

Field Guide to the Plant Community Types of Voyageurs National Park

By Don Faber-Langendoen¹, Norman Aaseng², Kevin Hop³,
and Michael Lew-Smith⁴

¹Ecology Department
NatureServe
Syracuse, New York
<http://www.natureserve.org>

²Minnesota County Biological Survey
Minnesota Department of Natural Resources
St. Paul, Minnesota
http://www.dnr.state.mn.us/ecological_services/mcbs/index.html

³U.S. Geological Survey
Upper Midwest Environmental Sciences Center
La Crosse, Wisconsin
<http://www.umesc.er.usgs.gov/>

⁴Arrowwood Environmental
Hardwick, Vermont

Techniques and Methods 2–A4

U.S. Department of the Interior
U.S. Geological Survey

U.S. Department of the Interior
Dirk Kempthorne, Secretary

U.S. Geological Survey
Mark D. Myers, Director

U.S. Geological Survey, Reston, Virginia: 2007

For product and ordering information:

World Wide Web: <http://www.usgs.gov/pubprod>

Telephone: 1-888-ASK-USGS

For more information on the USGS—the Federal source for science about the Earth, its natural and living resources, natural hazards, and the environment:

World Wide Web: <http://www.usgs.gov>

Telephone: 1-888-ASK-USGS

Any use of trade, product, or firm names is for descriptive purposes only and does not imply endorsement by the U.S. Government.

Although this report is in the public domain, permission must be secured from the individual copyright owners to reproduce any copyrighted materials contained within this report.

Suggested citation:

Faber-Langendoen, D., Aaseng, N., Hop K., and Lew-Smith, M., 2007, Field guide to the plant community types of Voyageurs National Park: U.S. Geological Survey Techniques and Methods 2-A4, 156 p.

Preface

The U.S. Geological Survey-National Park Service Vegetation Mapping Program has been supporting the development of vegetation classifications and maps for many of the National Parks across the country. The classification and map report for Voyageurs National Park was completed in 2001 (Hop and others, 2001). To make that information more accessible, we decided to produce a more field-oriented version of the report. In the meantime, additional vegetation plot information became available through the efforts of the Minnesota Natural Heritage and Nongame Research Program and the Minnesota County Biological Survey. At the same time, those same programs collaborated on a new native plant community classification of the state (Minnesota Department of Natural Resources, 2003). We incorporated this new information when producing this field guide, while still retaining the essential features of the original classification and map.

The vegetation classification system, originally developed under the auspices of The Nature Conservancy, has since 2000 been maintained and expanded by NatureServe. NatureServe staff and contractors also provided valuable assistance and expertise in the creation of map units. The USGS Upper Midwest Environmental Sciences Center produced the vegetation map of Voyageurs National Park, provided project coordination, and compiled all final products.

The format of this manual owes much to the excellent tradition of field guides to vegetation in Canada, especially those in northwestern Ontario by Sims and others (1989, 1997) and Harris and others (1996). This manual is unique in that it covers all vegetation types within the Park, not just wetlands or forests. Because of the similarity of the vegetation—Voyageurs National Park borders on northwestern Ontario—we crosswalked vegetation types from the Park to those manuals, yet retained the nomenclature and structure of the U.S. National Vegetation Classification.

Acknowledgments

Funding for this field guide was provided by the U.S. Geological Survey through the Park Oriented Biological Support program.

Many individuals contributed to the Voyageurs National Park Vegetation Mapping Project. The Voyageurs National Park staff cooperated in numerous ways including organizing several meetings, contracting for the aerial photography, providing housing and logistical and equipment support, and helping with data acquisition.

The authors specifically thank the following dedicated individuals for helping make the project a success: Roger Andrascik, Pat Lynch, Jim Schaberl, Wayne Wold, Sam Lammie, Lee Grim, Steve Jakala, and Bruce McKeeman, who were on staff at Voyageurs National Park during this project; the ranger staff of Voyageurs National Park; Jean Jancaitus and Kevin McNinch, seasonal employees for Voyageurs National Park during this project; Peter Budde, Ron Hook, Dennis Grossman, Jim Drake, Kristin Snow, Deb Pomroy-Petry, Stephanie Neid, Dawn Brownne, Larry Kallemeyn, Tom Owens, Ralph Root, Mike Story, Maury Nyquist, Sara Lubinksi, Janis Boyd, Christine Calogero Lovelace, Mel Bower, and Larry Robinson.

Regarding the field guide itself, we are thankful to Moy Burns for assisting with editing the fact sheets. We thank Jerry Cox for his careful attention to all aspects of copy-editing, publication layout, and final production of the field manual.

Contents

Preface	iii
Acknowledgments	iv
Introduction.....	1
Voyageurs National Park.....	2
U.S. National Vegetation Classification	4
Dichotomous Field Key to the Plant Communities at Voyageurs National Park	7
How to use the Key.....	7
Key to the Associations	10
How to Read the Fact Sheets	19
Layout and Conventions	19
Fact Sheets: List of Plant Communities	22
Fact Sheets A1–A49.....	24
Additional Community Types.....	122
References Cited.....	125
Appendix 1. Analytical Methods Used to Define Plant Community Types	129
Appendix 2. Ecological Systems.....	135
Appendix 3. Tree Names.....	137
Appendix 4. Relation Between Associations and Map Units for Voyageurs National Park Vegetation Mapping Project.....	139
Appendix 5. Location Maps of the Associations and Ecological Systems of Voyageurs National Park.....	145

Field Guide to the Plant Community Types of Voyageurs National Park

By Don Faber-Langendoen, Norman Aaseng, Kevin Hop, and
Michael Lew-Smith

Introduction

The objective of the U.S. Geological Survey-National Park Service Vegetation Mapping Program is to classify, describe, and map vegetation for most of the park units within the National Park Service (NPS). The program was created in response to the NPS Natural Resources Inventory and Monitoring Guidelines issued in 1992. Products for each park include digital files of the vegetation map and field data, keys and descriptions to the plant communities, reports, metadata, map accuracy verification summaries, and aerial photographs. Interagency teams work in each park and, following standardized mapping and field sampling protocols, develop products and vegetation classification standards that document the various vegetation types found in a given park.

The use of a standard national vegetation classification system and mapping protocol facilitate effective resource stewardship by ensuring compatibility and widespread use of the information throughout the NPS as well as by other Federal and state agencies. These vegetation classifications and maps and associated information support a wide variety of resource assessment, park management, and planning needs, and provide a structure for framing and answering critical scientific questions about plant communities and their relation to environmental processes across the landscape. This field guide is intended to make the classification accessible to park visitors and researchers at Voyageurs National Park, allowing them to identify any stand of natural vegetation and showing how the classification can be used in conjunction with the vegetation map (Hop and others, 2001).

2 Field Guide to the Plant Community Types of Voyageurs National Park

Voyageurs National Park

Voyageurs National Park was authorized in 1971 and established in 1975. The Park extends for more than 50 km along the Canadian–United States international border, from 29 km east of International Falls to the western edge of the Boundary Waters Canoe Area (BWCA) in the Superior National Forest (fig. 1). It covers 88,244 ha, of which 61.6% (54,336 ha) is land, the rest open lakes and ponds. Four large lakes compose the majority of the water area. Lakes, bays, and land masses specifically referenced in this field guide, along with some points of interest, are shown in Figure 2.



Figure 1. Location of Voyageurs National Park in northern Minnesota.

The climate is mid-continental with a mean annual temperature of 1.4°C, extremes of -40 and 36°C, and a mean annual precipitation of 63 cm (Kurmis and others, 1986). The landscape is rugged Canadian Shield terrain consisting of Early Precambrian granite (more common in the southern part of the Park), biotite schist (more common in the north), and migmatite (interlayered granite and biotite). A greenstone belt outcrop occurs in a limited region of the northwestern part of the Park. Mafic dikes occur in localized areas. Prolonged erosion and glacial scouring during the Pleistocene have produced the current surficial geology features, which include sandy loam tills, lacustrine deposits (particularly on the western edge from glacial Lake Agassiz, but also in localized lowlands and bedrock depressions), and localized outwash deposits of sand and gravel (Okajangas and Matsch, 1982).

Soils formed in the glacial deposits range from thin, loamy, and well drained, often in raised areas with bedrock outcrops, to thick, clayey, and poorly drained low-lying areas (Kurmis and others, 1986). The topography

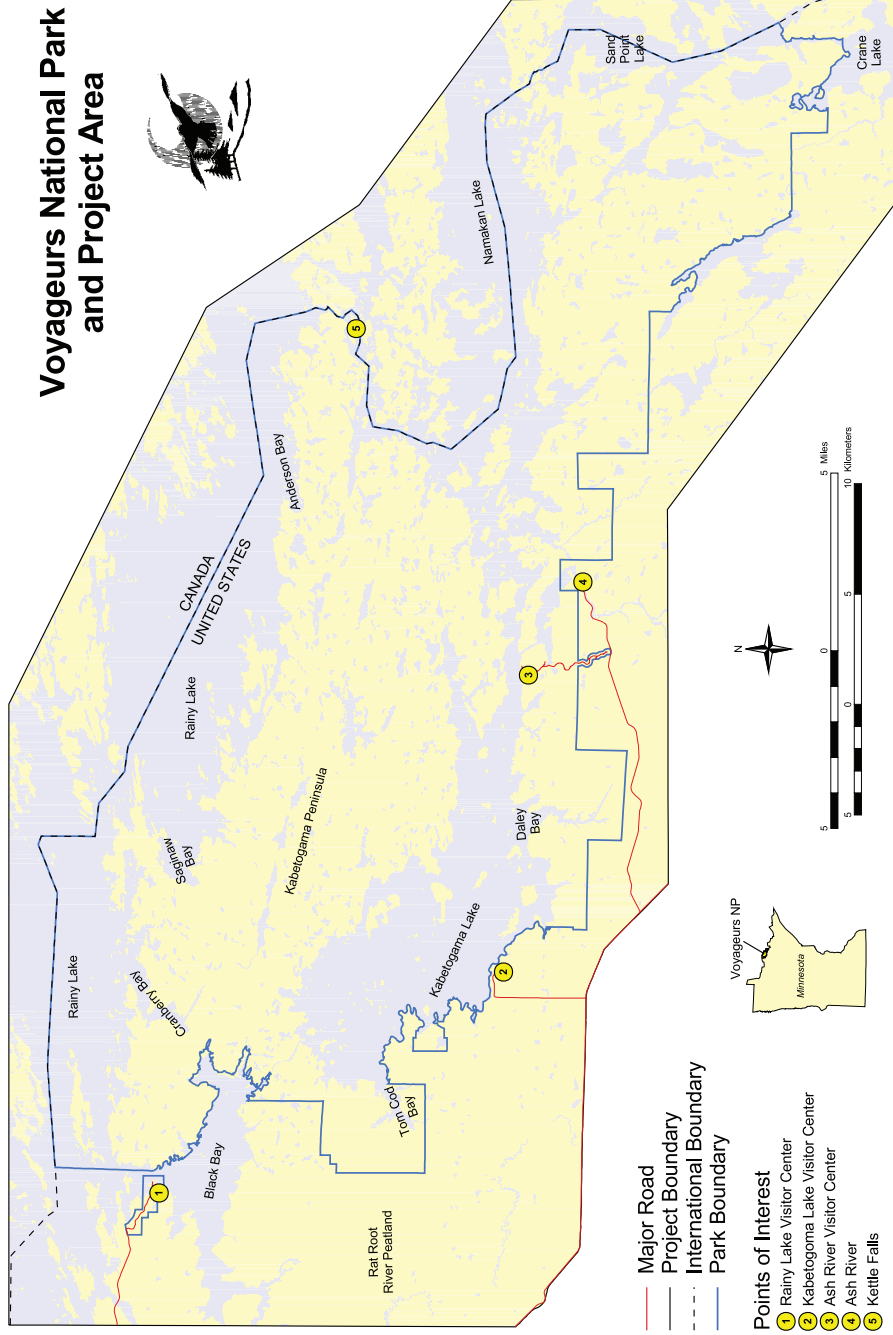


Figure 2. Lakes, bays, and land masses referenced in the field guide, along with various points of interest.

4 Field Guide to the Plant Community Types of Voyageurs National Park

of the area is a complex pattern of low ridges and valleys, with a maximum relief of 90 m (Johnston and Naiman, 1990), but more typically 20–30 m. All of Voyageurs National Park falls in one ecological land unit at the subsection level, the Border Lakes subsection (212La of Keys and others, 1995).

Before settlement and logging, which began around 1875 and ended in the early 1970s (cutting almost all of the Park forests in the process), the vegetation consisted of jack pine forests with rocky outcrops, white and red pine forests, spruce-fir and aspen forests, black spruce-tamarack bogs and swamps, fens, wet meadows, marshes, and aquatics (Marschner, 1974; Kurmis and others, 1986). Periodic fires before and after settlement favored the fire-dependent pines, as well as the aspen-birch forests. Based on analyses from the adjacent BWCA (Heinselman, 1996), fires could sweep through thousands of acres at a time. Heinselman's work indicated that jack pine stands in the BWCA had high-intensity catastrophic burns every 50–100 years, whereas red pine and white pine generally had more frequent low-intensity burns every 30–40 years, but less frequent high-intensity burns every 200 years or so. Windstorms, spruce-budworm disease, herbivores, and beaver activity are other disturbance factors acting in the Park (Johnston and Naiman, 1990; Crowley, 1995).

U.S. National Vegetation Classification

The U.S. National Vegetation Classification (USNVC) is used for park classification and mapping. The classification is vegetation based, emphasizes existing natural vegetation, uses a combined physiognomic-floristic hierarchy, and is appropriate for mapping at multiple scales. It was developed and implemented by NatureServe (formerly with The Nature Conservancy) and the network of Natural Heritage Programs over the past 20 years (Grossman and others, 1998), in cooperation with Federal, state, and international partners. Support has come from Federal agencies, the Federal Geographic Data Committee (1997), and the Ecological Society of America (Jennings and others, 2004). It is part of a larger International Vegetation Classification (IVC) system that includes Canada and parts of Latin America. Classification is refined in the process of application, leading to ongoing proposed revisions that are reviewed locally, as occurred during the Voyageurs project, and nationally and internationally as information from Voyageurs was compared with other information available in the northern United States and Canada.

The USNVC extends to all existing upland and wetland vegetation, whether natural or cultural. It presently includes mostly natural vegetation types, the focus of the current partners. "Natural vegetation" as defined in Grossman

and others (1998) includes types that “occur spontaneously without regular management, maintenance, or planting and have a strong component of native species.” “Cultural vegetation” includes planted or cultivated vegetation types such as orchards, pastures, and vineyards. The hierarchy has seven levels (five upper physiognomic levels and two lower floristic levels). The basic unit of the physiognomic portion of the classification is the “formation,” a type defined by dominance of a given growth form(s) in the uppermost layer of vegetation, as well as characteristics of the environment (e.g., temperate cold-deciduous broad-leaved forests). Criteria from these levels facilitate broad-scale mapping. The floristic levels include alliances and associations, which are more local or regional plant community types, based on differences in species composition (e.g., white spruce-fir forests, black ash swamps). The association is defined as “a plant community of definite floristic composition, uniform habitat conditions, and uniform physiognomy” (see Flahault and Schroter, 1910, in Moravec, 1993). The focus of this field guide is on descriptions of associations.

Development of associations at Voyageurs is summarized in detail in Appendix 1 (see also Faber-Langendoen and others, 2007). Briefly, detailed vegetation plots were collected throughout the Park by an ecology field team from 1996 to 1998 (fig. 3). Plots contain a comprehensive list of all plant species found in the plot, listed by layer (tree, shrub, field, moss-lichen), and abundance estimated using percent cover, with supplementary information on site factors. The Park was stratified into the western peatland area (Rat Root River Peatland), which falls mostly outside the Park boundaries; the northern unit, where the bedrock is primarily biotite schist (metasedimentary rocks) with local areas of greenstone; and a southern unit, where the bedrock is primarily granite (the Vermillion granitic complex: Okajangas and Matsch, 1982). Project requirements permitted only about three plots per type, but less well-understood types were sampled more extensively and rare types less. Also, as part of the mapping field work, an additional 1281 observation plots were collected across the Park. Observation plots contain information on the dominant and characteristic species in the plot and a few basic environmental factors (slope, elevation, topographic position, hydrological regime, evidence of disturbances), and were used in part to assess the accuracy of the photointerpretation mapping process. The 191 detailed vegetation plots were entered into the Minnesota Natural Heritage database and a larger dataset of 259 plots was created that included samples from other investigators taken in the same area. Quantitative analyses were completed and reviewed, and decisions on plant community (association) types in Voyageurs were made based on both park and regional scale patterns. In this way, a standardized



Figure 3. Trekking toward a Black Spruce / Labrador Tea Poor Swamp association (A3) for field data collection.

classification was developed that provides the Park with a set of types that can be applied both within and outside the Park, including adjacent state and national forest lands. The 1281 observation plots were also summarized and used to supplement information based on the plots. All data were then summarized into the fact sheets presented in this manual. The classification was also used to guide the mapping of the vegetation across the Park (Hop and others, 2001, Appendix F).

Associations are aggregated by Ecological System types (Comer and others, 2003), a relatively new classification approach that can be applied in conjunction with the USNVC. Ecological Systems group the associations by their shared spatial and ecological features rather than by vegetation taxonomic similarities, as done by the USNVC hierarchy. These ecological system types provide the organizational structure for the association fact sheets in this manual.

Dichotomous Field Key to the Plant Communities at Voyageurs National Park

How to use the Key

General

This is a key to the natural plant community types identified in the Park. Cultural types such as old fields, pastures, yards, etc., are not included. For the full list of types that are covered by this key, see the “Fact Sheets: List of Plant Communities.”

“Dominance” in the context of forest, shrub, and herbaceous communities means >60% cover. In the context of woodland communities, dominance means >25% cover.

An association may key out in multiple places in the key, therefore always verify the decision as to what type you are in by reading the fact sheet description. Check related types to determine the key characteristics that define the type you have keyed out.

Season of use

This classification works best during the optimal growing season of the understory species, which is usually from late June to early September. However, familiarity with the woody species during leaf-off or early and late in the growing season should allow you to key out many of the types from April to November.

Plot size

Identification of a type in the field should be done using a relatively homogeneous area between 400 and 1000 m². For example, one could define a square area of 20 x 20 m (400 m²) or a circular area with a radius of 18 m (~1000 m²).

Estimating percent cover

Cover is the percentage of a plot area beneath a canopy of a given species (e.g., jack pine) or combination of species (e.g., all conifer trees). Cover values must be estimated in order to apply many of the decision rules in the key. It can readily be applied to an understory species by looking down within the area and estimating the cover to the nearest 5%. For overstory species, one must look up into the canopy and estimate the cover. Cover is based on the

8 Field Guide to the Plant Community Types of Voyageurs National Park

outline of individual tree canopies, and holes in the canopy of a single tree need not be subtracted from the cover.

When the term “total tree canopy cover” is used, this refers to the absolute canopy cover of all tree species combined, ignoring overlap. All other cover values refer to relative canopy cover (e.g., if total canopy cover is 40%, >25% cover of tamarack refers to 25% of the 40% total cover).

Species

Species listed after “*” are indicator species for that community type and are often present. Other species listed are typical dominants in the type (i.e., they often contain 5% or more cover).

Soil/substrate

Two terms are often used to distinguish soil types.

“Mineral soils” are mixtures of sand, silt, clay, sometimes with rocks or boulders. Wetland mineral soils can be mucky, or have a shallow layer of organic matter.

“Peat soils” are soils with at least 30–40 cm of organic matter and composed of sedge, wood, or moss.

Hydrologic regime

The hydrologic, or water, regime describes the frequency and duration of flooding, and is an important influence on wetland associations (Cowardin and others, 1979; Harris and others, 1996). The following regimes are noted in the key or fact sheets:

permanently flooded – water covers the land surface throughout the year in all years, except extreme drought.

semi-permanently flooded – surface water persists throughout the growing season in most years. The land surface is normally saturated when water levels drop below the surface.

seasonally flooded – surface water is present for extended periods, especially early in the growing season, but is absent by the end of the growing season in most years. Seasonal flooding does not include ponding after rains or surface water runoff.

temporarily flooded – surface water is present for brief periods during the growing season, but the water table usually lies well below the surface.

saturated – surface water is seldom present, but substrate is saturated to surface for extended periods during the growing season.

Rich/poor

These expressions are used to describe associations in relative terms. In peatlands, they typically are used to describe the mineral (Ca^{++} , Mg^{++}) status of the surface water of an association relative to others. The term “minerotrophic indicator” is also used to describe species that are found in relatively richer sites.

Soil drainage

well drained – broadly used term to include rapidly to somewhat poorly drained soils, where soil moisture content varies from very low throughout most of the profile to somewhat high in lower horizons but not in the upper layer.

poorly drained – broadly used term to include poorly and very poorly drained soils where soil moisture content is high in all soil layers, and water may be present in the soil horizon within 30 cm of the surface for much of the growing season.

Vegetation

Trees – Larger woody plants, often single stemmed, mostly well above 5 m tall.

Shrubs – Smaller woody plants, often multi-stemmed at the ground, and mostly between 0.5 and 5 m tall. The shrub layer includes the cover of both shrubs and tree saplings (trees between 0.5 and 5 m tall).

Dwarf-shrubs – Low shrubs spreading near the ground surface, <50 cm high.

Herbs – Plants without perennial aboveground woody stems, including graminoids, forbs, and ferns. Dwarf-shrubs and herbs together constitute the “field” layer.

Moss-Lichen – Nonvascular plants including mosses, lichen, and liverworts.

Plant scientific names

Scientific names used in this document are from Ownbey and Morley (1991).

Key to the Associations

1. UPLANDS. Absence of standing water and/or peat soil. Mineral soil that is not saturated throughout the growing season.
 2. Well drained soils. Canopy dominated by one or more of the following: *Pinus* spp., *Quercus* spp., *Picea* spp., *Betula* spp., *Populus tremuloides*, *P. grandidentata*. If dominated by *Populus tremuloides* or *P. grandidentata* then *P. balsamifera*, *Thuja occidentalis*, or *Fraxinus nigra* present in canopy or shrub layers at <10% cover.
 3. Dominated by shrubs or herbaceous vegetation. Total tree canopy <25%.
 4. Dominated by herbaceous vegetation (shrub cover <25%).
Poverty Grass Granite Barrens (A35a)
 4. Dominated by shrubs (shrubs >25% cover). **Boreal Hazelnut - Serviceberry Rocky Shrubland (A35)**
 3. Forest or Woodland. Total tree canopy >25% (or if <25%, dominated by bedrock and lichens, not shrubs).
 5. Canopy dominated by evergreen trees or a mixture evergreen and deciduous trees. Percent cover of evergreen trees in canopy >25%.
 6. Canopy dominated by *Pinus banksiana* with or without *Quercus ellipsoidalis* or *Populus* spp.
 7. Canopy consisting primarily of *Pinus banksiana*. *Quercus ellipsoidalis* or *Populus* spp. absent or present <25%.
 8. Woodland. Total tree canopy cover <60% and canopy closure prevented by the presence of exposed bedrock.
 9. Sparsely vegetated, total tree canopy cover <25%. Dominated by bedrock and lichens. **Jack Pine / Lichen Rocky Barrens (A31)**
 9. Total tree canopy cover 25–60%. **Boreal Pine Rocky Woodland** (jack pine phase) **(A32)**
 8. Forest. Total tree canopy cover >60%. Or, if <60%, then canopy closure not prevented by the presence of exposed bedrock. **Jack Pine / Balsam Fir Forest (A40)**
 7. Canopy consisting of a mix of *Pinus banksiana* and *Populus* spp. or *Pinus banksiana* and *Quercus* spp. Deciduous trees comprising >25% cover.
 10. Canopy consisting of a mix of *Pinus banksiana* and *Populus* spp. each with >25% cover. **Jack Pine -**

Aspen / Bush Honeysuckle Forest (A41). This type is uncommon.

10. Canopy consisting of *Pinus banksiana* and *Quercus ellipsoidalis* each with >25% cover. *Populus* spp.

absent in canopy or present at <25% cover. **Northern Pin Oak - Bur Oak - (Jack Pine) Rocky Woodland** (jack pine-oak phase) (A33)

6. Canopy dominated by *Pinus strobus*, *Pinus resinosa*, *Picea* spp., *Populus* spp., and/or *Betula papyrifera*.

11. Canopy dominated by *Pinus resinosa* and/or *Pinus strobus*. Or canopy a mix of *Pinus resinosa* and *Pinus strobus* with *Populus* spp. and/or *Betula papyrifera*.

12. Forest. Total tree canopy cover >60%. Or, if <60%, then canopy closure not prevented by the presence of exposed bedrock.

13. Dominant conifer *Pinus strobus*. *Pinus resinosa* in canopy <60%.

14. <25% hardwoods (*Populus* spp. and/or *Betula papyrifera*) in canopy. **White Pine / Mountain Maple Mesic Forest Community** (A39)

14. >25% hardwoods (*Populus* spp. and/or *Betula papyrifera*) in canopy. **White Pine - Aspen - Birch Forest** (A38)

13. Dominant conifer *Pinus resinosa* (may contain <25% *P. strobus* in canopy).

15. <25% hardwoods (*Populus* spp. and/or *Betula papyrifera*) in canopy. **Red Pine / Blueberry Dry Forest Community** (A36)

15. >25% hardwoods (*Populus* spp. and/or *Betula papyrifera*) in canopy. **Red Pine - Aspen - Birch Forest Community** (A37)

12. Woodland. Total tree canopy cover <60% and canopy closure prevented by the presence of exposed bedrock. *Pinus strobus* and *Pinus resinosa* common, *Picea* spp. uncommon, with or without a mixture of hardwoods, typically *Populus* spp. and/or *Betula papyrifera*.

16. <25% hardwoods (typically *Populus* spp. and/or *Betula papyrifera*) in canopy. **Boreal Pine Rocky Woodland** (mixed pine phase) (A32)

12 Field Guide to the Plant Community Types of Voyageurs National Park

16. >25% hardwoods (*Populus* spp. and/or *Betula papyrifera*) in canopy. **Northern Pin Oak - Bur Oak - (Jack Pine) Rocky Woodland** (mixed pine-oak phase) (A33)

11. Canopy dominated solely by *Picea* spp. or a mixture of *Picea* spp. with *Populus* spp. and/or *Betula papyrifera*.

17. Woodland. Total tree canopy cover <60%, and canopy closure prevented by the presence of exposed bedrock.

18. <25% hardwoods (*Populus* spp. and/or *Betula papyrifera*) in canopy. **Boreal Pine Rocky Woodland** (mixed pine phase) (A32). This is an uncommon variant of the mixed pine phase.

18. >25% hardwoods (*Populus* spp. and/or *Betula papyrifera*) in canopy. **Northern Pin Oak - Bur Oak (Jack Pine) Rocky Woodland** (mixed pine-oak phase) (A33). This is an uncommon variant of the mixed pine-oak phase.

17. Forest. Total tree canopy cover >60%. Or, if <60%, then canopy closure not prevented by the presence of exposed bedrock.

19. Canopy dominated solely by *Picea* spp. Percent cover of *Populus* spp. and/or *Betula papyrifera* <25%.

20. Canopy dominated exclusively by *Picea mariana*. **Black Spruce / Feathermoss Forest** (A42)

20. Canopy dominated by *Picea glauca* (*P. mariana* may be present). **Spruce - Fir / Mountain Maple Forest Community** (A43)

19. Canopy a mixture of *Picea* spp., *Abies balsamea* and *Populus* spp. and/or *Betula papyrifera*. Percent canopy cover of these hardwoods >25%. **Spruce - Fir - Aspen Forest** (A44). The following two communities are minor variants of the Spruce - Fir - Aspen Forest and each is treated as a phase of that community.

21. Canopy a mixture of *Abies balsamea* and *Betula papyrifera*. **Balsam Fir - Paper Birch Forest** (CT1)

21. Canopy a mixture of *Picea mariana* and *Populus* spp. and/or *Betula papyrifera*. **Black Spruce Aspen Forest (CT2)**

5. Canopy dominated by deciduous trees. Percent cover of evergreen trees in canopy <25%.

22. Canopy dominated by *Quercus macrocarpa*, *Q. ellipsoidalis*, *Tilia americana* or *Fraxinus pensylvanica*.

23. Forest or woodland canopy dominated by *Q. ellipsoidalis*. Or woodland dominated by *Q. macrocarpa* with <60% cover and canopy closure prevented by the presence of exposed bedrock. **Northern Pin Oak - Bur Oak - (Jack Pine) Rocky Woodland (deciduous phase) (A33)**

23. Canopy dominated by *Quercus macrocarpa*, *Fraxinus pensylvanica*, and/or *Tilia americana*. Forest. Total tree canopy cover >60% and canopy closure not prevented by the presence of exposed bedrock. **Northern Bur Oak Mesic Forest (A49)**

22. Canopy dominated by *Populus* spp. and/or *Betula papyrifera*.

24. Forest. Total tree canopy cover >60%. Or, if <60%, then canopy closure not prevented by the presence of exposed bedrock.

25. Canopy dominated by *Populus* spp.

26. *Acer rubrum* absent in the canopy. **Aspen - Birch / Boreal Conifer Forest (A46)**

26. *Acer rubrum* present in the canopy. **Aspen - Birch - Red Maple Forest (A47)**, a very minor type.

25. Canopy dominated by *Betula papyrifera*. *Populus* spp. <10%. **Paper Birch / Fir Forest (A45)**

24. Woodland. Total tree canopy cover <60% and canopy closure prevented by the presence of exposed bedrock. Canopy cover <60%. **Mixed Aspen Rocky Woodland (A34)**

2. Poorly drained soils, canopy dominated by *Populus* spp., *Fraxinus nigra*, *Thuja occidentalis*. If dominated by *Populus* spp. then *P. balsamifera*, *Thuja occidentalis*, or *Fraxinus nigra* present in canopy or shrub layers at >10% cover.

14 **Field Guide to the Plant Community Types of Voyageurs National Park**

27. Canopy dominated by *Populus* spp. or a mix of *Populus* spp. and *Thuja occidentalis*

28. *Thuja occidentalis* absent or present <25% cover. **Trembling Aspen - Balsam Poplar Lowland Forest (A13)**

28. *Thuja occidentalis* present in the canopy or subcanopy >25% cover. **White Cedar - Yellow Birch Forest (A48)**

27. Canopy dominated by *Fraxinus nigra* and/or *Thuja occidentalis*.

29. Canopy consists solely of *Fraxinus nigra* (*T. occidentalis* may be present in the sub-canopy).

30. Canopy of *F. nigra* with >25% *T. occidentalis* in subcanopy. **White Cedar - Black Ash Swamp (A15)**

30. Canopy of *F. nigra* with <25% *T. occidentalis* in the subcanopy. **Black Ash - Mixed Hardwood Swamp (A14)**

29. Canopy consists solely of *T. occidentalis* (*F. nigra* <25%) or consists of a mix of *T. occidentalis* and *F. nigra* each comprising at least 25% cover.

31. Canopy dominated by *T. occidentalis* with <25% *F. nigra*. **White Cedar - Boreal Conifer Mesic Forest (A12)**

31. Canopy mixed *T. occidentalis* and *F. nigra* with at least 25% cover of each. **White Cedar - Black Ash Swamp (A15)**

1. WETLANDS. Presence of standing water, saturated mineral soil, or peat soil.

32. Non-peatland wetlands, *Sphagnum* spp. absent or present <25% cover.

33. Permanently flooded. Standing water ≥0.5 meters deep.

34. Dominated by *Typha* spp., *Carex lasiocarpa*, *Equisetum fluviatile* or *Phragmites australis*.

35. Dominated by *Typha* spp. **Midwest Cattail Deep Marsh (A24)**

35. Dominated by *Carex lasiocarpa*, *Equisetum fluviatile*, or *Phragmites australis*.

36. Dominated by *Carex lasiocarpa*. **Wiregrass Sedge Shore Fen (A11)**

36. Dominated by *Equisetum fluviatile* or *Phragmites australis*.

37. Dominated by *Phragmites australis*. **Eastern Reed Marsh (A25)**

37. Dominated by *Equisetum fluviatile*. **Water Horsetail - Spikerush Marsh (A27)**

34. Dominated by one or more of the following: *Potamogeton* spp., *Scirpus* spp., *Zizania palustris*, *Brasenia schreberii*, *Nymphaea odorata*.

38. Dominated by floating water aquatics especially *Brasenia schreberii* or *Nymphaea odorata* (>10% cover). **Northern Water Lily Aquatic Wetland (A30)**

38. Dominated by emergent or submerged aquatics. *Potamogeton* spp., *Scirpus* spp. or *Zizania palustris*. Usually located on large, open lakes or bays.

39. Dominated by submerged aquatics (*Ceratophyllum demersum*, *Potamogeton* spp., *Myriophyllum* spp.). Emergent and floating aquatics <10% cover. **Midwest Pondweed Submerged Aquatic Wetland (A29)**

39. Dominated by emergent aquatics (submerged aquatics may be present).

40. Dominated by *Zizania palustris*. **Wild Rice Marsh (A28)**

40. Dominated by *Scirpus* spp. **Freshwater Bulrush Marsh (A26)**

33. Not permanently flooded. Or, if permanently flooded, then standing water ≤0.5 meters deep.

41. Dominated by trees (*Populus* spp., *Fraxinus nigra*, *Thuja occidentalis*). Go to couplet 26.

41. Dominated by shrubs, graminoids, or herbs.

42. Shrub dominated.

43. Dominant shrub *Alnus incana*. **Speckled Alder Swamp (A19)**

43. Dominant shrubs *Salix* spp. and/or *Cornus* spp. **Dogwood - Pussy Willow Swamp (A21)**

42. Graminoid or herb dominated.

44. Community dominated by *Calamagrostis canadensis*. **Canada Bluejoint Eastern Meadow (A23)**

44. Community not dominated by *Calamagrostis canadensis*. Community dominated by *Equisetum fluviatile*, *Carex* spp. or *Typha* spp.

45. Dominated by *Equisetum fluviatile*. **Water Horsetail - Spikerush Marsh (A27)**

45. Not dominated by *Equisetum fluviatile*. Dominated by *Carex* spp. and/or *Typha* spp.

46. Percent cover of *Carex* spp. 50% or greater. **Northern Sedge Wet Meadow (A22)**

16 Field Guide to the Plant Community Types of Voyageurs National Park

46. Percent cover of *Carex* spp. <50%.
Community dominated by *Typha* spp. **Midwest
Cattail Deep Marsh (A24)**

32. Peatlands. *Sphagnum* spp. present >25% cover.

47. Dominated by shrubs or graminoids, trees <25% cover.

48. Dominated by graminoids.

49. Dominated by *Carex lasiocarpa*. Community restricted to water tracks of Rat Root River Peatland **Northern Sedge Poor Fen (A7)** (if also containing *Chamaedaphne calyculata* and other acidic indicators), else **Boreal Sedge Rich Fen (A10)**. See also **Wiregrass Sedge Shore Fen (A11)**

49. Not dominated by *Carex lasiocarpa*. Community found outside Rat Root River Peatland. Dominated by *Carex* spp. (commonly *C. lacustris*, *C. rostrata*, *C. vesicaria*, and/or *C. stricta*). **Northern Sedge Wet Meadow (A22)**

48. Dominated by shrubs.

50. Dominated by *Salix* spp. and/or *Cornus* spp. **Dogwood - Pussy Willow Swamp (A21)**

50. Dominated by *Alnus incana*, *Chamaedaphne calyculata*, or *Betula glandulifera*.

51. Dominated by *Alnus incana*. **Speckled Alder Swamp (A19)**

51. Dominated by *Chamaedaphne calyculata* and/or *Betula glandulifera*.

52. Minerotrophic indicators present (e.g., *Salix* spp., *Betula glandulifera*, *Alnus incana*, *Equisetum fluviatile*, *Calamagrostis canadensis*, *Spirea alba*, *Campanula aparanoides*, or *Myrica gale*). Commonly shoreline situations.

53. >25% *Betula glandulifera* (*Chamaedaphne calyculata* and *Salix* spp. may also be present). Common in shoreline situations throughout the Park. **Bog Birch - Willow Shore Fen (A8)**

53. <25% *Betula glandulifera*. Community dominated by *Chamaedaphne calyculata*. Other shrubs present but cover <25%.

54. *Betula glandulifera* or *Myrica gale* common, and other acidic ericaceous shrubs (e.g., *Kalmia polifolia*) rare; found in shoreline situations. **Leatherleaf - Sweet Gale Shore Fen (A9)**

54. *Myrica gale* absent and other acidic ericaceous shrubs (e.g., *Kalmia polifolia*) common; found inland from shores or in inland basins. **Leatherleaf Poor Fen (A6)**

52. Minerotrophic indicators absent. Not (or rarely) shoreline situations.

55. Dominated by *Chamadaphne calyculata*. Conifers (usually *Picea mariana* and *Larix laricina*) <10% cover. **Leatherleaf Bog (A3)**. Found in Rat Root River Peatland only, often in close juxtaposition with A2.

55. Dominated by *Chamadaphne calyculata*. Conifers (usually *Picea mariana* and *Larix laricina*) 10–25% cover. **Black Spruce / Leatherleaf Semi-treed Bog (A2)**. Found in Rat Root River Peatland and drainage between Cranberry Bay and Black Bay.

47. Dominated by trees, total tree canopy cover >25%. Woodland or forest physiognomy.

56. *Larix laricina* present >25% cover.

57. Dominated by *Larix laricina*. Other conifers absent or present <25%.

58. Graminoid layer dominated by *Carex lasiocarpa*. Restricted to Rat Root River Peatland. **Tamarack Scrub Poor Fen (A5)**

58. Graminoid layer not dominated by *Carex lasiocarpa*. Not restricted to Rat Root River Peatland. **Northern Tamarack Rich Swamp (A18)**

57. Dominated by mixture of *Larix laricina* and other conifers (*Picea mariana*, *Thuja occidentalis*). Other conifers present >25% cover.

59. Dominated by mixture of *Larix laricina* and *Picea mariana*. Woodland or forest physiognomy. **Black Spruce / Labrador Tea Poor Swamp (mixed phase) (A4)**

59. Dominated by mixture of *Larix laricina* and *Thuja occidentalis*. Woodland or forest physiognomy. **White Cedar - (Mixed Conifer) /Alder Swamp (tamarack phase) (A17)**

18 Field Guide to the Plant Community Types of Voyageurs National Park

56. *Larix laricina* absent or present <25% cover. Dominated by *Picea mariana* or *Thuja occidentalis*.

60. Dominated by *Thuja occidentalis*.

61. *Fraxinus nigra* in canopy <25% cover. **White Cedar - (Mixed Conifer) / Alder Swamp (A17)**

61. *Fraxinus nigra* in canopy >25% cover. **White Cedar - Black Ash Swamp (A15)**

60. Dominated by *Picea mariana*.

62. *Alnus incana* dominant in shrub layer.

Other minerotrophic species present, including *Carex lacustris*, *Dryopteris carthusiana* and *Calamagrostis canadensis*. **Black Spruce / Alder Rich Swamp (A16)**

62. *Alnus incana* not dominant in shrub layer.

Minerotrophic species absent.

63. Present in confined basins. **Black Spruce / Labrador Tea Poor Swamp** (evergreen phase) **(A4)**

63. Present within large peatlands.

Restricted to the Rat Root River Peatland and large peatland between Cranberry Bay and Black Bay. **Black Spruce Forested Bog (A1)**

How to Read the Fact Sheets

Each fact sheet describes an association (A-type) found at Voyageurs based on the combination of detailed vegetation plots (259) and observation plots (1281) collected in the Park. These fact sheets describe the most typical conditions of the type.

Layout and Conventions

Colored Box with Number: The color of the box helps identify the System the type belongs to, and is coordinated with the association number code on the ordination diagram. For example, a red box is for the Bog System, and all bog associations (A1, A2, and A3) are colored red (see below for “ordination”). The number A20 was skipped (at one point a split of A21 (Alder Swamp) into minerotrophic and peat swamp types was considered, but there were insufficient data to make that decision here) and A35a was added late to the manual (and is most similar to A35).

Name: Two names are provided; one is the common name (in bold), the other is the scientific name based on the Latin names of the species. Both are standard NVC names. The common name, along with the number code, is used in the text.

Photograph: A photograph of a stand or occurrence of the type in Voyageurs National Park.

Ordination: The ordination diagram showing wetland or upland associations. Separate ordinations are provided for wetland types A1–A23 (marsh and aquatic vegetation types A24–A30 excluded) and for uplands A32–A49 (open bedrock communities A31, A35, A35a are excluded). The ordination is a two-dimensional scatterplot of the type summaries, with each type represented by a dot, in which an index of similarity is used to calculate the relative similarity of types to each other. Types more similar to each other are closer in space than those further away. Typically types belonging to the same system (sharing the same color dot) may be expected to be more similar to each other than types in different systems. See Appendix 1 for more details on the ordinations.

Description: A brief description of the vegetation (first paragraph) and environment (second paragraph). Common names are used for trees (see Appendix 3 for scientific name equivalents). Both common and scientific names are used for shrubs and herbs. Only scientific names are used for mosses and lichens.

Conservation Rank: A rank that summarizes the relative rarity of the association across its entire range on a scale of 1 to 5: G1 (critically imperiled), G2 (imperiled), G3 (vulnerable), G4 (apparently secure), G5 (secure). A “?” after a rank indicates the precise rank is somewhat uncertain and a range rank (G2G3) indicates a somewhat greater degree of uncertainty, whereby the type is either a G2 or G3, but not enough is known to be more specific. A “Q” indicates that the taxonomy of the type is in question, and if resolved, could result in a less imperiled rank. GW indicates a type that is semi-natural weedy and not assessed for conservation status. G? and GU indicate that the association is not yet ranked or is considered unrankable, respectively. See Grossman and others (1998) for details.

Database Code: The standard code used in the NVC and IVC databases maintained by NatureServe to identify the association.

System Name: The local system name that the type belongs with is shown above the bar on page 2 of the fact sheet. See Appendix 2 for more details on System Names.

Characteristic Species: A summary of the characteristic species (by vegetation layer) for the type, based on detailed vegetation plots (first number in parentheses). The herb layer is separated into forb and graminoid growth forms. The dwarf-shrub layer includes both short shrubs such as *Chamaedaphne calyculata* (leatherleaf) and creeping dwarf-shrubs such as *Vaccinium oxycoccus* (cranberry). Criteria for inclusion in the table include “a)” for types with five or more plots, an average frequency (constancy) across all plots of at least 60%, but if constancy is between 50 and 60%, then average cover also at least 2%; “b)” for types with five or fewer plots, an average frequency greater than 50% and cover at least 2%. The second number in parentheses gives the number of observation plots used to supplement the text description. Constancy and cover are shown for each species with constancy shown as an index (III = 50–60%, IV = 61–80%, V = 81–100%), and cover shown as average cover (i.e., V.4 means the species is found in 81–100% of the stands with an average cover of 4%). Because plot sample size (first number in parentheses) was small, the list of characteristic species is not always typical

of the type as observed in accuracy assessment observation plots (second number in parentheses). For this reason, the Description field sometimes lists additional species not shown in the Characteristic Species field.

Range: Distribution of the association within the Park and across its entire range is briefly summarized. Location maps showing the distribution of plant communities are provided in Appendix 5.

Comments: Brief comments are provided that summarize the main diagnostic features of the type, classification issues relating to this and closely related types, and, where available, the closest equivalent type reported in northwest Ontario vegetation classification publications.



Map Unit: The map unit code(s) that was assigned to the type, based on the vegetation map produced for the USGS-NPS Vegetation Mapping Program (Hop and others, 2001). The links between community types and map units are summarized in Appendix 4 (see also Hop and others, 2001, Table 5, page 46).

Minnesota State Classification 2003: The name and code used by the Minnesota DNR classification for the type (Minnesota DNR 2003).

Fact Sheets: List of Plant Communities

Numbers and Names of Associations (A-types) organized by System

System	A-type	Association (plant community type)
BOG	A1	Black Spruce Bog
	A2	Black Spruce / Leatherleaf Semi-treed Bog
	A3	Leatherleaf Bog
POOR SWAMP	A4	Black Spruce / Labrador Tea Poor Swamp
	A5	Tamarack Scrub Poor Fen
POOR FEN	A6	Leatherleaf Poor Fen
	A7	Northern Sedge Poor Fen
RICH FEN	A8	Bog Birch - Willow Shore Fen
	A9	Leatherleaf - Sweet Gale Shore Fen
	A10	Boreal Sedge Rich Fen
RICH SWAMP	A11	Wiregrass Sedge Shore Fen
	A12	White Cedar - Boreal Conifer Mesic Forest
	A13	Trembling Aspen - Balsam Poplar Lowland Forest
	A14	Black Ash - Mixed Hardwood Swamp
	A15	White Cedar - Black Ash Swamp
	A16	Black Spruce / Alder Rich Swamp
	A17	White Cedar - (Mixed Conifer) / Alder Swamp
	A18	Northern Tamarack Rich Swamp
	A19	Speckled Alder Swamp
WET MEADOW - SHRUB SWAMP	A21	Dogwood - Pussy Willow Swamp
	A22	Northern Sedge Wet Meadow
	A23	Canada Bluejoint Eastern Meadow
FRESHWATER MARSH	A24	Midwest Cattail Deep Marsh
	A25	Eastern Reed Marsh
	A26	Freshwater Bulrush Marsh
	A27	Water Horsetail - Spikerush Marsh
	A28	Wild Rice Marsh
	A29	Midwest Pondweed Submerged Aquatic Wetland
ROCKY OUTCROP / WOODLAND	A30	Northern Water Lily Aquatic Wetland
	A31	Jack Pine / Lichen Rocky Barrens
	A32	Boreal Pine Rocky Woodland
	A33	Northern Pin Oak - Bur Oak - (Jack Pine) Rocky Woodland

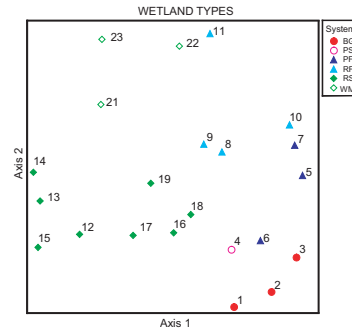
System (continued)	A-type	Association (plant community type)
	A34	Mixed Aspen Rocky Woodland
	A35	Boreal Hazelnut - Serviceberry Rocky Shrubland
	A35a	Poverty Grass Granite Barrens
 NORTHERN PINE - (OAK) FOREST	A36	Red Pine / Blueberry Dry Forest
	A37	Red Pine - Aspen - Birch Forest
	A38	White Pine - Aspen - Birch Forest
	A39	White Pine / Mountain Maple Mesic Forest
 JACK PINE - BLACK SPRUCE FOREST	A40	Jack Pine / Balsam Fir Forest
	A41	Jack Pine - Aspen / Bush Honeysuckle Forest
	A42	Black Spruce / Feathermoss Forest
 WHITE SPRUCE - FIR FOREST	A43	Spruce - Fir / Mountain Maple Forest
	A44	Spruce - Fir - Aspen Forest
 ASPEN - BIRCH FOREST	A45	Paper Birch / Fir Forest
	A46	Aspen - Birch / Boreal Conifer Forest
	A47	Aspen - Birch - Red Maple Forest
 NORTHERN HARDWOODS - (CONIFER) FOREST	A48	White Cedar - Yellow Birch Forest
	A49	Northern Bur Oak Mesic Forest
Association Phases (community types)		
	CT1	Balsam Fir - Paper Birch Forest
	CT2	Black Spruce - Aspen Forest
	CT3	Bog Birch – Leatherleaf Poor Fen

N.B. The number “A20” was skipped (see Layout and Conventions).

N.B. The terms Rich Fen and Rich Swamp include associations that some manuals would refer to as intermediate (or moderately rich) fens and swamps. Richness is used to describe the mineral (Ca⁺⁺, Mg⁺⁺) status of the surface water of a type relative to others. At Voyageurs, given the characteristics of the bedrock, the associations in the Rich Fen and Rich Swamp systems are more often intermediate in richness.

A1 Black Spruce Bog

Picea mariana / *Ledum groenlandicum* / *Carex trisperma* / *Sphagnum* spp. Forest



Description

This community has a variable canopy cover ranging from 25% in the woodland phases to 80% in the more closed, forested phases. Black spruce trees dominate this type and are typically 5–10 m tall in the woodland phase and 10–15 m tall in the forested phase. Tamarack trees are occasionally present. The canopy, especially in the woodland phase, tends to be uneven in size. The shrub layer is usually absent, though black spruce saplings may be present at moderate cover. In the dwarf-shrub layer, the ericaceous shrubs *Ledum groenlandicum* (labrador tea) and *Chamaedaphne calyculata* (leatherleaf) are nearly always present, but their cover is highly variable, ranging from 20 to 90%. Other ericaceous shrubs, such as *Kalmia polifolia* (bog laurel), *Andromeda glaucophylla* (bog-rosemary), and *Vaccinium oxycoccos* (small cranberry), can also be present at low cover. The herb layer is species poor, often with low cover. The most widespread herb species are *Carex trisperma* (three-fruited sedge) and *Smilacina trifolia* (three-leaved false Solomon's-seal). In some stands, the sedges *Carex chorderhiza* or *C. pauciflora* may replace *C. trisperma*. *Eriophorum spissum* (tufted cottongrass), *Drosera rotundifolia* (round-leaved sundew), and *Sarracenia purpurea* (pitcher plant) may also be present. Sphagnum typically covers nearly 100% of the ground layer. The most abundant sphagnum species are *Sphagnum magellanicum*, *S. recurvum sensu lato*, and *S. fuscum*.

Black Spruce Bogs are found in situations removed from ground and surface water inputs and only in the interior of large peatlands. They may be present at the crests of raised bogs and adjacent to water tracks. The substrate is deep, acidic sphagnum peat, which is mineral poor (pH usually <4.3). Hummock and hollow microtopography are moderately to well developed. The water regime is saturated.

CONSERVATION RANK G5.

DATABASE CODE CEGLO02485

CHARACTERISTIC SPECIES (n = 8, 21)**Tree**

Picea mariana (black spruce) IV.35

Shrub

Picea mariana (black spruce) V.55

Dwarf-shrub

Andromeda glaucophylla (bog-rosemary) III.4, *Chamaedaphne calyculata* (leatherleaf) IV.7, *Gaultheria hispidula* (creeping snowberry) V.4, *Kalmia polifolia* (bog laurel) V.7, *Ledum groenlandicum* (labrador tea) V.25, *Vaccinium angustifolium* (lowbush blueberry) IV.4, *V. oxycoccus* (small cranberry) V.7, *V. vitis-idaea* (mountain cranberry) III.7

Forb

Monotropa uniflora (Indian pipe) IV.4, *Smilacina trifolia* (three-leaved false Solomon's-seal) V.15

Graminoid

Carex trisperma (three-fruited sedge) V.15, *Eriophorum spissum* (tufted cotton-grass) IV.7

RANGE*Voyageurs National Park*

This type is found in the Rat Root River Peatland area and in the peatland complex between Black Bay and Cranberry Bay. For distribution of how this plant community was mapped, refer to the location map in Appendix 5 entitled Plant Community Types, Bog System.

Global

This black spruce-dominated bog community type is found in the sub-boreal to boreal regions of the Great Lakes and elsewhere in the boreal region of central Canada, ranging from inland areas of Maine to northern Minnesota and northward into central Canada, including Manitoba, Ontario and Quebec.

COMMENTS

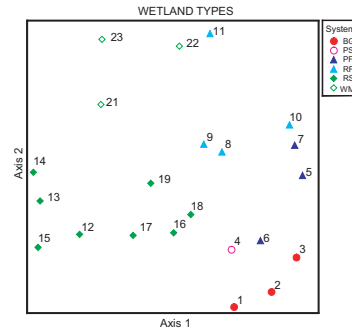
Diagnostic features include an open to closed canopy of black spruce within a large peatland, often as a raised peat bog, and a species-poor understory, with ericaceous shrubs and scattered sedges. The woodland (25–60%) and forested (60–100%) phases can be distinguished through mapping, but are floristically similar. In some cases, this community closely resembles more nutrient poor examples of the Black Spruce / Labrador Tea Poor Swamp (A4). That type will typically contain more minerotrophic indicators than this type, but heavy shading may reduce the presence of those indicators. Position on the landscape may be the best way to distinguish these types—Black Spruce Bog is found only in the interior of large peatlands whereas the Black Spruce / Labrador Tea Poor Swamp is found in confined basins, shores, and the margins of large peatlands. The A1 type is similar to Ontario's Treed Bog (W26, Harris and others, 1996).

MAP UNITS

The Black Spruce Bog (BSB) map unit represents this association. This association is mapped only in the Rat Root River Peatland bog complex and the bog complex between Black Bay and Cranberry Bay.

MINNESOTA STATE TYPE 2003

Black Spruce Bog, Treed Subtype (APn80a1)

A2 Black Spruce / Leatherleaf Semi-treed Bog*Picea mariana* / *Chamaedaphne calyculata* / *Sphagnum* spp. Dwarf-shrubland**Description**

Black spruce and/or tamarack are the dominant conifers in this community, though in some cases, white pine may be locally abundant. Canopy cover is 10–25% and height is usually 2–10 m tall. The ericaceous dwarf-shrub layer usually comprises 90–100% cover, and consists mainly of *Chamaedaphne calyculata* (leatherleaf), occasionally occurring with *Ledum groenlandicum* (labrador tea). Other ericaceous shrubs may also be present, including *Andromeda glaucophylla* (bog-rosemary), *Kalmia polifolia* (bog laurel), and *Vaccinium oxycoccos* (small cranberry). Herbaceous growth forms are poorly developed, with low species diversity and very sparse (<10%) cover. The more abundant species include *Smilacina trifolia* (three-leaved false Solomon's-seal), *Eriophorum spissum* (tufted cotton-grass), *Sarracenia purpurea* (pitcher plant), *Carex oligosperma* (few-seeded sedge), and *Drosera rotundifolia* (round-leaved sundew). Minerotrophic indicators are absent. *Sphagnum magellanicum*, *S. fuscum*, and *S. angustifolium* form a continuous carpet of peat moss. Typically, *S. fuscum* dominates the high hummocks, *S. magellanicum* dominates the lower and developing hummocks, and *S. angustifolium* colonizes the hollows. Other mosses such as *Aulacomnium palustre* and *Polytrichum strictum* may also be present.

This type occurs in confined basins, as part of large peatlands and as part of peatland shores. In the latter case, this type usually occurs away from the water's edge, often separated from it by a shrub bog. The substrate is deep fibric sphagnum peat, which is mineral poor (pH usually <4.3). High hummocks are often well developed whereas hollows are poorly developed. The water regime is saturated.

CONSERVATION RANK G?

DATABASE CODE CEGLO05218

CHARACTERISTIC SPECIES (n = 6, 24)**Shrub**

Picea mariana (black spruce) V.55

Dwarf-shrub

Andromeda glaucophylla (bog-rosemary) V.2, *Chamaedaphne calyculata* (leatherleaf) V.15, *Kalmia polifolia* (bog laurel) V.7, *Ledum groenlandicum* (labrador tea) V.25, *Vaccinium oxycoccus* (small cranberry) V.4

Forb

Drosera rotundifolia (round-leaved sundew) V.1, *Sarracenia purpurea* (pitcher-plant) V.2
Smilacina trifolia (three-leaved false Solomon's-seal) IV.25

Graminoid

Carex pauciflora (few-flowered sedge) V.25, *Eriophorum spissum* (tufted cotton-grass) V.15

RANGE*Voyageurs National Park*

This type occurs primarily in the Rat Root River Peatland, with scattered occurrences elsewhere. For distribution of how this plant community was mapped, refer to the location map in Appendix 5 entitled Plant Community Types, Bog System.

Global

This community is found in the sub-boreal regions of the Great Lakes in the United States and is widespread in central Canada.

COMMENTS

Diagnostic features of the type are the dwarf-shrub layer dominated by *Chamaedaphne calyculata* (leatherleaf) with 10–25% cover of conifers (typically black spruce and/or tamarack). This type differs from the Leatherleaf Bog (A3) primarily in the density of conifers, where that type has <10% tree cover. In large peatlands (such as Rat Root River Peatland), this community can grade into the woodland phase of the Black Spruce Bog (A1). The A2 type is similar to Ontario's Semi-treed Bog (W25, Harris and others, 1996).

MAP UNITS

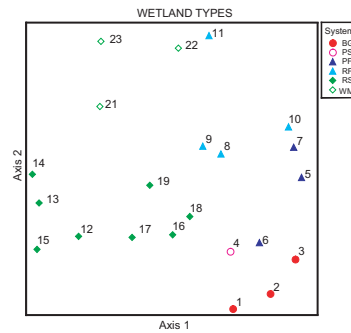
The Black Spruce/Leatherleaf Semi-treed Bog (LBC) map unit represents this association and the Leatherleaf Bog association (A3), which occur in close juxtaposition in the Rat Root River Peatland bog complex. (Veg Map Adjustment: See Appendix 4.)

MINNESOTA STATE TYPE 2003

Black Spruce Bog, Semi-Treed Subtype (APn80a2)

A3 Leatherleaf Bog

Chamaedaphne calyculata - *Ledum groenlandicum* - *Kalmia polifolia* Bog Dwarf-shrubland



Description

The vegetation is dominated by an open dwarf-shrub/scrub conifer layer with very scattered trees (<10% cover). Microtopography is high hummocks with weakly developed hollows. Ericaceous dwarf-shrubs are dominant, including *Chamaedaphne calyculata* (leatherleaf), *Kalmia polifolia* (bog laurel), *Andromeda glaucophylla* (bog-rosemary), *Ledum groenlandicum* (labrador tea), and the creeping dwarf-shrub *Vaccinium oxycoccos* (small cranberry). Scrub conifers include tamarack and black spruce. The herb layer is species poor, containing *Carex oligosperma* (few-seeded sedge), *C. pauciflora* (few-flowered sedge), *Eriophorum spissum* (tufted cotton grass) and *Sarracenia purpurea* (pitcher plant). The moss layer forms a continuous hummocky mat dominated by sphagnum, including *Sphagnum angustifolium*, *S. fuscum*, and *S. magellanicum*.

Sites are found on raised bog landforms in large peatland complexes, basin bogs, and occasionally oligotrophic shores. Stands have a saturated hydrology with a deep fibric sphagnum peat soil and a pH usually <4.3.

CONSERVATION RANK G5

DATABASE CODE CEGL005278

Old Code CEGL002498

CHARACTERISTIC SPECIES (n = 1, 30)**Shrub**

Larix laricina (tamarack) V.4, *Picea mariana* (black spruce) V.35

Dwarf-shrub

Andromeda glaucophylla (bog-rosemary) V.4, *Chamaedaphne calyculata* (leatherleaf) V.85, *Kalmia polifolia* (bog laurel) V.4, *Ledum groenlandicum* (labrador tea) V.4, *Vaccinium oxycoccus* (small cranberry) V.15

Herb

Drosera rotundifolia (round-leaved sundew) V.4, *Sarracenia purpurea* (pitcher-plant) V.4

Graminoid

Eriophorum spissum (tufted cotton-grass) V.4

RANGE*Voyageurs National Park*

This type occurs in the large peatlands in and near the Park. For distribution of how this plant community was mapped, refer to the location map in Appendix 5 entitled Plant Community Types, Bog System.

Global

This bog community is found in the sub-boreal regions of the Great Lakes in the United States and is widespread in central Canada.

COMMENTS

Diagnostic features of this type include the dominance of a dwarf-shrub ericaceous layer, absence of a tree layer (<10%), species-poor herb layer, and almost complete lack of minerotrophic indicators, such as *Betula glandulifera* (bog-birch), *Carex aquatilis* (water sedge), and *C. stricta* (tussock-sedge). It is typically found in larger raised bog peatlands. A possible subtype may occur in which pools form near the bogs crests, and contain species such as *Scheuchzeria palustris* (scheuchzeria), *Rhynchospora alba* (white beaked-sedge), *Sphagnum cuspidatum* (sphagnum), and *Utricularia cornuta* (horned bladderwort).

Stands with 10–25% black spruce and tamarack cover are placed in the Black Spruce / Leatherleaf Semi-treed Bog (A2). Stands with sufficient minerotrophic indicators are placed in the wetter Leatherleaf Poor Fen (A6). The A3 type is similar to Ontario's Open Low Shrub Bog (W24; Harris and others, 1996).

At the time of the vegetation mapping project, this type and Leatherleaf Poor Fen (A6) were not recognized as distinct. The old database code was used for the original broad type-concept.

MAP UNITS

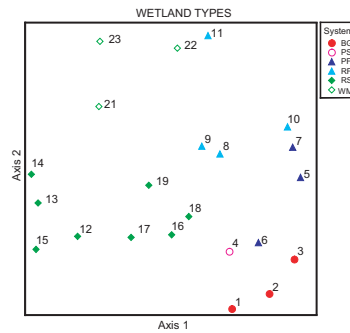
The Leatherleaf Bog (LBC) map unit represents this association and the Black Spruce / Leatherleaf Semi-Treed Bog association (A2), which occur in close together in the Rat Root River Peatland bog complex. (Veg Map Adjustment: See Appendix 4.)

MINNESOTA STATE TYPE 2003

Low Shrub Bog, Typic Subtype (APh90b1)

A4 Black Spruce / Labrador Tea Poor Swamp

Picea mariana / *Ledum groenlandicum* / *Sphagnum* spp. Forest



Description

Black spruce trees dominate this type, and are typically 10–20 m tall in the forested stands and 5–10 m tall in the woodland stands. Scattered tamarack trees are occasional codominants (25% cover). The shrub layer is usually absent, though black spruce saplings may be present at low cover, as can *Alnus incana* (speckled alder) or *Betula glandulifera* (bog-birch). The dwarf-shrubs *Ledum groenlandicum* (labrador tea) and *Chamaedaphne calyculata* (leatherleaf) are nearly always present, but cover is highly variable, ranging from 20 to 90%, with higher cover more common in the open stands. Other ericaceous dwarf-shrubs such as *Kalmia polifolia* (bog laurel), *Andromeda glaucophylla* (bog-rosemary), and *Vaccinium oxycoccos* (small cranberry) may also be present. The herb layer is species poor and present at low density, usually <40% cover. The most widespread species are *Carex trisperma* and *Smilacina trifolia* (three-leaved false Solomon's-seal). Scattered minerotrophic species may also be present, most commonly *Carex lacustris* and *Iris versicolor*, but occasionally *Menyanthes trifolia*, *Carex paupercula*, *Calamagrostis canadensis*, *Carex leptalea*, *Rubus pubescens*, and *Potentilla palustris*. Sphagnum typically covers nearly 100% of the forest floor. The most abundant species are *Sphagnum magellanicum*, *S. recurvum sensu lato*, *S. capillifolium*, and *S. russowii*. *Calliergon cordifolium* and/or *C. giganteum* may colonize the wet hollows.

This type is found in confined peatland basins, on the upland margins of large peatlands, in poorly drained depressions in bedrock, and removed from the water's edge on peatland shorelines. The substrate is deep, acidic sphagnum peat that is mineral poor. Hummock and hollow microtopography is moderately to well developed. The water regime is saturated.

CHARACTERISTIC SPECIES (n = 7, 84)**Tree**

Picea mariana (black spruce) IV.15

Shrub

Betula glandulifera (bog-birch) IV.7, *Larix laricina* (tamarack) III.15, *Picea mariana* (black spruce) V.35

Dwarf-shrub

Andromeda glaucophylla (bog-rosemary) IV.15, *Chamaedaphne calyculata* (leatherleaf) V.15, *Kalmia polifolia* (bog laurel) V.7, *Ledum groenlandicum* (labrador tea) V.35, *Vaccinium oxycoccus* (small cranberry) IV.4

Forb

Smilacina trifolia (three-leaved false Solomon's-seal) IV.4

Graminoid

Carex chordorrhiza (creeping sedge) IV.15, *C. paupercula* (poor sedge) IV.4, *C. trisperma* (three-fruited sedge) V.7

RANGE*Voyageurs National Park*

Though this type can be found throughout the Park, it is most common in the northern parts of the Park where peatlands are more extensive. For distribution of how this plant community was mapped, refer to the location map in Appendix 5 entitled Plant Community Types, Poor Swamp and Poor Fen Systems.

Global

This community is found in the northern Great Lakes region of the United States and Canada and elsewhere in the boreal regions of central Canada, ranging from northern Michigan to northern Minnesota, and northward to parts of Manitoba, Ontario and probably Quebec.

COMMENTS

Diagnostic features of the type are a forested or woodland canopy of black spruce with or without tamarack. In some cases, this community closely resembles more nutrient poor examples of the Black Spruce Bog (A1). This type will generally contain more minerotrophic indicators than that type. Position on the landscape, however, is the best way to distinguish these types. The Black Spruce Bog is found only in the interior of large peatlands whereas this type is found in confined basins, shores, and the margins of large peatlands. Where tamarack trees exceed 75%, stands should be placed in the Northern Tamarack Rich Swamp (A18). The A4 type is similar to Ontario's W27 and W28 (Harris and others, 1996).

MAP UNITS

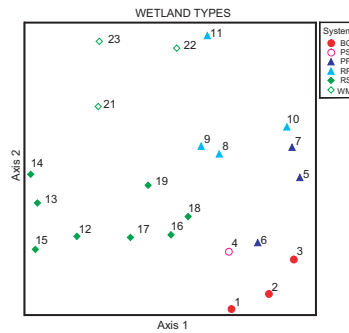
Three map units represent three structural phases of this one association: the Black Spruce/Labrador Tea Poor Swamp (evergreen phase) (BSL), the Black Spruce/Labrador Tea Poor Swamp (mixed phase) (BST), and the Black Spruce/Labrador Tea Open Swamp (open canopy phase) (BSO). The BSO portion of this association is also mapped as part of the Beaver Basin Break-up Mosaic (BBX) map unit when it occurs in inundated beaver complexes. (Veg Map Adjustment: See Appendix 4.)

MINNESOTA STATE TYPE 2003

Poor Black Spruce Swamp (APn81a)

A5 Tamarack Scrub Poor Fen

Larix laricina - *Betula pumila* / *Chamaedaphne calyculata* Shrubland



Description

This community is a low shrub poor fen where tree height does not exceed 2 m and the overall appearance may sometimes be of a very open tamarack scrub. Tamarack dominates the shrub layer, with occasional black spruce, along with shorter stems of *Betula glandulifera* (bog-birch). *Chamaedaphne calyculata* (leatherleaf), and *Andromeda glaucophylla* (bog-rosemary) are common dwarf-shrub species. Herbaceous species include the sedges *Carex chondrorrhiza* (creeping sedge) and *C. lasiocarpa* (wire-sedge).

Stands occur in peatlands with low exposure to mineral-rich groundwater, including in basins, shores above the level of seasonal flooding and on the margins of water tracks.

CHARACTERISTIC SPECIES (n = 1, 5)**Shrub**

Betula glandulifera (bog-birch) V.65, *Larix laricina* (tamarack) V.85, *Salix pedicellaris* (bog willow) V.4

Dwarf-shrub

Andromeda glaucophylla (bog-rosemary) V.15, *Chamaedaphne calyculata* (leatherleaf) V.15, *Vaccinium oxycoccus* (small cranberry) V.4

Forb

Lysimachia thyrsiflora (tufted loosestrife) V.15, *Potentilla palustris* (marsh cinquefoil) V.4

Graminoid

Carex chordorrhiza (creeping sedge) V.15, *C. lasiocarpa* (wire-sedge) V.4

RANGE*Voyageurs National Park*

This type is rare in the Park, where it occurs only in the Rat Root River Peatland. For distribution of how this plant community was mapped, refer to the location map in Appendix 5 entitled Plant Community Types, Poor Swamp and Poor Fen Systems.

Global

This tamarack low shrub poor fen is found in the northern Great Lakes region of the United States and into central Canada, ranging from Minnesota into Ontario and elsewhere in Canada.

COMMENTS

Stands occur on mineral-poor peatlands, generally having few minerotrophic indicators, but having greater cover of tamarack than similar scrubby poor fens dominated by *Chamaedaphne calyculata* (leatherleaf), such as Leatherleaf Poor Fen (A6). But this type and A6 are otherwise similar. It can be difficult to resolve how much of the tamarack is scrub (<2–5 m tall) versus tree (>5 m tall) from an aerial versus ground perspective. The wetter phase of this type occurs in the water tracks, is more clearly graminoid-dominated, and often contains standing water in the hollows. These stands grade into the sedge-dominated Northern Sedge Poor Fen (A7). The A5 type is similar to Ontario's W22 (Harris and others, 1996), especially in scrub cover, though it also shows strong floristic similarities to W20 and W21.

MAP UNITS

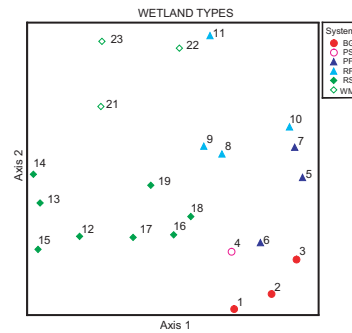
The Tamarack Scrub Poor Fen (TF) map unit represents this association. This association is mapped only in the Rat Root River Peatland bog complex.

MINNESOTA STATE TYPE 2003

Low Shrub Poor Fen [tamarack phase] (APn91ax2)

A6 Leatherleaf Poor Fen

Chamaedaphne calyculata / *Carex oligosperma* / *Sphagnum* spp. Poor Fen Dwarf-shrubland



Description

The vegetation is dominated by an open dwarf-shrub/scrub conifer layer with very scattered trees (<10% cover). Microtopography consists of high to intermediate hummocks with hollows or a flat lawn of *Sphagnum* spp. Ericaceous dwarf-shrubs are dominant, especially *Chamaedaphne calyculata* (leatherleaf), with *Betula glandulifera* (bog-birch), *Kalmia polifolia* (bog laurel), *Ledum groenlandicum* (labrador tea), *Andromeda glaucophylla* (bog-rosemary), and *Vaccinium oxycoccos* (small cranberry) common. Scrub conifers include tamarack and black spruce. They also occur as scattered trees (>3 m). The herb layer is species-poor, containing *Carex oligosperma* (few-seeded sedge), *Eriophorum spissum* (tufted cotton-grass), and *Equisetum fluviatile* (water horsetail), with occasional *Menyanthes trifoliata* (buckbean), *Sarracenia purpurea* (pitcher-plant), and *Drosera rotundifolia* (round-leaved sundew). The moss layer forms a continuous hummocky mat dominated by *Sphagnum angustifolium*, *S. fuscum*, and *S. magellanicum*.

Sites are found on peatlands with low exposure to mineral-rich groundwater, including basin fens, shores above the level of seasonal flooding, and margins of larger peatlands. Stands have a saturated hydrology with a fibric sphagnum peat soil and a pH usually <4.5.

CHARACTERISTIC SPECIES (n = 7, 4)**Shrub**

Betula glandulifera (bog-birch) III.15, *Picea mariana* (black spruce) IV.15

Dwarf-shrub

Andromeda glaucophylla (bog-rosemary) III.4, *Chamaedaphne calyculata* (leatherleaf) V.75, *Kalmia polifolia* (bog laurel) V.4, *Ledum groenlandicum* (labrador tea) III.7, *Vaccinium oxycoccus* (small cranberry) V.15

Forb

Drosera rotundifolia (round-leaved sundew) V.2, *Smilacina trifolia* (three-leaved false Solomon's-seal) IV.7

Graminoid

Eriophorum spissum (tufted cotton-grass) III.15

RANGE*Voyageurs National Park*

Though this type can be found throughout the Park, it is most common in the northern parts of the Park where peatlands are more extensive. For distribution of how this plant community was mapped, refer to the location map in Appendix 5 entitled Plant Community Types, Poor Swamp and Poor Fen Systems.

Global

This dwarf-shrub poor fen community is found in the northern Great Lakes region and northeastern United States and across much of central Canada, ranging from probably Maine and New Hampshire west to Minnesota, and northward from Quebec to Manitoba and other parts of Canada.

COMMENTS

It is difficult to distinguish this leatherleaf poor fen from leatherleaf bogs in the field, but conceptually this type has somewhat more minerotrophic influence, and no scrub conifer component. When minerotrophic indicators are absent or "very low," stands are placed in Leatherleaf Bog (A3). Stands with sparse black spruce-tamarack tree layer (<10% tree cover), but a scrubby conifer layer are placed in Tamarack Scrub Poor Fen (A5). There are intermediates between this poor fen and sedge meadows, such as when *Sphagnum* spp. and *Chamaedaphne calyculata* (leatherleaf) have invaded a *Carex rostrata* (beaked sedge) meadow and the sedge is hanging on because it still has deep rooting in the underlying minerotrophic peat or mineral soil (N. Aaseng pers. comm. 2000). At the time of the vegetation mapping project, this type and A3 were not recognized as distinct. The A6 type is similar to Ontario Poor Fen types W20 and W21 (Harris and others, 1996).

MAP UNITS

The Leatherleaf Poor Fen (LPF) map unit represents this association. This association is also mapped as part of the Beaver Basin Break-up Mosaic (BBX) map unit when it occurs in inundated beaver complexes. (Veg Map Adjustment: See Appendix 4.)

MINNESOTA STATE TYPE 2003

Low Shrub Poor Fen [leatherleaf phase] (APn91ax1)