Ducks Unlimited Canada

FIELD GUIDE

BOREAL WETLAND CLASSES

IN THE BOREAL PLAINS ECOZONE OF CANADA

FIRST EDITION
VERSION 1.2
AUGUST 2018

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Canada's boreal forest is rich in water resources.

Approximately 85 percent of Canada's wetlands are located in the boreal forest. In some areas, more than two-thirds of the landscape is covered by aquatic systems including wetlands, lakes, rivers and deltas. In such a landscape it is important that we can identify the type of wetlands encountered so that potential impacts to these essential aquatic systems can be avoided or minimized.

This field guide was developed by Ducks Unlimited Canada in conjunction with Louisiana Pacific Canada Ltd. (Swan River, MB), with assistance from Weyerhaeuser Company Ltd., Saskatchewan Timberlands (Hudson Bay, SK) and Spruce Products Ltd. (Swan River MB).

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Your Feedback is Welcome

This field guide is Version 1.2. Your feedback is welcome and encouraged. Please contact Ducks Unlimited Canada at boreal@ducks.ca. Please refer to "boreal wetlands field guide' when providing your comments or questions.

Photos by Ducks Unlimited Canada unless noted.

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PURPOSE

This guide is intended for resource managers to help them identify wetlands while in the field. This guide is based on the *Enhanced Wetland Classification* system developed by Ducks Unlimited Canada (DUC) for the *Boreal Plains Ecozone of Western Canada* and conforms to the Canadian Wetland Classification System and will help users identify five major wetland classes: bog, fen, swamp, marsh, and shallow open water. Furthermore, the user can then identify which of nineteen additional minor classes the wetland belongs to. It is intended to be useful at the planning and operational levels of business.

PRIMARY USERS

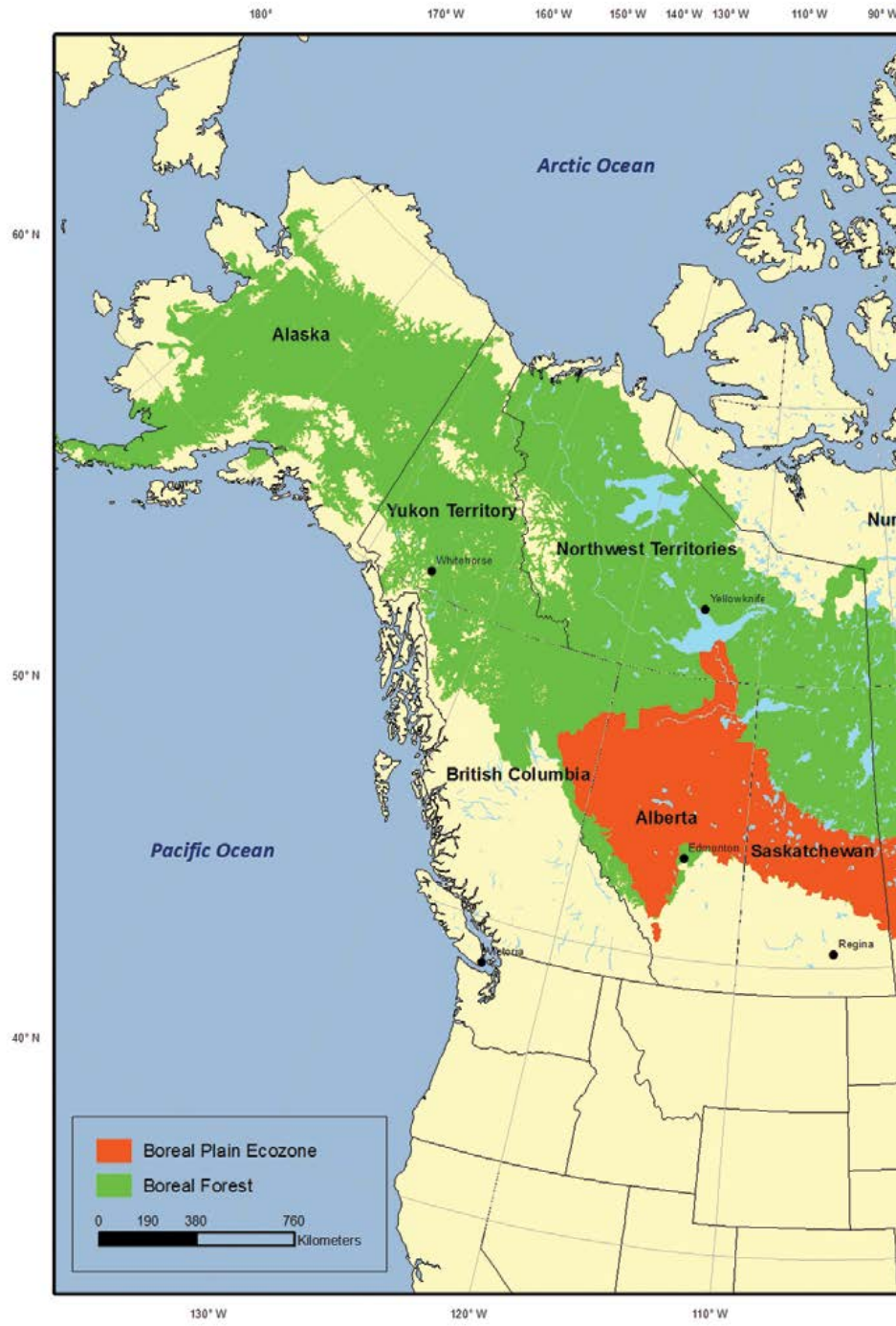
This guide has been developed for a wide range of resource managers, from professional foresters and engineers to biologists, technicians, construction supervisors and practitioners.

This guide will help users identify boreal wetlands. Moisture levels, nutrient levels and how water moves across the landscape can be inferred from wetland classification. Understanding these factors and the type of wetlands that are present allows for informed land management decisions such as delineating and avoiding wetlands or implementing practices that could conserve wetland integrity. This guide will also help the user identify the presence of various plant species.

Wetland Identification in Action

You are a road builder. You identify that your road will cross a **treed rich fen** (page 33). From this guide you will know that a **treed rich fen** is a wetland with lateral and subsurface water flows even though flow is not always apparent to the casual observer. As the road builder, you could employ a crossing design that ensures water flow is not blocked by the road and potentially reduce future costs of road maintenance.

GEOGRAPHIC SCOPE OF THIS GUIDE




80° W
70° W
60° W
50° W
40° W
30° W
Greenland
Iqaluit
50° N
Newfoundland
Quebec
Prince Edward Island
New Brunswick
Nova Scotia
Charlottetown
Halifax
Fredericton
Quebec
Manitoba
Ontario
Winnipeg
Ottawa
Toronto
40° N
Atlantic Ocean
100° W
90° W
80° W

Canada's boreal wetlands provide economic, environmental and societal benefits.

Boreal wetlands provide:

- Vital habitat for Canada's wildlife including songbirds, waterfowl, furbearers, moose, deer, elk and woodland caribou
- Carbon storage and help moderate climate change
- Filtration, storage and transport for large amounts of water and nutrients
- Flood prevention and water yield moderation by acting like sponges to absorb precipitation and runoff
- Important areas for hunting, fishing and other cultural activities
- Other economic values such as timber production, wild rice production and peat harvest

WHAT IS A WETLAND?

"... land that is saturated with water long enough to promote wetland or aquatic processes as indicated by poorly drained soils, hydrophytic vegetation and various kinds of biological activity which are adapted to a wet environment..."

- National Wetlands Working Group 1988

The following are common elements of wetlands:

- Permanently or seasonally waterlogged
- Water less than 2 metres in depth
- Characterized by vegetation that is adapted for life in saturated/flooded soil conditions
- May be treed, shrubby or open
- May be stagnant systems or moving/dynamic systems that transport water over long distances
- Often interconnected with other wetlands, lakes or streams and vulnerable to developments that can block their natural flow
- Most boreal wetlands are vegetated
- Water may be present above, at, or below the surface

WETLAND TYPES

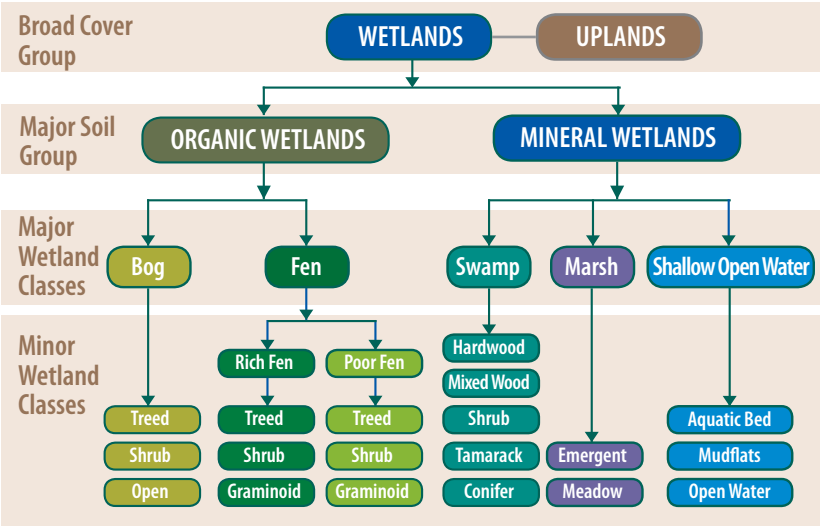
Wetlands found in the *Boreal Plains Ecozone of Western Canada* can be grouped into two main categories based on soil type and depth of organic deposits:

• ***Organic wetlands*** - include bogs and fens and are often located on flat, poorly drained terrain. They are characterized by organic deposits greater than 40 cm deep that build up slowly due to wet, cool conditions with little or no oxygen. They can be open, shrubby or treed. Organic wetlands are often called peatlands or muskegs.

• ***Mineral wetlands*** - include swamps, marshes and shallow open waters and are characterized by shallow organic deposits less than 40 cm deep containing more nutrient-rich soils and water. Mineral wetlands can also be open, shrubby or treed.

ENHANCED WETLAND CLASSIFICATION SYSTEM

This field guide will help you classify a wetland to one of the five major wetland classes and one of the nineteen minor wetland classes in Ducks Unlimited Canada's *Enhanced Wetland Classification* system as shown below.



THE FIVE MAJOR WETLAND CLASSES

The following wetland classes conform to the Canadian Wetland Classification System. This guide will help you distinguish these classes and their associated minor classes:

Bogs - are peatlands that receive water primarily through precipitation. Bog are nutrient poor and typically isolated from groundwater and surface run-off. They have low plant diversity due to low nutrient availability. Bogs are often considered stagnant, with little water movement under dry conditions. However, there are exceptions under wetter climatic conditions where some bogs may experience contact with groundwater, depending on their location in landscape and underlying surficial geology. In such cases, lateral flows are possible through bogs. The surface of a bog is typically dry, but the thick peat below is saturated with water like a wet sponge. All bogs have a thick ground cover of *Sphagnum* mosses. Some bogs contain stunted black spruce and low-lying shrubs.

Fens - are peatlands that receive water from a combination of precipitation, surface runoff and groundwater. They are more nutrient rich than bogs because of surface and groundwater inputs and have greater plant diversity. Fens can be nutrient rich or nutrient poor depending on water sources and nutrient availability. Nutrient-poor fens more closely resemble bogs, while nutrient-rich fens have more diverse and robust vegetation. Fens have a complex hydrology with high water tables, and can transport large volumes of water and nutrients across the landscape often connecting wetland systems over large distances.

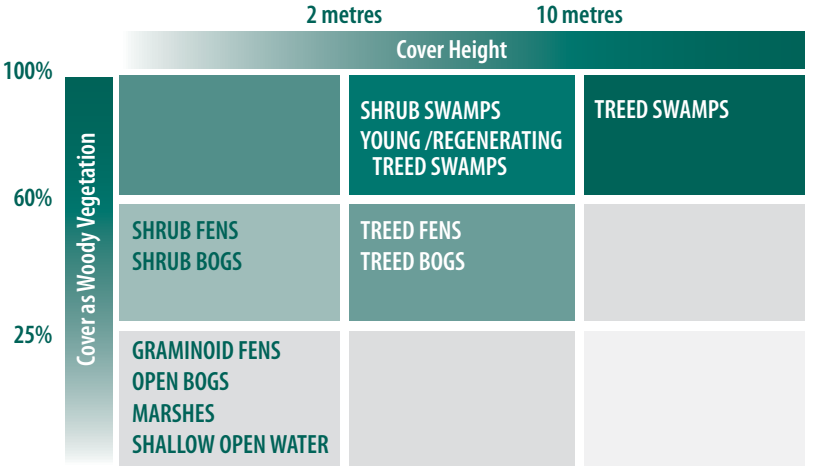
Swamps - are mineral wetlands that may have deeper peat soils in some settings. Swamps receive water from run-off, precipitation and groundwater. Water movement ranges from stagnant to dynamic. They are commonly recognized as shoreline areas of streams, lakes and floodplains. Swamps have fluctuating water tables and are seasonally flooded. They have fertile soils that periodically dry out supporting a diversity of trees, shrubs and other plants. Swamps are distinguished from other wetlands and from upland forests by hummocky ground that may contain pools of water and by a tall dense canopy of water tolerant shrubs or trees.

Marshes - are often a transition between open water and shorelines. Marshes receive water from precipitation and associated run-off, groundwater and stream inflow and fluctuate seasonally. They have mineral based soils with shallow organic deposits. Marshes dry out periodically exposing them to oxygen resulting in a nutrient rich area.

Shallow Open Water - these wetlands have a water depth of less than two metres, yet are too deep for emergent plants such as cattails and rushes to become established. Shallow open water wetlands receive water from precipitation, run-off, groundwater and streams. They look like shallow lakes with pond-lily or submerged aquatic vegetation in more nutrient rich settings. They are generally permanently flooded but may fluctuate seasonally resulting in exposed mudflats.

PLANT HEIGHT AND COVER

The following chart depicts wetland classes based on the amount (per cent) of the wetland area covered by woody vegetation (trees and shrubs) and vegetation height. These values are incorporated into the **classification decision key**.

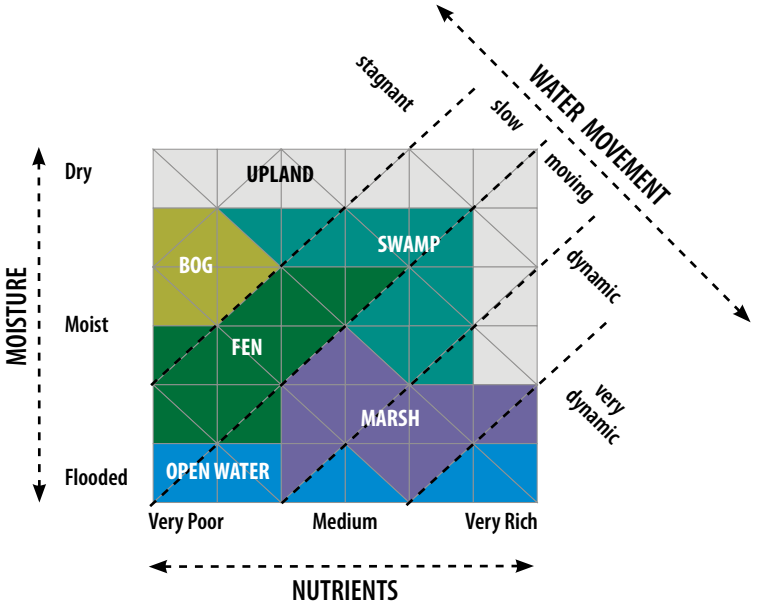


WATER MOVEMENT AND WETLANDS

Wetlands are often interconnected and water levels and flows may fluctuate throughout the growing season or in any given year. Water can move laterally across the landscape and may be above, at or below the surface. Water tables may also rise and fall seasonally and after precipitation events.

MOISTURE, NUTRIENTS AND WATER MOVEMENT

The following grid helps relate moisture, nutrients and movement, further helping to classify the wetland type.



DEFINITION OF THE TERMINOLOGY:

Movement

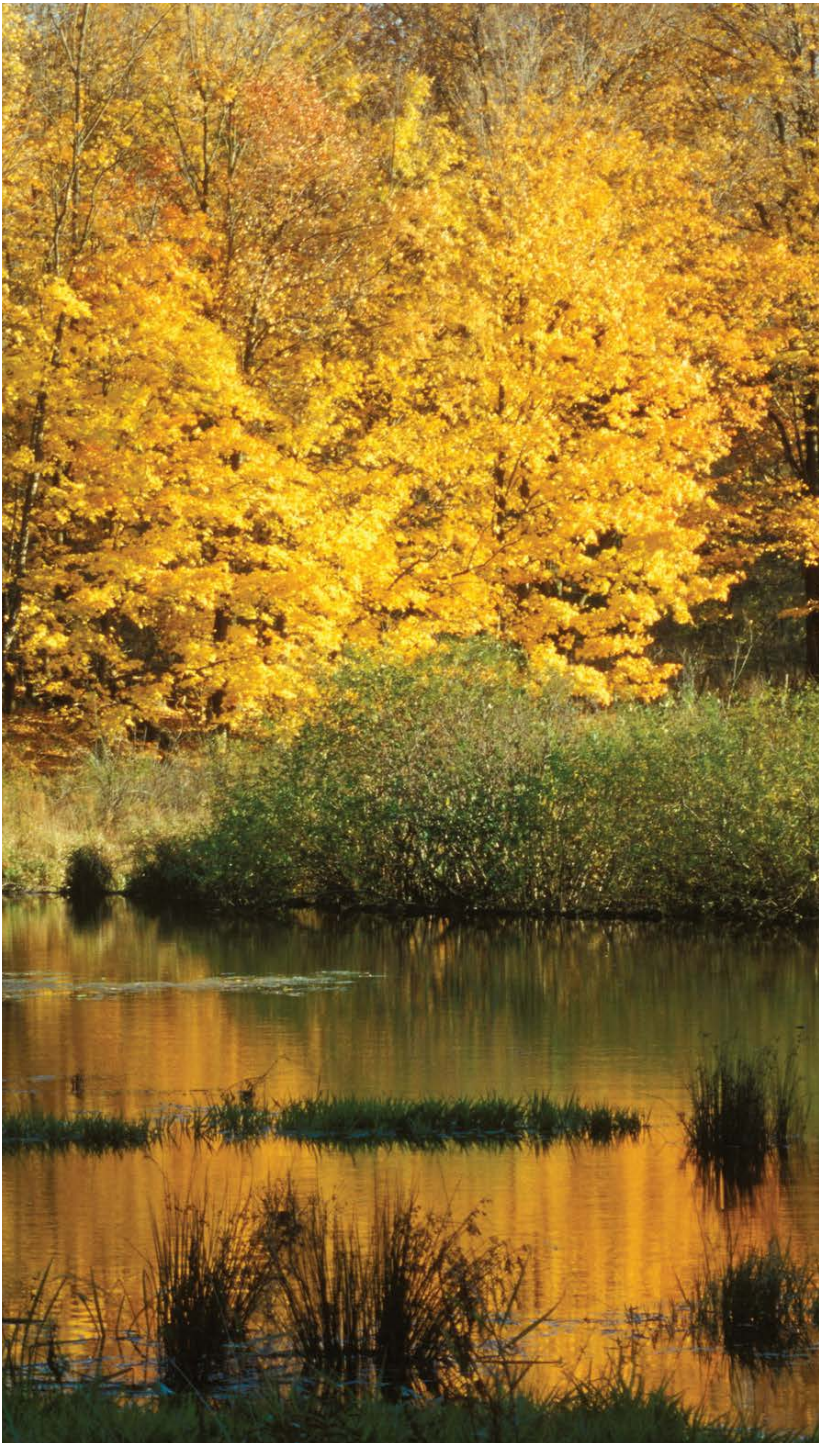
Stagnant: Typically stable, low flow areas. No lateral movement at the surface despite constant saturation.
Slow Moving: Gradual flow through at or below the surface with minor water level changes
Moving: Water level change is common; lateral water movement
Dynamic: High water level fluctuations
Very Dynamic: Significant water level fluctuations

Moisture

Very Dry: No contact with water table. Found on ridges, upper slopes (>70 degrees). Soil drainage is rapid.
Dry: Water table well below surface. Found on upper to mid slopes (31 to 70 degrees). Soil drainage is rapid.
Moist: Water table at or below surface. Found on mid to lower slopes (2 to 30 degrees). Soil drainage is moderate.
Wet: Water table at or above surface. Found on lower to flat slopes and in depressions. Soil drainage is slight.
Flooded: Water is above surface. Found in depressions with poor soil drainage.

Nutrients

Very Poor: Water is yellow to deep brown colour (stained). pH is <4.5.
Poor: Water is greenish to brownish (clear). pH is 4.5 to 7.
Medium: Water is blue to greenish (very clear). pH is >7.
Rich to Very Rich: Water is greenish to brownish (turbid). pH is >7.



HOW TO USE THIS GUIDE

The main tool for determining wetland type is the **classification decision key** beginning on page 20. The following information will guide the use of this **classification decision key**.

ABOUT SPATIAL SCALE

When classifying wetlands with this guide it is important to consider whether the wetland is part of a complex of wetlands or a local isolated feature. Recognizing where the wetland is located, in conjunction with other factors, can help understand important wetland features such as expected organic soil depth and water flow characteristics.

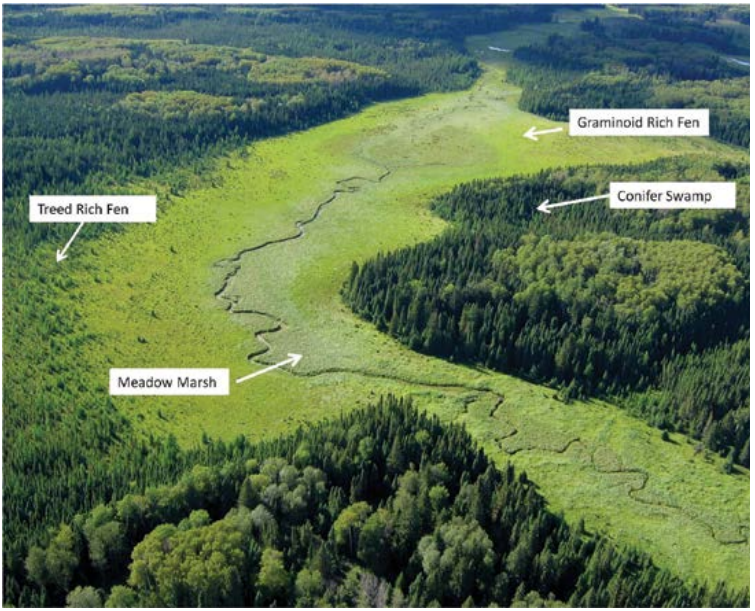
For Example

A wetland in a rolling terrain may be a small, well-defined and sometimes isolated basin such as a shallow pond of open water. In areas of low topographic relief, wetlands are often highly connected resulting in a complex of several wetlands transitioning from one wetland type to another across the landscape. Several wetland classes can also be associated with an easily delineated pond. As moisture and soil conditions change between the open water and the upland, several classes such as emergent marsh, meadow marsh, peatlands or any combination of these are possible.

CHOOSE THE SITE AND WORK OUTWARDS

This field guide classifies wetlands on the basis of vegetation type, vegetation height and other local factors including the presence of water. When classifying the wetland, choose a site that is representative of the surrounding area and consider the following:

- Some wetland areas are fairly uniform in nature and consist of mainly one wetland class while others are highly complex and transition from one type to another according to hydrology and soil conditions. The terrain of the area you are studying will affect the class and size of wetlands you encounter.
- Start with a small area of uniform vegetation such as a 10 x 10 metre zone. Classify this zone first. Expand outward from the initial zone to include the related/continuing vegetation.
- Proceed through the **classification decision key** from start to finish to determine if the area is a wetland or upland and then determine the specific class of wetland.
- High-resolution photography can help you determine boundaries between upland and wetland plant communities and boundaries between the various wetland classes.



IS IT A WETLAND OR UPLAND?

The **classification decision key** will first help determine if an area is a wetland or an upland. The following indicators help distinguish wetlands and uplands. *(for Latin plant names see Appendix 3, page 49)*

	Wetland	Upland
GENERAL SITE	• Areas permanently/seasonally waterlogged • Water at or near the surface • Pools of water • Hummocky terrain • Organic (peat) soils • Mineral soils with evidence of gleying	• Areas well drained • No evidence of pooling water • Mineral soils • Organic horizon is shallow
VEGETATION	**Trees** • balsam poplar* • black spruce* • tamarack • white/Alaskan birch** **Shrubs** • bog birch • Labrador tea • speckled alder • willow **Ground Cover** • brown mosses • buckbean • sedges and rushes • *Sphagnum* mosses	**Trees** • trembling aspen • balsam poplar* • black spruce* • jack pine • lodgepole pine • white spruce **Shrubs** • beaked hazelnut • green alder • mountain maple • rose **Ground Cover** • bunchberry • club moss • feather mosses

* Balsam poplar/black spruce are found in both wetland and upland sites. Black poplar are found in some swamp wetlands associated with low lying drainage areas. Black spruce is often stunted and in poor form in bogs and fens, while in swamps and uplands better soils and reduced moisture allow it to grow >10 m tall.

** White/Alaskan birch is found in both wetlands and upland sites. When found in wetlands they are typically small diameter trees with dense canopies and present in low lying drainage areas.

CLASSIFICATION DECISION KEY

STEP 1 CHECK SITE FOR:

- ☐ **Trees:** white spruce, jack pine, lodgepole pine, trembling aspen
- ☐ **Shrubs:** green alder, beaked hazelnut, rose
- ☐ **Ground Cover:** bunchberry, sarsaparilla, club moss, feather mosses, grass species
- ☐ **Soils:** mineral soils or shallow organic soils (20-40 cm)
- ☐ **Water Table:** below grade; no evidence of pooling water, shallow organic soils, well drained

NO YES → THIS IS UPLAND

STEP 2 CHECK SITE FOR:

- ☐ **Trees:** black spruce, tamarack, white/Alaskan birch, balsam poplar, Manitoba maple
- ☐ **Shrubs:** willow, speckled alder, dwarf birch, bog birch, dwarfed black spruce, Labrador tea, **ericaceous shrubs***, red-osier dogwood
- ☐ **Ground Cover:** *Sphagnum* mosses, brown mosses, sedges, rushes, cattail
- ☐ **Soils:** mineral soils with evidence of gleying or organic peat-based soils
- ☐ **Water Table:** at, or near, or above the land surface, areas permanently or seasonally waterlogged, pools of water or hummocky terrain

NO YES → THIS IS WETLAND

NO → RECONSIDER STEP 1.THIS MAY BE UPLAND

Check 1 - TREES

Is the area covered with >25% water tolerant trees? Are trees >2 m tall? Are trees black spruce, tamarack, balsam poplar or Manitoba maple?

NO YES

Go to page 21

Check 2 - SHRUBS

Is the area covered with >25% shrubs?

NO YES

Go to page 22

Check 3 - SPHAGNUM

Is the area covered with >25% *Sphagnum* mosses?

NO YES

Go to page 22

Check 4 - EMERGENT VEGETATION

Is the area covered with >25% graminoid (sedges, grasses) or emergent (cattails, rushes)?

NO YES

Go to page 23

Check 5 - WATER

Is the water table persistent and at or above the soil?

YES

Go to page 23

** see glossary page 24*

YOU HAVE BEEN REFERRED TO THIS PAGE FROM CHECK 1 TREES

Is >60% of the cover, conifer/ deciduous trees > 10 m tall?

YES → **THIS IS TREED SWAMP.**

- Are trees coniferous with >60% black spruce? → **THIS IS CONIFER SWAMP.** (page 43)
- Are trees coniferous with >60% tamarack? → **THIS IS TAMARACK SWAMP.** (page 42)
- Are trees deciduous with >60% white/Alaskan birch/balsam poplar? → **THIS IS HARDWOOD SWAMP.** (page 39)
- Are % coniferous and deciduous trees equal? → **THIS IS MIXEDWOOD SWAMP.** (page 40)

NO

Are 25 to 60% of the cover, trees that are <10 m tall?

YES

NO → If >60% of the cover is treed but they are <10m tall, this may be **REGENERATING/YOUNG TREED SWAMP.**

Are >5% of the trees tamarack? ***AND*** are FEN plants present such as dwarf birch, bog birch, buckbean, wire sedge? *(See Appendix 4, page 52, for plants common to FENS)*

YES → **THIS IS TREED FEN.**

- Are tamarack dominant*?
- Are there <20% *Sphagnum* mosses?
- Are RICH FEN plants present?

→ **THIS IS TREED RICH FEN.** (page 33)

- Are black spruce dominant?
- Are there >20% *Sphagnum* mosses?
- Are POOR FEN plants present?

→ **THIS IS TREED POOR FEN.** (page 36)

NO

Are <5% of the trees tamarack? ***AND*** are BOG plants present such as lowland black spruce, cotton grass, ericaceous shrubs? *(See Appendix 4, page 54, for plants common to BOGS)*

YES → **THIS IS TREED BOG.** (page 30)

* *see glossary page 24*

YOU HAVE BEEN REFERRED TO THIS PAGE FROM CHECK 2 SHRUBS

Are shrubs >2 m tall and primarily willows?

YES → **THIS IS SHRUB SWAMP.** (page 41)

NO

Shrubs are <2m tall

If shrubs are willows and <2 m tall ***AND*** there are no FEN plants this may be **REGENERATING/YOUNG SHRUB SWAMP.**

Are FEN plants present such as bog birch, dwarf birch, buckbean, wire sedge, sweet gale? *(See Appendix 4, page 52, for plants common to FENS)*

NO

YES → >25% of the shrubs are less than 2 m tall.

NO

THIS IS SHRUB FEN.

Shrubs are <2 m tall ***AND*** there are no FEN plants.

- Are shrubs bog birch/ dwarf birch?
- Is area <20% *Sphagnum* mosses?

→ **THIS IS SHRUBBY RICH FEN.** (page 34)

- Are shrubs ericaceous plants/dwarf willow?
- Is area >20% *Sphagnum* mosses?

→ **THIS IS SHRUBBY POOR FEN.** (page 37)

Are BOG plants present such as *Sphagnum* mosses, cotton grass, ericaceous shrubs? *(See Appendix 4, page 54, for plants common to BOGS)*

YES → **THIS IS SHRUBBY BOG.** (page 31)

YOU HAVE BEEN REFERRED TO THIS PAGE FROM CHECK 3 SPHAGNUM

Are BOG plants present such as *Sphagnum* mosses, cotton grass, wire sedge, ericaceous shrubs? *(See Appendix 4, page 54, for plants common to BOGS)*

YES → **THIS IS OPEN BOG.** (page 32)

YOU HAVE BEEN REFERRED TO THIS PAGE FROM CHECK 4 EMERGENT VEGETATION

Are FEN plants present such as *Sphagnum* mosses, brown moss, sedges, horsetail, or other FEN plants? *(See Appendix 4, page 52, for plants common to FENS)*

YES → **THIS IS GRAMINOID FEN.**

- Is area <20% *Sphagnum* mosses?
- Is brown moss present?
- Are RICH FEN plants (buckbean, sweet gale, marsh five-finger) present?

→ **THIS IS GRAMINOID RICH FEN.** (page 35)

- Is area >20% *Sphagnum* mosses?
- Are there fewer FEN plants present?

→ **THIS IS GRAMINOID POOR FEN.** (page 38)

NO

Are MARSH plants present such as broad-leaved sedges, bluejoint grass, emergent rushes (cattail, bulrush)? *(See Appendix 4, page 54, for plants common to MARSHES)*

YES → **THIS IS MARSH.**

- Is area >25% graminoid (sedges and grasses)?
- Is area <25% emergent rushes, cattails?

→ **THIS IS MEADOW MARSH.** (page 45)

- Is area <25% graminoid sp?
- Is area >25% emergent rushes, cattails?

→ **THIS IS EMERGENT MARSH.** (page 44)

YOU HAVE BEEN REFERRED TO THIS PAGE FROM CHECK 5 WATER

Does the open water have floating and/or submerged aquatic vegetation?

YES → **THIS IS SHALLOW OPEN WATER WETLAND.**

Does floating/submerged aquatic vegetation cover >25% of pond? → **THIS IS AQUATIC BED.** (page 46)

Does floating/submerged aquatic vegetation cover <25% of pond? → **THIS IS OPEN WATER.** (page 48)

Is soil substrate >25% exposed due to low water levels? → **THIS IS MUDFLAT.** (page 47)

aerobic - occurring in the presence of free oxygen, either as a gas in the atmosphere or dissolved in water.

anaerobic - occurring in conditions devoid of oxygen.

brown moss - a guild of peatland mosses that usually indicate mineral rich site conditions. Includes *Campylium stellatum* (starry campylium), *Scorpidium scorpioides* (scorpion tail moss), *Drepanocladus spp.*, and *Tomentypnum nitens* (fuzzy brown moss).

canopy - cover of branches and leaves formed collectively by the crowns of trees, shrubs, or other plants.

dominant - species which contributes the greatest vegetation cover to the overall community.

drawdown - decrease in water level of lakes, streams, or marshes exposing substrate that is normally submerged.

dwarf shrubs - plants with woody stems that are generally less than 15 cm in height at maturity. *Andromeda polifolia* (dwarf bog-rosemary), *Arctostaphylos uva-ursi* (bearberry), *Empetrum nigrum* (crowberry), *Gaultheria hispidula* (creeping-snowberry), *Kalmia polifolia* (bog-laurel), *Linnaea borealis* (twinflower), *Oxycoccus microcarpus* (small bog cranberry), *Rubus chamaemorus* (cloudberry), *Rubus arcticus* (arctic raspberry), *Vaccinium caespitosum* (blueberry), and *Vaccinium vitis-idaea* (bog cranberry) are the most common wetland dwarf shrub species.

ecozone - an area of the earth's surface that represents a large ecological zone and has characteristic landforms and climate.

emergents - upright plants rooted in water or exposed to seasonal flooding, emerging above the water surface. Does not include some submergents that normally lie entirely under water but have flowering parts that break the surface. Includes mostly sedges, rushes, bulrushes, and other grass-like forbs.

ericaceous shrubs - shrubs belonging to the Ericaceae (Heather Family). *Andromeda polifolia* (dwarf bog-rosemary), *Chamaedaphne calyculata* (leatherleaf), *Gaultheria hispidula* (creeping-snowberry), *Kalmia polifolia* (bog-laurel), *Rhododendron spp.* (Labrador tea), *Oxycoccus microcarpus* (small bog cranberry), and *Vaccinium spp.* (blue berry, bog cranberry) are the most common wetland genera.

feather mosses - upland moss species with a feather-like form including *Hylocomium splendens* (stair-step moss), *Pleurozium schreberi* (big red stem), and *Ptilium crista-castrensis* (knight's plume moss).

fibric - poorly decomposed peat with large amounts of well-preserved fiber readily identifiable as to botanical origin.

flark - elongated wet depressions separated by raised ribs (strings) in patterned peatlands. The long axis is always perpendicular to the direction of waterflow.

floating mat - mat of peat held together by roots and rhizomes underlain by water or fluid, loose peat (National Wetlands Working Group 1988).

floating-leaved plants - rooted or free-floating plants with leaves normally floating on the water surface.

flooding - surface inundation by moderate to fast moving water. Usually associated with sedimentation and erosion (see also inundation).

forb - a non-graminoid herb species.

forested - sites with greater than 25% canopy cover of tree species greater than 10 metres tall (see also treed).

frequent flooding - flood return interval of 2-5 years.

gleyed - soil condition resulting from prolonged soil saturation, which is manifested by the presence of bluish or greenish colors throughout the soil mass or in mottles if occasionally exposed to oxygen (usually orange spots or streaks).

graminoid - plants with a grass-like growth form including rushes (*Juncaceae*), grasses (*Poaceae*), and sedges (*Cyperaceae*).

groundwater - water passing through or standing in soil and underlying strata. Free to move by gravity (National Wetlands Working Group 1988).

hardwood - deciduous broad-leaved trees which are angiosperms.

herb - non-woody vascular plants. Includes forbs and graminoids.

hummock - mound composed of organic material, often composed of *Sphagnum* peat (see also Mound).

hydrophytic plant - any plant adapted for growing on permanently saturated soils deficient in oxygen.

indicator species - plant species that help characterize specific site conditions or environmental traits.

lichen - fungi and certain species of algae that live in a symbiotic relationship. The fungus provides the structural support and can absorb nutrients from the substrate. The algae in turn provide carbohydrates through the process of photosynthesis. Reindeer lichens are most common to wetlands (particularly peatland wetlands), including *Cladina spp.*

marl - sediments composed of shells of aquatic animals and CaCO3 precipitated in water.

moist - no water deficit occurs. Water table at or below surface. Found on mid to lower slopes (2 to 30 degrees). Soil drainage is moderate.

patterned peatland - peatland marked by distinct patterns of vegetation in alternating raised ridges (strings) and depressions (flarks). Sites are slightly sloping and ridges form perpendicular to the direction of waterflow.

peat - partly decomposed plant material deposited under saturated soil conditions.

peatland - generic term including all types of peat-covered terrain. Many peatlands are a complex of swamps, bogs, and fens, sometimes called a "mire complex" (National Wetland Working Group 1988).

rarely flooded - flooding occurs only during extreme events.

riparian - area at the interface between upland and water/wetland areas adjacent to or along the band of a river, lake, or wetland.

saturated - soil condition in which all voids (pore spaces) between soil particles are filled with water.

sedimentary peat - peat formed beneath a body of standing water composed of aquatic plant debris modified by aquatic animals. Material is loosely consolidated, slightly sticky, dark brown to black, and usually well decomposed (humic). Synonyms: aquatic peat, loonshit, allochthonous peat, detrital peat, gyttja (National Wetlands Working Group 1988).

seepage - groundwater discharge having less flow than a spring.

shrub - perennial plant usually with more than one low-branching woody stem and less than 10 metres tall.

stand - plant community that is relatively uniform in composition, structure, and habitat conditions.

submergents - plants that normally lie entirely beneath water. Some species have flowering parts that break the water surface.

treed - sites with greater than 25% canopy cover of tree species (see also forested).

upland - terrain dominated by non-hydrophytic vegetation where soils have high soil oxygen and are not saturated with water for any extended length of time.

very wet - groundwater table at or above the ground surface throughout most of the growing season.

water table - upper zone of saturation within the soil profile.

wetland - sites dominated by hydrophytic vegetation where soils are water-saturated for a sufficient length of time such that excess water and resulting low soil oxygen levels are principal determinants of vegetation and soil development (MacKenzie and Moran 2004).

wetland complex - contiguous wetland area consisting of several kinds of wetlands, potentially including shallow/open water, marsh, swamp, bog, and fen.

Glossary excerpts from "A Field Guide to the Wetlands of the Boreal Plains Ecozone of Canada".

Sources for this glossary include: MacKenzie and Moran 2004; Beckingham and Archibald 199; Harris et.al. 1996; National Wetlands Working Group 1988.

APPENDIX 1. SUPPLEMENTARY INDICATORS OF UPLAND OR WETLAND

The following table provides additional indicators to help you determine whether the area is wetland or upland. *(for Latin plant names see Appendix 3, page 49)*

	Wetland	Upland
TREES	• balsam poplar* • black spruce*† • tamarack • white/Alaskan birch* ** may be found in both uplands and wetlands* *† see Appendix 5*	• balsam poplar • black spruce • jack pine • lodgepole pine • trembling aspen • white spruce
SHRUBS	• bog birch • dwarf birch • dwarfed black spruce • ericaceous shrub (bog cranberry, bog-laurel, bog rosemary, leather leaf) • Labrador tea • speckled alder • willow	• beaked hazelnut • chokecherry • green alder • low bush-cranberry • mountain maple • rose • saskatoon • snowberry
GROUND COVER	• brown mosses • cattails • rushes • sedges • *Sphagnum mosses* • water tolerant grasses and sedges	• bunchberry • club moss • feather mosses • sarsaparilla

SOILS	**ORGANIC SOIL WETLAND**
	• In bogs and fens (peatlands) greater than 40 cm of fibric (moss derived) peat
	• In marshes, swamps and open waters typically less than 40 cm of 'silvic' woody or sedge peat or
	• a thin layer of muck on top of mineral soil layer at bottom
	MINERAL SOIL WETLAND
	• Water-logged near the top of the soil surface
	• Gleyed* within 50 cm of soil surface:
	  • Clay-dominated soils are blue-grey in colour (gleyed), indicating a high water table and low oxygen conditions
	  • Rusty "spots" (mottles) in gleyed soil indicate a periodic lowering of water table and aeration of soil. When the water table rises, mottles will eventually return to a greyish colour
		MINERAL SOIL UPLAND
		• Soils are better drained than wetland mineral soils, with better soil aeration
		• Soils are not gleyed within 50 cm of soil surface, or only slightly gleyed:
		• Mottles are generally faint to distinct within the upper 50 cm of soil, depending on period of saturation and soil drainage characteristics
		ORGANIC LAYER OVER MINERAL
		• Up to 39 cm of organic litter (leaf, needle, twigs, and woody materials) or up to 39 cm of peat over mineral soil

WATER TABLE	• Water at, near, or above the land surface • Areas permanently or seasonally waterlogged • Pools of water • Hummocky terrain	• Water below grade • No evidence of pooling water • Shallow organic soils • Well-drained

*See glossary page 25

APPENDIX 2. WETLAND CLASSES FACT SHEETS

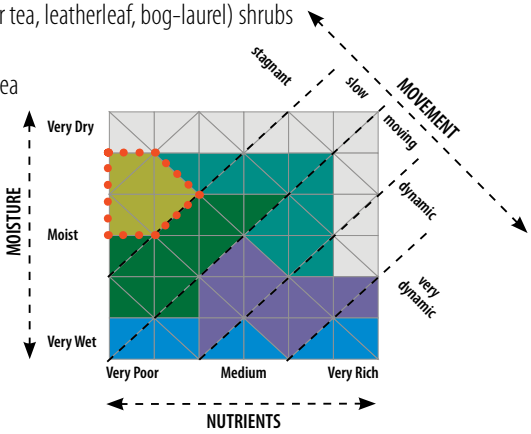
TREED BOG

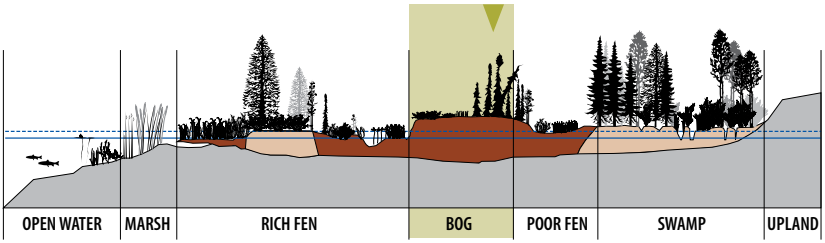
INDICATORS

- ☐ Peatland areas with water table at or near surface with no standing water
- ☐ Organic soils with >40 cm peat
- ☐ Trees primarily lowland black spruce (25 to 60% of area) and <10 m tall
- ☐ Ericaceous (crowberry, Labrador tea, leatherleaf, bog-laurel) shrubs dominate
- ☐ *Sphagnum* mosses >20% of area

COMMON VEGETATION

- ☐ Cotton grass
- ☐ Wire sedge
- ☐ Pitcher plant





High Water
Low Water
Mineral Soil
Sphagnum Peat
Woody Peat

Adapted to the boreal plains and expanded from Harris et. al. 1996.

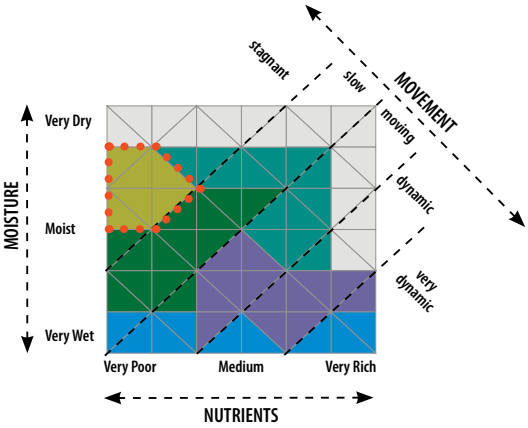
SHRUBBY BOG

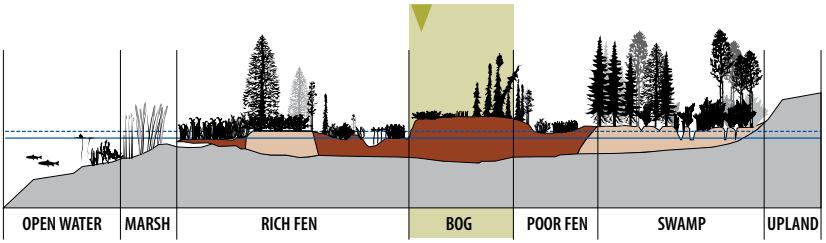
INDICATORS

- ☐ Peatland areas with water table at or near surface with no standing water
- ☐ Organic soils with >40 cm peat
- ☐ Trees primarily lowland black spruce <25% of area and <10 m tall
- ☐ Ericaceous (crowberry, Labrador tea, leatherleaf, bog-laurel) shrubs >25%
- ☐ *Sphagnum* mosses >20% of area

COMMON VEGETATION

- ☐ Cotton grass
- ☐ Wire sedge
- ☐ Pitcher plant





Adapted to the boreal plains and expanded from Harris et. al. 1996.

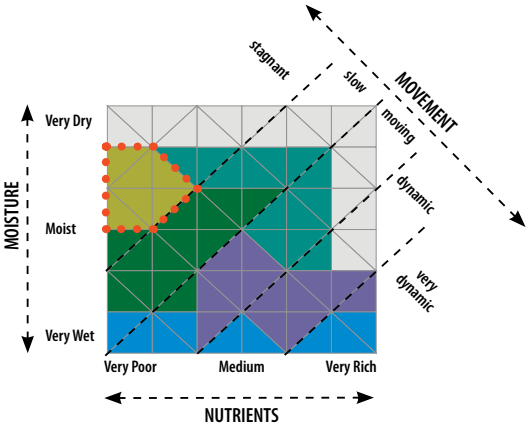
OPEN BOG

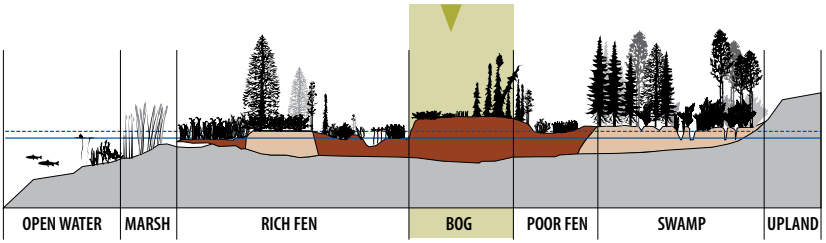
INDICATORS

- ☐ Peatland areas with water table at or near surface with no standing water
- ☐ Organic soils with >40 cm peat
- ☐ Tree and shrub cover <25% of area
- ☐ Bog areas with higher percentages of moss, with some sedges and few shrubs or trees

COMMON VEGETATION

- ☐ Ericaceous (crowberry, Labrador tea, leatherleaf, bog-laurel) shrubs
- ☐ Cotton grass
- ☐ Wire sedge



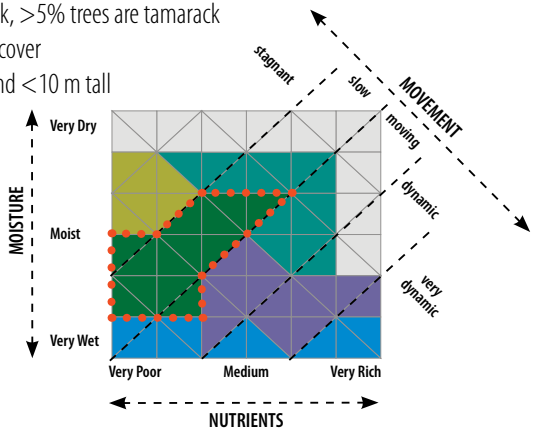


Adapted to the boreal plains and expanded from Harris et. al. 1996.

TREED RICH FEN

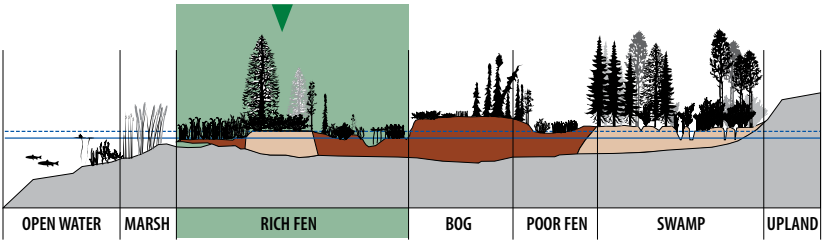
INDICATORS

- ☐ Peatland area that is saturated to flooded
- ☐ High nutrient (groundwater influenced) peatland soil
- ☐ Organic soils with >40 cm peat
- ☐ Trees are black spruce/tamarack, >5% trees are tamarack
- ☐ Tamarack often dominate tree cover
- ☐ Tree cover 25 to 60% of area and <10 m tall
- ☐ Shrubs <2 m tall
- ☐ *Sphagnum* mosses <20% of area
- ☐ High richness of plant species



COMMON VEGETATION

- ☐ Bog birch
- ☐ Sweet gale
- ☐ Willow
- ☐ Buckbean
- ☐ Wire sedge
- ☐ Brown moss



Adapted to the boreal plains and expanded from Harris et. al. 1996.

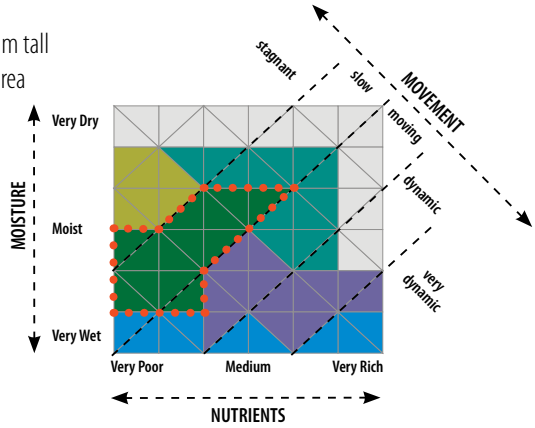
SHRUBBY RICH FEN

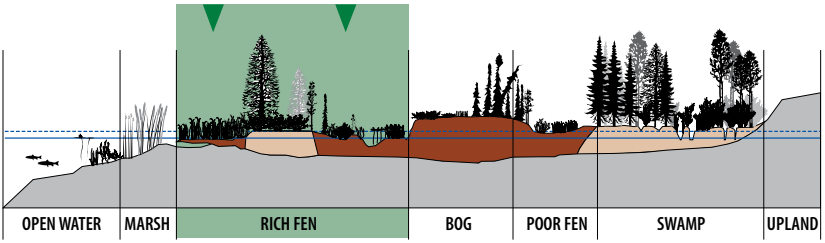
INDICATORS

- ☐ Peatland area that is saturated to flooded
- ☐ High nutrient (groundwater influenced) peatland soil
- ☐ Organic soils with >40 cm peat
- ☐ Tree cover <25% of area
- ☐ Shrubs >25% of area and <2 m tall
- ☐ *Sphagnum* mosses <20% of area
- ☐ High richness of plant species

COMMON VEGETATION

- ☐ Bog birch
- ☐ Sweet gale
- ☐ Willow
- ☐ Buckbean
- ☐ Wire sedge





Adapted to the boreal plains and expanded from Harris et. al. 1996.

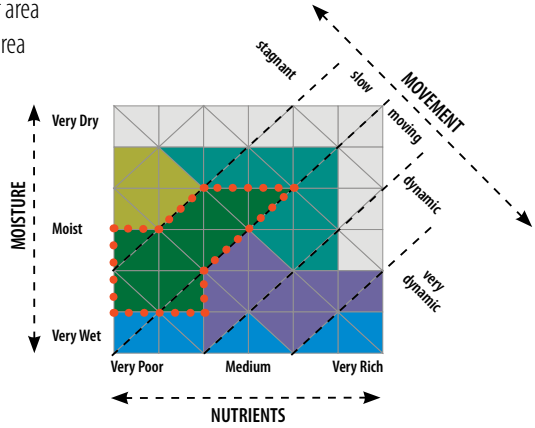
GRAMINOID RICH FEN

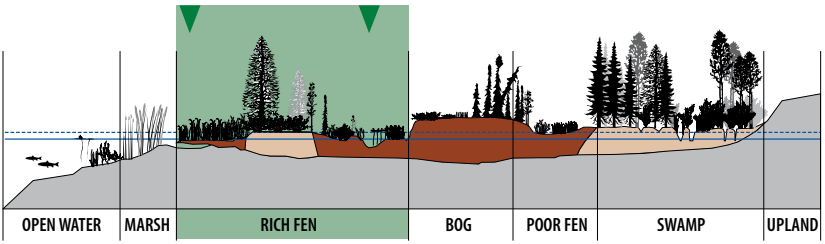
INDICATORS

- ☐ Peatland area that is saturated to flooded
- ☐ High nutrient (groundwater influenced) peatland soil
- ☐ Organic soils with >40 cm peat
- ☐ Tree and shrub cover <25% of area
- ☐ *Sphagnum* mosses <20% of area
- ☐ High richness of plant species

COMMON VEGETATION

- ☐ Buckbean
- ☐ Wire sedge
- ☐ Marsh five-finger



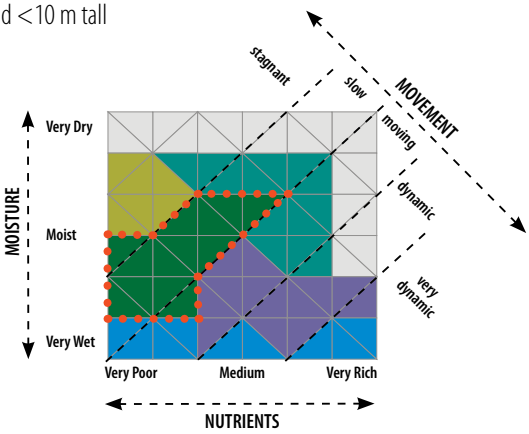


Adapted to the boreal plains and expanded from Harris et. al. 1996.

TREED POOR FEN

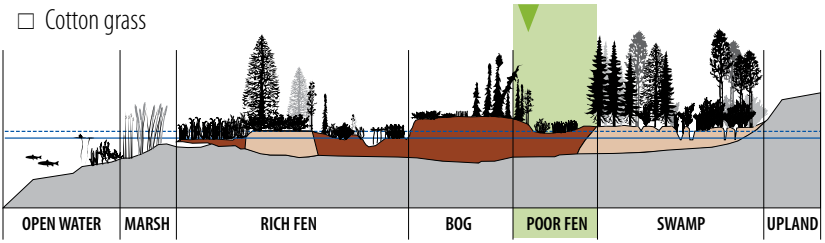
INDICATORS

- ☐ Peatland soils with components of both bogs and fens
- ☐ Saturated to flooded
- ☐ Organic soils with >40 cm peat
- ☐ Tree cover 25 to 60% of area and <10 m tall
- ☐ Tamarack >5% trees
- ☐ Black spruce dominate tree cover
- ☐ Shrubs <2 m tall
- ☐ *Sphagnum* mosses >20% of area



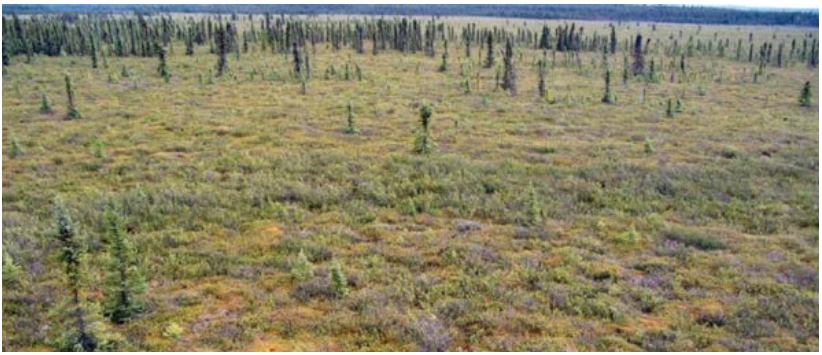
COMMON VEGETATION

- ☐ Lowland black spruce
- ☐ Bog birch
- ☐ Ericaceous (crowberry, Labrador tea, leatherleaf, bog-laurel) shrubs
- ☐ Willow
- ☐ Wire sedge
- ☐ Cotton grass



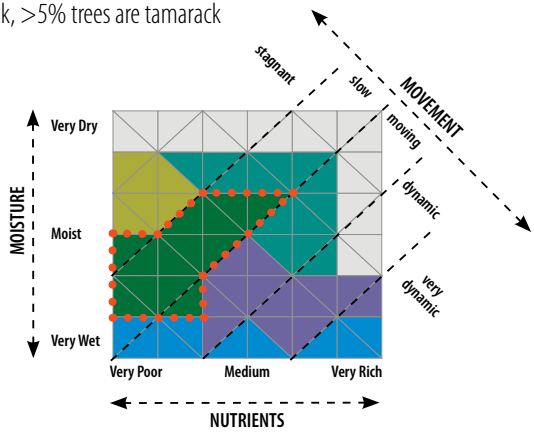
Adapted to the boreal plains and expanded from Harris et. al. 1996.

SHRUBBY POOR FEN



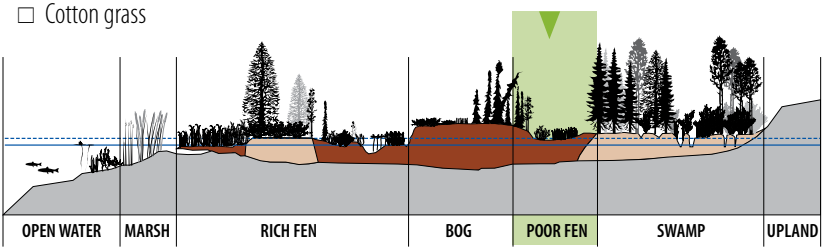
INDICATORS

- ☐ Peatland soils with components of both bogs and fens
- ☐ Saturated to flooded
- ☐ Organic soils with >40 cm peat
- ☐ Trees are black spruce/tamarack, >5% trees are tamarack
- ☐ Tree cover <25% of area
- ☐ Shrubs >25% of area and <2 m tall
- ☐ *Sphagnum* mosses >20% of area
- ☐ High richness of plant species



COMMON VEGETATION

- ☐ Bog birch
- ☐ Ericaceous (crowberry, Labrador tea, leatherleaf, bog-laurel) shrubs
- ☐ Willow
- ☐ Wire sedge
- ☐ Cotton grass



Adapted to the boreal plains and expanded from Harris et. al. 1996.

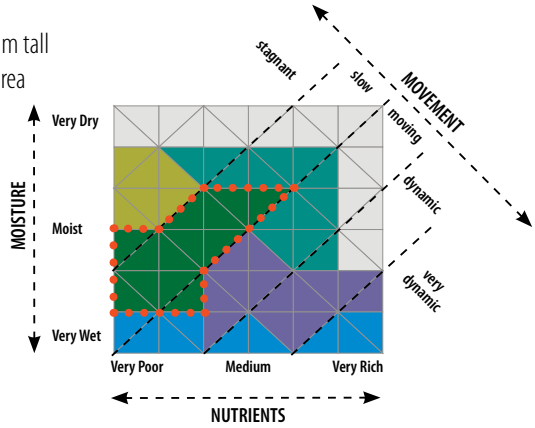
GRAMINOID POOR FEN

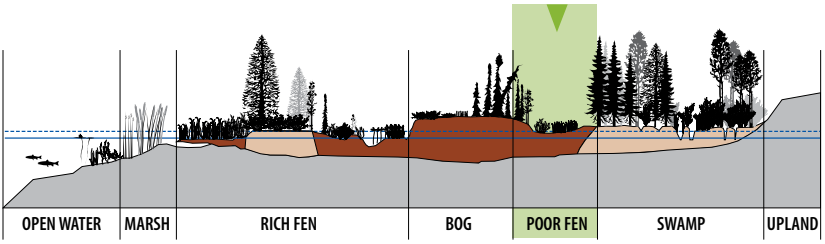
INDICATORS

- ☐ Peatland soils with components of both bogs and fens
- ☐ Saturated to flooded
- ☐ Organic soils with >40 cm peat
- ☐ Tree cover <25% of area
- ☐ Shrubs <25% of area and <2 m tall
- ☐ *Sphagnum* mosses >20% of area

COMMON VEGETATION

- ☐ Tamarack
- ☐ Lowland black spruce
- ☐ Bog birch
- ☐ Ericaceous (crowberry,
- ☐ Labrador tea, leatherleaf, bog-laurel) shrubs
- ☐ Willow
- ☐ Wire sedge
- ☐ Cotton grass





Adapted to the boreal plains and expanded from Harris et. al. 1996.

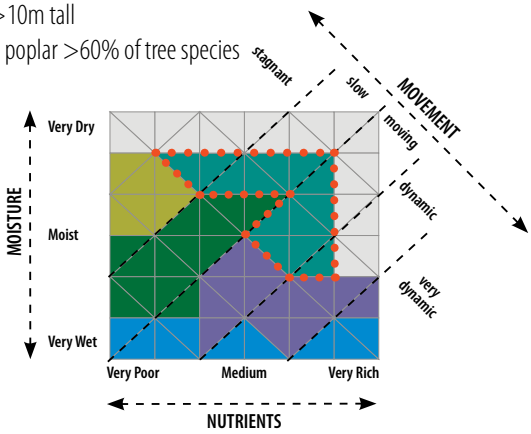
HARDWOOD SWAMP

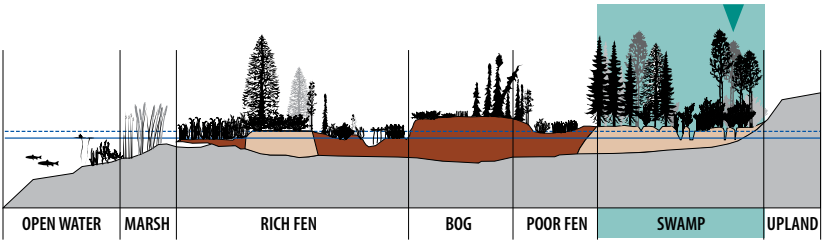
INDICATORS

- ☐ Found in mineral soil drainage areas or riparian floodplains
- ☐ Saturated to seasonally flooded
- ☐ Pools of water sometimes present
- ☐ Tree cover >60% of area and >10m tall
- ☐ White/Alaskan birch or balsam poplar >60% of tree species
- ☐ Shrubs >2 m tall

COMMON VEGETATION

- ☐ Willow and speckled alder understory
- ☐ Bluejoint grass
- ☐ Red-osier dogwood



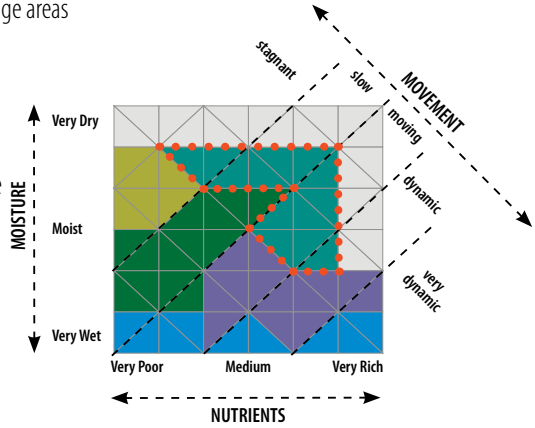


Adapted to the boreal plains and expanded from Harris et. al. 1996.

MIXEDWOOD SWAMP

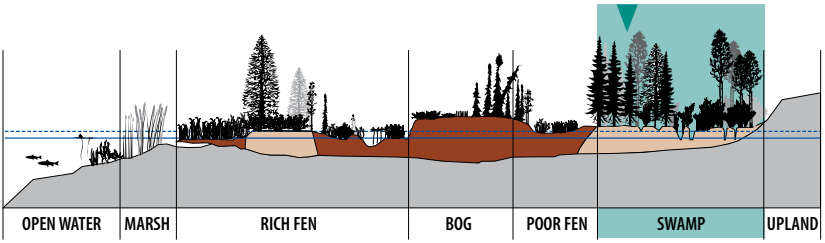
INDICATORS

- ☐ Transitional between tamarack and hardwood swamp
- ☐ Saturated to flooded
- ☐ Pools of water
- ☐ Often found in seepage/drainage areas
- ☐ Hummocky
- ☐ Trees >10 m tall and are >60% of the wetland area
- ☐ Mix of tamarack, white/ Alaskan birch and black spruce - no dominance
- ☐ Balsam poplar may also occur
- ☐ Shrubs >2 m tall



COMMON VEGETATION

- ☐ Willow and birch understory
- ☐ Bluejoint grass
- ☐ Red-osier dogwood



High Water
Low Water
Mineral Soil
Sphagnum Peat
Woody Peat

Adapted to the boreal plains and expanded from Harris et. al. 1996.

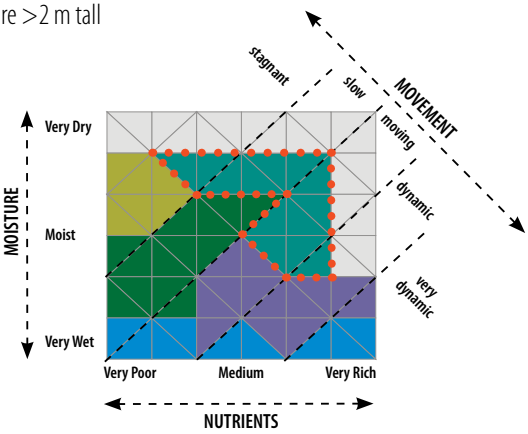
SHRUB SWAMP

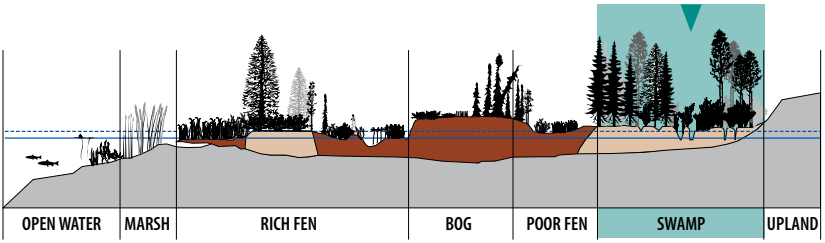
INDICATORS

- ☐ Transition between upland and meadow marshes
- ☐ Pools of water
- ☐ Found in mineral soils
- ☐ Shrubs are >25% of area and are >2 m tall
- ☐ Often areas of beaver activity

COMMON VEGETATION

- ☐ Willow, speckled alder and broad-leaved sedge understory
- ☐ Bluejoint grass





High Water
Low Water
Mineral Soil
Sphagnum Peat
Woody Peat

Adapted to the boreal plains and expanded from Harris et. al. 1996.

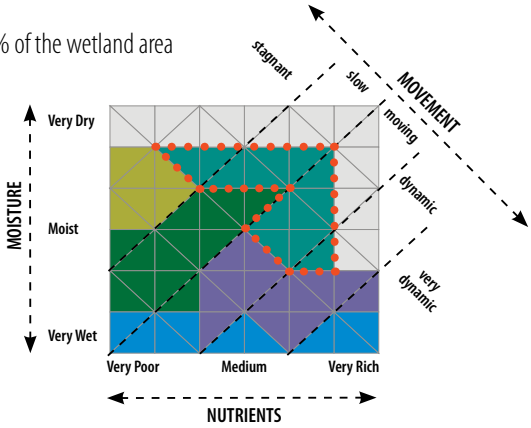
TAMARACK SWAMP

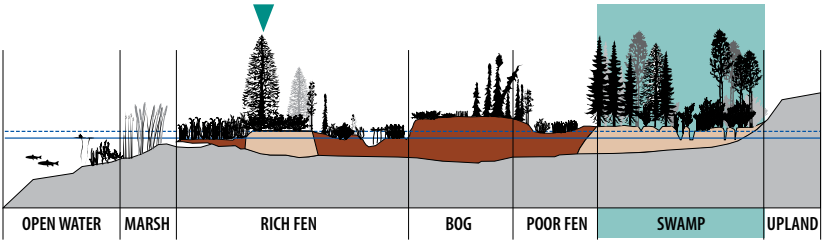
INDICATORS

- ☐ Transitional to rich treed fen or other swamp classes
- ☐ Occurs in high nutrient drainage areas of peatlands
- ☐ Saturated to flooded
- ☐ Pools of water
- ☐ Trees >10 m tall and are >60% of the wetland area
- ☐ Conifers dominate and >60% of trees are tamarack

COMMON VEGETATION

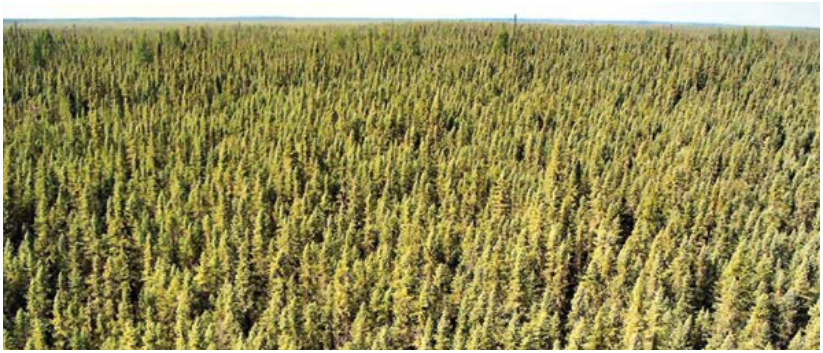
- ☐ Willow and birch understory
- ☐ Labrador tea
- ☐ Small bog cranberry
- ☐ Bluejoint grass





Adapted to the boreal plains and expanded from Harris et. al. 1996.

CONIFER SWAMP

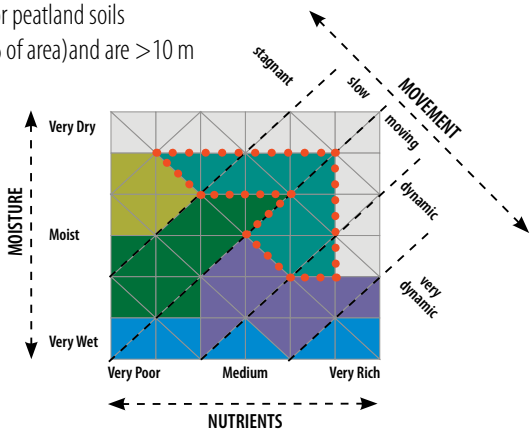


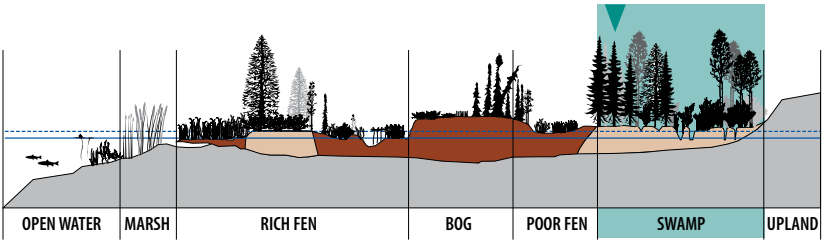
INDICATORS

- ☐ Transition between bog or fen and uplands
- ☐ Dry to saturated
- ☐ Pools of water
- ☐ Densely treed area in mineral or peatland soils
- ☐ Black spruce dominate (>60% of area)and are >10 m

COMMON VEGETATION

- ☐ Labrador tea
- ☐ Leather leaf
- ☐ Bluejoint grass
- ☐ *Sphagnum* mosses
- ☐ Brown moss





Adapted to the boreal plains and expanded from Harris et. al. 1996.

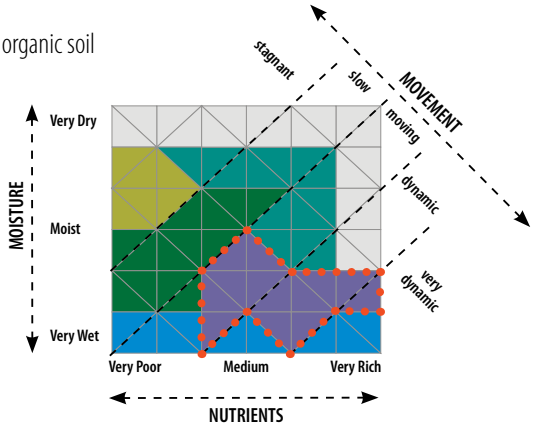
EMERGENT MARSH

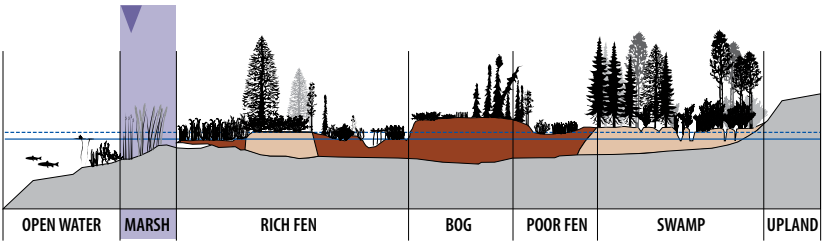
INDICATORS

- ☐ Transitional between open water and meadow marsh
- ☐ Saturated to permanently flooded
- ☐ Periodic drawdowns
- ☐ Clear, stained or turbid water
- ☐ Occurs in mineral or deposited organic soil
- ☐ Above surface emergent vegetation >25% of area
- ☐ Submerged aquatic vegetation <25% of area

COMMON VEGETATION

- ☐ Bulrush
- ☐ Cattail
- ☐ Spike-rush





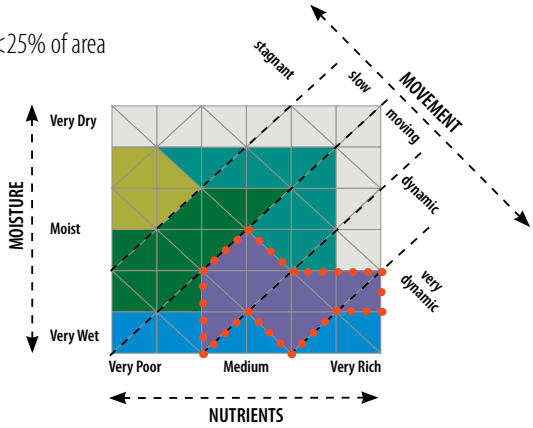
High Water
Low Water
Mineral Soil
Sphagnum Peat
Woody Peat

Adapted to the boreal plains and expanded from Harris et. al. 1996.

MEADOW MARSH

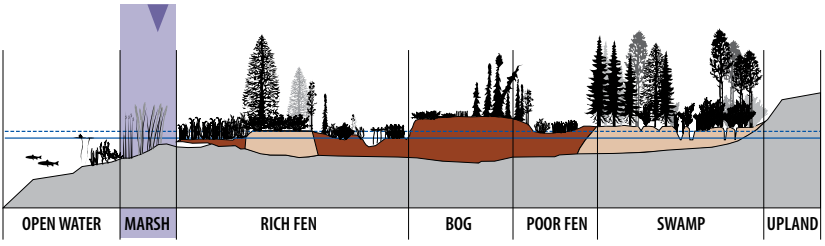
INDICATORS

- ☐ Occurs in mineral or deposited organic soil
- ☐ Seasonally flooded
- ☐ Saturated to dry
- ☐ Common along shorelines
- ☐ Clear, stained or turbid water <25% of area
- ☐ Above surface emergent vegetation >25% of area
- ☐ Submerged aquatic vegetation <25% of area
- ☐ Primarily broad-leaved vegetation



COMMON VEGETATION

- ☐ Beaked sedge
- ☐ Bluejoint grass



Adapted to the boreal plains and expanded from Harris et. al. 1996.

AQUATIC BED

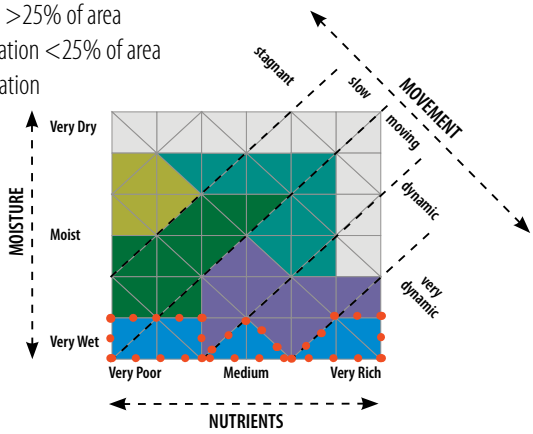
Harvey Barrison via Wikimedia Commons

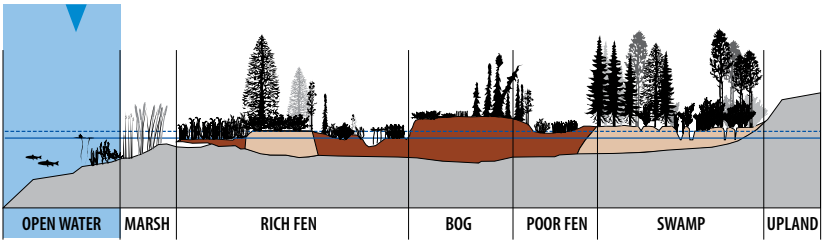
INDICATORS

- ☐ Transitional between open water and emergent marsh
- ☐ Open water area >25% of area
- ☐ Water is clear, stained or turbid water
- ☐ Submerged aquatic vegetation >25% of area
- ☐ Above surface emergent vegetation <25% of area
- ☐ Floating and submerged vegetation

COMMON VEGETATION

- ☐ Pond-lily
- ☐ Pondweed



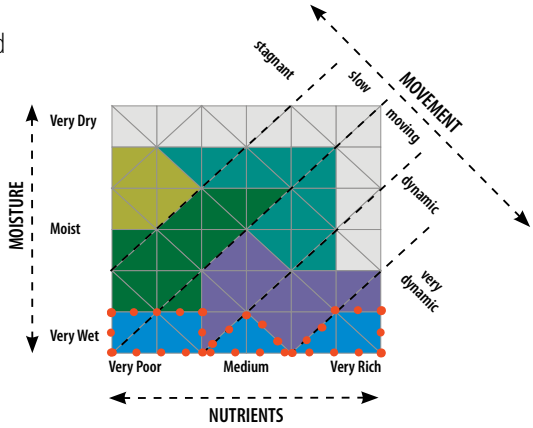


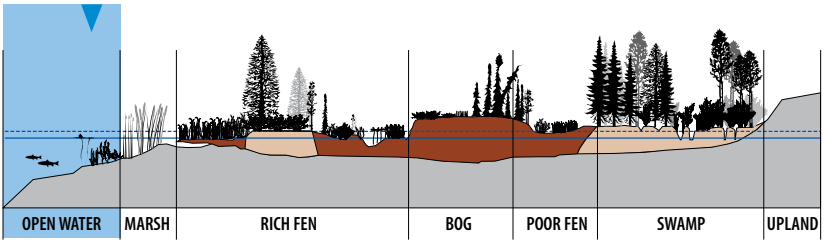
Adapted to the boreal plains and expanded from Harris et. al. 1996.

MUDFLATS

INDICATORS

- ☐ Transitional between open water, shoreline and/or emergent marsh
- ☐ Associated with shallow water
- ☐ Influenced by vertical water movement
- ☐ Temporary condition
- ☐ Exposed mud, marl, silt or sand
- ☐ Submerged aquatic vegetation <25% of area
- ☐ Above surface emergent vegetation <25% of area



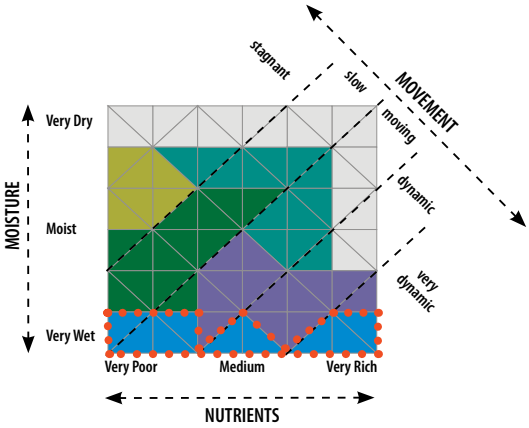


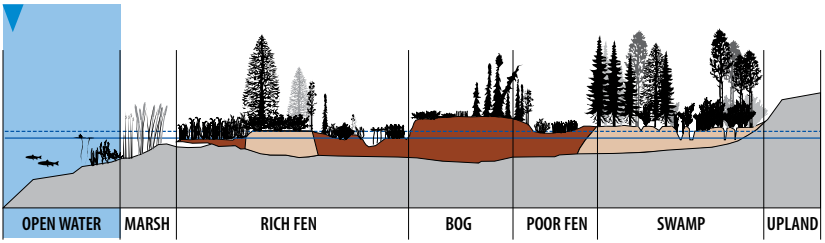
Adapted to the boreal plains and expanded from Harris et. al. 1996.

OPEN WATER

INDICATORS

- ☐ Most common with marsh, fen and swamp wetlands
- ☐ Associated with all wetland types
- ☐ Includes lakes, ponds and rivers
- ☐ Clear, stained or turbid water
- ☐ Submerged aquatic vegetation >25% of area
- ☐ Above surface emergent vegetation <25% of area





Adapted to the boreal plains and expanded from Harris et. al. 1996.

APPENDIX 3. PLANT SPECIES LIST - COMMON AND LATIN NAMES

COMMON NAME	LATIN NAME
Alaskan birch	*Betula neoalaskana*
alder-leaved buckthorn	*Rhamnus alnifolia*
alders	*Alnus spp.*
American elm	*Ulmus americana*
balsam fir	*Abies balsamea*
balsam poplar	*Populus balsamifera*
beaked hazelnut	*Corylus cornuta*
beaked sedge	*Carex rostrata*
bedstraw	*Galium spp.*
birch	*Betula spp.*
black spruce	*Picea mariana*
blueberry	*Vaccinium spp.*
bluejoint grass	*Calamagrostis canadensis*
bog birch	*Betula glandulosa*
bog cranberry	*Vaccinium vitis-idaea*
bog-laurel	*Kalmia polifolia*
buckbean	*Menyanthes trifoliata*
bulrush	*Scirpus spp.*
bunchberry	*Cornus canadensis*
Canada waterweed	*Elodea canadensis*
cattail	*Typha spp.*
chokecherry	*Prunus virginiana*
cloudberry	*Rubus chamaemorus*
common duckweed	*Lemna minor*
coontail	*Ceratophyllum demersum*
cottongrass	*Eriophorum spp.*
creeping-snowberry	*Gaultheria hispidula*
crowberry	*Empetrum nigrum*
dwarf birch	*Betula pumila*
dwarf bog-rosemary	*Andromeda polifolia*
floating-leaf pondweed	*Potamogeton natans*
fly honeysuckle	*Lonicera villosa*
fuzzy brown moss	*Tomenthypnum nitens*
green alder	*Alnus crispa*
hard-stemmed bulrush	*Scirpus acutus*
hornwort	*Ceratophyllum demersum*
horsetail	*Equisetum fluviatile*
jack pine	*Pinus banksiana*
knight's plume moss	*Ptilium crista-castrensis*
Labrador tea	*Rhododendron groenlandicum*
leatherleaf	*Chamaedaphne calyculata*
liverworts	*Marchantia spp.*
lodgepole pine	*Pinus contorta*
low bush-cranberry	*Viburnum edule*
Manitoba maple	*Acer negundo*
marsh five-finger /marsh cinquefoil	*Potentilla palustris*
northern wild rice	*Zizania palustris*
peat moss	*Sphagnum spp.*
pine	*Pinus spp.*
pitcher plant	*Sarracenia purpurea*
pond-lily	*Nuphar spp.*
prickly wild rose	*Rosa acicularis*
red raspberry	*Rubus idaeus*
red-osier dogwood	*Cornus stolonifera*
reindeer lichen	*Cladina spp.*
Richardson's pondweed	*Potamogeton richardsonii*
rushes	*Juncus spp.*
sedges	*Carex spp.*
shrubby cinquefoil	*Potentilla fruticosa*
slender sedge /wire sedge	*Carex lasiocarpa*
small bog cranberry	*Oxycoccus microcarpus*
small yellow pond-lily	*Nuphar variegata*
snowberry	*Symphoricarpos spp.*
speckled alder	*Alnus incana ssp. rugosa*
spiked water-milfoil	*Myriophyllum spicatum var. exalbescens*
spike-rush	*Eleocharis spp.*
stair-step moss	*Hylocomium splendens*
sticky false asphodel	*Triantha glutinosa*
sundews	*Drosera spp.*
sweet gale	*Myrica gale*
tamarack	*Larix laricina*
three-leaved false solomon's seal	*Smilacina trifolia*
three-leaved solomon's seal	*Maianthemum trifolium*
trembling aspen	*Populus tremuloides*
water-parsnip	*Sium suave*
water smartweed	*Polygonum amphibium*
white birch	*Betula papyrifera*
white spruce	*Picea glauca*
willows	*Salix spp.*

SWAMP

	Tree Species	Shrub Species

COMMON	• trees >60% cover including:
	  • balsam poplar
	  • black spruce
	  • tamarack-larch
	  • white/Alaskan birch
	• closed tree canopy with heights >10m
		• green alder
		• speckled alder
		• willow

CONIFER	• black spruce dominate (>60%) • tamarack sub dominate (<40%)	• alder-leaved buckthorn • blueberry • bog birch • creeping-snowberry • crowberry • dwarf birch • dwarf bog-rosemary • Labrador tea • bog-laurel • small bog cranberry
TAMARACK	• tamarack dominate (>60%)	• alder-leaved buckthorn • blueberry • bog birch • creeping-snowberry • crowberry • dwarf birch • dwarf bog-rosemary • Labrador tea • bog-laurel • small bog cranberry

HARDWOOD	• at least 60% of trees are:
	  • balsam poplar
	  • white/Alaskan birch
		See Common

MIXED WOOD	• mix of:
	  • balsam poplar
	  • black spruce
	  • tamarack
	  • white/Alaskan birch
	• no dominant tree species
		See Common

SHRUB	• tall shrubs >2m height • willow and alder dominate	See Common

For Latin Plant Names - See Appendix 3 Page 49

Ground Cover Species	Notes
• bluejoint grass (except conifer swamp) • cattail • *Equisetum spp.* • marsh marigold • bedstraw • sedges	• Swamps may have pools of water present • Pools of water rare in conifer swamps
• brown moss • buckbean • cotton grass • pitcher plant • solomon seal • *Sphagnum* mosses • sticky false asphodel • sundews	• Transitional between bog/fen and uplands • Can be dry or saturated depending on season/weather • Pools of water rare • Dense black spruce canopy • *Sphagnum* and/or brown mosses dominant ground cover
• buckbean • marsh five-finger • three-leaved false Solomon's seal • sticky false asphodel	• Transitional to rich treed fen or other swamp classes • Occur in high nutrient peatland drainage areas • Pools of water common • Dense tamarack canopy • Tall willow/bog birch understory
See Common	• Saturated or seasonally flooded • Pools of water sometimes present • Mineral soil drainage areas (birch dominated) • Mineral soil river flood plains (balsam poplar dominated) • Dense hard wood canopy • Tall willow/alder understory • *Sphagnum* mosses on ground
See Common	• Transitional between tamarack and hardwood swamp • Pools of water • Saturated to flooded • Hummocky ground • Seepage or drainage areas of landscape • Diverse plant community • Tall willow/birch understory
• grass and sedge spp. • marsh five-finger • water-parsnip	• Often occurs between upland and meadow marshes • Beaver activity often influences shrub swamp hydrology • Mineral soil tall shrub drainage areas • Alder or willow runs (long narrow drains)

		Tree Species	Shrub Species
FEN	COMMON	• trees>2m and <10 m in height include: • black spruce • tamarack	• blueberry • bog birch • dwarf birch • dwarf bog-rosemary • Labrador tea • leatherleaf • small bog cranberry • dwarf willow
RICH FEN	TREED	• 25 to 60% treed with: • black spruce • tamarack (dominant)	• currant *(Ribes spp.)* • fly honeysuckle • green alder • speckled alder • shrubby cinquefoil • sticky false asphodel • sweet gale
	SHRUBBY	• <25% treed with: • black spruce • tamarack • shrubs dominate	>25% is: • bog birch • dwarf birch Primary: • currant *(Ribes spp.)* • fly honeysuckle • green alder • speckled alder • shrubby cinquefoil • sweet gale
	GRAMINOID	• occasional trees: • black spruce • tamarack	• occasional shrubs
POOR FEN	TREED	• 25 to 60% treed with: • black spruce (dominant) • tamarack	• creeping-snowberry • crowberry • bog-laurel
	SHRUBBY	• lowland black spruce <25% of area	• 25 to 100% shrubs < 2m height • creeping-snowberry • crowberry • bog-laurel
	GRAMINOID	• NONE	• NONE

For Latin Plant Names - See Appendix 3 Page 49

Ground Cover Species		Notes
• brown moss • horsetail • pitcher plant • sedge	• solomon's seal • *Sphagnum* mosses • sundews	
• bedstraw • bluejoint grass • buckbean • cattail • grass of parnasus	• marsh five-finger • *Sphagnum* mosses • sticky false asphodel • wire sedge	• *Sphagnum* mosses<20% ground cover
• bedstraw • bluejoint grass • buckbean • cattail • grass of parnasus	• marsh five-finger • *Sphagnum* mosses • sticky false asphodel • wire sedge	• *Sphagnum* mosses <20% ground cover
• bedstraw • bluejoint grass • buckbean • cattail • grass of parnasus	• marsh five-finger • *Sphagnum* mosses • sticky false asphodel • wire sedge	• *Sphagnum* mosses <20% ground cover
• cotton grass • *Sphagnum* mosses		• *Sphagnum* mosses >20% ground cover
• cotton grass • *Sphagnum* mosses		• *Sphagnum* mosses >20% ground cover
• cotton grass • *Sphagnum* mosses		• *Sphagnum* mosses >20% ground cover

		Tree Species	Shrub Species
BOG	COMMON	• trees <10 m in height include: • lowland black spruce dominant • tamarack <5% of cover	• blueberry • creeping-snowberry • crowberry • dwarf bog-rosemary • Labrador tea • leather leaf • bog-laurel • small bog-cranberry • willow
	TREED	• 25 to 60% treed • see common tree species	• <25% shrubs • see common shrub species
	SHRUBBY	• <25% treed • see common tree species	• >25% shrubs • see common shrub species
	OPEN	• <25% treed • see common tree species	• <25% shrubs • see common shrub species

		Tree Species	Shrub Species
MARSH	MEADOW	• NONE	• NONE
	EMERGENT	• NONE	• NONE

		Tree Species	Shrub Species
OPEN WATER	MUDFLAT	• NONE	• NONE
	AQUATIC BED	• NONE	• NONE
	SHALLOW OPEN WATER	• NONE	• NONE

For Latin Plant Names - See Appendix 3 Page 49

Ground Cover Species	Notes
• cloudberry • cotton grass* • pitcher plant • pod grass • sedge • *Sphagnum* mosses • soloman's seal • sundews	• * also in treed poor fens but typically bog indicator
• cotton grass • *Sphagnum* mosses • wire sedge	• *Sphagnum* mosses >20% ground cover
• cotton grass • *Sphagnum* mosses • wire sedge	• *Sphagnum* mosses >20% ground cover
• cotton grass • *Sphagnum* mosses • wire sedge	• *Sphagnum* mosses dominate & >20% ground cover • Water table at/near surface • No standing water

For Latin Plant Names - See Appendix 3 Page 49

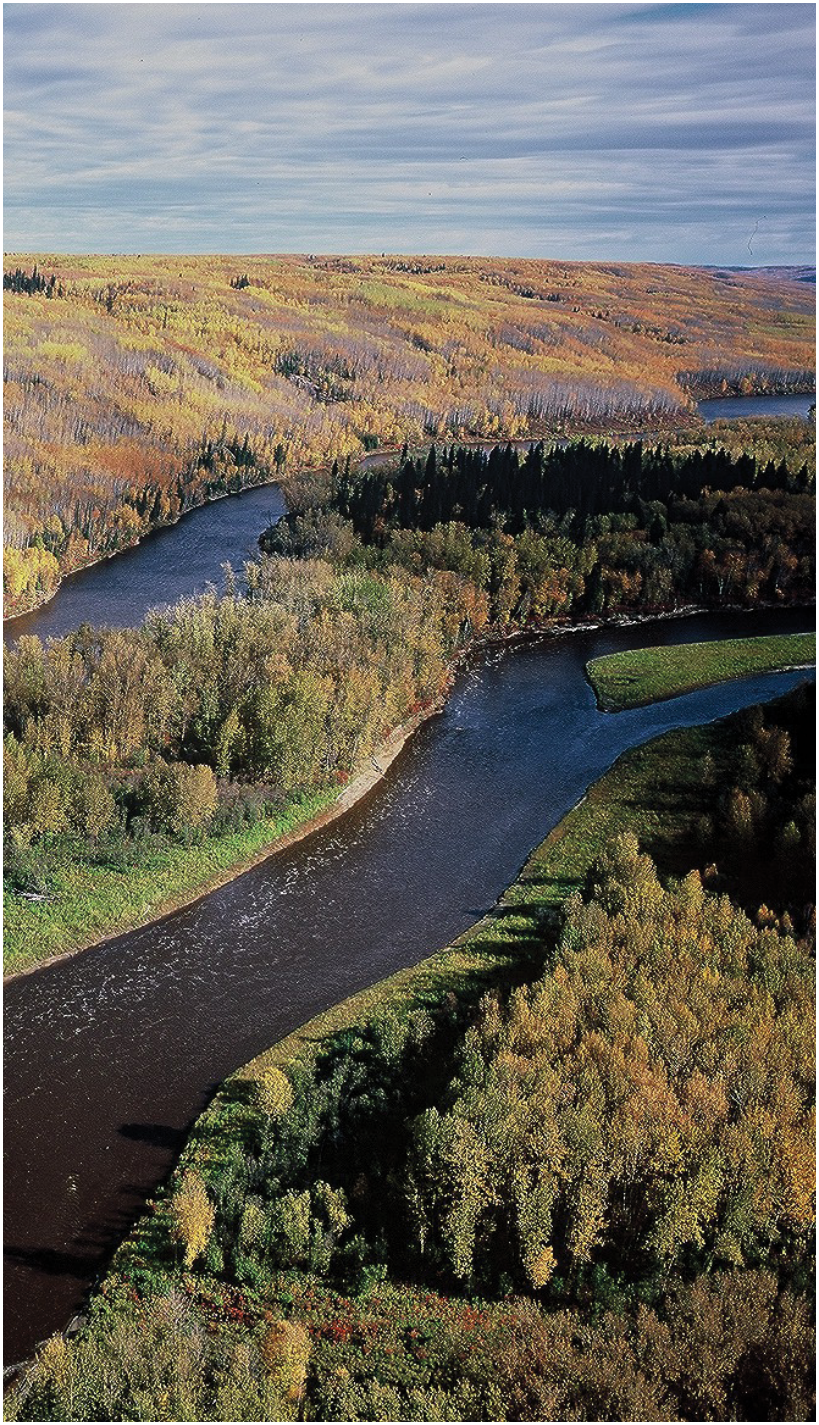
Ground Cover Species	Notes

• >25% above water surface:
  • broad-leaved sedge
  • bluejoint grass
	• Clear, stained or turbid water <25% area
	• Mineral soil or deposited organic
	• Seasonally flooded commonly along shoreline

• <25% submergent vegetation
• >25% above water surface:
  • cattail
  • bulrush
	• Clear, stained or turbid water <25% area
	• Transitional between open water and meadow marsh
	• Saturated to permanently flooded with periodic drawdowns

For Latin Plant Names - See Appendix 3 Page 49

Ground Cover Species	Notes
• <25% aquatic vegetation • <25% above water surface	• Clear, stained or turbid water <25% area • Formed by fluctuating water level • Exposed mudflat of wetland
• <25% above water surface • >25% aquatic vegetation: • duckweed, pond lily, coontail	• Clear, stained or turbid water <25% area • Floating & submerged aquatic vegetation dominates
• <25% aquatic vegetation • <25% above water surface	• Clear, stained or turbid water >25% area • Commonly associated with marsh, fen & swamp classes



APPENDIX 5. WETLAND PLANT IDENTIFICATION

This appendix will help you identify wetland plants to correctly identify wetland classes. Please note this is not a complete list of wetland plants.

References

Johnson, D., L. Kershaw, A. MacKinnon and J. Pojar. 1995. Plants of the Western Boreal Forest and Aspen Parkland. Lone Pine Publishing and the Canadian Forest Service. Edmonton, Alberta. 392 pp.

Ringius, G.S. and R.A. Sims. 1997. Indicator Plant Species in Canadian Forests. Canadian Forest Service, Natural Resources Canada, 580 Booth Street, Ottawa, Ontario. 218 pp.

FLOATING AQUATIC VEGETATION

INCLUDES:

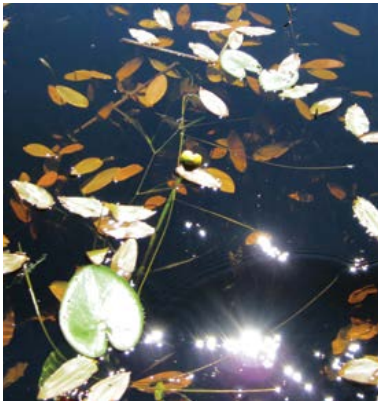
- ☐ Common duckweed (*Lemna minor*)
- ☐ Floating-leaf pondweed (*Potamogeton natans*)
- ☐ Small yellow pond-lily (*Nuphar variegata*)
- ☐ Water smartweed (*Polygonum amphibium*)

Common characteristics:

- ☐ Various rooted or free-floating plants with leaves normally floating on the surface

T. Lwiwski *

Common duckweed

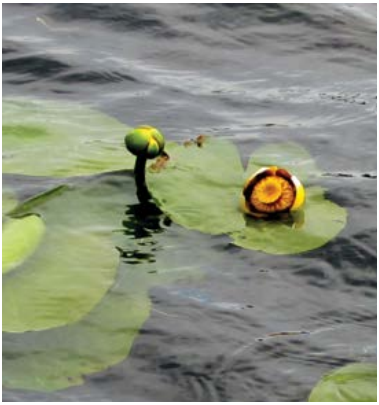


A. Morrison *

Floating-leaf pondweed

A. Morrison *

Water smartweed



A. Morrison *

Small yellow pond-lily

* *Photos from Opaskwayak Cree Nation Guide to the Wetlands of the Saskatchewan River Delta*

- Found in marshes and shallow open waters

BOG	RICH FEN	POOR FEN	SWAMP	MARSH ✓	OPEN WATER ✓

SUBMERGED AQUATIC VEGETATION

INCLUDES:

- ☐ Richardson's pondweed (*Potamogeton richardsonii*)
- ☐ Canada waterweed (*Elodea canadensis*)
- ☐ Spiked water-milfoil (*Myriophyllum spicatum* var. *exalbescens*)
- ☐ Hornwort (*Ceratophyllum demersum*)

Common characteristics:

- ☐ Plants normally lie entirely beneath water, some species have flowering parts that break the water surface

C. Szczerski *

Spiked water-milfoil

C. Szczerski *

Spiked water-milfoil (emergent flower stage)

A. Morrison *

Hornwort

* *Photos from Opaskwayak Cree Nation Guide to the Wetlands of the Saskatchewan River Delta*

- Found in marshes and shallow open waters

BOG	RICH FEN	POOR FEN	SWAMP	MARSH ✓	OPEN WATER ✓

BULRUSH

Scirpus lacustris (ssp. validus)

***Cyperaceae* (Sedge Family)**

- ☐ 3 m tall
- ☐ Thick, rounded green stem

A. Morrison *

* Photos from Opaskwayak Cree Nation Guide to the Wetlands of the Saskatchewan River Delta

- Found in marshes and shallow open waters

BOG	RICH FEN	POOR FEN	SWAMP	MARSH ✓	OPEN WATER ✓

CATTAIL *Typha latifolia*

***Typhaceae* (Cattail Family)**

- ☐ 1-2 m tall
- ☐ Leaves are 1 to 2 cm wide, upright
- ☐ Stems are pithy
- ☐ Stems are dark brown cylinder with spike at tip

- Found in marshes

✓

BOG | RICH FEN | POOR FEN | SWAMP | **MARSH** | OPEN WATER

HORSETAIL

Equisetum fluviale

***Equisetaceae* (Horsetail Family)**

- ☐ 10-100 cm tall
- ☐ Erect, hollow, grooved and jointed stems

- Found in rich fens, swamps and marshes
- Other species of *Equisetum* also common

BOG	RICH FEN ✓	POOR FEN	SWAMP ✓	MARSH ✓	OPEN WATER

BUCKBEAN *Menyanthes trifoliata*

***Menyanthaceae* (Buckbean Family)**

- ☐ Leaves alternate
- ☐ Divided into three egg-shaped to elliptical leaflets
- ☐ Flower petals are white with long hairs
- ☐ Indicator of rich fens
- ☐ Aquatic to semi-aquatic herb

- Found in rich fens

✔

BOG | **RICH FEN** | POOR FEN | SWAMP | MARSH | OPEN WATER

MARSH FIVE-FINGER/MARSH CINQUEFOIL

Potentilla palustris

***Rosaceae* (Rose Family)**

- ☐ 5 to 7 sharply jagged leaves
- ☐ Stems are reddish brown and low sprawling
- ☐ Flowers are red to purple and extend from the branch

- Found in rich fens, swamps and marshes

BOG	RICH FEN	POOR FEN	SWAMP	MARSH	OPEN WATER
	✓		✓	✓	

BLUEJOINT GRASS

Calamagrostis canadensis

***Poaceae* (Grass Family)**

- ☐ Large tufted grass 0.5 to 1.5 m tall
- ☐ Stems are purplish at the nodes or joints
- ☐ Leaves are long and drooping
- ☐ Flowers are stalked and purple tinged

- Found in rich fens, swamps and marshes
- Indicator of very moist to wet soil, yet drought tolerant

BOG	RICH FEN	POOR FEN	SWAMP	MARSH	OPEN WATER
	✓		✓	✓	

COTTON GRASS *Eriophorum spp.*

***Cyperaceae* (Sedge Family)**

- ☐ Perennial sedge
- ☐ Tall, erect cylindrical stem
- ☐ Seed heads are covered in fluffy mass of cotton

- Found in bogs and poor fens

BOG	RICH FEN	POOR FEN	SWAMP	MARSH	OPEN WATER
✓		✓			

SLENDER/WIRE AND BEAKED SEDGE *Carex spp.*

***Cyperaceae* (Sedge Family)**

- ☐ Leaves are long, narrow, flat blades
- ☐ Stems are triangular in cross section and solid (not hollow)
- ☐ Narrow-leaved sedges are more common in bogs and fens
- ☐ Wider-leaved sedges are more common in marshes
- ☐ Flowers are small and arranged in spikes
- ☐ 2,000 species of *Carex* sedges

Beaked sedge *(Carex rostrata)*

Slender/wire sedge *(Carex lasiocarpa)*

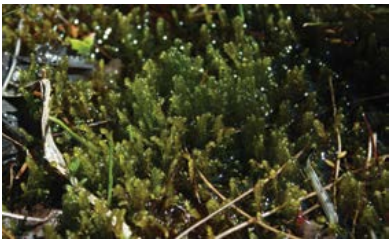
- Found in bogs, fens, swamps and marshes
- Slender/wire sedge (Carex lasiocarpa) - Common in peatlands
- Beaked sedge (Carex rostrata) - Common in marshes and swamps

BOG	RICH FEN	POOR FEN	SWAMP	MARSH	OPEN WATER
✓	✓	✓	✓	✓	

BROWN (SICKLE) MOSSES (GROUP)

☐ Ground cover with sickle shaped leaves

Includes:
***Campylium stellatum* (Starry Campylium)**
***Scorpidium scorpioides* (Scorpion Tail Moss)**
Drepanocladus spp.
***Tomentypnum nitens* (Fuzzy Brown Moss)**



- Found in rich fens and swamps
- Indicator of mineral rich soil

BOG	RICH FEN	POOR FEN	SWAMP	MARSH	OPEN WATER
	✓		✓		

SPHAGNUM MOSSES (GROUP)

Sphagnum spp.

***Sphagnaceae* (Peat Moss Family)**

- ☐ Ground cover 2 to 10 cm tall
- ☐ Main stem with tightly arranged clusters of branches
- ☐ 120 species of *Sphagnum* mosses

- Found in bogs and fens

BOG	RICH FEN	POOR FEN	SWAMP	MARSH	OPEN WATER
✓	✓	✓			

BOG BIRCH/ DWARF BIRCH

Betula glandulosa/ pumila

***Betulaceae* (Birch Family)**

- ☐ Spreading to erect shrub, usually up to 2m tall
- ☐ Leaves are alternate, simple, and circular to oval shaped
- ☐ Leaves are typically leathery and may be coarsely toothed (pumila) or have rounded teeth (glandulosa)
- ☐ Fruits are small, winged, and found in catkins

• Found in fens

BOG	RICH FEN ✓	POOR FEN ✓	SWAMP	MARSH	OPEN WATER

BOG-LAUREL *Kalmia polifolia*

***Ericaceae* (Heath Family)**

- ☐ Slender evergreen shrub up to 40 cm tall
- ☐ Leaves are opposite
- ☐ Narrow leaves, dark green on top, white hairs on leaf underside
- ☐ Leaf edges are rolled under
- ☐ Flowers are deep pink and bowl-shaped
- ☐ Berries are red and contain many small seeds

- Found in bogs and poor fens
- Indicator of wet to very wet (poor) soils

BOG	RICH FEN	POOR FEN	SWAMP	MARSH	OPEN WATER
✓		✓			

BOG WILLOW

Salix pedicellaris

***Salicaceae* (Willow Family)**

- ☐ Up to 5 m tall
- ☐ Multi-stemmed
- ☐ Buds are single
- ☐ Flowers are catkins

• Found in bogs, fens and swamps

BOG	RICH FEN	POOR FEN	SWAMP	MARSH	OPEN WATER
✓	✓	✓	✓		

LABRADOR TEA

Rhododendron groenlandicum

***Ericaceae* (Heath Family)**

- ☐ From 0.3 to 0.8 m tall
- ☐ Evergreen
- ☐ Leaves have a rusty underside with dense woolly hairs.
- ☐ Leaves have smooth edge (no teeth), with edges that roll towards surface
- ☐ Flowers are white, round clusters

- Found in bogs, fens and swamps
- Indicates moist to wet soils with stagnant water

BOG	RICH FEN	POOR FEN	SWAMP	MARSH	OPEN WATER
✓	✓	✓	✓		

RED-OSIER DOGWOOD

Cornus stolonifera

***Cornaceae* (Dogwood Family)**

- ☐ 1 to 3 m tall with multiple red stems
- ☐ Bark is bright red, sometimes greenish
- ☐ Leaves are opposite
- ☐ Flowers are white, dense and flat-topped in clusters
- ☐ Berries are white with a stone inside

- Found in swamps
- Tolerance for fluctuating groundwater levels
- Indicator of moist to wet soils
- Associated with hardwood swamps but can grow on moist uplands

BOG	RICH FEN	POOR FEN	✔ SWAMP	MARSH	OPEN WATER

SMALL BOG CRANBERRY

Oxycoccus microcarpus

***Ericaceae* (Heath Family)**

- ☐ Tiny creeping evergreen vine with runners
- ☐ Leaves alternate
- ☐ Leaves are widely spaced along vine
- ☐ Leaf edges roll under
- ☐ Flowers are four pink petals sharply bent backwards
- ☐ Berries are round, pale pink to dark red

- Found in bogs, fens and black spruce and tamarack swamps
- Indicator of wet, nutrient-poor, organic soil

BOG	RICH FEN	POOR FEN	SWAMP	MARSH	OPEN WATER
✓	✓	✓	✓		

SPECKLED ALDER

Alnus incana ssp. rugosa

***Betulaceae* (Birch Family)**

- ☐ Tall shrub (2 to 8 m tall)
- ☐ Often grows in clumps
- ☐ Leaves are coarsely edged and unevenly toothed
- ☐ Twigs and bark are speckled with warty dots
- ☐ Buds are club shaped with short stalks
- ☐ Fruits are cones without stalks or stalks are less than 1 cm long

- Found in shrub swamps and occasionally rich fens and uplands
- Very common in black spruce forests on organic soil
- Indicator of poorly drained soils and water table near surface
- Indicator of seepage on upland areas
- Nitrogen fixing, shade tolerant shrub

BOG	RICH FEN	POOR FEN	SWAMP	MARSH	OPEN WATER
	✓		✓		

SWEET GALE *Myrica gale*

***Myricaceae* (Family)**

- ☐ Leaves are dotted above and below with bright yellow wax-glands
- ☐ Pleasantly fragrant
- ☐ Leaf edge toothed on upper third
- ☐ Fruits are brown, cone-like catkins

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C. Woodward *

** Photos from Opaskwayak Cree Nation Guide to the Wetlands of the Saskatchewan River Delta*

- Found in bogs and swamps

✓

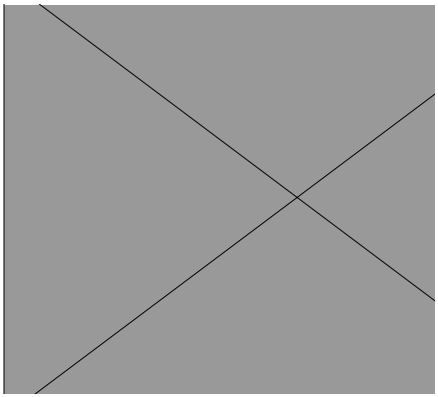
BOG	RICH FEN	POOR FEN	SWAMP	MARSH	OPEN WATER

BALSAM POPLAR

Populus balsamifera

***Salicaceae* (Willow Family)**

- ☐ Branches alternate
- ☐ Buds are large and sticky
- ☐ Bark is deeply furrowed with thick ridges
- ☐ Leaves are larger and darker green than trembling aspen
- ☐ Stalk of leaves are round



- Found in swamps, uplands and riparian areas

✔

BOG | RICH FEN | POOR FEN | **SWAMP** | MARSH | OPEN WATER

BLACK SPRUCE *Picea mariana*

***Pinaceae* (Pine Family)**

- ☐ Lowland black spruce (poor growth form - height 2 - 10 m)
- ☐ Dwarfed black spruce (poor growth form - height < 2m)
- ☐ Characteristic clump of branches at top of crown
- ☐ Inner bark is olive green
- ☐ Lower branches slope steeply downwards, occur in whorls
- ☐ Short needles, taste like turpentine
- ☐ Cones are smaller than white spruce, egg-shaped and purplish in colour
- ☐ Hairs extend past end of buds
- ☐ Capable of growing on most mineral soils

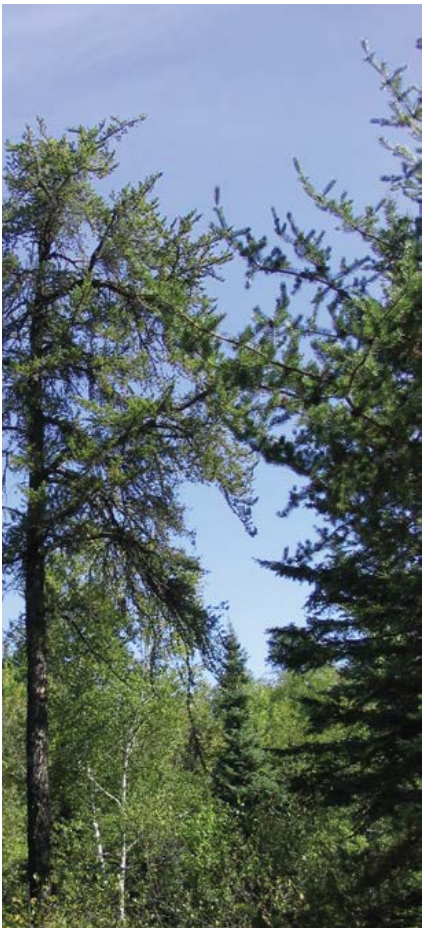
• Found in black spruce swamps, bogs, fens, uplands and riparian areas

BOG	RICH FEN	POOR FEN	SWAMP	MARSH	OPEN WATER
✓	✓	✓	✓		

JACK PINE *Pinus banksiana*

***Pinaceae* (Pine Family)**

- ☐ Branches occur in whorls
- ☐ Bark is brownish gray in scales
- ☐ Needles are two-needle clusters, often twisted
- ☐ Cones occur in pairs and are closed, curved and very hard



- Upland species
- Common on dry to average moisture mineral soil
- Mixed conifer stands of black spruce and jack pine are common

MANITOBA MAPLE

Acer negundo

***Aceraceae* (Maple Family)**

- ☐ Branches opposite
- ☐ Buds are small, rounded, white and woolly
- ☐ Bark is light brown to dark gray, furrowed on mature trees
- ☐ Leaves opposite, compound, 3 to 5 leaflets
- ☐ Seeds are large winged and in pairs

- Found in swamps and riparian areas

BOG	RICH FEN	POOR FEN	SWAMP ✓	MARSH	OPEN WATER

TAMARACK *Larix laricina*

***Pinaceae* (Pine Family)**

- ☐ Light green crown in spring and summer
- ☐ Needles change to yellow and drop off in fall
- ☐ Branches alternate
- ☐ Needles are soft, clusters of 12-20 needles
- ☐ Cones are small, egg-shaped
- ☐ Often occurs in mixed conifer stands of black spruce & larch

- Found in fens and swamps
- Found in bogs (<5% of the trees in bogs)

BOG	RICH FEN	POOR FEN	SWAMP	MARSH	OPEN WATER
✓	✓	✓	✓		

TREMBLING ASPEN

Populus tremuloides

***Salicaceae* (Willow Family)**

- ☐ Branches alternate
- ☐ Buds are small, sharp pointed, not resinous
- ☐ Bark is smooth, old aspen can have furrowed bark at the base
- ☐ Leaves are smaller in size and lighter green than balsam poplar
- ☐ Leaves are small toothed
- ☐ Stalks of leaves are flat

- Upland species
- Trembling aspen thrives on calcium-rich mineral soils – white 'dust' on aspen bark contains calcium

WHITE/ALASKAN BIRCH

Betula papyrifera

***Betulaceae* (Birch Family)**

- ☐ Often grows in clumps
- ☐ Branches alternate
- ☐ Bark is whitish, peels off like layers of paper
- ☐ Leaves alternate, double-toothed
- ☐ Twigs are reddish-brown in winter
- ☐ Can grow in swamps but is also an upland species

• Found in swamps

✓

BOG	RICH FEN	POOR FEN	SWAMP	MARSH	OPEN WATER

WHITE SPRUCE *Picea glauca*

***Pinaceae* (Pine Family)**

- ☐ Inner bark is light pink
- ☐ Young twigs are smooth and shiny
- ☐ Needles are longer than black spruce and stiff and sharp
- ☐ Needles are pungent and taste like cat urine
- ☐ Branches occur in whorls
- ☐ Hairs do not extend past end of buds
- ☐ Cones are light brown to purple and hang down from the branch

- Occasionally found in swamps

BOG	RICH FEN	POOR FEN	✓ SWAMP	MARSH	OPEN WATER

NOTES

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