	Raspberry, American wild	Shrub	Native	S5
<i>Rubus parviflorus</i>	Thimbleberry	Shrub	Native	S1
<i>Rubus pubescens</i>	Dewberry	Shrub	Native	S4
<i>Sorbus scopulina</i>	Mountain-ash, western	Shrub	Native	S3
<i>Spiraea lucida</i>	Shining-leaved Meadow-sweet	Forb	Native	S2
RUBIACEAE (Madder Family)				
<i>Galium aparine</i>	Cleavers	Forb	Native	S5
<i>Galium boreale</i>	Bedstraw, northern	Forb	Native	S5
<i>Galium trifidum</i> ssp. <i>trifidum</i>	Bedstraw, small	Forb	Native	S4
<i>Galium triflorum</i>	Bedstraw, sweet-scented	Forb	Native	S4
SALICACEAE (Willow Family)				
<i>Populus angustifolia</i>	Cottonwood, narrowleaf	Tree	Native	S2
<i>Populus balsamifera</i>	Poplar, balsam	Tree	Native	S5

<i>Populus tremuloides</i>	Aspen, trembling	Tree	Native	S5
<i>Populus x brayshawii</i>	Cottonwood, hybrid	Tree	Native	SH
<i>Salix amygdaloides</i>	Willow, peach-leaved	Shrub	Native	S4
<i>Salix bebbiana</i>	Willow, long-beaked	Shrub	Native	S4
<i>Salix boothii</i>	Willow, Booth's	Shrub	Native	S1
<i>Salix candida</i>	Willow, hoary	Shrub	Native	S4
<i>Salix discolor</i>	Willow, pussy	Shrub	Native	S4
<i>Salix interior</i>	willow, sandbar	Shrub	Native	S4
<i>Salix lasiandra</i>	willow, shining	Shrub	Native	SH
<i>Salix maccalliana</i>	Willow, velvet-fruited	Shrub	Native	S4
<i>Salix myrtillifolia</i>	willow, myrtle-leaf	Shrub	Native	S4
<i>Salix planifolia</i>	willow, flat leaved	Shrub	Native	S4
<i>Salix pseudomonticola</i>	Willow, false mountain	Shrub	Native	S4
<i>Salix scouleriana</i>	willow, Scouler's	Shrub	Native	S4
<i>Salix serissima</i>	Willow, autumn	Shrub	Native	S4
SANTALACEAE (Sandalwood Family)				
<i>Comandra umbellata</i>	Toadflax, bastard	Forb	Native	S5
SAXIFRAGACEAE (Saxifrage Family)				
<i>Heuchera parvifolia</i>	Alumroot, small-leaved	Forb	Native	S1
<i>Heuchera richardsonii</i>	Alumroot	Forb	Native	S4
<i>Lithophragma glabrum</i>	Prairie Star	Forb	Native	S2
<i>Micranthes occidentalis</i>	Western Saxifrage	Forb	Native	S1
<i>Mitella nuda</i>	Bishop's-cap	Forb	Native	S4
<i>Parnassia palustris</i> var. <i>tenuis</i>	Grass-of-parnassus, marsh	Forb	Native	S4
SCROPHULARIACEAE (Figwort Family)				
<i>Besseyia wyomingensis</i>	Kitten-tails	Forb	Native	S1
<i>Castilleja miniata</i> ssp. <i>miniata</i>	Paintbrush, common red	Forb	Native	S4
<i>Castilleja sessiliflora</i>	Paintbrush, downy	Forb	Native	S3
<i>Collinsia parviflora</i>	Mary, blue-eyed	Forb	Native	S3
<i>Gratiola neglecta</i>	Hedge-hyssop, clammy	Forb	Native	S4
<i>Limosella aquatica</i>	Mudwort	Forb	Native	S4

<i>Linaria vulgaris</i>	Toad-flax, yellow	Forb	Non-native	SNA
<i>Mimulus guttatus</i>	Monkeyflower, large yellow	Forb	Native	S3
<i>Orthocarpus luteus</i>	Owl's-clover	Forb	Native	S4
<i>Penstemon albidus</i>	Beardtongue, white	Forb	Native	S4
<i>Penstemon nitidus</i> var. <i>nitidus</i>	Beardtongue, smooth blue	Forb	Native	S4
<i>Penstemon procerus</i> var. <i>procerus</i>	Beardtongue, pincushion	Forb	Native	S4
<i>Rhinanthus minor</i> ssp. <i>minor</i>	Yellow-rattle	Forb	Native	S2
<i>Veronica americana</i>	Speedwell, American	Forb	Native	S4
<i>Veronica anagallis-aquatica</i>	Brook-pimpernell	Forb	Native	S4
<i>Veronica peregrina</i> ssp. <i>xalapensis</i>	Speedwell, hairy	Forb	Native	S4
<i>Veronica serpyllifolia</i>	Alkaline Wing-nerved Moss	Forb	Native	S1
<i>Veronica serpyllifolia</i> ssp. <i>humifusa</i>	Speedwell, northern thyme-leaved	Forb	Native	S1
SELAGINELLACEAE (Spike-Moss Family)				
<i>Selaginella densa</i>	Spike-moss, dense	Forb	Native	S4
SMILACACEAE (Greenbrier Family)				
<i>Smilax lasioneura</i>	Carrion-flower	Forb	Native	S4
SOLANACEAE (Potato Family)				
<i>Solanum triflorum</i>	Tomato, wild	Forb	Native	S4
SPARGANIACEAE (Bur-Reed Family)				
<i>Sparganium angustifolium</i>	Bur-reed, narrow-leaved	Forb	Native	S4
<i>Sparganium eurycarpum</i>	Bur-reed, broad-fruited	Forb	Native	S4
TYPHACEAE (Cattail Family)				
<i>Typha latifolia</i>	Cattail, common	Forb	Native	S4
URTICACEAE (Nettle Family)				
<i>Parietaria pensylvanica</i>	Pellitory, American	Forb	Native	S4
<i>Urtica dioica</i> ssp. <i>gracilis</i>	Nettle, stinging	Forb	Native	S4
VERBENACEAE (Verbena Family)				
<i>Verbena bracteata</i>	Vervain, bracted	Forb	Native	S4

VIOLACEAE (Violet Family)

<i>Viola adunca</i>	Violet, early blue	Forb	Native	S5
<i>Viola canadensis</i> var. <i>rugulosa</i>	Violet, western Canada	Forb	Native	S4
<i>Viola nephrophylla</i>	Violet, northern bog	Forb	Native	S4
<i>Viola nuttallii</i>	Violet, Nuttall's yellow	Forb	Native	S4
<i>Viola renifolia</i>	Violet, kidney-leaved white	Forb	Native	S4
<i>Viola vallicola</i>	Violet, yellow valley	Forb	Native	S4

VISCACEAE (Christmas Mistletoe Family)

<i>Arceuthobium pusillum</i>	Mistletoe, dwarf	Forb	Native	S1
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ZANNICHELLIACEAE (Horned Pondweed Family)

<i>Zannichellia palustris</i>	Pondweed, horned	Forb	Native	S4
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APPENDIX 2: Recommended Trees and Shrubs for planting at Cypress Hills Interprovincial Park

Common Name	Latin Name	Origin	Habitat	Growth Habit	Crown Form	Max Height	Max Spread	Site Type	Exposure	Growth Rate	Application
Beaked Hazelnut	<i>Corylus cornuta</i>	NS	Moist	Shrub - Small	Upright, spreading	2	2	Not Particular	Sun/Shade	Moderate	Eco-Buffer, Naturalizing
Wolf Willow	<i>Elaeagnus commutata</i>	NS	Dry	Shrub - Small	Upright, spreading	2	2	Not Particular	Sun/Shade	Moderate	Naturalizing, Reclamation
Shrubby Cinquefoil	<i>Potentilla fruticosa</i>	NS	Dry	Shrub - Small	Upright, spreading	1	1	Not Particular	Sun	Moderate	Eco-Buffer, Naturalizing
Prickly rose	<i>Rosa acicularis</i>	NS	Dry	Shrub - Small	Upright	1	1	Not Particular	Sun/Shade	Moderate	Eco-Buffers, Hedging
Woods Rose	<i>Rosa woodsii</i>	NS	Dry	Shrub - Small	Upright	1	1	Not Particular	Sun/Shade	Moderate	Eco-Buffers, Hedging
Hedge Rose	<i>Rosa woodsii x</i>										
Canada	<i>Rosa rugosa</i>	E	Dry	Shrub - Small	Upright	2	2	Not Particular	Sun/Shade	Moderate	Eco-Buffers, Hedging
Buffaloberry	<i>Shepherdia canadensis</i>	NS	Moist	Shrub - Small	Upright	2	2	Well-Drained	Sun	Moderate	Eco-Buffers, Hedging
Western Snowberry	<i>Symphoricarpos occidentalis</i>	NS	Dry	Shrub - Small	Spreading	2	2	Not Particular	Sun	Moderate	Eco-Buffers, Reclamation
Pussy Willow	<i>Salix discolor</i>	NS	Moist	Shrub - Medium	Upright	5	3	Moist	Sun	Moderate	Hedging
Red –Osier	<i>Cornus sericea var.</i>										
Dogwood	<i>stolonifera</i>	NS	Moist	Shrub - Medium	Upright	3	3	Not Particular	Sun/Shade	Moderate	Eco-Buffer, Naturalizing
Douglas Hawthorn	<i>Crataegus douglasii</i>	NS	Dry	Shrub - Medium	Upright, spreading	3	3	Not Particular	Sun/Shade	Moderate	Eco-Buffer, Naturalizing
Roundleaf	<i>Crataegus rotundifolia</i>	NS	Dry	Shrub - Medium	Upright, spreading	3	3	Not Particular	Sun/Shade	Moderate	Eco-Buffer, Naturalizing
Hawthorn											
Beaked Willow	<i>Salix bebbiana</i>	NS	Wet	Shrub - Medium	Upright	4	3	Moist	Sun	Moderate	Hedging
Silver Buffaloberry	<i>Shepherdia argentea</i>	NS	Dry	Shrub - Medium	Upright	5	4	Well-Drained	Sun	Moderate	Eco-Buffers, Hedging
High Bush											
Cranberry	<i>Viburnum trilobum</i>	NS	Moist	Shrub - Medium	Upright	3	2	Not Particular	Sun/Shade	Moderate	Eco-Buffers, Hedging
Saskatoon	<i>Amelanchier alnifolia</i>	NS	Moist	Shrub - Tall	Upright	5	4	Not Particular	Sun	Moderate	Eco-Buffer, Naturalizing
Choke Cherry	<i>Prunus virginiana</i>	NS	Moist	Shrub - Tall	Upright, Spreading	4	3	Well-Drained	Sun	Fast	Eco-Buffer, Naturalizing
River Birch	<i>Betula occidentalis</i>	NS	Moist	Tree - Small	Upright, open	6	4	Moist, Well Drained	Sun	Moderate	Eco-Buffer, Naturalizing

Siberian Crabapple	<i>Malus baccata</i>	E	Moist	Tree - Small	Upright, Oval	7	4	Not Particular	Sun	Moderate	Specimen, Hedging
Pin Cherry	<i>Prunus pensylvanica</i>	NS	Moist	Tree - Small	Low headed, Oval	5	3	Well-Drained Moist, Well Drained	Sun	Fast	Eco-Buffer, Naturalizing
Paper Birch	<i>Betula papyrifera</i>	NS	Moist	Tree - Medium	rounded Oval,	12	9	Moist, Well Drained	Sun	Fast	Eco-Buffer, Naturalizing
Paper Birch 'Prairie Dream'	<i>Betula papyrifera</i> 'Varen'	NS	Wet	Tree - Medium	rounded Upright,	12	9	Drained	Sun	Fast	Specimen
Siberian Larch	<i>Larix sibirica</i>	E	Moist	Tree - Tall	Pyramidal	18	6	Well-Drained	Sun	Moderate	Specimen, Hedging
White Spruce	<i>Picea glauca</i>	NS	Moist	Tree - Tall	Pyramidal	18	7	Well Drained	Sun/Shade	Slow	Specimen, Naturalizing
Colorado Blue Spruce	<i>Picea pungens</i> 'Glaucous'	E	Dry	Tree - Tall	Pyramidal Broad	20	8	Moist	Sun	Moderate	Specimen
Lodgepole pine	<i>Pinus contorta</i> <i>Populus</i>	NS	Dry	Tree - Tall	Pyramidal Broad,	15	7	Well-Drained Rich Moist	Sun	Slow	Specimen, Naturalizing
Balsam poplar	<i>balsamifera</i> <i>Populus deltoidea</i>	NS	Moist	Tree - Tall	Oval Broad,	15	10	Soils Rich Moist	Sun	Very Fast	Naturalizing
Plains Cottonwood	<i>var. occidentalis</i> <i>Populus</i>	NS	Moist	Tree - Tall	Oval Pyramidal	25	15	Soils	Sun	Very Fast	Specimen/Shade
Trembling aspen	<i>tremuloides</i>	NS	Moist	Tree - Tall	rounded	15	9	Not Particular	Sun	Fast	Naturalizing
Hybrid Poplar 'Okaneese'	<i>Populus x</i> 'Okaneese'	NS	Moist	Tree - Tall	Pyramidal rounded	20	10	Not Particular	Sun	Fast	Hedging
Bur Oak	<i>Quercus macrocarpa</i>	NS	Moist	Tree - Tall	Upright, Oval	20	15	Well-Drained	Sun	Moderate	Specimen/Shade
Acute Willow	<i>Salix acutifolia</i>	E	Moist	Tree - Tall	Upright Oval	12	12	Well-Drained	Sun	Fast	Specimen/Hedging
American Basswood	<i>Tilia americana</i>	E	Moist	Tree - Tall	Upright Oval	15	8	Moist	Sun	Moderate	Specimen/Shade
Brandon American Elm	<i>Ulmus americana</i>	NS	Moist	Tree - Tall	Upright Oval	20	15	Not Particular	Sun	Fast	Specimen/Shade

Origin: NS - Native Saskatchewan, E - Exotic to Saskatchewan

APPENDIX 3: Amphibians and Reptiles of Cypress Hills Interprovincial Park

Sources are Alberta Tourism, Parks and Recreation: Forest and Fire Management Strategy (2009), Saskatchewan Conservation Data Centre: All Taxa (SCDC 2019), Bebler and King (1979). Nomenclature and S-ranking has been updated following Saskatchewan Conservation Data Centre: All Taxa (SCDC 2019).

SCIENTIFIC NAME	COMMON NAME	S-RANK	COSEWIC	SARA
ORDER: SQUAMATA				
COLUBRIDAE (Colubrid Snake Family)				
<i>Pituophis catenifer sayi</i>	Bullsnake	S4	Special Concern	Under Consideration
<i>Thamnophis elegans vagrans</i>	Wandering Gartersnake	S4		
<i>Thamnophis radix haydenii</i>	Western Plains Gartersnake	S5		
<i>Thamnophis sirtalis parietalis</i>	Red-sided Gartersnake	S5		
ORDER: CHELONIA				
EMYDIDAE (Box Turtles and Pond Turtles Family)				
<i>Chrysemys picta bellii</i>	Western Painted Turtle	S3	Not At Risk	
ORDER: ANURA				
RANIDAE (True Frogs Family)				
<i>Lithobates pipiens</i>	Northern Leopard Frog	S3	Special Concern	Special Concern
<i>Lithobates sylvaticus</i>	Wood Frog	S5		
HYLIDAE (New World Tree Frogs Family)				
<i>Pseudacris maculata</i>	Boreal Chorus Frog	S5	Not At Risk	
ORDER: CAUDATA				
AMBYSTOMATIDAE (Mole Salamander Family)				
<i>Ambystoma mavortium</i>	Barred Tiger Salamander	S4	Special Concern	Special Concern

APPENDIX 4: Mammals of Cypress Hills Interprovincial Park

Sources are Alberta Tourism, Parks and Recreation (2009), Siepielski (2006), Saskatchewan Conservation Data Centre: All Taxa (SCDC 2019), Whitaker (1980). Nomenclature and S-ranking has been updated following Saskatchewan Conservation Data Centre: All Taxa (SCDC 2019).

¹ Potential to occur in Cypress Hills ² Extirpated and re-introduced to area ³ Not native to area ⁴ Extirpated from area

SCIENTIFIC NAME	COMMON NAME	S-RANK	COSEWIC	SARA
ORDER: INSECTIVORA				
SORICIDAE (Shrew Family)				
<i>Sorex cinereus</i>	Masked Shrew	S4		
<i>Sorex haydeni</i>	Prairie Shrew	S4		
<i>Sorex monticolus</i>	Dusky Shrew	SU		
ORDER: CHIROPTERA				
VESPERTILIONIDAE (Evening Bats and Vesper Bats)				
<i>Eptesicus fuscus</i>	Big Brown Bat	S5		
<i>Lasionycteris noctivagans</i>	Silver-haired Bat	S5B		
<i>Lasiurus borealis</i>	Eastern Red Bat	S5B		
<i>Myotis ciliolabrum</i>	Western Small-footed Myotis	S2		
<i>Myotis evotis</i>	Long-eared Myotis	S2B,S2N		
<i>Myotis lucifugus</i>	Little Brown Myotis	S4B,S4N	Endangered	Endangered
<i>Myotis volans</i>	Long-legged Myotis	SNR		
ORDER: LAGOMORPHA				
LEPORIDAE (Rabbits and Hares Family)				
<i>Lepus americanus</i>	Snowshoe Hare	S5		
<i>Lepus townsendii</i>	White-tailed Jack Rabbit	S4		
<i>Sylvilagus nuttallii</i>	Nuttall's Cottontail	S4		
ORDER: RODENTIA				

CASTORIDAE (Beaver Family)

<i>Castor canadensis</i>	American Beaver	S5		
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CRECETINAE (Mice, Lemmings, and Voles Family)

<i>Lemmyscus curtatus</i>	Sagebrush Vole	S4	Data Deficient	
<i>Microtus longicaudus</i>	Long-tailed Vole	SNA		
<i>Microtus pennsylvanicus</i>	Meadow Vole	S4		
<i>Myodes gapperi</i>	Gapper's Red-backed Vole	S5		
<i>Neotoma cinerea</i>	Bushy-tailed Wood Rat	SH		
<i>Ondatra zibethicus</i>	Muskrat	S5		
<i>Onychomys leucogaster</i>	Northern Grasshopper Mouse	S4		
<i>Peromyscus leucopus</i>	White-footed Mouse	S4		
<i>Peromyscus maniculatus</i>	Deer Mouse	S5		
<i>Reithrodontomys megalotis</i>	Western Harvest Mouse	SNA		

DIPODIDAE (Jumping Mice Family)

<i>Zapus princeps</i>	Western Jumping Mouse	S4		
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ERETHIZONTIDAE (Porcupine Family)

<i>Erethizon dorsatum</i>	Porcupine	S4		
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GEOMYIDAE (Pocket Gopher Family)

<i>Thomomys talpoides</i>	Northern Pocket Gopher	S5		
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HETEROMYIDAE (Pocket Mice & Kangaroo Rats Family)

<i>Perognathus fasciatus</i>	Olive-Backed Pocket Mouse	S2		
<i>Dipodomys ordii</i> ¹	Ord's Kangaroo Rat	S3	Endangered	Endangered

SCIURIDAE (Squirrels and Allies Family)

<i>Ictidomys tridecemlineatus</i>	Thirteen-lined Ground Squirrel	S5		
<i>Neotamias minimus</i>	Least Chipmunk	S5		
<i>Tamiasciurus hudsonius</i> ³	Red Squirrel	S5		
<i>Urocitellus richardsonii</i>	Richardson's Ground Squirrel	S5		

MURIDAE (Old World Rats and Mice Family)

	<i>Mus musculus</i> ³	House Mouse	SNA		
ORDER: CARNIVORA					
CANIDAE (Wolves, Dogs and Foxes Family)					
	<i>Canis latrans</i>	Coyote	S5		
	<i>Canis lupus occidentalis</i> ^{1 4}	Grey Wolf	S4	Not at Risk	
	<i>Vulpes vulpes</i>	Red Fox	S5		
	<i>Vulpes velox</i> ^{1 2}	Swift Fox	S3	Threatened	Threatened
PROCYONIDAE (Raccoon Family)					
	<i>Procyon lotor</i>	Raccoon	S5		
FELIDAE (Cat Family)					
	<i>Felis concolor</i>	Mountain Lion	S2		
	<i>Lynx rufus</i>	Bobcat	S3		
MEPHITIDAE (Skunk Family)					
	<i>Mephitis mephitis</i>	Striped Skunk	S5		
MUSTELIDAE (Weasel Family)					
	<i>Martes americana</i>	Marten	S5		
	<i>Mustela erminea</i>	Short-tailed Weasel	S5		
	<i>Mustela frenata longicauda</i>	Long-tailed Weasel	S3	Special Concern	Special Concern
	<i>Mustela nivalis</i>	Least Weasel	S5	Not At Risk	
	<i>Taxidea taxus taxus</i> ¹	Badger	S4		
	<i>Vison vison</i>	Mink	S5		
URSIDAE (Bear Family)					
	<i>Ursus arctos</i> ⁴	Plains Grizzly Bear	SX	Special Concern	
ORDER: ARTIODACTYLA					
ANTILOCAPRIDAE (Antelope Family)					
	<i>Antilocapra americana</i>	Pronghorn Antelope	S3		
BOVIDAE (Bovid Family)					

	<i>Bos bison bison</i> ⁴	Plains Bison	S2	Threatened	Under Consideration
CERVIDAE (Deer Family)	<i>Cervus elaphus</i> ²	Elk	S4		
	<i>Odocoileus hemionus</i>	Mule Deer	S4		
	<i>Odocoileus virginianus</i>	White-tailed Deer	S4		
	<i>Alces americanus</i> ²	Moose	S5		

APPENDIX 5: Birds of Cypress Hills Interprovincial Park

Sources are Alberta Tourism, Parks and Recreation: Forest and Fire Management Strategy (2009), Saskatchewan Conservation Data Centre: All Taxa (SCDC 2019), Udvardy (1977), All About Birds (2020), HABISask (2019), Saskatchewan Breeding Bird Atlas (no date), Nature Saskatchewan (no date), and Government of Canada (2019). Nomenclature and S-ranking has been updated following Saskatchewan Conservation Data Centre: All Taxa (SCDC 2019).

Resident Codes:

B – Breeding, known breeding within Cypress Area Y – Year-round occupant of area (breeding and non-breeding use) NB – Non-Breeding, known occupant within Cypress Area during non-breeding season M – Migrant, possibly found utilizing area during migration seasons V – visitor, potential to be found within area X – Extirpated from area

¹ Potential to occur in Cypress Hills ² Extirpated and re-introduced to area ³ Not native to area ⁴ Extirpated from area ⁵ Rare breeding species or SARA-listed ⁶ Rare breeding at regional level ⁷ Further documentation required to confirm species

SCIENTIFIC NAME	COMMON NAME	S-RANK	COSEWIC	RESIDENT
ACCIPITRIDAE (Hawks, Kites, and Eagles Family)				
<i>Accipiter cooperii</i>	Cooper's Hawk	S4B,S2M,S2N	Not at Risk	B
<i>Accipiter gentilis</i>	Northern Goshawk	S4B,S4M,S3N		Y
<i>Accipiter striatus</i>	Sharp-shinned Hawk	S4B,S4M,S2N	Not at Risk	B
<i>Aquila chrysaetos</i> ⁵	Golden Eagle	S3B,S4M,S3N	Not at Risk	Y
<i>Buteo jamaicensis</i>	Red-tailed Hawk	S5B,S5M,S1N	Not at Risk	B
<i>Buteo lagopus</i>	Rough-legged Hawk	S4M,S4N	Not at Risk	M
<i>Buteo platypterus</i>	Broad-winged Hawk	S4B,S3M		B
<i>Buteo regalis</i> ⁵	Ferruginous Hawk	S4B,S4M	Threatened	B
<i>Buteo swainsoni</i>	Swainson's Hawk	S4B		B
<i>Circus cyaneus</i>	Northern Harrier	S5B,S4M,S2N	Not at Risk	B
<i>Haliaeetus leucocephalus</i>	Bald Eagle	S5B,S4M,S4N	Not at Risk	M
ALAUDIDAE (Lark Family)				
<i>Eremophila alpestris</i>	Horned Lark	S5B,S5M,S5N		B
ALCEDINIDAE (Kingfisher Family)				
<i>Megaceryle alcyon</i>	Belted Kingfisher	S5B,S5M		B
ANATIDAE (Ducks, Geese, and Waterfowl Family)				

	<i>Aix sponsa</i> ¹	Wood Duck	S4B,S4M		V
	<i>Anas acuta</i>	Northern Pintail	S5B,S5M,S4N		B
	<i>Anas crecca</i> ⁶	Green-winged Teal	S5B,S5M,S2N		B
	<i>Anas cyanoptera</i> ⁷	Cinnamon Teal	S4B,S4M		B
	<i>Anas platyrhynchos</i>	Mallard	S5		B
	<i>Anser caerulescens</i>	Snow Goose	S5M		M
	<i>Aythya affinis</i>	Lesser Scaup	S5B,S5M,S3N		B
	<i>Aythya americana</i> ⁶	Redhead	S5B,S5M,S2N		B
	<i>Aythya collaris</i>	Ring-necked Duck	S5B,S5M		B
	<i>Aythya valisineria</i> ⁶	Canvasback	S5B,S5M,S2N		B
	<i>Branta canadensis</i>	Canada Goose	S5B,S5M,S2N		B
	<i>Bucephala albeola</i>	Bufflehead	S5B,S3M,S1N		M
	<i>Bucephala clangula</i>	Common Goldeneye	S5B,S3M,S3N		NB
	<i>Cygnus buccinator</i> ⁵	Trumpeter Swan	S3B	Not at Risk	B
	<i>Cygnus columbianus</i>	Tundra Swan	S5M		M
	<i>Mareca americana</i>	American Wigeon	S5B,S5M,S2N		B
	<i>Mareca strepera</i>	Gadwall	S5B,S5M,S2N		M
	<i>Melanitta fusca</i>	White-winged Scoter	S5B,S3M		B
	<i>Mergus merganser</i> ⁶	Common Merganser	S5B,S4M,S2N		B
	<i>Mergus serrator</i> ⁶	Red-breasted Merganser	S5B,S4M		M
	<i>Oxyura jamaicensis</i>	Ruddy Duck	S5B		B
	<i>Spatula clypeata</i>	Northern Shoveler	S5B,S5M		B
	<i>Spatula discors</i>	Blue-winged Teal	S5B,S5M		B
ARDEIDAE (Bitterns, Herons, and Egrets Family)					
	<i>Ardea herodias</i> ⁷	Great Blue Heron	S3B		B
	<i>Botaurus lentiginosus</i>	American Bittern	S4B		M
	<i>Nycticorax nycticorax</i>	Black-crowned Night-Heron	S5B		M
BOMBYCILLIDAE (Waxwings Family)					
	<i>Bombycilla cedrorum</i>	Cedar Waxwing	S5B		Y
	<i>Bombycilla garrulus</i>	Bohemian Waxwing	S4B		NB
CALCARIIDAE (Longspurs and Snow Buntings Family)					

	<i>Calcarius lapponicus</i>	Lapland Longspur	S4N		M
	<i>Calcarius ornatus</i> ⁵	Chestnut-collared Longspur	S5B	Threatened	B
	<i>Plectrophenax nivalis</i>	Snow Bunting	S5N		NB
	<i>Rhynchophanes mccownii</i> ⁵	McCown's Longspur	S3B	Threatened	B
CAPRIMULGIDAE (Nightjars and allies Family)					
	<i>Chordeiles minor</i> ⁵	Common Nighthawk	S4B,S4M	Threatened	B
	<i>Phalaenoptilus nuttallii</i> ⁵	Common Poorwill	S3B	Data Deficient	B
CARDINALIDAE (Cardinals and allies Family)					
	<i>Passerina amoena</i> ⁵	Lazuli Bunting	S5B		B
	<i>Pheucticus ludovicianus</i> ⁶	Rose-breasted Grosbeak	S5B		M
	<i>Pheucticus melanocephalus</i> ⁵	Black-headed Grosbeak	S4B		B
	<i>Piranga ludoviciana</i>	Western Tanager	S5B		B
	<i>Spiza americana</i>	Dickcissel	SNA		B
CATHARTIDAE (New World Vultures Family)					
	<i>Cathartes aura</i> ⁵	Turkey Vulture	S2B,S2M,S2N		B
CERTHIIDAE (Treecreepers Family)					
	<i>Certhia americana</i>	Brown Creeper	S4B,S3N		NB
CHARADRIIDAE (Plovers and Lapwings Family)					
	<i>Charadrius melodus</i> ¹	Piping plover	S3B	Endangered	V
	<i>Charadrius montanus</i> ^{1 5}	Mountain Plover	S1B	Endangered	V
	<i>Charadrius vociferus</i>	Killdeer	S5B		B
	<i>Pluvialis dominica</i>	American Golden-plover	S5M		M
	<i>Pluvialis squatarola</i>	Black-bellied plover	S4M		M
COLUMBIDAE (Pigeons and Doves Family)					
	<i>Columba livia</i> ³	Rock Dove	SNA		Y
	<i>Streptopelia decaocto</i> ³	Eurasian Collared-Dove	SNA		Y
	<i>Zenaida macroura</i>	Mourning Dove	S5B		B
CORVIDAE (Jays, Crows, Magpies, and Ravens Family)					

	<i>Corvus brachyrhynchos</i>	American Crow	S5		B
	<i>Nucifraga columbiana</i>	Clark's Nutcracker	SNA		VY
	<i>Pica hudsonia</i>	Black-billed Magpie	S5		Y
CUCULIDAE (Cuckoo Family)					
	<i>Coccyzus erythrophthalmus</i>	Black-billed Cuckoo	S5B		B
FALCONIDAE (Falcon Family)					
	<i>Falco columbarius</i>	Merlin	S4B	Not at Risk	Y
	<i>Falco mexicanus</i> ⁵	Prairie Falcon	S3	Not at Risk	Y
	<i>Falco peregrinus anatum</i>	Peregrine Falcon	S1B,S4M,S2N	Special Concern	M
	<i>Falco rusticolus</i>	Gyr Falcon	S4N	Not at Risk	NB
	<i>Falco sparverius</i>	American Kestrel	S5B,S5M,S1N		B
FRINGILLIDAE (Finches Family)					
	<i>Acanthis flammea</i>	Common Redpoll	S4		NB
	<i>Acanthis hornemanni</i>	Hoary Redpoll	S5N		NB
	<i>Coccothraustes vespertinus</i>	Evening Grosbeak	S4		Y
	<i>Haemorhous mexicanus</i> ¹	House Finch	S5N		V
	<i>Haemorhous purpureus</i>	Purple Finch	S5B		M
	<i>Leucosticte tephrocotis</i>	Gray-crowned Rosy-finch	S4N		NB
	<i>Loxia curvirostra</i>	Red Crossbill	S4B,S5N		Y
	<i>Loxia leucoptera</i> ⁶	White-winged Crossbill	S4B,S3N		Y
	<i>Pinicola enucleator</i>	Pine Grosbeak	S2B,S4N		NB
	<i>Spinus pinus</i>	Pine Siskin	S5		B
	<i>Spinus tristis</i>	American Goldfinch	S5B		B
GAVIIDAE (Loon Family)					
	<i>Gavia immer</i>	Common Loon	S5B	Not at Risk	M
GRUIDAE (Crane Family)					
	<i>Grus canadensis</i>	Sandhill Crane	S2B,S4M		B/M
HIRUNDINIDAE (Swallows and Martins Family)					
	<i>Hirundo rustica</i> ⁷	Barn Swallow	S5B,S5M	Threatened	B

<i>Petrochelidon pyrrhonota</i> ⁷	Cliff Swallow	S5B,S5M		B
<i>Progne subis</i> ^{1 7}	Purple Martin	S5B,S5M		V
<i>Riparia riparia</i> ⁷	Bank Swallow	S5B,S5M	Threatened	B
<i>Stelgidopteryx serripennis</i> ⁷	Northern Rough-winged Swallow	S5B		B
<i>Tachycineta bicolor</i>	Tree Swallow	S5B,S5M		B
<i>Tachycineta thalassina</i> ⁵	Violet-green Swallow	S4B		B
ICTERIDAE (Orioles, Grackles, Cowbirds Family)				
<i>Agelaius phoeniceus</i>	Red-winged Blackbird	S5B		B
<i>Dolichonyx oryzivorus</i> ⁶	Bobolink	S5B	Threatened	B
<i>Euphagus carolinus</i>	Rusty Blackbird	S4B	Special Concern	M
<i>Euphagus cyanocephalus</i>	Brewer's Blackbird	S5B		B
<i>Icterus bullockii</i> ⁵	Bullock's Oriole	S3B		B
<i>Icterus galbula</i>	Baltimore Oriole	S5B		B
<i>Molothrus ater</i>	Brown-headed Cowbird	S5B		B
<i>Quiscalus quiscula</i>	Common Grackle	S5B		B
<i>Sturnella neglecta</i>	Western Meadowlark	S5B		B
<i>Xanthocephalus xanthocephalus</i>	Yellow-headed Blackbird	S5B		B
ICTERIIDAE (Chat Family)				
<i>Icteria virens</i>	Yellow-breasted Chat	S4B		B
LANIIDAE (Shrike Family)				
<i>Lanius excubitor</i>	Northern Shrike	S1B,S4N		NB
<i>Lanius ludovicianus</i> ⁵	Loggerhead Shrike	S3B	non-active	B
LARIDAE (Gulls, Terns, and Skimmers Family)				
<i>Chlidonias niger</i> ⁷	Black Tern	S4B	Not at Risk	B
<i>Larus californicus</i> ⁷	California Gull	S5B,S5M		B
<i>Larus delawarensis</i> ⁷	Ring-billed Gull	S5B,S5M		B
<i>Leucophaeus pipixcan</i>	Franklin's Gull	S4B,S4M		B
<i>Sterna forsteri</i> ¹	Forster's Tern	S4B	Data Deficient	V
<i>Sterna hirundo</i> ⁷	Common Tern	S5B,S5M	Not at Risk	B
MIMIDAE (Mockingbirds and Thrashers Family)				

	<i>Dumetella carolinensis</i>	Gray Catbird	S5B		B
	<i>Mimus polyglottos</i> ^{1 5}	Northern Mockingbird	S5B,S5M		B/V
	<i>Oreoscoptes montanus</i> ^{1 5}	Sage Thrasher	S1B	Endangered	V
	<i>Toxostoma rufum</i>	Brown Thrasher	S5B		B
MOTACILLIDAE (Wagtails and Pipits Family)					
	<i>Anthus rubescens</i>	American Pipit	S5N		M
	<i>Anthus spragueii</i> ⁵	Sprague's Pipit	S3B	Threatened	B
PANDIONIDAE (Osprey Family)					
	<i>Pandion haliaetus</i>	Osprey	S4B,S3M		M
PARIDAE (Chickadees and Titmice Family)					
	<i>Poecile atricapillus</i>	Black-capped Chickadee	S5		Y
PARULIDAE (Wood-warbler Family)					
	<i>Cardellina canadensis</i> ¹	Canada Warbler	S5B	Threatened	V/M
	<i>Cardellina pusilla</i>	Wilson's Warbler	S5B		M
	<i>Geothlypis tolmiei</i> ⁵	MacGillivray's Warbler	S4B		B
	<i>Geothlypis trichas</i>	Common Yellowthroat	S5B		B
	<i>Mniotilta varia</i> ⁶	Black-and-white Warbler	S5B,S5M		M
	<i>Oreothlypis celata</i>	Orange-crowned Warbler	S5B		B
	<i>Oreothlypis peregrina</i>	Tennessee Warbler	S5B		B
	<i>Parkesia noveboracensis</i>	Northern Waterthrush	S5B		M
	<i>Seiurus aurocapilla</i>	Ovenbird	S5B		B
	<i>Setophaga coronata</i>	Yellow-rumped Warbler	S5B		B
	<i>Setophaga petechia</i>	Yellow Warbler	S5B		B
	<i>Setophaga ruticilla</i>	American Redstart	S5B		B
	<i>Setophaga striata</i>	Blackpoll Warbler	S5B		M
	<i>Setophaga townsendi</i> ⁵	Townsend's Warbler	SNA		B
PASSERELLIDAE (New World Sparrows Family)					
	<i>Ammodramus bairdii</i> ⁵	Baird's Sparrow	S4B	Special Concern	B
	<i>Ammodramus savannarum</i>	Grasshopper Sparrow	S4B		B
	<i>Ammospiza leconteii</i>	LeConte's Sparrow	S5B,S5M		B

<i>Ammospiza nelsoni</i> ^{1 6}	Nelson's Sparrow	S5B,S5M	Not at Risk	V
<i>Calamospiza melanocorys</i>	Lark Bunting	S4B		B
<i>Chondestes grammacus</i>	Lark Sparrow	S5B		B
<i>Junco hyemalis</i>	Dark-eyed Junco	S5B		Y
<i>Melospiza georgiana</i>	Swamp Sparrow	S5B,S5M		M
<i>Melospiza lincolnii</i>	Lincoln's Sparrow	S5B		M
<i>Melospiza melodia</i>	Song Sparrow	S5B		B
<i>Passerculus sandwichensis</i>	Savannah Sparrow	S5B		B
<i>Pipilo maculatus</i>	Spotted Towhee	S5B		B
<i>Pooecetes gramineus</i>	Vesper Sparrow	S5B		B
<i>Spizella arborea</i>	American Tree Sparrow	S5B		NB
<i>Spizella breweri</i>	Brewer's Sparrow	S4B,S4M		B
<i>Spizella pallida</i>	Clay-coloured Sparrow	S5B		B
<i>Spizella passerina</i>	Chipping Sparrow	S5B		B
<i>Zonotrichia leucophrys</i>	White-crowned Sparrow	S5B		M
<i>Zonotrichia querula</i>	Harris' Sparrow	S5B		M
PASSERIDAE (Old World Sparrows Family)				
<i>Passer domesticus</i> ³	House Sparrow	SNA		Y
PELECANIDAE (Pelicans Family)				
<i>Pelecanus erythrorhynchos</i> ⁷	American White Pelican	S3B	Not at Risk	B
PHALACROCORACIDAE (Cormorants Family)				
<i>Phalacrocorax auritus</i>	Double-crested Cormorant	S4B	Not at Risk	B
PHASIANIDAE (Pheasants, Grouse, and Allies Family)				
<i>Bonasa umbellus</i>	Ruffed Grouse	S5B,S5N		Y
<i>Centrocercus urophasianus</i> ⁵	Greater Sage-Grouse	S1		V
<i>Meleagris gallopavo</i> ^{3 5}	Wild Turkey	SNA		Y
<i>Perdix perdix</i> ³	Gray Partridge	SNA		Y
<i>Phasianus colchicus</i> ³	Ring-necked Pheasant	SNA		Y
<i>Tympanuchus cupido</i> ⁴	Greater Prairie Chicken	SX	Extirpated	X
<i>Tympanuchus phasianellus</i>	Sharp-tailed Grouse	S5		Y

PICIDAE (Woodpeckers Family)

<i>Colaptes auratus</i>	Northern Flicker	S4		Y
<i>Melanerpes erythrocephalus</i> ^{1 5}	Red-headed Woodpecker	S1B,S1M	Threatened	V
<i>Picoides dorsalis</i> ⁶	American Three-toed Woodpecker	S4		Y
<i>Picoides dorsalis</i>	Three-toed Woodpecker	S4		Y
<i>Picoides pubescens</i>	Downy Woodpecker	S5		Y
<i>Picoides villosus</i>	Hairy Woodpecker	S5		Y
<i>Sphyrapicus nuchalis</i> ⁵	Red-naped Sapsucker	S1B		B
<i>Sphyrapicus varius</i> ⁶	Yellow-bellied Sapsucker	S5B,S5M		B

PODICIPEDIDAE (Grebes Family)

<i>Aechmophorus occidentalis</i> ⁷	Western Grebe	S5B	Special Concern	B
<i>Podiceps auritus</i> ⁷	Horned Grebe	S5B	Special Concern	B
<i>Podiceps grisegena</i>	Red-necked Grebe	S5B	Not at Risk	B
<i>Podiceps nigricollis</i> ⁷	Eared Grebe	S5B		B
<i>Podilymbus podiceps</i>	Pied-billed Grebe	S5B		B

RALLIDAE (Rails, Gallinules, and Coots Family)

<i>Fulica americana</i>	American Coot	S5B	Not at Risk	B
<i>Porzana carolina</i>	Sora	S5B		B
<i>Rallus limicola</i> ⁶	Virginia Rail	S4B,S4M		B

RECURVIROSTRIDAE (Stilts and Avocets Family)

<i>Recurvirostra americana</i>	American Avocet	S4B,S4M		B
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REGULIDAE (Kinglets Family)

<i>Regulus calendula</i>	Ruby-crowned Kinglet	S5B		B
<i>Regulus satrapa</i>	Golden-crowned Kinglet	S4B		Y

SCOLOPACIDAE (Snipe, Woodcock, Sandpipers, Turnstones, and Allies Family)

<i>Actitis macularius</i>	Spotted Sandpiper	S5B,S5M		B
<i>Bartramia longicauda</i>	Upland Sandpiper	S5B,S5M		B
<i>Calidris alba</i>	Sanderling	S4M		M
<i>Calidris bairdii</i>	Baird's Sandpiper	S5M		M

	<i>Calidris melanotos</i>	Pectoral Sandpiper	S5M		M
	<i>Calidris minutilla</i>	Least Sandpiper	S4B,S4M		M
	<i>Gallinago delicata</i>	Wilson's Snipe	S5B		B
	<i>Limosa fedoa</i>	Marbled Godwit	S5B,S5M		B
	<i>Numenius americanus</i> ⁵	Long-billed Curlew	S3B,S4M	Special Concern	B
	<i>Phalaropus lobatus</i>	Red-necked Phalarope	S4B,S3M	Special Concern	M
	<i>Phalaropus tricolor</i>	Wilson's Phalarope	S5B,S5M		B
	<i>Tringa flavipes</i>	Lesser Yellowlegs	S5B,S5M		M
	<i>Tringa melanoleuca</i>	Greater Yellowlegs	S5B,S5M		M
	<i>Tringa semipalmata</i>	Willet	S5B,S4M		B
	<i>Tringa solitaria</i>	Solitary Sandpiper	S5B,S4M		M
SITTIDAE (Nuthatches Family)					
	<i>Sitta canadensis</i>	Red-breasted Nuthatch	S5		Y
	<i>Sitta carolinensis</i>	White-breasted Nuthatch	S5		Y
STRIGIDAE (Typical Owls Family)					
	<i>Aegolius acadicus</i>	Northern Saw-whet Owl	S5B,S4N		Y
	<i>Asio flammeus</i> ⁵	Short-eared Owl	S3B,S2N	Special Concern	B
	<i>Asio otus</i>	Long-eared Owl	S5B,S2N		B
	<i>Athene cunicularia</i> ⁵	Burrowing Owl	S2B,S2M	Endangered	B
	<i>Bubo scandiacus</i>	Snowy Owl	S5N	Not at Risk	NB
	<i>Bubo virginianus</i>	Great Horned Owl	S5		Y
	<i>Megascops asio</i> ^{1 5}	Eastern Screech-Owl	S2	Not at Risk	V
	<i>Megascops kennicottii</i> ^{1 5}	Western Screech-Owl	S1		V
STURNIDAE (Starlings Family)					
	<i>Sturnus vulgaris</i> ³	European Starling	SNA		Y
TROCHILIDAE (Hummingbirds Family)					
	<i>Archilochus colubris</i> ^{1 6}	Ruby-throated Hummingbird	S5B,S4M		V
TROGLODYTIDAE (Wrens Family)					
	<i>Cistothorus palustris</i>	Marsh Wren	S5B		B
	<i>Salpinctes obsoletus</i>	Rock Wren	S5B,S4M		B

	<i>Troglodytes aedon</i>	House Wren	S5B		B
	<i>Troglodytes pacificus</i> ⁵	Pacific Wren	SNR		B
TURDIDAE (Thrushes Family)					
	<i>Catharus fuscescens</i>	Veery	S5B		B
	<i>Catharus guttatus</i> ⁶	Hermit Thrush	S4B		B
	<i>Catharus ustulatus</i>	Swainson's Thrush	S5B		B
	<i>Myadestes townsendi</i> ⁵	Townsend's Solitaire	S3N,S3M		M
	<i>Sialia currucoides</i>	Mountain Bluebird	S5B		B
	<i>Turdus migratorius</i>	American Robin	S5B		B
TYRANNIDAE (Tyrant flycatchers)					
	<i>Contopus cooperi</i> ¹	Olive-sided Flycatcher	S4B,S4M	Threatened	V
	<i>Contopus sordidulus</i>	Western Wood-pewee	S5B		B
	<i>Empidonax alnorum</i>	Alder Flycatcher	S5B,S5M		B
	<i>Empidonax minimus</i>	Least Flycatcher	S5B,S5M		B
	<i>Empidonax oberholseri</i> ⁵	Dusky Flycatcher	S4B		B
	<i>Sayornis phoebe</i> ¹	Eastern Phoebe	S5B,S5M		V
	<i>Sayornis saya</i>	Say's Phoebe	S5B,S5M		B
	<i>Tyrannus tyrannus</i>	Eastern Kingbird	S5B,S5M		B
	<i>Tyrannus verticalis</i>	Western Kingbird	S5B,S5M		B
VIREONIDAE (Vireo Family)					
	<i>Vireo gilvus</i>	Warbling Vireo	S5B		B
	<i>Vireo olivaceus</i>	Red-eyed Vireo	S5B		B

