FOREST RESEARCH REPORT

Nova Scotia Department of Natural Resources

Contents

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Nova Scotia Code of Forest Practices

Pre-Treatment Assessment (PTA)

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Background

In 2011, the government of Nova Scotia announced a new natural resources strategy after comprehensive citizen, stakeholder and technical expert engagement (NSDNR, 2011). This strategy calls for "Apply(ing) the Code of Forest Practice (CFP) on publicly and privately owned woodlands". Applying the CFP is one of the actions necessary to move towards an ecosystems approach to forest management (NSDNR, 2012).

The **Code of Forest Practice** consists of three elements:

- The Framework Document that outlines the general principles of the code,
- Guidebooks that lists more detailed code guidelines, and
- Technical Manuals that show support implementing the guidelines.

Some examples of technical manuals are:

- Forest Ecosystem Classification (FEC) for Nova Scotia (Neily et al., 2013)
- Tolerant Hardwood Management Guide (McGrath, 2007)

- Tolerant Softwood & Mixedwood Management Guide (McGrath, 2010)

Pre-Treatment Assessments

One of the key guidelines of the Code of Forest Practice (CFP) concerns Pre-treatment Assessments and states:

> *1.2.2 The provincial FEC, an extension of the ELC, will be the stand level operational guide for applying ecosystem-based management.*
> *1.2.3 Areas planned for silviculture treatments, including timber harvest, will have a pre treatment assessment (PTA) prepared that describes site, and forest conditions.*
> *1.2.3.1 The PTA will serve as a basis for stand level management plans.*
> *1.2.3.2 Stand level management plans will be compatible with the eco district plan*

As is stated in these guidelines, a PTA that includes FEC, site and forest condition information is a required element in implementing ecosystem-based management (EBM). Before a harvest operation is carried out, stand-level details on the site such as vegetation type, soils type, ecosite and windthrow hazard along with stand characteristics such as basal area, species, tree diameter, height, potential quality and existing regeneration must be collected. Information on special wildlife and geological features is also required. This information will enable prescribing appropriate treatments, specific to stand attributes and avoid a "one-size fits all" system of forest management.

To help meet the objectives of CFP Guideline 1.2.3, a system was developed to identify the required elements of pre-treatment assessments (PTA). This PTA system was first published as part of the Tolerant Management Guides (McGrath, 207, 2010) to gather the information necessary to prescribe appropriate harvest treatments for specific ecosystems and stand conditions. This report extracts this methodology into a separate document, in order to define PTA requirements for inclusion into harvest plans. It is required on crown lands and is being encouraged on private lands.

Although detailed data collection and summary methods are described here, alternative collection methods are allowed as long as the required information is collected, summarized, used to formulate ecosystem- and stand-specific prescriptions and submitted in the standard electronic format used by the PTA computer program (NSDNR, Timber Management | novascotia.ca). Data collection must be performed by FEC and PTA certified staff.

Although it is not required that PTA information be collected in the field with the PTA program, it is required that the PTA data be submitted in electronic form, readable with the PTA program. If the PTA information is collected with paper tally sheets or another electronic data collection program, the data must be either entered into the PTA program from tally sheet or converted to a form readable by the PTA program. In this way, the PTA information can be shared and stored in a standard electronic format.

Paper tally sheet and computer data collection methods are described here. These tools are available from the Department of Natural Resources at.
http://novascotia.ca/natr/forestry/programs/timberman/pta.asp.

A sample PTA summary sheet is also shown. It illustrates the minimum required ecosystem, mensuration, biological and geological information necessary for prescribing ecosystem based management prescriptions.

The information shown can be used to prescribe treatments using the Nova Scotia Forest Management Guides (FMG), for example the Tolerant Hardwood or Tolerant Softwood/Mixedwood Management Guides (McGrath, 20117, 2010). Guides covering other major FEC vegetation groups are in development. If alternative treatments to those prescribed in the guides are recommended written justification must be included in the PTA.

Methods

The assessment methods detailed in this section provides one means of collecting PTA information required for crown land harvest plan submissions and NSDNR funding of harvests on private land. Alternate collection techniques are also acceptable, as long as one summary is submitted for every distinct prescription. The summary must include the required information. It is expected that conditions justifying a distinct treatment for as small as a two hectare portion of a harvest block will be identified. At most this will require one plot/point collected every hectare. A minimum of 3 points and a maximum of 25 points/plots should be taken per stand. The entire block must be walked to identify conditions within the block that require distinct treatments. The measurement locations (points/plots) must be flagged and GPS locations collected for submission with the PTA information. PTA submissions for crown land; and when required for provincial funding on private land, are subject to audit for accuracy of data and prescriptions.

- Use a BAF 2 prism.
- Evenly distribute these points throughout the stand.
- A PTA summary will include the following information (see Appendix I for an example).
    - Location
    - Stand ID
    - Number of sample plots
    - Area of stand
    - FEC vegetation type Forest Ecosystem Classification | novascotia.ca
    - FEC soil http://www.gov.ns.ca/natr/library/forestry/reports/Soil-Types.pdf
    - Wind exposure, http://www.gov.ns.ca/natr/library/forestry/reports/Soil-Types.pdf
    - Windthrow hazard http://www.gov.ns.ca/natr/library/forestry/reports/REPORT91.pdf
    - Total Basal Area (≥ 10cm Dbh)
    - Basal Area of **A**cceptable **G**rowing **S**tock (≥ 10cm Dbh) http://www.gov.ns.ca/natr/library/forestry/reports/REPORT91.pdf

- Species composition by basal area
- Basal Area by Diameter class (Dbh). < 15 cm Dbh, 15-20 cm Dbh, >25 cm Dbh and >35 cm Dbh for hardwoods
- Regeneration stocking at 2.4 m spacing for acceptable and established trees
- Special Wildlife/Biological features
- Silviculture Prescription
- Desired VT
- Map delineating the boundaries of the harvest areas in shape file format and locations of sample points.
- Details of the Harvest prescription.

- For a sample PTA assessment and blank PTA tally sheets see Appendix I.
- A brief description of the electronic PTA collection program see Appendix II.

References

NSDNR. August, 2011, The Path We Share, A Natural Resources Strategy for Nova Scotia 2011-2020. Report DNR 2011-01. 79 pp. http://novascotia.ca/natr/strategy/

NSDNR. August 2012. Nova Scotia's Code of Forest Practice, A Framework for the Implementation of Sustainable Forest Management, Guidelines for Crown Land. Report FOR 2012-3. 33 pp. http://www.gov.ns.ca/natr/forestry/reports/Code-of-Forest-Practice.pdf

Neily, P., K. Keys, E. Quigley, S. Basquill and B. Stewart. 2013. Forest Ecosystems Classification for Nova Scotia (2010). Renewable Resources Branch, Nova Scotia Dept. of Natural Resources. Report FOR 2013-1. 452 pp.
Part I: Vegetation Types: http://novascotia.ca/natr/forestry/veg-types/
Part II: Soil Types: http://www.gov.ns.ca/natr/library/forestry/reports/Soil-Types.pdf
Part III: Ecosites: http://www.gov.ns.ca/natr/library/forestry/reports/Ecosites.pdf

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NSDNR. 1998. Forestry Field Handbook. Forest Research Section, Nova Scotia Dept. of Natural Resources, Truro, Nova Scotia. 43 pp. Forestry Field Handbook | novascotia.ca

NSDNR. Pre-Treatment Assessments. Timber Management | novascotia.ca.

Appendix I

Case Study

The attached tally sheets show PTA data collected on a stand in Queens County (Figure 1). The data illustrates how a PTA is used for prescribing harvests. Also shown is a harvest plan report produced from the PTA program (Table 1). This example illustrates the crown-land PTA information-requirements for prescribing ecosystem based management activities at the stand level.

As a result of the PTA assessment the following information was determined:

Sample Cruise Summary

Vegetation Type	SH-2 : Hemlock – White pine/ Sarsaparilla
Soil Type:	ST2 – Fresh, Medium to Coarse textured Soil
Tolerant Species:	60%
Eastern Hemlock:	45%
Red Spruce:	15%
Total Growing Stock (10cm+Dbh):	47 m^2/ha
Sawlog Stock (25cm+Dbh):	38 m^2/ha
Acceptable Growing Stock (10cm+Dbh):	35 m^2/ha
Uniform Distribution:	83%
Regeneration Stocking	15%

Recommended Stand Prescription

Based on the information collected in this sample, the Tolerant Softwood/Mixedwood Management Guide recommends an Individual Tree Selection. During the assessment, the vegetation type was identified as SH-2: Hemlock – White Pine/ Sarsaparilla. An SH-2 is characterized by infrequent disturbance regimes. The soil was identified as a Fresh, Medium to Coarse textured (ST2) and the site was moderately exposed to winds making the windthrow hazard low. The majority of the trees are mature long-lived and shade tolerant species of acceptable growing stock uniformly distributed throughout the stand. These characteristics make the stand a suitable candidate for selection management (McGrath, 2010). The regeneration goal of this harvest is to move this stand further along its successional path to an SH3 Red spruce – Hemlock/ Wild lily-of the valley vegetation type by creating shaded regeneration conditions, favoring red spruce and hemlock over white pine. A thirty percent basal area removal is prescribed. The species to-leave preference list is red spruce, eastern hemlock, white pine and lastly red maple where tree condition allows.

Figure 1. Sample Completed Tally Sheets. See Appendix II for Definitions.

Pre Treatment Tree Assessment Tally Sheet Date:_*June 25, 2008*__ Prism Factor:_*2*__ ********Case Study*******

Loc:_Milton____Co:__Queens_____ BL:__*1*___ST:__*1*___ # Plots:___6____ Cruiser:___*TM*_____ Page:_*1*__ of _*1*___

Sp	*RS*		*EH*		*WP*		*RM*																	
TC	*UGS*	*AGS*	*UGS*	*AGS*	*UGS*	*AGS*	*UGS*	*AGS*																
Dbh																								
5							*1*																	
10	*1*		*3*	*1*																				
15	*3*		*2*		*3*		*1*	*1*																
20	*3*	*4*	*1*		*1*			*1*																
25		*6*	*1*	*8*	*2*		*1*																	
30		*2*	*2*	*11*		*9*																		
35	*1*	*1*	*2*	*6*		*10*																		
40			*1*	*10*		*12*																		
45			*3*	*3*	*1*	*6*																		
50			*2*	*5*		*6*																		
55						*1*																		
70			*2*																					
90				*1*																				

Pre-Treatment Site Assessment Tally Sheet. Loc:__*Milton*___ Co:___*Queens*____Stand:___*1 (0819)*__ ******Case Study******											
Plot	ST	VT	BD	EX	WET	TF	WT	WF	Patch	Regen	Heights/age
1	*2*	*SH4*	-	*M*	-	-	-	*D*	*U*	*5,BF/D/5/0.7, RS/D/5/1.0*	*17.8*
2	*2*	*SH4*	-	*M*	-	-	-	-	*M*	*5,EH/D/50/0.1*	*18.8*
3	*2*	*SH1*	-	*M*	-	*C*	-	-	*U*	*0*	*18.2*
4	*2*	*SH2*	-	*M*	-	-	-	-	*U*	*10,EH/D/50/3.0, RS/CD/5/2.0*	*17.9*
5	*2*	*SH2*	-	*M*	-	-	-	-	*U*	*5,EH/D/5/2.0, RS/D/2/2.0*	*19.1*
6	*2*	*SH2*	-	*M*	-	-	*N*	-	*U*	*0,AB/D/80/3.0*	*18.5*
Comments:											

Figure 2. Minimum Required Data for Pre-Treatment Assessment. Sample output of PTA Computer Program.

12 March 2014

Harvest Plan Summary Table (3)

Location	Stand, (Ref #)	Plot Count	Area (ha)	VT	ST	EX	WH	TBA (m2/ha)	AGS (m2/ha)	Species %	DBH Size Class (cm) (m2/ha) <15	15-20	>=25	>=35	Regen. Stocking %	Wildlife/ Geology	Rx	Notes
Milton	1 (08019)	6	6.0	SH2	ST2	M	Low	47	35	45eH36wP15rS4rM	2	7	38	24	15Total 9eH2rS	N,D,C	SS	1

Notes:

1. The goal is to increase the proportion of Red Spruce and Hemlock and move the stand to a SH3 - Red Spruce - Hemlock / Wild lily-of -the-valley vegetation type.

VT: FEC vegetation type *ST:* FEC soil type *EX:* Exposure: E=Exposed, ME=Moderately exposed, M=Moderate, MS=Moderately sheltered, S=Sheltered *WH:* Windthrow Hazard
TBA: Total Basal Area *AGS:* Basal area of Acceptable Growing Stock *Species:* Breakdown of species by basal area *DBH Size Class:* Basal area by diameter class (cm)
Regen Stocking: Regeneration stocking to 2.4m spacing by all species, and broken down by species, top 4 shown *Note:* Comment number, see footnotes.

Rx: Prescription	
CR=Crop tree release	OR=Overstory removal
CT=Commercial thinning	OT=Other
GS=Group selection	PC=Precommercial thinning
HB=Refer to Forestry Field Handbook	SH=Shelterwood
LG=Let it grow	SS=Single tree selection
OP=Overstory removal & Plant	ST=SeedTree
	*=User defined prescription

Wildlife/Geology: Special wildlife and biological features by category

V=Vernal pools	K=Karst	CT=Cavity trees (>20cm dbh with cavity of size suitable for nesting)
S=Springs	R=Ravine	N=Nests (raptors, heron colonies)
ST=Streams	O=Rock outcrop/Boulder fields	M=Mast (oak, beech or witch hazel with mast)
	C=Caves	D=Deer wintering areas, W=Wildlife concentrations
		SR=Species at risk/concern (http://www.gov.ns.ca/natr/wildlife/biodiversity/species-recovery.asp)

Appendix II

Blank Tally Sheets – Definitions Follow Tally Sheets

Pre-Treatment Tree Assessment Tally Sheet Date:_____ Prism Factor:___

Loc:_____Co:_____ BL:_____ST:_____ # Plots:_____ Cruiser:_____ Page:___ of ____

Sp																								
TC																								
Dbh																								

Comments:

Pre-Treatment Tree Assessment Tally Sheet - Tree Codes (TC):

Softwoods:

U- Unacceptable Growing Stock (UGS) - will not make sawlog or studwood quality stem in the future or has stud or sawlog quality stem now but tree will degrade in quality before the time of the next harvest. If the tree vigor is low due to reasons such as broken/dead tops, insect/disease damage, small crowns (<1/3 live crown ratio) etc which make it a poor candidate to leave growing as a future crop tree in a partial harvest, it should be called an UGS.

A - Acceptable Growing Stock (AGS) - will make a studwood or sawlog quality stem in the future or has one now and will still have studwood or sawlog quality at the time of the next harvest.

Hardwoods:

U- Unacceptable growing Stock (UGS) - will not make sawlog quality stem in the future or has sawlog quality stem now but will degrade in quality before the time of the next harvest. If the tree vigor is low due to reasons such as broken/dead tops, insect/disease damage, small crowns etc which make it a poor candidate to leave growing as a future crop tree it should be called an UGS.

A - Acceptable Growing Stock (AGS) - will make a sawlog quality stem in the future or is one now and will maintain or improve in quality by the time of the next harvest.

Pre-Treatment Site Assessment Tally Sheet: Loc:_____Co._____Stand:_____

Plot	ST	VT	BD	EX	WET	TF	WT	WF	Patch	Regen	LLST	Heights/Ages

Comments:

Pre-Treatment Site Assessment Tally Sheet:

Codes

ST- FEC soil type. Enter at each sample plot. It is necessary to dig or auger at least one plot for each site. If a change in land form or vegetation occurs verify that the soils have not changed by digging or augering. (4)
VT- FEC vegetation type. Enter at each plot. (3)
BD - Blowdown indicators: **E**=Existing windthrow, **MP**=Mound and Pit topography, **S**=Sphagnum moss
EX – Exposure: **E** = Exposed; **ME** = Moderately Exposed; **M** = Moderate; **MS** = Moderately Sheltered; **S** = Sheltered (5)
WET – Non mapped wetlands: **V** = Vernal Pools, **S**= Springs, **ST** = Streams
TF – Topographic Features: **K**=Karst, **R** = Ravine, **O** = Rock Outcrop/Boulder fields, **C**= Caves
WT – Wildlife Trees: **CT**=Cavity Trees (trees greater than 20 cm dbh with existing cavity of size suitable for nesting), **N**=Nests (raptors, heron colonies), **M**= Mast (oak, beech or witch hazel with mast)
WF – Wildlife Features: **D**=Deer Wintering Areas, **W**=Wildlife Concentrations, **SR**=Species at Risk/concern (http://www.gov.ns.ca/natr/wildlife/biodiversity/species-recovery.asp), **U**=Unique features (specify in comments).
Patch: - is the area around the sample plot dominated by **M** - mature to over mature trees, **I** - Immature AGS , **R**- Advanced regeneration of preferred species, or a **U**- Uniform mix of all age classes
Regen-Regeneration: Stocking to 2.4 m spacing of acceptable and established regeneration (required), (optional) Species, Dominance (D= dominant; C - Co-dominant, S - suppressed), Stocking to 2.4 m spacing (%), Average Height (m) eg: rS/D/30/0.3 - red spruce dominant 30% stocking, 30cm tall. This includes all trees that are less than 9 cm in Dbh (Diameter at Breast Height)
LLST- Existence of at least one Seed Tree within a radius of 10 metres from the plot centre of Long Lived species; including sugar maple, red spruce, eastern hemlock, yellow birch, white ash, red oak, or white pine. Enter either Y for yes or N for no.
Heights/ages: At least one height of a typical codominant tree must be entered for each plot for use in the Management Guides. If Land Capability calculations are desired, the breast height age and height of a dominant free growing tree in metres must be entered.

Appendix III

PTA Data Collection and Summary Computer Program

As an alternative to collecting PTA information via tally, a computer program has been developed for electronically collecting data in the field. This program has the ability to make all compilations necessary for the PTA summary and to produce standard tables that meet the requirements for PTAs. This program can also be used to enter tally sheet collected data into a standard data base format and make required calculations and reports.

Although it is not required that PTA information be collected in the field with the PTA program, it is required that the PTA data be submitted in electronic form, readable with the PTA program. If the PTA information is collected with paper tally sheets or another electronic data collection program, the data must be either entered into the PTA program from tally sheet or converted to a form readable by the PTA program. In this way, the PTA information can be shared and stored in a standard electronic format.

This program is developed for Windows® operating systems and has been tested on Windows XP, 7, 8 and 10 computers and tablets. The data collection screens have been designed to run on a Panasonic UF-1 Toughbook®. The UF-1 is a fully-ruggedized, all-weather, sealed unit with a 5.6 inch widescreen WSVGA touchscreen with 1024x600 resolution.

The PTA program can be found and downloaded from the Provincial web site at the following link: http://novascotia.ca/natr/forestry/programs/timberman/pta.asp

Installation Instructions

The files needed to install the PTA program on your desktop computer or field data collector can be downloaded from the provincial website. Once the downloaded “pta.zip” file is copied to your local drive, it can be extracted using an extraction program such as IZark®. Once pta.zip is extracted, the folder will contain the software installation instructions “PTA_Installation_Help.pdf”, the PTA software “pta#.exe”, the PTA data converter program “pta4Converter.exe”, the detailed user manual “PTA# User Manual.pdf”, data structures “PTA# File Structures for public.pdf” and a PTA introduction document “PTA_Intro.pdf”. It will also contain two subfolders named "Disk1" and “PDF”.

The “PTA Help.pdf” file contains further installation instructions.

Overview of PTA4 Program Capabilities

- Runs on any Windows® XP, 7, 8 or 10 computer or tablets with a minimum 5.6 Inch screen size
- Provides template for entering required PTA data
- Provides stand level compilations necessary to produce harvest plan.
- Includes File Management Utilities to organize data
- Includes ability to organize plot data into stands
- Ability to provide recommended prescription according to the Tolerant Management Guides (McGrath, 2007, 2010)
- Ability to compile volumes by product
- Ability to read PTA data collected from previous versions by using the PtaConverter program