

Selection Harvest Survey



Team



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Site Locations

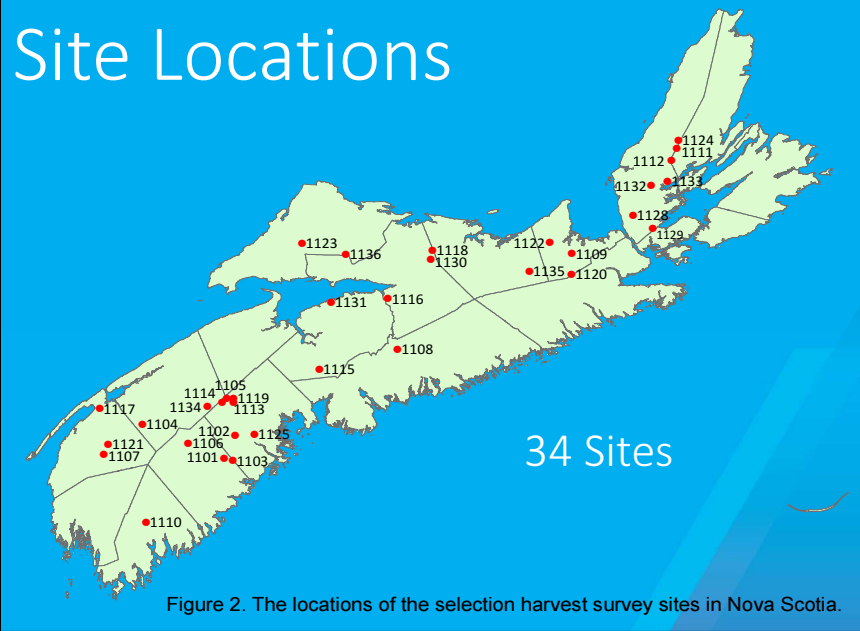


Figure 2. The locations of the selection harvest survey sites in Nova Scotia.

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Field Methods

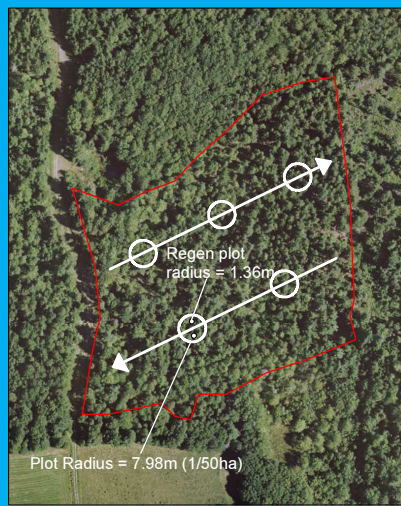
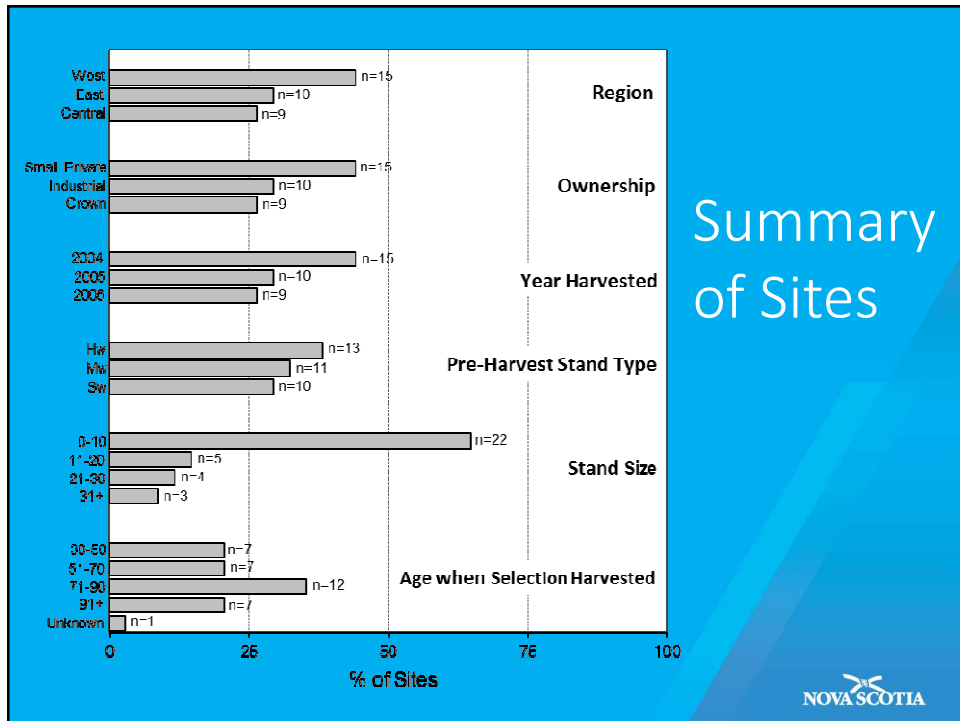
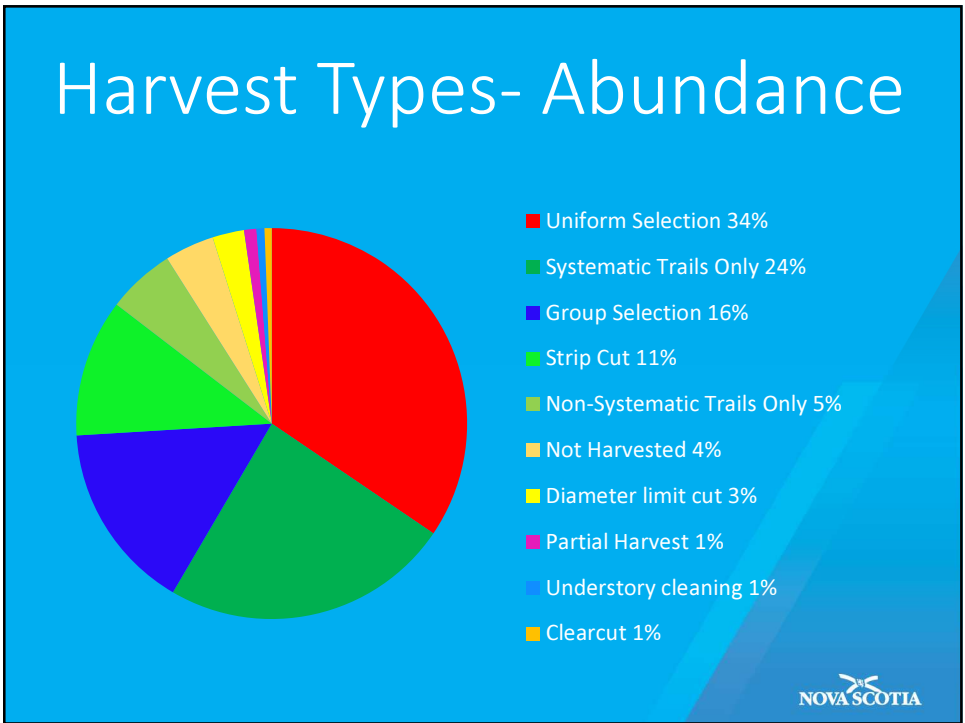
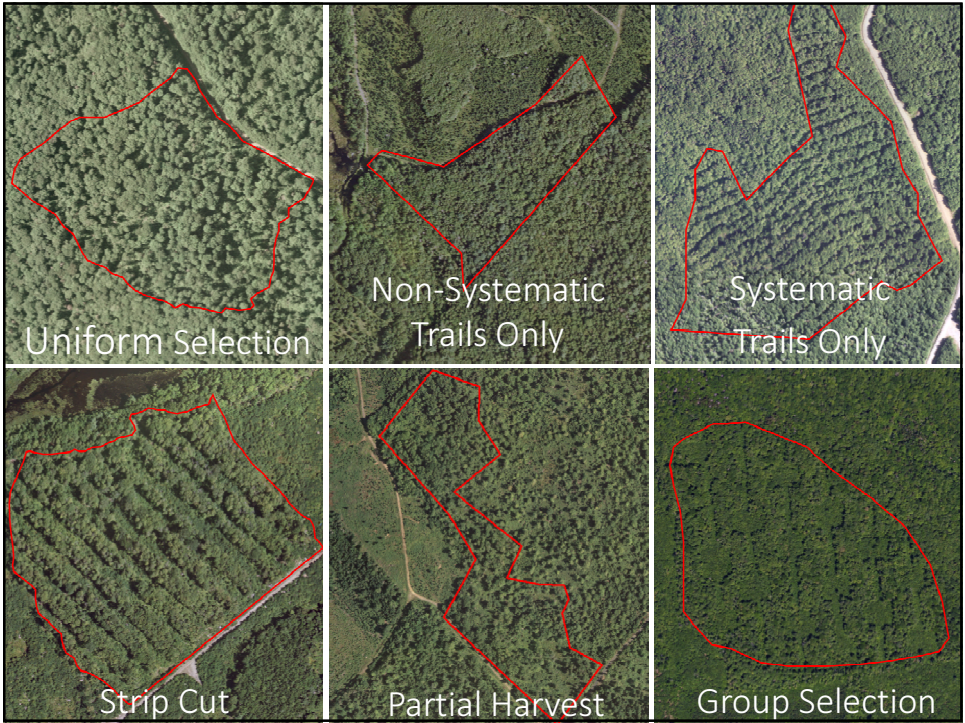


Figure 3. Example of plot layout.

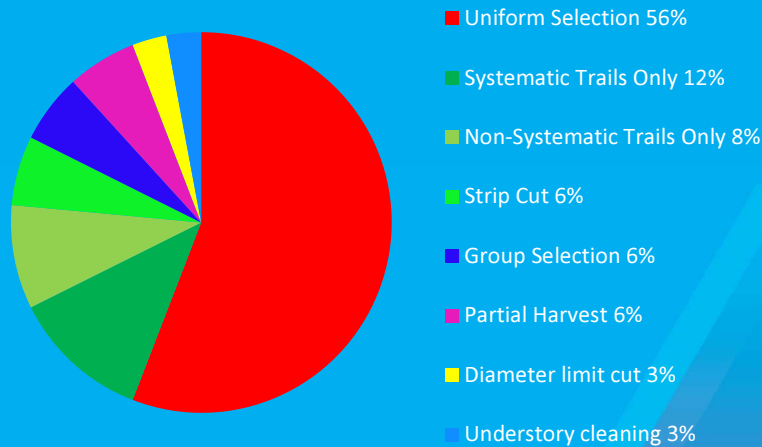
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Field Methods





Harvest Types- Frequency



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Indicators of Job Quality

Post-treatment basal area: must be at least 16 m²/ha.

% Basal Area Removal: must not exceed 50% basal area removal (including extraction trails).

Tolerant and long lived species: must contain at least 5 m²/ha of the following species (red spruce, white pine, eastern hemlock, eastern cedar, sugar maple, yellow birch, red oak, white ash).

Maturity: must be at least 60 years of age.

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Sites that failed to meet indicators

			Basal Area				Species Comp.	PTA	
	Stand ID	Age	Pre-Harvest (m ² /ha)	Cut (m ² /ha)	Post-Harvest ¹ (m ² /ha)	% BAR		Stand Type	Qualify for selection (Y/N)
Marginal pre-harvest Basal Area	1111	79	22	7	15	34%	14	SM ⁷⁶ YB ²⁰ WS ³	Y
	1116	90	24	10	14	41%	8	RM ³¹ RS ²⁷ YB ²³	N
	1128	97	23	9	15	37%	6	YB ³⁴ RM ²⁷ BE ²⁵	N
	1130	87	24	10	15	40%	14	SM ⁶⁴ YB ²⁵ BE ⁷	Y
Low pre-harvest Basal Area	1118	79	17	5	12	27%	10	SM ⁷⁶ YB ¹⁰ BE ⁷	N
Too Young	1101	39	22	3	19	12%	15	RS ⁷³ LTA ⁹ WP ⁷	N
Look at these examples	1131	47	30	9	22	29%	10	RS ³² BF ³³ RM ¹³	N
	1134	39	17	7	10	41%	6	RS ⁶⁰ RM ²⁹ BF ⁸	N
	1106	52	25	12	14	46%	12	RS ⁴⁷ HE ²⁴ WP ¹⁴	N
Too Much Removed	1108	72	40	23	17	57%	13	RS ²⁵ HE ²² RM ²¹	Y
	1110	60	39	21	18	54%	13	WP ⁵⁹ RM ¹⁶ HE ¹³	N
	1114	47	34	28	6	81%	4	WP ³³ BF ³³ HE ¹⁷	Y
	1107	56	36	6	30	18%	5	WS ³⁷ BF ²⁸ RM ¹⁶	N
Wrong Species Mix	1120	56	27	9	17	35%	4	RM ⁴³ YB ²⁴ BF ²³	N
Wrong Species Mix	1123	79	21	4	17	21%	0	BS ⁸⁵ BF ⁹ WP ²	N
	1105	46	29	16	13	54%	2	BF ⁵⁴ RM ³⁰ RS ¹⁰	N

14/18 sites would not have qualified for selection
harvest under PTA (PTA not available at the time)

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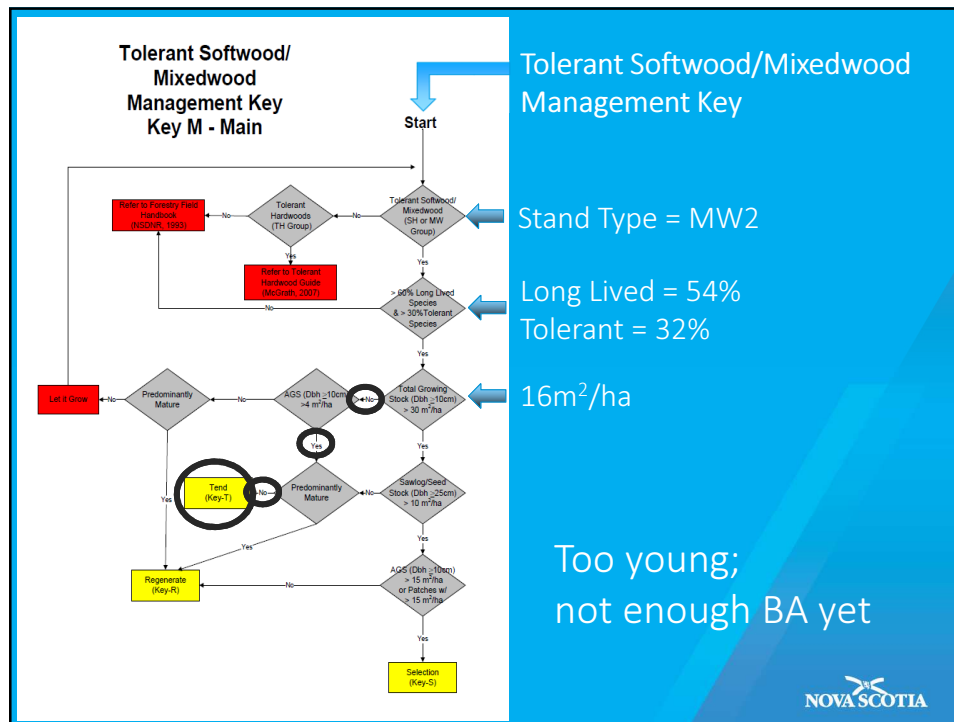
1102: Non-Systematic Trails Only

Age: 33 years
Ownership: Small Private
BA: Before=16m²/ha
Cut=2m²/ha
After=14m²/ha
BAR: 11%
DBH: 13 cm
Height: 11m

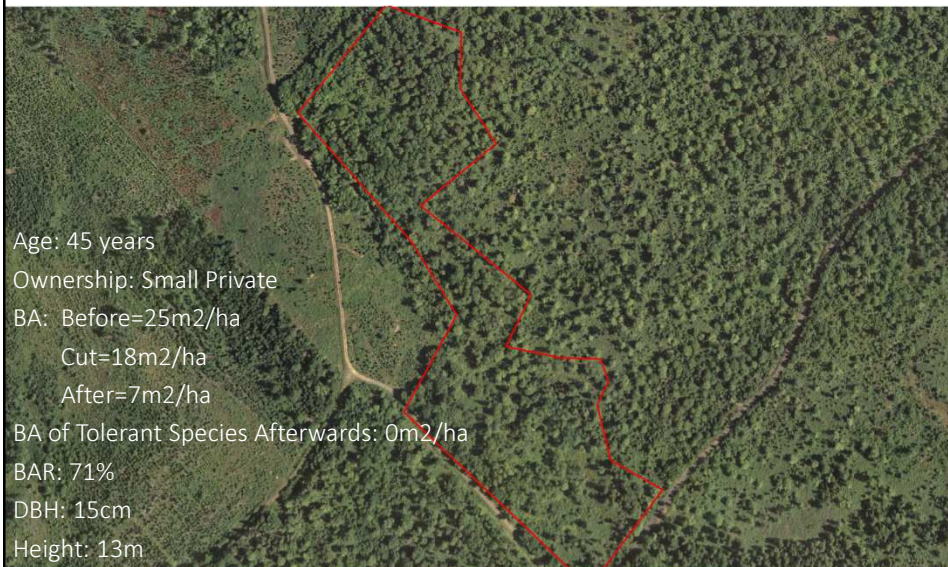


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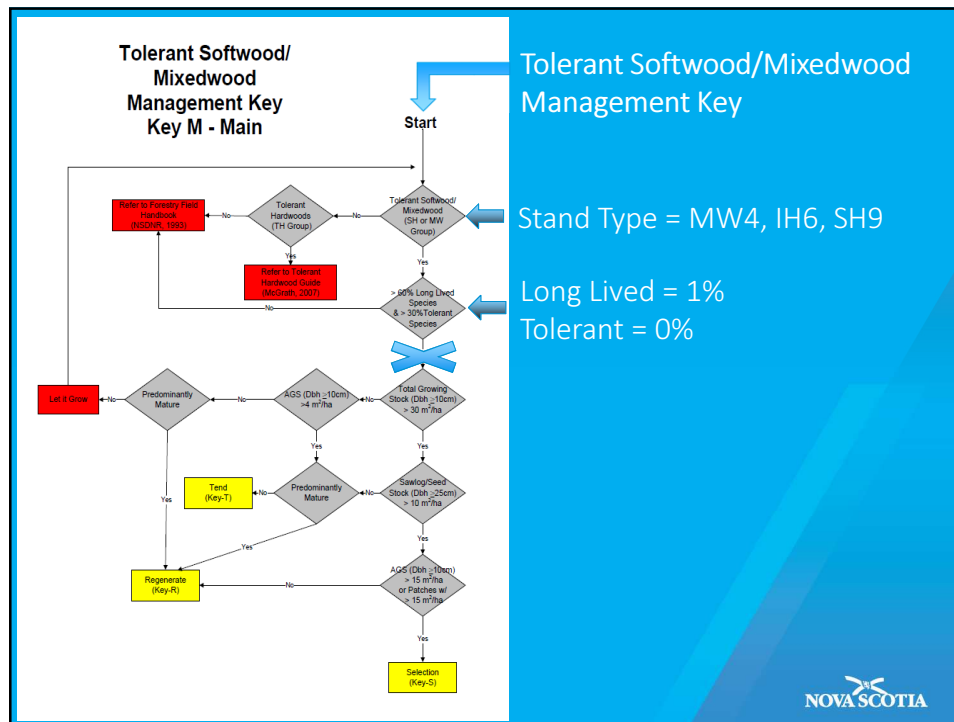


Site 1113: Partial Harvest









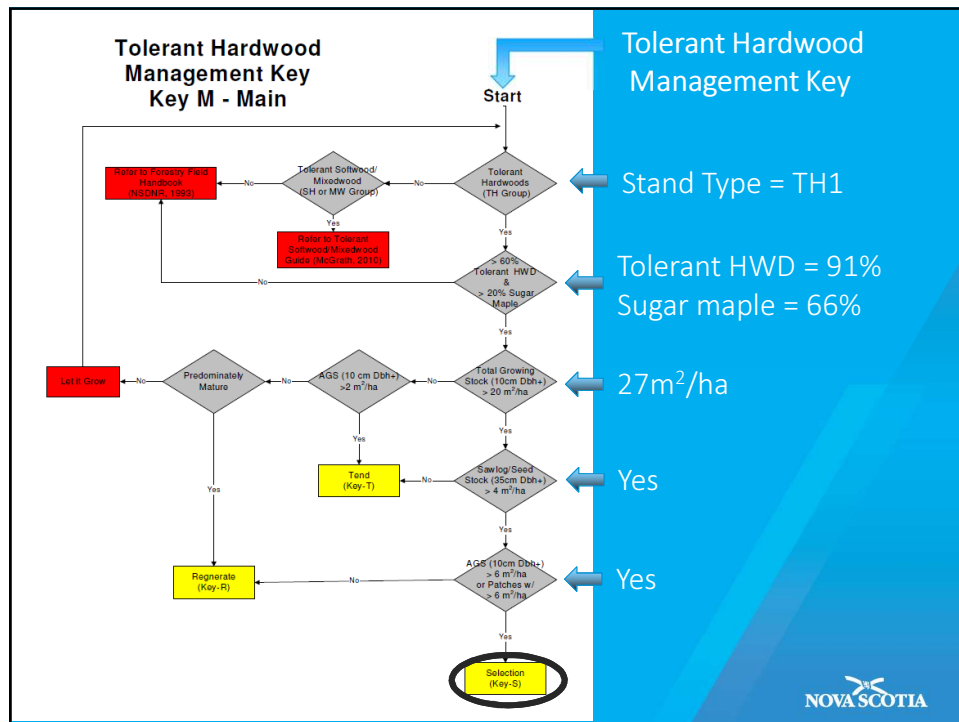
Site 1122: Uniform Selection (Hw)

Age: 85 years
 Ownership: Small Private
 BA: Before=27m²/ha
 Cut=10m²/ha
 After=17m²/ha
 BAR: 37%
 DBH: 24cm
 Height: 18m





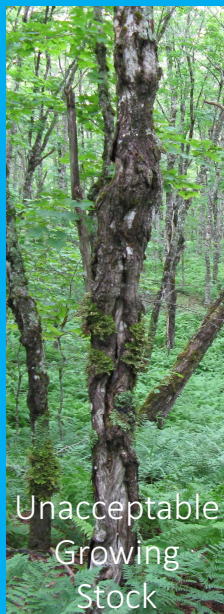




Acceptable Growing Stock



Acceptable
Growing
Stock



Unacceptable
Growing
Stock

Acceptable growing stock (AGS) : Trees are acceptable growing stock (AGS) when they are healthy with potential to produce high value stems suitable to meet sawlog or studwood specifications in the future and the ability to thrive after thinning until the time of the next harvest (McGrath *et al.* 2015).

Site 1103: Uniform Selection(Sw)

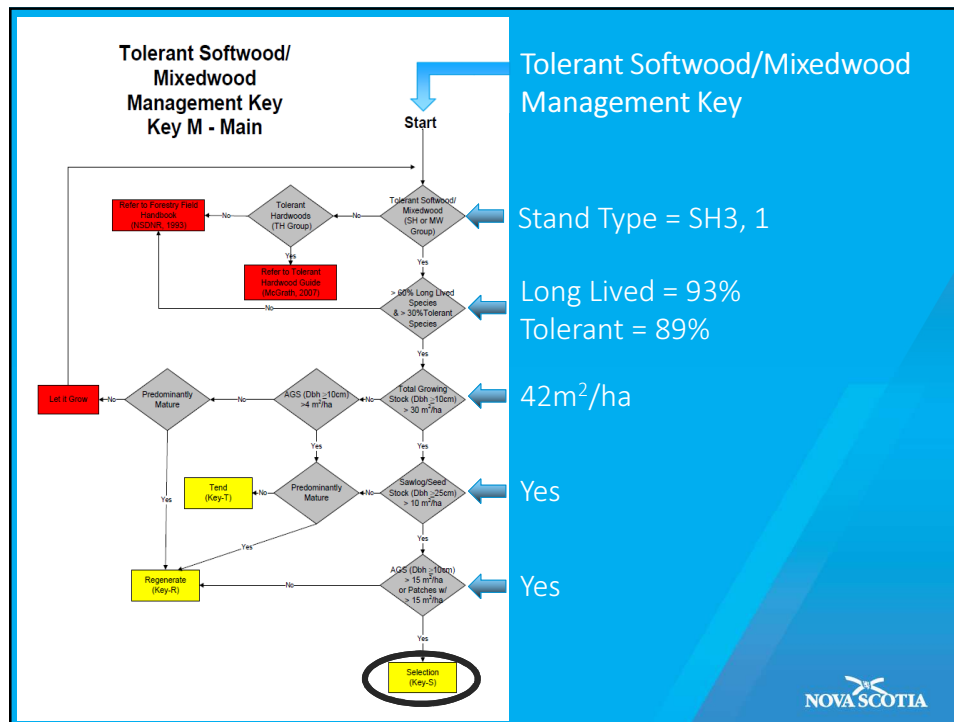


NOVA SCOTIA





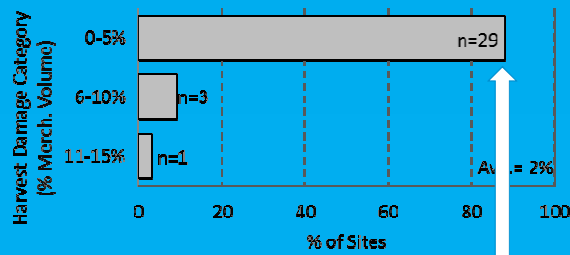




Volume and Basal Area

	Softwood Stand Type			Mixedwood Stand Type			Hardwood Stand Type			Total			
	Be-fore	Cut	After	Be-fore	Cut	After	Be-fore	Cut	After	Be-fore	Cut	After	
Merch. Vol. (m ³ /ha)	202	85	117	149	70	79	150	53	97	165	68	97	Volume
Basal Area (m ² /ha)	33	13	19	27	12	15	25	8	17	28	11	17	BA Left
% Basal Area		39%	61%		43%	57%		33%	67%		39%	61%	% BAR
# Stems/ha	1,370	499	871	1,215	521	694	627	169	458	1,048	386	662	
DBH (cm)	18	18	17	17	18	17	23	26	22	19	21	19	
Height (m)	15	15	15	14	15	14	16	17	16	15	16	15	
Age (years)			65			64			88			73	

Harvest Damage



85% of sites had very little harvest damage (<5%)



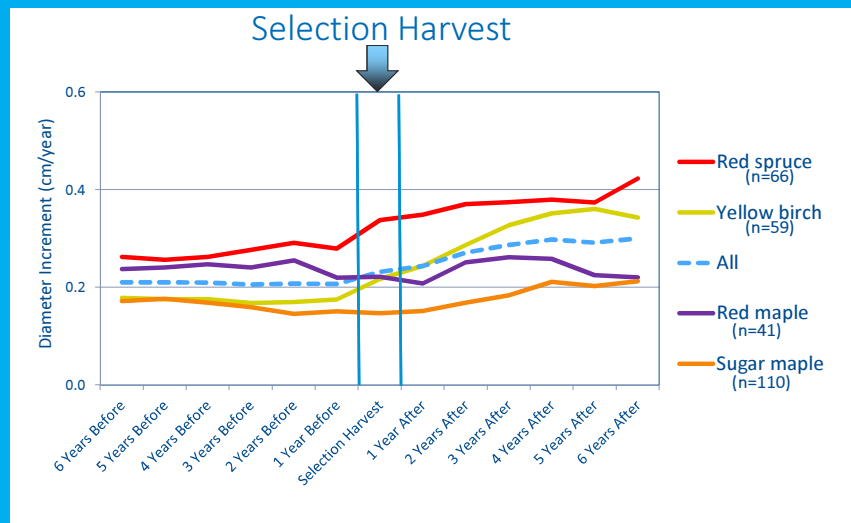
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Increment Cores



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Growth Response



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Growth Response

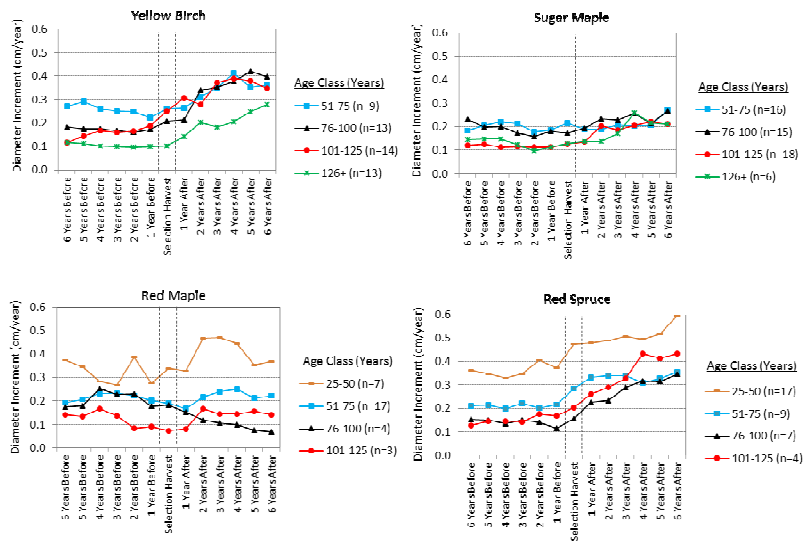
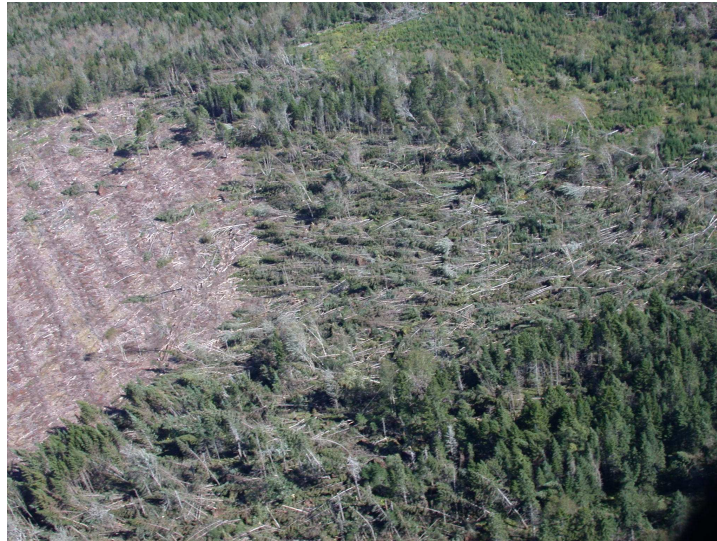


Figure 13. The diameter increment of released yellow birch, sugar maple, red maple, and red spruce by age class before and after selection harvest (n=# cores).

Wind Damage



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Wind Damage

	Softwood Stand Type			Mixedwood Stand Type			Hardwood Stand Type			Total		
	Blow- down	Bro- ken Tops	Total	Blow- down	Bro- ken Tops	Total	Blow- down	Bro- ken Tops	Total	Blow- down	Bro- ken Tops	Total
Basal Area (m ² /ha)	0.8	1.1	1.9	0.8	0.4	1.2	0.2	0.4	0.5	0.6	0.6	1.2
Basal Area (%)	4%	6%	10%	5%	2%	8%	1%	2%	3%	3%	4%	7%
Merch. Vol. (m ³ /ha)	5	7	12	5	2	7	1	2	3	4	4	7
Merch. Vol. (%)	4%	8%	12%	6%	2%	9%	1%	2%	3%	4%	4%	8%
Stems (#/ha)	31	39	70	23	18	40	3	11	14	18	21	40
DBH (cm)	17	22		17	16		25	19				

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Species Susceptibility to Wind Damage

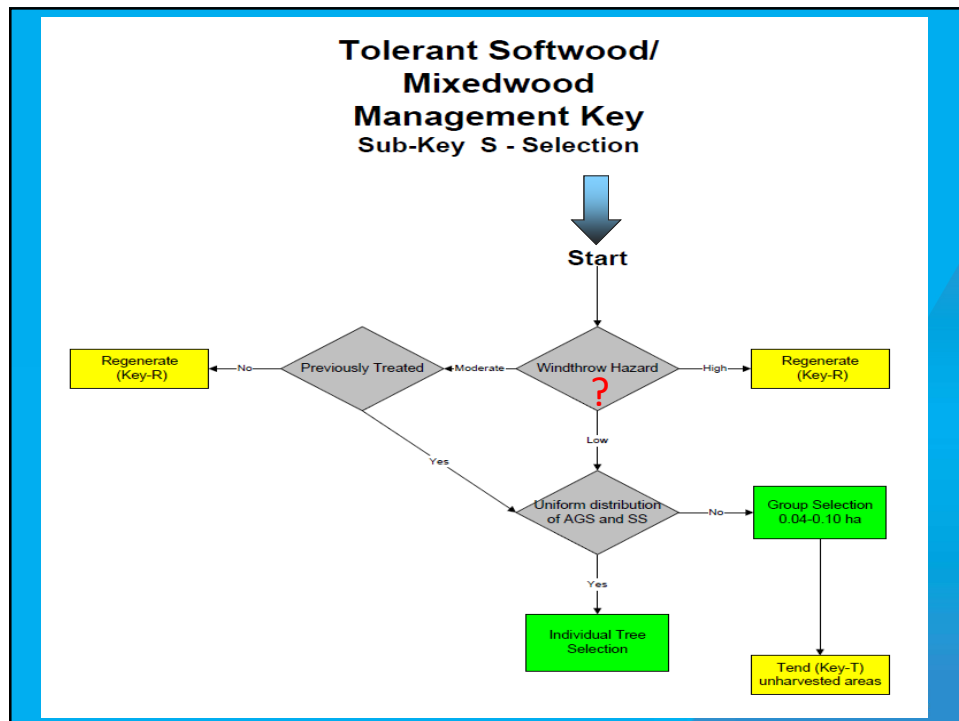
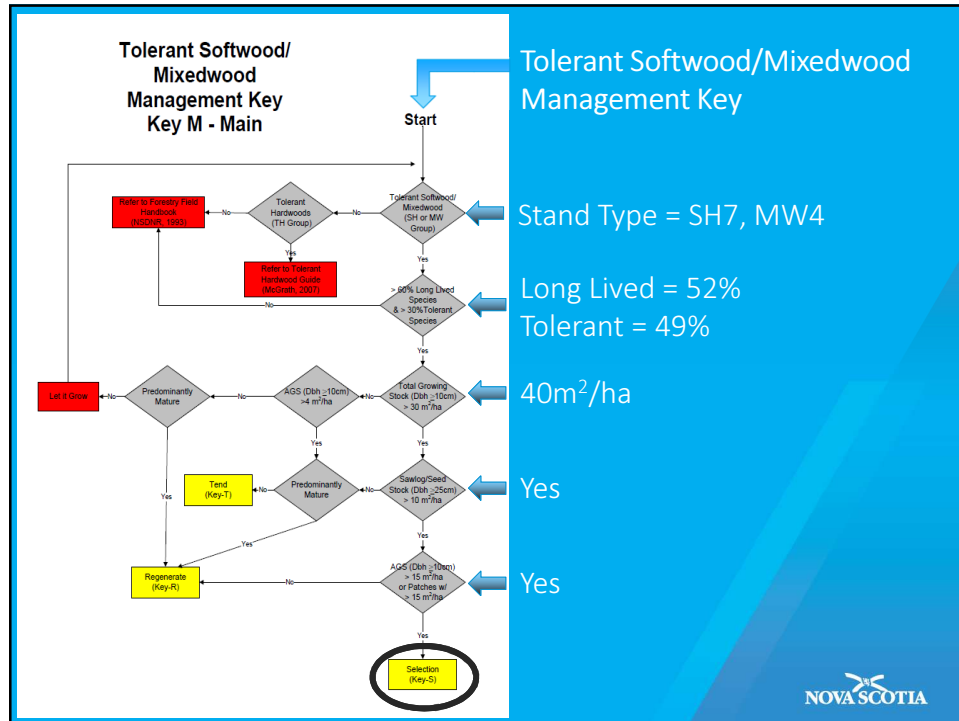
		Species Susceptibility to Wind Damage (% of Merchantable Volume)		
	Sample Size	Blowdown	Broken Tops	Total
Balsam fir	1,076	5%	19%	24%
Black spruce	213	11%	8%	19%
White spruce	218	11%	4%	15%
Hemlock	146	6%	6%	12%
Red spruce	1,380	5%	3%	8%
White pine	122	0%	3%	3%
Eastern larch	13	2%	1%	3%
Softwood species	3,168	6%	7%	13%
White birch	109	5%	1%	6%
Red maple	1,256	1%	2%	3%
Sugar maple	1,118	1%	1%	3%
Yellow birch	555	0%	2%	3%
Beech	296	1%	2%	3%
White ash	26	2%	0%	2%
Hardwood species	3,360	1%	2%	3%

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Site 1117: Wind Damage







Shallow Soil Type:
Mineral soil depth
< 30cm over
bedrock.



Shallow Soil Type



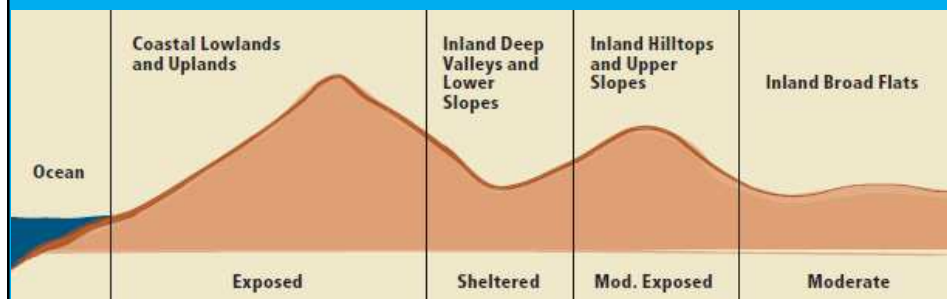
Windthrow Hazard

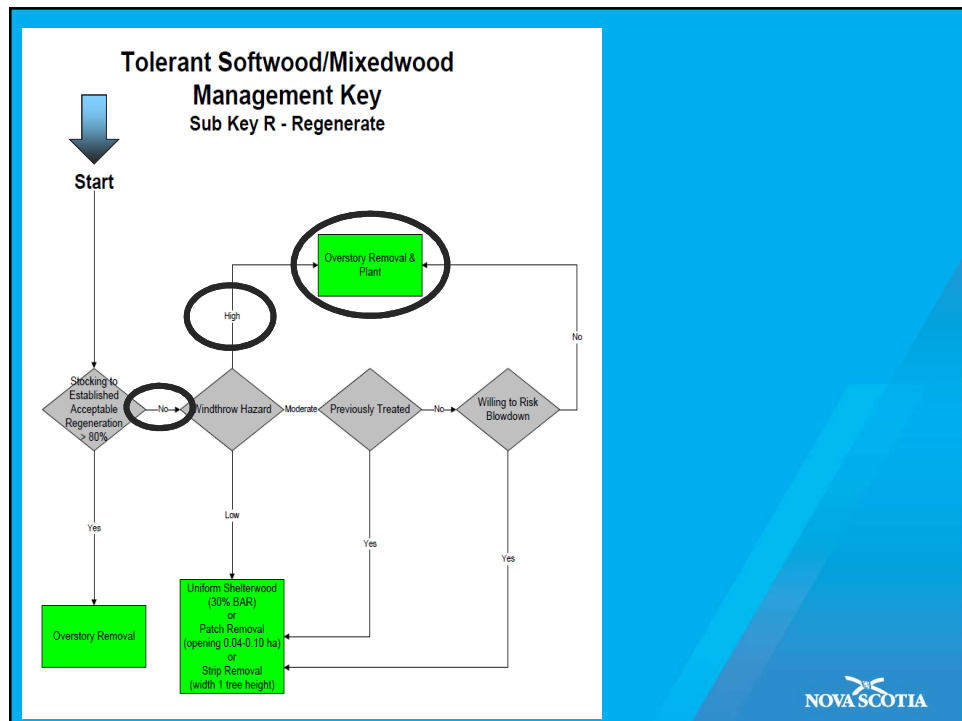
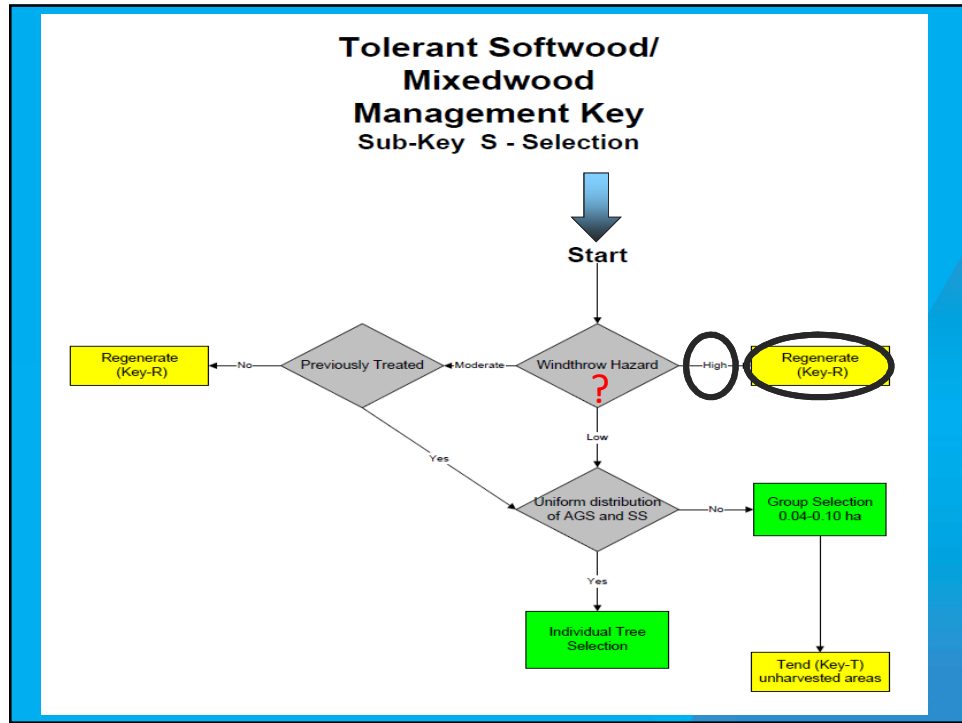
Soil Type = ST16; Exposure = Moderate

Table 1. Windthrow Hazard Rating Categories Based on Exposure and Soils.

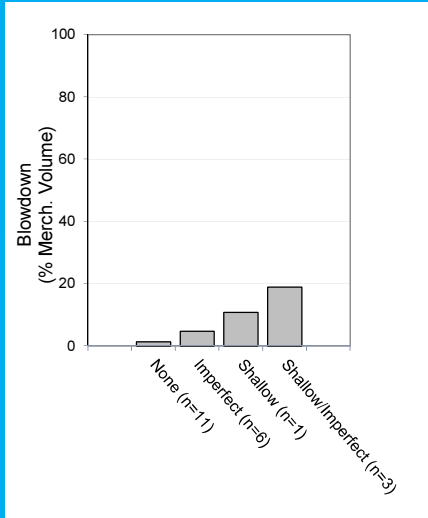
Soil Type (Keys et al., 2011)	Exposure Class				
	<i>Sheltered</i>	<i>Moderately Sheltered</i>	<i>Moderate</i>	<i>Moderately Exposed</i>	<i>Exposed</i>
1, 1-G, 2, 2-G, 2-L, 8, 8-C					
Stony phases					
3, 3-G, 3-L, 5, 9, 9-C, 11					
Stony phases					
6, 12					
Stony phases					
All wet, organic, moist shallow, and talus soil types (ST4, ST7, ST10, ST13, ST14, ST16, ST18, ST19)					
Dry shallow soil types (ST15, ST17) with 0-15 cm depth or stony (S) phase					
Dry shallow soil types (ST15, ST17) with 16-30 cm depth and non-stony phase					
Windthrow Hazard Rating	Low	Moderate	High		

Exposure





Blowdown Related to Soils

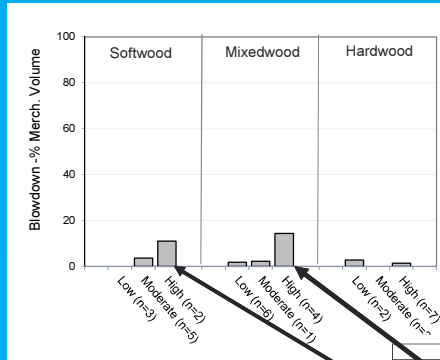


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Imperfect Drainage Clues



Windthrow Hazard



Windthrow hazard:

- Soil type (shallow, imperfect, ect) &
- Exposure

Stands considered high risk do have more blowdown (in softwood and mixedwood stand).

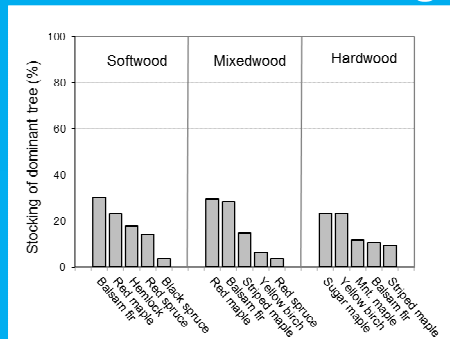
Does not apply to tolerant hardwood stands.

Table 1. Windthrow Hazard Rating Categories Based on Exposure and Soils.

Soil Type (Key et al., 2011)	Exposure Class				
	Sheltered	Moderately Sheltered	Moderate	Moderately Exposed	Exposed
1-G, 2, 2-G, 3-L, 8, 8-C					
Stony phases					
3, 3-G, 3-L, 5, 9, 9-C, 12					
Stony phases					
6, 12					
Stony phases					
All wet, organic, moist shallow, and forest soil types (ST4, ST7, ST10, ST13, ST14, ST16, ST18, ST19)					
Dry shallow soil types (ST4, ST17) with 0-15 cm depth or stony (S) phase					
Dry shallow soil types (ST15, ST17) with 0-15 cm depth and non-stony phase					
Windthrow Hazard Rating	Low	Moderate	High	High	High

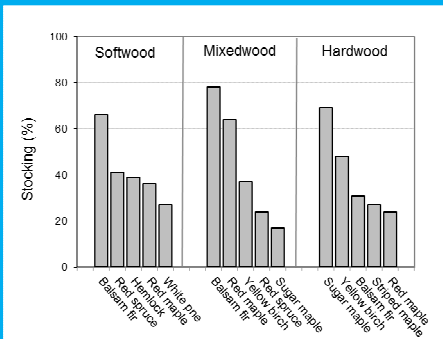
Regeneration

Dominant Stocking

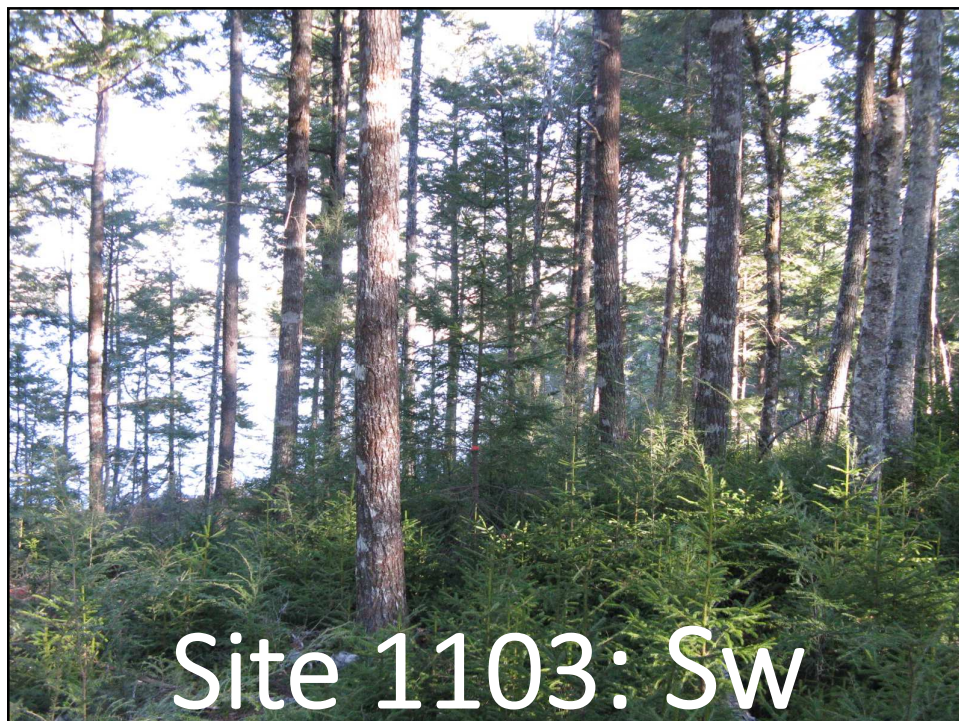


Likely scenario without any intervention

Stocking

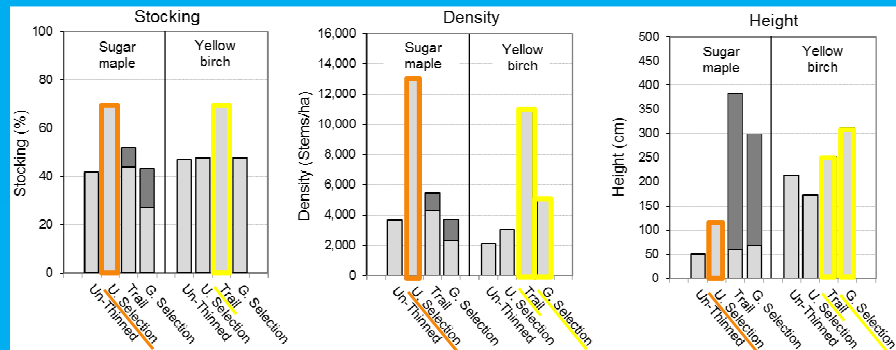


Potential





Comparing Hw Selection Types



Coppice

Seed

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Website

<http://novascotia.ca/natr/forestry/programs/timberman/pta.asp>

The screenshot shows the Nova Scotia Natural Resources website. The header includes the Nova Scotia logo and navigation links for Residents, Visitors, Businesses, Government, and News. The main content area is titled "Timber Management" and features a sidebar with a "Forestry" menu. The main text describes Pre-Treatment Assessments (PTAs) as a vital part of Nova Scotia's Natural Resource Strategy. It lists links for downloading PTA software and manuals, and provides contact information for Tim McGrath.

NOVA SCOTIA CANADA

RESIDENTS VISITORS BUSINESSES GOVERNMENT NEWS SEARCH

ENV - Forestry - Forestry Program Areas - Timber Management

Timber Management

Pre-Treatment Assessments (PTA)

PTAs are a vital part of Nova Scotia's Natural Resource Strategy. They are required to gather the necessary information to prescribe an ecosystem based management prescription. See Introduction.

To help implement PTAs, the following tools are available:

- Forest management guides have been produced for tolerant hardwoods (<http://novascotia.ca/natr/forestry/forestryreportsREPORT104.pdf>), tolerant softwood/hardwood (<http://novascotia.ca/natr/forestry/forestryreportsREPORT101.pdf>), intolerant hardwood (<http://novascotia.ca/natr/forestry/forestryreportsREPORT102.pdf>), and Spruce - Pine (<http://novascotia.ca/natr/forestry/forestryreportsREPORT103.pdf>) that contain the data collection protocol and management decision keys based on the PTA collected data.
- A Windows XP/10/10 program has also been developed that aids in the field data collection and automates the calculations required for the management keys.

Download Pre-Treatment Assessments software

Download Pre-Treatment Assessments software installation instructions

Download Pre-Treatment Assessment program user manual

To be notified of updates to the PTA program email: Tim McGrath at Timothy.McGrath@novascotia.ca

Timber Management Resources

- Harvesting
- Silviculture
- Selection Management
- Growth & Yield
- Policy
- Publications & Presentations
- Pre-Treatment Assessment
- Contacts

The screenshot shows the "FOREST RESEARCH REPORT" cover page. The title is "Tolerant Softwood & Mixedwood Management Guide" by Tim McGrath, Timber Management Group, Truro, Nova Scotia. The report is dated February 24, 2015. The cover includes a table of contents and an introduction section.

FOREST RESEARCH REPORT

Nova Scotia Department of Natural Resources
Forest Management Planning

Tolerant Softwood & Mixedwood Management Guide

Tim McGrath
Timber Management Group
Truro, Nova Scotia

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Introduction

Even-aged management is increasingly being considered as a management option in Nova Scotia. Recently the province has published an Ecological Land Classification (ELC) and Forest Ecosystem Classification (FEC) that identify natural disturbance patterns for Nova Scotia Forests (NSDNR, 2006; Neely et al., 2011). As part of these classifications, gap and infrequent disturbance regimes are identified as natural for many forest stands. Nova Scotia has adopted the use of ecosystem based management, and plans to implement it on crown land (NSDNR, 2008) by practicing "natural disturbance silviculture" (Dise and Rensink, 2003) on a portion of the forest (O'Brien and Smith, 2008) to enhance biodiversity. One tool that can be used to meet both biodiversity and timber production goals is even-aged management through the use of selection management systems. Up until recently, forest management guides for Nova Scotia have only included even-aged recommendations (NSDNR, 1993). To fill this void, guides have been produced for tolerant hardwoods (McGrath, 2007) that include selection management as an option. This report publishes management keys that identify the conditions where selection management is appropriate for softwood and mixedwood stands along with even-aged prescriptions.

NOVA SCOTIA Natural Resources

Report FOR 2010-2 No. 91
Updated February 24, 2015