

# Saskatchewan Forest Products Buyers' Guide



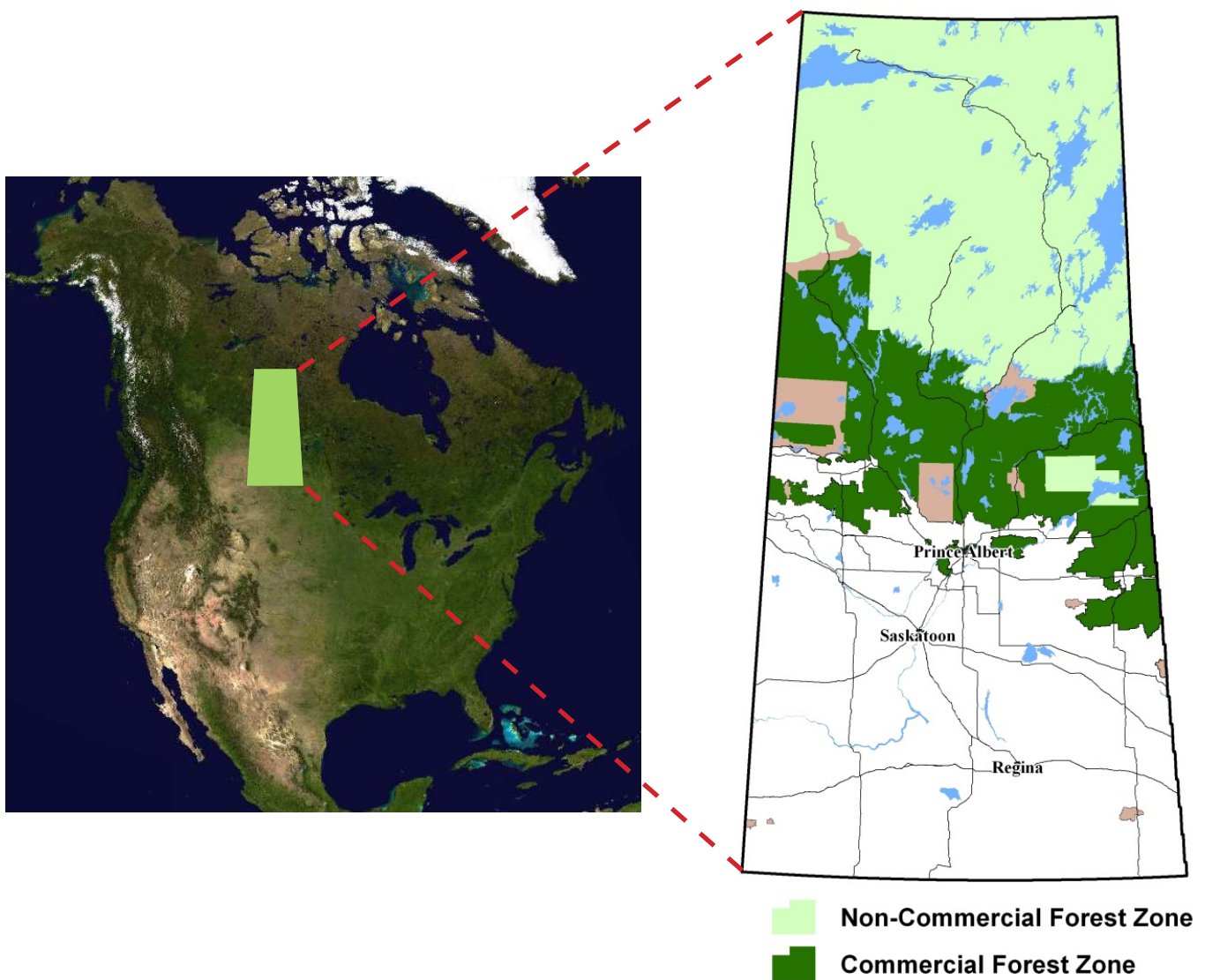
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# Introduction

The Saskatchewan Forest Products Buyers' Guide provides key information about Saskatchewan forest products to buyers around the world.

Saskatchewan has one of the most competitive business climates in North America. Our economy is strong and growing, including the forestry sector which is poised for growth and well positioned to meet increased global demand for forest products.

The province of Saskatchewan is located in western Canada. Boreal forest covers the entire northern half of the province, totalling 34 million hectares, most of which is owned by the Government of Saskatchewan. The Commercial Forest Zone is 12 million hectares, 5.0 million of which is productive forest land available for commercial timber harvesting. The current annual allowable cut (AAC) is over 9 million cubic metres of timber (4.7 million m<sup>3</sup> of coniferous trees and 4.3 million m<sup>3</sup> of deciduous trees).





## Saskatchewan forest products are sourced from natural forests

All Saskatchewan forest products are sourced from natural forests, because second rotation (plantation) forests are still too young to be harvested. Saskatchewan's main tree species are white spruce, jack pine, black spruce, and trembling aspen. These slow-growing boreal species yield high-quality wood that is dense and strong.



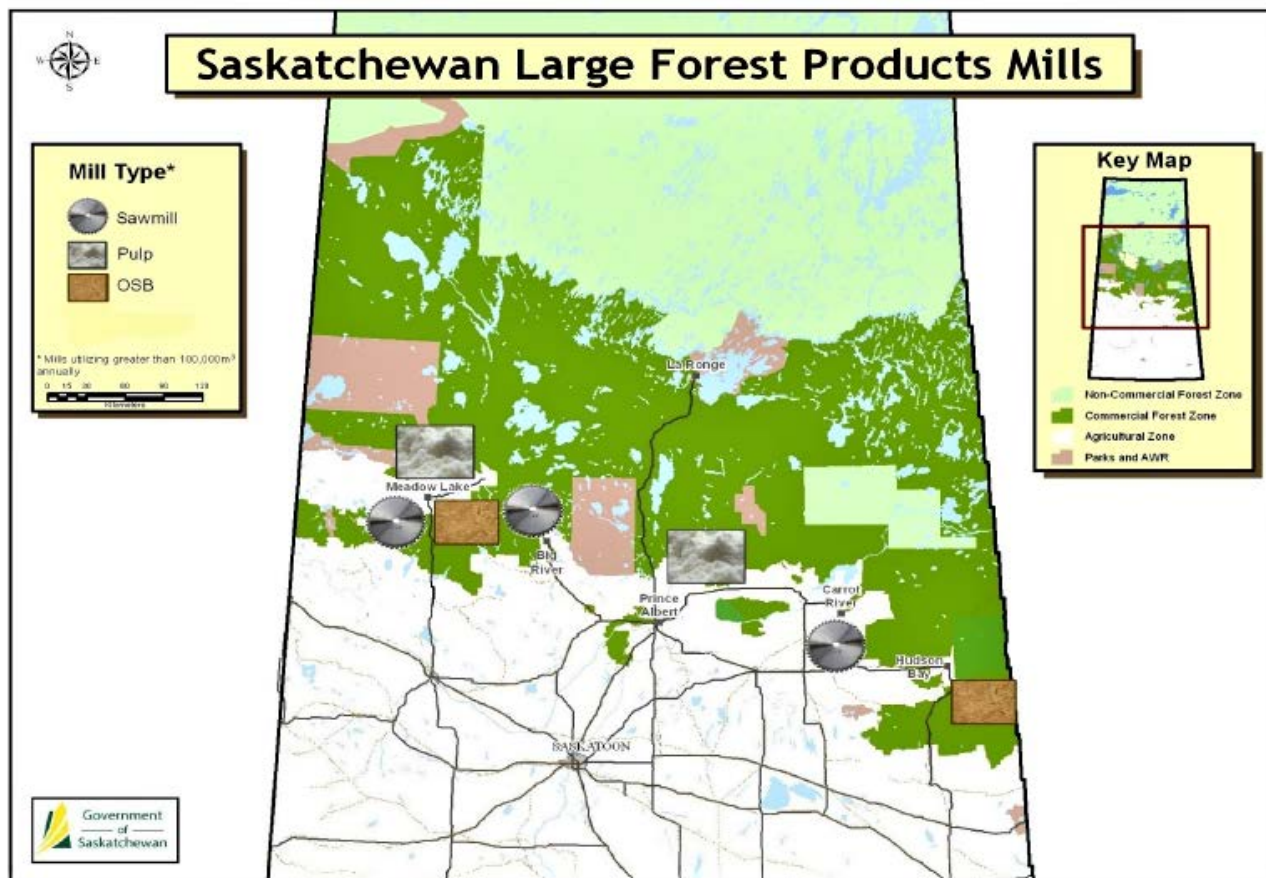
## Saskatchewan's robust forest industry

Forestry is northern Saskatchewan's largest industry, supporting nearly 8,000 jobs and generating over \$1 billion in sales annually, of which over 65% is from exports.

Saskatchewan forest companies have stable, long-term access to timber under a market-based timber-royalty system. Companies have an assured log supply at a predictable and competitive cost.

Aboriginal people own and operate numerous successful forestry businesses. Aboriginal people comprise over 27% of the workforce, which is the largest percentage of Aboriginal forestry employees in Canada.

Saskatchewan's forest industry is well established and competitive, and mills are equipped with leading-edge technology. The industry produces a large variety of products, ranging from dimension and stud lumber, oriented strand board (OSB), and pulp, to treated wood, cabinets, millwork, roof trusses, log and timber-frame homes, posts, and poles.



## Lumber



Saskatchewan has three large sawmills and a variety of smaller sawmills, with a combined annual production capacity of over 500 million board feet (800,000 m<sup>3</sup>) of spruce-pine-fir (SPF) lumber. Stud mills produce lumber in 2×3, 2×4, and 2×6-inch sizes, in lengths ranging from 5 to 9 feet. Dimension mills produce lumber in a variety of sizes ranging from 1×4 up to 2×10 inches, and they produce square timbers up to 8×8 inches. Lengths range from 8 to 20 feet. Metric dimensions are also available.





Saskatchewan lumber is made primarily from white spruce, jack pine, and black spruce, which yield very high quality lumber, with a high strength-to-weight ratio. The lumber is graded by the Central Forest Products Association (CFPA) according to the internationally recognized rules of the Canadian Standards Association (CSA) and Canada's National Lumber Grades Authority (NLGA). The Central Forest Products Association is accredited by the Canadian Lumber Standards Accreditation Board (CLSAB).

Lumber grades include J-Grade, #2 and better, #3, and economy. Most lumber, including all lumber destined for export, is kiln dried and heat treated (KD-HT).

Lumber has a variety of uses including residential and commercial building construction, general millwork, furniture, interior finishing, crates, and pallets.





## ***Oriented strand board***

Saskatchewan has two large oriented strand board (OSB) mills with a combined annual production capacity of 1.2 billion square feet – 3/8 inch basis (1.1 million m<sup>3</sup>). OSB is primarily produced from trembling aspen. Aspen's light-coloured wood fibre has an even grain that produces strong, lightweight panels with excellent workability.

OSB products include wall and roof sheathing, tongue-and-groove and square-edge flooring and sub-flooring, rim board, concrete forms, stair treads, and panels certified to the Japanese Agriculture Standard (JAS).

All OSB is certified by APA – The Engineered Wood Association in accordance with North American and Japanese standards.



## ***Pulp***

Saskatchewan has two pulp mills with a combined annual production capacity of 750,000 tonnes. A northern bleached softwood kraft (NBSK) pulp mill has an annual production capacity of 350,000 tonnes, and a bleached chemi-thermomechanical pulp (BCTMP) mill has an annual production capacity of 400,000 tonnes.

Pulp is utilized in the production of a wide variety of paper and packaging products.



## *Secondary manufacturing*

Saskatchewan also has an active secondary manufacturing sector. Cabinets, millwork, and roof trusses make up the largest share of secondary products, which are manufactured for both domestic and export markets. Saskatchewan has log, timber-frame, and log post-and-beam home manufacturers, which also serve domestic and export markets. Creative and customized design, high-quality logs, superior craftsmanship, and energy efficiency are hallmarks of their work.

Wood-treatment plants pressure treat pine and spruce using either oil-based pentachlorophenol (penta) or water-borne chromated copper arsenate (CCA). The treatment plants produce fence posts, rails, timbers, power poles, and other wood products requiring enhanced durability.



# Sustainably managed and certified forests

Most of Saskatchewan's commercial forest is certified to one or more internationally recognized forest certification systems, including the Sustainable Forest Initiative (SFI) and the Forest Stewardship Council (FSC).

The Government of Saskatchewan regulates timber-harvesting activities, and works collaboratively with the forest industry to ensure Saskatchewan's forests are sustainably managed and the forestry sector remains globally competitive.

Government regulations, standards, and monitoring activities ensure a balance of economic, social, and ecological values.



# Efficient product delivery and export

Saskatchewan has a well-established road and rail transportation network that provides excellent access to North American and offshore markets. The two world-class container ports on Canada's west coast give customers from around the world ready access to Saskatchewan's forest products.

Key export destinations for Saskatchewan forest products include the United States and Asia.

Saskatchewan forest companies are looking for new markets. Government and non-government organizations support these efforts by providing marketing and logistical support to export companies.

*Central location provides easy access to North American and global markets*



# Characteristics of Saskatchewan's Major Commercial Tree Species





# Jack Pine

## Botanical Name: *Pinus banksiana*

Jack pine is the most widely distributed pine species in Canada’s boreal forest region. It typically grows up to 20 metres high.

Jack pine distribution in Saskatchewan stretches across the province’s entire boreal forest region. Rapidly drained, coarse-textured, sandy soils generally support pure jack pine stands. It is also commonly found in mixed stands together with white spruce, balsam fir, trembling aspen, and black spruce.

In Saskatchewan, jack pine accounts for 26% of the total annual allowable cut and 43% of the coniferous annual allowable cut.

Pines are classified into two groups: soft pines and hard pines. Jack pine is a hard pine because it consists of mainly latewood, which is moderately hard and heavy.

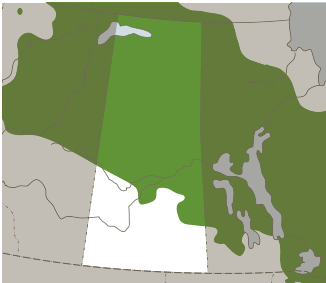
## Common Uses

Jack pine is primarily used in the production of spruce–pine–fir (SPF) lumber, laminating stock and pulp. Other uses include oriented strand board, power poles, railroad ties, and treated posts.

## Key Products

Lumber (SPF)

Pulp



Jack Pine coverage in Saskatchewan.

## Key Statistics

Specific Gravity	0.42
Density (Dry, kg/m <sup>3</sup> )	444
MOE (Dry, MPa)	10200
MOR (Dry, MPa)	77.9
Hardness (Side, N)	2560
Colour – Sapwood	Nearly white
Colour – Heartwood	Pale brown to reddish brown
Machining	Satisfactory to excellent
Fastening	Good
Finishing	Fair to good

## Physical Properties

		Jack Pine	Lodgepole Pine	Douglas-Fir
Density (kg/m <sup>3</sup> )	Green	421	410	450
	Air Dry	444	430	487
Specific Gravity		0.42	0.41	0.45
Hardness (N)	Side	2560	2190	2990
	End	3200	2990	4020
MOE (MPa)	Green	8070	8760	11100
	Air Dry	10200	10900	13500
MOR (MPa)	Green	43.5	39.0	52
	Air Dry	77.9	76.0	88.6
Shrinkage	Radial (OD)	4.0%	4.7%	4.8%
OD = Oven Dry	Tangential (OD)	5.9%	6.8%	7.4%
Air = Air Dry (12%)	Volumetric (OD)	9.6%	11.4%	11.9%
	Volumetric (air)	5.7%	6.6%	7.0%
	Tang / Rad ratio	1.5	1.4	1.50

## Visual Properties

### Colour

Heartwood	Pale brown to reddish brown
Sapwood	Nearly white
Heartwood / Sapwood Contrast	The sapwood is wide and generally makes up at least 50% of the volume of the stem
Latewood / Earlywood Contrast	Growth rings are distinct, delineated by a band of darker latewood. The earlywood zone is narrow to wide, and transition to latewood is abrupt

### Grain

The wood has uneven grain and medium texture and is somewhat resinous

### Figure

Plainsawn lumber or rotary-cut veneer: Distinct with visible latewood bands

Quartersawn lumber or quarter-sliced veneer: Little figure

Other: The split tangential surface is sometimes dimpled. Longitudinal resin canals are numerous and appear as white dots on the transverse surface, or like brownish streaks along the grain on the tangential surface

### Knots

Generally knotty

### Other

Wood has a resinous odour but is without characteristic taste. It is moderately strong in bending, less strong in compression, and fairly resistant to impact. Wood is resinous, pitch pockets are infrequent.

## Working Properties

	<i>Process</i>	<i>Performance</i>	<i>Comments</i>
<b><i>Machining</i></b>			
	Planing	Easy. Excellent planing quality	Recommended planer settings: 20° hook angle and 16 or 20 kmpi (knife marks per inch)
	Turning	Easy	Good surface quality
	Sawing	Easy to saw and work with tools	Little blunting effect
	Boring	Easy. Very good boring quality	
	Mortising	Easy. Very good mortising quality	
	Shaping	Easy to shape and mould	Good shaping quality
	Veneering	N/A	
	Sanding	Fair to good	
<b><i>Fastening</i></b>			
	Screwing	Easy. Good holding	Average screw retention: 458 lb
	Nailing	Easy. Good holding	Average nail retention: 103/104/77 lb (tangential/radial/end-grain)
	Gluing	Easy	Good results
<b><i>Finishing</i></b>			
	Staining	Fairly good results	
	Painting	Paints well	
	Lacquering	Fairly good results	Performed well in the pull-off test
	Waxing	Fairly good to good results	Fairly easy to easy. Recommend light colours
<b><i>Durability</i></b>			
	Decay Resistance	Very limited	
	Treatability	Difficult to penetrate with preservatives	

# White Spruce

## ***Botanical Name: Picea glauca***

White spruce is one of the most widely distributed boreal forest conifers in Canada. It typically grows up to 30 metres high.

White spruce distribution in Saskatchewan stretches across the province's entire boreal forest region. It can be found on moist, well-drained, silty soils. White spruce can form pure stands, but is typically a major component of mixed stands that include trembling aspen, white birch, and balsam fir.

In Saskatchewan white spruce accounts for 16% of the total annual allowable cut and 28% of the coniferous annual allowable cut.

## ***Common Uses***

White spruce is highly valued in the production of spruce-pine-fir (SPF) lumber, laminating stock, and plywood. Other uses include pulp, oriented strand board, and poles.

White spruce lumber is extremely versatile because of its high strength-to-weight ratio.

White spruce has exceptional resonance qualities, and is therefore excellent for manufacturing sounding boards for musical instruments.

## **Key Products**

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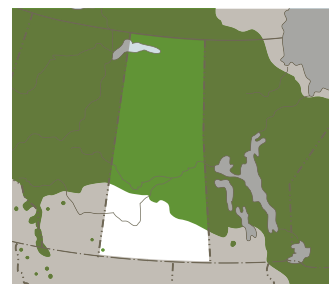
Lumber (SPF)

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Plywood

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Pulp



White Spruce coverage in Saskatchewan.

## **Key Statistics**

Specific Gravity	0.36
Density (Dry, kg/m <sup>3</sup> )	390
MOE (Dry, MPa)	9930
MOR (Dry, MPa)	62.7
Hardness (Side, N)	1880
Colour – Sapwood	Nearly white
Colour – Heartwood	Pale silvery yellow to pale brownish-white; wood is satiny or lustrous with indistinct heartwood
Machining	Good
Fastening	Satisfactory to good
Finishing	Good

## Physical Properties

		<i>White Spruce</i>	<i>Lodgepole Pine</i>	<i>Douglas-Fir</i>
Density (kg/m <sup>3</sup> )	Green	360	410	450
	Air Dry	390	430	487
Specific Gravity		0.36	0.41	0.45
Hardness (N)	Side	1880	2190	2990
	End	2470	2990	4020
MOE (MPa)	Green	7930	8760	11100
	Air Dry	9930	10900	13500
MOR (MPa)	Green	35.2	39.0	52
	Air Dry	62.7	76.0	88.6
Shrinkage	Radial (OD)	3.2%	4.7%	4.8%
OD = Oven Dry	Tangential (OD)	6.9%	6.8%	7.4%
Air = Air Dry (12%)	Volumetric (OD)	11.3%	11.4%	11.9%
	Volumetric (air)	6.8%	6.6%	7.0%
	Tang / Rad ratio	1.6	1.4	1.50

## Visual Properties

### Colour

Heartwood	Pale silvery yellow to pale brownish white, wood is satiny or lustrous
Sapwood	Nearly white
Heartwood / Sapwood Contrast	Sapwood is not usually distinguishable from heartwood
Latewood / Earlywood Contrast	Growth rings are distinct, delineated by the contrast between the latewood and the earlywood of the succeeding ring. Earlywood zone is usually a number of times wider than the latewood zone and transition from earlywood to latewood is gradual

### Grain

Usually straight-grained and fairly fine-textured

### Figure

Plainsawn lumber or rotary-cut veneer: Faint growth ring

Quartersawn lumber or quarter-sliced veneer: Very little

### Knots

Spruce lumber may have numerous small intergrown or encased pin knots

### Other

Wood has no distinctive odour or taste. White spruce is soft but firm, and moderately light in weight. Wood is resinous but hardly ever contains pitch pockets. The woods of white, black, red and Engelmann spruces cannot be distinguished with certainty from one another on the basis of gross or minute characteristics.

## Working Properties

<i>Process</i>	<i>Performance</i>	<i>Comments</i>
<b><i>Machining</i></b>		
Planing	Easy. Good quality	Good planing quality. Recommended planer settings: 12° or 20° hook angle and 20 kmpi (knife marks per inch)
Turning	Satisfactory	Satisfactory surface quality when using rotary-knife lathe and poor when using a single point lathe. Common defects: torn out grain
Sawing	Good	Easily worked with hand and power tools. Slight to moderate blunting effect
Boring	Medium quality	Medium boring quality using brad point bits
Mortising	Good	Very good mortising quality using both a hollow chisel and a chain mortise
Shaping	Good	Good shaping quality. Recommended: the use of a counter piece for end-grain shaping
Veneering	N/A	
Sanding	Very good	
<b><i>Fastening</i></b>		
Screwing	Satisfactory to good holding	Very good resistance to splitting. Average screw retention: 347 lb
Nailing	Satisfactory to good holding	Very good resistance to splitting Average nail retention: 111/101/69 lb (tangential/radial/end-grain)
Gluing	Moderately easy to glue	
<b><i>Finishing</i></b>		
Staining	Good	Good staining properties. A smooth finish is achieved. A natural finish (clear coat) or a light stain looks the best
Painting	Satisfactory	
Lacquering	Good	Good results. Performed very well in tape test
Waxing	Good	Easy and with good results. Best when using light coloured waxes
<b><i>Durability</i></b>		
Decay Resistance	Low	Non-resistant to heartwood decay
Treatability	Difficult	Very resistant to impregnation with preservatives

# Black Spruce

## ***Botanical Name: Picea mariana***

Black spruce is one of the most widely distributed boreal forest conifers in Canada. It typically grows up to 20 metres high.

Black spruce distribution in Saskatchewan stretches across the province's entire boreal forest region. It is typically found in pure stands on organic soils, but it also occurs in mixed stands on mineral soils, primarily along with white spruce and jack pine.

In Saskatchewan, black spruce accounts for 15% of the total annual allowable cut and 26% of the coniferous annual allowable cut.

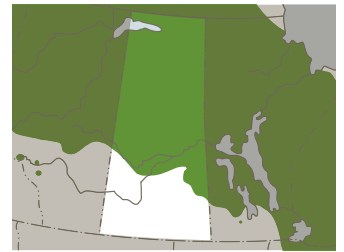
## ***Common Uses***

Black spruce is highly valued in the production of pulp due to its strength properties and long fibres. Other uses include spruce–pine–fir (SPF) lumber, laminating stock and oriented strand board.

## **Key Products**

Lumber (SPF)

Pulp



Black Spruce coverage in Saskatchewan.

## **Key Statistics**

Specific Gravity	0.41
Density (Dry, kg/m <sup>3</sup> )	440
MOE (Dry, MPa)	10400
MOR (Dry, MPa)	78.3
Hardness (Side, N)	2430
Colour – Sapwood	White to yellowish white
Colour – Heartwood	White to pale yellowish satiny and lustrous heartwood
Machining	Fair to good
Fastening	Good to very good
Finishing	Fair to good

## Physical Properties

		<i>Black Spruce</i>	<i>Lodgepole Pine</i>	<i>Douglas-Fir</i>
Density (kg/m <sup>3</sup> )	Green	410	410	450
	Air Dry	440	430	487
Specific Gravity		0.41	0.41	0.45
Hardness (N)	Side	2430	2190	2990
	End	3210	2990	4020
MOE (MPa)	Green	9100	8760	11100
	Air Dry	10400	10900	13500
MOR (MPa)	Green	40.5	39.0	52
	Air Dry	78.3	76.0	88.6
Shrinkage	Radial (OD)	3.8%	4.7%	4.8%
OD = Oven Dry	Tangential (OD)	7.5%	6.8%	7.4%
Air = Air Dry (12%)	Volumetric (OD)	11.1%	11.4%	11.9%
	Volumetric (air)	6.5%	6.6%	7.0%
	Tang / Rad ratio	2.0	1.4	1.50

## Visual Properties

### Colour

Heartwood	White to pale yellowish satiny and lustrous heartwood
Sapwood	White to yellowish white
Heartwood / Sapwood Contrast	Sapwood is not distinguishable from the heartwood
Latewood / Earlywood Contrast	Growth rings are narrow to very narrow, sharply delineated by narrow bands of latewood. Transition from earlywood to latewood is gradual

### Grain

Straight-grained, medium-fine and even textured wood

### Figure

Plainsawn lumber or rotary-cut veneer: Faint growth ring

Quartersawn lumber or quarter-sliced veneer: None

Other: Transverse resin canals are evident as wide rays on the transverse surface

### Knots

Spruce lumber may have numerous small intergrown or encased pin knots

### Other

No characteristic odour. Black spruce is moderately soft but firm, light in weight and has an excellent strength/ weight ratio. The wood of black spruce tends to be heavier and more durable than that of white spruce. Wood is resinous, possible pitch pockets present. The woods of white, black, red, and Engelmann spruces cannot be distinguished with certainty from one another on the basis of gross or minute characteristics.

## Working Properties

	Process	Performance	Comments
Machining			
	Planing	Fairly easy to plane. Fair to good results	Recommended planer settings: 20° hook angle and 20 kmpi (knife marks per inch). Typical defects: fuzzy grain and torn grain
	Turning	Fair to good results	
	Sawing	Easy to saw	Slight to moderate blunting effect
	Boring	Fair to good results	Fairly easy to easy
	Mortising	Fair to good results	Fairly easy to very easy
	Shaping	Fair to good results	Fairly easy to very easy
	Veneering	N/A	
	Sanding	Fairly good	
Fastening			
	Screwing	Very good holding	Average screw retention: 386 lb
	Nailing	Good holding	Average nail retention: 88/87/68 lb (tangential/radial/end-grain)
	Gluing	Glues easily and well	
Finishing			
	Staining	Fair to good	
	Painting	Average	
	Lacquering	Fairly good results	Produces a lustrous finish. Performed well in pull-off test
	Waxing	Fair to good results	
Durability			
	Decay Resistance	Low resistance	
	Treatability	Difficult	Heartwood difficult and sapwood moderately difficult to penetrate with preservatives



# Balsam Fir

## Botanical Name: *Abies balsamea*

Balsam fir is distributed across approximately two-thirds of the Canadian boreal forest. It typically grows up to 25 metres high.

Balsam fir distribution in Saskatchewan stretches across the province's entire boreal forest region. It is typically found in mixed stands on medium-to-fine textured and well-drained soils, primarily along with white spruce, trembling aspen, and white birch.

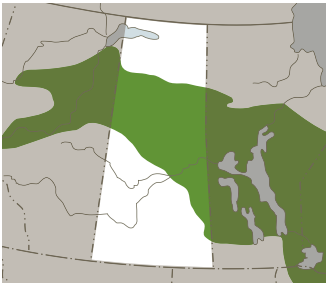
In Saskatchewan, balsam fir accounts for 2% of the total annual allowable cut and 3% of the coniferous annual allowable cut.

## Common Uses

Balsam fir is primarily used in the production of spruce–pine–fir (SPF) lumber and pulp.

## Key Products

Pulp



Balsam Fir coverage in Saskatchewan.

## Key Statistics

Specific Gravity	0.34
Density (Dry, kg/m <sup>3</sup> )	350
MOE (Dry, MPa)	9650
MOR (Dry, MPa)	58.3
Hardness (Side, N)	1820
Colour – Sapwood	Whitish to creamy white
Colour – Heartwood	Creamy white to pale brownish white
Machining	Good
Fastening	Fair to good
Finishing	Good

## Physical Properties

		<i>Balsam Fir</i>	<i>Lodgepole Pine</i>	<i>Douglas-Fir</i>
Density (kg/m <sup>3</sup> )	Green	335	410	450
	Air Dry	350	430	487
Specific Gravity		0.34	0.41	0.45
Hardness (N)	Side	1820	2190	2990
	End	3170	2990	4020
MOE (MPa)	Green	7790	8760	11100
	Air Dry	9650	10900	13500
MOR (MPa)	Green	36.5	39.0	52
	Air Dry	58.3	76.0	88.6
Shrinkage	Radial (OD)	2.7%	4.7%	4.8%
OD = Oven Dry	Tangential (OD)	7.5%	6.8%	7.4%
Air = Air Dry (12%)	Volumetric (OD)	10.7%	11.4%	11.9%
	Volumetric (air)	5.7%	6.6%	7.0%
	Tang / Rad ratio	2.8	1.4	1.50

## Visual Properties

### Colour

Heartwood	Creamy white to pale brownish white. Distinctly coloured heartwood is usually the result of fungus infection or chemical stain discolouration
Sapwood	Whitish to creamy white
Heartwood / Sapwood Contrast	Heartwood is usually hard to distinguish from sapwood
Latewood / Earlywood Contrast	Growth rings are distinct. The latewood zone is generally narrow; the earlywood usually occupying two-thirds or more of the ring. Transition for earlywood to latewood is very gradual

### Grain

Straight and even-grained with medium texture

### Figure

Plainsawn lumber or rotary-cut veneer: distinct; but inconspicuous growth ring

Quartersawn lumber or quarter-sliced veneer: very fine inconspicuous flecks; faint growth ring stripe

### Knots

Can have weak brittle knots

### Other

The wood is practically odourless and tasteless. It weathers to a grey colour with little sheen.

## Working Properties

<i>Process</i>	<i>Performance</i>	<i>Comments</i>
<b><i>Machining</i></b>		
Planing	Medium planing quality	Recommended planer settings: 20° hook angle and 12 kmpi (knife marks per inch). Typical defects are torn grain and raised grain
Turning	Medium surface quality	Common defects: torn out grain
Sawing	Easy to work	Slight blunting effect
Boring	Fairly good boring quality	Fairly good boring quality with both brad and single twist bits
Mortising	Good mortising quality when using a hollow chisel mortise	
Shaping	Medium shaping quality	Recommended: the use of a counter piece for end-grain shaping
Veneering	N/A	
Sanding	Good	
<b><i>Fastening</i></b>		
Screwing	Medium holding	Good splitting resistance. Average screw retention: 361 lb
Nailing	Low holding	Good splitting resistance
Gluing	Glues well	
<b><i>Finishing</i></b>		
Staining	Good	
Painting	Good paint holding ability	
Lacquering	Good	
Waxing	Good	
<b><i>Durability</i></b>		
Decay Resistance	Low	Both heartwood and sapwood are non-resistant to decay
Treatability	Difficult	Heartwood extremely resistant and sapwood moderately resistant to penetration with preservatives

# Trembling Aspen

## ***Botanical Name: Populus tremuloides***

Trembling aspen is the dominant deciduous tree species in Canada's boreal forest. It typically grows up to 25 metres high.

Trembling aspen distribution in Saskatchewan stretches across the province's entire boreal forest region. Trembling aspen grows in many soil conditions, is often found in pure stands, but is also commonly found in mixed stands that include balsam poplar, white birch, white spruce, and balsam fir.

In Saskatchewan, trembling aspen accounts for 34% of the total annual allowable cut and 83% of the deciduous annual allowable cut.

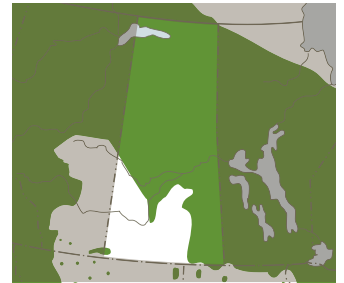
## ***Common Uses***

Trembling aspen is primarily used in the production of pulp and oriented strand board. Other uses include lumber, plywood, furniture, crates, and pallets.

## **Key Products**

Pulp

Oriented Strand Board



Trembling Aspen coverage in Saskatchewan.

## **Key Statistics**

Specific Gravity	0.37
Density (Dry, kg/m <sup>3</sup> )	408
MOE (Dry, MPa)	11200
MOR (Dry, MPa)	67.6
Hardness (Side, N)	2140
Colour – Sapwood	Nearly white
Colour – Heartwood	Varies from off-white to creamy to light greyish brown
Machining	Good
Fastening	Good
Finishing	Good

## Physical Properties

		<i>Trembling Aspen</i>	<i>Yellow Poplar</i>	<i>Red Oak</i>
Density (kg/m <sup>3</sup> )	Green	374	400	581
	Air Dry	408	510	640
Specific Gravity		0.37	0.40	0.58
Hardness (N)	Side	2140	2400	6170
	End	2820	N/A	7340
MOE (MPa)	Green	9030	8400	10800
	Air Dry	11200	10900	11900
MOR (MPa)	Green	37.6	41.0	64.5
	Air Dry	67.6	70.0	98.7
Shrinkage OD = Oven Dry Air = Air Dry (12%)	Radial (OD)	3.6%	4.6%	4.0%
	Tangential (OD)	6.6%	8.2%	8.6%
	Volumetric (OD)	11.8%	12.7%	13.7%
	Volumetric (air)	8.3%		
	Tang / Rad ratio	1.8	1.80	2.15

## Visual Properties

### Colour

Heartwood	Varies from off-white to creamy to light greyish brown
Sapwood	Nearly white
Heartwood / Sapwood Contrast	There is no distinct colour boundary between sapwood and heartwood to clearly delineate one from the other
Latewood / Earlywood Contrast	The diffuse-porous nature of this species makes growth ring recognition difficult

### Grain

Straight-grained, fine and even-textured

### Figure

Plainsawn lumber or rotary-cut veneer: Faint growth rings

Quartersawn lumber or quarter-sliced veneer: None

### Knots

Discolouration above and below knots form a "comet-tail" or "keyhole"

### Other

It has a characteristic disagreeable odour when wet, but odourless and tasteless when dry. Wood is soft and light. It weathers to a light grey with a pronounced silky lustre.

## Working Properties

	<i>Process</i>	<i>Performance</i>	<i>Comments</i>
<b><i>Machining</i></b>			
	Planing	Good planing quality	Recommended planer settings: 12° hook angle and 16 or 20 kmpi (knife marks per inch)
	Turning	Good surface quality	Common defects: torn out grain and, less severe, fuzzy grain. Sanding usually eliminate these defects
	Sawing	Resistance to sawing varies widely	Machine settings suitable for denser hardwoods will not produce an adequate finish on aspen. Also, high occurrence of tension wood in aspen, which dulls the saws, and may cause fuzzy grain
	Boring	Moderate quality	Recommended settings: use brad point bit
	Mortising	Very good	Very good mortising quality when using a hollow chisel mortise
	Shaping	Very good	
	Veneering	N/A	
	Sanding	Good	Heavily affected by fuzzy grain. Recommended settings: finer sandpaper after the initial sanding to eliminate fuzzy grain and the sandpaper frequently changed
<b><i>Fastening</i></b>			
	Screwing	Good	Good holding. Good resistance to splitting. Average screw retention: 482 lb
	Nailing	Satisfactory to poor holding	Good resistance to splitting. Average nail retention: 166/170/102 lb (tangential/radial/end-grain)
	Gluing	Moderately easy	Good adhesion
<b><i>Finishing</i></b>			
	Staining	Good	Finishes well. Blotches appear as the stains become darker. Recommended: light to medium stains
	Painting	Good	
	Lacquering	Good	Performed well in the tape test
	Waxing	Satisfactory	Best when using light coloured waxes
<b><i>Durability</i></b>			
	Decay Resistance	Low	Low decay resistance limits old age in living trees
	Treatability	Very good	Very permeable wood

# Balsam Poplar

## ***Botanical Name: Populus balsamifera***

Balsam poplar is found across a wide range of Canada's boreal forest. It typically grows up to 25 metres high.

Balsam poplar distribution in Saskatchewan stretches across the province's entire boreal forest region. Balsam poplar typically grows in wetter, moderately drained soils. It can be found in pure stands, but is also commonly found in mixed stands that include trembling aspen, white birch, and black spruce.

In Saskatchewan, balsam poplar accounts for 4% of the total annual allowable cut and 11% of the deciduous annual allowable cut.

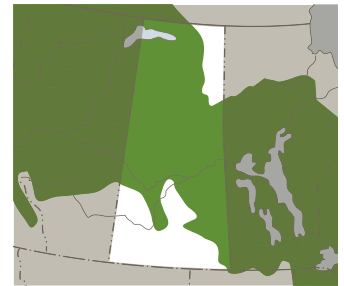
## ***Common Uses***

Balsam poplar is primarily used in the production of pulp and oriented strand board. Other uses include crates and pallets.

## **Key Products**

Pulp

Oriented Strand Board



Balsam Poplar coverage in Saskatchewan.

## **Key Statistics**

Specific Gravity	0.37
Density (Dry, kg/m <sup>3</sup> )	415
MOE (Dry, MPa)	11500
MOR (Dry, MPa)	69.8
Hardness (Side, N)	1840
Colour – Sapwood	Nearly white
Colour – Heartwood	Greyish white to greyish brown, often with a reddish brown tinge
Machining	Poor to moderate
Fastening	Poor to moderate
Finishing	Fair

## Physical Properties

		<i>Balsam Poplar</i>	<i>Yellow Poplar</i>	<i>Red Oak</i>
Density (kg/m <sup>3</sup> )	Green	372	400	581
	Air Dry	415	510	640
Specific Gravity		0.37	0.40	0.58
Hardness (N)	Side	1840	2400	6170
	End	2740	N/A	7340
MOE (MPa)	Green	7930	8400	10800
	Air Dry	11500	10900	11900
MOR (MPa)	Green	34.5	41.0	64.5
	Air Dry	69.8	70	98.7
Shrinkage	Radial (OD)	3.9%	4.6%	4.0%
OD = Oven Dry	Tangential (OD)	6.4%	8.2%	8.6%
Air = Air Dry (12%)	Volumetric (OD)	11.6%	12.7%	13.7%
	Volumetric (air)	9.5%		
	Tang / Rad ratio	1.8	1.80	2.15

## Visual Properties

### Colour

Heartwood	Greyish white to greyish brown, often with a reddish brown tinge
Sapwood	Nearly white
Heartwood / Sapwood Contrast	Not clearly defined
Latewood / Earlywood Contrast	Growth-rings are narrow to wide, distinct, each one delineated by a fine line of terminal parenchyma

### Grain

It is generally straight-grained, but can have spiral, or interlocked-grain. It has comparatively uniform texture

### Figure

Plainsawn lumber or rotary-cut veneer: Faint growth ring
Quartersawn lumber or quarter-sliced veneer: None
Other: Wood has faint growth-ring figure

### Knots

N/A

### Other

It has a fetid odour when green, odourless and tasteless when thoroughly seasoned. Wood of balsam poplar is very similar to trembling aspen but it is coarser in texture and has a higher incidence of wet pockets. It is darker in colour, with little or no lustre.

## Working Properties

<i>Process</i>	<i>Performance</i>	<i>Comments</i>
<b><i>Machining</i></b>		
Planing	Poor planing quality	Recommended planer settings: 20° hook angle and 8 kmpi (knife marks per inch). Typical defects: fuzzy grain and torn grain
Turning	Good surface quality	
Sawing	Moderately good when compared to other low- density wood species and poor when compared to high-density hardwoods (e.g., maple)	When conventional sawing methods are used, poplar, like aspen wood, tends to crash and/or tear
Boring	Poor quality	Recommended settings: use brad point bit
Mortising	Poor mortising quality when using a hollow chisel mortise	Common mortising defects: splintering on the out-going side of the mortise and crushed grain inside the mortise
Shaping	Poor surface quality after shaping	Common shaping defects in the order of frequency: splintering at the corner, rough end-grain, fuzzy grain, raised grain and torn grain. Recommended: the use of a counter piece for end-grain shaping
Veneering	N/A	
Sanding	Poorer surface quality than aspen	
<b><i>Fastening</i></b>		
Screwing	Poor holding	Good resistance to splitting
Nailing	Poor holding	Good resistance to splitting. Average nail retention: 108/101/71 lb (tangential/radial/end-grain)
Gluing	Satisfactory	
<b><i>Finishing</i></b>		
Staining	Fair	Soft, grainy texture. Stain takes differently on each piece. Recommended: pigmented finishes
Painting	Holds paint well	
Lacquering	N/A	
Waxing	N/A	
<b><i>Durability</i></b>		
Decay Resistance	Low	
Treatability	Extremely resistant to preservation	

# White Birch

## ***Botanical Name: Betula papyrifera***

White birch is found across a wide range of Canada's boreal forest. It typically grows up to 20 metres high.

White birch distribution in Saskatchewan stretches across the province's entire boreal forest region. White birch typically grows on moist, well-drained, sandy or silty loam soils. It can be found in pure stands, but is more commonly found in mixed stands along with trembling aspen, balsam poplar, white spruce, and balsam fir.

In Saskatchewan, white birch accounts for 3% of the total annual allowable cut and 6% of the deciduous annual allowable cut.

## ***Common Uses***

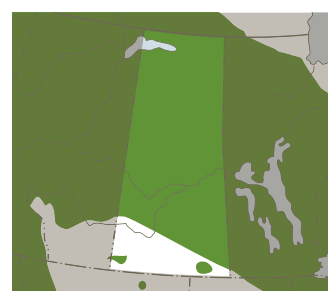
White birch is primarily used in the production of lumber, furniture, cabinets, and flooring.

## **Key Products**

Lumber

Flooring

Millwork



White Birch coverage in Saskatchewan.

## **Key Statistics**

Specific Gravity	0.51
Density (Dry, kg/m <sup>3</sup> )	571
MOE (Dry, MPa)	12900
MOR (Dry, MPa)	47.2
Hardness (Side, N)	4320
Colour – Sapwood	Whitish yellow
Colour – Heartwood	Dark or reddish brown
Machining	Excellent to good
Fastening	Excellent to good
Finishing	Satisfactory

## Physical Properties

		White Birch	Yellow Poplar	Red Oak
Density (kg/m <sup>3</sup> )	Green	506	400	581
	Air Dry	571	510	640
Specific Gravity		0.51	0.40	0.58
Hardness (N)	Side	4320	2400	6170
	End	4350	N/A	7340
MOE (MPa)	Green	10000	8400	10800
	Air Dry	12900	10900	11900
MOR (MPa)	Green	22.1	41.0	64.5
	Air Dry	47.2	70	98.7
Shrinkage	Radial (OD)	5.2%	4.6%	4.0%
OD = Oven Dry	Tangential (OD)	7.2%	8.2%	8.6%
Air = Air Dry (12%)	Volumetric (OD)	13.8%	12.7%	13.7%
	Volumetric (air)	10.5%		
	Tang / Rad ratio	1.4	1.80	2.15

## Visual Properties

### Colour

Heartwood	Ash-gray colour. Dark or reddish brown discolouration occurs naturally in heartwood
Sapwood	Whitish yellow
Heartwood / Sapwood Contrast	From very little to marked contrast
Latewood / Earlywood Contrast	Growth rings are indistinct in this diffuse porous hardwood

### Grain

Straight-grained with a fine and uniform texture

### Figure

Plainsawn lumber or rotary-cut veneer: Faint growth ring

Quartersawn lumber or quarter-sliced veneer: None

Other: Growth ring figure is faint. Pith flecks are usually numerous

### Knots

N/A

### Other

The wood has no characteristic odour or taste. White birch is moderately hard, heavy and strong. It is generally lighter than yellow birch.

## Working Properties

	Process	Performance	Comments
Machining			
	Planing	Excellent planing quality	Recommended planer settings: 12° or 20° hook angle and 12, 16 or 20 kmpi (knife marks per inch)
	Turning	Excellent surface quality	
	Sawing	Easy	Good working qualities. Easy to work with hand tools
	Boring	Excellent	Excellent boring quality when either brad point or single twist bits are used
	Mortising	Excellent	Excellent mortising quality when using a hollow chisel mortise
	Shaping	Very good	
	Veneering	Veneers well	
	Sanding	Very good	
Fastening			
	Screwing	Excellent holding	Poor resistance to splitting. Average screw retention: 723 lb
	Nailing	High tendency to split	However, once nailed, the wood holds the nails excellently. Average nail retention: 199/213/151 lb (tangential/radial/end-grain)
	Gluing	Moderately easy	
Finishing			
	Staining	Satisfactory	Very smooth finish achieved. Natural finish is best. Uneven colours become apparent as stains become darker. Could have pigment finish applied very easily with good results
	Painting	Good to excellent	
	Lacquering	Good	Performed well in the tape test
	Waxing	Excellent	
Durability			
	Decay Resistance	Not resistant	
	Treatability	Treats well	

## Contact

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