



Saskatchewan State of the Environment 2019: A Focus on Forests

Technical Report on Forest Type and Age Indicator
and Protected Areas Indicator

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Introduction

The extent, type and age of forests are important factors to consider when managing Saskatchewan's natural resources. Forests must be managed in such a way as to balance habitat needs, recreational opportunities, and economic growth. Ecosystem diversity, the variety and relative abundance of ecosystems and their plant and animal communities, is necessary for species preservation. Resilient ecosystems that sustain biological diversity are of value to all members of society, regardless of their use of the forest. We all have a role to play in ensuring that forests continue to support wildlife habitat needs while allowing for continued recreational and economic opportunities today and into the future.

This document accompanies Saskatchewan's State of the Environment Report 2019: A Focus on Forests. It is intended to provide the reader with additional details on two of the report's indicators: "Forest Age and Type" and "Protected Areas", as they pertain to conserving biological diversity.

The "Forest Age and Type" indicator describes the area of forests and wetlands in their current state, and how they have changed over time. Forests are categorized by a number of species types and age classes. Results are summarized by Saskatchewan's ecozones and ecoregions. Native plant and animal species are often associated with certain forest and wetland types and successional stages. Measuring the abundance and distribution of forest types, age-classes and wetlands indicates the availability of habitat for species. Maintaining the natural range of ecosystems results in a more resilient system, helping to sustain overall biological diversity.

The "Protected Areas" indicator describes the area of forests and wetlands within Saskatchewan's protected and un-protected areas. Forests are categorized by a number of species types and age classes. Results are summarized by Saskatchewan's ecozones and ecoregions. Protecting unique ecosystems, along with those representative of the landscape helps to maintain biological diversity. Following recommendations of the Brundtland Commission's report, "Our Common Future" (WCED 1987), Saskatchewan's Representative Area Network program set a goal to identify and designate 12 per cent of the province's natural landscapes by the year 2000. Many unique ecosystems are found throughout Saskatchewan that support their own unique range of species. Protecting unique ecosystems, along with those representative of the landscape helps to maintain biological diversity.

Distribution and abundance of forest types, seral stages of forest types and wetland types

The province of Saskatchewan covers an area of approximately 65.2 million hectares (Table 1 and Figure 1). Of this area, about 40 per cent are upland forests (23 per cent softwood, five per cent mixedwood, six per cent hardwood, and six per cent open productive / shrub¹ forest cover species groups). Wetlands and water each account for 11 per cent of Saskatchewan. Grass and agricultural lands account for seven per cent and 29 per cent of Saskatchewan, respectively. Barren rock / sand, and anthropogenic areas make up the remaining two per cent (Table 1 and Figure 2a). Four ecozones are found within the province of Saskatchewan: the Taiga Shield, the Boreal Shield, the Boreal Plain, and the Prairie (Table 2 and Figure 3).

¹ The open productive/shrub forest cover species group is capable of supporting forests, but at the time of inventory, did not support trees. For example, recent forest fires, recent harvests, and shrubby regeneration fall within this group.

Table 1. Area of forested and non-forested land types within the Province of Saskatchewan (SK), the provincial forest (PF), the greater commercial forest zone (GCFZ) and those timber supply areas with active forest management plans (AFMP).

Land type		SK (ha and (%))		PF [†] (ha and (%))		GCFZ [†] (ha and (%))		AFMP (ha and (%))	
Forest	Softwood	14,937,000	(23)	14,798,000	(41)	3,860,000	(27)	2,490,000	(30)
	Mixedwood	3,145,000	(5)	2,994,000	(8)	1,466,000	(10)	748,000	(9)
	Hardwood	4,044,000	(6)	2,511,000	(7)	1,961,000	(14)	1,545,000	(19)
	Open productive / shrub	3,842,000	(6)	2,828,000	(8)	265,000	(2)	18,000	(<1)
	Sub-total forest	25,968,000	(40)	23,131,000	(64)	7,552,000	(53)	4,801,000	(58)
Non-forest	Agricultural land	18,627,000	(29)	6,000	(<1)	6,000	(<1)	3,000	(<1)
	Grassland	4,634,000	(7)	244,000	(1)	244,000	(2)	240,000	(3)
	Wetland	7,448,000	(11)	5,884,000	(17)	4,370,000	(30)	2,471,000	(30)
	Water	6,971,000	(11)	6,038,000	(17)	1,938,000	(14)	740,000	(9)
	Rock and sand	711,000	(1)	315,000	(1)	165,000	(1)	6,000	(<1)
	Anthropogenic	772,000	(1)	82,000	(<1)	64,000	(<1)	43,000	(<1)
	Sub-total non-forest	39,163,000	(60)	12,569,000	(36)	6,787,000	(47)	3,503,000	(42)
No data [‡]		98,000	(<1)	98,000	(<1)	0	(0)	0	(0)
Total Saskatchewan		65,229,000	(100)	35,798,000	(100)	14,339,000	(100)	8,304,000	(100)

[†] Area includes Cold Lake Air Weapons Range, Suggi Lowlands, and Provincial and Federal parks adjacent to commercial forest zone.

[‡] Gaps in source land type data exist in the far northern portion of Saskatchewan due to the nature of the source information (Landsat-based Northern Digital Land Cover Map of Saskatchewan, circa 2000).

Table 2. Area of ecozones and ecoregions within the Province of Saskatchewan (SK), the provincial forest (PF), the greater commercial forest zone (GCFZ) and those timber supply areas with active forest management plans (AFMP).

Ecozone	Ecoregion	SK (ha and (%))		PF [†] (ha and (%))		GCFZ [†] (ha and (%))		AFMP (ha and (%))	
Taiga Shield	Selwyn Lake Upland	2,845,000	(4)	2,845,000	(8)	0	(0)	0	(0)
	Tazin Lake Upland	1,800,000	(3)	1,800,000	(5)	0	(0)	0	(0)
	Sub-total Taiga Shield	4,645,000	(7)	4,645,000	(13)	0	(0)	0	(0)
Boreal Shield	Athabasca Plain	7,392,000	(11)	7,392,000	(21)	0	(0)	0	(0)
	Churchill River Upland	11,314,000	(18)	11,314,000	(31)	2,633,000	(18)	213,000	(3)
	Sub-total Boreal Shield	18,706,000	(29)	18,706,000	(52)	2,633,000	(18)	213,000	(3)
Boreal Plain	Mid-Boreal Upland	10,196,000	(16)	9,488,000	(27)	8,747,000	(61)	6,350,000	(76)
	Mid-Boreal Lowland	2,159,000	(3)	2,094,000	(6)	2,094,000	(15)	950,000	(11)
	Boreal Transition	5,420,000	(8)	865,000	(2)	865,000	(6)	791,000	(10)
	Sub-total Boreal Plain	17,775,000	(27)	12,447,000	(35)	11,706,000	(82)	8,091,000	(97)
Prairie	Aspen Parkland	8,161,000	(13)	0	(0)	0	(0)	0	(0)
	Moist Mixed Grassland	6,787,000	(10)	0	(0)	0	(0)	0	(0)
	Mixed Grassland	8,652,000	(13)	0	(0)	0	(0)	0	(0)
	Cypress Upland	503,000	(1)	0	(0)	0	(0)	0	(0)
	Sub-total Prairie	24,103,000	(37)	0	(0)	0	(0)	0	(0)
Total Saskatchewan		65,229,000	(100)	35,798,000	(100)	14,339,000	(100)	8,304,000	(100)

[†] Area includes Cold Lake Air Weapons Range, Suggi Lowlands, and Provincial and Federal parks adjacent to commercial forest zone.

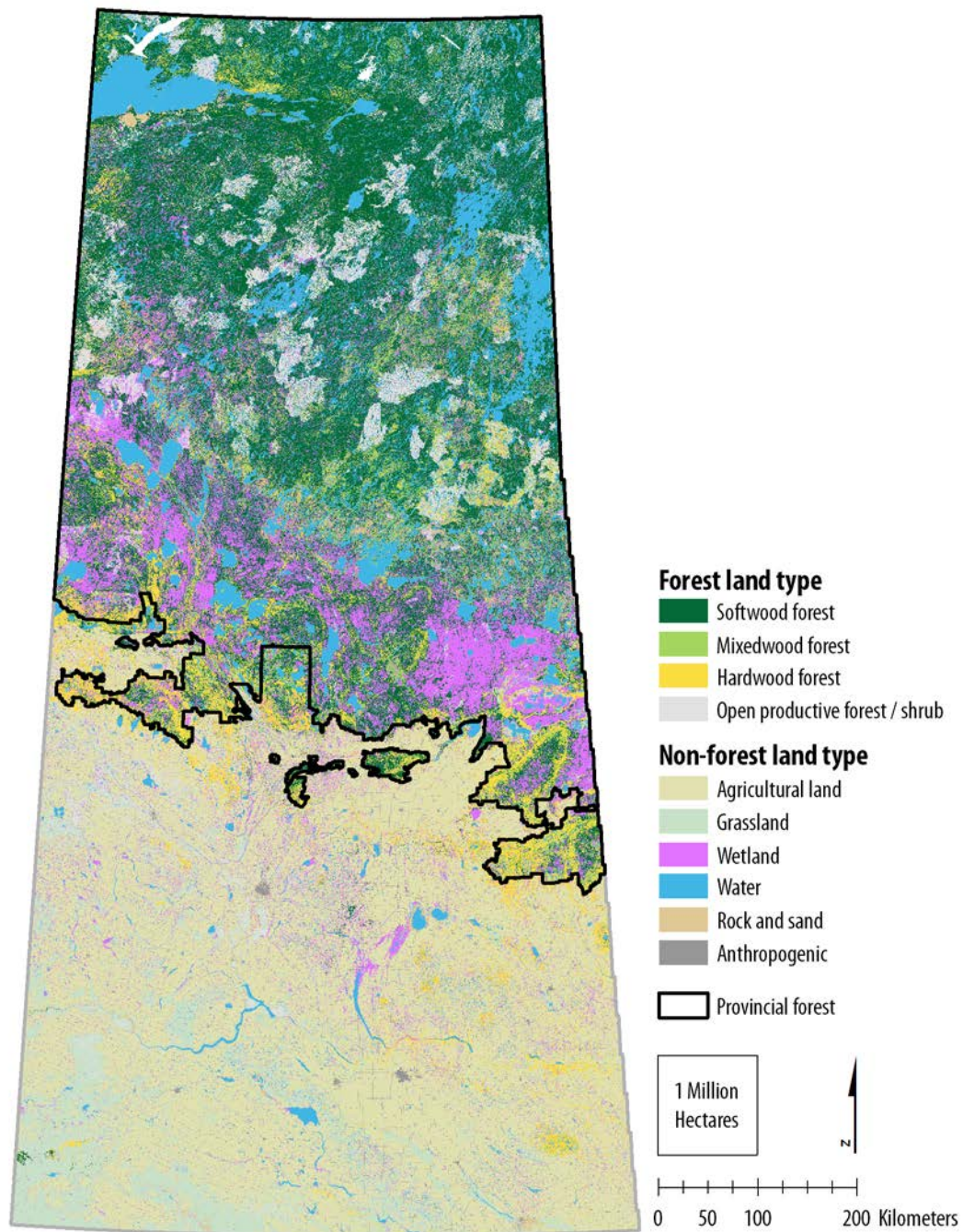


Figure 1. Extent of provincial forest in relation to Saskatchewan's forested and non-forested land types.

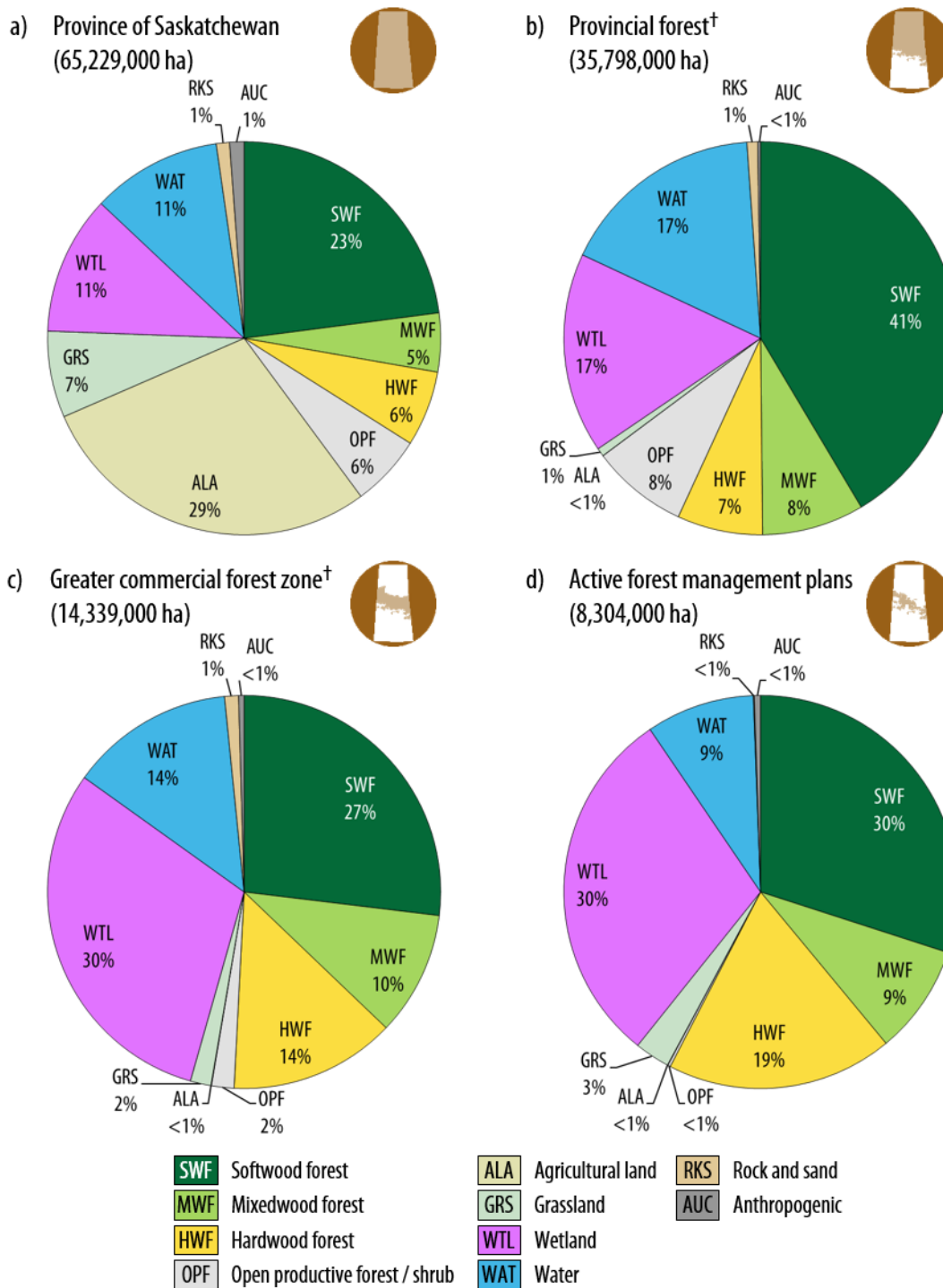


Figure 2. Land types within (a) the Province of Saskatchewan, (b) the provincial forest, (c) the greater commercial forest zone, and (d) those timber supply areas with active forest management plans.

[†] Area includes Cold Lake Air Weapons Range, Saggi Lowlands, and Provincial and Federal parks adjacent to commercial forest zone.

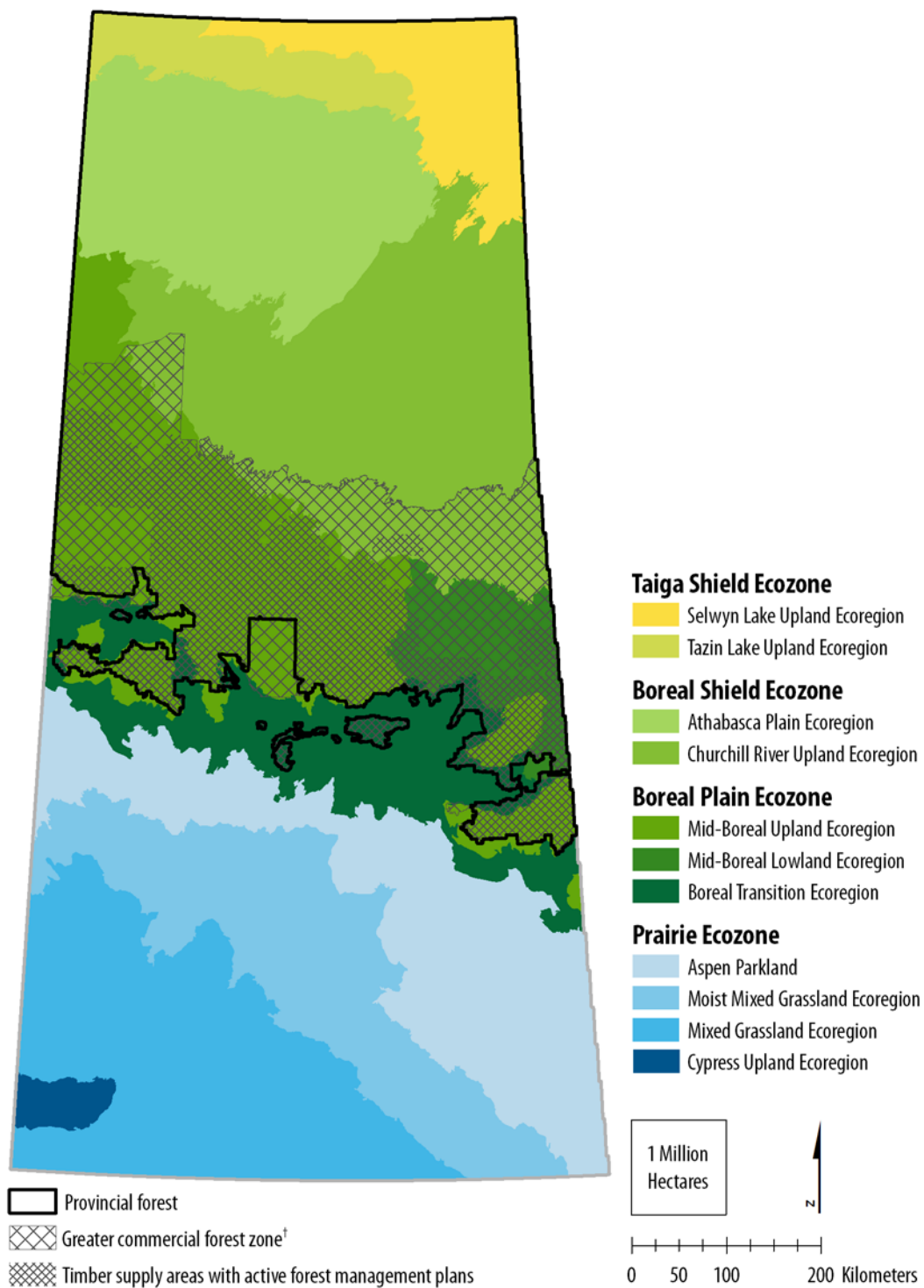


Figure 3. Extent of provincial forest, greater commercial forest zone, and timber supply areas with active forest management plans in relation to the ecozones and ecoregions of Saskatchewan.

[†] Area includes Cold Lake Air Weapons Range, Saggi Lowlands, and Provincial and Federal parks adjacent to commercial forest zone.

The “provincial forest” covers approximately 34 million hectares within the Taiga Shield, the Boreal Shield, and the Boreal Plain ecozones (Figure 1). About 64 per cent of the provincial forest are upland

forests (41 per cent softwood, eight per cent mixedwood, seven per cent hardwood, and eight per cent open productive shrub forest cover species groups). Wetlands and water each account for 17 per cent of the provincial forest. Grass, agricultural, barren rock/sand, and anthropogenic areas make up the remaining two per cent (Table 1 and Figure 2b).

The provincial forest's southern 11.7 million hectares are known as the "commercial forest zone". For the purposes of this indicator, the commercial forest zone has been expanded to include the Cold Lake Air Weapons Range, Suggi Lowlands, and provincial and national parks adjacent to the commercial forest zone. Also included in the greater commercial forest zone are any lands within the boundaries of the commercial forest zone that are not "provincial forest" as defined by the Forest Resources Management Regulations. For example: northern hamlets, northern villages, northern settlements, resort towns, resort subdivisions, indian reserves, parks, and lands described on a certificate of title other than one held by the Crown. The greatest amount of human activity occurs within this 14.3 million-hectare area, referred to here as the "greater commercial forest zone". Most forest-based economic activities and fire suppression occurs within this area. About 53 per cent of the greater commercial forest zone are upland forests (27 per cent softwood, 10 per cent mixedwood, 14 per cent hardwood, and two per cent open productive/shrub forest cover species groups). Wetlands and water account for 30 per cent and 14 per cent of the greater commercial forest zone, respectively. Grass, agricultural, barren rock/sand, and anthropogenic areas make up the remaining three per cent (Table 1 and Figure 2c).

The commercial forest zone is subdivided into a number of timber supply areas. Presently, six forest management plans are active, within 8.3 million hectare of the commercial forest zone. Of these areas, about 58 per cent are upland forests (30 per cent softwood, nine per cent mixedwood, and 19 per cent hardwood). Wetlands and water account for 30 per cent and nine per cent of the areas, respectively. Grass, agricultural, barren rock/sand, and anthropogenic areas make up the remaining three per cent (Table 1 and Figure 2d).

Greater commercial forest zone

Within the greater commercial forest zone, sufficient forest inventory data exists to refine the categorization of land and forest types, and to explore the distribution of forest ages. Seral stages are the steps forest ecosystems move through as they age. Generally, 63 per cent of upland forests within the greater commercial forest zone are considered "young" or "immature"; of which 33 per cent are softwood, 11 per cent are mixedwood, 15 per cent are hardwood, and four per cent are open productive/shrub forest cover species groups. Twenty-five per cent of upland forests within the greater commercial forest zone are considered "mature" or "old"; of which 10 per cent are softwood, five per cent are mixedwood, and 10 per cent are hardwood forest cover species groups. The remaining 12 per cent of upland forests within the greater commercial forest zone are considered "very old"; of which eight per cent are softwood, three per cent are mixedwood, and one per cent are hardwood forest cover species groups (Table 3 and Figure 4).

Table 3. Area of forest cover species groups within the greater commercial forest zone (GCFZ), by seral stage.

Forest cover species group	Seral stage [‡]										GCFZ [‡] (ha and (%))
	Young (ha and (%))		Immature (ha and (%))		Mature (ha and (%))		Old (ha and (%))		Very old (ha and (%))		
Softwood	954,000	(13)	1,495,000	(20)	482,000	(6)	318,000	(4)	611,000	(8)	3,860,000 (51)
Mixedwood	345,000	(5)	523,000	(6)	199,000	(3)	164,000	(2)	235,000	(3)	1,466,000 (19)
Hardwood	336,000	(4)	765,000	(11)	468,000	(6)	295,000	(4)	97,000	(1)	1,961,000 (26)
Open / shrub	102,000	(2)	163,000	(2)	0	(0)	0	(0)	0	(0)	265,000 (4)
Total forest	1,737,000	(24)	2,946,000	(39)	1,149,000	(15)	777,000	(10)	943,000	(12)	7,552,000 (100)

[†] Area includes Cold Lake Air Weapons Range, Suggi Lowlands, and Provincial and Federal parks adjacent to commercial forest zone.

[‡] Softwood or softwood-leading mixedwood seral stages: Young (0-20 years); Immature (21-80 years); Mature (81-100 years); Old (101-120 years); Very Old (>120 years). Hardwood or hardwood-leaning mixedwood seral stages: Young (0-20 years); Immature (21-70 years); Mature (71-90 years); Old (91-120 years); Very Old (>120 years).

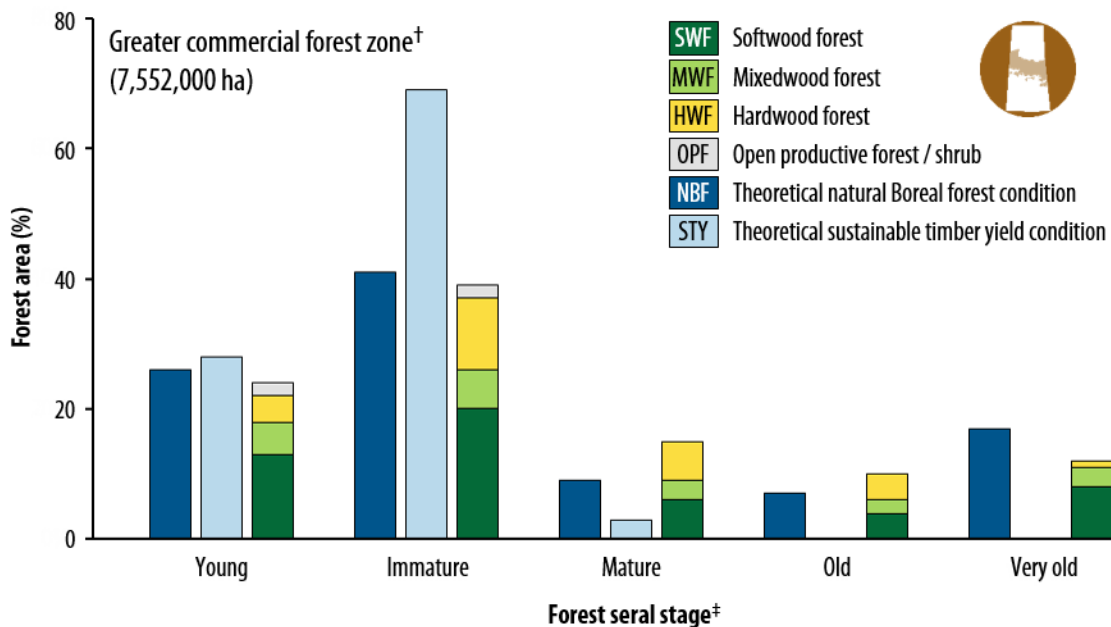


Figure 4. Greater commercial forest zone per cent upland forest area, by softwood (SWF) mixedwood (MWF), hardwood (HWF), and open productive / shrub forest cover species groups, and by forest seral stage, in relation to theoretical natural boreal forest (NBF) (after Van Wagner, 1978) and sustainable timber yield (STY) (after Seymour and Hunter, 1999) conditions.

[†] Area includes Cold Lake Air Weapons Range, Suggi Lowlands, and Provincial and Federal parks adjacent to commercial forest zone.

[‡] Softwood or softwood-leading mixedwood seral stages: Young (0-20 years); Immature (21-80 years); Mature (81-100 years); Old (101-120 years); Very Old (>120 years). Hardwood or hardwood-leaning mixedwood seral stages: Young (0-20 years); Immature (21-70 years); Mature (71-90 years); Old (91-120 years); Very Old (>120 years).

Boreal forests, when uninfluenced by human activities, are shaped by natural disturbances like fire, insects, disease, and wind. In theory, these forests exhibit age class distributions in a “reversed J” pattern (Van Wagner, 1978) (Figure 5a). Under this pattern, the greatest amount of forest area is typically found in the young seral stage and the least amount of forest area is typically found in the very old seral stage. In contrast, forests managed solely to sustain timber yield exhibit age class distributions in a “flat topped” pattern (Seymore and Hunter, 1999) (Figure 5b). In theory, a constant supply of wood is available for processing facilities over time from an efficient rotation of crop trees. Under this pattern, forest area is typically evenly distributed among young, immature and mature seral stages and very little forest area is typically found in the old and very old seral stages.

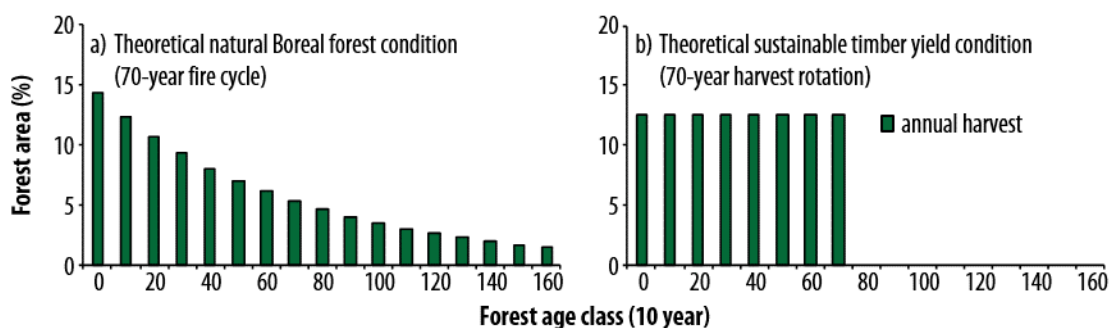


Figure 5. Comparisons of (a) a theoretical natural Boreal forest “reversed J” age class distribution resulting from a 70-year fire cycle (after Van Wagner, 1978) and (b) a theoretical sustainable timber yield forest “flat topped” age class distribution resulting from a 70-year harvest rotation (after Seymour and Hunter, 1999).

In Saskatchewan, forest age class targets are developed specific for the managed forest land base of each timber licence area based on the “natural forest pattern” approach as described in the Forest Management Planning Chapter and Standard of the Saskatchewan Environmental Code. The natural forest pattern approach is based on an estimate of the natural range of forest stands for the licence area. As a starting point, the Forest Management Planning Standard sets targets for age class distribution based on the 70-year fire cycle illustrated in Figure 5a (Van Wagner, 1978). However, licensees can define an alternate target for the licence areas based on regional fire cycle analysis. Researchers like David Andison have studied the fire cycles across several regions of Saskatchewan and found them to be variable depending on the stand types present in each region (Andison, 2013). The natural forest pattern section of the Forest Management Planning Standard specifically monitors key forest attributes including: age class frequency distribution (based on the defined fire cycle for the licence area as determined from research) including the amount of old and very old seral stage retention, harvest event and patch size, and the amount of stand structure that is left after harvesting. In this way, forest management in Saskatchewan is designed to result in forest age class distributions that emulate natural disturbance more so than under a solely sustained timber yield approach. By emulating natural disturbances, the natural range of ecosystems should be maintained, resulting in a more resilient system. This, in turn, helps to sustain biological diversity, protect habitat, maintain recreational opportunities, and ensure economic growth.

The current age class distribution of Saskatchewan’s greater commercial forest zone is somewhere in between the two theoretical patterns shown in Figure 5. In the Boreal Shield Ecozone, where fire suppression has been less intensive, the age class distribution approximates a reversed J pattern. This is shown for the portion of the greater commercial forest zone within the Churchill River Upland Ecozone of the Boreal Shield (Figure 6a). In the Boreal Plain Ecozone, where protection from fire and insect

damage have been a priority for over six decades, the proportion of mature and old seral stages are high relative to what is expected under natural Boreal forest conditions. For that portion of the greater commercial forest zone within the Mid-Boreal Lowland Ecoregion of the Boreal Shield, where forest harvesting has been minimal, an aging forest is evident (Figure 6c). For that portions of the greater commercial forest zone within the Mid-Boreal Upland and Boreal Transition Ecoregions of the Boreal Shield, where the majority of Saskatchewan's forest harvesting has taken place, a bimodal age class distribution occurs (Figure 6b and 6d). Here, fire and insect protection have ensured a supply of mature and old seral stages, and regulated harvesting has reset cutover ages and ensured a supply of young and immature seral stages. The relatively low amount of older immature (40- to 60-year old) forest is transitional; a legacy of fire suppression prior to the days of large scale harvesting, beginning the 1960s and 1970s.

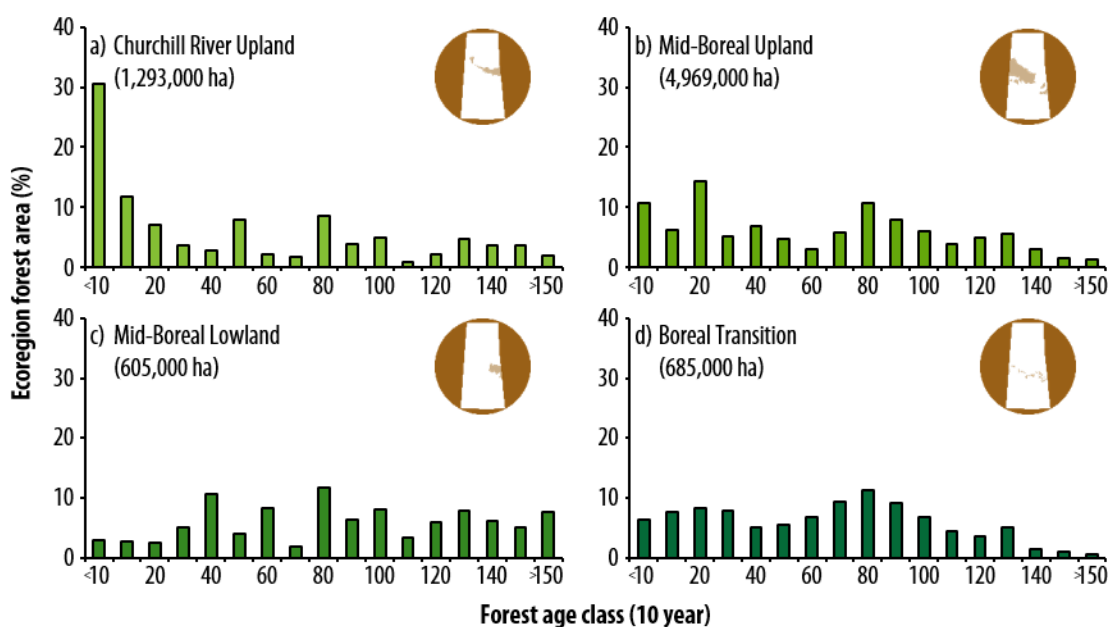


Figure 6. Greater commercial forest zone[†] per cent forest area by 10-year age class for the (a) Churchill River Upland, (b) Mid-Boreal Upland, (c) Mid-Boreal Lowland, and (d) Boreal Transition ecoregions.

[†] Area includes Cold Lake Air Weapons Range, Suggi Lowlands, and Provincial and Federal parks adjacent to commercial forest zone.

Within the 7.6 million ha of upland forests in the greater commercial forest zone, five softwood, four mixedwood, four hardwood, and one open productive/shrub upland forest types are recognized (Table 4 and Figures 7a). Softwood types are predominant (51 per cent), with jack pine dominated stands being the most common (16 per cent), followed by spruce and pine mixed dominated stands (15 per cent). Hardwood types are the second most prevalent (26 per cent), with the large majority being trembling aspen dominated stands (19 per cent). Mixedwood types represent 19 per cent of upland forests, and are a transition between pure hardwood and pure softwood types. Spruce influenced mixedwood types (12 per cent) occur nearly twice as frequently as pine influenced mixedwood types (seven per cent) (Figure 8a).

Table 4. Area of forested and non-forested land types within the greater commercial forest zone (GCFZ) and those timber supply areas with active forest management plans (AFMP).

Land type			GCFZ [†] (ha and (%))		AFMP (ha and (%))	
Forest	Softwood	White spruce or balsam fir dominating	180,000	(1)	142,000	(2)
		Upland black spruce dominating	522,000	(4)	337,000	(4)
		Lowland black spruce dominating or tamarack influencing	804,000	(5)	683,000	(8)
		Jack or lodgepole pine dominating	1,232,000	(9)	880,000	(11)
		Spruce and pine mixed dominating	1,122,000	(8)	448,000	(5)
		Sub-total softwood	3,860,000	(27)	2,490,000	(30)
	Mixedwood	Softwood leading, spruce influencing	375,000	(2)	171,000	(2)
		Softwood leading, pine influencing	308,000	(2)	145,000	(2)
		Hardwood leading, spruce influencing	532,000	(4)	292,000	(4)
		Hardwood leading, pine influencing	251,000	(2)	140,000	(2)
		Sub-total mixedwood	1,466,000	(10)	748,000	(10)
	Hardwood	Hardwood trembling aspen dominating	1,456,000	(10)	1,124,000	(14)
		Hardwood white birch dominating	37,000	(<1)	29,000	(<1)
		Hardwood aspen and birch mixed dominating	321,000	(2)	265,000	(3)
		Hardwood other hardwood dominating	147,000	(1)	127,000	(2)
		Sub-total hardwood	1,961,000	(14)	1,545,000	(19)
	Open productive / shrub		265,000	(2)	18,000	(<1)
	Sub-total forest		7,552,000	(53)	4,801,000	(59)
	Non-forest	Agricultural land	6,000	(<1)	3,000	(<1)
		Grassland	244,000	(2)	240,000	(3)
Treed wetland		3,400,000	(24)	1,863,000	(22)	
Shrubby wetland		347,000	(2)	200,000	(2)	
Open wetland		623,000	(4)	408,000	(5)	
Water		1,938,000	(14)	740,000	(9)	
Treed rock		163,000	(1)	6,000	(<1)	
Rock and sand		2,000	(<1)	<1,000	(<1)	
Anthropogenic		64,000	(<1)	43,000	(<1)	
Sub-total non-forest		6,787,000	(47)	3,503,000	(41)	
Total greater commercial forest zone		14,339,000	(100)	8,304,000	(100)	

[†] Area includes Cold Lake Air Weapons Range, Suggi Lowlands, and Provincial and Federal parks adjacent to commercial forest zone.

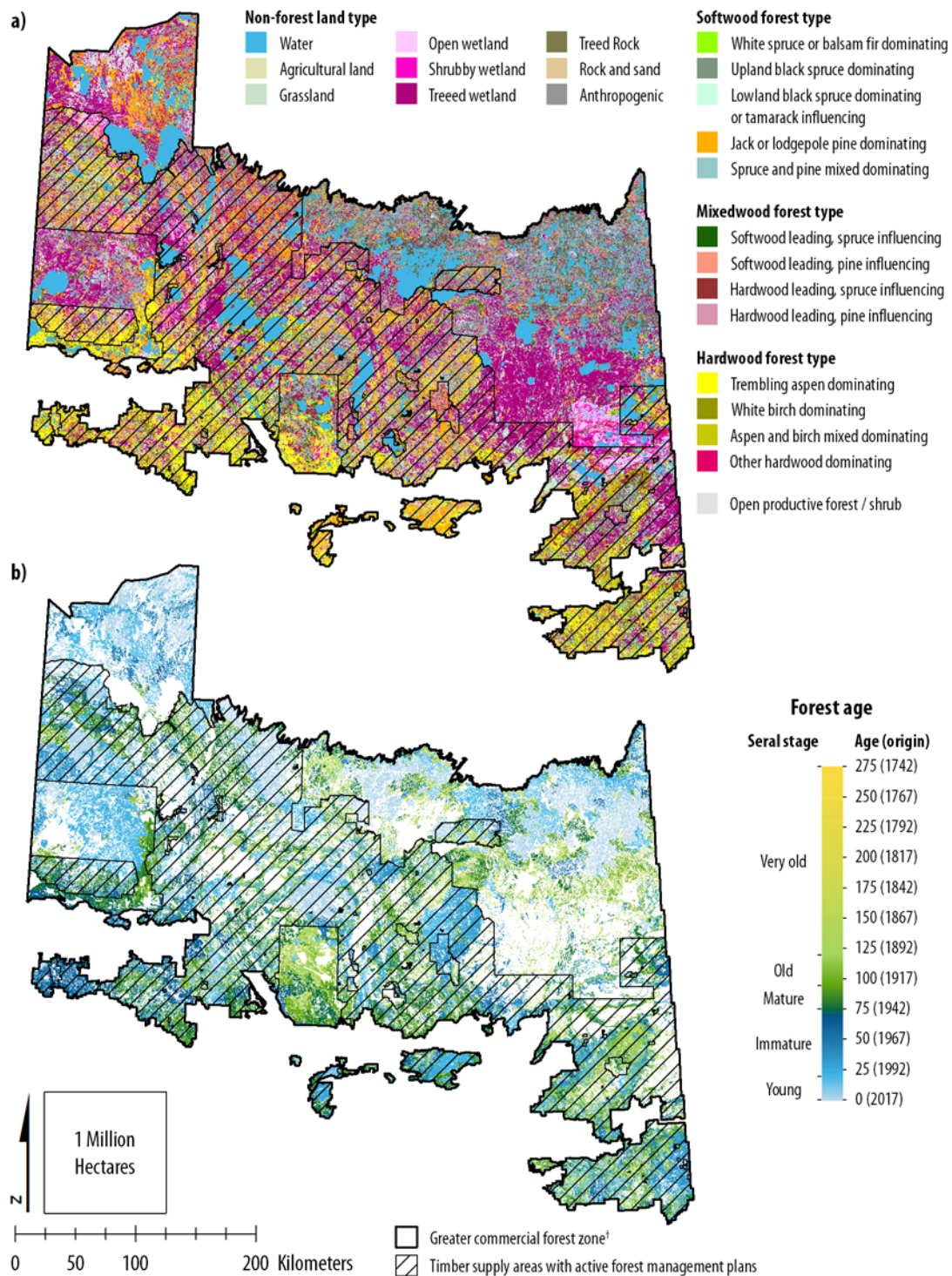


Figure 7. Maps of (a) non-forest and forest land types, and (b) forest ages and seral stages for Saskatchewan's greater commercial forest zone, and those timber supply areas with active forest management plans.

[†] Area includes Cold Lake Air Weapons Range, Suggi Lowlands, and Provincial and Federal parks adjacent to commercial forest zone.

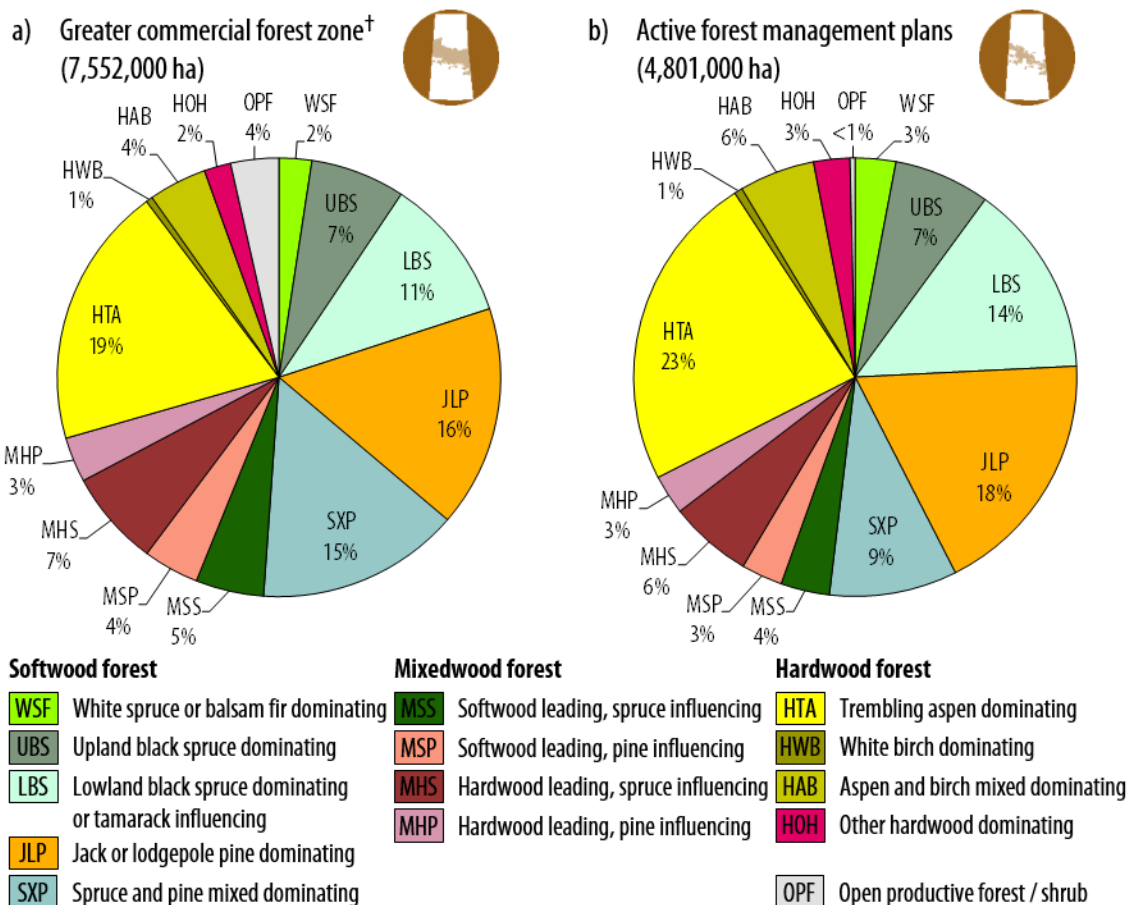


Figure 8. Distribution of upland forests within (a) the greater commercial forest zone[†] and (b) those timber supply areas with active forest management plans, by upland forest type.

[†] Area includes Cold Lake Air Weapons Range, Saggi Lowlands, and Provincial and Federal parks adjacent to commercial forest zone.

The distribution of age classes (Figure 7b) within each upland forest type is variable, but some interesting patterns are apparent (Figure 9). Of note:

- The most common provincial forest types (jack pine, spruce and pine mixed, and trembling aspen dominated) contain a large amount of area in the 80-year age class. Fire suppression practices have likely contributed to this increased amount of this mature seral stage.
- The most common softwood provincial forest types (jack pine and spruce and pine mixed dominated) both have the largest amounts of area in the young seral stages (< 20 years). This is not surprising given that these forest types are ecologically driven by fire, and 2015 was a particularly active fire season in Saskatchewan.
- The provincial forest type with the greatest amount of area in the very old seral stages (> 120 years) is the lowland black spruce dominated or tamarack influenced type. This pattern is expected given the wet, often inaccessible and low productive nature of this forest type. Being wet offers some protection from fires. Being inaccessible and of low productivity makes this type less desirable economically.

The greater commercial forest zone contains 4.4 million ha of wetlands (Table 4 and Figure 7a). Treed wetlands are predominant (24 per cent), shrubby and open wetlands account for two per cent and four per cent, respectively.

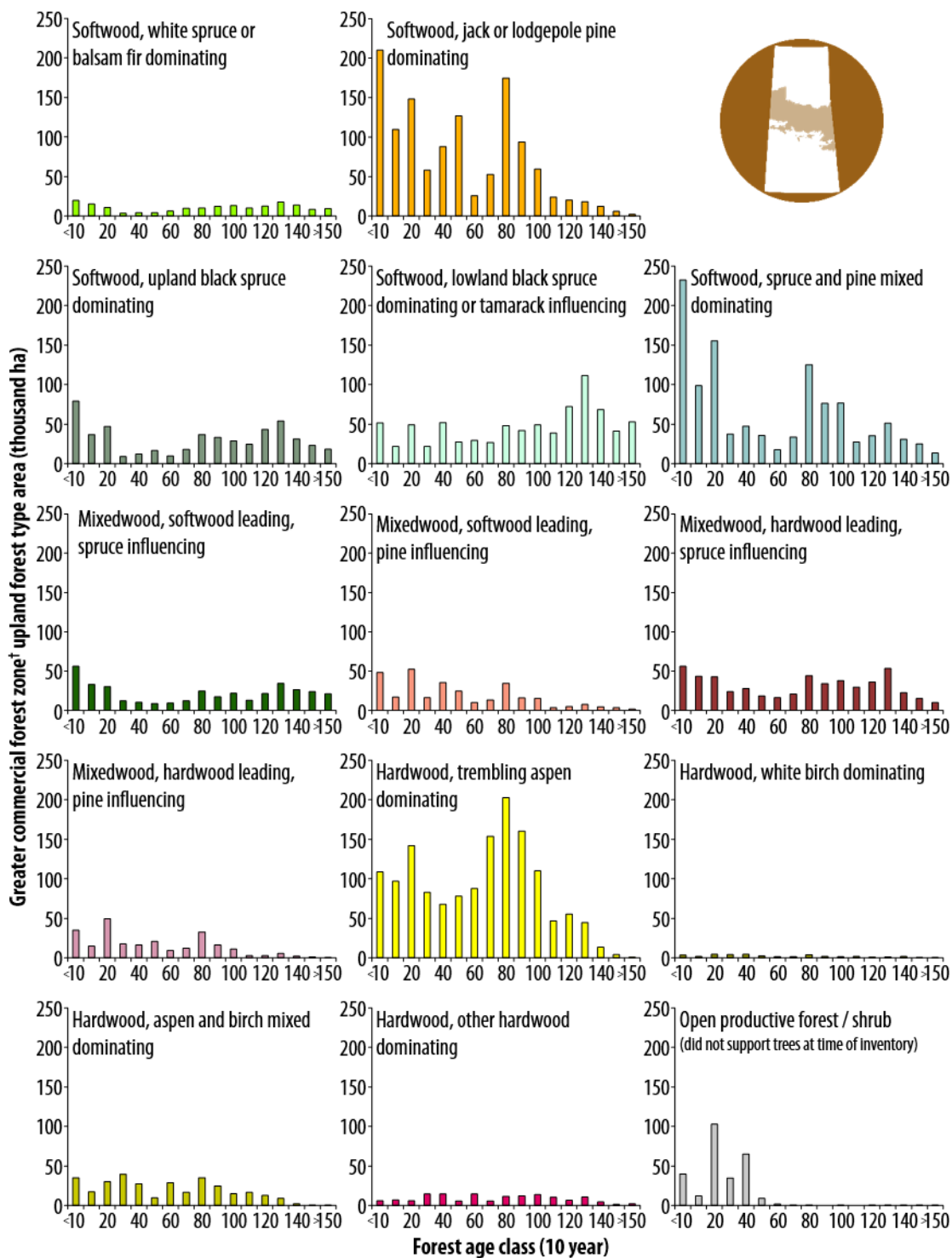


Figure 9. Area distribution of 10-year upland forest age classes within the greater commercial forest zone, by upland forest type.

[†] Area includes Cold Lake Air Weapons Range, Suggi Lowlands, and Provincial and Federal parks adjacent to commercial forest zone.

Timber supply areas with active forest management plans

For those timber supply areas with active forest management plans, 4.8 million hectares are upland forests. For this area, the abundance of provincial forest types shifts slightly from mixedwood and open productive / shrub types in favor of hardwood types (Table 4 and Figure 8b). This shift is mainly a consequence of geography, ecology, and data source. The more southern extent of the commercial forest zone, where the majority of forest management plans apply, ecologically supports more hardwood forest types. Further, harvested mixedwood types may be inventoried as hardwood types early in their succession to a mixedwood or softwood upland forest condition. With more current forest inventory data being used in active forest management plans, the amount of upland forest classified as open productive / shrub diminishes. Like the greater commercial forest zone as a whole, the distribution of age classes within those timber supply areas with active forest management plans is variable (Figure 10).

Timber supply areas with active forest management plans contain 2.5 million ha of wetlands (Table 4 and Figure 7a). Treed wetlands are predominant (13 per cent), shrubby and open wetlands account for one per cent and three per cent, respectively.

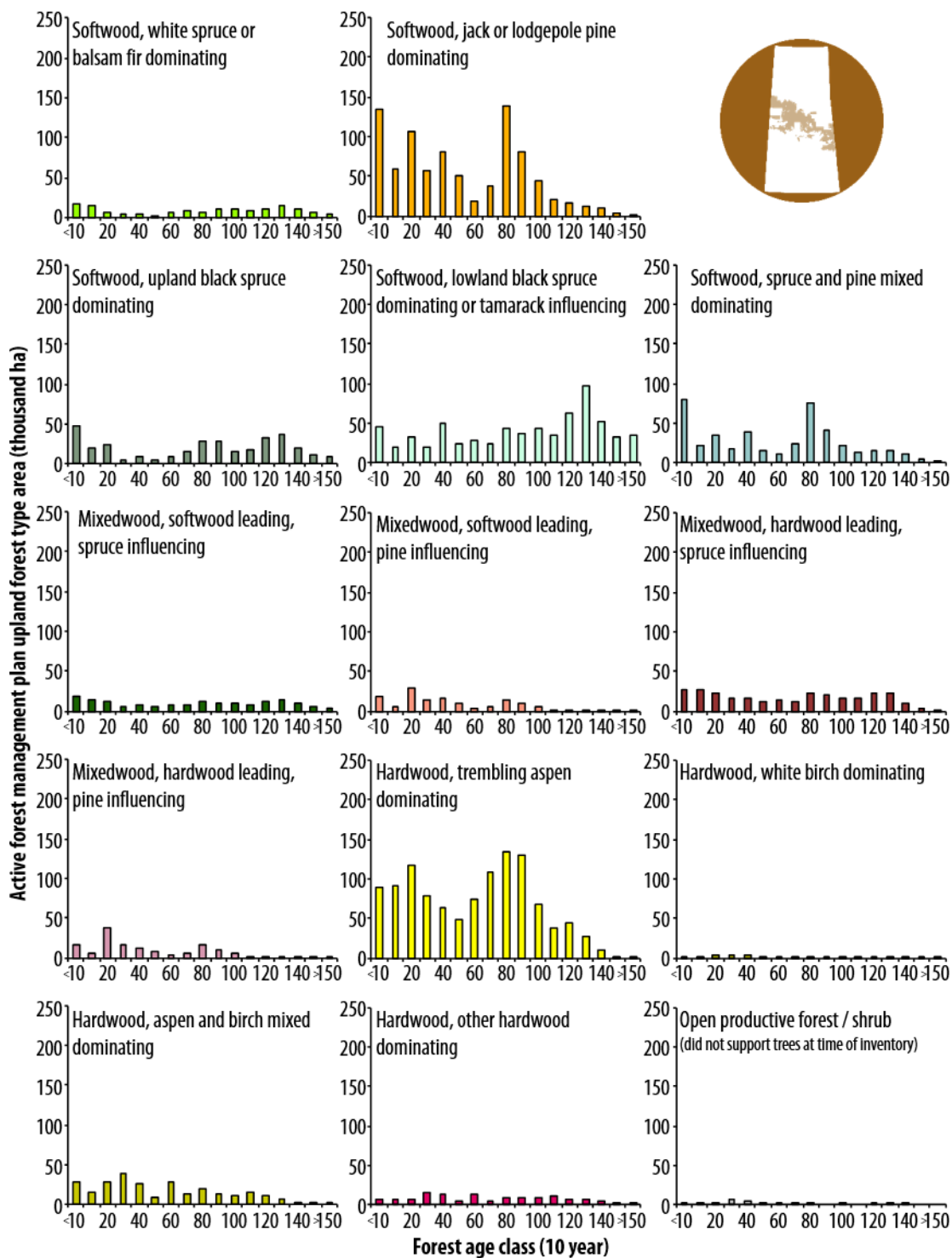


Figure 10. Area distribution of 10-year upland forest age classes for those timber supply areas with active forest management plans, by upland forest type.

[†] Area includes Cold Lake Air Weapons Range, Saggi Lowlands, and Provincial and Federal parks adjacent to commercial forest zone.

Change in distribution and abundance of forest types, seral stages of forest types and wetland types

Since Saskatchewan's 2009 State of the Environment Report: State of Saskatchewan's Provincial Forests, the proportion of land types within greater commercial forest zone ecoregions has remained relatively constant. Slight increases were observed in the proportion of forest, wetland and water types over non-forest and unclassified types (Table 5). These changes are most likely a product of different inventory sources, and the larger scope of the greater commercial forest zone used in this report.

Table 5. Comparison of greater commercial forest zone (GCFZ) per cent land type between the 2009 and the 2019 Saskatchewan State of the Environment Reports, by ecoregion.

Land type	Ecoregion												Total GCFZ (%)		
	Churchill River Upland (%)			Mid-Boreal Upland (%)			Mid-Boreal Lowland (%)			Boreal Transition (%)					
	2009	2019 [†]	+/-	2009	2019 [†]	+/-	2009	2019 [†]	+/-	2009	2019 [†]	+/-	2009	2019 [†]	+/-
Forest	9	9	0	33	35	2	4	4	0	5	5	0	51	53	2
Wetland	3	3	0	18	18	0	7	8	1	1	1	0	29	30	1
Water	4	5	1	6	7	1	2	2	0	<1	0	0	12	14	2
Non-forest	2	1	-1	3	1	-2	1	1	0	<1	0	0	6	3	-3
Unclassified	<1	0	0	1	0	-1	1	0	-1	<1	0	0	2	0	-2
Total	18	18	0	61	61	0	15	15	0	6	6	0	100	100	0

[†] 2019 data summarized as of 2017 and includes the Cold Lake Air Weapons Range, Suggi Lowlands, and Provincial and Federal parks adjacent to commercial forest zone.

The proportion of forest cover species groups within the greater commercial forest zone have also remained fairly constant between the 2009 and 2019 Saskatchewan State of the Environment Reports. Slight increases were observed in the proportion of mixedwoods over hardwoods (Table 6 and Figure 11). Again, these changes are most likely a product of different inventory sources, and the larger scope of the greater commercial forest zone used in this report.

Table 6. Comparison of greater commercial forest zone (GCFZ) per cent forest cover species groups between the 2009 and the 2019 Saskatchewan State of the Environment Reports, by seral stage.

Seral stage [‡]	Forest cover species group									Total GCFZ (%)		
	Softwood forest (%)			Mixedwood forest (%)			Hardwood forest (%)					
	2009	2019 [†]	+/-	2009	2019 [†]	+/-	2009	2019 [†]	+/-	2009	2019 [†]	+/-
Young	6	13	7	2	5	3	3	5	2	11	23	12
Immature	19	21	2	6	7	1	11	11	0	36	39	3
Mature	9	7	-2	4	3	-1	8	6	-2	21	16	-5
Old	10	4	-6	4	2	-2	5	4	-1	19	10	-9
Very old	9	8	-1	3	3	0	1	1	0	13	12	-1
Total	53	53	0	19	20	1	28	27	-1	100	100	0

[†] 2019 data summarized as of 2017 and includes the Cold Lake Air Weapons Range, Suggi Lowlands, and Provincial and Federal parks adjacent to commercial forest zone.

[‡] Softwood or softwood-leading mixedwood seral stages: Young (0-20 years); Immature (21-80 years); Mature (81-100 years); Old (101-120 years); Very Old (>120 years). Hardwood or hardwood-leaning mixedwood seral stages: Young (0-20 years); Immature (21-70 years); Mature (71-90 years); Old (91-120 years); Very Old (>120 years).

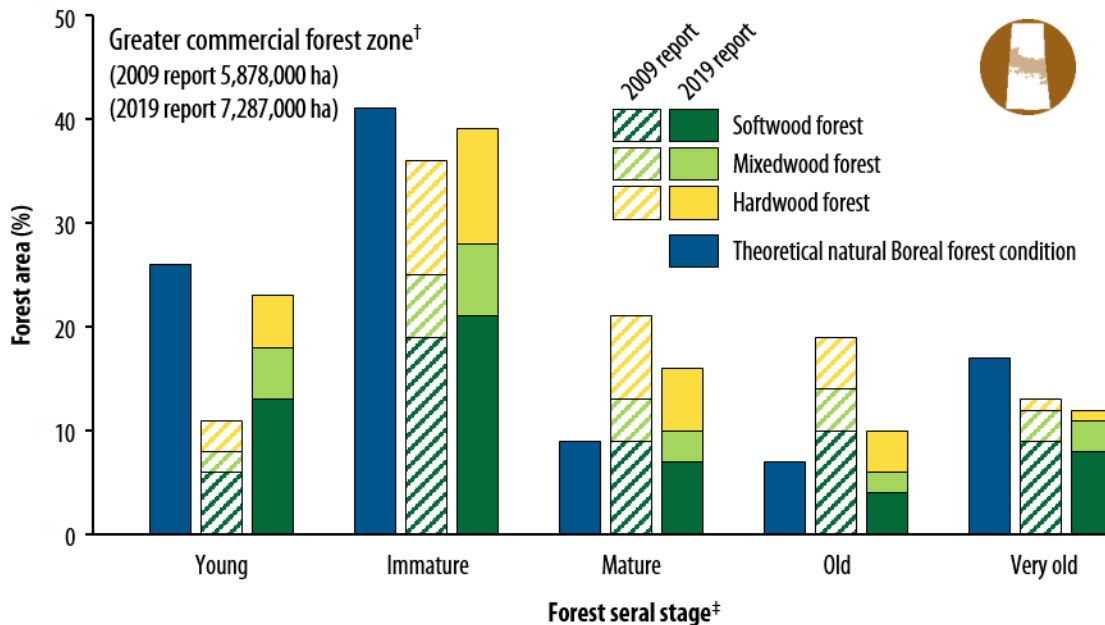


Figure 11. Greater commercial forest zone per cent forest area comparison between the 2009 and 2019 Saskatchewan State of the Environment Reports, by softwood, mixedwood, and hardwood forest cover species groups, and by forest seral stage, in relation to a theoretical natural boreal forest condition (after Van Wagner, 1978).

[†] Area includes Cold Lake Air Weapons Range, Suggi Lowlands, and Provincial and Federal parks adjacent to commercial forest zone in 2019 report. This was not necessarily the case in 2009 report.

[‡] Softwood or softwood-leading mixedwood seral stages: Young (0-20 years); Immature (21-80 years); Mature (81-100 years); Old (101-120 years); Very Old (>120 years). Hardwood or hardwood-leaning mixedwood seral stages: Young (0-20 years); Immature (21-70 years); Mature (71-90 years); Old (91-120 years); Very Old (>120 years).

Real changes were observed in the proportion of forest seral stages within the greater commercial forest zone. A 15 per cent increase was observed in the proportion of young (+12 per cent) and immature (+3 per cent) seral stages, at the expense of mature (-5 per cent), old (-9 per cent), and very old (-1 per cent) seral stages (Table 6 and Figure 11). Most of the shift in seral stages has occurred within the softwood forest cover species group. This shift is, in part, a product of forest fire and harvesting disturbances and the resulting natural or artificial regeneration since 2009. Also contributing to the shift are different inventory sources, the larger scope of the greater commercial forest zone, and different analysis methods.

Overall, changes in the distribution and abundance of forest types, seral stages of forest types and wetland types appear to be small between the 2009 and this 2019 Saskatchewan State of the Environment Reports. It is difficult to assess which changes are a function of different data sources, and which are a sign of actual landscape level change. To help clarify this indicator measure, an independent source of land inventory data was analyzed.

Each year since 2011, Agriculture Canada has prepared an Annual Crop Inventory for Canada. In addition to agricultural crops, this inventory identifies areas of softwood, mixedwood, hardwood, open productive / shrub upland forest types, and wetland types. While the coverage of annual crop inventories in Saskatchewan focuses on agricultural areas, a 5.9 million-hectare portion of the greater commercial forest zone (the southern 41 per cent) has been consistently inventoried each year since 2011. Between 2011 and 2017, 88 per cent of forest harvesting within the greater commercial forest

zone occurred in this area. Therefore, this subset of the greater commercial forest zone should provide a good measure of any recent human-caused changes to abundance of forest and wetland types. Based on the annual crop inventory data, the proportion of upland forest and wetland types has remained fairly constant within the greater commercial forest zone between 2011 and 2017 (Figure 12). Fluctuations in the proportions of softwood, mixedwood, hardwood, and open productive / shrub upland forest types are to be expected as forests are dynamic, continuously moving through successional stages of growth, disturbance, and renewal (Kimmins, 1997).

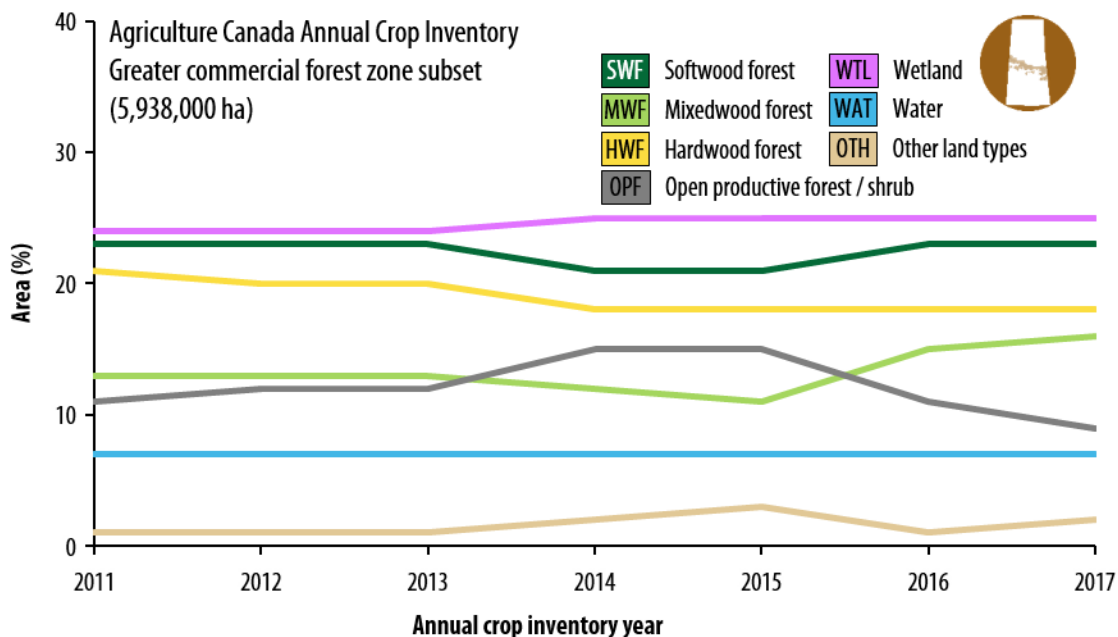


Figure 12. Annual per cent change in land cover type for a 5.9-million-hectare subset of the greater commercial forest zone[†], based on Agriculture Canada Annual Crop Inventory data, 2011 to 2017.

[†] Area includes Cold Lake Air Weapons Range, Suggi Lowlands, and Provincial and Federal parks adjacent to commercial forest zone.

Forest age and type indicator summary

State: mixed/fair

The majority of Saskatchewan's forests are found within the northern half of the province in an area known as the "provincial forest". This area encompasses the entire Taiga Shield and Boreal Shield Ecozones (the northern 36 per cent of Saskatchewan), and 70 per cent of the Boreal Plain Ecozone. The majority of human activity occurs with the southern 40 per cent of the provincial forest, in an area reported here as the "greater commercial forest zone".

Saskatchewan's northern ecozones are mostly in a natural state, affected mainly by fire disturbance. Softwood and open productive / shrub upland forest types dominate these ecozones. Human activities, such as harvesting, road construction, and fire suppression, are greatest in the Boreal Plain Ecozone. A greater diversity of forest types is found within the Boreal Plain Ecozone.

The abundance of different seral stages across the greater commercial forest zone indicates that a fair level of ecosystem diversity is present. Generally, forest management practices over the last number of decades in Saskatchewan have shifted the distribution of forest seral stages towards older age classes in the greater commercial forest zone. The proportion of young and immature forests, while having

increased from that reported in the 2009 Saskatchewan State of the Environment Report, still remain limited relative to what is expected under natural Boreal forest conditions

Trend: mixed / no change

Compared to the 2009 Saskatchewan State of the Environment Report, the proportion of land types and cover species groups has remained fairly constant. This is a positive result, as forest management activities have not caused landscape level changes in species distributions and abundances. This is a desired outcome for which forest management activities are tested.

Age class distributions, relative to those reported in the 2009 Saskatchewan State of the Environment Report, more closely approximated the natural Boreal forest 70-year fire cycle age class distribution. This is the starting point for forest management decisions. Compared to the 2009 report for the commercial forest zone, a 15 per cent increase was observed in the proportion of young (+12 per cent) and immature (+3 per cent) seral stages, at the expense of mature (-5 per cent), old (-9 per cent), and very old (-1 per cent) seral stages (Figure 11). However, there is no single target age class for the greater commercial forest zone. The ideal age class distribution for any management area depends on the ecology and management context for that area. In reality, the target age class structure is somewhere in between the “reversed J” natural pattern and the “flat topped” sustained yield pattern (Figure 5). What is important is that fiber, habitat, and ecosystem goods and services are maintained. The Forest Management Planning process is the manner in which Saskatchewan gets there.

Information: partial

The best available forest inventory data were used in preparation of this indicator report. Multiple sources of data were combined to represent the entire province, provincial forest, greater commercial forest zones, and those timber supply areas with active forest management plans. For each geographical extent, data needed to be summarized to the coarsest level of detail. Many of the inventory sources used were created prior to 2009 and were updated for this report to account for forest year of origin changes resulting from fire, harvest, and other stand re-initiating disturbances.

Distribution and abundance of protected areas

The province of Saskatchewan covers an area of approximately 65.2 million hectares. Of this area, nine per cent is under some form of protection² (Table 7 and Figure 13). At the ecozone level, 13 per cent of the Taiga Shield, six per cent of the Boreal Shield, 12 per cent of the Boreal Plain, and 10 per cent the Prairie ecozones are protected (Table 7 and Figure 14a). Upland forests account for 43 per cent of protected areas in Saskatchewan (17 per cent softwood, seven per cent mixedwood, 11 per cent hardwood, and eight per cent open productive/shrub forest cover species groups). Wetlands and water account for 13 per cent and 12 per cent of Saskatchewan’s protected areas, respectively. Grass and agricultural lands account for 24 per cent and four per cent of Saskatchewan’s protected areas, respectively. Barren rock/sand, anthropogenic and other areas make up the remaining four per cent (Table 8 and Figure 15a).

² For the purpose of this indicator, protected areas (International Union for Conservation of Nature category in parentheses) include: ecological reserves (Ia), wilderness parks (Ib), representative area ecological reserves (Ib), natural environment parks (II), national parks (II), historic parks (III), protected areas (III), national historic sites (III), fish and wildlife development fund lands (IV), game preserves (IV), migratory bird sanctuaries (IV), national wildlife areas (IV), private conservation lands (IV), wildlife refuges (IV), crown conservation easements (IV), recreation parks (V), recreation sites (V), AESB community pastures (VI), provincial pastures (VI), watershed authority lands (VI), wildlife habitat protection lands (VI), authority lands (n/a), and special management areas (n/a). Not included in this indicator are regional parks, and areas removed from harvesting eligibility through the forest management planning process due to operability and other constraints. For example: steep slopes, low merchantability stands, remote stands, riparian zones, and areas removed from harvesting eligibility due to stakeholder accommodations.

Table 7. Area of protected areas (PRO) within the Province of Saskatchewan (SK), the provincial forest (PF), and the greater commercial forest zone (GCFZ), by ecozone and ecoregion.

Ecozone	Ecoregion	Saskatchewan			Provincial forest [†]			Greater commercial forest zone [†]		
		SK (ha)	PRO (ha)	(%)	PF (ha)	PRO (ha)	(%)	GCFZ (ha)	PRO (ha)	(%)
Taiga	Selwyn Lake Upland	2,845,000	337,000	(12)	2,845,000	337,000	(12)	0	0	-
Shield	Tazin Lake Upland	1,800,000	254,000	(14)	1,800,000	254,000	(14)	0	0	-
	Sub-total Taiga Shield	4,645,000	591,000	(13)	4,645,000	591,000	(13)	0	0	-
Boreal	Athabasca Plain	7,392,000	208,000	(3)	7,392,000	208,000	(3)	0	0	-
Shield	Churchill River Upland	11,314,000	943,000	(8)	11,314,000	943,000	(8)	2,633,000	391,000	(15)
	Sub-total Boreal Shield	18,706,000	1,151,000	(6)	18,706,000	1,151,000	(6)	2,633,000	391,000	(15)
Boreal	Mid-Boreal Upland	10,196,000	1,330,000	(13)	9,488,000	1,157,000	(12)	8,747,000	1,036,000	(12)
Plain	Mid-Boreal Lowland	2,159,000	232,000	(11)	2,094,000	204,000	(10)	2,094,000	204,000	(10)
	Boreal Transition	5,420,000	489,000	(9)	865,000	96,000	(11)	865,000	96,000	(11)
	Sub-total Boreal Plain	17,775,000	2,051,000	(12)	12,447,000	1,457,000	(12)	11,706,000	1,336,000	(11)
Prairie	Aspen Parkland	8,161,000	504,000	(6)	0	0	-	0	0	-
	Moist Mixed Grassland	6,787,000	449,000	(7)	0	0	-	0	0	-
	Mixed Grassland	8,652,000	1,296,000	(15)	0	0	-	0	0	-
	Cypress Upland	503,000	107,000	(21)	0	0	-	0	0	-
	Sub-total Prairie	24,103,000	2,356,000	(10)	0	0	-	0	0	-
Total Saskatchewan		65,229,000	6,149,000	(9)	35,798,000	3,199,000	(9)	14,339,000	1,727,000	(12)

[†] Area includes Cold Lake Air Weapons Range, Suggi Lowlands, and Provincial and Federal parks adjacent to commercial forest zone.

Table 8. Area of forested and non-forested protected area land types within the Province of Saskatchewan (SK), the provincial forest (PF), and the greater commercial forest zone (GCFZ).

Land Type		SK		PF [†]		GCFZ [†]	
		(ha and (%))		(ha and (%))		(ha and (%))	
Forest	Softwood	1,073,000	(17)	1,023,000	(32)	348,000	(20)
	Mixedwood	430,000	(7)	397,000	(13)	289,000	(17)
	Hardwood	687,000	(11)	300,000	(9)	252,000	(15)
	Open Productive/Shrub	513,000	(8)	256,000	(8)	36,000	(2)
	Sub-total forest	2,703,000	(43)	1,976,000	(62)	925,000	(54)
Non-forest	Agricultural land	241,000	(4)	<1,000	(<1)	<1,000	(<1)
	Grassland	1,442,000	(24)	4,000	(<1)	4,000	(<1)
	Wetland	793,000	(13)	576,000	(18)	444,000	(26)
	Water	752,000	(12)	540,000	(17)	329,000	(19)
	Rock and sand	168,000	(3)	69,000	(2)	21,000	(1)
	Anthropogenic	21,000	(<1)	5,000	(<1)	4,000	(<1)
	Sub-total non-Forest	3,417,000	(56)	1,194,000	(37)	802,000	(46)
No data[‡]		29,000	(1)	29,000	(1)	0	(0)
Total Saskatchewan		6,149,000	(100)	3,199,000	(100)	1,727,000	(100)

[†] Area includes Cold Lake Air Weapons Range, Suggi Lowlands, and Provincial and Federal parks adjacent to commercial forest zone.

[‡] Gaps in source land type data exist in the far northern portion of Saskatchewan due to the nature of the source information (Landsat-based Northern Digital Land Cover Map of Saskatchewan, circa 2000).

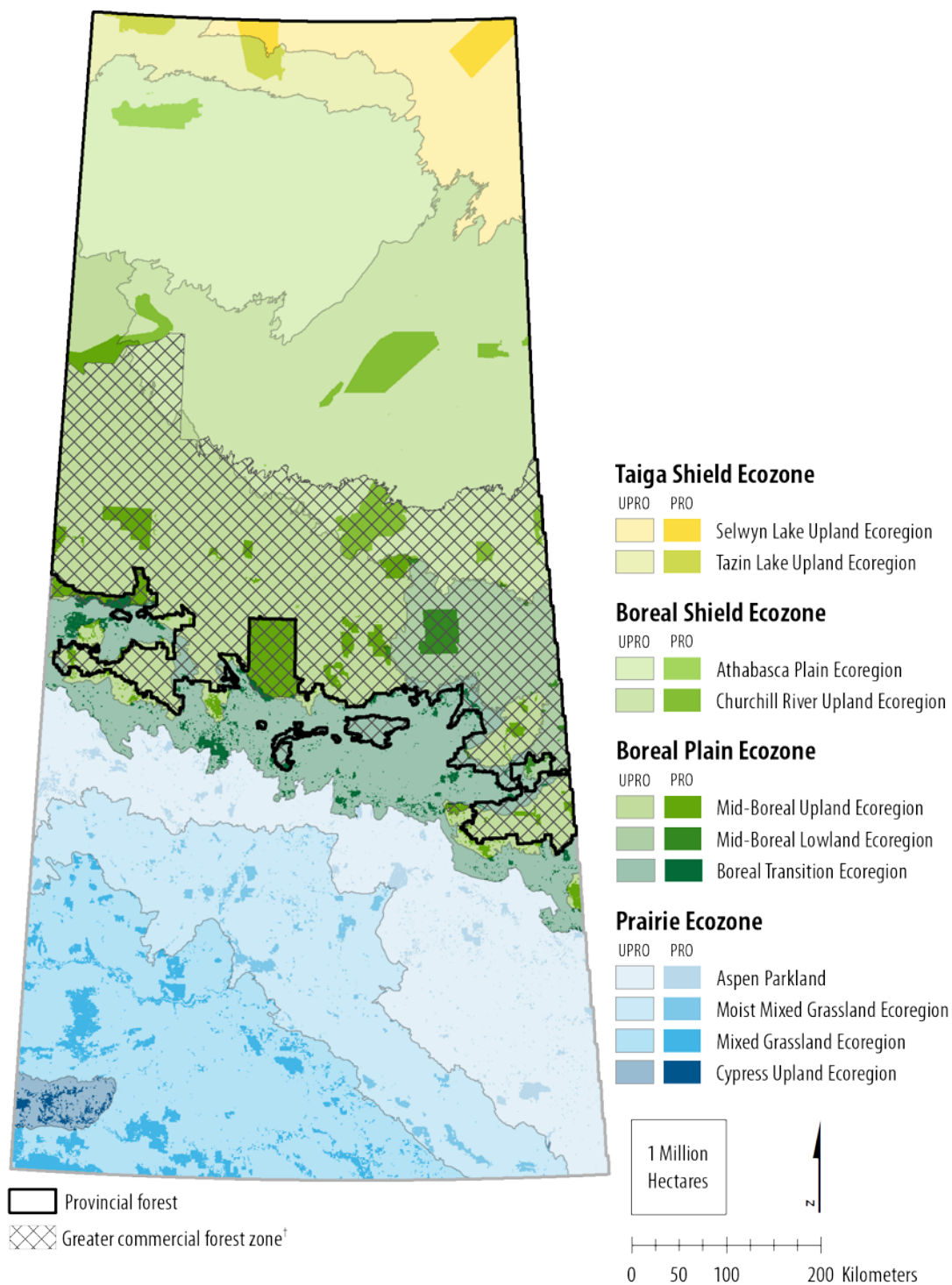
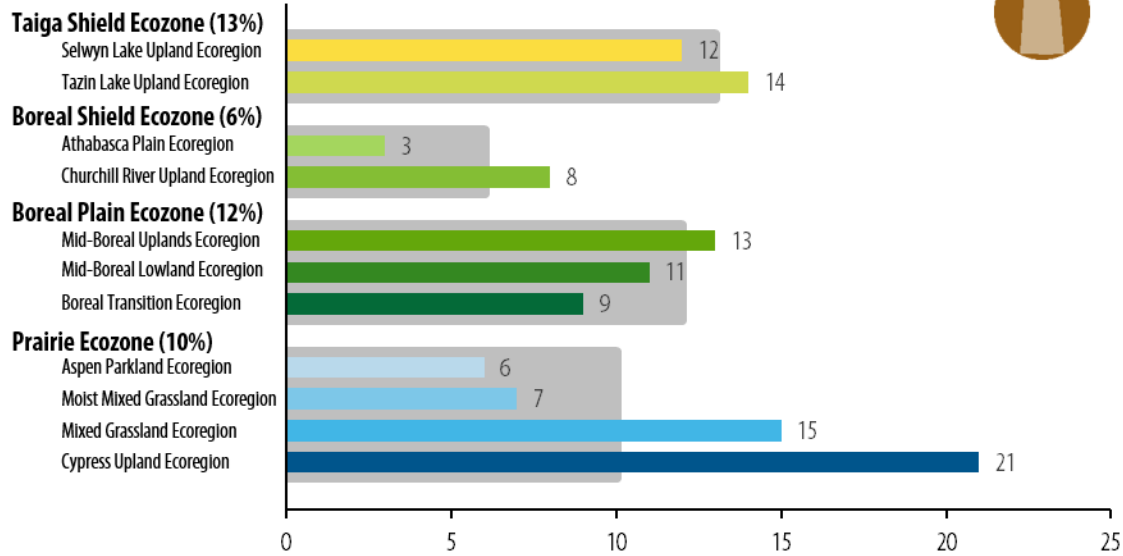


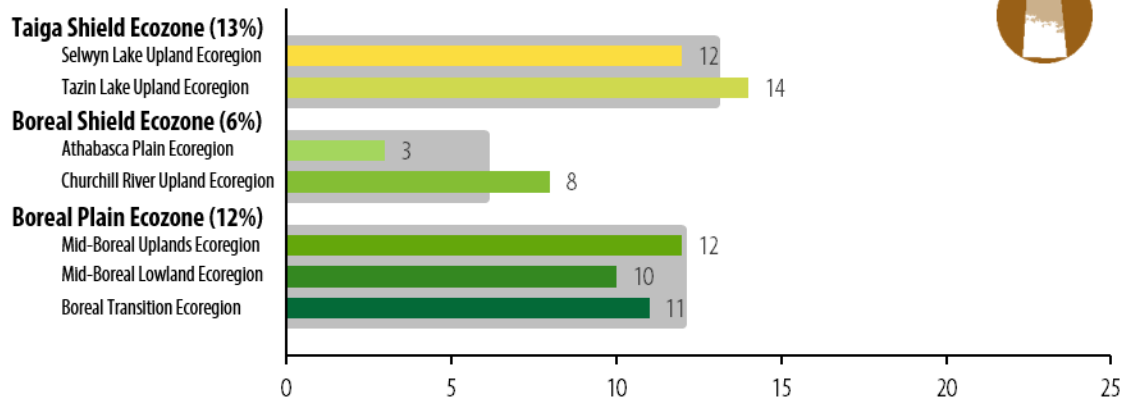
Figure 13. Extent of protected (PRO) and unprotected (UPRO) areas within the province of Saskatchewan, provincial forest, and greater commercial forest zone, in relation to the ecozones and ecoregions of Saskatchewan.

[†] Area includes Cold Lake Air Weapons Range, Suggi Lowlands, and Provincial and Federal parks adjacent to commercial forest zone.

a) Province of Saskatchewan (6,149,000 ha)



b) Provincial forest[†] (3,199,000 ha)



c) Greater commercial forest zone[†] (1,727,000 ha)

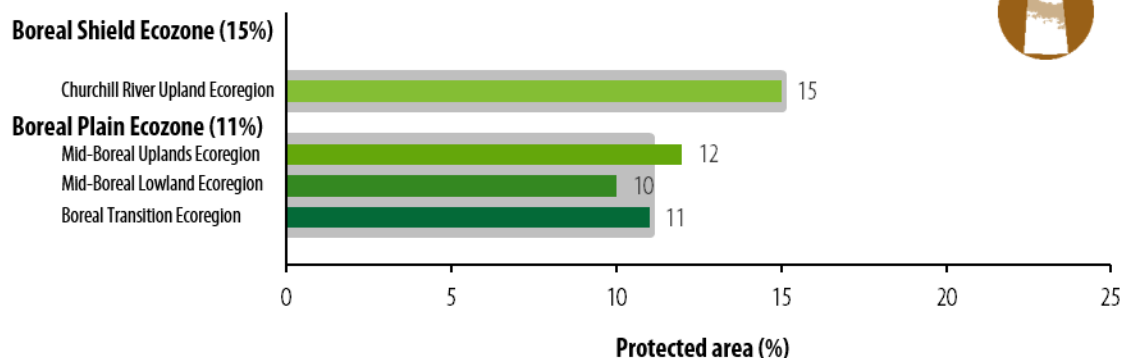


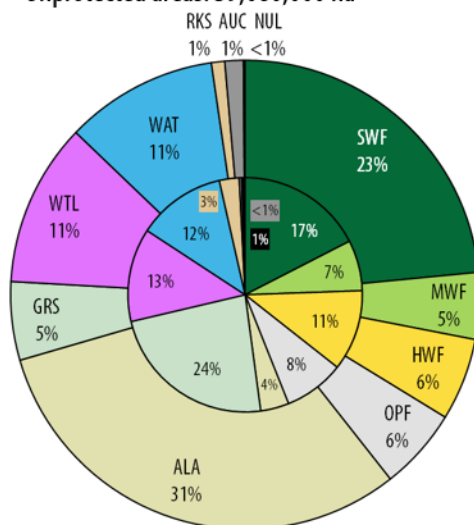
Figure 14. Per cent area protected within (a) the Province of Saskatchewan, (b) the provincial forest, and (c) the greater commercial forest zone, by ecozone and ecoregion. Grey bars show per cent area protected by ecozone, coloured bars show per cent area by ecoregion.

[†] Area includes Cold Lake Air Weapons Range, Suggi Lowlands, and Provincial and Federal parks adjacent to commercial forest zone.

a) Province of Saskatchewan

Protected areas: 6,149,000 ha

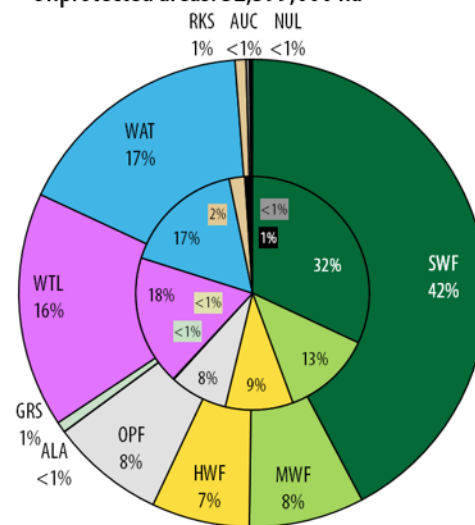
Unprotected areas: 59,080,000 ha



b) Provincial forest[†]

Protected areas: 3,199,000 ha

Unprotected areas: 32,599,000 ha



c) Greater commercial forest zone[†]

Protected areas: 1,727,000 ha

Unprotected areas: 12,612,000 ha

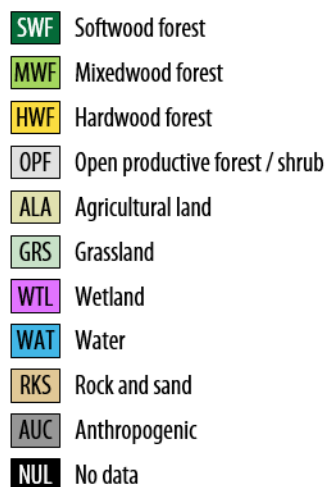
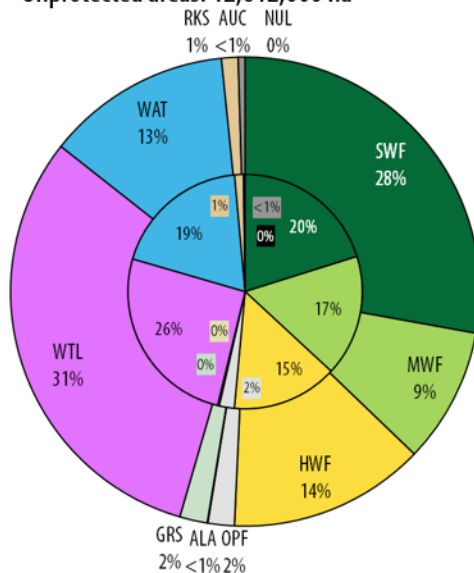


Figure 15. Protected area (inner pie chart) and unprotected area (outer pie chart) land cover types within (a) the Province of Saskatchewan, (b) the provincial forest, and (c) the greater commercial forest zone.

[†] Area includes Cold Lake Air Weapons Range, Suggi Lowlands, and Provincial and Federal parks adjacent to commercial forest zone

Within the Taiga Shield, Boreal Shield, and Boreal Plain ecozones, and covering approximately 34 million hectares, is the “provincial forest”. Like the province as a whole, protected areas within and adjacent to the provincial forest account for nine per cent of its area (Table 7 and Figure 13). At the ecozone level, 13 per cent of the Taiga Shield, six per cent of the Boreal Shield, and 12 per cent of the Boreal Plain ecozones within the provincial forest are protected (Table 7 and Figure 14b). Upland forests account for 62 per cent of protected areas in the provincial forest (32 per cent softwood, 13 per cent mixedwood, nine per cent hardwood, and eight per cent open productive/shrub forest cover species groups). Wetlands and water account for 18 per cent and 17 per cent of the provincial forest’s protected areas, respectively. Grass, agricultural, barren rock/sand, anthropogenic, and other areas make up the remaining three per cent (Table 8 and Figure 15b).

Within the provincial forest, the greatest amount of human activity occurs within a 14.3 million-hectare area, referred to here as the “greater commercial forest zone”. Protected areas within the greater commercial forest zone account for 12 per cent of its area (Table 7 and Figure 13). At the ecozone level, 15 per cent of the Boreal Shield, and 11 per cent of the Boreal Plain ecozones within the greater commercial forest zone are protected (Table 7 and Figure 14c).

Upland forests account for 54 per cent of protected areas in the greater commercial forest zone (20 per cent softwood, 17 per cent mixedwood, 15 per cent hardwood, and two per cent open productive/shrub forest cover species groups). Wetlands and water account for 26 per cent and 19 per cent of the greater commercial forest zone’s protected areas, respectively. Grass, agricultural, barren rock/sand, and anthropogenic areas make up the remaining one per cent (Table 8 and Figure 15c).

Greater commercial forest zone

Within the greater commercial forest zone, sufficient forest inventory data exists to refine the categorization of land and forest types, and to explore the distribution of upland forest ages. Seral stages are the steps upland forest ecosystems move through as they age. Within greater commercial forest zone protected areas, 40 per cent of upland forests are considered “young” or “immature”, 40 per cent are considered “mature” or “old”, and 20 per cent are considered “very old”. Across all seral stages, there is a balanced distribution of forest cover species groups (Table 9). Compared to the proportion of the greater commercial forest zone not under some form of protection, protected areas have 25 per cent more mature (+7 per cent), old (+9 per cent) and very old (+9 per cent) seral stages, and 25 per cent less young (-16 per cent) and immature (-9 per cent) seral stages (Table 9 and Figure 16). The proportion of mixedwood cover species groups are 13 per cent more prevalent in protected areas than in unprotected areas. At the same time, softwood forest cover species groups are 14 per cent less prevalent in protected areas than in unprotected areas.

Table 9. Area of protected (PRO) and unprotected (UPRO) forest cover species groups within the greater commercial forest zone (GCFZ), by seral stage.

Forest cover species group	Seral stage [‡]										Total GCFZ [†] (ha and (%))
	Young (ha and (%))		Immature (ha and (%))		Mature (ha and (%))		Old (ha and (%))		Very old (ha and (%))		
Protected areas											
Softwood	40,000	(4)	115,000	(13)	52,000	(5)	53,000	(6)	88,000	(10)	348,000 (38)
Mixedwood	32,000	(3)	86,000	(9)	41,000	(5)	51,000	(6)	79,000	(8)	289,000 (31)
Hardwood	7,000	(1)	63,000	(6)	99,000	(11)	65,000	(7)	18,000	(2)	252,000 (27)
Open / shrub	4,000	(1)	32,000	(3)	0	(0)	0	(0)	0	(0)	36,000 (4)
Subtotal PRO	83,000	(9)	296,000	(31)	192,000	(21)	169,000	(19)	185,000	(20)	925,000 (100)
Unprotected areas											
Softwood	914,000	(14)	1,380,000	(20)	430,000	(6)	265,000	(4)	523,000	(8)	3,512,000 (52)
Mixedwood	313,000	(5)	437,000	(7)	158,000	(2)	113,000	(2)	156,000	(2)	1,177,000 (18)
Hardwood	329,000	(5)	702,000	(11)	369,000	(6)	230,000	(4)	79,000	(1)	1,709,000 (27)
Open / shrub	98,000	(1)	131,000	(2)	0	(0)	0	(0)	0	(0)	229,000 (3)
Subtotal UPRO	1,654,000	(25)	2,650,000	(40)	957,000	(14)	608,000	(10)	758,000	(11)	6,627,000 (100)
Total GCFZ [†]	1,737,000	(24)	2,946,000	(39)	1,149,000	(15)	777,000	(10)	943,000	(12)	7,552,000 (100)

[†] Area includes Cold Lake Air Weapons Range, Suggi Lowlands, and Provincial and Federal parks adjacent to commercial forest zone.

[‡] Softwood or softwood-leading mixedwood seral stages: Young (0-20 years); Immature (21-80 years); Mature (81-100 years); Old (101-120 years); Very Old (>120 years). Hardwood or hardwood-leaning mixedwood seral stages: Young (0-20 years); Immature (21-70 years); Mature (71-90 years); Old (91-120 years); Very Old (>120 years).

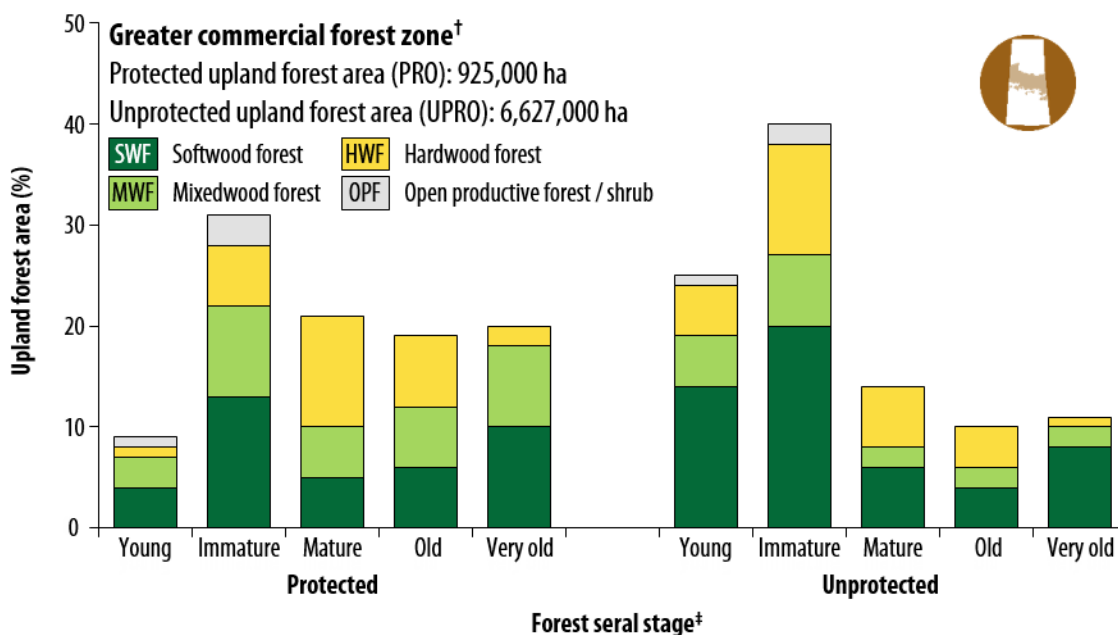


Figure 16. Greater commercial forest zone[†] protected and unprotected per cent upland forest area by softwood (SWF), mixedwood (MWF), hardwood (HWF), and open productive / shrub forest (OPF) cover species groups, and by forest seral stage[‡].

[†] Area includes Cold Lake Air Weapons Range, Suggi Lowlands, and Provincial and Federal parks adjacent to commercial forest zone.

[‡] Softwood or softwood-leading mixedwood seral stages: Young (0-20 years); Immature (21-80 years); Mature (81-100 years); Old (101-120 years); Very Old (>120 years). Hardwood or hardwood-leaning mixedwood seral stages: Young (0-20 years); Immature (21-70 years); Mature (71-90 years); Old (91-120 years); Very Old (>120 years).

Within the 925,000 ha of protected upland forests in the greater commercial forest zone, five softwood, four mixedwood, four hardwood, and one open productive/shrub “provincial forest types” are recognized (Table 10). Softwood types are predominant (38 per cent), with spruce and pine mixed dominated softwoods being the most common (14 per cent). Mixedwood types are the second most prevalent (31 per cent), with spruce influenced mixedwoods (22 cent) occurring more than twice as frequently than pine influenced mixedwoods (nine per cent). Hardwood types represent 27 per cent of protected greater commercial forest zone upland forests, with the large majority being trembling aspen dominated hardwoods (25 per cent) (Figure 17a). Compared to that proportion of the greater commercial forest zone not under some form of protection (Figure 17b), protected areas have 11 per cent more spruce influenced mixedwoods and six per cent more trembling aspen-dominated hardwoods. Protected areas also have nine per cent fewer jack pine-dominated and four per cent fewer lowland black spruce softwoods compared to greater commercial forest zone unprotected areas.

Table 10. Area of protected (PRO) and unprotected (UPRO) forested and non-forested land types within the greater commercial forest zone (GCFZ).

Land type		PRO GCFZ [†] (ha and (%))		UPRO GCFZ [†] (ha and (%))	
Forest	Softwood	White spruce or balsam fir dominating	29,000 (2)	151,000 (1)	
		Upland black spruce dominating	52,000 (3)	470,000 (4)	
		Lowland black spruce dominating or tamarack influencing	62,000 (4)	742,000 (6)	
		Jack or lodgepole pine dominating	74,000 (4)	1,158,000 (9)	
		Spruce and pine mixed dominating	131,000 (8)	991,000 (8)	
		Sub-total softwood	348,000 (21)	3,512,000 (28)	
	Mixedwood	Softwood leading, spruce influencing	75,000 (4)	300,000 (2)	
		Softwood leading, pine influencing	52,000 (3)	256,000 (2)	
		Hardwood leading, spruce influencing	135,000 (8)	397,000 (3)	
		Hardwood leading, pine influencing	27,000 (2)	224,000 (2)	
		Sub-total mixedwood	289,000 (17)	1,177,000 (9)	
	Hardwood	Hardwood trembling aspen dominating	229,000 (13)	1,227,000 (10)	
		Hardwood white birch dominating	2,000 (<1)	35,000 (<1)	
		Hardwood aspen and birch mixed dominating	18,000 (1)	303,000 (2)	
		Hardwood other hardwood dominating	3,000 (<1)	144,000 (1)	
		Sub-total hardwood	252,000 (14)	1,709,000 (13)	
		Open productive / shrub	36,000 (2)	229,000 (2)	
		Sub-total forest	925,000 (54)	6,627,000 (52)	
Non-forest		Agricultural land	<1,000 (<1)	6,000 (<1)	
		Grassland	4,000 (<1)	240,000 (2)	
		Treed wetland	349,000 (20)	3,051,000 (24)	
		Shrubby wetland	32,000 (2)	315,000 (3)	
		Open wetland	63,000 (4)	560,000 (4)	
		Water	329,000 (19)	1,609,000 (13)	
		Treed rock	21,000 (1)	142,000 (1)	
		Rock and sand	<1,000 (<1)	2,000 (<1)	
		Anthropogenic	4,000 (<1)	60,000 (1)	
		Sub-total non-forest	802,000 (46)	5,985,000 (48)	
Total greater commercial forest zone			1,727,000 (100)	12,612,000 (100)	

[†] Area includes Cold Lake Air Weapons Range, Suggi Lowlands, and Provincial and Federal parks adjacent to commercial forest zone.

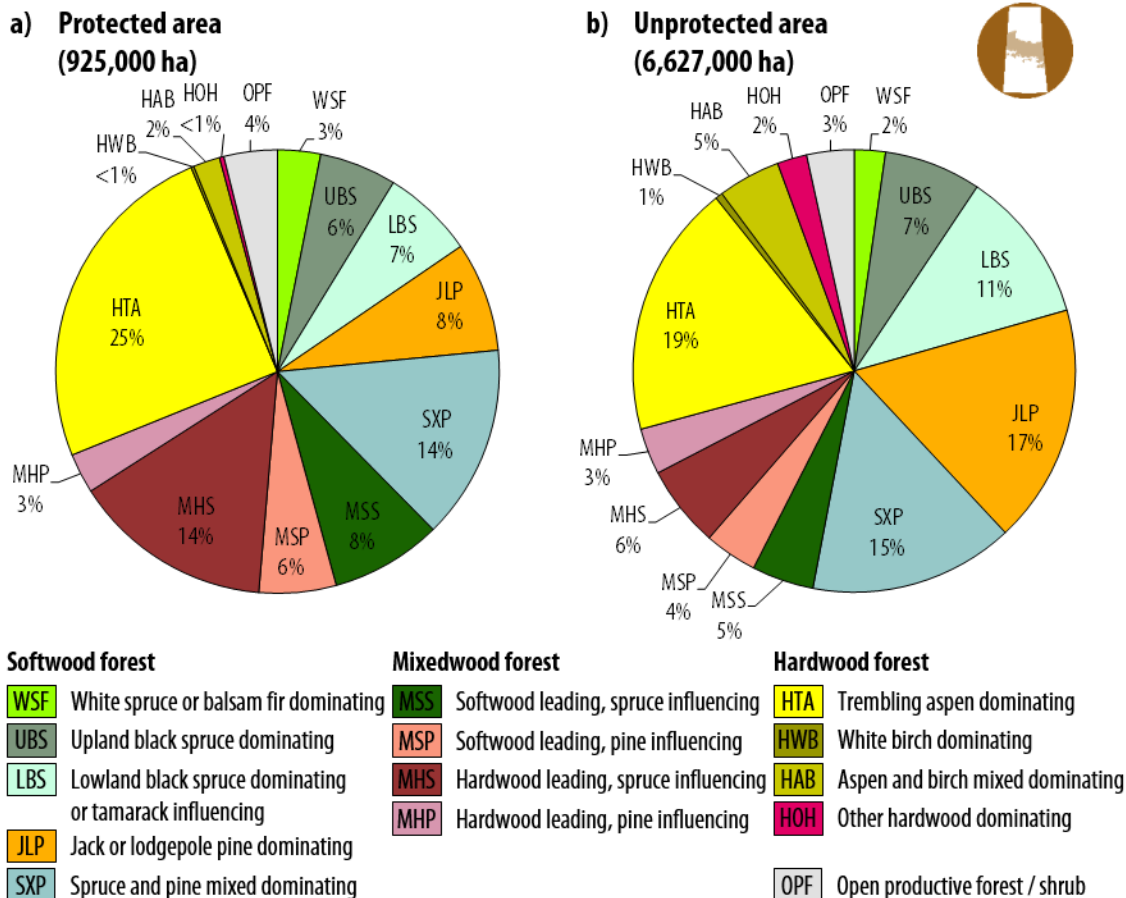


Figure 17. Per cent upland forest area within the greater commercial forest zone[†] (a) protected and (b) unprotected areas by upland forest type.

[†] Area includes Cold Lake Air Weapons Range, Saggi Lowlands, and Provincial and Federal parks adjacent to commercial forest zone.

Greater commercial forest zone protected areas contain 444,000 ha of wetlands (Table 10). Treed wetlands are predominant (20 per cent), shrubby and open wetlands account for two per cent and four per cent, respectively. Wetland types represent a slightly lower proportion of protected areas than unprotected areas. Here, unprotected treed, shrubby, and open wetland areas accounted for 24 per cent, three per cent and four per cent, respectively.

Change in distribution and abundance of protected areas

Following recommendations of the Brundtland Commission's report, *Our Common Future* (WCED 1987), Saskatchewan's Representative Area Network program set a goal to identify and designate 12 per cent of the province's natural landscapes by 2000. Over the last century, lands designated as protected in Saskatchewan have increased gradually from less than one per cent in 1919, to its current state of nine per cent (Figure 18a). While the current state of protected areas in Saskatchewan is less than the provincial protection target, the trend continues to move in a positive direction. Between 2000 and 2009 areas protected in Saskatchewan have increased from 4.97 million hectares (eight per cent) to 5.68 million hectares (nine per cent). In the last 10 years, 470,000 hectares have been placed under protection in Saskatchewan for a total of 6.15 million hectares (nine per cent).

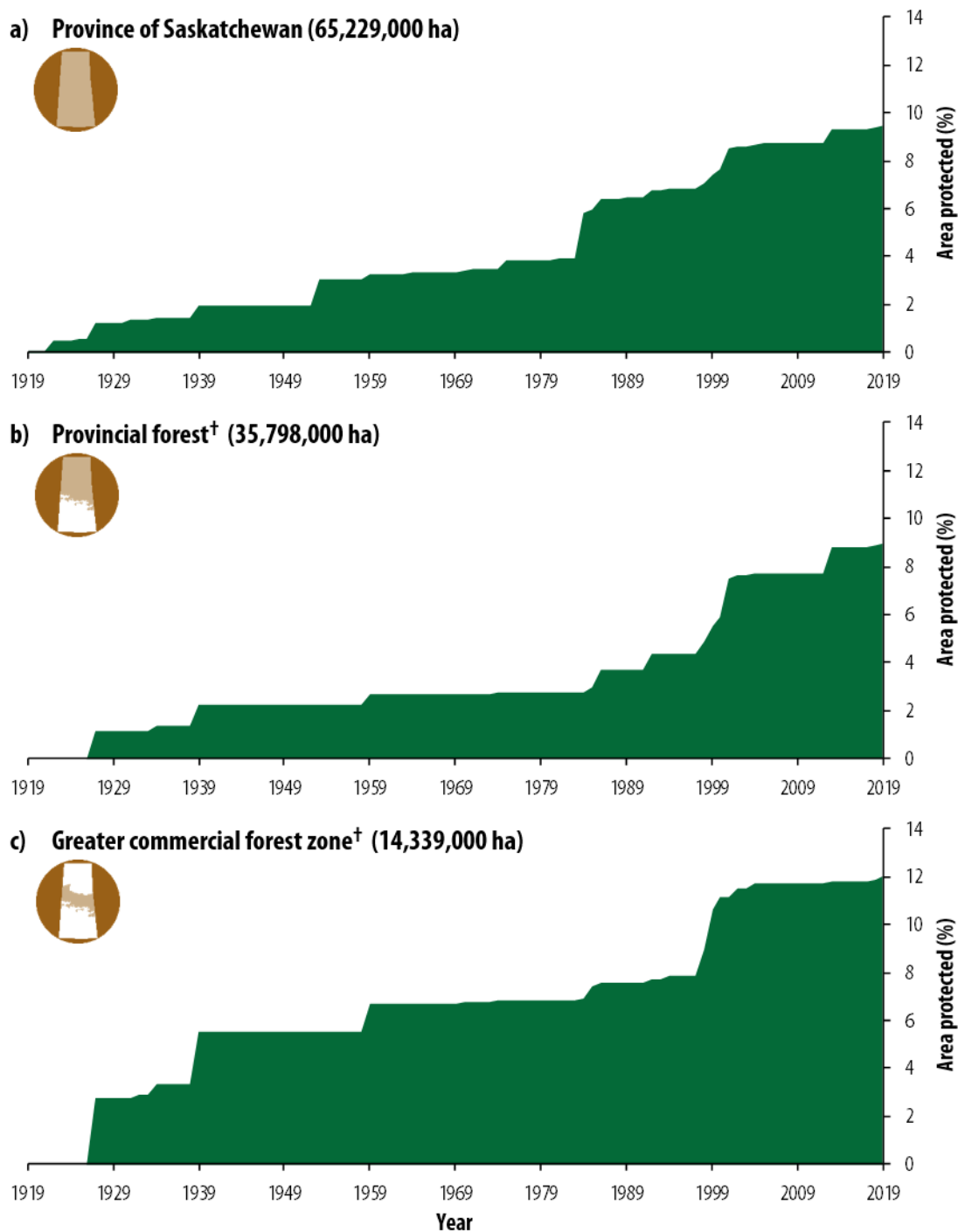


Figure 18. Per cent area protected over time for (a) the Province of Saskatchewan, (b) the provincial forest, and (c) the greater commercial forest zone.

[†] Area includes Cold Lake Air Weapons Range, Suggi Lowlands, and Provincial and Federal parks adjacent to commercial forest zone.

The protection of lands within and adjacent to the provincial forest has followed a pattern similar to that of the province as a whole, and is also currently nine per cent protected (Figure 18b). Between 2000 and 2009 areas protected within and adjacent to the provincial forest have increased from 2.09 million hectares (six per cent) to 2.76 million hectares (eight per cent). In the last 10 years, 436,000 hectares have been placed under protection in the provincial forest for a total of 3.20 million hectares (nine per cent).

The protection of lands within the greater commercial forest zone has been at or above 12 per cent since 2004 (Figure 18c). Between 2000 and 2009 areas protected within and adjacent to the greater commercial forest zone have increased from 1.60 million hectares (11 per cent) to 1.68 million hectares (12 per cent). In the last 10 years, 47,000 hectares have been placed under protection in the greater commercial forest zone for a total of 1.73 million hectares (12 per cent).

Protected areas indicator summary

State: mixed/fair

The province of Saskatchewan has nine per cent of its land base under some form of protection. While this is less than the 12 per cent goal set by Saskatchewan's Representative Area Network program, the trend continues to move in a positive direction. Regionally, 12 per cent protection has been achieved in a number of parts of the province. For example, the Taiga Shield and Boreal Plain ecozones have achieved 13 per cent and 12 per cent protection, respectively. On the other hand, the area protected in the Prairie and Boreal Shield ecozones are currently less than the 12 per cent protection target.

Like the province as a whole, protected areas within and adjacent to the provincial forest account for nine per cent of the land base, falling below the 12 per cent provincial target. However, when protected areas within the greater commercial forest zone are summarized, the 12 per cent target is achieved. As this zone is where forest land use pressures are highest, protection is of greatest importance. Current land use pressures in the portion of the provincial forest north of the greater commercial forest zone are relatively minor, suggesting that the majority of this landscape is in a natural state. The relative lack of forest land use pressures in this portion of the provincial forest suggests that the functional area protected is larger than the nine per cent with official protection designations. However, with continued interest in development, there may soon be a need to establish more protected areas in the northern ecoregions.

When compared to unprotected areas, protected areas within the greater commercial forest zone contain older forests that favor mixedwood cover species groups over softwood cover species groups. Specifically, 60 per cent of protected upland forests within the greater commercial forest zone are of the mature, old, and very old seral stages. Comparatively, 35 per cent of unprotected upland forests are of the mature, old, and very old seral stages. The proportion mixedwood cover species groups are 13 per cent more prevalent in greater commercial forest zone protected areas than in unprotected areas. At the same time, softwood forest cover species groups are 14 per cent less prevalent in greater commercial forest zone protected areas than in unprotected areas.

Trend: improving

Over the last century lands designated as protected in Saskatchewan have increased gradually from less than one per cent in 1919, to its current state of nine per cent. While this remains less than the 12 per cent provincial target, the trend continues to move in a positive direction with the designation of new protected areas.

Information: partial

The best available protected area and forest inventory data were used in preparation of this indicator. In a number of cases, the year a protected areas came into effect was unknown and was estimated. Multiple sources of inventory data were combined to represent forested and non-forested land types. Many of the forest inventory sources used were created prior to 2009 and were updated to account for forest year of origin changes resulting from fire, harvest, and other stand re-initiating disturbances.

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Seymour, R. and Hunter, M. 1999. Principles of ecological forestry. In Managing biodiversity in forested ecosystems, edited by Hunter, M. Cambridge: Cambridge University Press. pp 22-61.

Van Wagner, C.E. 1978. Age-class distribution and the forest fire cycle. Can. J. For. Res. 8: 220-227.

World Commission on Environment and Development (WCED). 1987. Our Common Future ("Brundtland Report"). Oxford University Press: Oxford, UK. 400 p.

Data sources

Saskatchewan northern digital land cover raster data (circa 2000)
Mistik / L&M FMA planning inventory (circa 2015)
Prince Albert FMA planning inventory (circa 2015)
Pasquia Porcupine FMA planning inventory (circa 2015)
Tolko TSL planning inventory (circa 2015)
North West TSL planning inventory (circa 2015)
Island Forest TSA planning inventory (circa 2015)
Meadow Lake Provincial Park SFVI inventory (circa 2007)
UTM smoothline inventory (1960s, 70s, 80s, 90s)
Prince Albert National Park inventory (circa 1968)
Agriculture Canada Annual Crop Inventory (2011 to 2017)
egis: PLANNING.Representative_Area_EcoReserve (accessed 24 September 2018)
egis: ADMINISTRATIVE.park (accessed 30 August 2018)
fwlb: WHPA_New.shp (accessed 21 September 2018)
fwlb: CCE_2018_Working.shp (accessed 21 September 2018)
fwlb: RAER_All.shp (accessed 21 September 2018)
carts: CARTS2017.gdb (accessed 5 May 2018)