



Northern Poor Fen

Open *Sphagnum* peatlands with variable development of hummocks and hollows. Dominated either by fine-leaved sedges or low ericaceous shrubs. Present in small basins, on floating mats near lakes and ponds, and in large peatlands on glacial lake plains.

Vegetation Structure & Composition

Description is based on summary of vascular plant data from 182 plots (relevés) and bryophyte data from 27 plots.

- **Moss and liverwort** cover is nearly always 100% and usually composed mainly of *Sphagnum* species. Oligotrophic *Sphagnum* species are dominant, including *S. angustifolium* and *S. papillosum* in hollows and carpets and *S. magellanicum* on hummocks, although minerotrophic species such as *S. majus* and *S. subsecundum* are also present and frequently form extensive carpets. *Polytrichum strictum*, *Aulacomnium palustre*, and *Pleurozium schreberi* are the most common brown moss species. The liverwort *Cladopodiella fluitans*, an indicator species for poor fens, often covers the bottom of the deepest hollows and pools and is also scattered among many of the hummock-forming *Sphagnum* species.

- **Forb** cover is sparse, typically < 25% and often < 5%. Pitcher plant (*Sarracenia purpurea*), scheuchzeria (*Scheuchzeria palustris*), and round-leaved sundew (*Drosera rotundifolia*) are frequently present.

- **Graminoids** are abundant, often forming the dominant vegetation. The most abundant graminoids are fine-leaved sedges, including fen wiregrass sedge (*Carex lasiocarpa*), bog wiregrass sedge (*C. oligosperma*), and candle-lantern sedge (*C. limosa*).

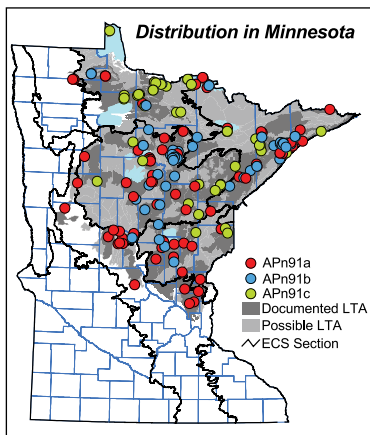
- **Low shrubs** have variable cover but are the dominant species on many sites and can have > 50% cover. Leatherleaf (*Chamaedaphne calyculata*) and bog birch (*Betula pumila*) are usually the most abundant shrub species, with lesser cover of bog rosemary (*Andromeda glaucophylla*), bog laurel (*Kalmia polifolia*), and small cranberry (*Vaccinium oxycoccos*).

- **Tree** cover is < 25% and commonly consists of scattered tamarack and black spruce of various heights but usually < 30ft (10m) tall.

- **Notes:** Species diversity is low in most sites, but minerotrophic species such as bog birch, fen wiregrass sedge (*Carex lasiocarpa*), creeping sedge (*C. chordorrhiza*), water horsetail (*Equisetum fluviatile*), buckbean (*Menyanthes trifoliata*), marsh cinquefoil (*Potentilla palustris*), and bog willow (*Salix pedicellaris*) are present and help to distinguish poor fens from bogs.

Landscape Setting & Soils

APn91 occurs in peat-filled basins on nutrient-poor outwash plains, on scoured bedrock terrain, and on noncalcareous till, or where watersheds are small and surface water inputs are minimal. APn91 often occurs on floating mats adjacent to open water in lakes and ponds, on the periphery of basins dominated by bogs, and in the interiors of large patterned peatlands on glacial lake plains or other level, poorly drained landscapes. In large patterned peatlands, APn91 occurs on lower flanks of raised bog crests, forming distinctive drains and water tracks and gradually grading into rich fens. Soils are typically deep (> 40in [1m]) peat, although they can be shallower in scoured bedrock landscapes and on nutrient-poor sand plains. Upper peat layer is poorly decomposed (fibric) peat formed from *Sphagnum* and may be underlain by more decomposed peat of variable





origin. Surface water is acidic (pH = 4.2–5.5), and mineral concentrations are low, particularly Ca^{++} (2–13 mg/l). Water table is close to the peat surface most of the time.

Natural History

APn91 occurs in peatlands where the peat surface is nearly isolated from mineral-rich runoff and is becoming increasingly acidic (pH is 4.2–5.5). In peat development and water chemistry, APn91 is intermediate between bogs and rich fens. Poor fens can develop either through acidification of rich fens and wet meadows or through alkalization of bogs. Acidification of rich fens and meadows can occur in basins and on floating mats where invasion and accumulation of *Sphagnum* elevates the surface peat, isolating plant roots from underlying minerotrophic water. Alkalization of bogs can occur on the lower flanks of well-developed raised bogs, where the chemistry of bog water runoff is transformed by increased concentrations or fluxes of cations from surface runoff; the exact process by which this occurs is unknown. As this runoff is channeled downslope into drains and water tracks, the less acidic water causes the development of areas of fen in the peatland. (In these circumstances, the fens often develop a characteristic ribbed pattern.) Poor fens are characterized by variation in plant species composition that is related to differences in tolerances of individual species to waterlogged conditions and to variation in bryophyte microtopography. In general, the waterlogged conditions of poor fens prevent or inhibit significant establishment or growth of black spruce and tamarack, although low *Sphagnum* hummocks in fens provide suitably dry conditions for growth of low ericaceous shrubs and scattered stunted black spruce and tamarack. In wetter areas, extensive carpets of *Sphagnum* are typical; these wet areas are dominated by graminoids.

Similar Native Plant Community Classes

• APn90 Northern Open Bog

Northern Open Bogs, like APn91, are open *Sphagnum*-dominated peatlands and can be similar in appearance. APn90, however, is more completely isolated from mineral-rich groundwater or surface runoff and has lower pH (< 4.2). As a result, APn90 lacks the minerotrophic indicator species typically present in APn91 and has vegetation composed mainly of bog species. Where well-developed wet hollows are present in APn90, they are mostly dominated by *Sphagnum angustifolium*. Because APn91 is not completely isolated from influence by minerotrophic groundwater or surface runoff, surface water in APn91 has higher pH (> 4.2), and one or more minerotrophic indicator species are present, usually in hollows. Minerotrophic vascular plant species include fen wiregrass sedge (*Carex lasiocarpa*), bog birch, buckbean, candle-lantern sedge (*Carex limosa*), white beak rush (*Rhynchospora alba*), and creeping sedge (*C. chordorrhiza*). The most common minerotrophic bryophyte species are *Sphagnum majus*, *S. papillosum*, *S. subsecundum*, and the liverwort *Cladopodiella fluitans*.

APn91 Indicator Species	(freq%)		APn90 Indicator Species
	APn91	APn90	
Fen wiregrass sedge (<i>Carex lasiocarpa</i>)	49	-	There are no species restricted to APn90 relative to APn91. Instead, APn90 is distinguished by being composed of a set of 25 vascular plant species tolerant of ombrotrophic conditions (see Appendix F). 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 APn90 rather than APn91.
White beak rush (<i>Rhynchospora alba</i>)	32	-	
Buckbean (<i>Menyanthes trifoliata</i>)	27	-	
Creeping sedge (<i>Carex chordorrhiza</i>)	26	-	
Bog birch (<i>Betula pumila</i>)	44	3	
Candle-lantern sedge (<i>Carex limosa</i>)	44	3	
Tawny cottongrass (<i>Eriophorum virginicum</i>)	21	3	
Scheuchzeria (<i>Scheuchzeria palustris</i>)	51	17	

• APn81 Northern Poor Conifer Swamp

When tree canopy cover is sparse in APn81, it can appear similar to APn91, although most often APn81 has > 25% canopy cover. In all cases, APn81 has greater presence of shade-tolerant species such as creeping snowberry (*Gaultheria hispida*), stemless lady's slipper (*Cypripedium acaule*), three-fruited bog sedge (*Carex trisperma*), and blueberries (*Vaccinium myrtilloides* or *V. angustifolium*). Wet hollows in APn81 are usually dominated by brown mosses, such as *Calliergon cordifolium*, rather than by *Sphagnum* species. APn91 has tree canopy cover < 25% and is more likely to



have shade-intolerant species such as fen wiregrass sedge (*Carex lasiocarpa*), scheuchzeria, white beak rush (*Rhynchospora alba*), and candle-lantern sedge (*Carex limosa*). Wet hollows in APn91 are usually dominated by *Sphagnum* species, such as *S. subsecundum*, *S. papillosum*, or *S. majus*, rather than brown mosses.

APn91 Indicator Species	(freq%)	
	APn91	APn81
White beak rush (<i>Rhynchospora alba</i>)	32	-
Beaked sedge (<i>Carex utriculata</i>)	17	-
Spatulate-leaved sundew (<i>Drosera intermedia</i>)	14	-
Intermediate bladderwort (<i>Utricularia intermedia</i>)	9	-
Scheuchzeria (<i>Scheuchzeria palustris</i>)	51	6
Fen wiregrass sedge (<i>Carex lasiocarpa</i>)	49	8
Candle-lantern sedge (<i>Carex limosa</i>)	44	9
Bog wiregrass sedge (<i>Carex oligosperma</i>)	42	14

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

APn81 Indicator Species	(freq%)	
	APn91	APn81
Indian pipe (<i>Monotropa uniflora</i>)	-	33
Lingonberry (<i>Vaccinium vitis-idaea</i>)	-	11
Stemless lady's slipper (<i>Cypripedium acaule</i>)	1	39
Spinulose shield fern (<i>Dryopteris carthusiana</i>)	1	17
Creeping snowberry (<i>Gaultheria hispida</i>)	2	38
Balsam fir (U)	1	17
Three-fruited bog sedge (<i>Carex trisperma</i>)	7	80
Velvet-leaved or Lowbush blueberry*	9	67

Native Plant Community Types in Class

• APn91a Low Shrub Poor Fen

Open peatlands with cover of leatherleaf and bog birch either > 50% or greater than cover of graminoids, although tussock cottongrass (*Eriophorum vaginatum*) and tawny cottongrass (*E. virginicum*) can be abundant in the graminoid layer. Stunted black spruce and tamarack are often present. *Sphagnum* hummocks are moderately well developed. Indicator species characteristic of wet hollows are absent or rare. APn91a is present in smaller peatland basins, on floating mats adjacent to ponds and lakes, and at margins or in strings in larger peatlands. Description is based on summary of vegetation data from 76 plots.

• APn91b Graminoid Poor Fen (Basin)

Open peatlands with cover of leatherleaf and bog birch either < 50% or less than cover of graminoids. Dominant graminoids include bog wiregrass sedge (*Carex oligosperma*), tussock cottongrass, and few-fruited sedge (*C. pauciflora*). Indicator species characteristic of wet hollows are frequently present, including white beak rush (*Rhynchospora alba*), scheuchzeria, candle-lantern sedge (*C. limosa*), and *Sphagnum papillosum*. APn91b occurs in smaller peatland basins, on floating mats adjacent to ponds and lakes, and at margins of larger peatlands. Description is based on summary of vegetation data from 55 plots.

• APn91c Graminoid Poor Fen (Water Track)

Open peatlands with cover of leatherleaf and bog birch either < 50% or less than cover of graminoids. Dominant graminoids typically include fen wiregrass sedge (*Carex lasiocarpa*) or coastal sedge (*C. exilis*). Species that help to differentiate APn91c from the other types in APn91 include bog willow, three-leaved false Solomon's seal (*Smilacina trifolia*), creeping sedge (*C. chordorrhiza*), sparse-fruited sedge (*C. tenuiflora*), and Labrador tea (*Ledum groenlandicum*). Species characteristic of wet hollows are often present, including white beak rush (*Rhynchospora alba*), scheuchzeria, lead-colored sedge (*C. livida*), and intermediate bladderwort (*Utricularia intermedia*). APn91c is associated with both patterned ribbed fens and featureless peatland water tracks in large peatlands and is divided into two subtypes on the basis of features of the peat surface. Description is based on summary of vegetation data from 48 plots.

○ APn91c1 Featureless Water Track Subtype

Graminoid-dominated fens in which the peat surface may have shallow *Sphagnum*-dominated hollows, but distinct pools and aquatic species are absent. Description is based on summary of vegetation data from 19 plots.

○ APn91c2 Flark Subtype

Graminoid-dominated fens characterized by distinct linear peat-bottom pools, or "flarks," that support species such as white beak rush (*Rhynchospora alba*), spatulate-leaved sundew (*Drosera intermedia*), lead-colored sedge (*Carex livida*), bog rush (*Juncus stygius*), and horned bladderwort (*Utricularia cornuta*). APn91c2 is best developed in interiors of well-developed water tracks in large glacial lakebed peatlands (usually in association with rich or poor shrub fens), although subtle pool development can also occur in smaller peatlands in the northeastern part of the state. Description is based on summary of vegetation data from 26 plots.



photo by T.J. Whitfield MN DNR



St. Louis County, MN



APn91 Northern Poor Fen — Species Frequency & Cover

	freq%	cover	freq%	cover
Forbs				
Pitcher plant (<i>Sarracenia purpurea</i>)	54	•		
Round-leaved sundew (<i>Drosera rotundifolia</i>)	52	•		
Scheuchzeria (<i>Scheuchzeria palustris</i>)	51	••		
Three-leaved false Solomon's seal (<i>Smilacina trifolia</i>)	32	•		
Buckbean (<i>Menyanthes trifoliata</i>)	28	•		
Water horsetail (<i>Equisetum fluviatile</i>)	14	•		
Spatulate-leaved sundew (<i>Drosera intermedia</i>)	14	•		
Marsh cinquefoil (<i>Potentilla palustris</i>)	11	•		
Grasses & Sedges				
Fen wiregrass sedge (<i>Carex lasiocarpa</i>)	50	••••		
Candle-lantern sedge (<i>Carex limosa</i>)	43	••		
Bog wiregrass sedge (<i>Carex oligosperma</i>)	42	••••		
White beak rush (<i>Rhynchospora alba</i>)	32	••••		
Tussock cottongrass (<i>Eriophorum vaginatum</i>)	30	••••		
Creeping sedge (<i>Carex chordeorrhiza</i>)	26	••		
Tawny cottongrass (<i>Eriophorum virginicum</i>)	21	••		
Beaked sedge (<i>Carex utriculata</i>)	18	••		
Few-fruited sedge (<i>Carex pauciflora</i>)	16	••		
Poor sedge (<i>Carex paupercula</i>)	14	••		
Low shrubs				
Leatherleaf (<i>Chamaedaphne calyculata</i>)	98	••••		
Small cranberry (<i>Vaccinium oxycoccos</i>)	79	••		
Bog rosemary (<i>Andromeda polifolia</i>)	71	••		
Bog laurel (<i>Kalmia polifolia</i>)	65	••		
Labrador tea (<i>Ledum groenlandicum</i>)	33	••••		
Bog willow (<i>Salix pedicellaris</i>)	14	•		
Tall Shrubs				
Bog birch (<i>Betula pumila</i>)	44	••••		
Speckled alder (<i>Alnus incana</i>)	14	••		
Trees				
		Canopy freq% cover	Understory freq% cover	
Tamarack	17	•	59	••
Black spruce	14	•	50	••
Paper birch	-	-	16	•
White pine	-	-	12	•