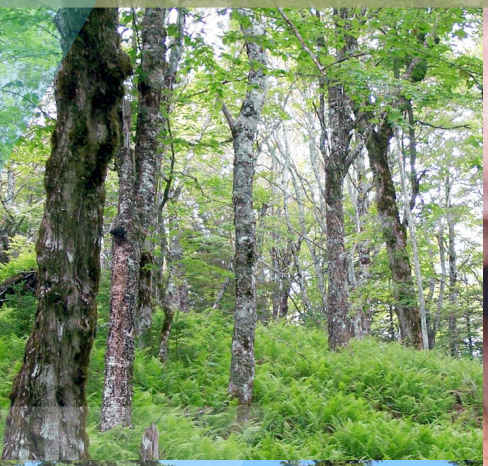
Forest Ecosystem Classification for Nova Scotia (2022):

Technical Guide



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NOVA SCOTIA

Forest Ecosystem Classification for Nova Scotia (2022): Technical Guide

Kevin Keys, Peter Neily, Scott Maston, Eugene Quigley, Sean Basquill, Bruce Stewart

Forestry and Wildlife Branch
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Acknowledgements

Forest ecosystem classification (FEC) in Nova Scotia has been widely accepted as a tool to strengthen understanding of forest ecology and promote ecosystem-based forest management. As authors we thank all our colleagues within and outside of DNRR who have contributed to field work, promotion, and use of FEC throughout the province from the time we started over 20 years ago. Your enthusiasm and support have been very much appreciated.

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Introduction

Nova Scotia's Forest Ecosystem Classification (FEC) describes and classifies forested ecosystems found in the province by applying standardized criteria and nomenclature.

The provincial FEC system:

- provides a means for comprehensively describing the range of vegetation, soil, and site conditions found in Nova Scotia forests
- provides a common language for communication and education through the identification of ecologically significant vegetation types, soil types, and ecosites
- allows for the development and use of ecosystem-specific guidelines and interpretations which can make management outcomes more predictable and sustainable

This FEC (2022): Technical Guide is a companion to the FEC (2022): Field Guide (Neily et al. 2023). It provides more details on FEC Soil Types and FEC Ecosites listed in the field guide – details that improve understanding of these units, but which are not needed for field classification. The Ecosite section also includes an overview of ecosite coverage by Forest Group that allows for easier comparison of vegetation/ecosite relationships. In addition, an overview of field assessment and data analysis methods used to collect FEC data and derive FEC units is provided – information that was not included in the FEC (2010) guide.

The Nova Scotia Department of Natural Resources and Renewables website has a wide variety of resources and technical reports that utilize FEC as a foundational base. Such topics include successional linkages, coarse woody material and snags, land capability assessment and interpretation, and soil hazard ratings which were previously found in the FEC (2010) guide. These, along with many other topics, are collectively referred to as **FEC (2022): Interpretations**, and are available as online resources (i.e. downloadable PDFs).

Interpretation documents will be added to or updated on a regular basis as more research and analysis is completed. Please visit the Natural Resources and Renewables website and look for more information.

Part I: Soils

Soil Types

Soil types are mainly differentiated by dominant texture, dominant moisture condition (drainage class), fertility (as inferred by A-horizon type) and depth. A total of 18 soil types and 5 soil type phases are currently recognized (Table S1).

TABLE S1.
Soil types (STs) and phases within the provincial FEC system

Code	Soil Type Name *	Code	Soil Type Name *
ST1	Dry – CT	ST10	Rich Wet – MT
ST2	Fresh – MT	ST11	Rich Fresh – FT
ST3	Moist – MT	ST12	Rich Moist – FT
ST4	Wet – MT	ST13	Rich Wet – FT
ST5	Fresh – FT	ST14	Organic
ST6	Moist – FT	ST15	Dry Shallow – MT
ST7	Wet – FT	ST16	Moist Shallow – MT
ST8	Rich Fresh – MT	ST17	Rich Dry Shallow – MT
ST9	Rich Moist – MT	ST18	Rich Moist Shallow – MT

Soil Type Phases		Applicable Soil Types
B	Boulder phase	ST1, ST2, ST3, ST4, ST8, ST9, ST14, ST15, ST16
C	Coarse phase	ST2, ST3, ST5, ST6, ST8, ST9, ST15, ST16
L	Loamy phase	ST2, ST3, ST15, ST16
S	Stony phase	All STs
U	Upland phase	ST14

* CT = coarse textured, MT = medium textured, FT = fine textured

The majority of current ST units have been carried over from the original FEC guide (Neily et al. 2013), with a few notable changes:

- **ST19 (Talus)** has been dropped from the system since soils in treed talus sites can be captured using stony phase calls.
- **Granite (G)** phase has been replaced by **boulder (B)** phase which now includes greywacke surface boulders as well as granite family rocks.
- A **coarse (C)** phase option has been added to ST5 and ST6 to differentiate typical ST5 and ST6 soils from those with distinctly coarser surface layers.
- As a complement to **loamy (L)** phase soils, a **coarse (C)** phase option has been added to ST2, ST3, ST15, and ST16 to differentiate typical soils from those that have distinctly coarser surface layers.
- The **definition of ST1** has been narrowed to mainly represent well to rapidly drained sand dominated soils.

Soil Type Phases

Phases are used to identify features within a soil type that are important for ecological and/or management interpretations, but which do not warrant establishment of a separate unit. Phases and their applicable soil types are listed in Table S1.

Loamy Phase (L)

Loamy (L) phase soils are associated with a subset of medium to coarse textured STs (ST2, ST3, ST15, ST16). They are characterized by having less than 50% sand in most of the upper 20 cm of soil for ST2 and ST3, or the majority of soil for ST15 and ST16. L-phase soils were identified because of their potential positive impact on fertility and negative impact on soil damage hazard ratings.

Coarse Phase (C)

Coarse (C) phase soils are characterized by having distinctly coarser surface layers compared to typical ST conditions. C-phase soils were identified because of their potential positive impact on trafficability and negative impact on fertility.

- For fine to medium textured ST5 and ST6 soils, C-phase applies when the top 30 cm of soil has both sand content > 50% and clay content < 20%.
- For medium to coarse textured ST2, ST3, ST8 and ST9 soils, C-phase applies when most of the top 30 cm of soil has sand content > 75%, or the top 30 cm of soil has > 50% gravel (gravel = rocks 0.2 cm to 7.5 cm in diameter).
- For shallow ST15 and ST16 soils, C-phase applies when most of the soil has sand content > 75%, or the soil has > 50% gravel (gravel = rocks 0.2 cm to 7.5 cm in diameter).

Upland Phase (U)

The U-phase is only associated with organic ST14 soils. The vast majority of ST14 soils are derived from hydrophytic vegetation (i.e. wetland vegetation). However, some upland forest floors can also become thick on cool, moist sites (e.g. imperfectly drained coastal areas or north-facing slopes). U-phase applies when the surface 40 cm of any organic soil is derived from upland vegetation sources, regardless of whether wetland organics are also found below this depth.

Stony Phase (S)

Many soils have a stony (S) phase which can further impact management interpretations, especially nutrient status, windthrow hazard, and trafficability.

S-phase is applied to any ST when the upper 30 cm of mineral soil contains a combination of cobbles, stones, and/or boulders such that tree rooting into the soil is severely restricted (or potentially severely restricted) by the presence of these coarse fragments. Although it is the effect on potential rooting that dictates the S-phase call, associated coarse fragment volumes in S-phase soils would generally be in the 70% plus range.

Assessment of S-phase includes all rock types but does not include surface stones unless surface stones form a continuous cover or are contiguous with the sub-surface stone restriction. Stony phase can also apply to organic soils (ST14 and ST14-U) in which case the upper 30 cm of organic soil is assessed.

cont'd

Note: Stoniness often begins at the interface between forest floor and mineral soil which can sometimes make it look like there is little to no mineral soil present. If these coarse fragments are below the forest floor, they mark the beginning (zero point) of the mineral soil layer. Coarse fragment content will often decrease with depth in S-phase soils since concentration of rock near the surface can be the result of both deposition and post-deposition processes such as frost heaving and surface stone weathering. Many S-phase soils show little obvious signs of stoniness on the surface.

Boulder Phase (B)

Many parts of Nova Scotia contain large surface boulders that, when numerous, affect site fertility and trafficability. Boulder (B) phase is mainly associated with medium to coarse textured soils and is applied when a site has granite or greywacke SURFACE boulders (rocks ≥ 60 cm in diameter) that are on average about 2 m apart or less. Distance can be increased up to about 4 m apart for larger boulders (≥ 120 cm in diameter). These surface boulders can be exposed or covered by vegetation (usually mosses).

B-phase ONLY includes granite family rocks (granite and granodiorite) and greywacke family rocks (greywacke and meta-greywacke–sometimes also called quartzite). These are mainly found in the Western and Eastern ecoregions, and parts of Cape Breton.

Note: Although B-phase soils are pre-disposed to stoniness, users should NOT equate B-phase with S-phase conditions since many B-phase soils do not have severe rooting restrictions associated with sub-surface stoniness. However, where both conditions are found, soils should be labelled as such.

Multiple Phases

In some cases, soils may need to be assigned more than one phase designation. This would only occur in conjunction with boulder (B) and/or stony (S) phase soils. Table S2 lists all possible multi-phase options with their expected frequency.

TABLE S2.
Possible multi-phase combinations for FEC soil types with their expected frequency of occurrence

Phase Code	Name	Occurrence
CB	Coarse – Boulder phase	Common *
CS	Coarse – Stony phase	Common *
CSB	Coarse – Stony – Boulder phase	Uncommon
LB	Loamy – Boulder phase	Uncommon
LS	Loamy – Stony phase	Uncommon
LSB	Loamy – Stony – Boulder phase	Rare
SB	Stony – Boulder phase	Common *
UB	Upland – Boulder phase	Rare
US	Upland – Stony phase	Rare
USB	Upland – Stony – Boulder phase	Rare

* Common with non-rich soils only, very rare or not found with rich soils.

Soil Type Key

The soil type key (Figure S1) on the following page is hierarchical, with the user working down through decision points until ST is determined. The key has been updated and made simpler compared to the original FEC guide (Neily et al. 2013).

Soil drainage class is no longer determined by soil features alone. Rather, users determine drainage class by weight of evidence from all site features (vegetation, soils, slope position, etc.) and apply this information within the key.

Use of the ST keys requires checking soils in an area representative of the forest stand being assessed. Attention must be paid to slope position, microtopography, and presence of possible flow channels. Users should avoid obvious mounds, pits, or other areas with signs of local disturbance as this could lead to errors in ST classification.

Note — It is also critical that users:

- Ensure they check up to the full 50 cm depth for clay content thresholds when needed. Not assessing deep enough is a common cause of errors in ST classification.
- Ensure they note when borderline conditions are found for texture, drainage, depth, B-phase, and/or S-phase.
- Ensure Ah or Ap horizons are well developed and continuous before making a rich ST call. This is accomplished by assessing A-horizon type at several locations away from the main sample point.
- Ensure shallowness is continuous before making a shallow ST call. This is accomplished by assessing depth at several locations away from the main sample point.
- Ensure that S-phase is not assigned based only on a few refusals when attempting to auger or dig into the soil. For S-phase to be applied, tree rooting into surface mineral soil must be severely restricted (or potentially severely restricted) by the increased presence of near-surface stones.

FIGURE S1.
Key to forest soil types in Nova Scotia

1a. Surface organic thickness is ≥ 40 cm — **Go to ORGANIC SOIL key**

1b. Not as above — **Go to 2**

2a. Average mineral soil depth is ≤ 30 cm over bedrock or a fully cemented soil horizon — **Go to SHALLOW SOIL key**

2b. Not as above — **Go to 3**

3a. Soil has a ≥ 10 cm thick layer starting within the top 50 cm of mineral soil with CLAY content ≥ 20% — **Go to FINE SOIL key**

3b. Not as above — **Go to COARSE SOIL key**

ORGANIC SOIL key *

1a. Some or all of the surface organic material in the top 40 cm is derived from wetland vegetation (e.g. *Sphagnum spp., Carex spp.,* etc.) — **ST14**

1b. Not as above — **ST14-U**

SHALLOW SOIL key *

1a. Soil has an unbroken Ah or Ap horizon ≥ 3 cm thick — **Go to 7**

1b. Not as above — **Go to 2**

2a. Soil is moderately well drained or better — **Go to 3**

2b. Soil is Imperfectly drained — **Go to 5**

2c. Soil Is poorly drained — **ST4**

3a. Majority of soil has SAND content > 75% or GRAVEL content in soil is > 50% — **ST15-C**

3b. Not as above — **Go to 4**

4a. Majority of soil has SAND content < 50% — **ST15-L**

4b. Not as above — **ST15**

5a. Majority of soil has SAND content > 75% or GRAVEL content in soil is > 50% — **ST16-C**

5b. Not as above — **Go to 6**

6a. Majority of soil has SAND content < 50% — **ST16-L**

6b. Not as above — **ST16**

7a. Soil Is well drained — **ST17**

7b. Soil Is imperfectly drained — **ST18**

7c. Soil Is poorly drained — **ST10**

FINE SOIL key *

1a. Soil has an unbroken Ah or Ap horizon ≥ 3 cm thick — **Go to 5**

1b. Not as above — **Go to 2**

2a. Soil is moderately well drained or better — **Go to 3**

2b. Soil is Imperfectly drained — **Go to 4**

2c. Soil Is poorly drained — **ST7**

3a. ALL of the top 30 cm of soil has SAND content > 50% and CLAY content < 20% — **ST5-C**

3b. Not as above — **ST5**

4a. ALL of the top 30 cm of soil has SAND content > 50% and CLAY content < 20% — **ST6-C**

4b. Not as above — **ST6**

5a. Soil is moderately well drained or better — **ST11**

5b. Soil is imperfectly drained — **ST12**

5c. Soil is poorly drained — **ST13**

COARSE SOIL key *

1a. Soil has an unbroken Ah or Ap horizon ≥ 3 cm thick **Go to 8**

1b. Not as above **Go to 2**

2a. Soil is moderately well drained or better **Go to 3**

2b. Soil is Imperfectly drained **Go to 6**

2c. Soil Is poorly drained **ST4**

3a. Majority of top 50 cm of soil has SAND content > 75% **ST1**

3b. Not as above **Go to 4**

4a. Majority of top 30 cm of soil has SAND content > 75% or GRAVEL content within top 30 cm of soil is > 50% **ST2-C**

4b. Not as above **Go to 5**

5a. Majority of top 20 cm of soil has SAND content < 50% **ST2-L**

5b. Not as above **ST2**

6a. Majority of top 30 cm of soil has SAND content > 75% or GRAVEL content within top 30 cm of soil is > 50% **ST3-C**

6b. Not as above **Go to 7**

7a. Majority of top 20 cm of soil has SAND content < 50% **ST3-L**

7b. Not as above **ST3**

8a. Soil is moderately well drained or better **Go to 9**

8b. Soil is Imperfectly drained **Go to 10**

8c. Soil Is poorly drained **ST10**

9a. Majority of top 30 cm of soil has SAND content > 75% or GRAVEL content within top 30 cm of soil is > 50% **ST8-C**

9b. Not as above **ST8**

10a. Majority of top 30 cm of soil has SAND content > 75% or GRAVEL content within top 30 cm of soil is > 50% **ST9-C**

10b Not as above **ST9**

* If soil meets stony phase definition, add S-phase to soil type call.
If surface stoniness meets boulder phase definition, add B-phase to soil type call.

It will take some training and calibration for assessors to confidently estimate soil texture in the field. However, for FEC soil type classification, assessors only need to become comfortable with three texture breakpoints: 20% clay, 75% sand, and 50% sand — everything else is extra (20% clay corresponds with the "distinctly sticky" threshold in the texture key).

Soil Type Relationships

As outlined above, soil types are mainly differentiated by dominant texture, dominant moisture condition, fertility and depth. Relationships between STs can be shown using a matrix table (Figure S2), which allows users to see how all soils are related to each other by these features.

Figure S2 is particularly useful in assessing the impact of changing moisture conditions on soil trafficability. Moisture condition associated with each soil type is the typical (or dominant) growing season condition, but every soil can be in a dry, fresh, moist, or wet condition on any given day (based on season and weather). This concept is important for correctly interpreting and assigning soil compaction and rutting hazards during, for example, harvesting operations.

FIGURE S2.
Matrix table showing general relationships (logic connections) between soil type units (excluding S-phase and B-phase soils)

Drainage Class	Typical Moisture Condition	Medium to Coarse Texture				Fine to Medium Texture		Organic
		Typic (Ae or Ahe)	Rich (Ah or Ap)	Shallow Typic (Ae or Ahe)	Shallow Rich (Ah or Ap)	Typic (Ae or Ahe)	Rich (Ah or Ap)	
Rapid Well	Dry	ST1		(ST15-C) ST15				
Well Mod. Well	Fresh	(ST2-C) ST2 (ST2-L)	(ST8-C) ST8	(ST15-L) ST16-C	ST17	(ST5-C) ST5	ST11	
Imperfect	Moist	(ST3-C) ST3 (ST3-L)	(ST9-C) ST9	ST16 (ST16-L)	ST18	(ST6-C) ST6	ST12	ST14-U
Poor Very Poor	Wet	ST4	ST10	ST4	ST10	ST7	ST13	ST14

Soil Texture and Particle Size Class

Soil texture refers to the percentage of sand, silt and clay in a soil (sand ranges in size from 0.05–2.0 mm; silt from 0.002–0.05 mm, and clay < 0.002 mm). Texture influences many soil attributes including moisture and nutrient retention, soil structure and aeration porosity, soil temperature, soil strength, and soil trafficability.

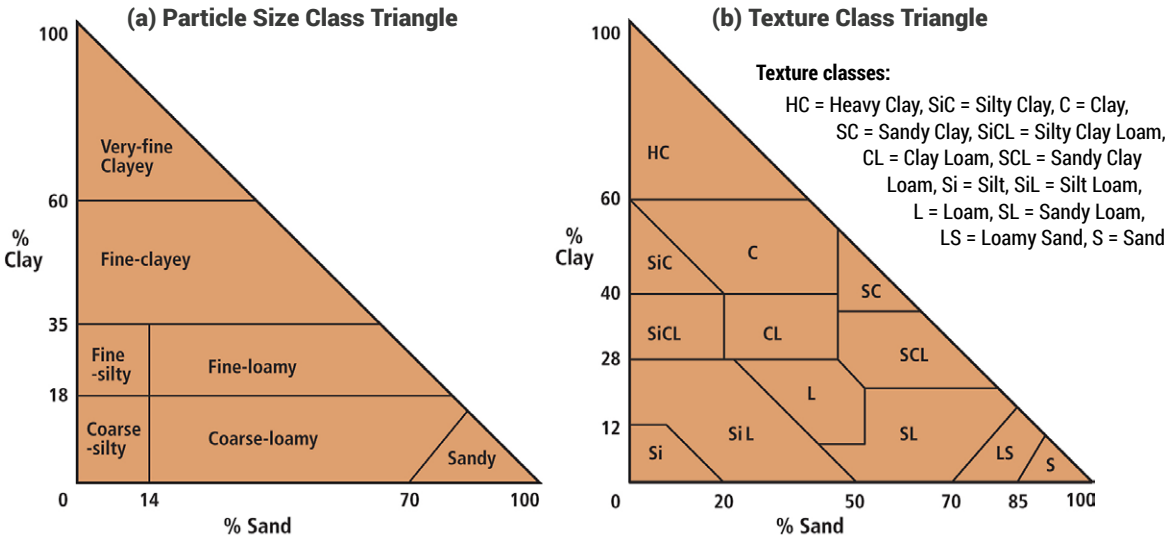
Texture is often described using classes that have defined ranges of sand, silt and clay. Several classification schemes have been developed to meet the needs of soil surveyors, engineers, agriculturalists and other resource managers. Choosing which classification to use depends, in part, on how well classification units meet interpretation needs. Two such classification schemes are shown in Figure S3 (adapted from SCWG 1998) and both are used in the FEC system to help differentiate soil types and phases for management purposes.

Soil Type Texture Breakpoints

The boundary between coarse-loamy and fine-loamy particle size classes (Figure S3a) coincides with clay percentages (about 20%) that are associated with increased plasticity and compaction hazard in forest soils (Curran 2001). This is the breakpoint used to differentiate fine soils from coarse soils in the FEC system. The sandy particle size class (beginning at about 75% sand) is another breakpoint used to separate soils that have reduced moisture and nutrient retention capabilities compared to coarse-loamy soils. However, the coarse-loamy unit is too broad for other interpretations (e.g. erosion and frost heave hazards) which need to account for smaller differences in sand content. In this case a breakpoint of 50% sand is used to separate loamy (L-phase) soils from typic soils. This roughly coincides with the breakpoint between sandy loam and loam (Figure S3b).

FIGURE S3.
Soil particle size and texture class triangles

Soil particle size and texture class triangles showing relative clay and sand percentages by class unit (% silt is inferred by knowing other values). In general, fine textured soils are higher in clay, medium textured soils are higher in silt, and coarse textured soils are higher in sand.



Using the Texture Key

To use the texture key (found on the following page), start by placing a small mass of soil on the middle of your three largest fingers (palm side) and remove any obvious organic material and rock (all solid particles over 2 mm in size are considered coarse fragments and are not part of the texture assessment). If the sample being assessed has many small coarse fragments (rocks), you must mentally disregard these when assessing the sample (but consider them when estimating gravel content).

Next, moisten the sample until it is wet enough to stay in place when inverted (when you turn your hand over), but not so that the sample is runny or excess water is present. Rub the moistened sample between your thumb and fingers to assess relative grittiness and smoothness (you must rub hard to feel all sand sizes). All grittiness, no matter how fine, is due to sand content (smoothness is due to both silt and clay). Based on relative grittiness, estimate sand content by going down the left hand column of the key until the description matches your sample.

If your sample has < 75% sand you also need to assess clay content. To do this, lift your thumb up and down from the fingers to assess relative stickiness within your moist sample. Only the clay fraction causes stickiness (silt just feels smooth). The more clay in your soil, the stickier it will feel when moist. Move across the key from left to right (beginning from where you established sand content) until the stickiness description matches your sample. This will lead you to your estimated texture class.

Once you have estimated soil texture, look up the associated particle size class to determine which soil type key you should use (fine or coarse).

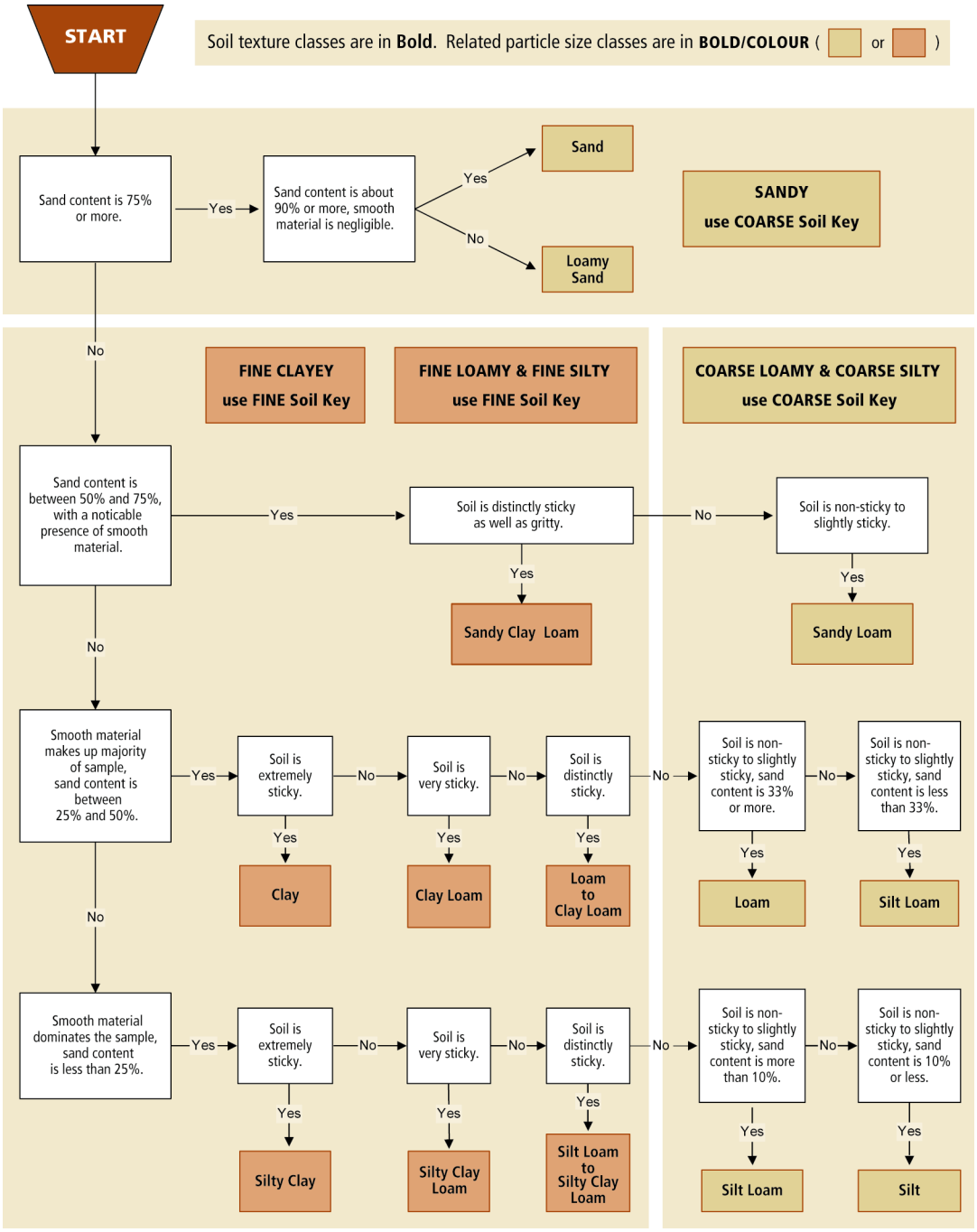
Soil sample before moistening

Soil sample after moistening, ready for texture / particle size class determination

Rubbing sample hard to a thin film between the thumb and fingers to ensure all sand sizes are being assessed — if sample is not rubbed hard, sand content will be underestimated

Lifting thumb from fingers to assess relative clay content (stickiness) — if the sample is too dry or too wet, stickiness (clay content) will be underestimated

Soil texture class and particle size class key



Drainage Classes

Soil drainage class reflects the length of time it takes water to be removed from a soil in relation to supply. Several factors affect drainage class. These include: (i) slope position, (ii) slope percent and aspect, (iii) soil texture, (iv) depth to impermeable layer, (v) coarse fragment content, and (vi) abundance and type of vegetation (evapotranspiration).

Six commonly recognized drainage classes are described below (adapted from ECSS 1982):

Rapid – Water is removed from the soil rapidly in relation to supply. Excess water flows downward if underlying material is permeable, or laterally if vertical flow is restricted. The water source is precipitation. Soils do not show any redoximorphic features within the profile.

Well – Water is removed from the soil readily, but not rapidly. Excess water flows downward if underlying material is permeable, or laterally if vertical flow is restricted. The water source is precipitation. Soils usually do not show redoximorphic features within the first metre, but may show features below this depth.

Moderately Well – Water is removed from the soil somewhat slowly in relation to supply – due to low permeability and lack of slope, shallow water table, seepage inputs, or some combination of these. The water source is precipitation in medium to fine textured soils, and precipitation and seepage flow in coarse textured soils. Soils commonly show redoximorphic features in lower BC and C horizons.

Imperfect – Water is removed from the soil sufficiently slowly in relation to supply to keep the soil wet for a significant part of the growing season. Excess water moves slowly downward if precipitation is the major supply. If seepage water or ground water (or both) is the main source, the flow rate may vary but the soil remains wet for a significant part of the growing season. Soils commonly show redoximorphic features in upper B horizons and sometimes in A horizons.

Poor – Water is removed so slowly in relation to supply that the soil remains wet for a comparatively large part of the time (when not frozen). Seepage inputs or ground water flow (or both), in addition to precipitation, are the main water sources. There may also be a perched water table with precipitation exceeding evapotranspiration. Soils usually show redoximorphic features throughout the profile.

Very Poor – Water is removed from the soil so slowly that the water table remains at or near the surface for the greater part of the time (when the soil is not frozen). Groundwater flow and seepage inputs are the major water sources. Precipitation is less important, except where there is a perched water table with precipitation exceeding evapotranspiration. Soils usually show redoximorphic features throughout the profile and are often organic.

Assessing Drainage Class

In the Nova Scotia FEC system, there are three main drainage class groups used to help differentiate soil types:

Well (includes rapid, well, moderately well)

Imperfect

Poor (includes poor, very poor)

Soil features alone can often be used to determine imperfect or poor drainage conditions (see wet soils section below), but it is sometimes difficult to assess these features in stony soils or when soils are seasonally wet or frozen. Instead, drainage class should be assigned based on an overall assessment of site, vegetation, and soil features.

Aboveground features associated with imperfect to poor drainage include:

- Slope position where moisture or snow can collect (lower, depression, level)
- Slope length (longer slopes have increased seepage potential)
- Proximity of surface water bodies and wetlands (near-surface water table)
- Presence of hydrophytic vegetation (wet site plant indicators)

Soils that are imperfectly or poorly drained have periods during the growing season when soils are saturated for days or weeks at a time. Under these conditions, reduction/oxidation (redox) reactions occur that result in telltale signs of this periodic saturation. Soil redox features include:

IMPERFECT drainage
Scattered, faint to distinct redox concentrations (or depletions) in the upper 30 cm of mineral soil
Soil with thicker organic horizons than nearby well drained locations
POOR drainage
Many, distinct to prominent redox concentrations (or depletions) throughout the upper 30 cm of mineral soil
Soil with a greyish background colour throughout the upper 30 cm of mineral soil (depleted matrix)
Soil with variable shades of grey in the leached Ae horizon along with redox features in the B-horizon below
Soil with thick organic horizons (20+ cm) derived from sphagnum mosses (peat)

Note: Poorly drained soils are usually easy to recognize; it is imperfectly drained soils that are most easily missed, but which are important to recognize because of differences in productivity and trafficability.

Soil Features

Wet Soils

Typical moisture condition is an important feature differentiating FEC soil types. Visible soil characteristics can usually be used to identify imperfectly to poorly drained soils, even when soils are relatively dry at time of assessment. These characteristics are collectively called redoximorphic features from the reduction/oxidation (redox) reactions that produce them (Richardson and Vepraskas 2001).

Redoximorphic (redox) features result when a microbially active soil lacks oxygen (air) for long periods, as in prolonged saturation with water. Under these conditions, reactions occur that alter iron (Fe) and manganese (Mn) chemistry in the soil, as well as organic matter condition, leaving telltale visible features.

Oxidized Fe (and to a lesser extent Mn) is responsible for much of the red, orange, and yellow colours associated with well aerated soils. These elements, along with organic matter, are the "paint" that gives colour to soils. Under prolonged saturation, oxidized Fe and Mn are chemically reduced and made soluble in water, which leads to the "paint" being stripped off soil particles and diffused or washed out of the soil. The extent of this colour change depends on the length of time under reducing conditions and on the original soil colour.

Soils that are not derived from reddish parent materials tend to turn a dull grey colour under long-term saturation conditions. These soils are said to be depleted (i.e. most of the Fe paint has been removed) (Figure S4a). In some cases, soils may also turn a bluish or greenish grey colour, also called gley colour (Figure S4b). When oxygen occasionally gets back into these soils and reaches areas where diffused Fe has accumulated, prominent redox concentrations (red/orange blotches) form where reduced Fe becomes oxidized and shows its original

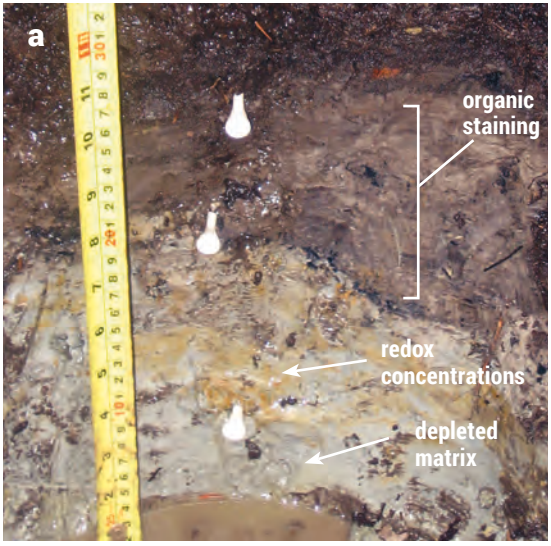
colours in contrast to the now depleted matrix (background) colour (Figure S4a, Figure S5a). Permanently saturated soils may also show depleted or gley colours without any redox concentrations.

Under less extreme saturation conditions (e.g. when soils are only seasonally wet, as after spring snowmelt), soils are not subject to as much Fe loss so that when oxygen reenters the soil, colour contrast between redox concentrations and the soil matrix is only faint to distinct (Figure S6a, b).

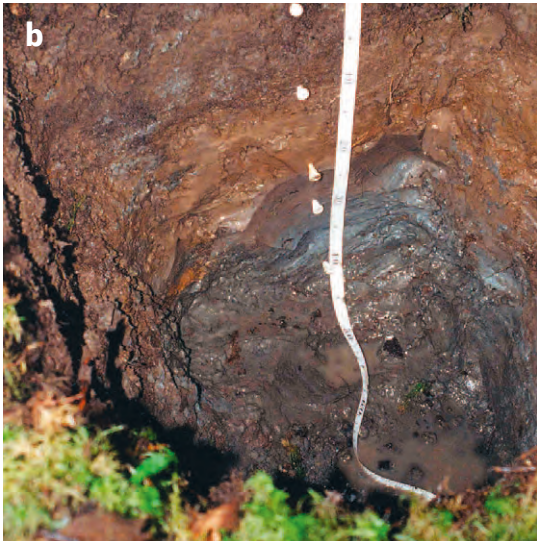
In some Ae horizons that have also been variably depleted, there may be variable shades of grey present rather than the more typical uniform colour associated with leaching alone. Prolonged saturation with water high in dissolved organic compounds can also cause organic staining which can give the A horizon further variation in colour (Figure S4a, Figure S5b).

In all cases, the depth where redox features begin coincides with the depth of prolonged saturation, with features often becoming more pronounced with depth.

FIGURE S4.
Depleted matrix and gley colours in poorly drained, non-red soils



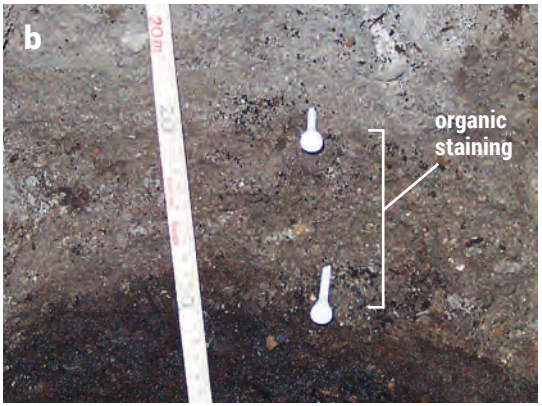
(a) A poorly drained soil showing Fe depletion (low chroma grey colours) throughout the profile, prominent (orange) redox concentrations in the middle horizon, and organic staining in the upper horizon. Redox concentrations are also found in the stained A horizon, but their prominence has been masked by organic staining.



(b) Blue-grey (gley) colour in bottom of soil profile caused by prolonged saturation and related redox reactions.

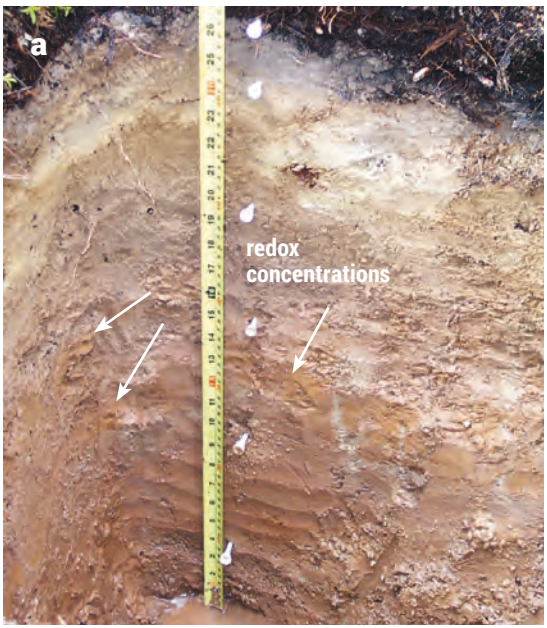
FIGURE S5.
Prominent redox concentrations and organic staining in poorly drained, non-red soils

(a) Close-up of soil with many, coarse, prominent (orange) redox concentrations within a depleted (grey) soil matrix.



(b) Organic staining in the bottom section of a leached and depleted Ae horizon where water periodically pools on top of a cemented and impermeable B horizon.

FIGURE S6.
Faint to distinct redox concentrations in imperfectly drained, non-red soils



(a) An imperfectly drained soil showing faint to distinct redox concentrations indicative of a fluctuating water table where saturation conditions do not last long enough to cause excess loss of Fe.

(b) Close-up view of faint to distinct (orange) redox concentrations against a light brown soil matrix.

For reasons not fully understood, soils derived from reddish parent materials do not always undergo full colour change under prolonged saturation. Instead, these soils tend to have a mix of red and grey colours and/or grey redox depletions (instead of red/orange concentrations) within a reddish soil matrix (Figure S7a). Redox depletions and concentrations are sometimes also found together in the same soil (Figure S7b). Mn redox features are also more common in red soils, usually expressed as very dark (almost black) concentrations or concretions.

FIGURE S7.
Redox depletions and concentrations in poorly drained, red soils

(a) A poorly drained soil derived from reddish parent material showing a mix of red and grey (depletion) colours. Pockets of organic staining are also visible in this profile.

(b) Close-up view of prominent (orange) redox concentrations near the surface of a soil underlain by massive, clay-rich (red) soil with grey redox depletions. This soil is affected by a seasonal, perched water table that was dry at time of soil assessment.

*In older literature, redox concentrations and redox depletions are referred to as **mottles** and **grey mottles** respectively. These older terms are less precise and so are not used in this guide. For example, mottling in soils is not always associated with restricted drainage; other factors may cause these colour patterns (e.g. the physical mixing of soil horizons).*

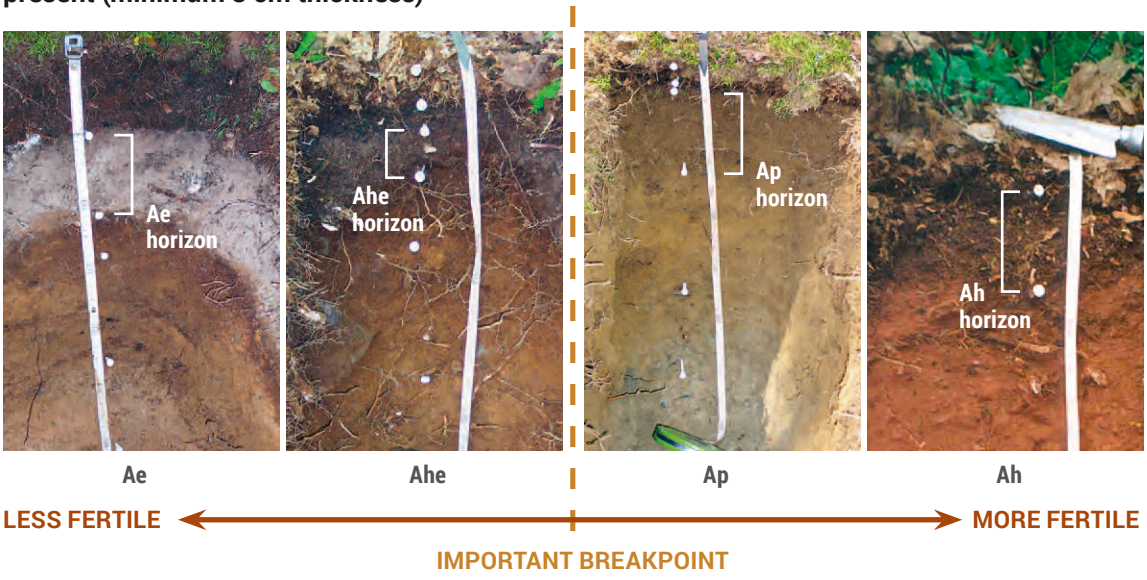
Ah and Ap Horizons

Well-developed Ah and Ap horizons can be identified based on several features:

- Increased organic matter in Ah/Ap horizons gives the soil a more brownish or sometimes blackish colour compared to horizons below. This is in contrast to the leached, light colours found in Ae horizons, or the mixed colours found in Ahe horizons.
- Ah/Ap horizons often have a high percentage of fine roots because of the availability of nutrients in these horizons. This is in contrast to the low fine root percentages found in most Ae horizons.
- Ah/Ap horizons often have a distinctive granular structure due to earthworm activity; worms may also be visible during sampling.

For a soil type to be called "rich" (Figure S8), Ah or Ap horizons must be thick enough (minimum 3 cm) and unbroken, i.e. found in all directions.

FIGURE S8.
Soil fertility is inferred to be greater when there is an unbroken Ah/Ap horizon present (minimum 3 cm thickness)



Cemented Soils

Cemented horizons (Orstein and fragipan) act as barriers to rooting and restrict or reduce the vertical flow of water. When encountered, these horizons strongly resist penetration with an auger or shovel, as if they were frozen or rock-like.

Orstein horizons (Bfc, Bhfc, Bhc) are generally associated with well to imperfectly drained, sandy and/or gravelly soils. Fragipan horizons (Bx, BCx) are loamy, dense, and frequently show bleached fracture planes. In both cases, these horizons are found below more friable or loose surface horizons.

To be considered "fully cemented" and potentially associated with shallow soil types (ST15, ST16), these cemented horizons need to be continuous and very firm or very hard (i.e. only penetrated with great difficulty, if at all, with a soil auger).

If a cemented horizon is found within 30 cm of the surface, additional checks need to be made to determine if cementation is continuous within that depth. Also, the degree of cementation should be assessed. If when using an auger it feels like you are only spinning on top of the horizon despite putting significant downward pressure on the auger as you turn it, consider the consistence very firm or very hard. If Orstein and fragipan horizons are discontinuous and/or show only partial cementation (i.e. shows resistance, but can be penetrated with an auger), then they do not qualify as fully cemented horizons.

Stony Phase Soils

Abundant stones visible below windthrown trees and repeated refusals across a sampling area when attempting to auger into surface soils are good indicators of stony phase conditions (Figure S9). However, when dealing with S-phase soils, assessors still need to determine soil type based on features below the stony surface layer. This can often be accomplished by removing one or two stones from the surface to allow deeper access. In those cases where deeper access is not possible or practical, assessors must use professional judgment in assigning soil type based on site conditions, available soil information, and nearby soil type assignments.

FIGURE S9.
Sample stony phase soil features

Stony phase soils have increased windthrow hazard. High stone content visible below windthrown trees is a good indicator of stony phase conditions.

Very Gravelly Soils

Very gravelly and/or cobbly soils (> 50% of soil volume) are easily assessed using a shovel, but auger assessment is often more difficult. Although small gravel sizes can be captured in auger samples, larger pieces and cobbles can cause difficulty in sampling and/or eventual refusal.

Assessors should watch for the presence of numerous, small gravel pieces when checking auger samples, especially in soils derived from granitic glacial tills. Persistent difficulty in augering should also alert assessors to the possibility of high gravel and/or cobble volumes (Figure S10).

FIGURE S10.
Sample very gravelly and cobbly soil profiles

(a) Soil with high gravel and cobble content in lower half of profile

(b) Soil with high gravel content throughout the profile

Soil Horizons

Soil terminology used in all FEC guides generally follows conventions outlined in *The Canadian System of Soil Classification (SCWG 1998)* and *The Canadian Soil Information System (CanSIS) Manual for Describing Soils in the Field (ECSS 1982)*. Reference should be made to these publications when more detailed information on soil terms is sought.

Mineral Soil Horizons

Mineral soil horizons are described using various letter combinations. Capital letters are used to symbolize main soil horizons (A, B, C), and lower case letters (suffixes) are used to describe dominant horizon features.

The following are explanations of the more common soil horizon descriptors.

A Horizon

Mineral horizon formed at or near the surface of the soil, generally immediately beneath the forest floor. It is usually formed:

(i) by leaching or loss of iron and aluminum, clay, and organic matter content to form an **Ae** horizon;

(ii) by incorporation or accumulation of partially decomposed organic matter to form an **Ah** horizon;

(iii) by a combination of leaching and organic matter accumulation to form an **Ahe** horizon;

(iv) by incorporation of organic matter through cultivation (or other human disturbance) to form an **Ap** horizon; or

(v) by additional influence of prolonged anaerobic (reducing) conditions to form an **Aeg**, **Ahg**, **Aheg** or **Apg** horizon.

B Horizon

Mineral horizon characterized by enrichment of material lost from the A horizon above, and/or through transformations (weathering) within the horizon itself.

C Horizon

Mineral horizon relatively unaffected by the soil formation processes active in the A and B horizons above. A transition horizon between the B and C horizons (and one that has features of both) is called a BC horizon.

Mineral horizon descriptors:

b Indicates a buried horizon.

c Used with **B** or **BC** horizon, it denotes a naturally cemented horizon.

e Used with **A** horizon only, it denotes a horizon that has been leached of iron and aluminum, clay, and organic matter (alone or in combination), resulting in a horizon with a greyish-white colour (or pinkish colour in red soils).

f Used with **B** horizon only, it denotes an accumulation of organically complexed iron and aluminum from the **A** horizon above. The increased iron content is evident by a change in soil colour.

g Used with **A**, **B**, or **C** horizon, it denotes a horizon characterized by depleted/gley colours, prominent redox concentrations, or both, indicating permanent or prolonged anaerobic (reducing) conditions.

h Used with **A** or **B** horizon, it denotes an accumulation of organic matter by various processes. In the **A** horizon, the accumulation is through physical means (mixing); in the **B** horizon, the accumulation is through chemical means (solution deposit). In both cases, accumulation is indicated by a change in soil colour.

j Used as a modifier, when placed to the right of another suffix it denotes a weak expression of the horizon characteristic. For example, **Bfgj** denotes a **Bf** horizon with evidence of periodic reducing conditions.

m Used with **B** horizon only, it denotes a horizon mainly formed through in-place weathering with minor accumulation of materials from the **A** horizon above.

p Used with **A** horizon only, it denotes a surface horizon disturbed by human activities (e.g. cultivation, logging, habitation) usually leading to an increase in organic matter content.

t Used with **B** horizon only, it denotes an accumulation of clay from the **A** horizon above.

x A dense, compact horizon of fragipan character.

Full profile image of an ST2 soil

Organic Horizons

Organic horizons are divided into four main types:

L **(Litter)** – An upland organic horizon consisting of relatively fresh organic material in which entire original structures are discernible (e.g. leaves, needles, twigs).

F **(Fragmented)** – An upland organic horizon comprised of more-or-less disintegrated plant residues, but which is still identifiable as to origin (even though decomposition is very apparent). Fine rooting is often abundant in this horizon because of the release of nutrients during decomposition.

H **(Humus)** – An upland organic horizon dominated by fine substances in which the organic materials are no longer identifiable as to origin. Fine rooting is common, but often less so than in the **F** horizon.

O **(Organic)** – Horizons developed mainly from sphagnum mosses, rushes and other plant material associated with wetland ecosystems (hydrophytic vegetation). They are divided into fibric (**Of**), mesic (**Om**) and humic (**Oh**) horizons, depending on the level of decomposition. (Figure S12.)

Together, **LFH** horizons make up the forest floor in upland sites. Organic Horizons (**O** horizons) can also be part of the forest floor in wetter sites. The type and relative thickness of **LFH**, **O**, and **Ah** horizons (when present) determine the humus form. Different humus forms (Figure S11.) are associated with varying levels of biological diversity, biological activity, and nutrient dynamics.

FIGURE S11.
Humus form Key (from Green et al. 1993)

1a. Well to imperfectly drained sites – humus form NOT saturated for prolonged periods:

- **2a.** Combined thickness of **FH** horizons > 2 cm (or ≤ 2 cm if **Ah** < 2 cm):
  - **3a. F** horizon does NOT include **Fz** or **Fa**
    - **4a.** Decaying wood > 35% of **OM** volume in humus form profile: . . . . . **Lignomor**
    - **4b.** Decaying wood ≤ 35% of **OM** in humus form profile:
      - **5a. Fm** horizon > 50% of **FH** thickness:. . . . . **Hemimor**
      - **5b. Hh** horizon > 50% of **FH** thickness: . . . . . **Humimor**
      - **5c. Hr** horizon > 50% of **FH** thickness:. . . . . **Resimor**
  - **3b. F** horizon includes **Fz** and/or **Fa**
    - **4a.** Decaying wood > 35% of **OM** volume in humus form profile: . . . . . **Lignomoder**
    - **4b.** Decaying wood ≤ 35% of **OM** in humus form profile:
      - **5a. Fa** horizon > 50% of **F** thickness or **Fm** horizon present:. . . . . **Mormoder**
      - **5b. Fz** horizon > 50% of **F** thickness:
        - **6a. FH** thickness ≥ **Ah** thickness: . . . . . **Leptomoder**
        - **6b. FH** thickness < **Ah** thickness: . . . . . **Mullmoder**
- **2b.** Combined thickness of **FH** horizons ≤ 2 cm with **Ah** > 2 cm:
  - **3a. Ah** horizon formed from decomposition of dense fine roots: . . . . . **Rhizomull**
  - **3b. Ah** horizon formed from actions of abundant earthworms:. . . . . **Vermimull**

1b. Poor to very poorly drained sites – humus form saturated for prolonged periods:

- **2a.** Combined thickness of **F**, **H**, and **O** horizons ≤ 2 cm with **Ah** > 2 cm: . . . . . **Hydromull**
- **2b.** Combined thickness of **FH** horizons > 2 cm (or ≤ 2 cm if **Ah** < 2 cm):
  - **3a. FH** thickness ≥ **O** thickness:
    - **4a. F** horizon does NOT include **Fz** or **Fa**: . . . . . **Hydromor**
    - **4b. F** horizon includes **Fz** and/or **Fa**: . . . . . **Hydromoder**
  - **3b. O** thickness > **FH** thickness:
    - **4a. Of** horizon > 50% of **O** thickness: . . . . . **Fibrimor**
    - **4b. Om** horizon > 50% of **O** thickness:. . . . . **Mesimor**
    - **4b. Oh** horizon > 50% of **O** thickness: . . . . . **Saprimoder**

Horizon Descriptions

Ln **(new)** – L horizon composed of newly accreted and essentially unfragmented plant residues. These materials have recently accumulated on the ground surface (usually less than one year old). They are generally loose, show essentially no structural change and may be somewhat discoloured.

Lv **(variative)** – L horizon exhibiting initial decay and strong discolouration. These materials are comprised of less recently accreted plant residues in which disintegration and discolouration have occurred, but fragmentation and fine substances are lacking.

Fm **(mycogenous)** – F horizon in which plant residues are aggregated in a matted structure with a tenacious consistence. The matted fabric typically features a felty character due to abundant fungal mycelia. Faunal droppings may be present, but only with low frequency and abundance. Roots may be abundant, contributing to the formation of the matted fabric.

Fz **(zoogenous)** – F horizon in which plant residues are weakly aggregated with a loose or friable consistency. The friable fabric reflects the presence of active populations of soil meso and microfauna. Faunal droppings are typically numerous and easily observable under magnification with a hand lens or binocular microscope. Fungal mycelia may be present, but rarely in large amounts. Root residues comprise a moderate proportion of plant residues and are typically less abundant than in Fm horizons.

Fa **(amphi)** – F horizon in which plant residues are aggregated into a weak to moderate, non-compact matted structure. This is an intergrade between the Fm and Fz horizons, and as such, reflects properties of both. The structure of the materials is not strong, therefore aggregates disrupt relatively easily when disturbed. Often the fabric is variable, featuring clumps of aggregated material with pockets of loose material. Fungal mycelia and faunal droppings may occur; however, neither predominates over the other.

Hh **(humic)** – H horizon predominated by fine substances with very few if any recognizable plant residues. The organic material has a greasy character when moist, with a massive or blocky structure. The colour is typically black and the material stains fingers when rubbed.

Hz **(zoogenous)** – H horizon predominated by fine substances with very few if any recognizable plant residues – faunal droppings constitute most of the fabric. The organic material is typically a black colour, with a fine granular structure. The abundance of very small cylindrical or spherical faunal droppings gives the appearance of fine black “sawdust”.

Hr **(residues)** – H horizon predominated by fine substances but that also contains recognizable plant residues, usually from fine roots, bark, and wood. The organic material has a slightly greasy character when moist and does not stain the fingers with dark colours when rubbed. This reflects a lower content of dark-coloured, mature humic substances relative to Hh and Hz horizons. Hr horizons are typically dark reddish brown, with hues around 2.5 YR, and are at least one or two hues redder than underlying Hh horizons (if present).

Of O horizon consisting largely of poorly decomposed plant residues that are readily identifiable as to origin (von Post 1–4).

Om O horizon consisting of partly decomposed plant residues which are at a stage of decomposition intermediate between Of and Oh horizons (von Post 5–6).

Oh O horizon consisting of well decomposed plant residues that for the most part have been transformed into humic materials (von Post 7–10, sometimes 6)

Ah A horizon enriched with humified organic matter. The only mineral soil horizon used in humus form classification.
Note: When needed, Ap was substituted for Ah when classifying humus form.

FIGURE S12.
von Post Scale of Decomposition (adapted from SCWG 1998)

Fibric (Of)

VP1	Undecomposed:	plant structure distinct; yields only clear water, coloured light yellow brown.
VP2	Almost undecomposed:	plant structure distinct; yields only clear water, coloured light yellow brown.
VP3	Very weakly decomposed:	plant structure distinct; yields distinctly turbid brown water, no peat substance passes between the fingers, residue not mushy.
VP4	Weakly decomposed:	plant structure distinct; yields strongly turbid water, no peat substance escapes between the fingers, residue rather mushy.

Mesic (Om)

VP5	Moderately decomposed:	plant structure clear but becoming indistinct; yields much turbid brown water, some peat escapes between the fingers, residue very mushy.
VP6	Strongly decomposed:	plant structure somewhat indistinct but clearer in the squeezed residue than in the undisturbed peat; about a third of the peat escapes between the fingers, residue strongly mushy.

Humic (Oh)

VP7	Strongly decomposed:	plant structure indistinct but recognizable, about half the peat escapes between the fingers.
VP8	Very strongly decomposed:	plant structure very indistinct; about two-thirds of the peat escapes between the fingers, residue almost entirely resistant remnants such as root fibres and wood.
VP9	Almost completely decomposed:	plant structure almost unrecognizable; nearly all the peat escapes between the fingers.
VP10	Completely decomposed:	plant structure unrecognizable; all the peat escapes between the fingers.

Parent Material

Soils can develop from a variety of parent material types, the characteristics of which influence soil development and site quality. Parent material types discussed in this guide are (adapted from ECSS 1982):

Aeolian – Material deposited by wind action. Aeolian deposits are usually high in silt and/or fine sand and may show internal structures such as cross-bedding.

Alluvium – Sediments deposited by streams and rivers (floodplains, deltas, etc.). These deposits are younger than glacial deposits and may or may not contain rock (gravel/cobbles).

Colluvium – Deposits of sand, silt, clay, organic matter and/or rock that have reached their position by gravity-induced movement. These deposits are younger than glacial deposits.

Glacial Till – Unstratified deposits of sand, silt, clay and rock that have been released from glacier ice. Some glacial deposits also have recognizable landform features such as drumlins.

Glaciofluvial – Deposits which were partly or wholly stratified by glacial meltwater. Glaciofluvial deposits are often high in sand and/or gravel.

Lacustrine – Sediments deposited in quiet waters (lakes and ponds) which may or may not have been directly associated with glaciers. These deposits tend to be high in silt and clay and generally do not contain rock.

Marine – Sediments deposited in salt or brackish water or through shoreline processes. Marine deposits are generally stratified, of variable texture, and may contain shells and gravel.

Organic – Built up plant debris which does not easily decompose because of high moisture and low soil temperatures.

Organic/Bedrock – Combination of upland organic over weathered, near-surface bedrock.

Till/Bedrock – Combination of thin glacial till over weathered, near-surface bedrock.

Coarse Fragments

Coarse fragments (CF) are rock fragments found in soil which are larger than 2 mm in size.
Abundance classes used in this guide: Low (< 20%) Moderate (20–50%) High (> 50%)

Coarse fragment size classes (from ECSS 1982)

Size	Rounded/Angular	Flat
Gravel	0.2 – 7.5 cm diameter	0.2 – 15 cm long
Cobble	7.6 – 25 cm diameter	16 – 38 cm long
Stone	26 – 60 cm diameter	39 – 60 cm long
Boulder	> 60 cm diameter	> 60 cm long

Site Features

Slope Position

Slope position describes the relative topographic position of a site within the landscape. Position classes are illustrated and described below (adapted from ECSS 1982):

Crest (C): The generally convex upper-most portion of a hill, it is usually convex in all directions with no distinct aspect.

Upper (U): The upper portion of a hill immediately below the crest – it has a convex surface profile with a specific aspect.

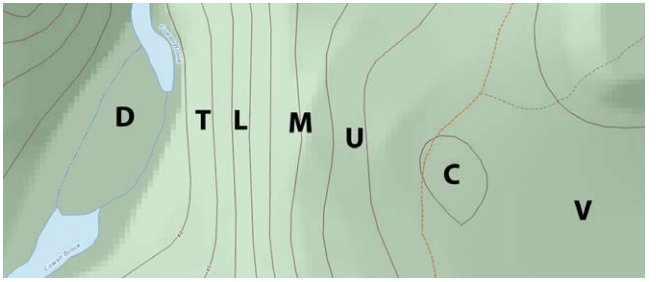
Middle (M): The area of a hill between the upper slope and lower slope with a specific aspect.

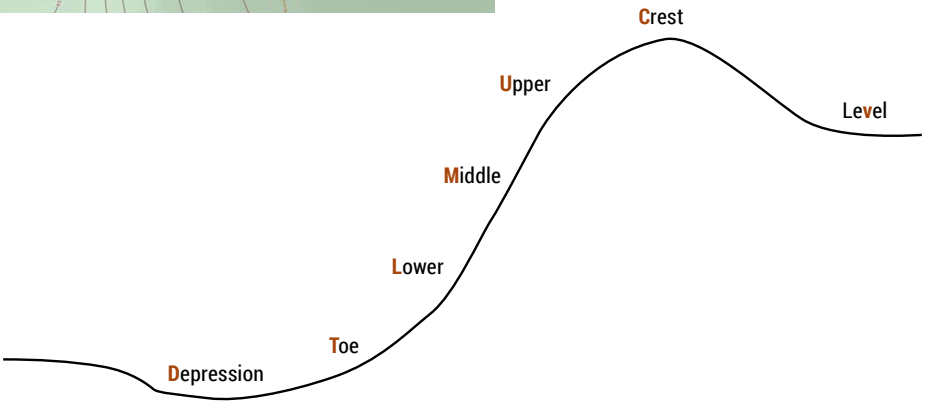
Lower (L): The area toward the base of a hill with a specific aspect.

Toe (T): The area below the lower slope usually demarcated by an abrupt leveling of the slope.

Depression (D): An area that is concave in all directions, generally at the foot of a hill or in a level area.

Level (V): Any level area not immediately adjacent to a hill. The surface profile is generally horizontal with no aspect. Level areas can be lower or upper elevations.





Surface Stoniness

Stoniness describes coverage of a site by surface stones and boulders

Surface stoniness class based on stone size and approximate distance
(from ECSS 1982)

Code	Class	Stones 26 cm **Distance Apart (m)**	Stones 60 cm **Distance Apart (m)**	Stones 120 cm **Distance Apart (m)**
NS	Non-stony	> 25	> 60	> 120
SS	Slightly Stony	8–25	20–60	37–120
MS	Moderately Stony	1–8	3–20	6–37
VS	Very Stony	0.5–1	1–3	2–6
ES	Exceedingly Stony	0.1–0.5	0.2–1	0.5–2
XS	Excessively Stony	< 0.1	< 0.2	< 0.5

Surface Rockiness

Rockiness describes the percentage area of a site with bedrock outcrops.

Surface rockiness class based on percent cover of exposed bedrock
(from ECSS 1982)

Code	Class	Percent Cover
NR	Non-rocky	< 2
SR	Slightly Rocky	2–10
MR	Moderately Rocky	11–25
VR	Very Rocky	26–50
ER	Exceedingly Rocky	51–90
XR	Excessively Rocky	> 90

Slope Gradient

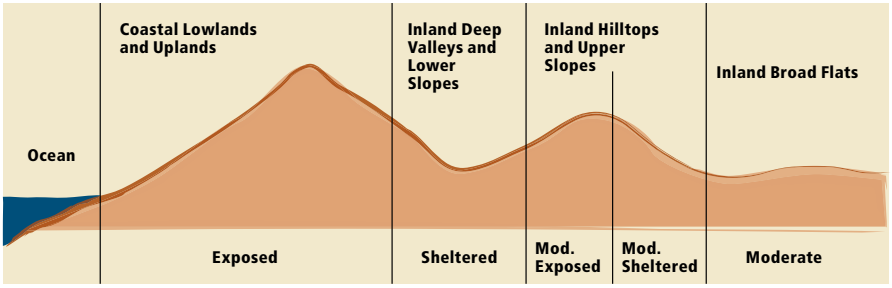
Slope gradient describes the percentage of vertical rise relative to horizontal distance. Zero percent slope describes a level site, and 100% slope equates to a 45 degree angle.

In this guide, slope classes used are:

Level 0–3% Gentle 4–15% Moderate 16–30% Steep 31–60% Extreme >60%

Exposure

Exposure refers to the relative openness of a site to weather conditions, particularly wind and sun. Exposure can affect moisture conditions on a site and severely impact the height growth of trees. Exposure is assigned using topographical features at the landscape scale and does not include temporary conditions created by natural disturbance or harvesting. A digital wind exposure map has been developed to aid in exposure assessment (Keys et al. 2017), and is available on the Natural Resources and Renewables website.



Exposure classes used in this guide are described below.

Exposed: Sites with high exposure – includes upper slopes of moderate ridges immediately along the coastline and steep upper slopes of uplands open to winds from two or more directions.

Sheltered: The most extreme category of protection from wind and atmospheric drought stress, best illustrated by lower slopes of deep valleys where protection is provided on all sides.

Moderately Exposed: Intermediate between Exposed and Moderate – includes upper slopes of inland ridges or hills, except where sheltered by a larger hill.

Moderately Sheltered: Intermediate between Moderate and Sheltered – includes middle slopes between high ridges and broad basins which are afforded some wind protection from one or more directions.

Moderate: The topographically neutral category – includes broad flats, lower and middle slopes of strong ridges (plus sheltered upper slopes), and upper slopes of gentle relief in a flat landscape.

Microtopography

Microtopography refers to the degree of mounding found on a site, as usually formed through repeated episodes of tree windthrow over centuries and millennia, creating "mound and pit" microrelief.

Microtopography classes

Site Data	Soil Data
Level	Few or no mounds (or micro-mounded)
Slightly mounded	Mounds 0.3–1.0 m high and > 7 m apart
Moderately mounded	Mounds 0.3–1.0 m high and 3–7 m apart
Strongly mounded	Mounds 0.3–1.0 m high and 1–3 m apart
Severely mounded	Mounds 0.3-1.0 m high and < 1 m apart
Extremely mounded	Mounds > 1.0 m high and > 3 m apart
Ultra-mounded	Mounds > 1.0 m high and < 3 m apart

Wentworth, Cumberland County

Soil Type Fact Sheet Components

The following section contains fact sheets describing all soil types and phases in the FEC system.

Below is a summary of information found in each fact sheet:

1. The soil type number and name
2. A general description of the soil type and range of conditions found during field sampling
3. Possible phases associated with each soil type
4. Comments on soil type distribution across the province by Ecoregion and/or Ecodistrict
5. Ecological features related to fertility, vegetation types, and humus forms
6. Soil type hazard ratings: Categories include Low (L), Moderate (M), High (H), Very High (VH). See Glossary, page 141 for category definitions.
7. Photographs showing representative soil type profiles and/or features
8. Field assessment tips

Soil Type Fact Sheets

ST1
Dry – Coarse Textured

Description

ST1 is mainly associated with dry, sandy (loamy sand to sand) soils. Depending on parent material type, coarse fragment content in surface horizons can be absent (e.g. sandy glaciofluvial deposits) or very gravelly and/or cobbly (e.g. granitic till deposits), but it is high sand content found throughout the profile that defines this soil type. Site drainage is usually well or rapid, but can be moderately well in lower or level slope positions. In all cases, the ability to retain moisture and nutrients is reduced due to high sand content. ST1 profiles usually contain a thick, well developed Ae horizon and may also contain partially or fully cemented B horizons.

Phases

Common: na
Uncommon: ST1-B, ST1-S, ST1-SB

Distribution

ST1 can be found scattered throughout the province, but is most common in the Western (700) ecoregion where it is associated with coarse, granitic glacial till; in the Annapolis Valley (610) and Minas Lowlands (620) ecodistricts where it is associated with sandy outwash (glaciofluvial) deposits; and in the Northumberland / Bras d'Or ecoregion (mainly Cumberland County) where it is associated with sandstone enriched glacial till.

Ecological Features

ST1 is generally very poor to poor in fertility and prone to drought. It is usually associated with Spruce Pine (SP) or Open Woodland (OW) vegetation types, but may support selected vegetation types from other forest groups (especially where deep-rooting trees can access additional moisture). Associated humus forms are mainly Hemimor and Humimor, with Resimor also common (especially where ericaceous species dominate the shrub layer).

Hazard Ratings

Type	Compaction	Rutting	Erosion (slope ≤ 10%)	Erosion (slope 11–30%)	Frost Heave	Forest Floor Loss
ST1	L	L	L	L-M	L	VH
ST1-B	L	L	L	L-M	L	VH
ST1-S	L	L	L-M	M	L	VH
ST1-SB	L	L	L-M	M	L	VH

ST1 derived from a sand-capped, gravelly and cobbly glaciofluvial deposit.

ST1 derived from a sandy glacial till deposit. Note the well developed (almost white) Ae horizon which is common in ST1 soils because of their coarse texture and good internal drainage.

ST1-S with high stone content in a thick, sandy Ae horizon. Note the concentration of stones near the surface (edges protruding from profile) which decreases with depth.

Assessment Tips

Watch for the presence of cemented (Orstein) soils which are relatively common in well to rapidly drained, sandy soils. Where a fully cemented layer occurs within 30 cm of the mineral soil surface, ST1 soils become shallow ST15 soils.

ST2
Fresh – Medium to Coarse Textured

Description

ST2 is mainly associated with fresh, coarse-loamy soils dominated by sandy loam texture. Coarse fragment content is generally low to moderate in surface horizons, but levels can be higher in soils derived from granite, greywacke, or sandstone tills. Where sand or gravel content is higher than average in the top 30 cm, a coarse phase is added (ST2-C). Site drainage is usually well, but ranges between rapid and moderately well depending on slope position, slope percent, and subsoil permeability. ST2 profiles usually contain a well developed Ae horizon, but Ahe horizons can also be found, particularly in loamy soils (ST2-L). Cemented B horizons are also possible.

Phases

Common:	ST2-B, ST2-C, ST2-CB, ST2-CS, ST2-L, ST2-S, ST2-SB
Uncommon:	ST2-CSB, ST2-LB, ST2-LS, ST2-LSB

Distribution

ST2 is the most common upland forest soil type in Nova Scotia and is found throughout the province, particularly where softwoods and mixedwoods are the dominant cover. ST2-B and ST2-C are mainly found in the Western (700), Eastern (400), and Atlantic Coastal (800) ecoregions; while ST2-L is common in the Nova Scotia Uplands (300) and Fundy Shore (900) ecoregions, and on drumlin ecosections throughout the province.

Ecological Features

ST2 is generally poor to medium in fertility, but is sometimes richer (especially ST2-L). Moisture may be somewhat limiting during the growing season (especially in coarser soils), but usually not severely so. ST2 is associated with all Forest Groups except wet forests (all) and Floodplain (FP). Associated humus forms range from acidic mors (mainly Hemimor and Humimor) on softwood dominated sites, to medium fertility moders (mainly Mormoder) under mixedwood and hardwood cover. Resimors are also possible, especially in Coastal Boreal (CB) and Highland (HL) softwood stands.

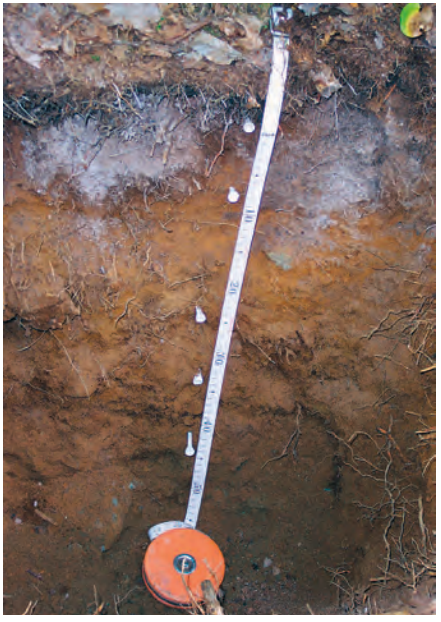
Assessment Tips

Watch for the presence of numerous, small coarse fragments when assessing soils derived from granitic glacial tills. These coarse fragments, which are usually large quartz grains left over from weathered rock, can cause ST2 to shift to ST2-C.

ST2-L can sometimes be found in a complex with ST5 where depth to clay enrichment is variable.

Hazard Ratings

Type	Compaction	Rutting	Erosion (slope ≤ 10%)	Erosion (slope 11–30%)	Frost Heave	Forest Floor Loss
ST2	L-M	L	L	L-M	L	H
ST2-B	L-M	L	L	L-M	L	H
ST2-C	L	L	L	L-M	L	VH
ST2-CB	L	L	L	L-M	L	VH
ST2-CS	L	L	L-M	M	L	VH
ST2-CSB	L	L	L-M	M	L	VH
ST2-L	M	L-M	M	H	L-M	M
ST2-LB	M	L-M	M	H	L-M	M
ST2-LS	L-M	L	M-H	H-VH	L-M	H
ST2-LSB	L-M	L	M-H	H-VH	L-M	H
ST2-S	L	L	L-M	M	L	VH
ST2-SB	L	L	L-M	M	L	VH



ST2 dominated by sandy loam texture. Note the well developed, but broken, Ae horizon and dominant orange/brown colours below signifying well aerated (good drainage) conditions

ST2-L derived from a loamy glacial till deposit. L-phase soils often have an Ahe horizon (as is the case here) and/or thinner Ae horizons than typic soils.

ST3
Moist – Medium to Coarse Textured

Description

ST3 is mainly associated with moist, coarse-loamy soils dominated by sandy loam texture, but also includes moist sandy soils. Coarse fragment content is generally low to medium in surface horizons, but levels can be higher in soils derived from granite, greywacke or sandstone tills. Where sand or gravel content is higher than average in the top 30 cm, a coarse phase is added (ST3-C). Site drainage is moderately well to imperfect due to slope position (middle, lower, level) and/or restricted vertical drainage in areas of gentle slope. ST3 profiles usually contain a well developed Ae horizon, but Ahe horizons can also be found, particularly in loamy soils (ST3-L) or where seepage inputs have increased site fertility. Cemented B horizons are also possible.

Phases

Common:	ST3-B, ST3-C, ST3-CB, ST3-CS, ST3-L, ST3-S, ST3-SB
Uncommon:	ST3-CSB, ST3-LB, ST3-LS, ST3-LSB

Distribution

ST3 is the imperfectly drained equivalent of ST1 and ST2 and is found in association with these better drained soils throughout the province (usually in lower slope positions and level areas). ST3-B is mainly found in the Western (700), Eastern (400), and Atlantic Coastal (800) ecoregions; while ST3-L is common in the Nova Scotia Uplands (300) and Fundy Shore (900) ecoregions, and on the lower slopes of drumlin ecosections throughout the province.

Ecological Features

ST3 is generally poor to medium in fertility, but is sometimes richer (especially ST3-L) with increased fertility often due to seepage inputs. Imperfect drainage means moisture levels can be excessive early and late in the growing season (i.e. after spring snowmelt and fall rains), but is rarely limiting during the summer. ST3 can be associated with all forest groups except wet forests (all) and Floodplain (FP), but mainly occurs with Spruce Pine (SP), Spruce Hemlock (SH), Intolerant Hardwood (IH), Mixedwood (MW), Coastal Boreal (CB) and Highland (HL) vegetation types. Associated humus forms range from acidic mors (mainly Hemimor and Humimor) on softwood dominated sites, to medium fertility moders (mainly Mormoder) under mixedwood and hardwood cover. Resimors are also possible, especially in coastal and highland softwood stands.

Assessment Tips

Faint redox features are often hard to see in coarse or gravelly soils, be sure to look for other site clues that suggest imperfect drainage conditions.

Hazard Ratings

Type	Compaction	Rutting	Erosion (slope ≤ 10%)	Erosion (slope 11–30%)	Frost Heave	Forest Floor Loss
ST3	M-H	M-H	M	M-H	M	M-H
ST3-B	M-H	M-H	M	M-H	M	M-H
ST3-C	M	M	L-M	M	L	H
ST3-CB	M	M	L-M	M	L	H
ST3-CS	L-M	L-M	M	M-H	L	VH
ST3-CSB	L-M	L-M	M	M-H	L	VH
ST3-L	H-VH	H-VH	H	VH	H	M
ST3-LB	H-VH	H-VH	H	VH	H	M
ST3-LS	M-H	M-H	H	VH	M-H	H
ST3-LSB	M-H	M-H	H	VH	M-H	H
ST3-S	M	M	M-H	H	M	H
ST3-SB	M	M	M-H	H	M	H

ST3 dominated by sandy loam texture. Note the thick forest floor and well developed (grey) Ae horizon. Redox features are visible in the B and BC horizons in this photo.

ST3-L derived from a loamy glacial till deposit. L-phase soils often have thinner Ae horizons than most typic soils (as is the case here). Redox features are more noticeable with depth in this photo.

ST4
Wet – Medium to Coarse Textured

Description

ST4 is mainly associated with wet, coarse-loamy soils dominated by sandy loam texture, but also includes wet sandy and wet shallow soils. In all cases, potential rooting is restricted by poor drainage due to slope position (lower, level, depression), restricted vertical drainage in areas of gentle slope, and/or a near-surface water table. Coarse fragment content can vary from low to high depending on parent material characteristics. ST4 profiles often contain a well developed Ae horizon which shows redox concentrations and/or variable shades of grey due to organic staining and/or additional iron depletion. Ahe horizons (or wet variants) can also be found.

Phases

Common: ST4-B, ST4-S, ST4-SB
Uncommon: na

Distribution

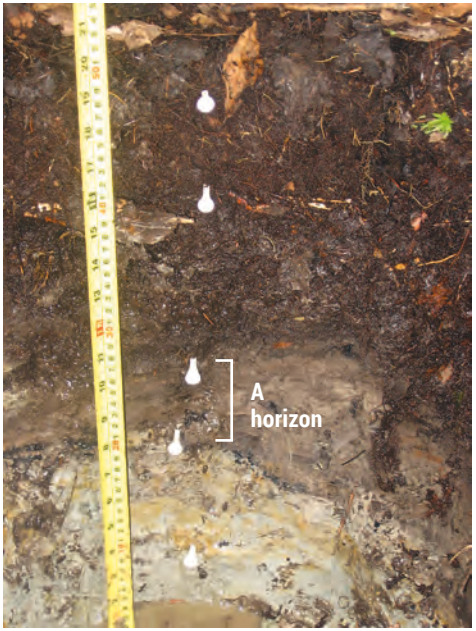
ST4 is the poorly drained equivalent of ST1, ST2, ST3, ST15 and ST16, and is found in association with these soils throughout the province. In most cases, ST4 occurs as small pockets or patches within larger areas dominated by ST2 and ST3. However, ST4 coverage can be more extensive in the Cape Breton Taiga (100) ecoregion; and the Cape Breton Highlands (210), Bras d'Or Lowlands (510), Northumberland Lowlands (530), Central Lowlands (630) and Sable (760) ecodistricts where matrix forests are often dominated by wet forest vegetation types. ST4-B is mainly found in the Western (700), Eastern (400), and Atlantic Coastal (800) ecoregions.

Ecological Features

ST4 is generally poor to medium in fertility, with differences often due to seepage inputs or ground water quality. Poor drainage means moisture levels are usually excessive during the growing season, but levels are sometimes lower in summer dry periods. ST4 is only associated with wet forest groups (WC, WM, WD, WB). Associated humus forms are mainly Fibrimor, Mesimor and Saprimoder; with Hydromor and Hydromoder also possible.

Hazard Ratings

Type	Compaction	Rutting	Erosion (slope ≤ 10%)	Erosion (slope 11–30%)	Frost Heave	Forest Floor Loss
ST4	H-VH	H-VH	L-M	–	–	VH
ST4-B	H-VH	H-VH	L-M	–	–	VH
ST4-S	M-H	H	M	–	–	VH
ST4-SB	M-H	H	M	–	–	VH



ST4 with organic staining in the A horizon (Aeg) suggesting this soil is often saturated above the mineral soil surface and into the forest floor.

ST4 with a well developed Ae (Aeg) horizon above a depleted B (Bg) horizon with many, prominent redox concentrations.

ST4-S with thick, mossy forest floor. Note the stones that came from the top of this pit, and the standing water at the surface.

Assessment Tips

ST4 can sometimes appear relatively dry in late summer, but redox features should still be obvious near the surface. Also, watch for ST4 grading into ST14 as you move further into the middle of wet forest sites.

ST5
Fresh – Fine to Medium Textured

Description

ST5 is mainly associated with fresh to fresh-moist, fine-loamy soils dominated by silt loam, loam, clay loam, and/or sandy clay loam texture. Surface horizons are often more loamy, with clay content increasing with depth. Where near-surface sand content is above 50% and clay content is below 20%, ST5 soils are classed as ST5-C. Coarse fragment content (all sizes) is usually low to medium in surface horizons. Drainage is usually moderately well, but sites can also be well drained depending on slope position, slope percent, subsoil permeability, and near-surface texture (ST5-C). ST5 profiles usually contain Ae horizons, but Ahe or thin/broken Ah horizons are also common. Redox features are often found in lower BC and C horizons due to restricted drainage and/or poor aeration in the fine textured subsoil.

Phases

Common: ST5-C
Uncommon: ST5-CS, ST5-S

Distribution

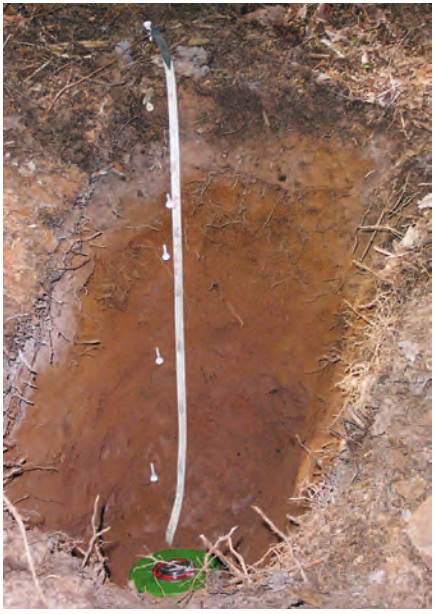
ST5 is a less common soil type found in Nova Scotia. This is because higher clay content (combined with gentle topography) usually results in restricted drainage leading to moist ST6 (or ST12) conditions. Where ST5 is found it is typically in association with ST6 or ST2-L. ST5 is mainly found in the Valley and Central Lowlands (600) and Northumberland Bras d'Or (500) ecoregions, and in the Cape Breton Hills (310) ecodistrict. It is virtually absent from the Western (700) ecoregion (except for northern Lunenburg County) and most Atlantic Coastal (800) sites, but may be scattered elsewhere.

Ecological Features

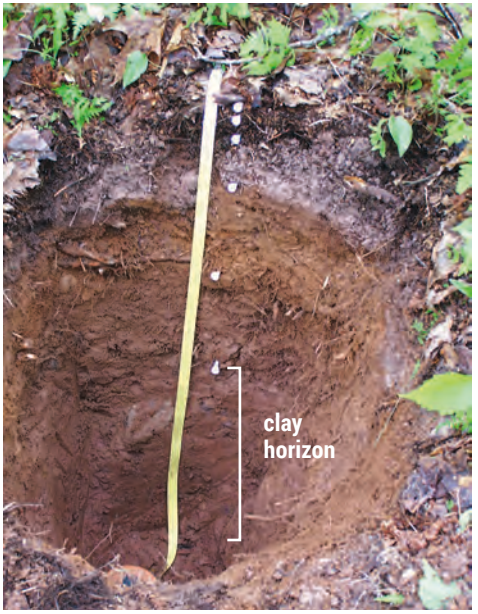
ST5 is generally medium in fertility, but is sometimes poorer or richer, as often indicated by vegetation type association. Moisture is usually not limiting during the growing season. ST5 can be associated with all forest groups except wet forests (all), Floodplain (FP), and Open Woodland (OW). Associated humus forms range from acidic mors (mainly Hemimor and Humimor) on softwood dominated sites, to medium fertility moders (mainly Mormoder) under mixedwood and hardwood cover. Leptomoders are also possible where thin Ah horizons are found.

Hazard Ratings

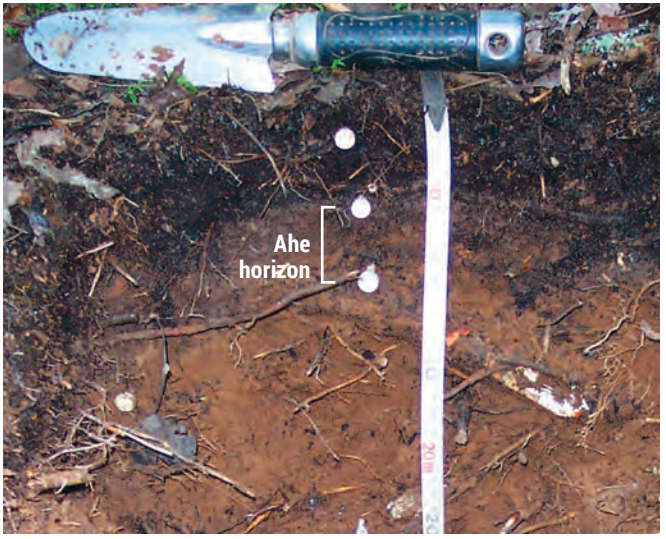
Type	Compaction	Rutting	Erosion (slope ≤ 10%)	Erosion (slope 11–30%)	Frost Heave	Forest Floor Loss
ST5	M-H	M	M	H	M-H	M
ST5-C	L-M	L	L	M	L	H
ST5-CS	L	L	L-M	M	L	VH
ST5-S	M	L-M	M-H	H-VH	M	H



ST5 with a loamy surface layer and clay content increasing with depth (reddish brown colour). Soil type in this stand could shift to ST2-L where loamy conditions extend deeper into the profile (> 50 cm).



ST5 with high clay content near the surface. Note the smooth, chiseled appearance of the enriched (reddish-brown) clay horizon.



Close up view of a thin, greyish-brown Ahe horizon. Ahe and/or thin Ah horizons are common in ST5 profiles.

Assessment Tips

ST5 is defined by the unusual combination of good drainage with higher clay content, so the presence of this ST is very much topography driven (usually found in upper slope positions). Watch for the strong likelihood of other soil types forming a complex with ST5 (e.g. ST2-L, ST6), or for ST5 occurring as inclusions within a more imperfectly drained site condition (ST6).

ST6
Moist – Fine to Medium Textured

Description

ST6 is mainly associated with moist to moist-wet, fine-loamy soils dominated by silt loam, loam, clay loam, and/or sandy clay loam texture. Near-surface horizons are sometimes coarser due to inputs from weathered rock or different parent material deposits. Where near-surface sand content is above 50% and clay content is below 20%, ST6 soils are classed as ST6-C. Coarse fragment content (all sizes) is usually low to medium in surface horizons, but can be high on some sites. Site drainage is generally imperfect due to slope position (middle, lower, level), gentle slope, high clay content in surface horizons, and/or poor subsoil permeability. ST6 profiles usually contain Ae horizons, but Ahe or thin/broken Ah horizons are also common. Lower slope seepage potential may be high due to restricted vertical drainage in the fine textured subsoil.

Phases Common: ST6-C, ST6-S Uncommon: ST6-CS

Distribution

ST6 is the most common fine textured soil type found in Nova Scotia. This is because higher clay content (combined with gentle topography) usually results in restricted drainage leading to moist ST6 conditions. Also, acidic soils common to Nova Scotia generally do not allow development of Ah horizons associated with ST12. ST6 is mainly found in Valley and Central Lowlands (600) and Northumberland Bras d'Or (500) ecoregions, and in the Cape Breton Hills (310) ecodistrict. It is virtually absent from the Western (700) ecoregion (except for northern Lunenburg County) and most Atlantic Coastal (800) sites, but may be scattered elsewhere.

Ecological Features

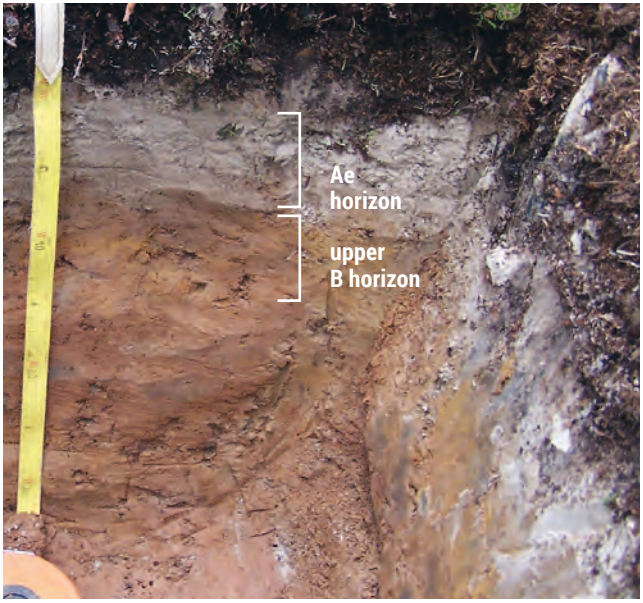
ST6 is generally medium in fertility, but is sometimes poorer or richer, as often indicated by vegetation type association. Imperfect drainage and higher clay content means moisture levels are often excessive early and late in the growing season (i.e. after spring snowmelt and fall rains), but rarely limiting during the summer except possibly on some ST6-C sites. ST6 is associated with all forest groups except wet forests (all), Floodplain (FP), and Open Woodland (OW). Associated humus forms range from acidic mors (mainly Hemimor and Humimor) on softwood dominated sites, to medium fertility moders (mainly Mormoder) under mixedwood and hardwood cover. Leptomoders are also possible where thin Ah horizons are found.

Assessment Tips

Typical redox features often don't form (or are hard to see) in red parent materials common to ST6. Be sure to look for redox depletions (as well as concentrations) and other site clues that suggest imperfect drainage conditions. Also, watch for stony (S) phase conditions in ST6 due to increased frost heave potential.

Hazard Ratings

Type	Compaction	Rutting	Erosion (slope ≤ 10%)	Erosion (slope 11–30%)	Frost Heave	Forest Floor Loss
ST6	VH	VH	H	VH	H-VH	M
ST6-C	M-H	M-H	M	M-H	M	H
ST6-CS	M	M	M-H	H	M	VH
ST6-S	H	H	H	VH	H	H



(top, left) ST6 with a well developed Ae horizon and redox features visible in the upper B horizon. ST6 sites can be relatively dry in mid to late summer, but are easily wetted again after major rain events.

(top, right) ST6-C soil with a well developed, sandy Ae horizon. These soils are seasonally wet like other ST6 soils, but are often deceptively dry in summer months.

(left) ST6 with a very thin Ah horizon just below the forest floor. Note the high moisture level in this soil at time of assessment which is common in ST6. This soil is very susceptible to compaction and rutting damage in this condition.

ST7
Wet – Fine to Medium Textured

Description

ST7 is mainly associated with wet, fine-loamy soils dominated by silt loam, loam, silty clay loam, clay loam, and/or sandy clay loam texture. Near-surface horizons are sometimes coarser due to inputs from weathered rock. Coarse fragment content (all sizes) is usually low to medium in surface horizons, but can be high on some sites. Site drainage is generally poor due to slope position (lower, level, depression), high clay content in surface horizons, poor subsoil permeability, and/or a near-surface water table. ST7 profiles usually contain Ae horizons, but Ahe or thin/broken Ah horizons are also common. Redox features are visually dominant in A and B horizons.

Phases

Common: na
Uncommon: ST7-S

Distribution

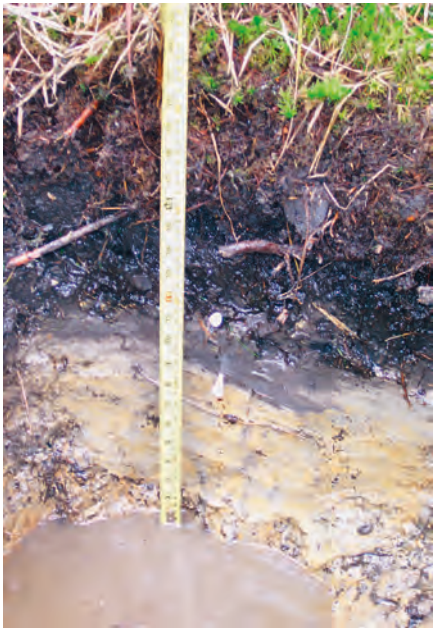
ST7 is the poorly drained equivalent of ST5 and ST6 and is generally found as small pockets or patches in association with these soils. However, it is also sometimes found embedded within coarser upland soils (e.g. ST2 and ST3) where wet forests have developed on old pond sites underlain by lacustrine deposits. ST7 is mainly found in the Valley and Central Lowlands (600) and Northumberland Bras d'Or (500) ecoregions, and in the Cape Breton Hills (310) ecodistrict. It is rare in the Western (700) ecoregion and most Atlantic Coastal (800) sites, but may be scattered elsewhere.

Ecological Features

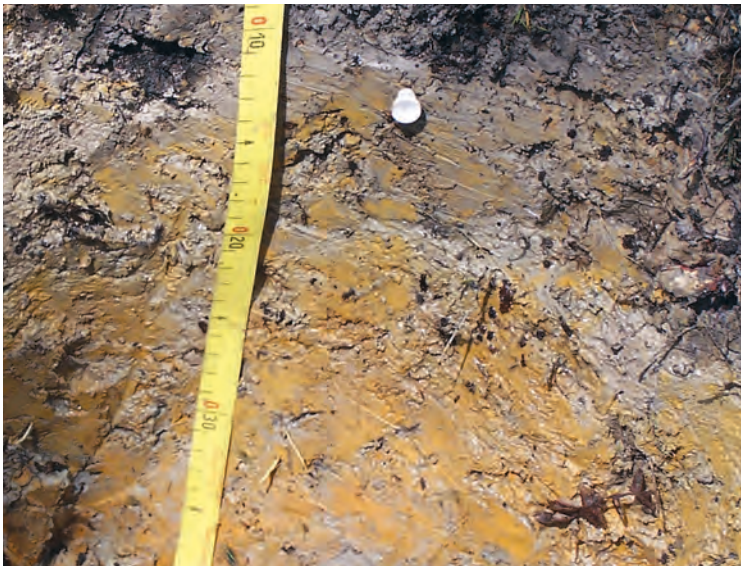
ST7 is generally medium in fertility, but is sometimes poorer or richer, as often indicated by vegetation type association. Fertility differences are usually due to seepage inputs and/or ground water quality. Poor drainage and higher clay content mean moisture levels are usually excessive during most (if not all) of the growing season. ST7 is only associated with wet forest groups (WC, WM, WD, WB). Associated humus forms are mainly Fibrimor, Mesimor and Saprimoder; with Hydromor and Hydromoder also possible.

Hazard Ratings

Type	Compaction	Rutting	Erosion (slope ≤ 10%)	Erosion (slope 11–30%)	Frost Heave	Forest Floor Loss
ST7	VH	VH	M	–	–	VH
ST7-S	H	H-VH	M-H	–	–	VH



ST7 profiles showing thick forest floors derived mainly from sphagnum mosses; variable organic staining and depletion in the Ae (Aeg) horizons; and many, distinct redox concentrations in upper B horizons. The reddish colour often associated with clay rich soils in Nova Scotia is also visible in the left photograph (along with grey redox depletions).



Close up view of prominent redox concentrations found near the surface of this sample ST7 profile. Only prolonged saturation conditions can produce this type of prominent colour contrast.

Assessment Tips

A soil auger is very handy in assessing wet forest soil types since samples can be easily obtained even when soils are saturated or ponded. Watch for the possibility of ST7 in wet, layered soils (coarse/fine/coarse).

ST8
Rich Fresh – Medium to Coarse Textured

Description

ST8 is mainly associated with fresh, coarse-loamy soils dominated by loam to sandy loam texture, but also includes rich, sandy and/or very gravelly soils (ST8-C). In all cases, soils show significant organic matter enrichment in the A horizon through natural mixing by soil fauna (Ah horizon), or through pasturing or tillage (Ap horizon). Coarse fragment content (all sizes) is usually low to medium in surface horizons, but levels can be higher in some soils (e.g. gravelly alluvium deposits, colluvium deposits high in basalt). Site drainage is usually well, but ranges between rapid and moderately well depending on slope position, slope percent, sand content, coarse fragment content, and subsoil permeability. On non-floodplain sites, ST8 profiles may contain an Ae horizon below the Ah or Ap horizon, especially when organic enrichment is relatively new or artificial (old field conditions).

Phases

Common: ST8-C
Uncommon: ST8-B, ST8-CS, ST8-S

Distribution

ST8 is the rich equivalent of ST2 and ST2-L and is found in association with these soils throughout the province, especially under Tolerant Hardwood (TH) vegetation types. It is also the most common soil type found on well drained floodplains and old field sites. ST8 is particularly common in the Nova Scotia Uplands (300) and Fundy Shore (900) ecoregions, and on drumlin ecosections throughout the province. It is likely absent from the Cape Breton Taiga (100) ecoregion.

Ecological Features

ST8 is generally medium to rich in fertility, but is sometimes very rich (as on floodplain sites). Moisture is usually not limiting during the growing season. ST8 is mainly associated with Floodplain (FP), Old Field (OF), Tolerant Hardwood (TH), and Karst (KA) vegetation types, but is occasionally found with select vegetation types in other forest groups. Associated humus forms include Vermimull, Rhizomull, Mullmoder and Leptomoder.

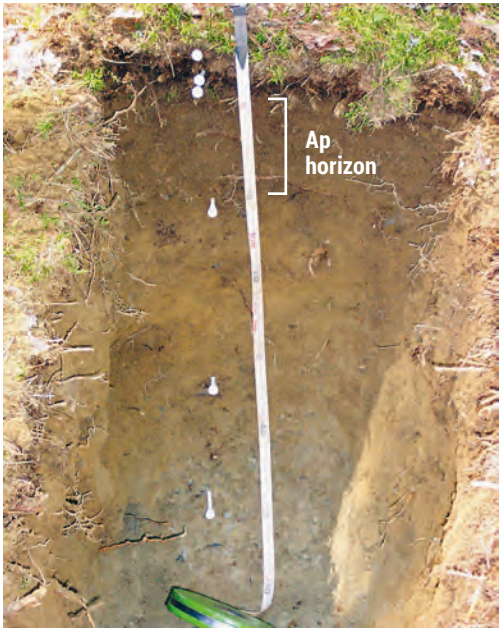
Hazard Ratings

Type	Compaction	Rutting	Erosion (slope ≤ 10%)	Erosion (slope 11–30%)	Frost Heave	Forest Floor Loss
ST8	M	L-M	L-M	M-H	L-M	L
ST8-B	M	L-M	L-M	M-H	L-M	L
ST8-C	L	L	L	L-M	L	M
ST8-CS	L	L	L-M	M	L	H
ST8-S	L-M	L	M	H	L-M	M

ST8 with a well developed, granular Ah horizon (dark brown colour) below a thin forest floor derived from hardwood and herbaceous plant litter. Note the extensive fine rooting in this rich soil.

Assessment Tips

Whenever an Ah horizon is found, it is necessary to confirm conditions by checking A-horizon type a few metres away in all directions. Local disturbances can sometimes create conditions for Ah horizon formation that is not representative of the overall stand being assessed.



ST8 profile under an old field site. This soil likely had a thin Ae horizon before tillage converted it to an organically enriched Ap horizon.

ST8-C profile from a floodplain site with white spruce cover and a thin moss layer. This soil is both sandy and high in stone content (borderline S-phase).

ST9
Rich Moist – Medium to Coarse Textured

Description

ST9 is mainly associated with moist, coarse-loamy soils dominated by loam to sandy loam texture, but also includes rich, sandy and/or very gravelly soils (ST9-C). In all cases, soils have significant organic matter enrichment in the A horizon through natural mixing by soil fauna (Ah horizon), presence of graminoid species (Ah horizon), or through pasturing or tillage (Ap horizon). Coarse fragment content (all sizes) is usually low to medium in surface horizons, but levels can be higher in some soils (e.g. gravelly alluvium deposits, colluvium deposits high in basalt, lower slope seepage sites in stony glacial till). Site drainage is usually imperfect due to slope position (middle, lower, level), restricted vertical drainage in areas with gentle slope, and/or a near-surface water table. On non-floodplain sites, ST9 profiles may contain an Ae horizon below the Ah or Ap horizon, especially when organic enrichment is relatively new or artificial (old field conditions).

Phases

Common: ST9-C
Uncommon: ST9-B, ST9-CS, ST9-S

Distribution

ST9 is the imperfectly drained equivalent of ST8 and is found in association with these soils throughout the province, mainly under Tolerant Hardwood (TH) vegetation types. It is also the most common soil type found on imperfectly drained floodplains and old field sites. ST9 is particularly common in the Nova Scotia Uplands (300) and Fundy Shore (900) ecoregions, and on lower slope drumlin ecosections throughout the province. It is likely absent from the Cape Breton Taiga (100) ecoregion.

Ecological Features

ST9 is generally medium to rich in fertility, but is sometimes very rich as on floodplain or seepage sites. Imperfect drainage means moisture levels can be excessive early and late in the growing season (i.e. after spring snowmelt and fall rains), but is rarely (if ever) limiting during the summer. ST9 is mainly associated with Floodplain (FP), Old Field (OF) and Tolerant Hardwood (TH) vegetation types, but is occasionally found with select vegetation types in other forest groups. Associated humus forms include Vermimull, Rhizomull, Mullmoder and Leptomoder.

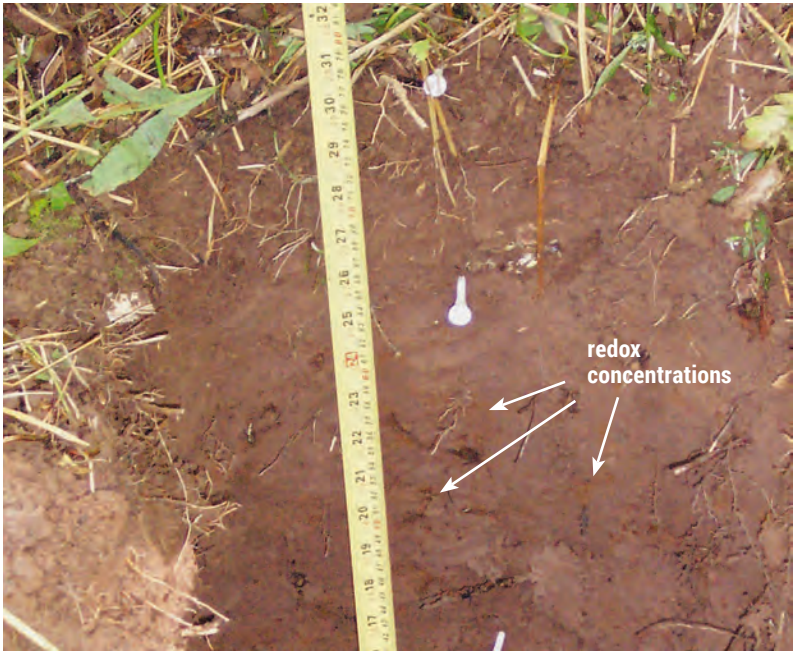
Hazard Ratings

Type	Compaction	Rutting	Erosion (slope ≤ 10%)	Erosion (slope 11–30%)	Frost Heave	Forest Floor Loss
ST9	H-VH	H-VH	M-H	H	H	L
ST9-B	H-VH	H-VH	M-H	H	H	L
ST9-C	M	M	L-M	M	L	L
ST9-CS	L-M	L-M	M	M-H	L	M
ST9-S	M-H	M-H	M-H	H-VH	M-H	M

ST9-C with high gravel content throughout the profile

Assessment Tips

Where seepage inputs reduce acidity and increase fertility, ST9 can sometimes be found in association with well drained ST2 or ST2-L soils instead of ST8. Watch for this, especially in mixedwood and tolerant softwood cover types.



ST9 from a floodplain site. Note the orange redox concentrations in the middle horizon of this photo.

ST10
Rich Wet – Medium to Coarse Textured

Description

ST10 is mainly associated with wet, coarse-loamy soils dominated by loam to sandy loam texture, but also includes wet sandy and wet shallow soils. In all cases, soils have significant organic matter enrichment in the A horizon through the presence of graminoid species (Ah horizon), natural mixing by soil fauna (Ah horizon), or possibly pasturing (Ap horizon). Potential rooting is restricted by poor drainage due to slope position (lower, level, depression), restricted vertical drainage in areas of gentle slope, and/or a near-surface water table. Coarse fragment content (all sizes) is usually low to medium in surface horizons, but levels can be higher in some soils (e.g. gravelly alluvium deposits, lower slope seepage sites in stony glacial till). On non-floodplain sites, ST10 profiles may contain an Aeg horizon below the Ah or Ap horizon, but this is not common. Redox features are visually dominant in B horizons, but may be hard to see in organically enriched A horizons.

Phases

Common: na
Uncommon: ST10-S

Distribution

ST10 is a relatively uncommon soil type which usually occurs as small pockets or patches within larger areas dominated by ST8 and ST9 (and possibly ST2 and ST3). ST10 is not associated with any particular ecoregion or ecodistrict, but is found on poorly drained floodplains, riparian zones and/or seepage enriched depressions.

Ecological Features

ST10 is generally medium to rich in fertility, but is sometimes very rich (as on floodplain, seepage, or rich ground water sites). Poor drainage means moisture levels are usually excessive during the growing season, but levels are sometimes lower in summer dry periods. ST10 is mainly associated with Wet Deciduous (WD) and Wet Mixedwood (WM) vegetation types. Associated humus forms are Hydromull, Hydromoder and Saprimoder.

Hazard Ratings

Type	Compaction	Rutting	Erosion (slope ≤ 10%)	Erosion (slope 11–30%)	Frost Heave	Forest Floor Loss
ST10	VH	VH	L-M	–	–	M
ST10-S	H	H-VH	M	–	–	H

ST10 enriched by seepage inputs.

Assessment Tips

Dark soil colours often associated with ST10 can make it difficult to discern redox features. Be sure to look for other site clues that suggest poor drainage conditions and make the call based on all available information. Where seepage inputs reduce acidity and increase fertility, ST10 can sometimes be found in association with more typic upland soils (ST2 and ST3) instead of ST8 and ST9.

ST10 with organic enrichment associated with the decay of graminoid roots, in this case mainly sedges.

ST11
Rich Fresh – Fine to Medium Textured

Description

ST11 is mainly associated with fresh to fresh-moist, fine-loamy soils dominated by silt loam, loam, clay loam, and/or sandy clay loam texture. Surface horizons are often more loamy with clay content increasing with depth. Soils also show significant organic matter enrichment in the A horizon through natural mixing by soil fauna (Ah horizon) or through pasturing or tillage (Ap horizon). Coarse fragment content (all sizes) is usually low to medium in surface horizons, and may be absent from alluvium soils. Drainage is usually moderately well, but sites can also be well drained depending on slope position, slope percent, and subsoil permeability. On non-floodplain sites, ST11 profiles may contain an Ae horizon below the Ah or Ap horizon, especially when organic enrichment is relatively new or artificial (old field conditions). Redox features are often found in lower BC and C horizons due to restricted drainage and/or poor aeration in the fine textured subsoil.

Phases

Common: na
Uncommon: ST11-S

Distribution

Along with ST5, ST11 is one of the least common forest soil types found in Nova Scotia. This is because higher clay content (combined with gentle topography) usually results in restricted drainage leading to moist ST6 (or ST12) conditions. Where ST11 is found it is typically in association with ST12, ST5 or ST8. ST11 is mainly found in the Valley and Central Lowlands (600) and Northumberland Bras d'Or (500) ecoregions, and in the Cape Breton Hills (310) ecodistrict. It is virtually absent from the Western (700) ecoregion (except for northern Lunenburg County) and most Atlantic Coastal (800) sites, but may be scattered elsewhere. It is likely absent from the Cape Breton Taiga (100) ecoregion.

Ecological Features

ST11 is generally medium to rich in fertility, but is sometimes very rich as on floodplain sites. Moisture is usually not limiting during the growing season. ST11 is mainly associated with Old Field (OF), Tolerant Hardwood (TH) and Floodplain (FP) vegetation types, but can be found with select vegetation types in other forest groups. Associated humus forms include Vermimull, Rhizomull, Mullmoder and Leptomoder.

Hazard Ratings

Type	Compaction	Rutting	Erosion (slope ≤ 10%)	Erosion (slope 11–30%)	Frost Heave	Forest Floor Loss
ST11	M-H	M	L-M	M-H	M	L
ST11-S	M	L-M	M	H	L-M	M

ST11 with high clay content near the surface. Note the smooth, chiseled appearance of the enriched (reddish-brown) clay horizon.

Assessment Tips

Whenever an Ah horizon is found, it is necessary to confirm conditions by checking A-horizon type a few metres away in all directions. Watch for the strong likelihood of other soil types forming a complex with ST11 (e.g. ST5, ST8), or for ST11 occurring as inclusions within a more imperfectly drained site condition (ST12).

ST11 from an old field site.

ST12
Rich Moist – Fine to Medium Textured

Description

ST12 is mainly associated with moist to moist-wet, fine-loamy soils dominated by silt loam, loam, clay loam, and/or sandy clay loam texture. Surface horizons are often more loamy with clay content increasing with depth. Soils also show significant organic matter enrichment in the A horizon through natural mixing by soil fauna (Ah horizon), presence of graminoid species (Ah horizon), or through pasturing or tillage (Ap horizon). Coarse fragment content (all sizes) is usually low to medium in surface horizons, and may be absent from alluvium soils. Site drainage is usually imperfect due to slope position (middle, lower, level), gentle slope, high clay content in surface horizons, poor subsoil permeability, and/or a near-surface water table. On non-floodplain sites, ST12 profiles may contain an Ae horizon below the Ah or Ap horizon, especially when organic enrichment is relatively new or artificial (old field conditions).

Phases

Common: na
Uncommon: ST12-S

Distribution

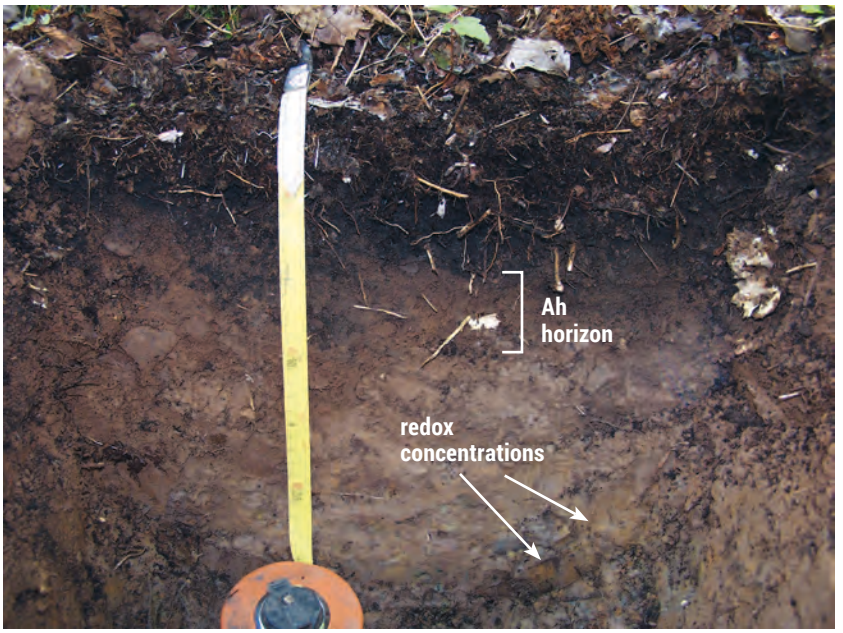
ST12 is the rich equivalent of ST6 and is often found in association with this more common soil type within its geographic range. Other associates include ST5, ST11 and ST9. ST12 is mainly found in the Valley and Central Lowlands (600) and Northumberland Bras d'Or (500) ecoregions, and in the Cape Breton Hills (310) ecodistrict. It is virtually absent from the Western (700) ecoregion (except for northern Lunenburg County) and most Atlantic Coastal (800) sites, but may be scattered elsewhere. It is likely absent from the Cape Breton Taiga (100) ecoregion.

Ecological Features

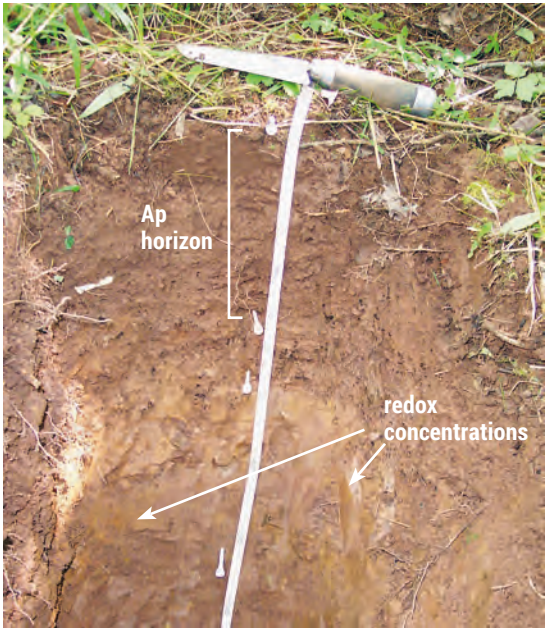
ST12 is generally medium to rich in fertility, but is sometimes very rich (as on floodplain sites). Imperfect drainage and higher clay content mean moisture levels are often excessive early and late in the growing season (i.e. after spring snowmelt and fall rains), but rarely (if ever) limiting during the summer. ST12 is mainly associated with Old Field (OF), Tolerant Hardwood (TH) and Floodplain (FP) vegetation types, but can be found with select vegetation types in other forest groups. Associated humus forms include Vermimull, Rhizomull, Mullmoder and Leptomoder.

Hazard Ratings

Type	Compaction	Rutting	Erosion (slope ≤ 10%)	Erosion (slope 11–30%)	Frost Heave	Forest Floor Loss
ST12	VH	VH	M-H	H-VH	H	L
ST12-S	H	H	H	VH	M-H	L-M



ST12 with brown, wavy Ah horizon above a lighter coloured B horizon. Redox features are clearly visible in the bottom right of this photo.



ST12 from an old field site. Note the thick Ap horizon above the clay enriched B horizon with many, distinct redox concentrations.

Assessment Tips

Typical redox features often don't form (or are hard to see) in red parent materials common to ST12. Be sure to look for redox depletions (as well as concentrations) and other site clues that suggest imperfect drainage conditions. Watch for the strong likelihood of other soil types forming a complex with ST12 (e.g. ST6, ST9, ST13).

ST13
Rich Wet – Fine to Medium Textured

Description

ST13 is mainly associated with wet, fine-loamy soils dominated by silt loam, loam, silty clay loam, clay loam, and/or sandy clay loam texture. Surface horizons are often more loamy with clay content increasing with depth. Soils also show significant organic matter enrichment in the A horizon through the presence of graminoid species (Ah horizon), natural mixing by soil fauna (Ah horizon), or possibly pasturing (Ap horizon). Coarse fragment content (all sizes) is usually low to medium in surface horizons, and may be absent from alluvium soils. Site drainage is generally poor due to slope position (lower, level, depression), high clay content in surface horizons, poor subsoil permeability, and/or a near-surface water table. On non-floodplain sites, ST13 profiles may contain an Aeg horizon below the Ah or Ap horizon, but this is not common. Redox features are visually dominant in B horizons, but may be hard to see in organically enriched A horizons.

Phases

Common: na
Uncommon: ST13-S

Distribution

ST13 is a relatively uncommon soil type which usually occurs as small pockets or patches within larger areas dominated by ST6 and ST12. However, it is also sometimes found embedded within coarser upland soils (e.g. ST2, ST3, ST8, ST9) where wet forests have developed on old pond sites underlain by lacustrine deposits. ST13 is mainly found in the Valley and Central Lowlands (600) and Northumberland Bras d'Or (500) ecoregions, and in the Cape Breton Hills (310) ecodistrict. It is rare in the Western (700) ecoregion and most Atlantic Coastal (800) sites, but may be scattered elsewhere.

Ecological Features

ST13 is generally medium to rich in fertility, but is sometimes very rich (as on floodplain, seepage, or rich ground water sites). Poor drainage and higher clay content means moisture levels are usually excessive during most (if not all) of the growing season. ST13 is mainly associated with Wet Deciduous (WD) and Wet Mixedwood (WM) vegetation types. Associated humus forms are mainly Hydromull, Hydromoder and Saprimoder

Hazard Ratings

Type	Compaction	Rutting	Erosion (slope ≤ 10%)	Erosion (slope 11–30%)	Frost Heave	Forest Floor Loss
ST13	VH	VH	M	–	–	M
ST13-S	H	H-VH	M-H	–	–	H

ST13 with a relatively thick, well decomposed forest floor above a brown Ah horizon. Note the redox features in the lower B horizon and high moisture level at time of assessment.

Assessment Tips

Dark soil colours often associated with ST13 can make it difficult to discern redox features. Be sure to look for other site clues that suggest poor drainage conditions and make the call based on all available information. Watch for the possibility of ST13 in wet, layered soils (coarse/fine/coarse).

ST13 with many, prominent redox concentrations near the surface. The Ah horizon can appear lighter in colour when it is drier.

ST14
Organic

Description

ST14 is mainly associated with thick organic layers derived from wetland (hydrophytic) vegetation, but also includes thick, upland organic deposits (ST14-U). Transition profiles with wetland O horizons (Of, Om, Oh) capped by upland LFH horizons are also possible. Mineral soil (if reached) can be of variable texture and coarse fragment content can be low to high. Drainage is poor to very poor for ST14 sites due to level or depression slope position, seepage inputs, poor subsoil permeability, and/or a near-surface water table. ST14-U sites usually have moderately well to imperfect drainage and are often associated with mid to lower slope positions.

Phases

Common:	ST14-U, ST14-B
Uncommon:	ST14-S, ST14-SB, ST14-UB, ST14-US, ST14-USB

Distribution

Wet ST14 occurs throughout Nova Scotia usually as small pockets or patches within larger upland areas. However, coverage can be more extensive in the Bras d'Or Lowlands (510), Northumberland Lowlands (530), Central Lowlands (630) and Sable (760) ecodistricts where matrix forests are often dominated by wet forest vegetation types. In all cases, ST14 is often found as a complex with wet mineral soil types (ST4, ST7, ST10, ST13). ST14-B and ST14-S are mainly found in the Western (700), Eastern (400) and Atlantic Coastal (800) ecoregions.

ST14-U is mainly found in the Atlantic Coastal (800) and Cape Breton Taiga (100) ecoregions, and the Cape Breton Highlands (210) ecodistrict (i.e. areas associated with Maritime Boreal ecosites). It is rare elsewhere in Nova Scotia, but sometimes occurs in the Western (700) ecoregion – usually on cool, moist, lower slope positions with softwood cover.

Ecological Features

Wet ST14 fertility can range from poor to rich, with differences mainly due to seepage inputs or ground water quality. However, fertility is generally in keeping with nearby upland conditions. Poor to very poor drainage means moisture levels are usually excessive during the growing season. ST14 is only associated with wet forest groups (WC, WM, WD, WB). Associated humus forms are Fibrimor, Mesimor and Saprimoder.

ST14-U is generally very poor to poor in fertility. Moderate to imperfect drainage, combined with the enhanced water holding capacity of organic matter, means moisture levels are often excessive early and late in the growing season (i.e. after spring snowmelt and fall rains). ST14-U is mainly associated with Coastal Boreal (CB), Highland (HL), Open Woodland (OW), Spruce Pine (SP), and Spruce Hemlock (SH) vegetation types. Associated humus forms are Hemimor and Resimor, with Lignomor also possible.

Hazard Ratings

Type	Compaction	Rutting	Erosion (slope ≤ 10%)	Erosion (slope 11–30%)	Frost Heave	Forest Floor Loss
ST14	L	VH	–	–	–	–
ST14-B	L	VH	–	–	–	–
ST14-S	L	H-VH	–	–	–	–
ST14-SB	L	VH	–	–	–	–
ST14-U	L	VH	–	–	–	–
ST14-UB	L	VH	–	–	–	–
ST14-US	L	H-VH	–	–	–	–
ST14-USB	L	H-VH	–	–	–	–

ST14-US with well developed Resimor intermixed with greywacke. Soils in this stand were a complex of ST14-US and ST2-S

Assessment Tips

As softwood swamps develop, it is not uncommon for a cap of conifer litter (LFH) to develop on top of O horizons which were primarily derived from sphagnum moss. These soils are still classed as wet ST14 until the LFH becomes 40 cm thick. An easy way to check for organic thickness (especially on wet sites) is to push your soil auger in until it meets resistance. An auger will easily move through organic material without turning it, but usually not through mineral soil.

ST14-U with well developed Humimor

Classic ST14 derived from sphagnum moss

ST15
Dry Shallow – Medium to Coarse Textured

Description

ST15 is mainly associated with dry to fresh, coarse-loamy, shallow soils over near-surface cemented horizons or bedrock (including forest floor material over bedrock). Coarse fragment content (all sizes) and texture can vary depending on parent material characteristics. Site drainage is usually rapid or well, but can be moderately well depending on slope position. ST15 profiles usually contain an Ae horizon, but Ahe horizons can also be found, particularly in loamy soils (ST15-L). Variation in texture is captured by phases, with sandy or gravelly soils being classed as ST15-C and loamy soils being classed as ST15-L. In some cases, clay content may exceed 20% within the profile, but this is captured within the definition of ST15-L.

Phases

Common: ST15-B, ST15-C, ST15-CB, ST15-CS, ST15-L, ST15-S, ST15-SB
Uncommon: ST15-CSB, ST15-LB, ST15-LS, ST15-LSB

Distribution

Bedrock controlled ST15 (and related phases) can be found scattered throughout Nova Scotia wherever near-surface bedrock is found. ST15 caused by natural cementation (Orstein horizons) is mainly associated with coarse, granitic tills and glaciofluvial deposits found in the Western (700) ecoregion and the South Shore (830) and Annapolis Valley (610) ecodistricts, but can be found elsewhere wherever similar parent materials exist.

Ecological Features

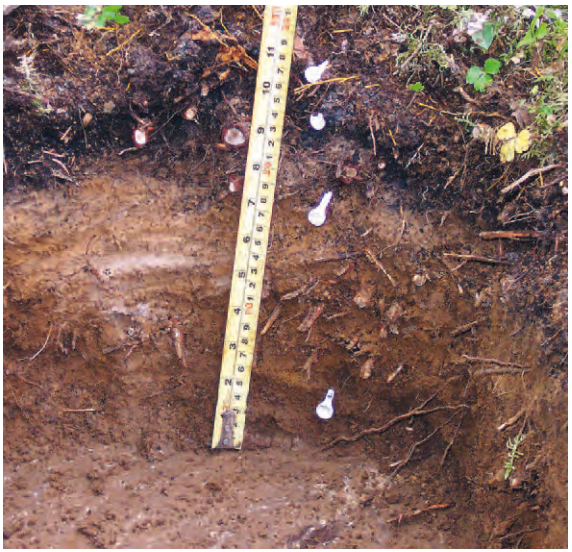
ST15 is generally very poor to poor in fertility, but is sometimes poor to medium, as often indicated by vegetation type association. Fertility differences are mainly related to parent material and/or bedrock mineralogy. Shallow soils and well to rapid drainage mean ST15 sites are often droughty during the growing season. ST15 is mainly associated with Spruce Pine (SP), Open Woodland (OW) and Coastal Boreal (CB) vegetation types, but may support selected vegetation types in other forest groups. Associated humus forms are mainly acidic mors (Hemimor, Humimor, Resimor), with Mormoder also possible on richer sites.

Assessment Tips

It is sometimes difficult to tell whether you are hitting bedrock or just stones/boulders when assessing soil depth. If bedrock is near the surface, you should also see some evidence of outcrops (exposures) in or near the stand being assessed. Road cuts can also show evidence of near-surface bedrock.

Hazard Ratings

Type	Compaction	Rutting	Erosion (slope ≤ 10%)	Erosion (slope 11–30%)	Frost Heave	Forest Floor Loss
ST15	M	L-M	M-H	H-VH	L	VH
ST15-B	M	L-M	M-H	H-VH	L	VH
ST15-C	L	L	M-H	H	L	VH
ST15-CB	L	L	M-H	H	L	VH
ST15-CS	L	L	M-H	H	–	VH
ST15-CSB	L	L	M-H	H	–	VH
ST15-L	M-H	M	H	VH	M	H-VH
ST15-LB	M-H	M	H	VH	M	H-VH
ST15-LS	M	L	VH	VH	–	VH
ST15-LSB	M	L	VH	VH	–	VH
ST15-S	L-M	L	H	VH	–	VH
ST15-SB	L-M	L	H	VH	–	VH



ST15 over bedrock. Previous disturbance in this soil has caused a mixing of A and B horizons leading to a mottled appearance, but these are not redox features.

A site with high granite surface stoniness leading to a B-phase designation (in this case ST15-B).

ST16
Moist Shallow – Medium to Coarse Textured

Description

ST16 is mainly associated with fresh to moist, coarse-loamy, shallow soils over near-surface cemented horizons or bedrock (including forest floor material over bedrock). Coarse fragment content (all sizes) and texture can vary depending on parent material characteristics. Site drainage is usually imperfect due to slope position (middle, lower, level) and restricted vertical flow. Seepage inputs are also common in lower slope positions. Variation in texture is captured by phases, with sandy or gravelly soils being classed as ST16-C and loamy soils being classed as ST16-L. In some cases, clay content may exceed 20% within the profile, but this is captured within the definition of ST16-L.

Phases

Common: ST16-B, ST16-C, ST16-CB, ST16-CS, ST16-L, ST16-S, ST16-SB
Uncommon: ST16-CSB, ST16-LB, ST16-LS, ST16-LSB

Distribution

ST16 is the imperfectly drained equivalent of ST15 (and often found in association with ST15). Bedrock controlled ST16 (and related phases) can be found scattered throughout Nova Scotia wherever near-surface bedrock is found. ST16 caused by natural cementation (Orstein horizons) is mainly associated with coarse, granitic tills and glaciofluvial deposits found in the Western (700) ecoregion and South Shore (830) and Annapolis Valley (610) ecodistricts, but can be found elsewhere wherever similar parent materials exist. ST16 associated with fragipan horizons are less common, but have been noted in the Northumberland Bras d'Or (500) ecoregion (mainly Cumberland County) and in the Minas Lowlands (620) ecodistrict.

Ecological Features

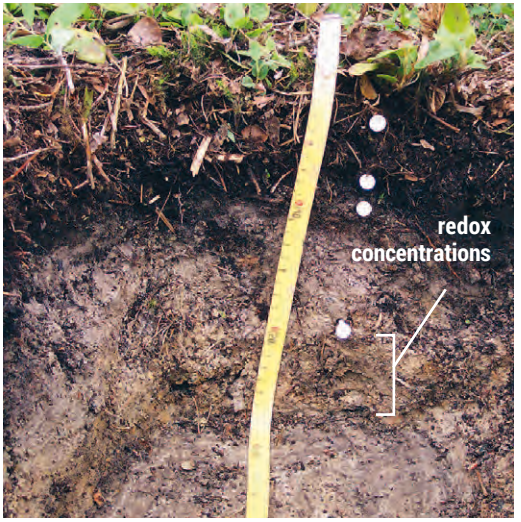
ST16 is generally very poor to poor in fertility, but is sometimes poor to medium, as often indicated by vegetation type association. Fertility differences are mainly related to parent material and/or bedrock mineralogy along with seepage inputs. Shallow soils combined with imperfect drainage mean ST16 sites can range from fresh to moist depending on local conditions. Moisture levels can be excessive early and late in the growing season (i.e. after spring snowmelt and fall rains), but also limiting during summer dry periods. ST16 is mainly associated with Spruce Pine (SP), Open Woodland (OW), and Coastal Boreal (CB) vegetation types, but may support selected vegetation types in other forest groups. Associated humus forms are mainly acidic mors (Hemimor, Humimor, Resimor), with Mormoder also possible on richer sites.

Assessment Tips

Redox concentrations are sometimes found directly above bedrock where a thin film of water is allowed to sit for prolonged periods in local depressions. To indicate significant drainage problems in shallow soils, redox features must be found more than 5 cm above the bedrock (or cemented layer), otherwise the soil is classed as ST15.

Hazard Ratings

Type	Compaction	Rutting	Erosion (slope ≤ 10%)	Erosion (slope 11–30%)	Frost Heave	Forest Floor Loss
ST16	H	H	H	VH	M-H	H-VH
ST16-B	H	H	H	VH	M-H	H-VH
ST16-C	M	M	M-H	H-VH	L-M	VH
ST16-CB	M	M	M-H	H-VH	L-M	VH
ST16-CS	L-M	L-M	H	VH	–	VH
ST16-CSB	L-M	L-M	H	VH	–	VH
ST16-L	VH	VH	VH	VH	VH	H
ST16-LB	VH	VH	VH	VH	VH	H
ST16-LS	H	M-H	VH	VH	–	VH
ST16-LSB	H	M-H	VH	VH	–	VH
ST16-S	M-H	M	VH	VH	–	VH
ST16-SB	M-H	M	VH	VH	–	VH



Imperfectly drained ST16 over bedrock. Redox features are visible in the bottom half of this soil (bedrock starts where the tape measure bends).

Close up of a cemented (Orstein) horizon, which restricts root growth and drainage in this 16-C soil. In this case, a rock hammer was used to break through the cemented layer to expose other horizons below.

ST17
Rich Dry Shallow – Medium to Coarse Textured

Description

ST17 is mainly associated with dry to fresh, coarse-loamy, shallow soils over near-surface basalt or gabbro bedrock (including exposed bedrock). Soils show significant organic matter enrichment in the A horizon through natural mixing by soil fauna (Ah horizon) or sometimes pasturing (Ap horizon). Coarse fragment content (all sizes) can vary from low to high. Site drainage is usually well, but can be rapid or moderately well depending on slope position. ST17 profiles are unlikely to have Ae horizons below the Ah/Ap horizon.

Phases

Common: ST17-S
Uncommon: na

Distribution

ST17 is mainly associated with near-surface basalt bedrock in the North Mountain (920) ecodistrict, but can also be found in other parts of the province (e.g. on gabbro bedrock sites in the Cape Breton Hills (310) ecodistrict). Where ST17 is a result of pasturing (Ap horizon), soils would mainly be inclusions within a larger area dominated by ST8.

Ecological Features

ST17 is generally medium in fertility, with limitations mainly the result of shallow depth or stoniness. Shallow soils and good drainage mean moisture levels can be limiting during summer dry periods. However, soil organic matter helps retain moisture making ST17 less drought prone than ST15. ST17 is mainly associated with Tolerant Hardwood (TH) and Spruce Hemlock (SH) vegetation types, but may support selected vegetation types in other forest groups. Associated humus forms are Vermimull, Rhizomull and Mullmoder, with Leptomoder also possible on some sites.

Hazard Ratings

Type	Compaction	Rutting	Erosion (slope ≤ 10%)	Erosion (slope 11–30%)	Frost Heave	Forest Floor Loss
ST17	M-H	M	H	VH	M	M-H
ST17-S	M	L-M	VH	VH	–	H

ST17 over basalt bedrock. Note the well developed Ah horizon and extensive fine rooting in this rich (but shallow) soil. Where slope position does not allow for good drainage, ST17 becomes imperfectly drained ST18.

Assessment Tips

It is sometimes difficult to tell whether you are hitting bedrock or just stones/boulders when assessing soil depth. If bedrock is near the surface, you should also see some evidence of outcrops (exposures) in or near the stand being assessed. Road cuts can also show evidence of near-surface bedrock.

ST18
Rich Moist Shallow – Medium to Coarse Textured

Description

ST18 is mainly associated with moist, coarse-loamy, shallow soils over near-surface basalt or gabbro bedrock (including exposed bedrock). Soils show significant organic matter enrichment in the A horizon through natural mixing by soil fauna (Ah horizon) or sometimes pasturing (Ap horizon). Coarse fragment content (all sizes) can vary from low to high. Site drainage is usually imperfect due to slope position (middle, lower, level) and restricted vertical flow. Seepage inputs are common in lower slope positions.

Phases

Common: ST18-S
Uncommon: na

Distribution

ST18 is the imperfectly drained equivalent of ST17 and is often found in association with this soil type. It is mainly found in the North Mountain (920) ecodistrict, but is also scattered in other parts of the province (e.g. on gabbro bedrock sites in the Cape Breton Hills (310) ecodistrict). In some cases, ST18 can be found in association with ST15 where seepage inputs have increased fertility in lower slope positions, but this is not common. Where ST18 is a result of pasturing (Ap horizon), soils would mainly be inclusions within a larger area dominated by ST8 and/or ST9.

Ecological Features

ST18 is generally medium in fertility, but seepage inputs can increase fertility on some sites. Shallow soils combined with imperfect drainage mean ST18 sites can range from fresh to moist depending on local conditions. Moisture levels can be excessive early and late in the growing season (i.e. after spring snowmelt and fall rains), but also limiting during summer dry periods. ST18 is mainly associated with Tolerant Hardwood (TH) and Spruce Hemlock (SH) vegetation types, but may support selected vegetation types in other forest groups. Associated humus forms are Vermimull, Rhizomull and Mullmoder, with Leptomoder also possible on some sites.

Hazard Ratings

Type	Compaction	Rutting	Erosion (slope ≤ 10%)	Erosion (slope 11–30%)	Frost Heave	Forest Floor Loss
ST18	H-VH	VH	VH	VH	VH	M
ST18-S	H	M-H	VH	VH	–	H

Basalt bedrock exposure associated with ST17/ST18. Fractured surface rock can lead to stony (S-phase) conditions on some sites.

Assessment Tips

Redox concentrations are sometimes found directly above bedrock where a thin film of water is allowed to sit for prolonged periods in local depressions. To indicate significant drainage problems in shallow soils, redox features must be found more than 5 cm above the bedrock, otherwise the soil is classed as ST17.

Notes

Part II: Ecosites

Provincial Forest Macrogroups

Ecosites represent general productivity units and provide an ecological setting through which vegetation type (VT) and soil type (ST) combinations can be grouped and compared. By itself, ecosite classification is useful for forest management planning purposes such as growth and yield analysis, tree species suitability assessment, successional pathway prediction, wildlife habitat analysis, and biodiversity considerations.

Ecosites, as an expression of relative moisture and nutrient regimes, are influenced by regional climate conditions. Nine climate-based ecoregions have been identified in Nova Scotia's ecological land classification (ELC) system (Neily et al. 2017). Theoretically, each ecoregion could have its own set of ecosites to represent relative moisture and nutrient regimes. However, it has been determined through analysis of tree species distribution and growth data that Nova Scotia can be effectively represented by two forest macrogroups: Acadian and Maritime Boreal (Table E1 and Fig. E1).

TABLE E1.
FEC Macrogroups and associated ecoregion and ecodistrict units

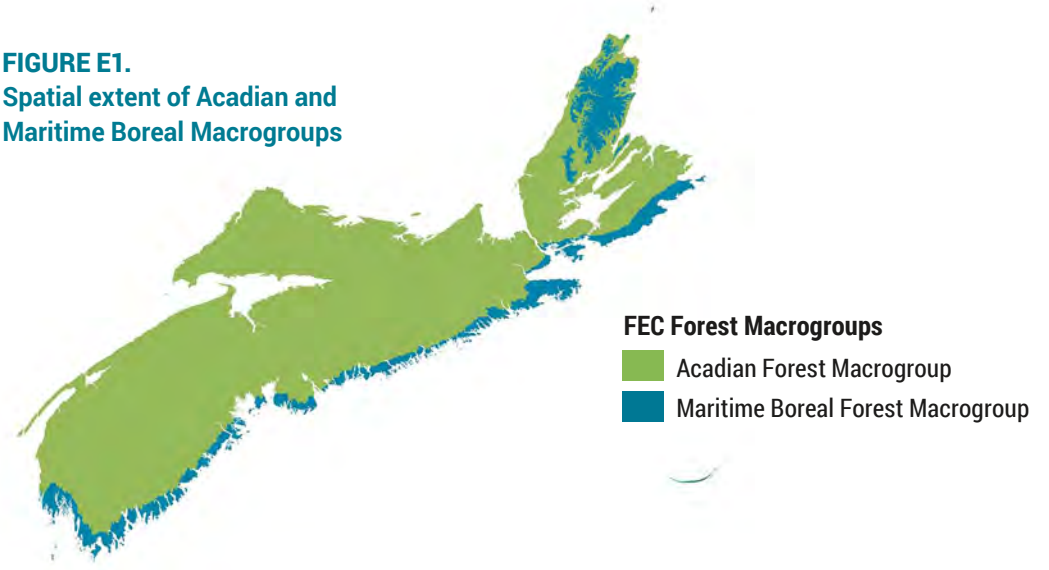
Acadian Forest Macrogroup

Cape Breton Highlands ecoregion 220–Victoria Lowlands ecodistrict only	(200)
Nova Scotia Uplands ecoregion	(300)
Eastern ecoregion	(400)
Northumberland / Bras d'Or ecoregion	(500)
Valley and Central Lowlands ecoregion	(600)
Western ecoregion	(700)
Fundy Shore ecoregion	(900)

Maritime Boreal Forest Macrogroup

Cape Breton Taiga ecoregion	(100)
Cape Breton Highlands ecoregion 210–Cape Breton Highlands ecodistrict only	(200)
Atlantic Coastal ecoregion	(800)

FIGURE E1.
Spatial extent of Acadian and Maritime Boreal Macrogroups



Seventeen (17) Acadian and ten (10) Maritime Boreal ecosites have been identified (Tables E2 and E3). Each ecosite name describes the general moisture/nutrient condition and typical climax forest community associated with the ecosite.

TABLE E2.
Acadian Ecosites

Ecosite	Ecosite Name
AC1	Dry-Very Poor / Jack pine-Black spruce
AC2	Fresh-Very Poor / Black spruce-Pine
AC3	Moist-Very Poor / Black spruce-Pine
AC4	Wet-Very Poor / Black spruce-Tamarack
AC5	Dry-Poor / White pine-Oak
AC6	Fresh-Poor / Black spruce-White pine
AC7	Moist-Poor / Black spruce-White pine
AC8	Wet-Poor / Spruce-Fir-Red maple
AC9	Dry-Medium / Red maple-Beech
AC10	Fresh-Medium / Red spruce-Hemlock
AC11	Moist-Medium / Red spruce-Yellow birch
AC12	Wet-Medium / Red maple-White ash-Fir
AC13	Fresh-Rich / Sugar maple-Beech
AC14	Moist-Rich / Sugar maple-Yellow birch
AC15	Wet-Rich / White ash-Red maple
AC16	Fresh-Very Rich / Sugar maple-White ash
AC17	Moist-Very Rich / Sugar maple-White ash

TABLE E3.
Maritime Boreal Ecosites

Ecosite	Ecosite Name
MB1	Dry-Poor / Black spruce-Jack pine
MB2	Fresh-Poor / Black spruce
MB3	Moist-Poor / Black spruce
MB4	Wet-Poor / Black spruce
MB5	Fresh-Medium / Fir-Spruce
MB6	Moist-Medium / Fir-Spruce
MB7	Wet-Medium / Fir-Spruce
MB8	Fresh-Rich / Birch-Fir
MB9	Moist-Rich / Birch-Fir
MB10	Wet-Rich / White spruce

Acadian Macrogroup

The Acadian (AC) Forest Macrogroup includes 17 ecosites representing a full range of forest site conditions (Figure E2).

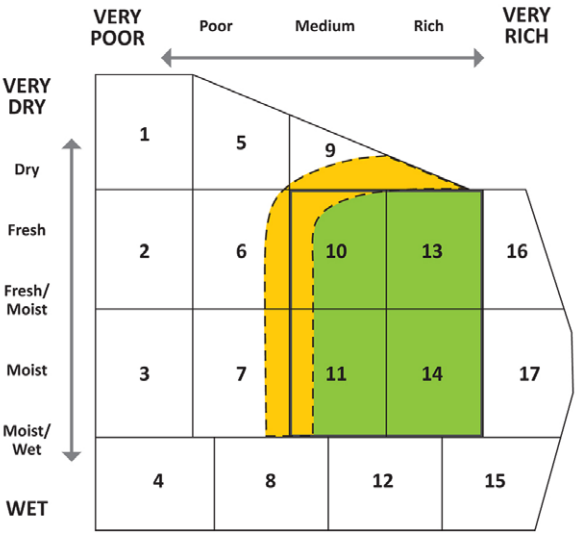
Zonal AC ecosites are associated with climatic climax forests containing mainly shade-tolerant and shade-intermediate species such as red spruce, hemlock, white pine, sugar maple, red maple, yellow birch, beech, white ash and white spruce. These are the ecosites associated with what is generally called "Acadian" forest. In contrast, vegetation on azonal (edaphic) ecosites are dictated by site factors such as low fertility, insufficient or excessive moisture, or richer floodplain conditions. Climax forests on azonal sites are dominated by species such as black spruce, white pine, red pine, jack pine, balsam fir, tamarack, red oak, red maple and white ash.

Several early- to mid-successional vegetation types are also associated with AC ecosites, with species such as trembling aspen, large-tooth aspen, red oak, white birch, grey birch, red maple, black cherry, balsam fir and white spruce.

The depiction of AC ecosite units (Figure E2) has been updated from the original FEC guide (Neily et al. 2013) to more clearly show the relative placement of upland zonal and azonal ecosites and the transition between these units. The transition zone between AC6/7 and AC10/11 is where black spruce presence or dominance transitions to red spruce presence or dominance. It is also where hybrid red and black spruce is most commonly found. The transition zone between AC9 and AC10/13 is where vegetation types found on richer, shallow soils transition from non-edaphic conditions.

FIGURE E2.
Edatopic grid showing relative moisture and nutrient regimes for the Acadian Forest Macrogroup

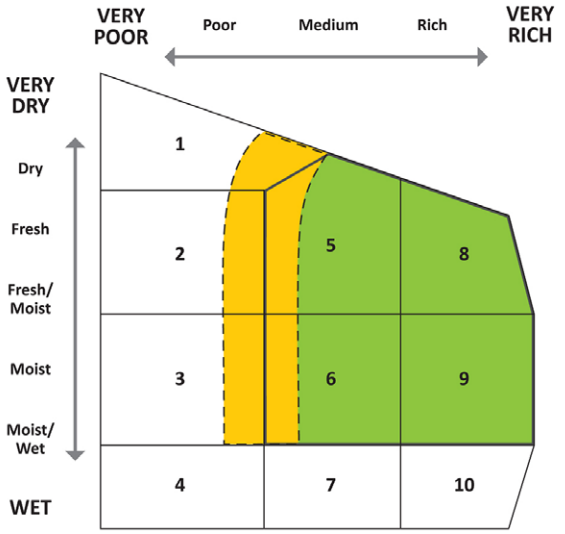
GREEN = zonal ecosites **White** = azonal (edaphic) ecosites **ORANGE** = area between upland azonal and zonal ecosites that support transitional vegetation types



1. Dry-Very Poor / Jack pine-Black spruce
2. Fresh-Very Poor / Black spruce-Pine
3. Moist-Very Poor / Black spruce-Pine
4. Wet-Very Poor / Black spruce-Tamarack
5. Dry-Poor / White pine-Oak
6. Fresh-Poor / Black spruce-White pine
7. Moist-Poor / Black spruce-White pine
8. Wet-Poor / Spruce-Fir-Red maple
9. Dry-Medium / Red maple-Beech
10. Fresh-Medium / Red spruce-Hemlock
11. Moist-Medium / Red spruce-Yellow birch
12. Wet-Medium / Red maple-White ash-Fir
13. Fresh-Rich / Sugar maple-Beech
14. Moist-Rich / Sugar maple-Yellow birch
15. Wet-Rich / White ash-Red maple
16. Fresh-Very Rich / Sugar maple-White ash
17. Moist-Very Rich / Sugar maple-White ash

FIGURE E3.
Edatopic grid showing relative moisture and nutrient regimes for the Maritime Boreal Forest Macrogroup

GREEN = zonal ecosites **White** = azonal (edaphic) ecosites **ORANGE** = area between upland azonal and zonal ecosites that support transitional vegetation types



1. Dry-Poor / Black spruce-Jack pine
2. Fresh-Poor / Black spruce
3. Moist-Poor / Black spruce
4. Wet-Poor / Black spruce
5. Fresh-Medium / Fir-Spruce
6. Moist-Medium / Fir-Spruce
7. Wet-Medium / Fir-Spruce
8. Fresh-Rich / Birch-Fir
9. Moist-Rich / Birch-Fir
10. Wet-Rich / White spruce

Maritime Boreal Macrogroup

The Maritime Boreal (MB) Forest Macrogroup includes 10 ecosites representing a range of forest site conditions, but with less precision than the Acadian Macrogroup (Figure E3). This is due, in part, to lower sampling intensity which currently does not allow for finer divisions within this group.

Climate differentiates the Maritime Boreal Forest Macrogroup from the Acadian Forest Macrogroup, with concomitant changes in climax forest conditions. Zonal MB climax forests mainly contain balsam fir, white spruce, black spruce and white birch. Yellow birch may also be found in some Boreal (Highland) ecosites where they transition to Acadian ecosites. Azonal (edaphic) ecosites contain mainly black spruce, white spruce and/or balsam fir. In both cases, tree species associated with early- to mid-successional communities are like those found in climax forests.

The depiction of MB ecosite units (Figure E3) has been updated from the original FEC guide (Neily et al. 2013) to more clearly show the relative placement of upland zonal and azonal ecosites and the transition between these units. The transition zone between MB1/2/3 and MB5/6 is where black spruce presence or dominance transitions to white spruce presence or dominance.

Notes

Ecosite Fact Sheets

Ecosite Fact Sheet Components

The following section contains fact sheets describing 17 Acadian and 10 Maritime Boreal ecosites. Below is a summary of information found in each ecosite fact sheet.

1 The ecosite unit, number and name are found at the top of the fact sheet, along with the number of FEC sample plots (**n**) described in the field, and its edatopic grid position.

2. **Description** provides general information on landscape setting and dominant vegetation by category. Implications of **+**, **-**, **/** ecosite designations are also discussed.

3. An outline of natural **Disturbance and Succession** patterns that occur within the ecosite follows the discussion on vegetation.

4. **Site Characteristics** have superscript numbers that refer to percentages of each unit found during field sampling (range 1=10% to 10=100%). In some cases, data were not collected for particular features and these are recorded as **nd** (no data) in site summaries.

5. **Vegetation Types** (VT) associated with the ecosite are presented. They are separated into two categories: **Confirmed** if found during field sampling, or **Suspected** if they are anticipated to occur but are not yet confirmed by sampling. Vegetation type variants are not specifically identified apart from their parent VT.

6. **Soil Types** associated with the ecosite are listed, and separated into two categories: **Confirmed** if found during field sampling, or **Suspected** if they are anticipated to occur but are not yet confirmed by sampling. Soil type phases are only listed when their presence leads to a change in ecosite from that of the parent soil type.

7. The **Comments** section provides additional information related to the ecology and/or distribution of each ecosite.

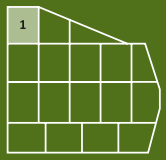
For details on Vegetation Types found within each ecosite, users should refer to *FEC (2022): Field Guide, Part I: Vegetation Types. (Neily et al. 2023)*

For details on Soil Types found within each ecosite, users should refer to the Soil Type Fact Sheets in this Guide.

Acadian Ecosites

AC1
Dry – Very Poor / Jack pine – Black spruce

n = 34



Description

Occurring on upper slopes and crests of bedrock ridges and/or on coarse textured glacial till and glaciofluvial deposits, this ecosite has dry, nutrient very poor soils supporting stunted, poorly stocked stands of black spruce, red pine, jack pine, red maple and red oak. Open Woodland conditions are common. Ericaceous species dominate the shrub layer (mainly huckleberry, lambkill and blueberry), with black crowberry, broom crowberry, wild raisin and mountain holly also common. There are usually low levels of herb cover with bracken and teaberry the main species. The forest floor is dominated by reindeer lichens and Schreber's moss.

On slightly richer sites (AC1+), Spruce Pine VTs may exhibit moderately open canopies of lower vigour. The poorest sites (AC1-) may show increased cover of low woody shrubs (e.g. blueberry, broom crowberry) and other plants tolerant of very poor site fertility (e.g. three-toothed cinquefoil, cow wheat) and may approach barrens conditions (Porter et al. 2020).

Disturbance and Succession

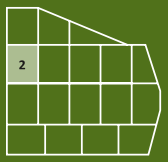
Following disturbance or natural mortality, VTs on this ecosite regenerate to similar species found in mature stands leading to an edaphic climax forest dominated by black spruce. Windthrow and fire are significant disturbance agents, and frequent fires can lead to increased ericaceous cover.

Comments

The range in surface stoniness and rockiness reflects different parent material influences. Large stones and near-surface bedrock are not associated with glaciofluvial deposits, whereas glacial till and bedrock sites are often stony and/or rocky.

AC1 sites are scattered throughout Nova Scotia wherever near-surface bedrock and sandy soils can be found. Ecodistricts with increased rockiness include Eastern Granite Uplands (430), Eastern Interior (440) and Chignecto Ridges (560). Glaciofluvial deposits are mainly associated with the Annapolis Valley (610) and Minas Lowlands (620) ecodistricts.

Characteristic Site, Soil and Vegetation	
Slope Position	Crest[5] Level[3] Upper[1] Middle[1]
Slope Gradient	Level[7] Gentle[2] Moderate/Steep[1]
Exposure	Moderate[4] Exposed[3] Mod.Exposed[1] Mod.Sheltered[1] nd[1]
Parent Material	Glacial till[3] Glaciofluvial[3] Till/Bedrock[3] Organic/Bedrock[1]
Drainage	Rapid[6] Well[3] Mod.Well[1]
Surface Stoniness	(Non – Slightly)[6] (Moderately)[2] (Very – Excessively)[2]
Surface Rockiness	(Non-rocky)[4] (Very – Excessively)[4] (Slightly – Moderately)[2]
Vegetation Types	Confirmed: OW1, OW2, OW3 Suspected: SP1, SP2, SP3
Soil Types	Confirmed: ST1, ST15 Suspected: none



AC2
Fresh – Very Poor / Black spruce – Pine

n = 19

Description

Occurring mainly on gentle slopes or well drained level areas with coarse textured glacial till or glaciofluvial deposits, this ecosite has fresh, nutrient very poor soils which generally support poorly stocked stands of black spruce, red pine, jack pine and white pine. These sites often exhibit Open Woodland conditions. Ericaceous species dominate the shrub layer (mainly lambkill, rhodora and blueberry) often with significant black spruce regeneration. Bracken cover can be extensive in the herb layer with teaberry and bunchberry also common. The forest floor is dominated by Schreber's moss.

On slightly richer sites (AC2+), Spruce Pine VTs may exhibit moderately open canopies of lower vigour. The poorest sites (AC2-) may exhibit increased cover of very low woody shrubs (e.g. blueberry, broom crowberry) and other plants tolerant of very poor site fertility (e.g. three-toothed cinquefoil, cow wheat).

Disturbance and Succession

Following disturbance or natural mortality, VTs on this ecosite regenerate to similar species found in mature stands leading to an edaphic climax forest dominated by black spruce. White pine may form a super canopy over black spruce on some sites. Windthrow and fire are significant disturbance agents, and frequent fires can lead to increased ericaceous cover.

Characteristic Site, Soil and Vegetation	
Slope Position	Level[4] Upper[2] Crest[2] Middle[1] Lower[1]
Slope Gradient	Gentle[6] Level[4]
Exposure	Moderate[6] Exposed[3] Mod.Exposed[1]
Parent Material	Glacial/Basal till[4] Bedrock[2] Glaciofluvial[1] Till/Bedrock[1] Other[2]
Drainage	Well[3] Imperfect[3] Rapid[2] Mod.Well[2]
Surface Stoniness	(Non – Slightly)[5] (Very – Excessively)[3] (Moderately)[2]
Surface Rockiness	(Non-rocky)[5] (Slightly – Moderately)[3] Very[2]
Vegetation Types	Confirmed: OW1, OW2, OW3 Suspected: SP1, SP2, SP3, IH8
Soil Types	Confirmed: ST2, ST16 Suspected: ST1, ST15

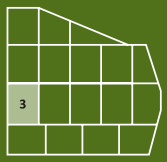
Comments

AC2 sites may be underlain by ST16 soils which, due to their shallow depth, are only associated with fresh moisture regimes even though they are classed as imperfectly drained.

AC2 sites are distributed throughout Nova Scotia wherever fresh, nutrient very poor soils can be found. Areas of higher occurrence include the St. George's Bay (520), Northumberland Lowlands (530), Eastern Interior (440), South Mountain (720), and St. Margaret's Bay (780) ecodistricts.

AC3
Moist – Very Poor / Black spruce – Pine

n = 15



Description

Occurring mainly on imperfectly drained level areas with coarse textured glacial till or glaciofluvial deposits, this ecosite has moist, nutrient very poor soils that generally support poorly stocked stands of black spruce, red pine, jack pine and white pine. These sites often exhibit Open Woodland conditions. Ericaceous species dominate the shrub layer (mainly lambkill, rhodora and blueberry) often with significant black spruce regeneration. Bracken cover can be extensive in the herb layer with teaberry and bunchberry also common. The forest floor is dominated by Schreber's moss.

On slightly richer sites (AC3+), Spruce Pine VTs may exhibit moderately open canopies of lower vigour. Slightly poorer sites (AC3-) may exhibit increased cover of woody shrubs such as huckleberry and rhodora. An increasing abundance and coverage of wet site indicator plants (e.g. cinnamon fern and sphagnum mosses) suggests higher levels of soil moisture.

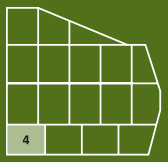
Disturbance and Succession

Following disturbance or natural mortality, VTs on this ecosite regenerate to similar species found in mature stands leading to an edaphic climax forest dominated by black spruce. White pine may form a super canopy over black spruce on some sites. Windthrow and fire are significant disturbance agents and frequent fires can lead to increased ericaceous cover.

Comments

AC3 sites are distributed throughout Nova Scotia wherever moist, nutrient very poor soils can be found. Areas of higher occurrence include the Eastern Interior (440), Minas Lowlands (620), and Central Lowlands (630) ecodistricts.

Characteristic Site, Soil and Vegetation	
Slope Position	Level[7] Upper[1] Crest[1] Middle[1]
Slope Gradient	Level[7] Gentle[3]
Exposure	Moderate[7] Mod.Exposed[1] Exposed[1] nd[1]
Parent Material	Glacial till[4] Basal till[3] Glaciofluvial[1] Till/Bedrock[1] nd[1]
Drainage	Imperfect[9] Mod.Well[1]
Surface Stoniness	(Non – Slightly)[6] (Very – Excessively)[3] nd[1]
Surface Rockiness	(Non-rocky)[8] (Slightly – Moderately)[2]
Vegetation Types	Confirmed: OW1, OW2 Suspected: IH8, OW3, SP1, SP2
Soil Types	Confirmed: ST3, ST6 Suspected: ST16



AC4
Wet – Very Poor / Black spruce – Tamarack

n = 107

Description

Occurring mainly on poorly to very poorly drained level areas and depressions with coarse textured glacial till and/or organic deposits, this ecosite has wet, nutrient very poor to poor soils which generally support poorly stocked stands of black spruce with tamarack. Depending on moisture levels, stands can also be stunted and exhibit open wetland conditions. Mountain holly and ericaceous species dominate the shrub layer (mainly lambkill, blueberry, rhodora and Labrador tea). Creeping snowberry, bunchberry, cinnamon fern, bracken and three seeded sedge are common herbs. The forest floor is dominated by sphagnum mosses, with lesser Schreber's and/or stair-step moss cover.

Slightly richer (AC4+) conditions may exhibit increasing presence of red maple and balsam fir. When conditions are poorer and wetter (AC4-), open to partially-closed overstory canopies, increasing woody shrub cover (e.g. Labrador tea, rhodora), and plants indicative of nutrient very poor, wet sites (such as pitcher plant and cotton grasses) may be found.

Disturbance and Succession

Following disturbance or natural mortality, VTs on this ecosite regenerate to similar species found in mature stands leading to an edaphic climax forest dominated by black spruce. Fluctuating water table levels, windthrow, and insects and disease are significant disturbance agents. Seasonal moisture deficits combined with the flammability of ericaceous vegetation can sometimes create favourable fire conditions.

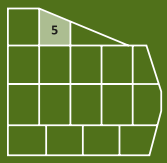
Characteristic Site, Soil and Vegetation	
Slope Position	Level[8] Lower – Toe[1] Depression[1]
Slope Gradient	Level[9] Gentle[1]
Exposure	Moderate[7] Mod.Exposed[1] Mod.Sheltered[1] Exposed[1]
Parent Material	Organic[3] Glacial till[2] Basal/Ablation till[2] Glaciofluvial[1] Lacustrine[1] nd[1]
Drainage	Poor-Very Poor[10]
Surface Stoniness	(Non – Slightly)[9] (Very – Excessively)[1]
Surface Rockiness	(Non-rocky)[9] (Other)1
Vegetation Types	Confirmed: WC1, WC2, WC3, WC4, WC11 Suspected: none
Soil Types	Confirmed: ST4, ST7, ST14 Suspected: none

Comments

AC4 sites are generally associated with treed swamps that can also grade into treed bogs or fens. They are found throughout Nova Scotia, and may be matrix forming or embedded as patches within the matrix forest. Sites are most commonly found in the Bras d'Or Lowlands (510), Northumberland Lowlands (530), Central Lowlands (630) and Sable (760) ecodistricts.

AC5
Dry – Poor / White pine – Oak

n = 74



Description

Occurring mainly on well to rapidly drained slopes with coarse textured and/or shallow soils, this ecosite has dry, nutrient poor soils which often support poorly stocked stands of white pine (often as a super canopy) and other species capable of withstanding harsh site conditions (e.g. black spruce, red pine, red maple, large-tooth aspen and red oak). Herb coverage and diversity are low and favour species which tolerate dry, acid soils such as bracken, teaberry, mayflower and bunchberry. The forest floor is dominated by Schreber's moss and broom mosses.

Poorer sites (AC5-) are often indicated by increased softwood cover (e.g. red pine, jack pine, black spruce). Partially closed canopies are also common.

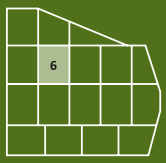
Disturbance and Succession

Following disturbance or natural mortality, VTs on this ecosite regenerate to similar species found in mature stands leading to an edaphic climax forest dominated by black spruce and white pine. Windthrow and fire are significant disturbance agents, and frequent fires can lead to increased ericaceous cover.

Comments

AC5 sites are mainly found in western Nova Scotia, but are scattered elsewhere wherever dry, nutrient poor soils can be found. Areas of higher occurrence include the Eastern Interior (440), South Mountain (720), Rossignol (750), Western Barrens (770) ecodistricts; and Northumberland /Bras d'Or (500) and Valley/ Central Lowlands (600) ecoregions.

Characteristic Site, Soil and Vegetation	
Slope Position	Upper[5] Level[2] Middle[2] Crest[1]
Slope Gradient	Gentle[6] Level[2] Moderate[1] Steep1
Exposure	Moderate[7] Exposed[2] Other[1]
Parent Material	Glacial till[5] Basal/Ablation till[2] Glaciofluvial[2] Organic/Bedrock[1]
Drainage	Well[5] Rapid[4] Imperfect[1]
Surface Stoniness	(Non – Slightly)[5] (Moderately)[3] (Very – Excessively)[2]
Surface Rockiness	(Non-rocky)[8] (Very – Excessively)[1] (Slightly – Moderately)[1]
Vegetation Types	Confirmed: CA2, IH1, IH2, IH8, MW11, MW12, SP1, SP2, SP3, SP4, SP5, SP6, SP7 Suspected: MW9, MW10, SP8, SP10
Soil Types	Confirmed: ST1, ST2-C, ST15 Suspected: none



AC6
Fresh – Poor / Black spruce – White pine

n = 187

Description

Occurring mainly on well drained slopes with medium to coarse textured glacial till deposits, this ecosite has fresh, nutrient poor soils which generally support closed canopy stands of white pine and black spruce. When balsam fir is present, it is generally intermediate in the canopy and of low vigour. Early successional stands are dominated by large-tooth aspen, red oak, red maple, and white birch. Ericaceous species dominate the shrub layer (mainly lambkill and blueberry), with wild raisin, witch-hazel and huckleberry also common. Herb coverage and diversity are low and favour species that tolerate acid soils such as bracken, teaberry, mayflower and bunchberry. The forest floor is dominated by Schreber's moss.

On slightly richer sites (AC6+), some white spruce, hemlock and red spruce (and/or hybrid red/black spruce) are also possible. Poorer sites (AC6-) often support higher coverage to shrubs such as witch-hazel, huckleberry, and lambkill.

Disturbance and Succession

Following disturbance or natural mortality, VTs on this ecosite regenerate to similar species found in mature stands leading to an edaphic climax forest dominated by black spruce and white pine. Windthrow and fire are significant disturbance agents, and frequent fires can lead to increased ericaceous cover.

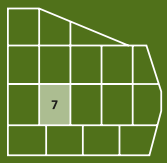
Comments

AC6 sites are distributed throughout Nova Scotia wherever well drained, nutrient poor soils can be found. Areas of higher occurrence include the Eastern Interior (440), Bras d'Or Lowlands (510), Northumberland Lowlands (530), Minas Lowlands (620), Central Lowlands (630), South Mountain (720) and Rossignol (750) ecodistricts.

Characteristic Site, Soil and Vegetation	
Slope Position	Upper[5] Middle[2] Level[2] Crest[1]
Slope Gradient	Gentle[6] Level[2] Moderate[1] Steep[1]
Exposure	Moderate[7] Mod.Exposed[2] Other[1]
Parent Material	Glacial till[5] Basal/Ablation till[4] Other[1]
Drainage	Well[6] Mod.Well[2] Rapid[1] Imperfect[1]
Surface Stoniness	(Non – Slightly)[5] (Moderately)[3] (Very – Excessively)[2]
Surface Rockiness	(Non-rocky)[9] (Slightly – Moderately)[1]
Vegetation Types	Confirmed: CA2, IH1, IH2, IH8, MW9, MW10, MW11, MW12, SP1, SP2, SP3, SP4, SP5, SP6, SP7, SP8, SP9 Suspected: SP10
Soil Types	Confirmed: ST1, ST2, ST5, ST16 Suspected: ST15-L

AC7
Moist – Poor / Black spruce – White pine

n = 110



Description

Occurring mainly on imperfectly drained slopes and level areas with medium to coarse textured glacial till deposits, this ecosite has moist, nutrient poor soils which generally support closed canopy stands of black spruce with white pine and red pine. When balsam fir is present, it is generally intermediate in the canopy and of low vigour. Early successional stands are dominated by large-tooth aspen, red oak and red maple. Imperfect drainage is indicated by the presence of sphagnum mosses, cinnamon fern and creeping snowberry. Bracken and bunchberry are also present in the herb layer. Ericaceous shrubs dominate the shrub layer (mainly lambkill and blueberry), but black spruce regeneration (from layering) can also be extensive in the understory.

On slightly richer sites (AC7+), some white spruce, hemlock and red spruce (and/or hybrid red/black spruce) are also possible. Poorer sites (AC7-) often support higher coverage to shrubs such as witch-hazel, huckleberry and lambkill.

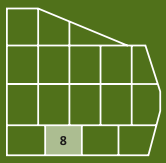
Disturbance and Succession

Following disturbance or natural mortality, VTs on this ecosite regenerate to similar species found in mature stands leading to edaphic climax forests dominated by black spruce and white pine. Windthrow and fire are significant disturbance agents, and frequent fires can lead to increased ericaceous cover.

Comments

AC7 sites are distributed throughout Nova Scotia wherever moist, nutrient poor soils can be found. Areas of higher occurrence include the Eastern Interior (440), Bras d'Or Lowlands (510), Northumberland Lowlands (530), Minas Lowlands (620), Central Lowlands (630), South Mountain (720) and Sable (760) ecodistricts.

Characteristic Site, Soil and Vegetation	
Slope Position	Level[6] Upper[2] Middle[1] Lower – Toe[1]
Slope Gradient	Level[6] Gentle[3] Moderate[1]
Exposure	Moderate[8] Mod.Exposed[1] Exposed[1]
Parent Material	Glacial till[5] Basal/Ablation till[4] Other[1]
Drainage	Imperfect[8] Mod.Well[2]
Surface Stoniness	(Non – Slightly)[8] (Moderately)[1] (Very – Excessively)[1]
Surface Rockiness	(Non-rocky)[9] (Slightly – Moderately)[1]
Vegetation Types	Confirmed: CA2, IH1, IH2, IH8, MW9, MW10, MW12, SP1, SP2, SP4, SP5, SP6, SP7, SP8, SP9, SP10 Suspected: MW11, SP3
Soil Types	Confirmed: ST3, ST6, 14-U Suspected: ST16-L



AC8
Wet – Poor / Spruce – Fir – Red maple

n = 109

Description

Occurring mainly on poorly to very poorly drained level areas and depressions with medium to coarse textured glacial till and/or organic deposits, this ecosite has wet, nutrient poor to medium soils that generally support softwood stands containing spruce (white, red, black, red/black hybrid), balsam fir, hemlock, and tamarack. Mountain holly, wild-raisin, speckled alder and softwood regeneration dominate the shrub layer. The herb layer is moderately diverse with cinnamon fern and sedges the main species. Bryophyte diversity is also moderate with sphagnum mosses dominant.

Richer sites (AC8+) often support wet, red maple mixedwood forests or wet, softwood dominated forests containing white spruce, red spruce, hybrid red/black spruce and/or hemlock. Poorer (AC8-) sites are dominant to black spruce and tamarack and may exhibit reduced hardwood cover.

Disturbance and Succession

Following disturbance or natural mortality, VTs on this ecosite regenerate to similar species found in mature stands leading to an edaphic climax softwood forest dominated by black spruce, balsam fir, hybrid red/black spruce and hemlock, or an edaphic climax mixedwood forest dominated by red maple and balsam fir. Along with senescence, windthrow and fluctuating water table levels are the main disturbance agents.

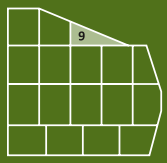
Characteristic Site, Soil and Vegetation	
Slope Position	Level[8] Lower – Toe[1] Depression[1]
Slope Gradient	Level[9] Gentle[1]
Exposure	Moderate[6] Mod.Sheltered[2] Mod.Exposed[1] Sheltered[1]
Parent Material	Organic[5] Glacial till[2] Lacustrine/Fluvial[1] nd[1] Basal/Ablation till1
Drainage	Poor-Very Poor[10]
Surface Stoniness	(Non – Slightly)[8] (Moderately)[1] (Very – Excessively)[1]
Surface Rockiness	(Non-rocky)[9] (Other)[1]
Vegetation Types	Confirmed: WC5, WC6, WC7, WC8, WC9, WD2, WM1, WM3 Suspected: none
Soil Types	Confirmed: ST4, ST7, ST10, ST13, ST14 Suspected: none

Comments

AC8 sites are generally associated with coniferous and mixedwood treed swamps which receive seepage flows and/or ground water inputs. They are found throughout the province, usually embedded as small or large patches within the matrix forest. AC8 sites with red spruce and hemlock are usually found in the Western Ecoregion (700). Mixedwood sites with red maple and balsam fir are found throughout the province, with higher occurrence in the Northumberland Lowlands (530) and Central Lowlands (630) ecodistricts.

AC9
Dry – Medium / Red maple – Beech

n = 35



Description

Occurring mainly on well drained steep slopes with shallow glacial till and/or colluvial deposits, this ecosite has dry, nutrient medium soils which generally support mixed forests of sugar maple, red maple, white birch and beech. Red spruce, black spruce, hybrid red/black spruce, white spruce and occasionally hemlock may be present, often as minor stand components. Understory vegetation diversity is usually low and coverage is generally sparse to moderate. Ericaceous shrubs such as blueberry and lambkill are present in low numbers. Herbs include species such as starflower, evergreen wood fern, sarsaparilla and bracken. Hay-scented fern coverage can sometimes be extensive in hardwood dominated vegetation types. The extent of bryophyte cover depends on tree species mix—usually increasing with softwood cover (mainly Schreber's moss and broom mosses).

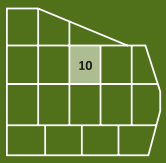
Disturbance and Succession

Following disturbance, VT succession on this ecosite depends on residual overstory condition and the presence/survival of advanced regeneration. Intense disturbance can promote early successional stages dominated by shade-intolerant species. Lightly disturbed, late successional stages can continue to develop as uneven-aged forests.

Comments

AC9 sites are scattered throughout Nova Scotia and are often associated with mafic bedrock and/or mafic rock colluvium, which make these sites inherently more fertile than AC5 sites while still within the dry moisture regime. However, exposure often precludes good tree growth. Areas of higher occurrence include the Cape Breton Hills (310), Pictou Antigonish Highlands (330), Cobequid Hills (340) and North Mountain (920) ecodistricts.

Characteristic Site, Soil and Vegetation	
Slope Position	Upper – Crest[5] Middle[2] Level[2] Lower[1]
Slope Gradient	Steep – Extreme[3] Moderate[3] Gentle[3] Level[1]
Exposure	Moderate[5] Mod.Exposed[2] Exposed[2] Mod.Sheltered[1]
Parent Material	Bedrock[3] Basal/Ablation till[3] Glacial till[2] Colluvium[2]
Drainage	Well[6] Rapid[2] Mod.Well[2]
Surface Stoniness	(Non – Slightly)[5] (Moderately)[3] (Very – Excessively)[2]
Surface Rockiness	(Very – Excessively)[5] (Non-rocky)[3] (Slightly – Moderately)[2]
Vegetation Types	Confirmed: KA2, KA4, SH1, SH4, SH5, SH6, SH7, SH8, TH1, TH3, TH5, TH6, TH7, TH8, TH9 Suspected: CA1, IH4, IH6, IH7, KA1, KA3, MW1, MW2, MW3, MW4, MW5, MW6, MW7, MW8, SH2, SH3, TH2
Soil Types	Confirmed: ST1, ST15, ST17 Suspected: none



AC10
Fresh – Medium / Red spruce – Hemlock

n = 372

Description

Occurring mainly on well drained slopes with medium textured glacial till deposits, this ecosite has fresh, nutrient medium soils which generally support late successional forests dominated by red spruce, hemlock and yellow birch. Earlier successional forests contain balsam fir, white birch, red maple and aspen. The shrub layer is usually dominated by regenerating softwoods, while typical softwood forest plants are found in the herb layer (e.g. wild lily-of-the-valley, starflower, bluebead lily, partridge-berry and wood ferns). Schreber's moss is the main bryophyte along with stair-step moss and bazzania.

On slightly poorer sites (AC10-), hybrid red/black spruce are possible. Richer sites (AC10+) may show an increase in yellow birch cover.

Disturbance and Succession

Natural stand-level disturbances are infrequent and usually due to windthrow (hurricanes) and/or fire. Following disturbance, VT succession on this ecosite depends on residual overstory condition and the presence/survival of advanced regeneration. Intense disturbance can promote early successional stages dominated by shade-intolerant species. Lightly disturbed, late successional stages will continue to develop as uneven-aged forests.

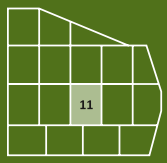
Characteristic Site, Soil and Vegetation	
Slope Position	Upper[4] Middle[2] Level[2] Lower[1] Crest[1]
Slope Gradient	Gentle[6] Level[2] Moderate[1] Steep[1]
Exposure	Moderate[6] Mod.Exposed[2] Mod.Sheltered[1] Other[1]
Parent Material	Basal/Ablation till[5] Glacial till[4] Other[1]
Drainage	Well[7] Mod.Well[2] Imperfect[1]
Surface Stoniness	(Non – Slightly)[6] (Moderately)[3] (Very – Excessively)[1]
Surface Rockiness	(Non-rocky)[9] (Slightly – Moderately)[1]
Vegetation Types	Confirmed: CA1, IH4, IH6, IH7, IH9, KA1, KA2, KA3, KA4, MW1, MW2, MW3, MW4, MW5, MW6, MW7, MW8, OF1, SH1, SH2, SH3, SH4, SH5, SH6, SH7, SH8, TH1, TH2, TH3, TH5, TH7, TH9 Suspected: IH3, IH5, OF3, OF4, OF5, OW4, TH6, TH8
Soil Types	Confirmed: ST2, ST5, ST8-C, ST15-L, ST16, ST17 Suspected: ST18

Comments

In Nova Scotia, the majority of Acadian climax softwood forests are found on AC10 and AC11 sites. Areas of higher AC10 occurrence include the South Mountain (720), Rossignol (750) and St. Margaret's Bay (780) ecodistricts (red spruce, hemlock and white pine dominant); and the Central Uplands (380), Eastern Interior (440), Governor Lake (450), Cumberland Hills (540) and Parrsboro Shore (910) ecodistricts (red spruce dominant).

AC11
Moist – Medium / Red spruce – Yellow birch

n = 149



Description

Occurring mainly on imperfectly drained lower slopes and level areas with medium textured glacial till deposits, this ecosite has moist, nutrient medium soils which generally support mixedwood climax communities dominated by red spruce, hemlock and yellow birch. Earlier successional forests contain balsam fir, aspen, white birch and red maple. The shrub layer usually includes regenerating tree species (especially balsam fir) along with striped maple and fly-honeysuckle. Many fern species are found in the herb layer, often dominated by New York fern and wood ferns (club-mosses are also present). Bryophyte cover will vary depending on tree species mix – usually increasing in both diversity and coverage as the softwood component increases.

On slightly poorer sites (AC11-), hybrid red/black spruce are possible. Richer sites (AC11+) may show an increase in yellow birch cover.

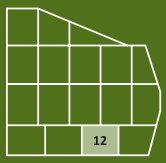
Disturbance and Succession

Natural stand-level disturbances are infrequent and usually due to windthrow (hurricanes) and/or fire. Following disturbance, VT succession on this ecosite depends on residual overstory condition and the presence/survival of advanced regeneration. Intense disturbance can promote early successional stages dominated by shade-intolerant species. Lightly disturbed, late successional stages will continue to develop as uneven-aged forests.

Comments

In Nova Scotia, the majority of Acadian climax softwood and mixedwood forests are found on AC11 and AC10 sites. Areas of higher AC11 occurrence are similar to AC10, with mixedwood climax forests more prominent in the Rawdon/Wittenburg Hills (410), St. George's Bay (520), Central Lowlands (630), Clare (730) and LaHave Drumlins (740) ecodistricts.

Characteristic Site, Soil and Vegetation	
Slope Position	Level[4] Lower – Toe[3] Middle[2] Upper[1]
Slope Gradient	Gentle[5] Level[4] Moderate[1]
Exposure	Moderate[7] Mod.Exposed[2] Other[1]
Parent Material	Basal/Ablation till[5] Glacial till[4] Other[1]
Drainage	Imperfect[7] Mod.Well[3]
Surface Stoniness	(Non – Slightly)[7] (Moderately)[2] (Very – Excessively)[1]
Surface Rockiness	(Non-rocky)[9] (Slightly – Moderately)[1]
Vegetation Types	Confirmed: CA1, IH4, IH5, IH6, IH7, IH9, MW1, MW2, MW3, MW4, MW6, MW7, OF1, OF5, SH1, SH2, SH3, SH4, SH5, SH6, SH7, SH8, Suspected: IH3, KA1, KA2, KA3, KA4, MW5, MW8, OF2, OF3, OF4, OW4, TH1, TH2, TH3, TH6, TH7, TH8, TH9
Soil Types	Confirmed: ST3, ST6, ST9, 14-U, ST16-L Suspected: ST18



AC12
Wet – Medium / Red maple – White ash – Fir

n = 110

Description

Occurring mainly on poorly to very poorly drained level areas and depressions with medium to fine textured glacial till and/or organic deposits, this ecosite has wet, nutrient medium to rich soils. Increased oxygenation of ground water from seepage and sub-surface flow can contribute to site productivity.

Richer sites (AC12+) often support wet deciduous forests or wet mixedwood forests dominated by red maple, yellow birch, trembling aspen, and white ash. Poorer (AC12-) sites may exhibit wet mixedwood or wet coniferous forests with white spruce, red spruce, hybrid red/black spruce, and/or hemlock.

Disturbance and Succession

Following disturbance or natural mortality, VTs on this ecosite regenerate to similar species found in mature stands leading to an edaphic climax mixedwood or hardwood forest. Along with senescence, windthrow and fluctuating water table levels are the main disturbance agents.

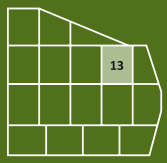
Comments

AC12 ecosites are generally associated with mixedwood and hardwood treed swamps which receive nutrient rich seepage flows and/or ground water inputs. They are scattered throughout Nova Scotia, usually embedded as small or large patches within the matrix forest. Areas of higher occurrence include the Northumberland/ Bras d'Or (500) and Valley and Central Lowlands (600) ecoregions.

Characteristic Site, Soil and Vegetation	
Slope Position	Level[7] Lower – Toe[2] Other[1]
Slope Gradient	Level[8] Gentle[2]
Exposure	Moderate[5] Sheltered[1] Mod.Sheltered[1] Exposed[1] Mod.Exposed[1] nd[1]
Parent Material	Organic[5] Glacial till[2] Lacustrine/Fluvial[2] Alluvium[1]
Drainage	Poor[5] Very Poor[5]
Surface Stoniness	(Non – Slightly)[9] (Moderately -Very)[1]
Surface Rockiness	(Non-rocky)[10]
Vegetation Types	Confirmed: WC5, WC8, WC9, WC10, WD3, WD4, WD5, WM1, WM2, WM4 Suspected: none
Soil Types	Confirmed: ST4, ST7, ST10, ST13, ST14 Suspected: none

AC13
Fresh – Rich / Sugar maple – Beech

n = 434



Description

Occurring mainly on well drained slopes with fine to medium textured glacial till deposits, this ecosite has fresh, nutrient rich soils which generally support late successional forests dominated by sugar maple and beech along with yellow birch, red maple, white ash, and occasionally ironwood. Earlier successional forests contain aspen, white birch and red maple. Old field forests of white spruce and white pine are also common where upland hardwood forests were cleared for agriculture and later abandoned. Typical hardwood forest plants dominate all layers in this ecosite. Ferns are extensive in the herb layer and include hay-scented, New York, Christmas, and wood fern species. Except for old field sites, bryophytes are typically absent from the forest floor, but can be found on stumps, downed wood and live tree boles.

AC13+ sites often exhibit increased white ash and ironwood cover along with a suite of herbs indicative of increased nutrient availability.

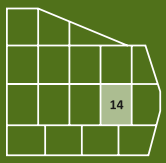
Disturbance and Succession

Most natural disturbance is small scale which promotes uneven-aged forests. Natural stand-level disturbances are infrequent and usually due to windthrow. Insects, disease and/or abiotic stresses have caused significant mortality in some regions (e.g. beech scale disease, sugar maple die-back, and ice damage). Following disturbance, VT succession on this ecosite depends on residual overstory condition and the presence/survival of advanced regeneration. Intense disturbance can promote early successional stages dominated by shade-intolerant species.

Characteristic Site, Soil and Vegetation	
Slope Position	Upper[4] Middle[3] Level[1] Lower[1] Other[1]
Slope Gradient	Gentle[6] Moderate[2] Level[1] Steep[1]
Exposure	Moderate[5] Mod.Exposed[3] Mod.Sheltered[1] Exposed[1]
Parent Material	Basal/Ablation till[6] Glacial till[3] Other[1]
Drainage	Well[6] Mod.Well[3] Imperfect[1]
Surface Stoniness	(Non – Slightly)[6] (Moderately)[3] (Other)[1]
Surface Rockiness	(Non-rocky)[9] (Slightly – Moderately)[1]
Vegetation Types	Confirmed: IH3, IH5, IH6, IH7, IH9, KA1, KA2, KA3, KA4, MW1, MW2, MW3, MW4, MW5, MW6, OF1, OF3, OF4, OF5, OF6, OW5, SH1, SH7, TH1, TH2, TH3, TH4, TH5, TH6, TH7, TH8, TH9 Suspected: CA1, IH4, MW7, MW8, SH2, SH3, SH5, SH6, SH8
Soil Types	Confirmed: ST2, ST5, ST8, ST11 Suspected: ST17, ST18

Comments

In Nova Scotia, the majority of Acadian climax hardwood forests are found on AC13 and AC14 sites. The Nova Scotia Uplands ecoregion (300) has the greatest percentage of AC13 sites. Other areas of high occurrence include drumlin sites in the Eastern Interior (440), Clare (730) and LaHave Drumlins (740) ecodistricts.



AC14
Moist – Rich / Sugar maple – Yellow birch

n = 162

Description

Occurring mainly on moderately well to imperfectly drained slopes with fine to medium textured glacial till deposits, this ecosite has moist, nutrient rich soils which generally support late successional forests of sugar maple, white ash, yellow birch and ironwood. Earlier successional forests are rare as vegetation types in this unit are usually small patches embedded within a larger matrix forest. Plant diversity is high, and may support several rare and endangered plant species including foamflower, thimbleweed, grape fern species and sedge species. The shrub layer usually includes regenerating trees along with numerous shrub species. Except for old field sites, bryophyte cover is usually sparse.

AC14- sites may show increased softwood cover indicative of decreased nutrient availability.

Disturbance and Succession

Most natural disturbance is small scale (individual trees or small patches) which promotes uneven-aged forests. Natural stand-level disturbances are infrequent and usually due to windthrow. Insects, disease and/or abiotic stresses have also caused significant mortality in some regions (e.g. sugar maple die-back, yellow birch die-back, and ice damage). Following disturbance, VT succession on this ecosite depends on residual overstory condition and the presence/survival of advanced regeneration. Intense disturbance can promote early successional stages dominated by shade-intolerant species.

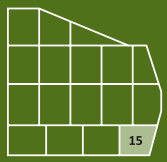
Characteristic Site, Soil and Vegetation	
Slope Position	Lower – Toe[4] Level[2] Middle[2] Upper[1] Other[1]
Slope Gradient	Gentle[7] Level[2] Other[1]
Exposure	Moderate[5] Mod.Exposed[2] Mod.Sheltered[1] Other[2]
Parent Material	Basal/Ablation till[5] Glacial till[4] Other[1]
Drainage	Imperfect[7] Mod.Well[3]
Surface Stoniness	(Non – Slightly)[7] (Moderately)[2] (Very – Excessively)[1]
Surface Rockiness	(Non-rocky)[9] Other[1]
Vegetation Types	Confirmed: IH3, IH4, IH5, IH6, IH7, IH9, KA1, KA2, MW1, MW2, MW3, MW4, MW5, MW6, MW7, MW13, OF1, OF2, OF3, OF4, OF5, OF6, SH3, SH5, SH7, TH1, TH2, TH3, TH4, TH8, TH9 Suspected: CA1, KA3, KA4, MW8, OW5, SH1, SH2, SH6, SH8, TH6, TH7
Soil Types	Confirmed: ST3, ST6, ST9, ST12 Suspected: ST18

Comments

In Nova Scotia, the majority of Acadian climax hardwood forests are found on AC14 and AC13 sites. The Nova Scotia Uplands ecoregion (300) has the greatest percentage of AC14 sites. Other areas of high occurrence include long slopes in the Northumberland Lowlands (530) and Central Lowlands (630) ecodistricts.

AC15
Wet – Rich / White ash – Red maple

n = 21



Description

Occurring mainly on poorly to very poorly drained level areas with fine to medium textured glacial till or alluvium deposits, this ecosite has wet, nutrient rich to very rich soils which generally support a well developed canopy dominated by white ash with frequent red maple and yellow birch. The herb layer is well developed. The bryophyte layer is composed of small pockets of upland species and nutrient demanding wetland species such as prickly sphagnum. Shrub cover and diversity are low.

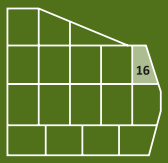
Disturbance and Succession

Following disturbance or natural mortality, VTs on this ecosite regenerate to similar species found in mature stands leading to an edaphic climax hardwood forest. Along with senescence, windthrow, ice scouring, and fluctuating water table levels are the main disturbance agents.

Comments

Forested AC15 sites are generally associated with hardwood treed swamps that receive nutrient rich seepage flow, ground water inputs and/or flood waters. AC15 sites are scattered throughout mainland Nova Scotia with areas of higher occurrence in the Northumberland Lowlands (530), Annapolis Valley (610) and Central Lowlands (630) ecodistricts.

Characteristic Site, Soil and Vegetation	
Slope Position	Level[9] Lower – Toe[1]
Slope Gradient	Level[9] Gentle[1]
Exposure	Moderate[6] Mod.Sheltered[4]
Parent Material	Organic[5] Glacial till[3] Alluvium[1] Lacustrine[1]
Drainage	Poor[6] Very Poor[4]
Surface Stoniness	(Non – Slightly)[9] (Moderate – Excessively)[1]
Surface Rockiness	(Non-rocky)[10]
Vegetation Types	Confirmed: WD1, WM5 Suspected: WD5, TH4
Soil Types	Confirmed: ST7, ST10, ST13, ST14 Suspected: none



AC16
Fresh – Very Rich / Sugar maple – White ash

n = 86

Description

Occurring mainly on well to moderately well drained alluvial floodplains, this ecosite has fresh, nutrient very rich soils which generally support closed canopy forests dominated by sugar maple and white ash (sometimes multi-layered). Earlier successional stages may contain various levels of red maple, balsam poplar, black cherry and white spruce. The species rich understory is typically dominated by ferns, especially ostrich fern. This ecosite can support several rare and endangered plant species including wild leek, blue cohosh, Canada lily and wood-nettle. Earlier successional stages may also have significant coverage of meadow-rue and goldenrod species. Shrub cover is variable and includes choke cherry, beaked hazelnut and alternate-leaved dogwood. Bryophyte cover is typically very low except where softwood cover is higher.

On upland sites, TH4 (Sugar maple – White ash / Silvery spleenwort – Baneberry) has rich understory species not typically found outside of floodplain conditions.

Disturbance and Succession

The floodplain climax forest dominated by sugar maple and white ash is expected to endure small disturbances caused by windthrow or fluctuating water levels. Earlier successional stages are usually even-aged and prone to larger disturbances and loss (e.g. black knot fungus on black cherry). Flood events and/or ice scour can also cause individual tree and stand-level disturbance. On upland sites, the climax forest is expected to endure scattered gap disturbances and develop (or maintain) an uneven-aged condition.

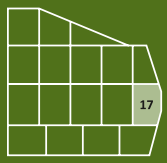
Characteristic Site, Soil and Vegetation	
Slope Position	Level[10]
Slope Gradient	Level[10]
Exposure	Mod.Sheltered[4] Moderate[3] Sheltered[2] Other[1]
Parent Material	Alluvium[9] Other[1]
Drainage	Well[8] Mod.Well[1] Other[1]
Surface Stoniness	(Non – Slightly)[9] (Moderately)[1]
Surface Rockiness	(Non-rocky)[10]
Vegetation Types	Confirmed: FP1, FP2, FP3, FP4, FP5, FP6, FP7 Suspected: TH4
Soil Types	Confirmed: ST8, ST11 Suspected: none

Comments

AC16 floodplain sites occur primarily along major rivers in central and northern Nova Scotia. Other areas of occurrence include the Annapolis Valley (610) and Inverness Lowlands (320) ecodistricts, and along the east and west branches of the St. Mary's River. Upland AC16 sites are typically small patches embedded within larger AC13 forests and are mainly associated with the Nova Scotia Uplands (300) ecoregion.

AC17
Moist – Very Rich / Sugar maple – White ash

n = 15



Description

Occurring mainly on imperfectly drained alluvial floodplains and upland lower slopes, this ecosite has moist, nutrient very rich soils. On floodplains the closed canopy is dominated by red maple with lesser amounts of yellow birch, white ash, red spruce and hemlock. Earlier successional stages will have red maple, balsam poplar and black cherry. Typical understory shrubs and herbs include a mix of floodplain and wetland species including alternate-leaved dogwood, silvery spleenwort and sweet cicely. This ecosite can support several rare and endangered plant species including wild leek, blue cohosh, Canada lily and wood-nettle. Bryophyte cover is typically very low.

On upland sites, TH4 (Sugar maple – White ash / Silvery spleenwort – Baneberry) has rich understory species not typically found outside of floodplain conditions.

Disturbance and Succession

The floodplain climax forest dominated by red maple is expected to endure small disturbances caused by windthrow or fluctuating water levels. Earlier successional stages are usually even-aged and prone to larger disturbances and loss (e.g. black knot fungus on black cherry). Flood events and/or ice scour can also cause individual tree and stand-level disturbance. On upland sites, the climax forest of sugar maple and white ash is expected to endure scattered gap disturbances and develop (or maintain) an uneven-aged condition.

Characteristic Site, Soil and Vegetation	
Slope Position	Level[9] Lower[1]
Slope Gradient	Level[9] Gentle[1]
Exposure	Mod.Sheltered[3] Moderate[3] Sheltered[2] Other[2]
Parent Material	Alluvium[6] Glaciofluvial[3] Basal till[1]
Drainage	Imperfect[7] Mod.Well[3]
Surface Stoniness	(Non – Slightly)[10]
Surface Rockiness	(Non-rocky)[10]
Vegetation Types	Confirmed: FP3, FP4, FP5, FP6, FP7, TH4 Suspected: FP1, FP2
Soil Types	Confirmed: ST9, ST12 Suspected: none

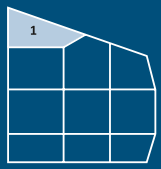
Comments

AC17 floodplain sites occur primarily along major rivers in central and northern Nova Scotia. Other areas of occurrence include the Annapolis Valley (610) and Inverness Lowlands (320) ecodistricts, and along the east and west branches of the St. Mary's River. Upland AC17 sites are typically small patches embedded within larger AC14 forests and are mainly associated with the Nova Scotia Uplands (300) ecoregion.

Maritime Boreal Ecosites

MB1
Dry – Poor / Black spruce – Jack pine

n = 7



Description

Occurring mainly on upper slopes and crests of bedrock ridges and/or on coarse textured glacial till deposits, this ecosite has dry, nutrient very poor to poor soils that generally support open stands of stunted black spruce, balsam fir, white spruce, red maple and jack pine. On extremely exposed sites (such as coastal headlands, ridges and hilltops), tree growth can become even more scrubby and twisted (referred to as krummholtz). The shrub layer can be extensive with lambkill, blueberry, black crowberry, ground juniper and bayberry. There are usually low levels of herb cover, with bracken, teaberry and bunchberry the main species. The bryophyte/lichen layer can be well developed with Schreber's moss, broom mosses and several reindeer lichens.

On the poorest sites (MB1-), Open Woodland (OW) conditions of black spruce and occasionally jack pine occur and may approach barrens conditions (Porter et al. 2020). Richer, transitional edaphic/zonal MB1+ sites show more closed-canopy forests that can include some white spruce.

Disturbance and Succession

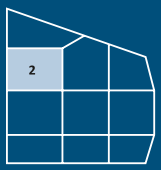
Following disturbance or natural mortality, VTs on this ecosite regenerate to similar species found in mature stands leading to an edaphic climax forest dominated by black spruce, balsam fir and/or jack pine. Although uncommon and not often recognized, old-growth and multi-aged stands dominated by black spruce are possible. Windthrow and fire are significant disturbance agents, and frequent fires can lead to increased ericaceous cover.

Characteristic Site, Soil and Vegetation	
Slope Position	Upper[5] Level[2] Middle[2] Other[1]
Slope Gradient	Level[6] Moderate[4]
Exposure	Exposed[9] Other[1]
Parent Material	Glacial till[6] Till/Bedrock[4]
Drainage	Rapid[7] Well[3]
Surface Stoniness	(Non – Slightly)[6] (Very)[4]
Surface Rockiness	(Very – Excessively)[9] (Non-Rocky)[1]
Vegetation Types	Confirmed: CB1, CB5, CB6, OW1, OW2 Suspected: none
Soil Types	Confirmed: ST1, ST15 Suspected: none

Comments

MB1 sites occur as small to large patches within a larger softwood matrix forest wherever near-surface bedrock and sandy soils can be found. Highland MB1 sites are found scattered throughout the Cape Breton Taiga (100) ecoregion and Cape Breton Highlands (210) ecodistrict. Coastal MB1 sites are mainly found in the Atlantic Coastal (800) ecoregion, but also occur in association with Coastal Boreal (CB) vegetation types in other areas.

MB1 sites with jack pine are uncommon, with known stands on the eastern slopes of the Cape Breton Highlands near Neil's Harbour; and along the Atlantic coast near Isle Madame, Canso, Peggy's Cove and Blandford.



MB2
Fresh – Poor / Black spruce

n = 25

Description

Occurring mainly on well drained slopes and level areas with medium to coarse textured glacial till and/or near surface bedrock, this ecosite has fresh, nutrient very poor to poor soils which generally support poorly stocked stands of black spruce. Other minor species include balsam fir, jack pine, white pine, white spruce and red maple. Ericaceous shrubs such as lambkill, blueberry and huckleberry dominate the shrub layer along with black spruce regeneration. The herb layer consists mainly of bracken, teaberry and bunchberry. In Coastal Boreal (CB) forests, frequently occurring plants include twinflower, bunchberry and foxberry. In Highland (HL) forests, wood-sorrel and large-leaved goldenrod are common. A thick forest floor is typically overlain by Schreber's moss, plume moss and stair-step moss. This ecosite also includes coastal areas with stabilized marine sands supporting white spruce along with salt-tolerant shrubs and herbs.

On the poorest sites (MB2-), Open Woodland (OW) conditions of black spruce and occasionally jack pine occur and may approach barrens conditions (Porter et al. 2020). Richer, transitional edaphic/zonal (MB2+) sites exhibit more closed-canopy forests that include some white spruce.

Disturbance and Succession

Following disturbance or natural mortality, VTs on this ecosite regenerate to similar species found in mature stands leading to an edaphic climax forest dominated by black spruce. Although uncommon and not often recognized, old-growth and multi-aged stands dominated by black spruce are possible. Windthrow is the primary disturbance agent, usually occurring in small to large patches. Secondary disturbance agents include insects and diseases which take advantage of trees weakened by wind and breakage.

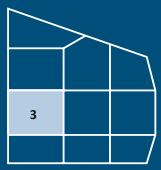
Characteristic Site, Soil and Vegetation	
Slope Position	Middle[4] Level[3] Upper[2] Crest[1]
Slope Gradient	Level[4] Gentle[3] Moderate[2] Steep[1]
Exposure	Exposed[9] Mod.Exposed[1]
Parent Material	Glacial till[4] Basal till/Bedrock[3] Marine[2] Other[1]
Drainage	Rapid[4] Well[3] Mod.Well[2] nd[1]
Surface Stoniness	(Non – Slightly)[6] (Moderately to Very)[4]
Surface Rockiness	(Non-rocky)[7] (Slightly – Moderately)[3]
Vegetation Types	Confirmed: CB1, CB5, CB6, OW1, OW2, HL6, HL7 Suspected: none
Soil Types	Confirmed: ST1, ST2, ST15, ST16 Suspected: ST5

Comments

In the Highlands, MB2 sites are mainly found in the Cape Breton Taiga (100) ecoregion and eastern slopes of the Cape Breton Highlands (210) ecodistrict. Coastal MB2 sites occur on all saltwater coastlines, but areas of highest occurrence are the Cape Breton Coastal (810), Eastern Shore (820) and South Shore (830) ecodistricts.

MB3
Moist – Poor / Black spruce

n = 25



Description

Occurring mainly on imperfectly drained gentle slopes and level areas with medium to coarse textured glacial till deposits, this ecosite has moist, nutrient very poor to poor soils which generally support poorly stocked stands of black spruce. Other minor species include balsam fir, jack pine, white pine, white spruce and red maple. Non-tree species found are similar to MB2 sites, but also include plants associated with higher moisture levels including mountain holly, cinnamon fern, creeping snowberry and sphagnum mosses. In Coastal Boreal (CB) forests, frequently occurring plants include twinflower, bunchberry and foxberry. In Highland (HL) forests, wood-sorrel and large-leaved goldenrod are common. This ecosite also includes coastal areas with stabilized marine sands supporting white spruce along with salt-tolerant shrubs and herbs.

On the poorest sites (MB3-), Open Woodland (OW) conditions of black spruce and occasionally jack pine occur and may approach barrens conditions (Porter et al. 2020). Richer, transitional edaphic/zonal MB3+ sites exhibit more closed-canopy forests that include some white spruce.

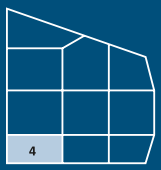
Disturbance and Succession

Following disturbance or natural mortality, VTs on this ecosite regenerate to similar species found in mature stands leading to an edaphic climax forest dominated by black spruce. Although uncommon and not often recognized, old-growth and multi-aged stands dominated by black spruce are possible. Windthrow is the primary disturbance agent, usually occurring in small to large patches. Secondary disturbance agents include insects and diseases which take advantage of trees weakened by wind and breakage.

Characteristic Site, Soil and Vegetation	
Slope Position	Level[6] Upper[2] Middle[2]
Slope Gradient	Gentle[5] Level[5]
Exposure	Exposed[9] Mod.Exposed[1]
Parent Material	Basal till/Bedrock[5] Glacial till[4] Other[1]
Drainage	Imperfect[9] Mod.Well[1]
Surface Stoniness	(Non – Slightly)[6] (Moderate)[2] (Very – Excessively)[2]
Surface Rockiness	(Non-rocky)[9] (Slightly)[1]
Vegetation Types	Confirmed: CB1, CB6, HL6, HL7 Suspected: CB5, OW1, OW2
Soil Types	Confirmed: ST3, ST6, ST14-U, ST16 Suspected: none

Comments

In the Highlands, MB3 sites are mainly found in the Cape Breton Taiga (100) ecoregion and eastern slopes of the Cape Breton Highlands (210) ecodistrict. Coastal MB3 sites occur on all saltwater coastlines, but areas of highest occurrence are the Cape Breton Coastal (810), Eastern Shore (820) and South Shore (830) ecodistricts.



MB4
Wet – Poor / Black spruce

n = 24

Description

Occurring mainly on poorly to very poorly drained level areas and depressions with glacial till and/or organic deposits, this ecosite has moist/wet to wet, nutrient very poor to poor soils which generally support black spruce dominated stands with scattered balsam fir and (in a few localized areas) jack pine. Crown closure in these stands can be low to high with some sites supporting densely populated stands of stunted trees. The shrub layer is dominated by ericaceous species such as Labrador tea, lambkill and rhodora. Characteristic herbs include cinnamon fern, three seeded sedge, goldthread and creeping snowberry. The bryophyte layer is dominated by sphagnum mosses.

The poorest MB4- sites may exhibit open treed bog conditions which persist as an edaphic climax.

Disturbance and Succession

Following disturbance or natural mortality, VTs on this ecosite regenerate to similar species found in mature stands leading to an edaphic climax forest dominated by black spruce. Fluctuating water table levels and windthrow are the main disturbance agents. Although uncommon and not often recognized, old-growth and multi-aged stands dominated by black spruce are possible.

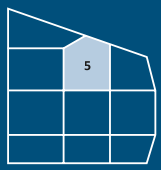
Characteristic Site, Soil and Vegetation	
Slope Position	Level[6] Lower[3] Depression[1]
Slope Gradient	Level[6] Gentle[4]
Exposure	Exposed[8] Mod.Exposed[1] Moderate[1]
Parent Material	Glacial till[4] Organic[4] Basal till[2]
Drainage	Poor[7] Very Poor[3]
Surface Stoniness	(Non – Slightly)[9] (Moderate)[1]
Surface Rockiness	(Non-rocky)[10]
Vegetation Types	Confirmed: WC3, WC7, WC11, WB1, WB3, WB4 Suspected: none
Soil Types	Confirmed: ST4, ST7, ST14 Suspected: none

Comments

Forested MB4 sites are generally associated with coniferous treed swamps that can also grade into treed bogs.
Highland MB4 sites are found only in the Cape Breton Taiga (100) ecoregion and Cape Breton Highlands (210) ecodistrict. Coastal MB4 sites are mainly found in the Atlantic Coastal (800) ecoregion, but also occur in association with Coastal Boreal (CB) vegetation types in other areas. MB4 sites with jack pine are rare, with known stands at Isle Madame and Blandford along the Atlantic coast.

MB5
Fresh – Medium / Fir – Spruce

n = 70



Description

Occurring mainly on well drained slopes with medium to coarse textured glacial till and/or colluvium deposits, this ecosite has fresh, nutrient poor to medium soils which generally support closed canopy forests of balsam fir and white spruce. Occasionally, they are mixed with black spruce (particularly on transitional MB5- sites). Red maple, white birch, heart-leaf birch and mountain-ash are also present, but seldom extend into the overstory. The shrub layer is dominated by regenerating overstory species, while the herb layer is sparse to moderate with typical woodland flora such as starflower, bluebead lily, sarsaparilla and wood aster. In Coastal Boreal (CB) forests, frequently occurring plants include twinflower, bunchberry and foxberry. In Highland (HL) forests, wood-sorrel and large-leaved goldenrod are common. A thick forest floor is typically overlain by Schreber's moss, broom mosses and stair-step moss. Balsam fir wave forests are common on more exposed sites and on off-shore islands. White spruce krummholtz forests are found on all coastlines as well as on more exposed sites in the Cape Breton Highlands.

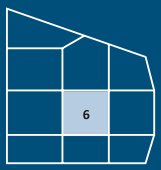
Disturbance and Succession

Following disturbance or natural mortality, VTs on this ecosite regenerate to similar species found in mature stands. Zonal climax conditions are often expressed as a matrix of even-aged patches across a range of age classes. Windthrow is the primary disturbance agent in coastal areas, usually occurring in small to large patches that release advanced regeneration layers. Multi-cohort, old age stands are uncommon due to the frequency of stand initiating events. Earlier successional stages may contain red maple, white birch and pin cherry, but exposure quickly returns these sites to softwood species. Mortality can also be caused by spruce bark beetle or spruce budworm. On the Highlands, spruce budworm periodically causes a collapse of the balsam fir forest resulting in landscape-scale disturbance. In the absence of spruce budworm, balsam fir longevity is in the range of 70–80 years.

Characteristic Site, Soil and Vegetation	
Slope Position	Upper[4] Middle[3] Level[2] Lower[1]
Slope Gradient	Gentle[6] Moderate[2] Level[1] Steep[1]
Exposure	Exposed[8] Mod.Exposed[2]
Parent Material	Glacial till[5] Basal/Ablation till[4] Other[1]
Drainage	Well[9] Other[1]
Surface Stoniness	(Non – Slightly)[7] (Moderate)[2] (Very – Excessively)[1]
Surface Rockiness	(Non-rocky)[8] (Slightly – Moderately)[2]
Vegetation Types	Confirmed: CB2, CB3, HL1, HL2, HL5, Suspected: CB4, OF1, OF4
Soil Types	Confirmed: ST1, ST2, ST5, ST8, ST15 Suspected: ST17

Comments

Highland MB5 sites are found only in the Cape Breton Taiga (100) ecoregion and Cape Breton Highlands (210) ecodistrict. Coastal MB5 sites occur on all saltwater coastlines, but areas of highest occurrence are in the Atlantic Coastal (800) ecoregion.



MB6
Moist – Medium / Fir – Spruce

n = 45

Description

Occurring mainly on imperfectly drained gentle slopes and level areas with medium to coarse textured glacial till deposits, this ecosite has moist, nutrient poor to medium soils which generally support closed canopy forests of balsam fir and white spruce. Occasionally, they are mixed with black spruce (particularly on transitional MB6- sites). Red maple, white birch, heart-leaf birch and mountain-ash are also present, but seldom extend into the overstory. Non-tree species found are similar to MB5 sites, but also include plants associated with higher moisture levels including mountain holly, cinnamon fern, creeping snowberry and sphagnum mosses. In Coastal Boreal (CB) forests, frequently occurring plants include twinflower, bunchberry and foxberry. In Highland (HL) forests, wood-sorrel and large-leaved goldenrod are common.

Disturbance and Succession

Following disturbance or natural mortality, VTs on this ecosite regenerate to similar species found in mature stands. Zonal climax conditions are often expressed as a matrix of even-aged patches across a range of age classes. Windthrow is the primary disturbance agent in coastal areas, usually occurring in small to large patches that release advanced regeneration layers. Multi-cohort, old age stands are uncommon due to the frequency of stand initiating events. Earlier successional stages may contain red maple, white birch and pin cherry, but exposure quickly returns these sites to softwood species. Mortality can also be caused by spruce bark beetle or spruce budworm. On the highlands, spruce budworm periodically causes a collapse of the balsam fir forest resulting in landscape-scale disturbance. In the absence of spruce budworm, balsam fir longevity is in the range of 70–80 years.

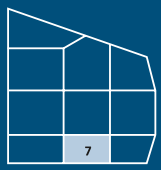
Characteristic Site, Soil and Vegetation	
Slope Position	Level[6] Middle[2] Upper[2]
Slope Gradient	Gentle[7] Level[2] Moderate[1]
Exposure	Exposed[8] Mod.Exposed[2]
Parent Material	Glacial till[6] Basal till[4]
Drainage	Imperfect[6] Mod.Well[4]
Surface Stoniness	(Non – Slightly)[9] (Moderately – Excessively)[1]
Surface Rockiness	(Non-rocky)[9] (Very rocky)[1]
Vegetation Types	Confirmed: CB2, CB3, HL1, HL2, HL5, HL6 Suspected: CB4, OF1, OF2, OF4
Soil Types	Confirmed: ST3, ST6, ST14-U, ST16, ST18 Suspected: ST9

Comments

Highland MB6 sites are found only in the Cape Breton Taiga (100) ecoregion and Cape Breton Highlands (210) ecodistrict. Coastal MB6 sites occur on all saltwater coastlines, but areas of highest occurrence are in the Atlantic Coastal (800) ecoregion.

MB7
Wet – Medium / Fir – Spruce

n = 8



Description

Occurring mainly on poorly to very poorly drained level areas and depressions with glacial till and/or organic deposits, this ecosite has moist/wet to wet, nutrient poor to medium soils which generally support a closed canopy dominated by balsam fir, with lesser amounts of black spruce, white spruce and/or red maple. Shrub layer development can be variable, but usually contains regenerating trees, mountain holly, wild raisin and scattered ericaceous species such as Labrador tea and lambkill. Herb cover is moderate to high consisting of cinnamon fern, wood aster, creeping snowberry and three seeded sedge. The forest floor has a well developed bryophyte layer dominated by sphagnum mosses.

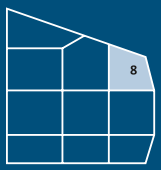
Disturbance and Succession

Following disturbance or natural mortality, VTs on this ecosite maintain edaphic climax forests of similar species mixtures. Although uncommon and not often recognized, old-growth and multi-aged stands dominated by black spruce are possible. Fluctuating water table levels and windthrow are the main disturbance agents. Although less frequent, insect attack can also be significant.

Characteristic Site, Soil and Vegetation	
Slope Position	Level[10]
Slope Gradient	Level[10]
Exposure	Exposed[7] Other[3]
Parent Material	Glacial till[5] Organic[5]
Drainage	Poor[10]
Surface Stoniness	(Non – Slightly)[10]
Surface Rockiness	(Non-rocky)[10]
Vegetation Types	Confirmed: WC6, WB2 Suspected: none
Soil Types	Confirmed: ST4, ST14 Suspected: ST7

Comments

MB7 sites are generally associated with coniferous and mixedwood treed swamps which receive seepage flows and/or ground water inputs. Highland MB7 sites are scattered throughout the Cape Breton Taiga (100) ecoregion and Cape Breton Highlands (210) ecodistrict. Coastal MB7 sites are mainly found in the Atlantic Coastal (800) ecoregion, but also occur in association with Coastal Boreal (CB) vegetation types in other areas.



MB8
Fresh – Rich / Birch – Fir

n = 27

Description

Occurring mainly on well drained slopes with medium to coarse textured glacial till and/or colluvium deposits, this ecosite has fresh, nutrient medium to rich soils which generally support closed canopy forests of white birch, heart-leaf birch, white spruce, and balsam fir. In the Cape Breton Highlands (210), yellow birch and red maple become prominent in areas of climatic transition to Acadian ecosites, usually on shoulder-slope positions. Mountain maple and striped maple may also be common in these areas. The sparse shrub layer consists mainly of regenerating trees and mountain-ash. Ericaceous shrubs are also present in coastal areas including lambkill and blueberry. In such areas, the herb layer is generally sparse and includes bunchberry, goldthread and wood ferns. On highland sites, wood fern coverage can be extensive along with wood-sorrel and bunchberry. Bryophyte coverage is usually moderate with Schreber's moss the dominant species. Many Old Field VTs previously captured in MB11 have been reclassified to MB8, often as MB8+.

Disturbance and Succession

Most natural disturbance is small scale with regeneration to similar species found in mature stands (mainly red maple and white birch in coastal areas, and yellow birch, red maple, balsam fir and white spruce in highland areas). A conifer dominated successional stage is also possible where more intense stand-level disturbances occur. Along with natural senescence, windthrow and insects are the primary disturbance agents. The transitional yellow birch-balsam fir forest of the highlands may have an uneven-aged structure owing to the longevity of birch which has been aged to 225 years. In coastal areas, both red maple and white birch seldom exceed 125 years.

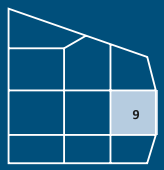
Characteristic Site, Soil and Vegetation	
Slope Position	Upper[5] Middle[3] Level[2]
Slope Gradient	Gentle[5] Moderate[2] Level[2] Other[1]
Exposure	Exposed[7] Mod.Exposed[3]
Parent Material	Glacial till[4] Basal/Ablation till[4] Other[2]
Drainage	Well[7] Mod.Well[3]
Surface Stoniness	(Moderate)[5] (Non – Slightly)[3] (Very – Excessively)[2]
Surface Rockiness	(Non-rocky)[9] (Slightly – Moderately)[1]
Vegetation Types	Confirmed: CB4, HL2, HL3, HL4, HL5, OF1, OF4 Suspected: none
Soil Types	Confirmed: ST2, ST5, ST8, ST15 Suspected: ST11, ST16, ST17

Comments

Highland MB8 sites are mainly found in the Cape Breton Highlands (210) ecodistrict. Coastal MB8 sites occur on all saltwater coastlines, but areas of highest occurrence are in the Atlantic Coastal (800) ecoregion (especially in more sheltered areas) and on old-field sites.

MB9
Moist – Rich / Birch – Fir

n = 4



Description

Occurring mainly on imperfectly drained gentle slopes and level areas with medium to coarse textured glacial till deposits, this ecosite has moist, nutrient medium to rich soils which generally support closed canopy forests of white birch, heart-leaf birch, balsam fir and white spruce. In the Cape Breton Highlands (210), yellow birch and red maple become more prominent in areas of climatic transition to Acadian ecosites, usually on shoulder-slope positions. Mountain maple and striped maple may also be common in these areas. The herb layer is generally sparse and includes bunchberry, goldthread, wood ferns, cinnamon fern, interrupted fern and New York fern. On Highland sites, wood fern coverage can be extensive along with wood-sorrel and bunchberry. Bryophyte coverage is usually moderate with Schreber's moss and stair-step moss the dominant species. Many Old Field VTs previously captured in MB11 have been reclassified to MB9, often as MB9+.

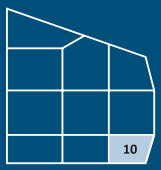
Disturbance and Succession

Most natural disturbance is small scale with regeneration to similar species found in mature stands (mainly red maple and white birch in coastal areas, and yellow birch, red maple, balsam fir and white spruce in highland areas). A conifer dominated successional stage is also possible where more intense stand-level disturbances occur. Along with natural senescence, windthrow and insects are the primary disturbance agents. The transitional climax yellow birch-balsam fir forest of the highlands may have an uneven-aged structure owing to the longevity of birch which has been aged to 225 years. In coastal areas, both red maple and white birch seldom exceed 125 years.

Characteristic Site, Soil and Vegetation	
Slope Position	Level[10]
Slope Gradient	Gentle[5] Level[5]
Exposure	Exposed[10]
Parent Material	Glacial till[5] Basal till[5]
Drainage	Imperfect[10]
Surface Stoniness	(Non – Slightly)[10]
Surface Rockiness	(Non-rocky)[10]
Vegetation Types	Confirmed: CB4, HL3, OF1, Suspected: HL4, HL5, OF2, OF4
Soil Types	Confirmed: ST3, ST6, ST9, ST12 Suspected: ST14-U, ST16-L, ST18

Comments

Highland MB9 sites are mainly found in the Cape Breton Highlands (210) ecodistrict. Coastal MB9 sites occur on all saltwater coastlines, but areas of highest occurrence are in the Atlantic Coastal (800) ecoregion (especially in more sheltered areas).



MB10
Wet – Rich / White spruce

n = 0

Description

Occurring mainly on poorly to very poorly drained level areas and depressions with glacial till and/or organic deposits, this ecosite has moist/wet to wet, nutrient medium to rich soils which support open-canopy stands dominated by white spruce, balsam fir, and speckled alder. Cover to speckled alder may be extensive. The herb layer is typically dominated by fern species including cinnamon fern and sensitive fern. The forest floor has a well developed bryophyte layer dominated by sphagnum mosses. At least one known Wet Boreal VT (WB2) is suspected to occur on this ecosite.

Disturbance and Succession

Following disturbance or natural mortality, VTs on this ecosite regenerate to similar species found in mature stands leading to an edaphic climax forest dominated by white spruce. Fluctuating water table levels and windthrow are the main disturbance agents.

Comments

MB10 sites are generally associated with shrub dominated, sparsely-treed swamps which receive nutrient rich seepage flows and/or ground water inputs.

Highland MB10 sites are absent from the Cape Breton Taiga (100) ecoregion and infrequent in the Cape Breton Highlands (210) ecodistrict. Coastal MB10 sites are expected in sheltered areas along the Atlantic Coastal (800) ecoregion with richer till deposits.

Characteristic Site, Soil and Vegetation	
Slope Position	nd[10]
Slope Gradient	nd[10]
Exposure	nd[10]
Parent Material	nd[10]
Drainage	nd[10]
Surface Stoniness	nd[10]
Surface Rockiness	nd[10]
Vegetation Types	Confirmed: none Suspected: WB2, OF2
Soil Types	Confirmed: none Suspected: ST7, ST10, ST13, ST14

Notes

Part III:
Edatopic Position of Forest Groups

Introduction

This section illustrates the edatopic range for each of the 17 Forest Groups described in the FEC (2022): Field Guide. (Neily et al. 2023) In cases where vegetation types are currently recognized in both Acadian (AC) and Maritime Boreal (MB) macrogroups, both edatopic grids are displayed.

Ecosites denote general productivity units with similar moisture and nutrient regimes, and provide an ecological setting through which vegetation type (VT) and soil type (ST) combinations can be grouped and compared. This concept can be extended to the Forest Group level to encompass a range of ecosites over which the collective Forest Group may occur.

Forest Groups represent collections of VTs with similar species composition, site conditions and successional pathways. In some Forest Groups, both zonal and azonal climax conditions can occur. In such cases, vegetation types are assigned to the appropriate condition.

Where such separations occur, VTs specific to each condition are identified— those occurring on zonal ecosites are coloured **green**, and those on edaphic ecosites are in **orange**.

For ease of reference, the Key to the Forest Groups of Nova Scotia (Figure EP1) as found in the FEC (2022): Field Guide follows:

FIGURE EP1.
Key to the Forest Groups of Nova Scotia

In this key, **tree cover** refers to the relative percent cover—the percentage of total overstory cover. **Ground vegetation cover** refers to the absolute percent cover—the total area covered on the ground.

Cover Classes:	
Sparse	< 10%
Scattered	10–25%
Abundant	26–50%
Dominant	> 50%

1a. Stands with > 30% planted trees **... PLANTED FORESTS (PF)**

1b. Not as above **... 2**

2a. Stands on poorly drained or borderline poorly drained soils with conspicuous hydrophytic ground vegetation **... 3**

2b. Stands on rapidly to imperfectly drained soils with little or no hydrophytic vegetation **... 6**

3a. Stands located in Atlantic Coastal or Highland Ecoregions **... WET BOREAL FOREST (WB)**

3b. Not as above **... 4**

4a. Stands with > 75% softwood in the overstory **... WET CONIFEROUS FOREST (WC)**

4b. Stands with < 75% softwood in the overstory **... 5**

5a. Stands with > 75% hardwood in the overstory **... WET DECIDUOUS FOREST (WD)**

5b. Stands with < 75% hardwood in the overstory **... WET MIXEDWOOD FOREST (WM)**

6a. Stands occurring on abandoned fields and pastures where natural features such as microtopography have been altered by past agricultural practices **... OLD FIELD FOREST (OF)**

6b. Not as above **... 7**

7a. Stands adjacent to lakes, rivers and smaller watercourses that are subject to regular or periodic flooding
... FLOODPLAIN FOREST (FP)

7b. Not as above **... 8**

8a. Stands on karst topography with bedrock exposures often with a unique assemblage of plants common to calcium enriched soils
... KARST FOREST (KA)

8b. Not as above **... 9**

9a. Stands in an open woodland condition where natural disturbances or site have limited the establishment of trees to less than 30% crown closure or stands with excessively stony, steep slopes of colluvium interspersed with pockets of talus
... OPEN WOODLAND (OW)

9b. Not as above **... 10**

10a. Stands usually restricted to high elevations of the Cape Breton Plateau (Ecoregion 100 and Ecodistrict 210) and characterized by balsam fir and various amounts of white birch, white spruce and heart-leaf birch
... HIGHLAND FOREST (HL)

10b. Not as above **... 11**

11a. Stands located in coastal areas that are influenced by fog and cool, moisture-laden on-shore winds. Heart-leaf birch, mountain ash, downy alder, bayberry, black crowberry, foxberry, large-leaved goldenrod, starry false Solomon's seal, and a thick duff layer are indicators, though not always present. There is a distinct absence of sugar maple, beech, hemlock and pines **... 12**

11b. Not as above **... 13**

12a. Stands typical of the Atlantic Coastal Ecoregion (800), more exposed areas of the Victoria Lowlands (220), Bras d'Or Lowlands (510), and Clare (730) and the outer Bay of Fundy (920)
... COASTAL BOREAL FOREST (CB)

12b. Stands found on warmer, more sheltered, coastal areas (inner Bay of Fundy, Tusket Islands (840), Northumberland Strait and Gulf of St. Lawrence)
... COASTAL ACADIAN FOREST (CA)

13a. Stands with > 75% softwood in the overstory **... 14**

13b. Stands with < 75% softwood in the overstory **... 15**

14a. Nutrient poor ecosites (Azonal) dominated by black spruce and/or pines with an understory of acid loving plants (ericaceous shrubs, bracken, pink lady's slipper, cow-wheat, pyrola)
... SPRUCE PINE FOREST (SP)

14b. Not as above. Medium nutrient ecosites (Zonal) dominated by red spruce, fir & hemlock
... SPRUCE HEMLOCK FOREST (SH)

15a. Stands with > 25% softwood in the overstory
... MIXEDWOOD FOREST (MW)

15b. Stands with < 25% softwood in the overstory **... 16**

16a. Stands dominated by a combination of early-successional hardwoods (large-tooth aspen, trembling aspen, white birch, red oak, or red maple when NOT in combination with sugar maple or yellow birch)
... INTOLERANT HARDWOOD FOREST (IH)

16b. Stands dominated by northern hardwoods (sugar maple, yellow birch, beech, white ash, ironwood)
... TOLERANT HARDWOOD FOREST (TH)

Edatopic Grid Position Fact Sheet Components

The following section contains fact sheets describing the edatopic grid positions for all Forest Groups in the FEC system.

Below is a summary of information found in each fact sheet:

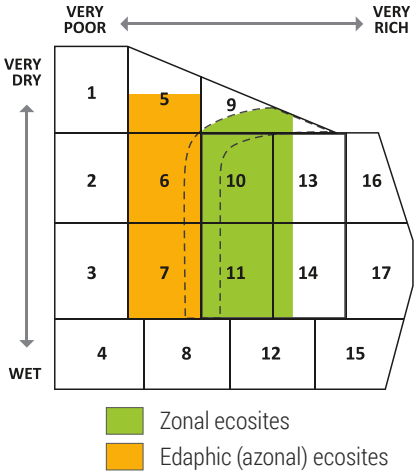
1. The Forest Group name and its two-letter code
2. Comments on the Forest Group regarding ecosites, specific Vegetation Types (VTs) and vegetative characteristics, successional linkages and other pertinent details
3. An edatopic grid indicating the known and expected soil moisture regime range and soil nutrient regime range for the Forest Group
4. Specific VTs in the Forest Group known to occur on either zonal or edaphic ecosites are identified
5. A list of all VTs within the Forest Group for reference purposes

Coastal Acadian Forest Group

CA

Despite the edatopic proximity, there is little ecological similarity between the VTs in the Coastal Acadian forest group. Red/black spruce hybridization was uncommon in sampled areas for both vegetation types. However, some hybridized physical traits should not be ruled out.

Coastal Acadian forests most commonly occur along the inner Bay of Fundy, Northumberland Strait and Gulf of St. Lawrence.



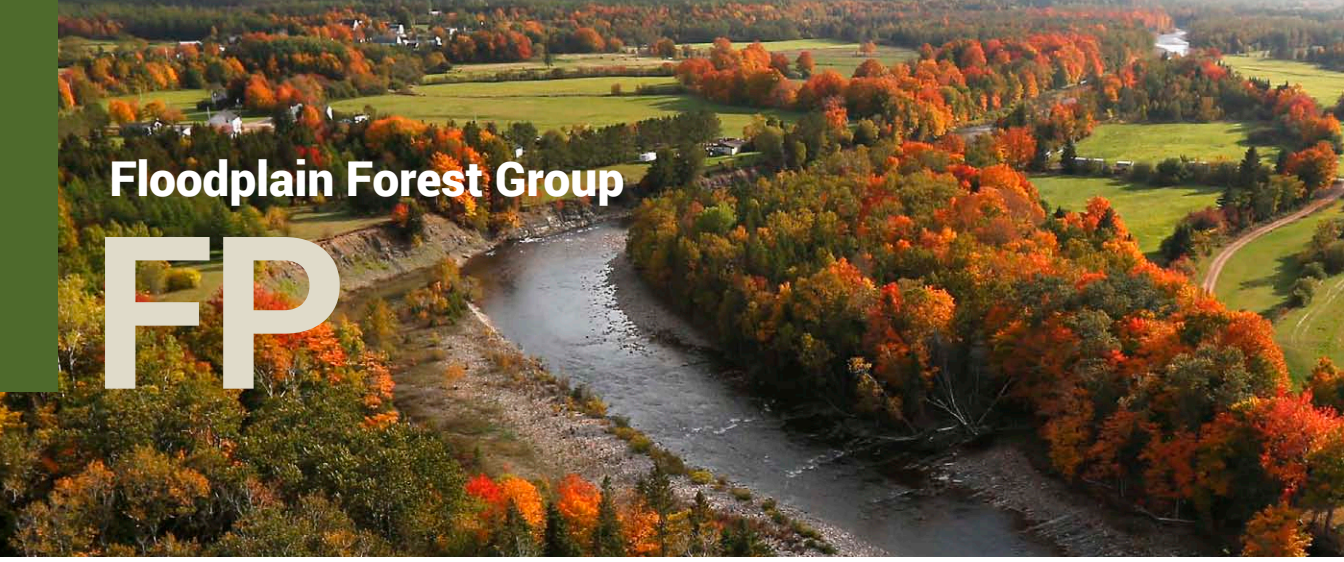
Vegetation Types

Zonal ecosites: CA1

Edaphic ecosites: CA2

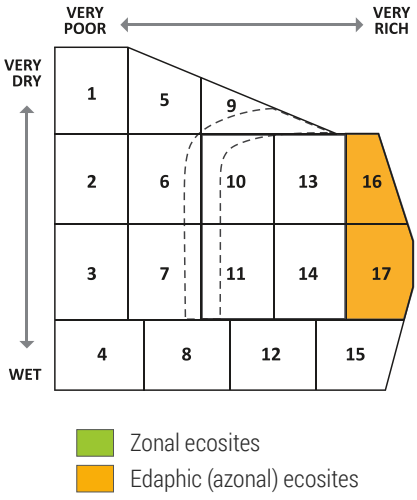
Coastal Acadian Forests

CA1 Red spruce / Mountain-ash / Foxberry / Bazzania
CA2 Black spruce – White spruce / Bayberry / Poison ivy



Floodplain Forest Group

FP



The FP forest group occupies the richest portions of the Acadian edatopic grid.

Climax floodplain forests contain species commonly seen in zonal upland climax forests (sugar maple, white ash, yellow birch, ironwood, white spruce and occasionally hemlock). However, due to highly enriched soil nutrient regimes from periodic flooding, along with frequent disturbances from mechanical damage and/or ice scouring, floodplain forests follow different successional pathways than typical upland zonal ecosites.

Vegetation Types

Zonal ecosites: none

Edaphic ecosites: all

Floodplain Forests

FP1 Sugar maple – White ash / Ostrich fern – Wood goldenrod

FP2 Red maple – Red oak / Bellwort – Nodding trillium

FP3 Red maple / Sensitive fern – Rough goldenrod

FP4 Balsam poplar – White spruce / Ostrich fern – Cow-parsnip

FP5 Black cherry – Red maple / Rough goldenrod – Jack-in-the-pulpit

FP6 White spruce / Wood goldenrod / Shaggy moss

FP7 White ash / Sensitive fern – Meadow rue

FP8 Black ash / Hawthorne / Jack-in-the-pulpit

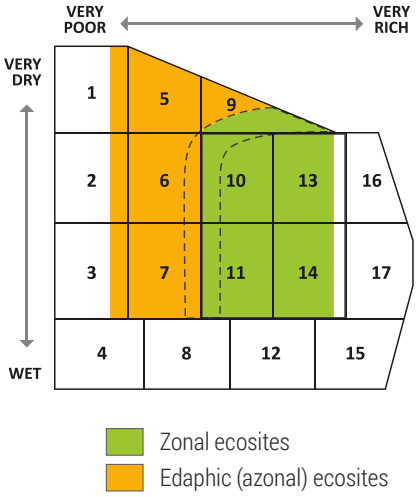
FP9 Ironwood / Choke cherry / Wood goldenrod

Acadian Macrogroup

Intolerant Hardwood Forest Group

IH

The IH forest group represents the broadest continuous range of potential upland ecosites in the Acadian macrogroup. IH4 and IH6 occur on both zonal and edaphic ecosites with generalist species such as red maple, white birch and aspen adaptable to many environmental conditions. Many IH VTs also occur on zonal-edaphic transitional ecosites. Successional linkages can be assessed from remnant trees of previous stands and advanced regeneration.



Vegetation Types

Zonal ecosites: IH3 — IH7, IH9

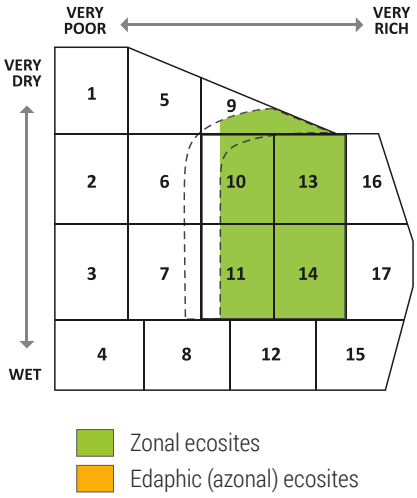
Edaphic ecosites: IH1, IH2, IH4, IH6, IH8

Intolerant Hardwood Forests

IH1 Large-tooth aspen / Lambkill / Bracken
IH1a Red oak variant
IH2 Red oak / Witch-hazel – Lambkill
IH2a Red maple variant
IH3 Large-tooth aspen / Christmas fern – New York fern
IH4 Trembling aspen / Wild raisin / Bunchberry
IH4a Red maple variant
IH5 Trembling aspen – White ash / Beaked hazelnut / Christmas fern
IH6 White birch – Red maple / Sarsaparilla – Bracken
IH6a Aspen variant
IH6b White birch variant
IH7 Red maple / Hay-scented fern – Wood-sorrel
IH8 White birch – Red maple / Lambkill – Huckleberry
IH9 Grey birch / Tall white aster / Hair-cap moss

Karst Forest Group

KA



The KA forest group occupies a unique upland Acadian zonal ecosite niche. Vascular plants associated with karst topography (calciphytes) are common, some of which are rare. Most sites range from fresh to moist with medium to rich fertility. Successional pathways are similar to Tolerant Hardwood and Spruce Hemlock vegetation types.

Karst soils are often shallow and dry, especially in crest and upper slope positions. In such cases (AC9), species better adapted to such sites (large-tooth aspen and black spruce for example) may occur as minor stand components.

Vegetation Types

Zonal ecosites: all

Edaphic ecosites: none

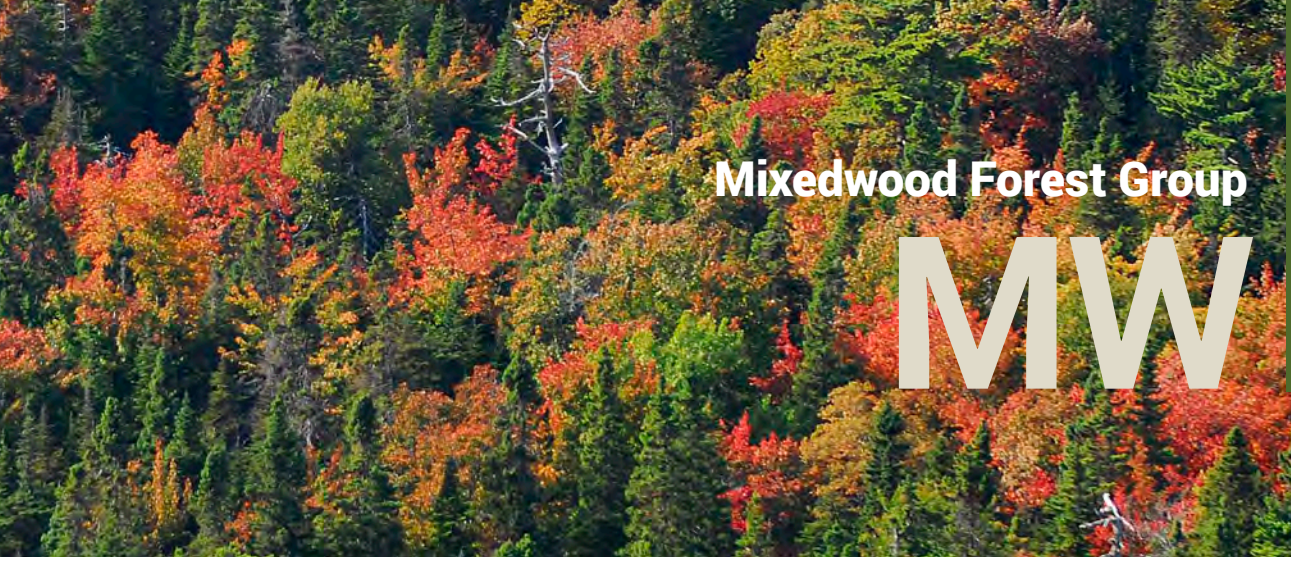
Karst Forests

KA1 Hemlock / Christmas fern – White lettuce – Wood goldenrod

KA2 Sugar maple / Christmas fern – Rattlesnake fern – Bulblet bladder fern

KA3 Hemlock – Sugar maple – Yellow birch / Hawkweed – Marginal wood fern

KA4 White spruce / Round-leaved dogwood / Bulblet bladder fern – Wood goldenrod

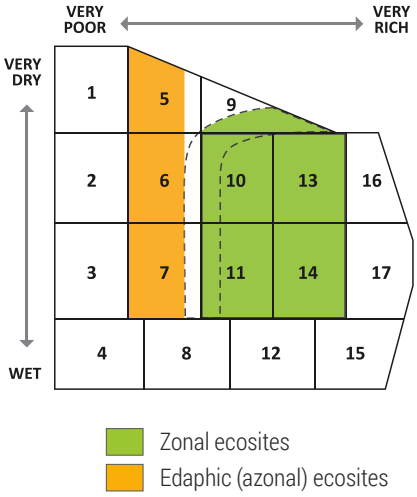


Mixedwood Forest Group

MW

Early to mid-successional VTs on relatively poorer zonal ecosites may exhibit some transitional vegetative characteristics but will still succeed to zonal climax communities.

Mixedwood VTs on edaphic ecosites exhibit few transitional vegetative characteristics and succeed to edaphic climax communities dominated by black spruce, white pine, and red oak, depending on disturbance mechanisms.



Vegetation Types

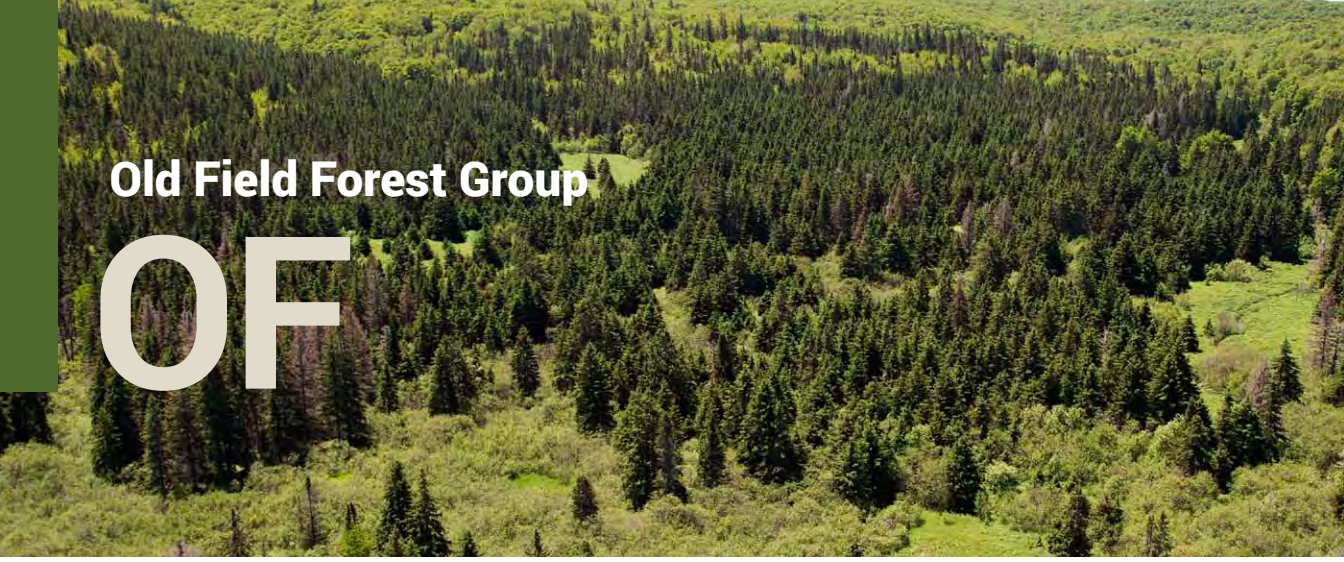
Zonal ecosites: MW1 – MW8, MW13

Edaphic ecosites: MW9 – MW12

Mixedwood Forests

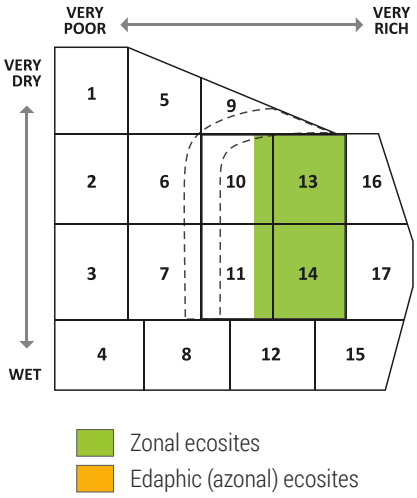
MW1	Red spruce – Yellow birch / Evergreen wood fern
MW2	Red spruce – Red maple – White birch / Goldthread
MW2a	Aspen variant
MW3	Hemlock – Yellow birch / Evergreen wood fern
MW4	Hemlock – Red maple / Wood fern – Starflower
MW4a	Aspen variant
MW5	White spruce – Yellow birch / Bunchberry – Wood fern
MW6	White spruce – Red maple (White birch) / Starflower / Schreber's moss
MW7	Balsam fir – Red maple / Wood-sorrel – Goldthread
MW8	White birch – Balsam fir / Starflower
MW9	Black spruce – Red maple / Bracken – Sarsaparilla
MW10	Black spruce – Aspen / Bracken – Sarsaparilla
MW11	Red oak – White pine / Teaberry
MW12	White pine – Red maple / Velvet-leaf blueberry / Bracken
MW13	Eastern white cedar – Balsam fir / Stair-step moss

Acadian Macrogroup



Old Field Forest Group

OF



Within the Acadian forest macrogroup, Old Field vegetation types occur on nutrient medium to rich, fresh to moist soils on zonal upland ecosites.

Historically, forested sites were transformed from natural vegetation types to agricultural land. These sites were often selected for their inherently higher nutrient regimes (e.g. tolerant hardwood and tolerant mixedwood sites).

Agricultural practices (soil amendments, drainage improvements, and tillage) often further improved nutrient and/or moisture regimes on these sites.

Vegetation Types

Zonal ecosites: all

Edaphic ecosites: none

Old Field Forests

OF1 White spruce / Aster – Goldenrod / Shaggy moss

OF2 Tamarack / Speckled alder / Rough goldenrod / Shaggy moss

OF3 White pine – Balsam fir / Shinleaf – Pine-sap

OF4 Balsam fir – White spruce / Evergreen wood fern – Wood aster

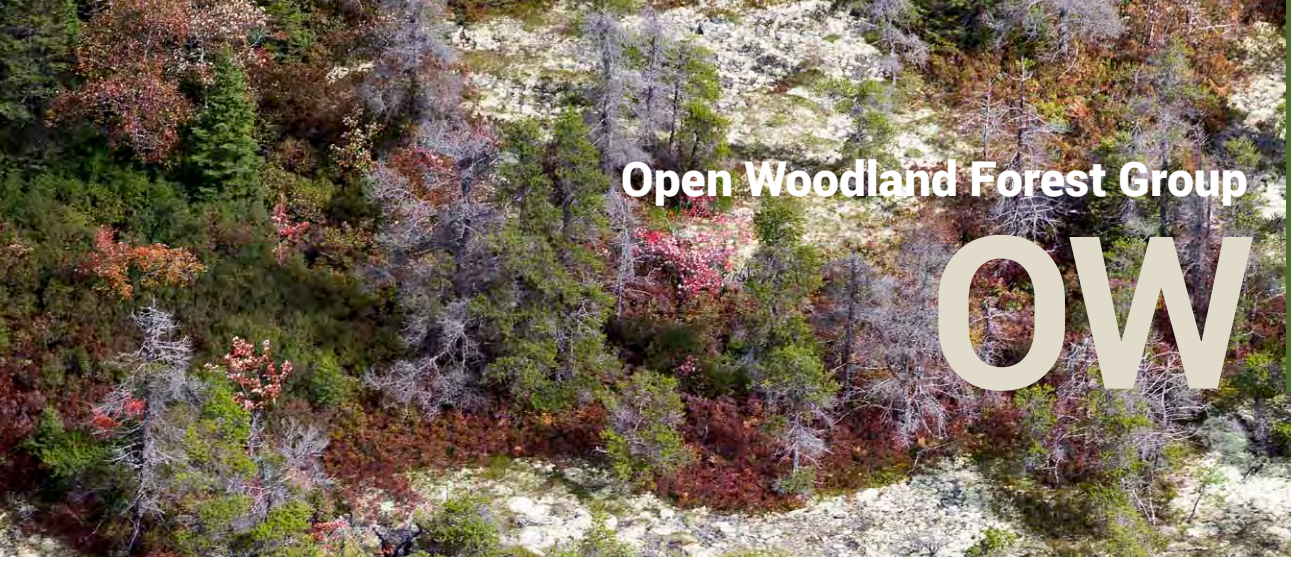
OF5 Trembling aspen – Grey birch / Rough goldenrod – Strawberry

OF6 White ash / Choke cherry / Tall buttercup

OF7 Red Oak – Red maple / Hawkweed – Speedwell

OF8 Eastern White Cedar / Lady fern – Jack-in-the-pulpit

OF9 Black cherry / Hawthorn – Meadow-sweet / Evergreen wood fern

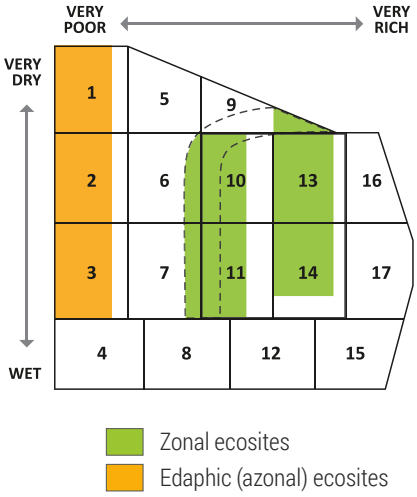


Open Woodland Forest Group

OW

OW1, OW2 and OW3 occur on Acadian upland edaphic ecosites with very poor, dry to moist soils.

OW4 and OW5 occur on Acadian upland zonal ecosites with medium to rich, fresh to moist soils. In these two unique VTs, crown closure often exceeds 30%, but fully closed-canopy conditions are prevented by excessive surface stone or steep slopes of colluvium/talus.



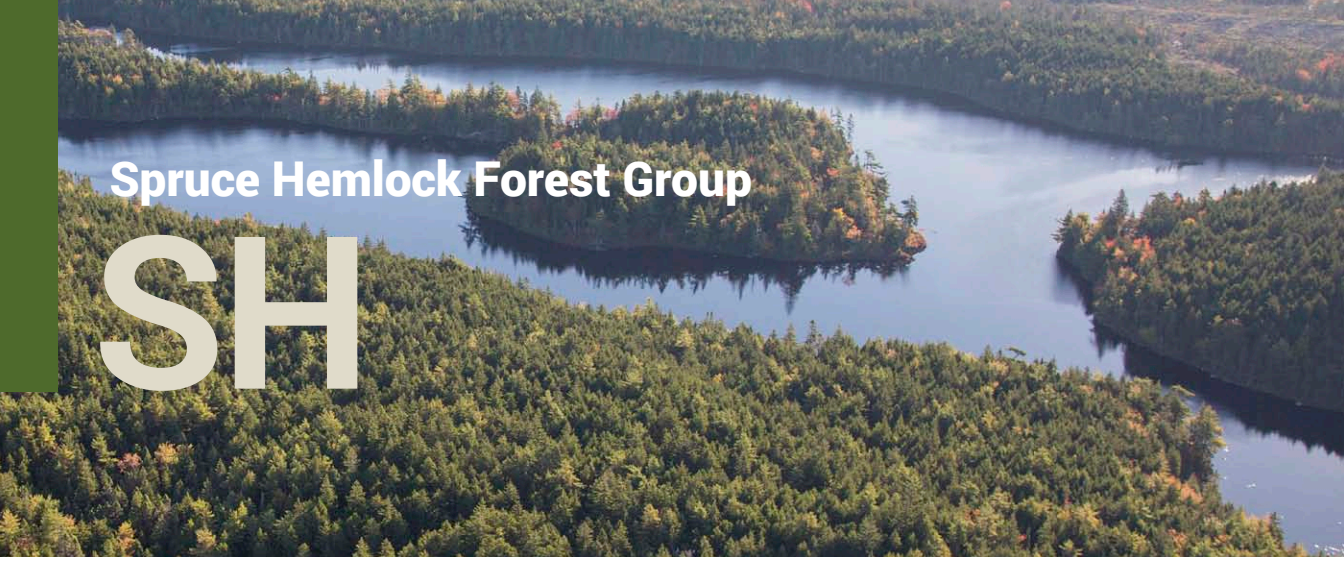
Vegetation Types

Zonal ecosites: OW4, OW5

Edaphic ecosites: OW1, OW2, OW3

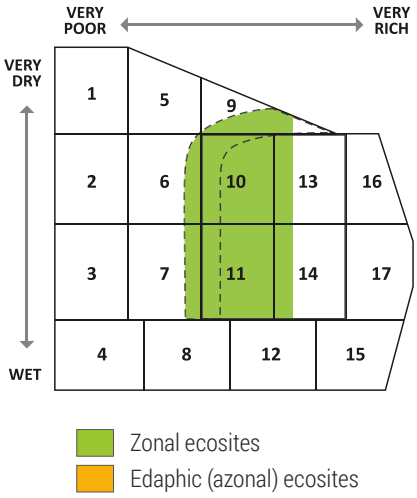
Open Woodland Forests

- OW1 Jack pine / Huckleberry – Broom crowberry / Reindeer lichen
- OW2 Black spruce / Lambkill / Reindeer lichen
- OW3 Red pine – White pine / Broom crowberry / Grey reindeer lichen
- OW4 Red spruce / Red-berried elder / Rock polypody
- OW5 White ash – Red oak / Marginal wood fern – Herb-Robert



Spruce Hemlock Forest Group

SH



VTs in the SH forest group occur on upland zonal Acadian ecosites with fresh to moist, nutrient medium soils.

In the transition zone, red/black spruce hybridization and increasing white pine presence can be expected.

Ecosites with higher levels of moisture and nutrients may have greater cover to yellow birch.

Vegetation Types

Zonal ecosites: all

Edaphic ecosites: none

Spruce Hemlock Forests

SH1 Hemlock / Needle carpet
SH2 Hemlock – White pine / Sarsaparilla
SH3 Red spruce – Hemlock / Wild lily-of-the-valley
SH4 Red spruce – White pine / Lambkill / Bracken
SH5 Red spruce – Balsam fir / Schreber's moss – Stair-step moss
SH5a Sphagnum variant
SH5b Balsam fir variant
SH6 White spruce – Balsam fir / Broom moss
SH7 White spruce – Red spruce / Blueberry / Schreber's moss
SH8 Balsam fir / Wood fern / Schreber's moss

Spruce Pine Forest Group

SP

VTs in the SP forest group occur on nutrient poor, fresh to moist, Acadian upland edaphic ecosites.

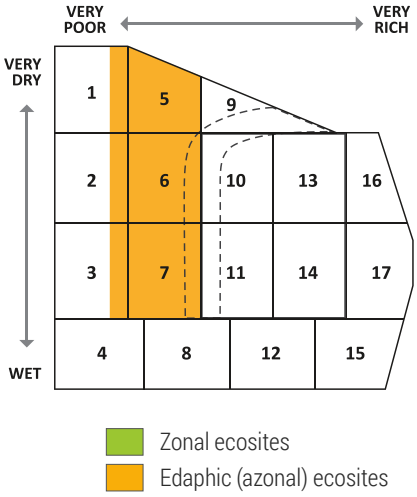
On transitional ecosites, red/black spruce hybridization can be expected. White spruce, hemlock and balsam fir may also occur on such sites.

Reduced tree cover and overall poorer tree growth is indicative of sites with poorer nutrient regimes.

Vegetation Types

Zonal ecosites: none

Edaphic ecosites: all

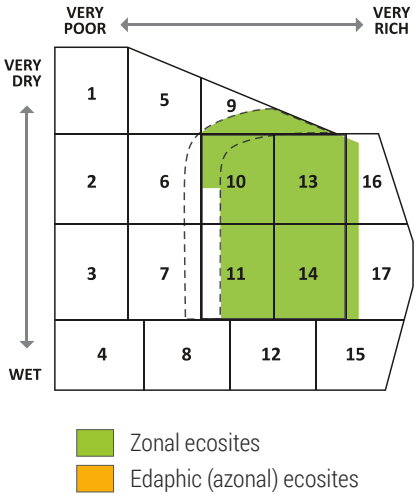


Spruce Pine Forests

SP1	Jack pine / Bracken – Teaberry
SP1a	Black spruce variant
SP2	Red pine / Blueberry / Bracken
SP2a	Black spruce variant
SP3	Red pine – White pine / Bracken – Mayflower
SP4	White pine / Blueberry / Bracken
SP4a	Black spruce variant
SP4b	Huckleberry variant
SP5	Black spruce / Feathermoss
SP6	Black spruce – Balsam fir / Blueberry
SP7	Black spruce / Lambkill – Wild raisin – Mountain holly
SP8	Black spruce – Hemlock / Bracken / Schreber's moss
SP9	Tamarack / Wild raisin / Schreber's moss
SP10	Black spruce – White spruce / Twinflower / Schreber's moss

Tolerant Hardwood Forest Group

TH



VTs in the TH forest group occur on nutrient medium to rich, fresh to moist Acadian upland zonal ecosites.

On relatively drier, nutrient poorer transitional ecosites, VTs are typically dominated by beech with reduced amounts of sugar maple and yellow birch.

The richest conditions in these upland Acadian ecosites are indicated by the presence of white ash and ironwood.

Vegetation Types

Zonal ecosites: all

Edaphic ecosites: none

Tolerant Hardwood Forests

TH1	Sugar maple / Wood fern – Hay-scented fern
TH1a	Yellow birch variant
TH2	Sugar maple / New York fern – Northern beech fern
TH2a	Yellow birch variant
TH3	Sugar maple – White ash / Christmas fern
TH4	Sugar maple – White ash / Silvery spleenwort – Baneberry
TH5	Beech / Sarsaparilla / Leaf litter
TH6	Red oak – Yellow birch / Striped maple / Partridge-berry
TH7	Yellow birch – White birch / Evergreen wood fern
TH8	Red maple – Yellow birch / Striped maple
TH8a	White ash variant
TH9	Red maple – Sugar maple / Hay-scented fern – Evergreen woodfern

Wet Coniferous Forest Group

WC

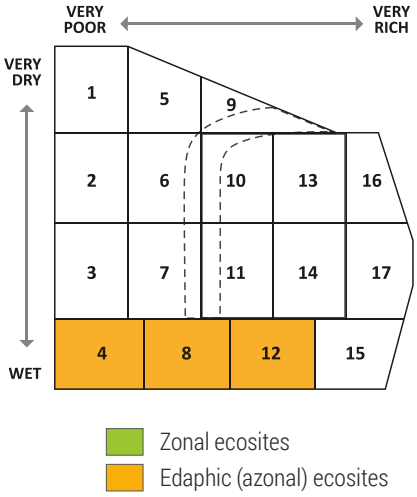
Moist/wet to wet, nutrient very poor to medium ecosites in the Acadian macrogroup support edaphic VTs of the Wet Coniferous forest group.

Stands are mainly associated with treed swamps but can also include more open treed bogs and fens.

Vegetation Types

Zonal ecosites: none

Edaphic ecosites: all

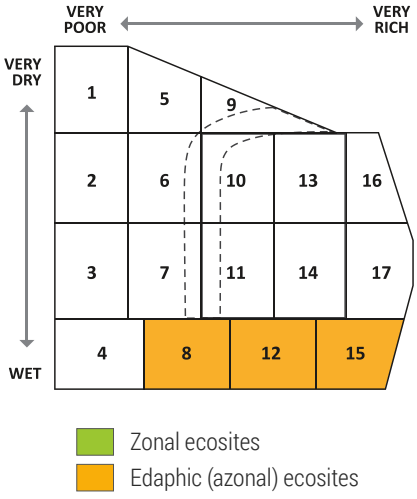


Wet Coniferous Forests

WC1	Black spruce / Cinnamon fern / Sphagnum
WC2	Black spruce / Lambkill – Labrador tea / Sphagnum
WC2a	Inkberry variant
WC3	Jack pine – Black spruce / Rhodora / Sphagnum
WC4	Red pine – Black spruce / Huckleberry – Rhodora / Sphagnum
WC5	Red spruce – Balsam fir / Cinnamon fern / Sphagnum
WC6	Balsam fir / Cinnamon fern – Three seeded sedge / Sphagnum
WC7	Tamarack – Black spruce / Lambkill / Sphagnum
WC7a	Inkberry variant
WC8	Hemlock / Cinnamon fern – Sensitive fern / Sphagnum
WC9	White spruce – Balsam fir / Lady fern / Prickly sphagnum
WC10	Eastern white cedar / Speckled alder / Cinnamon fern / Sphagnum
WC11	Black spruce Woodland Bogs

Wet Deciduous Forest Group

WD



VTs in the WD forest group occur on moist/wet to wet, nutrient poor to rich ecosites in the Acadian macrogroup.

Stands are mainly treed swamps dominated by red maple, with increasing occurrences of trembling aspen and/or white ash on richer sites.

Vegetation Types

Zonal ecosites: none

Edaphic ecosites: all

Wet Deciduous Forests

WD1 White ash / Sensitive fern – Lady fern

WD2 Red maple / Cinnamon fern / Sphagnum

WD3 Red maple / Sensitive fern – Lady fern / Sphagnum

WD4 Red maple / Poison ivy / Sphagnum

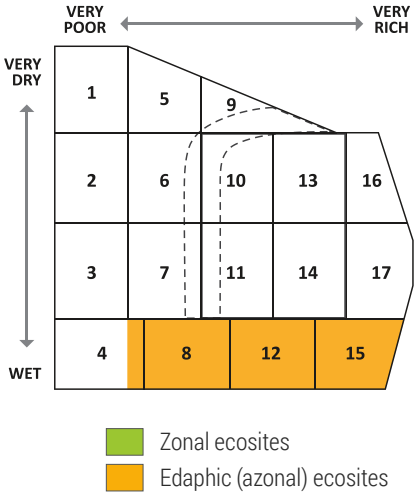
WD5 Trembling aspen / Beaked hazelnut / Interrupted fern / Sphagnum

Wet Mixedwood Forest Group

WM

VTs in the WM forest group occur on moist/wet to wet, nutrient poor to rich ecosites in the Acadian macrogroup.

Stands are mainly treed swamps with red maple and balsam fir as common constituents. With increasing fertility, species such as white ash and speckled alder often increase in abundance, while sites with lower fertility typically have increased cover of black spruce, lambkill and huckleberry.



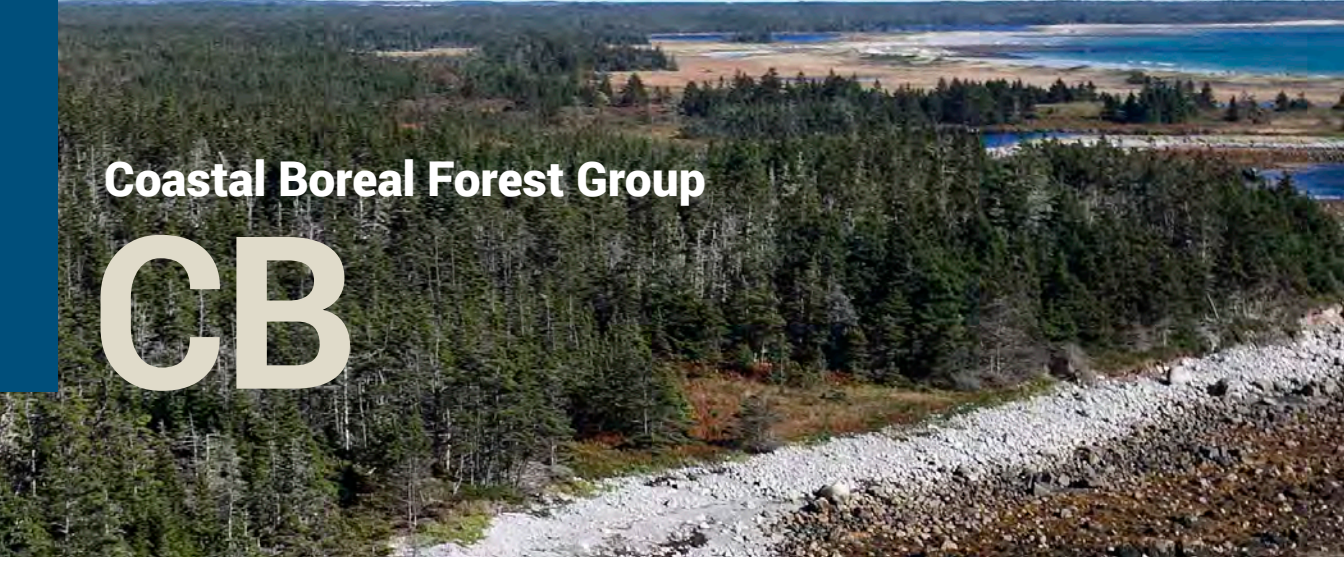
Vegetation Types

Zonal ecosites: none

Edaphic ecosites: all

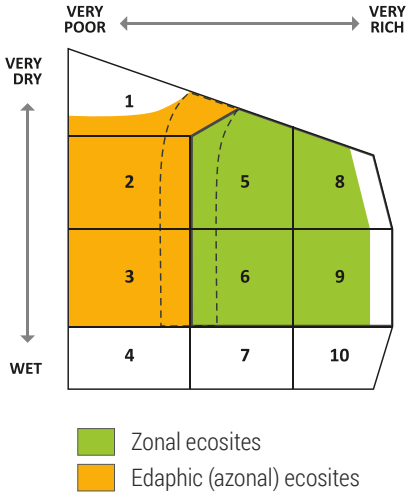
Wet Mixedwood Forests

WM1	Red maple – Balsam fir / Wood aster / Sphagnum
WM2	Red maple – Red spruce / Wood-sorrel – Sensitive fern
WM3	Red maple – Black spruce / Lambkill / Cinnamon fern / Sphagnum
WM3a	Red maple / Huckleberry – Inkberry / Sphagnum variant
WM4	White spruce – Yellow birch / Cinnamon fern – Dwarf raspberry
WM5	Ash / Alder-leaved buckthorn / Shaggy moss



Coastal Boreal Forest Group

CB



White spruce and balsam fir dominate on zonal ecosites whereas black spruce and balsam fir dominate on upland edaphic ecosites. Transitional ecosites are indicated by variable mixtures of black and white spruce.

White spruce has the ability to tolerate salt spray on exposed headland, beach dune and beach cobble edaphic ecosites creating unique ecosystems within the CB forest group.

Vegetation Types

Zonal ecosites: CB2, CB3, CB4

Edaphic ecosites: CB1, CB5, CB6

Coastal Boreal Forests

CB1 Black spruce – Balsam fir / Foxberry / Plume moss

CB2 White spruce – Balsam fir / Foxberry / Twinflower

CB2a Black crowberry Headland variant

CB3 Balsam fir / Foxberry – Twinflower

CB4 White birch – Balsam fir / Foxberry – Wood aster

CB5 White spruce / Bayberry / Beach pea Cobble Beach

CB6 White spruce / Bayberry / Beech grass Dune

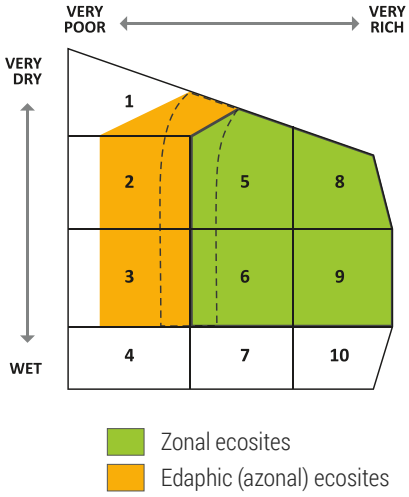
Maritime Boreal Macrogroup

Highland Forest Group

HL

White spruce and balsam fir dominate on zonal ecosites whereas black spruce and balsam fir dominate on upland edaphic ecosites. Transitional ecosites are indicated by mixtures of black and white spruce.

The richest VTs in this forest group (HL3, HL4) occur along a climatic transitional zone between the Acadian and Maritime Boreal macrogroups. This zone is typically found where the highland boreal plateau meets the upper slopes of the Acadian forest.



Vegetation Types

Zonal ecosites: HL1 – HL5

Edaphic ecosites: HL6, HL7

Highland Forests

HL1 Balsam fir / Mountain-ash / Large-leaved goldenrod

HL2 White spruce / Wood aster

HL3 Yellow birch – Balsam fir / Mountain wood fern – Wood-sorrel

HL4 Birch / Wood fern / Wood-sorrel

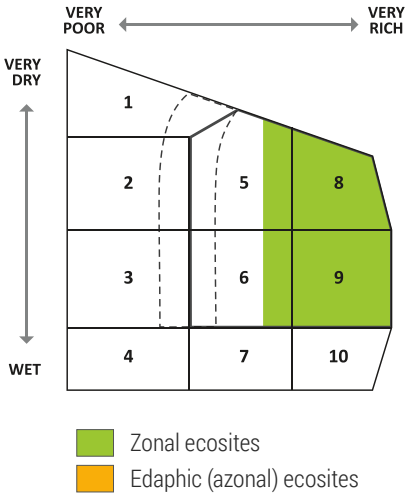
HL5 White birch (Heart-leaf birch) – Balsam fir / Wood fern – Wood-sorrel

HL6 Black spruce – Balsam fir / Mountain holly / Schreber's moss

HL7 Krummholz Balsam fir / Mountain holly / Bracken

Old Field Forest Group

OF



The occurrence of Old Field VTs on upland Maritime Boreal zonal ecosites is limited to the most fertile sites in this group.

Historically, sites selected for farmland along the Atlantic Coast were on deeper soils and somewhat sheltered from harsh climatic conditions.

Agricultural practices (soil amendments, drainage improvements, and tillage) often further improved nutrient and/or moisture regimes on these sites.

Vegetation Types

Zonal ecosites: OF1, OF2, OF4

Edaphic ecosites: none

Old Field Forests

OF1 White spruce / Aster – Goldenrod / Shaggy moss
OF2 Tamarack / Speckled alder / Rough goldenrod / Shaggy moss
OF4 Balsam fir – White spruce / Evergreen wood fern – Wood aster

Open Woodland Group

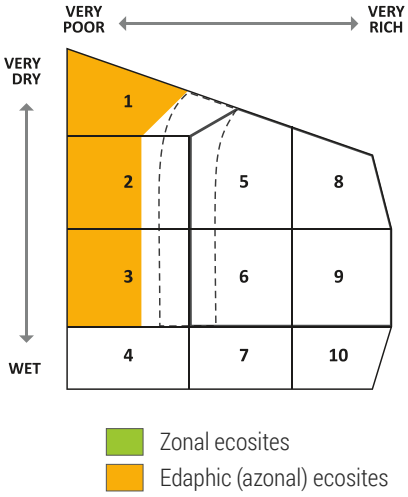
OW

These very poor, dry to moist Maritime Boreal edaphic ecosites additionally support two VTs more commonly found in the Acadian macrogroup.

Vegetation Types

Zonal ecosites: none

Edaphic ecosites: OW1, OW2

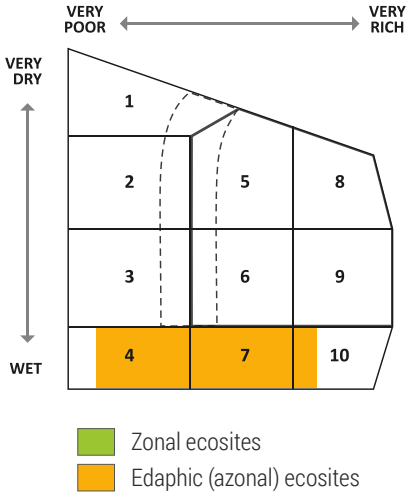


Open Woodland Forests

OW1 Jack pine / Huckleberry – Broom crowberry / Reindeer lichen
OW2 Black spruce / Lambkill / Reindeer lichen

Wet Boreal Forest Group

WB



VTs in the WB forest group occur on moist/wet to wet, nutrient poor to rich edaphic ecosites in the Maritime Boreal macrogroup.

Stands can be treed swamps, bogs, or fens dominated by black spruce, tamarack, and white spruce.

Vegetation Types

Zonal ecosites: none

Edaphic ecosites: all

Wet Boreal Forests

WB1 Black spruce / Mountain-ash / Foxberry / Sphagnum

WB2 White spruce – Balsam fir / Speckled alder / Blue joint

WB3 Black spruce / Creeping snowberry / Sphagnum

WB4 Tamarack / Labrador tea / Pitcher-plant

Wet Coniferous Forest Group

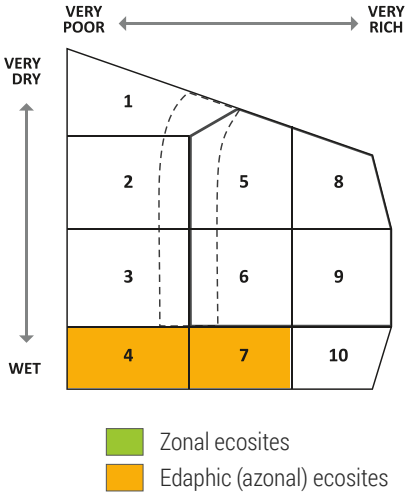
WC

Moist/wet to wet edaphic ecosites in the Maritime Boreal macrogroup additionally support four Wet Coniferous VTs that are more commonly found in the Acadian macrogroup. These stands are mainly treed swamps with partial to closed canopies of conifer species typical of the Maritime Boreal. More open treed bogs and fens are also included in this group.

Vegetation Types

Zonal ecosites: none

Edaphic ecosites: WC3, WC6, WC7, WC11



Wet Coniferous Forests

WC3	Jack pine – Black spruce / Rhodora / Sphagnum
WC6	Balsam fir / Cinnamon fern – Three seeded sedge / Sphagnum
WC7	Tamarack – Black spruce / Lambkill / Sphagnum
WC7a	Inkberry variant
WC11	Black spruce Woodland Bogs

Planted Forest Group

PF

In this classification, planted forests have not been assigned an edatopic position.

Naturally occurring forests reflect local climatic and site conditions. Planted forests are a human intervention (or artificial creation) that may not truly indicate these conditions.

Successional linkages can be assessed from remnant trees of previous stands, advanced regeneration, and other vegetation indicative of ecosite.

Planted Forests

PF1 In Situ Conifer Planted Forest
PF2 Ex Situ Conifer Planted Forest
PF3 Exotic Conifer Planted Forest
PF4 Christmas Tree Production Forest
PF5 Deciduous Planted Forest
PF6 Afforestation

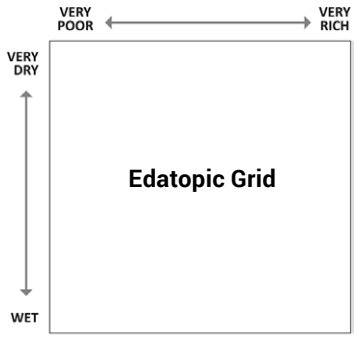
Appendices

Background

To produce an accurate FEC, field sampling must capture the full range of soil moisture and nutrient conditions expected within a region. Soil moisture regime (SMR) represents average moisture availability for plant growth. It is assessed by integrating moisture supply (as related to climate) with drainage and soil moisture holding capacities. In general, very dry to dry regimes are associated with severe to moderate moisture deficits, fresh to moist regimes are associated with little to no moisture deficits, and wet regimes are associated with excess moisture during the growing season.

Soil nutrient regime (SNR) represents the relative availability of nutrients for plant growth. Estimation of SNR requires consideration and integration of several features including soil texture, soil depth, soil parent material, humus form, and seepage class.

An edatopic grid is a two-dimensional diagram used to plot ecosystems (and subsequently ecosites) with respect to their relative moisture and nutrient regimes.



While a random sampling approach is desirable for statistical purposes, in the case of FEC it would be impossible to randomly sample enough plots to ensure the full range of SMR and SNR conditions was being captured. Instead, FEC requires a stratified sampling approach whereby landscapes are broken down into smaller sampling units based on features known to influence soil moisture and nutrient regimes.

Sampling Methods

For the FEC project, data and related outputs from earlier land classifications—namely *Biophysical Land Classification for Nova Scotia* (NSDLF 1986) and *Ecological Land Classification for Nova Scotia* (NSDNR 2001)—were used to help produce a field sampling scheme.

The province was first stratified by ecoregion to capture macro-climate influences on SMR and SNR. Secondary stratification was based on biophysical attributes assigned to ecodistricts and ecosections which include parent material/rock type (PM) and topographic pattern/landform (Topo). To reduce the number of PM/Topo combinations to a more manageable number, similar parent material types were grouped prior to stratification. The result was an initial matrix of 47 possible PM/Topo units (Table A1).

The areal extent of each PM/Topo unit within an ecoregion was used as a guide for determining a strategic sampling intensity within each unit. When a unit was wide-spread or large, sampling was distributed throughout the unit when feasible. Selection of potential sampling areas also considered forest cover type information, soil series information, and the presence of unique habitats or landforms (e.g. floodplains, rock outcrops, drumlins). Where there were significant changes in cover type or soil within a PM/Topo unit, or where there were unique areas identified, these were targeted for sampling. Finally, whenever possible, sampling was conducted along topographic gradients (slopes) to capture seepage influences on SMR and SNR.

Once a potential sampling area was chosen, possible sample sites were identified on aerial photos and all relevant background data collected before visiting the site. Final sample locations were determined in the field based on stand and site conditions found. Stands that were relatively mature, i.e. greater than 40 years old, were preferred. After deciding to establish a measurement plot in the field, that plot was placed in an area that best represented overall stand and site conditions found.

A comprehensive plot assessment protocol was followed to acquire data for FEC development. This included systematic assessment of stand, tree, ground vegetation, site, and soil characteristics.

TABLE A1.
Parent material / topographic landform (PM/Topo) units derived for FEC strategic sampling

PM/Topo Unit	PM/Topo Unit
SIM Acid Ridged Complex	Basic Ign Ridged Complex
SIM Acid Gentle Slopes Complex	Basic Ign Gentle Slopes Complex
SIM Acid Drumlinoid Complex	Basic Ign Drumlinoid Complex
SIM Acid Dissected Complex	Basic Ign Dissected Complex
SIM Acid Smooth Topography	Basic Ign Smooth Topography
Acid/SS Ridged Complex	Basic Ign/SS Gentle Slopes Complex
Acid/SS Gentle Slopes Complex	Basic Ign/SS Drumlinoid Complex
Acid/SS Drumlinoid Complex	Basic Ign/SS Dissected Complex
Acid/SS Dissected Complex	Basic Ign/SS Smooth Topography
Acid/SS Smooth Topography	Lime/Gyp Ridged Complex
Shales/Slate Ridged Complex	Lime/Gyp Gentle Slopes Complex
Shales/Slate Gentle Slopes Complex	Lime/Gyp Dissected Complex
Shales/Slate Drumlinoid Complex	Lime/Gyp Smooth Topography
Shales/Slate Dissected Complex	Lime/Gyp Karst Topography
Shales/Slate Smooth Topography	Misc. Karst Topography
Medium Ign Ridged Complex	Lime/Gyp/SS Ridged Complex
Medium Ign Gentle Slopes Complex	Lime/Gyp/SS Gentle Slopes Complex
Medium Ign Drumlinoid Complex	Lime/Gyp/SS Dissected Complex
Medium Ign Dissected Complex	Lime/Gyp/SS Smooth Topography
Medium Ign Smooth Topography	Lime/Gyp/SS Karst Topography
Medium Ign/SS Gentle Slopes Complex	Marble Gentle Slopes Complex
Medium Ign/SS Drumlinoid Complex	Marble Drumlinoid Complex
Medium Ign/SS Dissected Complex	Marble Smooth Topography
Medium Ign/SS Smooth Topography	

SIM = Sedimentary, Igneous, Metamorphic; SS = Shales and Slates; Ign = Igneous; Lime = Limestone, Gyp = Gypsum

Stand assessments and tree measurements were conducted based on observation and use of mensuration equipment (prism, calipers, clinometer, increment borer, 30 m tapes). Data collected or derived included:

- All living trees recorded by species, canopy class, and diameter class (2 cm)
- Calculation of basal area and percent cover (based on prism sweep data)
- All dead standing trees (snags) recorded by type (softwood, hardwood) and size class
- Coarse woody material (CWM) recorded by type and diameter class (5 cm) (along the 40 m plot boundary)
- Height and age of at least three living co-dominant trees (for site productivity assessment)
- Disturbance/origin of current stand
- Successional stage of stand

For characterizing vegetation, a 10 m x 10 m plot was laid out. Every species, excluding fungi and arboreal lichens, within the plot was then identified and assessed for percent cover by layer (tree layer, shrub layer, herb layer, and bryophyte-lichen-liverwort layer).

Soils were assessed by first digging a soil pit to a depth of 60–100 cm (or to a restricting layer) in an area representative of the plot/stand being assessed. Soil and site assessments were mainly based on *The Canadian Soil Information System (CanSIS) Manual for Describing Soils in the Field* (Expert Committee on Soil Survey 1983), *The Canadian System of Soil Classification* (Soil Classification Working Group 1998), and *Towards a Taxonomic Classification of Humus Forms* (Green et al. 1993). Features assessed are listed in Table A2.

TABLE A2.
Site and soil information collected from FEC sample plots

Site Data	Soil Data
Location	Organic horizon:
GPS coordinates (UTM)	Type and thickness
Elevation (from GPS)	Fine root occurrence
ELC units (from Neily et al. 2001)	Mineral soil horizon:
Exposure class	Type and thickness
Old field (Y/N)	Texture and particle size class
Rock outcrop class and type	Coarse fragment content and type
Surface stoniness class and type	Fine root occurrence
Microtopography class	Colour and Consistence
Slope position	Redox feature description
Slope percent and length	Rooting depth (actual and potential)
Aspect (degrees)	Rooting restrictions
Seepage class	Parent material type
Drainage class	Humus form classification
Charcoal present (Y/N)	Soil classification
Photographs	Soil series unit (mapped and found)

In addition to data collection, an estimate of edatopic grid position for each plot was made based on a synthesis of vegetation, soil and site data; as well as in relation to plots sampled in other PM/topo units. This was done to facilitate later analysis and interpretation of province-wide plot data.

Table A3 lists soil and site features used to estimate SMR in the field (modified from Meades and Moores 1994), while Figure A1 was used as a guide for assigning SNR (modified from Beckingham and Archibald 1996).

The presence of indicator plants, soil parent material type, and knowledge of coarse fragment mineralogy were also used in assessing SNR.

The protocols outlined above were followed for most of the 1,456 FEC plots sampled between 2000 and 2010 (i.e. for production of the first provincial FEC guide). Sampling after 2010 focused mainly on acquiring additional data for under-sampled or new vegetation types, with additional soil data collected when needed.

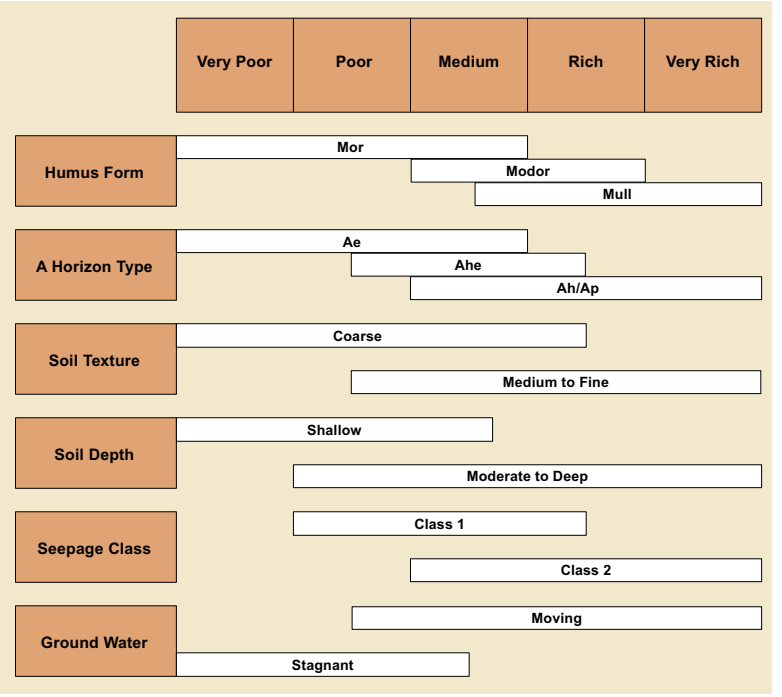
TABLE A3.
Soil moisture regime (SMR) as a function of site and soil conditions
(modified from Meades and Moores 1994)

Moisture Regime	General Site and Soil Features
Very Dry	Rapidly drained, coarse textured and/or shallow soils not influenced by ground water or seepage.
Dry	Deeper, well drained, coarse textured soils not influenced by ground water or seepage; and shallow soils not rapidly drained or influenced by ground water or seepage.
Fresh	Deeper, well drained, medium to fine textured soils; moderately well drained coarse textured soils; or well drained coarse textured soils influenced by ground water.
Fresh/Moist	Deeper, moderately well drained, medium to fine textured soils often with some evidence of anaerobic (reducing) conditions in lower BC and C horizons.
Moist	Soils with imperfect drainage, but with surface soil still well aerated during most of the growing season. Evidence of anaerobic (reducing) conditions in upper B horizons.
Moist/Wet	Poorly drained soils with water levels near the surface for most of the year, but with well aerated surface conditions during dry periods.
Wet	Very poorly drained soils with water levels near the surface for most of the year – often associated with wetland organic soils.

FIGURE A1.

Soil nutrient regime as a function of site and soil conditions

(modified from Beckingham and Archibald 1996)



Data Analysis

Vegetation Types (VTs) and related Forest Groups were derived using dedicated statistical software (TWINSPAN – Hill 1979) as informed by expert opinion. TWINSPAN (Two-Way INdicator Species ANalysis) is a method for hierarchical division of communities based on correspondence analysis of community composition (sites x species).

Soil types and phases were differentiated by features of known ecological and management related significance, as informed by interpretation of field data and expert opinion:

- Thickness and type of organic horizons (organic vs. mineral soil)
- Mineral soil depth (shallow vs. non-shallow soil)
- Presence of organically enriched surface horizons (richer vs. typic conditions)
- Dominant soil texture (coarse vs. fine soil, loamy phase, coarse phase)
- Soil/site drainage class (related to moisture regime)
- Excessive stoniness above or below the surface (boulder phase and stony phase)

Ecosites were derived based on interpretation of SMR and SNR field calls, as informed by analysis of tree height and age (land capability) data and expert opinion.

Ecological and forest management related terms found in this guide are defined below. References are given where definitions (or portions thereof) have been taken directly from other sources.

A

A horizon – a mineral soil horizon formed at or near the surface of the soil, generally immediately beneath the forest floor. It is usually formed by (derived from SCWG 1998):

- leaching or loss of iron and aluminum, clay and organic matter to form an **Ae horizon**,
- by natural accumulation of partially decomposed organic matter to form an **Ah horizon**,
- a combination of leaching and natural organic matter accumulation to form an **Ahe horizon**,
- incorporation of organic matter through human disturbance to form an **Ap horizon**, or
- additional influence of prolonged anaerobic conditions to form an **Aeg**, **Ahg**, **Aheg** or **Apg horizon**

Advanced regeneration – trees of variable age found in the understory shrub layer, which are in a position to grow into the canopy when overstory competition has been removed by disturbance or natural mortality

Aeolian – see Parent material

Aeration porosity – in soils, pore space mainly associated with gas exchange

Alluvium – see Parent material

Anaerobic (reducing) conditions – in microbially-active soils, a condition where oxygen is absent or in very low concentrations for a prolonged period usually due to water saturation

Aspect – the direction of a downhill slope expressed in degrees or as a compass point

Azonal ecosite– the opposite of zonal. Also see Edaphic

B

B horizon – a mineral soil horizon characterized by enrichment of material lost from the A horizon above and/or through transformations (chemical reactions) within the horizon itself (derived from SCWG 1998)

BC horizon – a transition soil horizon between the B horizon and C horizon, which has features of both (derived from SCWG 1998)

Bedrock – solid rock that underlies gravel, soil, or other surficial material (AGI 1984). Also, see Parent material

Bog – a type of wetland characterized by peat accumulation and virtually unaffected by runoff waters or ground water from surrounding mineral soils (NWWG 1997)

Boulder phase – see Soil Type Phases, pages 7–8. Boulders are rocks greater than 60 cm in diameter.

Bryophytes – mosses, hornworts and liverworts

C

C horizon – a mineral soil horizon relatively unaffected by the formation processes active in the A and B horizons above (derived from SCWG 1998)

Calciphytes – a plant that thrives in gypsum soil (calcareous habitat)

Canopy – the uppermost continuous layer of branches and foliage in a stand of trees

Cemented – soils having a very hard or firm consistency because particles are held together by cementing substances such as iron and aluminum oxides, iron-aluminum-organic complexes, or calcium carbonate

Climatic climax forest – see Zonal climax forest

Climax community – a relatively stable and self-perpetuating community condition, which maintains itself (more or less) until stand-level disturbance causes a return to an earlier successional stage

Coarse woody material (CWM) – in this guide, dead wood larger than 7.5 cm in diameter and lying horizontally at 45 degrees or less

Co-dominant – see Crown class

Coarse phase – see Soil Type Phases, pages 7–8.

Colluvium – see Parent material

Coniferous – typically evergreen tree species, bearing cones, and having needle-shaped or scale-like leaves. Larch is a coniferous species but is not evergreen.

Covertype – refers to the relative percentage of softwood versus hardwood species in the overstory of a stand. In this guide, covertype classes are:

Softwood: overstory coverage of softwood species is 75% or more

Hardwood: overstory coverage of hardwood species is 75% or more

Mixedwood: overstory coverage of softwood and hardwood species is between 25% and 75%

Crown class – refers to groups of trees in a forest with crowns of similar development and occupying a similar position in the canopy (Dunster and Dunster 1996). Three crown classes are defined:

Dominant: defines trees with crowns extending above the general level of the main canopy, receiving full light from above and partial light from the sides

Co-dominant: defines trees with crowns forming the general level of the main canopy, receiving full light from above and comparatively little light from the sides

Intermediate: defines trees with crowns extending into the lower portion of the main canopy, but shorter in height than co-dominants. These trees receive little direct light from above and none from the sides.

D

Deciduous – typically refers to broad-leaved tree species whose leaves are not persistent and fall off at the end of the growing season. Larch, a coniferous species, is deciduous.

Disturbance – a discreet force that causes significant change in structure and/or composition of a forest (Dunster and Dunster 1996). Also see Natural disturbance

Dominant – 1) In forest stand canopy position, see Crown class; 2) When describing cover class greater than 50%

Drainage class – reflects the length of time it takes water to be removed from a soil in relation to supply. The six drainage classes used in this guide (adapted from ECSS 1982) are found on page 16–17

Drumlin – a low, smoothly rounded, elongate hill of compact glacial till built under the margin of the ice and shaped by its flow. Its long axis is parallel to the direction of ice movement. (AGI 1984)

E

Ecodistrict – a subdivision of ecoregion and the third level within the Nova Scotia ecological land classification system. It is based on distinct assemblages of relief, geology and landform.

Ecological land classification – a classification of lands from an ecological perspective based on factors such as climate, physiography and site conditions. It is a framework used to delineate ecosystems at different landscape scales and includes five levels: **ecozone**, **ecoregion**, **ecodistrict**, **ecosection** and **ecosite**.

Ecoregion – the second level in the Nova Scotia ecological land classification system used to characterize a distinctive regional climate as expressed by vegetation. There are nine ecoregions identified in Nova Scotia.

Ecosite – a unit which represent ecosystems that have developed under a variety of conditions and influences, but which have similar moisture and nutrient regimes. Ecosite is found in both the landscape-level ecological land classification and the stand-level forest ecosystem classification systems.

Edaphic – refers to the influence of soil and site conditions on plant growth. In this guide, edaphic is used to express the dominance of site over climate in vegetation development

Edaphic climax forest – results when a forest community cannot progress to the zonal climax due to local extremes in site conditions

Edatopic grid – a two-dimensional diagram used to plot ecosystems (and subsequently ecosites) with respect to their relative moisture and nutrient regimes

Ericaceous – plants in or related to the heath family (*Ericaceae*) usually found on acidic (nutrient poor) soils including *Kalmia spp.*, *Vaccinium spp.* and *Rhododendron spp.* (Dunster and Dunster 1996)

Even-aged – describes a forest, stand, or vegetation type in which relatively small age differences exist between individual trees

Exposure (exposure class) – the relative openness of a site to weather conditions, particularly wind and sun. Commonly used classes include **sheltered**, **moderately sheltered**, **moderate**, **moderately exposed**, and **exposed**. Refer to page 32

F

Fen – a nutrient-poor to rich wetland type that obtains water from both precipitation and surface or ground water flow. Fens develop on 40 or more cm of accumulated peat.

Fluvial – a general term to describe stream or river processes that involve the transport and deposition of sediment (Dunster and Dunster 1996). When used in this guide, fluvial refers to all flowing water deposits regardless of age or time since deposition.

Floodplain – an area adjacent to a stream or river, consisting of alluvial sediments, that is periodically inundated during periods of high stream flow (Cauboue et al. 1996)

Forest – in this guide, sites that can (and normally do) support a minimum of 30% crown closure by trees

Forest floor – a general term encompassing the layer of organic matter (leaves, twigs and plant remains in various stages of decomposition) lying on top of the mineral soil (Dunster and Dunster 1996). Often referred to as the **duff layer**.

G

Gap disturbance – natural disturbances are characterized by gap and small-patch mortality, followed by understory recruitment, resulting in stands with multiple age classes. This generally leads to the establishment and/or perpetuation of late-successional vegetation types.

Glacial till – see Parent material

Glaciofluvial – see Parent material

Gleyed – a soil condition achieved when soils are under water saturation and prolonged anaerobic conditions. It is a condition generally associated with high water tables or saturation over a relatively impermeable layer (Cauboue et al. 1996). Gleyed is an older term replaced by **redoximorphic** features (**redox** features) in more current literature

Graminoid – grasses (*Poaceae* family) and grass-like plants such as sedges (*Carex spp.*) and rushes (*Juncus spp.*).

Ground water – that part of subsurface water that is in the zone of saturation, including underground streams (AGI 1984).

H

Hardwood – see Covertype

Humus form – a system for describing and classifying organic (forest floor) horizons. See Figure S11. on page 26. Common humus forms include (derived from Green et al. 1993):

Mor: organic horizons (generally derived from acidic plant material) which have decomposition and horizon features dominated by fungal processes. There is no mixing of organic material into surface mineral soil.

Moder: similar to mor humus forms in appearance, but more zoologically active (less fungi). There is only minor (if any) mixing of organic material into surface mineral soil.

Mull: humus form with high zoological activity characterized by significant incorporation of humus into surface mineral soil forming an Ah horizon

Hybrid spruce – in Nova Scotia, a natural cross between red spruce and black spruce, displaying features of both

I

Intermediate – in reference to shade tolerance, a condition between intolerant and tolerant (also, see Crown class)

Intolerant – refers to shade tolerance and defines a condition whereby trees are not capable of successfully growing beneath the shading canopy of other or similar species

K

Karst – surface and subsurface features created by the dissolving of soluble rock such as limestone and gypsum, which results in features such as caverns and sinkholes (Cauboue et al. 1996). In the Nova Scotia FEC, karst sites are limited to those that have gypsum or limestone bedrock exposures in addition to sinkholes and/or caverns.

L

Lacustrine – see Parent material

Landscape – an expanse of land with landforms, land cover, habitats, and natural features which are repeated in similar form, and that taken together, form a composite (Dunster and Dunster 1996)

Layering – a form of vegetative reproduction where a branch buried in the forest floor develops roots and becomes independent of the parent tree (Dunster and Dunster 1996)

Loamy phase – see Soil Type Phases, pages 7–8.

M

Mafic – referring to igneous rock composed chiefly of dark, ferromagnesian minerals (AGI 1984) (i.e. basalt and gabbro)

Marine – see Parent material

Matrix forest – a widespread forest community that dominates the landscape and forms the background in which other smaller-scale communities occur (Thompson 2002).

Microtopography – refers to the expression of mound and pit surface terrain within a forest stand, the main cause being the uprooting and subsequent decay of trees. Microtopography classes are defined on page 33.

Mixedwood – see Covertype

Moder – see Humus form

Moisture regime – represents average moisture in the soil available for plant growth. It is assessed by integrating moisture supply (as related to climate) with soil drainage and moisture holding capacities.

Mor – see Humus form

Mull – see Humus form

N

Natural disturbance – a natural force that causes significant change in forest stand structure and/or composition, such as fire, wind, flood, insect damage or disease. A natural disturbance regime is the frequency and type of natural disturbances that influence the arrangement of forested ecosystems and their biodiversity on a given landscape.

Nutrient regime – represents the relative availability of nutrients in the soil for plant growth. Determination of nutrient regime requires consideration and integration of several environmental features, including forest floor humus form, soil type, seepage class, and ground water characteristics.

O

Open woodland – upland sites where natural disturbances (e.g. frequent fires) and/or site conditions (e.g. sandy soils, excessive surface stoniness, bedrock exposures) generally limit the establishment of trees to less than 30% crown closure

Organic – a substance derived from living organisms or their products (Dunster and Dunster 1996). Also see Parent material.

Organic/Bedrock – see Parent material

Overstory – refers to trees that occupy the dominant, co-dominant and intermediate canopy positions (also, see Crown class)

P

Parent material – the unconsolidated and more or less chemically unweathered material from which a soil develops by soil formation (pedogenic) processes (Cauboue et al. 1996). Parent material types found in Nova Scotia are found on page 29 (adapted from ECSS 1982)

Particle Size Class – see page 13

Percent cover – the vertical projection of tree crown or plant shoot area as a percentage of stand area (Dunster and Dunster, 1996)

R

Redoximorphic features – visible evidence of chemical (redox) reactions in microbially active soils under prolonged anaerobic conditions (Richardson and Vepraskas 2001)

Riparian – refers to terrain, vegetation, or simply position adjacent to, or associated with, a stream, floodplain, or standing water body (Cauboue et al. 1996)

Rockiness – describes sites with bedrock exposure. Refer to page 31

S

Seepage – in this guide, all lateral subsurface water flow (includes precipitation and spring sources)

Senescence – generally, the process of aging in mature individuals (trees), typical toward the end of an organism's life (Dunster and Dunster 1996)

Sinkhole – a funnel-shaped depression common in karst topography caused by the dissolving of underlying limestone or gypsum bedrock

Slope Gradient – the percentage of vertical rise relative to horizontal distance. Zero percent slope describes a level site and 100% slope equates to a 45 degree angle. Slope gradient is defined on page 32.

Slope Position – describes the relative topographic position of a site within the landscape. Slope position is described and illustrated on page 30.

Softwood – see Covertype

Soil texture – the percentage of sand, silt and clay in a soil. In general, fine textured soils are relatively high in clay, medium textured soils are relatively high in silt, and coarse textured soils are relatively high in sand

Soil Type Hazard Ratings – **Low (L)** minor risk of damage or negative impacts under normal operating conditions; **Moderate (M)** exercise caution as there is potential for some damage or negative impacts under normal operating conditions; **High (H)** potential for significant damage or negative impacts under normal operating conditions; **Very High (VH)** potential for severe damage or negative impacts under normal operating conditions

Stand – in the case of forests, a group of trees in a specific area that are sufficiently uniform in composition, age, arrangement and condition to be distinguishable from adjacent forest areas (Dunster and Dunster 1996)

Stoniness – see Surface Stoniness, page 31

Stony Phase – see Soil Type Phases, pages 7–8

Successional dynamics – an orderly process of community development that involves changes in species structure and community processes with time; it is reasonably directional and, therefore, predictable (Odum 1971). A number of distinct successional stages (e.g. early, middle, late) replace one another in a predictable sequence.

Super canopy – a canopy position above the normal overstory/canopy layer

Swamp – a treed or tall shrub dominated wetland that is influenced by ground water, either on mineral or organic soils (NWWG 1997).

T

Talus – a form of colluvium deposit, characterized by excessive surface stoniness, usually found at the base of steep slopes or cliffs (Dunster and Dunster 1996)

Till/Bedrock – see Parent material

Tolerant – refers to shade tolerance and defines a condition whereby trees are capable of successful growth and reproduction beneath the shading canopy of other or similar species.

Transitional ecosites – those sites that exhibit characteristics of two closely related ecosites as a result of soil nutrient and/or soil moisture regimes

U

Understory – refers to vegetation growing below the overstory, grouped into three categories:

Shrub layer: woody stemmed species and regenerating trees usually less than 2 m in height, but occasionally taller

Herb layer: dwarf woody plants plus ferns, club mosses and other herbaceous plants

Bryophytes and Lichens: mosses, hornworts, liverworts and lichens

Uneven-aged – describes a forest, stand, or vegetation type in which intermingling trees differ markedly in age

Upland – an area that is not a wetland

Upland Phase – see Soil Type Phases, pages 7–8

W

Wave forest – a wave-like pattern of dead and living trees found on highly exposed sites and created by wind damage and subsequent mortality

Windthrow – a disturbance where a tree (or trees) has been uprooted by the wind. Over time, windthrow leads to the development of mound and pit microtopography. Windthrow is synonymous with blowdown.

Woodland – see Open woodland

Z

Zonal climax forest – results when a forest community reflects regional climate norms and is not unduly affected by local extremes in site conditions

Zonal site – in this guide, a site with conditions that could potentially support establishment of a zonal climax forest

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