



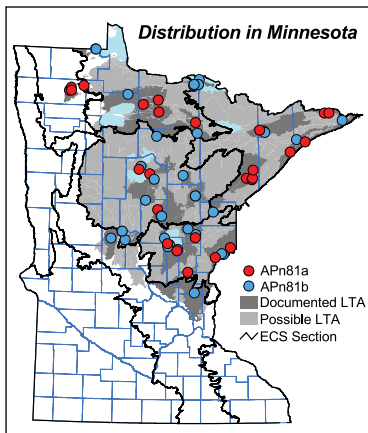
Northern Poor Conifer Swamp

Conifer-dominated peatlands with sparse canopy of stunted trees. Understory is depauperate and dominated by ericaceous shrubs, fine-leaved graminoids, and low *Sphagnum* hummocks. Minerotrophic plant species are present.

Vegetation Structure & Composition

Description is based on summary of vascular plant data from 60 plots (relevés) and bryophyte data from 5 plots.

- **Moss layer** is dominated mostly by *Sphagnum* species, which form nearly continuous carpets consisting of low hummocks of *S. magellanicum* and extensive lawns of *S. angustifolium*. Hollows are dominated by brown mosses such as *Calliergon cordifolium*.
- **Forb** cover is sparse (< 25%) and typically includes three-leaved false Solomon's seal (*Smilacina trifolia*), with stemless lady's slipper (*Cypripedium acaule*), Indian pipe (*Monotropa uniflora*), and pitcher plant (*Sarracenia purpurea*) sometimes present.
- **Graminoid** cover is variable. Fine-leaved graminoids such as three-fruited bog sedge (*Carex trisperma*) are important; cottongrasses, particularly tussock cottongrass (*Eriophorum vaginatum*), are commonly present.
- **Low-shrub layer** is dominated by ericaceous shrubs, typically with 5–25% cover; Labrador tea (*Ledum groenlandicum*) and leatherleaf (*Chamaedaphne calyculata*) are abundant. Small cranberry (*Vaccinium oxycoccos*) is frequent but less abundant.
- **Tall-shrub layer** is sparse (< 25% cover), with minerotrophic indicators such as bog birch (*Betula pumila*) and speckled alder (*Alnus incana*) occasionally present.
- **Understory trees** typically include scattered black spruce with tamarack frequent.
- **Canopy** is patchy (25–50% cover) and dominated by stunted (< 33ft [10m] tall) black spruce or tamarack.
- **Notes:** Species diversity is relatively low, but minerotrophic indicators are typical, including the moss *Calliergon stramineum*, which is present among *Sphagnum* species on hummocks (see Appendix D for an explanation of minerotrophic versus non-minerotrophic species).



Landscape Setting & Soils

APn81 occurs in peat-filled basins on nutrient-poor outwash plains, on bedrock-dominated terrain, on noncalcareous till, and on other landforms in basins with small watersheds where surface water inputs are minimal. In these basins, APn81 is often adjacent to open poor fens or rich swamps at the margins of bogs. APn81 also occurs in large peatlands on glacial lake plains in areas adjacent to rich fen water tracks or between forested bogs and uplands. In most settings soils are moderately deep to very deep peat (> 20in [50cm]), although they can be shallower in bedrock-dominated landscapes or on nutrient-poor sand plains. The upper layer of soil is poorly decomposed (fibric) peat formed from *Sphagnum* and may be underlain by more decomposed peat of variable origin. The surface water is acidic (pH = 4.2–5.5) and low in minerals, particularly Ca^{++} . Water-table fluctuations are less variable than in forested bogs (i.e., APn80) but more variable than in poor fens (i.e., APn91).

Natural History

APn81 occurs primarily in the Laurentian Mixed Forest Province, where climate and poor soil drainage result in active peat accumulation. The most extensive examples are in the Glacial Lake Agassiz basin in the MOP and in the basins of Glacial Lakes Aitkin



and Upham in the MDL. The distribution of APn81 is similar to that of Northern Spruce Bogs (APn80), but because it can develop in conditions that are less continuously saturated and less nutrient poor, its range extends farther west into the Tallgrass Aspen Parklands Province and south beyond the acid till of the Superior and Koochiching glacial lobes into the MIM. In general, APn81 develops in peatlands where the peat surface is becoming isolated from mineral-rich groundwater because of buildup of peat and invasion by *Sphagnum*, which leads to increasingly acidic conditions with the water table typically below the peat surface. APn81 is transitional in water chemistry between bogs and rich black spruce swamps. The community may develop from rich black spruce swamps in settings where buildup of *Sphagnum*-dominated substrates creates conditions increasingly unfavorable to minerotrophic species. APn81 may also develop from poor fens where the formation of *Sphagnum* hummocks creates sufficiently aerated conditions for the establishment and growth of black spruce and tamarack.

Although catastrophic fires can occur in poor conifer swamps, they are not common, because the community is present in wet landscapes or in areas where the upland forests are mostly hardwoods rather than fire-prone conifers. An analysis of Public Land Survey (PLS) records indicates that the historic rotation of catastrophic fires in APn81 was about 570 years. If fires are particularly intense, they can release sufficient quantities of nutrients from peat and vegetation to convert APn81 to a rich swamp community. Moderate surface fires and light windthrow were somewhat more common disturbances in APn81, occurring about every 90 years. The ability of black spruce and tamarack to send up new stems, or layer, from branches buried by peat has been interpreted as an adaptive trait for surviving windthrow. There is, however, little direct evidence that windthrow has a significant impact on poor swamp forests. The PLS records suggest the historic rotation of catastrophic windthrow in APn81 was about 500 years. Trees in APn81 are somewhat susceptible to windthrow because of structurally weak peat soils and shallow root systems, but this seems to be offset by short height (< 30ft [10m]), sparse crowns, root grafting, and branch layering.

Similar Native Plant Community Classes

• APn80 Northern Spruce Bog

APn80 is a *Sphagnum*-dominated peatland community with stunted black spruce trees and can appear similar to APn81. APn80 differs from APn81 by being isolated from mineral-rich groundwater, with surface water pH usually < 4.2. As a result, the vegetation in APn80 is composed mainly of bog species; minerotrophic species are absent, and most hollows are covered by *Sphagnum angustifolium* carpets. In APn81, surface water pH is usually > 4.2, minerotrophic species such as bog birch, speckled alder, creeping sedge (*Carex chordorrhiza*), and bluejoint (*Calamagrostis canadensis*) are present, and *Sphagnum* carpets are restricted to low hummocks and areas around tree bases. Brown mosses, such as *Calliergon cordifolium*, are abundant in hollows.

APn81 Indicator Species	(freq%)		APn80 Indicator Species
	APn81	APn80	
Speckled alder (<i>Alnus incana</i>)	27	-	There are no species restricted to APn80 relative to APn81. Instead, APn80 is distinguished by being composed of a restricted set of 25 vascular plant species tolerant of ombrotrophic conditions (see Appendix D). Significant presence of species other than these 25 species usually indicates the plant community is not a bog. If minerotrophic species are present but are limited to just a few individuals that are unlikely to persist at the site, the community would still be classified as APn80 rather than APn81.
Bluejoint (<i>Calamagrostis canadensis</i>)	23	-	
Spiny-leafed fern (<i>Dryopteris carthusiana</i>)	17	-	
Buckbean (<i>Menyanthes trifoliata</i>)	16	-	
Lake sedge (<i>Carex lacustris</i>)	16	-	
Bog birch (<i>Betula pumila</i>)	44	-	
Creeping sedge (<i>Carex chordorrhiza</i>)	33	-	
Balsam fir (U)	17	-	

• APn91 Northern Poor Fen

APn91 often has a sparse canopy of stunted black spruce or tamarack and can appear similar to APn81. APn91 differs from APn81 by usually having tree canopy cover < 25%, by the presence of light-requiring species such as bog wiregrass sedge (*Carex oligosperma*), and by having hollows dominated by semiaquatic *Sphagnum* species, such as *S. subsecundum*, *S. papillosum*, or *S. majus*. APn81 usually has tree canopy cover of 25–50% and is more likely to have shade-tolerant species such as creeping snowberry (*Gaultheria hispida*), stemless lady's slipper, and three-fruited bog sedge



(*Carex trisperma*). APn81 is also more likely to have hollows dominated by semiaquatic brown mosses such as *Calliergon cordifolium*.

APn81 Indicator Species	(freq%)		APn91 Indicator Species	(freq%)	
	APn81	APn91		APn81	APn91
Indian pipe (<i>Monotropa uniflora</i>)	33	-	White beak rush (<i>Rhynchospora alba</i>)	-	32
Lingonberry (<i>Vaccinium vitis-idaea</i>)	11	-	Beaked sedge (<i>Carex utriculata</i>)	-	17
Stemless lady's slipper (<i>Cypripedium acaule</i>)	39	1	Spatulate-leaved sundew (<i>Drosera intermedia</i>)	-	14
Northern red oak (U)	27	1	Scheuchzeria (<i>Scheuchzeria palustris</i>)	6	51
Spinulose shield fern (<i>Dryopteris carthusiana</i>)	17	1	Fen wiregrass sedge (<i>Carex lasiocarpa</i>)	8	49
Creeping snowberry (<i>Gaultheria hispida</i>)	38	2	Candle-lantern sedge (<i>Carex limosa</i>)	9	44
Three-fruited bog sedge (<i>Carex trisperma</i>)	80	7	Bog wiregrass sedge (<i>Carex oligosperma</i>)	14	42
Velvet-leaved or lowbush blueberry*	47	4	Round-leaved sundew (<i>Drosera rotundifolia</i>)	19	52

*Velvet-leaved or lowbush blueberry (*Vaccinium myrtilloides* or *V. angustifolium*)

• FPN62 Northern Rich Spruce Swamp (Basin)

FPN62 is similar to APn81 but is richer in minerals and has denser canopy cover with taller trees. FPN62 has higher species diversity (usually ≥ 23 species/400m²) and is more likely to have rich forest indicators such as white cedar, twinflower (*Linnaea borealis*), and bluebead lily (*Clintonia borealis*). APn81 has lower species diversity (usually < 23 species/400m²) and is more likely to have shade-intolerant species, including bog rosemary (*Andromeda glaucophylla*), pitcher plant, and tussock cottongrass (*Eriophorum vaginatum*).

APn81 Indicator Species	(freq%)		FPN62 Indicator Species	(freq%)	
	APn81	FPN62		APn81	FPN62
Creeping sedge (<i>Carex chordorrhiza</i>)	33	-	Bluebead lily (<i>Clintonia borealis</i>)	-	48
Pitcher plant (<i>Sarracenia purpurea</i>)	31	-	Fly honeysuckle (<i>Lonicera canadensis</i>)	-	23
Tawny cottongrass (<i>Eriophorum virginicum</i>)	20	-	Mountain ashes (U)	2	61
Buckbean (<i>Menyanthes trifoliata</i>)	16	-	Dwarf raspberry (<i>Rubus pubescens</i>)	2	55
Bog wiregrass sedge (<i>Carex oligosperma</i>)	14	-	Twinflower (<i>Linnaea borealis</i>)	2	52
Bog rosemary (<i>Andromeda glaucophylla</i>)	50	3	Red raspberry (<i>Rubus idaeus</i>)	2	32
Tussock cottongrass (<i>Eriophorum vaginatum</i>)	34	3	White cedar (U)	2	26
Round-leaved sundew (<i>Drosera rotundifolia</i>)	19	3	Goldthread (<i>Coptis trifolia</i>)	5	55

• FPN71 Northern Rich Spruce Swamp (Water Track)

FPN71 is similar to APn81 but is richer in minerals and has denser canopy cover with taller trees. As a result, FPN71 has higher species diversity (usually > 23 species/400m²) and is more likely to have rich forest indicators such as white cedar, red-osier dogwood (*Cornus sericea*), sweet-scented bedstraw (*Galium triflorum*), and naked miterwort (*Mitella nuda*). APn81 has lower species diversity (usually < 23 species/400m²) and is more likely to have shade-intolerant species such as tussock cottongrass and creeping sedge (*Carex chordorrhiza*).

APn81 Indicator Species	(freq%)		FPN71 Indicator Species	(freq%)	
	APn81	FPN71		APn81	FPN71
Tussock cottongrass (<i>Eriophorum vaginatum</i>)	34	-	Dwarf alder (<i>Rhamnus alnifolia</i>)	-	79
Northern red oak (U)	27	-	Red-osier dogwood (<i>Cornus sericea</i>)	-	71
Bog wiregrass sedge (<i>Carex oligosperma</i>)	14	-	Sweet-scented bedstraw (<i>Galium triflorum</i>)	-	64
Few-fruited sedge (<i>Carex pauciflora</i>)	14	-	Naked miterwort (<i>Mitella nuda</i>)	-	57
Creeping sedge (<i>Carex chordorrhiza</i>)	33	7	Marsh bellflower (<i>Campanula aparinoides</i>)	-	50
Paper birch (U)	30	7	Labrador bedstraw (<i>Galium labradoricum</i>)	-	43
Bluejoint (<i>Calamagrostis canadensis</i>)	23	7	Touch-me-not (<i>Impatiens</i> spp.)	-	36
Three-fruited bog sedge (<i>Carex trisperma</i>)	80	29	White cedar (C,U)	2	50

Native Plant Community Types in Class

• APn81a Poor Black Spruce Swamp

Tree canopy has $> 50\%$ cover, typically dominated by black spruce, occasionally with tamarack (which rarely may be codominant). Paper birch is also occasionally present in the canopy. Tall shrubs are usually absent or infrequent. APn81a occurs in slightly drier areas than APn81b and as a result has a denser tree canopy and greater presence of shade-tolerant species in the understory, including Indian pipe, creeping snowberry, ferns (especially *Dryopteris* spp.), lingonberry (*Vaccinium vitis-idaea*), soft-leaved sedge (*Carex disperma*), clubmosses and groundpines (*Lycopodium* spp.), bunchberry (*Cornus canadensis*), junberries (*Amelanchier* spp.), and balsam fir. Description is based on summary of vegetation data from 21 plots.

**● APn81b Poor Tamarack - Black Spruce Swamp**

Tree canopy has 25–50% cover and is dominated by black spruce with occasional tamarack, or by tamarack with black spruce. APn81b develops in slightly wetter areas than APn81a. Because of this, APn81b has a more open canopy and more light-demanding species in the understory, including bog rosemary, creeping sedge (*Carex chordorrhiza*), bog birch, bog wiregrass sedge (*C. oligosperma*), lake sedge (*C. lacustris*), few-fruited sedge (*C. pauciflora*), bog willow (*Salix pedicellaris*), buckbean (*Menyanthes trifoliata*), and bog laurel (*Kalmia polifolia*). APn81b is divided into two subtypes, based on differences in the abundance of black spruce and tamarack in the tree canopy.

○ APn81b1 Black Spruce Subtype

Tree canopy is dominated by black spruce, occasionally with some tamarack. Understory species that help to differentiate APn81b1 from APn81b2 are round-leaved sundew (*Drosera rotundifolia*), few-fruited sedge (*Carex pauciflora*), and buckbean. Description is based on summary of vegetation data from 13 plots.

○ APn81b2 Tamarack Subtype

Tree canopy is dominated by tamarack, typically with black spruce, and is slightly more open than the canopy of APn81b1. As a result, bog rosemary and leatherleaf are more abundant in the understory of APn81b2. The presence of lowbush blueberry (*Vaccinium angustifolium*) in the understory also helps to distinguish APn81b2. Description is based on summary of vegetation data from 16 plots.



photo by T.J. Whitfield MN DNR

Hubbard County, MN



APn81 Northern Poor Conifer Swamp – Species Frequency & Cover

Forbs, Ferns & Fern Allies		freq%	cover
Three-leaved false Solomon's seal (<i>Smilachina trifolia</i>)	85	•••	
Stemless lady's slipper (<i>Cypripedium acaule</i>)	40	•	
Indian pipe (<i>Monotropa uniflora</i>)	35	•	
Pitcher plant (<i>Sarracenia purpurea</i>)	32	•	
Round-leaved sundew (<i>Drosera rotundifolia</i>)	20	•	
Spinylose shield fern (<i>Dryopteris carthusiana</i>)	18	•	
Buckbean (<i>Menyanthes trifoliata</i>)	17	••	
Northern blue flag (<i>Iris versicolor</i>)	13	•	
Tufted loosestrife (<i>Lysimachia thyrsiflora</i>)	13	•	
Bunchberry (<i>Cornus canadensis</i>)	10	•	
Bristly clubmoss (<i>Lycopodium annotinum</i>)	10	•	
Marsh cinquefoil (<i>Potentilla palustris</i>)	10	•	
Grasses & Sedges			
Three-fruited bog sedge (<i>Carex trisperma</i>)	83	•••	
Poor sedge (<i>Carex paupercula</i>)	37	••	
Tussock cottongrass (<i>Eriophorum vaginatum</i>)	37	•	
Creeping sedge (<i>Carex chordorrhiza</i>)	33	•••	
Bluejoint (<i>Calamagrostis canadensis</i>)	25	•	
Tawny cottongrass (<i>Eriophorum virginicum</i>)	22	•	
Lake sedge (<i>Carex lacustris</i>)	17	•••	
Bog wiregrass sedge (<i>Carex oligosperma</i>)	15	•••	
Few-fruited sedge (<i>Carex pauciflora</i>)	13	•	
Soft-leaved sedge (<i>Carex disperma</i>)	10	•	
Low shrubs			
Labrador tea (<i>Ledum groenlandicum</i>)	93	•••	
Leatherleaf (<i>Chamaedaphne calyculata</i>)	83	•••	
Small cranberry (<i>Vaccinium oxycoccos</i>)	80	•	
Bog laurel (<i>Kalmia polifolia</i>)	60	••	
Bog rosemary (<i>Andromeda glaucophylla</i>)	53	••	
Velvet-leaved blueberry (<i>Vaccinium myrtilloides</i>)	48	••	
Creeping snowberry (<i>Gaultheria hispida</i>)	38	••	
Lowbush blueberry (<i>Vaccinium angustifolium</i>)	38	•	
Lingonberry (<i>Vaccinium vitis-idaea</i>)	12	•••	
Tall Shrubs			
Bog birch (<i>Betula pumila</i>)	47	••	
Speckled alder (<i>Alnus incana</i>)	27	••	
Bog willow (<i>Salix pedicellaris</i>)	13	•	
Balsam willow (<i>Salix pyrifolia</i>)	10	•	
Trees			
Black spruce	93	•••	92
Tamarack	73	•••	65
Paper birch	15	•	32
White pine	8	•	22
Northern red oak	-	-	27
Red maple	-	-	23
Balsam fir	-	-	18