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Wetland Forest Habitat Type Classification System for Northern Wisconsin

A Guide for Land Managers and Landowners

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Introduction

Forest habitat type classification system is a site classification system, based on repeatable patterns in the composition of understory vegetation. The habitat types are developed independent of the current tree species composition and can be applied to most forest stands.

Field identification of a habitat type provides a convenient label (habitat type name) for a given site and places that site in the context of a larger group of sites that share similar ecological characteristics.

In contrast to upland forests, our understanding of wetland forest ecosystems is still limited and silvicultural techniques to manage wetland forest communities are not well developed. This project was undertaken in order to address these issues that apply to an estimated 2.7 million acres of the State's wetland forest.

Wetland forest habitat type classification is an effort to complete the ecological classification of Wisconsin's forest ecosystems, using the methods and interpretations similar to those used in the development of the forest habitat type classification system for upland forests *(A Guide to Forest Communities and Habitat Types, Kotar, Kovach, Burger, 2002).*

Wetland forests differ from their upland counterparts in several significant ways. Substrate can be mineral or organic and is always under the influence of a fluctuating water table. Typically, saturated conditions are found within the upper two to three feet of the soil profile. Seasonal, or yearly fluctuations in depth to saturation zone can be considerable. The number of tree species that play a dominant role across all wetland habitat types is relatively small. Stands typically are dominated by some mixture of the following: **balsam fir, northern white cedar, black ash, red maple, white spruce, black spruce** and **tamarack**. A number of associates occur sporadically. Most forest cover types comprised of these species can be found on either mineral or organic substrate. The principal physical factor differentiating wetland habitat types is nutrient availability.

Factors controlling nutrient availability on these habitat types are far more variable and complex than is the case of upland systems. First, organic substrate varies in degree of decomposition, which results in differences in nutrient availability. Secondly, regional and local hydrology is a strong modifying factor. Nutrient availability in organic substrates is modified by groundwater flow, or runoff, that originates on uplands of differing geology and soils. For this reason organics of similar appearance can be low, or relatively high in nutrient availability. In general, nutrient status of wetland habitat types varies from very poor to medium.

However, these are very general categories based on vegetation as determined by the synecological coordinates method. The fact that several different habitat types often occupy the same position on a moisture-nutrient grid does not mean that nutrient regimes are identical. In wetland soils, availability of specific nutrients is strongly controlled (or modified) by water chemistry. We have no practical way of measuring these differences directly, but the habitat types are differentiated by variations in floristic composition reflected in the many soil regimes.

There are also great differences in **successional** processes between upland and lowland systems. There appears to be no "relay floristics" type of succession as is common on upland habitat types. Tree species that dominate wetland communities are moderately to very tolerant of understory conditions and tend to replace themselves, subject to variation in environmental conditions, that favor a particular species. In order to effectively manage forests on different wetland habitat types, we need to learn the specific conditions that favor individual tree species.

For general descriptions of forested wetlands, consult *Forested Wetlands – Functions, Benefits and the Use of Best Management Practices* (Wisconsin DNR Publication Number NA-PR-01-95).

(Photo from Kemp Natural Resources Station Archives)

Organization and Application of this Guide

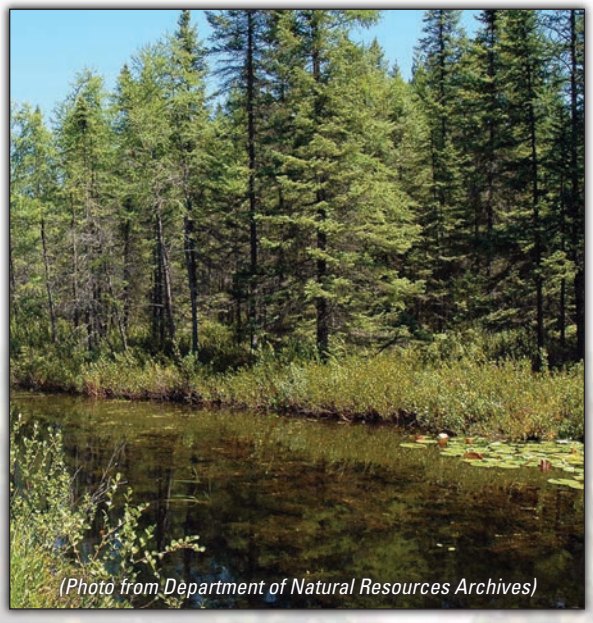
Although aimed primarily as a forest management tool, this basic ecological classification system of northern Wisconsin's forested wetlands is intended to serve diverse users and purposes. Following the introduction and table of contents, you will find field instructions for identifying forest habitat types.

This guide is divided into five independent components:

- **Five Regions (Sections 2, 3, 4, 5 and 6)**
  This component contains identification keys and detailed descriptions for all five habitat type regions for the 19 wetland forest habitat types.
- **Management Implications (Section 7)**
  This component discusses management implications of relative productivity groups for the 19 wetland forest habitat types that occur across the five regions. The five relative productivity groups include: very poor, poor, poor to medium, medium, and medium to rich.
- **Plant Identification (Section 8)**
  This component provides descriptions, illustrations and graphs of position on the moisture/nutrient gradient of most species referred to in this guide.
- **Methodology (Section 9)**
  This component describes the methodology classification system and a historic overview of the research project.
- **Appendices (Section 10)**
  This component includes maps of the Wisconsin ecological landscapes and the Natural Heritage Inventory of forested wetland types. Also included is a plant species checklist for use in field identification of wetland forest habitat types.

(Photo from Kemp Natural Resources Station Archives)

Using the information contained in this guide, natural resource managers can further assess site productivity or wildlife habitat quality, choose feasible management alternatives, and more accurately predict the effectiveness of potential silvicultural treatments. The system is also well suited for prioritizing and directing management activities in wetland forests with emphasis on water quality and the advancing threat of emerald ash borer infestation and other forest health threats.



(Photo from Department of Natural Resources Archives)

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What is a Wetland Forest?

In some cases, it may be difficult to decide whether to use the keys for mesic to wet mesic habitat types in the upland field guide *(A Guide to Forest Communities and Habitat Types, Kotar, Kovach, Burger, 2002)*, or the keys in this guide. Most of the typically "wet site species" listed in the "key to keys" in the upland field guide that lead us to the wet mesic group, also occur on wetland types described in this guide, but usually with higher constancy and/or coverage. On a moisture continuum, the types treated in this guide are distinctly more poorly drained than those described in the upland guide which are characterized as only "somewhat poorly drained."

Some General Clues

- A wetland forest consists of any peatland, bog (with trees) or "swampy" site.
- Cover types dominated by any mixture of: black ash, red maple, northern white cedar, black spruce, white spruce, balsam fir and tamarack. Many other tree species may occur as "off-site" associates, with aspen and birch particularly common.
- Common presence of some of these understory species: Sphagnum Mosses *(Sphagnum* spp.*)*, Cinnamon Fern *(Osmunda cinnamomea)*, Red-osier Dogwood *(Cornus stolonifera)*, speckled alder *(Alnus rugosa)*, Sensitive Fern *(Onoclea sensibilis)*, Dwarf Raspberry *(Rubus pubescens)*, Spotted Touch-me-not *(Impatiens capensis)*, Bunchberry *(Cornus canadensis)*, Goldthread *(Coptis groenlandica)*.

Follow These Steps

1) Before leaving for the field, make copies of the Species Checklist found on pages 9-7 (Scientific Name) or 9-8 (Common Name). You will need one checklist for each location to be habitat typed. ***At the time of this guide's publication, species scientific names were the most current; however, note that some scientific names may now differ.***

2) Determine that you are in an area of a stand that is representative of the habitat as a whole. This can be difficult if the terrain is irregular, which is often the case in lowland stands (e.g., mounds, ridges, slopes). In such cases, more than one habitat type may be present and one must decide whether all or only the most extensive portion will be considered.

3) Outline an area of approximately one-half to one acre (140' x 140' to 200' x 200'). Walk over the area slowly and systematically and fill out the species present on your checklist. Exclude extreme microsites such as rotten logs, stumps, small ridges or plateaus, mounds, and rock outcrops.

   For each present species, enter a "coverage value" of one to four as defined on the checklist. As an alternative to the checklist, you can prepare your own list of all species you encounter.

4) Using the completed checklist, proceed to the keys for your region.

5) Using your species checklist carefully consider statements in the top box and make a "yes" or "no" choice to proceed down the key. **Always start with the top box and do not skip forward without making a decision.** You will be asked to make a "yes" or "no" decision on a statement in a single box, or to chose the more accurate statement comparing two boxes.

6) Carefully read descriptions of potential habitat types in the "Habitat Type Description." You may also want to read descriptions of similar types (adjacent in the key) before deciding on final identification.

7) If the identification cannot be made from the observation of a representative plot because the understory vegetation is sparse, it will be necessary to walk around a larger area of the stand to come up with a cumulative assessment of species presence and relative abundance. Experienced users nearly always follow this method.

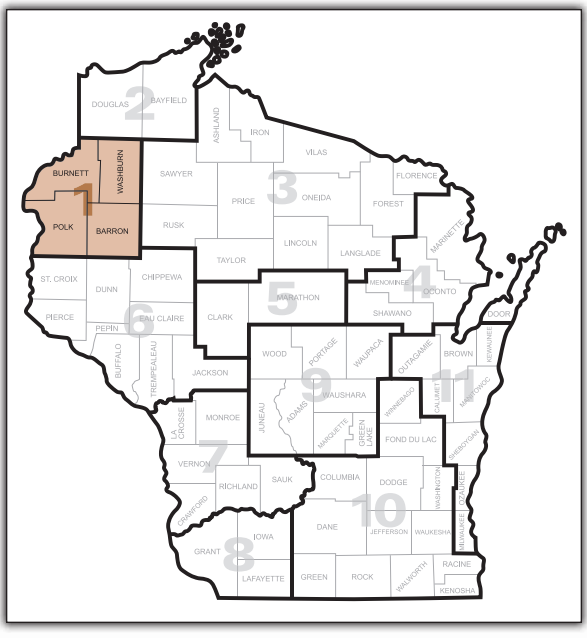
8) **Borderline cases.** Each plant association described in this guide represents a central concept of floristic composition for a range of sites known collectively as a habitat type. No specific criteria have been defined to recognize exact boundaries between related habitat types. Some stands will occupy intermediate positions. In this case, a stand can be assigned to the habitat type it most closely resembles or it can be labeled as an intermediate, e.g., ThAbFnC/AbThArAsp.

(Photo from Department of Natural Resources Archives)

Region 1

GENERAL DESCRIPTION

Region 1 encompasses Barron, Burnett, Polk and Washburn Counties. The greater part of the region was glaciated during the Wisconsin Glacial Period; only the southern fringe of Barron County is blanketed by older till. The most extensive glacial feature is the level of rolling pitted outwash plain that covers much of Burnett and Washburn Counties and extends northeast into Region 2. Podzolized stony loams are the principal soils.



Region 1: Barron, Burnett, Polk and Washburn Counties

(Photo from Kemp Natural Resources Station Archives)

Hydrological features are reflected in the two main ecological landscapes (Northwest Sands and Forest Transition). The highly porous soils in the Northwest Sands act like a sponge rapidly storing groundwater discharge. Forest wetlands are dominated by poor nutrient, forested peatlands of black spruce and tamarack. In the Forest Transition, the St. Croix basin was dominated by clusters of small lakes, streams and forested wetlands of black spruce and tamarack.

WETLAND FOREST HABITAT TYPES OF REGION 1

PmLLe

- *Picea-Larix/Ledum*
- Black Spruce-Tamarack/Labrador Tea

PmLNe

- *Picea-Larix/Nemopanthus*
- Black Spruce-Tamarack/Mountain Holly

LArIx

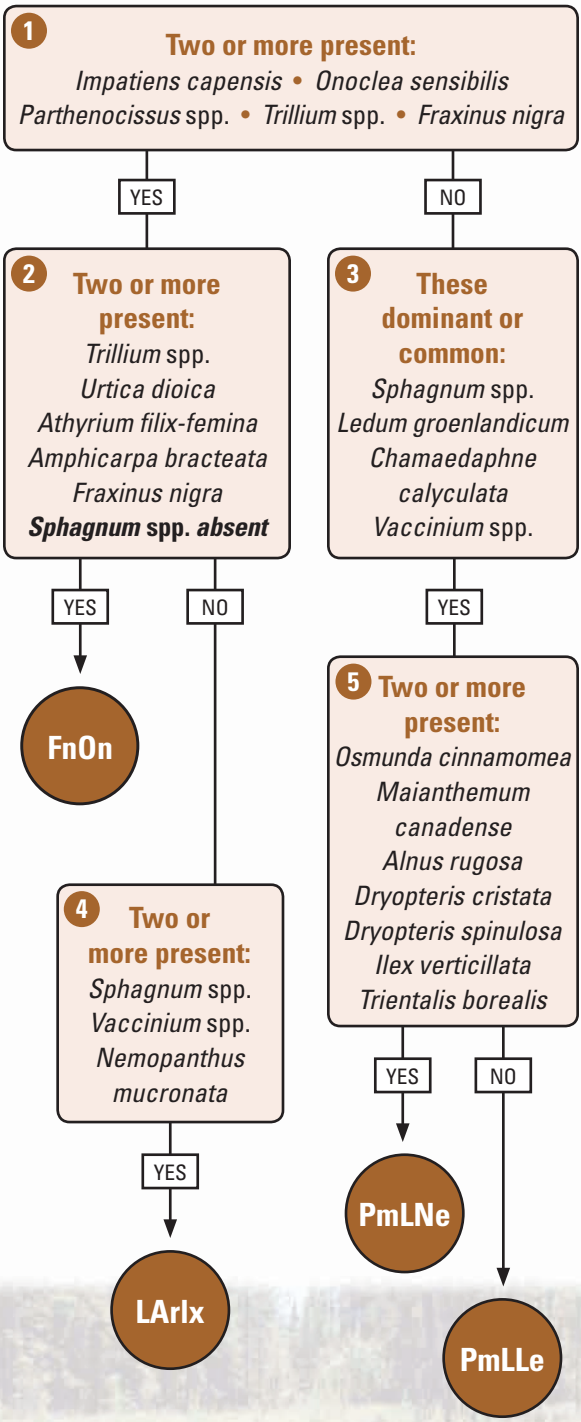
- *Larix-Acer/Ilex*
- Tamarack-Red Maple/Winterberry

FnOn

- *Fraxinus/Onoclea*
- Black Ash/Sensitive Fern

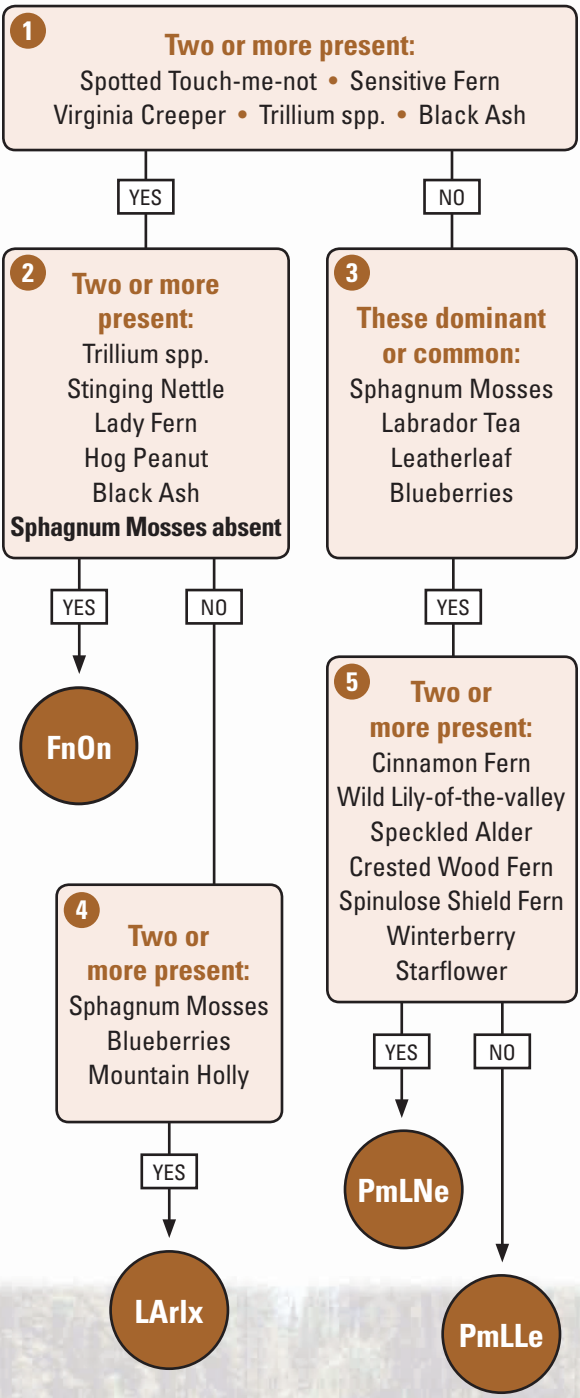
REGION 1

Key to Wetland Habitat Types (Scientific Names)

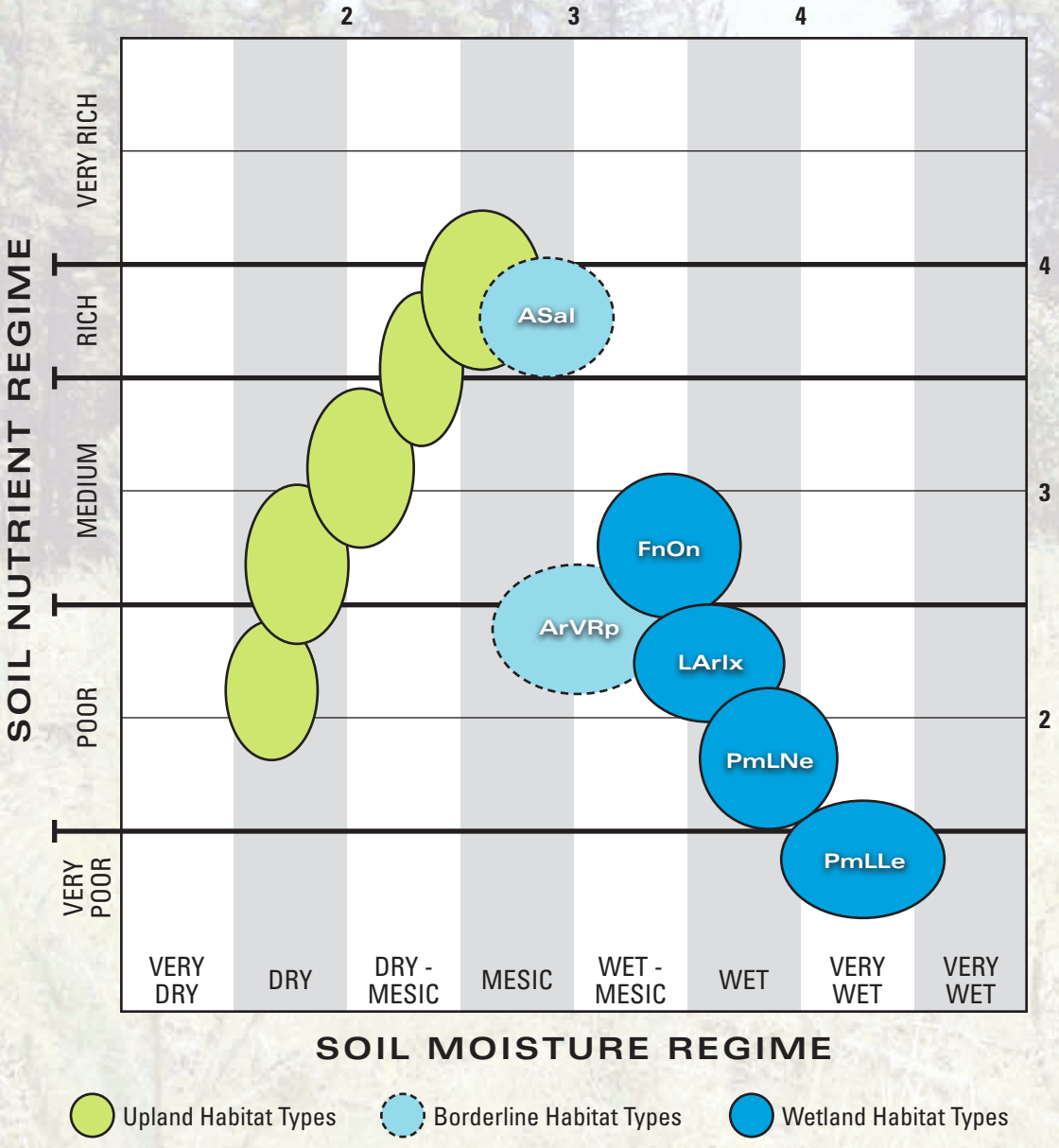


REGION 1

Key to Wetland Habitat Types (Common Names)



RELATIONSHIP OF HABITAT TYPES TO SOIL MOISTURE AND NUTRIENT REGIMES IN REGION 1



Region 1 Habitat Type Descriptions

PmLLe

Picea-Larix/Ledum

Picea mariana-Larix laricina/Ledum groenlandicum

Black Spruce-Tamarack/Labrador Tea

DISTRIBUTION

Throughout the region.

LANDFORM AND SOILS

Deep organic substrate – peat bog.

VEGETATION

Common Forest Cover Types: Stands are dominated entirely by black spruce and tamarack. Only paper birch, white pine, and occasionally jack pine, occur as temporary associates. Advance reproduction also consists almost entirely of black spruce and tamarack, but paper birch saplings are at times well represented.

Shrub and Small Tree Layer: Tall shrubs are not well represented. The only conspicuous species with occasionally high coverage are Leatherleaf *(Chamaedaphne calyculata)*, Labrador Tea *(Ledum groenlandicum)*, Mountain Holly *(Nemopanthus mucronata),* Canada Blueberry *(Vaccinium myrtilloides)* and Low-sweet Blueberry *(Vaccinium angustifolium*). Several other woody species characteristic of this type are inconspicuous and best described with ground flora.

Ground Flora Characteristics: *Sphagnum* spp. and sedges are dominant characteristics. Herb species are poorly represented. The following occur with low frequencies: Three-leaved Solomon's Seal *(Smilacina trifolia)*, Purple-stemmed Aster *(Aster puniceus)*, Bunchberry *(Cornus canadensis)*, and various species of Lady's Slippers *(Cypripedium* spp.*)*. More frequent, although often inconspicuous, are several species of the Heath family *(Ericaceae)*, such as Wintergreen *(Gaultheria procumbens)*, Creeping Snowberry *(Gaultheria hispidula)*, Pale Laurel *(Kalmia polifolia)*, Small Cranberry *(Vaccinium oxycoccus)* and Bog Rosemary *(Andromeda glaucophylla)*.

Disturbance and Succession: See the Introduction.

Management Implications: On the relative scale of wetland habitat type productivity (very poor, poor, poor to medium, medium, medium to rich) **PmLLe** type is classified as "very poor" (see the **Management Implications** section).

REGION 1: PLANT SPECIES BY HABITAT TYPE (PmLLe)

Understory Species in Order of Decreasing Frequency of Occurrence

Common Name *(Scientific Name)*	Freq. %	Cover %
Labrador Tea *(Ledum groenlandicum)*	100	20
Sphagnum Mosses *(Sphagnum* spp.*)*	100	84
Leatherleaf *(Chamaedaphne calyculata)*	96	9
Sedges *(Sedge* spp.*)*	96	18
Low-sweet Blueberry *(Vaccinium angustifolium)*	93	10
Pale Laurel *(Kalmia polifolia)*	89	1
Small Cranberry *(Vaccinium oxycoccus)*	71	1
Three-leaved Solomon's Seal *(Smilacina trifolia)*	68	2
Pink Lady's Slipper *(Cypripedium acaule)*	57	1
Bog Rosemary *(Andromeda glaucophylla)*	54	1
Mountain Holly *(Nemopanthus mucronata)*	43	2
Indian Pipe *(Monotropa uniflora)*	32	1
Cinnamon Fern *(Osmunda cinnamomea)*	25	1
Creeping Snowberry *(Gaultheria hispidula)*	21	1
Bog Birch *(Betula pumila)*	14	5
Winterberry *(Ilex verticillata)*	14	1
Blue Cohosh *(Caulophyllum thalictroides)*	11	1
American Hazelnut *(Corylus americana)*	11	1
Crested Wood Fern *(Dryopteris cristata)*	11	1
Larger Blue Flag *(Iris versicolor)*	11	1
Chokecherry *(Prunus virginiana)*	11	1
Pitcher Plant *(Sarracenia purpurea)*	11	1
Large Cranberry *(Vaccinium macrocarpon)*	11	1
Canada Blueberry *(Vaccinium myrtilloides)*	11	5

REGION 1: TREE SPECIES BY HABITAT TYPE (PmLLe)

Tree Species Frequency of Occurrence and Average Cover by Size Class

Sawtimber	**Freq. %**	**Cover %**
Larix laricina	18	3
Pinus banksiana	7	3
Pinus strobus	7	1

Poles	**Freq. %**	**Cover %**
Larix laricina	93	12
Picea mariana	82	6
Pinus strobus	36	4
Pinus banksiana	18	5

Saplings	**Freq. %**	**Cover %**
Larix laricina	100	8
Picea mariana	82	13
Betula papyrifera	46	4
Pinus strobus	36	3
Pinus banksiana	18	2

Large Seedlings	**Freq. %**	**Cover %**
Picea mariana	96	3
Larix laricina	71	1
Betula papyrifera	46	1
Pinus strobus	36	1
Quercus rubra	36	1
Acer rubrum	32	1
Pinus banksiana	11	1

Small Seedlings	**Freq. %**	**Cover %**
Picea mariana	86	1
Quercus rubra	82	1
Acer rubrum	68	1
Larix laricina	64	1
Pinus strobus	43	1
Betula papyrifera	29	1

PmLNe

Picea-Larix/Nemopanthus

Picea mariana-Larix laricina/Nemopanthus mucronata

Black Spruce-Tamarack/Mountain Holly

DISTRIBUTION

Throughout the region.

LANDFORM AND SOILS

Deep organic substrate – peat bog. Often in narrow zones adjacent to uplands. Hydrologically nutrient enriched, therefore less acid than PmLLe type.

VEGETATION

Common Forest Cover Types: Most stands are dominated by tamarack and black spruce, but white pine, red maple and paper birch are common associates. Advance reproduction is typically dominated by the same species.

Shrub and Small Tree Layer: This layer may be sparse or moderately well developed. The best represented shrubs are Mountain Holly *(Nemopanthus mucronata)*, Leatherleaf *(Chamaedaphne calyculata)*, Winterberry *(Ilex verticillata)*, Labrador Tea *(Ledum groenlandicum)*, Canada Blueberry *(Vaccinium myrtilloides)*, Low-sweet Blueberry *(Vaccinium angustifolium)* and speckled alder *(Alnus rugosa)*. Some of the "low shrubs" (or "sub-shrubs") mostly of the Heath family and characteristic of PmLLe habitat type, are occasionally present.

Ground Flora Characteristics: *Sphagnum* spp. and sedges are dominant characteristics. Herb species are few and some are characteristic of wet-mesic uplands, e.g., Cinnamon Fern *(Osmunda cinnamomea)*, Bunchberry *(Cornus canadensis)*, Starflower *(Trientalis borealis)*, Spinulose Shield Fern *(Dryopteris spinulosa)*, Wild Lily-of-the-valley *(Maianthemum canadense)*, Goldthread *(Coptis groenlandica)*, and Yellow Beadlily *(Clintonia borealis)*.

Disturbance and Succession: See the Introduction.

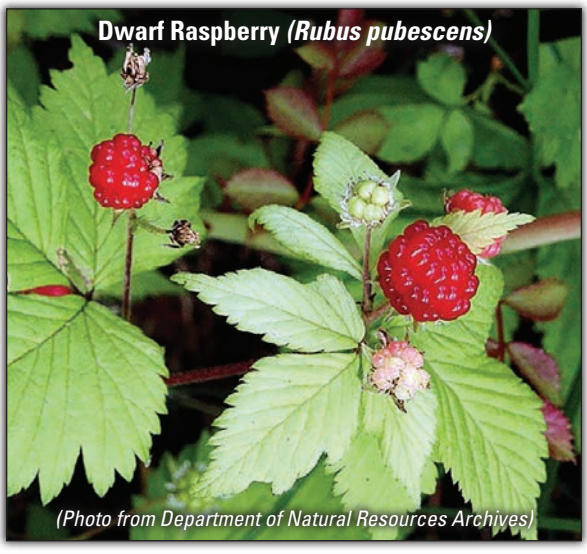
Management Implications: On the relative scale of wetland habitat type productivity (very poor, poor, poor to medium, medium, medium to rich) **PmLNe** type is classified as "poor" (see the **Management Implications** section).

REGION 1: PLANT SPECIES BY HABITAT TYPE (PmLNe)

Understory Species in Order of Decreasing Frequency of Occurrence

Common Name *(Scientific Name)*	Freq. %	Cover %
Sphagnum Mosses *(Sphagnum* spp.*)*	100	63
Sedges *(Sedge* spp.*)*	92	16
Winterberry *(Ilex verticillata)*	88	2
Cinnamon Fern *(Osmunda cinnamomea)*	88	6
Leatherleaf *(Chamaedaphne calyculata)*	85	1
Mountain Holly *(Nemopanthus mucronata)*	85	2
Labrador tea *(Ledum groenlandicum)*	81	6
Starflower *(Trientalis borealis)*	81	1
Low-sweet Blueberry *(Vaccinium angustifolium)*	81	4
Pink Lady's Slipper *(Cypripedium acaule)*	77	1
Wild Lily-of-the-valley *(Maianthemum canadense)*	77	1
Spinulose Shield Fern *(Dryopteris spinulosa)*	73	1
Crested Wood Fern *(Dryopteris cristata)*	65	1
Three-leaved Solomon's Seal *(Smilacina trifolia)*	65	1
Small Cranberry *(Vaccinium oxycoccus)*	65	1
Speckled Alder *(Alnus rugosa)*	58	5
Bugleweed *(Lycopus uniflorus)*	58	1
Pale Laurel *(Kalmia polifolia)*	50	1
Juneberries *(Amelanchier* spp.*)*	46	1
Wild Sarsaparilla *(Aralia nudicaulis)*	46	1
Narrow-leaved Meadowsweet *(Spiraea alba)*	46	1
Bunchberry *(Cornus canadensis)*	42	1
Raspberries/Blackberries *(Rubus* spp.*)*	59	6
Bog Birch *(Betula pumila)*	38	2
Creeping Snowberry *(Gaultheria hispidula)*	35	1
Indian Pipe *(Monotropa uniflora)*	35	1
Arrow-leaved Tearthumb *(Polygonum sagittatum)*	35	1
Violets *(Viola* spp.*)*	35	1
Purple-stemmed Aster *(Aster puniceus)*	31	1
Larger Blue Flag *(Iris versicolor)*	31	1
Goldthread *(Coptis groenlandica)*	27	1

Common Name *(Scientific Name)*	Freq. %	Cover %
Dwarf Raspberry *(Rubus pubescens)*	27	1
Common Cattail *(Typha latifolia)*	27	1
Bog Rosemary *(Andromeda glaucophylla)*	23	1
Asters *(Aster* spp.*)*	23	1
Water Arum *(Calla palustris)*	23	3
Yellow Beadlily *(Clintonia borealis)*	23	1
Wood Horsetail *(Equisetum sylvaticum)*	19	1
Wintergreen *(Gaultheria procumbens)*	19	1
Marsh Cinquefoil *(Potentilla palustris)*	19	1
Shinleafs *(Pyrola* spp.*)*	19	1
Currants/Gooseberries *(Ribes* spp.*)*	19	1
Blue Cohosh *(Caulophyllum thalictroides)*	15	1
Purple-leaved Willow Herb *(Epilobium coloratum)*	15	1
Wild Strawberry *(Fragaria virginiana)*	15	1
Rough Bedstraw *(Galium asprellum)*	15	1
Buckbean *(Menyanthes trifoliata)*	15	1
Halberd-leaved Tearthumb *(Polygonum arifolium)*	15	1
Meadowsweets *(Spiraea* spp.*)*	15	1



Dwarf Raspberry *(Rubus pubescens)*

(Photo from Department of Natural Resources Archives)

REGION 1: TREE SPECIES BY HABITAT TYPE (PmLNe)

Tree Species Frequency of Occurrence and Average Cover by Size Class

Sawtimber	Freq. %	Cover %
Larix laricina	50	7
Picea mariana	12	2
Pinus strobus	12	1

Poles	Freq. %	Cover %
Larix laricina	100	15
Picea mariana	54	9
Pinus strobus	23	7
Acer rubrum	15	5

Saplings	Freq. %	Cover %
Larix laricina	96	6
Acer rubrum	73	2
Betula papyrifera	69	5
Picea mariana	58	6
Pinus strobus	27	2
Fraxinus nigra	19	1

Large Seedlings	Freq. %	Cover %
Acer rubrum	85	1
Quercus rubra	81	1
Picea mariana	58	1
Betula papyrifera	50	1
Pinus strobus	50	1
Larix laricina	35	1

Small Seedlings	Freq. %	Cover %
Quercus rubra	100	1
Acer rubrum	96	1
Larix laricina	62	1
Pinus strobus	62	1
Betula papyrifera	58	1
Picea mariana	54	1
Abies balsamea	27	1

LArIx

Larix-Acer/Ilex

Larix laricina-Acer rubrum/Ilex verticillata

Tamarack-Red Maple/Winterberry

DISTRIBUTION

Relatively infrequent type throughout Region 1.

LANDFORM AND SOILS

Substrate is peat, deeper than five feet. Type is closely related to PmLNe.

VEGETATION

Common Forest Cover Types: Stands typically are dominated by tamarack and red maple, but white pine and paper birch are common associates. Advance regeneration is represented by the same species but typically is not abundant.

Shrub and Small Tree Layer: This layer is not well developed. The most frequently present shrubs are Winterberry *(Ilex verticillata)*, Raspberries/Blackberries *(Rubus* spp.*)*, speckled alder *(Alnus rugosa)*, Currants/Gooseberries *(Ribes* spp.*)*, Red-osier Dogwood *(Cornus stolonifera)*, Leatherleaf *(Chamaedaphne calyculata)*, Blueberries *(Vaccinium* spp.*)*, Mountain Holly *(Nemopanthus mucronata)* and Labrador Tea *(Ledum groenlandicum)*. In some stands, American mountain ash *(Sorbus americana)*, Beaked Hazel *(Corylus cornuta)* and Chokecherry *(Prunus virginiana)* also occur.

Ground Flora Characteristics: Sedges, *Sphagnum* spp. and Cinnamon Fern *(Osmunda cinnamomea)* typically dominate this layer. Other herbs with relatively high frequency of occurrence include Crested Wood Fern *(Dryopteris cristata)*, Purple-stemmed Aster *(Aster puniceus)*, Spinulose Shield Fern *(Dryopteris spinulosa)*, Spotted Touch-me-not *(Impatiens capensis)*, and Bugleweed *(Lycopus uniflorus)*.

Disturbance and Succession: See the Introduction.

Management Implications: On the relative scale of wetland habitat type productivity (very poor, poor, poor to medium, medium, medium to rich) **LArIx** is classified as "poor to medium" (see the **Management Implications** section).

REGION 1: PLANT SPECIES BY HABITAT TYPE (LArIx)

Understory Species in Order of Decreasing Frequency of Occurrence

Common Name *(Scientific Name)*	Freq. %	Cover %
Crested Wood Fern *(Dryopteris cristata)*	100	1
Winterberry *(Ilex verticillata)*	100	5
Wild Lily-of-the-valley *(Maianthemum canadense)*	100	1
Raspberries/Blackberries *(Rubus* spp.*)*	100	2
Sphagnum Mosses *(Sphagnum* spp.*)*	100	13
Purple-stemmed Aster *(Aster puniceus)*	83	1
Spinulose Shield Fern *(Dryopteris spinulosa)*	83	2
Spotted Touch-me-not *(Impatiens capensis)*	83	1
Bugleweed *(Lycopus uniflorus)*	83	1
Mountain Holly *(Nemopanthus mucronata)*	83	1
Cinnamon Fern *(Osmunda cinnamomea)*	83	19
Sedges *(Sedge* spp.*)*	83	20
Starflower *(Trientalis borealis)*	83	1
Speckled Alder *(Alnus rugosa)*	67	9
Juneberries *(Amelanchier* spp.*)*	21	1
Leatherleaf *(Chamaedaphne calyculata)*	67	1
Virginia Creeper *(Parthenocissus* spp.*).*	67	1
Arrow-leaved Tearthumb *(Polygonum sagittatum)*	67	1
Currants/Gooseberries *(Ribes* spp.*)*	83	1
Curled Dock *(Rumex crispus)*	67	1
Low-sweet Blueberry *(Vaccinium angustifolium)*	67	1
Asters *(Aster* spp.*)*	50	1
Water Arum *(Calla palustris)*	50	14
Red-osier Dogwood *(Cornus stolonifera)*	50	1
Labrador Tea *(Ledum groenlandicum)*	50	1
Sensitive Fern *(Onoclea sensibilis)*	50	1
Chokecherry *(Prunus virginiana)*	50	1
Three-leaved Solomon's Seal *(Smilacina trifolia)*	50	1
Violets *(Viola* spp.*)*	50	1
Wild Sarsaparilla *(Aralia nudicaulis)*	33	1
Bog Birch *(Betula pumila)*	33	2
Swamp Thistle *(Cirsium muticum)*	33	1
Virgin's Bower *(Clematis virginiana)*	33	1
American Hazelnut *(Corylus americana)*	33	2

Common Name *(Scientific Name)*	Freq. %	Cover %
Pink Lady's Slipper *(Cypripedium acaule)*	33	1
Sweet-scented Bedstraw *(Galium triflorum)*	33	1
Royal Fern *(Osmunda regalis)*	33	1
Marsh Cinquefoil *(Potentilla palustris)*	33	1
Mad-dog Skullcap *(Scutellaria lateriflora)*	33	1
Goldenrods *(Solidago* spp.*)*	33	1
Narrow-leaved Meadowsweet *(Spiraea alba)*	33	1
Large-leaved Aster *(Aster macrophyllus)*	17	1
Lady Fern *(Athyrium filix-femina)*	17	3
Marsh Marigold *(Caltha palustris)*	17	1
Water Hemlock *(Cicuta maculata)*	17	1
Yellow Beadlily *(Clintonia borealis)*	17	1
Wild Cucumber *(Echinocystis lobata)*	17	1
Purple-leaved Willow Herb *(Epilobium coloratum)*	17	1
Wood Horsetail *(Equisetum sylvaticum)*	17	1
Rough Bedstraw *(Galium asprellum)*	17	1
Larger Blue Flag *(Iris versicolor)*	17	1
Wild Mint *(Mentha arvensis)*	17	1
Halberd-leaved Tearthumb *(Polygonum arifolium)*	17	1
Pitcher Plant *(Sarracenia purpurea)*	17	1
Meadowsweets *(Spiraea* spp.*)*	17	1
American Germander *(Teucrium canadense)*	17	63
Common Cattail *(Typha latifolia)*	17	1
Small Cranberry *(Vaccinium oxycoccus)*	17	1

Wild Mint *(Mentha arvensis)*

(Photo from Department of Natural Resources Archives)

REGION 1: TREE SPECIES BY HABITAT TYPE (LArIx)

Tree Species Frequency of Occurrence and Average Cover by Size Class

Sawtimber	**Freq. %**	**Cover %**
Larix laricina	67	6
Pinus strobus	33	3

Poles	**Freq. %**	**Cover %**
Larix laricina	100	10
Acer rubrum	67	6
Betula papyrifera	50	2
Pinus strobus	50	2
Betula alleghaniensis	17	1
Picea mariana	17	1

Saplings	**Freq. %**	**Cover %**
Betula papyrifera	100	6
Larix laricina	100	4
Acer rubrum	83	3
Pinus strobus	50	1
Ulmus spp.	50	1
Quercus rubra	33	1
Abies balsamea	17	3

Large Seedlings	**Freq. %**	**Cover %**
Acer rubrum	100	1
Quercus rubra	83	1
Betula papyrifera	67	1
Pinus strobus	50	1
Ulmus spp.	33	1
Abies balsamea	17	1

Small Seedlings	**Freq. %**	**Cover %**
Acer rubrum	100	1
Quercus rubra	100	1
Pinus strobus	50	1
Betula papyrifera	33	1
Larix laricina	33	1
Abies balsamea	17	1
Picea glauca	17	1

FnOn

Fraxinus/Onoclea

Fraxinus nigra/Onoclea sensibilis

Black Ash/Sensitive Fern

DISTRIBUTION

Mostly Barron County, but also anywhere in Region 1 where finer texture soils are present.

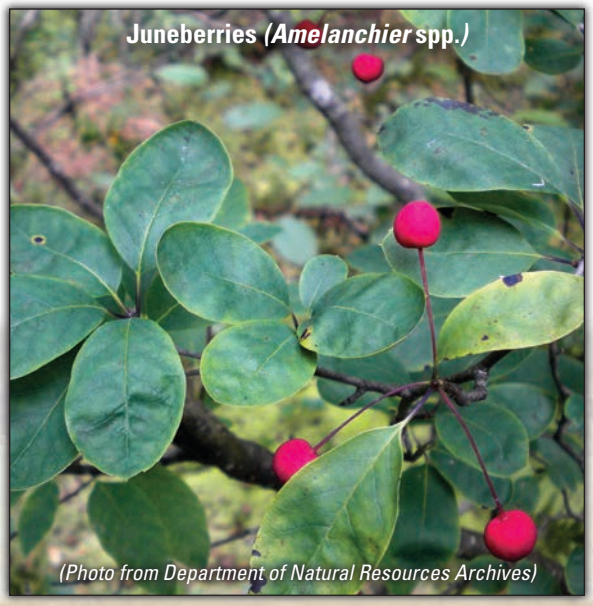
LANDFORM AND SOILS

Landform, most likely is till deposits. Soil profile typically consists of a shallow organic layer (less than one foot) over finer texture mineral soil, with sandier layers often present, especially at depths below three feet. Texture varies greatly, but clay or silt components are usually conspicuous. Soil profile stratification can be complex. On some sites, well decomposed organic material occurs to a depth greater than five feet.

VEGETATION

Common Forest Cover Types: Most stands are dominated by black ash with red maple and (formerly) American elm as most common associates. Conifers typically are absent, although balsam fir occurs sporadically. Advance reproduction in most stands is best represented by black ash.

Shrub and Small Tree Layer: Generally, this layer is not well developed. The most frequently present shrubs are speckled alder *(Alnus rugosa)*, Winterberry *(Ilex verticillata)* and Currants/Gooseberries *(Ribes* spp.*)*. Beaked Hazel *(Corylus cornuta)*, Alder-leaved Buckthorn *(Rhamnus alnifolia)* and Raspberries/Blackberries *(Rubus* spp.*)* also occur **in some stands**.



Juneberries *(Amelanchier* spp.*)*

(Photo from Department of Natural Resources Archives)

Ground Flora Characteristics: Sedges typically dominate this layer. Common herbs include Sensitive Fern *(Onoclea sensibilis)*, Spotted Touch-me-not *(Impatiens capensis)*, Virginia Creeper *(Parthenocissus* spp.*)*, Cinnamon Fern *(Osmunda cinnamomea),* and Marsh Marigold *(Caltha palustris)*. In many stands Stinging Nettle *(Urtica dioica)* is also common. Other species with relatively high frequency of occurrence include Spinulose Shield Fern *(Dryopteris spinulosa)*, Crested Wood Fern *(Dryopteris cristata)*, Nodding Trillium *(Trillium cernuum)* and Bugleweed *(Lycopus uniflorus)*.

Disturbance and Succession: See the Introduction.

Management Implications: On the relative scale of wetland habitat type productivity (very poor, poor, poor to medium, medium, medium to rich) **FnOn** is classified as "medium" (see the **Management Implications** section). It is the richest wetland habitat type in Region 1.

REGION 1: PLANT SPECIES BY HABITAT TYPE (FnOn)

Understory Species in Order of Decreasing Frequency of Occurrence

Common Name *(Scientific Name)*	Freq. %	Cover %
Sedges *(Sedge* spp.*)*	100	35
Asters *(Aster* spp.*)*	97	1
Sensitive Fern *(Onoclea sensibilis)*	90	2
Virginia Creeper *(Parthenocissus* spp.*)*	86	1
Currants/Gooseberries *(Ribes* spp.*)*	83	1
Speckled Alder *(Alnus rugosa)*	79	6
Crested Wood Fern *(Dryopteris cristata)*	79	1
Spotted Touch-me-not *(Impatiens capensis)*	79	5
Cinnamon Fern *(Osmunda cinnamomea)*	79	8
Nodding Trillium *(Trillium cernuum)*	76	1
Marsh Marigold *(Caltha palustris)*	69	1
Wild Strawberry *(Fragaria virginiana)*	66	1
Bugleweed *(Lycopus uniflorus)*	66	1
Wild Lily-of-the-valley *(Maianthemum canadense)*	66	1
Violets *(Viola* spp.*)*	66	1
Spinulose Shield Fern *(Dryopteris spinulosa)*	62	1
Hog Peanut *(Amphicarpa bracteata)*	59	1
Rough Bedstraw *(Galium asprellum)*	59	1
Winterberry *(Ilex verticillata)*	59	2
Raspberries/Blackberries *(Rubus* spp.*)*	59	6
Lady Fern *(Athyrium filix-femina)*	55	3
Naked Miterwort *(Mitella nuda)*	55	1
Stinging Nettle *(Urtica dioica)*	55	6
Wild Sarsaparilla *(Aralia nudicaulis)*	52	1
Purple-stemmed Aster *(Aster puniceus)*	52	1
Wood Horsetail *(Equisetum sylvaticum)*	52	2
White Avens *(Geum canadense)*	52	1
Alder-leaved Buckthorn *(Rhamnus alnifolia)*	52	1
Early Meadow Rue *(Thalictrum dioicum)*	52	1
Starflower *(Trientalis borealis)*	52	1
American Hazelnut *(Corylus americana)*	48	3
Goldenrods *(Solidago* spp.*)*	48	2
Yellow Beadlily *(Clintonia borealis)*	45	1

Common Name *(Scientific Name)*	Freq. %	Cover %
Dwarf Enchanter's Nightshade *(Circaea alpina)*	41	1
Larger Blue Flag *(Iris versicolor)*	38	1
Hairy Solomon's Seal *(Polygonatum pubescens)*	38	1
Goldthread *(Coptis groenlandica)*	34	1
Red-osier Dogwood *(Cornus stolonifera)*	34	2
Large-leaved Aster *(Aster macrophyllus)*	31	4
Bunchberry *(Cornus canadensis)*	31	1
Dwarf Raspberry *(Rubus pubescens)*	31	7
Bedstraws *(Galium* spp.*)*	28	1
Chokecherry *(Prunus virginiana)*	28	1
Poison Ivy *(Rhus radicans)*	28	1
Ostrich Fern *(Matteuccia struthiopteris)*	24	2
Arrow-leaved Tearthumb *(Polygonum sagittatum)*	24	1
Juneberries *(Amelanchier* spp.*)*	21	1
Wood Anemone *(Anemone quinquefolia)*	21	1
Bush Honeysuckle *(Diervilla lonicera)*	21	1
Royal Fern *(Osmunda regalis)*	21	4
Heal-all *(Prunella vulgaris)*	21	1
Curly Dock *(Rumex crispus)*	21	1
Swamp Thistle *(Cirsium muticum)*	17	1
Oak Fern *(Dryopteris disjuncta)*	17	1
Purple-leaved Willow Herb *(Epilobium coloratum)*	17	1
Horsetails *(Equisetum* spp.*)*	17	2
Swamp Buttercup *(Ranunculus hispidus)*	17	1
Low-sweet Blueberry *(Vaccinium angustifolium)*	17	1

Oak Fern *(Dryopteris disjuncta)*

(Photo from Department of Natural Resources Archives)

REGION 1: TREE SPECIES BY HABITAT TYPE (FnOn)

Tree Species Frequency of Occurrence and Average Cover by Size Class

Sawtimber	**Freq. %**	**Cover %**
Fraxinus nigra	66	13
Abies balsamea	14	4
Acer rubrum	14	2
Populus tremuloides	14	2

Poles	**Freq. %**	**Cover %**
Fraxinus nigra	83	21
Ulmus spp.	55	6
Acer rubrum	41	6
Abies balsamea	24	10
Betula alleghaniensis	24	16
Populus tremuloides	17	3
Tilia americana	14	9

Saplings	**Freq. %**	**Cover %**
Fraxinus nigra	90	15
Ulmus spp.	83	9
Acer rubrum	48	5
Abies balsamea	31	7
Betula alleghaniensis	21	7
Betula papyrifera	17	1
Quercus rubra	17	1
Tilia americana	17	1
Carpinus caroliniana	14	2
Populus tremuloides	14	2

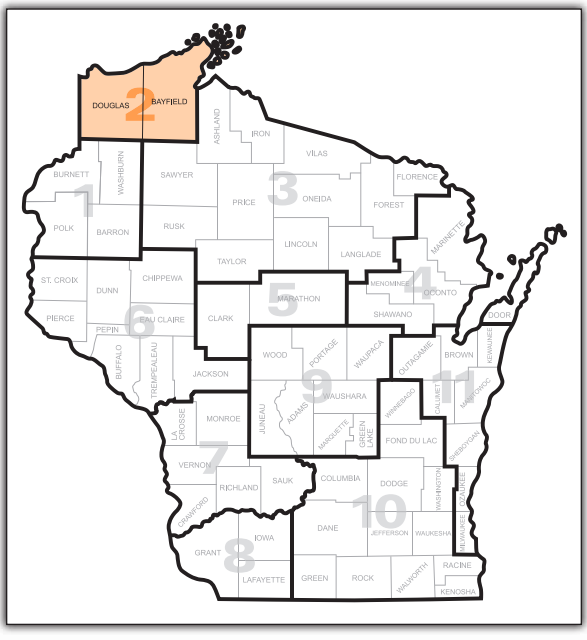
Seedlings	**Freq. %**	**Cover %**
Fraxinus nigra	79	3
Quercus rubra	59	1
Acer rubrum	52	1
Ulmus spp.	48	1
Abies balsamea	28	1
Tilia americana	24	1
Populus tremuloides	21	1
Acer saccharum	14	1
Betula papyrifera	14	1
Picea glauca	14	1

(Photo from Department of Natural Resources Archives)

Region 2

GENERAL DESCRIPTION

Region 2 encompasses Bayfield and Douglas Counties. The entire region was glaciated during the last part of the Wisconsin Glaciation. It can be characterized by four distinct ecological landscapes: the Superior Coastal (Clay Plain) bordering Lake Superior and extending to a maximum of 15 miles inland, the Northwest Sands extending across the region in a belt of outwash sands and gravel from southwest to northeast, the North Central Forest, and Northwest Lowlands.



Region 2: Bayfield and Douglas Counties

(Photo from Kemp Natural Resources Station Archives)

This region, with its variety of landscapes, has a mix of forested wetlands as a reflection of it variety in soils and landscape. Boreal swamp conifer (balsam, cedar, black spruce) exist on the clay, nutrient poor peatland of black spruce and tamarack on the sandy outwash and some black ash swamps on deep organic muck soils.

WETLAND FOREST HABITAT TYPES OF REGION 2

PmLLe

- *Picea-Larix/Ledum*
- Black Spruce-Tamarack/Labrador Tea

PmLNe

- *Picea-Larix/Nemopanthus*
- Black Spruce-Tamarack/Mountain Holly

ThAbFnIx

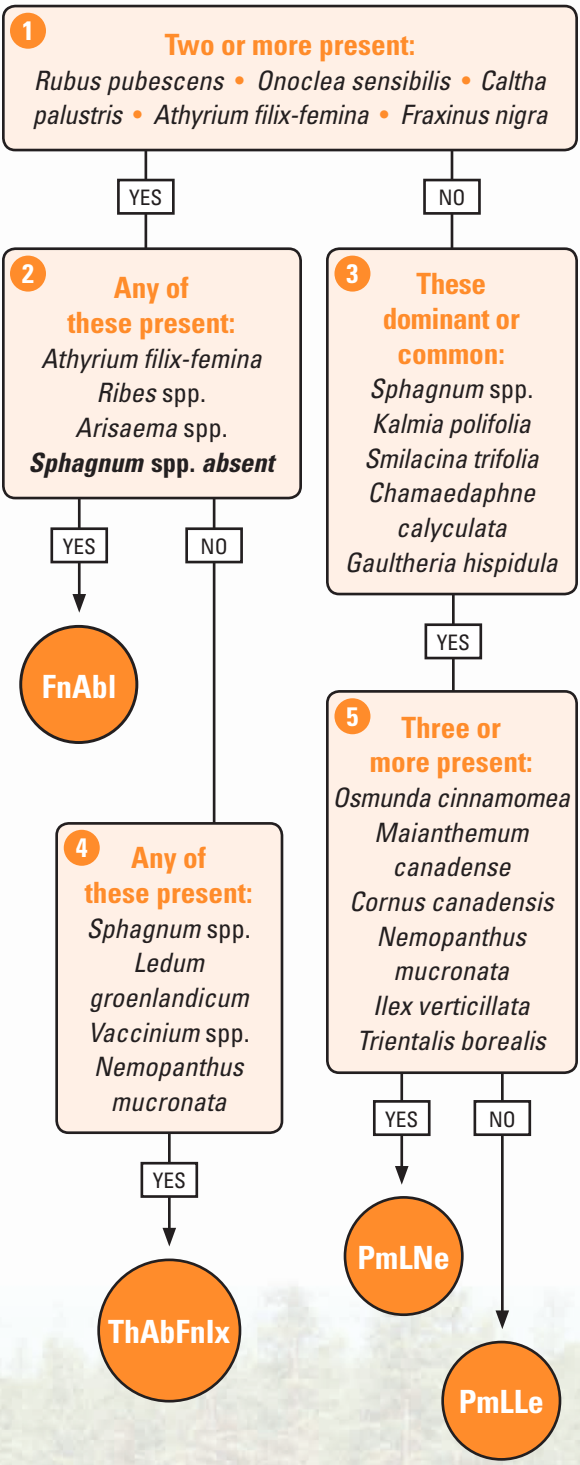
- *Thuja-Abies-Fraxinus/Ilex*
- Northern White Cedar-Balsam Fir-Black Ash/ Winterberry

FnAbI

- *Fraxinus-Abies/Impatiens*
- Black Ash-Balsam Fir/Spotted Touch-me-not

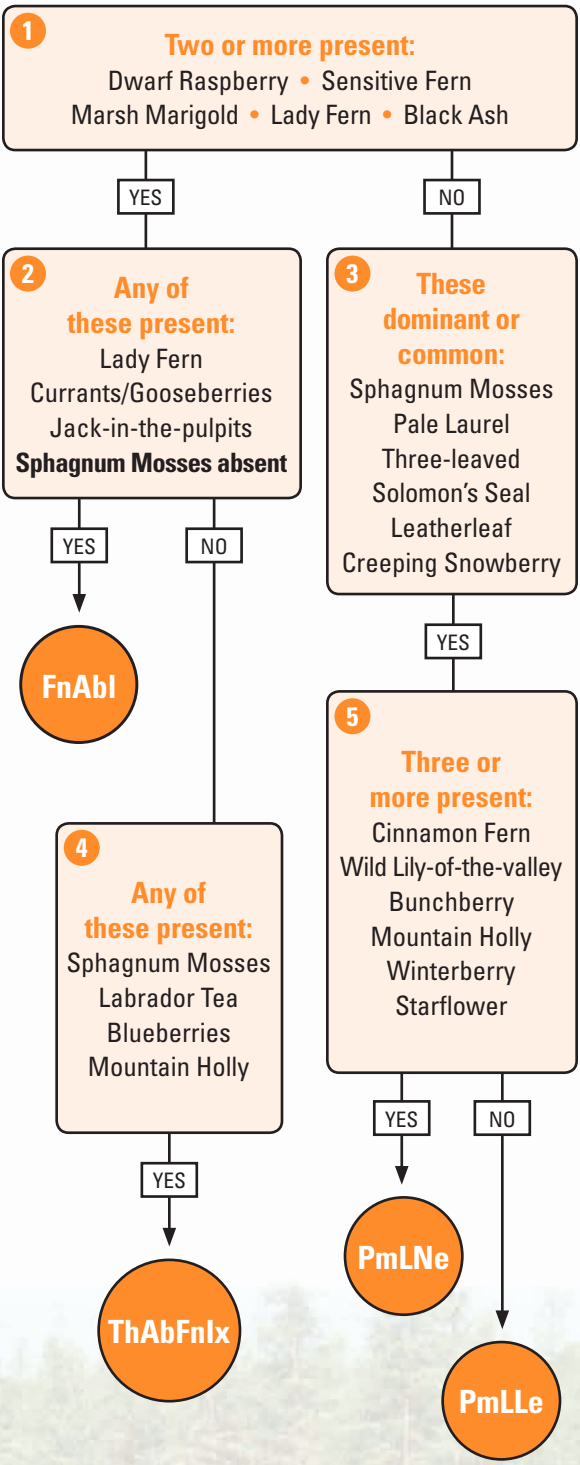
REGION 2

Key to Wetland Habitat Types (Scientific Names)

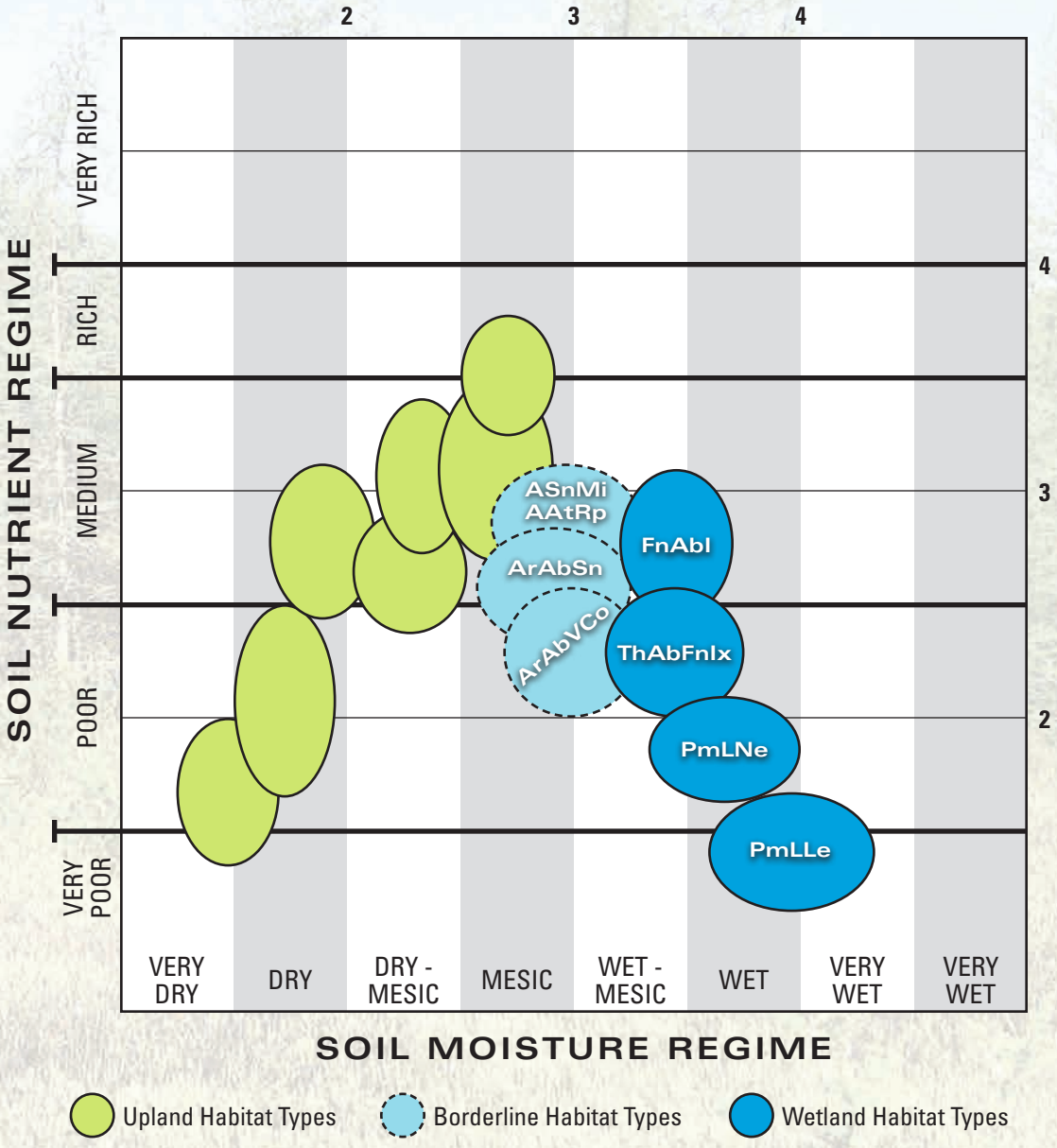


REGION 2

Key to Wetland Habitat Types (Common Names)



RELATIONSHIP OF HABITAT TYPES TO SOIL MOISTURE AND NUTRIENT REGIMES IN REGION 2



Region 2 Habitat Type Descriptions

PmLLe

Picea-Larix/Ledum

Picea mariana-Larix laricina/Ledum groenlandicum

Black Spruce-Tamarack/Labrador Tea

DISTRIBUTION

Bayfield, Douglas Counties and surrounding regions.

LANDFORM AND SOILS

Deep organics – peatlands

VEGETATION

Common Forest Cover Types: Stands are dominated entirely by black spruce and tamarack. Only paper birch and white pine occur as temporary associates. Advance reproduction also consists almost entirely of black spruce and tamarack, although paper birch saplings are sometimes well represented. Other species that sometimes occur as saplings, but typically do not reach maturity, are red maple, balsam fir and yellow birch.

Shrub and Small Tree Layer: Tall shrubs are not well represented. In most stands the only conspicuous species with relatively high coverage is Labrador Tea *(Ledum groenlandicum)*. Leatherleaf *(Chamaedaphne calyculata)* typically is the most common low shrub. Canada Blueberry *(Vaccinium myrtilloides)* and Low-sweet Blueberry *(Vaccinium angustifolium)* are also relatively common. Several other woody species characteristic of this type are inconspicuous and best described with ground flora.

Leatherleaf *(Chamaedaphne calyculata)*

(Photo from Department of Natural Resources Archives)


Three-leaved Solomon's Seal *(Smilicina trifolia)*

(Photo from Department of Natural Resources Archives)

Ground Flora Characteristics: *Sphagnum* spp. is a dominant characteristic. Herb species are poorly represented. The following occur with low frequencies: Three-leaved Solomon's Seal *(Smilacina trifolia)*, Yellow Beadlily *(Clintonia borealis)*, Bunchberry *(Cornus canadensis)* and various species of Lady's Slippers *(Cypripedium* spp.*)*. More frequent, although often inconspicuous, are several species of the Heath family *(Ericaceae)* such as Leatherleaf *(Chamaedaphne calyculata)*, Wintergreen *(Gaultheria procumbens)*, Creeping Snowberry *(Gaultheria hispidula)*, Pale Laurel *(Kalmia polifolia)*, Small Cranberry *(Vaccinium oxycoccus)*, and Bog Rosemary *(Andromeda glaucophylla)*.

Disturbance and Succession: See the Introduction.

Management Implications: On the relative scale of wetland habitat type productivity (very poor, poor, poor to medium, medium, medium to rich) **PmLLe** is classified as "very poor" (see the **Management Implications** section).


Small Cranberry *(Vaccinium oxycoccus)*

(Photo from Department of Natural Resources Archives)

REGION 2: PLANT SPECIES BY HABITAT TYPE (PmLLe)

Understory Species in Order of Decreasing Frequency of Occurrence

Common Name *(Scientific Name)*	Freq. %	Cover %
Labrador Tea *(Ledum groenlandicum)*	100	25
Sphagnum Mosses *(Sphagnum* spp.*)*	100	87
Pale Laurel *(Kalmia polifolia)*	97	1
Three-leaved Solomon's Seal *(Smilacina trifolia)*	97	9
Small Cranberry *(Vaccinium oxycoccus)*	97	1
Leatherleaf *(Chamaedaphne calyculata)*	94	7
Pink Lady's Slipper *(Cypripedium acaule)*	94	1
Low-sweet Blueberry *(Vaccinium angustifolium)*	94	4
Purple-stemmed Aster *(Aster puniceus)*	74	5
Creeping Snowberry *(Gaultheria hispidula)*	74	1
Canada Blueberry *(Vaccinium myrtilloides)*	74	4
Indian Pipe *(Monotropa uniflora)*	45	1
Bog Rosemary *(Andromeda glaucophylla)*	32	1
Mountain Holly *(Nemopanthus mucronata)*	29	1
Wintergreen *(Gaultheria procumbens)*	26	3
Speckled Alder *(Alnus rugosa)*	19	2
Cotton Sedge *(Eriophorum angustifolium)*	19	1
Cinnamon Fern *(Osmunda cinnamomea)*	13	1
Bunchberry *(Cornus canadensis)*	10	1
American Hazelnut *(Corylus americana)*	10	1
Larger Blue Flag *(Iris versicolor)*	10	1
Clubmosses *(Lycopodium* spp.*)*	10	5

Cinnamon Fern *(Osmunda cinnamomea)*

(Photo from Department of Natural Resources Archives)

REGION 2: TREE SPECIES BY HABITAT TYPE (PmLLe)

Tree Species Frequency of Occurrence and Average Cover by Size Class

Sawtimber	**Freq. %**	**Cover %**
Larix laricina	32	7
Pinus strobus	19	3
Picea mariana	13	2

Poles	**Freq. %**	**Cover %**
Larix laricina	97	18
Picea mariana	97	24
Pinus strobus	32	4

Saplings	**Freq. %**	**Cover %**
Picea mariana	97	14
Larix laricina	58	11
Abies balsamea	32	2
Betula papyrifera	26	9
Acer rubrum	13	1
Betula alleghaniensis	13	2
Pinus strobus	13	2

Seedlings	**Freq. %**	**Cover %**
Picea mariana	97	3
Betula papyrifera	42	1
Abies balsamea	35	1
Larix laricina	35	1
Pinus strobus	35	1
Quercus rubra	32	1
Acer rubrum	29	1
Picea mariana	97	1
Acer rubrum	65	1
Quercus rubra	61	1
Betula papyrifera	42	1
Larix laricina	39	1
Pinus strobus	39	1
Abies balsamea	26	1

PmLNe

Picea-Larix/Nemopanthus

Picea mariana-Larix laricina/Nemopanthus mucronata

Black Spruce-Tamarack/Mountain Holly

DISTRIBUTION

Throughout the region.

LANDFORM AND SOILS

Deep organic substrate – peat bog. Often in narrow zones adjacent to uplands, hydrologically nutrient enriched, therefore, less acid than PmLLe type.

VEGETATION

Common Forest Cover Types: Most stands are dominated by black spruce and tamarack, but any of the following species can be common associates: balsam fir, northern white cedar, red maple, white spruce, paper birch and aspen. Advance reproduction typically is dominated by balsam fir and black spruce, but saplings of the following species are sometimes well represented: red maple, paper birch, tamarack and northern white cedar.

Shrub and Small Tree Layer: This layer may be sparse or moderately well developed. The best represented shrubs are Mountain Holly *(Nemopanthus mucronata)*, Labrador Tea *(Ledum groenlandicum)*, Canada Blueberry *(Vaccinium myrtilloides)*, Low-sweet Blueberry *(Vaccinium angustifolium),* and speckled alder *(Alnus rugosa)*. Some of the low shrubs (or "sub-shrubs") mostly of the Heath family and characteristic of PmLLe habitat type are occasionally present.

Ground Flora Characteristics: *Sphagnum* spp. is a dominant characteristic. Herb species are few and characteristic of wet-mesic uplands, e.g., Bunchberry *(Cornus canadensis)*, Starflower *(Trientalis borealis)*, Spinulose Shield Fern *(Dryopteris spinulosa)*, Wild Lily-of-the-valley *(Maianthemum canadense)*, Goldthread *(Coptis groenlandica)*, Cinnamon Fern *(Osmunda cinnamomea)*, and Yellow Beadlily *(Clintonia borealis)*.

Disturbance and Succession: See the Introduction.

Management Implications: On the relative scale of wetland habitat type productivity (very poor, poor, poor to medium, medium, medium to rich) **PmLNe** is classified as "poor" (see the **Management Implications** section).

REGION 2: PLANT SPECIES BY HABITAT TYPE (PmLNe)

Understory Species in Order of Decreasing Frequency of Occurrence

Common Name *(Scientific Name)*	Freq. %	Cover %
Sphagnum Mosses *(Sphagnum* spp.*)*	100	80
Labrador Tea *(Ledum groenlandicum)*	100	8
Low-sweet Blueberry *(Vaccinium angustifolium)*	100	5
Mountain Holly *(Nemopanthus mucronata)*	96	9
Pink Lady's Slipper *(Cypripedium acaule)*	87	1
Cinnamon Fern *(Osmunda cinnamomea)*	87	4
Three-leaved Solomon's Seal *(Smilacina trifolia)*	87	2
Purple-stemmed Aster *(Aster puniceus)*	83	24
Bunchberry *(Cornus canadensis)*	83	3
Starflower *(Trientalis borealis)*	83	1
Pale Laurel *(Kalmia polifolia)*	78	1
Wild Lily-of-the-valley *(Maianthemum canadense)*	78	1
Canada Blueberry *(Vaccinium myrtilloides)*	78	2
Creeping Snowberry *(Gaultheria hispidula)*	74	3
Small Cranberry *(Vaccinium oxycoccus)*	74	1
Leatherleaf *(Chamaedaphne calyculata)*	65	2
Indian Pipe *(Monotropa uniflora)*	65	1
Spinulose Shield Fern *(Dryopteris spinulosa)*	57	1
Winterberry *(Ilex verticillata)*	57	1
Juneberries *(Amelanchier* spp.*)*	48	1
Wintergreen *(Gaultheria procumbens)*	48	1
Speckled Alder *(Alnus rugosa)*	43	5
Crested Wood Fern *(Dryopteris cristata)*	39	1
Goldthread *(Coptis groenlandica)*	35	1
Chokecherry *(Prunus virginiana)*	22	1
Alder-leaved Buckthorn *(Rhamnus alnifolia)*	22	1
American Mountain Ash *(Sorbus americana)*	22	1
Trailing Christmas Green/Clubmoss *(Lycopodium annotinum)*	17	11

Common Name *(Scientific Name)*	Freq. %	Cover %
Eastern White Pine *(Pinus strobus)*	17	1
Dwarf Raspberry *(Rubus pubescens)*	17	1
Willows *(Salix* spp.*)*	17	2
Bog Rosemary *(Andromeda glaucophylla)*	13	1
Wild Sarsaparilla *(Aralia nudicaulis)*	13	1
Yellow Beadlily *(Clintonia borealis)*	23	1
American Hazelnut *(Corylus americana)*	13	1
Wood Horsetail *(Equisetum sylvaticum)*	13	1
Larger Blue Flag *(Iris versicolor)*	13	1
Wild Red Raspberry *(Rubus idaeus)*	13	1

Larger Blue Flag *(Iris versicolor)*

(Photo from Department of Natural Resources Archives)

REGION 2: TREE SPECIES BY HABITAT TYPE (PmLNe)

Tree Species Frequency of Occurrence and Average Cover by Size Class

Sawtimber	**Freq. %**	**Cover %**
Larix laricina	52	13
Picea mariana	30	6
Pinus strobus	17	7

Poles	**Freq. %**	**Cover %**
Picea mariana	96	26
Larix laricina	91	18
Betula papyrifera	26	4
Abies balsamea	22	6
Acer rubrum	17	8
Pinus strobus	9	1

Saplings	**Freq. %**	**Cover %**
Picea mariana	100	13
Larix laricina	61	4
Betula papyrifera	52	2
Acer rubrum	43	6
Abies balsamea	35	3
Betula alleghaniensis	17	7
Pinus strobus	13	1

Seedlings	**Freq. %**	**Cover %**
Acer rubrum	74	2
Picea mariana	70	4
Quercus rubra	52	1
Abies balsamea	48	1
Betula papyrifera	35	1
Larix laricina	22	1
Pinus strobus	17	1
Salix spp.	17	2
Betula alleghaniensis	13	1

ThAbFnIx

Thuja-Abies-Fraxinus/Ilex
Thuja occidentalis-Abies balsamea-
Fraxinus nigra/Ilex verticillata
Northern White Cedar-Balsam Fir-Black Ash/Winterberry

DISTRIBUTION

Bayfield, Douglas Counties and surrounding regions.

LANDFORM AND SOILS

The substrate is typically a saturated organic layer less than one foot to several feet thick, upon mineral substrate, usually sand or gravel. In some cases finer textured material occurs before transitioning to coarser material. In some instances, highly decomposed organic matter extends from the surface to beyond five feet.

VEGETATION

Common Forest Cover Types: Most stands are dominated, singly or in combination, by northern white cedar, balsam fir and black ash. Yellow birch and tamarack are occasional associates. Advance reproduction is best represented by balsam fir and black ash. Northern white cedar is conspicuously underrepresented in this layer, apparently due to deer browsing. Red maple saplings also occur in some stands.

(Photo from Department of Natural Resources Archives)

Shrub and Small Tree Layer: This layer is not well developed. The most common dominant shrub is speckled alder *(Alnus rugosa)*. Winterberry *(Ilex verticillata)* is present with high frequency but generally low coverage. Other sporadically occurring shrubs include Labrador Tea *(Ledum groenlandicum)*, Red-osier Dogwood *(Cornus stolonifera)*, Mountain Holly *(Nemopanthus mucronata)* and Low-sweet Blueberry *(Vaccinium angustifolium)*.

Ground Flora Characteristics: Relatively high coverage of *Sphagnum* spp. and the presence of several species typical of bogs is characteristic of most stands. However, this habitat type is distinguished from bog types by the common presence of black ash and sporadic occurrence of such species as Sensitive Fern *(Onoclea sensibilis)*, Wild Sarsaparilla *(Aralia nudicaulis)*, Bugleweed *(Lycopus uniflorus)*, Oak Fern *(Dryopteris disjuncta)*, Dwarf Raspberry *(Rubus pubescens)* and, of course, black ash.

Disturbance and Succession: See the Introduction.

Management Implications: On the relative scale of wetland habitat type productivity (very poor, poor, poor to medium, medium, medium to rich) **ThAbFnIx** is classified as "poor to medium" (see the **Management Implications** section).

REGION 2: PLANT SPECIES BY HABITAT TYPE (ThAbFnIx)

Understory Species in Order of Decreasing Frequency of Occurrence

Common Name *(Scientific Name)*	Freq. %	Cover %
Sphagnum Mosses *(Sphagnum* spp.*)*	100	48
Purple-stemmed Aster *(Aster puniceus)*	100	11
Winterberry *(Ilex verticillata)*	100	5
Wild Lily-of-the-valley *(Maianthemum canadense)*	100	1
Speckled Alder *(Alnus rugosa)*	92	15
Goldthread *(Coptis groenlandica)*	92	1
Bunchberry *(Cornus canadensis)*	92	2
Spinulose Shield Fern *(Dryopteris spinulosa)*	92	1
Cinnamon Fern *(Osmunda cinnamomea)*	92	9
Goldenrods *(Solidago* spp.*)*	92	1
Starflower *(Trientalis borealis)*	92	1
Bugleweed *(Lycopus uniflorus)*	83	1
Dwarf Raspberry *(Rubus pubescens)*	83	4
Crested Wood Fern *(Dryopteris cristata)*	75	1
Sensitive Fern *(Onoclea sensibilis)*	75	2
Wild Sarsaparilla *(Aralia nudicaulis)*	67	2
Yellow Beadlily *(Clintonia borealis)*	23	1
Oak Fern *(Dryopteris disjuncta)*	67	1
Violets *(Viola* spp.*)*	67	1
Red-osier Dogwood *(Cornus stolonifera)*	58	2
Labrador Tea *(Ledum groenlandicum)*	58	2
Partridgeberry *(Mitchella repens)*	58	1
Mountain Holly *(Nemopanthus mucronata)*	58	1
Three-leaved Solomon's Seal *(Smilacina trifolia)*	58	1
Low-sweet Blueberry *(Vaccinium angustifolium)*	58	1
Marsh Marigold *(Caltha palustris)*	50	1
Wild Strawberry *(Fragaria virginiana)*	50	1
Rough Bedstraw *(Galium asprellum)*	50	1
Creeping Snowberry *(Gaultheria hispidula)*	50	1
American Fly Honeysuckle *(Lonicera canadensis)*	50	1
Naked Miterwort *(Mitella nuda)*	50	1
Heal-all *(Prunella vulgaris)*	50	1
Shinleafs *(Pyrola* spp.*)*	50	1
Juneberries *(Amelanchier* spp.*)*	42	1
Wood Horsetail *(Equisetum sylvaticum)*	42	1

Common Name *(Scientific Name)*	Freq. %	Cover %
Spotted Touch-me-not *(Impatiens capensis)*	42	2
Stiff Clubmoss *(Lycopodium annotinum)*	42	5
Royal Fern *(Osmunda regalis)*	42	4
Alder-leaved Buckthorn *(Rhamnus alnifolia)*	42	1
Nodding Trillium *(Trillium cernuum)*	42	1
Canada Blueberry *(Vaccinium myrtilloides)*	42	1
Mountain Maple *(Acer spicatum)*	33	1
Lady Fern *(Athyrium filix-femina)*	33	1
Dwarf Enchanter's Nightshade *(Circaea alpina)*	33	1
American Hazelnut *(Corylus americana)*	33	1
Gooseberry *(Ribes lacustre)*	33	1
Large-leaved Aster *(Aster macrophyllus)*	25	1
Asters *(Aster* spp.*)*	25	1
Common Fleabane *(Erigeron philadelphicus)*	25	1
Bedstraws *(Galium* spp.*)*	25	1
Swamp Red Currant *(Ribes triste)*	25	1
American Mountain Ash *(Sorbus americana)*	25	1
Small Jack-in-the-pulpit *(Arisaema triphyllum)*	17	1
Pink Lady's Slipper *(Cypripedium acaule)*	17	1
Oak Fern *(Dryopteris disjuncta)*	17	2
Fringed Orchids *(Habenaria* spp.*)*	17	1
Ground Pine *(Lycopodium obscurum)*	17	1
Common Wood Sorrel *(Oxalis montana)*	17	1
Virginia Creeper (*Parthenocissus* spp.*)*.	17	1
White Lettuce *(Prenanthes alba)*	17	1
Chokecherry *(Prunus virginiana)*	17	1
Small Cranberry *(Vaccinium oxycoccus)*	17	1

Virginia Creeper *(Parthenocissus* spp.*)*

(Photo from Department of Natural Resources Archives)

REGION 2: TREE SPECIES BY HABITAT TYPE (ThAbFnIx)

Tree Species Frequency of Occurrence and Average Cover by Size Class

Sawtimber	Freq. %	Cover %
Thuja occidentalis	67	29
Larix laricina	33	15
Fraxinus nigra	17	18

Poles	Freq. %	Cover %
Abies balsamea	83	5
Thuja occidentalis	75	27
Fraxinus nigra	58	14
Betula alleghaniensis	33	6
Larix laricina	33	28
Acer rubrum	17	13
Tsuga canadensis	17	20

Saplings	Freq. %	Cover %
Abies balsamea	100	20
Fraxinus nigra	92	10
Acer rubrum	42	4
Thuja occidentalis	33	3
Betula papyrifera	25	1
Betula alleghaniensis	17	3
Larix laricina	17	1
Picea mariana	17	2

Seedlings	Freq. %	Cover %
Abies balsamea	92	2
Acer rubrum	92	1
Fraxinus nigra	75	1
Betula papyrifera	17	1
Picea mariana	17	1
Quercus rubra	17	1
Ulmus americana	17	1

FnAbI

Fraxinus-Abies/Impatiens

Fraxinus nigra-Abies balsamea/Impatiens capensis

Black Ash-Balsam Fir/Spotted Touch-me-not

DISTRIBUTION

Bayfield, Douglas Counties and surrounding regions.

LANDFORM AND SOILS

Landform is most likely till deposits. Soil profile typically consists of a shallow organic layer (less than one foot) over finer texture mineral soil with sandier layers often present. Texture varies greatly but clay component usually is conspicuous. Soil profile stratification can be complex.

VEGETATION

Common Forest Cover Types: Most stands are dominated singly, or in combination, by black ash and balsam fir. Some common associates include northern white cedar, red maple, aspen, white birch and (formerly) American elm. Advance reproduction is best represented by black ash and balsam fir. Northern white cedar is conspicuously underrepresented in this layer, at least in part, due to browsing by deer.

Shrub and Small Tree Layer: This layer is not well developed. The most frequently present shrubs are speckled alder *(Alnus rugosa)*, Winterberry *(Ilex verticillata)* and Currants/Gooseberries *(Ribes* spp.*)*. Mountain Maple *(Acer spicatum)*, Red-osier Dogwood *(Cornus stolonifera)*, Beaked Hazel *(Corylus cornuta)* and Raspberries/Blackberries *(Rubus* spp.*)* also occur in some stands.

Ground Flora Characteristics: In many stands, Purple-stemmed Aster *(Aster puniceus)* dominates this layer, and Dwarf Raspberry *(Rubus pubescens)* and Lady Fern *(Athyrium filix-femina)* are often well represented. Other species with relatively high frequency of occurrence include Spinulose Shield Fern *(Dryopteris spinulosa)*, Spotted Touch-me-not *(Impatiens capensis)*, Marsh Marigold *(Caltha palustris)*, Sensitive Fern *(Onoclea sensibilis)* and Jack-in-the-pulpit *(Arisaema atrorubens)*.

Disturbance and Succession: See the Introduction.

Management Implications: On the relative scale of wetland habitat type productivity (very poor, poor, poor to medium, medium, medium to rich) **FnAbI** is classified as "medium" (see the **Management Implications** section). It is the richest wetland habitat type in Region 2.

REGION 2: PLANT SPECIES BY HABITAT TYPE (FnAbl)

Understory Species in Order of Decreasing Frequency of Occurrence

Common Name *(Scientific Name)*	Freq. %	Cover %
Spinulose Shield Fern *(Dryopteris spinulosa)*	94	2
Purple-stemmed Aster *(Aster puniceus)*	87	38
Dwarf Raspberry *(Rubus pubescens)*	87	9
Goldenrods *(Solidago* spp.*)*	87	1
Lady Fern *(Athyrium filix-femina)*	81	5
Marsh Marigold *(Caltha palustris)*	81	2
Wood Horsetail *(Equisetum sylvaticum)*	81	5
Spotted Touch-me-not *(Impatiens capensis)*	81	5
Rough Bedstraw *(Galium asprellum)*	77	2
Small Jack-in-the-pulpit *(Arisaema triphyllum)*	74	1
Sensitive Fern *(Onoclea sensibilis)*	74	4
Wild Lily-of-the-valley *(Maianthemum canadense)*	65	1
Speckled Alder *(Alnus rugosa)*	61	19
Swamp Red Currant *(Ribes triste)*	61	3
Starflower *(Trientalis borealis)*	61	1
Violets *(Viola* spp.*)*	58	1
Wild Strawberry *(Fragaria virginiana)*	55	1
Winterberry *(Ilex verticillata)*	55	4
Dwarf Enchanter's Nightshade *(Circaea alpina)*	52	1
Naked Miterwort *(Mitella nuda)*	52	1
Cinnamon Fern *(Osmunda cinnamomea)*	52	4
Gooseberry *(Ribes lacustre)*	52	2
Early Meadow Rue *(Thalictrum dioicum)*	52	4
Nodding Trillium *(Trillium cernuum)*	52	1
Asters *(Aster* spp.*)*	48	1
Crested Wood Fern *(Dryopteris cristata)*	48	1
Large-leaved Aster *(Aster macrophyllus)*	45	3
Red-osier Dogwood *(Cornus stolonifera)*	45	1
Chokecherry *(Prunus virginiana)*	45	3
Swamp Buttercup *(Ranunculus hispidus)*	45	1
Wild Red Raspberry *(Rubus idaeus)*	45	6
White Lettuce *(Prenanthes alba)*	42	1
Mountain Maple *(Acer spicatum)*	39	11

Common Name *(Scientific Name)*	Freq. %	Cover %
Wood Anemone *(Anemone quinquefolia)*	39	1
Goldthread *(Coptis groenlandica)*	39	1
American Hazelnut *(Corylus americana)*	39	5
Bugleweed *(Lycopus uniflorus)*	39	1
Interrupted Fern (Osmunda claytoniana)	39	4
Virgin's Bower *(Clematis virginiana)*	35	1
Yellow Beadlily *(Clintonia borealis)*	23	1
Bunchberry *(Cornus canadensis)*	35	1
Oak Fern *(Dryopteris disjuncta)*	35	1
Beech Fern *(Dryopteris phegopteris)*	35	3
Wild Sarsaparilla *(Aralia nudicaulis)*	32	4
Common Fleabane *(Erigeron philadelphicus)*	32	1
Wild Lettuce *(Lactuca canadensis)*	32	1
Heal-all *(Prunella vulgaris)*	32	1
Bladder Sedge *(Carex intumescens)*	29	1
Ostrich Fern *(Matteuccia struthiopteris)*	26	5
Virginia Creeper *(Parthenocissus* spp.*)*.	26	1
Tall Buttercup *(Ranunculus acris)*	26	1
Swamp Thistle *(Cirsium muticum)*	23	1
American Fly Honeysuckle *(Lonicera canadensis)*	23	1
Currants/Gooseberries *(Ribes* spp.*)*	23	1
Red Baneberry *(Actaea rubra)*	19	1
Juneberries *(Amelanchier* spp.*)*	19	1
Wood Nettle *(Laportea canadensis)*	19	5
Mosses *(Moss* spp.*)*	19	15
Shinleafs *(Pyrola* spp.*)*	19	1
Hooked Crowfoot *(Ranunculus recurvatus)*	19	1
Sessile-leaved Bellwort *(Uvularia sessifolia)*	19	1
Bush Honeysuckle *(Diervilla lonicera)*	16	1
Hairy Solomon's Seal *(Polygonatum pubescens)*	16	1
American Mountain Ash *(Sorbus americana)*	16	1
Spotted Joe-Pye Weed *(Eupatorium maculatum)*	13	1
Larger Blue Flag *(Iris versicolor)*	13	1
Raspberries/Blackberries *(Rubus* spp.*)*	13	1
Sphagnum Mosses *(Sphagnum* spp.*)*	13	2
Nannyberry *(Viburnum lentago)*	13	3
High-bush Cranberry *(Viburnum trilobum)*	13	1

REGION 2: TREE SPECIES BY HABITAT TYPE (FnAbl)

Tree Species Frequency of Occurrence and Average Cover by Size Class

Sawtimber	Freq. %	Cover %
Fraxinus nigra	61	16
Thuja occidentalis	35	25
Abies balsamea	19	5
Betula alleghaniensis	13	10
Acer saccharum	10	14
Betula papyrifera	10	7
Populus tremuloides	10	16

Poles	Freq. %	Cover %
Fraxinus nigra	87	34
Abies balsamea	68	12
Ulmus americana	32	7
Acer rubrum	26	9
Thuja occidentalis	26	17
Betula papyrifera	23	6
Acer saccharum	16	6
Betula alleghaniensis	16	6
Populus tremuloides	13	14

Saplings	Freq. %	Cover %
Fraxinus nigra	94	13
Abies balsamea	84	5
Acer rubrum	48	4
Ulmus americana	45	7
Betula alleghaniensis	23	6
Acer saccharum	19	12
Populus tremuloides	13	1
Thuja occidentalis	10	2

Seedlings	Freq. %	Cover %
Fraxinus nigra	77	2
Abies balsamea	52	1
Acer rubrum	52	1
Ulmus americana	39	1
Acer saccharum	29	4
Quercus rubra	29	1
Picea glauca	16	1
Populus tremuloides	16	1
Betula alleghaniensis	13	1

Crested Wood Fern *(Dryopteris cristata)*

(Photo from Department of Natural Resources Archives)

Spotted Touch-me-not *(Impatiens capensis)*

(Photo from Department of Natural Resources Archives)

Wood Horsetail *(Equisetum sylvaticum)*

(Photo from Department of Natural Resources Archives)

(Photo from Kemp Natural Resources Station Archives)

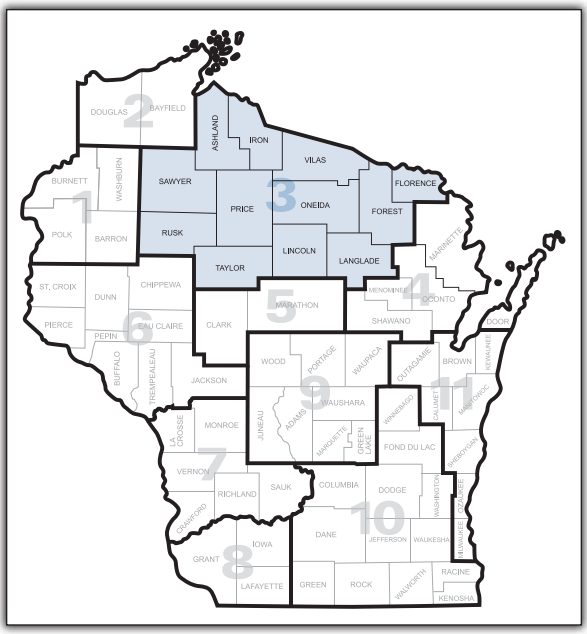
Region 3

GENERAL DESCRIPTION

Region 3 encompasses 12 counties in northcentral and northeastern Wisconsin: Ashland, Florence, Forest, Iron, Langlade, Lincoln, Oneida, Price, Rusk, Sawyer, Taylor, and Vilas Counties. Glacial features include end, recessional and ground moraine, outwash and loess. Soils are a mix of sandy outwash, loams, silt and some clay.

Hydrological features are reflected in the wide variety of soils, topography and geology in the North Central and Northern Highland ecological landscape. Tamarack and black spruce forested wetlands exist on sandy outwash. Larger stands of black ash and northern white cedar forests occur as isolated forest wetlands on organic muck or mineral soils. The location of these forest types are determined by the flow of water over the landscape which are influenced by topography and soils. Acidic sites tend to be limited on groundwater and most rely on rainfall (peatlands). Other areas with slow moving groundwater have more nutrients leading to a dominance of cedar, ash and other species.

(Photo from Kemp Natural Resources Station Archives)



Region 3: Ashland, Florence, Forest, Iron, Langlade, Lincoln, Oneida, Price, Rusk, Sawyer, Taylor, and Vilas Counties

WETLAND FOREST HABITAT TYPES OF REGION 3

PmLLe

Primary Occurrence: Throughout Region 3

- *Picea-Larix/Ledum*
- Black Spruce-Tamarack/Labrador Tea

PmLNe

Primary Occurrence: Throughout Region 3

- *Picea-Larix/Nemopanthus*
- Black Spruce-Tamarack/Mountain Holly

AbThArAsp

Primary Occurrence: Forest & Langlade Counties

- *Abies-Thuja-Acer/Acer*
- Balsam Fir-Northern White Cedar-Red Maple/ Mountain Maple

AbFnThOs

Primary Occurrence: Ashland, Iron & Price Counties

- *Abies-Fraxinus-Thuja/Osmunda*
- Balsam Fir-Black Ash-Northern White Cedar/ Cinnamon Fern

AbFnThIx

Primary Occurrence: Langlade, Lincoln, Oneida & Vilas Counties

- *Abies-Fraxinus-Thuja/Ilex*
- Balsam Fir-Black Ash-Northern White Cedar/ Winterberry

FnAbArOn

Primary Occurrence: Ashland, Iron & Price Counties

- *Fraxinus-Abies-Acer/Onoclea*
- Black Ash-Balsam Fir-Red Maple/Sensitive Fern

FnArI

Primary Occurrence: Ashland, Iron & Price Counties

- *Fraxinus-Acer/Impatiens*
- Black Ash-Red Maple/Spotted Touch-me-not

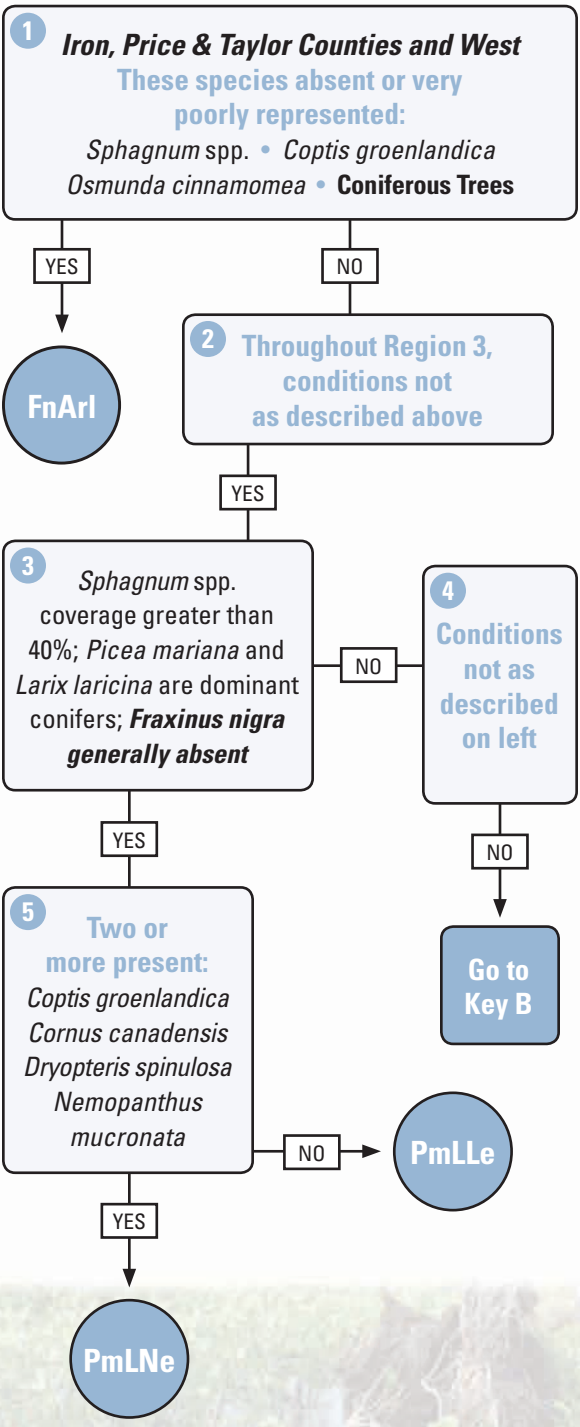
(Photo from Department of Natural Resources Archives)

(Photo from Kemp Natural Resources Station Archives)

(Photo from Kemp Natural Resources Station Archives)

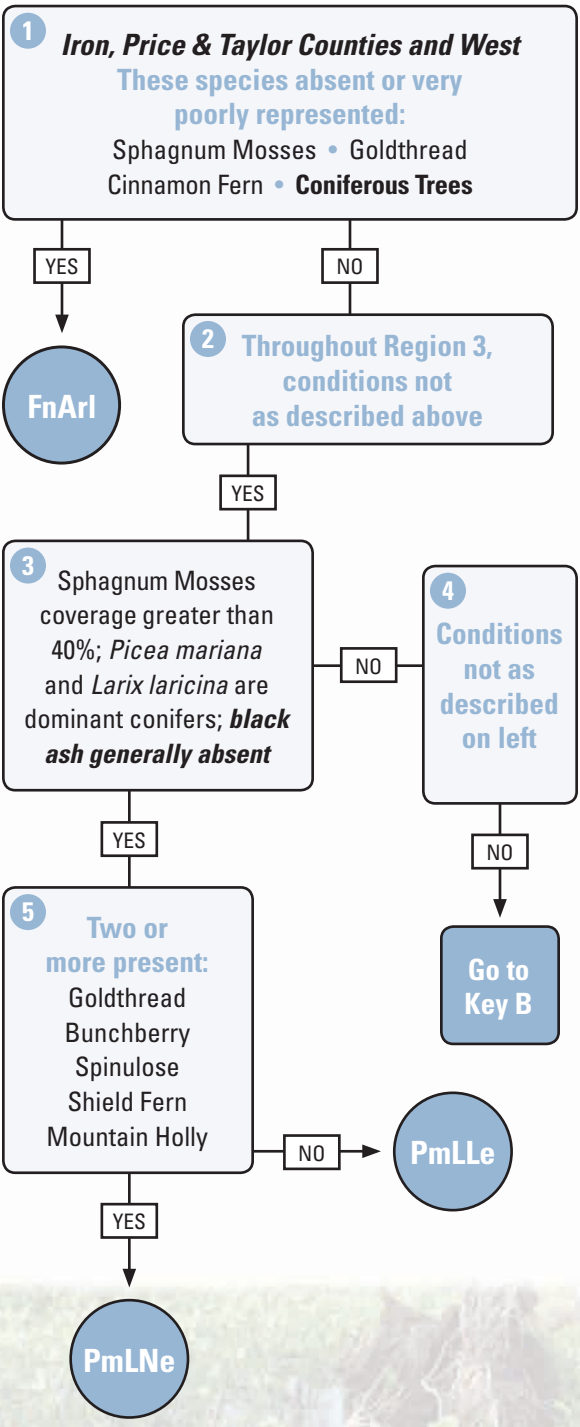
REGION 3

Key to Wetland Habitat Types Key A (Scientific Names)



REGION 3

Key to Wetland Habitat Types Key A (Common Names)



REGION 3

Key to Wetland Habitat Types Key B (Scientific Names)*

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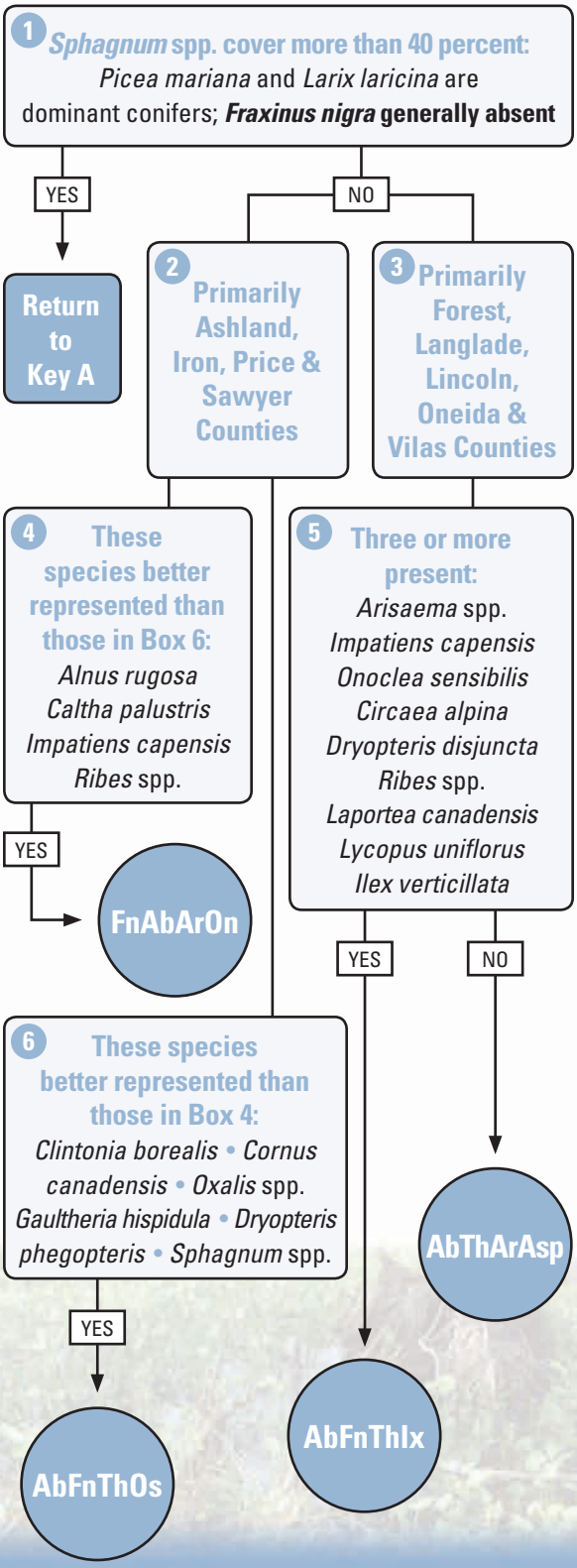

REGION 3

Key to Wetland Habitat Types Key B (Common Names)*

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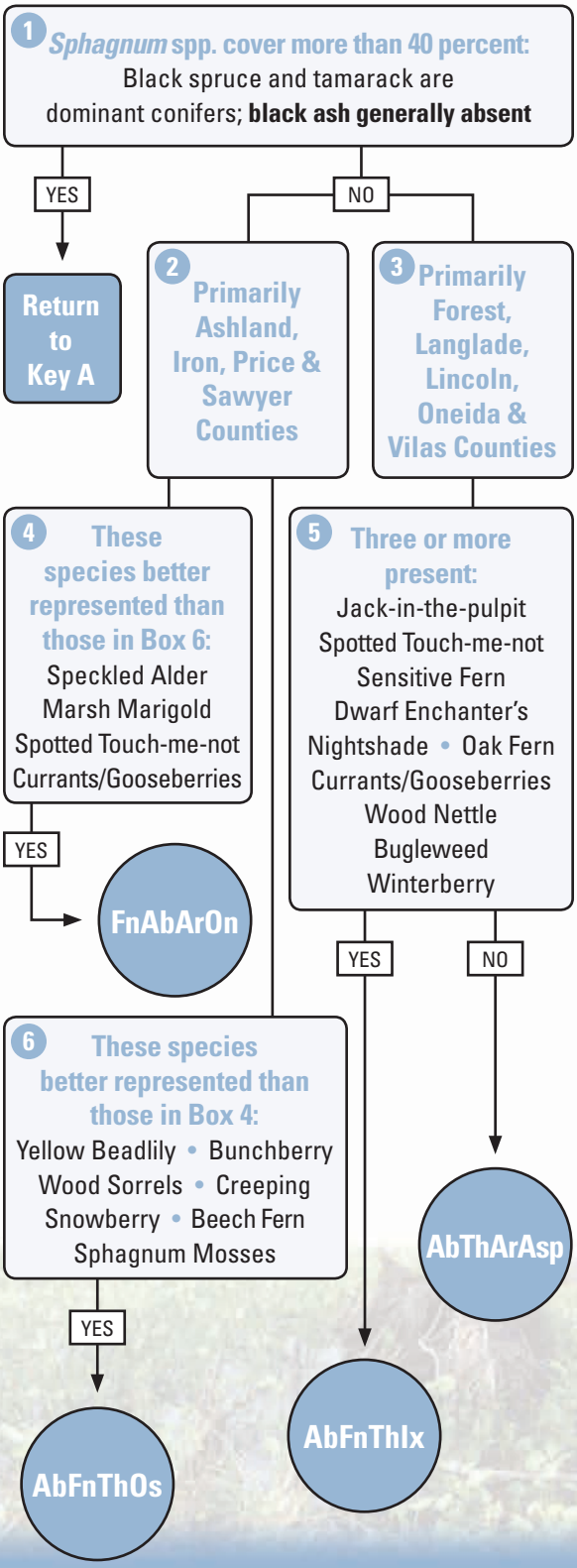
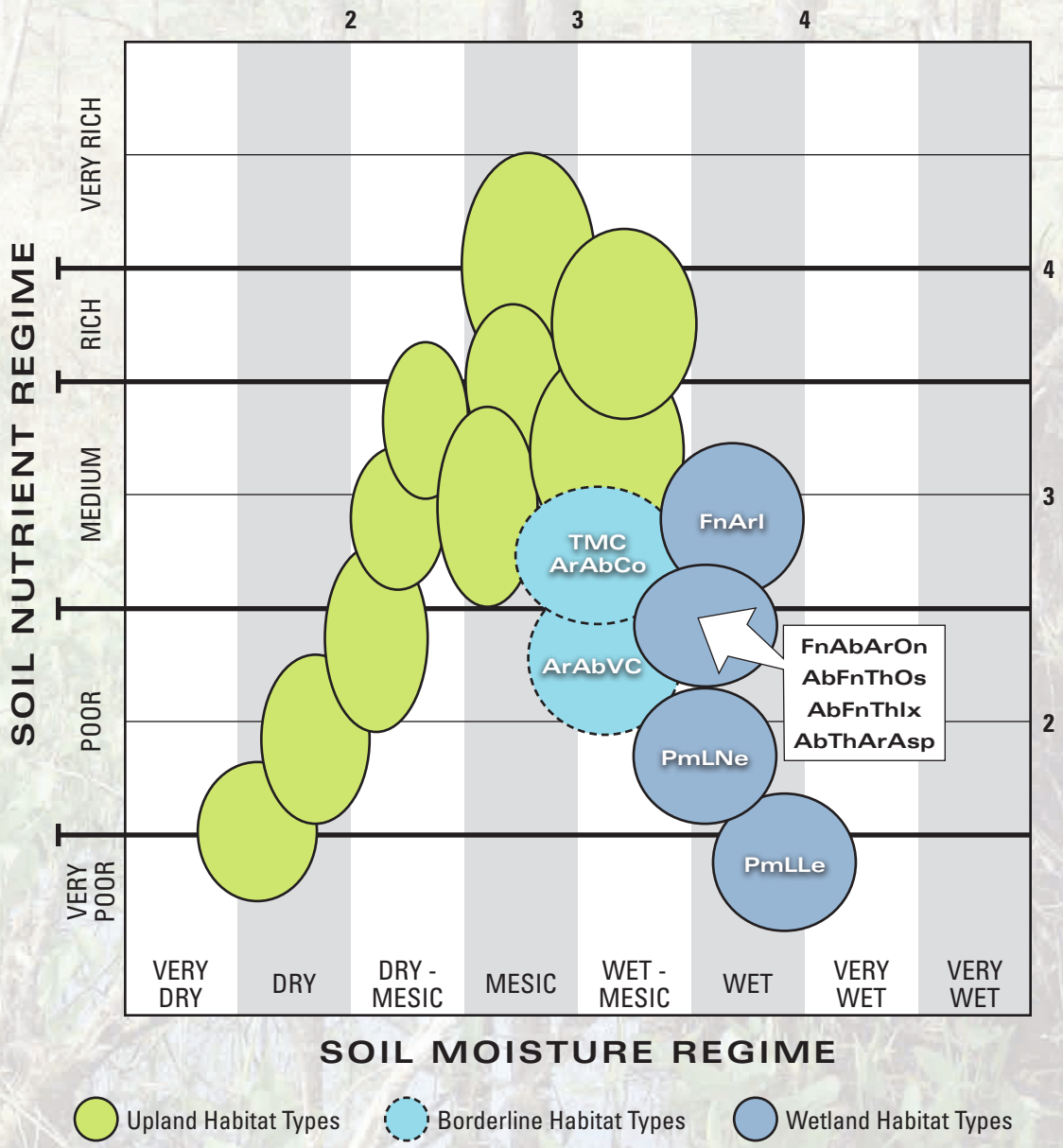


RELATIONSHIP OF HABITAT TYPES TO SOIL MOISTURE AND NUTRIENT REGIMES IN REGION 3



Region 3 Habitat Type Descriptions

PmLLe

Picea-Larix/Ledum

Picea mariana-Larix laricina/Ledum groenlandicum

Black Spruce-Tamarack/Labrador Tea

DISTRIBUTION

Throughout the region.

LANDFORM AND SOILS

Deep organic substrate – peat bog.

VEGETATION

Common Forest Cover Types: Stands are dominated entirely by black spruce and tamarack. Only paper birch and white pine occur as temporary associates. Advance reproduction consists almost entirely of black spruce and tamarack, but paper birch saplings are sometimes well represented. Other species that sometimes occur as saplings, but typically do not reach maturity, are red maple, balsam fir, yellow birch and eastern hemlock.

Shrub and Small Tree Layer: Tall shrubs are not well represented. The only conspicuous species with high coverage are Labrador Tea *(Ledum groenlandicum)*, Mountain Holly *(Nemopanthus mucronata)* and Canada Blueberry *(Vaccinium myrtilloides)* and Low-sweet Blueberry *(Vaccinium angustifolium)*. Several other woody species characteristic of this type are inconspicuous and best described with ground flora.

Ground Flora Characteristics: *Sphagnum* spp. is a dominant characteristic. Herb species are poorly represented. The following occur with low frequencies: Three-leaved Solomon's Seal *(Smilacina trifolia)*, Yellow Beadlily *(Clintonia borealis)*, Bunchberry *(Cornus canadensis)* and various species of Lady's Slippers *(Cypripedium* spp.*)*. More frequent and often inconspicuous are species of the Heath family *(Ericaceae)*, such as Leatherleaf *(Chamaedaphne calyculata)*, Wintergreen *(Gaultheria procumbens)*, Creeping Snowberry *(Gaultheria hispidula)*, Pale Laurel *(Kalmia polifolia)*, Small Cranberry *(Vaccinium oxycoccus)*, and Bog Rosemary *(Andromeda glaucophylla)*.

Disturbance and Succession: See the Introduction.

Management Implications: On the relative scale of wetland habitat type productivity (very poor, poor, poor to medium, medium, medium to rich) **PmLLe** type is classified as "very poor" (see the **Management Implications** section).

REGION 3: PLANT SPECIES BY HABITAT TYPE (PmLLe)

Understory Species in Order of Decreasing Frequency of Occurrence

Common Name *(Scientific Name)*	Freq. %	Cover %
Sphagnum Mosses *(Sphagnum* spp.*)*	100	83
Leatherleaf *(Chamaedaphne calyculata)*	97	4
Labrador Tea *(Ledum groenlandicum)*	97	17
Black Spruce *(Picea mariana)*	97	4
Creeping Snowberry *(Gaultheria hispidula)*	94	4
Canada Blueberry *(Vaccinium myrtilloides)*	94	6
Small Cranberry *(Vaccinium oxycoccus)*	82	1
Pale Laurel *(Kalmia polifolia)*	73	1
Hair Mosses *(Polytrichum* spp.*)*	61	1
Mountain Holly *(Nemopanthus mucronata)*	58	3
Three-leaved Solomon's Seal *(Smilacina trifolia)*	58	7
Feather Mosses *(Feather Moss* spp.*)*	45	2
Low-sweet Blueberry *(Vaccinium angustifolium)*	42	5
Wintergreen *(Gaultheria procumbens)*	36	1
Speckled Alder *(Alnus rugosa)*	30	1
Yellow Beadlily *(Clintonia borealis)*	30	3
Bunchberry *(Cornus canadensis)*	30	2
Pink Lady's Slipper *(Cypripedium acaule)*	30	1
Wild Lily-of-the-valley *(Maianthemum canadense)*	30	1
Bog Rosemary *(Andromeda glaucophylla)*	27	1
Cinnamon Fern *(Osmunda cinnamomea)*	27	3
Starflower *(Trientalis borealis)*	27	1
Juneberries *(Amelanchier* spp.*)*	24	1
Spinulose Shield Fern *(Dryopteris spinulosa)*	21	1
Grasses *(Grass* spp.*)*	21	1
Reindeer Lichens *(Cladina* spp.*)*	15	1
Large Cranberry *(Vaccinium macrocarpon)*	15	1
Goldthread *(Coptis groenlandica)*	12	1
Larger Blue Flag *(Iris versicolor)*	12	5

REGION 3: TREE SPECIES BY HABITAT TYPE (PmLLe)

Tree Species Frequency of Occurrence and Average Cover by Size Class

Sawtimber	**Freq. %**	**Cover %**
Larix laricina	48	10
Pinus strobus	24	6
Picea mariana	15	4

Poles	**Freq. %**	**Cover %**
Picea mariana	88	26
Larix laricina	85	26
Pinus strobus	21	5
Betula papyrifera	15	5
Tsuga canadensis	9	7

Saplings	**Freq. %**	**Cover %**
Picea mariana	91	12
Larix laricina	76	7
Abies balsamea	42	3
Betula papyrifera	39	7
Pinus strobus	33	5
Acer rubrum	18	2
Tsuga canadensis	12	7

Seedlings	**Freq. %**	**Cover %**
Picea mariana	91	5
Abies balsamea	48	1
Betula papyrifera	42	1
Acer rubrum	39	1
Pinus strobus	36	1
Larix laricina	15	1
Quercus rubra	15	1

PmLNe

Picea-Larix/Nemopanthus

Picea mariana-Larix laricina/Nemopanthus mucronata

Black Spruce-Tamarack/Mountain Holly

DISTRIBUTION

Throughout the region.

LANDFORM AND SOILS

Deep organic substrate – peat bog. Often in narrow zones adjacent to uplands, hydrologically nutrient enriched, therefore, less acidic than PmLLe type.

VEGETATION

Common Forest Cover Types: Most stands are dominated by black spruce and tamarack, but any of the following species can be common associates: balsam fir, northern white cedar, red maple, white spruce, paper birch and aspen. Advance reproduction typically is dominated by balsam fir and black spruce, but saplings of the following species are sometimes well represented: red maple, paper birch, tamarack and northern white cedar.

Shrub and Small Tree Layer: This layer may be sparse or moderately well developed. Best represented shrubs are Mountain Holly *(Nemopanthus mucronata)*, Labrador Tea *(Ledum groenlandicum)*, Canada Blueberry *(Vaccinium myrtilloides)*, Low-sweet Blueberry *(Vaccinium angustifolium)* and speckled alder *(Alnus rugosa)*. Some of the low shrubs (or "sub-shrubs"), mostly of the Heath family and characteristic of PmLLe habitat type, are occasionally present.

Ground Flora Characteristics: *Sphagnum* spp. is a dominant characteristic. Herb species are few and characteristic of wet-mesic uplands, e.g., Bunchberry *(Cornus canadensis)*, Starflower *(Trientalis borealis)*, Spinulose Shield Fern *(Dryopteris spinulosa)*, Wild Lily-of-the-valley *(Maianthemum canadense)*, Goldthread *(Coptis groenlandica)*, Cinnamon Fern *(Osmunda cinnamomea)*, and Yellow Beadlily *(Clintonia borealis)*.

Disturbance and Succession: See the Introduction.

Management Implications: On the relative scale of wetland habitat type productivity (very poor, poor, poor to medium, medium, medium to rich) **PmLNe** type is classified as "poor" (see the **Management Implications** section).

REGION 3: PLANT SPECIES BY HABITAT TYPE (PmLNe)

Understory Species in Order of Decreasing Frequency of Occurrence

Common Name *(Scientific Name)*	Freq. %	Cover %
Mountain Holly *(Nemopanthus mucronata)*	96	3
Starflower *(Trientalis borealis)*	96	1
Canada Blueberry *(Vaccinium myrtilloides)*	96	4
Sphagnum Mosses *(Sphagnum* spp.*)*	92	33
Goldthread *(Coptis groenlandica)*	88	1
Bunchberry *(Cornus canadensis)*	88	3
Wild Lily-of-the-valley *(Maianthemum canadense)*	88	1
Labrador Tea *(Ledum groenlandicum)*	80	4
Cinnamon Fern *(Osmunda cinnamomea)*	76	13
Spinulose Shield Fern *(Dryopteris spinulosa)*	72	3
Creeping Snowberry *(Gaultheria hispidula)*	72	1
Hair Mosses *(Polytrichum* spp.*)*	68	3
Juneberries *(Amelanchier* spp.*)*	64	1
Low-sweet Blueberry *(Vaccinium angustifolium)*	56	4
Feather Mosses *(Feather Moss* spp.*)*	52	6
Wintergreen *(Gaultheria procumbens)*	52	1
Yellow Beadlily *(Clintonia borealis)*	44	1
Speckled Alder *(Alnus rugosa)*	40	7
Winterberry *(Ilex verticillata)*	36	2
Pink Lady's Slipper *(Cypripedium acaule)*	32	1
Twinflower *(Linnaea borealis)*	28	1
Leatherleaf *(Chamaedaphne calyculata)*	24	1
Horsetails *(Equisetum* spp.*)*	24	1
Ground Pine *(Lycopodium obscurum)*	24	1
Common Wood Sorrel *(Oxalis montana)*	24	1
Raspberries/Blackberries *(Rubus* spp.*)*	24	1
Three-leaved Solomon's Seal *(Smilacina trifolia)*	24	1
Wild Sarsaparilla *(Aralia nudicaulis)*	20	1

Common Name *(Scientific Name)*	Freq. %	Cover %
Beaked Hazelnut *(Corylus cornuta)*	20	3
Swamp Dewberry *(Rubus hispidus)*	20	1
Dwarf Raspberry *(Rubus pubescens)*	20	2
Small Cranberry *(Vaccinium oxycoccus)*	20	1
Stiff Clubmoss *(Lycopodium annotinum)*	16	1
Bracken Fern *(Pteridium aquilinum)*	16	5
Reindeer Lichens *(Cladina* spp.*)*	12	1
Trailing Arbutus *(Epigaea repens)*	12	1
Fly Honeysuckles *(Lonicera* spp.*)*	12	1
Bugleweed *(Lycopus uniflorus)*	12	1
Interrupted Fern *(Osmunda claytoniana)*	12	1
Royal Fern *(Osmunda regalis)*	12	4

Royal Fern *(Osmunda regalis)*

(Photo from Department of Natural Resources Archives)

REGION 3: TREE SPECIES BY HABITAT TYPE (PmLNe)

Tree Species Frequency of Occurrence and Average Cover by Size Class

Sawtimber	Freq. %	Cover %
Larix laricina	49	13
Picea mariana	35	10
Thuja occidentalis	30	22
Pinus strobus	19	19
Tsuga canadensis	16	15

Poles	Freq. %	Cover %
Picea mariana	70	26
Larix laricina	54	13
Betula papyrifera	51	5
Abies balsamea	43	5
Acer rubrum	35	9
Thuja occidentalis	30	21
Populus tremuloides	19	3
Tsuga canadensis	19	23
Pinus strobus	14	3
Picea glauca	11	28

Saplings	Freq. %	Cover %
Abies balsamea	86	9
Acer rubrum	62	7
Picea mariana	57	11
Betula papyrifera	43	6
Larix laricina	30	2
Thuja occidentalis	19	7
Betula alleghaniensis	14	8
Picea glauca	11	2
Tsuga canadensis	11	9

Seedlings	Freq. %	Cover %
Acer rubrum	89	1
Abies balsamea	86	3
Picea mariana	57	1
Betula papyrifera	27	1
Quercus rubra	22	1
Prunus serotina	16	1
Pinus strobus	14	1
Picea glauca	11	1
Sorbus americana	11	1

AbThArAsp

Abies-Thuja-Acer/Acer • Abies balsamea-Thuja occidentalis-Acer rubrum/Acer spicatum

Balsam Fir-Northern White Cedar-Red Maple/Mountain Maple

DISTRIBUTION

Mostly Forest and Oneida Counties, and occasionally eastern Vilas and northern Langlade Counties. It also occurs east in Region 4.

LANDFORM AND SOILS

Landform is primarily pitted outwash or other ice contact deposits. Soils are sandy with the depth of organic horizon varying from less than six inches to more than two feet. Saturation depth, in years and seasons of sampling, was between two and three feet.

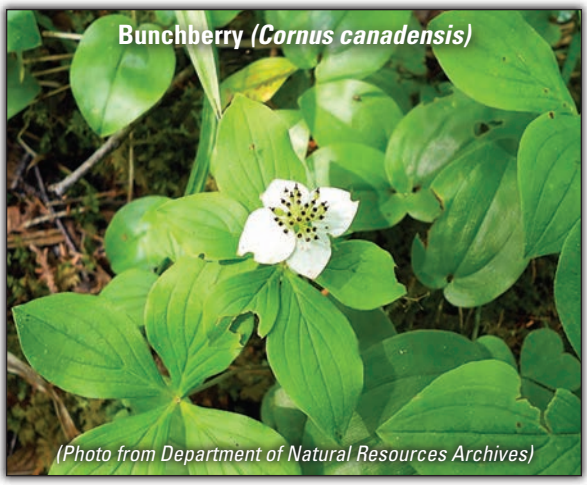
VEGETATION

Common Forest Cover Types: Most stands are dominated, singly or in combination, by balsam fir, northern white cedar and red maple. White spruce, paper birch, yellow birch and hemlock are occasional associates. Advance reproduction is typically dominated by balsam fir. Red maple, black spruce and black ash are sometimes present. Northern white cedar is conspicuously underrepresented in this layer, presumably largely due to deer browsing.

Shrub and Small Tree Layer: This layer may be sparse or moderately well developed. Best represented shrubs are Mountain Maple *(Acer spicatum)*, speckled alder *(Alnus rugosa)*, Beaked Hazel *(Corylus cornuta)*, Fly Honeysuckles *(Lonicera* spp.*)*, and Canada Blueberry *(Vaccinium myrtilloides)*.

Speckled Alder *(Alnus rugosa)*

(Photo from Department of Natural Resources Archives)



Ground Flora Characteristics: Herbaceous layer is moderately well developed and species rich. Species with the highest frequency of occurrence are Bunchberry *(Cornus canadensis)*, Starflower *(Trientalis borealis)*, Spinulose Shield Fern *(Dryopteris spinulosa)*, Wild Lily-of-the-valley *(Maianthemum canadense)*, Goldthread *(Coptis groenlandica)*, Wild Sarsaparilla *(Aralia nudicaulis)*, Dwarf Raspberry *(Rubus pubescens)*, Cinnamon Fern *(Osmunda cinnamomea)*, Yellow Beadlily *(Clintonia borealis)* and Oak Fern *(Dryopteris disjuncta)*. *Sphagnum* spp. was present on 85 percent of study plots with average coverage of 40 percent.

Disturbance and Succession: See the Introduction.

Management Implications: On the relative scale of wetland habitat type productivity (very poor, poor, poor to medium, medium, medium to rich) **AbThArAsp** type is classified as "poor to medium" (see the **Management Implications** section).

REGION 3: PLANT SPECIES BY HABITAT TYPE (AbThArAsp)

Understory Species in Order of Decreasing Frequency of Occurrence

Common Name *(Scientific Name)*	Freq. %	Cover %
Spinulose Shield Fern *(Dryopteris spinulosa)*	100	4
Starflower *(Trientalis borealis)*	100	1
Bunchberry *(Cornus canadensis)*	96	6
Wild Lily-of-the-valley *(Maianthemum canadense)*	96	1
Goldthread *(Coptis groenlandica)*	92	1
Sphagnum Mosses *(Sphagnum* spp.*)*	85	40
Wild Sarsaparilla *(Aralia nudicaulis)*	77	3
Yellow Beadlily *(Clintonia borealis)*	77	2
Oak Fern *(Dryopteris disjuncta)*	73	2
Cinnamon Fern *(Osmunda cinnamomea)*	73	4
Canada Blueberry *(Vaccinium myrtilloides)*	73	1
Mountain Maple *(Acer spicatum)*	69	11
Dwarf Raspberry *(Rubus pubescens)*	69	8
American Fly Honeysuckle *(Lonicera canadensis)*	65	3
Speckled Alder *(Alnus rugosa)*	58	15
Juneberries *(Amelanchier* spp.*)*	58	1
Beaked Hazelnut *(Corylus cornuta)*	58	3
Beech Fern *(Dryopteris phegopteris)*	58	3
Twinflower *(Linnaea borealis)*	54	1
Feather Mosses *(Feather Moss* spp.*)*	50	3
Yellow Birch *(Betula alleghaniensis)*	46	1
Creeping Snowberry *(Gaultheria hispidula)*	46	1
Grasses *(Grass* spp.*)*	46	3
Shinleafs *(Pyrola* spp.*)*	46	1
Sedges *(Carex* spp.*)*	42	6
Mountain Holly *(Nemopanthus mucronata)*	42	1
Hair Mosses *(Polytrichum* spp.*)*	42	5
Black Cherry *(Prunus serotina)*	42	1
Low-sweet Blueberry *(Vaccinium angustifolium)*	42	1
Lady Fern *(Athyrium filix-femina)*	38	11
Dwarf Enchanter's Nightshade *(Circaea alpina)*	33	1

Common Name *(Scientific Name)*	Freq. %	Cover %
Bedstraws *(Galium* spp.*)*	38	1
Bugleweed *(Lycopus uniflorus)*	38	1
Raspberries/Blackberries *(Rubus* spp.*)*	24	1
Shinleafs *(Pyrola* spp.*)*	24	1
Marsh Marigold *(Caltha palustris)*	22	2
Bugleweed *(Lycopus uniflorus)*	20	1
Arrow-leaved Tearthumb *(Polygonum sagittatum)*	20	1
Speckled Alder *(Alnus rugosa)*	18	10
Small Jack-in-the-pulpit *(Arisaema triphyllum)*	16	1
Hawkweeds *(Hieracium* spp.*)*	16	1
Wood Anemone *(Anemone quinquefolia)*	16	1
Interrupted Fern *(Osmunda claytoniana)*	14	4
Partridgeberry *(Mitchella repens)*	14	1
Naked Miterwort *(Mitella nuda)*	38	1
Common Wood Sorrel *(Oxalis montana)*	38	2
Yellow Wood Sorrel *(Oxalis stricta)*	38	1
Crested Wood Fern *(Dryopteris cristata)*	35	1
Ground Pine *(Lycopodium obscurum)*	35	3
Currants/Gooseberries *(Ribes* spp.*)*	35	2
Asters *(Aster* spp.*)*	31	1
Horsetails *(Equisetum* spp.*)*	31	1
Winterberry *(Ilex verticillata)*	31	1
Spotted Touch-me-not *(Impatiens capensis)*	31	1
Shining Clubmoss *(Lycopodium lucidulum)*	31	2
Labrador Tea *(Ledum groenlandicum)*	27	1
Swamp Red Currant *(Ribes triste)*	27	1
Raspberries/Blackberries *(Rubus* spp.*)*	27	1
Violets *(Viola* spp.*)*	27	1
Red-osier Dogwood *(Cornus stolonifera)*	23	5
Sweet-scented Bedstraw *(Galium triflorum)*	23	1
Stiff Clubmoss *(Lycopodium annotinum)*	23	1
Small Jack-in-the-pulpit *(Arisaema triphyllum)*	19	1

Common Name *(Scientific Name)*	Freq. %	Cover %
Alternate-leaved Dogwood *(Cornus alternifolia)*	19	3
Wild Strawberry *(Fragaria virginiana)*	19	1
Interrupted Fern *(Osmunda claytoniana)*	19	2
Eastern White Pine *(Pinus strobus)*	19	1
Hairy Solomon's Seal *(Polygonatum pubescens)*	19	1
Hooked Crowfoot *(Ranunculus recurvatus)*	19	1
Rose Twisted Stalk *(Streptopus lanceolatus)*	19	1
Nodding Trillium *(Trillium cernuum)*	19	1
Pink Lady's Slipper *(Cypripedium acaule)*	15	1
Bush Honeysuckle *(Diervilla lonicera)*	15	1
Wood Horsetail *(Equisetum sylvaticum)*	15	1
Common Clubmoss *(Lycopodium clavatum)*	15	1
Quaking Aspen *(Populus tremuloides)*	15	1
Chokecherry *(Prunus virginiana)*	15	1
Bracken Fern *(Pteridium aquilinum)*	15	3
Swamp Dewberry *(Rubus hispidus)*	15	1
Three-leaved Solomon's Seal *(Smilacina trifolia)*	15	1

Wood Horsetail *(Equisetum sylvaticum)*

(Photo from Department of Natural Resources Archives)

REGION 3: TREE SPECIES BY HABITAT TYPE (AbThArAsp)

Tree Species Frequency of Occurrence and Average Cover by Size Class

Sawtimber	**Freq. %**	**Cover %**
Thuja occidentalis	62	36
Tsuga canadensis	46	18
Betula alleghaniensis	38	18
Acer rubrum	35	18
Larix laricina	19	32
Picea mariana	19	13
Betula papyrifera	15	8
Populus tremuloides	15	19
Abies balsamea	12	4
Pinus strobus	12	19

Poles	**Freq. %**	**Cover %**
Abies balsamea	88	16
Thuja occidentalis	69	16
Acer rubrum	50	15
Betula alleghaniensis	31	11
Betula papyrifera	31	13
Fraxinus nigra	27	4
Tsuga canadensis	27	16
Picea mariana	19	19
Populus tremuloides	12	9

Saplings	**Freq. %**	**Cover %**
Abies balsamea	88	23
Acer rubrum	38	4
Thuja occidentalis	31	2
Picea mariana	23	9
Betula alleghaniensis	19	7

Seedlings	**Freq. %**	**Cover %**
Abies balsamea	77	2
Acer rubrum	42	1
Fraxinus nigra	35	1
Acer saccharum	27	1
Betula alleghaniensis	27	1
Acer saccharinum	19	2
Picea mariana	19	2
Prunus serotina	19	1

AbFnThOs

Abies-Fraxinus-Thuja/Osmunda • Abies balsamea-Fraxinus nigra-Thuja occidentalis/Osmunda cinnamomea

Balsam Fir-Black Ash-Northern White Cedar/Cinnamon Fern

DISTRIBUTION

Iron, Price and Taylor Counties and west.

LANDFORM AND SOILS

In this region the pattern of different types of glacial deposits is complex, often resulting in the occurrence of significantly different habitat types in very close proximity to each other. AbFnThOs habitat type occurs primarily where soils are of coarser textures. Surface organic layer is typically shallow, but on some plots it exceeded five feet. In the year of sampling, soil on most plots was saturated to the surface.

VEGETATION

Common Forest Cover Types: Most stands are dominated singly, or in combination, by northern white cedar, balsam fir, black ash and red maple. Advance reproduction is best represented by balsam fir, black ash and red maple. Northern white cedar is conspicuously underrepresented in this layer, presumably due largely to deer browsing.

Shrub and Small Tree Layer: This layer is not well developed. Best represented shrubs, but with relatively low coverage, are Mountain Holly *(Nemopanthus mucronata)*, Mountain Maple *(Acer Spicatum)* and Beaked Hazel *(Corylus cornuta)*. Less common species are Fly Honeysuckles *(Lonicera* spp.*)* and Red-osier Dogwood *(Cornus stolonifera)*.

Ground Flora Characteristics: Herbaceous layer is not well developed. Species with highest frequency of occurrence are Starflower *(Trientalis borealis)*, Bunchberry *(Cornus canadensis)*, Spinulose Shield Fern *(Dryopteris spinulosa)*, Wild Lily-of-the-valley *(Maianthemum canadense)*, Cinnamon Fern *(Osmunda cinnamomea)*, Goldthread *(Coptis groenlandica)*, Dwarf Raspberry *(Rubus pubescens)*, Spotted Touch-me-not *(Impatiens capensis)*, and Sensitive Fern *(Onoclea sensibilis)*. *Sphagnum* spp. was present on 62 percent of study plots with average coverage of 11 percent.

Disturbance and Succession: See the Introduction.

Management Implications: On the relative scale of wetland habitat type productivity (very poor, poor, poor to medium, medium, medium to rich) **AbFnThOs** type is classified as "poor to medium" (see the **Management Implications** section).

REGION 3: PLANT SPECIES BY HABITAT TYPE (AbFnThOs)

Understory Species in Order of Decreasing Frequency of Occurrence

Common Name *(Scientific Name)*	Freq. %	Cover %
Starflower *(Trientalis borealis)*	96	1
Bunchberry *(Cornus canadensis)*	94	2
Wild Lily-of-the-valley *(Maianthemum canadense)*	92	1
Cinnamon Fern *(Osmunda cinnamomea)*	90	8
Spinulose Shield Fern *(Dryopteris spinulosa)*	88	2
Goldthread *(Coptis groenlandica)*	82	1
Mountain Holly *(Nemopanthus mucronata)*	72	1
Dwarf Raspberry *(Rubus pubescens)*	70	3
Goldenrods *(Solidago* spp.*)*	68	1
Beaked Hazelnut *(Corylus cornuta)*	66	3
Fly Honeysuckles *(Lonicera* spp.*)*	62	2
Sphagnum Mosses *(Sphagnum* spp.*)*	62	10
Mountain Maple *(Acer spicatum)*	52	4
Bedstraws *(Galium* spp.*)*	48	1
Sensitive Fern *(Onoclea sensibilis)*	48	1
Oak Fern *(Dryopteris disjuncta)*	48	1
Yellow Beadlily *(Clintonia borealis)*	46	2
Nodding Trillium *(Trillium cernuum)*	44	1
Common Wood Sorrel *(Oxalis montana)*	44	2
Horsetails *(Equisetum* spp.*)*	42	2
Beech Fern *(Dryopteris phegopteris)*	42	2
Hair Mosses *(Polytrichum* spp.*)*	42	2
Naked Miterwort *(Mitella nuda)*	40	2
Red-osier Dogwood *(Cornus stolonifera)*	40	1
Creeping Snowberry *(Gaultheria hispidula)*	40	2
Spotted Touch-me-not *(Impatiens capensis)*	38	1
Wild Strawberry *(Fragaria virginiana)*	38	1
Canada Blueberry *(Vaccinium myrtilloides)*	38	1
Twinflower *(Linnaea borealis)*	32	1
Currants/Gooseberries *(Ribes* spp.*)*	28	2
Raspberries/Blackberries *(Rubus* spp.*)*	24	1
Shinleafs *(Pyrola* spp.*)*	24	1
Marsh Marigold *(Caltha palustris)*	22	2
Bugleweed *(Lycopus uniflorus)*	20	1

Common Name *(Scientific Name)*	Freq. %	Cover %
Arrow-leaved Tearthumb *(Polygonum sagittatum)*	20	1
Speckled Alder *(Alnus rugosa)*	18	10
Small Jack-in-the-pulpit *(Arisaema triphyllum)*	16	1
Hawkweeds *(Hieracium* spp.*)*	16	1
Wood Anemone *(Anemone quinquefolia)*	16	1
Interrupted Fern *(Osmunda claytoniana)*	14	4
Partridgeberry *(Mitchella repens)*	14	1

Bugleweed *(Lycopus uniflorus)*

(Photo from Department of Natural Resources Archives)

Marsh Marigold *(Caltha palustris)*

(Photo from Department of Natural Resources Archives)

REGION 3: TREE SPECIES BY HABITAT TYPE (AbFnThOs)

Tree Species Frequency of Occurrence and Average Cover by Size Class

Sawtimber	Freq. %	Cover %
Thuja occidentalis	76	32
Betula papyrifera	50	14
Fraxinus nigra	32	19
Acer rubrum	30	7
Tsuga canadensis	30	18
Abies balsamea	22	5
Picea mariana	16	7
Populus tremuloides	16	8

Poles	Freq. %	Cover %
Thuja occidentalis	64	23
Abies balsamea	62	10
Fraxinus nigra	62	19
Acer rubrum	48	11
Betula papyrifera	38	9
Tsuga canadensis	24	16
Picea mariana	18	8
Betula alleghaniensis	14	7

Saplings	Freq. %	Cover %
Abies balsamea	92	7
Fraxinus nigra	68	9
Acer rubrum	48	6
Thuja occidentalis	40	5
Betula papyrifera	28	8
Acer saccharum	18	5
Tsuga canadensis	16	12
Ulmus thomasii	16	2
Abies balsamea	90	2

Seedlings	Freq. %	Cover %
Fraxinus nigra	84	1
Acer rubrum	76	1
Betula papyrifera	48	1
Acer saccharum	34	1
Populus tremuloides	22	1
Tsuga canadensis	20	1
Quercus rubra	16	1
Prunus serotina	14	1
Thuja occidentalis	12	1
Ulmus thomasii	12	1

AbFnThIx

Abies-Fraxinus-Thuja/Ilex • Abies balsamea-Fraxinus nigra-Thuja occidentalis/Ilex verticillata

Balsam Fir-Black Ash-Northern White Cedar/Winterberry

DISTRIBUTION

Lincoln, Oneida and Vilas Counties and east.

LANDFORM AND SOILS

Substrate is either organic material, typically deeper than five feet, or very thin and underlain by mineral soil with sandy texture and saturated to near surface.

VEGETATION

Common Forest Cover Types: Most stands are dominated singly, or in combination, by balsam fir, northern white cedar, black ash and red maple. White spruce, yellow birch, white birch and hemlock are occasional associates. Advance reproduction is best represented by balsam fir and black ash. Northern white cedar is underrepresented in this layer, presumably due largely to deer browsing.

Shrub and Small Tree Layer: This layer is not well developed. Best represented shrubs are Beaked Hazel *(Corylus cornuta)*, Currants/Gooseberries *(Ribes* spp.*)*, Winterberry *(Ilex verticillata)*, Juneberries *(Amelanchier* spp.*)*, Mountain Maple *(Acer spicatum)*, Fly Honeysuckles *(Lonicera* spp.*)* and Canada Blueberry *(Vaccinium myrtilloides)*.

Winterberry *(Ilex verticillata)*

(Photo from Department of Natural Resources Archives)

Ground Flora Characteristics: Herbaceous layer is moderately well developed. Species with the highest frequency of occurrence are Bunchberry *(Cornus canadensis)*, Starflower *(Trientalis borealis)*, Spinulose Shield Fern *(Dryopteris spinulosa)*, Wild Lily-of-the-valley *(Maianthemum canadense)*, Goldthread *(Coptis groenlandica)*, Wild Sarsaparilla *(Aralia nudicaulis)*, Dwarf Raspberry *(Rubus pubescens)*, Cinnamon Fern *(Osmunda cinnamomea)*, and Oak Fern *(Dryopteris disjuncta)*. *Sphagnum* spp. was present on 63 percent of study plots with average coverage of 15 percent.

Disturbance and Succession: See the Introduction.

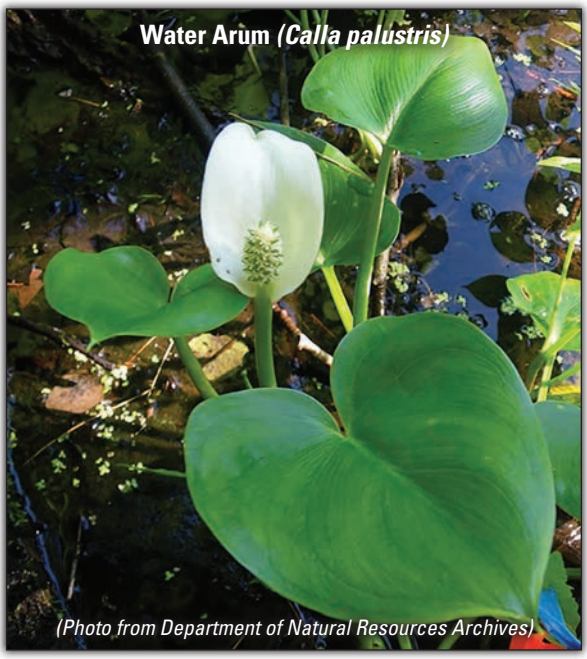
Management Implications: On the relative scale of wetland habitat type productivity (very poor, poor, poor to medium, medium, medium to rich) **AbFnThIx** type is classified as "poor to medium" (see the **Management Implications** section).

REGION 3: PLANT SPECIES BY HABITAT TYPE (AbFnThIx)

Understory Species in Order of Decreasing Frequency of Occurrence

Common Name *(Scientific Name)*	Freq. %	Cover %
Starflower *(Trientalis borealis)*	100	1
Spinulose Shield Fern *(Dryopteris spinulosa)*	99	2
Wild Lily-of-the-valley *(Maianthemum canadense)*	99	1
Asters *(Aster* spp.*)*	97	1
Bunchberry *(Cornus canadensis)*	92	2
Dwarf Raspberry *(Rubus pubescens)*	91	4
Goldthread *(Coptis groenlandica)*	89	1
Cinnamon Fern *(Osmunda cinnamomea)*	85	3
Beaked Hazelnut *(Corylus cornuta)*	80	1
Yellow Beadlily *(Clintonia borealis)*	76	1
Spotted Touch-me-not *(Impatiens capensis)*	75	2
Naked Miterwort *(Mitella nuda)*	75	1
Wild Sarsaparilla *(Aralia nudicaulis)*	74	2
Fly Honeysuckles *(Lonicera* spp.*)*	74	1
Bedstraws *(Galium* spp.*)*	74	1
Wood Sorrels *(Oxalis* spp.*)*	72	1
Small Jack-in-the-pulpit *(Arisaema triphyllum)*	69	1
Mountain Maple *(Acer spicatum)*	68	6
Sensitive Fern *(Onoclea sensibilis)*	68	2
Canada Blueberry *(Vaccinium myrtilloides)*	63	1
Sphagnum Mosses *(Sphagnum* spp.*)*	63	15
Currants/Gooseberries *(Ribes* spp.*)*	62	15
Dwarf Enchanter's Nightshade *(Circaea alpina)*	61	1
Winterberry *(Ilex verticillata)*	61	1
Bugleweed *(Lycopus uniflorus)*	60	1
Mad-dog Skullcap *(Scutellaria lateriflora)*	59	1
Horsetails *(Equisetum* spp.*)*	58	2
Twinflower *(Linnaea borealis)*	47	1
Juneberries *(Amelanchier* spp.*)*	47	1
Violets *(Viola* spp.*)*	47	1
Speckled Alder *(Alnus rugosa)*	45	3
Shinleafs *(Pyrola* spp.*)*	45	1
Beech Fern *(Dryopteris phegopteris)*	37	1
Red-osier Dogwood *(Cornus stolonifera)*	36	1
Oak Fern *(Dryopteris disjuncta)*	34	1

Common Name *(Scientific Name)*	Freq. %	Cover %
Raspberries/Blackberries *(Rubus* spp.*)*	34	1
Nodding Trillium *(Trillium cernuum)*	34	1
Big-leaved Aster *(Aster macrophyllus)*	33	1
Creeping Snowberry *(Gaultheria hispidula)*	28	1
Black Cherry *(Prunus serotina)*	27	1
Rough Bedstraw *(Galium asprellum)*	26	1
Crested Wood Fern *(Dryopteris cristata)*	24	1
Wild Strawberry *(Fragaria virginiana)*	23	1
Alternate-leaved Dogwood *(Cornus alternifolia)*	20	1
Interrupted Fern *(Osmunda claytoniana)*	20	1
Stiff Clubmoss *(Lycopodium annotinum)*	17	1
Ground Pine *(Lycopodium obscurum)*	15	1
Water Arum *(Calla palustris)*	15	1
Marsh Marigold *(Caltha palustris)*	15	1



Water Arum *(Calla palustris)*

(Photo from Department of Natural Resources Archives)

REGION 3: TREE SPECIES BY HABITAT TYPE (AbFnThIx)

Tree Species Frequency of Occurrence and Average Cover by Size Class

Sawtimber	Freq. %	Cover %
Thuja occidentalis	70	15
Picea glauca	20	5
Betula papyrifera	35	7
Acer rubrum	20	10
Tsuga canadensis	23	12
Larix laricina	26	10
Populus tremuloides	16	13
Fraxinus nigra	30	16

Poles	Freq. %	Cover %
Abies balsamea	85	10
Thuja occidentalis	82	22
Betula papyrifera	47	13
Acer rubrum	38	6
Fraxinus nigra	68	18
Picea glauca	21	6
Tsuga canadensis	22	4
Larix laricina	10	13

Saplings	Freq. %	Cover %
Abies balsamea	94	8
Thuja occidentalis	42	2
Fraxinus nigra	55	7
Acer rubrum	40	3
Betula papyrifera	31	2
Picea glauca	41	1
Tsuga canadensis	12	1
Populus tremuloides	13	1

Seedlings	Freq. %	Cover %
Abies balsamea	94	1
Acer rubrum	70	1
Fraxinus nigra	70	1
Picea glauca	42	1
Populus tremuloides	26	1
Prunus serotina	15	1
Thuja occidentalis	24	2
Betula papyrifera	16	1

FnAbArOn

Fraxinus-Abies-Acer/Onoclea • Fraxinus nigra-Abies balsamea-Acer rubrum/Onoclea sensibilis

Black Ash-Balsam Fir-Red Maple/Sensitive Fern

DISTRIBUTION

Iron, Price and Taylor Counties and west.

LANDFORM AND SOILS

Landform is either ground moraines or outwash with parent materials of medium texture. A surface organic layer of one to three feet thick is underlain by mineral soil of sandy loam or loamy sand texture. In the year of sampling, the soil profile was saturated to near surface. About 25 percent of study plots had well decomposed organic layer to a depth greater than five feet.

VEGETATION

Common Forest Cover Types: Black ash typically dominates stands on this habitat type. Sporadic associates include balsam fir, paper birch, red maple and, infrequently, northern white cedar. Advance reproduction is best represented by black ash.

Shrub and Small Tree Layer: This layer is well developed. Most frequently present are speckled alder *(Alnus rugosa)*, Currants/Gooseberries *(Ribes* spp.*)*, Raspberries/Blackberries *(Rubus* spp.*)* and Mountain Maple *(Acer spicatum)*. Less frequent are Red-osier Dogwood *(Cornus stolonifera)* and Mountain Holly *(Nemopanthus mucronata)*.

Ground Flora Characteristics: Species with the highest constancies include Sensitive Fern *(Onoclea sensibilis)*, Spotted Touch-me-not *(Impatiens capensis)*, Bedstraws *(Galium* spp.*)*, Spinulose Shield Fern *(Dryopteris spinulosa)*, Dwarf Raspberry *(Rubus pubescens)*, Marsh Marigold *(Caltha palustris)*, and Horsetails *(Equisetum* spp.*)*.

Disturbance and Succession: See the Introduction.

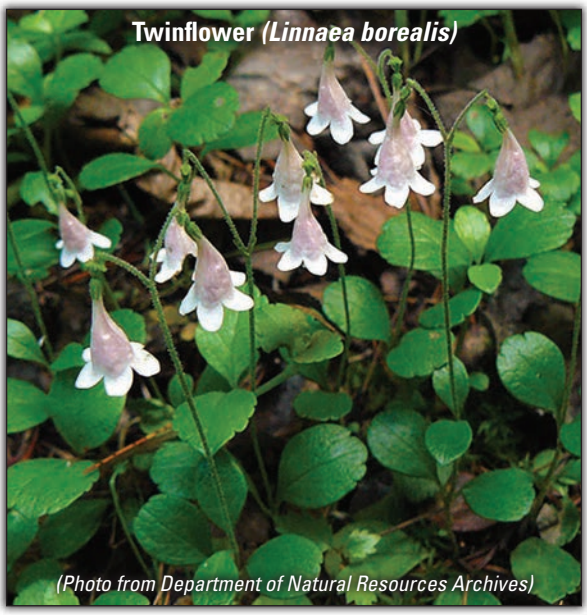
Management Implications: On the relative scale of wetland habitat type productivity (very poor, poor, poor to medium, medium, medium to rich) **FnAbArOn** type is classified as "poor to medium" (see the **Management Implications** section).

REGION 3: PLANT SPECIES BY HABITAT TYPE (FnAbArOn)

Understory Species in Order of Decreasing Frequency of Occurrence

Common Name *(Scientific Name)*	Freq. %	Cover %
Bedstraws *(Galium* spp.*)*	96	1
Dwarf Raspberry *(Rubus pubescens)*	96	4
Spinulose Shield Fern *(Dryopteris spinulosa)*	92	2
Sensitive Fern *(Onoclea sensibilis)*	92	4
Goldenrods *(Solidago* spp.*)*	92	1
Spotted Touch-me-not *(Impatiens capensis)*	83	5
Speckled Alder *(Alnus rugosa)*	79	10
Wild Lily-of-the-valley *(Maianthemum canadense)*	79	1
Marsh Marigold *(Caltha palustris)*	75	2
Currants/Gooseberries *(Ribes* spp.*)*	75	2
Raspberries/Blackberries *(Rubus* spp.*)*	71	2
Cinnamon Fern *(Osmunda cinnamomea)*	67	4
Starflower *(Trientalis borealis)*	63	1
Nodding trillium *(Trillium cernuum)*	63	1
Mountain Maple *(Acer spicatum)*	58	4
Naked Miterwort *(Mitella nuda)*	58	1
Goldthread *(Coptis groenlandica)*	50	1
Mountain Holly *(Nemopanthus mucronata)*	50	2
Red-osier Dogwood *(Cornus stolonifera)*	46	1
White Lettuce *(Prenanthes alba)*	46	1
White Birch *(Betula papyrifera)*	42	1
Wild Strawberry *(Fragaria virginiana)*	42	1
Rough Avens *(Geum laciniatum)*	42	2
Beaked Hazelnut *(Corylus cornuta)*	38	2
Bugleweed *(Lycopus uniflorus)*	38	1
Arrow-leaved Tearthumb *(Polygonum sagittatum)*	38	1
Violets *(Viola* spp.*)*	38	1
Bunchberry *(Cornus canadensis)*	33	1
Black Cherry *(Prunus serotina)*	33	1
Horsetails *(Equisetum* spp.*)*	29	3
Oak Fern *(Dryopteris disjuncta)*	29	1
Wild Lettuce *(Lactuca canadensis)*	29	1
Fly Honeysuckles *(Lonicera* spp.*)*	29	2
Small Jack-in-the-pulpit *(Arisaema triphyllum)*	25	1
Blue Cohosh *(Caulophyllum thalictroides)*	25	1

Common Name *(Scientific Name)*	Freq. %	Cover %
Boneset *(Eupatorium perfoliatum)*	25	1
White Avens *(Geum canadense)*	25	1
Interrupted Fern *(Osmunda claytoniana)*	25	2
Shinleafs *(Pyrola* spp.*)*	25	1
Sphagnum Mosses *(Sphagnum* spp.*)*	25	2
Beech Fern *(Dryopteris phegopteris)*	17	2
Common Wood Sorrel *(Oxalis montana)*	17	2
Spotted Joe-Pye Weed *(Eupatorium maculatum)*	25	1
Narrow-leaved Meadowsweet *(Spiraea alba)*	17	1
Northern White Cedar *(Thuja occidentalis)*	17	1
Water Hemlock *(Cicuta maculata)*	13	1
Twinflower *(Linnaea borealis)*	13	1
Stinging Nettle *(Urtica dioica)*	13	1
Canada Blueberry *(Vaccinium myrtilloides)*	13	1
Violets *(Viola* spp.*)*	13	1



Twinflower *(Linnaea borealis)*

(Photo from Department of Natural Resources Archives)

REGION 3: TREE SPECIES BY HABITAT TYPE (FnAbArOn)

Tree Species Frequency of Occurrence and Average Cover by Size Class

Sawtimber	Freq. %	Cover %
Fraxinus nigra	92	25
Thuja occidentalis	42	15
Betula papyrifera	29	6
Acer rubrum	21	17
Tsuga canadensis	13	15

Poles	Freq. %	Cover %
Fraxinus nigra	100	31
Abies balsamea	58	4
Betula papyrifera	38	11
Acer rubrum	33	7
Thuja occidentalis	25	7
Betula alleghaniensis	13	5

Saplings	Freq. %	Cover %
Fraxinus nigra	96	16
Abies balsamea	79	9
Acer rubrum	50	3
Betula papyrifera	33	5
Acer saccharum	25	9
Ulmus thomasii	25	5
Picea glauca	17	4
Thuja occidentalis	17	2

Seedlings	Freq. %	Cover %
Acer rubrum	88	1
Fraxinus nigra	88	1
Abies balsamea	71	2
Acer saccharum	42	2
Betula papyrifera	42	1
Prunus serotina	33	1
Ulmus thomasii	29	1
Picea glauca	17	1
Thuja occidentalis	17	1

FnArI

Fraxinus-Acer/Impatience

Fraxinus nigra-Acer rubrum/Impatience capensis

Black Ash-Red Maple/Spotted Touch-me-not

DISTRIBUTION

Iron, Price and Taylor Counties and west.

LANDFORM AND SOILS

Regions dominated by ground moraines. The surface of the soil profile typically consists of a relatively shallow layer (one to two feet) of organic material in varying degrees of decomposition, from fibric to sapric. Mineral substrate near the surface is of medium to fine texture, e.g., loam, fine sand or silt loam, underlain by coarser-texture deposits. Saturated conditions were found at two to three feet. However, about 30 percent of plots had well decomposed organic material reaching depths greater than five feet.

VEGETATION

Common Forest Cover Types: Black ash is a predominant species in most stands. Common associates are red maple, paper birch and sometimes balsam fir. The same species are best represented in advance regeneration.

Shrub and Small Tree Layer: This layer is not well developed on this type. Most common are Currants/Gooseberries *(Ribes* spp.*)* and Raspberries/Blackberries *(Rubus* spp.*)*. The following species occur with frequencies of less than 50 percent: Mountain Maple *(Acer spicatum)*, Beaked Hazel *(Corylus cornuta)*, Red-osier Dogwood *(Cornus stolonifera)* and speckled alder *(Alnus rugosa)*.

Ground Flora Characteristics: Species with the highest constancies include Sensitive Fern *(Onoclea sensibilis)*, Spotted Touch-me-not *(Impatiens capensis)*, Bedstraws *(Galium* spp.*)*, Spinulose Shield Fern *(Dryopteris spinulosa)*, Dwarf Raspberry *(Rubus pubescens)*, Marsh Marigold *(Caltha palustris)* and Horsetails *(Equisetum* spp.*)*.

Disturbance and Succession: See the Introduction.

Management Implications: On the relative scale of wetland habitat type productivity (very poor, poor, poor to medium, medium, medium to rich) **FnArI** type is classified as "medium" (see the **Management Implications** section). It is the richest type in Region 3.

REGION 3: PLANT SPECIES BY HABITAT TYPE (FnArl)

Understory Species in Order of Decreasing Frequency of Occurrence

Common Name *(Scientific Name)*	Freq. %	Cover %
Sensitive Fern *(Onoclea sensibilis)*	100	6
Bedstraws *(Galium* spp.*)*	95	2
Raspberries/Blackberries *(Rubus* spp.*)*	95	2
Goldenrods *(Solidago* spp.*)*	95	3
Spinulose Shield Fern *(Dryopteris spinulosa)*	90	3
Spotted Touch-me-not *(Impatiens capensis)*	90	5
Dwarf Raspberry *(Rubus pubescens)*	86	1
Rough Avens *(Geum laciniatum)*	67	1
Northern Bugleweed *(Lycopus uniflorus)*	67	1
Arrow-leaved Tearthumb *(Polygonum sagittatum)*	67	1
Marsh Marigold *(Caltha palustris)*	57	1
Horsetails *(Equisetum* spp.*)*	57	3
Currants/Gooseberries *(Ribes* spp.*)*	57	1
Violets *(Viola* spp.*)*	57	1
Mountain Maple *(Acer spicatum)*	43	2
Wild Lettuce *(Lactuca canadensis)*	38	1
White Lettuce *(Prenanthes alba)*	38	1
Narrow-leaved Meadowsweet *(Spiraea alba)*	38	1
Stinging Nettle *(Urtica dioica)*	38	1

Stinging Nettle *(Urtica dioica)*

(Photo from Department of Natural Resources Archives)

Small Jack-in-the-pulpit *(Arisaema triphyllum)*.....33 1
White Avens *(Geum canadense)*.....33 1
Nodding Trillium *(Trillium cernuum)*.....33 1
Blue Cohosh *(Caulophyllum thalictroides)*....29 4
Red-osier Dogwood *(Cornus stolonifera)*.....29 1
Spotted Joe-Pye Weed *(Eupatorium maculatum)*.....29 1
Naked Miterwort *(Mitella nuda)*.....29 1
Wild Strawberry *(Fragaria virginiana)*.....24 1
Mountain Holly *(Nemopanthus mucronata)*.... 24.....2
Larger Blue Flag *(Iris versicolor)*.....19 1
Shinleafs *(Pyrola* spp.*)*.....19 1
Sphagnum Mosses *(Sphagnum* spp.*)*.....19 2
Juneberries *(Amelanchier* spp.*)*.....14 1
Asters *(Aster* spp.*)*.....14 2
Water Hemlock *(Cicuta maculata)*..... 14.....1
American Hazelnut *(Corylus americana)*.....14 2
Miterwort *(Mitella diphylla)*.....14 1
Buttercups *(Ranunculus* spp.*)*.....14 1
Violets *(Viola* spp.*)*.....14 1


Red-osier Dogwood *(Cornus stolonifera)*
(Photo from Department of Natural Resources Archives)

REGION 3: TREE SPECIES BY HABITAT TYPE (FnArl)

Tree Species Frequency of Occurrence and Average Cover by Size Class

Sawtimber	**Freq. %**	**Cover %**
Fraxinus nigra	100	33
Betula papyrifera	10	4

Poles	**Freq. %**	**Cover %**
Fraxinus nigra	100	32
Acer rubrum	29	11
Betula papyrifera	29	12
Abies balsamea	14	3
Acer saccharum	10	3
Ulmus thomasii	10	5

Saplings	**Freq. %**	**Cover %**
Fraxinus nigra	95	8
Acer rubrum	62	3
Abies balsamea	43	3
Betula papyrifera	33	10
Ulmus thomasii	33	10
Acer saccharum	24	4
Ulmus americana	14	8
Ostrya virginiana	10	9

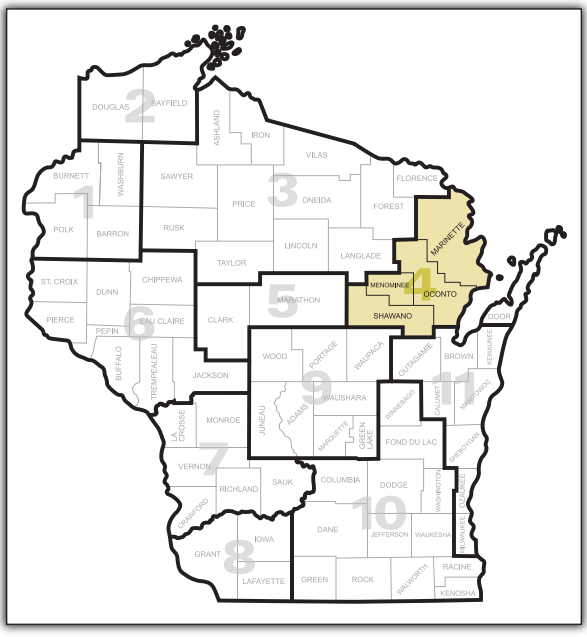
Seedlings	**Freq. %**	**Cover %**
Fraxinus nigra	81	1
Acer rubrum	57	1
Ulmus thomasii	29	1
Populus tremuloides	24	1
Abies balsamea	19	1
Acer saccharum	19	1
Betula papyrifera	19	1
Quercus rubra	10	1
Tilia americana	10	1
Ulmus americana	10	1

(Photo from Kemp Natural Resources Station Archives)

Region 4

GENERAL DESCRIPTION

Region 4 encompasses Door, Marinette, Menominee, Oconto, and Shawano Counties. The entire region was glaciated during the Wisconsin glacial period. It is characterized by glacial and fluvioglacial landforms from lake plain, end moraine and outwash. Loams and silt loams are predominant soils and are developed over calcareous dolomite. Black spruce and tamarack forested wetlands exist on the sandy outwash in the northern portion of the region. Boreal conifer (white spruce and northern white cedar) and lowland black and green ash forested swamps exist on the lake plain influenced by Lake Michigan. Green ash is more predominant in the hardwood swamps of this region.



Region 4: Door, Marinette, Menominee, Oconto, and Shawano Counties

(Photo from Kemp Natural Resources Station Archives)

WETLAND FOREST HABITAT TYPES OF REGION 4

PmLLe
- *Picea-Larix/Ledum*
- Black Spruce-Tamarack/Labrador Tea

PmLNe
- *Picea-Larix/Nemopanthus*
- Black Spruce-Tamarack/Mountain Holly

ThAbFnC
- *Thuja-Abies-Fraxinus/Coptis*
- Northern White Cedar-Balsam Fir-Black Ash/ Goldthread

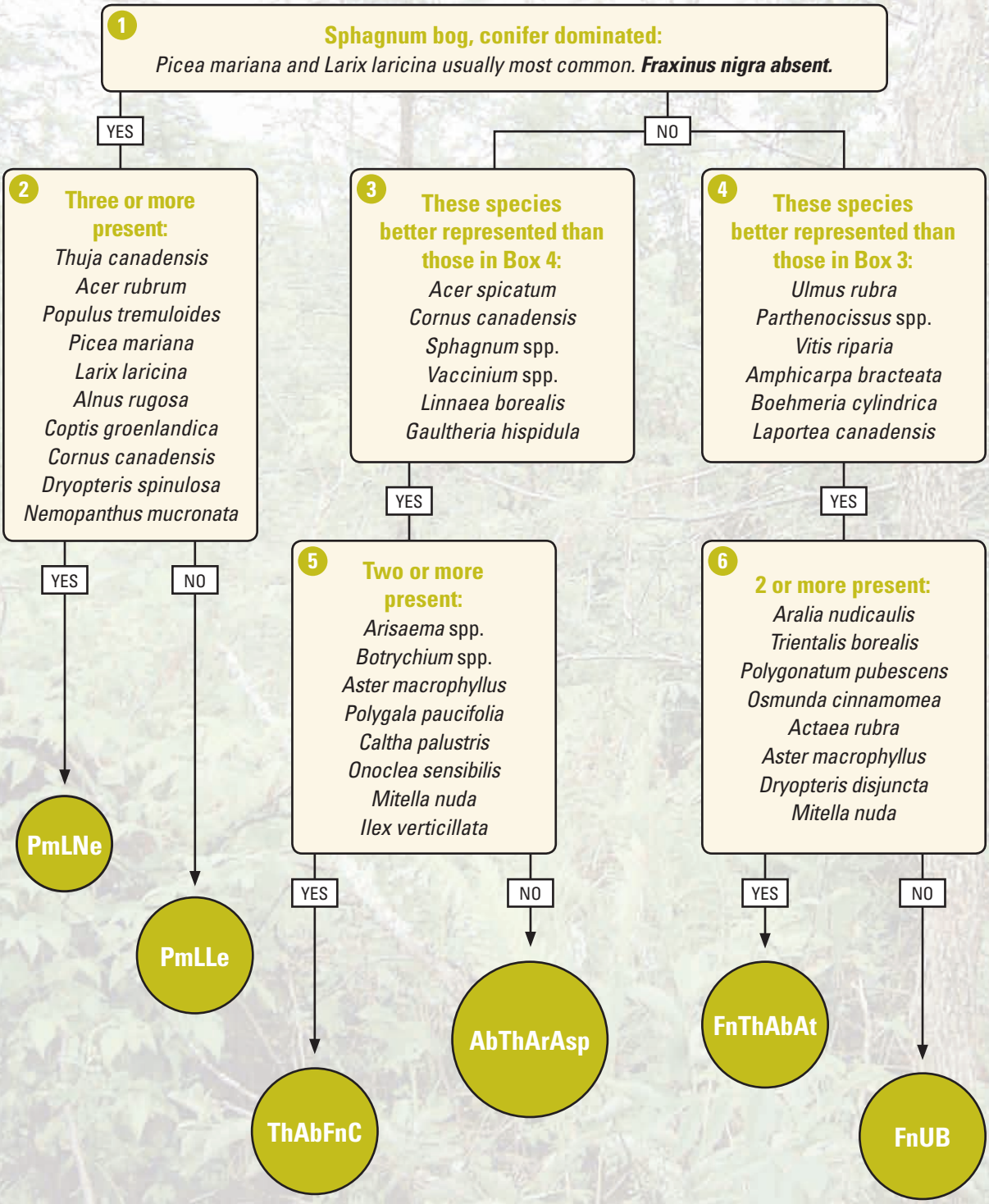
AbThArAsp
- *Abies-Thuja-Acer/Acer*
- Balsam Fir-Northern White Cedar-Red Maple/ Mountain Maple

FnThAbAt
- *Fraxinus-Thuja-Abies/Athyrium*
- Black Ash-Northern White Cedar-Balsam Fir/ Lady Fern

FnUB
- *Fraxinus-Ulmus/Boehmeria*
- Black Ash-(Formerly) Red Elm/False Nettle

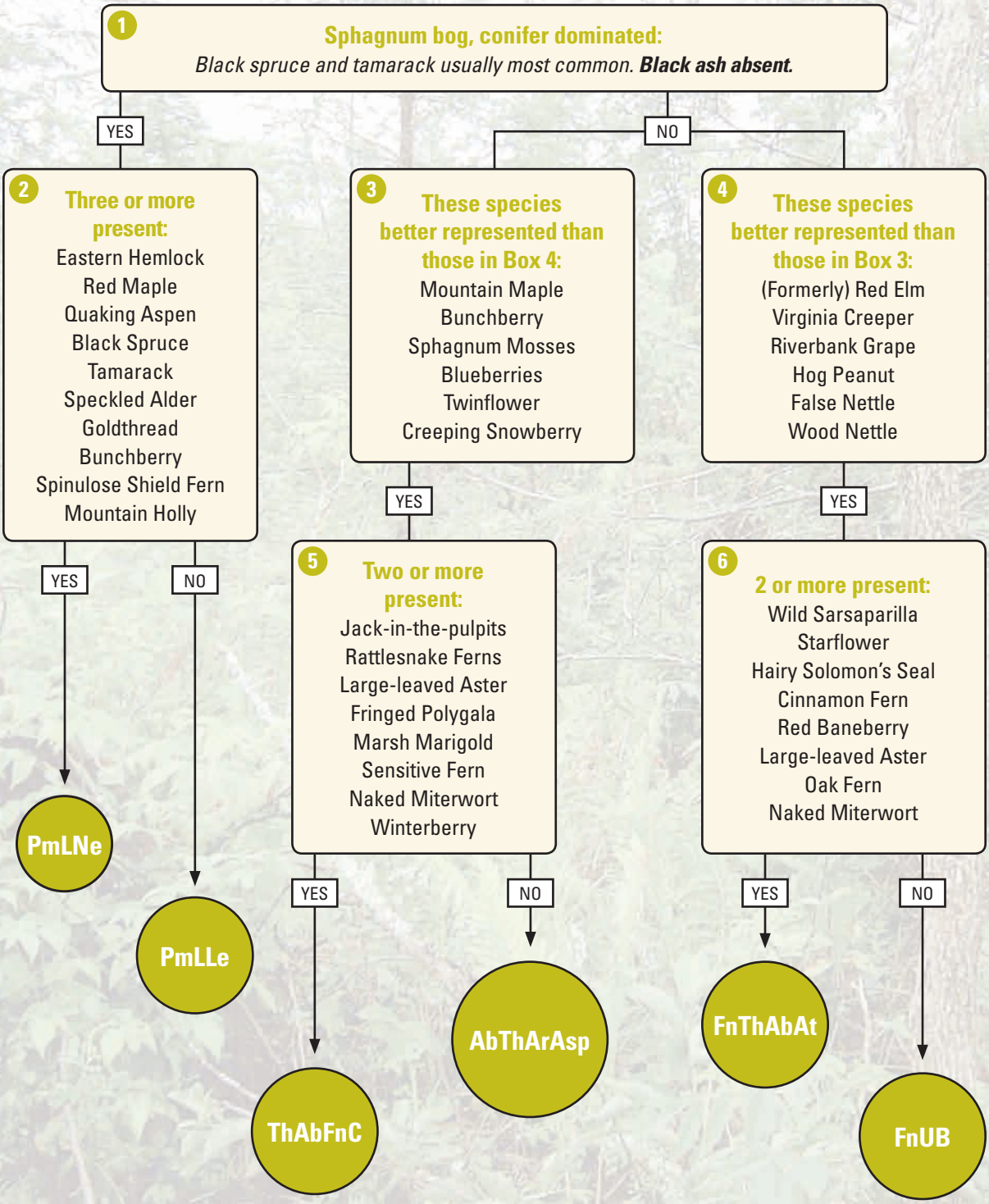
REGION 4

Key to Wetland Habitat Types (Scientific Names)

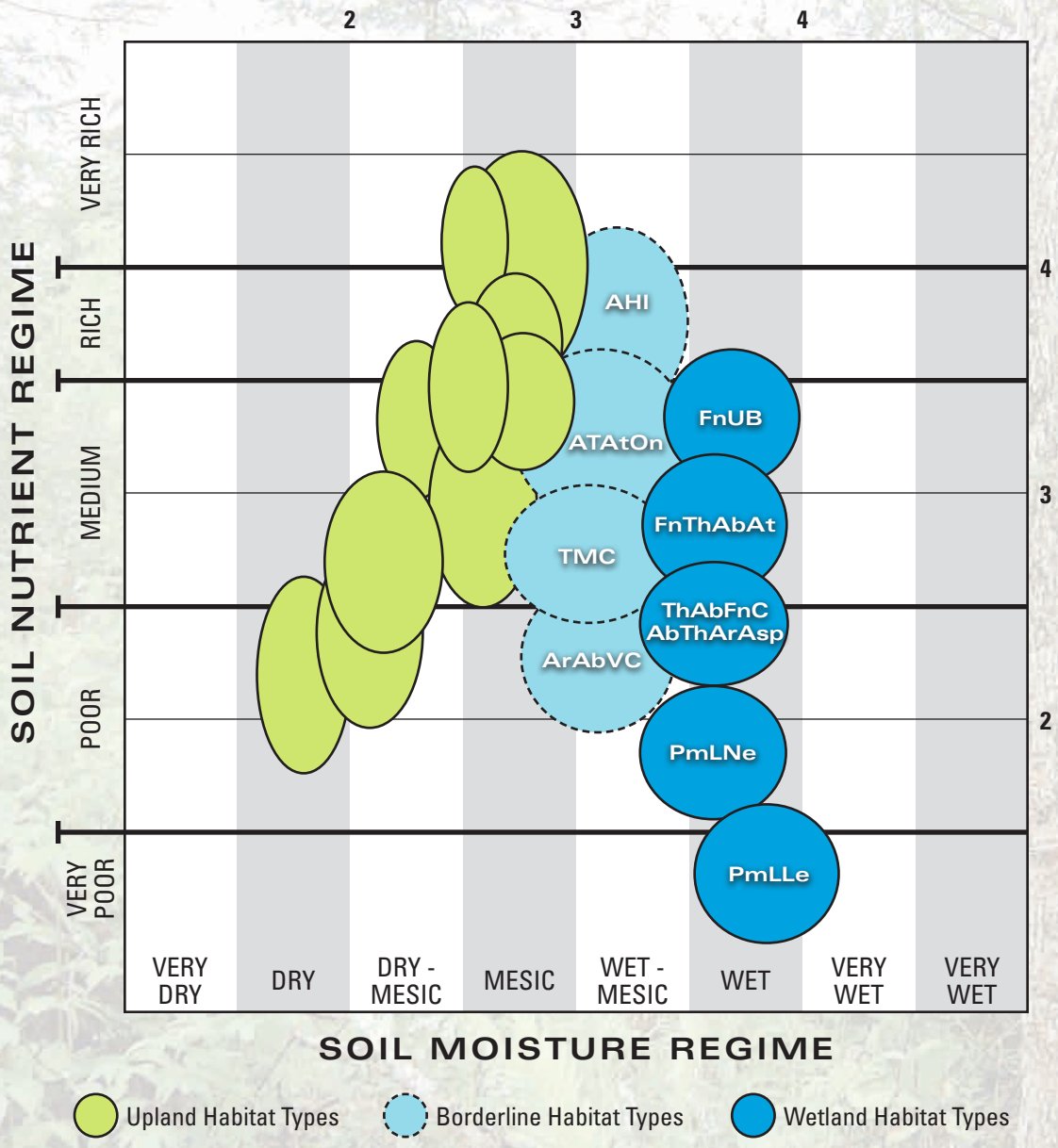


REGION 4

Key to Wetland Habitat Types (Common Names)



RELATIONSHIP OF HABITAT TYPES TO SOIL MOISTURE AND NUTRIENT REGIMES IN REGION 4



Region 4 Habitat Type Descriptions

PmLLe

Picea-Larix/Ledum

Picea mariana-Larix laricina/Ledum groenlandicum

Black Spruce-Tamarack/Labrador Tea

DISTRIBUTION

Throughout the region.

LANDFORM AND SOILS

Deep organic substrate – peat bog.

VEGETATION

Common Forest Cover Types: Stands are dominated entirely by black spruce and tamarack. Only paper birch and white pine occur as temporary associates. Advance reproduction consists almost entirely of black spruce and tamarack, although paper birch saplings are sometimes well represented. Other species that sometimes occur as saplings, but typically do not reach maturity, are red maple, balsam fir, yellow birch and eastern hemlock.

Shrub and Small Tree Layer: Tall shrubs are not well represented. The only conspicuous species with high coverage are Labrador Tea *(Ledum groenlandicum)*, Mountain Holly *(Nemopanthus mucronata)* and Canada Blueberry *(Vaccinium myrtilloides)* and Low-sweet Blueberry *(Vaccinium angustifolium)*. Several other woody species characteristic of this type are inconspicuous and best described with ground flora.

Mountain Holly *(Nemopanthus mucronata)*

(Photo from Department of Natural Resources Archives)

Ground Flora Characteristics: *Sphagnum* spp. is a dominant characteristic. Herb species are poorly represented. The following occur with low frequencies: Three-leaved Solomon's Seal *(Smilacina trifolia)*, Yellow Beadlily *(Clintonia borealis)*, Bunchberry *(Cornus canadensis)* and various species of Lady's Slippers *(Cypripedium* spp.*)*. More frequent, although often inconspicuous, are several species of the Heath family *(Ericaceae)*, such as Leatherleaf *(Chamaedaphne calyculata)*, Wintergreen *(Gaultheria procumbens)*, Creeping Snowberry *(Gaultheria hispidula)*, Pale Laurel *(Kalmia polifolia)*, Small Cranberry *(Vaccinium oxycoccus)*, and Bog Rosemary *(Andromeda glaucophylla)*.

Disturbance and Succession: See the Introduction.

Management Implications: On the relative scale of wetland habitat type productivity (very poor, poor, poor to medium, medium, medium to rich) **PmLLe** type is classified as "very poor" (see the **Management Implications** section).

REGION 4: PLANT SPECIES BY HABITAT TYPE (PmLLe)

Understory Species in Order of Decreasing Frequency of Occurrence

Common Name *(Scientific Name)*	Freq. %	Cover %
Sphagnum Mosses *(Sphagnum* spp.*)*	100	83
Leatherleaf *(Chamaedaphne calyculata)*	97	4
Labrador Tea *(Ledum groenlandicum)*	97	17
Creeping Snowberry *(Gaultheria hispidula)*	94	4
Canada Blueberry *(Vaccinium myrtilloides)*	94	6
Small Cranberry *(Vaccinium oxycoccus)*	82	1
Pale Laurel *(Kalmia polifolia)*	73	1
Hair Mosses *(Polytrichum* spp.*)*	61	1
Mountain Holly *(Nemopanthus mucronata)*	58	3
Three-leaved Solomon's Seal *(Smilacina trifolia)*	58	7
Feather Mosses *(Feather Moss* spp.*)*	45	2
Low-sweet Blueberry *(Vaccinium angustifolium)*	42	5
Wintergreen *(Gaultheria procumbens)*	36	1
Speckled Alder *(Alnus rugosa)*	30	1
Yellow Beadlily *(Clintonia borealis)*	30	3
Bunchberry *(Cornus canadensis)*	30	2
Pink Lady's Slipper *(Cypripedium acaule)*	30	1
Wild Lily-of-the-valley *(Maianthemum canadense)*	30	1
Bog Rosemary *(Andromeda glaucophylla)*	27	1
Cinnamon Fern *(Osmunda cinnamomea)*	27	3
Starflower *(Trientalis borealis)*	27	1
Juneberry *(Amelanchier* spp.*)*	24	1
Spinulose Shield Fern *(Dryopteris spinulosa)*	21	1
Grasses *(Grass* spp.*)*	21	1
Reindeer Lichen *(Cladina* spp.*)*	15	1
Large Cranberry *(Vaccinium macrocarpon)*	15	1
Goldthread *(Coptis groenlandica)*	12	1
Larger Blue Flag *(Iris versicolor)*	12	5

REGION 4: TREE SPECIES BY HABITAT TYPE (PmLLe)

Tree Species Frequency of Occurrence and Average Cover by Size Class

Sawtimber	**Freq. %**	**Cover %**
Larix laricina	48	10
Pinus strobus	24	6
Picea mariana	15	4

Poles	**Freq. %**	**Cover %**
Picea mariana	88	26
Larix laricina	85	26
Pinus strobus	21	5
Betula papyrifera	15	5
Tsuga canadensis	9	7

Saplings	**Freq. %**	**Cover %**
Picea mariana	91	12
Larix laricina	76	7
Abies balsamea	42	3
Betula papyrifera	39	7
Pinus strobus	33	5
Acer rubrum	18	2
Tsuga canadensis	12	7

Seedlings	**Freq. %**	**Cover %**
Picea mariana	91	5
Abies balsamea	48	1
Betula papyrifera	42	1
Acer rubrum	39	1
Pinus strobus	36	1
Larix laricina	15	1
Quercus rubra	15	1

PmLNe

Picea-Larix/Nemopanthus

Picea mariana-Larix laricina/Nemopanthus mucronata

Black Spruce-Tamarack/Mountain Holly

DISTRIBUTION

Throughout the region.

LANDFORM AND SOILS

Deep organic substrate – peat bog. Often in narrow zones adjacent to uplands, hydrologically nutrient enriched, therefore, less acid than PmLLe type.

VEGETATION

Common Forest Cover Types: Most stands are dominated by black spruce and tamarack, but any of the following species can be common associates: balsam fir, northern white cedar, red maple, white spruce, paper birch and aspen. Advance reproduction is typically dominated by balsam fir and black spruce, but saplings of the following species are sometimes well represented: red maple, paper birch, tamarack and northern white cedar.

Shrub and Small Tree Layer: This layer may be sparse or moderately well developed. Best represented shrubs are Mountain Holly *(Nemopanthus mucronata)*, Labrador Tea *(Ledum groenlandicum)*, Canada Blueberry *(Vaccinium myrtilloides)*, Low-sweet Blueberry *(Vaccinium angustifolium)* and speckled alder *(Alnus rugosa)*. Some low shrubs (or "sub-shrubs"), mostly of the Heath family and characteristic of PmLLe habitat type, are occasionally present.

Ground Flora Characteristics: *Sphagnum* spp. is a dominant characteristic. Herb species are few and characteristic of wet-mesic uplands, e.g., Bunchberry *(Cornus canadensis)*, Starflower *(Trientalis borealis)*, Spinulose Shield Fern *(Dryopteris spinulosa)*, Wild Lily-of-the-valley *(Maianthemum canadense)*, Goldthread *(Coptis groenlandica)*, Cinnamon Fern *(Osmunda cinnamomea)*, and Yellow Beadlily *(Clintonia borealis)*.

Disturbance and Succession: See the Introduction.

Management Implications: On the relative scale of wetland habitat type productivity (very poor, poor, poor to medium, medium, medium to rich) **PmLNe** is classified as "poor" (see the **Management Implications** section).

REGION 4: PLANT SPECIES BY HABITAT TYPE (PmLNe)

Understory Species in Order of Decreasing Frequency of Occurrence

Common Name *(Scientific Name)*	Freq. %	Cover %
Sphagnum Mosses *(Sphagnum* spp.*)*	100	33
Mountain Holly *(Nemopanthus mucronata)*	96	3
Starflower *(Trientalis borealis)*	96	1
Canada Blueberry *(Vaccinium myrtilloides)*	96	4
Goldthread *(Coptis groenlandica)*	88	1
Bunchberry *(Cornus canadensis)*	88	3
Wild Lily-of-the-valley *(Maianthemum canadense)*	88	1
Labrador Tea *(Ledum groenlandicum)*	80	4
Cinnamon Fern *(Osmunda cinnamomea)*	76	13
Spinulose Shield Fern *(Dryopteris spinulosa)*	72	3
Creeping Snowberry *(Gaultheria hispidula)*	72	1
Hair Mosses *(Polytrichum* spp.*)*	68	3
Juneberry *(Amelanchier* spp.*)*	64	1
Low-sweet Blueberry *(Vaccinium angustifolium)*	56	4
Feather Mosses *(Feather Moss* spp.*)*	52	6
Wintergreen *(Gaultheria procumbens)*	52	1
Yellow Beadlily *(Clintonia borealis)*	44	1
Speckled Alder *(Alnus rugosa)*	40	7
Winterberry *(Ilex verticillata)*	36	2
Pink Lady's Slipper *(Cypripedium acaule)*	32	1
Twinflower *(Linnaea borealis)*	28	1
Leatherleaf *(Chamaedaphne calyculata)*	24	1
Horsetails *(Equisetum* spp.*)*	24	1
Ground Pine *(Lycopodium obscurum)*	24	1
Common Wood Sorrel *(Oxalis montana)*	24	1
Raspberries/Blackberries *(Rubus* spp.*)*	24	1
Three-leaved Solomon's Seal *(Smilacina trifolia)*	24	1
Wild Sarsaparilla *(Aralia nudicaulis)*	20	1
Beaked Hazelnut *(Corylus cornuta)*	20	3
Swamp Dewberry *(Rubus hispidus)*	20	1
Dwarf Raspberry *(Rubus pubescens)*	20	2

Common Name *(Scientific Name)*	Freq. %	Cover %
Small Cranberry *(Vaccinium oxycoccus)*	20	1
Stiff Clubmoss *(Lycopodium annotinum)*	16	1
Bracken Fern *(Pteridium aquilinum)*	16	5
Reindeer Lichen *(Cladina* spp.*)*	12	1
Trailing Arbutus *(Epigaea repens)*	12	1
Interrupted Fern *(Osmunda claytoniana)*	12	1
Royal Fern *(Osmunda regalis)*	12	4

Small Cranberry *(Vaccinium oxycoccus)*

(Photo from Department of Natural Resources Archives)

Common Wood Sorrel *(Oxalis montana)*

(Photo from Department of Natural Resources Archives)

REGION 4: TREE SPECIES BY HABITAT TYPE (PmLNe)

Tree Species Frequency of Occurrence and Average Cover by Size Class

Sawtimber	Freq. %	Cover %
Larix laricina	49	13
Picea mariana	35	10
Thuja occidentalis	30	22
Pinus strobus	19	19
Tsuga canadensis	16	15

Poles	Freq. %	Cover %
Picea mariana	70	26
Larix laricina	54	13
Betula papyrifera	51	5
Abies balsamea	43	5
Acer rubrum	35	9
Thuja occidentalis	30	21
Populus tremuloides	19	3
Tsuga canadensis	19	23

Saplings	Freq. %	Cover %
Abies balsamea	86	9
Acer rubrum	62	7
Picea mariana	57	11
Betula papyrifera	43	6
Larix laricina	30	2
Thuja occidentalis	19	7
Betula alleghaniensis	14	8

Seedlings	Freq. %	Cover %
Acer rubrum	89	1
Abies balsamea	86	3
Picea mariana	57	1
Betula papyrifera	27	1
Quercus rubra	22	1
Prunus serotina	16	1
Pinus strobus	14	1

ThAbFnC

Thuja-Abies-Fraxinus/Coptis • Thuja occidentalis-Abies balsamea-Fraxinus nigra/Coptis groenlandica

Northern White Cedar-Balsam Fir-Black Ash/Goldthread

DISTRIBUTION

Throughout northwestern parts of Marinette and Oconto Counties, areas characterized by pitted outwash.

LANDFORM AND SOILS

Pitted outwash and other ice-contact glacial deposits (see page 8-2, "Glacial Deposits" map). Soil profile is most often characterized by one to two feet of well decomposed organic matter, underlain by sandy mineral material. Early summer saturation depth was within two feet. In some instances, the organic layer exceeds five feet.

VEGETATION

Common Forest Cover Types: Most stands are dominated, singly or in combination, by northern white cedar, balsam fir, black ash, paper birch and red maple. Black spruce, yellow birch and eastern hemlock are occasional associates. Advance reproduction is typically dominated by northern white cedar, balsam fir and black ash. Red maple and yellow birch reproduction is sometimes present.

Shrub and Small Tree Layer: This layer is often sparse. Most often present species are Winterberry *(Ilex verticillata)*, Juneberries *(Amelanchier* spp.*)*, Mountain Maple *(Acer spicatum)*, Beaked Hazel *(Corylus cornuta)* and Canada Blueberry *(Vaccinium myrtilloides)*.

Ground Flora Characteristics: Herbaceous layer is well developed and species rich. Species with the highest frequency of occurrence are Bunchberry *(Cornus canadensis)*, Starflower *(Trientalis borealis)*, Spinulose Shield Fern *(Dryopteris spinulosa)*, Wild Lily-of-the-valley *(Maianthemum canadense)*, Goldthread *(Coptis groenlandica)*, Wild Sarsaparilla *(Aralia nudicaulis)*, Dwarf Raspberry *(Rubus pubescens)*, Cinnamon Fern *(Osmunda cinnamomea)*, Yellow Beadlily *(Clintonia borealis)* and Oak Fern *(Dryopteris disjuncta)*. *Sphagnum* spp. was present on 86 percent of study plots with average coverage of 24 percent.

Disturbance and Succession: See the Introduction.

Management Implications: On the relative scale of wetland habitat type productivity (very poor, poor, poor to medium, medium, medium to rich) **ThAbFnC** type is classified as "poor to medium" (see the **Management Implications** section).

REGION 4: PLANT SPECIES BY HABITAT TYPE (ThAbFnC)

Understory Species in Order of Decreasing Frequency of Occurrence

Common Name *(Scientific Name)*	Freq. %	Cover %
Juneberries *(Amelanchier* spp.*)*	100	1
Wild Sarsaparilla *(Aralia nudicaulis)*	100	5
Goldthread *(Coptis groenlandica)*	100	4
Wild Lily-of-the-valley *(Maianthemum canadense)*	100	1
Starflower *(Trientalis borealis)*	100	1
Bunchberry *(Cornus canadensis)*	97	1
Dwarf Raspberry *(Rubus pubescens)*	97	8
Yellow Beadlily *(Clintonia borealis)*	93	2
Cinnamon Fern *(Osmunda cinnamomea)*	90	10
Bedstraws *(Galium* spp.*)*	86	1
Grasses *(Grass* spp.*)*	86	11
Sphagnum Moss *(Sphagnum* spp.*)*	86	24
Violets *(Viola* spp.*)*	86	1
Lady Fern *(Athyrium filix-femina)*	83	2
Beaked Hazelnut *(Corylus cornuta)*	83	1
Spinulose Shield Fern *(Dryopteris spinulosa)*	83	1
Naked Miterwort *(Mitella nuda)*	83	2
Feather Mosses *(Feather Moss* spp.*)*	79	11
Currants/Gooseberries *(Ribes* spp.*)*	79	1
Oak Fern *(Dryopteris disjuncta)*	76	3
Mountain Maple *(Acer spicatum)*	72	3
Asters *(Aster* spp.*)*	72	1
Crested Wood Fern *(Dryopteris cristata)*	72	1
Bugleweed *(Lycopus uniflorus)*	72	1
Shinleafs *(Pyrola* spp.*)*	69	1
Small Jack-in-the-pulpit *(Arisaema triphyllum)*	66	1
Winterberry *(Ilex verticillata)*	66	2
Twinflower *(Linnaea borealis)*	66	1
Creeping Snowberry *(Gaultheria hispidula)*	62	2
Mnium Mosses *(Mnium* spp.*)*	62	4
Rattlesnake Fern *(Botrychium virginianum)*	59	1
Sedges *(Carex* spp.*)*	59	23
Shining Clubmoss *(Lycopodium lucidulum)*	59	2
Bog Fern *(Thelypteris simulata)*	59	3
Red-osier Dogwood *(Cornus stolonifera)*	55	1
Fringed Polygala *(Polygala paucifolia)*	55	1

Common Name *(Scientific Name)*	Freq. %	Cover %
Claspleaf Twisted Stalk *(Streptopus amplexifolius)*	55	1
Speckled Alder *(Alnus rugosa)*	52	1
Dwarf Enchanter's Nightshade *(Circaea alpina)*	52	2
Canada Blueberry *(Vaccinium myrtilloides)*	52	2
Large-leaved Aster *(Aster macrophyllus)*	48	1
Wild Strawberry *(Fragaria virginiana)*	48	1
Wood Anemone *(Anemone quinquefolia)*	45	1
Marsh Marigold *(Caltha palustris)*	41	1
Partridgeberry *(Mitchella repens)*	41	1
Sensitive Fern *(Onoclea sensibilis)*	41	1
Alder-leaved Buckthorn *(Rhamnus alnifolia)*	41	1
Nodding Trillium *(Trillium cernuum)*	41	1
Hooked Crowfoot *(Ranunculus recurvatus)*	38	1
Goldenrods *(Solidago* spp.*)*	38	1
Meadow Horsetail *(Equisetum pratense)*	34	1
Wood Horsetail *(Equisetum sylvaticum)*	34	1
Early Meadow Rue *(Eupatorium maculatum)*	34	1
Interrupted Fern *(Osmunda claytoniana)*	34	2
Low-sweet Blueberry *(Vaccinium angustifolium)*	34	2
Thistles *(Cirsium* spp.*)*	31	1
Royal Fern *(Osmunda regalis)*	31	3
Common Skullcap *(Scutellaria galericulata)*	31	1
Alternate-leaved Dogwood *(Cornus alternifolia)*	28	1
Avens *(Geum* spp.*)*	28	1
Spotted Touch-me-not *(Impatiens capensis)*	28	1
White Lettuce *(Prenanthes alba)*	28	1
Beggars Ticks *(Bidens frondosus)*	24	1
Beech Fern *(Dryopteris phegopteris)*	24	3
Wintergreen *(Gaultheria procumbens)*	24	1
Heal-all (Prunella vulgaris)	24	2
Chokecherry *(Prunus virginiana)*	24	1
Poison Ivy *(Rhus radicans)*	24	1
Water Hemlock *(Cicuta maculata)*	21	1
Mountain Holly *(Nemopanthus mucronata)*	21	1
Hairy Solomon's Seal *(Polygonatum pubescens)*	21	1
Three-leaved Solomon's Seal *Smilacina trifolia)*	21	1
Hog Peanut *(Amphicarpa bracteata)*	17	1

REGION 4: TREE SPECIES BY HABITAT TYPE (ThAbFnC)

Tree Species Frequency of Occurrence and Average Cover by Size Class

Sawtimber	Freq. %	Cover %
Thuja occidentalis	90	30
Betula papyrifera	38	14
Picea mariana	28	4
Pinus strobus	28	11
Acer rubrum	24	18
Picea glauca	24	9
Larix laricina	21	13
Tsuga canadensis	21	35
Betula alleghaniensis	17	14
Populus tremuloides	14	8

Poles	Freq. %	Cover %
Thuja occidentalis	93	44
Betula papyrifera	62	15
Abies balsamea	55	14
Fraxinus nigra	52	21
Picea mariana	52	8
Acer rubrum	48	21
Betula alleghaniensis	31	19
Tsuga canadensis	28	25
Larix laricina	24	17
Picea glauca	17	6

Saplings	Freq. %	Cover %
Thuja occidentalis	86	12
Abies balsamea	69	12
Fraxinus nigra	55	16
Acer rubrum	34	5
Betula papyrifera	34	10
Betula alleghaniensis	21	6
Tsuga canadensis	17	8

Seedlings	Freq. %	Cover %
Abies balsamea	86	5
Acer rubrum	79	1
Fraxinus nigra	76	2
Quercus rubra	55	1
Betula alleghaniensis	45	1
Betula papyrifera	34	1
Picea glauca	34	3
Ulmus rubra	34	1
Fagus grandifolia	28	1
Tsuga canadensis	28	1
Picea mariana	24	1
Pinus strobus	24	1
Populus tremuloides	24	1
Thuja occidentalis	24	1
Acer saccharum	17	1

(Photo from Kemp Natural Resources Station Archives)

AbThArAsp

Abies-Thuja-Acer/Acer • Abies balsamea-Thuja occidentalis-Acer rubrum/Acer spicatum

Balsam Fir-Northern White Cedar-Red Maple/Mountain Maple

DISTRIBUTION

Mostly Forest and Oneida Counties and occasionally eastern Vilas and northern Langlade Counties. It also occurs in adjacent Region 4.

LANDFORM AND SOILS

Landform is primarily pitted outwash or other ice contact deposits. Soils are sandy with a depth of organic horizon varying from less than six inches to more than two feet. Saturation depth, in years and seasons of sampling, was between two and three feet.

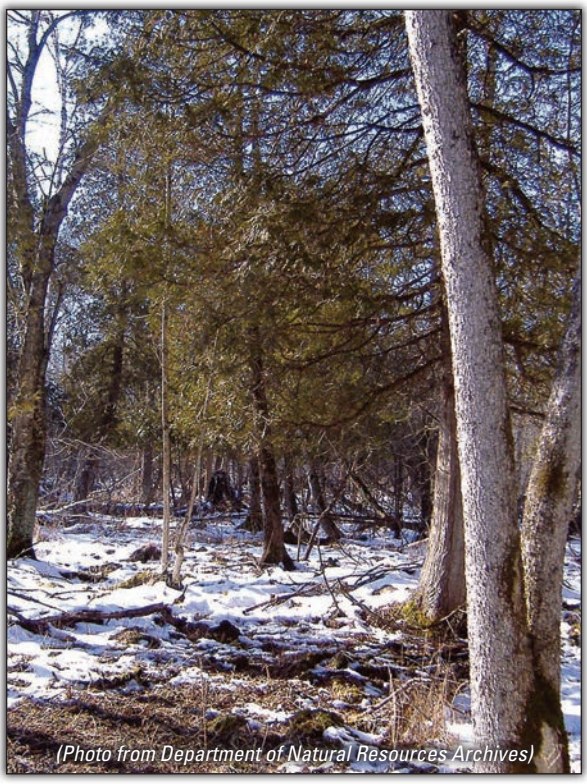
VEGETATION:

Common Forest Cover Types: Most stands are dominated singly, or in combination, by balsam fir, northern white cedar and red maple. White spruce, paper birch, yellow birch and eastern hemlock are occasional associates. Advance reproduction is typically dominated by balsam fir. Red maple, black spruce and/or black ash are sometimes present. Northern white cedar is conspicuously underrepresented in this layer, presumably due to deer browsing.

Shrub and Small Tree Layer: This layer may be sparse or moderately well developed. Best represented shrubs are Mountain Maple *(Acer spicatum)*, speckled alder *(Alnus rugosa)*, Beaked Hazel *(Corylus cornuta)*, Fly Honeysuckles *(Lonicera* spp.*)*, and Canada Blueberry *(Vaccinium myrtilloides)*.

Mountain Maple *(Acer spicatum)*

(Photo from Department of Natural Resources Archives)



(Photo from Department of Natural Resources Archives)

Ground Flora Characteristics: Herbaceous layer is moderately well developed and species rich. Species with the highest frequency of occurrence are Bunchberry *(Cornus canadensis)*, Starflower *(Trientalis borealis)*, Spinulose Shield Fern *(Dryopteris spinulosa)*, Wild Lily-of-the-valley *(Maianthemum canadense)*, Goldthread *(Coptis groenlandica)*, Wild Sarsaparilla *(Aralia nudicaulis)*, Dwarf Raspberry *(Rubus pubescens)*, Cinnamon Fern *(Osmunda cinnamomea)*, Yellow Beadlily *(Clintonia borealis),* and Oak Fern *(Dryopteris disjuncta). Sphagnum* spp. was present on 85 percent of study plots with average coverage of 40 percent.

Disturbance and Succession: See the Introduction.

Management Implications: On the relative scale of wetland habitat type productivity (very poor, poor, poor to medium, medium, medium to rich) **AbThArAsp** type is classified as "poor to medium" (see the **Management Implications** section).

REGION 4: PLANT SPECIES BY HABITAT TYPE (AbThArAsp)

Understory Species in Order of Decreasing Frequency of Occurrence

Common Name *(Scientific Name)*	Freq. %	Cover %
Spinulose Shield Fern *(Dryopteris spinulosa)*	100	4
Starflower *(Trientalis borealis)*	100	1
Bunchberry *(Cornus canadensis)*	96	6
Wild Llily-of-the-valley *(Maianthemum canadense)*	96	1
Goldthread *(Coptis groenlandica)*	92	1
Sphagnum Mosses *(Sphagnum* spp.*)*	85	40
Wild Sarsaparilla *(Aralia nudicaulis)*	77	3
Yellow Beadlily *(Clintonia borealis)*	77	2
Oak Fern *(Dryopteris disjuncta)*	73	2
Cinnamon Fern *(Osmunda cinnamomea)*	73	4
Canada Blueberry *(Vaccinium myrtilloides)*	73	1
Mountain Maple *(Acer spicatum)*	69	11
Dwarf Raspberry *(Rubus pubescens)*	69	8
American Fly Honeysuckle *(Lonicera canadensis)*	65	3
Speckled Alder *(Alnus rugosa)*	58	15
Juneberry *(Amelanchier* spp.*)*	58	1
Beaked Hazelnut *(Corylus cornuta)*	58	3
Beech Fern *(Dryopteris phegopteris)*	58	3
Twinflower *(Linnaea borealis)*	54	1
Feather Mosses *(Feather Moss* spp.*)*	50	3
Creeping Snowberry *(Gaultheria hispidula)*	46	1
Grasses *(Grass* spp.*)*	46	3
Shinleafs *(Pyrola* spp.*)*	46	1
Sedges *(Carex* spp.*)*	42	6
Mountain Holly *(Nemopanthus mucronata)*	42	1
Hair Mosses *(Polytrichum* spp.*)*	42	5
Low-sweet Blueberry *(Vaccinium angustifolium)*	42	1
Lady Fern *(Athyrium filix-femina)*	38	11
Dwarf Enchanter's Nightshade *(Circaea alpina)*	38	1
Bedstraws *(Galium* spp.*)*	38	1
Bugleweed *(Lycopus uniflorus)*	38	1
Naked Miterwort *(Mitella nuda)*	38	1

Common Name *(Scientific Name)*	Freq. %	Cover %
Common Wood Sorrel *(Oxalis montana)*	38	2
Crested Wood Fern *(Dryopteris cristata)*	35	1
Ground Pine *(Lycopodium obscurum)*	35	3
Currants/Gooseberries *(Ribes* spp.*)*	35	2
Asters *(Aster* spp.*)*	31	1
Horsetails *(Equisetum* spp.*)*	31	1
Winterberry *(Ilex verticillata)*	31	1
Spotted Touch-me-not *(Impatiens capensis)*	31	1
Shining Clubmoss *(Lycopodium lucidulum)*	31	2
Labrador Tea *(Ledum groenlandicum)*	27	1
Raspberries/Blackberries *(Rubus* spp.*)*	27	1
Violets *(Viola* spp.*)*	27	1
Red-osier Dogwood *(Cornus stolonifera)*	23	5
Stiff Clubmoss *(Lycopodium annotinum)*	23	1
Small Jack-in-the pulpit *(Arisaema triphyllum)*	19	1
Alternate-leaved Dogwood *(Cornus alternifolia)*	19	3
Wild Strawberry *(Fragaria virginiana)*	19	1
Interrupted Fern *(Osmunda claytoniana)*	19	2
Hairy Solomon's Seal *(Polygonatum pubescens)*	19	1
Hooked Crowfoot *(Ranunculus recurvatus)*	19	1
Rose Twisted Stalk *(Streptopus lanceolatus)*	19	1
Nodding Trillium *(Trillium cernuum)*	19	1

Labrador Tea *(Ledum groenlandicum)*

(Photo from Department of Natural Resources Archives)

REGION 4: TREE SPECIES BY HABITAT TYPE (AbThArAsp)

Tree Species Frequency of Occurrence and Average Cover by Size Class

Sawtimber	**Freq. %**	**Cover %**
Thuja occidentalis	62	36
Tsuga canadensis	46	18
Betula alleghaniensis	38	18
Acer rubrum	35	18
Larix laricina	19	32
Picea mariana	19	13
Betula papyrifera	15	8
Populus tremuloides	15	19

Poles	**Freq. %**	**Cover %**
Abies balsamea	88	16
Thuja occidentalis	69	16
Acer rubrum	50	15
Betula alleghaniensis	31	11
Betula papyrifera	31	13
Fraxinus nigra	27	4
Tsuga canadensis	27	16
Picea mariana	19	19

Saplings	**Freq. %**	**Cover %**
Abies balsamea	88	23
Acer rubrum	38	4
Thuja occidentalis	31	2
Picea mariana	23	9
Betula alleghaniensis	19	7

Seedlings	**Freq. %**	**Cover %**
Abies balsamea	77	2
Acer rubrum	42	1
Fraxinus nigra	35	1
Acer saccharum	27	1
Betula alleghaniensis	27	1
Acer saccharinum	19	2
Picea mariana	19	2
Prunus serotina	19	1

FnThAbAt

Fraxinus-Thuja-Abies/Athyrium

Fraxinus nigra-Thuja occidentalis/Athyrium filix-femina

Black Ash-Northern White Cedar-Balsam Fir/Lady Fern

DISTRIBUTION

Mostly in parts of central Marinette and Oconto Counties characterized by ground moraine landforms.

LANDFORM AND SOILS

Landform typically is ground moraine. Soil profile consists of a surface layer of well decomposed black muck underlain by mineral soil of relatively fine texture. If sub-soil is sandy, it typically contains a clay or silty component. The saturated zone is typically within three feet of the surface. On some plots, depth of a well decomposed organic layer exceeded four feet.

VEGETATION

Common Forest Cover Types: Black ash and northern white cedar are the predominant species in most stands. Common associates are red maple and balsam fir. Yellow birch and paper birch are sometimes present. The same species are best represented in advance regeneration.

Shrub and Small Tree Layer: This layer is mostly lacking. No shrub species exceeded 40 percent constancy and, when present, the coverage was negligible. Observed species included Currants/Gooseberries *(Ribes* spp.*)*, Raspberries/Blackberries *(Rubus* spp.*)*, Mountain Maple *(Acer spicatum)*, Beaked Hazel *(Corylus cornuta)*, Red-osier Dogwood *(Cornus stolonifera),* and speckled alder *(Alnus rugosa)*.

Ground Flora Characteristics: This layer is well developed and species rich. Highest coverage is represented by grasses and sedges. Species with highest constancies include Lady Fern *(Athyrium filix-femina)*, Jack-in-the-pulpit *(Arisaema triphyllum)*, Virginia Creeper *(Parthenocissus* spp.*)*, Spinulose Shield Fern *(Dryopteris spinulosa)*, Dwarf Raspberry *(Rubus pubescens)*, Wild Sarsaparilla *(Aralia nudicaulis)*, and Sensitive Fern *(Onoclea sensibilis)*.

Disturbance and Succession: See the Introduction.

Management Implications: On the relative scale of wetland habitat type productivity (very poor, poor, poor to medium, medium, medium to rich) **FnThAbAt** type is classified as "medium" (see the **Management Implications** section).

REGION 4: PLANT SPECIES BY HABITAT TYPE (FnThAbAt)

Understory Species in Order of Decreasing Frequency of Occurrence

Common Name *(Scientific Name)*	Freq. %	Cover %
Wild Lily-of-the-valley *(Maianthemum canadense)*	100	1
Grasses *(Grass* spp.*)*	97	12
Lady Fern *(Athyrium filix-femina)*	93	6
Asters *(Aster* spp.*)*	90	1
Violets *(Viola* spp.*)*	90	1
Small Jack-in-the-pulpit *(Arisaema triphyllum)*	87	1
Spinulose Shield Fern *(Dryopteris spinulosa)*	87	4
Starflower *(Trientalis borealis)*	87	1
Currants/Gooseberries *(Ribes* spp.*)*	83	1
Virginia Creeper *(Parthenocissus* spp.*)*	80	1
Dwarf Raspberry *(Rubus pubescens)*	80	9
Wild Sarsaparilla *(Aralia nudicaulis)*	77	9
Bugleweed *(Lycopus uniflorus)*	77	2
Sedges *(Carex* spp.*)*	70	23
Sensitive Fern *(Onoclea sensibilis)*	70	5
Hooked Crowfoot *(Ranunculus recurvatus)*	70	1
Hairy Solomon's Seal *(Polygonatum pubescens)*	67	1
Spotted Touch-me-not *(Impatiens capensis)*	63	4
White Lettuce *(Prenanthes alba)*	63	1
Oak Fern *(Dryopteris disjuncta)*	60	4
Bedstraws *(Galium* spp.*)*	60	1
Cinnamon Fern *(Osmunda cinnamomea)*	57	3
Red Baneberry *(Actaea rubra)*	53	1
Large-leaved Aster *(Aster macrophyllus)*	53	3
Bog Fern *(Thelypteris simulata)*	50	2
Hog Peanut *(Amphicarpa bracteata)*	47	2
Wood Anemone *(Anemone quinquefolia)*	47	1
Wild Strawberry *(Fragaria virginiana)*	47	1
Naked Miterwort *(Mitella nuda)*	47	2
Goldenrods *(Solidago* spp.*)*	47	1
Nodding Trillium *(Trillium cernuum)*	47	1
Goldthread *(Coptis groenlandica)*	43	1
Poison Ivy *(Rhus radicans)*	43	4
Riverbank Grape *(Vitis riparia)*	43	1
Water Hemlock *(Cicuta maculata)*	40	2
Dwarf Enchanter's Nightshade *(Circaea alpina)*	40	1
Crested Wood Fern *(Dryopteris cristata)*	40	1

Common Name *(Scientific Name)*	Freq. %	Cover %
Avens *(Geum* spp.*)*	40	1
Juneberries *(Amelanchier* spp.*)*	37	1
Meadow Horsetail *(Equisetum pratense)*	37	2
Raspberries/Blackberries *(Rubus* spp.*)*	37	1
Bittersweet Nightshade *(Solanum dulcamara)*	37	1
Rattlesnake Fern *(Botrychium virginianum)*	33	1
Turtlehead *(Chelone glabra)*	33	1
Virgin's Bower *(Clematis virginiana)*	33	1
Royal Fern *(Osmunda regalis)*	33	3
Heal-all *(Prunella vulgaris)*	33	1
Alder-leaved Buckthorn *(Rhamnus alnifolia)*	33	2
Beggar Ticks *(Bidens frondosa)*	30	1
Marsh Marigold *(Caltha palustris)*	30	1
Yellow Beadlily *(Clintonia borealis)*	30	1
Bunchberry *(Cornus canadensis)*	30	1
Feather Mosses *(Feather Moss* spp.*)*	30	14
Miterwort *(Mitella diphylla)*	30	1
Common Skullcap *(Scutellaria galericulata)*	30	1
Spikenard *(Aralia racemosa)*	27	1
Red-osier Dogwood *(Cornus stolonifera)*	27	1
Spotted Joe-Pye Weed *(Eupatorium maculatum)*	27	1
Winterberry *(Ilex verticillata)*	27	4
Maidenhair Fern *(Adiantum pedatum)*	23	2
Thistles *(Cirsium* spp.*)*	23	1
Alternate-leaved Dogwood *(Cornus alternifolia)*	23	2
Wood Horsetail *(Equisetum sylvaticum)*	23	2
Wood Nettle *(Laportea canadensis)*	23	11
Interrupted Fern *(Osmunda claytoniana)*	23	1
Shinleafs *(Pyrola* spp.*)*	23	1
Mad-dog Skullcap *(Scutellaria lateriflora)*	23	1
Bristly Greenbrier *(Smilax tamnoides)*	23	1
Speckled Alder *(Alnus rugosa)*	20	4
Enchanter's Nightshade *(Circaea quadrisulcata)*	20	4
Beech Fern *(Dryopteris phegopteris)*	20	3
Wild Lettuce *(Lactuca canadensis)*	20	1
Fringed Polygala *(Polygala paucifolia)*	20	1
Tall Meadow Rue *(Thalictrum dasycarpum)*	20	1
False Nettle *(Boehmeria cylindrica)*	17	1
Beaked Hazelnut *(Corylus cornuta)*	17	5
Larger Blue Flag *(Iris versicolor)*	17	1
Ground Pine *(Lycopodium obscurum)*	17	13
Rose Twisted Stalk *(Streptopus lanceolatus)*	17	1

REGION 4: TREE SPECIES BY HABITAT TYPE (FnThAbAt)

Tree Species Frequency of Occurrence and Average Cover by Size Class

Sawtimber	Freq. %	Cover %
Thuja occidentalis	63	28
Fraxinus nigra	50	28
Acer rubrum	33	32
Betula papyrifera	27	23
Populus tremuloides	20	17
Tilia americana	20	17
Pinus strobus	17	12
Tsuga canadensis	17	19

Poles	Freq. %	Cover %
Fraxinus nigra	83	23
Thuja occidentalis	63	31
Acer rubrum	50	22
Abies balsamea	47	13
Betula alleghaniensis	40	15
Betula papyrifera	27	12
Tsuga canadensis	27	9
Tilia americana	23	20
Ulmus rubra	20	8
Acer saccharum	13	21
Picea glauca	13	9

Saplings	Freq. %	Cover %
Fraxinus nigra	73	20
Abies balsamea	67	13
Thuja occidentalis	47	14
Acer rubrum	40	9
Ulmus rubra	40	6
Tilia americana	37	8
Betula alleghaniensis	23	5
Picea glauca	17	6
Tsuga canadensis	17	7

Seedlings	Freq. %	Cover %
Fraxinus nigra	80	5
Abies balsamea	67	5
Ulmus rubra	63	2
Acer rubrum	30	1
Populus tremuloides	30	1
Tilia americana	27	1
Betula alleghaniensis	23	2
Populus balsamifera	20	1
Quercus rubra	20	1
Betula papyrifera	17	1
Fagus grandifolia	17	1
Picea glauca	17	1
Picea mariana	17	1
Prunus serotina	17	2
Tsuga canadensis	17	1

(Photo from Kemp Natural Resources Station Archives)

FnUB

Fraxinus-Ulmus/Boehmeria

Fraxinus nigra-Ulmus* spp./*Boehmeria cylindrica

Black Ash-Elms/False Nettle

DISTRIBUTION

Best represented in eastern parts of Marinette and Oconto Counties.

LANDFORM AND SOILS

Primarily on glacio-lacustrine deposits associated with the Green Bay lobe (see page 8-2, "Glacial Deposits" map). Most often mineral soil of varying texture, but typically containing a significant proportion of clay and silt in the upper portion of the profile, and coarser materials below. Saturation zone typically within three feet of the surface. Substrate on about 30 percent of study plots consisted entirely of well decomposed organic matter (black muck) to a depth greater than five feet.

VEGETATION

Common Forest Cover Types: Black or green ash is a predominant species in most stands. Common associates are (formerly) red elm and silver maple. Conifers almost entirely lacking. The same species, except for elm, are best represented in advance regeneration.

Shrub and Small Tree Layer: This layer is not well developed. Only Currants/Gooseberries *(Ribes* spp.*)* occurs with high constancy (91 percent). The following species occur with frequencies less than 50 percent: Chokecherry *(Prunus virginiana)*, Common Elderberry *(Sambucus canadensis)*, Winterberry *(Ilex verticillata)*, and Glossy Buckthorn *(Rhamnus frangula)*.

Ground Flora Characteristics: The herb layer is well developed and species rich. Grasses and sedges represent the highest coverage, but the following herbs are well represented: Virginia Creeper *(Parthenocissus* spp.*)*, Dwarf Raspberry *(Rubus pubescens)*, Bugleweed *(Lycopus uniflorus)*, False Nettle *(Boehmeria cylindrica)*, Spotted Touch-me-not *(Impatiens capensis)*, and Sensitive Fern *(Onoclea sensibilis)*.

Disturbance and Succession: See the Introduction.

Management Implications: On the relative scale of wetland habitat type productivity (very poor, poor, poor to medium, medium, medium to rich) **FnUB** type is classified as "medium to rich" (see the **Management Implications** section). It is the richest type in Region 4.

REGION 4: PLANT SPECIES BY HABITAT TYPE (FnUB)

Understory Species in Order of Decreasing Frequency of Occurrence

Common Name *(Scientific Name)*	Freq. %	Cover %
Asters *(Aster* spp.*)*	100	5
Grasses *(Grass* spp.*)*	100	23
Wood Anemone *(Anemone quinquefolia)*	95	4
Currants/Gooseberries *(Ribes* spp.*)*	91	2
Bedstraws *(Galium* spp.*)*	86	3
Bugleweed *(Lycopus uniflorus)*	86	1
Dwarf Raspberry *(Rubus pubescens)*	86	4
Violets *(Viola* spp.*)*	86	1
False Nettle *(Boehmeria cylindrica)*	82	8
Sedges *(Carex* spp.*)*	82	11
Sensitive Fern *(Onoclea sensibilis)*	77	7
Spotted Touch-me-not *(Impatiens capensis)*	73	12
Goldenrods *(Solidago* spp.*)*	73	3
Lady Fern *(Athyrium filix-femina)*	68	2
Bittersweet Nightshade *(Solanum dulcamara)*	68	4
Hog Peanut *(Amphicarpa bracteata)*	64	3
Riverbank Grape *(Vitis riparia)*	64	1
Water Hemlock *(Cicuta maculata)*	59	2
Spinulose Shield Fern *(Dryopteris spinulosa)*	59	1
Larger Blue Flag *(Iris versicolor)*	59	1
Wood Nettle *(Laportea canadensis)*	59	11
Raspberries/Blackberries *(Rubus* spp.*)*	59	1
Small Jack in-the-pulpit *(Arisaema triphyllum)*	55	1
Marsh Marigold *(Caltha palustris)*	55	1
Chokecherry *(Prunus virginiana)*	55	4
Wild Strawberry *(Fragaria virginiana)*	50	1
Common Elderberry *(Sambucus canadensis)*	50	1
Gray Dogwood *(Cornus racemosa)*	45	1
Avens *(Geum* spp.*)*	45	1
Winterberry *(Ilex verticillata)*	45	6
Wild Lily-of-the-valley *(Maianthemum canadense)*	45	1

Common Name *(Scientific Name)*	Freq. %	Cover %
Meadow Horsetail *(Equisetum pratense)*	41	3
Fringed Loosestrife *(Lysimachia ciliata)*	41	1
Swamp Buttercup *(Ranunculus hispidus)*	41	4
Beggar Ticks *(Bidens frondosa)*	36	1
Virgin's Bower *(Clematis virginiana)*	36	1
Hooked Crowfoot *(Ranunculus recurvatus)*	36	1
Nannyberry *(Viburnum lentago)*	36	4
Glossy Buckthorn *(Rhamnus frangula)*	32	5
Common Skullcap *(Scutellaria galericulata)*	32	1
Hedge Nettle *(Stachys hispida)*	32	2
Wild Sarsaparilla *(Aralia nudicaulis)*	27	1
Enchanter's Nightshade *(Circaea quadrisulcata)*	27	1
Small-flowered Crowfoot *(Ranunculus abortivus)*	27	1
Poison Ivy *(Rhus radicans)*	27	1
Bristly Greenbriar *(Smilax tamnoides)*	27	1
Stinging Nettle *(Urtica dioica)*	27	1
Red-osier Dogwood *(Cornus stolonifera)*	23	3
Wild Cucumber *(Echinocystis lobata)*	23	1
Northern Willow Herb *(Epilobium glandulosum)*	23	1
Clearweed *(Pilea pumila)*	23	1
Alder-leaved Buckthorn *(Rhamnus alnifolia)*	23	1
Mad-dog Skullcap *(Scutellaria lateriflora)*	23	1
Tall Meadow Rue *(Thalictrum dasycarpum)*	23	1
Horsetails *(Equisetum* spp.*)*	18	1
Boneset *(Eupatorium perfoliatum)*	18	1
Wood Lily *(Lilium philadelphicum)*	18	1
American Bugleweed *(Lycopus americanus)*	18	1
Hairy Solomon's Seal *(Polygonatum pubescens)*	18	1
Swamp Rose *(Rosa palustris)*	18	1
Water Parsnip *(Sium suave)*	18	1
Starry False Solomon's Seal *(Maianthemum stellatum)*	18	1
Early Meadow Rue *(Thalictrum dioicum)*	18	1

REGION 4: TREE SPECIES BY HABITAT TYPE (FnUB)

Tree Species Frequency of Occurrence and Average Cover by Size Class

Sawtimber	Freq. %	Cover %
Fraxinus nigra	50	41
Acer saccharinum	36	34
Fraxinus pennsylvanica	27	49
Acer negundo	14	46
Ulmus rubra	14	8

Poles	Freq. %	Cover %
Fraxinus nigra	73	44
Ulmus rubra	55	14
Acer saccharinum	32	25
Fraxinus pennsylvanica	27	43
Acer negundo	14	19

Saplings	Freq. %	Cover %
Fraxinus nigra	73	30
Ulmus rubra	68	10
Acer saccharinum	27	14
Fraxinus pennsylvanica	27	24
Thuja occidentalis	23	3
Quercus bicolor	18	4
Acer rubrum	14	6

Seedlings	Freq. %	Cover %
Ulmus rubra	82	2
Fraxinus nigra	68	4
Fraxinus pennsylvanica	32	3
Acer saccharinum	27	1
Quercus bicolor	23	1

Riverbank Grape *(Vitis riparia)*

(Photo from Department of Natural Resources Archives)

Spotted Joe-Pye Weed *(Eupatorium maculatum)*

(Photo from Department of Natural Resources Archives)

Spinulose Shield Fern *(Dryopteris spinulosa)*

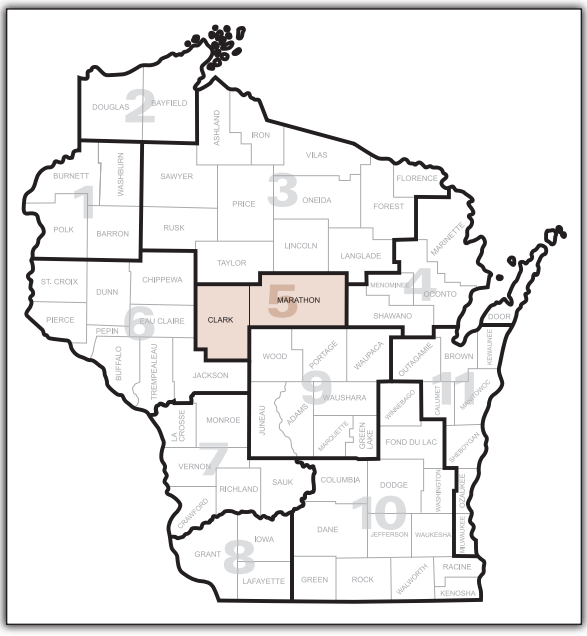
(Photo from Department of Natural Resources Archives)

(Photo from Department of Natural Resources Archives)

Region 5

GENERAL DESCRIPTION

This region encompasses only two counties, Clark and Marathon, and lies mostly outside of the limits of the Wisconsin stage glaciation. Characterized by mainly level to rolling till plains that are predominately silt loam soils. Portions of southern Clark County are poorly drained sandy to loam over shaly sandstone. Forested lowlands are common, especially tamarack and black spruce swamps in the southern portion of the region. Black ash and some northern white cedar exist in the northern portion.



Region 5: Clark and Marathon Counties

(Photo from Kemp Natural Resources Station Archives)

WETLAND FOREST HABITAT TYPES OF REGION 5

PmLLe-An

- *Picea-Larix/Ledum-Aronia* variant
- Black Spruce-Tamarack/Labrador Tea-Black Chokeberry variant

PArGy

- *Pinus-Acer/Gaylussacia*
- Eastern White Pine-Red Maple/Black Huckleberry

ArFnRh

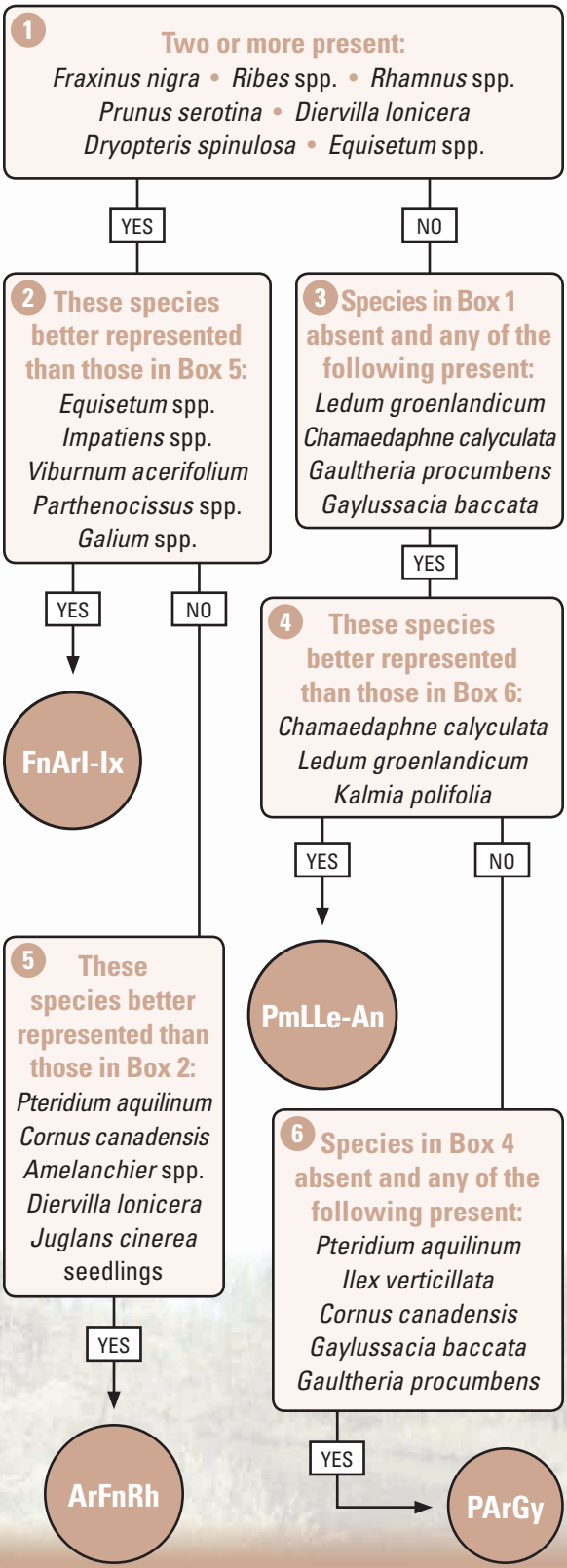
- *Acer-Fraxinus/Rubus*
- Red Maple-Black Ash/Swamp Dewberry

FnArI-Ix

- *Fraxinus-Acer/Impatiens-Ilex* variant
- Black Ash-Red Maple/Spotted Touch-me-not-Winterberry variant

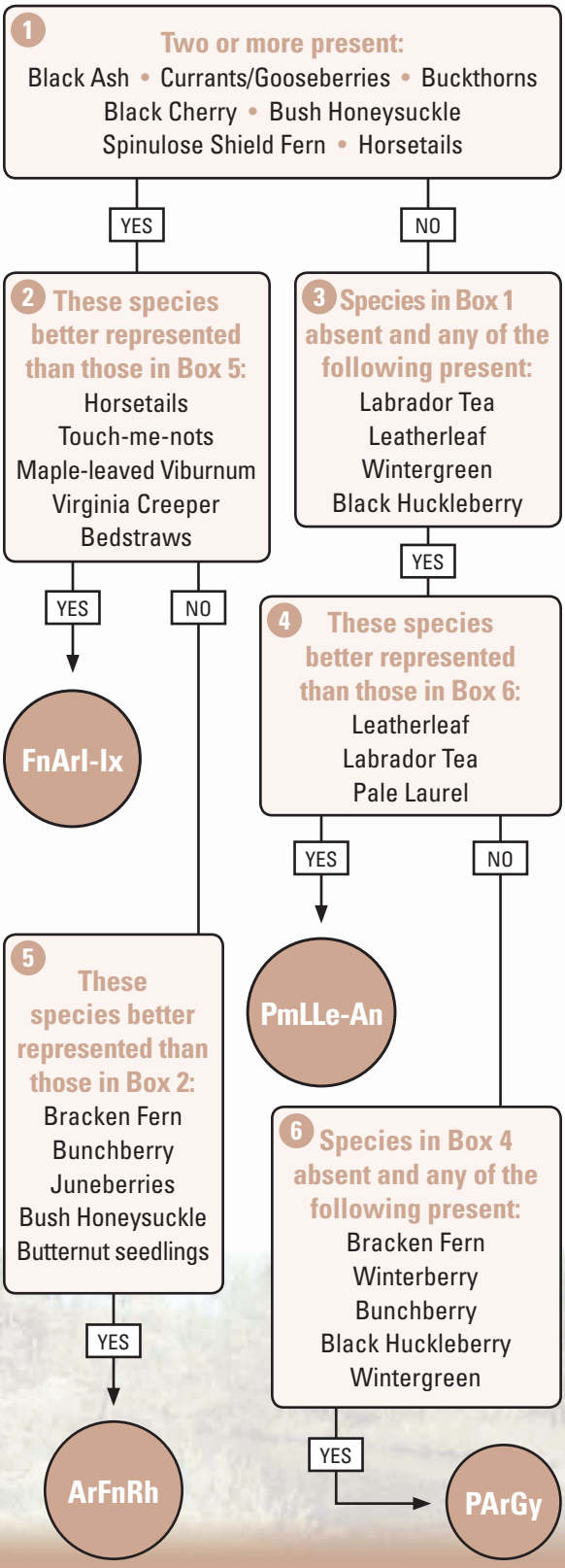
REGION 5

Key to Wetland Habitat Types (Scientific Names)

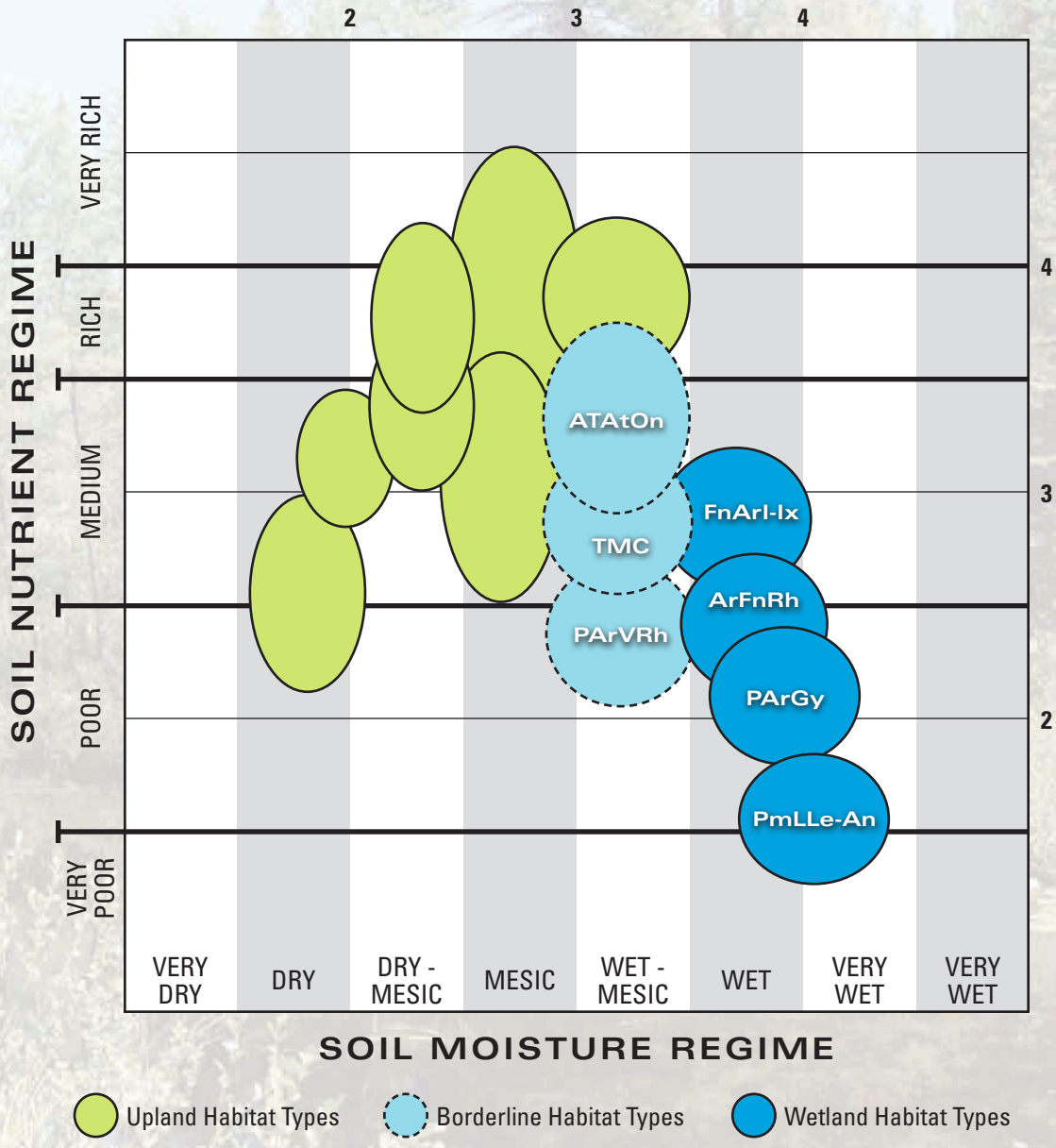


REGION 5

Key to Wetland Habitat Types (Common Names)



RELATIONSHIP OF HABITAT TYPES TO SOIL MOISTURE AND NUTRIENT REGIMES IN REGION 5



Region 5 Habitat Type Descriptions

PmLLe-An

Picea-Larix/Ledum-Aronia
***Picea mariana-Larix laricina/Ledum groenlandicum (Aronia melancarpa* variant)**
Black Spruce-Tamarack/Labrador Tea (Black Chokeberry variant)

DISTRIBUTION

Clark and Marathon Counties and adjacent regions.

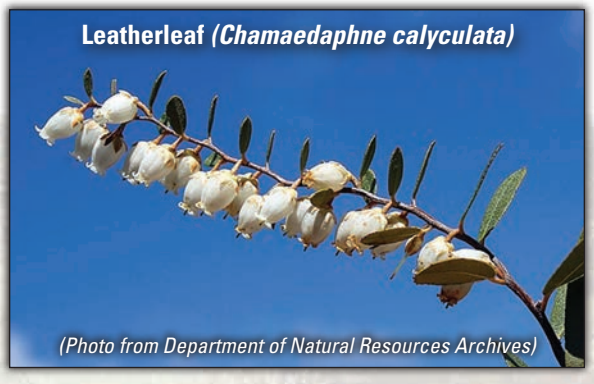
LANDFORM AND SOILS

Deep organics – peatlands.

VEGETATION

Common Forest Cover Types: Stands are dominated entirely by black spruce and tamarack. Only paper birch and white pine occur as temporary associates. Advance reproduction consists almost entirely of black spruce and tamarack, although paper birch saplings are sometimes well represented. Other species that sometimes occur as saplings, but typically do not reach maturity, are red maple, eastern hemlock and yellow birch.

Shrub and Small Tree Layer: Tall shrubs are not well represented. In most stands the only conspicuous species with relatively high coverage is Labrador Tea *(Ledum groenlandicum)*. Leatherleaf *(Chamaedaphne calyculata)* typically is the most common low shrub. Canada Blueberry *(Vaccinium myrtilloides)* and Low-sweet Blueberry *(Vaccinium angustifolium)* are also relatively common. Black Chokeberry *(Aronia melanocarpa)* and Black Huckleberry *(Gaylussacia baccata)* were present in about half of sample stands. Several other woody species characteristic of this type are inconspicuous and best described with ground flora.



Leatherleaf *(Chamaedaphne calyculata)*

(Photo from Department of Natural Resources Archives)

Ground Flora Characteristics: *Sphagnum* spp. is a dominant characteristic. Herb species are poorly represented. The following occur with moderate frequencies (50 to 80 percent): Purple-stemmed Aster *(Aster puniceus)*, Interrupted Fern *(Osmunda claytoniana)*, Spinulose Shield Fern *(Dryopteris spinulosa)*, Starflower *(Trientalis borealis)*, Wild Lily-of-the-valley *(Maianthemum canadense)* and various species of Lady's Slippers *(Cypripedium* spp.*)*. Also frequent are Swamp Dewberry *(Rubus hispidus)* and Shining Clubmoss *(Lycopodium lucidulum)*. Less conspicuous are several species of the Heath family *(Ericaceae)* such as Creeping Snowberry *(Gaultheria hispidula)*, Pale Laurel *(Kalmia polifolia)* and Large Cranberry *(Vaccinium macrocarpon)*.

Disturbance and Succession: See the Introduction.

Management Implications: On the relative scale of wetland habitat type productivity (very poor, poor, poor to medium, medium, medium to rich) **PmLLe-An** is classified as "very poor" (see the **Management Implications** section).

REGION 5: PLANT SPECIES BY HABITAT TYPE (PmLLe-An)

Understory Species in Order of Decreasing Frequency of Occurrence

Common Name *(Scientific Name)*	Freq. %	Cover %
Sphagnum Mosses *(Sphagnum* spp.*)*	100	88
Labrador Tea *(Ledum groenlandicum)*	100	32
Low-sweet Blueberry *Vaccinium angustifolium)*	100	21
Shining Clubmoss *(Lycopodium lucidulum)*	100	2
Leatherleaf *(Chamaedaphne calyculata)*	100	9
Pale Laurel *(Kalmia polifolia)*	83	1
Swamp Dewberry *(Rubus hispidus)*	67	30
Interrupted Fern *(Osmunda claytoniana)*	67	19
Black Chokeberry *(Aronia melanocarpa)*	67	6
Purple-stemmed Aster *(Aster puniceus)*	67	4
Larger Blue Flag *(Iris versicolor)*	67	1
Large Cranberry *(Vaccinium macrocarpon)*	67	4
Black Huckleberry *(Gaylussacia baccata)*	50	27
Juneberries *(Amelanchier* spp.*)*	50	1
Spinulose Shield Fern *(Dryopteris spinulosa)*	50	1
Wild Lily-of-the-valley *(Maianthemum canadense)*	50	1
Raspberries/Blackberries *(Rubus* spp.*)*	50	1
Starflower *(Trientalis borealis)*	50	1
Small Cranberry *(Vaccinium oxycoccus)*	33	23
Speckled Alder *(Alnus rugosa)*	33	4
Yellow Beadlily *(Clintonia borealis)*	33	5
Bunchberry *(Cornus canadensis)*	33	2
American Hazelnut *(Corylus americana)*	33	2
Creeping Snowberry *(Gaultheria hispidula)*	33	3
Winterberry *(Ilex verticillata)*	33	1
Whorled Loosestrife *(Lysimachia quadrifolia)*	33	1
Cinnamon Fern *(Osmunda cinnamomea)*	33	2
Currants/Gooseberries *(Ribes* spp.*)*	33	1
Skunk Cabbage *(Symplocarpus foetidus)*	33	5
Field Bindweed *(Convolvulus arvensis)*	17	18
Feather Mosses *(Feather Moss* spp.*)*	17	1
Spotted Touch-me-not *(Impatiens capensis)*	17	1
Dwarf Raspberry *(Rubus pubescens)*	17	1
Canada Blueberry *(Vaccinium myrtilloides)*	17	1
Downy Arrowwood *(Viburnum rafinesquianum)*	17	3

REGION 5: TREE SPECIES BY HABITAT TYPE (PmLLe-An)

Tree Species Frequency of Occurrence and Average Cover by Size Class

Sawtimber	**Freq. %**	**Cover %**
Larix laricina	83	12
Picea mariana	17	3
Pinus strobus	17	3

Poles	**Freq. %**	**Cover %**
Larix laricina	100	37
Picea mariana	67	20
Betula papyrifera	33	3
Pinus strobus	33	5
Acer rubrum	17	8
Tsuga canadensis	17	1

Saplings	**Freq. %**	**Cover %**
Larix laricina	100	6
Picea mariana	83	2
Pinus strobus	67	1
Acer rubrum	33	4
Betula papyrifera	33	13

Large Seedlings	**Freq. %**	**Cover %**
Larix laricina	100	1
Picea mariana	83	3
Acer rubrum	67	1
Betula papyrifera	50	1
Pinus strobus	50	1
Quercus velutina	33	1
Tsuga canadensis	33	1
Populus grandidentata	17	1

Small Seedlings	**Freq. %**	**Cover %**
Acer rubrum	100	1
Larix laricina	100	1
Picea mariana	100	1
Quercus velutina	100	1
Betula papyrifera	83	1
Pinus strobus	50	1
Quercus alba	33	1

PArGy

Pinus-Acer/Gaylussacia

Pinus strobus-Acer rubrum/Gaylussacia baccata

***Eastern* White Pine-Red Maple/Black Huckleberry**

DISTRIBUTION

Clark and Marathon Counties and surrounding region.

LANDFORM AND SOILS

At the surface, a shallow organic layer is typically less than one foot thick. Mineral soil is clayey sand to depth of more than five feet, or changing to sand at a depth of three to five feet. The year of sampling, the soil profile was saturated to the surface, or at least below two foot depth.

VEGETATION

Common Forest Cover Types: Stand species composition is extremely varied. Most frequent species are red maple, white pine and paper birch, although a number of sample stands had high representation or even dominance of black spruce, jack pine, red pine, quaking aspen or black oak. Advance reproduction is typically sparse. Red maple is most often the dominant sapling. Only white pine, white oak and black oak saplings occurred in more than half of the sample stands.

Shrub and Small Tree Layer: Only low shrubs typically are well represented. Low-sweet Blueberry *(Vaccinium angustifolium)* is best represented, but Black Huckleberry *(Gaylussacia baccata)* was most abundant and characteristic of the type on about 70 percent of the sample stands. Other species with relatively high frequency of occurrence are Raspberries/Blackberries *(Rubus* spp.*)* and Winterberry *(Ilex verticillata)*.

Black Huckleberry *(Gaylussacia baccata)*

(Photo from Department of Natural Resources Archives)

Ground Flora Characteristics: Presence and relatively high cover of *Sphagnum* spp. is characteristic. Other species with high frequency of occurrence are Purple-stemmed Aster *(Aster puniceus)*, Starflower *(Trientalis borealis)*, Wild Lily-of-the-valley *(Maianthemum canadense)*, Swamp Dewberry *(Rubus hispidus)*, Bracken Fern *(Pteridium aquilinum)*, Shining Clubmoss *(Lycopodium lucidulum)*, Wintergreen *(Gaultheria procumbens)*, and Bunchberry *(Cornus canadensis)*.

Disturbance and Succession: See the Introduction.

Management Implications: On the relative scale of wetland habitat type productivity (very poor, poor, poor to medium, medium, medium to rich) **PArGy** is classified as "poor" (see the **Management Implications** section).

REGION 5: PLANT SPECIES BY HABITAT TYPE (PArGy)

Understory Species in Order of Decreasing Frequency of Occurrence

Common Name *(Scientific Name)*	Freq. %	Cover %
Sphagnum Mosses *(Sphagnum* spp.*)*	100	57
Low-sweet Blueberry *(Vaccinium angustifolium)*	98	10
Purple-stemmed Aster *(Aster puniceus)*	91	4
Winterberry *(Ilex verticillata)*	91	7
Starflower *(Trientalis borealis)*	91	2
Swamp Dewberry *(Rubus hispidus)*	89	14
Shining Clubmoss *(Lycopodium lucidulum)*	86	4
Bracken Fern *(Pteridium aquilinum)*	77	21
Wild Lily-of-the-valley *(Maianthemum canadense)*	75	5
Raspberries/Blackberries *(Rubus* spp.*)*	75	6
Wintergreen *(Gaultheria procumbens)*	73	8
Black Huckleberry *(Gaylussacia baccata)*	70	24
Bunchberry *(Cornus canadensis)*	68	7
Whorled Loosestrife *(Lysimachia quadrifolia)*	59	1
Juneberry *(Amelanchier* spp.*)*	57	2
Interrupted Fern *(Osmunda claytoniana)*	55	11
Dwarf Raspberry *(Rubus pubescens)*	41	1
Black Chokeberry *(Aronia melanocarpa)*	34	1
Canada Blueberry *(Vaccinium myrtilloides)*	34	5
Goldenrods *(Solidago* spp.*)*	32	1
Sessile-leaved Bellwort *(Uvularia sessifolia)*	32	1
Speckled Alder *(Alnus rugosa)*	27	8
Partridgeberry *(Mitchella repens)*	27	3
Three-leaved Solomon's Seal *(Smilacina trifolia)*	23	5
Wild Sarsaparilla *(Aralia nudicaulis)*	20	1
American Hazelnut *(Corylus americana)*	20	4
Violets *(Viola* spp.*)*	20	1
Spinulose Shield Fern *(Dryopteris spinulosa)*	18	1
Ground Pine *(Lycopodium obscurum)*	18	1
Lady Fern *(Athyrium filix-femina)*	16	1
Leatherleaf *(Chamaedaphne calyculata)*	16	14
Yellow Beadlily *(Clintonia borealis)*	16	1
Cinnamon Fern *(Osmunda cinnamomea)*	16	7
Hairy Solomon's Seal *(Polygonatum pubescens)*	14	1

REGION 5: TREE SPECIES BY HABITAT TYPE (PArGy)

Tree Species Frequency of Occurrence and Average Cover by Size Class

Sawtimber	Freq. %	Cover %
Pinus strobus	32	20
Picea mariana	18	15
Pinus banksiana	18	18
Acer rubrum	16	7
Quercus velutina	16	11
Betula papyrifera	14	5
Pinus resinosa	14	19

Poles	Freq. %	Cover %
Acer rubrum	61	18
Betula papyrifera	55	11
Pinus strobus	48	9
Quercus velutina	39	13
Picea mariana	32	52
Pinus banksiana	32	32
Populus tremuloides	20	22
Quercus alba	18	4
Larix laricina	11	28

Saplings	Freq. %	Cover %
Acer rubrum	82	26
Quercus velutina	59	8
Betula papyrifera	57	6
Pinus strobus	45	5
Quercus alba	45	2
Fraxinus nigra	23	6
Pinus banksiana	23	2
Picea mariana	20	2

Large Seedlings	Freq. %	Cover %
Acer rubrum	86	4
Quercus velutina	86	2
Betula papyrifera	59	2
Pinus strobus	50	1
Quercus alba	50	1
Pinus banksiana	30	1
Fraxinus nigra	18	2
Populus tremuloides	16	1

Small Seedlings	Freq. %	Cover %
Acer rubrum	93	3
Quercus velutina	93	2
Quercus alba	75	2
Pinus strobus	64	1
Betula papyrifera	59	1
Picea mariana	36	1
Pinus banksiana	30	1
Fraxinus nigra	25	1

(Photo from Department of Natural Resources Archives)

(Photo from Department of Natural Resources Archives)

ArFnRh

Acer-Fraxinus/Rubus

Acer rubrum-Fraxinus nigra/Rubus hispidus

Red Maple-Black Ash/Swamp Dewberry

DISTRIBUTION

Clark and Marathon Counties and surrounding region, more likely in areas of glacial outwash rather than till.

LANDFORM AND SOILS

Shallow organic layer, typically less than one foot thick, over predominantly sandy substrate. Often there is a clay layer within sandy profile with mottling or saturated condition above it.

VEGETATION:

Common Forest Cover Types: Stand species composition is extremely varied. The most frequent species are red maple, paper birch, black spruce, quaking aspen and eastern hemlock, although none were present in more than 50 percent of the study plots. Advance reproduction is typically sparse. Red maple, black ash and Black Cherry saplings each occurred in about one third of sample stands and with modest density.

Shrub and Small Tree Layer: This layer is not well developed. Most common dominant shrubs are Raspberries/Blackberries *(Rubus* spp.*)*, Currants/Gooseberries *(Ribes* spp.*)* and Winterberry *(Ilex verticillata)*. Beaked Hazel *(Corylus cornuta)* was relatively abundant in about half of the study stands.

Ground Flora Characteristics: Presence of *Sphagnum* spp. is characteristic. Other species with high frequency of occurrence are Purple-stemmed Aster *(Aster puniceus)*, Starflower *(Trientalis borealis)*, Wild Lily-of-the-valley *(Maianthemum canadense)*, Swamp Dewberry *(Rubus hispidus)*, Bracken Fern *(Pteridium aquilinum)* and Bunchberry *(Cornus canadensis)*. All other species occur with frequencies under 50 percent.

Disturbance and Succession: See the Introduction.

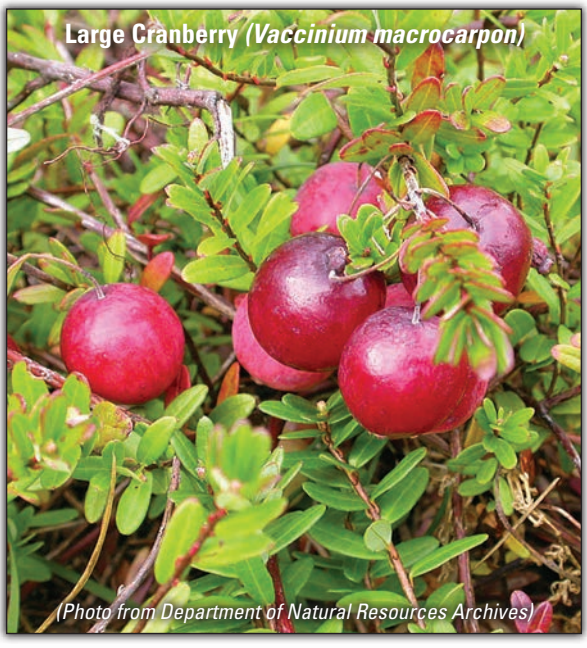
Management Implications: On the relative scale of wetland habitat type productivity (very poor, poor, poor to medium, medium, medium to rich) **ArFnRh** is classified as "poor to medium" (see the **Management Implications** section).

REGION 5: PLANT SPECIES BY HABITAT TYPE (ArFnRh)

Understory Species in Order of Decreasing Frequency of Occurrence

Common Name *(Scientific Name)*	Freq. %	Cover %
Sphagnum Mosses *(Sphagnum* spp.*)*	100	33
Raspberries/Blackberries *(Rubus* spp.*)*	100	12
Purple-stemmed Aster *(Aster puniceus)*	100	3
Starflower *(Trientalis borealis)*	88	3
Wild Lily-of-the-valley *(Maianthemum canadense)*	84	7
Swamp Dewberry *(Rubus hispidus)*	84	8
Juneberry *(Amelanchier* spp.*)*	72	1
Winterberry *(Ilex verticillata)*	72	4
Common Buckthorn *(Rhamnus cathartica)*	64	1
Currants/Gooseberries *(Ribes* spp.*)*	60	25
Bracken Fern *(Pteridium aquilinum)*	60	7
Violets *(Viola* spp.*)*	60	5
Bunchberry *(Cornus canadensis)*	56	5
Bush Honeysuckle *(Diervilla lonicera)*	52	5
Interrupted Fern *(Osmunda claytoniana)*	52	8
Goldenrods *(Solidago* spp.*)*	52	4
Spinulose Shield Fern *(Dryopteris spinulosa)*	48	6
Shining Clubmoss *(Lycopodium lucidulum)*	48	14
Low-sweet Blueberry *(Vaccinium angustifolium)*	44	4
American Hazelnut *(Corylus americana)*	40	13
Nodding Trillium *(Trillium cernuum)*	40	1
Partridgeberry *(Mitchella repens)*	36	1
Cinnamon Fern *(Osmunda cinnamomea)*	36	4
Common Wood Sorrel *(Oxalis montana)*	36	3
Asters *(Aster* spp.*)*	32	5
Horsetails *(Equisetum* spp.*)*	32	1
Oak Fern *(Dryopteris disjuncta)*	32	1
Sensitive Fern *(Onoclea sensibilis)*	32	2
Lady Fern *(Athyrium filix-femina)*	28	11
Beaked Hazelnut *(Corylus cornuta)*	28	3
Sessile-leaved Bellwort *(Uvularia sessifolia)*	24	1

Common Name *(Scientific Name)*	Freq. %	Cover %
Wild Sarsaparilla *(Aralia nudicaulis)*	20	2
Yellow Beadlily *(Clintonia borealis)*	20	2
Bedstraws *(Galium* spp.*)*	20	1
Whorled Loosestrife *(Lysimachia quadrifolia)*	20	1
Gray Dogwood *(Cornus racemosa)*	16	2
Spotted Touch-me-not *(Impatiens capensis)*	16	5
Large Cranberry *(Vaccinium macrocarpon)*	16	2
Hog Peanut *(Amphicarpa bracteata)*	12	2
Marsh Cinquefoil *(Potentilla palustris)*	12	2
Downy Arrowwood *(Viburnum rafinesquianum)*	12	1



REGION 5: TREE SPECIES BY HABITAT TYPE (ArFnRh)

Tree Species Frequency of Occurrence and Average Cover by Size Class

Sawtimber	**Freq. %**	**Cover %**
Populus tremuloides	28	12
Picea mariana	24	41
Acer rubrum	20	9
Tsuga canadensis	20	16
Betula papyrifera	16	7
Thuja occidentalis	16	26

Poles	**Freq. %**	**Cover %**
Acer rubrum	48	18
Picea mariana	44	25
Betula papyrifera	36	32
Populus tremuloides	32	40
Tsuga canadensis	32	31
Prunus serotina	24	5
Fraxinus nigra	16	4
Quercus velutina	16	7
Thuja occidentalis	16	34

Saplings	**Freq. %**	**Cover %**
Acer rubrum	60	11
Prunus serotina	44	14
Fraxinus nigra	28	4
Quercus velutina	28	2
Betula papyrifera	24	23
Carpinus caroliniana	24	5
Picea mariana	24	2
Tsuga canadensis	24	5
Ostrya virginiana	20	5

Large Seedlings	**Freq. %**	**Cover %**
Acer rubrum	64	1
Quercus velutina	52	2
Populus tremuloides	44	3
Prunus serotina	44	4
Carpinus caroliniana	24	3
Fraxinus nigra	24	2
Tsuga canadensis	20	2

Small Seedlings	Freq. %	Cover %
Acer rubrum	92	2
Quercus velutina	68	1
Picea mariana	48	1
Tsuga canadensis	48	1
Populus tremuloides	36	1
Fraxinus nigra	32	1
Betula papyrifera	24	1

(Photo from Department of Natural Resources Archives)

FnArI-Ix

Fraxinus-Acer/Impatience (Ilex variant*)*
Fraxinus nigra-Acer rubrum/Impatience capensis (Ilex verticillata variant*)*
Black Ash-Red Maple/Spotted Touch-me-not (Winterberry variant)

DISTRIBUTION

Clark and Marathon Counties and adjacent regions; primarily areas of till rather than outwash.

LANDFORM AND SOILS

Typically shallow (less than one foot) organic layer over finer texture mineral soil, e.g., loamy sand, sandy clay loam, loamy clay.

VEGETATION:

Common Forest Cover Types: Black ash is the most consistently present and dominant species, but red maple and quaking aspen are common associates and are dominant in many stands. Conifers are absent or rare.

Shrub and Small Tree Layer: This layer may be well developed or sparse. Most common species are Currants/Gooseberries *(Ribes* spp.*)*, Raspberries/Blackberries *(Rubus* spp.*)*, Winterberry *(Ilex verticillata),* and Common Buckthorn *(Rhamnus cathartica)*. In some stands, speckled alder *(Alnus rugosa)* is also well represented.

Ground Flora Characteristics: *Sphagnum* spp. is well represented, or at least present, in most stands. Spotted Touch-me-not *(Impatiens capensis)* was present in about 80 percent of study stands. Other species with a frequency of occurrence greater than 70 percent are Purple-stemmed Aster *(Aster puniceus)*, Spinulose Shield Fern *(Dryopteris spinulosa)*, Wild Lily-of-the-valley *(Maianthemum canadense)* and Swamp Dewberry *(Rubus hispidus)*.

Disturbance and Succession: See the Introduction.

Management Implications: On the relative scale of wetland habitat type productivity (very poor, poor, poor to medium, medium, medium to rich) **FnArI-Ix** type is classified as "medium" (see the **Management Implications** section). It is the richest type in Region 5.

REGION 5: PLANT SPECIES BY HABITAT TYPE (FnArl-lx)

Understory Species in Order of Decreasing Frequency of Occurrence

Common Name *(Scientific Name)*	Freq. %	Cover %
Raspberries/Blackberries *(Rubus* spp.*)*	100	33
Sphagnum Mosses *(Sphagnum* spp.*)*	100	26
Goldenrods *(Solidago* spp.*)*	100	6
Currants/Gooseberries *(Ribes* spp.*)*	93	32
Purple-stemmed Aster *(Aster puniceus)*	93	3
Horsetails *(Equisetum* spp.*)*	93	1
Winterberry *(Ilex verticillata)*	93	7
Violets *(Viola* spp.*)*	86	2
Spotted Touch-me-not *(Impatiens capensis)*	79	11
Common Buckthorn *(Rhamnus cathartica)*	79	10
Spinulose Shield Fern *(Dryopteris spinulosa)*	79	4
Wild Lily-of-the valley *(Maianthemum canadense)*	71	3
Swamp Dewberry *(Rubus hispidus)*	71	3
Nodding Trillium *(Trillium cernuum)*	64	2
Maple-leaved Viburnum *(Viburnum acerifolium)*	64	2
Bedstraws *(Galium* spp.*)*	57	3
Sensitive Fern *(Onoclea sensibilis)*	57	1
Virginia Creeper *(Parthenocissus* spp.*)*	57	3
Hog Peanut *(Amphicarpa bracteata)*	50	7
Wild Sarsaparilla *(Aralia nudicaulis)*	50	2
Bittersweet Nightshade *(Solanum dulcamara)*	50	3
Stinging Nettle *(Urtica dioica)*	43	7
Speckled Alder *(Alnus rugosa)*	36	20
Interrupted Fern *(Osmunda claytoniana)*	36	13
Columbine *(Aquilegia canadensis)*	36	1
Asters *(Aster* spp.*)*	36	1
Field Bindweed *(Convolvulus arvensis)*	36	9
Starflower *(Trientalis borealis)*	36	1
Lady Fern *(Athyrium filix-femina)*	29	15
Bunchberry *(Cornus canadensis)*	29	1
Geraniums *(Geranium* spp.*)*	29	3
Larger Blue Flag *(Iris versicolor)*	29	5
Skunk Cabbage *(Symplocarpus foetidus)*	29	2
Juneberries *(Amelanchier* spp.*)*	21	2
Bush Honeysuckle *(Diervilla lonicera)*	21	6

Common Name *(Scientific Name)*	Freq. %	Cover %
Common Wood Sorrel *(Oxalis montana)*	21	1
Bracken Fern *(Pteridium aquilinum)*	21	1
Carrion Flower *(Smilax herbacea)*	21	1
Beaked Hazel *(Corylus cornuta)*	14	28
Feather Mosses *(Feather Moss* spp.*)*	14	1
Fly Honeysuckles *(Lonicera* spp.*)*	14	2
Whorled Loosestrife *(Lysimachia quadrifolia)*	14	3
Low-sweet Blueberry *(Vaccinium angustifolium)*	14	9
Riverbank Grape *(Vitis riparia)*	14	2

Riverbank Grape *(Vitis riparia)*

(Photo from Department of Natural Resources Archives)

Rough Bedstraw *(Galium asprellum)*

(Photo from Department of Natural Resources Archives)

REGION 5: TREE SPECIES BY HABITAT TYPE (FnArI-Ix)

Tree Species Frequency of Occurrence and Average Cover by Size Class

Sawtimber	Freq. %	Cover %
Populus tremuloides	50	17
Fraxinus nigra	43	33
Acer rubrum	21	19
Picea mariana	21	24

Poles	Freq. %	Cover %
Fraxinus nigra	86	24
Populus tremuloides	50	47
Acer rubrum	43	16
Picea mariana	29	35
Acer saccharum	21	8
Abies balsamea	14	2
Betula papyrifera	14	3
Ostrya virginiana	14	3

Saplings	Freq. %	Cover %
Fraxinus nigra	86	26
Acer rubrum	29	20
Acer saccharum	21	2
Betula papyrifera	21	4
Prunus serotina	21	4
Ostrya virginiana	14	4
Tilia americana	14	1
Tsuga canadensis	14	1

Large Seedlings	Freq. %	Cover %
Fraxinus nigra	93	4
Acer rubrum	79	1
Acer negundo	14	1
Acer saccharum	14	1
Betula papyrifera	14	2
Quercus velutina	14	1

Large Seedlings	Freq. %	Cover %
Acer rubrum	93	1
Fraxinus nigra	71	1
Quercus velutina	57	1
Populus tremuloides	29	1
Acer saccharum	21	1
Picea mariana	14	1

(Photo from Kemp Natural Resources Station Archives)

Management Implications

This section is not intended as a manual for specific management prescriptions, because these depend on management goals and objectives, which in turn, depend on ownership. However, it is intended as a tool to help identify ecological opportunities and limitations for management on specific sites.

GENERAL CONSIDERATIONS

The hydrologic processes in a forested wetland include the movement and behavior of water through that wetland. Understanding landform, water source, water table position, the factors controlling it, and other factors in forest management will help with management considerations. While many wetland functions are unaffected or even enhanced by forest management, some functions can be compromised by land management activities. For some sites, potential water table rise or "swamping" is a concern following timber harvesting. There is also a lack of understanding about under what conditions and on what types of sites swamping is a problem.

(Photo from Kemp Natural Resources Station Archives)

Changes in water table dynamics can impact regeneration growth and survival leading to stand conversion, especially on very wet sites. The water table is the boundary between water saturated and unsaturated soil. The water table may vary seasonally due to changes in precipitation and evapotranspiration (ET) which includes both evaporation and transpiration. Evaporation is the movement of water to the air from sources such as soil, canopy interception and waterbodies. Transpiration is the movement of water within a plant from the soil and the subsequent loss of water vapor through leaf stomata.

Both transpiration and the precipitation processes can play a large role in water loss from wetlands. Since timber harvesting reduces total leaf biomass at the site, it reduces transpiration levels and may raise the water table. In other words, if the removal of trees reduces ET, and as a result, soil water depletion decreases, then the water table will rise. If the duration of time when water tables are near the soil surface is extended after harvesting, it can cause a shift in the vegetation community from facultative wetland species. It can also favor the establishment of herbaceous or shrub vegetation rather than trees. Soil characteristics that impede drainage, topographic positions that favor water collection, and increased levels of basal area removal are all known to increase the potential for the water table to rise following timber harvesting.

Forest hydrologists tend to identify the measurement of 30 cm (growing condition) because it is used to differentiate between wetland and upland sites. For wetlands, most of the rooting zone occurs within 30 cm of the surface and can affect the hydrologic response (Verry 1986, 1997, Slezak 2014). Sites with consistent water input are less likely to be influenced by management.

Hydroperiod, or the period of soil saturation, is known to vary greatly in wetland types and landscape positions. Wetlands fed by consistent groundwater sources have very little water table variability, while alluvial floodplain forests may have variations of several meters. Overall, forested wetlands in northern North America that occur on mineral soils and are dominated by precipitation inputs have intermediate water level variability characterized by frequent water level fluctuation and a large water table drop during the peak of ET that occurs in mid- to late summer *(Slesak et. al, 2014)*. These latter wetland types are most susceptible to management induced water table rise associated with reduced transpiration following harvesting.

Verry (1986, 1997) proposed a general consideration regarding mean water table depth and its relationship to swamping following harvesting in wetlands. If the water table is within 30 cm of the surface, harvesting will generally not cause a rise in the water table elevation because these wetlands typically have a consistent source of water input with less influence of evapotranspiration (ET). However, if the water table is more than 30 cm below the surface, then harvesting will raise the water table, especially on mineral soil wetlands where ET is the dominant water loss pathway.

Measuring the average annual depth of the water table without an onsite monitoring well can be difficult, but there are some options that can be used to estimate relative water table position. Foresters can refer to water table depth from the Natural Resource Conservation Service (NRCS) Web Soil Survey data. Soil types in the NRCS Survey with very poor and poor drainage classifications generally have water tables near the soil surface. In addition to soil survey data, soil augers can be used to extract a soil sample to check for mottling and gleyed color patterns, indicators of saturation and seasonally high water tables. Soil pits can also be used at some sites to directly observe water table position.

Other factors that can affect the hydrologic processes and increase ponding/swamping are vehicular traffic (rutting and compaction) and alteration or impeded drainage. In particular, rutting on organic soil wetlands can restrict shallow subsurface flow and cause ponding. Studies have shown that more than one pass by logging equipment in wetland soils can dramatically compact the area, thus affecting water movement. Harvesting during frozen conditions, use of logging mats and driving over tops/branches can minimize these affects. Road systems near or through wetland forests can impede water flow, and should be located away from wetlands whenever feasible.

(Photo from Department of Natural Resources Archives)

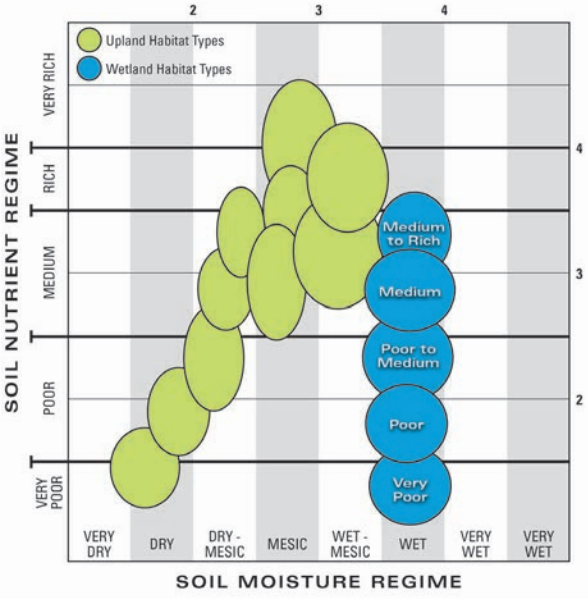
Installing adequate cross drainage structures such as culverts can maintain the hydrologic flow necessary to maintain these forest systems when properly designed. Failing to consider these practices may alter the hydrology and result in swamping, tree mortality, and site conversion to alder, cattails or other undesirable vegetation.

Infrastructure (roads, skid trails, and landings) development and maintenance can have both immediate and cumulative impacts on forest soils and wetland hydrology. Studies have correlated these impacts with changes in hydrologic regimes, surface drainage patterns, and soil moisture. The negative impacts of transportation systems are well studied at the fine scale or site-level, but have not been studied in an integrated manner on larger landscapes in the Great Lakes region. Roads and utility corridors have been implicated in the spread of non-native invasive species. They can also act as barriers to movement for some species, fragment habitat, create edge, and attract human disturbances.

Fortunately, the development of best management practices for water quality in Wisconsin is diminishing these problems. We also hope that applying wetland habitat type classification to research and management will help advance safe utilization of this valuable resource.

HABITAT TYPE GROUPS

To simplify the description, analysis and discussion of ecologically-similar habitat types (those occupying the same position on the moisture-nutrient gradient) across the five regions, a total of 19 types were grouped into five relative productivity (or soil nutrient richness) groups: very poor, poor, poor to medium, medium, and medium to rich.



	VERY POOR	POOR	POOR TO MEDIUM	MEDIUM	MEDIUM TO RICH
REGION 1	PmLLe	PmLNe	LArIx	FnOn	
REGION 2	PmLLe	PmLNe	ThAbFnIx	FnAbI	
REGION 3	PmLLe	PmLNe	FnAbArOn AbFnThOs AbFnThIx AbThArAsp	FnArI	
REGION 4	PmLLe	PmLNe	ThAbFnC AbThArAsp	FnThAbAt	FnUB
REGION 5	PmLLe-An	PArGy	ArFnRh	FnArI-Ix	

HABITAT TYPE GROUP 1
NUTRIENT — VERY POOR

Site Characteristics

This group of treed peatlands, or acid bogs, represents the most nutrient poor wetland forests in their respective regions. These most often occur in strips along lakeshores, or as landscape depressions clearly showing evidence of filled-lake origin. Surface consists of a thick layer of hummocky sphagnum moss, which grades into substrate of progressively decomposed sphagnum peat. Depth of peat varies greatly, but generally exceeds five feet. These peatlands receive little or no stream or groundwater discharge and depend on precipitation for moisture, resulting in acidic and nutrient poor growing conditions.

Principal Cover Types

Tamarack and black spruce are the only consistently present and best adapted species. Although jack pine, white pine and white birch also occur sporadically, they tend to display clearly an "offsite" condition. Most hardwoods require higher nutrient levels than these types provide.

Regeneration

Black spruce and tamarack reproduce naturally via wind dispersed seed on suitable seed beds of moist sphagnum with limited competing vegetation. Hummock microsites with some drainage can be important for germination and seedling growth during wet periods. Extended droughts, on the other hand, can dry out the sphagnum and cause regeneration failures. Regeneration periods are typically long due to the difficult growing conditions and low productivity of these sites.

Growth Potential

Growth potential is generally low, but tamarack and black spruce are well-suited for these types. Growth potential is very poor for other tree species.

(Photo from Kemp Natural Resources Station Archives)

Other Management Considerations

Primarily even-aged methods are used to manage both black spruce and tamarack. The progressive strip clearcut regeneration method has been used successfully in Wisconsin to promote black spruce and tamarack seed dispersal and subsequent regeneration, while maintaining partial forest cover to reduce the risk of swamping (i.e., raising the water table). Uniform clearcut, followed by prescribed fire and broadcast direct seeding, is another commonly used method in the Lake States. Insect and disease threats, such as dwarf mistletoe in black spruce and larch sawfly and eastern larch beetle in tamarack, can be very damaging.

Hydrology and operational considerations are especially important in this group, due to the extremely saturated conditions and sensitive nature of the sites. Site damage due to rutting or poorly placed roads can impede water movement, increase swamping risks, and limit future site productivity. Raised sphagnum bogs sometimes have open water areas or "moats" adjacent to the upland, making access more difficult. Logging is almost always seasonally restricted to well frozen conditions, which may not occur every year. The use of slash mats can help minimize site disturbance. Consult Wisconsin's *Forestry Best Management Practices for Water Quality* for additional operational considerations.

HABITAT TYPE GROUP 2
NUTRIENT — POOR

Site Characteristics

This group of treed peatlands or bogs are generally less acidic and somewhat less poor in available nutrients than Habitat Type Group 1. The more plant-favorable nutrient status is due to hydrologically elevated nutrient conditions. They most often occur in strips along lakeshores, or as landscape depressions clearly showing the evidence of filled-lake origin. Substrate profile is similar to that of Group 1. Surface consists of a thick layer of hummocky sphagnum moss, which grades into substrate of progressively decomposed sphagnum peat. Depth of peat varies greatly, but generally exceeds five feet. In contrast to Group 1, these peatlands receive some stream or groundwater discharge resulting in higher pH and improved growing conditions.

Principal Cover Types

Tamarack and black spruce are consistently present and the best adapted species on these sites, but in contrast to types in Group 1, stands often contain other species, particularly balsam fir, northern white cedar, red maple, paper birch and sometimes white pine.

Regeneration

Black spruce and tamarack are the dominant reproduction, however, balsam fir and red maple reproduction is often well represented. Black spruce and tamarack reproduce via wind dispersed seed on suitable seed beds of sphagnum. The moist sphagnum substrate is important for germination and seedling growth but can dry out during drought periods, causing regeneration failure. This habitat type group tends to have more vegetation competition from shrubs and other tree species. Opportunities for management of stands on these types are somewhat better than those in Group 1.

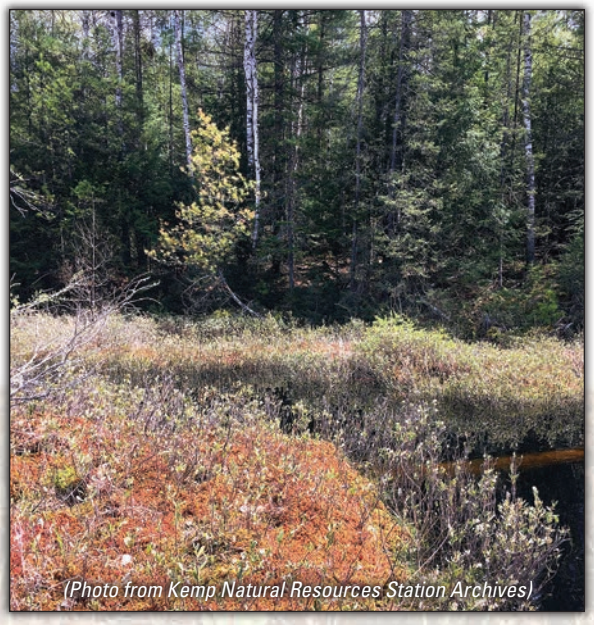
Growth Potential

Growth potential is moderate for tamarack, black spruce and balsam fir; low for northern white cedar, red maple and paper birch.

Other Management Considerations

Primarily even-aged methods are used to manage both black spruce and tamarack. The progressive strip clearcut regeneration method (with strips placed perpendicular to prevailing wind) is used to manage black spruce and tamarack. One important consideration during regeneration harvests is to leave tops and branches scattered throughout, primarily as a source of seed, and to maintain nutrient regimes. Uniform clearcut, followed by prescribed fire and broadcast direct seeding, is also a regeneration method used in the Lakes States. Insect and disease threats include dwarf mistletoe and spruce budworm in black spruce and several insects in tamarack (larch sawfly, larch casebearer, eastern larch beetle), periodically causing landscape-level mortality.

Hydrology and operational considerations are especially important due to the extremely saturated conditions and sensitive nature of the sites. Swamping can occur on these sites, especially if there is increased compaction and impeded drainage due to rutting from harvesting equipment and travel throughout the stand. Sphagnum bogs usually have open water areas or "moats" adjacent to the upland, making access more difficult. Logging is usually restricted to well frozen conditions, which may not occur every year. The use of slash mats can help minimize site disturbance. Consult Wisconsin's *Forestry Best Management Practices for Water Quality* for additional operational considerations.



(Photo from Kemp Natural Resources Station Archives)

HABITAT TYPE GROUP 3 NUTRIENT— POOR TO MEDIUM

Site Characteristics

Habitat types in this group typically represent areas of glacial outwash, or pitted outwash, although they may also be found on other glacial landforms. Soil surfaces typically consist of a shallow (less than two feet) organic layer upon mineral soil of sandy and gravely texture. Mottling is found in the soil profile within two feet of the surface and, in some seasons, saturated conditions are found at the surface. In some instances, the organic layer is deeper than five feet, e.g., LArIx type in Region 1. Vernal ponding and lateral flow of groundwater strongly favors black ash on these types.

Principal Cover Types

Because this group spans a relatively wide range of soil nutrient availability, species composition of stands on types in this group varies considerably. Balsam fir may be considered the "common denominator" on all types and northern white cedar is also a common component. Presence of black ash is an important characteristic. The importance of this species increases and that of conifers decreases toward the "rich" end of the scale. Other important species in some stands are red maple and paper birch, and sometimes eastern hemlock and yellow birch.

Regeneration

Presence and species composition of advance regeneration is dependent on the composition of the overstory. However, balsam fir and black ash saplings are best represented in most stands in this group. Canopy gaps created by windthrow are a common natural disturbance within these stands, favoring black ash (and red maple) reproduction from seed and vegetative sprouts. Yellow birch and eastern hemlock also disperse their light seeds easily and recruit well in light conditions created by the windthrow gaps.

Growth Potential

Growth potential is good for balsam fir and northern white cedar, moderate for black ash, paper birch and red maple. Maintenance of lateral flow of groundwater is important for good growth potential.

Other Management Considerations

A variety of silvicultural methods have been used to manage black ash. The strip clearcut or strip shelterwood method has been a successful alternative by maintaining site hydrology while creating conditions for a variety of species to regenerate in the harvest strips. Coppice with reserves is limited to sites where there is potential for leaving larger reserve patches for seeding potential and maintaining hydrology; however, sometimes this method can raise the water table. Clearcutting has been less successful, mainly because of the risk for swamping the site.

Insect and disease threats in black ash are mainly emerald ash borer, which causes near complete mortality of ash in the stand. Recommendations to regenerate non-ash species on these habitat types are being developed.

Hydrology and operational considerations are particularly important due to seasonally saturated conditions. Site damage due to rutting and impeded water movement increase swamping risks and limit site productivity. Lateral flow of groundwater sustains these forests and can be dramatically altered by rutting, road construction, and the improper installation of drainage structures. Many of these sites have swamped and converted to tag alder as a result of altered hydrology. If road construction is developed near these stands, proper drainage features is recommended.

These forests are susceptible to invasive plant infestations and other competitive vegetation, including reed canary grass, Buckthorns *(Rhamnus* spp.*)*, prickly ash and tag alder. Since these plants can negatively impact habitats, minimize or avoid their spread.

HABITAT TYPE GROUP 4
NUTRIENT — MEDIUM

Site Characteristics

Habitat types representing this group typically are found on glacial till. Surface of the soil profile typically consists of a relatively shallow layer (less than one foot) of organic material in varying degrees of decomposition, from fibric to sapric. Mineral soil in the upper two to three feet of the profile is of medium to fine texture (e.g., loam, silt loam or fine sand) and often is sandier below this depth. Saturated conditions are often found at two to three feet of depth. However, about 20 percent of study plots had well decomposed organic material reaching to depths greater than five feet.

Principal Cover Types

Black ash typically is well represented, if not dominant, in all habitat types of this group. There are, however, some regional differences. Balsam fir is sometimes a strong associate in Region 2, red maple in Regions 3 and 5, and balsam fir and northern white cedar in Region 4. Other minor associates in some types include paper birch, (formerly) American elm, sugar maple, basswood, yellow birch, quaking aspen and eastern hemlock.

Regeneration

Presence and species composition of advance regeneration is to a large extent dependent on composition of the overstory. However, black ash, red maple or balsam fir saplings are best represented in most stands in this group. Canopy gaps created by windthrow are a common natural disturbance within these stands, favoring black ash and red maple reproduction from seed and vegetative sprouts. Northern white cedar, yellow birch, and eastern hemlock also recruit well in light conditions created by the windthrow gaps.

Growth Potential

Growth potential is good for black ash, northern white cedar, balsam fir and red maple. Maintenance of lateral flow of groundwater is important for good growth potential.

(Photo from Department of Natural Resources Archives)

Other Management Considerations

A variety of silvicultural methods have been used to manage black ash. The strip clearcut or strip shelterwood method has been a successful alternative by maintaining site hydrology while creating conditions for a variety of species to regenerate in the harvest strips. Coppice with reserves is limited to sites where there is potential for leaving larger reserve patches for seeding potential and maintaining hydrology, however, sometimes this method can raise the water table. Clearcutting has been less successful, mainly because of the risk for swamping the site.

Insect and disease threats in black ash are mainly emerald ash borer which causes near complete mortality of ash in the stand. Recommendations to regenerate non-ash species on these habitat types are being developed.

Hydrology and operational considerations are particularly important due to seasonally saturated conditions. Site damage due to rutting and impeded water movement increase swamping risks and limit site productivity. Lateral flow of groundwater sustains these forests and can be dramatically altered by rutting, road construction, and the improper installation of drainage structures. Many of these sites have swamped and converted to tag alder as a result of altered hydrology. If road construction is developed near these stands, proper drainage features will have to be considered.

These forests are susceptible to invasive plant infestations and other competitive vegetation, including reed canary grass, Buckthorns *(Rhamnus* spp.*)*, prickly ash and tag alder. Since these plants can negatively impact habitats, minimize or avoid their spread.

HABITAT TYPE GROUP 5
NUTRIENT — MEDIUM TO RICH

NOTE: Only one habitat type, FnUB in Region 4, fits into this category.

Site Characteristics

Primarily on glacio-lacustrine deposits associated with the Green Bay lobe (see page 8-2, "Glacial Deposits" map). Most often mineral soil of varying texture, but typically containing significant proportions of clay and silt in the upper profile and coarser materials below. Saturation zone typically within three feet of the surface. Substrate on about 30 percent of study plots consisted entirely of well decomposed organic matter (black muck) to a depth of greater than five feet.

Principal Cover Types

Black or green ash are a predominant species in most stands. Common associates are (formerly) red elm and silver maple. Conifers almost entirely lacking in this type.

Regeneration

Black ash saplings are best represented in most stands. Green ash, silver maple and (formerly) red elm occurred in approximately one-third of the study stands. Black and green ash reproduce naturally through gaps from windthrow. The seed bank can stay viable for up to seven years. Both species are prolific stump sprouters with rapid growth rates. Silver maple is a prolific seeder with good seed crops every two years. (Formerly) Red elm reproduces in large gaps from windthrow and the seed is wind dispersed with good seed crops every two to four years. Like all elms, this species is subject to Dutch elm disease.

Growth Potential

Representing one of the most nutrient rich wetland habitat types, growth potential is good for black ash and silver maple; possibly also good for northern white cedar and other swamp conifers, although these rarely occur naturally on this type.

(Photo from Department of Natural Resources Archives)

Other Management Considerations

A variety of silvicultural methods have been used to regenerate the predominant tree species of ash and silver maple on this type. Strip clearcut and group selection may be the appropriate methods. Selection and shelterwood can also be applied but increases the number of harvest entries over a period of time. Some sites are located near or on lacustrine deposits near Green Bay, and may encounter periodic water table fluctuation associated with the lake, while others are depressional wetlands affected by runoff.

Hydrology and operational considerations are particularly important due to seasonally saturated conditions, particularly due to spring runoff. Site damage due to rutting and impeded water movement increases swamping risks and limits site productivity. Lateral flow of groundwater sustains these forests and can be dramatically altered by road construction and improper installation of drainage structures. If road construction is developed adjacent to the site, proper drainage structures will have to be installed.

These forests are susceptible to invasive plant infestations and other competitive vegetation, including reed canary grass, Buckthorns *(Rhamnus* spp.*)*, prickly ash and tag alder. Since these plants can negatively impact habitats, minimize or avoid their spread.

(Photo from Department of Natural Resources Archives)

(Photo from Department of Natural Resources Archives)

(Photo from Department of Natural Resources Archives)

(Photo from Kemp Natural Resources Station Archives)

Plant Identification

(Photo from Kemp Natural Resources Station Archives)

This section will assist you with identification of the species used in the habitat type keys and some additional common forest plants. However, it is not intended as a complete guide to flora. Consult other references when needed. Species are arranged alphabetically, by scientific name.

Graphs of each species' representation on a moisture-nutrient grid are included. Shading represents frequency of occurrence classes for reference stands (10-25%; 26-50%; 51-75%; >75%). Distribution of species on habitat types of Region 3 are shown.

FIELD IDENTIFICATION

When faced with an unknown plant, first examine it carefully and note features such as size of the whole plant, color of flower or foliage, hairiness (pubescence), flower and fruit characteristics, shape, arrangement, and attachment of leaves. Remember that within any species, some of these features will vary depending on the season, microhabitat, or historic influences (e.g., defoliation, grazing, frost, etc.).

Examine the color plates and line drawings in this section. When you find one that best matches your specimen, carefully read the description. If no match is found, you may have to consult other sources (see list below; complete references are listed on pages 8-6, 8-7 and 8-8). Perhaps the easiest reference to use is *Newcomb's Wildflower Guide*, but note that it does not include ferns.

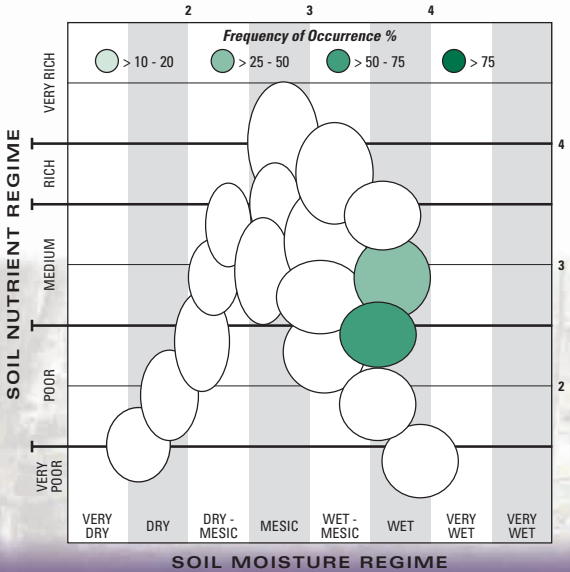
Additional Resources:

- *Ferns of Michigan* (Billington)
- *Ferns of Minnesota* (Tyron)
- *Michigan Wildflowers* (Smith)
- *Newcomb's Wildflower Guide* (Newcomb)
- *Spring Flora of Wisconsin* (Fasset)

(Photo from Department of Natural Resources Archives)

Acer spicatum
Mountain Maple

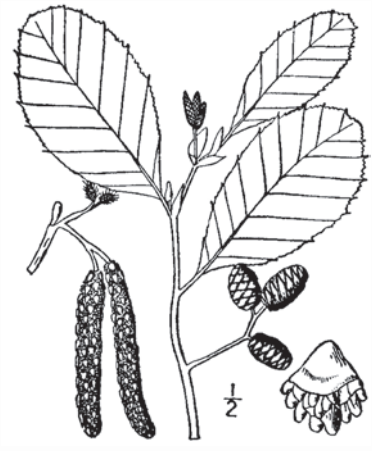
- Perennial shrub or small tree.
- Long spike-like flower clusters.
- Do not confuse with red maple saplings and seedlings. Mountain maple leaves have more pronounced venation and slightly hairy twigs and buds.

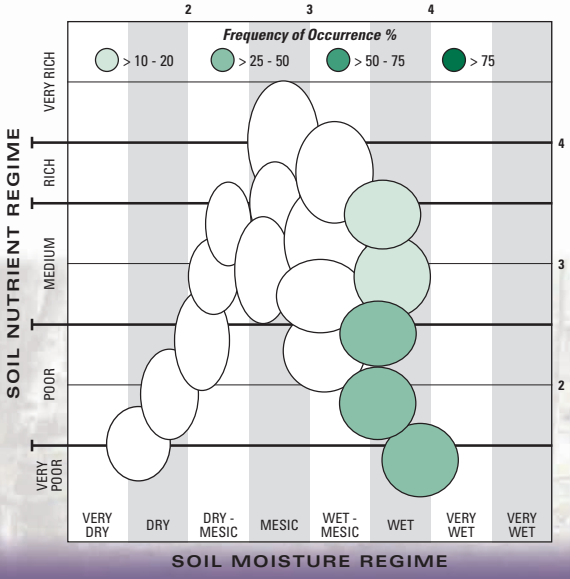


(Photo from Department of Natural Resources Archives)

Alnus rugosa
Speckled Alder

- A tall shrub with coarsely-toothed, somewhat shiny leaves.
- Bark is gray, reddish to brown, thin and smooth, often with whitish lenticils.
- Thicket forming with open crowns; found only in wet places.

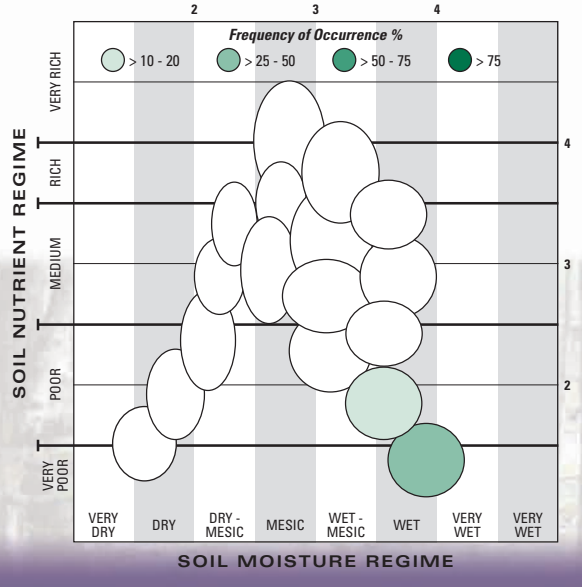




(Photo from Department of Natural Resources Archives)

Andromeda glaucophylla
Bog Rosemary

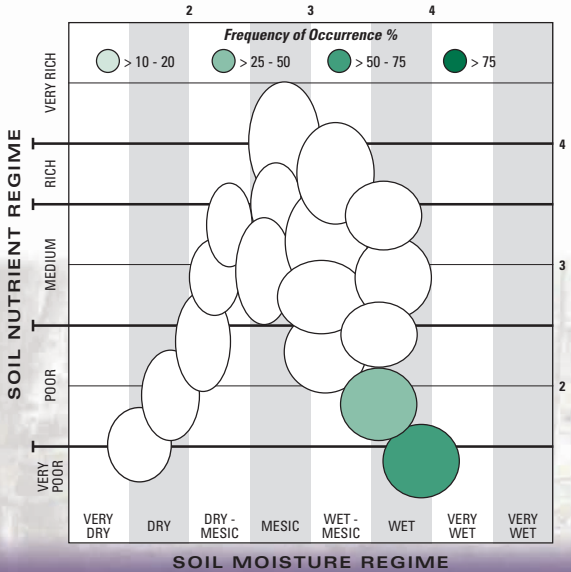
- A low, erect, evergreen shrub; round, hairless stems; bark is grey to blackish.
- Leaves alternate, leathery, whitish beneath when young; flower pink, urn-shaped, on backward-curving stalks.
- A wetland obligate.



(Photo from Department of Natural Resources Archives)

Aronia melanocarpa
Black Chokeberry

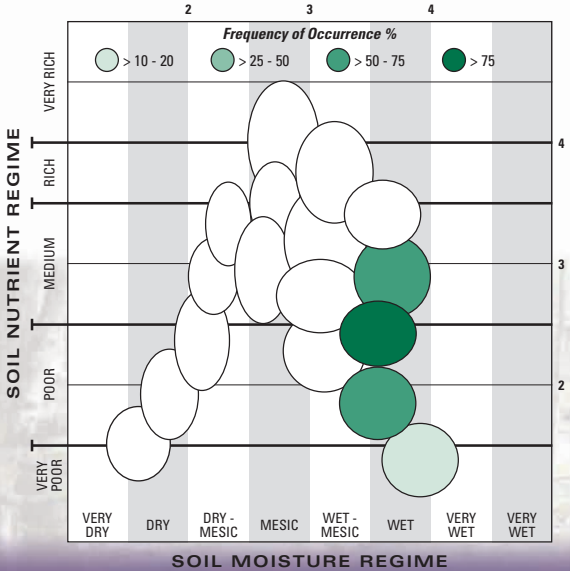
- Medium shrub up to 6' tall with finely serrated leaves.
- Leaves commonly draw to a point at the end and taper toward the base.



(Photo from Department of Natural Resources Archives)

Aster puniceus
Purple-stemmed Aster

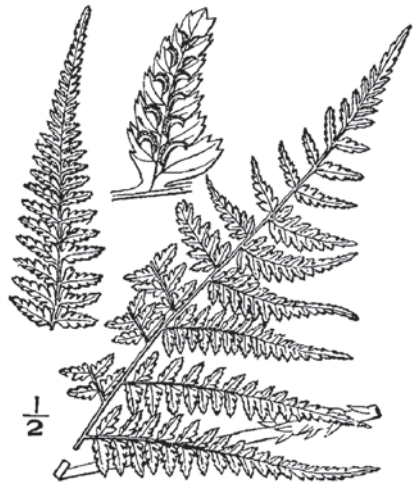
- Perennial wildflower with stout stems light green to reddish purple, evenly covered with stiff spreading hairs.
- Alternate leaves becoming gradually smaller along the upper half of each plant.

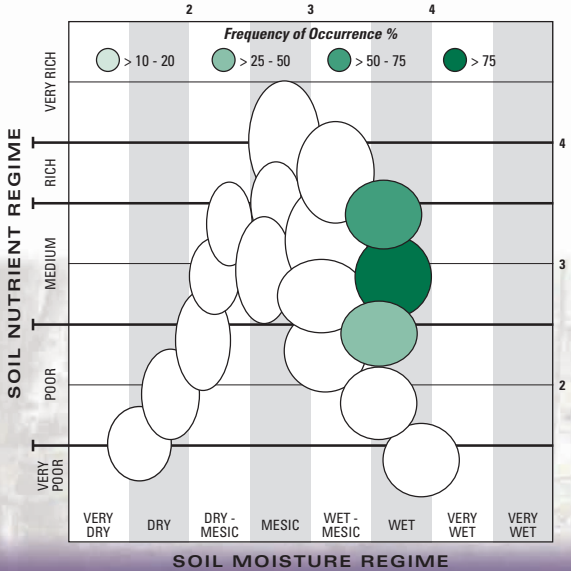


(Photo from Department of Natural Resources Archives)

Athyrium filix-femina
Lady Fern

- Lacy-cut, finely-divided, light green fronds which grow in a dense circular clumps to 2' to 3' tall.
- Base of fronds with dark brown or reddish scales.
- Species is found in rich moist woods, thickets, fields, meadows and ravines.

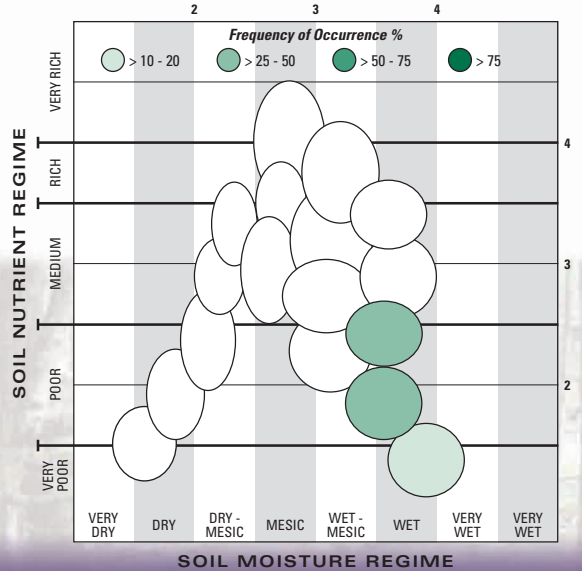




(Photo from Department of Natural Resources Archives)

Betula pumila
Bog Birch

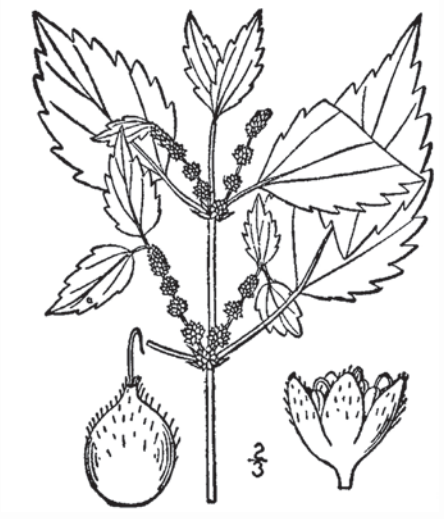
- Erect, coarse, irregular shrub; smooth bark dark reddish brown; forms large colonies.
- Leaves stiff; broadly-round above and at the base; edges coarsely toothed.
- Found in bogs, calcareous fens, wooded swamps, muskegs, and along lakeshores.

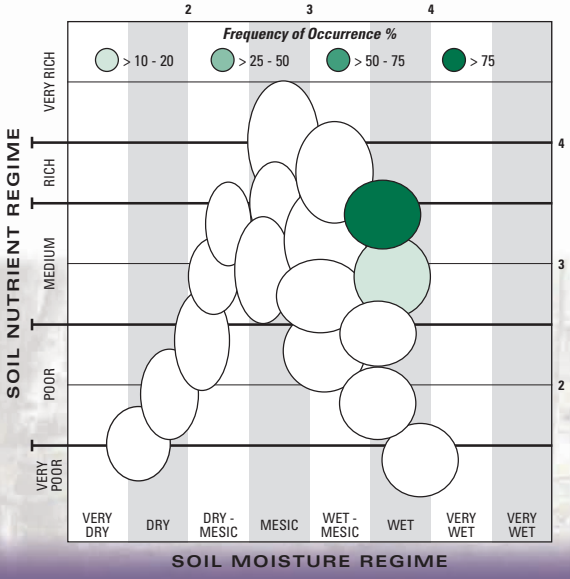


(Photo from Department of Natural Resources Archives)

Boehmeria cylindrica
False Nettle

- Erect, perennial forb with no stinging hairs.
- Leaves long-stalked, opposite, and coarsely toothed.
- Found in wet to moist habitat; woods, shores, marshes.

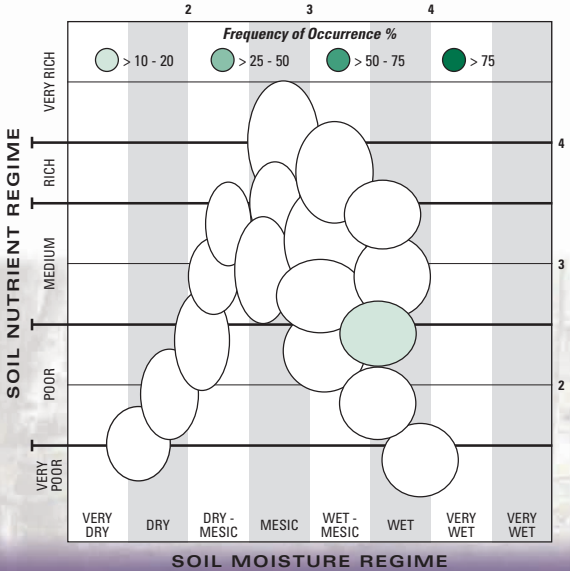




(Photo from Department of Natural Resources Archives)

Calla palustris
Water Arum

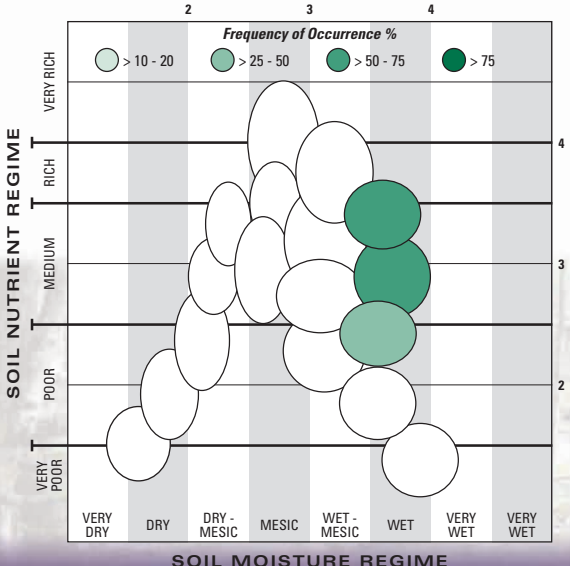
- Erect, perennial, emergent, semi-aquatic 5" to 10" tall.
- Leaves broadly oval with a pointed tip.
- Found in bogs, shallows, cold water; in peaty, mucky soil.



(Photo from Department of Natural Resources Archives)

Caltha palustris
Marsh Marigold

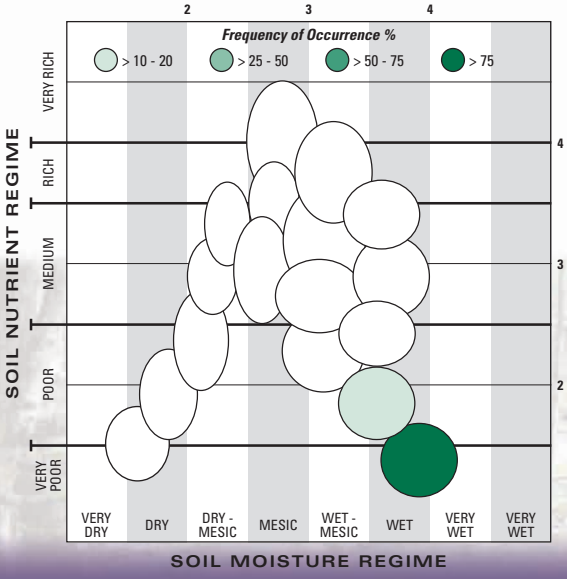
- Erect, perennial forb; stems hollow, branched toward the top.
- Leaves widely heart-shaped; yellow flowers, blooms April through May.
- Found in wet habitat; meadows, woods, forest marshes, and streambanks.



(Photo from Department of Natural Resources Archives)

Chamaedaphne calyculata
Leatherleaf

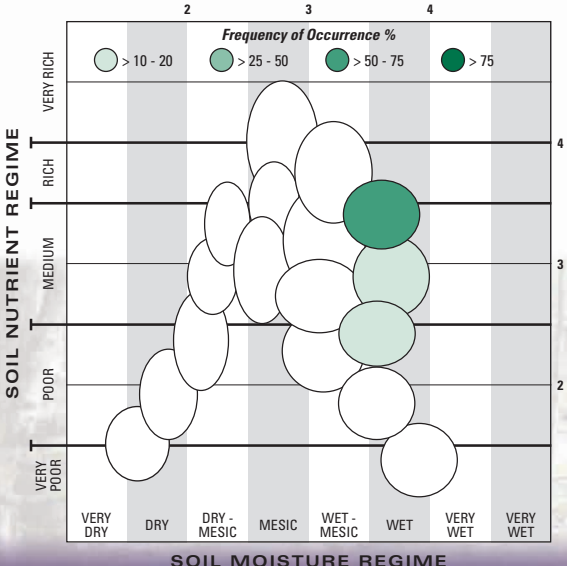
- Erect, perennial shrub; branched, covered with tiny, brown scales, forms dense thickets.
- Leaves evergreen, oblong, edges curled downward; flowers solitary, nodding, on one-sided, spike-like cluster.
- Found in wet habitat; bogs; in acidic soil.



(Photo from Department of Natural Resources Archives)

Cicuta maculata
Water Hemlock

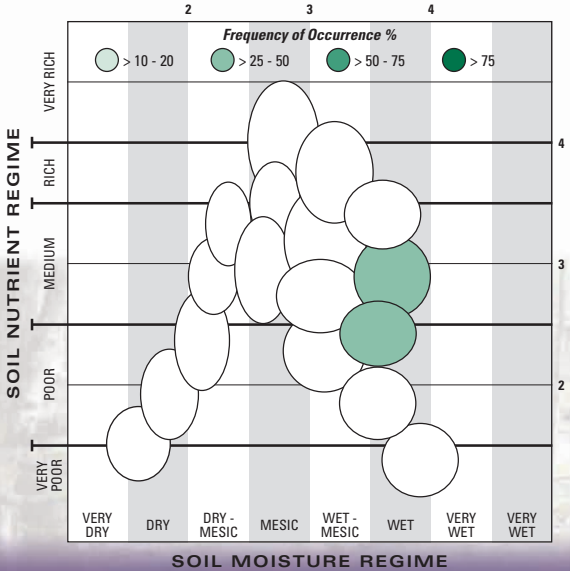
- Erect, perennial, 2' to 7' tall, emerging, semi-aquatic forb; stems often purple-spotted.
- Leaves pinnately-divided; broad, toothed leaflets; 3" flat-topped inflorescence, blooms June thru August.
- Found in wet to moderately moist habitat; woods, meadows and marshes.



(Photo from Department of Natural Resources Archives)

Circaea alpina
Dwarf Enchanter's Nightshade

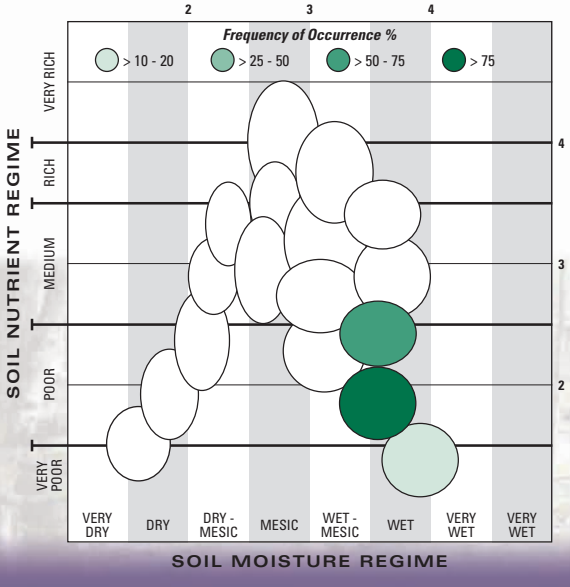
- Erect, perennial, 4" to 12" tall forb; stems weak, soft.
- Leaves opposite, more than half as wide as long, sharply-pointed.
- Inflorescence with open, stalked flowers, blooms June through August.



(Photo from Department of Natural Resources Archives)

Coptis groenlandica
Goldthread

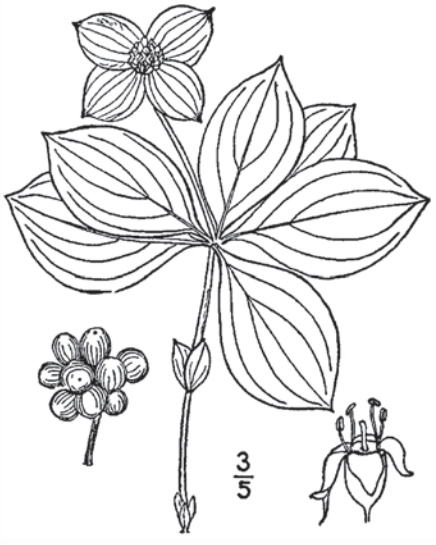
- Erect, perennial, evergreen forb; slender.
- Shiny, evergreen leaves, roundish with rounded teeth.
- Flowers white, tiny, with petal-like sepals on 2" to 6" stalks, blooms May through June.

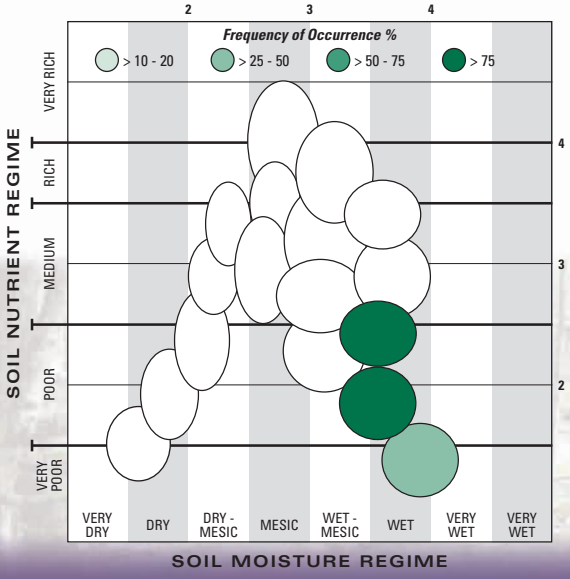


(Photo from Department of Natural Resources Archives)

Cornus canadensis
Bunchberry

- Small, perennial, herb usually occurring in patches.
- Single flowers appear white, fruit in clusters of red berries.

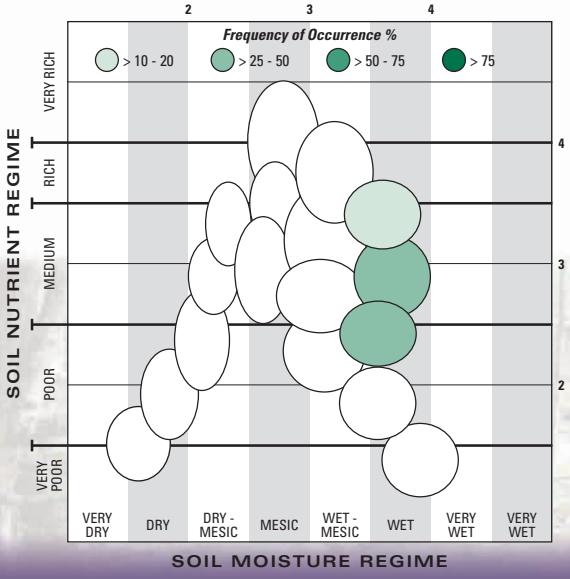




(Photo from Department of Natural Resources Archives)

Cornus stolonifera
Red-osier Dogwood

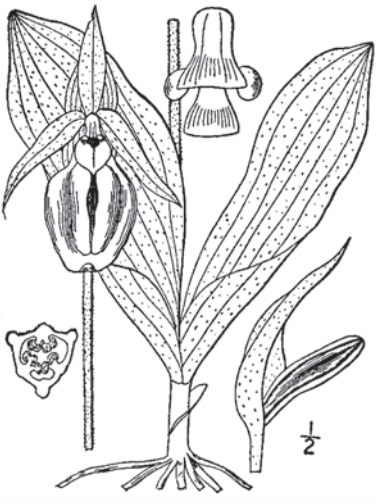
- Medium-sized shrub; stems smooth and bright red to reddish purple.
- Leaves with five to seven veins, pale beneath.
- Most often found on wetter sites.

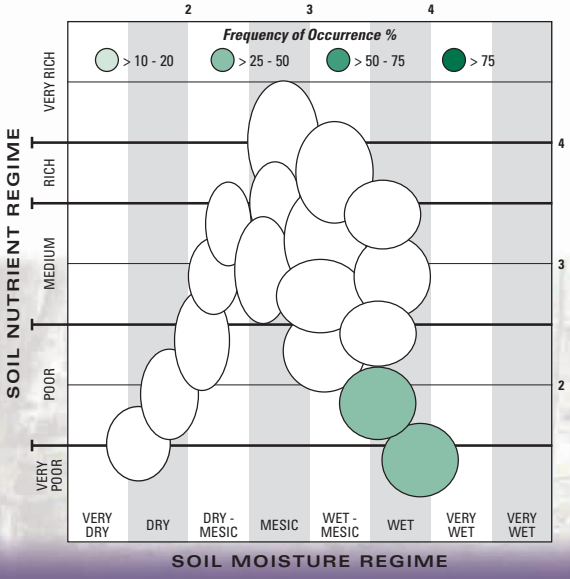


(Photo from Department of Natural Resources Archives)

Cypripedium acaule
Pink Lady's Slipper

- Perennial forb with hairy stems; leaves, oblong with pointed tips, ribbed, undersides pale.
- Flowers long, pink pouch with red veins, hairy inside.
- Dry to wet habitat; prefers acidic, sandy soil.

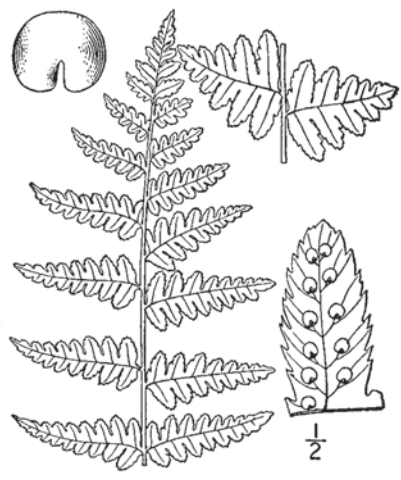


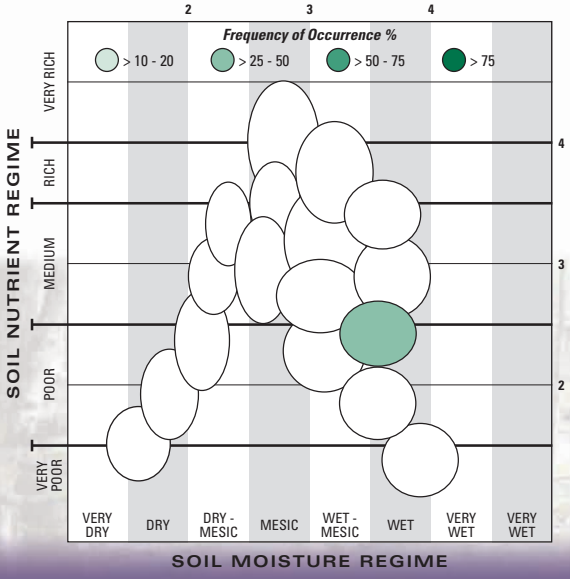


(Photo from Department of Natural Resources Archives)

Dryopteris cristata
Crested Wood Fern

- Easily identified by small, broadly triangular shaped lower leaflets.
- Leaves once-compound, tapering at the tip; leaflets with six plus pairs of lobes with bristly tipped teeth.
- Prefers swamps and boggy woods.

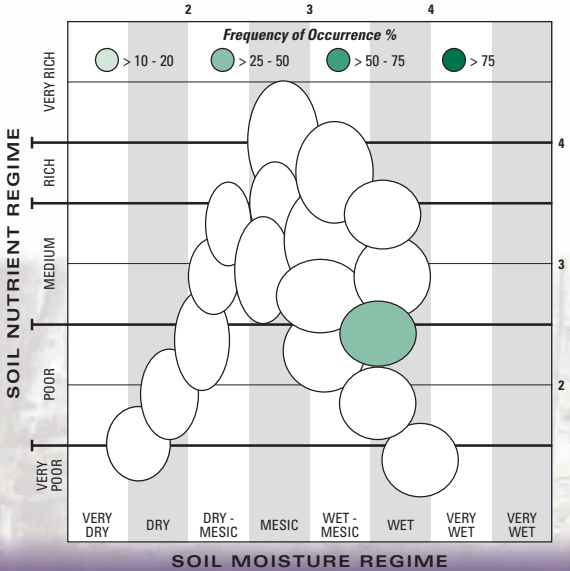




(Photo from Department of Natural Resources Archives)

Dryopteris disjuncta
Oak Fern

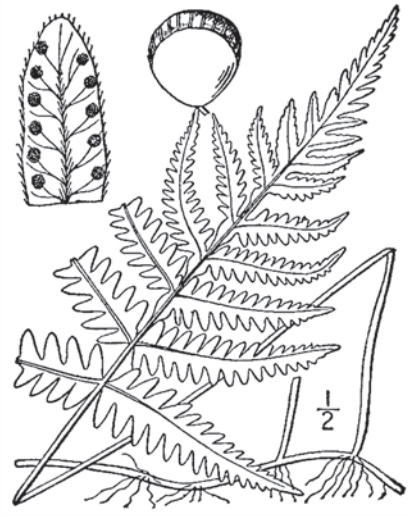
- Delicate looking fern with a dark stem.
- Slightly scaly near the base only.

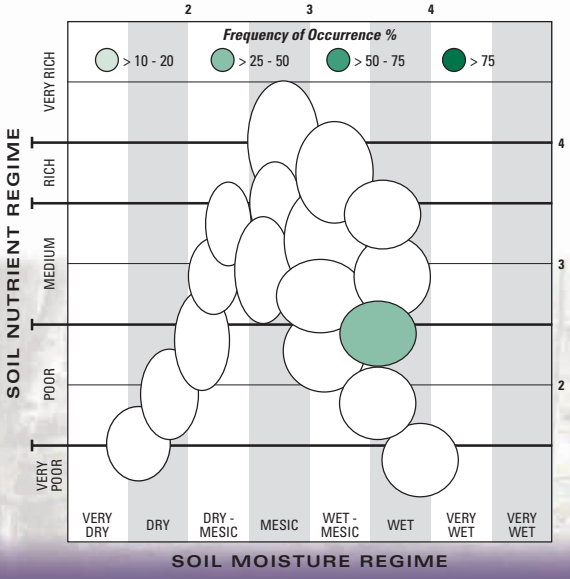


(Photo from Department of Natural Resources Archives)

Dryopteris phegopteris
Beech Fern

- Scaly stem and more coarse in appearance than Oak Fern.
- Lowest pair of leaves point away from the tip of the plant.

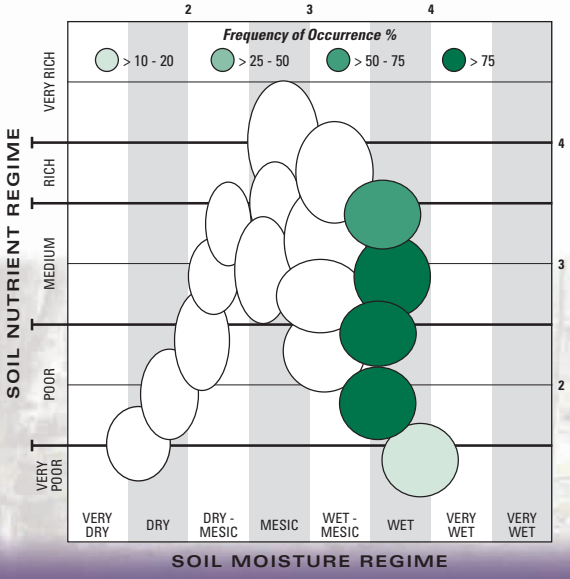




(Photo from Department of Natural Resources Archives)

Dryopteris spinulosa
Spinulose Shield Fern

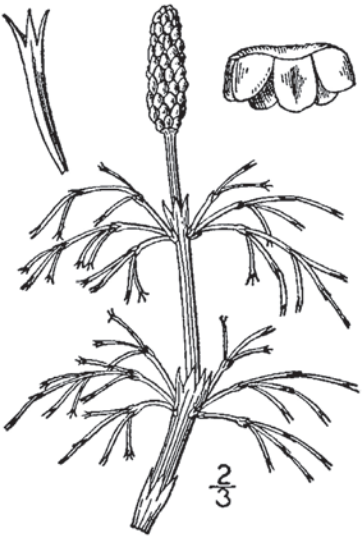
- Scales on base of fronds are light brown.
- Some fronds remain alive during the winter.

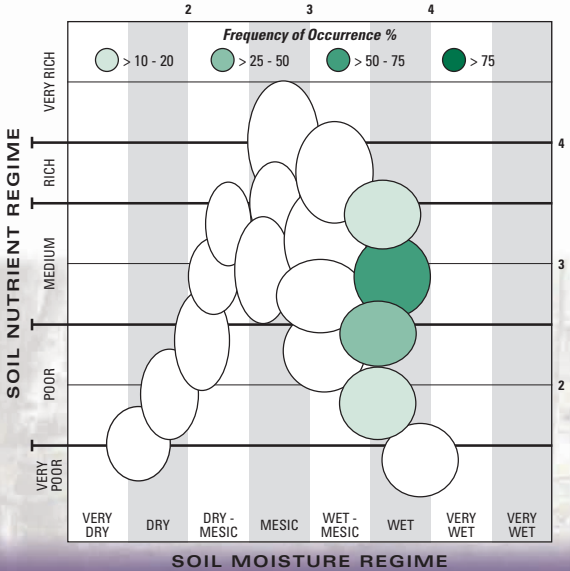


(Photo from Department of Natural Resources Archives)

Equisetum sylvaticum
Wood Horsetail

- Fern ally; prefers moist shaded areas.
- Jointed stems.
- Branches in regular whorls, usually branched again.

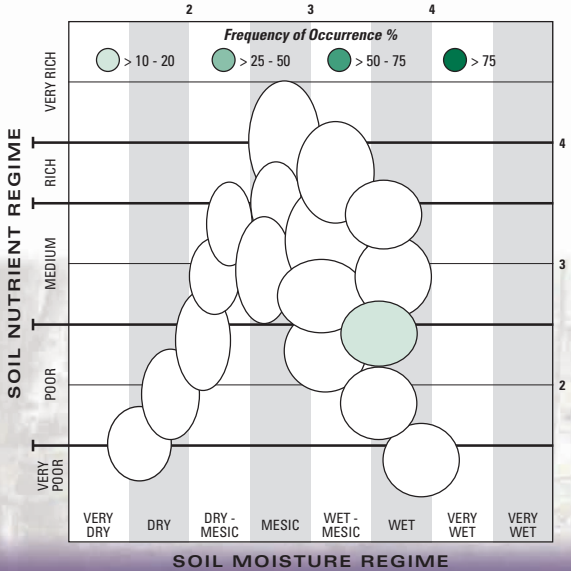




(Photo from Department of Natural Resources Archives)

Eupatorium perfoliatum
Boneset

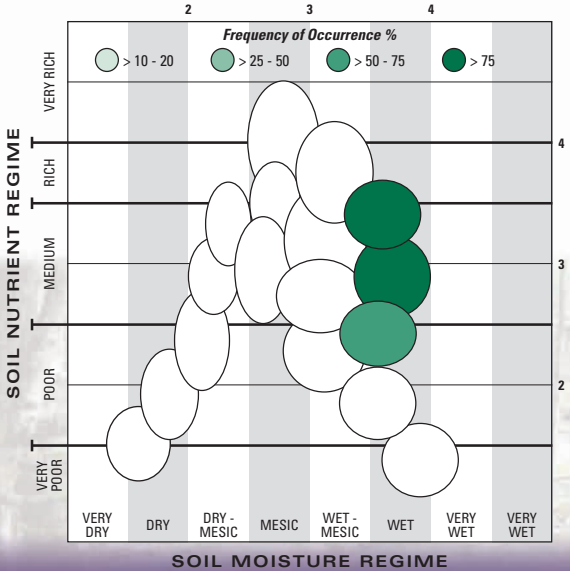
- Erect, perennial forb; stems with long spreading hairs.
- Leaves opposite, sharply toothed, pointed tip and a wide base surrounding the stem.



(Photo from Department of Natural Resources Archives)

Galium asprellum
Rough Bedstraw

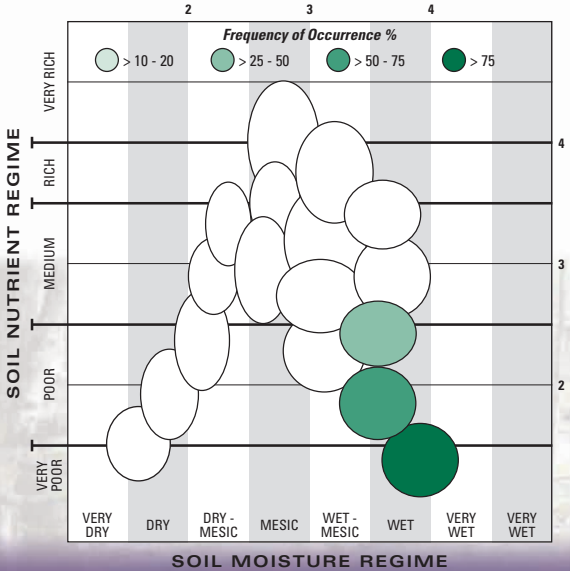
- Erect to sprawling square-stemmed herb with narrow leaves in whorls of six.
- Stems are prickly-rough on the four sides.



(Photo from Department of Natural Resources Archives)

Gaultheria hispidula
Creeping Snowberry

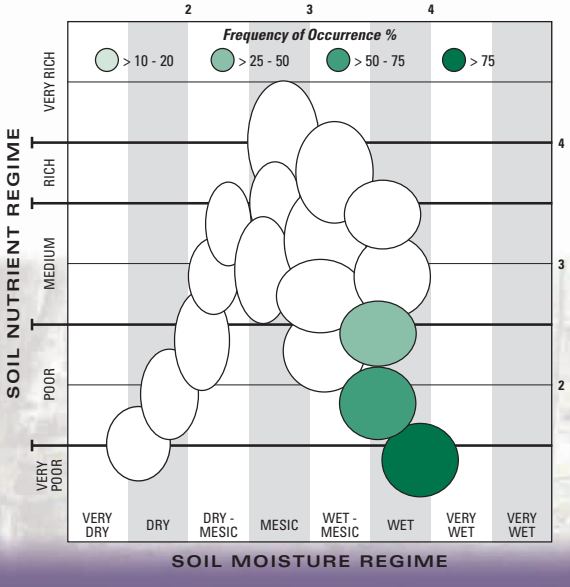
- Trailing, perennial shrub, bristly; stems very leafy, prostrate.
- Leaves are short-stalked and round with bristles underneath.
- White flowers develop into small white edible berries.



(Photo from Department of Natural Resources Archives)

Gaylussacia baccata
Black Huckleberry

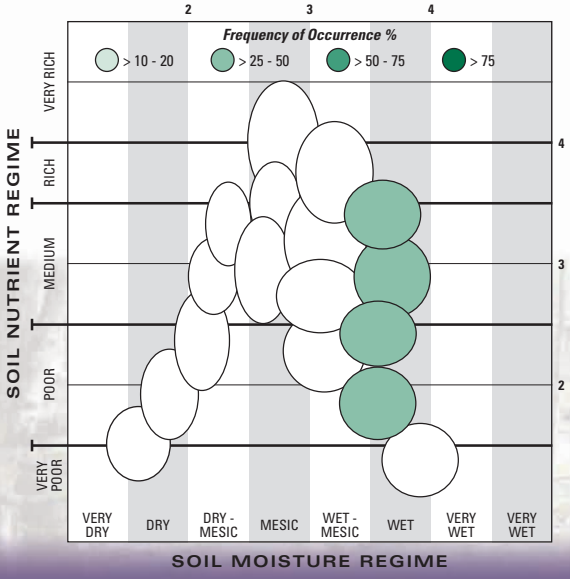
- Small woody shrub.
- Fruit is similar to blueberry, but appear in clusters and vary in color from blue to black.
- Underside of leaves covered with shiny resinous dots.



(Photo from Department of Natural Resources Archives)

Ilex verticillata
Winterberry

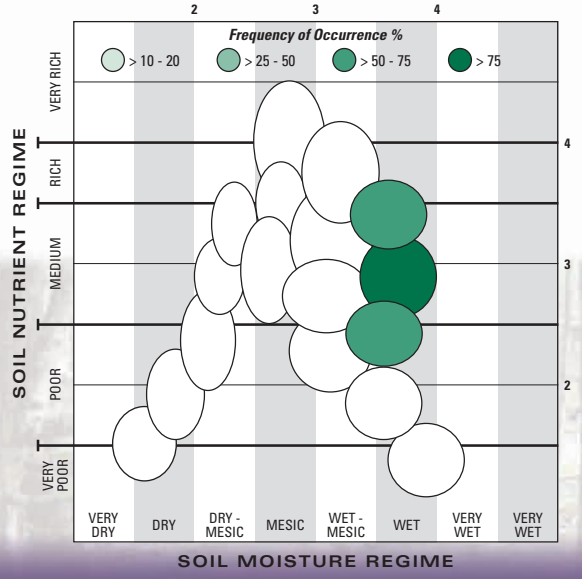
- A large shrub with finely toothed deciduous leaves.
- Bright red berries appear at base of leaves in October and persist into winter.



(Photo from Department of Natural Resources Archives)

Impatiens capensis
Spotted Touch-me-not

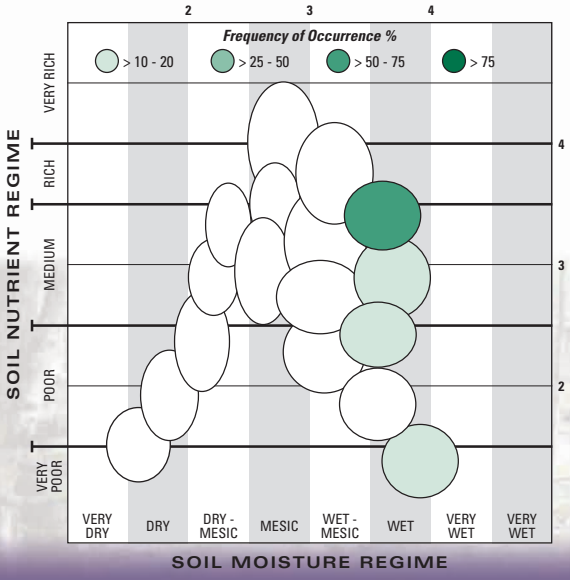
- Succulent, quickly wilting herb with translucent stems.
- Orange, tubular shaped, drooping flowers; blooms July through September.



(Photo from Department of Natural Resources Archives)

Iris versicolor
Larger Blue Flag

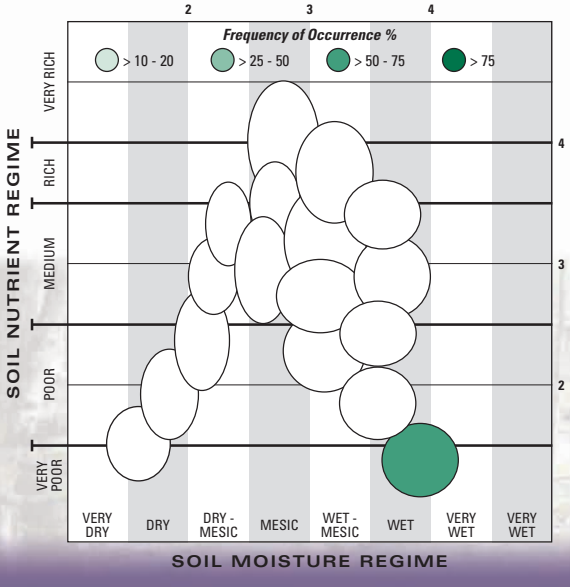
- Erect, perennial, semi-aquatic to emergent, forb with sword shaped leaves.
- Flower blue to purple, 4" wide, inflorescence held above the leaves; blooms June through July.



(Photo from Department of Natural Resources Archives)

Kalmia polifolia
Pale Laurel

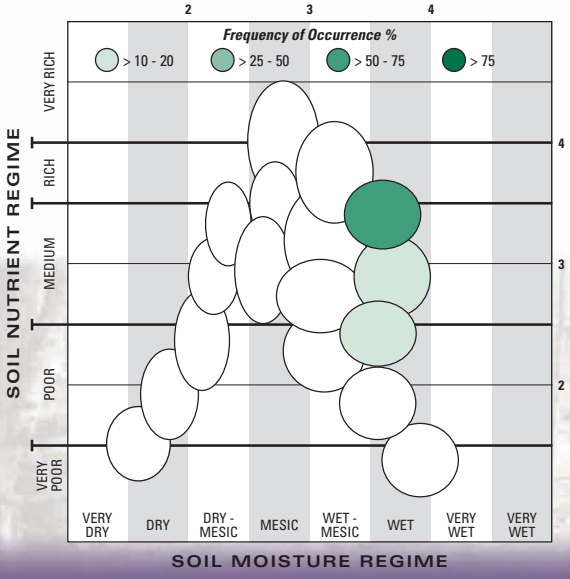
- Erect, perennial, 1' to 2' tall shrub; twigs with two sharp edges.
- Leaves evergreen, leathery, linear to lance-like and shiny; fine, white hairs below.
- Usually found in bog habitats.



(Photo from Department of Natural Resources Archives)

Laportea canadensis
Wood Nettle

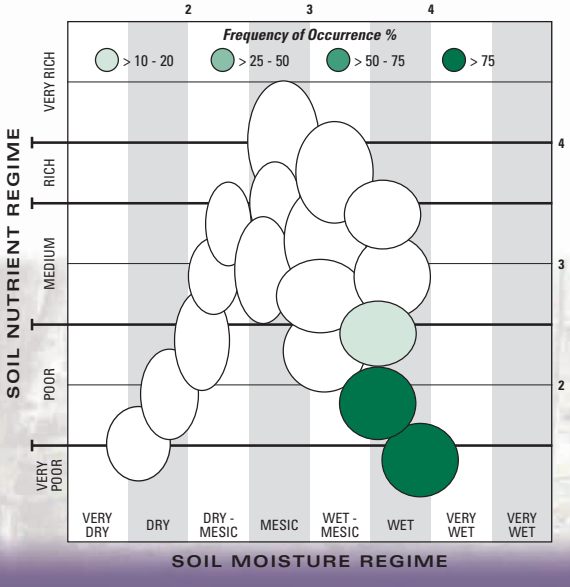
- Erect, perennial, forb with stinging hairs.
- Leaves widely-oval, coarsely-toothed, hairy, and long-stalked; only nettle species with alternate leaves.



(Photo from Department of Natural Resources Archives)

Ledum groenlandicum
Labrador Tea

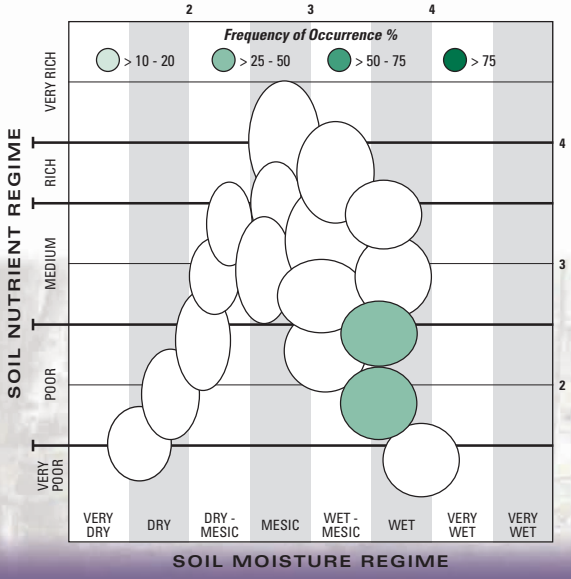
- Erect, perennial, shrub; stems densely orange-hairy.
- Leaves evergreen, thick, lance-like to elliptical, woolly, often with orangish hairs beneath.



(Photo from Department of Natural Resources Archives)

Linnaea borealis
Twinflower

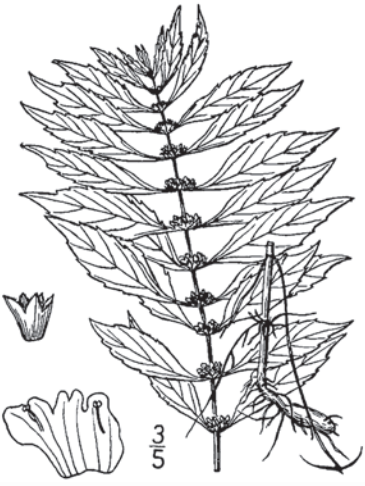
- Creeping, perennial, evergreen forb with opposite leaves.
- Flowers pink/white, long, funnel-shaped, very fragrant, hairy inside; inflorescence a two-flowered, nodding cluster; blooms June through August.

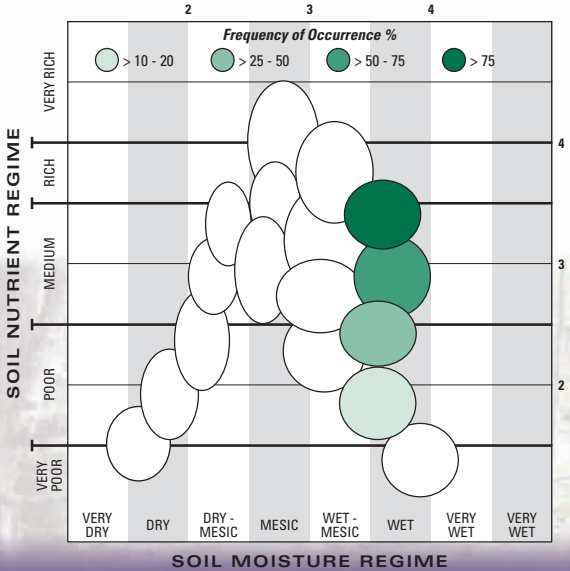


(Photo from Department of Natural Resources Archives)

Lycopus uniflorus
Bugleweed

- Erect, perennial, aromatic forb; stems square.
- Leaves opposite, long and narrow with a pointed tip and a few shallow teeth.
- Flower inflorescence tight, small, whorled clusters from the leaf axils; blooms July through September.

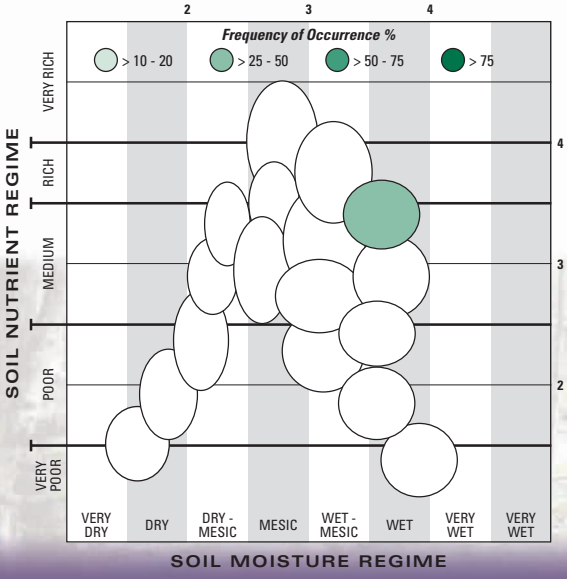




(Photo from Department of Natural Resources Archives)

Lysimachia ciliata
Fringed Loosestrife

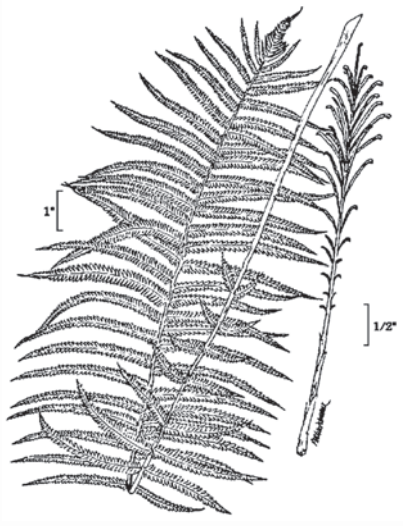
- Erect, perennial, forb; slender, long, creeping rhizomes.
- Leaves opposite with hairs along the entire stalk.
- Flower yellow with a rusty-red "eye," stalked; solitary in the upper leaf axils; blooms June through July.

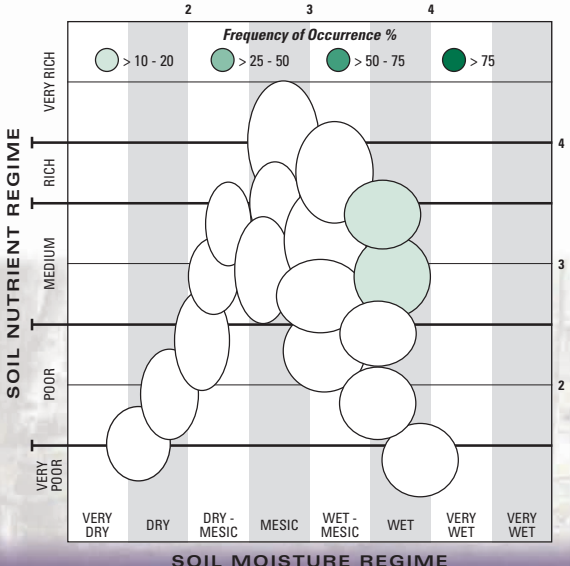


(Photo from Department of Natural Resources Archives)

Matteuccia struthiopteris
Ostrich Fern

- Clump-forming, upright to arching, deciduous fern.
- Finely dissected, medium green, fronds with a feathery appearance.
- Prefers wet woodland habitat.

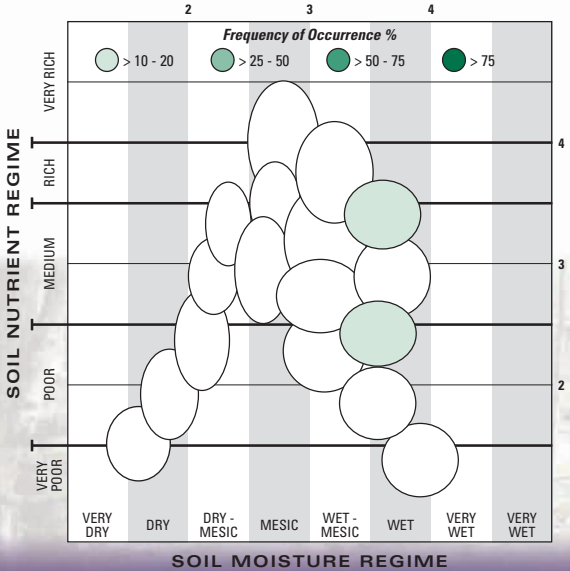




(Photo from Department of Natural Resources Archives)

Mentha arvensis
Wild Mint

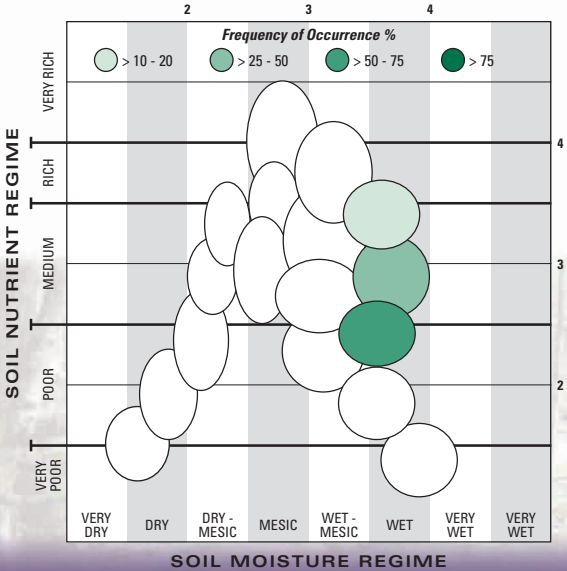
- Erect, perennial, aromatic forb with square stems.
- Leaves opposite, short-stalked, toothed, with a pointed tip.
- Inflorescence dense, whorled clusters distinctly separated along the stem; blooms July through September.



(Photo from Department of Natural Resources Archives)

Mitella nuda
Naked Miterwort

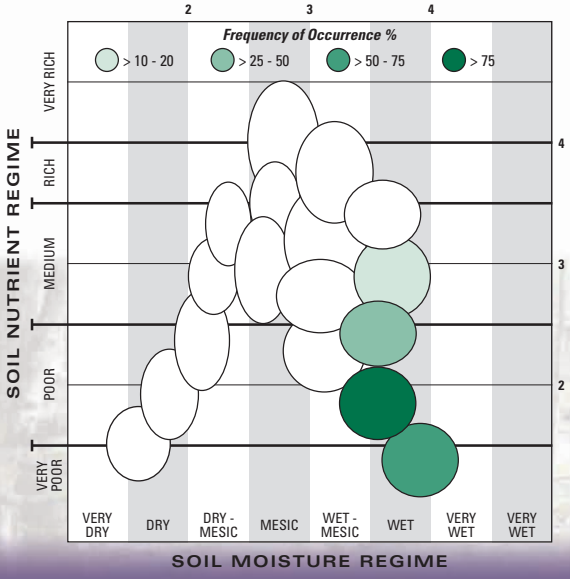
- Small forb (3" to 8") with roundly heart-shaped and bluntly toothed basal leaves.
- Leafless flowering stem.



(Photo from Department of Natural Resources Archives)

Nemopanthus mucronata
Mountain Holly

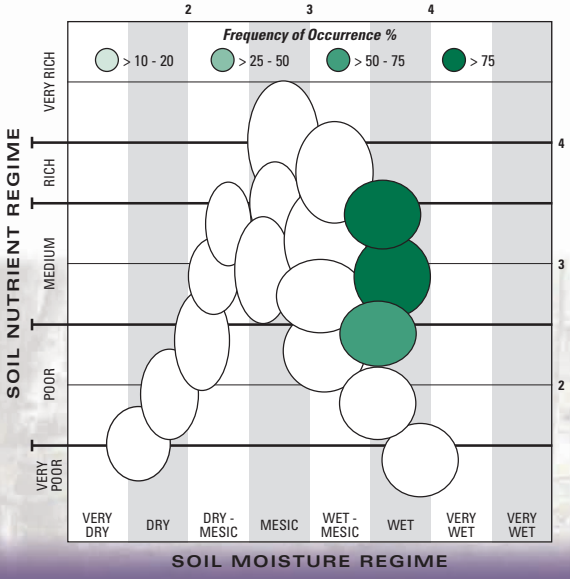
- Erect, 10' tall shrub, branched.
- Leaves short with sharp point and bases rounded, stalks often reddish.
- Red/yellow berries.



(Photo from Department of Natural Resources Archives)

Onoclea sensibilis
Sensitive Fern

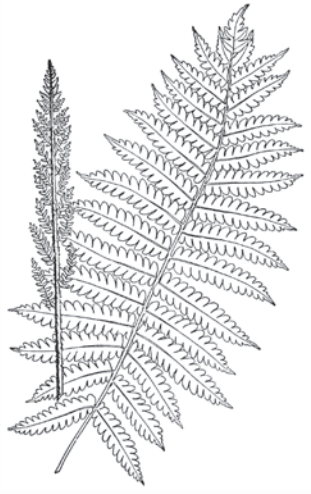
- A large, somewhat coarse, deciduous fern which occurs in wet woods and thickets and in moist soils along streams and springs.
- Distinguishable by broadly lobed, rather than finely divided, frond.
- Green fronds are extremely sensitive to frost and drought.

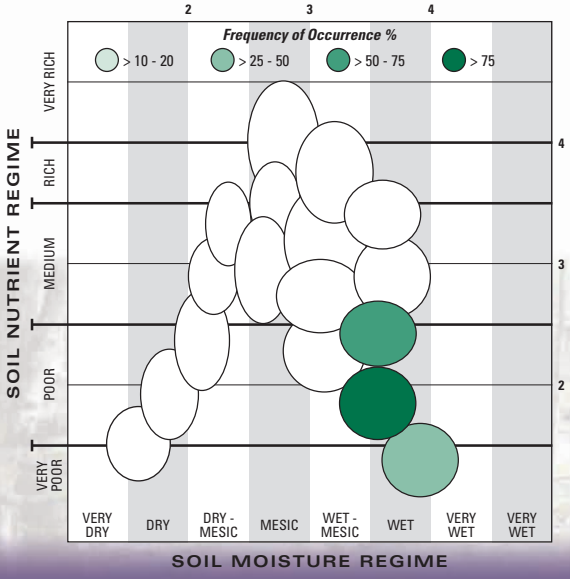


(Photo from Department of Natural Resources Archives)

Osmunda cinnamomea
Cinnamon Fern

- Occurs in clumps in moist, boggy ground.
- Large, erect, pinnately-compound, yellowish-green, fronds persist through summer, turn yellow in autumn.
- Stiff, spore-bearing fronds grow from center of clump; appear in early spring, quickly turning brown.

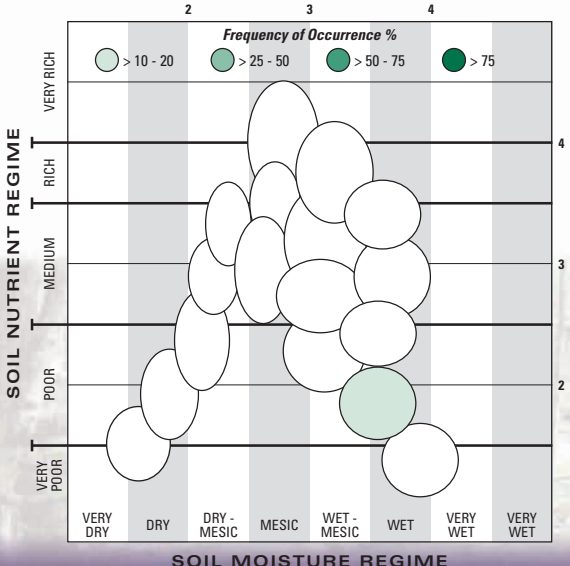




(Photo from Department of Natural Resources Archives)

Osmunda regalis
Royal Fern

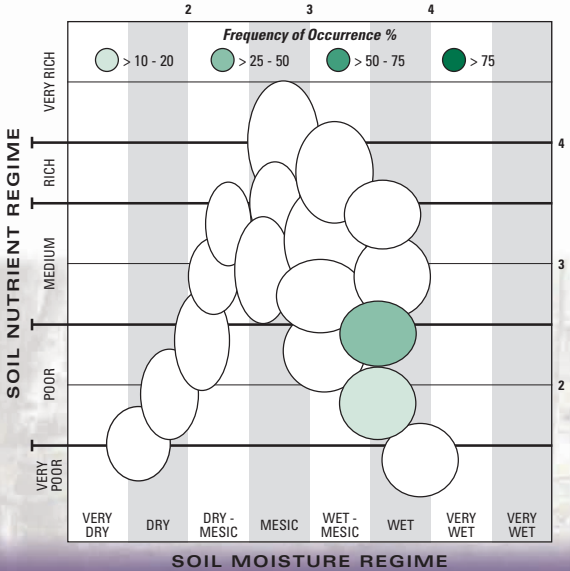
- Grows in clumps on moist bluffs and ledges and along streams.
- Broad fronds have large, well-separated leaflets which turn yellow to brown in autumn.
- Spores in brown, tassel-like, clusters at the tips of the fronds.



(Photo from Department of Natural Resources Archives)

Oxalis montana
Common Wood Sorrel

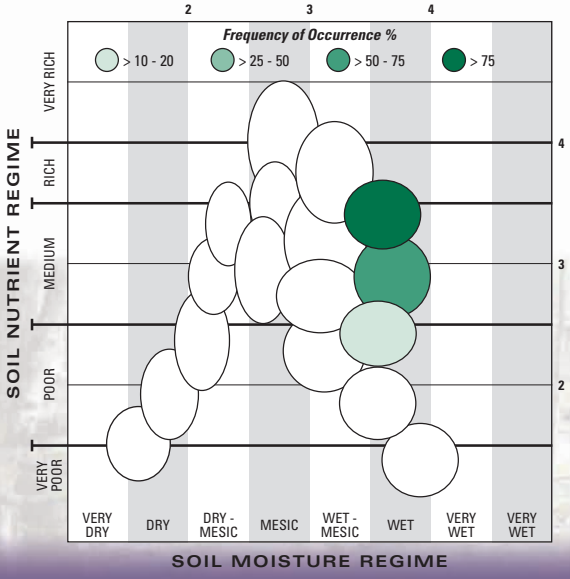
- White flowers with pink veins.
- Leaves heart-shaped, notched at tip.
- Found on somewhat poorly to poorly drained soils.



(Photo from Department of Natural Resources Archives)

Parthenocissus spp.
Virginia Creeper

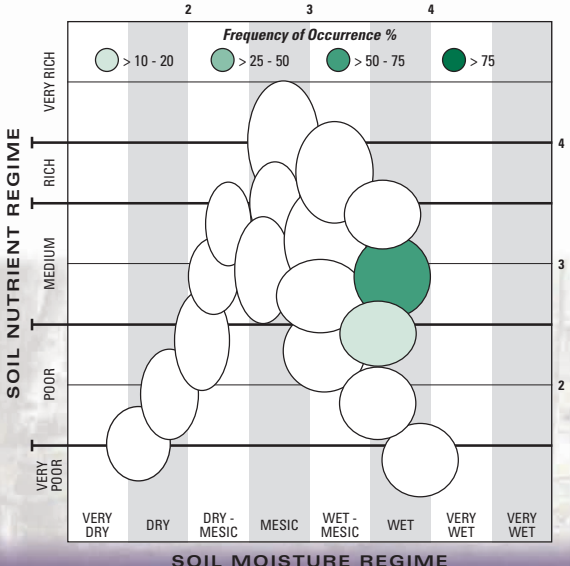
- Trailing/climbing woody vine.
- Leaves palmate, dull green on top.
- Found in openings and rich woods.



(Photo from Department of Natural Resources Archives)

Polygonum sagittatum
Arrow-leaved Tearthumb

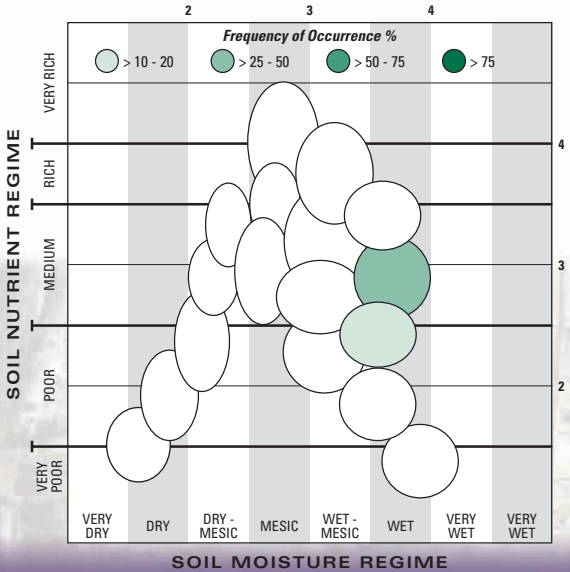
- Climbing or tangling, slender forb; very prickly four-angled stems.
- Leaves alternate with downward-pointed lobes forming a heart-shaped base surrounding stem.
- Wet habitat; marshes, swamps, streambanks.



(Photo by Bernd Haynold, distributed under a CC-BY 2.0 license.)

Potentilla palustris
Marsh Cinquefoil

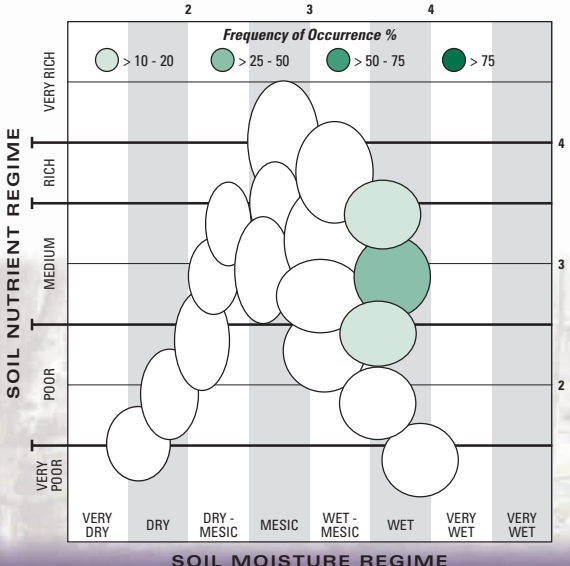
- Sprawling, emergent, semi-aquatic; stems reddish-brown.
- Leaves long stalked, divided into five to seven leaflets, oblong, sharply toothed; flowers purple to red.
- Prefers bogs, swamps, streambanks; in mucky, peaty soil.



(Photo from Department of Natural Resources Archives)

Prunella vulgaris
Heal-all

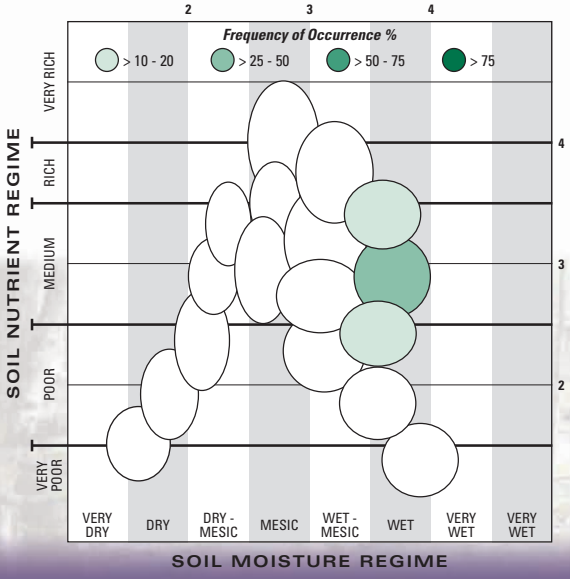
- Low, perennial forb with a square stem and opposite lance-like leaves.
- Cylindrical, terminal spikes of purple flowers with overlapping hairy bracts.



(Photo from Department of Natural Resources Archives)

Rhamnus alnifolia
Alder-leaved Buckthorn

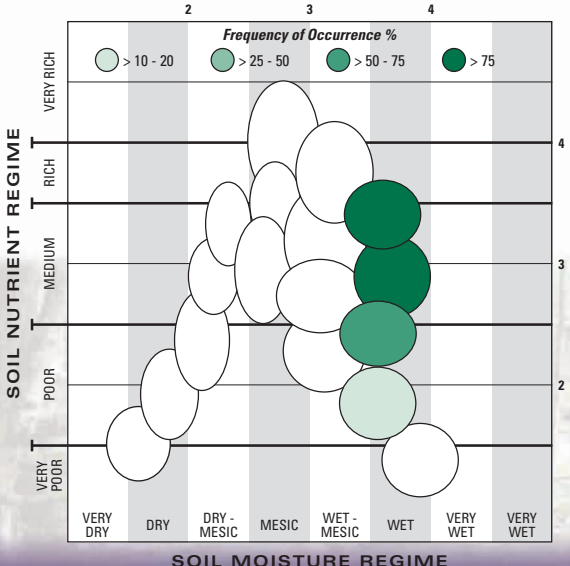
- Perennial woody shrub with thin roughish red-brown to gray bark.
- Leaves alternate, oval or oblong with rounded teeth; upper surface is darker green and shiny; lower surface lighter green with hairs present.
- Produces shiny, black berries.



(Photo from Department of Natural Resources Archives)

Rubus pubescens
Dwarf Raspberry

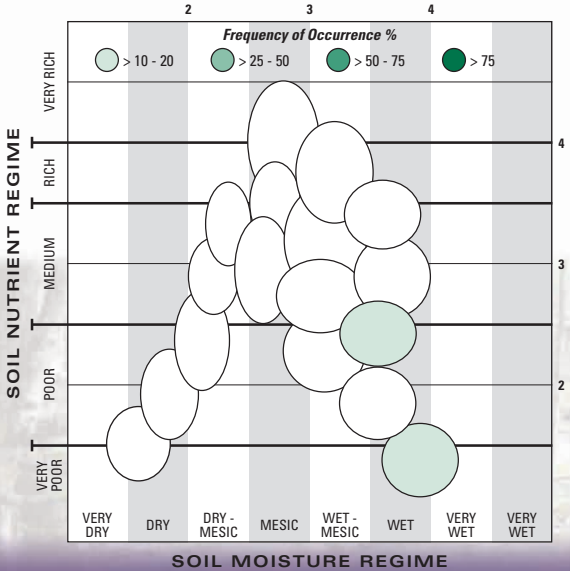
- Non-woody forb, main stems creeping along the ground then putting up erect stems with no prickles.
- Leaves long-stalked, three-parted, sharply toothed; produces small dark red berries.
- Wet habitat; woods, bogs, cedar swamps.



(Photo from Department of Natural Resources Archives)

Sarracenia purpurea
Pitcher Plant

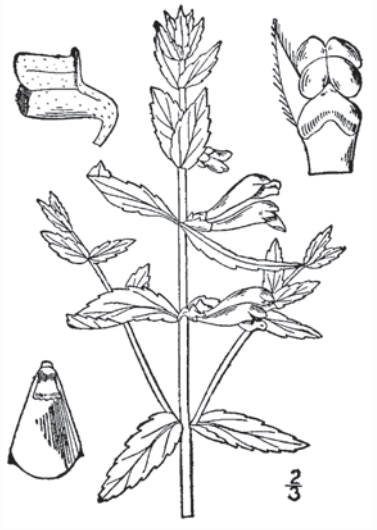
- Erect, insectivorous forb.
- Leaves hollow, forming a hooded pitcher-shaped opening that holds water to capture and digest insects, widely winged edges.
- Wet habitat; bogs, shores; in sand, marl (clayey, limy) soil.

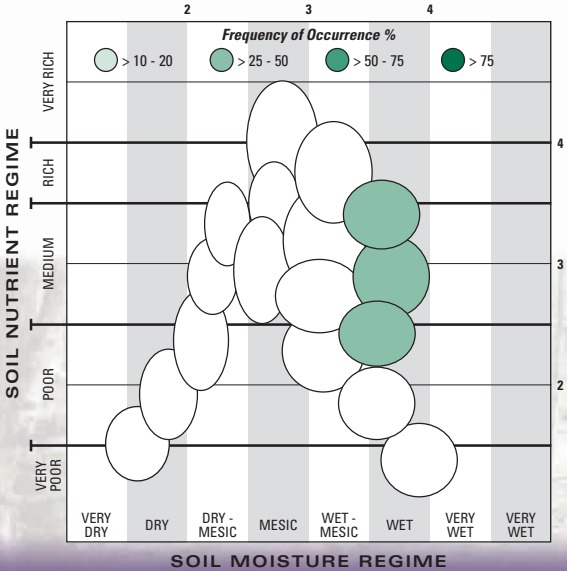


(Photo from Department of Natural Resources Archives)

Scutellaria galericulata
Common Skullcap

- Erect, perennial, weak, aromatic forb; stems square.
- Leaves opposite, barely stalked; solitary flowers grow from axils.
- Wet habitat; shores, meadows, marshes.

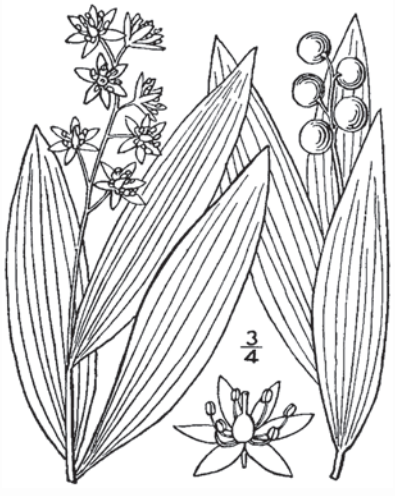


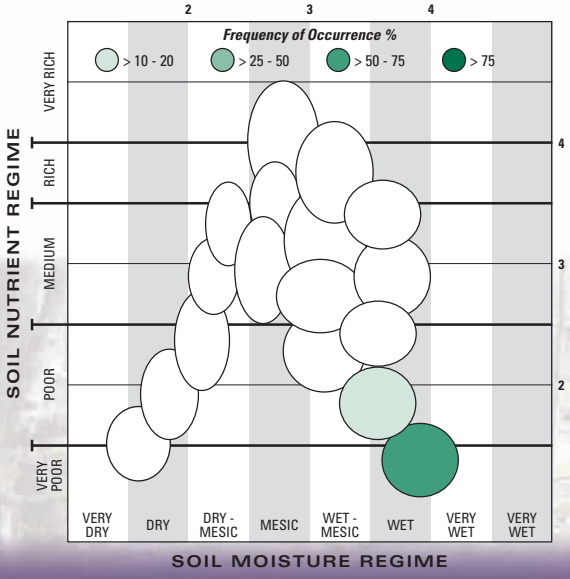


(Photo from Department of Natural Resources Archives)

Smilacina trifolia
Three-leaved Solomon's Seal

- Erect, perennial forb; leaves alternate, stalkless, almost erect, lance-like with pointed tips.
- Flower white, starry; inflorescence with three to eight flowers on a 2" long, narrow cluster.
- Wet habitat; swamps, bogs.

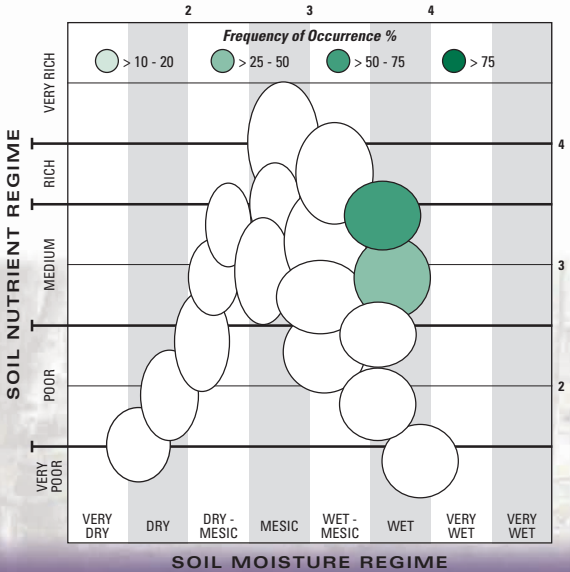




(Photo from Department of Natural Resources Archives)

Solanum dulcamara
Bittersweet Nightshade

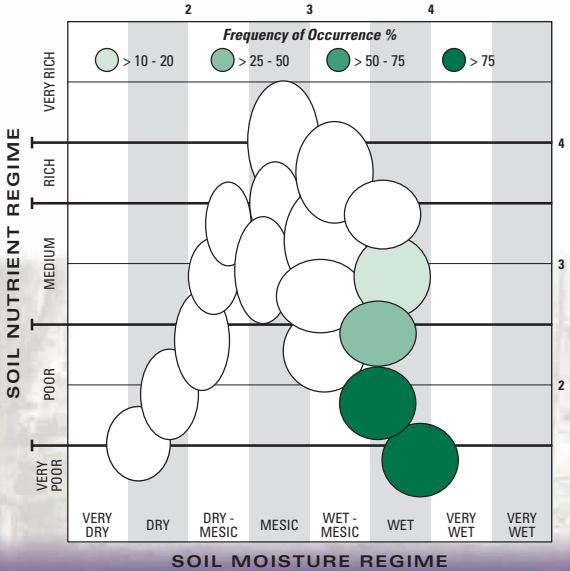
- Trailing or twining perennial, smooth, woody vine; leaves stalked, mostly simple but some with two lower lobes.
- Flower purple/blue with shiny, green spots in the center; inflorescence a branched cluster.
- Moist habitat; disturbed sites, woods, cliffs, marshes.



(Photo from Kemp Natural Resources Station Archives)

Sphagnum spp.
Sphagnum Mosses

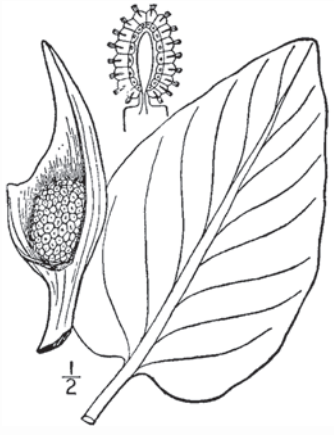
- Bryophyte generally found growing in thick, dense clumps.
- Leaves are tiny, sometimes slightly toothed and grow in hair-like tufts close to the stem; usually light green, but some species have yellow, pink, deep red, or brown leaves.
- Found in wet, boggy areas with acidic soil.

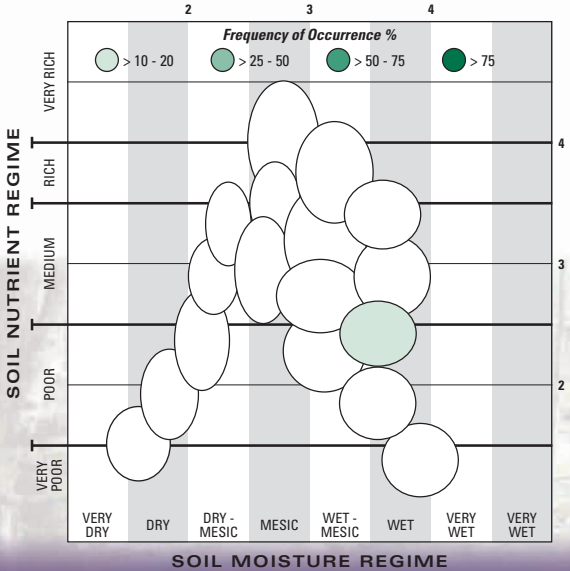


(Photo from Department of Natural Resources Archives)

Symplocarpus foetidus
Skunk Cabbage

- Large-leaved, stemless plant that emits a skunk-like odor when crushed.
- Flowers green, tiny; inflorescence roundish, mottled, green to purplish shrouded by a pointed, broad, hood-like, purple spathe; blooms March through May.
- Found in shade; wet; swamps, low ground.

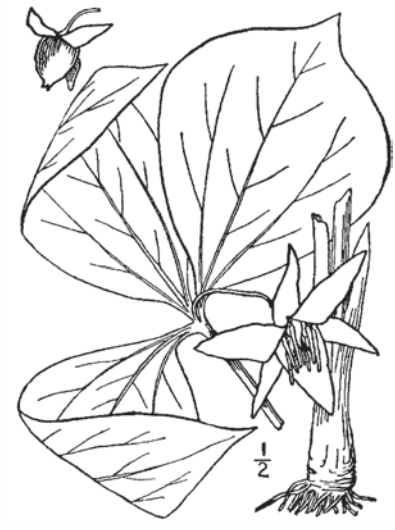


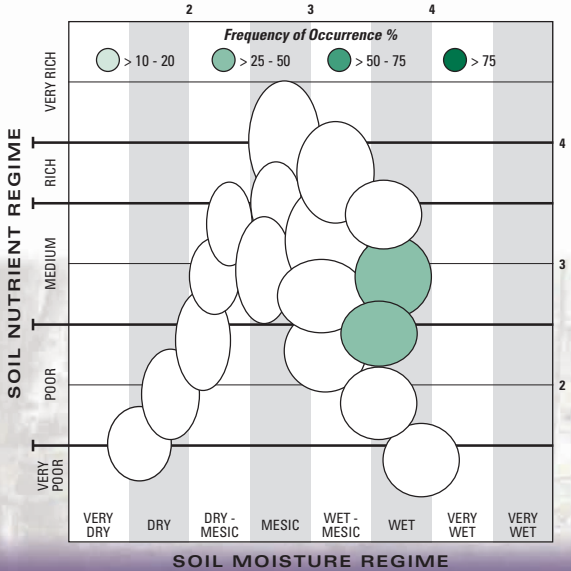


(Photo by Fungus Gus, distributed under a CC-BY 2.0 license.)

Trillium cernuum
Nodding Trillium

- Single flower droops below a whorl of three simple leaves.
- Found primarily in lowland forests.

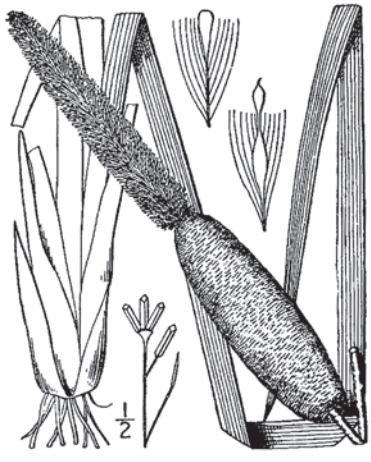


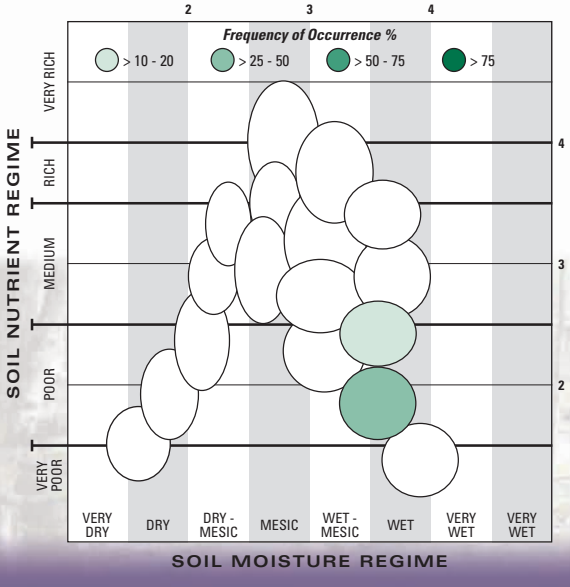


(Photo from Department of Natural Resources Archives)

Typha latifolia
Common Cattail

- Emergent semi-aquatic, with many smooth stems; wide flat overlapping leaves.
- Characteristic seed head packed tightly into a brown, cylindrical spike.
- Found in sun; wet to damp; ditches, marshes, shallows; in muddy soil.

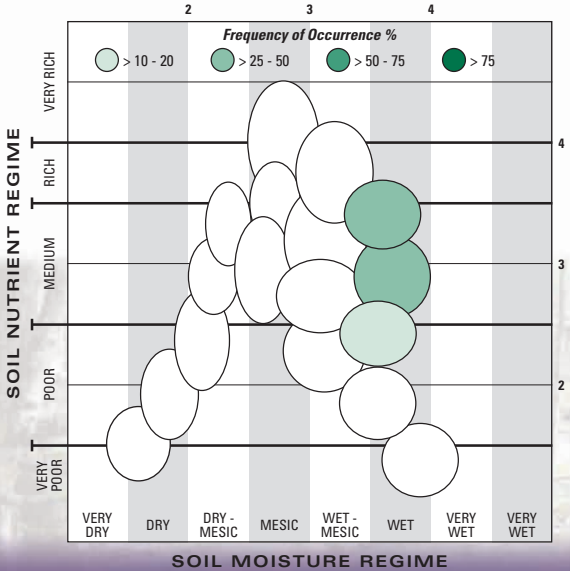




(Photo from Department of Natural Resources Archives)

Urtica dioica
Stinging Nettle

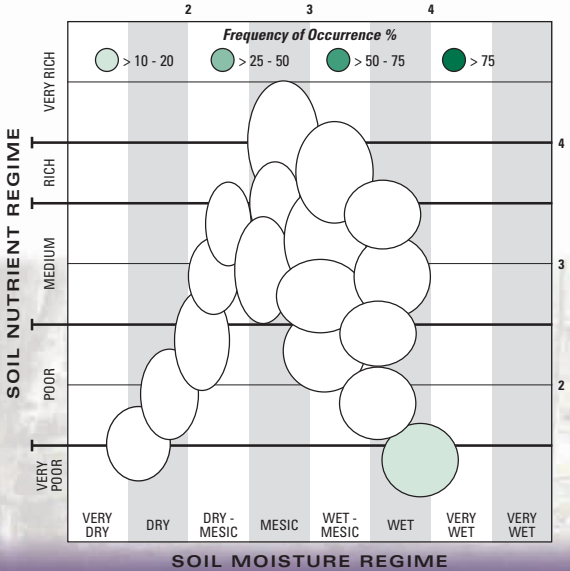
- Erect, perennial, forb with **stinging hairs**, often forming large colonies.
- Leaves toothed, opposite, lance-like with a sharp point; flowers cream, tiny; inflorescence many-flowered, long clusters from the upper leaf axils.
- Found in wet to dry habitat; disturbed sites.



(Photo from Department of Natural Resources Archives)

Vaccinium macrocarpon
Large Cranberry

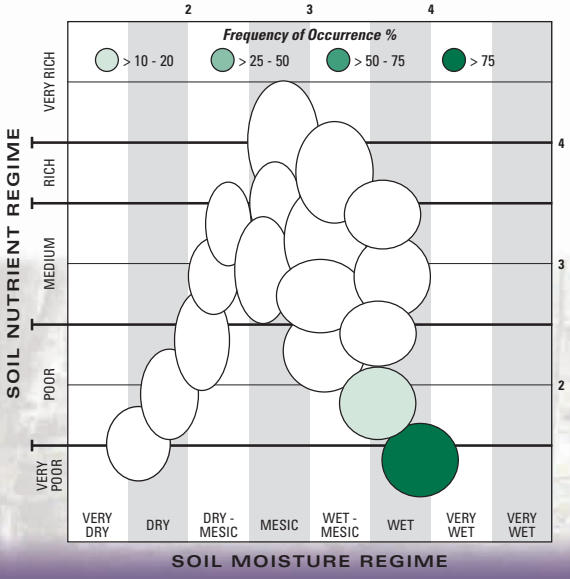
- Trailing, perennial shrub with very thin stems.
- Leaves leathery, evergreen, oblong, tapering at both ends; flower white to pink, deep lobes turning upward; produces red tart berry.
- Found in bog habitat.



(Photo from Department of Natural Resources Archives)

Vaccinium oxycoccus
Small Cranberry

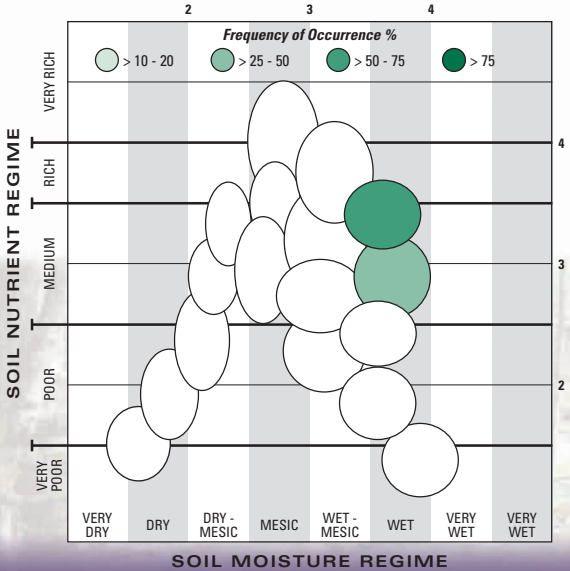
- Creeping, perennial shrub; leaves evergreen, elliptical, tapering at both ends, not toothed.
- Flowers pink, lobes deeply parted and turning upward; two small, red bracts; produce red berries.
- Wet habitat; bogs; in sandy soil.



(Photo from Department of Natural Resources Archives)

Vitis riparia
Riverbank Grape

- Woody vine; climbing or sprawling in open areas; older stems thick with shaggy bark.
- The leaves are large, alternate, lobed, and coarsely serrated; lower surface pale green, upper leaf surface yellowish green to dark green.
- Moist to mesic habitat; woodland edges and openings, thickets, and areas along rivers, lakes, and ditches.



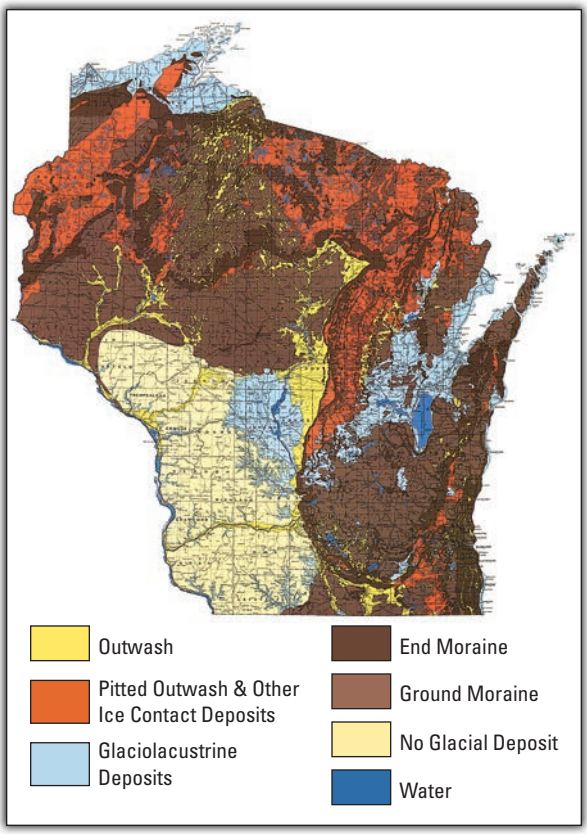
(Photo from Kemp Natural Resources Station Archives)

Methodology of System Development

REGIONAL DIVISIONS

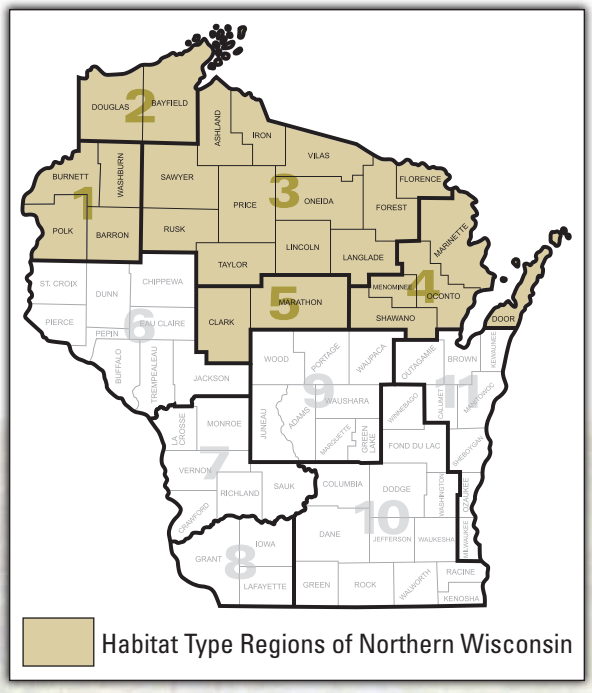
The wetland forest habitat type classification system uses the same geographical regions as established for the upland system *(Kotar, Kovach, Burger, 2002)*. While no objective ecologically defined geographical boundaries can be established, the system uses 11 Regions (five for northern Wisconsin that are characterized by differences in geology, soils, climate and floristic gradients (see page 8-2, "Glacial Deposits" map). A regional approach also makes it easier to develop more specific floristic identification keys and habitat type descriptions. For convenience, the region boundaries simply adopt the most approximate political boundaries.

(Photo from Kemp Natural Resources Station Archives)



Glacial Deposits of Wisconsin: Sand and Gravel Resource Potential Map

(©1976 Wisconsin Geological and Natural History Survey, University of Wisconsin-Extension, State Planning Office, Wisconsin Department of Administration)



FIELD PROCEDURES

The classification is based on systematic vegetation and soil sampling of "wetland forests." In an attempt to capture the broadest possible range of wetland forests, we established a broad definition of the type of site and forest community to sample. We included all forested sites where a permanent or seasonal high water table was clearly evident. For reconnaissance planning, we utilized maps produced by the Natural Resources Conservation Service (NRCS) showing distribution of wet and poorly drained soils. Tree species composition of stands is usually, but not always, an indication of wetland conditions. In observing potential areas for sampling, we keyed on dominance or strong presence of any of the following species: black ash, red maple, (formerly) American elm, eastern hemlock, tamarack, balsam fir, black spruce and northern white cedar. If soil properties suggested wet conditions, we also considered stands dominated by any other species, most often aspen, white birch, yellow birch, white pine and jack pine.

A stand meeting above criteria was sampled in the following manner. A 300 (21 m x 14 m) square meter macro plot was laid out. The macro plot was subdivided into six 7 m x 7 m subplots. Within each of the subplots, all plant species, with the exception of some grasses, sedges and mosses, were identified and their abundance estimated according to six coverage classes. Plants were also stratified in the following categories: trees (large trees, poles, saplings, seedlings), shrubs and herbs. Species coverage values for the six subplots were later averaged to obtain one value for the macro plot. Soils were sampled with a bucket auger for the following properties: texture at one foot intervals, presence of mottling (indication of fluctuating saturation periods), and depth of current soil saturation. In cases of organic substrate, the organic matter was classified in degrees of decomposition as fibric, hemic and sapric in one foot intervals.

DELINEATION OF ECOLOGICAL CLASSES OR HABITAT TYPES

As in the case of upland forest habitat type classification system, the ecological groups, or categories, (habitat types) are defined by similarities and differences in overall floristic composition. To reveal such floristic groupings, the plant data for each of the five regions were analyzed with a Two Way Indicator Species Analysis (TWINSPAN) computer program. Depending on the region, this procedure yielded four to eight floristic groupings.

The ecological relationships among delineated floristic groups were examined through the Synecological Coordinates ordination or syncords *(Bakuzis 1959, Bakuzis and Kurmis 1978, Gutierrez-Espeleta 1996)*. On the basis of extensive studies in Minnesota, Bakuzis assigned each forest species (trees, shrubs, ground flora) a value of one to five to indicate the species' requirements for optimal growth and survival under competitive conditions for four site factors: moisture, nutrients, light and heat. For example, a species with a moisture index of five primarily occurs in a very wet environment while a species with an index of one occurs on droughty sites. These values were termed "synecological coordinates."

Using the list of synecological coordinates developed by Bakuzis, an estimate of environmental conditions of a given site is obtained by calculating a mean index from the individual indices of all the species present on that site. For this guide, moisture and nutrient indices were used to calculate and plot the means for all sample plots in the data set. The plots representing floristic groups delineated in a given region formed clusters with varying degree or overlap among the most similar groups. The circular/oval fields in the moisture/nutrient graphs (syncords) were drawn to include at least 90 percent of the plots representing each floristic group or habitat type. Descriptive terms (e.g., dry, dry-mesic, mesic, and poor, medium, rich) were arbitrarily assigned to segments of the moisture and nutrient axes to provide more visual and practical interpretation of the physical environment of various habitat types.

(Photo from Kemp Natural Resources Station Archives)

NAMING THE HABITAT TYPES

Habitat type name is based on floristic composition of plant association that defines it and on ecological characteristics of individual species. A type is named after a tree species that shows the strongest tendency to dominate a community on that site type in the absence of disturbance, and after one or more understory species that have a higher frequency of occurrence on this habitat type than on any other types in the same region. For convenience in common usage, we utilize standardized abbreviations. For example, the complete name of a type *Fraxinus nigra-Acer rubrum/Impatiens capensis*, (Black Ash-Red Maple/Spotted Touch-me-not) is referred to as **FnArI**, or ***F****raxinus-****A****cer/****I****mpatiens*.

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(Photo from Kemp Natural Resources Station Archives)

Historical Overview of the Project Development

The wetland forest habitat type classification project has had a long history of development. Wetland forests were initially excluded during the development of the forest habitat type classification system for Wisconsin in the 1980s and 1990s. The main reason for this was a lack of data on stability of plant associations on sites where hydrological factors vary seasonally and year-to-year. In terms of soil moisture holding capacity and available nutrients, the two primary physical factors controlling structure and function of plant communities, the upland sites represent relatively stable conditions and the use floristic composition as an indirect indicator of these factors may be justified. Nevertheless, the data in our upland project also included a percentage of plots from stands on poorly drained soils. From these data, we observed significant differences in species composition on poorly drained soils of different mineralogy and soil texture. It became apparent that floristic composition can be used, at least as an indicator of available soil nutrients (therefore, relative productivity) of poorly drained sites as well as on uplands.

This project was launched in 2005 on a contract basis with Dr. John Kotar, Emeritus Professor, UW-Madison, shortly after the publication of the second edition of the *Guide to Forest Communities and Habitat Types of Northern Wisconsin* (Kotar, Kovach, Burger, 2002). The project was funded by Wisconsin Department of Natural Resources at a level that supported two student field technicians per year and a part-time research associate. Fieldwork was initiated in the large, 13-county, Region 3, starting in Vilas and Oneida Counties and continuing west in 2006 and 2007. Preliminary classification for Region 3 was completed with an in-house publication in 2009. Field testing the classification and several field training sessions for Department of Natural Resources staff followed. Fieldwork continued into the remaining regions, finishing with Region 5 in 2011. Final classifications for all regions and materials for this publication were completed in 2015.

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Greg Edge is Wisconsin Department of Natural Resources Forest Ecologist/Silviculturist.

Brad Hutnik is Wisconsin Department of Natural Resources Forest Ecologist/Silviculturist.

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I also wish to thank the following Wisconsin Department of Natural Resources staff who continue to promote the development and use of the forest habitat type classification system including: **Brad Hutnik**, **Greg Edge**, **Colleen Matula** and **Scott Mueller**.

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(Photo from Kemp Natural Resources Station Archives)

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(Photo from Kemp Natural Resources Station Archives)

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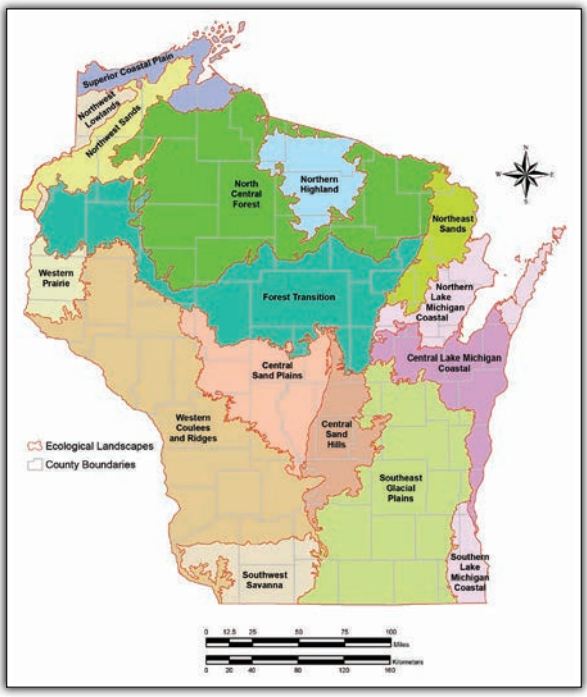
(Photo from Kemp Natural Resources Station Archives)

Appendix 1: Ecological Landscapes of Wisconsin



Ecological Landscapes of Wisconsin Map
(©2011 Wisconsin Department of Natural Resources, Ecological Landscapes of Wisconsin Handbook - 1805.1)
Scale: 1:2,750,000 Wisconsin Transverse Mercator NAD83(91) Map S1-ams

Wisconsin was divided into 16 ecoregions with similar ecology and management opportunities. Each of these ecoregions is called an Ecological Landscape. The Ecological Landscapes are based on the National Hierarchical Framework of Ecological Units (NHFEU; Cleland et. al 1997). There were too many NHFEU Subsections and too few NHFEU Sections to be useful for management purposes. Ecological Landscapes use the same boundaries as NHFEU Sections or Subsections. However, some NHFEU Subsections were combined to reduce the number of geographical units in the state to a manageable number. Therefore, Ecological Landscapes are at a size (scale) between NHFEU Sections and Subsections.

Appendix 2: WDNR Natural Heritage Inventory Forested Wetland Types

The following are forested wetland types that are described by the Wisconsin Department of Natural Resources Natural Heritage Inventory (which crosswalks to Northern Lowland forest cover types) and characteristics of each.

BLACK SPRUCE SWAMPS

An acidic conifer swamp forest characterized by a relatively closed canopy of black spruce *(Picea mariana)* and an open understory in which Labrador Tea *(Ledum groenlandicum)* and Sphagnum Mosses *(Sphagnum* spp.*)* are often prominent, along with Three-leaved Solomon's Seal *(Smilacina trifolia)*, Creeping Snowberry *(Gaultheria hispidula)*, and Three-seeded Sedge *(Carex trisperma)*. The herbaceous understory is otherwise relatively depauperate. These forests are found in flat depressions on outwash or moraine. A "moat" (or "lagg") may occur at the upland-wetland interface. This wetland type receives water mainly from precipitation and runoff. Natural disturbance factors include windthrow, insect outbreak, and rarely, flooding and fire.

TAMARACK SWAMPS

These weakly to moderately minerotrophic conifer swamps are dominated by a broken to closed canopy of tamarack *(Larix laricina)* and a frequently dense understory of speckled alder *(Alnus rugosa)*. The understory is more diverse than in black spruce *(Picea mariana)* swamps and may include more nutrient demanding species such as Winterberry *(Ilex verticillata)* and black ash *(Fraxinus nigra)*. Stands with spring seepage with more nutrients sometimes have Marsh Marigold *(Caltha palustris)* and Skunk Cabbage *(Symplocarpus foetidus)*. As with black spruce swamp, they receive water mainly from precipitation and runoff. Natural disturbance factors include windthrow, insect outbreak, and rarely flooding and fire.

NORTHERN WET FORESTS

This type encompasses a group of weakly minerotrophic, conifer-dominated, acid peatlands located mostly north of the Tension Zone. It is sometimes broken out into subgroups that are influenced by nutrient levels. The dominant trees are black spruce *(Picea mariana)* and tamarack *(Larix laricina)*. Jack pine *(Pinus banksiana)* is a significant component in parts of the type's range. This community is found primarily in kettle depressions or partially filled basins, on glacial outwash landforms, moraines, and till plains, where the water table is near the surface or where drainage is somewhat impeded. The community also occurs along the margins of lakes and low-gradient streams.

On the drier end of the spectrum, the spruce-tamarack swamps may grade into "rich" swamp forests of northern white cedar *(Thuja occidentalis)* or black ash *(Fraxinus nigra)*, if a source of nutrient enriched groundwater is present. They are associated with headwater streams or shallow kettles depressions. Tamarack swamp is a less acid, wet conifer forest community that can support nutrient demanding understory plants that are also tolerant of relatively high pH levels. Tamarack *(Larix laricina)* is the dominant tree, sometimes to the virtual exclusion of other tree species. In some stands, hardwoods such as paper birch *(Betula papyrifera)*, red maple *(Acer rubrum)*, black ash *(Fraxinus nigra)*, and (formerly) elm *(Ulmus* spp.*)* occur as canopy associates, subcanopy trees, or saplings. The understory may be more diverse and structurally complex than in the more acid spruce-dominated swamps, and sometimes features a well developed tall shrub layer composed of plants with relatively high nutrient demands such as speckled alder *(Alnus rugosa)*, Alder-leaved Buckthorn *(Rhamnus alnifolia)*, Mountain Holly *(Nemopanthus mucronata)*, and Winterberry *(Ilex verticillata)*. Natural disturbance factors include windthrow, and in drier years, fire.

CEDAR SWAMPS

This is a rare upland forest community of mesic sites in northern Wisconsin, characterized by northern white cedar *(Thuja occidentalis)* and various associates including eastern hemlock *(Tsuga canadensis)*, balsam fir *(Abies balsamea)*, yellow birch *(Betula alleghaniensis)*, and white pine *(Pinus strobus)*. The herb layer may contain Wild Lily-of-the-Valley *(Maianthemum canadense)*, Clubmosses *(Lycopodium* spp.*)*, Goldthread *(Coptis groenlandica)*, Fringed Polygala *(Polygala paucifolia)*, and Naked Miterwort *(Mitella nuda)*, and trailing sub-shrubs such as Twinflower *(Linnaea borealis)* and Creeping Snowberry *(Gaultheria hispidula)* and others. This forested minerotrophic wetland, maintained by mineral rich groundwater, occurs on rich, neutral to alkaline peats and mucks throughout much of northern Wisconsin. Natural disturbance is mainly wind events that create gaps in the stand for new regeneration. A number of rare plants occur more frequently in cedar swamps than any other habitat.

HARDWOOD SWAMPS

The northern hardwood swamp is a deciduous forested wetland that occurs along lakes or streams, or in insular basins in poorly drained morainal landscapes. This community occurs across the state, but is most common in northern Wisconsin. The dominant tree species are black ash *(Fraxinus nigra)* and green ash *(Fraxinus pennsylvanica)*, but in some stands red maple, yellow birch, and (formerly) American elm *(Ulmus americana)* are also important. The diversity of tree species is usually dictated by timing, extent and duration of flooding, and windthrow which are common disturbance events. More stagnant swamps favor black ash *(Fraxinus nigra)*, where as oxygenated, moving water favors more green ash *(Fraxinus pennsylvanica)*. Speckled alder *(Alnus rugosa)* is common in the shrub layer while herbaceous flora is often Marsh Marigold *(Caltha palustris)*, Swamp Dewberry *(Rubus hispidus)*, Skullcaps *(Scutellaria* spp.*)*, Spotted Touch-me-not *(Impatiens capensis)*, and many sedges. Soils may be mucks or mucky sands.

FLOODPLAIN FORESTS

This lowland hardwood forest community type occurs on alluvial plains of larger rivers. Canopy dominants vary, but may include silver maple *(Acer saccharum)*, river birch *(Betula nigra)*, green ash *(Fraxinus pennsylvanica)*, black ash *(Fraxinus nigra)*, hackberries *(Celtis* spp.*)*, swamp white oak *(Quercus bicolor)*, (formerly) Elms *(Ulmus* spp.*)*, and eastern cottonwood *(Populus deltoides)*. Historically, the elms were a significant component of the floodplain forests, but Dutch elm disease has eliminated most large elm trees that formerly provided supercanopy structure, snag and den sites, and large woody debris. Northern occurrences of this type tend to be less extensive, are often discontinuous, and are relatively less diverse compared to those in the south. Silver maple *(Acer saccharinum)* and green ash *(Fraxinus pennsylvanica)* remain among the dominant species, bur oak *(Quercus macrocarpa)*, and boxelder maple *(Acer negundo)* replacing some of the many missing southern trees. Buttonbush *(Cephalanthus occidentalis)* is a locally dominant shrub that may form dense thickets on the margins of oxbow lakes, sloughs and ponds, which are often important aquatic habitats within these forests. Understory plants include Nettles *(Urtica* spp.*)*, sedges, tall ferns, and a wide variety of other plants. Flooding (channel migration) is the main disturbance event while sedimentation and tree fall can shape the occurrence and diversity of species.

(Photo from Department of Natural Resources Archives)

(Photo from Department of Natural Resources Archives)

(Photo from Kemp Natural Resources Station Archives)

APPENDIX 3: SPECIES CHECKLIST FOR FIELD USE
(Scientific Name)

*Date:*_____/_____/_____ *Stand ID#:*_____ *Collected By:*_____

*Location:*_____

COVER CLASS VALUES: ❶ **Present-trace (<1%)** ❷ **Common (1-5%)** ❸ **Well Represented (5-25%)** ❹ **Abundant (>25%)**

Herbs & Small Shrubs

_____ *Arisaema triphyllum*
_____ *Aralia racemosa*
_____ *Athyrium filix-femina*
_____ *Calla palustris*
_____ *Cicuta maculata*
_____ *Clintonia borealis*
_____ *Coptis groenlandica*
_____ *Cornus canadensis*
_____ *Dryopteris cristata*
_____ *Dryopteris disjuncta*
_____ *Dryopteris phegopteris*
_____ *Dryopteris spinulosa*
_____ *Equisetum spp.*
_____ *Eupatorium maculatum*
_____ *Impatiens capensis*
_____ *Iris versicolor*
_____ *Linnaea borealis*
_____ *Lycopus uniflorus*
_____ *Maianthemum canadense*
_____ *Matteuccia struthiopteris*
_____ *Mitchella repens*
_____ *Mitella nuda*
_____ *Onoclea sensibilis*
_____ *Osmunda cinnamomea*
_____ *Osmunda claytoniana*
_____ *Oxalis montana*
_____ *Polygonatum pubescens*
_____ *Prunella vulgaris*
_____ *Pteridium aquilinum*
_____ *Scutellaria lateriflora*
_____ *Smilax herbacea*
_____ *Smilax tamnoides*
_____ *Trientalis borealis*
_____ *Trillium cernuum*
_____ *Urtica dioica*

Other Species

_____ _____
_____ _____
_____ _____
_____ _____
_____ _____
_____ _____
_____ _____
_____ _____
_____ _____
_____ _____

Shrubs

_____ *Acer spicatum*
_____ *Alnus rugosa*
_____ *Cornus stolonifera*
_____ *Corylus cornuta*
_____ *Lonicera spp.*
_____ *Nemopanthus mucronata*
_____ *Rhamnus alnifolia*
_____ *Ribes spp.*
_____ *Rubus hispidus*
_____ *Rubus pubescens*
_____ *Rubus spp.*
_____ *Spirea alba*
_____ *Vaccinium angustifolium*
_____ *Vaccinium myrtilloides*

Trees

_____ *Abies balsamea*
_____ *Acer rubrum*
_____ *Betula alleghaniensis*
_____ *Betula papyrifera*
_____ *Fraxinus nigra*
_____ *Fraxinus pennsylvanica*
_____ *Larix laricina*
_____ *Picea glauca*
_____ *Picea mariana*
_____ *Quercus rubra*
_____ *Sorbus americana*
_____ *Thuja occidentalis*
_____ *Tilia americana*
_____ *Tsuga canadensis*
_____ *Ulmus americana*
_____ *Ulmus spp.*

APPENDIX 4: SPECIES CHECKLIST FOR FIELD USE (Common Name)

Date: _____ / _____ / _____ *Stand ID#:* _____ *Collected By:* _____

Location: _____

COVER CLASS VALUES: ❶ Present-trace (<1%) ❷ Common (1-5%) ❸ Well Represented (5-25%) ❹ Abundant (>25%)

Herbs & Small Shrubs

_____ Beech Fern
_____ Bracken Fern
_____ Bristly Greenbrier
_____ Bugleweed
_____ Bunchberry
_____ Carrion Flower
_____ Cinnamon Fern
_____ Common Wood Sorrel
_____ Crested Wood Fern
_____ Goldthread
_____ Hairy Solomon's Seal
_____ Heal-all
_____ Horsetails
_____ Interrupted Fern
_____ Lady Fern
_____ Larger Blue Flag
_____ Mad-dog Skullcap
_____ Naked Miterwort
_____ Nodding Trillium
_____ Oak Fern
_____ Ostrich Fern
_____ Partridgeberry
_____ Sensitive Fern
_____ Small Jack-in-the-pulpit
_____ Spikenard
_____ Spinulose Shield Fern
_____ Spotted Joe-Pye Weed
_____ Spotted Touch-me-not
_____ Starflower
_____ Stinging Nettle
_____ Twinflower
_____ Water Arum
_____ Water Hemlock
_____ Wild Lily-of-the-valley
_____ Yellow Beadlily

Other Species

_____ _____
_____ _____
_____ _____
_____ _____
_____ _____
_____ _____
_____ _____
_____ _____
_____ _____
_____ _____
_____ _____

Shrubs

_____ Alder-leaved Buckthorn
_____ Beaked Hazel
_____ Canada Blueberry
_____ Currants/Gooseberries
_____ Dwarf Raspberry
_____ Fly Honeysuckles
_____ Low-sweet Blueberry
_____ Mountain Holly
_____ Mountain Maple
_____ Narrow-leaved Meadowsweet
_____ Raspberries/Blackberries
_____ Red-osier Dogwood
_____ Speckled Alder
_____ Swamp Dewberry

Trees

_____ American Basswood
_____ American Elm
_____ American Mountain Ash
_____ Balsam Fir
_____ Black Ash
_____ Black Spruce
_____ Eastern Hemlock
_____ Elm
_____ Green Ash
_____ Northern Red Oak
_____ Northern White Cedar
_____ Paper Birch
_____ Red Maple
_____ Tamarack
_____ White Spruce
_____ Yellow Birch

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