

**BRYOPHYTES OF THE  
OTTAWA CALCAREOUS FEN,  
LE SUEUR COUNTY, MINNESOTA  
Preliminary Reconnaissance**

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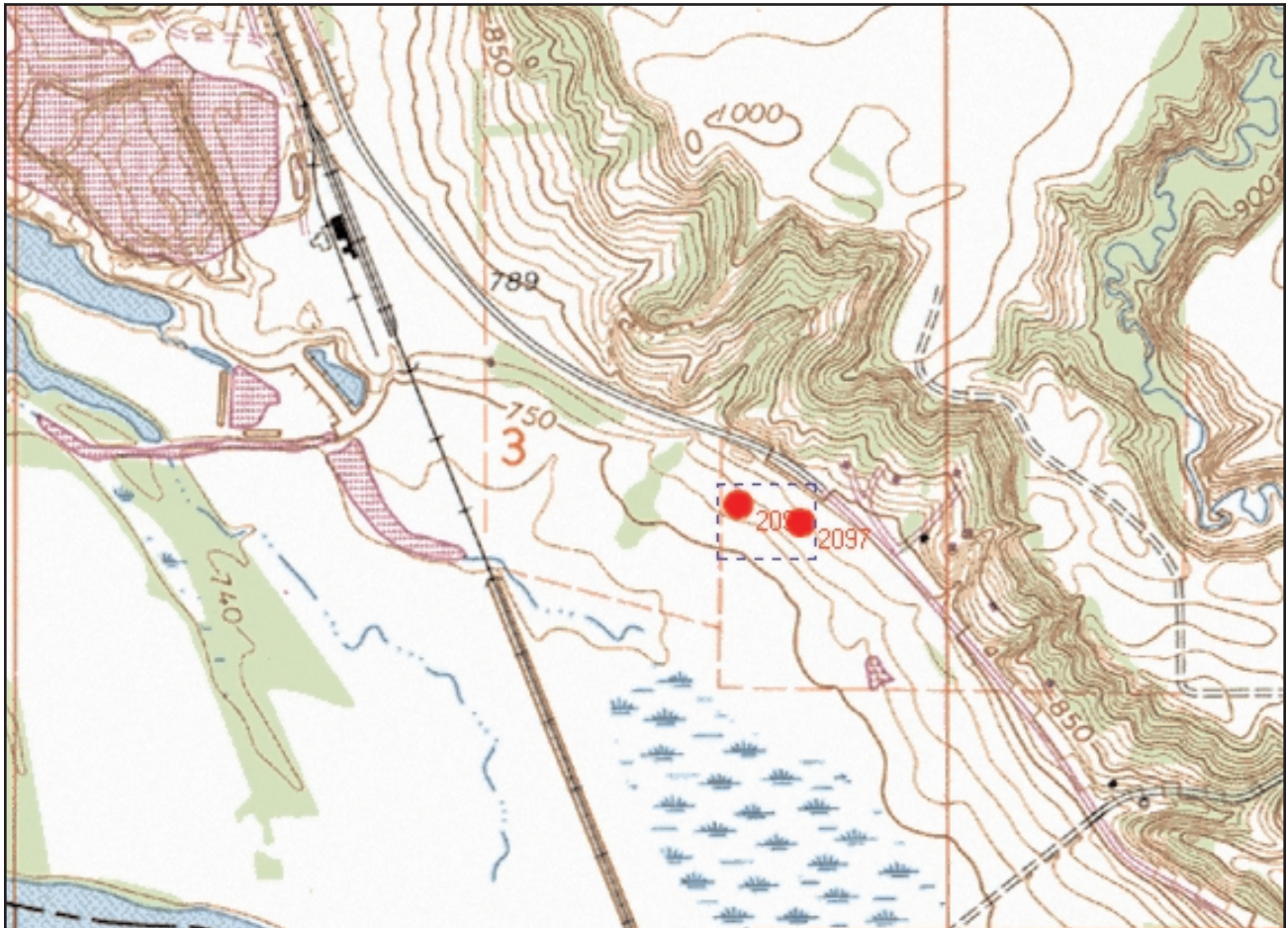
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## INTRODUCTION

The Ottawa Calcareous Fen (Fig. 1) is a complex seepage and spring-fen area located at 44° 21' 42" to 43" N, 93° 55' 56" to 56' 01" W, 240 m a.s.l., on west side of County Road 23, 2.75 km south of Ottawa, 4.5 km NNE of St. Peter, Le Sueur County, Minnesota. Bryophytes were surveyed by J.A. Janssens on May 12, 2000.

Two major sites (2097 and 2098) with four ecotopes or meso-habitats each were recognized based on physiognomic differentiation (Table 1, Janssens 2002). Water-chemistry samples and bryophyte vouchers were collected in all ecotopes. No point-intercept transects were surveyed during this preliminary reconnaissance.

This report presents the results of the floristic reconnaissance of bryophytes (mosses and liverworts) at the four ecotopes A to D of sites 2097 and 2098. The collections (*Janssens 40886 to 40991*) are deposited at the herbaria of Lambda-Max Ecological Research and the Science Museum of Minnesota as vouchers. The results of the water-chemistry measurements (pH, specific conductance, and absorbance @ 350 nm, see Janssens 2002) are also given in Table 1.



**Figure 1.** Topographic map extract from 1:24,000 St. Peter quad with site 2097 marked at 44° 21' 42" N, 93° 55' 56" W and site 2098 at 44° 21' 43" N, 93° 56' 01" W.

**Table 1.** Ecotopes differentiation of sites 2097 and 2098, Ottawa Calcareous Fen in Le Sueur County. Also given are the listing of bryophyte vouchers and the water-chemistry measurements (see Janssens 2002 for methods).

Ecotope ID and description	Bryophyte collection nos	---Water-chemistry---		
		pH	K <sub>25°C</sub> reduced	absorbance @ 350 nm
2097A: seepage fen with <i>Scirpus acutus</i> and scattered <i>Cornus</i> shrubs	JAJ40886-920	8.2	345	0.030
2097B: seepage fen with <i>Typha latifolia</i>	JAJ40921-938	7.6	453	0.023
2097C: channel in seepage fen with <i>Typha angustifolia</i>	JAJ40939-941	7.1	487	0.042
2097D: short-sedge meadow	JAJ40942-950	7.6	398	0.023
2098A: seepage fen with <i>Scirpus acutus</i> and scattered shrubs	JAJ40951-964	8.0	443	0.044
2098B: spring-seepage area with tufa build-up	JAJ40965-972	7.4	424	0.008
2098C: short-sedge meadow	JAJ40973-978	8.3	415	0.028
2098D: seepage fen with <i>Typha latifolia</i>	JAJ40979-991	7.1	497	0.035

## RESULTS AND CONCLUSIONS

Table 2 lists the species of bryophytes identified for all ecotopes of site 2097 and 2098. The species are individually discussed in the Appendix.

Site 2097 has a typical extreme-rich fen assemblage of bryophytes, but with the addition of some shade-tolerant species, such as *Hypnum lindbergii*, *Plagiomnium cuspidatum*, and large populations of the small modification of *Drepanocladus aduncus*, possibly indicating the encroachment of shrubs. In addition, there is no indication of spring upwelling such as found in nearby site 2098, where *Cratoneuron filicinum* marks the sites of groundwater discharge and tufa formation. Notwithstanding the lower species diversity of site 2098 (the site presumably the most impacted by water-table change and strongly overgrown by *Impatiens*), there appears to be no sign of significant disturbance yet by the presence of either ruderal (weedy) or exotic species. The large, upright, and aquatic modification of *Drepanocladus aduncus* abundant on the spring areas of site 2098 converges strongly with the growth form of *Cratoneuron filicinum*, and both species grow intimately intermingled.

The Ottawa has 9 obligate, 5 facultative, and 3 occasional calcareous-fen indicators among the bryophytes recorded. This adds up to a score value of 253 (Janssens 2004). This is the highest value so far recorded for any of the calcareous fens of the southeastern region, and for Minnesota the fen ranks the fifth out of 60 calcareous and extreme-rich fens with bryophyte surveys.

## Bryophytes of the Ottawa Calcareous Fen

**Table 2.** Mosses and liverworts found at sites 2097 and 2098, calcareous seepage fen near Ottawa, Le Sueur County, Minnesota. See Table 1 for a description of the ecotopes (columns). All species except *Campylium stellatum* are new county records (Janssens 2000 for mosses, and for liverworts an unpublished database). The distribution and habitat of each species is discussed in the Appendix. (OB = obligate, FA = facultative, and OC = occasional calcareous-fen indicator, Janssens 2004).

	2097				2098			
	A	B	C	D	A	B	C	D
<i>Amblystegium varium</i> FA	x							
<i>Aneura pinguis</i> OB	x	x			x			
<i>Brachythecium acuminatum</i> OC	x							
<i>Brachythecium rivulare</i> OB	x	x	x		x	x		x
<i>Brachythecium salebrosum</i> FA	x	x						
<i>Bryum pseudotriquetrum</i> OB	x	x	x	x	x	x	x	x
<i>Calliergonella cuspidata</i> OB	x	x						
<i>Campylium polygamum</i> OB	x				x	x	x	
<i>Campylium radicale</i> OC		x						
<i>Campylium stellatum</i> OB	x	x	x	x	x		x	
<i>Cratoneuron filicinum</i> FA					x	x	x	
<i>Drepanocladus aduncus</i> OB	x	x			x	x		x
<i>Drepanocladus aduncus</i> var. <i>polycarpus</i> FA	x							
<i>Hypnum lindbergii</i> FA	x		x		x			
<i>Limprichtia cossonii</i> OB			x					
<i>Plagiomnium cuspidatum</i> OC	x							
<i>Plagiomnium ellipticum</i> OB	x	x						

## REFERENCES

- Janssens, J.A. 2000. County Atlas of Minnesota Mosses. Website by Ecological Services, Minnesota Department of Natural Resources, 500 Lafayette Road, St. Paul, Minnesota 55155, [www.dnr.state.mn.us/plants/flm/mossatlas](http://www.dnr.state.mn.us/plants/flm/mossatlas)
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- Janssens, J.A. 2004. Classification, indicator value, and regional differentiation of bryophyte species in Minnesota's calcareous fens and validation of the calcareous fens of the prairie region, update June 2004. Available from [janss008@tc.umn.edu](mailto:janss008@tc.umn.edu) or [jeanette.letee@dnr.state.mn.us](mailto:jeanette.letee@dnr.state.mn.us)

## APPENDIX

### Habitat and Distribution Notes on Recorded Bryophyte Species

Copied, compiled, and modified from, *inter alia*:

Crum, H.A. and L.E. Anderson. 1981. Mosses of Eastern North America. Columbia University Press, New York.

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*Amblystegium varium* (Hedw.) Lindb.

Habitat. - On wet to moist substrates, usually on soil, rocks, rotting wood, root of trees, in shaded habitats in calcareous areas.

Extant Distribution. - Alaska to Labrador, Newfoundland, and Greenland, widespread in Canada and the northern United States, especially in the east, south to Florida and California. Mexico, Central and South America. Europe and Asia, Japan. North Africa.

*Aneura pinguis* (L.) Dum.

Habitat. - Abundant in rich fens and along seepage near limestone. Often on peaty substrates, but, at least in boreal and northern temperate areas, in nearly all sites a common indicator of high pH and available Ca.

Extant Distribution. - Nearly cosmopolitan, from the high arctic to the tropics. In North America from Greenland to Alaska, and south to California and Florida. Mexico, Central and South America. Africa, Madagascar. Asia, Japan, south to New Guinea, Australia, and New Zealand, Campbell Island.

*Brachythecium acuminatum* (Hedw.) Aust.

Habitat. On the base of trees and rotten logs, in the south of Minnesota often covering rocks. Also on dry to mesic forest floor.

Extant Distribution. Endemic to temperate eastern North America, but very widespread. From Nova Scotia west to Saskatchewan, South Dakota, and south to Oklahoma, Texas, and Florida.

*Brachythecium rivulare* B.S.G.

Habitat. in wet to moist habitats in upland and lowland forest, and in alkaline peatlands. On rock, soil, logs, and humus, in depressions, seepage and spring areas, and along creeks.

Extant Distribution. In North America from Greenland, Newfoundland, and Labrador in the east to Alaska and British Columbia in the west, south to New Mexico and Nevada and to North Carolina and Arkansas. Europe, Asia Minor and central Asia, Japan. South America.



## Bryophytes of the Ottawa Calcareous Fen

*Brachythecium salebrosum* (Web. & Mohr) B.S.G

Habitat. On shaded soil, stones, bases of trees, and logs, usually in rather dry, disturbed places.

Extant Distribution. In North America from Greenland and Newfoundland to Manitoba and Nebraska, south to the mountains of North Carolina and Tennessee. In the west from Alaska and the Yukon to British Columbia, Idaho, and Colorado. Europe. Macaronesia. Caucasus. Asia, Japan. Tasmania and Kerguelen.

*Bryum pseudotriquetrum* (Hedw.) Gaertn. *et al.*

Habitat. On moist calcareous soil and in rich fens.

Extant Distribution. Circumboreal. In North America from Alaska, Northwest Territories, Greenland, and Labrador, south to Ontario. Svalbard, throughout Europe, arctic Asia, Altai Mountains.

*Calliergonella cuspidata* (Hedw.) Loeske

Habitat. - In highly calcareous habitats in the north, less so southward. On wet peat and humus in open areas of wet meadows, lake edges, and fen mats. In Europe at least often in wet lawn and grassland, often abundant.

Extant Distribution. - In North America in the west from British Columbia to California and inland to Idaho and Wyoming. In the east from Newfoundland to Minnesota, south to Iowa, Tennessee, North Carolina, Ohio, and Massachusetts. Jamaica. Europe. Caucasus. Japan. New Zealand.

*Campylium polygamum* (B.S.G.) Jens.

Habitat. - On soil, rotten wood, and humus in meadows, swamps, and wooded bogs. Sometimes submerged in lakes or pools.

Extant Distribution. - Circumboreal, temperate, and austral. In North America from Alaska and British Columbia to Newfoundland, and south to Wyoming and the Great Lakes states. South America. Europe, northern Africa, Siberia, Japan. Australia, New Zealand, Patagonia.

*Campylium radicale* (P. Beauv.) Grout

Habitat. - On decaying leaves, twigs, and humus or wet, sapric soil in swampy places.

Extant Distribution. - Uncommon and difficult to differentiate from poorly developed modifications of related species. Apparently widespread, in the east from Newfoundland to Minnesota and south to Arkansas and Florida. Reported in the west from Oregon and Washington. Central America. Europe. Japan.

*Campylium stellatum* (Hedw.) C. Jens. (including var. *stellatum* and var. *protensum* (Brid.) Bryhn)

Habitat. - On moist and wet calcareous soil and peat, plant litter, and rocks. In fens, along streamsides, in ditches, seepage areas around springs.

Extant Distribution. - Circumboreal. In North America from Alaska to Greenland, Labrador and Newfoundland, south through the western mountains to Wyoming, Colorado and New Mexico in the west and to North Carolina in the east.

*Cratoneuron filicinum* (Hedw.) Spruce

Habitat. - In calcareous seepages, near springs, waterfalls, and in drainage ditches. On highly minerotrophic rock and mineral soil.

Extant Distribution. - Circumboreal and circumarctic, bipolar. In North America from the Aleutians to the Arctic, Greenland and Newfoundland, south to North Carolina, Arkansas, Texas, New Mexico and California. Central and South America. Europe, Svalbard, Middle East, Himalayas, Japan. Northern Africa. New Zealand.

*Drepanocladus aduncus* (Hedw.) Warnst. (including the varieties *aduncus* and *polycarpus* (Bland. ex Voit.) Roth)

Habitat. - in fens, in seepage, beside lakes and pools in calcareous areas, sometimes brackish water. On stumps and logs in wet *Betula* forests, *Alnus* swamps and lags, or in moderately rich fens. The species grows well in luxurious vascular-plant vegetation, often in highly shaded situations, attached to thatch and litter (var. *polycarpus*). It is commonly found in ditches and prairie potholes subject to fluctuating water levels. It is the *Drepanocladus* species most commonly associated with disturbance and eutrophication and is extremely variable in structure, with numerous intergrading modifications. The variety *D. aduncus* var. *kneiffii* (B.S.G.) Mönk., excluded from the discussion here, is a distinct taxon (or modification?) found only in rich fens and sedge meadows, often submerged.

Extant Distribution. - Circumboreal and arctic-alpine. In North America from Alaska to Greenland, south to New England, Ohio, Indiana, Illinois, Mississippi, Missouri, Oklahoma, Nebraska, Colorado, Arizona, California, and Mexico.

Peru. Iceland, Europe. Algeria. Northern and central Asia, Japan. Australia, New Zealand, and Kerguelen.

*Hypnum lindbergii* Mitt.

Habitat. - On wet organic substrate and rotten wood in forested swamps and sedge meadows, at the margins of lakes and ponds. Rich fens.

Extant Distribution. - Circumboreal and arctic. In North America from the Aleutians and Alaska to Greenland and Newfoundland, south to New England, Florida, Texas, Minnesota, and British Columbia. Europe, Siberia, Japan, China.

*Limprichtia cossonii* (Schimp.) Anderson

Habitat. - Common in regions with Ca-rich soils and bedrock in boreal and arctic zones, further south mainly in mountainous areas. In fens, springs, water-filled depressions, on shores, or rarely submerged. In more alkaline situations than the related *L. revolvens*. Extreme-rich and rich fens.

Extant Distribution. - Widespread in North America: from Greenland and Newfoundland to Alaska, south to British Columbia, Colorado, and Montana in the west, and to Minnesota, Michigan, Illinois, Ohio, and New York in the east.

*Plagiomnium cuspidatum* (Hedw.) Kop.

Habitat. Extremely common species in upland and lowland habitats, on soil and humus, at the base of trees, on decayed logs and stumps, and on rocks covered by humus. Often in rather moist micro-habitats, but often also found in quite a dried-out condition.

Extant Distribution. In North America from Labrador to central Alaska and south throughout the United States. Europe. Asia: Himalayas, China, Korea, Japan.

*Plagiomnium ellipticum* (Brid.) Kop.

Habitat. - Commonly on organic substrates, in highly minerotrophic and often highly shaded habitats. In swampy forests, fens, alluvial meadows, alder and willow carrs, on river and lake shores.

Extant Distribution. - Circumboreal and bipolar. North America: from Alaska to Greenland and south to Pennsylvania, Ohio, Illinois, Iowa, New Mexico, Arizona, and California. Iceland, Europe, Caucasus, northern and central Asia, China, Japan. South America. Antarctica.