



Cypress Hills InterProvincial Park

FOREST CONSERVATION MANAGEMENT PLAN

March 2024



Forest Conservation Management Plan for Cypress Hills InterProvincial Park

For the 20-year period from April 1, 2020 to March 31, 2040

Approval Form

The Forest Conservation 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 ecosystem and landscape of Cypress Hills Interprovincial Park.

I hereby certify that I have prepared this FCMP document to the best of my professional skills and judgment.



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EXECUTIVE SUMMARY

This plan describes the details for the undertaking of a twenty-year Forest Conservation Management Plan for Cypress Hills Interprovincial Park (CHIPP). This plan is intended to shift the age class distribution from predominately old and very old age classes to a forest with a more natural and diverse age distribution and control insect and disease to maintain forest ecosystem health.

Given that CHIPP does not manage their forested area for timber production, but for non-timber values, this plan is an area-based management plan as opposed to a volume-based management plan. The inventory used to develop this plan was Saskatchewan Forest Vegetation Inventory (SFVI) completed in 2019. Cypress Hills Interprovincial Park (CHIPP) encompasses 18,320 ha (ha) with approximately 10,425 ha being considered productive forest that is available for forest management. The tactical plan is divided into two decades of treatment. Priority has been given to the old and very old seral stands and stands that have been affected by mountain pine beetle. These selected stands are recommended to be treated within decade one of the plan. The total area of the decade one treatment area is 1,934 ha, with 1,469 ha being in the old and very old seral stage.

The three primary treatment options recommended include timber harvesting, Fire Smart treatments, and prescribed burning. These treatments will be effective in both decreasing the spread of insects and diseases, allowing for regeneration, and mitigate wildfire hazard. Harvesting is recommended as a pre-treatment for prescribed burning, in conifer dominated stands, to reduce the fuel load and mitigate some of the risks associated with a prescribed burn. Prescribed burning is the recommended treatment to stimulate sucker regeneration in deciduous stand types. Given the objective of CHIPP is not to maximize timber extraction, harvesting treatments are recommended to retain a higher than average retention level that will mimic retention levels typically found after a wildfire. Recommended retention levels in pine dominated stands targeted for prescribed burning are between 25 and 50% of the pre-treatment stand condition.

Prescribed burning involves strategically applying fire to a predetermined area to achieve a desired outcome, in this case forest management. In hardwood stands, a low intensity prescribed burn alone will allow for adequate suckering to occur for regeneration.

In areas where harvesting or prescribed burns are deemed unacceptable, recommended treatments may include the establishment of a white spruce understory in aspen dominated stands. This understory will maintain forest cover as the over mature lodgepole pine and aspen stands start to breakup.

Fire Smart treatments along with larger tactical plan treatment areas are recommended in the Centre Block to reduce the risk of wildfire to park and private assets, maintain safe evacuation routes in the event of a wildfire, and to reduce fuel loading. Fire Smart treatments designed to reduce ladder fuels will also reduce the risk of fires originating within a campground or cottage development from crowning and rolling into other undeveloped timber stands. These treatments are effective in maintaining the fire on the surface and improving the success of initial attack treatments.

TABLE OF CONTENTS

EXECUTIVE SUMMARY III

TABLE OF CONTENTS IV

LIST OF FIGURES VIII

LIST OF TABLES X

1 OVERVIEW..... 11

1.1 Introduction..... 11

2 INFORMATION GATHERING 12

2.1 Provincial Sources of Direction..... 12

2.1.1 Ecosystem Based Management Plans..... 12

3 PARK-SPECIFIC INFORMATION 12

3.1 Location of Cypress Hills Interprovincial Park..... 12

3.2 Biophysical Description 14

3.2.1 Ecozones, Ecoregions, and Ecodistricts..... 14

3.2.2 Forest Vegetation..... 16

3.2.3 Hydrology 17

3.2.4 Climate..... 17

3.2.5 Geology and Landforms 20

3.2.6 Soils 21

3.2.7 Watersheds..... 23

3.3 Other Land Uses and Values..... 24

3.3.1 Wildlife 24

3.3.2 Fish 24

3.3.3 Hunting and Trapping 25

3.3.4 Archaeological, Cultural and Heritage Sites..... 25

3.3.5 Non-Timber Forest Products 26

3.3.6 Recreational Activities 26

3.3.7 Grazing..... 27

3.3.8 Visually Sensitive Areas..... 28

3.3.9 Species at Risk..... 28

3.3.10 Mineral Dispositions 33

3.3.11 Oil and Gas Exploration..... 33

3.3.12	Land Dispositions and Leases	33
3.3.13	Linear Developments	34
4	CURRENT FOREST CONDITIONS	36
4.1	Land-base Summary	36
4.2	Forest Attributes	37
4.3	Natural Disturbance	42
4.3.1	Fire	42
4.3.2	Insects and Diseases	46
4.3.3	Links to Forest Management	48
4.3.4	Land Use Classifications	49
5	TACTICAL PLAN	50
5.1	Development Approach	50
5.2	Tactical Plan Areas	50
6	ENGAGEMENT AND INFORMATION SHARING	53
6.1	First Nations and Métis Engagement	53
6.2	Stakeholders and Other Tenure Holders Engagement	53
6.3	Public Engagement	53
7	STRATEGIES TO ADDRESS NATURAL DISTURBANCE IN CHIPP	54
7.1	Strategy for Wildfire Management	54
7.1.1	Forest Protection	54
7.1.2	Values at Risk	55
7.1.3	Evacuation Routes	55
7.1.4	Fuel Treatments	56
7.1.5	Cottage Fire Smart Program	57
7.1.6	Safety Zones	57
7.2	Management of Forest Insect and Disease Disturbances	58
7.2.1	Mountain Pine Beetle (MPB)	58
7.2.2	Non-Native Plant Species AND INVASIVES	59
7.3	Indicators and Targets	63
8	MANAGEMENT CHALLENGES	70
8.1	Economic challenges	70
8.1.1	Climate Change	70
8.1.2	First Nations, Métis, Stakeholders, and Public	70

8.2 Non-forest Industry Related Resource-based Interests 70

8.3 Community Interests..... 70

8.4 Indigenous Interests..... 70

8.5 Natural Disturbances 71

8.6 Access management and road and trail density 71

9 VULNERABILITY ASSESSMENT TO ADDRESS CLIMATE CHANGE 72

9.1 Climate Change Considerations..... 72

9.1.1 Impact of Climate Changes on Forest Values..... 73

10 INTEGRATION OF FOREST MANAGEMENT ACTIVITIES WITH NON-TIMBER VALUES..... 74

10.1 Maintenance of Biodiversity 74

10.2 Species at Risk / Sensitive Species..... 75

10.3 Archaeological Resources, Traditional Use Areas, and Culturally Significant Sites..... 75

10.4 Visually Sensitive Areas..... 75

10.5 Non-Timber Botanical Forest Products..... 75

10.6 Hunting, Fishing, Tourism, Trapping..... 75

10.7 Recreational Use 76

10.8 Resorts and Tourism 76

10.9 Cabins 76

10.10 Recreational and Indigenous Fishing 76

10.11 Livestock Grazing Leases 77

11 FOREST MANAGEMENT RECOMMENDATIONS 78

11.1 Treatment Options..... 78

11.2 Tactical Plan Treatment Area Selection 79

11.3 Access Management 80

12 SILVICULTURE TREATMENT RECOMMENDATIONS..... 85

REFERENCE CODE 85

TRANSITIONS..... 85

Existing Forest Condition 85

Future Forest Condition..... 85

TREATMENT OPTIONS 85

Silviculture System 85

Site Preparation 85

APPENDIX A: TACTICAL PLAN AREAS 89

APPENDIX B: WILDFIRE PLAN AREAS96

APPENDIX C:.....102

WILDFIRE THREAT METHODOLOGY SUMMARY102

LITERATURE CITED.....107

LIST OF FIGURES

Figure 1 Location of Cypress Hills Interprovincial Park in Relation to Ecoregions of Saskatchewan.....	15
Figure 2 Cypress Hills Formation (Photo supplied by CHIPP).	15
Figure 3 Forested Area within CHIPP.	16
Figure 4 Adjacent Land Uses within Five Kilometres of CHIPP (red outline).	17
Figure 5 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).	18
Figure 6 Climatic Moisture Index for the 1981-2010 Period and predicted from 2011-2100 in the Prairie Ecozone including Cypress Upland Ecoregion (NRCan 2011).	19
Figure 7 Generalized Landforms Within Cypress Hills.	21
Figure 8 Soil Moisture Regimes within Centre Block, CHIPP.	22
Figure 9 Soil Moisture Regimes within West Block, CHIPP.	23
Figure 10 Overall Developmental Footprint within Centre Block, CHIPP.	27
Figure 11 Permitted Grazing Areas for 2020 within Centre Block, CHIPP.	28
Figure 12 Known Locations of Rare Plant Species, Centre Block, CHIPP (uncertainty observations were removed) (Source: HABISask).	32
Figure 13 Known Locations of Rare Plant Species, West Block, CHIPP (uncertainty observations were removed) (Source: HABISask).	33
Figure 14 Non-Timber Dispositions in CHIPP.	34
Figure 15 Trails and Roads within West and Centre Blocks, CHIPP.	35
Figure 16 Productive Forest Area by PFT and Seral Stage.	38
Figure 17 Productive Forest by Seral Stage in CHIPP.	38
Figure 18 Productive Forest by PFT in CHIPP, Centre Block.	39
Figure 19 Productive Forest by PFT in CHIPP, West Block.	40
Figure 20 Productive Forest area by Forest Cover Type in CHIPP, Centre Block.	41
Figure 21 Productive Forest area by Forest Cover Type in CHIPP, West Block.	42
Figure 22 Decade of Origin for All Forest Stands in CHIPP Summarized from SFVI Database.	43
Figure 23 Recent Fire Occurrences within Centre Block, CHIPP (Post 2000).	45
Figure 24 Recent Fire Occurrences within West Block, CHIPP (Post 2000).	46
Figure 25 Known Point Locations of MPB Affected Trees/Hectare within Centre Block, CHIPP.	47
Figure 26 Known Point Locations of MPB Affected Trees/Hectare within West Block, CHIPP.	48
Figure 27 Decadal Treatment Area (ha) by Treatment Year.	51
Figure 28 Mountain pine beetle affected treed within the Cypress Hills area (Government of Saskatchewan 2023).	59
Figure 29 Centre Block Sprague’s Pipit Habitat Suitability	65
Figure 30 West Block Sprague’s Pipit Habitat Suitability	66
Figure 31 Centre Block Elk Habitat Suitability.....	68
Figure 32 West Block Elk Habitat Suitability	69
Figure 33 Forest Stand Age Class Distribution in CHIPP.	74
Figure 34 Forest Stand Age Class Distribution in CHIPP After 10 Years of Management.	81
Figure 35 Forest Stand Age Class Distribution in CHIPP Over 20 Years of Management.	81
Figure 36 Forest Stand Age Class Distribution in CHIPP Over 50 Years of Management.	82
Figure 37 Forest Stand Age Class Distribution in CHIPP Over 100 Years of Management.	82

Figure 38 Forest Stand Age Class Distribution in CHIPP Over 150 Years of Management. 83

Figure 39 Forest Stand Age Class Distribution in CHIPP Over 200 Years of Management. 83

Figure 40 Percent of Total Old and Very Old and Very Old Only Seral Stages Over a 200 Year
Management Horizon. 84

Figure 41 Centre Block Values at Risk..... 96

Figure 42 West Block Values at Risk 97

Figure 43 Centre Block Wildfire Risk Assessment..... 98

Figure 44 West Block Wildfire Risk Assessment 99

Figure 45 Centre Block Burn Probability 100

Figure 46 West Block Burn Probability 101

LIST OF TABLES

Table 1 Species at Risk in CHIPP by Listing Agency	29
Table 2 Management area land summary.	36
Table 3 Area by Provincial Forest Type (PFT) in CHIPP.	37
Table 4 Area by Provincial Forest Type (PFT) and Seral Stage.....	37
Table 5 Recent Fires (Post Year 2000) within West and Centre Blocks of CHIPP Including Size and Origin Type.....	44
Table 6 Land Use Classifications.	49
Table 7 Tactical Plan Area (TPA) Decade by PFT and Seral Stage.	51
Table 8 Areas by PFT and seral stage available for Tactical Plan Treatments.	52
Table 9 Potential Impacts of Climate Change on CHIPP Forests.....	73
Table 10 Existing Roads and Trails within CHIPP.	80
Table 11 Proposed Tactical Plan Class 3 Roads.....	80
Table 12 Silviculture Treatment Recommendations.....	87

1 Overview

1.1 INTRODUCTION

Saskatchewan Ministry of Parks, Culture and Sport, Landscape Protection Unit, Parks Division, herein referred to as Parks Division, has developed a 20-year Forest Conservation Management Plan (FCMP) for the Cypress Hills Interprovincial Park (CHIPP). An FCMP is designed to provide direction for the management of Park forest resources by implementing the principles of sustainable forest management and natural forest patterns. A FCMP provides treatment recommendations that will maintain a natural forest age class distribution, maintain species diversity, and reduce the risks associated with uncontrolled wildfire, and insect and disease outbreaks.

This plan was developed using the “Ecosystem Based Management Plan for Cypress Hills Interprovincial Park” as a basis on the current state of the park. The inventory used to develop this plan was a Saskatchewan Forest Vegetation Inventory (SFVI) completed in 2019.

2 Information Gathering

2.1 PROVINCIAL SOURCES OF DIRECTION

2.1.1 ECOSYSTEM BASED MANAGEMENT PLANS

An Ecosystem Based Management Plan (EBMP) for the Cypress Hills Interprovincial Park was developed in conjunction with this plan and approved in March 2021. The EBMP provides guidance to the FCMP process on areas of special places, tourism, traditional uses, and interaction between timber and non-timber forest uses such as trapping, recreation, and aesthetics. The EBMP provides recommendations such as:

- ▶ Restoring a more natural disturbance regime to park ecosystems
- ▶ Monitor the state of CHIPP environment and the outcomes of ecosystem-based management actions
- ▶ Ongoing inventory of CHIPP's biological and ecological resources

3 Park-Specific Information

3.1 LOCATION OF CYPRESS HILLS INTERPROVINCIAL PARK

Cypress Hills Interprovincial Park (CHIPP) is located south and southwest of the community of Maple Creek, Saskatchewan. The park is comprised of two forest islands named the Centre Block and West Block. The West block stretches across the provincial border into Southeastern Alberta and Southwestern Saskatchewan. The extent of the Centre Block ranges from 49° 41' 54.96" N to 49° 38' 23.64" N in latitude and -109° 26' 16.8" W to 109° 34' 26.4" W in longitude. The extent of the West Block ranges from 49° 40' 9.84" N to 49° 33' 9.72" N in latitude and -109° 47' 16.8" W to -110° 0' 18" W in longitude with the park extending further into Alberta (GCS_WGS_1984 datum). The Saskatchewan extent of the park encompasses 45 and 138 square kilometres for the Centre and West blocks, respectively. CHIPP is located within the Cypress Upland Ecoregion and is surrounded by the Mixed Grassland Ecoregion. CHIPP represents a unique ecoregion and series of landforms within the prairies. (Acton et al. 1998).

Cypress Hills is a significant place culturally and spiritually for Indigenous people since time immemorial. The uniqueness of the natural resources offered by Cypress Hills, as a geographic and geological anomaly within the semi-arid area of the Canadian prairies "great plains" region, later known as "Palliser's Triangle" has been home to Cree and Sioux nations and the Blackfoot Confederacy. Cypress Hills Interprovincial Park Saskatchewan was created in 1931 within Treaty Four (1874) territory, which encompasses the traditional homelands of the nêhiyawak (Cree), Anihšīnāpēk (Saulteaux), Dakota, Nakota, Lakota, and the Métis.

Because of its cultural significance or central location, Cypress Hills was the location of the signing of adhesions to: Treaty #4 by Chief Long Lodge (Teepee Hoksá), Chief Lean Man (Wica Hostaka), and Chief Man Who Took The Coat (Cuwiknaga Je Eyaku) on September 25, 1877; Treaty #6 by Chief Lucky Man

(Papaway) and Chief Little Pine (Minahikosis) on July 2, 1879; and Treaty #6 by Chief Big Bear (Mistahimaskwa) on December 8, 1882.

3.2 BIOPHYSICAL DESCRIPTION

3.2.1 ECOZONES, ECOREGIONS, AND ECODISTRICTS

The Cypress Hills Interprovincial Park is located within the Prairies Ecozone. Ecoregions each have a particular climate, soil or landform structure that determines the types of forest and productivity found within them. These regions are further subdivided into Ecodistricts reflecting local variations of the same factors and often expressed with distinctive vegetation.

Cypress Hills Interprovincial Park (CHIPP) is entirely located within the Cypress Upland Ecoregion (**Figure 1**) and is surrounded by the Mixed Grassland Ecoregion. The Cypress Upland occupies 623,633 ha within in the Prairie Ecozone (Thorpe 2011) with 503,000 ha 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 (**Figure 2**).

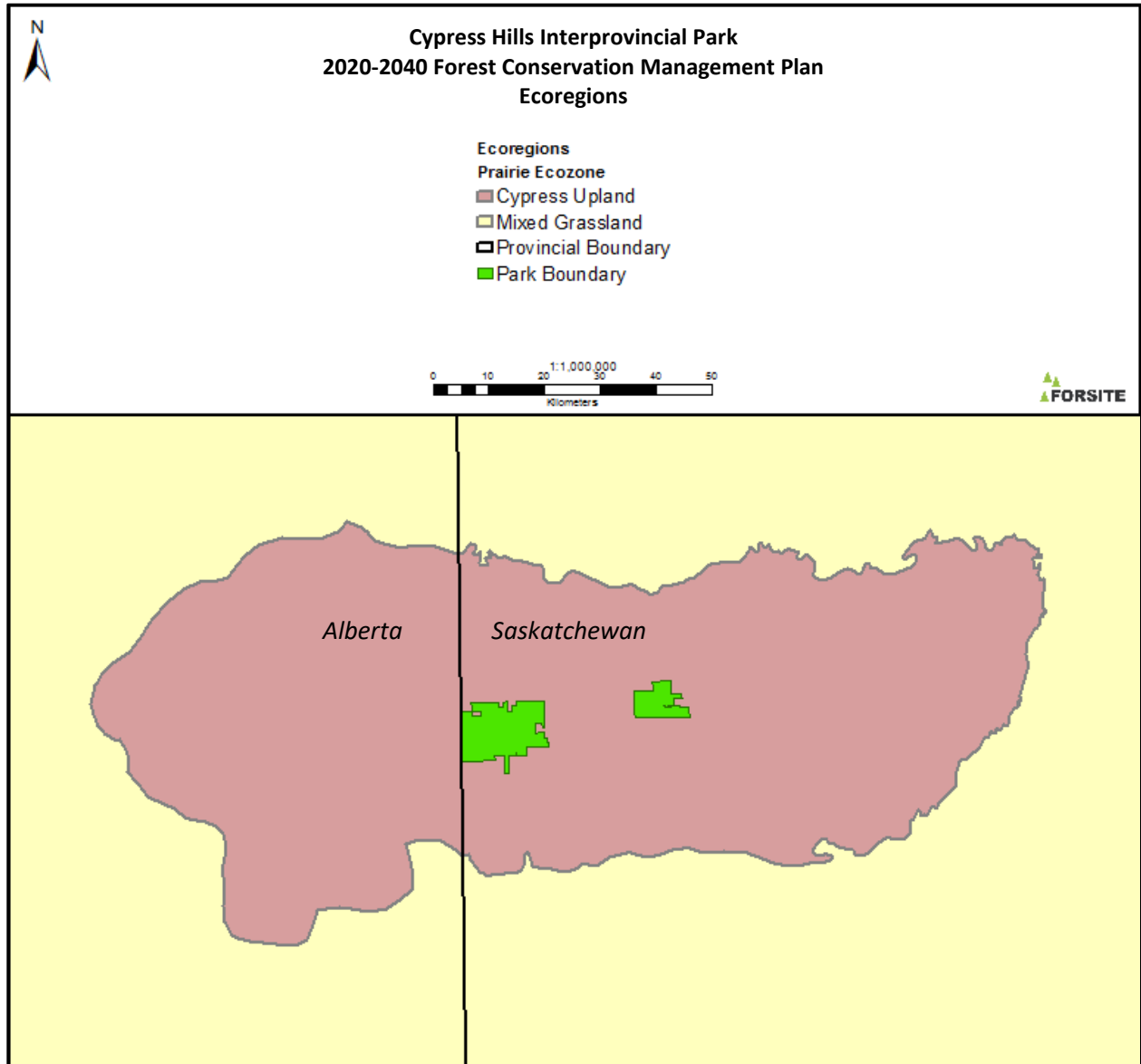


Figure 1 Location of Cypress Hills Interprovincial Park in Relation to Ecoregions of Saskatchewan.



Figure 2 Cypress Hills Formation (Photo supplied by CHIPP).

3.2.2 FOREST VEGETATION

The Cypress Hills Interprovincial Park within Saskatchewan encompasses 18,320 ha with approximately 10,424 ha being considered productive forest (**Figure 3**) and is available for forest management treatments. The classification of “productive forest” and “non-productive forest” is not intended to diminish the ecological value of non-productive lands but is designed to differentiate these lands from lands capable of producing mature forest cover.

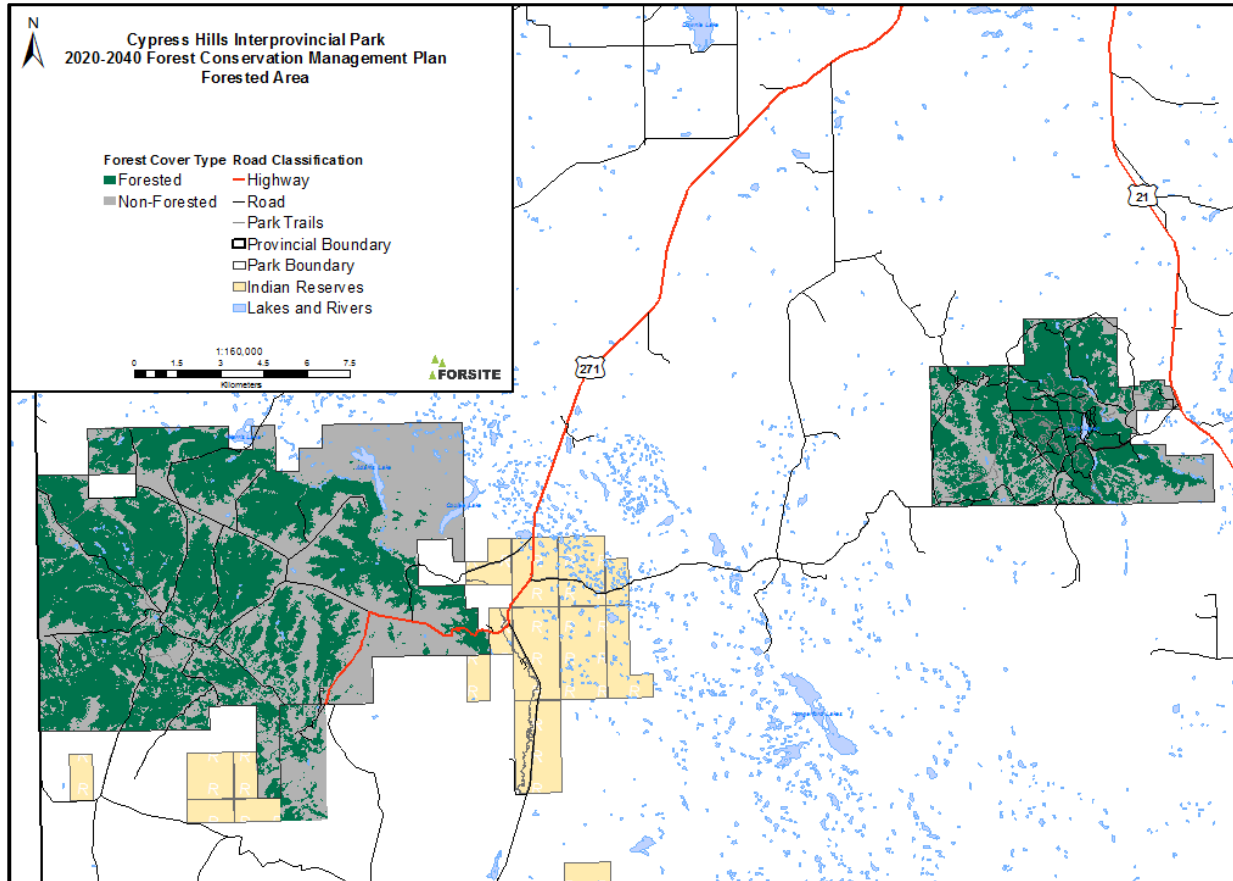


Figure 3 Forested Area within CHIPP.

Surrounding CHIPP are various types of land uses and administrations. Within a five-kilometre radius of the park, the land administration is primarily private land utilized for agriculture and grazing, as well as leased crown land (**Figure 4**). There also are three First Nation reserves in the adjacent area. The nearest settlement within Saskatchewan is Maple Creek (population 2,084 in 2016 census), located approximately 40 kilometres north of the Centre Block. The nearest major city within Saskatchewan is Swift Current (population 16,604 in 2016 census), located approximately 240 kilometres northeast of the Centre Block.

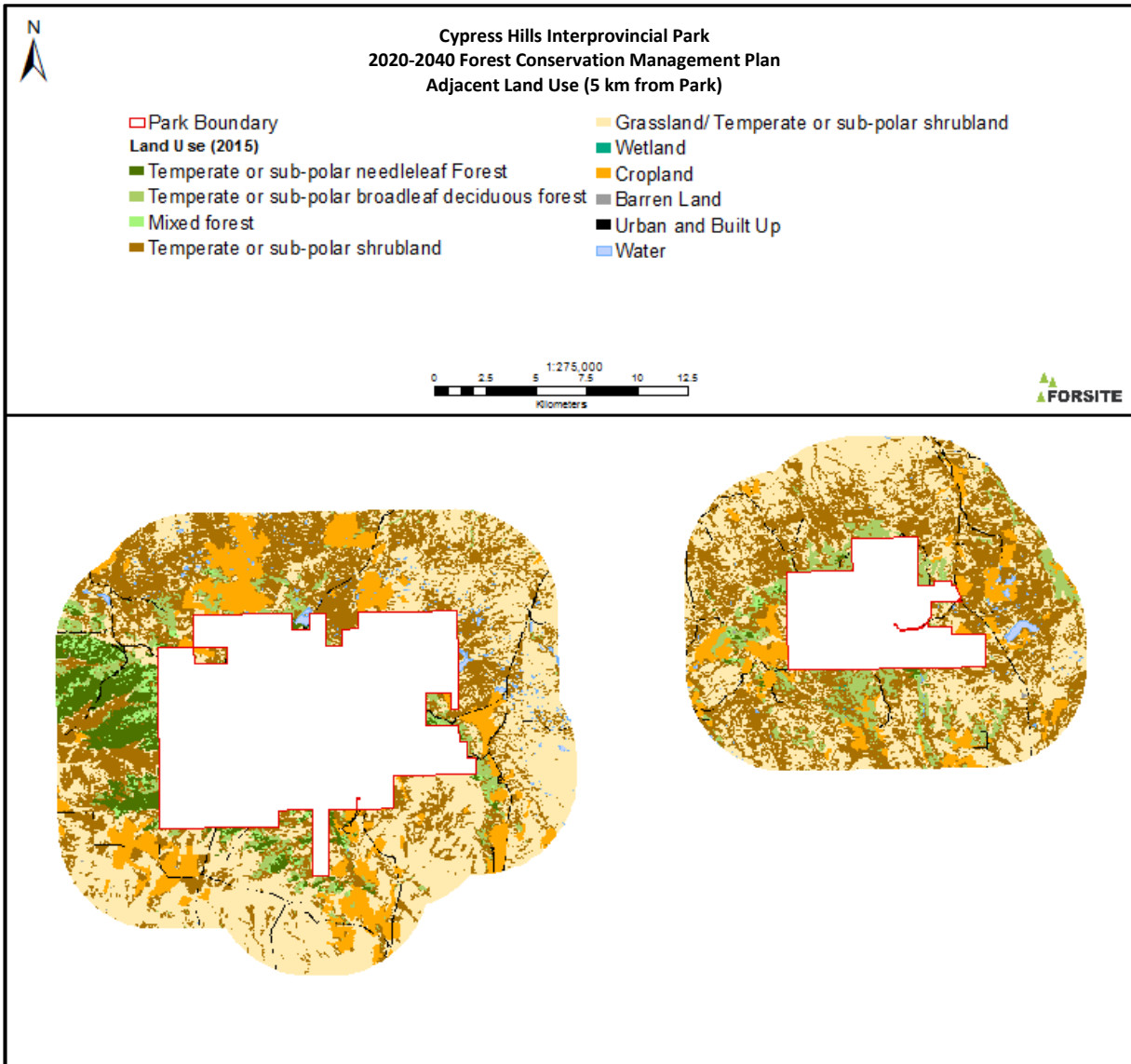


Figure 4 Adjacent Land Uses within Five Kilometres of CHIPP (red outline).

3.2.3 HYDROLOGY

The Cypress Hills act as an essential water source for the region. The area is comprised of permanent, intermittent and ephemeral streams, springs, made-made reservoirs, small natural waterbodies, and one natural lake. Main hydrological features within CHIPP (Saskatchewan) include the Battle Creek, Boiler Creek, Loch Leven, Harris Lake, and Adams Lake. The systems drain into the South Saskatchewan River and the Milk River watersheds (Nolan *et al.* no date).

3.2.4 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). Mean annual temperatures within Cypress Hill Centre Block averaged 3.0° Celsius while Maple Creek (located 28 kilometres north) averaged 5.6° Celsius (Phipps and O’Kennon 2007). Summers typically have 52 frost-free days and a total of 1288 growing degree days¹ (Acton *et al.* 1998). 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).

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 indicate that the climate moisture index will continue to transition to a dryer condition through to 2100 as shown in Figure 5 (NRCan 2011).

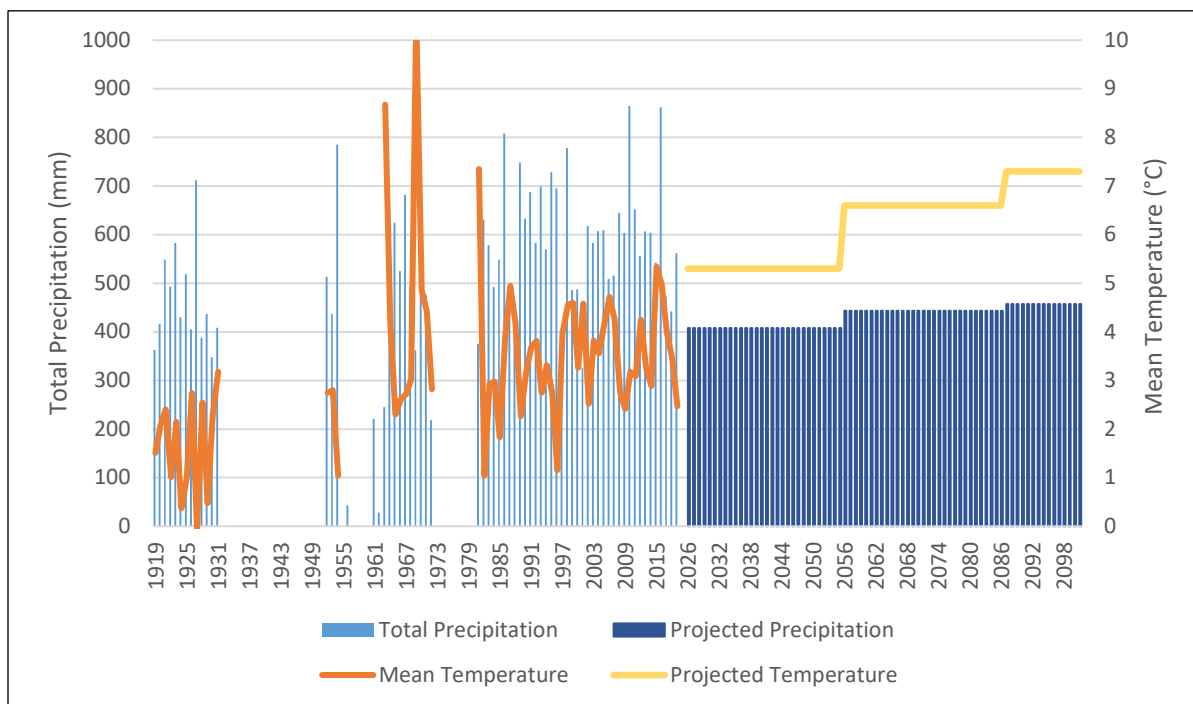


Figure 5 Historical (1919-2019) and Projected (2020-2100) Mean Temperature and Precipitation for Cypress Hills Interprovincial Park based on Climate Model RCP 4.5 (Environment Canada, 2019).

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.

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 6. 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.

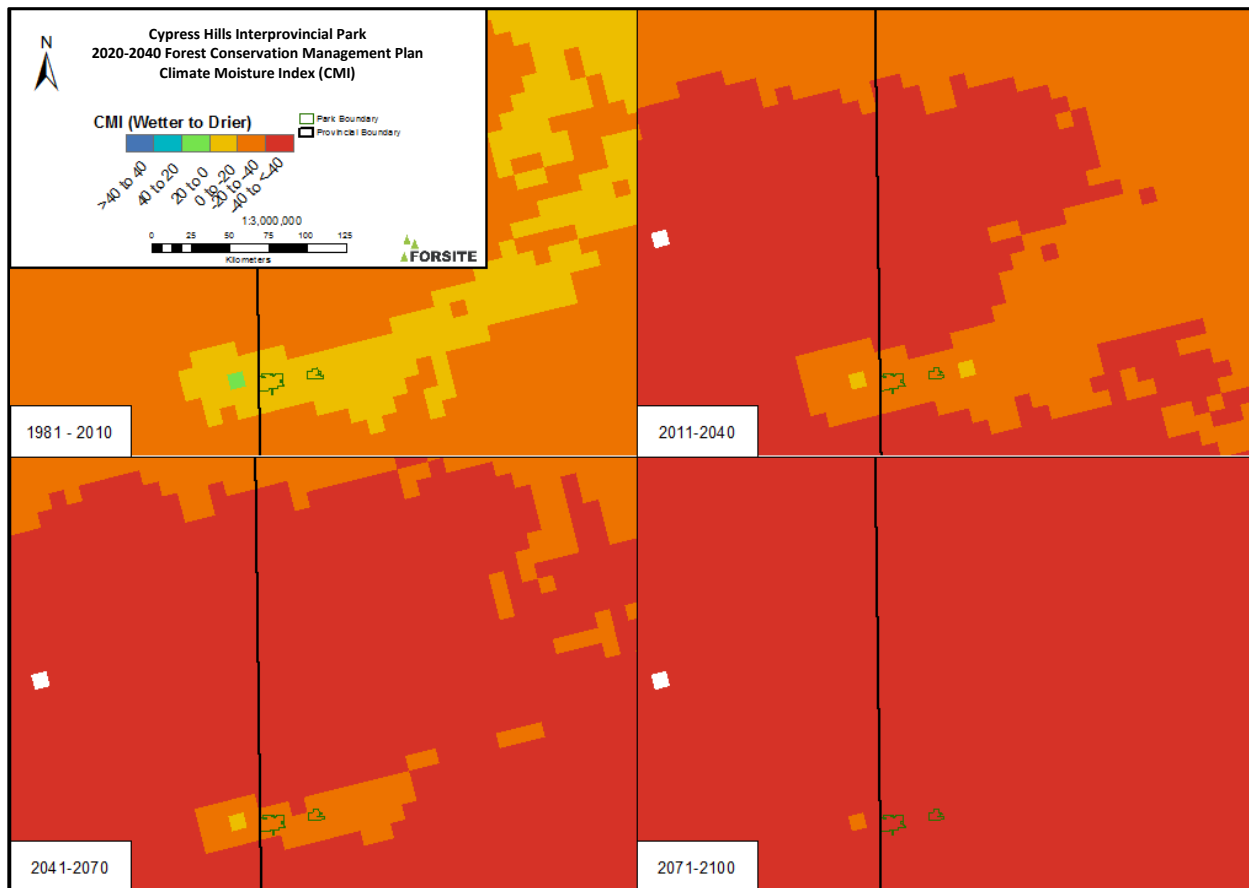


Figure 6 Climatic Moisture Index for the 1981-2010 Period and predicted from 2011-2100 in the Prairie Ecozone including Cypress Upland Ecoregion (NRCan 2011).

3.2.5 GEOLOGY AND LANDFORMS

The geology of Cypress Hills was not affected by the last glaciation period, allowing for soil and landscape development to occur over many epochs. Records indicate that the base of the Cypress Hills was formed during the Late Cretaceous period, when most of Saskatchewan and Alberta was covered by the shallow Bear Paw Sea. As the Bear Paw Sea receded, lighter clay and shale particles remained, forming dark grey flaky shales at the base of the Cypress Hills. The middle layers of Cypress Hills, which ranges from eight meters to 125 meters thick, was formed between 68 million and 50 million years ago. This layer consists of deposited materials primarily including sandstone and shales, but also includes layers containing clays, siltstones, and coal. Around 50 million years ago, gravel and cobbles started being deposited, which formed an erosion resistant “cap”. This “cap” protected the underlying softer sediments during glaciations of the Pleistocene Epoch, including the Wisconsin Glacial Episode (Acton *et al.* 1998). To this date, winds continue to deposit fine silts (known as loess) atop the formation, creating a thick layer of fine silts atop the formation. The dominant parent soil mode of deposition in CHIPP is morainal, fluvial, and fluvial-lacustrine (**Figure 7**).

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).

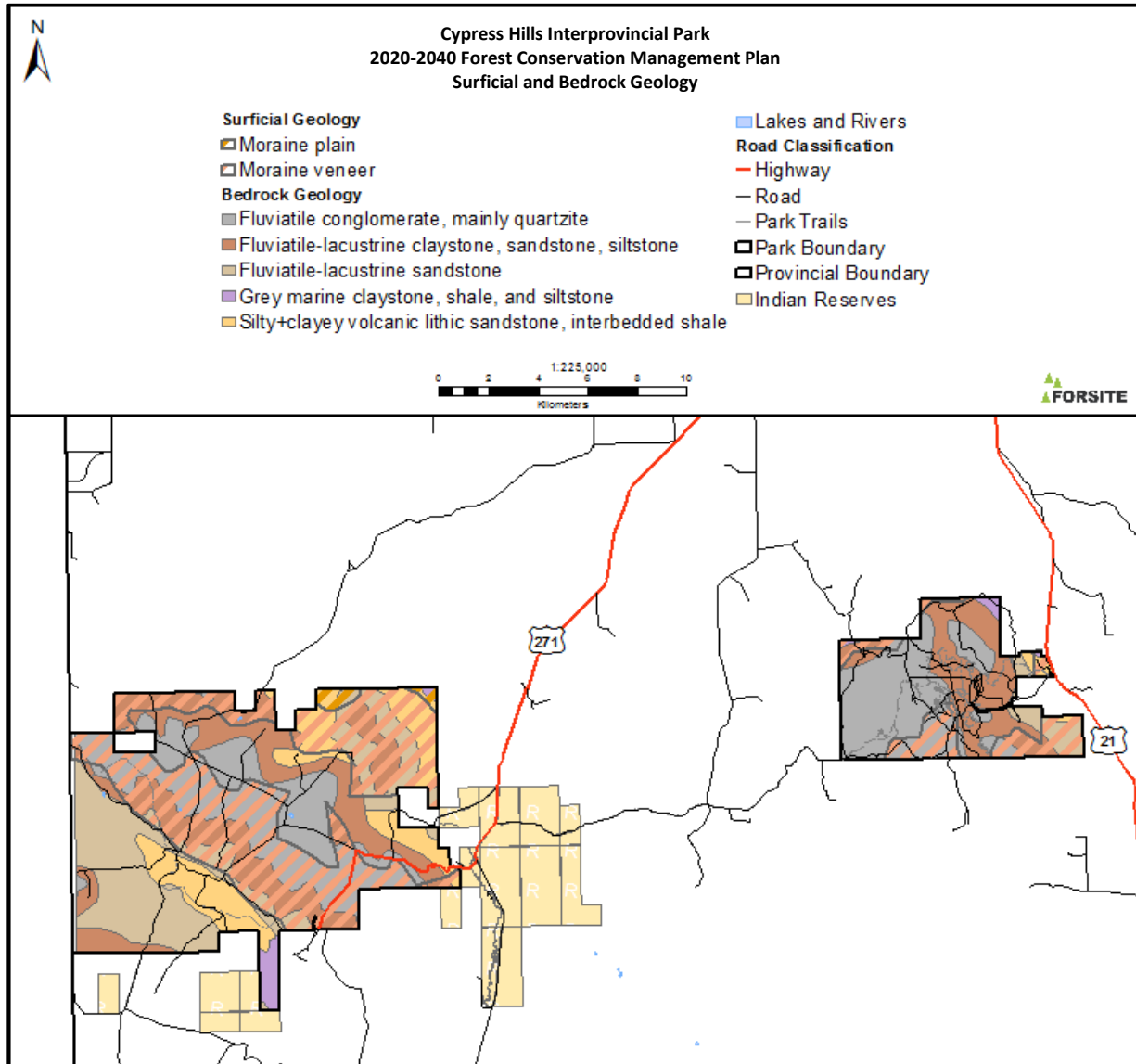


Figure 7 Generalized Landforms Within Cypress Hills.

3.2.6 SOILS

A thick layer of loess covers the top of the Cypress Hills formation. Loess is an unstratified usually buff to yellowish brown loamy deposit found in North America, Europe, and Asia and believed to be chiefly deposited by the wind. 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 (Canadian System of Soil Classification 1998). Chernozemic soils are predominantly found under grassland and shrubby areas while Luvisolic soils are found under forested areas, including aspen (*Populus tremuloides*), lodgepole pine (*Pinus contorta*), and white spruce (*Picea glauca*) (Canadian System of Soil Classification 1998; Nolan *et al.* no date; 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 forest soils encroach on grasslands soils, the accumulation of forest litter degrades organics within the Chernozemic soils leading to lighter surface horizon colours and a mixed appearance of light grey and dark material. Alternatively, when grasslands encroach on forested lands, the characteristic dark Chernozemic A horizon develops while the previous lighter-coloured horizon from the previous forest will remain relatively un-mixed.

Other soil types found within Cypress Hills include eluviated dystric Brunisols and Regosols, gleyed Chernozems, gleyed eutric Brunisols, and terric Humisols (Canadian System of Soil Classification 1998; Nolan *et al.* no date). The soil types of Cypress Hills are discussed in-depth within the associated Ecosystem Based Management Plan.

Soil moisture regimes for the West and Centre Blocks can be seen in **Figure 8** and **Figure 9**.

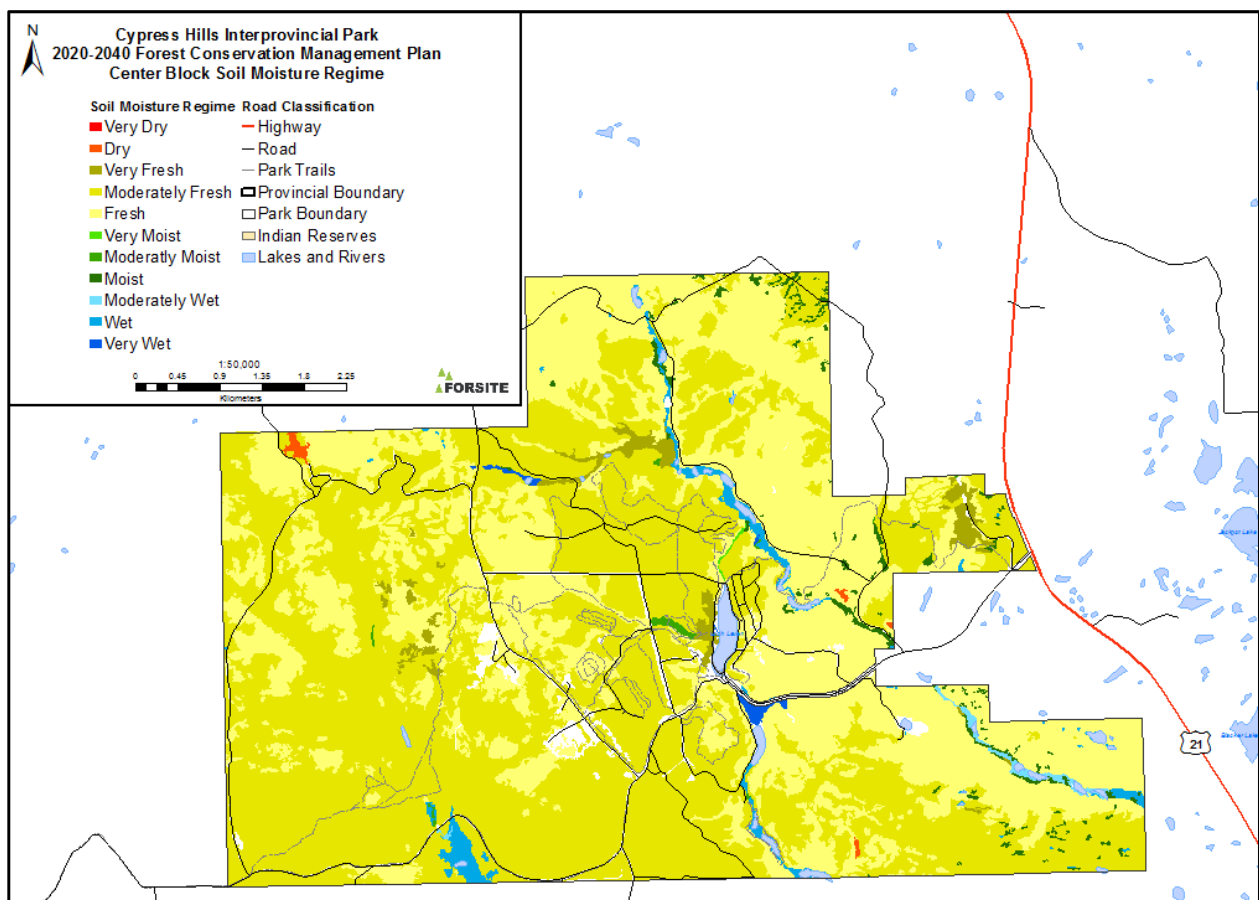


Figure 8 Soil Moisture Regimes within Centre Block, CHIPP.

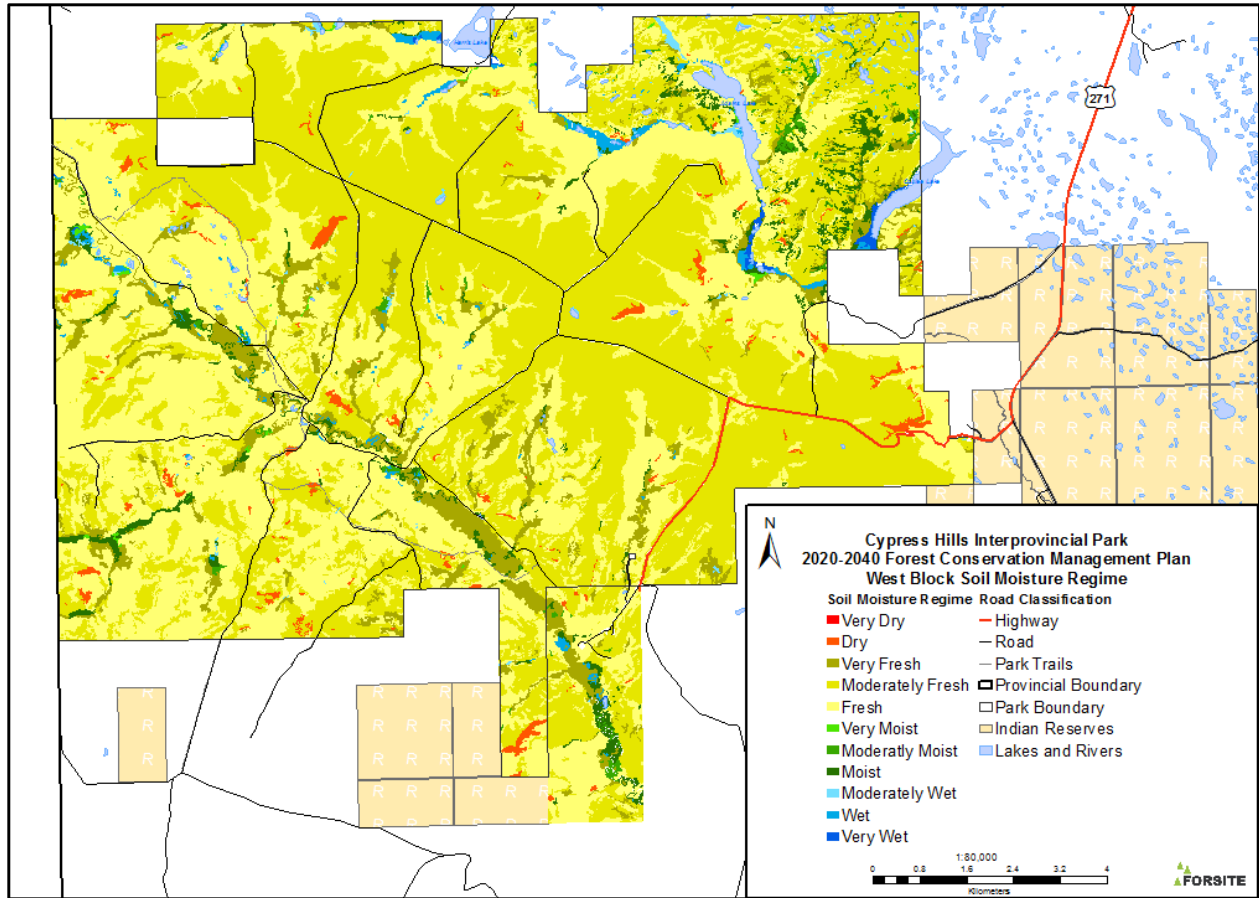


Figure 9 Soil Moisture Regimes within West Block, CHIPP.

3.2.7 WATERSHEDS

The hydrology of Cypress Hills is comprised of permanent, intermittent and ephemeral streams, springs, made-made reservoirs, small natural waterbodies, and one natural lake. 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).

3.3 OTHER LAND USES AND VALUES

3.3.1 WILDLIFE

The grasslands, forested land, water, plants, and ecological processes within CHIPP provide habitat for an array of wildlife species. Common wildlife species found in CHIPP include moose, white-tailed deer, mule deer, elk, mountain lion, snowshoe hare, beaver, and muskrat.

Over 227 bird species use the park as breeding, staging and/or wintering habitat. Species include (Cypress Hills Interprovincial Park 2014 and 2014b):

- ▶ American Three-toed Woodpecker
- ▶ Caspian Tern
- ▶ Common Nighthawk
- ▶ Common Poorwill
- ▶ Common Yellowthroat
- ▶ Dusky Flycatcher
- ▶ Forster's Tern
- ▶ Grasshopper Sparrow
- ▶ Lazuli Bunting
- ▶ MacGillivray's Warbler
- ▶ Northern Goshawk
- ▶ Pine Siskin
- ▶ Red Crossbill
- ▶ Red-naped Sapsucker
- ▶ Townsend's Solitaire
- ▶ Turkey Vulture
- ▶ Violet-green Swallow
- ▶ Western Wood-Pewee
- ▶ Black-capped Chickadee
- ▶ Wilson's Snipe
- ▶ Yellow-bellied Sapsucker

The Migratory Birds Convention Act (MBCA) of 1994 protects most of the migratory birds located in Canada and works in conjunction with the Migratory Birds Convention of 1916 between Canada and the USA. Environment Canada holds the responsibility to develop and implement policies and regulations to ensure the protection of migratory birds, their eggs and nests identified in the Convention. The Canadian Wildlife Service branch of Environment Canada administers the MBCA.

Enforcement of the MBCA in Saskatchewan is coordinated by the Wildlife Enforcement Directorate of Environment Canada in cooperation with Environment Canada Game Officers, Government of Saskatchewan Ministry of Environment, the Royal Canadian Mounted Police, and provincial law enforcement agencies. (Environment Canada, 2017)

The wildlife species within CHIPP are utilized for wildlife observations, food for local Indigenous Peoples, and sport or consumptive hunters within the West Block. Saskatchewan Ministry of Environment is responsible for overall management of wildlife resources within CHIPP and the allocation of rights to harvest and use these resources.

3.3.2 FISH

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 (Visit Cypress Hills: What to do).

3.3.3 HUNTING AND TRAPPING

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 exist for ring-necked pheasants, sharp-tailed grouse, gray (Hungarian) partridge, and ruffed grouse. The West Block is also utilized by First Nations hunters. There are no commercial wildlife outfitters within CHIPP. Fur harvest trapping within CHIPP is allowed with the permission of the Park Manager (Government of Saskatchewan 2019).

3.3.4 ARCHAEOLOGICAL, CULTURAL AND HERITAGE SITES

The Cypress Hills have been a site of human and cultural significance both historically and pre-historically. Archeological sites have revealed that the hills have been utilized for human habitation for more than 8500 years. Traditional Indigenous use of the area prior to 1870 was by the Cree, Assiniboine, Gros Venture, Blood, and Peigan (Alberta Parks: History 2017 and Nolan *et al.* no date). European exploration of the area established trading posts within the hills and along the Battle Creek. Well known posts were owned by the Hudson Bay Company, Abe Farwell, and Moses Solomon. The historical event of the “Cypress Hills Massacre” occurred in 1873 which subsequently lead to the establishment of Fort Walsh and the Northwest Mounted Police by the Canadian Government. The site of Fort Walsh was designated a National Historic Site of Canada in 1924. The fort has since been recreated and is a popular tourist attraction within the West Block of the Park (Alberta Parks: History 2017). In addition to Federal designations, *The Heritage Property Act* provides for the preservation, interpretation, and development of heritage property in Saskatchewan.

The Ministry of Parks, Culture and Sport plays an important role to ensure that irreplaceable and non-renewable heritage is protected and preserved. These heritage resources contribute to our understanding and appreciation of Saskatchewan’s past, its people, and its culture.

- ▶ *The Heritage Property Act* of Saskatchewan broadly defines heritage property as:
 - Archaeological objects;
 - Paleontological objects; and
 - Any property of interest for its architectural, historical, cultural, environmental, archaeological, paleontological, aesthetic or scientific value.
- ▶ In Saskatchewan, the main heritage resources that have been traditionally recognized, and are actively managed and regulated, include:
 - Archaeological heritage sites and objects reflecting First Nations and later Euro-Canadian settlement and use of land;
 - Paleontological heritage sites and objects, including dinosaur fossil localities and stratotypes, and
 - Built heritage properties and structures of historical and architectural importance.
- ▶ Other types of heritage locations are only now being recognized as heritage resources. These include:

- “traditional cultural properties” (associated with the cultural practices and beliefs of a living community, and are central to the cultural and historical identity of that community); and
- “Cultural heritage landscapes” (geographical areas that have been modified or influenced or give special cultural meaning by people)

3.3.5 NON-TIMBER FOREST PRODUCTS

Non-timber forest products within CHIPP include berries, mushrooms, medicinal plants, firewood harvesting, and livestock grazing.

3.3.6 RECREATIONAL ACTIVITIES

Being a provincial park, CHIPP boasts a variety of recreational activities, including fishing, hiking, and camping. Park managed trails span 92.1 km through the park for outdoor enthusiasts. There are cabin and recreational developments throughout the park (**Figure 10**). There are also a number of campgrounds in the park, such as:

- ▶ Meadows Campground
- ▶ Terrace Campground
- ▶ Warlodge Campground
- ▶ Rainbow Campground
- ▶ Deer Hollow Campground
- ▶ Group Campgrounds
- ▶ Lodgepole Campground
- ▶ Ranger Campground
- ▶ West Block Campground
- ▶ Equestrian Campground
- ▶ Two Private Campgrounds
- ▶ Staff Campgrounds
- ▶ Pine Hill Campground

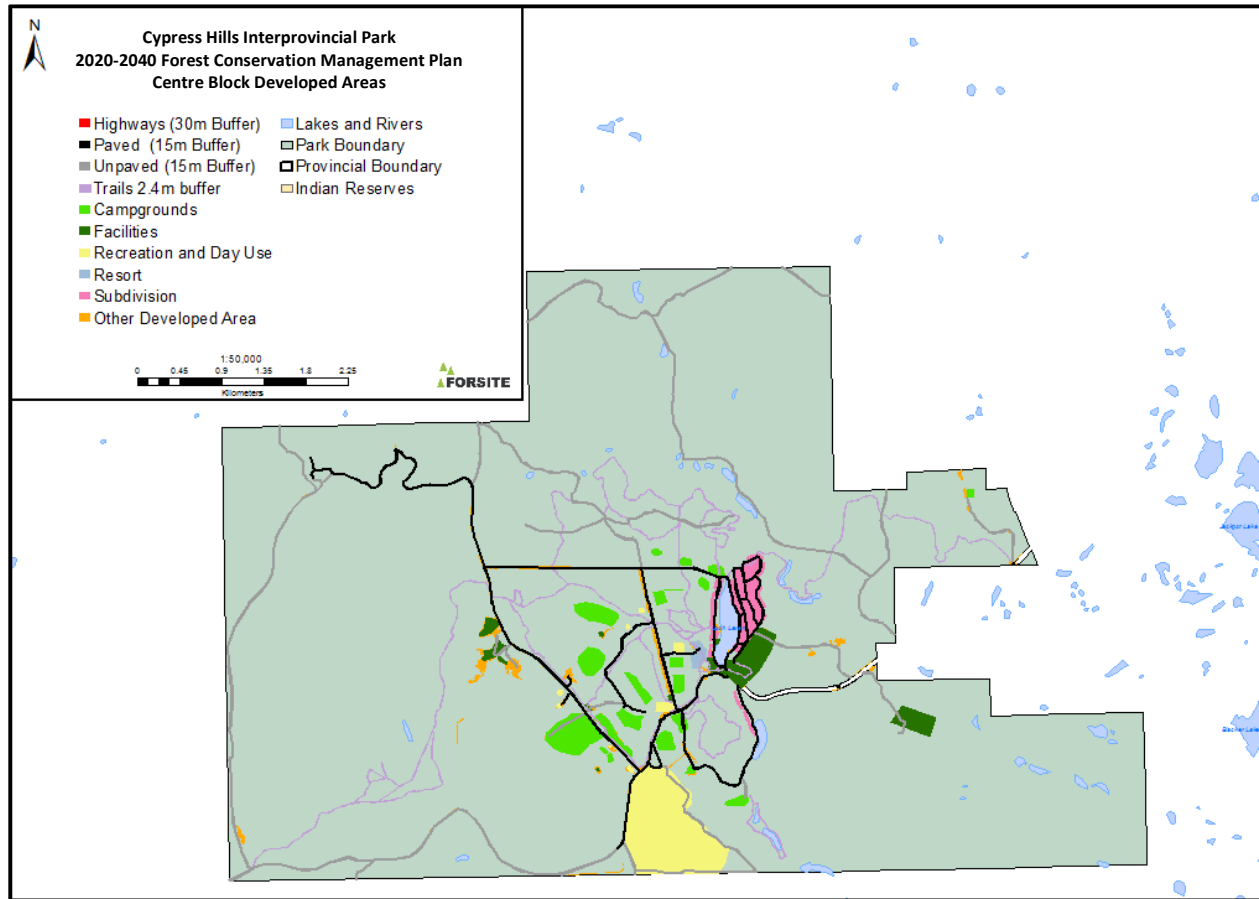


Figure 10 Overall Developmental Footprint within Centre Block, CHIPP.

3.3.7 GRAZING

There are grazing permits within the West Block and Centre Blocks of CHIPP. The grazing areas for the Centre Block can be seen in **Figure 11** below. Parks Division has been completing range assessments in the grazing areas in 1994, 2008, 2011, 2021, and 2022 to monitor the quality of the grazing lands and adjust the grazing units to ensure the integrity of the forage cover.

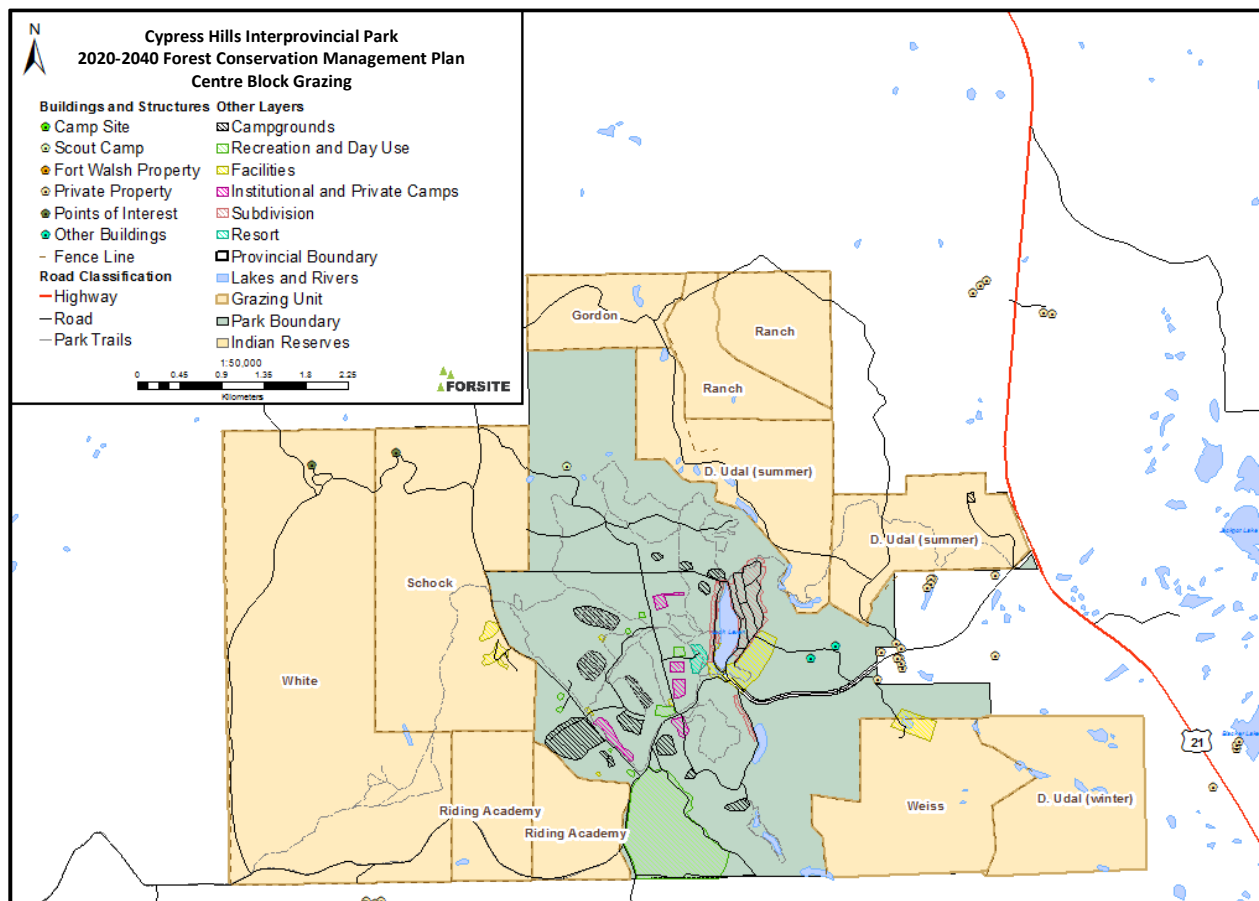


Figure 11 Permitted Grazing Areas for 2020 within Centre Block, CHIPP.

3.3.8 VISUALLY SENSITIVE AREAS

Visually sensitive areas within the park will be developed by Parks Division as part of the planning process. The intent is to apply visual quality objectives in areas adjacent to roadways, campgrounds, Loch Leven, Battle Creek, streams, and rivers, and other important viewsapes where appropriate. Input from the Park Advisory Group will be valued while conducting this exercise.

3.3.9 SPECIES AT RISK

In Saskatchewan, *The Wildlife Act*, the *Wild Species at Risk Regulations*, *The Migratory Birds Conservation Act*, the *Fisheries Act*, and the federal *Species at Risk Act (SARA)* provide the mechanisms for protecting wildlife and species at risk, while also aims to prevent harm or disturbance to wildlife. The intent of the legislation is to prevent native species from becoming extirpated or extinct, to provide for the recovery of extirpated, endangered or threatened species, and to encourage the management of other species to prevent them from becoming threatened or endangered.

Within CHIPP, there are a number of species that are identified as “at risk” by the *Species at Risk Act* (SARA) and as found on the provincial Conservation Data Centre list relevant to CHIPP² (**Table 1**). Additionally, rare plant species locations are displayed below in **Figure 12** and **Figure 13**. Due to the concern regarding species at risk, additional ground field surveys were conducted by Parks Division in 2021 across planned tactical plan blocks and a report was received later that year. This information was provided to the provincial Conservation Data Centre who then entered the information in their database. The enclosed **Table 1** and **Figures 12-13** reflect this newer integrated information.

Table 1. Species at Risk in CHIPP by Listing Agency

Common Name	Scientific Name	COSEWIC	SARA	SKDC
Amphibians				
Northern Leopard Frog	<i>Lithobates pipiens</i>	SC	SC	S3
Reptiles				
Bullsnake	<i>Pituophis catenifer sayi</i>	SC	SC	S4
Fish				
Plains Sucker	<i>Catostomus platyrhynchus</i>	THR	THR	S1
Mammals				
American Badger	<i>Taxidea taxus taxus</i>	SC	SC	S3
Little Brown Myotis	<i>Myotis lucifugus</i>	END	END	S4B,S4N
Swift fox	<i>Vulpes velox</i>	THR	THR	S3
Birds				
Bank Swallow	<i>Riparia riparia</i>	THR	THR	S4B,S5M
Barn Swallow	<i>Hirundo rustica</i>	SC	THR	S4B
Common Nighthawk	<i>Chordeiles minor</i>	SC	THR	S4B
Eastern Screech-owl	<i>Megascops asio</i>			S2
Ferruginous Hawk	<i>Buteo regalis</i>	SC	THR	S3B
Golden Eagle	<i>Aquila chrysaetos</i>			S3
Loggerhead Shrike	<i>Lanius ludovicianus excubitorides</i>	THR	THR	S3B
Olive-sided Flycatcher	<i>Contopus cooperi</i>	SC	THR	S4B
Red-naped Sapsucker	<i>Sphyrapicus nuchalis</i>			S1B
Sprague's Pipit	<i>Anthus spragueii</i>	THR	THR	S3B
Townsend's Solitaire	<i>Myadestes townsendi</i>			S3
Common Poorwill	<i>Phalaenoptilus nuttallii</i>	DD		S3
Pileated Woodpecker	<i>Dryocopus pileatus</i>			S3
Bobolink	<i>Dolichonyx oryzivorus</i>	SC	THR	
Vascular Plants				
Alpine Foxtail	<i>Alopecurus magellanicus</i>			S1
American Pinesap	<i>Monotropa hypopithys</i>			S1
Beaked Annual	<i>Shinersoseris rostrata</i>			S2
Skeleton-weed				

² A query was conducted of the Conservation Data Centre list for species at risk that are filtered for the province and relevant ecoregions/landscape areas. Not all of these species are likely to be impacted by forest management activities given their habitat. COSEWIC Terms: SC = Special Concern, THR = Threatened, END = Endangered, DD = Data Deficient

Common Name	Scientific Name	COSEWIC	SARA	SKCDC
Beardless Oats	<i>Trisetum wolfii</i>			S1
Bent-flowered Milk- vetch	<i>Astragalus vexilliflexus</i> var. <i>vexilliflexus</i>			S2
Black-fruited Hawthorn	<i>Crataegus douglasii</i>			S2
Bluebunch Wheatgrass	<i>Pseudoroegneria spicata</i>			S2
Blue-leaved Cinquefoil	<i>Potentilla glaucophylla</i> var. <i>glaucophylla</i>			S1
Booth's Willow	<i>Salix boothii</i>			S1
Bristly Gooseberry	<i>Ribes oxycanthoides</i> var. <i>setosum</i>			S2
Brown-bracted Pussytoes	<i>Antennaria umbrinella</i>			S2
Bur Ragweed	<i>Ambrosia acanthicarpa</i>			S2
Caespitose Sedge	<i>Carex petasata</i>			S2
Chamomile Grape-fern	<i>Botrychium matricariifolium</i>			S1
Chilean Sweet-cicley	<i>Osmorhiza berteroi</i>			S1
Clematis	<i>Clematis occidentalis</i> var. <i>grosseserrata</i>			S2
Clustered Oreocarya	<i>Cryptantha celosioides</i>			S2
Creeping Oregon-grape	<i>Berberis repens</i>			S1
Dagger Rush	<i>Juncus ensifolius</i> var. <i>ensifolius</i>			S2
Dark Hawk's-beard	<i>Crepis atribarba</i>			S2
Eaton Aster	<i>Symphyotrichum eatonii</i>			S1
False Spikenard	<i>Maianthemum racemosum</i> ssp. <i>amplexicaule</i>			S1
Few-flowered Rush	<i>Juncus confusus</i>			S2
Flat-topped Pussy-toes	<i>Antennaria corymbosa</i>			S1
Gairdner's Yampah	<i>Perideridia gairdneri</i>			S2
Giant Rattlesnake- plantain	<i>Goodyera oblongifolia</i>			S1
Graceful Buttercup	<i>Ranunculus inamoenus</i> var. <i>inamoenus</i>			S1
Hood's Sedge	<i>Carex hoodii</i>			S1
Hooker's Townsendia	<i>Townsendia hookeri</i>			S2
Idaho Fescue	<i>Festuca idahoensis</i>			S2
Kelsey's Cryptantha	<i>Cryptantha kelseyana</i>			S2
Kitten-tails	<i>Synthyris wyomingensis</i>			S1
Lance-leaved Spring- beauty	<i>Claytonia lanceolata</i>			S2
Large Yellow Monkeyflower	<i>Erythranthe guttata</i>			S2
Linear-leaved Spring- beauty	<i>Montia linearis</i>			S1
Lodgepole Lupine	<i>Lupinus parviflorus</i>			S1

Common Name	Scientific Name	COSEWIC	SARA	SKCDC
Meadow Wild Barley	<i>Hordeum brachyantherum</i> ssp. <i>brachyantherum</i>			S1
Michigan Moonwort	<i>Botrychium michiganense</i>			S1
Mountain Lady's-slipper	<i>Cypripedium montanum</i>			S1
Mountain Meadow-parsley	<i>Lomatium cous</i>			S1
Mountain Timothy	<i>Phleum alpinum</i>			S1
Mountain Wild Parsnip	<i>Lomatium dissectum</i> var. <i>multifidum</i>			S1
Pale Moonwort	<i>Botrychium pallidum</i>			S1
Parry's Oat-grass	<i>Danthonia parryi</i>			S1
Peculiar Moonwort	<i>Botrychium paradoxum</i>			S1
Pine Grass	<i>Calamagrostis rubescens</i>			S2
Pine-drops	<i>Pterospora andromedea</i>			S1
Prairie Fescue	<i>Festuca campestris</i>			S1
Prairie Star	<i>Lithophragma glabrum</i>			S2
Raynold's Sedge	<i>Carex raynoldsii</i>			S1
Rocky Mountain Rush	<i>Juncus ensifolius</i> var. <i>montanus</i>			S1
Sandhills Cinquefoil	<i>Potentilla lasiodonta</i>			S2
Self-heal	<i>Prunella vulgaris</i> ssp. <i>lanceolata</i>			S2
Shining-leaved Meadow-sweet	<i>Spiraea lucida</i>			S2
Silvery Lupine	<i>Lupinus argenteus</i>			S2
Silvery Lupine	<i>Lupinus argenteus</i> var. <i>argenteus</i>			S2
Small Broomrape	<i>Orobanche uniflora</i> var. <i>occidentalis</i>			S1
Small-leaved Alumroot	<i>Heuchera parvifolia</i>			S1
Smooth Hawk's-beard	<i>Crepis runcinata</i> ssp. <i>hispidulosa</i>			S1
Spotted Coralroot	<i>Corallorhiza maculata</i> var. <i>maculata</i>			S1
Stalked Moonwort	<i>Botrychium pedunculatum</i>			S2
Sticky Purple Geranium	<i>Geranium viscosissimum</i>			S2
Streambank Butterweed	<i>Packera pseudoaurea</i> var. <i>pseudoaurea</i>			S1
Tall Pussytoes	<i>Antennaria anaphaloides</i>			S1
Thimbleberry	<i>Rubus parviflorus</i>			S1
Thyme-leaved Speedwell	<i>Veronica serpyllifolia</i>			S1
Triangle Grape-fern	<i>Botrychium lanceolatum</i>			S2
Triangle-lobe Moonwort	<i>Botrychium ascendens</i>			S1
Twin Arnica	<i>Arnica sororia</i>			S2
Western Blue Virgin's-bower	<i>Clematis occidentalis</i>			S2
Western Meadow-rue	<i>Thalictrum occidentale</i>			S2
Western Saxifrage	<i>Micranthes occidentalis</i>			S1

Common Name	Scientific Name	COSEWIC	SARA	SKCDC
White-flowered Hawkweed	<i>Hieracium albiflorum</i>			S1
Wild White Geranium	<i>Geranium richardsonii</i>			S2
Wishbone Moonwort	<i>Botrychium furculatum</i>			S1
Woolly Gromwell	<i>Lithospermum ruderale</i>			S2
Yellow Touch-me-not	<i>Impatiens noli-tangere</i>			S2

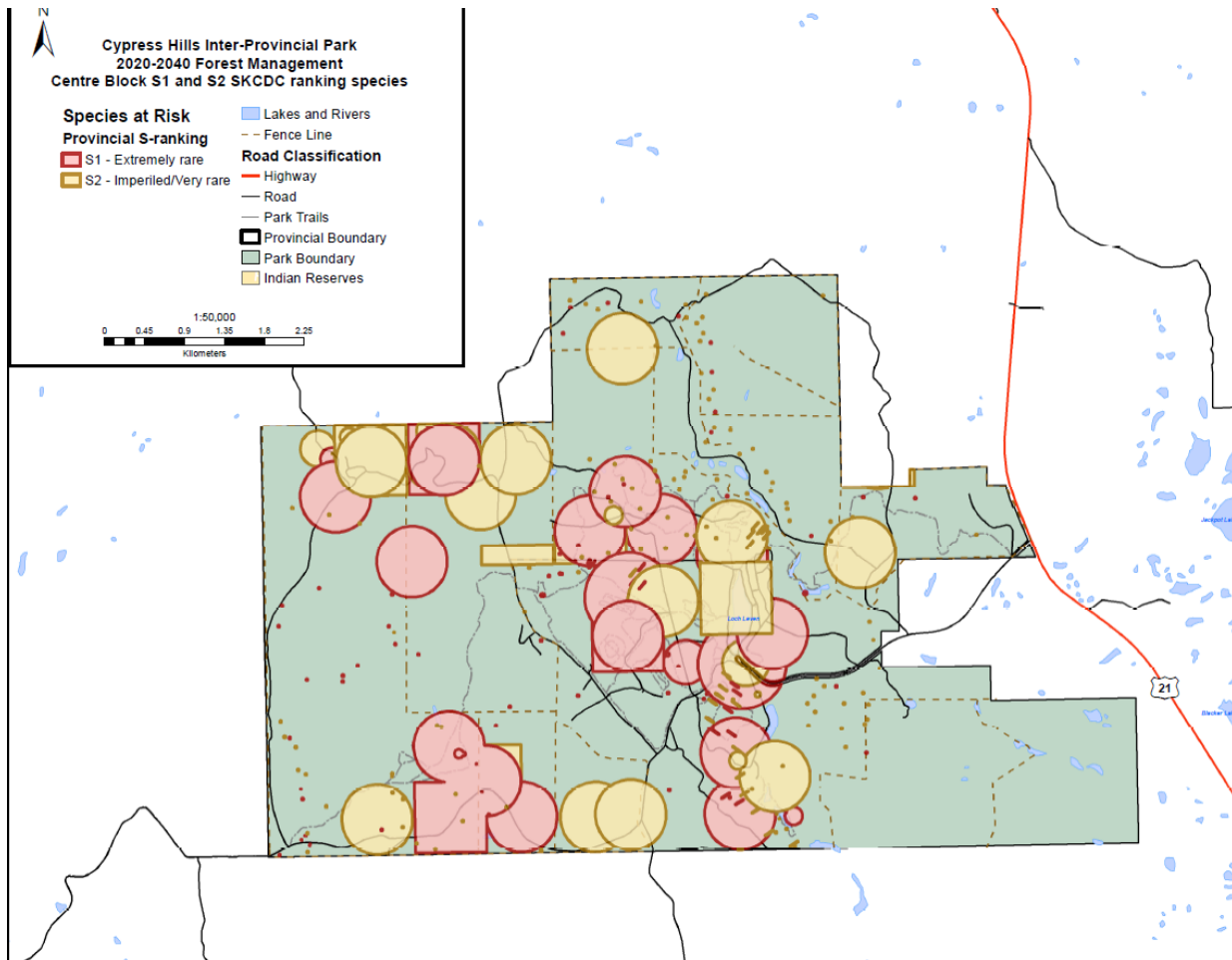


Figure 12 Known Locations of Rare Plant Species, Centre Block, CHIPP (uncertainty observations were removed) (Source: HABISask).

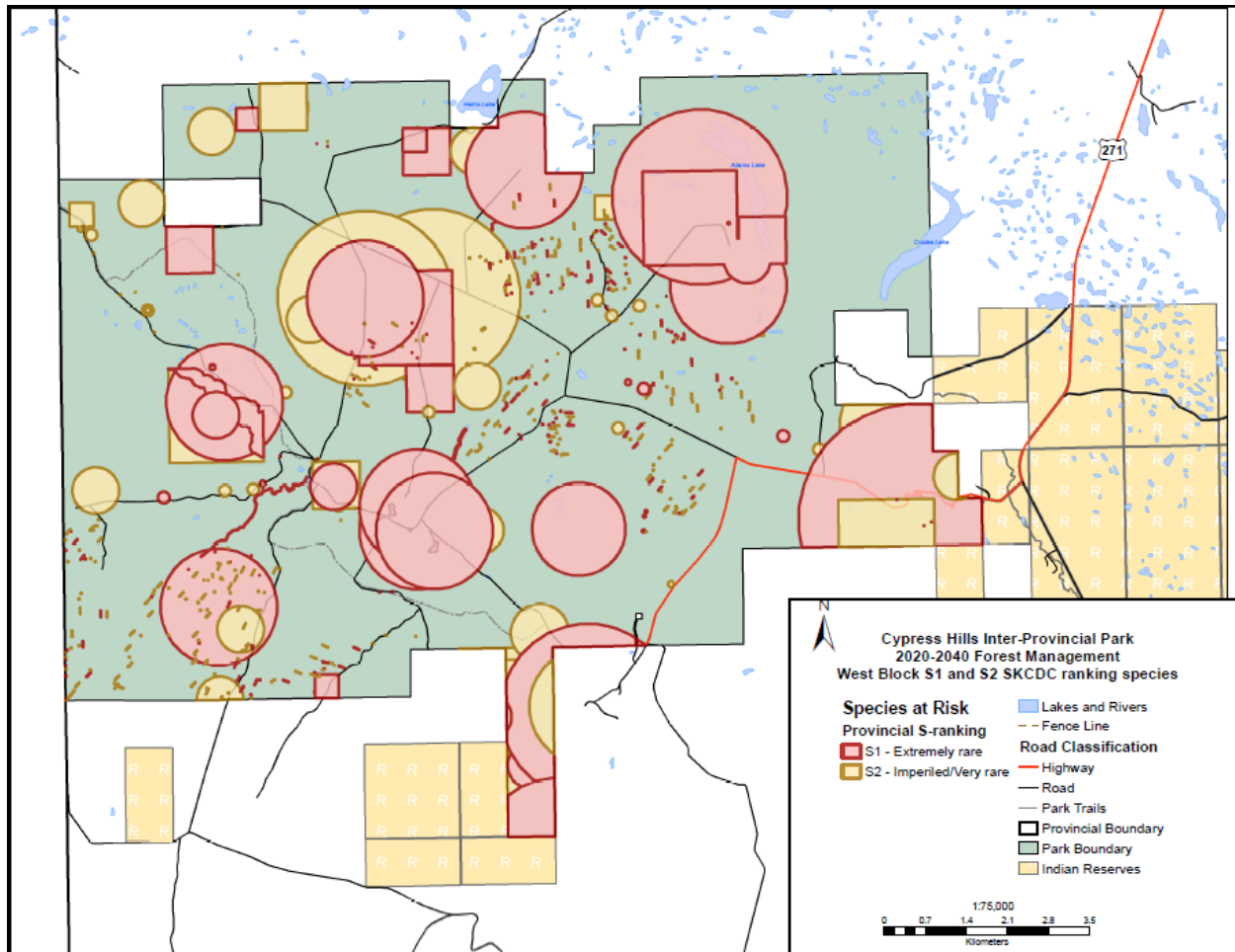


Figure 13 Known Locations of Rare Plant Species, West Block, CHIPP (uncertainty observations were removed) (Source: HABISask).

3.3.10 MINERAL DISPOSITIONS

There are no known active mineral dispositions in CHIPP other than a park-operated gravel pit within the Centre Block. Historically, cobbles, coal, and gravel have been harvested from the area.

3.3.11 OIL AND GAS EXPLORATION

There are no known active oil and gas explorations within CHIPP.

3.3.12 LAND DISPOSITIONS AND LEASES

The Park contains a variety of land dispositions and leases including private businesses, cabins, and grazing and haying allowances. Grazing and haying dispositions within the park are discussed in detail within the EBMP Section 3.5.1.8. The core area of the park (**Figure 14**) contains 202 private cabins, two long term seasonal campground with approximately 74 sites, a hotel/resort with over 60 units, and

various businesses including institutional camps, mini golf and nine-hole golf, gas station, restaurants, and recreational amenities.

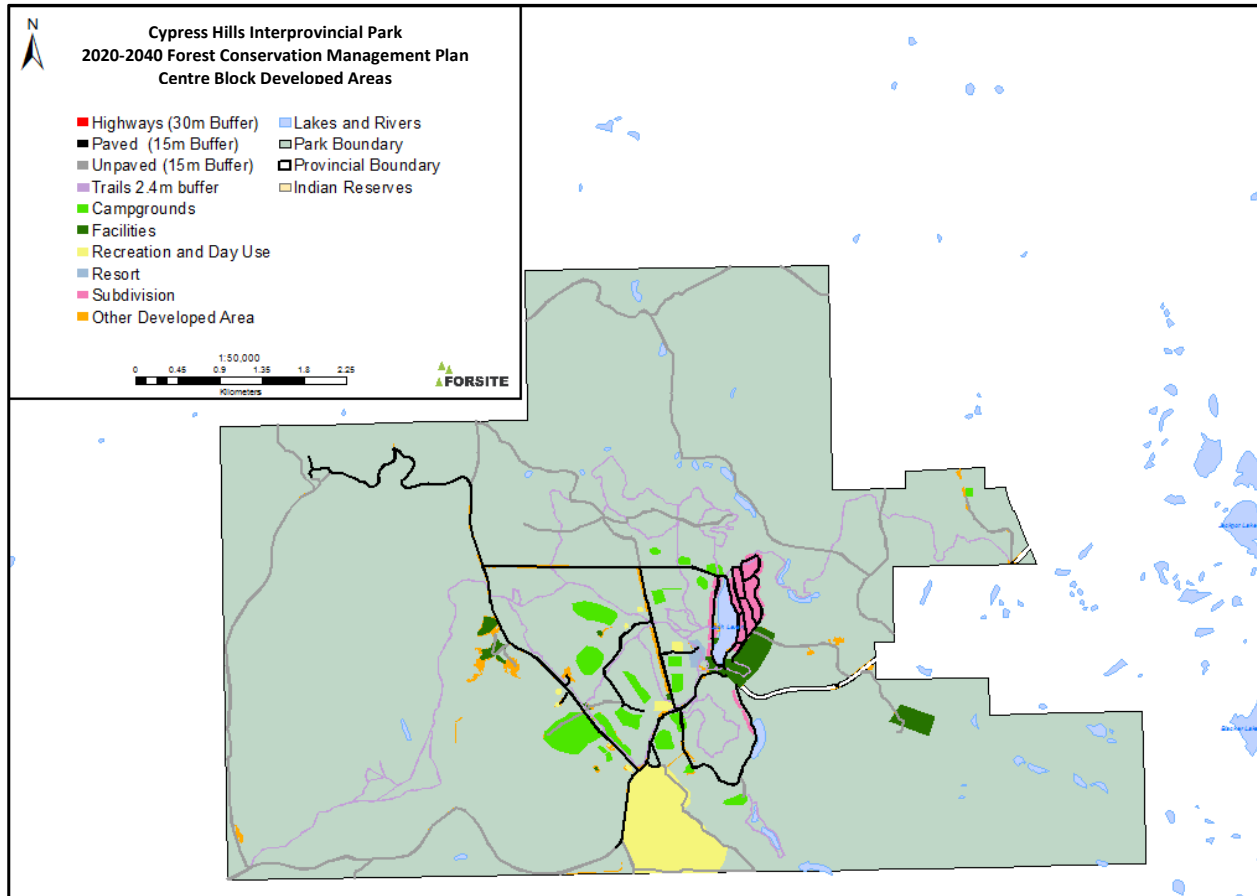


Figure 14 Non-Timber Dispositions in CHIPP.

3.3.13 LINEAR DEVELOPMENTS

Figure 15 provides an overview of the linear developments located in CHIPP. Currently, there is approximately 133.2 kilometres of highway and road, within the park, as well as 92.1 kilometres of trails managed by the park.

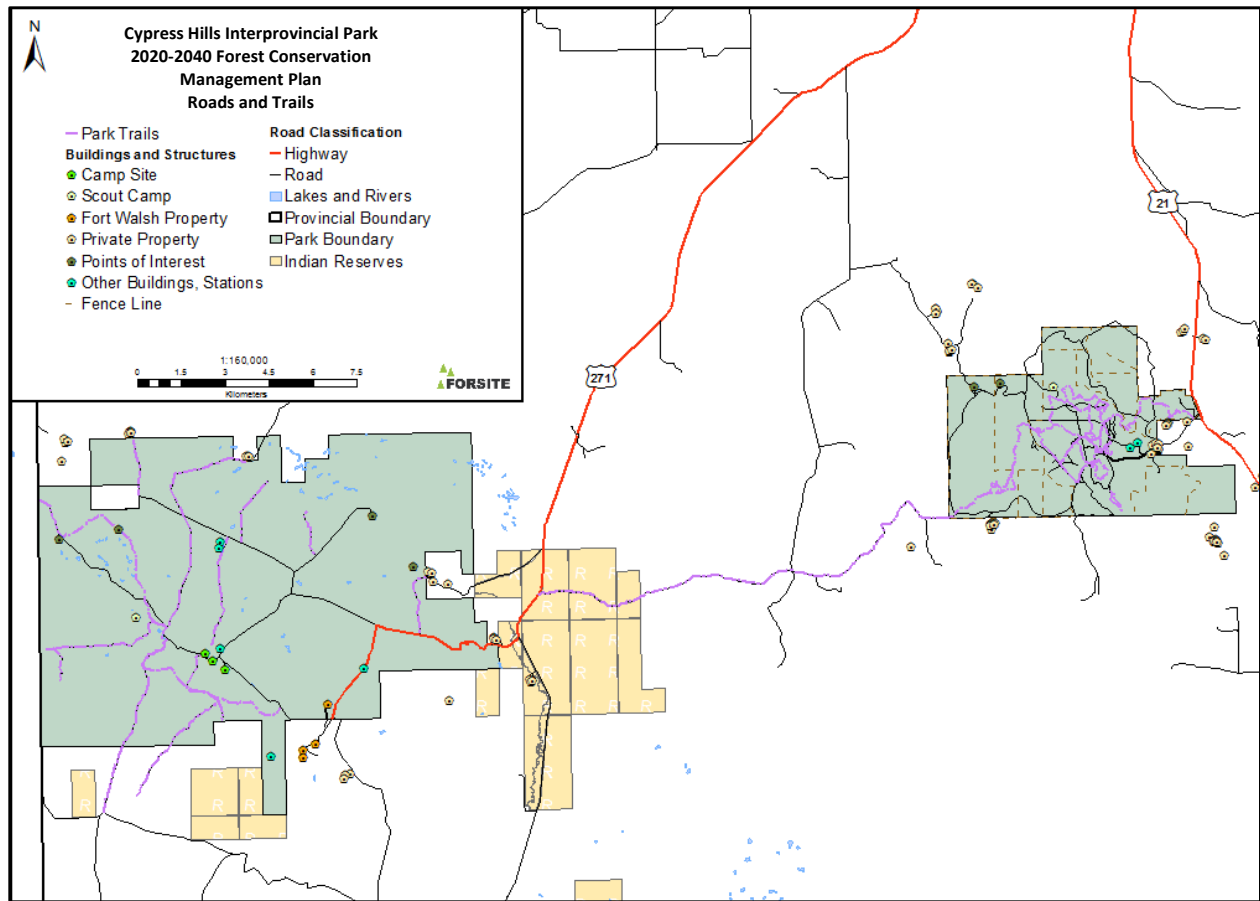


Figure 15 Trails and Roads within West and Centre Blocks, CHIPP.

4 Current Forest Conditions

4.1 LAND-BASE SUMMARY

Table 2 below describes the area with the extents of the current CHIPP land base and differentiates between the areas available for forest management and areas designated as unavailable and excluded (such as cabin developments, campgrounds, and grazing) from the plan. The gross area of the park is 18,320 ha. Not all areas within the extent of the park are available for management. The following table itemizes the areas excluded from the managed forest land base. For each land base element, the total area within that classification is noted, as well as the percent of the total area.

Table 2 Management area land summary.

Land Base element	Total Area (ha)	% Total Area
Total Park Area	18,319.88	100.0%
Non-Productive Forest	7,895.19	43.1%
Productive Forest	10,424.69	56.9%

The following dispositions are productive forest lands currently not supporting forest growth available for forest management.

Recreational Areas, Developments, and Grazing	34.4	1.7%
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4.2 FOREST ATTRIBUTES

Table 3 and **Table 4** describe and summarize the total productive forest area for CHIPP by Provincial Forest Type (PFT) and seral stage. Productive forest area is a forest management term designed to describe lands supporting or capable of supporting forest growth but is not intended to undervalue the ecological value of lands not described as productive forest lands. 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). **Figure 16** displays the graphical representation of this summary.

Table 3 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	3,906.33
WSF	White spruce or balsam fir dominated softwood stands	2,999.51
TAB	Trembling aspen or white birch dominated hardwood stands	2,939.61
HSM	Hardwood with Spruce Mixedwood	391.99
SMW	Spruce Dominated Mixedwood Stands	117.08
HPM	Hardwood with Pine Mixedwood	45.09
BSL	Black spruce or tamarack/larch dominated softwood stands	24.88
AOH	Any other hardwood dominated not dominated by TAB	0.19
	Total Forested	10,424.69
	Total Non-Forested	7,895.19
	Total	18,319.88

Table 4 Area by Provincial Forest Type (PFT) and Seral Stage.

PFT	Area (Ha) by Seral Stage					Total Area (ha)
	Young	Immature	Mature	Old	Very Old	
	0-20 yrs	H/HS: 21-70 yrs S/SH: 21-80 yrs	H/HS: 71-90 yrs S/SH: 81-100 yrs	H/HS: 91-110 yrs S/SH: 101-120 yrs	H/HS: >110 yrs S/SH: >120 yrs	
BSL	0.0	22.9	1.3	0.0	0.6	24.9
HPM	0.0	19.6	20.9	2.7	2.0	45.1
HSM	0.9	90.7	184.4	114.2	1.8	392.0
JLP	62.1	657.7	24.5	112.1	3,050.0	3,906.3
SMW	0.0	38.2	8.2	18.8	51.9	117.1
TAB	13.5	1,839.0	778.5	266.1	42.5	2939.6
WSF	0.0	682.6	202.4	148.7	1,965.8	2999.5
Total	76.5	3,350.8	1,220.2	662.5	5,114.5	10,424.4

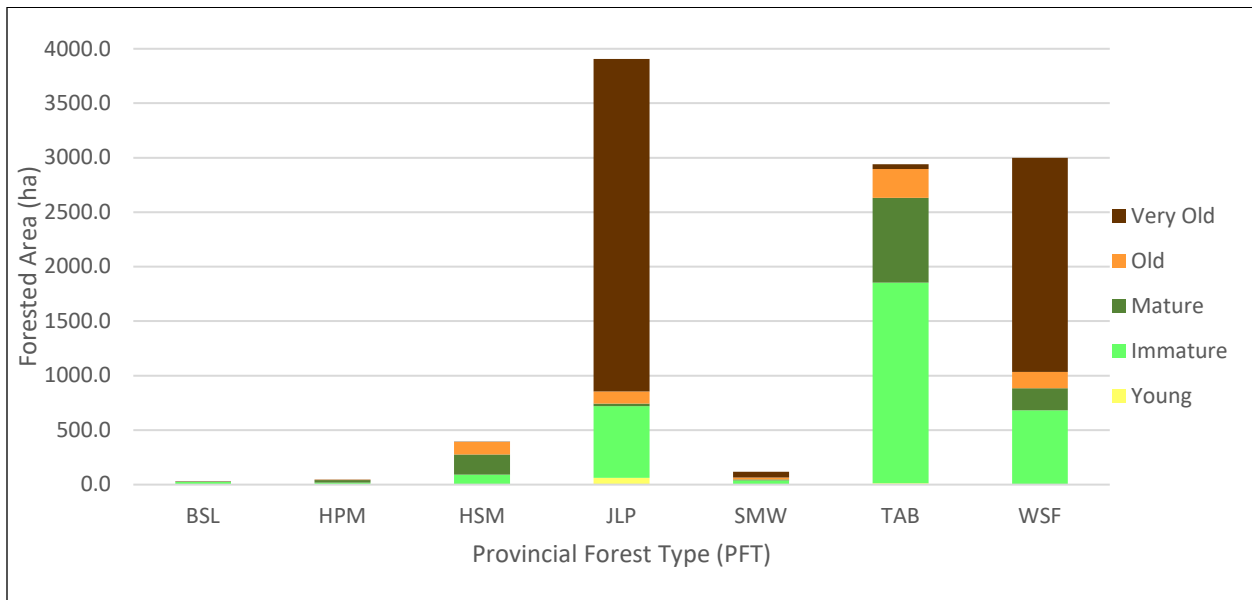


Figure 16 Productive Forest Area by PFT and Seral Stage.

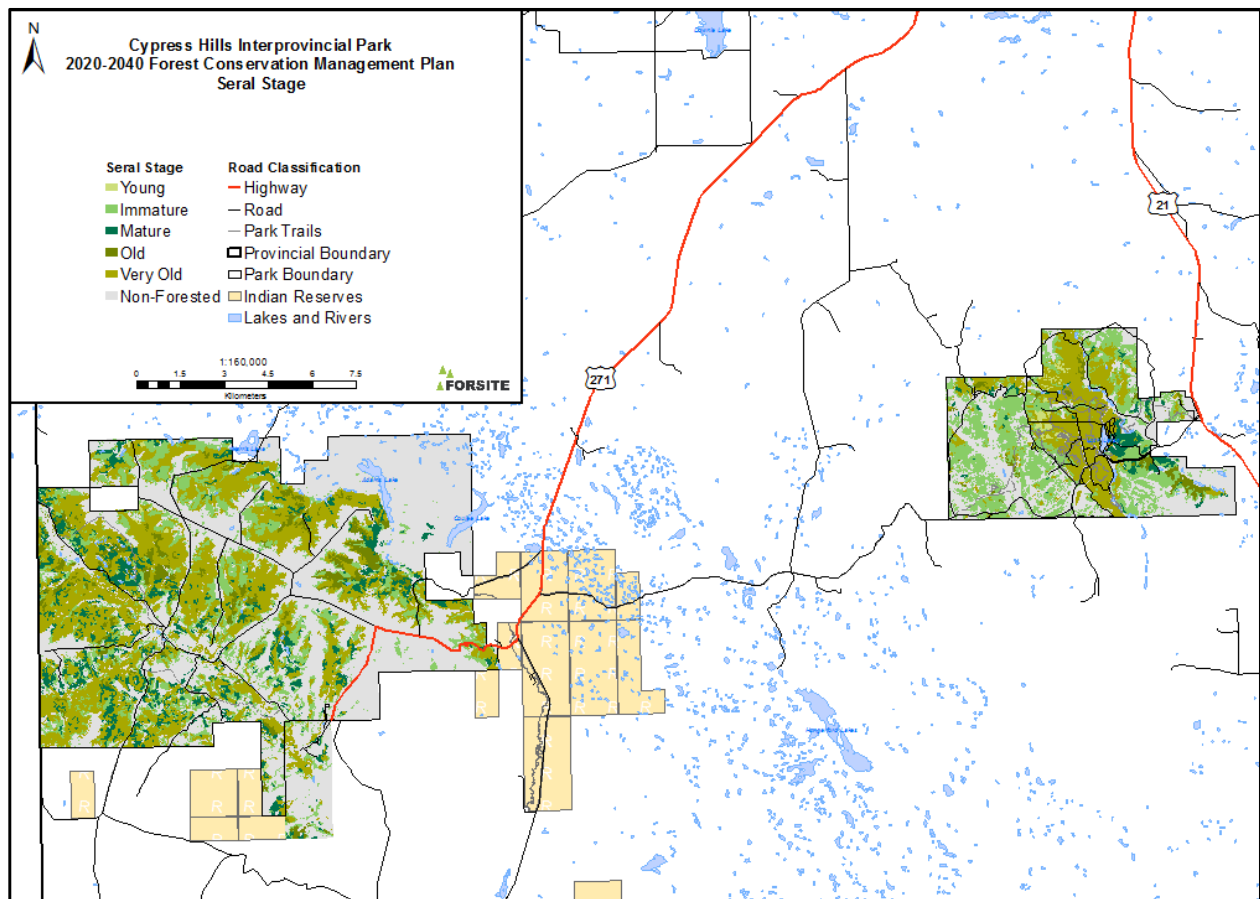


Figure 17 Productive Forest by Seral Stage in CHIPP.

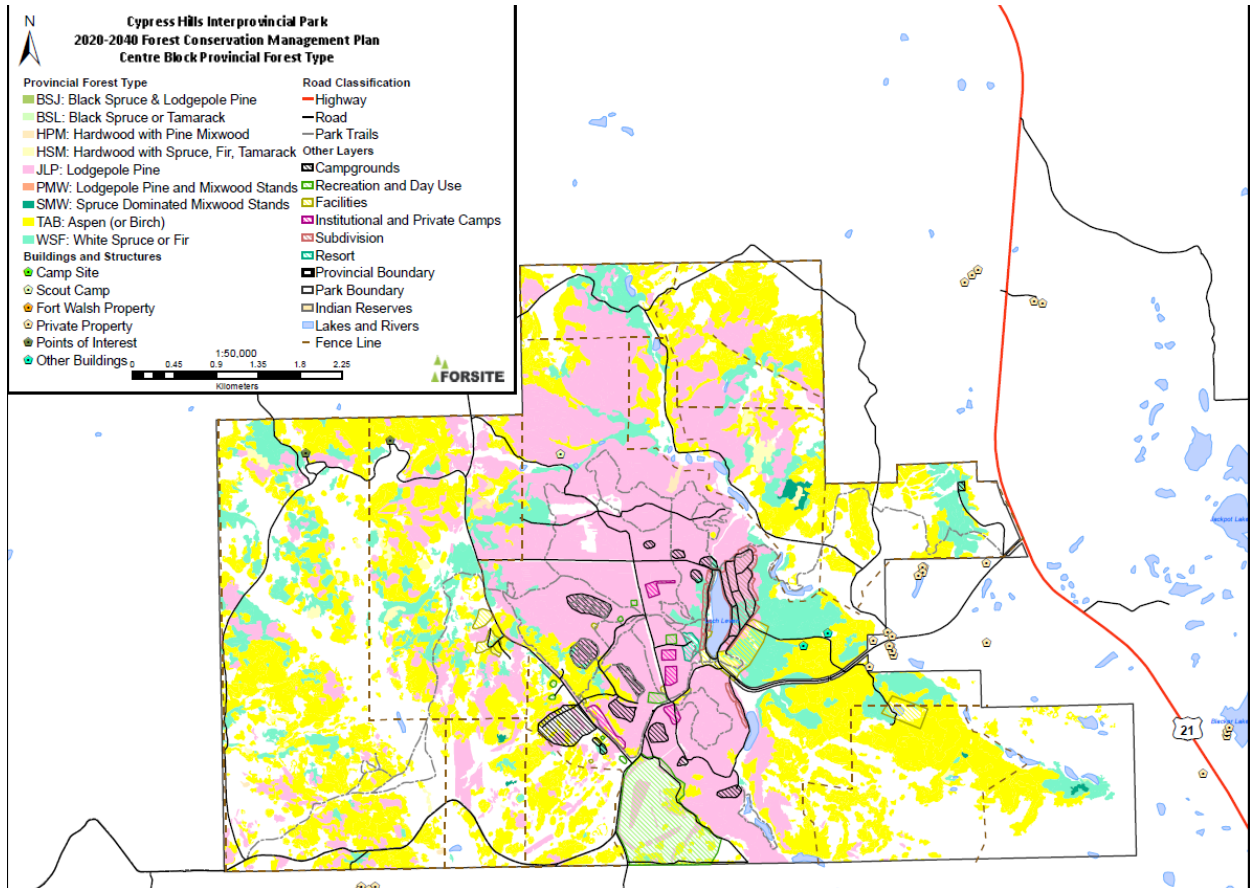


Figure 18 Productive Forest by PFT in CHIPP, Centre Block.

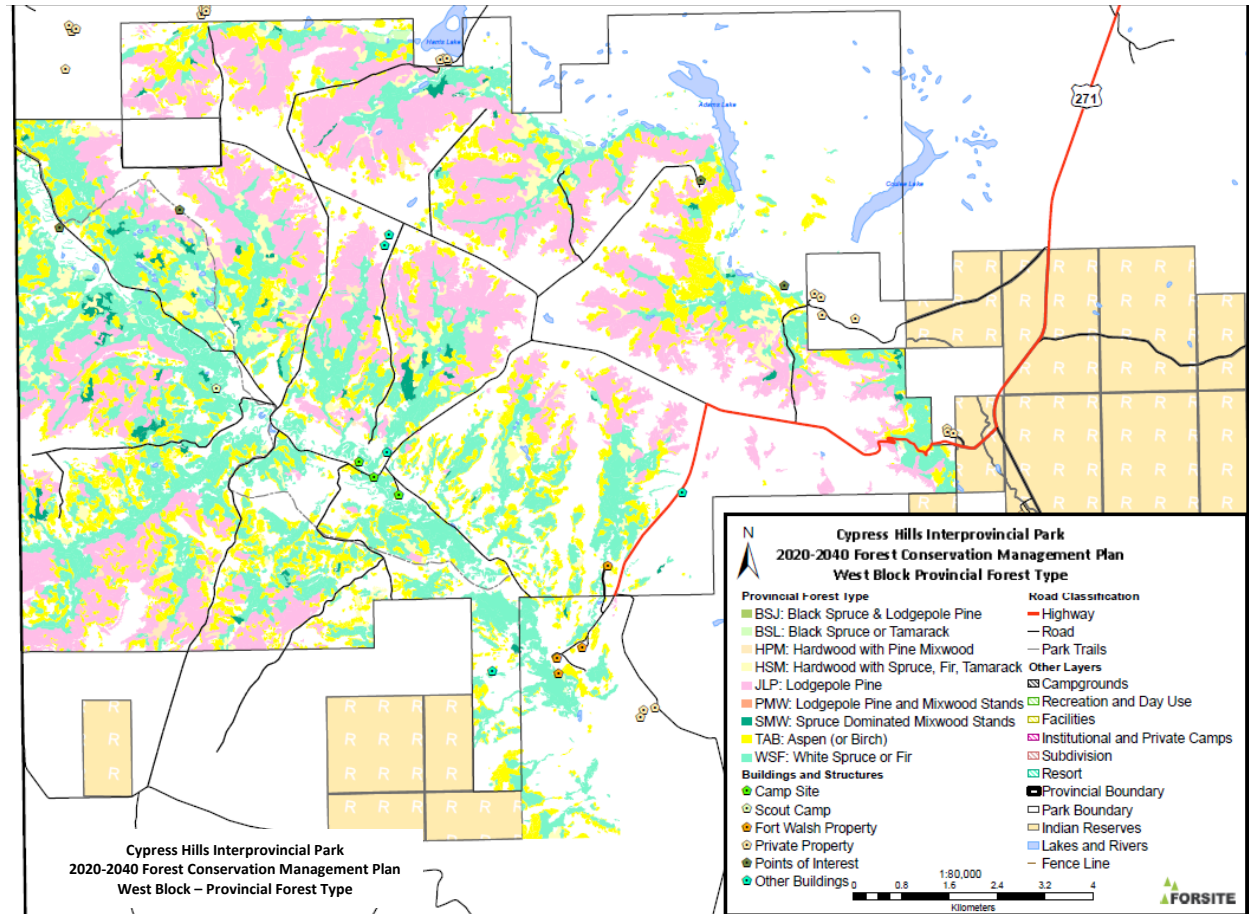


Figure 19 Productive Forest by PFT in CHIPP, West Block.

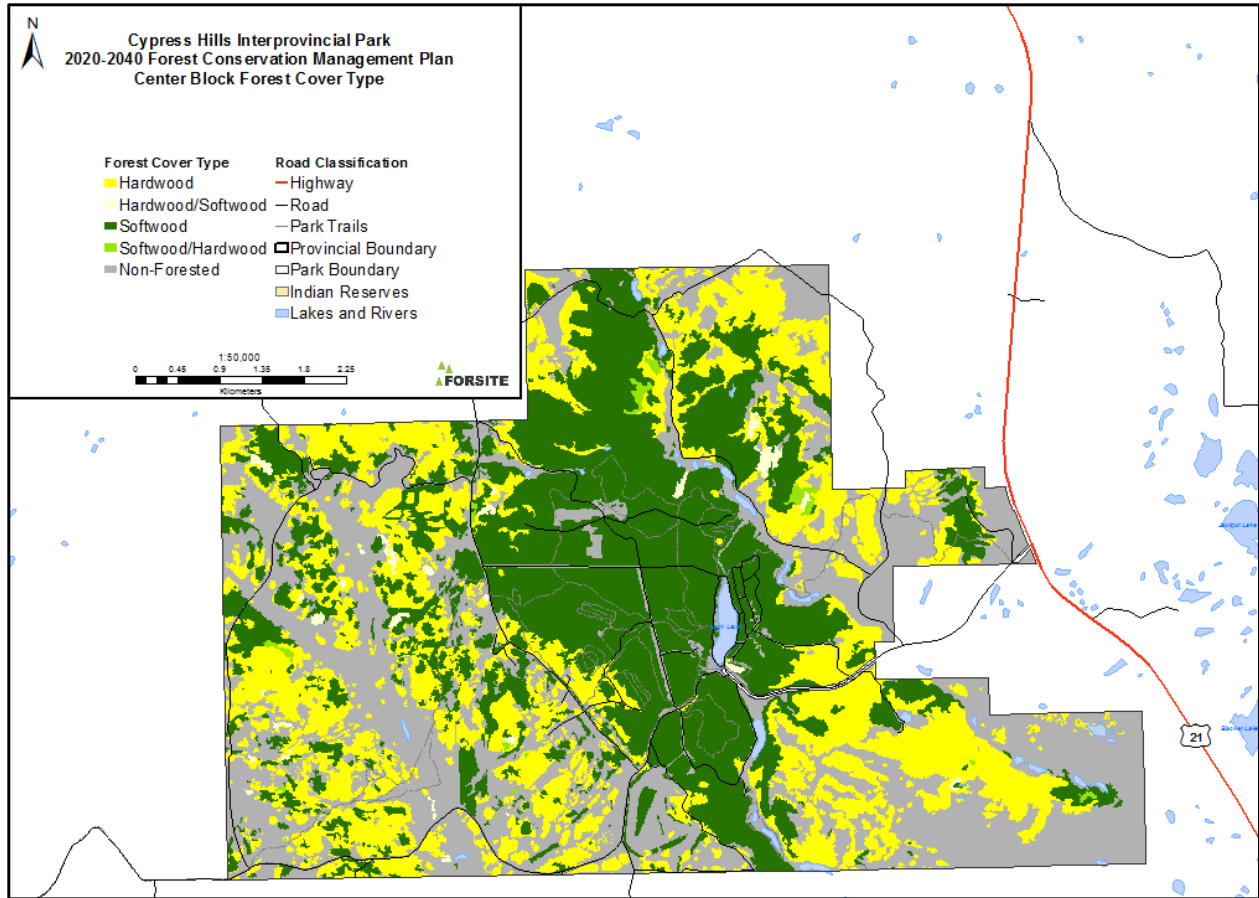


Figure 20 Productive Forest area by Forest Cover Type in CHIPP, Centre Block.

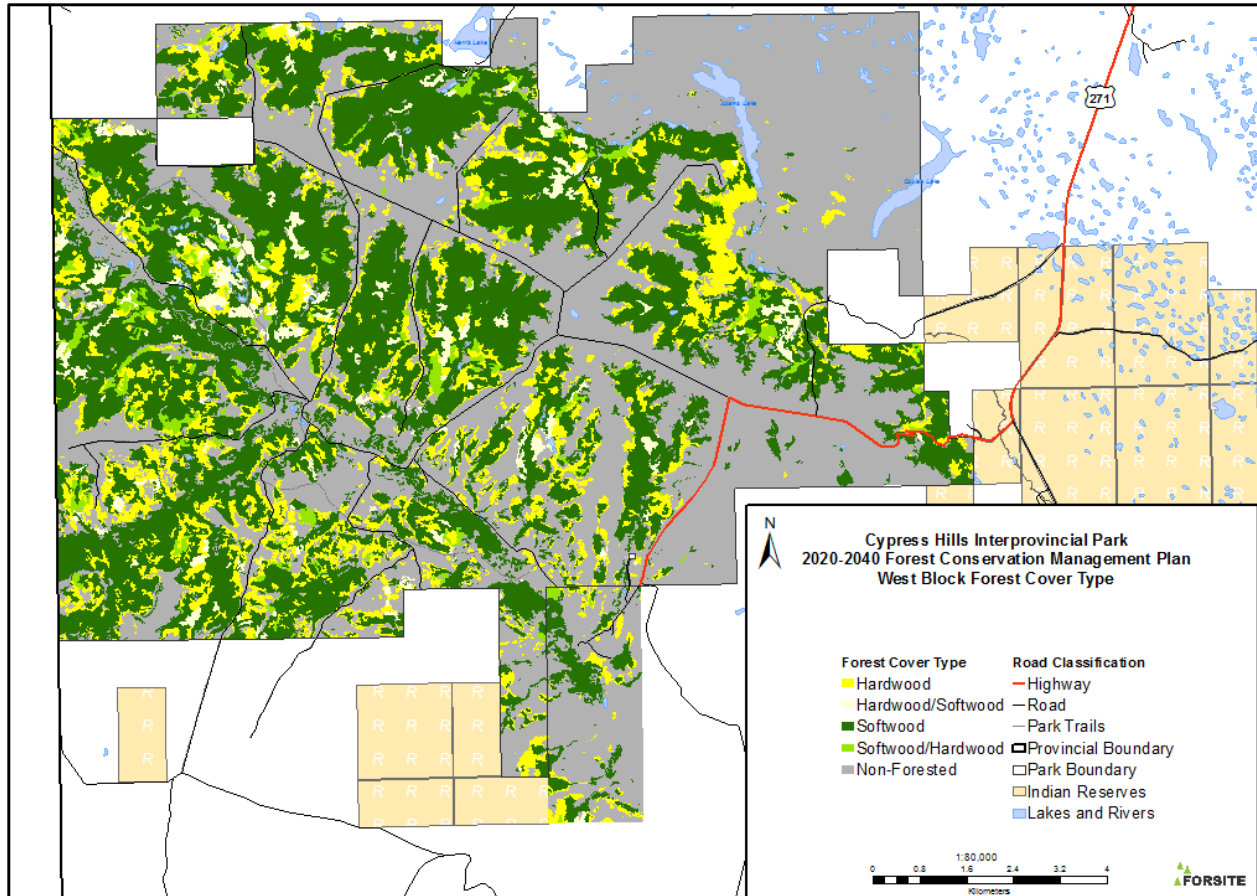


Figure 21 Productive Forest area by Forest Cover Type in CHIPP, West Block

4.3 NATURAL DISTURBANCE

4.3.1 FIRE

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, fire suppression activities since the 1950s have created ecological and safety issues. Fire is considered a natural disturbance and aids in resetting the 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 high heat. 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).

Historical records and tree data show that the Cypress Hills 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.

Historically, two major fire events have occurred within Cypress Hills. Landscape-level burns occurred in 1885 and 1889. The fire of 1885 is considered to be the stand originating fire for the current lodgepole forests of the park and is apparent in **Figure 22**. Recent fire history between the years of 1969 and 2007 show a total of 63 fires within the Alberta side of the West Block. Recent fire history (post year 2000) within the Saskatchewan side’s Centre and West Blocks total 1.82 ha and are presented in **Table 5**. Total area burned since 2000 within the Centre Block equals 1.71 ha. Of the 13 fires recorded for the Centre Block only one was caused by lighting (0.04 ha in 2000). The remaining 12 fires that occurred within the Centre Block were from anthropogenic sources, their locations are presented in **Figure 23**. Two total known fires since 2000 within the West Block equal 0.11 ha. Both fires were caused by lighting and their locations are presented **Figure 24**. Anthropogenic sources, including recreational land users, account for most of the 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).

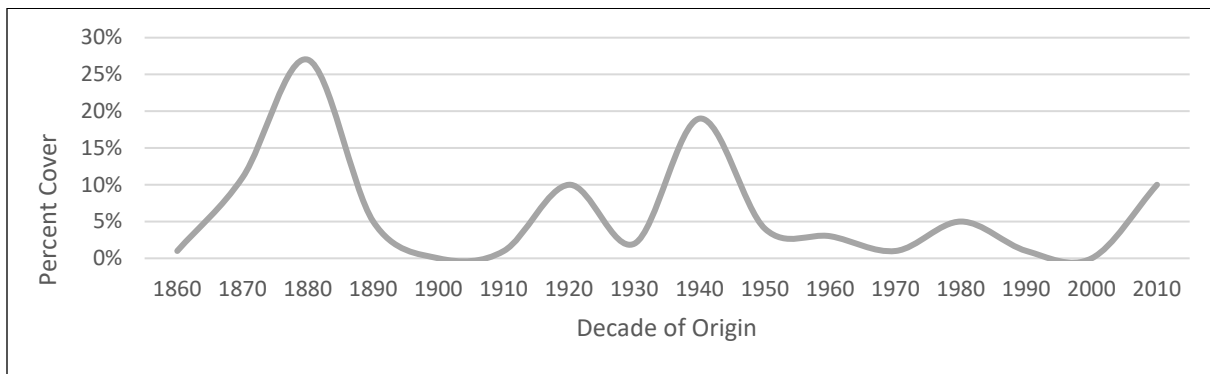


Figure 22 Decade of Origin for All Forest Stands in CHIPP Summarized from SFVI Database.

Table 5 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	0.10
	2007	Human	0.02
	2008	Human	0.01
	2011	Human	0.01
	2012	Human	0.40
	2014	Human	0.10
	2017	Human	0.10
	2019	Human	0.10
	2021	Lightning	0.10
	2021	Human	0.10
	Total		2.01
West Block			
	2011	Lightning	0.01
	2014	Lightning	0.10
	2021	Lightning	0.10
	Total		0.21

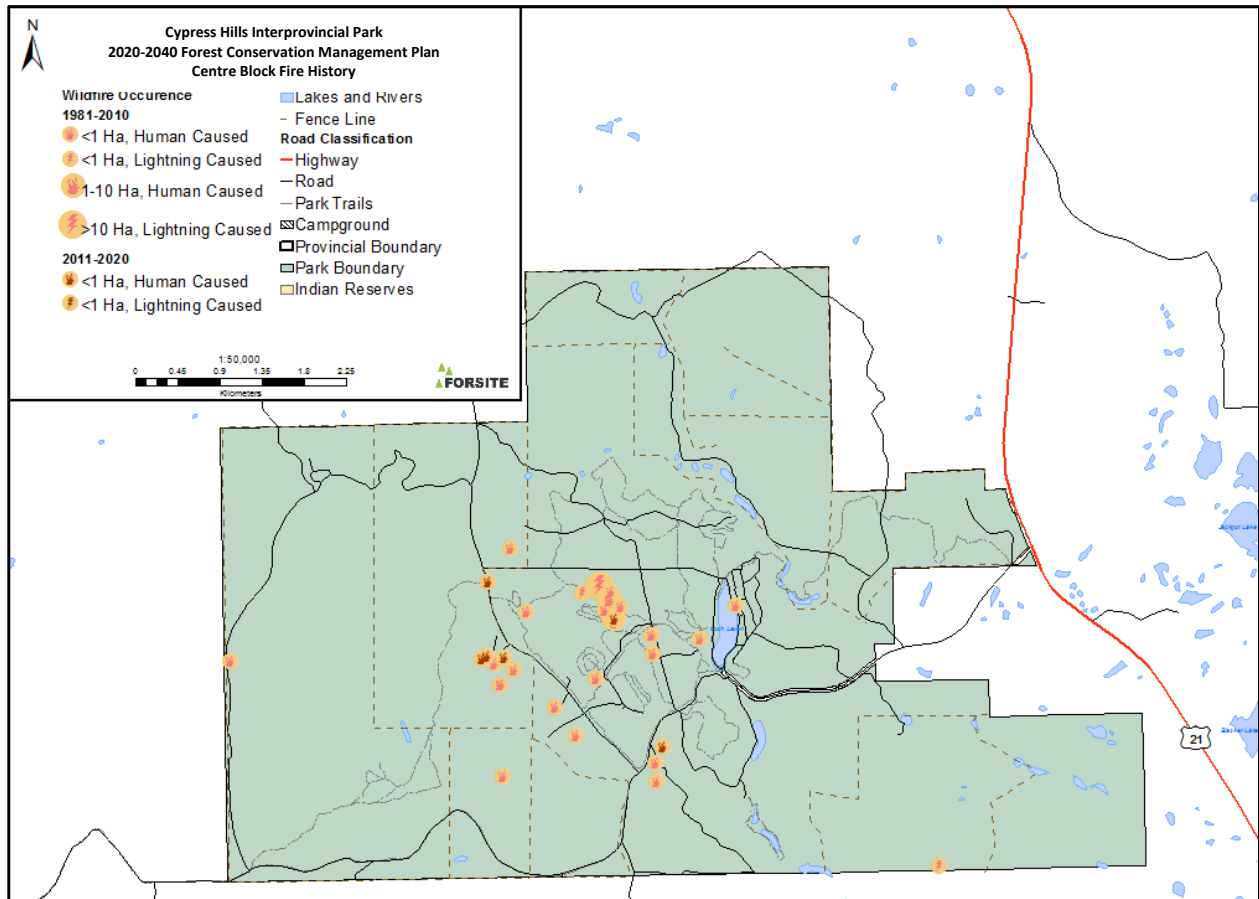


Figure 23 Recent Fire Occurrences within Centre Block, CHIPP (Post 2000).

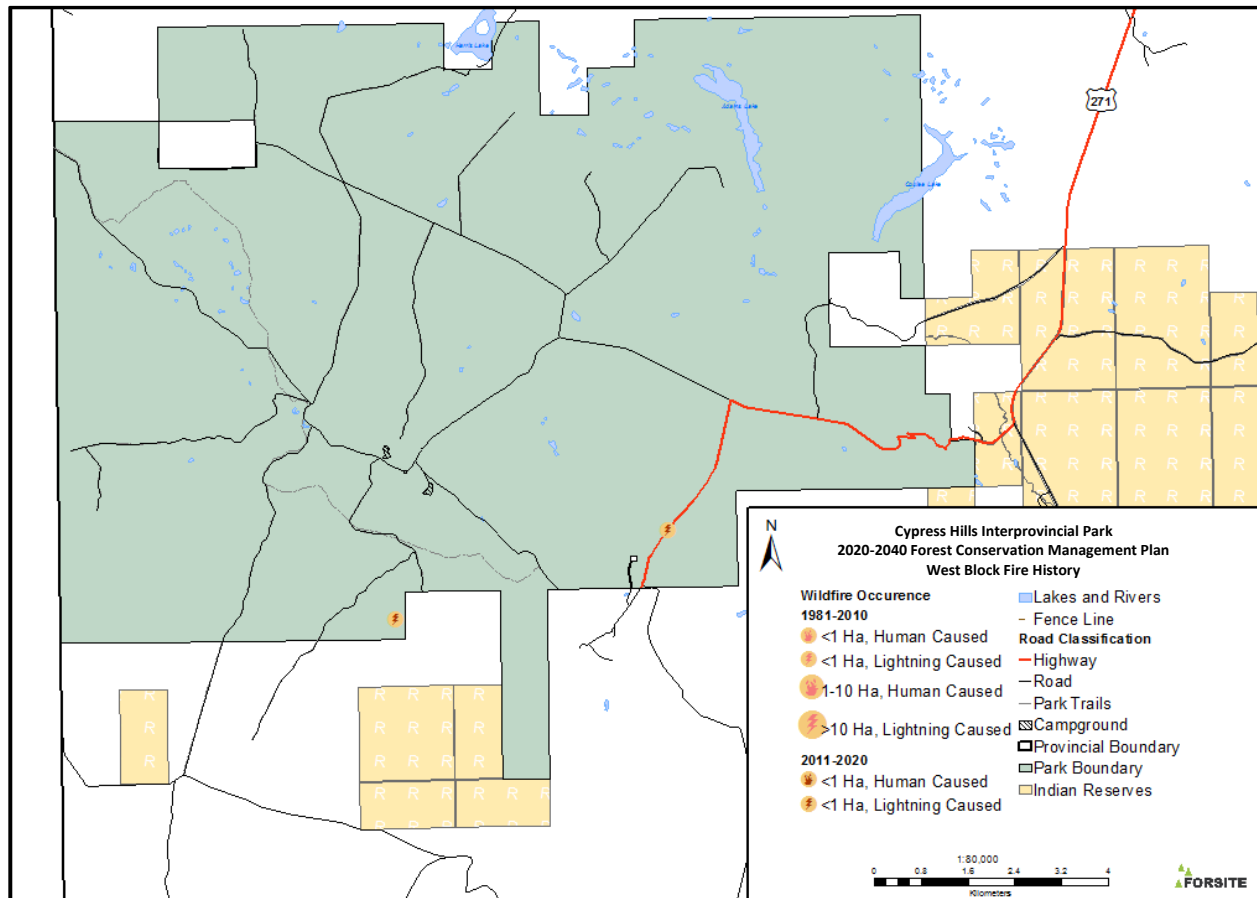


Figure 24 Recent Fire Occurrences within West Block, CHIPP (Post 2000).

4.3.2 INSECTS AND DISEASES

Other natural disturbances that have affected CHIPP include insects and diseases which have caused damage to the forests but are an integral part of the forest system. Currently, the disturbance with the most concern within the park is mountain pine beetle (*Dendroctonus ponderosae*) (MPB). Mountain pine beetle is a bark beetle that typically attacks overmature, stressed, and weakened trees. Currently, lodgepole pine found in the Cypress Hills are being attacked, but the beetle is also known to attack lodgepole-jack pine hybrids and pure jack pine (Cullingham et al 2011) as well (in Alberta). Known incidents of mountain pine beetle within CHIPP are presented in **Figure 25** and **Figure 26**. The main mode of dispersal in CHIPP is short-distance dispersal which tends to be within a stand in the range of 20-50 metres (Safranyik and Carroll 2006); however, some beetles can go as far as 100 metres (Robertson et al. 2007). The Forest Service Branch of the Saskatchewan Ministry of Environment has implemented a “zero-tolerance” policy designed to catch and control as many short-distance infestations as possible in CHIPP (Kunegel-Lion et al. 2019). The policy is implemented using the following procedure: Pheromone baits are set up in strategic locations throughout the park in the spring to “contain and concentrate” locally dispersing beetles that are flying and actively seeking host to colonize and produce their brood during the summer.

In the early fall, the Forest Service conducts a systematic aerial survey of the park area to collect global positioning system (GPS) data points for lodgepole pine trees that display a red-top (red needles), which are dead or dying trees infested by MPB the previous year. These identified trees are later visited on the ground to confirm MPB attacks. A 50-metre radius plot is then established around each of the red-top trees confirmed killed by MPB. The survey plot is then searched for live (green) trees infested with MPB from the current year. Green trees with a confirmed MPB presence are controlled later that fall or winter by felling and burning the infested trees to ensure the beetles are killed (Kunegel-Lion et al. 2019). If the infestation in green trees extends close beyond the plot radius, the survey plot can be extended to include these infested trees (Saskatchewan Ministry of Environment 2016). In addition to the survey plot control measures, areas with high densities of red-top trees are mapped, entirely surveyed, and controlled (Kunegel-Lion *et al.* 2019). A total of 15 mountain pine beetle annual surveys have occurred between the years 2001 and 2019 to monitor and control the epidemic. Trees affected by MPB during this period were controlled by fall and burn activities during the winter period by contractors working for Parks Division.

There are also three known pine stands infected with lodgepole pine dwarf mistletoe (*Arceuthobium americanum*) in the west block. It has not been observed elsewhere in the park. These areas have been scheduled to be harvested in the tactical plan.

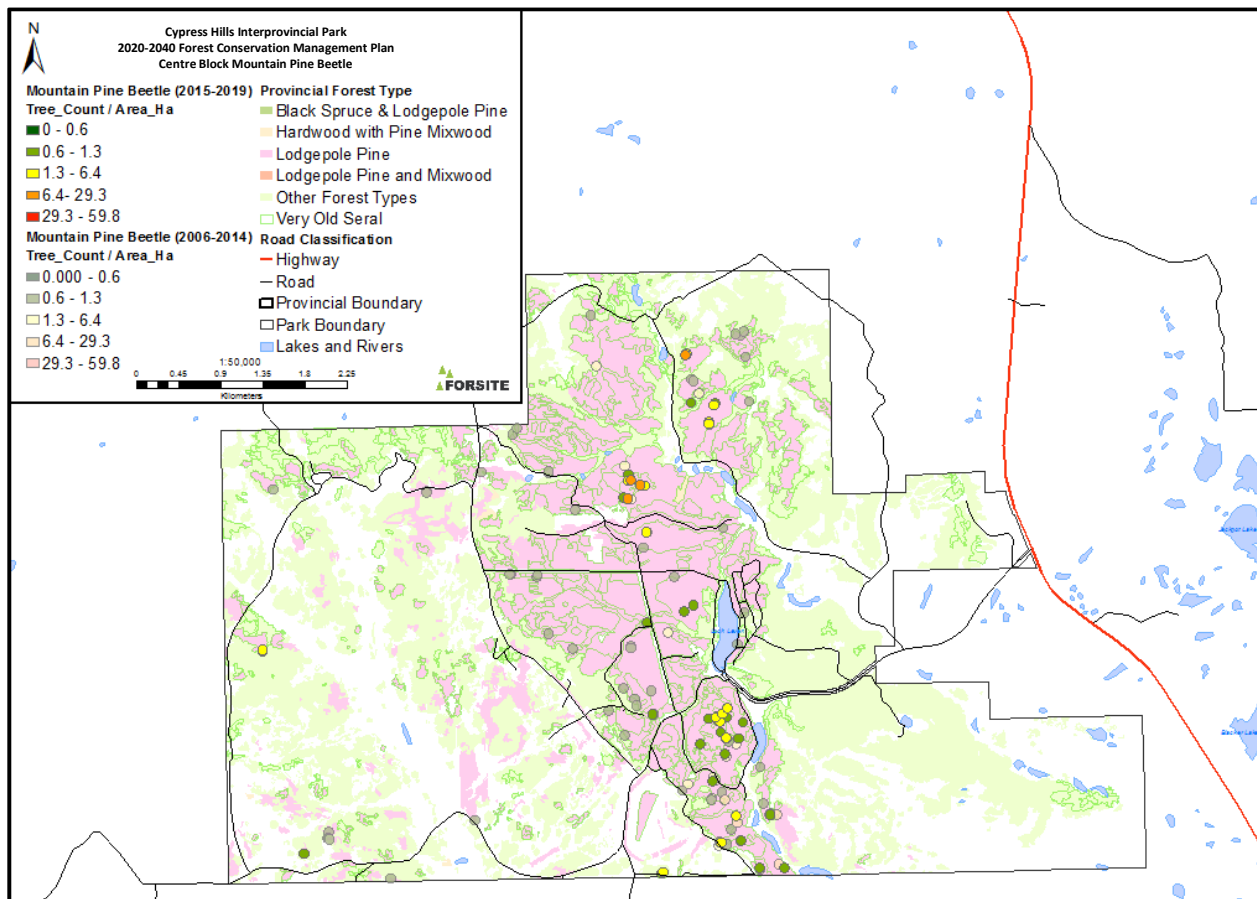


Figure 25 Known Point Locations of MPB Affected Trees/Hectare within Centre Block, CHIPP.

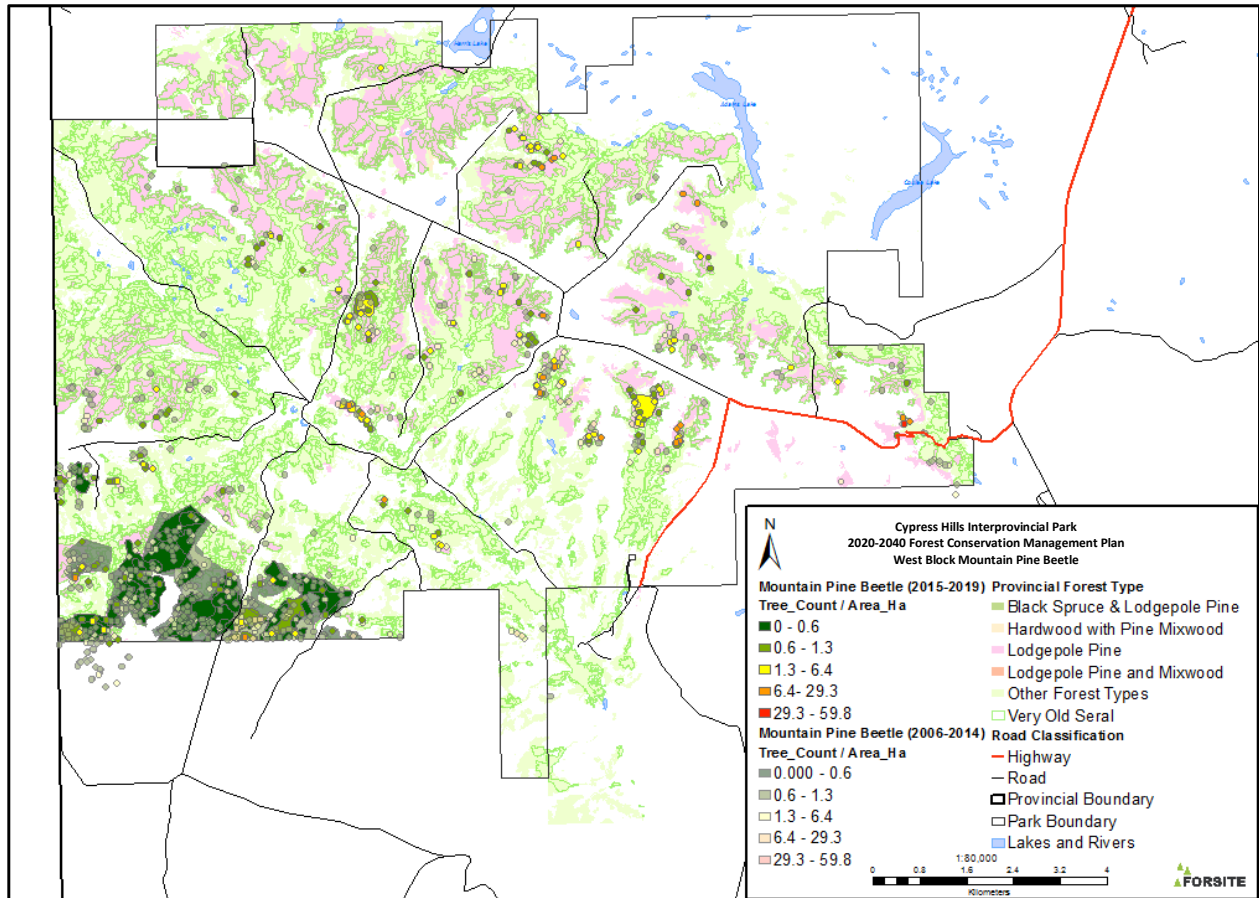


Figure 26 Known Point Locations of MPB Affected Trees/Hectare within West Block, CHIPP.

4.3.3 LINKS TO FOREST MANAGEMENT

Much of the natural forest present in CHIPP today was initiated by fire. The protection of forest resources through fire suppression alters the natural disturbance regime of these forests. To some degree natural disturbance patterns can be emulated through strategic landscape planning by creating a natural range of harvest opening sizes and appropriate levels of stand retention. Harvest openings cannot entirely replicate the character of fire disturbances; conversely wildfire cannot be eliminated, so collectively these disturbances may capture reasonably well many of the ecological processes observed across the broader landscape.

Diversity of native species is more likely to be conserved over the long-term if natural patterns and processes are emulated in forest management. As the climate changes, in particular warmer temperatures and shifts in seasonal precipitation, the fire return interval and disease and insect outbreak cycles, distribution and severity will be altered and may need to be considered in future planning.

4.3.4 LAND USE CLASSIFICATIONS

The land and water that is contained within the Park boundary is classified by various land use classifications and are listed in **Table 6** below.

Table 6 Land Use Classifications.

Land Use Classification	Area (Ha)
Agriculture and Pasture Land	11.6
Unclassified	9.3
Brushland	255.5
Forested	10,319.2
Population area (e.g., cities, towns)	11.5
Recreation area	66.2
Grasslands	7,098.0
Agricultural and pasture	25.1
Recreation area	11.9
Research Site	0.1
Weather Station	0.1
Open Muskeg	202.2
Gravel Pit	2.3
Other unspecified site	15.5
Recreation area	54.9
Research Site	0.2
Tower site	0.3
Unclassified	104.8
Treed Muskeg	33.5
Other unspecified site	0.4
Waterbodies	94.8
Lagoon	2.3
Grand Total	18,319.7

5 Tactical Plan

A 20-year tactical plan is a key component of this FCMP and is designed to guide forest planners during the development of forest operating plans during the FCMP term. It is a spatial representation of where treatment is strategically planned to occur over the next two decades.

5.1 DEVELOPMENT APPROACH

The tactical plan areas (TPA's) were selected based on the following parameters:

- ▶ **Very Old Seral Stands** – Areas with a high proportion of very old stands were given priority for treatment in decade one. Old, and very old stands are at a greater risk of natural disturbances, such as insects, diseases, and fire. CHIPP will benefit from regeneration for age class diversity over the land base. Lodgepole pine stands are the primary focus for treatment areas to reduce the age class and to assist in the control of MPB. Over the life of the plan, the 10-year treatments areas were focused on treating forest stands in the old and very old seral stage as these stands are at the greatest risk of wildfire, insect infestations and stand breakout. Over the 200-year planning cycle, the 10-year treatment areas range from 0 ha to 1,469.1 ha. These treatments were designed to ensure at least 15% retention of old and very old seral stages remain on the landscape through time. The selection of mature stands in decade 1 and decade 2 was minimal and only used in harvest events which were designed to treat areas with known MPB infestations and may be at risk for further infestations.
- ▶ **Mountain Pine Beetle Infestation Areas** – Areas of known MPB activity were captured in decades 1 and 2 of the tactical plan in an effort to limit the short distance dispersal of the beetle and to reduce beetle populations and the availability of over mature host pine stands.
- ▶ **Values at Risk** – Areas with extensive public use, building infrastructure (Park or private), and evacuation routes were identified for either Fire Smart or forest management treatments. These treatments were designed to increase public safety of park visitors in the event of a wildfire or other natural disasters (e.g., - tornado). Also, these treatments are designed to reduce the risk of a wildfire originating within a park development (campground or cottage yard) from reaching mature forest, and to reduce the risk of a wildfire originating in mature forest from impacting park and private assets.

5.2 TACTICAL PLAN AREAS

Tactical Plan Areas (TPAs) are shown on the maps within **Appendix A: Tactical Plan Areas**.

Table 7 provides an overall summary of area broken down by Tactical Plan decade, PFT, and seral stage. There are 1,934.7 ha planned for the decade one tactical plan including areas designated for FireSmart treatments, with up to 1,632.5 ha in the mature, old, and very old seral stages. There are 890.2 ha planned for decade two, with up to 768.9 ha in the mature, old, and very old seral stages. The target treatment area in each decade is variable, in order to maintain at least 15% in the old and very old seral stages. Young and immature stands were not targeted in the tactical plan. The first two decades of tactical plan treatments were focused on reducing the amount of forest area with very old and old age classes, as well as treating lodgepole pine stands infected with or susceptible to the mountain pine beetle. Where contiguous to the harvest events, mature seral stage stands were included due to their proximity to old or very old stands and to minimize entries into the forest.

The Tactical Plan treatment areas are not equal by decade as the objective is to target the old and very old seral stages while maintaining the minimum of 15% old and very old across the land base. This results in fluctuating treatments through time as shown in **Figure 27**.

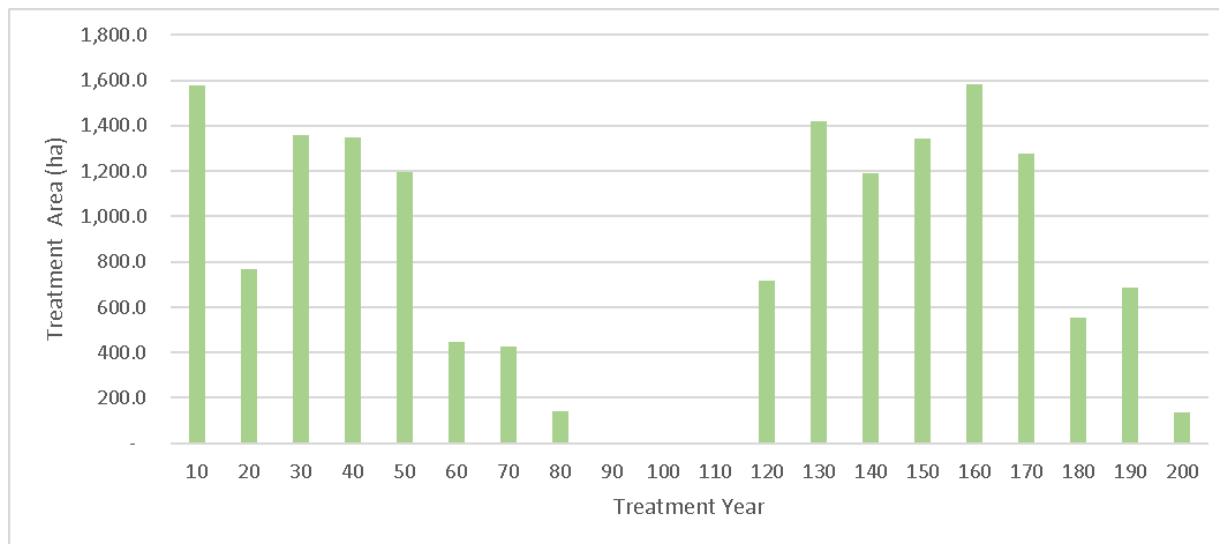


Figure 27 Decadal Treatment Area (ha) by Treatment Year.

Table 7 Tactical Plan Area (TPA) Decade by PFT and Seral Stage.

Tactical Plan Decade	PFT	Young	Immature	Mature	Old	Very Old	Total
Decade One	BSL	0	1.9	0.5	0	0	2.4
	HPM	0	3.3	15.7	2.7	0	21.6
	HSM	0	5.2	13.2	29.7	1.7	49.8
	JLP	9.3	83.9	6.4	62.2	1125.3	1287.1
	PMW	0	0	0	0	0	0
	SMW	0	1.6	1.5	0	2.5	5.6
	TAB	0.1	156.3	113.0	26.7	0	296.1
	WSF	0	40.7	13.0	2.2	216.1	272.1
	Total	9.4	292.8	163.3	123.4	1345.7	1934.7
Decade Two	BSL	0	0	0	0	0	0
	HPM	0	0	0	0	2.0	2
	HSM	0	1.8	11.4	7.4	0	20.6
	JLP	12.7	37.0	2.6	0	447.3	499.6
	PMW	0	0	0	0	0	0
	SMW	0	1.4	0	4.1	16.8	22.3
	TAB	0	35.7	49.2	14.1	39.1	138.1
	WSF	0	32.8	2.9	3.3	168.6	207.6
	Total	12.7	108.7	66.1	28.9	673.8	890.2
Grand Total		22.1	401.1	229.5	152.4	2019.4	2824.8

Table 8 Areas by PFT and seral stage available for Tactical Plan Treatments.

	Treatment Area (ha) by PFT									
	Centre Block				West Block					
Tactical Plan Decade	PFT	Mature	Old	Very Old	Total	Mature	Old	Very Old	Total	Grand Total
<i>Decade One</i>	BSL	0	0	0	0	0.5	0	0	0.5	0.5
	HPM	0	0	0	0	15.7	2.7	0	18.4	18.4
	HSM	0	0	0	0	13.2	29.7	1.7	44.6	44.6
	JLP	0.5	0	217.3	217.8	5.9	62.2	908.1	976.2	1194.0
	SMW	0	0	0	0	1.5	0	2.5	4	4.0
	TAB	0	0.3	0	0.3	113.0	26.4	0	139.4	139.7
	WSF	6.1	0	4.8	10.9	6.9	2.2	211.3	220.4	231.3
	Total	6.6	0.3	222.1	229.0	156.7	123.2	1123.6	1403.5	1632.5
<i>Decade Two</i>	HPM	0	0	2.0	2.0	0	0	0	0	2.0
	HSM	0	0	0	0	11.4	7.4	0	18.8	18.8
	JLP	1.2	0	149.1	150.3	1.4	0	298.2	299.6	449.9
	SMW	0	0	0	0	0	4.1	16.8	20.9	20.9
	TAB	0	0.5	38.0	38.5	49.2	13.7	1.1	64.0	102.5
	WSF	0	0	13.8	13.8	2.9	3.3	154.8	161.0	174.8
	Total	1.2	0.5	202.9	204.6	64.9	28.5	470.9	564.3	768.9
	Grand Total	7.8	0.7	424.9	433.4	221.6	151.7	1,594.5	1,967.8	2401.2

6 Engagement and Information Sharing

6.1 FIRST NATIONS AND MÉTIS ENGAGEMENT

The identification, management, and potential accommodation of Indigenous rights is significant to resource management activities. Engagement with First Nations and Métis communities has sought to identify where Indigenous rights are present and may be affected by plan activities. The plan will consider potential impacts on Indigenous rights and traditional use and will seek to minimize them. Engagement with First Nations and Métis communities will need to occur during the planning phases as well as regularly during the term of the plan.

The Ministry of Parks, Culture, and Sport is responsible for the Duty to Consult with First Nations and Métis Locals for Government decisions and actions that have the potential to adversely impact the exercise of Treaty and Indigenous rights and pursuit of traditional uses. The Ministry's duty to consult process is directed by The Government of Saskatchewan's First Nation and Métis Consultation Policy Framework (CPF)³. It is recommended that CHIPP will follow this framework prior to implementation of the plan.

Three First Nations have identified traditional use on the lands contained within the CHIPP: Carry the Kettle First Nation, Little Pine First Nation, and Nekaneet Cree Nation; however, there is a rich history of many First Nations occupying the Cypress Hills area.

6.2 STAKEHOLDERS AND OTHER TENURE HOLDERS ENGAGEMENT

Cypress Hills Interprovincial Park shares the land base with other stakeholders. Other stakeholders include grazing and haying disposition holders, business owners, and recreational hunters. CHIPP must consider these other stakeholders when conducting timber management activities. CHIPP will consult with other tenure and stakeholders in the development of this plan and consider the comments received in the plan's development. CHIPP Saskatchewan is also key partners with both CHIPP Alberta and the Fort Walsh National Historic Site (managed by Parks Canada). The University of Regina also has a field research station located in the West Block.

It is beneficial for engagement with stakeholders to occur regularly during the term of the plan as part of the development process.

6.3 PUBLIC ENGAGEMENT

CHIPP will hold meetings with stakeholders and interested public to discuss upcoming treatment plans. The public will be able to discuss any concerns they may have concerning the operations in the plan.

³ Government of Saskatchewan (2010). First Nation and Métis Consultation Policy Framework.
<http://publications.gov.sk.ca/documents/313/98187-Consultation%20Policy%20Framework.pdf>

7 Strategies to Address Natural Disturbance in CHIPP

The forests and grasslands found in CHIPP are often influenced by natural disturbances from insects, diseases, wildfires and more increasingly, windthrow. It is recommended that CHIPP will use the response strategies detailed below to incorporate consideration of natural disturbance into its forest management and implementation.

7.1 STRATEGY FOR WILDFIRE MANAGEMENT

Wildfires are the single largest source of natural disturbance in Saskatchewan's forest and was historically significant within the forests and grasslands of Cypress Hills. Past fires have influenced the current forest types, age-class distributions, and associated biodiversity within the park. The active suppression of fire requires that the chosen treatments mimics natural disturbance to maintain the same forest types. A detailed wildfire risk assessment was conducted for CHIPP. A detailed analysis of this assessment can be found within [Appendix B: Wildfire Plan Areas](#).

Saskatchewan's Fire and Forest Insect and Disease Policy Framework (2003) was developed to provide direction for ministry staff and forest management licensees regarding how wildfires, along with insect and disease outbreaks will be managed on the landscape. This Policy framework represents a fundamental shift from fire control and suppression to wildfire management and planning. The forest insect and disease component of the policy framework is discussed in [Section 4.3.2](#).

The policy framework includes recognition that the boreal forest is a fire dependent ecosystem, but the same principles will apply to these montane forest ecosystems. Where opportunities exist to support forest resource management objectives, fire will be used to protect, maintain, and enhance forest resources, and will be allowed to perform its natural ecological role. Prescribed burning is proposed as a viable treatment to achieve these objectives.

7.1.1 FOREST PROTECTION

The wildfire season in Saskatchewan falls between April 1 and October 31 each year. However, due to predicted changes associated with global climate change, it is anticipated that this window will expand and that more extreme fire conditions will likely occur. *The Wildfire Act and Regulations* allows for the extension of the wildfire season, if required.

The Wildfire Act provides the legal framework for the protection and management of Saskatchewan resources in relation to wildfire. MOE is responsible for fire suppression efforts within Saskatchewan's provincial forests.

The Forest Resources Management Act and Regulations provides legislative guidance for the protection of forests from insects and diseases. In 2008, a Minister's order was enacted under FRMA restricting the import, transport and storage in Saskatchewan, of all pine logs and pine forest products with bark attached, from the Cypress Hills area (lands bounded by Highways 1 and 37), or the Provinces of Alberta and British Columbia; or the USA, without the written authority of the Executive Director of the Forest Service Branch of the Ministry of Environment.

7.1.2 VALUES AT RISK

The provincial “Wildfire Management Operational Policy and Procedure Manual, April 11, 2016” (OPS 311) indicates that Wildfire Management Branch (WFM) of the MOE, now Saskatchewan Public Safety Agency (SPSA), Wildfire Management, will use a “values at risk” approach to decision-making relating to prioritizing wildfire suppression activities ensuring that human life and safety receive and maintain the highest priority. Values at risk has been extended to include both human values at risk and natural values at risk (e.g., high value forested areas, species at risk and critical habitat). This approach is used by WFM for wildfire suppression and also to prioritize requests for assistance from other ministries, governments, municipalities, industry, and organizations.

The Wildland Urban Interface (WUI) is an area where structures are built close to, or within the forest (**Figure 41** and **Figure 42** within **Appendix B: Wildfire Plan Areas**). The consequence of wildfires within these areas is often very severe. CHIPP is recommended to consider WUI areas within the park during treatment planning in these areas with the goal of enhancing wildfire prevention and preparedness of forest communities and neighbouring ranches (see section 7.1.5).

7.1.3 EVACUATION ROUTES

Management strategies for evacuation routes within CHIPP include:

- ▶ Initiate strategic evacuation analysis of the Centre Block, which will include the following at a minimum:
 - Identification of risk areas/sectors;
 - Identification of emergency response system and its capacity;
 - Forecasted evacuation demand; and
 - Modelling traffic behavior.
- ▶ Confirm existing primary evacuation routes within the West and Centre Blocks:
 - Cypress Drive Corridor (Centre Block)
 - Valley Trail Corridor (Centre Block)
 - Battle Creek Road (West Block)
- ▶ Improve the ‘robustness’ of each primary evacuation route.
- ▶ Identify alternate/secondary evacuation routes for each primary evacuation route.
- ▶ Develop secondary evacuation routes.
- ▶ Improve communications to ensure all park visitors, lessees, and cottage owners know the procedures and evacuation routes in the event of wildland fire (Centre Block).
- ▶ Clearly mark primary and secondary evacuation routes:
 - Replace older wooden signs with non-combustible metal signs along primary and secondary evacuation routes.
- ▶ Improve communications on evacuation procedures and escape routes in collaboration with Fort Walsh and the University of Regina (West Block):

- Feasibility study - Determining the feasibility of alternative evacuation routes for West Block.
- Design alternate evacuation routes as determined by feasibility study recommendations.
- Develop a system of warning for evacuation within the West Block (e.g., siren, radio).
- ▶ Post an Emergency Escape Plan for evacuation at strategic sites throughout the core area.
- ▶ Provide an evacuation procedure workshop to all Park staff annually.

7.1.4 FUEL TREATMENTS

Proposed fuel treatments for various areas within CHIPP include:

- ▶ Evacuation Routes - Establish fuel treatments to improve primary evacuation routes and develop secondary evacuation routes identified in 0.
 - Improve all primary evacuation routes via fuel modification, signage, mowing, and maintenance through a seasonally monitored standard operating plan.
 - Implement fuel modification and trail improvement treatments on trails identified as secondary evacuation routes.
- ▶ Landscape Level - Build on existing system of fuel reduction and modification zones and prioritize them to serve as fuel breaks, reduce fuel loading and improve the capability of fire suppression and escape routes.
- ▶ Fuel and Fire Breaks
 - A system of both fuel breaks and fire breaks have been drafted in the Centre Block to protect all people utilizing the park. The SPSA will work with the Park Manager, local cottage owner association and lessees to further refine this plan and has prepared Fuel Management Plans for CHIPP – Centre Block. SPSA will work closely with Parks Division to ensure strong linkage amongst plans.
- ▶ Loading Reduction and Modification Zones:
 - The FCMP utilizes some of the existing zones identified in the 2005 CHIPP Forest and Fire Management Plan (also Fire Control Zones in West Block) and recommends that these zones are further reviewed and updated as necessary. Where practical, these zones have been incorporated for forest harvesting in the tactical plan, where merchantable timber exists. During the term of this FCMP, it is recommended that Parks Division work with the SPSA to re-evaluate the fuel zone boundaries to account for additional management strategies included in this plan and implement recommendations made for each fuel zone. Parks Division will continue to work with SPSA to monitor the results of fuel reduction and modification treatments.
- ▶ Area Specific Infrastructure and Residence - Establish Fire Smart and/or fuel treatments (e.g., ladder fuel reduction) around specific areas of high density infrastructure:
 - Ben Voirlich Subdivision,
 - Ben Nevis Subdivision,
 - Ben Vannoch Subdivision,

- Resort at Cypress Hills,
- Campgrounds.
- ▶ Trails - Improve and develop access and trails to all areas of the park for fire control vehicles and crews (operational):
 - Fuel modification on access trails not identified as secondary evacuation routes in section 7.1.3.
 - Valley trail corridor
 - Hidden Valley Trail Loop
- ▶ Grassland Mowing and Haying
 - Identify priority grassland areas within the Centre Block
 - Develop a mowing/haying program to maintain grassland fire breaks and trails annually
- ▶ Powerlines - Work in conjunction with utility providers (i.e., SaskPower)
 - Acquire powerline location data from SaskPower to be included in future risk assessment.
 - Communicate the plan with SaskPower and work in conjunction to identify high hazard areas where vegetation management is needed under powerlines:
 - Inspect all hazard trees.
 - Remove all softwood trees.
 - Work with cottage owners in and around the subdivision for vegetation maintenance under powerlines:
 - Removal of softwood trees which pose a safety hazard.

7.1.5 COTTAGE FIRE SMART PROGRAM

- ▶ Institute the Wildland Urban Interface Program with cottagers and business owners within CHIPP:
 - Develop support materials, staff, training, and resources to carry out this program.
 - Provide expertise, training and educational workshops to cottage owners, lessees and park users.
- ▶ Improve communications on evacuation procedures and escape routes.
- ▶ Provide expertise to cottage owners to “fire smart” their property through tree removal, planting less fire volatile species, pruning, installation of sprinkler systems, etc.
- ▶ Work with lease owners and institutional camps (e.g., churches, children’s camps) while developing within Fire Smart programs in the park.

7.1.6 SAFETY ZONES

- ▶ Identify/confirm safety zones in both Centre and West Blocks:
 - West Block: Fort Walsh, Ranger Station

- Centre Block: Golf Course
 - ▶ Determine the effectiveness of identified Safety Zones in response to fire behavior.
 - ▶ Develop and implement treatment plans specific to each safety zone to improve robustness.

Provide and communicate locations of "Safety Zones" to visitors, businesses

7.2 MANAGEMENT OF FOREST INSECT AND DISEASE DISTURBANCES

At a provincial level, the surveillance, monitoring, and management of insects and disease are completed by Saskatchewan Ministry of Environment. Information on most of the key pests found in Saskatchewan forests is available on the Ministry of Environment website (<https://www.saskatchewan.ca/business/agriculture-natural-resources-and-industry/forestry/forest-health>) as well as the State of the Environment Report, which is published annually (Government of Saskatchewan 2023). At the time of preparing this plan, the main concern for CHIPP is the MPB. There are affected patches sporadically throughout the park. The spread of MPB has a greater chance of increasing if treatment of the old growth pine stands does not occur.

7.2.1 MOUNTAIN PINE BEETLE (MPB)

The Mountain Pine Beetle (MPB) (*Dendroctonus ponderosae*) has been a species of concern within British Columbian and Alberta forests, as well as neighbouring southern states, such as Montana. 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 of concern to resource managers.

In response to the threat of MPB the ministry has been conducting early detection surveillance since 2006. The lodgepole pine forests within the Cypress Hills Interprovincial Park are known to have naturally existing MPB. Annual surveys are conducted in conjunction with the Ministry of Environment, Forest Service to monitor the beetle within the park. Surveys are conducted via aerial observations with detailed ground-based monitoring.

Monitoring has been conducted within CHIPP for the last 18 years. During this time period, surveys have identified approximately 4331 MPB infested trees. Results from the surveys are presented below in **Figure 28**. Initial survey results found two infested trees in 2006, however, the number of infested trees increased between the years 2007 and 2013. The highest number of infested trees (n=484) were found in 2013. The number of infested trees found during surveys decreased between 2014 and 2017. After declining for four years, the outbreak built again to levels slightly higher than the 2013 peak. In 2022, the number of trees marked for removal decreased from 476 to 232 for the first time in four years (See figure 28) (McIntosh 2022).

In response to infested trees, the Ministry of Parks, Culture and Sport (PCS) conducts a fall and burn program in CHIPP. This program removes attacked trees and helps limit the spread of the beetle within the park (Government of Saskatchewan 2018).



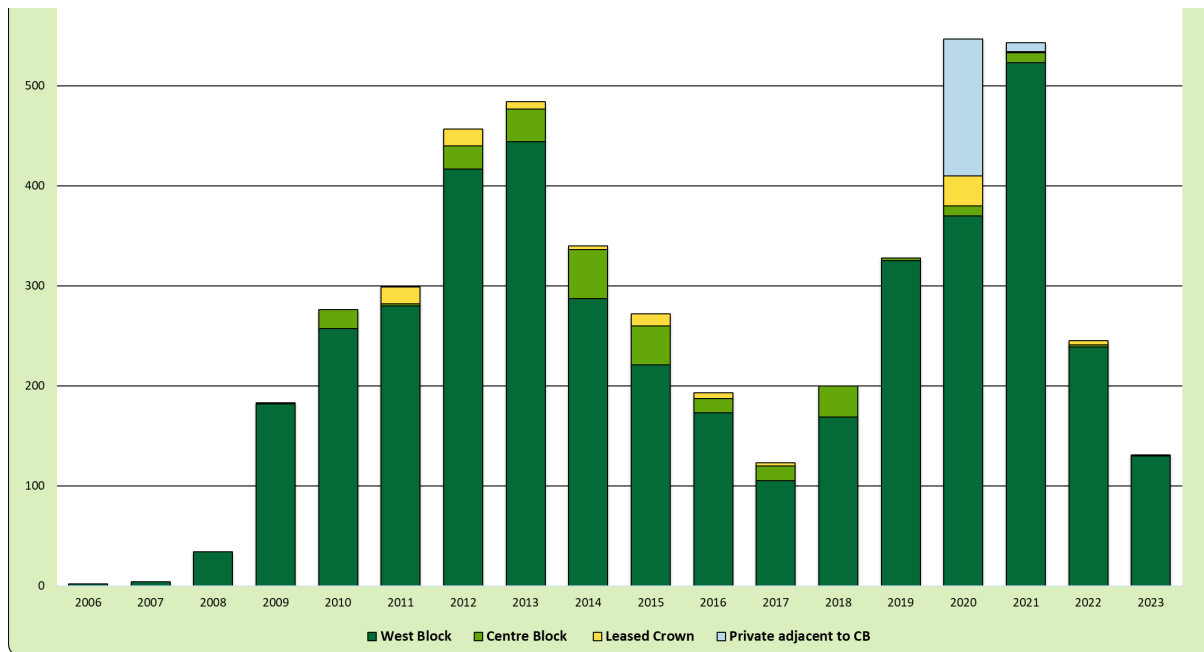


Figure 28 Mountain pine beetle affected treed within the Cypress Hills area (Government of Saskatchewan 2023).

There are a number of other forest health agents that cause disturbances in the CHIPP. Other insects and diseases are also being monitored within the park. The forest tent caterpillar (*Malacosoma disstria*), a defoliator of hardwood trees, outbreak extent was mapped between 2013 and 2018. Additionally, there are a number of other biotic and abiotic agents that result in killing trees. This is one measure for one year as an example. For example, hardwood defoliation caused by forest tent caterpillar was mapped from 2013 to 2018. The outbreak collapsed in 2019. Additionally, during the annual MPB ground surveys to check the mortality cause of recently killed pine trees, other agents are often identified. These include bark beetles such as *Ips* spp. or lodgepole pine beetle, wood borers such as sawyer beetle, and root rots, such as *Armillaria*, stem diseases, etc. (Poniatowski 2020).

Any pine stands infected with lodgepole pine dwarf mistletoe (*Arceuthobium americanum*) will be scheduled to be harvested in the tactical plan to avoid spread. The threat of *Armillaria* spp., a destructive forest pathogen which affects primarily softwood species, including older white spruce is also of concern on the horizon.

7.2.2 NON-NATIVE PLANT SPECIES AND INVASIVES

In 1957, a plantation of hybrid pine was established in the Centre Block. These hybrid pine are crossed between lodgepole pine (*Pinus contorta* Dougl. ex Loud. var. *latifolia*) and jack pine (*Pinus banksiana* Lamb) and occur naturally in regions where the lodgepole pine and jack pine ranges meet, such as north-central Alberta (Cullingham *et al.* 2012). Lodgepole pine is native to CHIPP and jack pine is native to northern Saskatchewan; however, the two ranges do not meet. Therefore, both the hybrid pine and jack pine in CHIPP are considered non-native to the provincial park. Parks Division initiated removal of the mature hybrid pine through forest harvesting for park firewood, which was completed by March 2020. Some of the grasslands area adjacent to the mature hybrid pine block had juvenile hybrid pine

which had naturally seeded in over the past 10-20 years. The Landscape Protection Unit and Saskatchewan Public Safety Agency removed these trees and seedlings in 2021.

Some younger plantations of jack pine were also located and subsequently removed in Centre Block in the past five years. In 2021, another area of both young jack pine and hybrid pine in Centre Block was reported to the Landscape Protection Unit by a local rancher in his grazing lease. A 120 ha area was subsequently surveyed and mapped, which unfortunately has both jack pine and hybrid pine unevenly distributed throughout the lease area in both forest and grassland ecosystems within the grazing lease. The Landscape Protection Unit and CHIPP staff have been working together to properly dispose of these young trees, with fall and burn activities taken place in the winters of both 2023 and 2024.

CHIPP is committed to addressing invasive plant species throughout the park, and as part of the planning process, a separate study was commissioned in 2021 to help mitigate the impacts of forest ecosystem management planned in the park by invasives. This document is in support of managing invasiveness of exotic plants (invasive plants) in CHIPP. The focus of this Integrated Vegetation Management Plan for Cutovers (IVMP) is the management of invasive plants for forest harvesting blocks (cutovers); however, the process and concept transfer to grassland ecosystems and maintained sites (e.g., roadsides, stations [fire and ranger], campsites, staging areas, etc.) (Trace Associates, 2021).

Integrated vegetation management is defined as “managing the course and rate of forest vegetation succession to achieve silvicultural objectives by integrating knowledge of plant ecology with a wide variety of complementary methods that are ecosystem based, economical, and socially acceptable” (Wagner, 1994). The IVMP is a tool to prevent, predict and identify, treat (using site suitable methods), and monitor (as a gauge of success [feedback] to the planned regeneration target). Development of forest operating plans or work authorizations will need to follow the IVMP which will be provided to proponents during the plan development state. The following sections of the plan have been provided for strategic direction within the FCMP.

7.2.2.1 PLANNING

Manage invasive plants using an objective-based system of goals according to the concept of SMART: specific, measurable, achievable, results-orientated, and time-bound. As relevant examples, eradicate invasive plants within the fireguard area in center block by 2023 or reduce populations of noxious weeds within 500 m of planned harvest blocks before harvesting starts.

Using the spatial locations and abundance of invasive plants, determine priority areas and assign these areas a relevant name based on locally known features (e.g., Old Fire Tower Road, Fire Base, Observatory, Equestrian Campground, Ranger Station, or the name of the cutover [planned and existing], etc.). Create a boundary to the area to help monitor SMART goals.

Within the boundary of the treatment areas, evaluate and map key aspects, including but not limited to: known locations of invasive plants; environmental considerations (watercourses, waterbodies, wetlands, rare plant locations, rare plant community locations, and wildlife features and habitats); roads; trails; historical resources; locally important features; etc. Create an easy to understand maps/figures of the treatment areas for use by staff, consultants, contractors, and stakeholders.

Plan and coordinate with the Park’s ecologists to ensure that within or near planned treatment areas there are no known occurrences of:

- Key wildlife or wildlife habitat
- Rare plants or rare plant habitat
- Wetlands, watercourses, or waterbodies in the treatment area or within a buffer (at a minimum the buffer stated on manufacture's label [when using chemical treatment])

Within the Park, key environmental considerations when planning and implementing the IVMP are:

7.2.2.1.1 Wildlife

Conduct work that will not negatively impact wildlife or wildlife habitat. Federally listed wildlife species under the SARA or under the Committee on the Status of Endangered Wildlife in Canada that occur or have potential to occur within CHIPP are listed in Table 25 of the EBMP. Mitigations may consist of adopting a risk-based approach for weed treatments. For example, when possible time treatments that have high risk of impact to wildlife (e.g., mowing) to avoid general nesting periods of migratory birds, which is mid-April to late August (GOC 2018). If necessary, conduct a pre-treatment assessment no more than seven days in advance of treatment.

7.2.2.1.2 Vegetation

Conduct work that will not negatively impact rare plants or the potential for rare plants (i.e., habitat disturbance, residual herbicide). For invasive plants in the Park, refer to Appendix A (Invasive Plant List and Autecology) and Appendix B (Fact Sheets for invasive plants in the Park) in the IVMP. Potential impacts to rare plants may be mitigated through identification, avoidance, suitable treatment, and timing, and when new locations of rare plants are found during treatment to stop treatment and consult the Park's staff.

Plan treatments based on the known occurrence or potential for occurrence of environmental consideration within a planned treatment area. Refer to the SFVI for ecosites within the planned cutovers and evaluate if some areas (specific polygons) of the planned treatments need to be avoided because of environmental considerations. As much as there may be potential impact from a treatment on the environmental consideration, it is also possible that no treatment or an ineffective treatment may reduce wildlife habitat or exclude desired vegetation by more competitive invasive plants.

7.2.2.2 PREVENTION

Strategies to prevent (limit) invasive plants from establishing, spreading, and causing injury or mortality of desired plant species is key to minimizing or avoiding undesired treatments. Examples of prevention strategies include but are not limited to:

- Preclude cattle and horses from cutovers where the establishment and spread of invasive plants is possible
- Eliminate or reduce invasive plants from areas adjacent to new (recently harvested as they exist in 2020 and into the future) or proposed cutovers to avoid the spread to new areas
- Maintain equipment (heavy and all-terrain vehicles) clean and weed free

- Avoid unnecessary disturbances that create receptive seedbeds for invasive plants
- Promptly establish desired vegetation (i.e., trees) to outcompete invasive plants
- When grass seeding is required, use seed that is certified weed free. Ideally do not seed grass in cutovers
- Control weeds promptly before they become a problem

Understanding the autecological factors that influence the establishment and survival of invasive plants on a site is key to the IVMP. As a simplistic example of autecology used to control a species, scentless chamomile (*Tripleurospermum inodorum*) requires full light, almost bare soil (as a seed bed), and moist to dry soil conditions; if any one of these requirements is lacking, then scentless chamomile may not establish or if established might be outcompeted by desired vegetation or more easily controlled by a suitable treatment.

7.2.2.3 PREDICTION AND IDENTIFICATION

Predicting how a site will react following disturbance (i.e., timber harvesting that creates soil disturbances from road construction, skidding [primarily non-frozen], slash abatement by burning slash piles, and site preparation) is a key aspect in prescribing treatments that may prevent the need for future control of invasive plants. Utilize knowledge of the autecology of the invasive plants to prevent establishment and spread.

When predicting the potential of an invasive plant to dominate a site or spread from a site into a cutover, consider pre-disturbance, existing disturbed sites, and post-treatment, invasive plant extent, difficulty to manage, and opportunity for spread (e.g., proximity to new disturbance areas).

As an example, timothy (*Phleum pratense*) in the roadside ditch adjacent to a planned cutover is predicted to invade the cutover through seed dispersal. Tactics to reduce or prevent the spread include: space new disturbances (e.g., roads, slash burns, staging areas) away from the roadside and areas with timothy (planning); plant suitable sized seedlings that can withstand competition from grasses (cultural treatment); identify the problem in year one (monitoring); and prompt treatment using suitable method based on site objectives (treatment [likely chemical]); monitor and conduct follow up treatments until timothy is no longer a problem.

7.2.2.4 TREATMENTS

Implement treatments based on the IVMP concept and predicted or observed populations of invasive plants. Treatment selection is complicated by a diversity of factors to consider, the primary factors are: successional target; presence or proximity to environmental considerations; treatment efficacy (i.e., will the treatment work as intended); treatment cost; physical constraints to treatment; and stakeholder concerns.

Where a treatment is necessary, it is important that the chosen treatment is effective in addressing the target species of invasive plants and it is cost effective. This is complicated by constraints such as access to the site (road access with truck vs. quad vs. helicopter), and on-site constraints, such as slash loading, residual trees, environmental considerations, etc.

Due to the complexity of considerations that may influence a treatment decision, the IVMP is premised on scenarios versus a treatment decision matrix that may exclude constraints or that may apply extraneous constraints upon a treatment decision. If efficacy, cost, and operational constraints were to be the leading indicators of a treatment decision matrix, herbicides would likely be the leading treatment choice. Therefore, employing the principle of integrated vegetation management is the main mechanism to minimize the need to conduct a treatment to address invasive plants in cutovers.

7.2.2.5 MONITORING

Conduct invasive plant assessments at a suitable interval (seasonally and yearly) to determine species presence and coverage on the landscape. Incorporate surveys from past years into a collective spatial database. Use monitoring as the feedback loop to planning and subsequent decisions to meet desired outcome.

Post-treatment monitoring for efficacy and appropriateness of the treatment regime (e.g., tending, planting, site preparation, leave for natural, or combination thereof) is essential to continual improvement of the IVMP. Formal or informal assessments occur from the time of treatment until the cutover meets target for the cutover or site. The frequency of monitoring should increase with the level of infestation and species of invasive plants (i.e., aggressive, or prohibited or noxious) and generally follow the guidance of SMART.

Monitoring frequency is expected to decrease once infestations are controlled to desired level. When monitoring, consider two primary aspects: is there sufficient stocking to meet desired reforestation standard; and, is the competition level overtopping or predicted to overtop crop trees or desired vegetation. The concept of crop tree status and competition index are explained further in the IVMP; also refer to the stocking requirements of the Forest Regeneration Assessment Standard (GOS 2012b). Monitoring should be simplistic to ensure monitoring occurs but sufficiently detailed to inform treatments.

7.3 INDICATORS AND TARGETS

Parks Division has identified six indicators and targets to utilize as measures during forest management activities. These indicators and targets align with natural disturbance regimes as well as the goals within the Ecosystem-based Management Plan.

► **Age class distribution on CHIPP forest land base and amount of old and very old forest by provincial forest type.**

Target: Increase area of younger forest age classes

- Forest biodiversity requires species and age diversity. By maintaining species representation consistent with current diversity will ensure consistent species diversity over time. By converting old and very old forest stands to young stands will improve age diversity.
 - Treat up to 1,577 ha of mature, old, and very old lodgepole pine and white spruce stands to reset their age to 0 within the first 10 years of the plan.
 - Evaluate age class distribution every 10 years.

- Maintain at least 25% of old and very old seral stages over the life of the plan (i.e., 200 years).

► **Maintenance of forest health**

Target: Reduce the spread of Mountain Pine Beetle

- Ensure at least 50% of treated lodgepole pine stands are conducted in areas with recent Mountain Pine Beetle treatments.

► **Reduce wildfire risks to park and private assets**

Target: Areas designated for FireSmart treatments within the Centre Block are treated within the first decade of the plan.

- At least 10% of areas designated for FireSmart treatments are completed annually.

► **Remove non-native pine plantations**

Target: Both hybrid and jack pine plantations within the Centre Block are to be removed and within the first decade of the plan.

- 100% of known hybrid pine and jack pine areas are to be removed by 2030.

► **Maintenance of Black Hills Mountain Snail Habitat**

Target: Identify and avoid disturbances in known/potential Black Hills Mountain snail (*Oreohelix cooperi*) habitat:

- Utilize GIS mapping (i.e., soils, aspect, elevation, vegetation cover, etc.) and known habitat locations (i.e., previous studies) to determine primary habitat sites.
- Incorporate buffers in tactical plan treatments to avoid known and potential habitat areas.

► **Maintenance of Sprague's Pipit Habitat**

Target: Reduction of invasive species encroachment/presence within large expanses of fescue grasslands to improve habitat for Sprague's pipit within first 10 years of plan:

- Identify and prioritize treatments in sites of invasive species invasions within the fescue grasslands:
 - Prioritize the management of discrete invasive species patches over non-discrete patches within the fescue grasslands.
- Focus on efforts to ensure expansions of fescue grasslands, focusing on contiguous grassland patches greater than 65 ha in size.
- Minimize disturbance within these areas during breeding seasons.

Figure 29 and Figure 30 show the habitat suitability for the Sprague's Pipit in the Centre and West blocks. Recommended tactical plan treatment areas are designed to increase fescue grasslands over time and will not negatively impact Sprague Pipit habitat. Management treatments undertaken by Parks Division that increase the area of fescue grasslands will increase Sprague Pipit habitat.

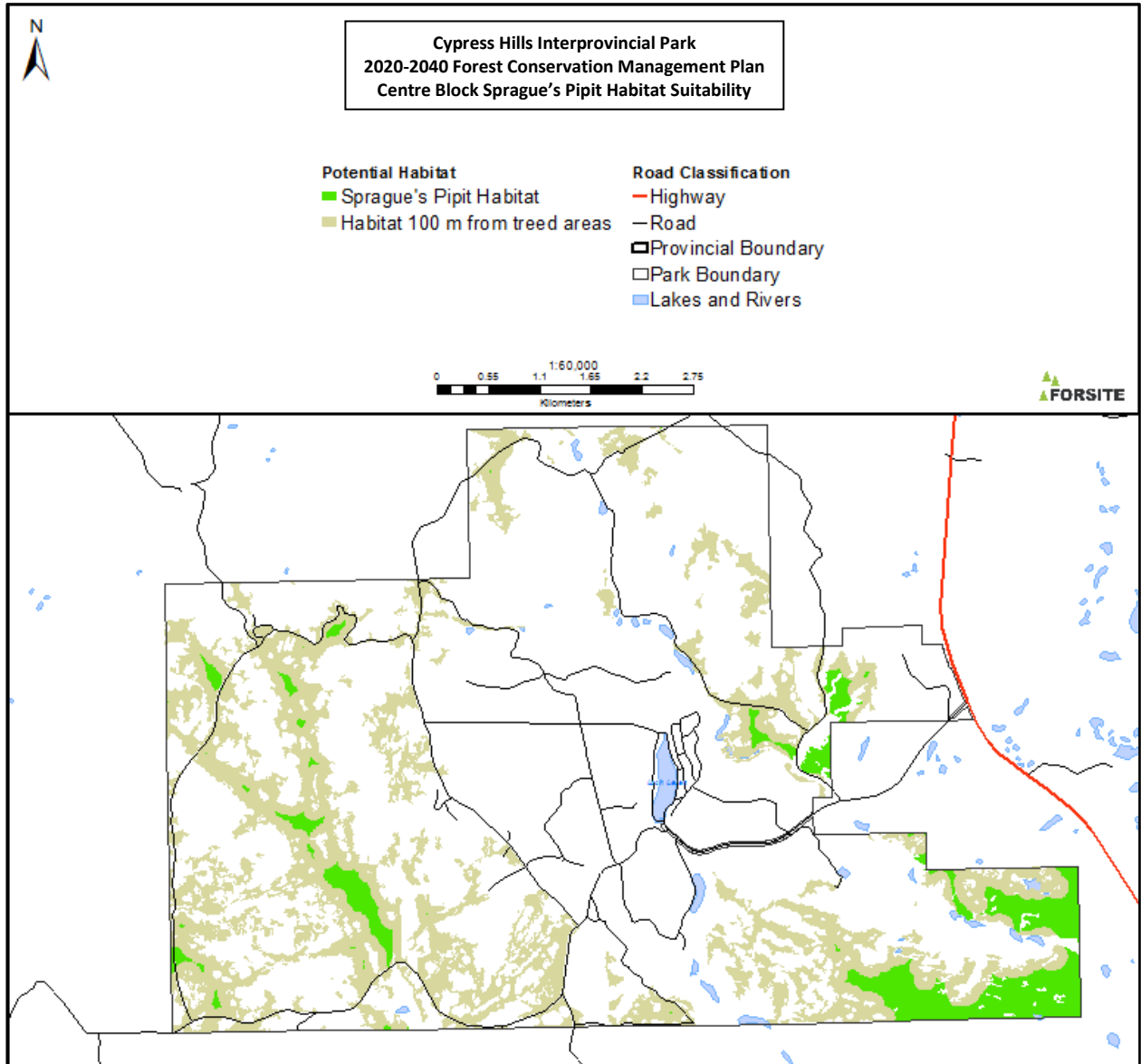


Figure 29 Centre Block Sprague's Pipit Habitat Suitability

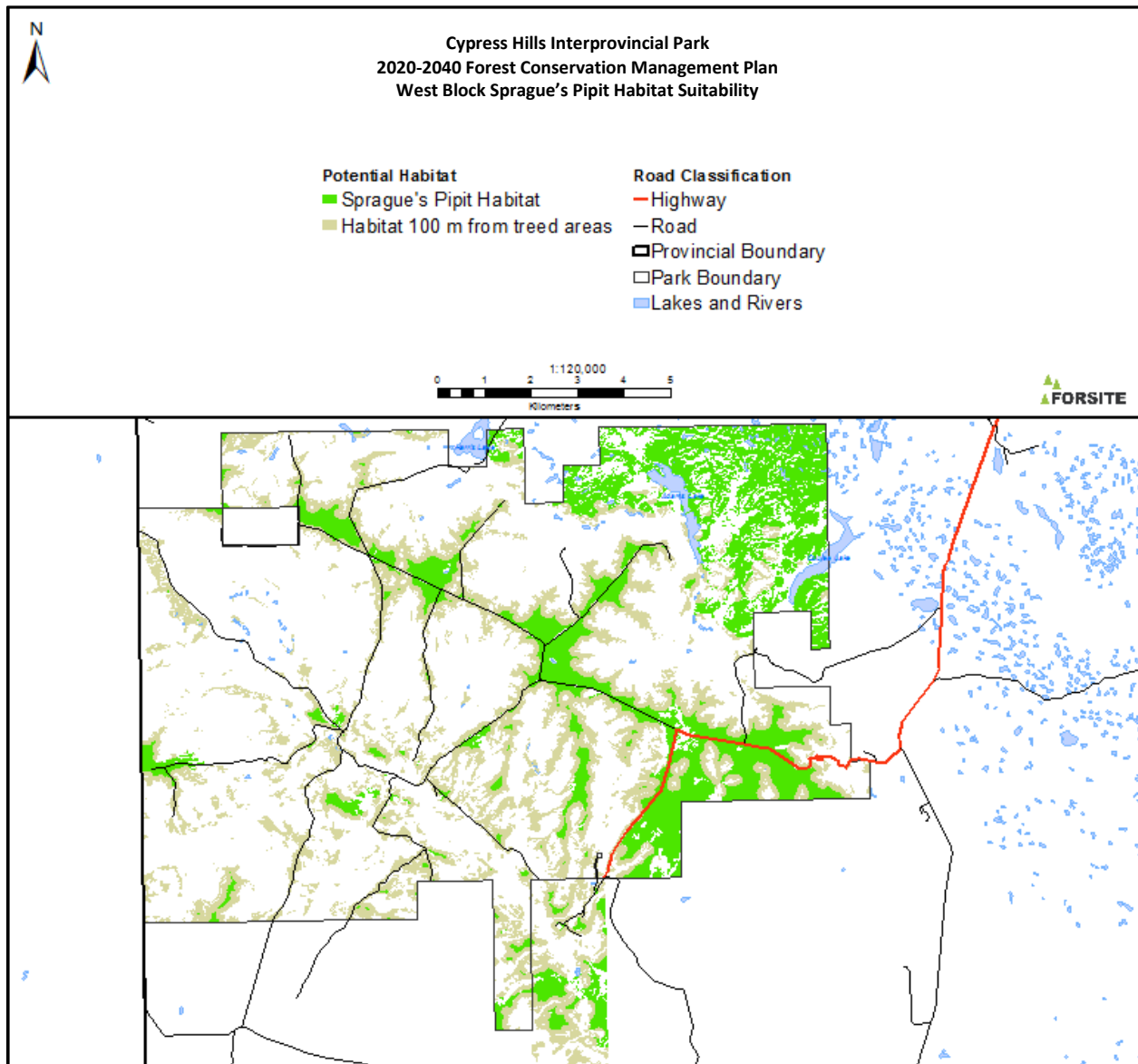


Figure 30 West Block Sprague's Pipit Habitat Suitability

► **Maintenance of Elk Habitat**

Target: Increase Elk browse habitat while maintaining thermal/security cover.

- Elk exhibit high site/range fidelity – identify areas of high use prior to harvesting treatments.
- Maintain 25% in-block retention as thermal/security cover with at least 50% as islands that are 2 ha or larger.
- Reforest treated areas within 2 years of harvest to establish security cover of regrowth that is two metres high within 10 years.
- All in-block roads are reclaimed within 2 years of the completion of treatments.

Figure 31 and **Figure 32** show the elk habitat suitability in the Centre and West blocks. The elk habitat suitability index (HSI) designed by Saskatchewan Ministry of Environment, Fish, Wildlife and Lands Branch is generated from 4 suitability indices based on:

- (1) presence of grassland or forest patch $>2 \text{ km}^2$;
- (2) distance to forest and grassland patches $>2 \text{ km}^2$ within home ranges;
- (3) presence of major roads; and
- (4) oil and gas well density.

Grassland or forest patches $>2\text{-km}^2$ are highly suitable (i.e., $S1 = 1$). Suitability decreases linearly with increasing distance from forest or grassland patches $>2\text{-km}^2$ with high suitability (i.e., $S2=1$) at 0-km distance and low suitability (i.e., $S2=0$) at 25-km distance. Negligible suitability ($S3=0$) is associated with major roads and increases linearly until 1,000m from the road ($S3=1$), and suitability is high ($S4=1$) where <20 wells/ km^2 occur but drops to $S4=0$ where >30 wells/ km^2 . The HSI is the product of the distance (2), major road (3), well density (4) SIs, and the max value between the grassland and forest patch SIs (1) (i.e., $S1 \times S2 \times S3 \times S4$) (Ryan Fisher, per. comm.). Although the Ministry of Environment HSI does not account for tree species or age, there are some sources in the literature that indicates that coniferous tree species do not provide adequate thermal and security cover until >17 years of age (Stelfox 1976).

Currently in CHIPP, the elk HSI indicates that roads and other developments within the park provide the greatest negative impacts to elk habitat.

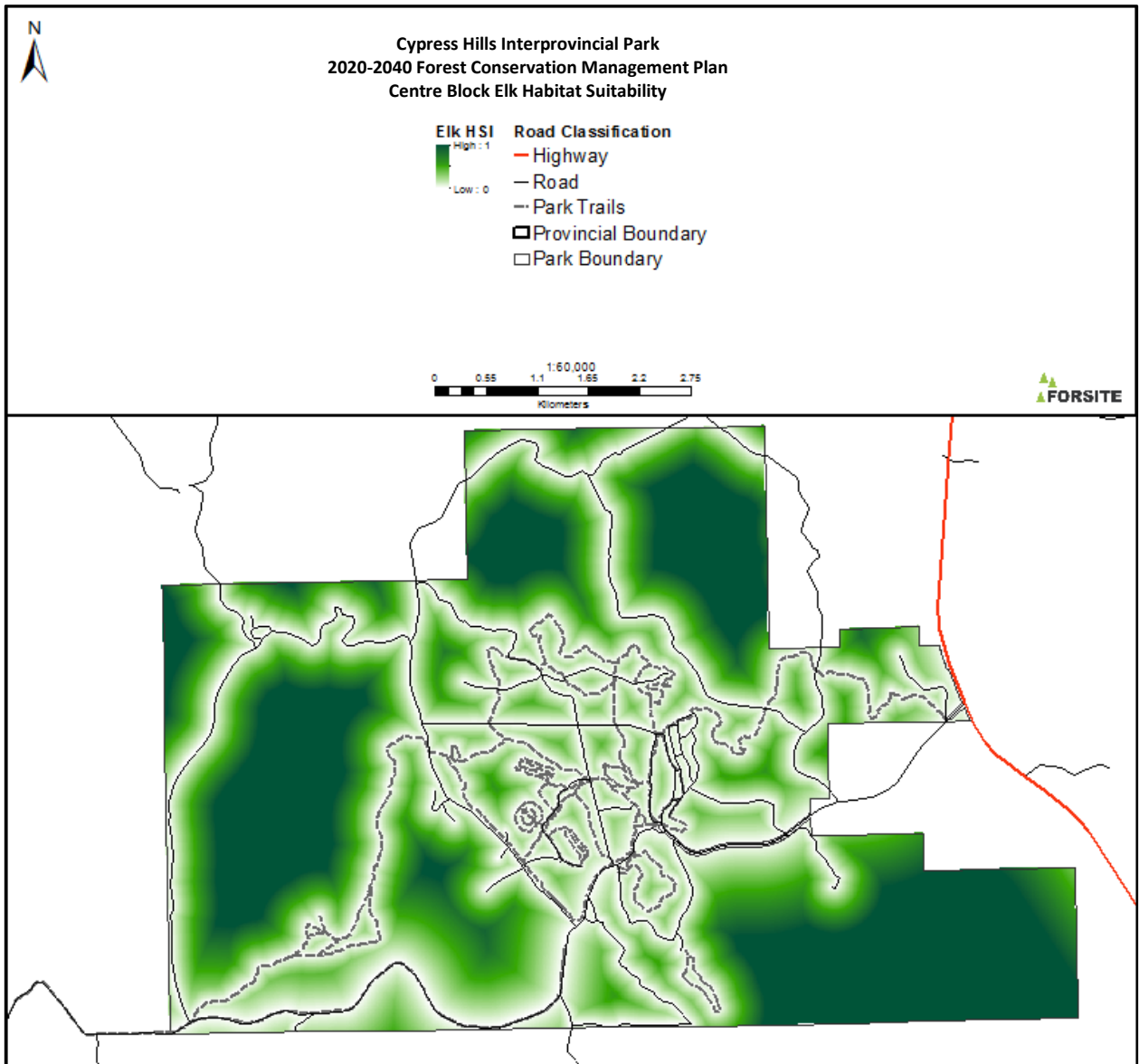


Figure 31 Centre Block Elk Habitat Suitability

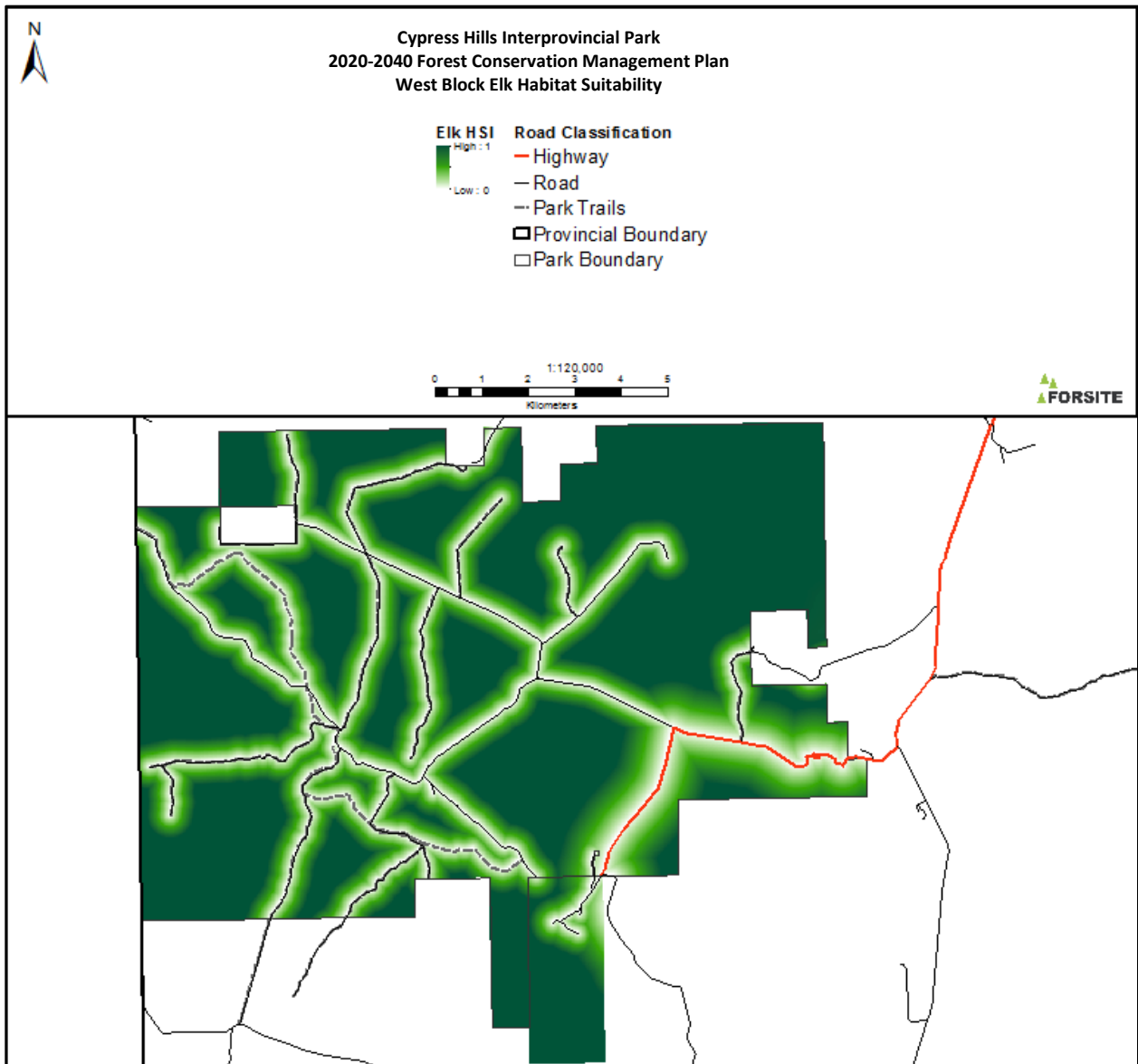


Figure 32 West Block Elk Habitat Suitability

► **Maintenance of Little Brown Bat habitat**

Target: Increase Little Brown Bat habitat within treatment areas.

- Locate single and clump residuals within 50 metres of treatment edges with South/Southwest aspect.
- Maintain 25% in-block retention.
- Incorporate buffers in tactical plan treatments to avoid known and potential habitat areas (e.g., riparian areas along Battle Creek in the West Block).

8 Management Challenges

8.1 ECONOMIC CHALLENGES

Provincial budget constraints will pose a challenge for the implementation of the management plan. The treatment options have the potential to become expensive to implement, depending on the size and location of the area. Therefore, the timing and type of treatment will rely on the annual provincial budget.

Provincial parks rely on visitors annually, which can also be an economic challenge for CHIPP. The treatment recommendations could lead to issues associated with visitor numbers. For example, the implementation of the plan has the potential to cause areas of the park to be temporarily closed to the public that might have recreational importance. This in turn might lead to a reduction of visitor numbers.

Revenues from crown dues of harvested timber can assist in funding other forest management activities and/or renewal treatments by the Landscape Protection Unit. Forest management fees are also collected and deposited in the Park Land Forest Trust Fund which helps ensure prompt renewal of harvest areas.

8.1.1 CLIMATE CHANGE

Climate change presents a significant risk to CHIPP. In general, climate change may result in increased frequency, severity and area of natural disturbances. Climate change may also affect growth rates, stand composition, regeneration success and encroachment on to native fescue grasslands.

8.1.2 FIRST NATIONS, MÉTIS, STAKEHOLDERS, AND PUBLIC

CHIPP's forest management objectives may be difficult to achieve if there is significant opposition to the treatments. It is recommended that CHIPP will manage these risks by promoting early, open communication.

8.2 NON-FOREST INDUSTRY RELATED RESOURCE-BASED INTERESTS

Other resource-based interests in CHIPP include fishing, hunting, camping, and grazing. CHIPP attempts to work collaboratively with these interests through regular communication. Stakeholder concerns will be taken into consideration, and activities will be integrated with these stakeholders where possible.

8.3 COMMUNITY INTERESTS

CHIPP is located close to several communities, including three First Nation's areas. There is significant interest in CHIPP's activities, as well as use of the park by the public for recreational and traditional activities.

8.4 INDIGENOUS INTERESTS

Indigenous rights within CHIPP must be identified and respected. The primary mechanism used to identify Indigenous issues is regular communication with First Nations and Métis communities.

8.5 NATURAL DISTURBANCES

Natural disturbance emulation is a challenge facing CHIPP. The forests and grasslands of Saskatchewan are fire dominated landscapes and the many wildlife species found within these ecosystems have adapted to the natural frequency and scale of fire disturbance, and the associated stand and forest structures it creates.

The challenge to CHIPP is to have their forest management practices emulate natural forest patterns, including the size and scale of historic disturbances. There is no intention to create extremely large disturbance events, but even large events approaching 200 to 400 ha are likely to prove difficult due to the high recreational and social values and challenging terrain within the park.

8.6 ACCESS MANAGEMENT AND ROAD AND TRAIL DENSITY

There are a number of trails and road access that can be utilized for the treatment of the TPA's in CHIPP. Since these trails are used by many stakeholders, this FCMP must be sure to leave the trails accessible after treatments are concluded. Stakeholders who commonly use these trails should also be consulted prior to treatments to address any concerns they may have. Concerns may include buffers, fuel modifications or treatments around high-value trails.

9 Vulnerability Assessment to Address Climate Change

9.1 CLIMATE CHANGE CONSIDERATIONS

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).

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). 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.

A changing climate within the park is 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.

Historical vegetation zonation shows the Cypress Upland as mix of Foothills Fescue occupying the plateaus with Moist Mixed Grassland surrounding them. 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).

9.1.1 IMPACT OF CLIMATE CHANGES ON FOREST VALUES

Warmer winters, longer frost-free seasons, increased precipitation in the winter and spring, longer and drier summers, and an increase in storm intensity and frequency may result in positive and negative influences on forest ecosystems (**Table 9**).

Table 9 Potential Impacts of Climate Change on CHIPP Forests.

Positive Impacts	Negative Impacts
More favourable growing conditions where sites are not moisture limited	Increased drought stress for vegetation on sites that are moisture limited
Lengthened growing season	Increased fire frequency and intensity
CO ₂ enhanced growth	Increased insect and disease outbreaks
	Increased wind and mechanical (ice and snow) damage
	Increased flooding and mass wasting events
	Transition from softwood forest types to hardwood forest types
	Trees and shrubs encroachment into native fescue grassland
	Aspen dieback

It is recommended that CHIPP establish a provenance trial within treated areas to monitor the response of lodgepole pine and white spruce seedlots from southern regions and lower elevations that may be indicative of predicted future climates. The provenance trials must have controls that are established from locally collected seed sources as a comparison to the non-local seedlots.

10 Integration of Forest Management Activities with Non-Timber Values

CHIPP recognizes the importance of non-timber values and commits to working collaboratively with other users of the land base to provide for these values.

10.1 MAINTENANCE OF BIODIVERSITY

Maintaining species and genetic biodiversity in CHIPP is a key driver of this FCMP. Maintaining forest types and spatial patterns similar to those produced by natural disturbances, at stand and landscape levels, is expected to maintain and enhance habitat diversity, and therefore, promote ecological diversity at a species and genetic level. This ‘coarse-filter’ approach makes managing for biodiversity practicable, as it eliminates the need to separately manage for individual wildlife and plant species and communities.

Landscapes in CHIPP are comprised of matrices of upland forests, bench land grasslands, fens, marshes, brush, rock, and water which provide a diversity of landscape patterns, ecosystems, and wildlife habitats at many scales. These landscapes are made even more diverse by the influence of disturbance events such as wildfire, wind-throw, pathogens, and insect infestations. Historically, fire is the largest disturbance agent in the Cypress Hills forest and grassland ecosystems. 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. More recently, fire suppression has succeeded in reducing the extent of fire events on the landscape today and has resulted in much longer fire intervals.

The current forest age class distribution for stand types found within CHIPP are presented in **Figure 33**. One of the objectives of this FCMP is to shift the forests age class structure toward what would be found under natural disturbance regimes. A more natural age class distribution would have a higher proportion of the area in younger age classes and a declining area represented in older age classes.

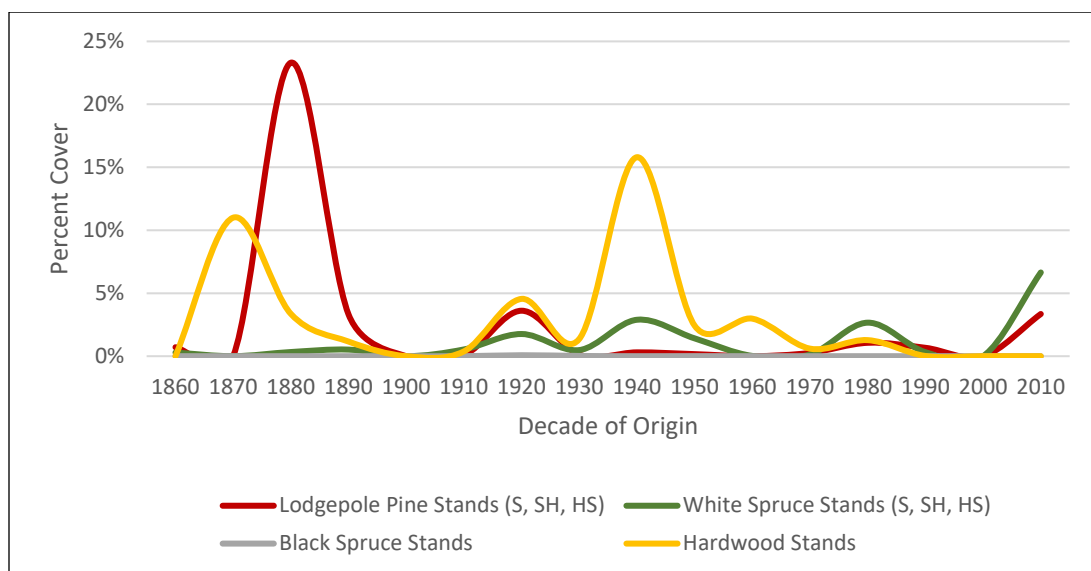


Figure 33 Forest Stand Age Class Distribution in CHIPP.

10.2 SPECIES AT RISK / SENSITIVE SPECIES

It is recommended that fine-scale habitat management will be used by CHIPP to accommodate habitat protection for species at risk (endangered, threatened, special concern). Currently, approximately 100 rare and at-risk species have the potential to occur within CHIPP during at least some portion of the year; these species are listed in Section 3.3.9.

The Ministry of Environment has developed the “Saskatchewan Activity Restriction Guidelines for Sensitive Species (June 2015)” that outline restricted activity periods and setback distances by disturbance category. CHIPP is recommended to use these guidelines where occurrences of sensitive species have been identified.

10.3 ARCHAEOLOGICAL RESOURCES, TRADITIONAL USE AREAS, AND CULTURALLY SIGNIFICANT SITES

It is recommended that digital spatial files of the tactical plan areas will be provided to the Heritage Conservation Branch (HCB) of the Saskatchewan Ministry of Parks, Culture, and Sport for assessment of archaeological and heritage resource potential. Based on location, topography, known heritage resource information, and professional judgment, HCB rates each area for heritage site potential. A qualified professional archaeologist is then engaged to carry out field surveys if soil disturbance occurs within the specified minimums identified in the screening. If sites are found, planned activities are modified to avoid disturbing them.

In addition to the HCB annual review, sites of archaeological or cultural significance may be identified during the public engagement process. Engagement with First Nations and Métis communities, and discussions with the HCB will identify appropriate management actions for such sites.

10.4 VISUALLY SENSITIVE AREAS

Visually Sensitive Areas (VSAs) in CHIPP include the core area, cabins, Loch Leven, Battle Creek, and campgrounds. More VSAs may also be identified during the plan process.

10.5 NON-TIMBER BOTANICAL FOREST PRODUCTS

Non-timber botanical forest products include grazing, berries, mushrooms, and floral products. Most harvesting of non-timber botanicals is for agricultural use (i.e., grazing and haying) with minimal personal use.

In addition to natural disturbance events such as wildfire, forest harvesting and renewal techniques, it is recommended that forest practices by CHIPP will maintain the presence of these resources within the park. The abundance and location of non-timber botanical resources will vary over time, as the location of disturbance events and time between events varies.

10.6 HUNTING, FISHING, TOURISM, TRAPPING

CHIPP is recommended to consult regularly with those who utilize hunting and fishing opportunities within the park throughout the development of treatments. Engagement around harvest areas and access management will provide park users with the opportunity to identify mitigation opportunities relative to their interests.

Accommodation measures may include adjusting treatment areas, leaving retention in specific locations, and measures to manage access. Appropriate measures will be determined at the treatment plan stage.

10.7 RECREATIONAL USE

A wide variety of recreational activities occur in the forested lands of CHIPP. It includes amenities such as campgrounds, extensive trail networks, hunting, and other recreational activities. The numerous recreation trails existing in the park are used by hikers. There are also several cabin developments within CHIPP.

Treatment buffers have been implemented around cabins, developments, and campgrounds in the park. This is done to minimize impacts on the aesthetic value important to the public. It is recommended that the timing of the treatments will also be considered in order to minimize the effects on recreational users.

It is recommended that public engagement during development of treatment plans will be used as the primary means of identifying concerns about recreational values and identifying potential mitigation options.

10.8 RESORTS AND TOURISM

CHIPP is recommended to work with resort owners and other tourism operators to mitigate impacts on the forest resources and values on which these businesses depend. Potential mitigation measures can include visuals buffers, leave areas, maintenance of access, restrictions on operation timing, etc.

10.9 CABINS

Established cabins leases will be treated with FireSmart treatments. Access to cabins will also be maintained at a level that is similar to that which existed prior to treatment. It is recommended that cabin owners will be informed of SPSAs and CHIPPs planned activities prior to operations.

10.10 RECREATIONAL AND INDIGENOUS FISHING

The *Fisheries Act* (Canada) was amended in 2012, to manage threats to the sustainability and ongoing productivity of Canada's commercial, recreational, and Indigenous (CRA) fisheries. Amendments also provided the Department of Fisheries and Oceans Canada (DFO) with enhanced compliance and protection tools, and provided clarity, certainty, and consistency of regulatory requirements across the country. One of the key amendments to the Act involves the merging of two previous sections into a single provision (Section 35 (1)):

“No person shall carry on any work, undertaking, or activity that results in serious harm to fish that are part of a CRA fishery, or to fish that support such a fishery.”

Under the amended Act, DFO's regulatory role is focused on managing threats related to habitat degradation and loss, and flow alterations that have potential to impact CRA fisheries. An Authorization must be obtained from DFO under the *Fisheries Act* in order to proceed with any development or project that may result in localized effects to fish populations or fish habitat. DFO's policy interpretation of serious harm to fish includes:

- ▶ the death of fish;

- ▶ permanent alteration to fish habitat; or
- ▶ destruction of fish habitat.

10.11 LIVESTOCK GRAZING LEASES

It is recommended that CHIPP will work with livestock grazing lease holders when operating in grazing lease areas and will seek to minimize impacts to natural grazing lease barriers and other grazing lease resources (e.g., corrals, watering sites).

11 Forest Management Recommendations

11.1 TREATMENT OPTIONS

Based on the desired outcome and goals set by Cypress Hills Interprovincial Park, Park's Division is recommending three primary treatment options. These include FireSmart treatments, timber harvesting, and prescribed burning. These treatments will be effective in reducing the risk of wildfire to park infrastructure, decreasing the outbreak potential spread of insects (MPB), and promoting regeneration which will start shifting the age class distribution to younger age classes and return the park to a more balanced age class. As per the CHIPP EBM Plan, given the high risk of wildfire in CHIPP, prescribed burns or "allow to burn naturally" policy is not recommended at the 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. Harvesting is recommended as a pre-treatment for prescribed burning, in conifer dominated stands, to reduce the fuel load and mitigate some of the risks associated with a prescribed burn. Deciduous dominated stands are well suited for prescribed burns that will stimulate sucker regeneration. An alternative to prescribe burning of some hardwood stands could involve harvesting some of the volume as part of the parks firewood program. Harvesting will stimulate root suckering to renew the treatment areas. In areas where prescribed burning and harvesting is not feasible, the stands will follow the successional pathway and start to breakup naturally. Once sufficient openings are created in the stands, hardwood regeneration will be stimulated, and the areas will regenerate naturally. Given the objective of CHIPP is not to maximize timber extraction, harvesting treatments are recommended to retain a higher than average retention level that will produce results similar to that of a wildfire. Recommended retention levels in pine dominated stands targeted for prescribed burning are between 15 and 25% of the pre-treatment stand condition. The harvest treatment will leave the pine branches and tops dispersed throughout the treatment area to ensure even distribution of cones for natural regeneration. The prescribed burn must follow the harvesting treatment by no more than two growing seasons. If the prescribed burn occurs more than two growing seasons after harvesting, supplemental treatments of seeding or planting may be required to ensure adequate pine regeneration as the in-situ pine cones will start to open and shed their seed. A prescribed burn at this time would potentially consume the cones and any new pine germinants.

Hardwood stands are recommended to be treated with prescribed burns. Prescribed burning involves strategically applying fire to a predetermined area to achieve a desired outcome, in this case forest management. In hardwood stands, a low intensity prescribed burn will result in a low-density hardwood understory to establish from suckering while maintaining the existing overstory. As the crown of old and very old hardwood stands start to open up and more light reaches the forest floor, a new cohort of hardwood regeneration may start to develop. Where these stands are starting to regenerate and are producing stocking greater than 800 stems per hectare, it is recommended to allow them to develop naturally. If sufficient hardwood is not regenerating, the areas could be supplemented with the establishment of a white spruce understory.

The size of treatment areas will be constrained by treatment method, forest type, geographic features, and stakeholder considerations. Larger treatment areas are recommended over small, fragmented treatments so as to align with the principles of natural forest patterns.

Harvested treatment areas will target 20% retention of merchantable trees representative of the pre-treatment species composition with the acceptable retention range from 15 to 25%. Retention will occur as either dispersed residuals (individuals or up to 4 trees), clump residuals (contiguous areas less than 2 ha), or island residuals (contiguous areas of at least 2 ha). Retention can be located within treatment areas to reduce line of sight into treatment areas from visually sensitive areas such as roads, lakes, or major streams; or to provide wildlife travel corridors. Retention will be measured on an area basis, i.e., if a treatment area is 100 ha, then a retention range of 15 to 25 ha of dispersed residuals, clumps, or islands will remain post treatment.

In aspen dominated stands where harvesting or prescribed burns are deemed unacceptable, Parks Division recommends the establishment of understory white spruce seedlings. This understory will maintain forest cover as the over mature aspen stands start to breakup. The white spruce can be planted at densities between 800 and 1,200 stems per hectare. This treatment aligns with the natural successional path of hardwood dominated stands. These areas could be offset by reduced planting in mixedwood stands to allow an equivalent area of hardwoods on the landscape.

With forest management treatments and natural disturbance events over an extended time frame, it is possible to maintain the attributes of forested lands and achieve a more diverse age class within CHIPP. The following charts, **Figure 39**, show the gradual shift in age class over time if management activities are initiated and maintained.

11.2 TACTICAL PLAN TREATMENT AREA SELECTION

Tactical Plan treatment areas for the first 20 years of the plan overlap with the areas old and very old forest seral stages, areas known Mountain Pine Beetle infestations, and areas of high fire risk (see **Appendix A: Tactical Plan Areas** and **Appendix B: Wildfire Plan Areas**).

The primary management objectives for CHIPP is to reduce the average age of the forests within the park to an age class distribution that more closely represents the natural forest condition prior to wildfire suppression activities. To achieve this objective, some stands with a potentially lower risk of fire were scheduled for treatment to manage for age class by replacing an over mature stand with a young regenerating stand. This management objective will assist the park in maintaining the forest cover of the park with greater age diversity which will also reduce the risk of Mountain Pine Beetle infestations.

Areas with concentrations of past Mountain Pine Beetle infestations were also selected for Tactical Plan treatment areas. The Forest Service Branch of the Saskatchewan Ministry of Environment has implemented a “zero-tolerance” policy designed to catch and control as many short-distance infestations as possible within CHIPP (Kunegel-Lion *et al.* 2019). By harvesting a larger treatment area, there is a higher probability of treating more infected trees and limiting short-distance infestations.

Fire risk is a function of forest species cover, age, density, health, and accumulations of fuel from dead trees and branches. Generally, lodgepole pine stands that are over mature or infected with Mountain Pine Beetle and have several dead standing or dead and down stems, are of higher risk to fire than a healthy mature pine stand. The objective of the Tactical Plan is to prioritize treatments within the first 20 years of the plan in the areas with the highest fire risk. For logistical reasons, not all stands designated as high risk are scheduled for treatment, and not all stands treated are of high fire risk. The objective is to reduce the risk of fire across the landscape over time; however, wildfire risk cannot be eliminated from within CHIPP. Managing the fire risk will improve the effectiveness of wildfire control

efforts and reduce the risk to human life, park and private assets, and landscape level disturbance to forest stands.

11.3 ACCESS MANAGEMENT

Currently within the park, there are 225.4 km of roads and trails as shown in **Table 10**. The proposed access within the Tactical Plan areas are Class 3 Forest Bush Roads. These roads have a right-of-way width of 20 metres and a road surface no wider than 7 metres. The proposed length of roads within the Tactical Plan areas is 62.9 km and shown in **Table 11**.

Table 10. Existing Roads and Trails within CHIPP.

Road Class	Right-of-Way (m)	West Block		Centre Block	
		Total Length (km)	Area (ha)	Total Length (km)	Area (ha)
Trail*	5	51.6	7.2	40.5	18.1
Paved	30	0.04	122.7	23.9	193.9
Unpaved	30	68.5	2,945.2	32.5	2,967.6
Highway	60	8.3	49.4	0	0
Total		128.5	3,124.5	96.9	3,179.6

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

Table 11 Proposed Tactical Plan Class 3 Roads.

Road Class	Total Length (km)		
	West Block	Centre Block	Grand Total
Decade 1 Proposed Class 3	30.8	6.5	37.3
Decade 2 Proposed Class 3	20.0	8.6	28.6
Total	50.8	15.1	65.9

The following charts, **Figure 34** to **Figure 39**, demonstrate the predicted shifts in age class distribution based on forest management treatments over the next 200 years. The percentage of old and very old seral stages present after each decade of forest management treatments is shown in **Figure 40**.

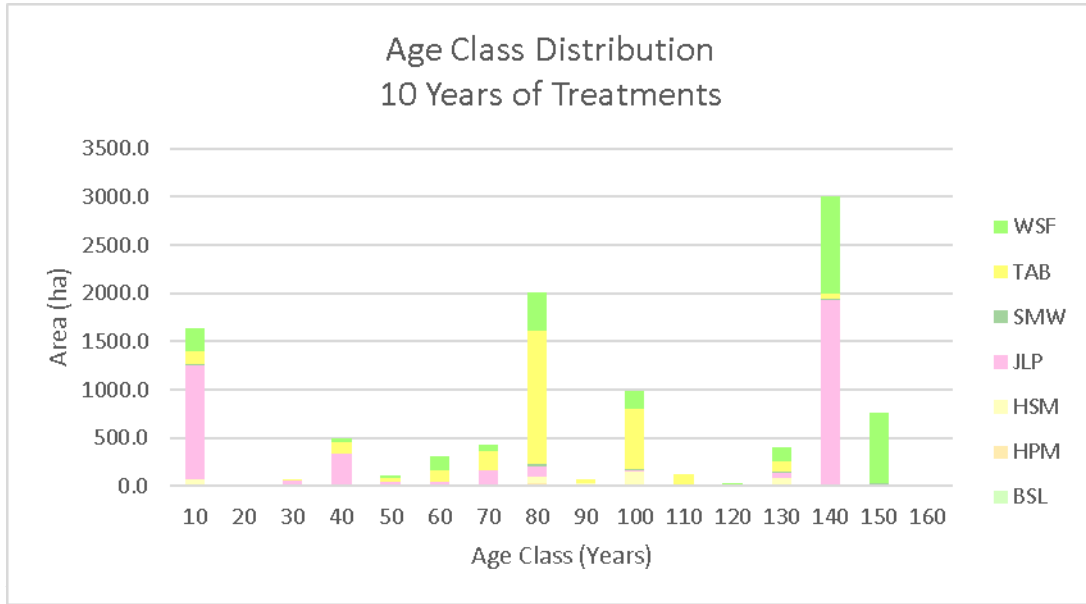


Figure 34 Forest Stand Age Class Distribution in CHIPP After 10 Years of Management.

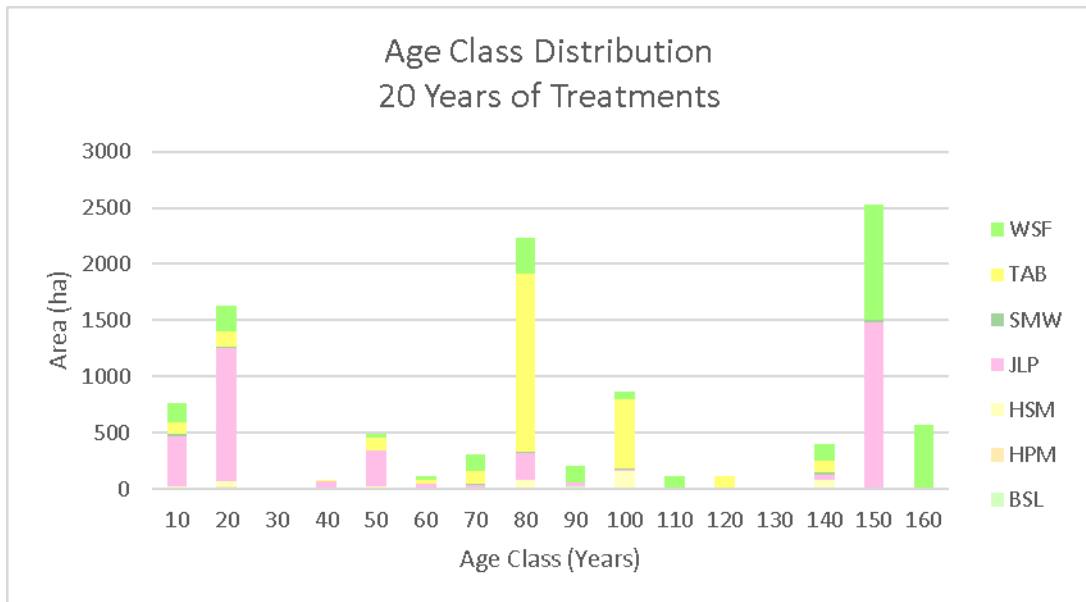


Figure 35 Forest Stand Age Class Distribution in CHIPP Over 20 Years of Management.

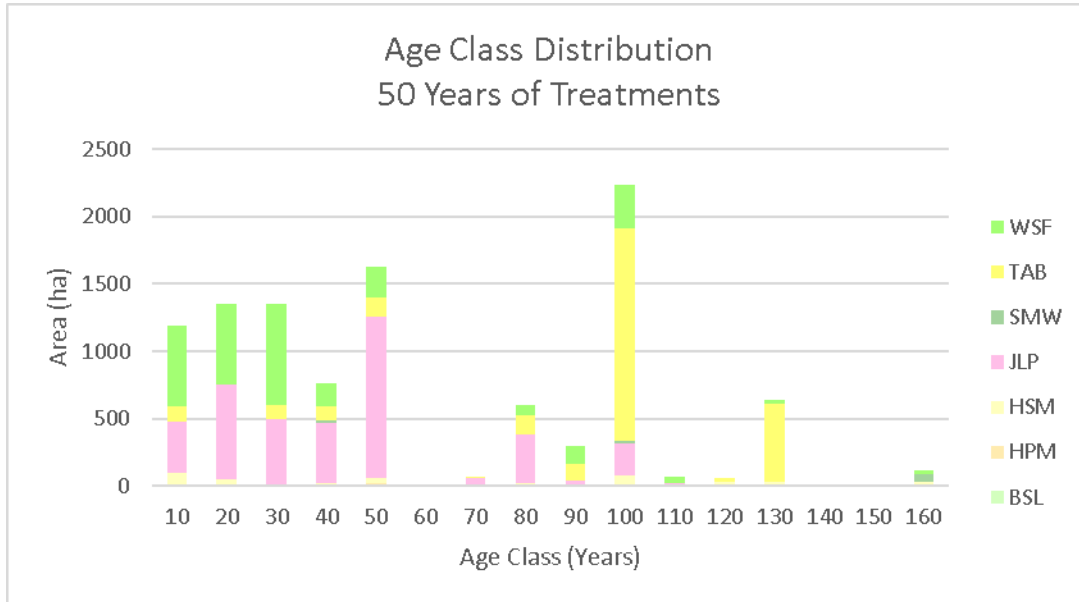


Figure 36 Forest Stand Age Class Distribution in CHIPP Over 50 Years of Management.

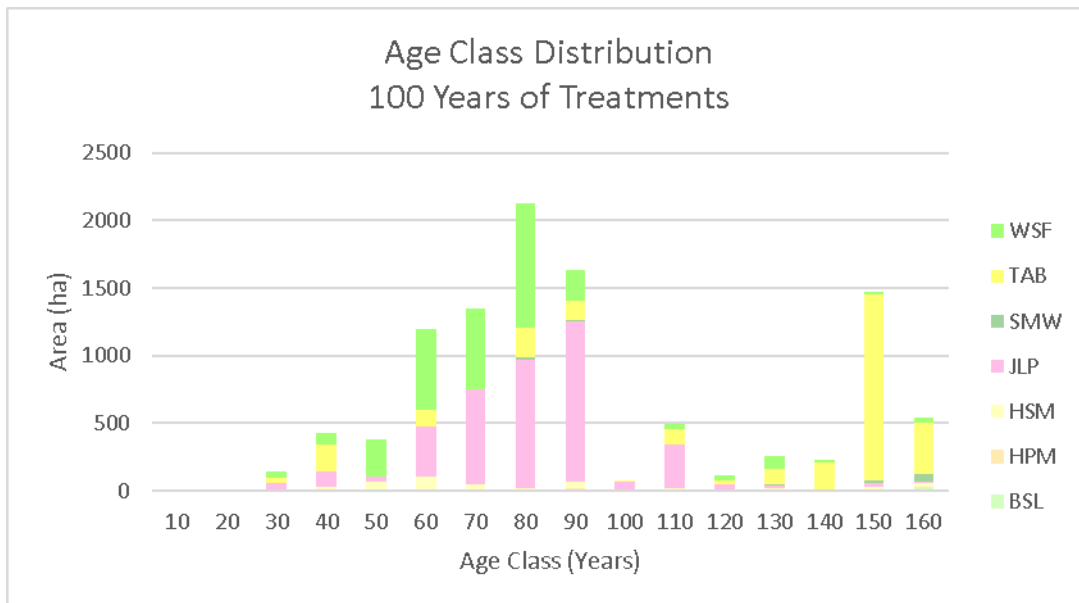


Figure 37 Forest Stand Age Class Distribution in CHIPP Over 100 Years of Management.

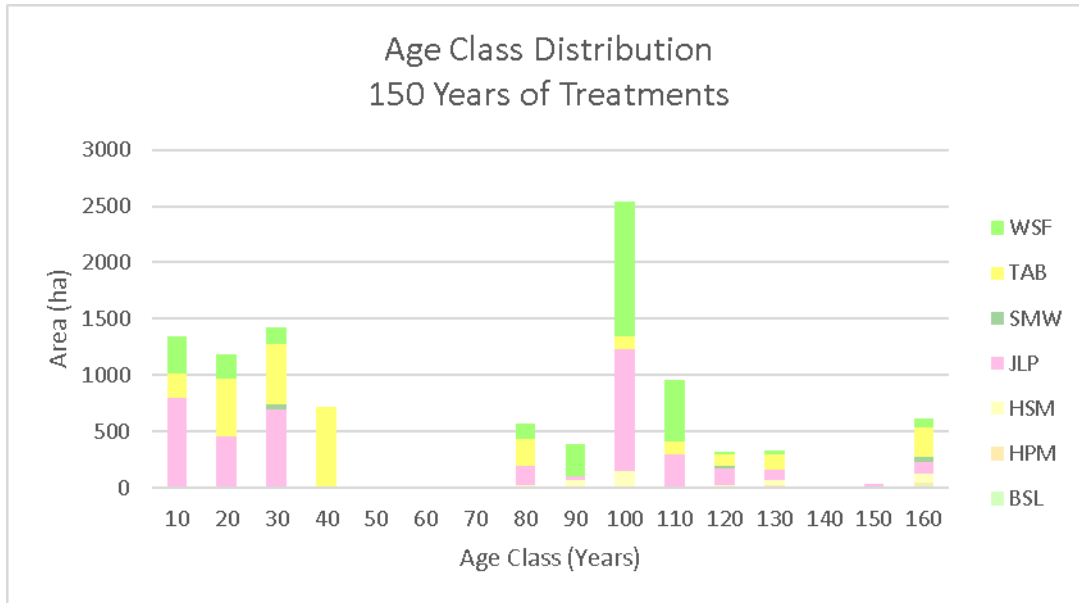


Figure 38 Forest Stand Age Class Distribution in CHIPP Over 150 Years of Management.

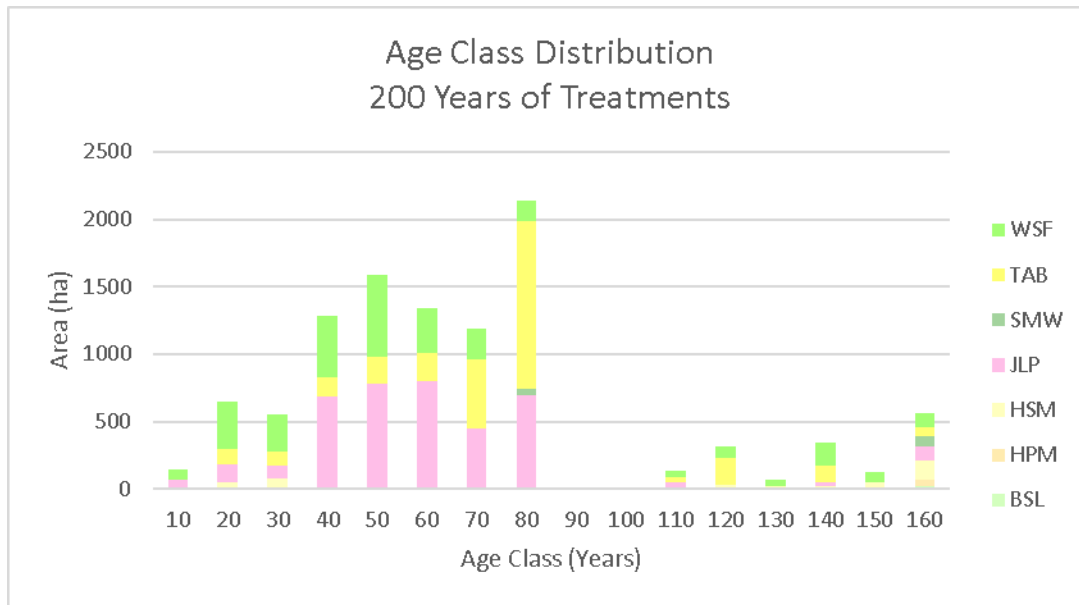


Figure 39 Forest Stand Age Class Distribution in CHIPP Over 200 Years of Management.

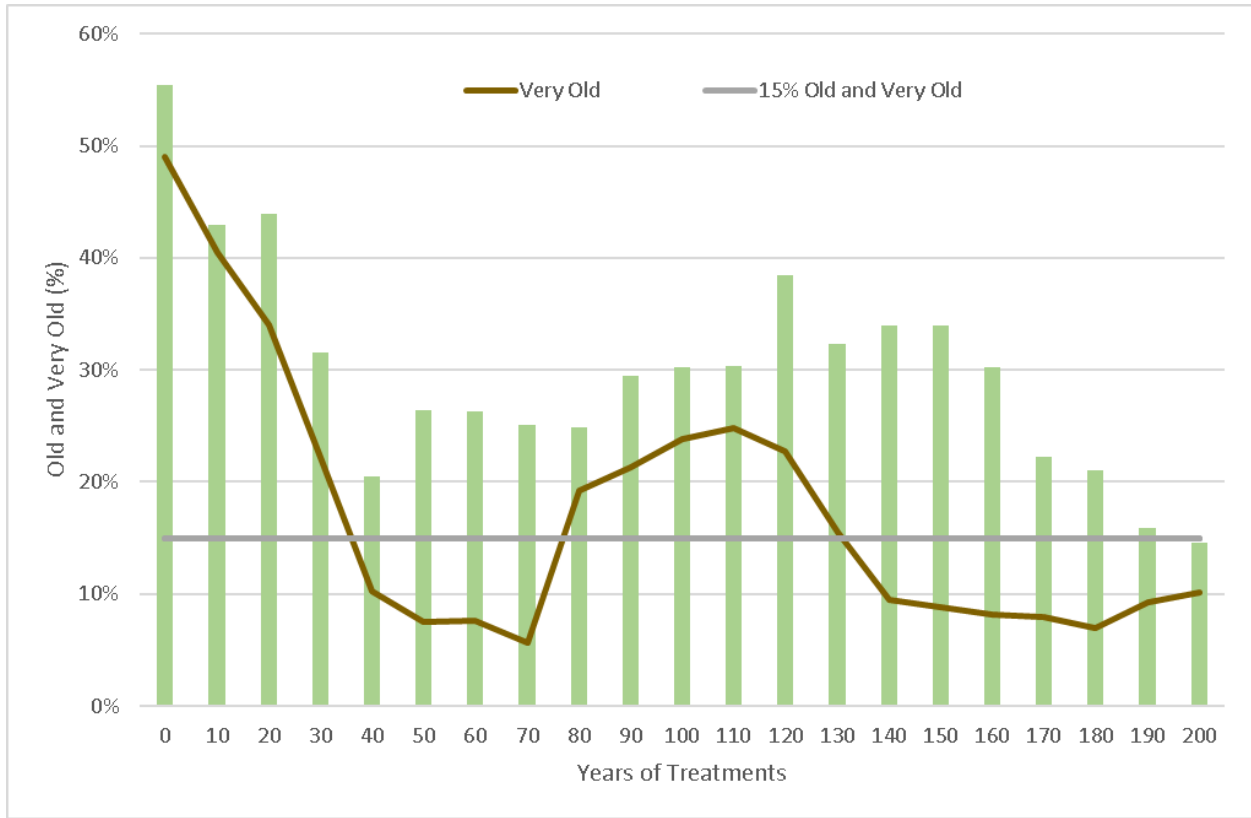


Figure 40 Percent of Total Old and Very Old and Very Old Only Seral Stages Over a 200 Year Management Horizon.

12 Silviculture Treatment Recommendations

Silviculture treatment recommendations (STRs) identify the current and expected future forest conditions, silviculture systems, management options, regeneration standards, renewal and stand tending treatments for a specific development type. STRs guide prescriptions for operational treatments (i.e., harvest, renewal and stand tending). They also provide linkages between stand development types, silviculture regimes and modelling assumptions.

Nine (9) STRs were developed for the CHIPP FCMP. For easy reference, each STR is organized with all pertinent components (i.e., reference code, transitions, treatment options) described in a single table, **Table 12**. These components are briefly described in the sections below.

Reference Code

The reference code is used to identify each STR for reference in the FCMP, operational plans and reports. The three-part code (separated by dashes) indicates the appropriate: STR number (1 to 9), species type and development type.

Transitions

There are no transitions of forest types (H, HS, SH, H) planned at the landscape level; however, stands or portions of stands may regenerate to different types. Overall, the amount of each type regenerated will be consistent with the treatment areas, but the treatment level flexibility will allow for the efficient application of silvicultural resources. For example, a small area of H in a larger SH treatment is likely to be planted and shift types – but small HS areas within a larger H treatment may well be left for natural regeneration.

Existing Forest Condition

The existing forest condition describes how development types are organized into stand groups for modelling purposes. This section also provides the corresponding provincial forest type (PFT) and approximate area of the productive forest for each development type for context.

Future Forest Condition

The future forest condition lists the future stand group(s) used to project forest growth after treatment and provides expected species types and areas predicted for a typical rotation age.

Treatment Options

The treatment options column describes the appropriate operational treatments (i.e., plant, scarify, and leave for natural) for each STR.

Silviculture System

The silviculture system of clear-cut with retention is assumed to be applied on all treatment blocks.

Site Preparation

Site preparation is not anticipated within the plan; however, some sites may require a mechanical site preparation treatment to manage soil moisture and temperature. Mechanical site preparation may be required to treat areas of heavy competition, generally as a treatment for Not Sufficiently Regenerated (NSR) areas as determined by an establishment or performance regeneration survey.

Regeneration

This section describes the appropriate treatment options for stand regeneration (e.g., natural, plant, seed) and planting densities.

Tending

Tending is anticipated in the areas designed for a Fire Smart treatment. Tending (spacing) and pruning are required treatments to remove “ladder fuels” and reduce the risk of a surface fire getting into the crown of the trees and becoming a full on crown fire. Stand tending treatment options (e.g., cleaning, spacing) may be required to meet the regeneration standard in areas outside of the Fires Smart treatment areas.

Table 12 Silviculture Treatment Recommendations.

Silviculture Reference Code	Existing Forest Condition					Future Forest Condition		
	Area (ha)	Forest Dev. Type	PFT	Min. Age	Max. Age	Treatment	% ¹ Area Treated	Regeneration Prescription
1-H-HW	2,940	HW	TAB	71	140	LFN	95	Leave for natural HWD
							5	Plant 800 sph white spruce / lodgepole pine on roads and NSR areas
2-HS-HIP	45	HIP	HPM	71	130	Scarify	45	Drag scarify pine
							50	Leave for natural HWD
							5	Plant 800 sph lodgepole pine on roads and NSR areas
3-SH-IPH	0	IPH	PMW	81	150	Scarify	90	Drag scarify pine
							5	Leave for natural pine
							5	Plant 1,800 sph lodgepole pine on roads and NSR areas
4-HS-HwS	392	HwS	HSM	71	130	Plant	95	Plant 800 sph white spruce
							5	Leave for natural
5-SH-wSH	117	wSH	SMW	81	140	Plant	95	Plant 1,200 sph white spruce
							5	Leave for natural

¹ Percent Area Treated values are intended as guidelines and are not to be considered as absolute values.

Sph – Stems per hectare.

100% of forest development types will have a post-harvest silviculture treatment.

The silviculture system is clear-cut with variable retention.

Silviculture Reference Code	Existing Forest Condition					Future Forest Condition		
	Area (ha)	Forest Dev. Type	PFT	Min. Age	Max. Age	Treatment	% ¹ Area Treated	Regeneration Prescription
6-S-bS	0	bS	BSL	81	130	Plant	90	Plant 1,800 sph black spruce
							9	Drag scarify black spruce
							1	Leave for natural black spruce
7-S-IP	3,906	IP	JLP	81	150	Scarify	90	Drag scarify lodgepole pine
							5	Leave for natural lodgepole pine
							5	Plant 1,800 sph lodgepole pine
8-S-IPbS	25	IPbS	BSL	81	130	Scarify	80	Drag scarify lodgepole pine / black spruce
							15	Plant 1,800 sph lodgepole pine / black spruce
							5	Leave for natural lodgepole pine / black spruce
9-S-wSbF	3,000	wSbF	WSF	81	160	Plant	99	Plant 1,200 sph white spruce
							1	Leave for natural white spruce

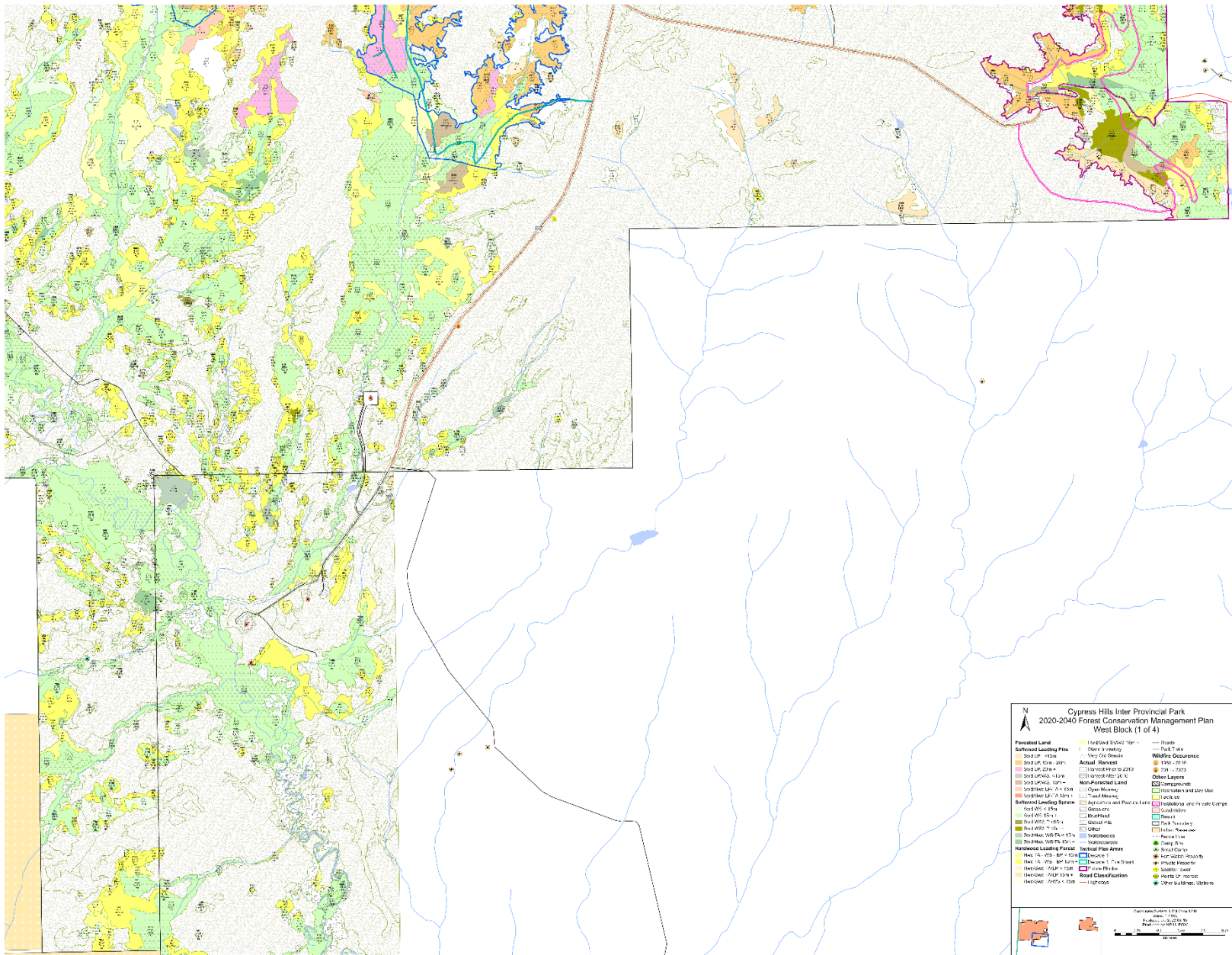
¹ Percent Area Treated values are intended as guidelines and are not to be considered as absolute values.

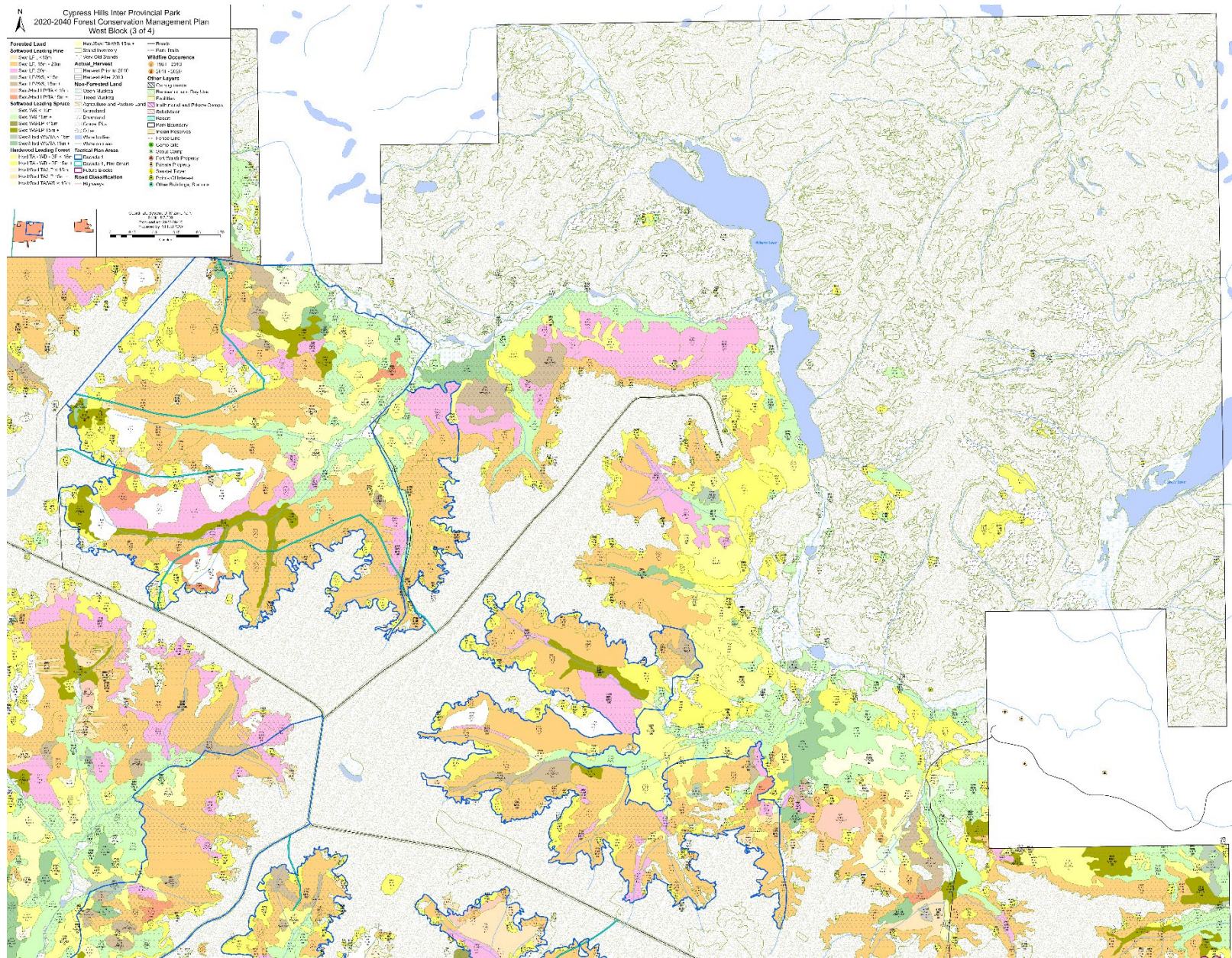
Sph – Stems per hectare.

100% of forest development types will have a post-treatment silviculture treatment.

The silviculture system is clear-cut with variable retention.

Appendix A: Tactical Plan Areas





Appendix B: Wildfire Plan Areas

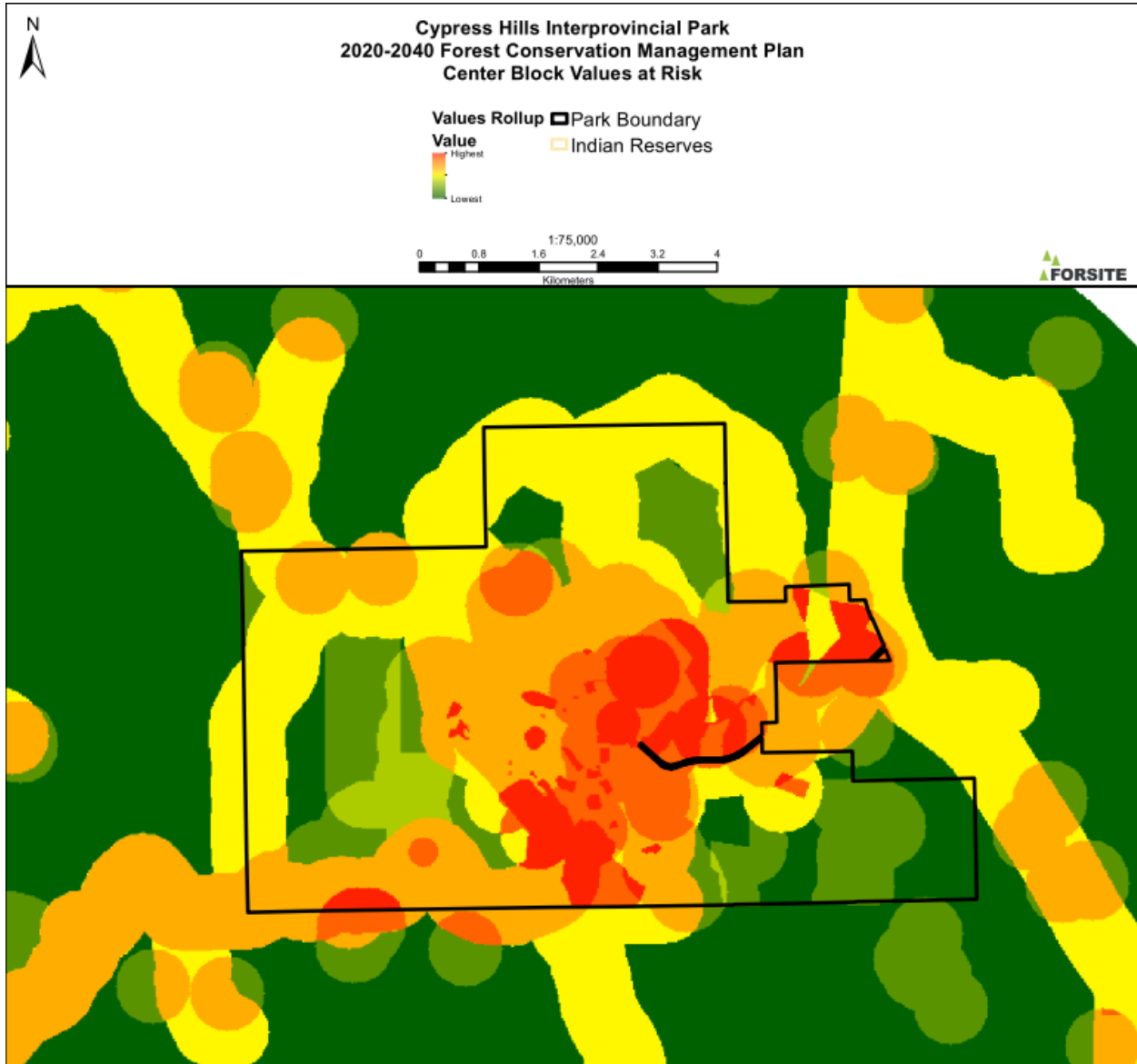


Figure 41 Centre Block Values at Risk

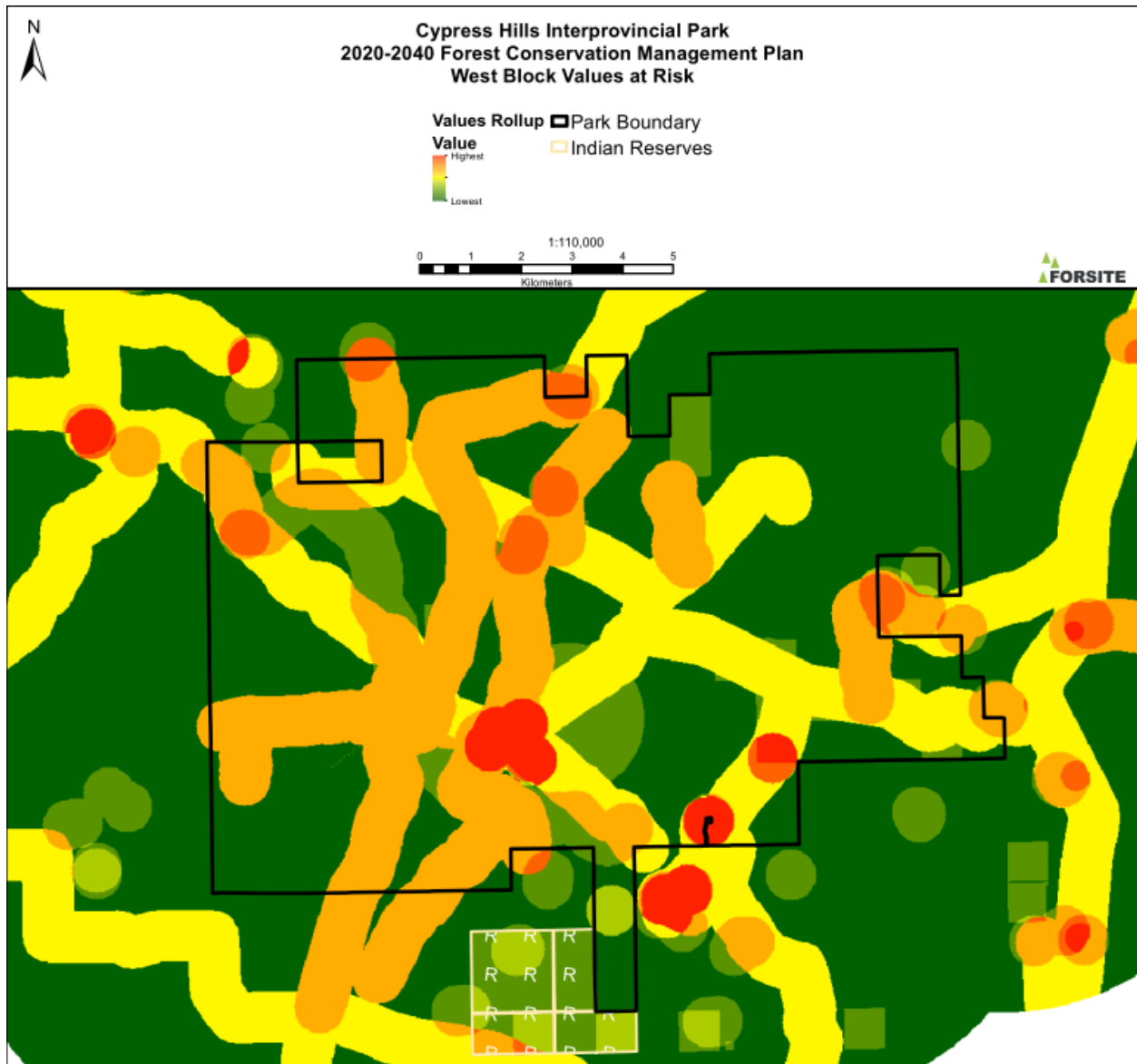


Figure 42 West Block Values at Risk

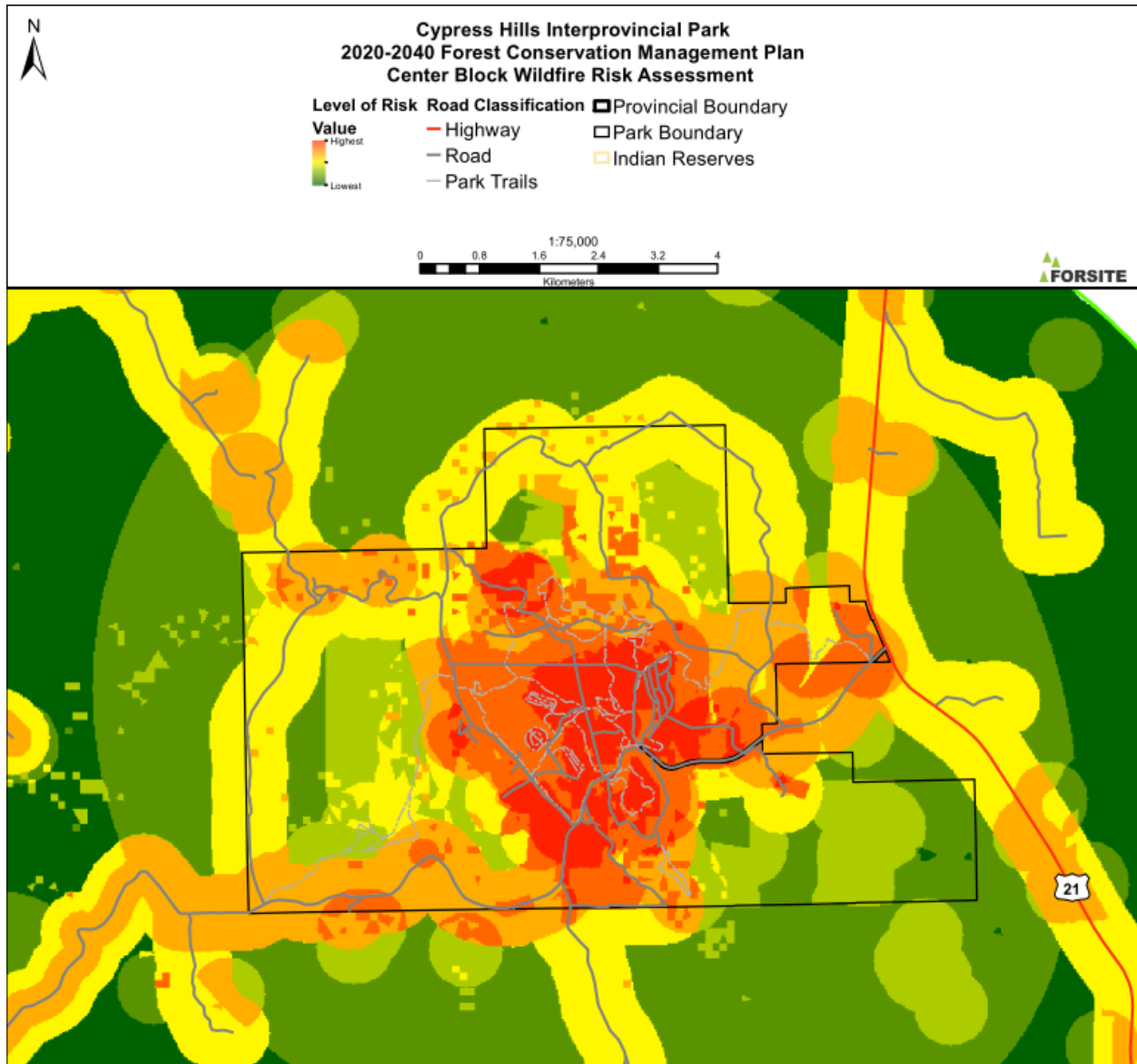


Figure 43 Centre Block Wildfire Risk Assessment

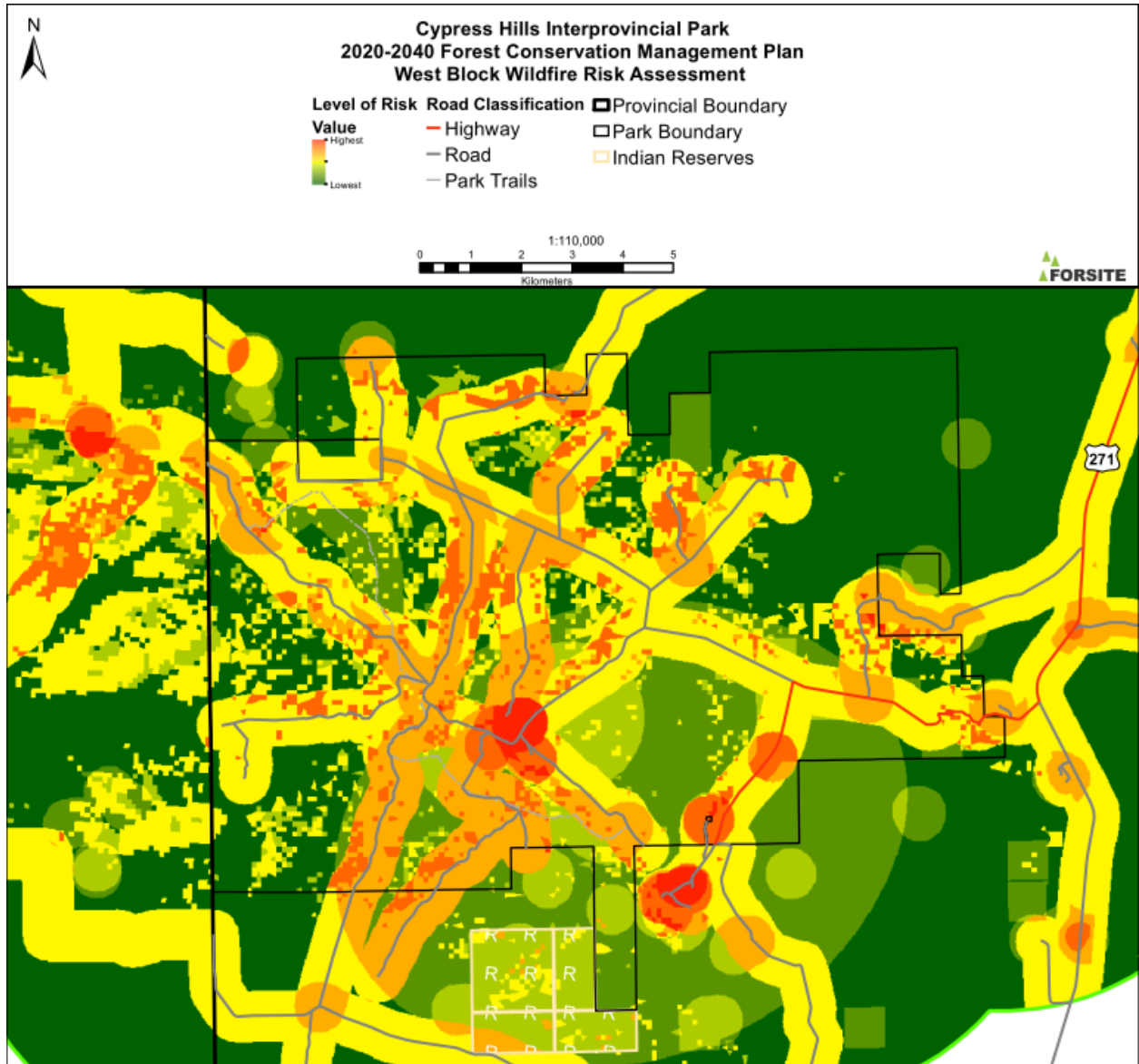


Figure 44 West Block Wildfire Risk Assessment

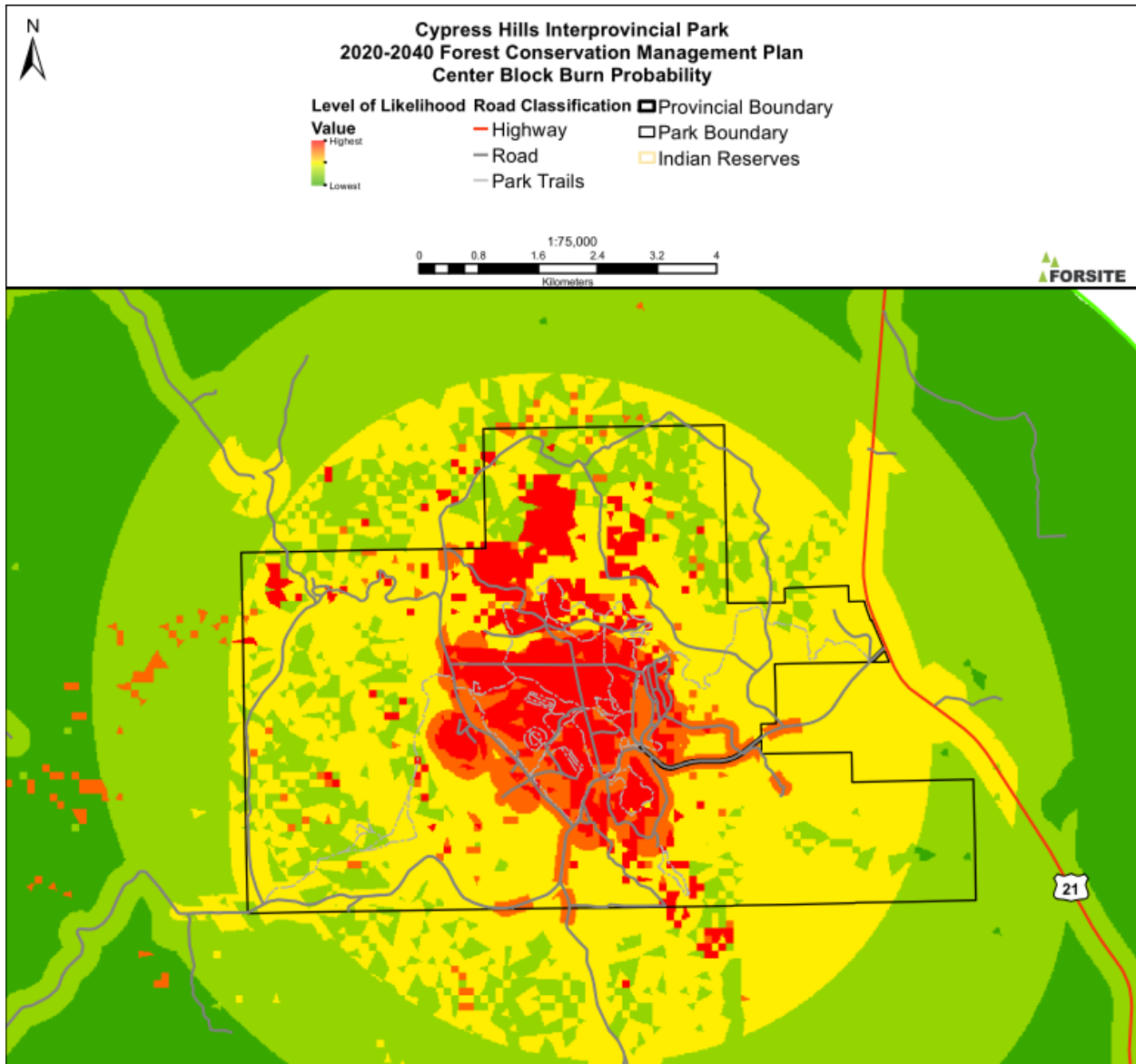


Figure 45 Centre Block Burn Probability

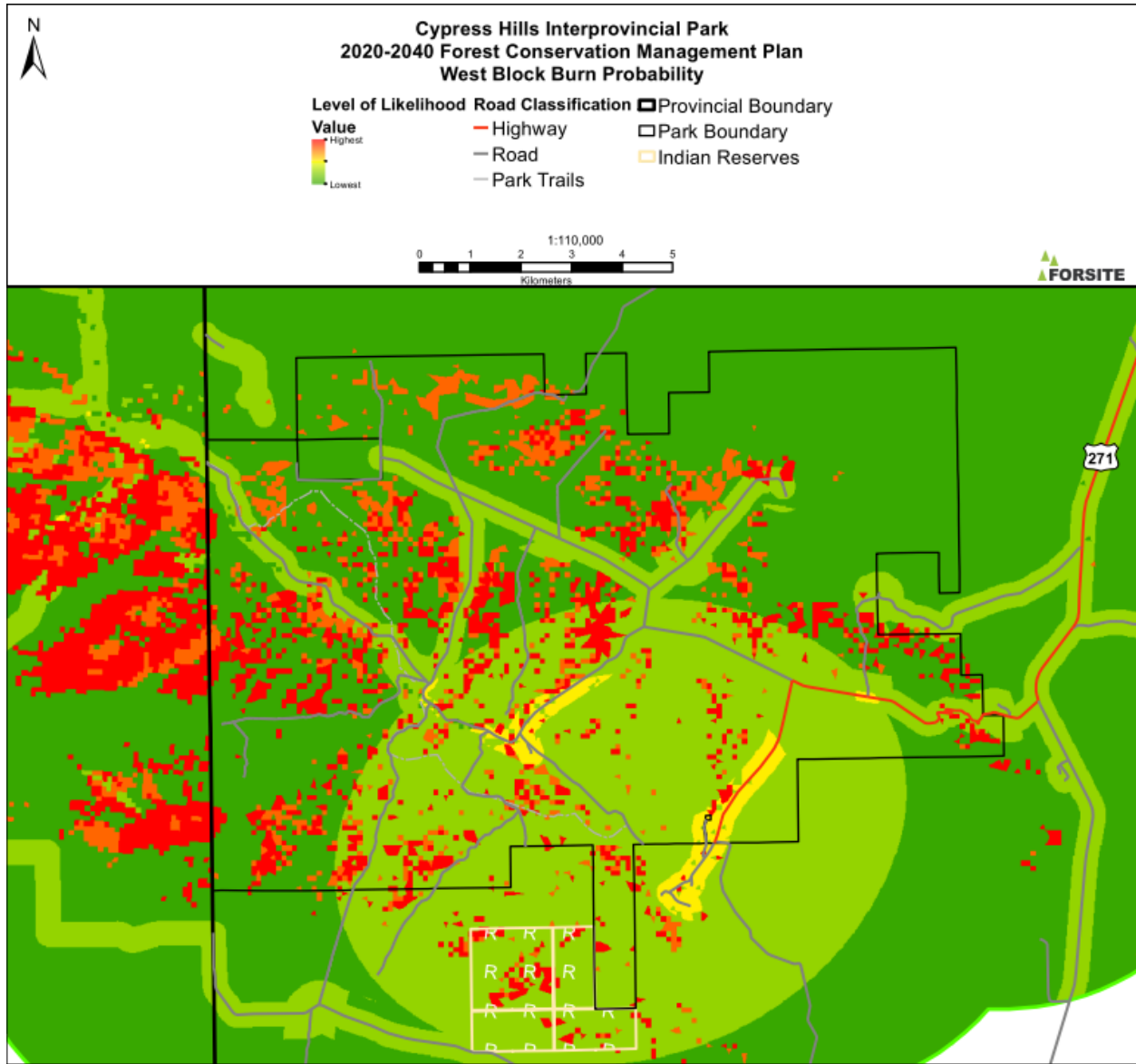


Figure 46 West Block Burn Probability

Appendix C:

Wildfire Threat Methodology Summary

Objective:

“Undertake landscape level wildfire hazard risk assessment based on the vegetation inventory, fuel types, and topographic data to identify priority treatment areas to be included in the tactical plan areas. The objective is to develop strategic placements of fuel breaks to maximize the hazard risk reduction for various values at risk within CHIPP.”

Threat:

- ▶ Human Life, Infrastructure, etc. still primary
- ▶ Natural resources, ecological values that could be impacted (negatively)

Opportunity:

- ▶ Fescue grasslands – risk of loss from tree encroachment

Identify Priority:

- ▶ Previous wildfire or wildfire spread modeling – for the fire and surrounding lands
- ▶ Burn probability or likelihood – including the spread modeling
- ▶ Overall fuels in the area, and related expected fire intensity
- ▶ Fire starts – where and what causes
- ▶ Values at risk, their importance/weighting

Methodology:

1. Threat (Hazard) – classify park landscape into different levels of risk.
 - ▶ Components: Fire behavior (fire weather data, fuel types, head fire intensity), fire occurrence risk (historical fire data), human and natural values at risk (proximity), and fire suppression capability (proximity to facilities):
 - Canadian Forest Fire Behavior Prediction (FBP) provides quantitative estimates of potential head fire intensity, fire spread rate, fuel consumption and fire descriptions:
 - Fuels:
 - FWI components, fuel, topography, foliar moisture content and duration of prediction are inputs of FBP system.
 - Fire behavior potential:
 - Quantified using head fire intensity (HFI).

- HFI is defined as the rate of heat energy release per unit time per unit length of fire front, and it is function of FFMC, BUI and ISI as well as fuel complex.
- Fire Occurrence Risk:
 - Province’s fire occurrence history - locations of fire occurrence, time, and fire causes (i.e., human or lightning).
 - Kernel Density algorithm in ArcGIS - area with higher density of historical fires has higher probability of fire ignitions and spread, indicating higher wildfire risk.
- Values at Risk:
 - Human and natural resource values that are vulnerable to wildfire:
 - Communities, subdivisions, campgrounds, cottages/resorts, First Nation development areas and traditional resource use cabins, gas wells/lines, power lines and species at risk
 - Proximity analysis to those values at risk was applied using Euclidean distance algorithm in ArcGIS – High/Medium/Low.
- Fire Suppression Capability:
 - Defined as the ability to detect and contain a wildfire - higher suppression capability indicates lower fire risk:
 - Fixed detection – fire tower visibility
 - Air attack – response time of water bombers
 - Skimmer lakes - presence
 - Ground attack – distance to FM/FP fire bases and main road access
 - All calculated components related to fire suppression capability were standardized and ranked from low (1) to extreme (5) values indicating corresponding threat levels.
 - Overall assessment of fire threat with regards to suppression capability was finally derived using those standardized and ranked components.

▶ Components listed above are then weighted.

▶ Combined weighted components to derive the overall relative wildfire threat assessment:

Inputs	Component	Weight
Data analysis of head fire intensity (2010-2018)	Fire behavior potential	55%
Analysis patterns of historical fire ignitions	Fire occurrence risk	10%
Proximity to communities, subdivisions, campgrounds, cottages, gas wells/lines, power lines and species at risk	Values at Risk	15%
Proximity analysis to ground fire bases, skimmer lakes, fire towers and water bomber suppression capability	Suppression capability	20%

2. Overall Assessment of Wildfire Threats

▶ The wildfire threat assessment model for CHIPP incorporates four components:

1. Fire behavior potential,

2. Fire occurrence risk,
 3. Values at risk, and
 4. Suppression Capability
- Standardized and combined to calculate a relative threat value for each park landscape unit:
 - Threat ranking = $0.55 \times \text{Fire behavior potential} + 0.1 \times \text{Fire occurrence} + 0.15 \times \text{Values at risk} + 0.2 \times \text{Suppression capability}$.
 - Fire threat ranking was assessed separately for each fire season.
 - Fire behavior potential weighted at 55% of the total threat.
 - Area with the highest standardized score was assigned a value of 0.55 and the other areas were ranked relative to the highest value resulting scores ranging from 0-0.55 for fire behavior potential factor.
 - Overall threat ranking scores:
 - Scale from 0 to 1
 - Final threat ranking score was then reclassified into five equal-interval ordinal classes:
 - Low, moderate, high, very high, extreme

3. CHIPP Forest and Fire Management Plan (Centre Block), 2005

► Fire Management

- Public Safety/Human Life/Protection from Wildfire:
 - Provide expertise, training and educational workshops to cottage owners, lessees and park users.
 - Improve communications on evacuation procedures and escape routes.
 - Develop additional evacuation routes.
 - Increase detection capability and activate a fire siren.
 - Provide and communicate locations of "Safety Zones."
- Wildland Urban Interface Program:
 - Institute the Wildland Urban Interface Program with cottagers and business owners in CHIPP.
 - Develop support materials, staff, training and resources to carry out this program.
- Fire Control Enhancement Program:
 - Develop a system of fuel breaks and fire breaks in the Centre Block.
 - Improve and develop access and trails to all areas of the park for fire control vehicles and crews.

- Consult with park and Saskatchewan Public Safety Agency, Wildfire Management personnel if any alteration to the landscape is necessary.
 - Research the installation of “Dry Fire Hydrants” in the cottage subdivision.
- Grassland Mowing Program:
 - Develop a mowing program to maintain grassland fire breaks and trails each year.
 - Develop a long-term contract arrangement to carry out this plan.
- Prescribed Fire Slash Burning:
 - Begin a series of test burns in lodgepole pine slash to test the benefits of burning in the harvest blocks after tree removal.
 - Develop crew training and support equipment for this purpose.
- Prescribed Burning in the Centre Block for exotic species control and ecological landscape management:
 - Institute a research program on prescribed burning in the park.
 - Plan one or several prescribed burns for the Centre Block.
 - Continue the fuels study.
- Core Area as a Separate Forest and Fire Management unit – west, Centre and east zones
- Trails:
 - Trail improvement to increase access for fire control emergencies.

4. Cypress Hills:

- ▶ The escalating Liability and Risk Management concerns resulting from mature to over-mature, decadent forest and the threat of wildland fire in the core area.
 - Identify and remove the risk management trees due to decadence in excess of 30% diameter rot and structural failure and replace with planted stock.
 - Incorporate selective or small-scale patchwork removal using hand felling and skidding by either mechanical quad ATV or small tractor.
 - Research, design and implement efficient fuel breaks at strategic locations in and surrounding the core areas.
- ▶ Public Safety in The Event of Wildfire:
 - Centre Block:
 - Provide expertise to cottage owners to “fire smart” their property through tree removal, planting less fire volatile species, pruning, installation of sprinkler systems, etc.
 - Improve communications to ensure all park visitors, lessees and cottage owners know the procedures and evacuation routes in the event of wildland fire. Refer to Section 5.8 for more information on Fire Planning for Safety.

- Post an Emergency Escape Plan for evacuation at strategic sites throughout the core area.
- West Block:
 - Provide and communicate the locations of “Safety Zones.”
 - Improve communications on evacuation procedures and escape routes in collaboration with Fort Walsh and the U of R.
 - Develop secondary evacuation routes.
- ▶ Trails:
 - Trail improvement to increase access for fire control emergencies:
 - Improve existing trails
 - Create new non-intrusive trails that double as hiking trails
 - Development of fire and fuel breaks that follow trails:
 - No new fire breaks except for those created by harvest pattern in the pine stands.
 - Existing roads used as firebreaks
 - Trails widened for access considered secondary firebreaks
 - Minimal impact to park
 - Fuel modification on access trails:
 - Mowing in grassy areas
 - Trees cleared back from trails distance necessary for fire protection
 - Removal of ladder fuels
- ▶ Fuel Reduction and Modification Areas:
 - Develop a system of fuel reduction and modification zones and prioritize them to serve as fuel breaks, reduce fuel loading and improve the capability of fire suppression.
- ▶ Protecting Cultural Landscapes:
 - GIS map the locations of cultural significant sites
 - Work with Heritage Resource Branch and First Nations to expand our knowledge and database.

Literature Cited

- Acton, D.F., Padbury, G.A., and Stushnoff, C.T. 1998. *The Ecoregions of Saskatchewan*. Canadian Plains Research Centre, University of Regina, Saskatchewan. Print.
- Alberta Parks. "Cypress Hills Provincial Park: Geology Fact Sheet". albertaparks.ca. Alberta Parks, no date. Web. 10 December 2019.
- Alberta Parks: Cypress Hills Provincial Park. "Cypress Hills Provincial Park: History". albertaparks.ca. Alberta Parks, 28 June 2017. Web. 13 December 2019.
- Canadian System of Soil Classification. 1998. "Soil Classification Working Group". Agriculture and Agri-Food Canada. Publication Number 1646 (Revised). 187 pp.
- Cutforth, H., E. O'Brien, J. Tuchelt, and R. Rickwood. "Long-term Changes in the Frost-free Season on the Canadian Prairies." *Canadian Journal of Plant Science* 84.4 (2004): 1085-091. Print.
- Cullingham, C.I. et al. 2011. Mountain pine beetle host-range expansion threatens the boreal forest. *Molecular Ecology*. 20:2157-2171.
- Cullingham C.I, James P.M, Cooke J.E, Coltman D.W. Characterizing the physical and genetic structure of the lodgepole pine × jack pine hybrid zone: mosaic structure and differential introgression. *Evol Appl*. 2012 Dec;5(8):879-91. doi: 10.1111/j.1752-4571.2012.00266.x. Epub 2012 May 8. PMID: 23346232; PMCID: PMC3552405.
- Cypress Hills Interprovincial Park (2014). "Bird Checklist". cypresshills.com. Cypress Hills Interprovincial Park, Alberta, December 2014. Web. 14 January 2020.
- Cypress Hills Interprovincial Park (2014b). "Commonly Seen Birds". cypresshills.com. Cypress Hills Interprovincial Park, Alberta, December 2014. Web. 14 January. 2020.
- Environment Canada. "Canadian Climate Normals". climate.weather.gc.ca. Environment Canada, 2019. Web. 14 January 2020.
- Fisher, R. 2020. Government of Saskatchewan, Landscape Conservation Specialist/Adjunct Professor University of Regina, Fish, Wildlife and Lands Branch, Ministry of Environment.
- Government of Alberta. "Cypress Hills Provincial Park Management Plan". albertaparks.ca. Alberta Tourism, Parks and Recreation, June 2011. Web. 17 December 2019.
- Government of Canada. "Canadian Climate Normals 1981 – 2020 Station Data." climate.weather.gc.ca. Environment and Natural Resources, December 2019. Web. 31 December 2019.
- GOC (Government of Canada). (2018, October 30). *Nesting periods*. Government of Canada. <https://www.canada.ca/en/environment-climate-change/services/avoiding-harm-migratory-birds/general-nesting-periods/nesting-periods.html#ZoneB>
- GOS (Government of Saskatchewan). (2012). *Forest regeneration assessment standard*. <https://publications.saskatchewan.ca/api/v1/products/77494/formats/110410/download>
- Government of Saskatchewan (2019). "Saskatchewan Hunters and Trappers Guide, 2019". saskatchewan.ca. Ministry of Environment, 2019. Web. 7 January 2020.
- Government of Saskatchewan. "Managing Saskatchewan Rangeland: Revised Edition". npss.sk.ca. Agriculture and Agri-Food Canada, March 2008. Web. 30 December 2019.

- Government of Saskatchewan (2023). The State of the Environment Report - 2023. saskatchewan.ca. Ministry of Environment, 2023. Web. 19 March 2024.
- Jungerius, P. D. "Soil Evidence of Postglacial Tree Line Fluctuations in the Cypress Hills Area, Alberta, Canada." *Arctic and Alpine Research* 1.4 (1969): 235-245. Print.
- Kunegel-Lion, M., McIntosh, R. L., and Lewis, M. A. "Management assessment of mountain pine beetle infestation in Cypress Hills". NRC Research Press, June 2019. Web. 07 April 2020.
- McIntosh, R. 2022. Government of Saskatchewan, Ministry of Environment, Forest Service. November 2022. Email.
- Merriam Webster. Dictionary. <https://www.merriam-webster.com/dictionary/loess>. Web. 8 September 2022.
- Nolan, J., A. Startsev, and G. Scrimgeour. "Cypress Hills Biological Research in Support of Ecosystem Management Chapter 2 – Cypress Hills Study Area". Cypress Hills Research Steering Group, Alberta Wilderness Association, no date. Unpublished. Print.
- Phipps, J. B., and R. J. O'Kennon. "Hawthorns (Crataegus: Rosaceae) of the Cypress Hills, Alberta and Saskatchewan." *Journal of the Botanical Research Institute of Texas* (2007): 1031-1090. Web. 30 December 2019.
- Poniatowski, B., Government of Saskatchewan Forest Service. "CHIPP Insect and Disease" to Darryl Sande, Forsite Consultants Ltd. 20 March 2020. Email.
- Robertson, C., Nelson, T.A., and Boots, B. 2007. Mountain pine beetle dispersal: the spatial-temporal interaction of infestations. *For. Sci.* 53: 395–405.
- Saskatchewan Ministry of Environment. 2016. Mountain pine beetle operational procedures document.
- Saskatchewan Parks. "Cypress Hills Interprovincial Park Forest and Fire Management Plan: Combined Centre and West Blocks Plan". Unpublished Document, October 2005.
- Safranyik, L., and Carroll, A.L. 2006. The biology and epidemiology of the mountain pine beetle in lodgepole pine forests. In *The mountain pine beetle: a synthesis of biology, management and impacts on lodgepole pine*. Edited by L. Safranyik and B. Wilson. Natural Resources Canada, Canadian Forest Service, Pacific Forestry Centre, Victoria, B.C. pp. 3–66.
- Stelfox, J. G., Lynch, G. M., and McGillis, J. R. 1976. Effects of Clearcut Logging on Wild Ungulates in the Central Albertan Foothills. *The Forestry Chronicle*, p. 69.
- Trace Associates. Integrated Vegetation Management Plan for Cutovers. Cypress Hills Interprovincial Park West Block and Centre Block, Saskatchewan. Unpublished Document. March 2021
- Thorpe, J. "*Vulnerability of prairie grasslands to climate change*". Prairies Regional Adaptation Collaborative, May 2011. SRC Publication No. 12855-2E11.
- University of Saskatchewan. "Soils of Saskatchewan". soilsofsask.ca. University of Saskatchewan: College of Agriculture and Bioresources, no date. Web. 21 January 2020.
- Visit Cypress Hills. "*What To Do: Hunting and Fishing*". visitcypresshills.ca. Cypress Hills Destination Area, no date. Web. 30 December 2019.
- Wang, T., A. Hamann, D. Spittlehouse, and C. Carroll. "Locally Downscaled and Spatially Customizable Climate Data for Historical and Future Periods for North America". *PLoS ONE* 11.6 (2016): e0156720. Web. 13 January 2020.

Widenmaier, K. J., and W. L. Strong. "Tree and Forest Encroachment into Fescue Grasslands on the Cypress Hills Plateau, Southeast Alberta, Canada." *Forest Ecology and Management* 259.10 (2010): 1870-879. Print.

Zhang, X., L. A. Vincent, W. D. Hogg, and A. Niitsoo. "Temperature and precipitation trends in Canada during the 20th century". *Atmosphere-Ocean* 38:3 (2000): 395-429. Web. 30 December 2019.