MGM Research Note #2020-1

Estimating site index using ecosite guides for Western Canada

Phil Comeau
University of Alberta, Dept. of Renewable Resources, Edmonton, AB
email: phil.comeau@ualberta.ca

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Introduction

Site index is the height of dominant and codominant trees at a reference age and is the primary estimator of potential productivity in the Mixedwood Growth Model (MGM) and in other models. Site index can be readily determined for stands where there are healthy top height trees close to reference age (50 years is widely used as the reference age in western Canada) for the species of interest. However, site index is difficult to determine when healthy top height trees are not present, and where estimates of site index are required for species not currently present in the stand. In addition, site index estimates can be unreliable when trees are less than 7 m tall or substantially older than reference age.

Ecological site classification (Mah and Nigh 2003; BC Ministry of Forest and Range 2008) or ecological site factors (Wang and Klinka 1996; Ung et al. 2001) can be used to estimate potential site index. This note provides tabular summaries of site index values for western boreal and foothills ecosystem classification units (Site Series in BC and Ecosites in British Columbia, Alberta, Saskatchewan and Manitoba) for use in estimating site index for stands being modelled.

Methods

Information presented in this note summarizes information available for the western boreal and foothills forests in each of the four western provinces. Summary tables indicating site index at breast height age of 50 years for each site series (B.C.) or ecosite (Alberta, Saskatchewan and Manitoba) and associated ranges in soil moisture regime and soil nutrient regime were prepared.

Information for five variants of the Boreal White and Black Spruce (BWBS) biogeoclimatic zone was obtained from the SIBEC project report (BC Ministry of Forests, Lands and Natural Resource Operations, 2013). Site series used for the BWBS are based on DeLong et al. (2011). For Alberta, information was extracted from ecosite fact sheets presented by Beckingham and Archibald (1996) and Beckingham et al. (1996a). Site index information for Saskatchewan is summarized for both the 1996 (Beckingham et al. 1996b) and 2010 (McLachlan et al. 2010) ecosite guides. Site index for Manitoba ecosites was summarized from information presented by Yakielshek (2006) based on the ecosite classification of Arnup et al. (2006).

Results and Discussion

Table 1 summarizes site index estimates for site series in six subzones of the Boreal White and Black Spruce biodgeoclimatic zone in Northeastern B.C. Table 2 provides a summary for western Alberta based on Beckingham et al. (1996a) and Table 3 summarizes SI values for ecosites in northern Alberta based on Beckingham and Archibald (1996). Information on site index presented in Saskatchewan ecosite guides (Beckingham et al. 1996b; McLaughlan et al. 2010) is shown in Tables 4 and 5. The applicability of the estimates provided in the three 1996 guides (Beckingham and Archibald 1996; Beckingham et al. 1996a; and Beckingham et al. 1996b) to regenerating stands is of concern because: 1) the focus of ecosite sampling was in mature and old-growth stands; and, 2) sample sizes used in development of these estimates are generally small. In addition, the broad ranges of climates included in the aggregation of natural subregions into Ecological Areas in Beckingham and Archibald (1996) (particularly aggregation of several Subregions into the "Boreal Mixedwoods" Area) is of concern since it could lead to variability in site index values within ecosite units. Consequently, use of information presented by Bjelanovic and Comeau (2019) is recommended for estimating site index based on ecosite classification for Alberta. In addition, Bjelanovic and Comeau (2019) present SI values calculated using Huang et al. 2009 equations which are currently in wide use in Alberta and are recommended for MGM simulations.

Table 1. British Columbia Site Index values for site series in the BWBS.

					SI (m @50 years breast height age)					
BGC Subzone and Variant	**Site Series**	**Site Association**	**SMR**	**SNR**	**subalpine fir**	**lodgepole pine**	**white spruce**	**black spruce**	**trembling aspen**	**balsam poplar**
BWBSdk	101	Soopolallie-Step moss	3-5	c-d	12.0	15.0	15.0		12.0	
BWBSdk	102	Pl-Kinnikinnick-Lingonberry	1-2	a-c		12.0	9.0			
BWBSdk	103	SwPl-Soopolallie-Toad-flax	3-3	b-d		15.0	15.0		12.0	
BWBSdk	104	Sb-Labrador tea-Stepmoss	3-6	a-b		12.0	12.0	9.0	12.0	
BWBSdk	110	Sw-Currant-Horsetail	5-6	c-d		15.0	15.0			
BWBSdk	111	Sw-Mountain alder-Horsetail	5-6	e-e		15.0	15.0			
BWBSdk	112	AcbSw-Mountain alder-Dogwood	5-6	e-e			18.0			18.0
BWBSmk	101	Sw-Lingonberry-Step moss	3-4	c-d		15.0	15.0	9.0	15.0	
BWBSmk	102	Pl-Kinnikinnick-Lingonberry	1-2	a-c		12.0	9.0			
BWBSmk	103	SwPl-Soopolallie-Fuzzy-spiked wildrye	3-4	c-d		15.0	12.0		15.0	
BWBSmk	104a	Sb-Labrador tea-Step moss	3-4	a-b		12.0	9.0	12.0		
BWBSmk	104b	Sb-Labrador tea-Step moss	5-6	a-b		9.0	9.0	6.0		
BWBSmk	110	Sw-Currant-Horsetail	5-6	c-d		18.0	18.0		18.0	
BWBSmk	111	Sw-Mountain alder-Horsetail	5-6	d-e		18.0	18.0			
BWBSmk	112	AcbSw-Mountain alder-Dogwood	5-6	d-e			18.0			18.0
BWBSmw	101	Sw-Trailing raspberry-Step moss	3-5	c-d		18.0	21.0		18.0	
BWBSmw	102	Pl-Kinnikinnick-Lingonberry	1-2	a-c		12.0	9.0		12.0	
BWBSmw	103	SwPl-Soopolallie-Fuzzy-spiked wildrye	3-3	b-d		15.0	12.0	9.0	12.0	
BWBSmw	104	Sb-Labrador tea-Step moss	3-6	a-b		15.0	12.0	9.0	12.0	
BWBSmw	110	Sw-Oak fern-Sarsaparilla	4-5	d-d		18.0	18.0	15.0	18.0	
BWBSmw	111	Sw-Currant-Horsetail	5-6	c-d		18.0	18.0		18.0	18.0
BWBSmw	112	AcbSw-Mountain alder-Dogwood	5-6	d-e			18.0			21.0

See notes at bottom of page 4.

Table 1. British Columbia Site Index values for site series in the BWBS (continued)

					SI (m @50 years breast height age)					
BGC Subzone and Variant	**Site Series**	**Site Association**	**SMR**	**SNR**	**subalpine fir**	**lodgepole pine**	**white spruce**	**black spruce**	**trembling aspen**	**balsam poplar**
BWBSwk1	101	Sw-Huckleberry-Feathermoss	3-4	b-c		15.0	15.0		15.0	
BWBSwk1	102	Pl-Lingonberry-Reindeer lichen	1-2	a-c		12.0	9.0			
BWBSwk1	103	SwPl-Soopolallie-Showy aster	3-3	b-d		15.0	15.0		15.0	
BWBSwk1	104	Sb-Huckleberry-Lingonberry	3-5	a-b		12.0	12.0	9.0		
BWBSwk1	110	Sw-Currant-Horsetail	4-5	c-d		18.0	18.0		15.0	15.0
BWBSwk1	111	Sb-Horstail-Step moss	5-6	c-d				15.0		
BWBSwk2	101	SwBl-Huckleberry-Feathermoss	3-4	b-c		15.0	15.0		15.0	
BWBSwk2	102	Pl-Lingonberry-Reindeer lichen	1-2	a-c		12.0	9.0			
BWBSwk2	103	SwPl-Soopolallie-Fuzzy-spiked wildrye	3-3	b-d		15.0	15.0		15.0	
BWBSwk2	104	Sb-Huckleberry-Lingonberry	3-6	a-b		12.0	12.0	9.0		
BWBSwk2	110	Sw-Currant-Bluebells	4-5	c-d		15.0	15.0		15.0	15.0
BWBSwk2	111	Sw-Currant-Horsetail	5-6	c-d		15.0	15.0		15.0	
BWBSwk3	101	SwBl-Huckleberry-Feathermoss	3-4	c-d		12.0	12.0	9.0		
BWBSwk3	102	Pl-Crowberry-Lingonberry	1-2	a-c		9.0		9.0		
BWBSwk3	103	Sb-Huckleberry-Lingonberry	3-5	a-b		9.0		9.0		
BWBSwk3	110	Sw-Currant-Horsetail	5-6	c-d		12.0	12.0			
BWBSwk3	111	Sb-Horsetail-Step moss	6	a-b				9.0		

Source: BC Ministry of Forests, Lands and Natural Resource Operations. 2013. Site Index Estimates by Site Series (2013 Approximation). http://www.for.gov.bc.ca/hre/sibec/Reports/sisuByBGCUnit2013.pdf accessed Dec 4 2013

Site series and site associations based on: DeLong, C., A. Banner, W. H. MacKenzie, B. J. Rogers, and B. Kaytor. 2011. A field guide to ecosystem identification for the Boreal White and Black Spruce Zone of British Columbia. B.C. Min. For. Range, For. Sci. Prog., Victoria, B.C. Land Manag. Handb. No. 65. Land Manag. Handb. No. 65.

SMR (Soil Moisture Regime): 1=very xeric, 2=xeric, 3=subxeric, 4=submesic, 5=mesic, 6=subhygric, 7=hygric, 8=subhydric, 9=hydric

SNR (Soil Nutrient Regime): a=very poor, b=poor, c=medium, d=rich, e=very rich

SI values use 3 m classes. Site Index equations are not clearly indicated in the reports but are assumed to conform to SiteTools (4.1) standard recommendations: subalpine fir-Chen and Klinka 2000; lodgepole pine-Thrower 1994 ; white spruce–Goudie 1984 (natural) ; black spruce–Nigh, Krestov and Klinka 2002a ; trembling aspen-Nigh, Krestov and Klinka 2002b ; balsam poplar–Huang, Titus and Lakusta 1994 .

Table 2. Western Alberta Ecosite-based Site Index Values

					SI (m @ 50 years breast height age)							
Area/Subregion	**Ecosite**	**Ecosite name**	**SMR**	**SNR**	**trembling aspen**	**white spruce**	**black spruce**	**balsam poplar**	**balsam fir**	**lodgepole pine**	**subalpine fir**	**Engelmann spruce**
Lower Foothills	b	bearberry/lichen	2-4	a-b						13.2		
Lower Foothills	c	hairy wild rye	3-5	b-d	14.5	17.6	9.5			18.4		
Lower Foothills	d	Labrador tea-mesic	4-6	a-b	15.9	12.6	12.8		11.1	15.3		
Lower Foothills	e	low-bush cranberry	4-6	b-c	17.7	17.1	14.5	14.9	14.7	17.7		
Lower Foothills	f	bracted honeysuckle	5-7	d-e	19.1	18.5	13.6	18.8		19.1	15.4	
Lower Foothills	h	labrador tea-subhygric	6-8	a-b	18.5	14.7	11.1	7.1		15.0		
Lower Foothills	i	horsetail	6-7	b-e	23.1	15.8	15.5	25.8		16.7		
Lower Foothills	j	Labrador tea/horsetail	7-8	b-d		10.8	9.9					
Lower Foothills	k	bog	7-9	a-c			9.5					
Upper Foothills	b	bearberry/lichen	2-4	a-b						11.4		
Upper Foothills	c	hairy wild rye	3-5	b-d	15.6	14.7	15.0			14.7		
Upper Foothills	d	Labrador tea-mesic	4-6	a-b		10.5	9.7			12.9	8.5	
Upper Foothills	e	tall billberry/arnica	4-6	b-d	17.8	11.6	11.8			14.4	10.8	
Upper Foothills	f	bracted honeysuckle	5-6	d-e	17.5	16.1	14.7	18.8		16.9	12.5	
Upper Foothills	h	labrador tea-subhygric	5-8	a-c			10.3			14.7	12.2	
Upper Foothills	i	Labrador tea/horsetail	6-8	b-d		11.1	8.9			12.3		
Upper Foothills	j	horsetail	6-8	c-e		15.0	12.1			14.2	10.0	
Upper Foothills	k	bog	7-9	a-b			8.2					
Upper Foothills	m	rich fen	7-9	c-e			8.4					

See notes at bottom of page 6

Table 2 Western Alberta Ecosite-based Site Index Values (continued)

					SI (m @ 50 years breast height age)							
Area/Subregion	**Ecosite**	**Ecosite name**	**SMR**	**SNR**	**trembling aspen**	**white spruce**	**black spruce**	**balsam poplar**	**balsam fir**	**lodgepole pine**	**subalpine fir**	**Engelmann spruce**
Montane	b	bearberry	3-5	a-d		12.1				10.9		
Montane	c	hairy wild rye	4-6	b-d	12.2	12.8				19.6		
Montane	d	dogwood	5-7	c-e	20.2	14.3		18.0				
Montane	f	horsetail	6-8	c-e		6.2	7.1					
Montane	g	fen	7-9	c-e		5.3	4.0					
Subalpine	b	bearberry/lichen	2-4	a-c						8.4		
Subalpine	c	hairy wild rye	3-5	b-d						13.4		8.3
Subalpine	d	rhodendron-mesic	4-6	a-d			6.9			10.8	10.8	8.8
Subalpine	f	rhododendron-subhygric	5-8	a-d			7.5			11.9	12.2	16.2
Subalpine	g	horsetail	5-8	c-e						10.3	7.7	11.4

Source: Beckingham et al 1996a. Field guide to ecosites of west-central Alberta. Nat. Resour. Can., Can. For. Serv., Northwest Reg., North. For. Cent., Edmonton, Alberta. Spec. Rep. 9.
SMR (Soil Moisture Regime): 1=very xeric, 2=xeric, 3=subxeric, 4=submesic, 5=mesic, 6=subhygric, 7=hygric, 8=subhydric, 9=hydric
SNR (Soil Nutrient Regime): a=very poor, b=poor, c=medium, d=rich, e=very rich
Equations used to calculate site index are unknown but are likely based on Alberta Forest Service 1985.

*** Use of Bjelanovic and Comeau 2019 is recommended in place of values in Table 2.**

Table 3. Northern Alberta Ecosite-based Site Index Values.

					SI (m @ 50 years breast height age)							
Area[1]	**Ecosite**	**Ecosite name**	**SMR**	**SNR**	**jack pine**	**trembling aspen**	**white spruce**	**white birch**	**black spruce**	**balsam poplar**	**balsam fir**	**tamarack**
Boreal Mixedwoods	a	lichen	2-3	a-b	13.4							
Boreal Mixedwoods	b	blueberry	3-4	b-c	14.3	15.8	17.5	11.5				
Boreal Mixedwoods	c	Labrador tea-mesic	4-6	c-c	14.3				11.5			
Boreal Mixedwoods	d	low-bush cranberry	4-6	b-d	15.2	18.2	16.8	14.4	15.7	17.3	14.0	
Boreal Mixedwoods	e	dogwood	5-6	c-d		21.4	17.8	13.9		19.7	16.6	15.2
Boreal Mixedwoods	f	horsetail	6-8	d-e		19.8	16.4			17.8		
Boreal Mixedwoods	g	Labrador tea-subhygric	6-7	a-c	11.7				9.9			
Boreal Mixedwoods	h	Labrador tea/horsetail	7	b-d			12.9		9.5			17.9
Boreal Highlands	a	bearberry	2-4	a-c	12.1							
Boreal Highlands	b	blueberry	3-5	b-d	14.9	17.2						
Boreal Highlands	c	Labrador tea-mesic	4-6	a-c	14.4				8.2			
Boreal Highlands	d	low-bush cranberry	4-6	b-d	12.7	17.1	15.7	15.5	13.1			
Boreal Highlands	e	fern	5-7	d-e			15.0					
Boreal Highlands	f	horsetail	6-8	c-e			16.5					
Boreal Highlands	g	Labrador tea-hygric	6-8	a-c	10.7				11.3			
Boreal Highlands	i	poor fen	7-9	b-c					7.9			
Boreal Highlands	j	rich fen	8-9	c-e								8.8

See notes at bottom of page 8.

Table 3. Northern Alberta Ecosite-based Site Index Values (continued).

					SI (m @ 50 years breast height age)						
Area[1]	**Ecosite**	**Ecosite name**	**SMR**	**SNR**	**jack pine**	**trembling aspen**	**white spruce**	**white birch**	**black spruce**	**balsam poplar**	**lodgepole pine**
Subarctic	a	bearberry	2-4	a-c							12.1
Subarctic	b	Canada buffalo-berry	4-6	b-d		15.8	15.0				
Subarctic	c	Labrador tea-mesic	4-6	a-c					11.1		9.3
Subarctic	d	horsetail	6-7	c-e			10.4	17.4		12.1	
Subarctic	e	Labrador tea-hygric	6-8	a-c					6.5		
Canadian Shield	a	bearberry	2-4	a-c	8.8						
Canadian Shield	b	Canada buffalo-berry-green alder	3-6	b-d	10.4		12.0	10.4			
Canadian Shield	c	Labrador tea-mesic	4-6	a-c			6.4		16.9		

Source: Beckingham and Archibald 1996. Field guide to ecosites of northern Alberta. Nat. Resour. Can., Can. For. Serv., Northwest Reg., North. For. Cent., Edmonton, Alberta Spec. Rep. 5.

[1]Boreal Mixedwood Area includes: Central Mixedwood, Dry Mixedwood, Wetland Mixedwood, Peace River Lowlands Natural Subregions; Boreal Highlands Area includes: Boreal Highlands Natural Subregion; Subarctic Area includes Subarctic Natural Subregion; Canadian Shield includes: Athabasca Plan and Kazan Uplands Natural Subregions.

SMR (Soil Moisture Regime): 1=very xeric, 2=xeric, 3=subxeric, 4=submesic, 5=mesic, 6=subhygric, 7=hygric, 8=subhydric, 9=hydric

SNR (Soil Nutrient Regime): a=very poor, b=poor, c=medium, d=rich, e=very rich.

Equations used to calculate site index are unknown but are likely based on Alberta Forest Service 1985.

*** Use of Bjelanovic and Comeau 2019 is recommended in place of values in Table 3.**

Table 4. Saskatchewan (1996) Ecosite-based Site Index Values for the Mid Boreal (Lowland and Upland) Ecoregion

				SI (m @ 50 years breast height age)									
Ecosite	**Ecosite name**	**SMR**	**SNR**	**jack pine**	**trembling aspen**	**white spruce**	**white birch**	**black spruce**	**balsam poplar**	**balsam fir**	**tamarack**	**Manitoba maple**	**white elm**
a	lichen	2-3	a-b	14.9									
b	blueberry	3-5	b-d	18.2	18.3	16.1		15.8					
c	Labrador tea-submesic	3-6	a-c	16.1			9.2	12.2					
d	low-bush cranberry	4-6	b-d	18.6	20.0	19.7	16.8	14.9	18.9	18.5			
e	dogwood	5-7	c-e		21.3	18.5	18.8	13.6	20.1	16.0			
f	ostrich fern	5-7	d-e		21.4	23.6	20.6		22.3			16.1	15.8
g	Labrador tea-hygric	6-8	a-c	15.5		10.9		12.9					
h	horsetail	6-7	b-d		19.9	18.1		14.3	15.0		23.0		
j	bog	7-9	a-b			10.8		8.0	20.0		12.3		
k	poor fen	7-9	b-c					10.7			13.2		
l	rich fen	7-9	b-e					9.9			13.5		

Source: Beckingham et al. 1996b. Field guide to ecosites of the mid-boreal ecoregions of Saskatchewan. Nat. Resour. Can., Can. For. Serv. Northwest Reg., North. For. Cent., Edmonton, Alberta. Spec. Rep. 6.
SMR (Soil Moisture Regime): 1=very xeric, 2=xeric, 3=subxeric, 4=submesic, 5=mesic, 6=subhygric, 7=hygric, 8=subhydric, 9=hydric
SNR (Soil Nutrient Regime): a=very poor, b=poor, c=medium, d=rich, e=very rich
Equations used to calculate site index are unknown but are likely based on Cieszewski et al 1993 (EQ2).

Table 5. Saskatchewan (2010) Ecosite-based Site Index Values.

Taiga Shield Ecozone			**SI (m @ 50 years breast height age)**						
Ecosite	**Ecosite Name**	**SMR**	**jack pine**	**black spruce**	**white birch**	**balsam poplar**	**trembling aspen**	**white spruce**	**tamarack**
1	jack pine/bearberry/lichen	d-mf	7.8						
2	jack pine-black spruce/lichen	md-vm	9.0	7.9	8.0				
3	white birch/ligonberry/lichen	md-mw	10.1	5.8	7.8				
4	black spruce/lingonberry/feathermoss	md-vm	7.5	5.1	5.8				
5	trembling aspen/prickly rose-twinflower	md-f	12.8			18.3	12.0	12.1	
6	white birch - spruce/green alder	d-vm	9.8	10.9	9.5	9.4	11.6	9.8	
7	white birch - black spruce/lingonberry	d-vm	11.3	7.8	7.9				
8	white birch/river alder/ feathermoss	vm-vm		8.3	9.1				
9	black spruce treed bog	vm-w		4.4					7.1
10	Labrador tea shrubby bog	md-vw		3.7					
13	Tamarack treed fen	vm							7.2
14	Labrador tea shrubby fen	vm							15.2
16	Open fen	mw		5.6					

Source: McLaughlan, et al. 2010. Field guide to the ecosites of Saskatchewan's provincial forests. Sask. Min. Env. For. Serv. Prince Albert, SK.

SMR (Soil Moisture Regime): d=dry, md=moderately dry, mf=moderately fresh, f=fresh, vf=very fresh, mm=moderately moist, m=moist, vm=very moist, mw=moderately wet, w=wet, vw=very wet.

Site index calculated following: Cieszewski et al 1993 (EQ2).

Table 5. Saskatchewan (2010) Ecosite-based Site Index Values (continued).

Boreal Shield Ecozone			**SI (m @ 50 years breast height age)**							
Ecosite	**Ecosite Name**	**SMR**	**jack pine**	**black spruce**	**white birch**	**balsam poplar**	**trembling aspen**	**white spruce**	**tamarack**	**balsam fir**
1	sand heather - floccose tansy sand dune	md-mf	8.2		11.1					
2	lichen/felsenmeer - bedrock	d		4.9						
3	jack pine/blueberry/lichen	d-f	9.5	10.6	6.6		10.7	8.3		
4	jack pine-black spruce/feathermoss	md-vm	10.4	4.1	7.5		13.0			
5	jack pine-white birch/feathermoss	md-f	11.0	11.6	10.6		13.7	9.2		
6	jack pine-trembling aspen/green alder	md-vm	12.6	12.6	12.0		12.7			
7	black spruce/blueberry/lichen	d-mm	9.1	9.6	10.6		10.6			
8	black spruce-white birch/lichen	md-vm	8.7	9.3	10.0		12.9			
9	black spruce-jack pine/feathermoss	md-m	9.9	9.2	9.2	7.6	9.7		9.4	
10	black spruce-white birch/feathermoss	d-vm	9.3	11.6	10.7			10.7		
11	white spruce-balsam fir/feathermoss	d-vf	6.4	13.5	9.4		13.7	8.6		15.1
12	white spruce/crowberry/feathermoss	d-mm	15.1	14.9	8.4		20.1	8.0		
13	white birch-black spruce-trembling aspen	d-vm	10.5	11.8	10.9		12.4	8.2		
14	white birch/lingonberry-Labrador tea	md-vm	11.2	11.5	10.2		9.1	8.9		
15	trembling aspen-white birch/green alder	md-f	12.6	13.2	11.7	9.9	12.3	11.2		
16	black spruce/balsam poplar/river alder swamp	vm-vw		11.2	18.9	16.1			12.9	6.5
17	black spruce treed bog	vm-w	9.4	6.5	9.2				8.5	
18	Labrador tea shrubby bog	vm-vw	10.0	7.7						
20	Open bog	mw-vw		4.1						
21	tamarack treed fen	mw-w		6.8					9.1	
22	leatherleaf shrubby poor fen	vm-vw		9.2					7.2	
23	willow shrubby rich fen	f-vw			11.5				19.2	
25	graminoid fen	mw-vw		5.3					4.4	

Source: McLaughlan, et al. 2010. Field guide to the ecosites of Saskatchewan's provincial forests. Sask. Min. Env. For. Serv. Prince Albert, SK.

SMR (Soil Moisture Regime): d=dry, md=moderately dry, mf=moderately fresh, f=fresh, vf=very fresh, mm=moderately moist, m=moist, vm=very moist, mw=moderately wet, w=wet, vw=very wet.

Site index calculated following: Cieszewski et al 1993 (EQ2).

Table 5. Saskatchewan (2010) Ecosite-based Site Index Values (continued).

Boreal Plain Ecozone			**SI (m @ 50 years breast height age)**							
Ecosite	**Ecosite Name**	**SMR**	**jack pine**	**black spruce**	**white birch**	**balsam poplar**	**trembling aspen**	**white spruce**	**tamarack**	**balsam fir**
2	jack pine/lichen	md-vf	13.3							
3	jack pine/feathermoss	md-mm	14.9	12.7	11.3		12.0	11.8		
4	jack pine-trembling aspen/feathermoss	md-vm	16.2	12.5	10.8	14.0	14.5	13.6		14.5
5	trembling aspen/prickly rose/grass	md-vf	14.7				14.8	16.7		
6	trembling aspen/beaked hazel/sarsaparilla	md-vm		16.1	9.9	15.5	17.2	15.0		17.9
7	trembling aspen-white birch/sarsaparilla	md-vm	19.0	9.8	13.3	12.1	16.8	15.6		
8	termbling aspen-white birch/mountain maple	f-vm			14.1	12.3	21.0	13.9		10.4
9	white spruce-trembling aspen/feathermoss	md-vm	15.4	9.7	12.3	15.3	16.9	15.7		17.7
10	trembling aspen-white spruce/feathermoss	f-m	15.9	12.2	9.8	12.6	16.7	14.5		16.1
11	white birch-white spruce-balsam fir	md-vm	13.2	15.1	14.4	16.8	15.8	13.4		15.3
12	jack pine-spruce/feathermoss	md-vm	14.5	13.4	12.0		11.2	15.5		
13	white spruce-balsam fir/feathermoss	mf-vm	19.0	12.5	15.7	17.8	18.0	14.8		15.2
14	black spruce/Labrador tea/feathermoss	f-vm	13.0	11.9	13.0	17.1	15.3	14.8	12.1	12.6
15	balsam poplar-white spruce/feathermoss	md-vm	14.7	7.8	12.0	14.9	18.3	14.3		19.2
16	balsam poplar-trembling aspen/prickly rose	mf-vm			12.7	18.9	16.1	11.0		25.1
17	Manitoba maple-balsam poplar/ostrich fern	f-m			13.0	18.9	17.1	12.3		14.2
18	black spruce-tamarack treed swamp	vm-vw		10.2	12.0	12.2		13.4	15.4	11.0
19	black spruce treed bog	vm-w	7.7	6.0					7.4	
20	labrador tea shrubby bog	vm-vw		8.9						
23	tamarack treed fen	vm-vw		8.5					8.1	
24	tamarack shrubby poor fen	mw-vw							8.9	
25	willow shrubby rich fen	mw-vw		10.9	8.3			9.5		

Source: McLaughlan, et al. 2010. Field guide to the ecosites of Saskatchewan's provincial forests. Sask. Min. Env. For. Serv. Prince Albert, SK.

SMR (Soil Moisture Regime): d=dry, md=moderately dry, mf=moderately fresh, f=fresh, vf=very fresh, mm=moderately moist, m=moist, vm=very moist, mw=moderately wet, w=wet, vw=very wet.

Site index calculated following: Cieszewski et al 1993 (EQ2).

Table 5. Saskatchewan (2010) Ecosite-based Site Index Values (continued).

Prairie Ecozone			**SI (m @ 50 years breast height age)**					
Ecosite	**Ecosite Name**	**SMR**	**lodgepole pine**	**white birch**	**balsam poplar**	**trembling aspen**	**white spruce**	**green ash**
2	lodgepole pine/grass	md-f	14.60				14.10	
3	trembling aspen-lodgepole pine/bearberry	f	15.30			13.10	11.80	
4	trembling aspen/bearberry/strawberry	mf-f			17.20	10.20	13.50	
5	trembling aspen/beaked hazel/sarsaparilla	f-vm		12.30	12.20	15.80		9.30
6	white spruce/grass/other mosses	f	15.10			13.40	14.20	
7	trembling aspen-white spruce/western snowberry	f-vm				11.40	14.90	
8	balsam poplar-trembling aspen-green ash	m-vm			15.30	15.50		12.00

Source: McLaughlan, et al. 2010. Field guide to the ecosites of Saskatchewan's provincial forests. Sask. Min. Env. For. Serv. Prince Albert, SK.

SMR (Soil Moisture Regime): d=dry, md=moderately dry, mf=moderately fresh, f=fresh, vf=very fresh, mm=moderately moist, m=moist, vm=very moist, mw=moderately wet, w=wet, vw=very wet.

Site index calculated following: Cieszewski et al 1993 (EQ2).

Table 6. Manitoba Ecosite-based Site Index Values for the Mid-boreal Upland Ecoregion.

					SI (m @ 50 years breast height age)						
EcoSeries	**Ecosite**	**Ecosite Name**	**SMR**	**SNR**	**balsam poplar**	**black spruce**	**jack pine**	**trembling aspen**	**tamarack**	**white birch**	**white spruce**
10	11	TA-BA hardwood	d	b-c				19.4			
10	12	TA-JP-Spruce mixedwood	d-f	b-c			10.8	12.2		10.2	
20	21	WB mixedwood	d-vf	b-d				20.5			
20	22	TA hardwood	f-vf	c			15.6	21.6			18.0
20	23	TA-WS mixedwood	f-vf	c-d	18.5	12.7	14.4	17.0		11.9	17.4
20	24	JP-BS mixedwood	d-vf	b-c		12.7	13.1				15.7
30	31	TA-BA hardwood/mixedwood	f-vf	b-d	15.6	12.9	15.0	19.2	16.5	14.7	17.1
30	32	TA-BA hardwood	f-vf	c	17.7	12.2	15.4	19.3		17.9	16.0
30	33	TA-BA mixedwood	f-vf	b-c	16.3	13.4	15.5	17.9		13.2	16.5
30	34	WS-BF mixedwood	f-vf	c-d	15.4	14.5	17.1	16.7	12.8	16.1	16.8
30	35	JP-BS mixedwood	f-vf	b-c	19.4	15.1	16.1	16.9			16.7
30	36	BS-JP-(WS-BF) Labrador tea-feathermoss	f-vf	a-c	14.6	12.5	14.6	16.0	18.7		16.6
40	41	TA-BA hardwood	m-m	b-c				21.9			
40	42	WS (BF) mixedwood	vf-m	b-e		12.2					17.2
40	43	BS-JP-feathermoss	vf-m	b-c	10.1	9.1	13.7	10.9	21.8	14.5	14.2
50	51	TA-BA hardwood	vf-m	c-d				20.5			17.4
50	52	TA-WS-JP mixedwood	vf-m	b-d		10.2		20.4		14.8	19.0
50	53	BS-feathermoss-Labrador-tea	vf-m	a-d	14.7	11.9	14.3	17.5	16.3		16.0
60	61	BS-(WS)-Lab tea-Fmoss-Sphagnum	w	a-c	14.5	9.5	15.1	16.3	10.7		17.9
60	62	BS-Alder-Herb Rich	w	a-c		6.7			8.8		
60	63	TL-BS-Sedge (Treed Fen)	w	a-c	14.5	7.4		15.3	9.1		
60	64	BS-(JP)-Ericaceous-Sphagnum (Treed Bog)	w	a-b		7.5					

Source: Yakielshek, T.M. 2006. Ecosite and site index relations for tree species in the mid-boreal upland ecoregion of Manitoba. B.Sc.F. thesis. Lakehead University, Thunder Bay, On. 78 pp.

Ecosite Classification based on: Arnup, R., P.A. LeBlanc and G.Becker. 2006. Field Guide to Ecosites of the Mid-Boreal Upland Ecoregion of Manitoba. (unpubl).

SMR (Soil Moisture Regime): d=moderately dry, f=fresh, vf=very fresh, m=moist, w=wet.

SNR (Soil Nutrient Regime): a=very poor, b=poor, c=medium, d=rich, e=very rich.

Site index calculated following: Cieszewski et al 1993 (EQ2).

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For further Information contact:

Phil Comeau
Department of Renewable Resources
University of Alberta
email: phil.comeau@ualberta.ca

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