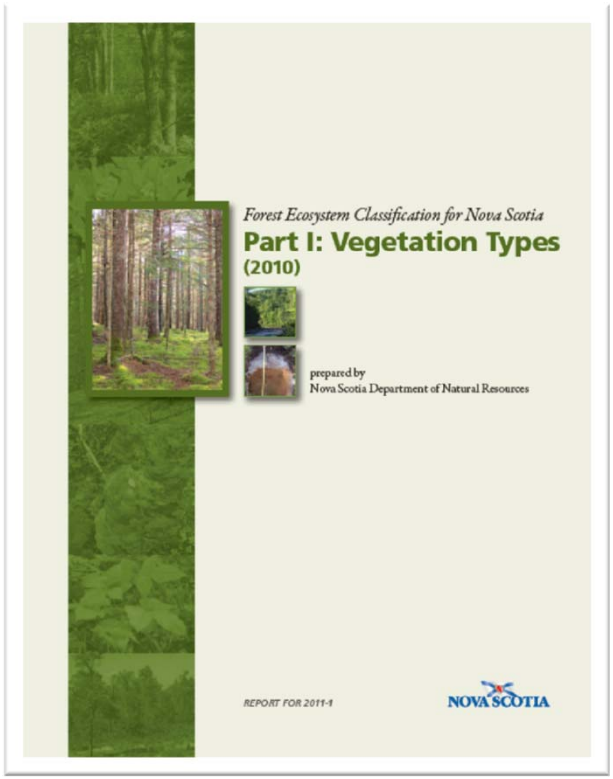
An Introduction to Vegetation Types

Open File Report Ext 2012 - 2

An Introduction to Vegetation Types

How to use Nova Scotia's new Forest Ecosystem Classification manual to identify vegetation types, and use this information to help manage your forested land.

In this presentation we will provide an overview of Part I of the Forest Ecosystem Classification manual for Nova Scotia, which is devoted to vegetation types.



Introducing Forest Groups & Vegetation Types

What are vegetation types? What are forest groups? How can they help you manage your woodlot?

The term *vegetation type* (VT) refers to communities of plants that are typically found together in areas with similar characteristics.

The Nova Scotia Department of Natural Resources has identified 88 vegetation types in Nova Scotia.

Each vegetation type belongs to one of 14 forest groups. Each of these forest groups is referred to by two capital letters, such as *HL* for *Highland Forest Group* or *WC* for *Wet Coniferous Forest Group*.

A forest group will have several vegetation types associated with it. Some forest groups have as few as two vegetation types associated with them, but some have as many as 10.

Vegetation types are designated with a number following the letters indicating the forest group.

This photo shows a vegetation type designated **HL1**. The *HL* tells us that this is part of the **Highland Forest Group**. The *1* tells us that this is a vegetation type characterized by the presence of Balsam fir, Mountain-ash and large-leaved goldenrod. HL1 is the dominant vegetation type in the Cape Breton Highlands.

Some vegetation types have *variants*. These are variations from the typical species or site features of this particular vegetation type. The differences in species presence or cover can be of management-related significance, but they are not so significant that the variant should be considered a different vegetation type.

When present, variants are indicated by a lower case letter. So for instance HL1a is a variant of the vegetation type we just viewed.

Knowing what vegetation types are present on a woodlot provides clues on topics that can be very useful in forest management:

- Soils.
- Moisture (water).
- What might happen to this forest over time.
- What plants might be able to grow here.
- What types of animals might be able to live here.

In order to identify a vegetation type:

- Identify plants present on the woodlot.
- Collect other information, such as location, if needed.
- Use the *forest group key* to identify the forest group.
- Use the *vegetation type key* for that forest group to identify the vegetation type.
- Check the fact sheet for that forest group and vegetation type in order to confirm your identification.

Plant Identification

What are the different types of plants and which ones should be identified? How do you do this?

Forest plants are classified either as:

- Vegetation found in the top layers of the forest (the *overstory*) or
- Vegetation found on the lower levels (the *understory*). This is also referred to as *ground vegetation.*

Overstory vegetation consists of trees in the uppermost continuous layer of branches and foliage (the *canopy*), such as this hemlock. Trees are classified as either *softwoods* or *hardwoods*.

The understory may include a variety of plant types, including shrubs such as witch hazel or Labrador tea …

Witch hazel

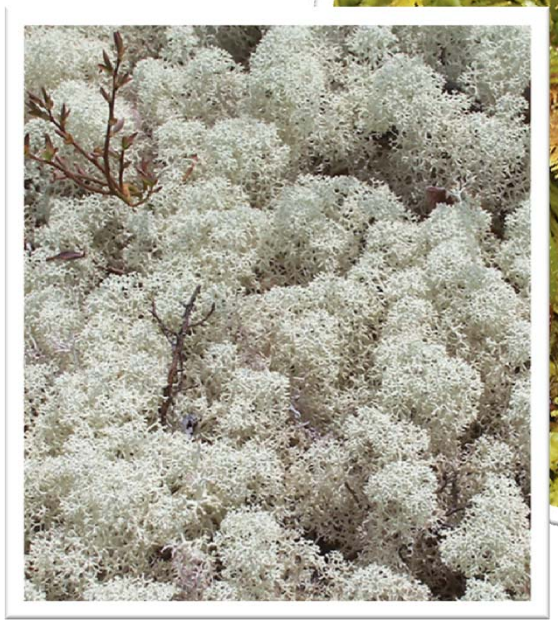
Labrador tea

Herbaceous plants, including wildflowers, ferns, club mosses and dwarf woody plants …

Dog tooth violet

Cinnamon fern

And *bryophytes* (including mosses and liverworts) and *lichens*.



Reindeer lichen

Plume moss

A general reference work such as the Wikipedia will explain the differences between these plant types and can also be used to look up any unfamiliar terms.

http://en.wikipedia.org/

To determine what trees are present on a woodlot, it may be helpful to:

- Conduct a forest inventory or hire a professional to do one for you.
- Use pictures in the Vegetation Types manual.
- Use guides that are available both online and in print.

There is an interactive guide to trees at the NSDNR website.

http://www.gov.ns.ca/natr/forestry/treeid/

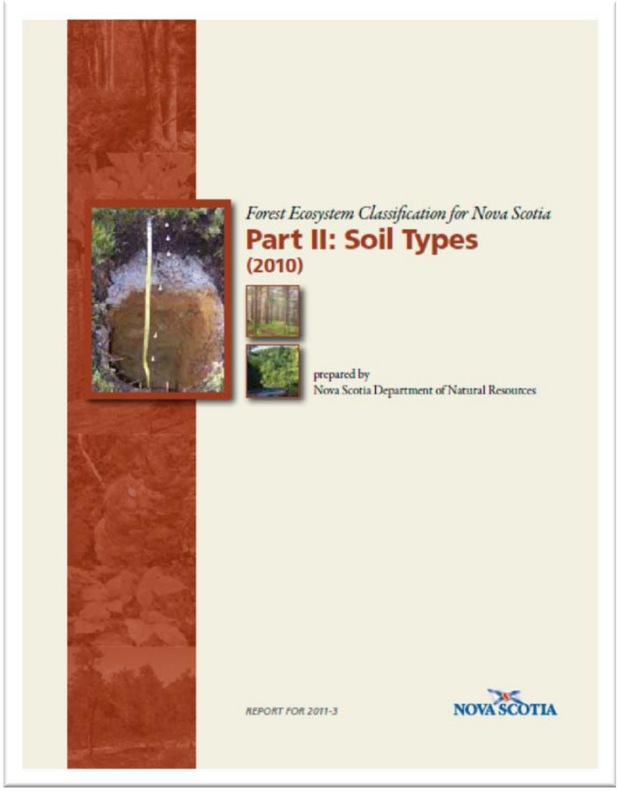
These materials will tell you not only what species the tree is but also whether it is considered a hardwood or a softwood.

To determine what understory plants are present on a woodlot, it may be helpful to:

- Use photos in the Vegetation Types manual.
- Use one of the guides available in print and online.

When identifying plants, it can be helpful to determine the soil type or types present on the woodlot. This tells you what plants are likely to be able to grow in the soils found on this site. With that information, identification often becomes much easier.

Though we discuss them separately in this presentation, the Vegetation Types and Soil Types parts of the FEC Manual are meant to be used together.



Additional Information

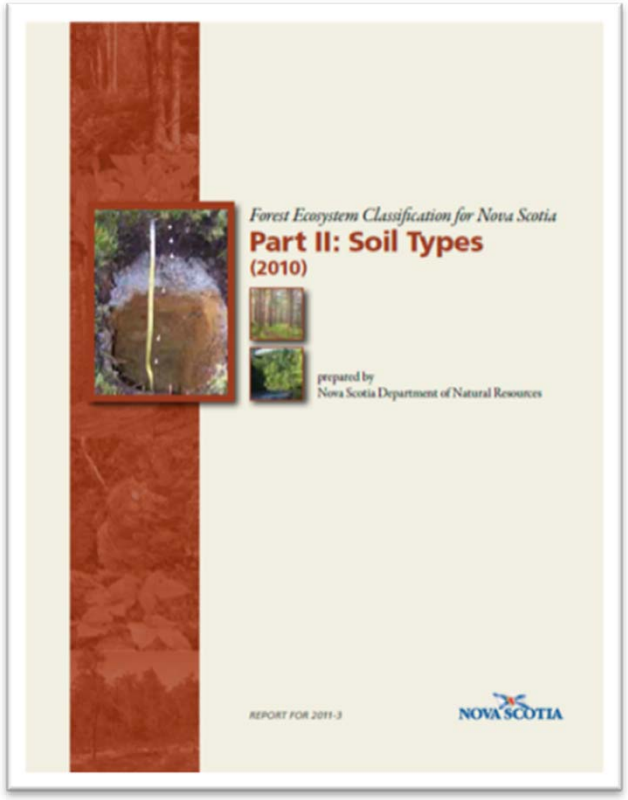
What other information will you need in order to identify forest group and vegetation type?

In order to identify forest groups and vegetation types, you may need some specialized knowledge. However, you will not need all of this information in order to identify all vegetation types.

What follows is a quick summary of information that *might* be needed in order to identify a forest group or vegetation type.

In most case, if you need this information, either the Vegetation Types or the Soil Types manual will help you find out what you need to know.

For example, for some identifications you may need to refer to the Soil Types manual to get information on your soil.



In other circumstances, you may need to be able to recognize stands with more than 75% softwood or less than 25% softwood in the overstory.

It may also be necessary to assess *tree cover* and *ground vegetation cover* .

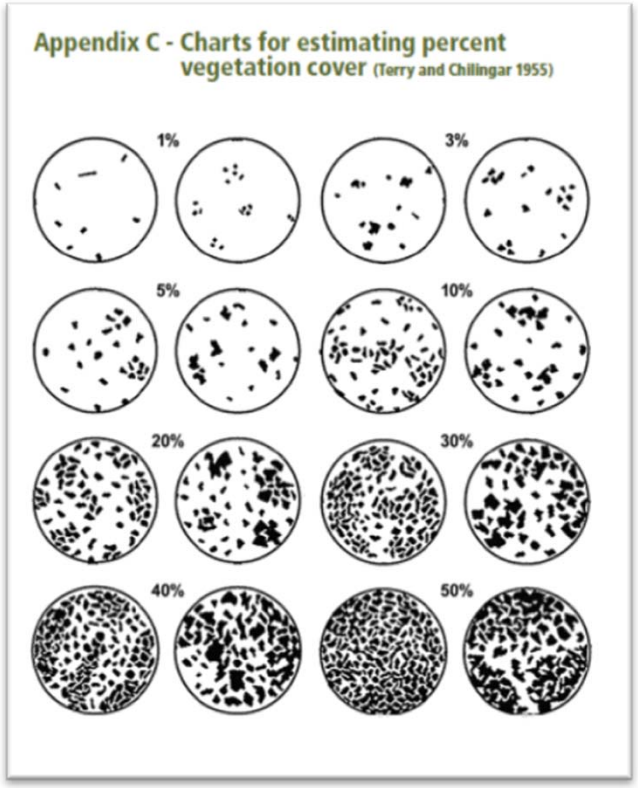
- *Tree cover* refers to the percentage of total overstory cover.
- *Ground vegetation cover* refers to the percentage of total area on the ground.

The cover classes that may need to be assessed are:

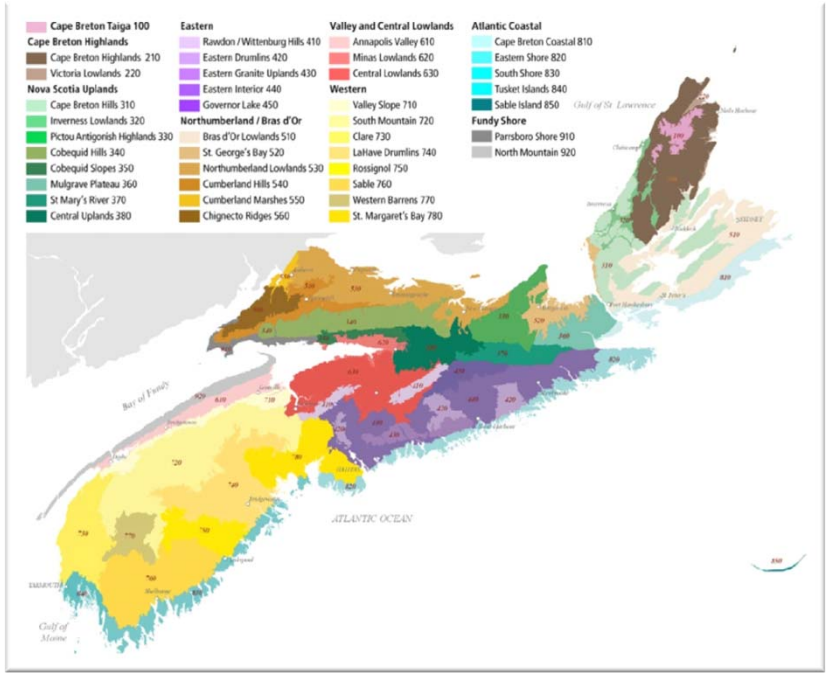
- *Sparse*: Less than 10%
- *Scattered*: 10-25%
- *Abundant*: 26-50%
- *Dominant*: More than 50%

Keep in mind that these terms are applied differently when assessing tree cover (percentage of total overstory cover) and ground vegetation cover (percentage of total area on the ground).

There is an appendix in the Vegetation Types manual that shows you how to estimate the percentage of vegetation cover. This drawing works best for assessing ground vegetation cover.

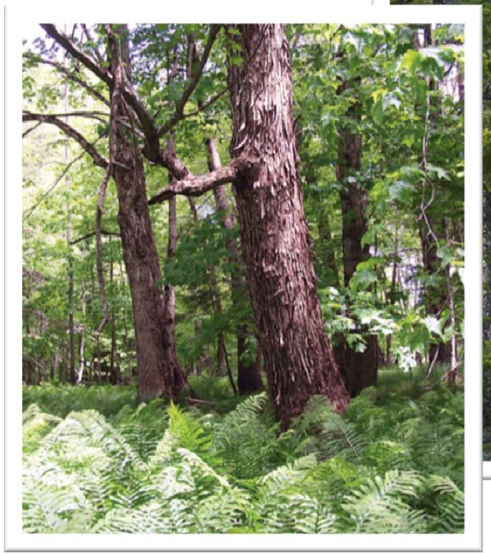


You may need to use a map in the Vegetation Types manual to determine what ecoregion you are in.



You may need to know how to recognize certain specific forest groups if they occur in your area.

These include Open Woodlands, Floodplain Forests …



… Karst Forests, Coastal Forests …

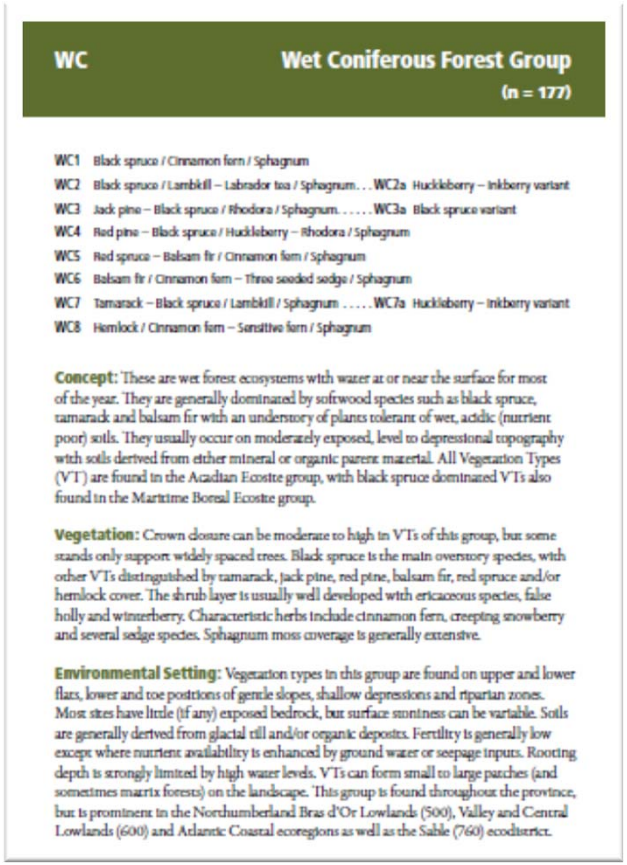
… Highland Forests and Old Field Forests …

In each case the Vegetation Types manual provides information and tools that will help you to make this determination. The fact sheets for each forest group are especially helpful.

Overview of a Forest Group Fact Sheet

What information can you learn from studying a forest group fact sheet?

Each forest group has its own fact sheet.



WC **Wet Coniferous Forest Group**
(n = 177)

WC1 Black spruce / Cinnamon fern / Sphagnum
WC2 Black spruce / Lambkill – Labrador tea / Sphagnum. . . WC2a Huckleberry – Inkberry variant
WC3 Jack pine – Black spruce / Rhodora / Sphagnum. . . . . WC3a Black spruce variant
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 Huckleberry – Inkberry variant
WC8 Hemlock / Cinnamon fern – Sensitive fern / Sphagnum

Concept: These are wet forest ecosystems with water at or near the surface for most of the year. They are generally dominated by softwood species such as black spruce, tamarack and balsam fir with an understory of plants tolerant of wet, acidic (nutrient poor) soils. They usually occur on moderately exposed, level to depressional topography with soils derived from either mineral or organic parent material. All Vegetation Types (VT) are found in the Acadian Ecosite group, with black spruce dominated VTs also found in the Maritime Boreal Ecosite group.

Vegetation: Crown closure can be moderate to high in VTs of this group, but some stands only support widely spaced trees. Black spruce is the main overstory species, with other VTs distinguished by tamarack, jack pine, red pine, balsam fir, red spruce and/or hemlock cover. The shrub layer is usually well developed with ericaceous species, false holly and winterberry. Characteristic herbs include cinnamon fern, creeping snowberry and several sedge species. Sphagnum moss coverage is generally extensive.

Environmental Setting: Vegetation types in this group are found on upper and lower flats, lower and toe positions of gentle slopes, shallow depressions and riparian zones. Most sites have little (if any) exposed bedrock, but surface stoniness can be variable. Soils are generally derived from glacial till and/or organic deposits. Fertility is generally low except where nutrient availability is enhanced by ground water or seepage inputs. Rooting depth is strongly limited by high water levels. VTs can form small to large patches (and sometimes matrix forests) on the landscape. This group is found throughout the province, but is prominent in the Northumberland Bras d'Or Lowlands (500), Valley and Central Lowlands (600) and Atlantic Coastal ecoregions as well as the Sable (760) ecodistrict.

The fact sheet will include a list of vegetation types associated with this forest group …

WD1 White ash / Sensitive fern – Christmas fern

WD2 Red maple / Cinnamon fern / Sphagnum

WD3 Red maple / Sensitive fern – Lady fern / Sphagnum

WD4 Red maple / Poison ivy / Sphagnum . . . . . **WD4a** Huckleberry – Inkberry variant

WD5 Trembling aspen / Beaked hazelnut / Interrupted fern / Sphagnum

WD6 Red maple – Balsam fir / Wood aster / Sphagnum

WD7 Balsam fir – White ash / Cinnamon fern – New York fern / Sphagnum

WD8 Red spruce – Red maple / Wood sorrel – Sensitive fern / Sphagnum

Key characteristics that define the forest group …

Concept: These are wet forest ecosystems with water at or near the surface for most of the year. They are generally dominated by hardwood species such as red maple and white ash, but also include mixedwood forests with balsam fir. The shrub layer is mainly regenerating tree species, while the well-developed herb layer includes many species of ferns and sedges. Moss abundance is low to moderate. Vegetation Types (VT) are associated with moderate to high nutrient availability with increasing richness indicated by white ash presence. They occur primarily on level to depressional topography with soils derived from either mineral or organic parent material. All VTs in this group are found in the Acadian Ecosite group, with some red maple and balsam fir dominated VTs also found in the Maritime Boreal Ecosite group.

Description of plants that characterize the group …

Vegetation: Crown closure can be moderate to high in VTs of this group, but some stands only support widely spaced trees. Red maple is the main overstory species, with other VTs distinguished by trembling aspen and white ash cover. Mixedwood VTs in this group are dominated by red maple with balsam fir or red spruce. Yellow birch, sugar maple, white pine and hemlock can sometimes be found on better drained hummocks. The shrub layer mainly contains regenerating tree species, alder, winterberry and false holly. The herb layer is dominated by sensitive fern, cinnamon fern, lady fern and dewberry. Poison ivy is also found in western Nova Scotia. Sphagnum moss coverage is often extensive.

… and general site features and geographic information.

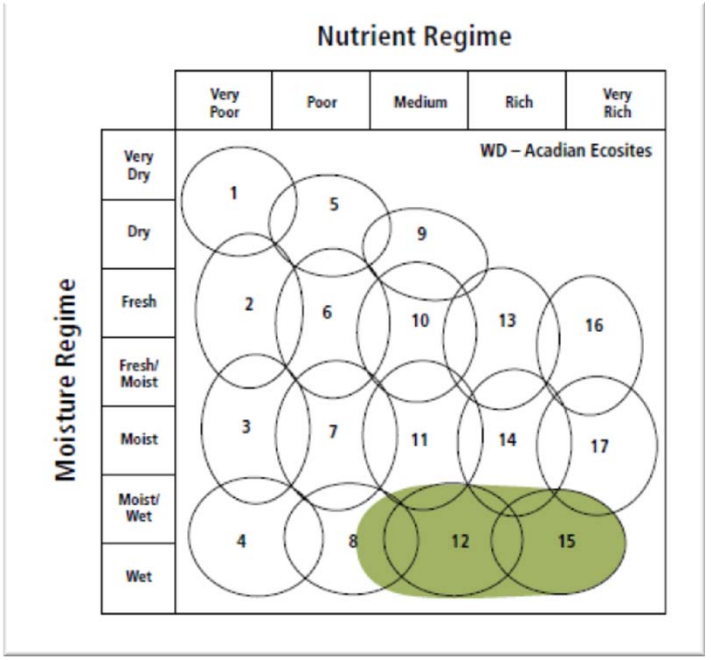
Environmental Setting: Vegetation types in this group are found on upper and lower flats, lower and toe positions of gentle slopes, shallow depressions and riparian zones. Most sites have little (if any) surface stoniness or exposed bedrock. Soils are generally derived from glacial till, fluvial, lacustrine and/or organic deposits, with

fertility enhanced by ground water or seepage inputs. Rooting depth is strongly limited by high water levels. Various VTs form small to large patches on the landscape. This group is found throughout the province, but is prominent in the Northumberland Bras d'Or Lowlands (500), Valley and Central Lowlands (600) and Western (700) ecoregions.

This is followed by a discussion of *successional dynamics*, which refers to the way a vegetation type changes over time.

Successional Dynamics: These wet hardwood and mixedwood forests are mainly edaphic climax associations maintained by excessive moisture. Fluctuating water levels, windthrow, insects and disease are significant disturbance agents. Stands within a given VT may display a range of development stages depending on disturbance history and natural senescence.

The forest group fact sheet will also contain *edatopic grids*. These are diagrams showing the availability of water and nutrients in the vegetation types found within this forest group.

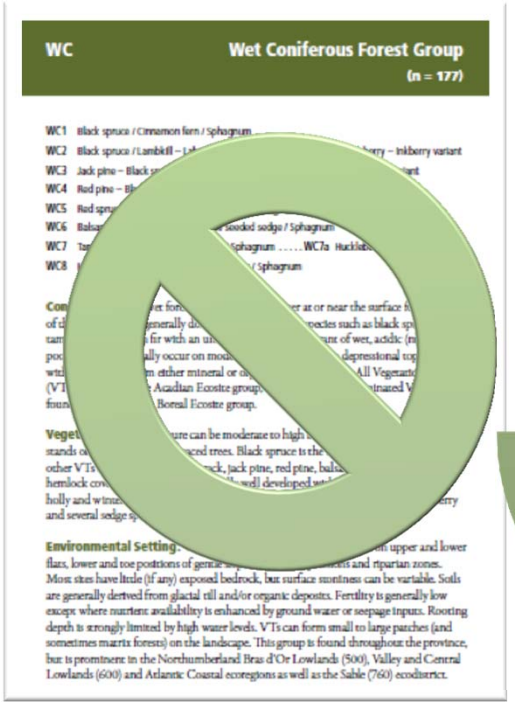


Finally, the fact sheet will provide special interest information such as what types of wildlife use this forest group.

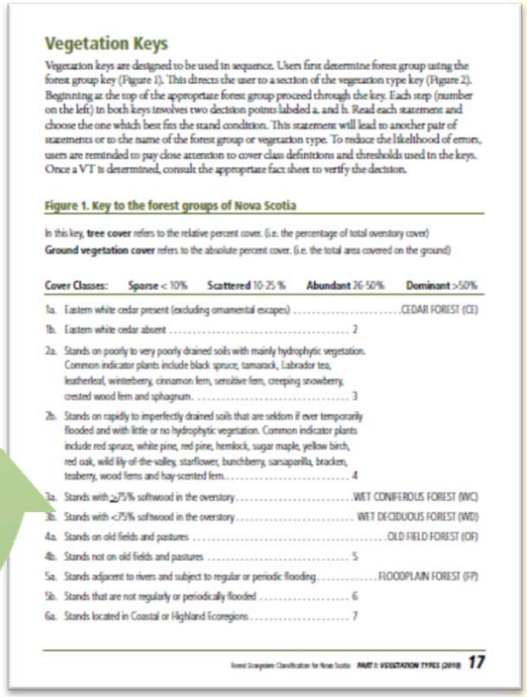
Ecological Features

These small to large patch forests usually develop on wet organic or mineral soils, but are occasionally found on moist upland sites. Wet coniferous forests receive water from precipitation, springs, seepage or surface flows. Water flows and nutrient inputs in this group are lower than those in wet deciduous forests, while peat accumulation is generally higher. These forests make important contributions to landscape diversity, carbon and water budgets. They can provide habitat for numerous plants, lichens,

Information from the fact sheet can be used to help determine what forest group you are dealing with. Or if you have already made an identification of the forest group, you can check your identification against the information in the fact sheet.



If the description does not match the site, you may need to go back and try again.



Vegetation Keys

Vegetation keys are designed to be used in sequence. Users first determine forest group using the forest group key (Figure 1). This directs the user to a section of the vegetation type key (Figure 2). Beginning at the top of the appropriate forest group proceed through the key. Each step (number on the left) in both keys involves two decision points labeled a. and b. Read each statement and choose the one which best fits the stand condition. This statement will lead to another pair of statements or to the name of the forest group or vegetation type. To reduce the likelihood of errors, users are reminded to pay close attention to cover class definitions and thresholds used in the keys. Once a VT is determined, consult the appropriate fact sheet to verify the decision.

Figure 1. Key to the forest groups of Nova Scotia

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

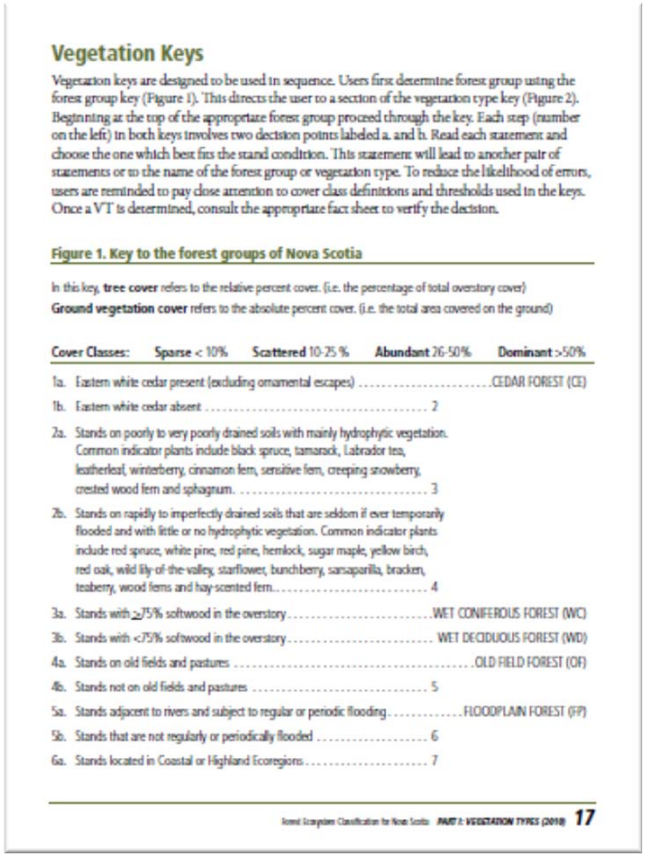
Cover Classes:	Sparse < 10%	Scattered 10-25 %	Abundant 26-50%	Dominant >50%

1a. Eastern white cedar present (excluding ornamental escapes) ..... CEDAR FOREST (CE)
1b. Eastern white cedar absent 2
2a. Stands on poorly to very poorly drained soils with mainly hydrophytic vegetation. Common indicator plants include black spruce, tamarack, Labrador tea, leatherleaf, winterberry, cinnamon fern, sensitive fern, creeping snowberry, crested wood fern and sphagnum. 3
2b. Stands on rapidly to imperfectly drained soils that are seldom if ever temporarily flooded and with little or no hydrophytic vegetation. Common indicator plants include red spruce, white pine, red pine, hemlock, sugar maple, yellow birch, red oak, wild lily-of-the-valley, starflower, bunchberry, sarsaparilla, bracken, teaberry, wood ferns and hay-scented fern. 4
3a. Stands with ≥75% softwood in the overstory ..... WET CONIFEROUS FOREST (WC)
3b. Stands with <75% softwood in the overstory ..... WET DECIDUOUS FOREST (WD)
4a. Stands on old fields and pastures ..... OLD FIELD FOREST (OF)
4b. Stands not on old fields and pastures 5
5a. Stands adjacent to rivers and subject to regular or periodic flooding ..... FLOODPLAIN FOREST (FP)
5b. Stands that are not regularly or periodically flooded 6
6a. Stands located in Coastal or Highland Ecoregions 7

How to Use a Key to Identify Vegetation Type

How do you use the forest group and vegetation keys? Once you have identified a vegetation type, what kind of information will you be able to learn from reading the fact sheet for that type?

A *key* is a series of yes/no choices. By choosing between options and following the instructions, you can use the key to make an identification of the item under study.



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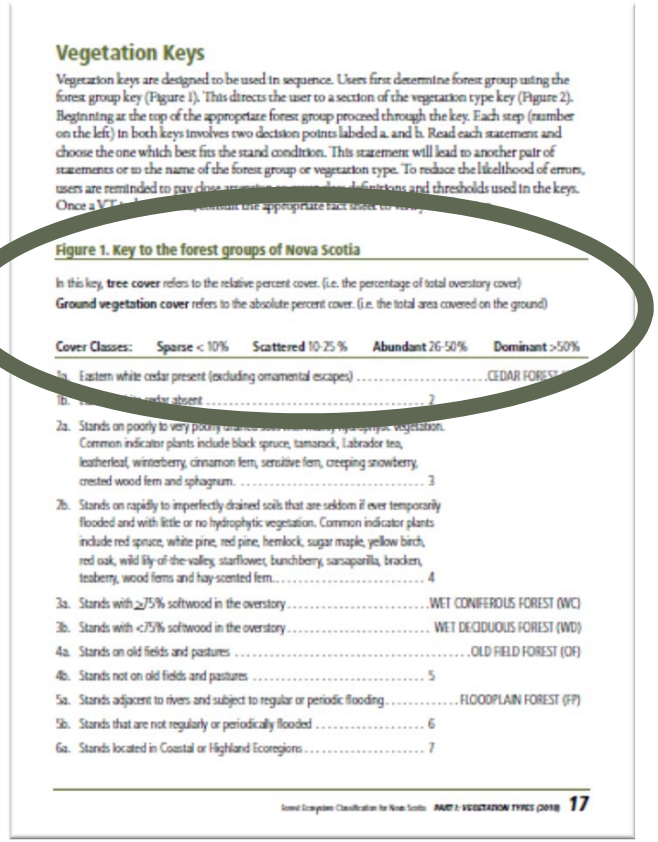
It may seem as though you need a lot of information in order to use a key. However, if you proceed through the key step by step, the identification process is often not as difficult as it first appears.

If you do have questions, most likely they will be answered in the Vegetation Types or Soil Types manuals.

There are two keys in the Vegetation Types manual. The first is a key used to identify forest groups. We've already reviewed the information you might need to collect in order to use this key.



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

1a. Eastern white cedar present (excluding ornamental escapes) ..... CEDAR FOREST (C)
1b. [illegible] cedar absent 2
2a. Stands on poorly to very poorly [illegible] hydrophytic vegetation. Common indicator plants include black spruce, tamarack, Labrador tea, leatherleaf, winterberry, cinnamon fern, sensitive fern, creeping snowberry, crested wood fern and sphagnum. 3
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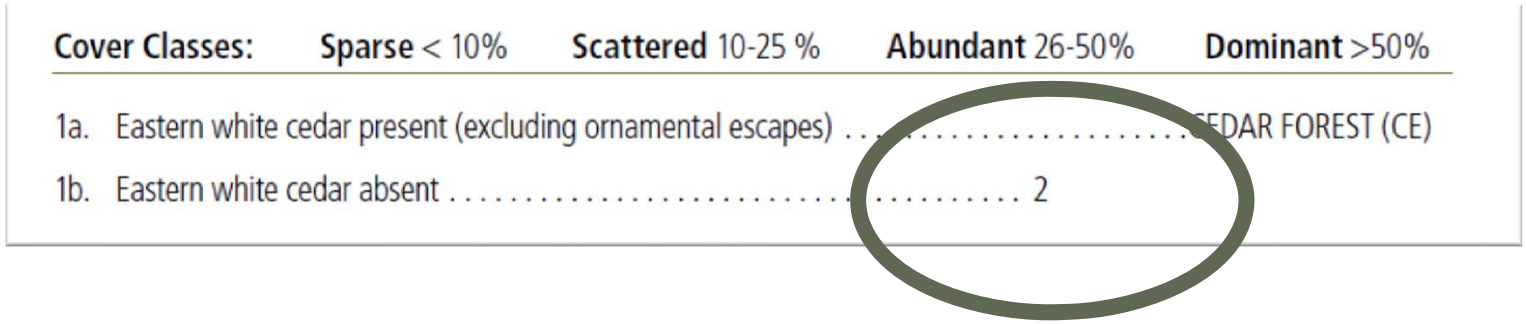
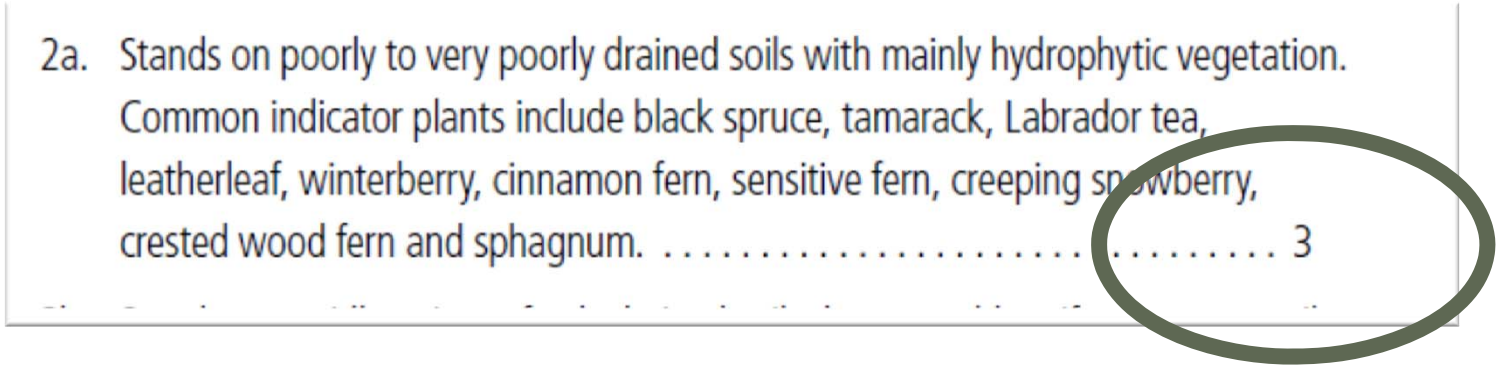
Begin with Item 1, which asks whether there is eastern white cedar on the site. If the answer is no, the key tells you to proceed to item 2.



Cover Classes:	**Sparse** < 10%	**Scattered** 10-25 %	**Abundant** 26-50%	**Dominant** >50%
1a. Eastern white cedar present (excluding ornamental escapes)				EDAR FOREST (CE)
1b. Eastern white cedar absent				2

Item 2 asks about soil drainage. (The Soil Types manual can help with that.) If choice 2a is the best description of your site, the key tells you to proceed to item 3.



2a. Stands on poorly to very poorly drained soils with mainly hydrophytic vegetation. Common indicator plants include black spruce, tamarack, Labrador tea, leatherleaf, winterberry, cinnamon fern, sensitive fern, creeping sp[illegible]wberry, crested wood fern and sphagnum. 3

Item 3 asks about the amount of softwood in the overstory. If the stand has at least 75% softwood in the overstory, the key tells you that this is a Wet Coniferous Forest.

3a. Stands with ≥75% softwood in the overstory . . . . . WET CONIFEROUS FOREST (WC)

3b. Stands with <75% softwood in the overstory . . . . . WET DECIDUOUS FOREST (WD)

There are 13 items in the forest groups key, and each one has the potential to identify a different forest group.

To keep this simple, we are going to pretend that we have used the key to identify a stand in the Wet Coniferous Forest Group.

Once you have identified a forest group, you now proceed to the vegetation types key for that group.

Once again, follow the steps beginning with item one. In the key for Wet Coniferous Forests, Item 1 asks whether tamarack is abundant to dominant.

WET CONIFEROUS FOREST (WC)

1a. Tamarack abundant to dominant. . . . . **WC7** Tamarack – Black spruce / Lambkill / Sphagnum

1b. Tamarack absent to scattered 2

Let's say that the answer to this question is no. The key would direct you to Item 2.

Item 2 asks whether black spruce and/or pines are dominant to abundant.

2a. Black spruce and/or pines abundant to dominant 3

2b. Black spruce and/or pines absent to scattered 7

Let's say that the answer to this question is yes. The key directs you to Item 3.

Item 3 asks about the abundance of pines in the stand.

If pines are absent or sparse, you are directed to Item 4.

Item 4 asks about shrub layer cover vs. herb layer cover.

4a. Shrub layer cover exceeds herb layer cover 5

4b. Herb layer cover exceeds shrub layer cover . . . . . **WC1** Black spruce / Cinnamon fern / Sphagnum

If herb layer cover exceeds shrub layer cover, the key tells you that this is a WC1 vegetation type.

Refer to the fact sheet for this vegetation type in order to confirm your identification and get additional information.

Tyndal Road, Cumberland County

WC1

Black spruce / Cinnamon fern / Sphagnum

Picea mariana / Osmunda cinnamomea / Sphagnum spp.

n=65

Concept: The Black spruce / Cinnamon fern / Sphagnum forest is characterized by black spruce canopy dominance, moderate to high herbaceous cover, and by a well-developed layer of sphagnum mosses. It is found on wet, nutrient poor soil, persisting as an edaphic climax. This Vegetation Type (VT) is similar to WC2 (Black spruce / Lambkill – Labrador tea / Sphagnum), which is an even more nutrient poor ecosystem found on sites with further reduced ground and surface water flow.

Vegetation: Crown closure is moderate to high, although some stands support more widely spaced trees. The canopy is heavily dominated by black spruce, or infrequently by hybrid black spruce-red spruce, with lesser balsam fir. Other trees are sparsely scattered with low cover. The understory supports low to moderate levels of woody species but higher herbaceous cover. Characteristic vascular plants include false holly, cinnamon fern, creeping snowberry, goldthread and three seeded sedge. Bryophyte development is high, composed of sphagnum moss and lesser amounts of common upland species. Ladies' tresses and/or pale fat-leaved sphagnum, with small pockets of common green or flat topped sphagnum, are common.

Environmental Setting: This is a nutrient poor wet forest that occasionally develops on moist sites. Soils are usually derived from glacial till or organic deposits with minor ground and/or surface water flow. It is found in shallow depressions and on flats and gentle slopes with very little microtopography. Sloped occurrences are usually cooler aspects. Rooting potential is strongly limited by high water levels. Most stands are in the Eastern and Northumberland/Bras d'Or ecoregions, with outliers scattered throughout the remainder of the province. WC1 is widespread and abundant across the Maritime Provinces.

Successional Dynamics: This ecosystem can be expressed at a variety of successional stages, but most stands are mid-successional. It is a type of edaphic climax, largely maintained by limiting site conditions. Tree windthrow and uprooting are the primary mechanisms of renewal, but many stands have a history of timber harvest. WC1 does not shift to other vegetation types after major disturbance, but does change in development stage. Between stand-level disturbance events, natural senescence can create uneven-aged stands. Vegetative layering is the dominant form of black spruce regeneration.

Ecological Features

This small-patch ecosystem has variable crown closure and height but dense herbaceous and bryophyte cover. Productivity is generally low, although stands on richer sites may support higher species richness, including some rare plants (e.g. showy lady's slipper, alder-leaved buckthorn, black ash, brittle stem sphagnum and golden ragwort). Vegetation is slow growing, limiting its forage value for herbivorous wildlife, although WC1 can provide summer thermal cover for moose, winter cover for deer, habitat for amphibians, and can support other unique habitat features. Wet forests contribute to carbon and nitrogen budgets and are often associated with headwaters, functioning to regulate water flow, provide filtration and recharge groundwater. These forests can sustain old growth conditions which are easily overlooked due to the generally small trees. It can support prominent levels of dwarf mistletoe and associated witches broom.

The fact sheet tells you that the WC1 vegetation type is characterized by a dominant canopy of black spruce and well-developed layer of sphagnum mosses. It is a wet, nutrient-poor site.

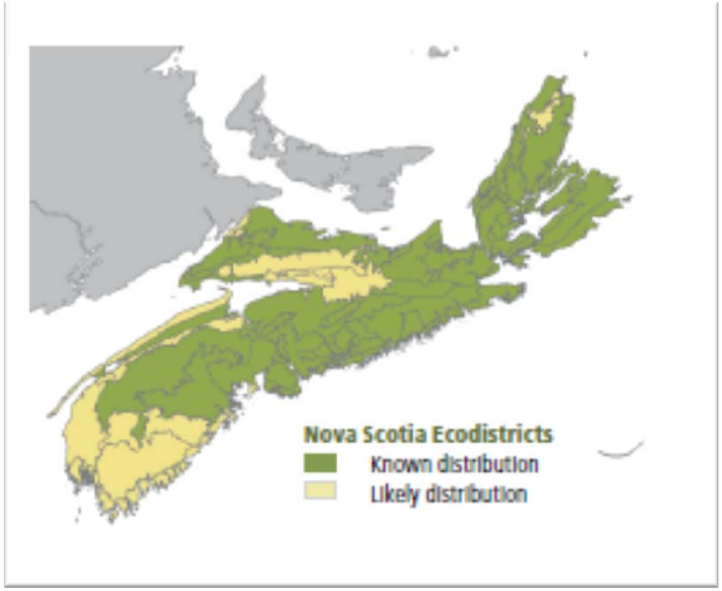
The fact sheet goes on to discuss crown closure and vegetation, including plants usually found on these sites.

Cinnamon fern

It also discusses typical environmental conditions such as soil and moisture, successional dynamics, ecological features and distinguishing characteristics.

There will be a list of characteristic plants and typical site and soil characteristics.

Finally, there will be a map showing where this forest type is known or is likely to be found.



Why Identify Vegetation Types

Why is it important to know what vegetation type or types are present on your woodlot? How can this information be used to help you manage your forest?

Information about vegetation type has many practical uses:

- It helps in determining soil type, which in turn helps to prevent or limit hazards associated with management operations.
- It tells you what trees can grow on a site, and how well, which allows you to make realistic plans and focus management efforts where they will do the most good.

Vegetation type information may also help you meet specific goals, such as:

- Managing for wildlife habitat.
- Managing for high-quality trees.
- Restoring characteristics of natural Acadian Forest.

Information about successional dynamics is especially useful because your forest could contain a very different mix of species today than is possible in the future. Information about successional dynamics tells you what is possible for your forest.

The Vegetation Types manual contains tables showing typical successional patterns for some forest groups.

Figure 6. Tolerant Hardwood (TH) Forest Group — Successional Links

	Early	Middle	Late
TH1	IH3, IH5, IH6	IH7, TH6, TH7	TH1, TH8
TH2	IH3, IH5, IH6	IH7, TH6, TH7	TH2, TH8
TH3	IH3, IH5	IH7	TH3
TH4	IH3, IH5		TH4
TH5		IH7	TH1, TH2, TH5
TH6	IH3, IH4, IH6	IH7	TH1, TH2, TH6
TH7	MW4, MW5	IH7, SH10, TH7	MW1, MW3, TH1, TH2
TH8	IH3, IH4, IH5, IH6	IH7, SH10	TH1, TH2, TH8

Last but not least, the Vegetation Types manual also provides information on the amount and type of dead wood typically present in each forest group.

Standing dead trees (*snags*) and *coarse woody debris* are essential components of Nova Scotia forests.

Retaining appropriate amounts of both snags and coarse woody debris is vital part of good forest management.

Credits

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