



Northern Rich Fen (Water Track)

Open peatlands, primarily in water tracks in the interiors of large peatlands. Dominated by fine-leaved sedges or low shrubs, with scattered stunted tamaracks.

Vegetation Structure & Composition

Description is based on summary of vegetation data from 76 plots (relevés) and moss data from 3 bryophyte plots.

- **Moss** cover ranges from absent to interrupted (0–75% cover) and may include *Sphagnum* or other species.

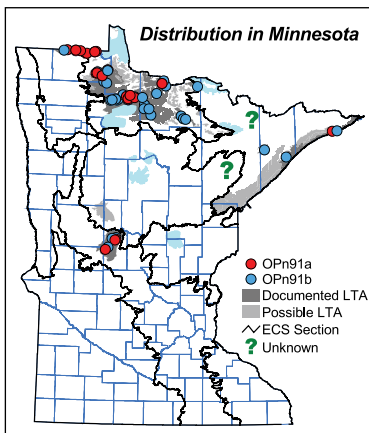
- **Graminoid** cover is > 50% and dominated by fine-leaved sedges, such as fen wiregrass sedge (*Carex lasiocarpa*) and tufted bulrush (*Scirpus cespitosus*). Lead-colored sedge (*C. livida*), candle-lantern sedge (*C. limosa*), and creeping sedge (*C. chordorrhiza*) are frequently present.

- **Shrub** cover is variable and may be dominated by bog birch (*Betula pumila*) or shrubby cinquefoil (*Potentilla fruticosa*), with bog rosemary (*Andromeda glaucophylla*) frequently present.

- **Forb** cover is variable but usually includes buckbean (*Menyanthes trifoliata*), with pitcher plant (*Sarracenia purpurea*) and intermediate bladderwort (*Utricularia intermedia*) commonly present.

- **Tree layer** is absent to very sparse, with scattered stunted tamarack.

- **Notes:** Wetter sites are characterized by low mossy lawns with subtle hummocks and hollows, and open peat-bottomed pools containing insectivorous plants such as sundews (*Drosera* spp.) and bladderworts (*Utricularia* spp.). Drier sites are characterized by low, shrub-dominated moss hummocks (formed of minerotrophic *Sphagnum* or brown mosses) that often occur as linear ridges (strings) in water tracks and in areas along the outer margins of water tracks. The interconnected wet hollows (flarks) between strings are usually dominated by floating or emergent brown mosses. Northern marsh fern (*Thelypteris palustris*) and Arctic raspberry (*Rubus acaulis*) are often present on dry sites, along with sparse cover of stunted tamarack.



Landscape Setting & Soils

OPn91 occurs most commonly in water tracks that develop in association with lenses of sandy or coarse-textured beach deposits in the interiors of large peatlands on former glacial lake plains, especially the Lake Agassiz plain. OPn91 also occurs rarely in peat basins that have significant lateral flow of subsurface water. Substrate is usually deep (> 16in [40cm]) hemc peat. Surface water pH ranges from 5.6 to 7.0. Water table is near the surface and very stable throughout the year. OPn91 is often present adjacent to Northern Rich Tamarack Swamps (Water Track) (FPn81).

Natural History

OPn91 occurs in peatlands where there is lateral flow of mineral-rich groundwater, resulting in surface water chemistry that is nutrient poor but has sufficient mineral concentrations to maintain circumneutral pH (> 5.5). These conditions are most common in areas of peatlands underlain by permeable sandy soils, which provide zones of groundwater discharge. The mineral-rich groundwater typically emanates from areas of calcareous glacial till, often outside of the peatlands where OPn91 occurs, and flows beneath dense clayey sediments underlying the peatlands until it reaches lenses of sand or coarse-textured material and percolates to the surface.



Similar Native Plant Community Classes

• OPn92 Northern Rich Fen (Basin)

OPn92, when characterized by fine-leaved sedges, bog birch, minerotrophic indicator species, and a ground cover of *Sphagnum* (OPn92b), can be similar to OPn91. OPn92, however, typically occurs in basins and on floating mats along shores rather than in large peatland water tracks. OPn92 is more likely to have wet meadow plants such as marsh St. John's wort (*Triadenum fraseri*) and broad-leaved arrowhead (*Sagittaria latifolia*). The dominant moss species in OPn92 include less minerotrophic brown mosses such as *Drepanocladus aduncus* or *Sphagnum* species such as those of the section Subsecunda. OPn91 is more likely to have boreal peatland plants such as English sundew (*Drosera anglica*) and seaside arrowgrass (*Triglochin maritima*). The dominant mosses in OPn91 are minerotrophic *Sphagnum* species on hummocks and aquatic brown mosses in hollows.

OPn91 Indicator Species	(freq%)	
	OPn91	OPn92
Lead-colored sedge (<i>Carex livida</i>)	79	-
Kalm's lobelia (<i>Lobelia kalmii</i>)	26	-
Shrubby cinquefoil (<i>Potentilla fruticosa</i>)	21	-
English sundew (<i>Drosera anglica</i>)	21	-
Tufted bulrush (<i>Scirpus cespitosus</i>)	21	-
Flattened spikerush (<i>Eleocharis compressa</i>)	50	2
Hudson Bay bulrush (<i>Scirpus hudsonianus</i>)	26	2
Seaside arrowgrass (<i>Triglochin maritima</i>)	48	4

OPn92 Indicator Species	(freq%)	
	OPn91	OPn92
Broad-leaved arrowhead (<i>Sagittaria latifolia</i>)	-	40
Beaked sedge (<i>Carex utriculata</i>)	-	36
Large cranberry (<i>Vaccinium macrocarpon</i>)	-	34
Lake sedge (<i>Carex lacustris</i>)	-	34
Three-way sedge (<i>Dulichium arundinaceum</i>)	-	28
Steeplebush (<i>Spiraea tomentosa</i>)	-	24
Speckled alder (<i>Alnus incana</i>)	2	32
Marsh St. John's wort (<i>Triadenum fraseri</i>)	6	68

• OPn81 Northern Shrub Shore Fen

OPn81 when dominated by sweet gale with fen wiregrass sedge (*Carex lasiocarpa*) may appear similar to OPn91, particularly when present where water tracks flow into ponds. OPn81 is more likely to have wet meadow plants such as bluejoint (*Calamagrostis canadensis*) and lake sedge (*C. lacustris*), and the mosses in OPn81 consist of sparse and interrupted cover of less minerotrophic brown mosses, such as *Drepanocladus aduncus*, with few hummock-forming species. OPn91 is more likely to have boreal peatland plants such as pitcher plant and seaside arrowgrass. The mosses in OPn91 include hummock-forming and minerotrophic *Sphagnum* species beneath shrubs or along strings in water tracks, with minerotrophic brown mosses along the edges of pools and flarks.

OPn91 Indicator Species	(freq%)	
	OPn91	OPn81
Lead-colored sedge (<i>Carex livida</i>)	79	-
White beak rush (<i>Rhynchospora alba</i>)	55	-
Intermediate bladderwort (<i>Utricularia intermedia</i>)	52	-
Flattened spikerush (<i>Eleocharis compressa</i>)	50	-
Seaside arrowgrass (<i>Triglochin maritima</i>)	48	-
Scheuchzeria (<i>Scheuchzeria palustris</i>)	41	-
Spatulate-leaved sundew (<i>Drosera intermedia</i>)	30	-
Pitcher plant (<i>Sarracenia purpurea</i>)	68	5

OPn81 Indicator Species	(freq%)	
	OPn91	OPn81
Bluejoint (<i>Calamagrostis canadensis</i>)	-	77
Lake sedge (<i>Carex lacustris</i>)	-	63
Balsam willow (<i>Salix pyrifolia</i>)	-	49
Beaked sedge (<i>Carex utriculata</i>)	-	40
Red maple (U)	-	30
Speckled alder (<i>Alnus incana</i>)	2	81
Crested fern (<i>Dryopteris cristata</i>)	2	44
Meadowsweet (<i>Spiraea alba</i>)	2	42

• OPn93 Northern Extremely Rich Fen

OPn93 is similar to graminoid-dominated occurrences of OPn91 (OPn91b) but is present in groundwater-discharge zones, most often forming anastomosing channels that dissect rich conifer swamps. Occurrences of OPn93 are characterized by loose unconsolidated peat with areas of open water, calcareous precipitates, and brown moss mats (formed mainly of *Scorpidium scorpioides*) with little vascular plant cover. OPn93 is more likely to have calciphilic species such as twig rush (*Cladium mariscoides*), sterile sedge (*Carex sterilis*), and beaked spikerush (*Eleocharis rostellata*).

OPn91 Indicator Species	(freq%)	
	OPn91	OPn93
Water horsetail (<i>Equisetum fluviatile</i>)	47	-
Bog willow (<i>Salix pedicularis</i>)	36	-
Leatherleaf (<i>Chamaedaphne calyculata</i>)	29	-
Marsh cinquefoil (<i>Potentilla palustris</i>)	22	-
Slender cottongrass (<i>Eriophorum gracile</i>)	22	-
Creeping sedge (<i>Carex chordorrhiza</i>)	69	13
Scheuchzeria (<i>Scheuchzeria palustris</i>)	60	13
Small cranberry (<i>Vaccinium oxycoccos</i>)	42	13

OPn93 Indicator Species	(freq%)	
	OPn91	OPn93
Beaked spikerush (<i>Eleocharis rostellata</i>)	-	38
Slender sedge (<i>Carex echinata</i>)	-	25
Sterile sedge (<i>Carex sterilis</i>)	-	25
White cedar (U)	4	75
Dwarf alder (<i>Rhamnus alnifolia</i>)	2	25
American grass-of-Parnassus (<i>Parnassia glauca</i>)	2	25
Twig rush (<i>Cladium mariscoides</i>)	7	75
Shrubby cinquefoil (<i>Potentilla fruticosa</i>)	7	38



• OPp91 Prairie Rich Fen

OPp91, like OPn91, occurs in water tracks and may have a ribbed fen pattern. OPp91, however, generally is present to the west of OPn91 in the LAP, northern MIM, and the Prairie Parkland Province. The ranges of the two classes may overlap in the extreme western MOP. OPp91 is more likely to have wet meadow species such as grass-leaved goldenrod (*Euthamia graminifolia*), eastern panicled aster (*Aster lanceolatus*), cut-leaved bugleweed (*Lycopus americanus*). OPn91 is more likely to have ericaceous shrubs such as bog rosemary and small cranberry (*Vaccinium oxycoccos*), as well as other boreal peatland species such as pitcher plant and sundews.

OPn91 Indicator Species	(freq%)	
	OPn91	OPp91
Pitcher plant (<i>Sarracenia purpurea</i>)	65	-
White beak rush (<i>Rhynchospora alba</i>)	52	-
Small cranberry (<i>Vaccinium oxycoccos</i>)	44	-
Scheuchzeria (<i>Scheuchzeria palustris</i>)	43	-
Round-leaved sundew (<i>Drosera rotundifolia</i>)	35	-
Bog rosemary (<i>Andromeda glaucophylla</i>)	68	1
Candle-lantern sedge (<i>Carex limosa</i>)	67	1
Creeping sedge (<i>Carex chordorrhiza</i>)	70	2

* Hardstem and slender bulrush (*Scirpus acutus* and *S. heterochaetus*)

Opp91 Indicator Species	(freq%)	
	OPn91	OPp91
Grass-leaved goldenrod (<i>Euthamia graminifolia</i>)	-	51
Cut-leaved bugleweed (<i>Lycopus americanus</i>)	-	41
Rough bugleweed (<i>Lycopus asper</i>)	-	30
Hardstem and slender bulrush*	-	30
Common mint (<i>Mentha arvensis</i>)	-	29
Eastern panicled aster (<i>Aster lanceolatus</i>)	2	45
Swamp milkweed (<i>Asclepias incarnata</i>)	2	39
Buxbaum's sedge (<i>Carex buxbaumii</i>)	6	74

• FPN81 Northern Rich Tamarack Swamp (Water Track)

FPN81 can sometimes have sparse (< 25%) tree canopy cover and appear similar to OPn91, although the trees in FPN81 are usually taller (> 16ft [5m] tall) than the stunted trees characteristic of OPn91. FPN81 is more likely to have shade-tolerant species such as creeping snowberry (*Gaultheria hispida*), one-sided pyrola (*Pyrola secunda*), and soft-leaved sedge (*Carex disperma*). OPn91 is more likely to have shade-intolerant species such as lead-colored sedge (*C. livida*), white beak rush (*Rhynchospora alba*), and scheuchzeria (*Scheuchzeria palustris*).

OPn91 Indicator Species	(freq%)	
	OPn91	FPN81
White beak rush (<i>Rhynchospora alba</i>)	55	-
Intermediate bladderwort (<i>Utricularia intermedia</i>)	52	-
Scheuchzeria (<i>Scheuchzeria palustris</i>)	41	-
Spatulate-leaved sundew (<i>Drosera intermedia</i>)	30	-
Kalm's lobelia (<i>Lobelia kalmii</i>)	26	-
Lesser bladderwort (<i>Utricularia minor</i>)	26	-
Shrubby cinquefoil (<i>Potentilla fruticosa</i>)	21	-
Lead-colored sedge (<i>Carex livida</i>)	79	5

FPN81 Indicator Species	(freq%)	
	OPn91	FPN81
Soft-leaved sedge (<i>Carex disperma</i>)	-	75
One-sided pyrola (<i>Pyrola secunda</i>)	-	55
Stemless lady's slipper (<i>Cypripedium acaule</i>)	-	50
Creeping snowberry (<i>Gaultheria hispida</i>)	-	45
Three-fruited bog sedge (<i>Carex trisperma</i>)	-	40
Bluejoint (<i>Calamagrostis canadensis</i>)	-	35
Poor sedge (<i>Carex paupercula</i>)	3	90
Velvet-leaved blueberry (<i>Vaccinium myrtilloides</i>)	2	40

Native Plant Community Types in Class

• OPn91a Shrub Rich Fen (Water Track)

OPn91a is variable across its range but typically is dominated by shrubs, including bog birch, leatherleaf, bog rosemary, and shrubby cinquefoil, usually with > 25% cover, interspersed with sparsely vegetated hummocks formed from minerotrophic *Sphagnum* or brown mosses. OPn91a often develops on peat ridges (strings). Description is based on summary of vegetation data from 21 plots.

• OPn91b Graminoid Rich Fen (Water Track)

OPn91b is dominated by graminoids, with ericaceous shrub cover < 25%. OPn91b is divided into two subtypes on the basis of peat architecture. Subtype descriptions are based on summary of vegetation data from 45 plots.

○ OPn91b1 Featureless Water Track Subtype

Graminoid-dominated rich fens lacking distinct pools and aquatic species, although the peat surface may have shallow hollows dominated by brown mosses or *Sphagnum* species of the section Subsecunda.

○ OPn91b2 Flark Subtype

Graminoid-dominated rich fens with distinct peat-bottom pools oriented perpendicular to groundwater flow. Pools support characteristic aquatic species not present in OPn91b1, including English sundew (*Drosera anglica*), linear-leaved sundew (*D. linearis*), lesser bladderwort (*Utricularia minor*), seaside arrowgrass, and lead-colored sedge (*Carex livida*). OPn91b2 is best developed in flarks that form in interiors of well-developed featureless water tracks in large peatlands, typically in association with rich or poor shrub fens. Subtle pool formation, however, can also occur in the smaller peatlands present in the northeastern part of the state.



photo by B.A. Coffin MN DNR

Winter Road Lake Peatland Scientific and Natural Area, Lake of the Woods County, MN



OPn91 Northern Rich Fen (Water Track) – Species Frequency & Cover

	freq%	cover		freq%	cover
Forbs, Ferns & Fern Allies					
Buckbean (<i>Menyanthes trifoliata</i>)	79	••	Bristle-stalked sedge (<i>Carex leptalea</i>)	35	••
Pitcher plant (<i>Sarracenia purpurea</i>)	68	•	Clustered muhly grass (<i>Muhlenbergia glomerata</i>)	33	••
Intermediate bladderwort (<i>Utricularia intermedia</i>)	52	•	Hudson Bay bulrush (<i>Scirpus hudsonianus</i>)	26	••
Seaside arrowgrass (<i>Triglochin maritima</i>)	48	•	Interior sedge (<i>Carex interior</i>)	24	••
Water horsetail (<i>Equisetum fluviatile</i>)	42	•	Tufted bulrush (<i>Scirpus cespitosus</i>)	21	••••
Scheuchzeria (<i>Scheuchzeria palustris</i>)	41	•	Chamisso's cottongrass (<i>Eriophorum chamissonis</i>)	20	••
Round-leaved sundew (<i>Drosera rotundifolia</i>)	38	•	Slender cottongrass (<i>Eriophorum gracile</i>)	18	•
Marsh cinquefoil (<i>Potentilla palustris</i>)	36	•	Prairie sedge (<i>Carex prairea</i>)	14	••
Northern marsh fern (<i>Thelypteris palustris</i>)	32	••	Lesser-panicled sedge (<i>Carex diandra</i>)	12	•
Spatulate-leaved sundew (<i>Drosera intermedia</i>)	30	•	Twin bentgrass (<i>Agrostis hyemalis</i>)	12	••
Labrador bedstraw (<i>Galium labradoricum</i>)	27	•	Sparse-fruited sedge (<i>Carex tenuiflora</i>)	11	•
Marsh bellflower (<i>Campanula aparinoides</i>)	27	•	Delicate cottongrass (<i>Eriophorum tenellum</i>)	11	•
Kalm's lobelia (<i>Lobelia kalmii</i>)	26	•	Aquatic sedge (<i>Carex aquatilis</i>)	9	•••
Lesser bladderwort (<i>Utricularia minor</i>)	26	•	Fringed brome (<i>Bromus ciliatus</i>)	9	•
Bog aster (<i>Aster borealis</i>)	24	•	Sooty-colored beak rush (<i>Rhynchospora fusca</i>)	9	•••
English sundew (<i>Drosera anglica</i>)	21	•	Slender sedge (<i>Carex echinata</i>)	9	•
Tufted loosestrife (<i>Lysimachia thyrsiflora</i>)	18	•	Coastal sedge (<i>Carex exilis</i>)	9	••••
Arctic raspberry (<i>Rubus acaulis</i>)	18	•	Buxbaum's sedge (<i>Carex buxbaumii</i>)	8	•••
Marsh grass-of-Parnassus (<i>Parnassia palustris</i>)	15	•	Tall cottongrass (<i>Eriophorum polystachion</i>)	8	••
Horned bladderwort (<i>Utricularia cornuta</i>)	14	••	Low Shrubs		
Big-leaf white violet or Northern white violet*	14	•	Bog rosemary (<i>Andromeda glaucophylla</i>)	68	••
Linear-leaved sundew (<i>Drosera linearis</i>)	12	•	Small cranberry (<i>Vaccinium oxycoccos</i>)	48	•
Bog goldenrod (<i>Solidago uliginosa</i>)	12	•	Leatherleaf (<i>Chamaedaphne calyculata</i>)	32	••
Rose pogonia (<i>Pogonia ophioglossoides</i>)	11	•	Sweet gale (<i>Myrica gale</i>)	9	•
Three-leaved false Solomon's seal (<i>Smilacina trifolia</i>)	11	•	Labrador tea (<i>Ledum groenlandicum</i>)	9	•
Swamp lousewort (<i>Pedicularis lanceolata</i>)	9	•	Tall Shrubs		
Northern bugleweed (<i>Lycopus uniflorus</i>)	9	•	Bog birch (<i>Betula pumila</i>)	59	•••
Grasses & Sedges			Bog willow (<i>Salix pedicellaris</i>)	47	••
Fen wiregrass sedge (<i>Carex lasiocarpa</i>)	95	••••	Shrubby cinquefoil (<i>Potentilla fruticosa</i>)	21	••
Lead-colored sedge (<i>Carex livida</i>)	79	•	Slender willow (<i>Salix petiolaris</i>)	12	•
Candle-lantern sedge (<i>Carex limosa</i>)	68	••	Autumn willow (<i>Salix serissima</i>)	11	•
Creeping sedge (<i>Carex chordeorrhiza</i>)	67	•	Dwarf alder (<i>Rhamnus alnifolia</i>)	9	•
White beak rush (<i>Rhynchospora alba</i>)	55	••	Sage-leaved willow (<i>Salix candida</i>)	9	•
Flattened spikerush (<i>Eleocharis compressa</i>)	50	•	Tree Seedlings or Saplings (< 6ft)		
*Big-leaf white violet or Northern white violet (<i>Viola blanda</i> or <i>V. macloskeyi</i>)			Tamarack	32	••