

App. 1a. Characteristics used for classification of bryophyte macrofossil remains (based on Vitt et al. 1988).

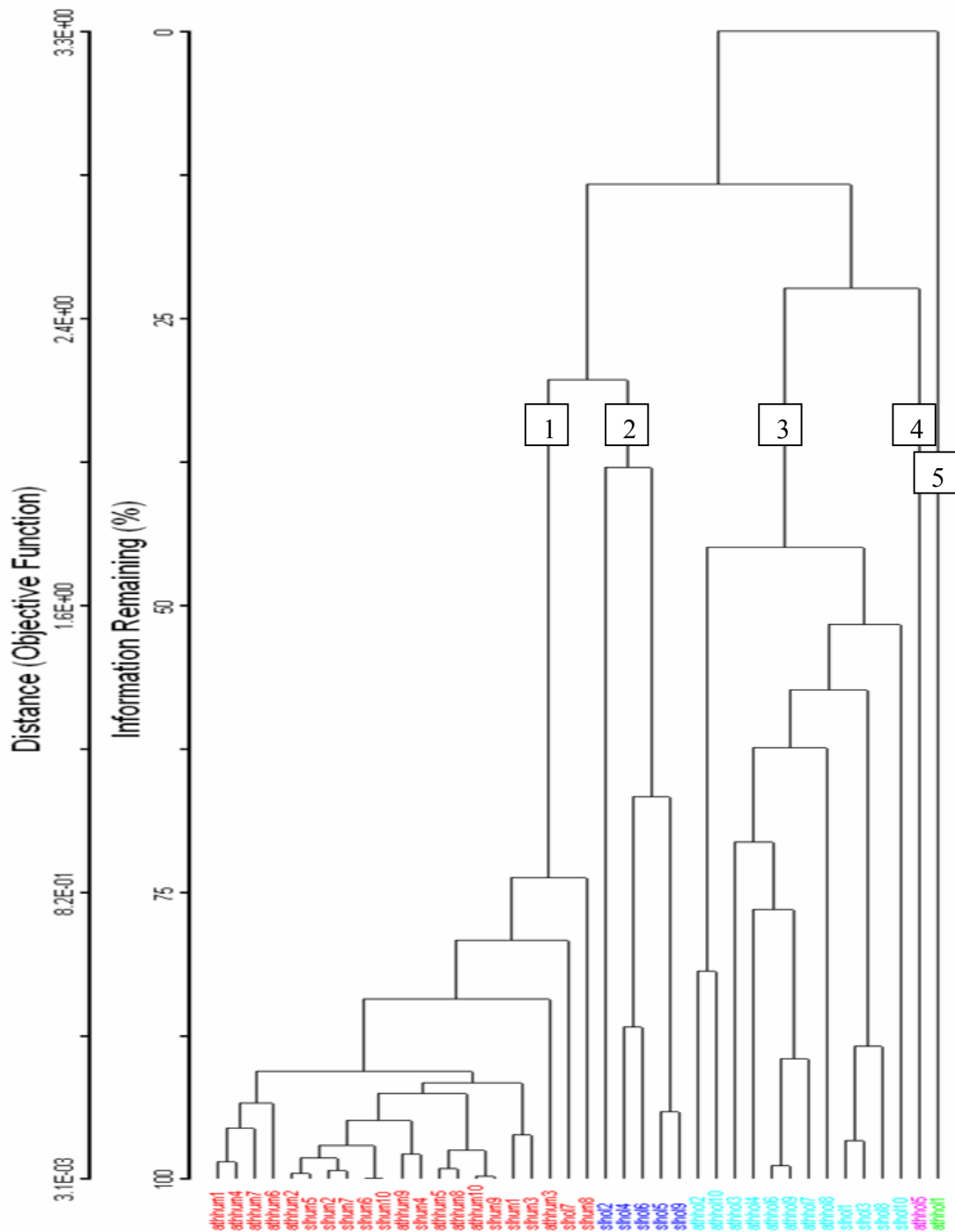
Classification	Stem	Stem leaf	Branch leaf
Sphagnum			
<i>Sphagnum magellanicum</i>	Large, exterior hyalodermis	Blunt with hyaline pores and fibers	Large with 'hooded' tip
Acutifolia			
<i>Sphagnum fuscum</i>	Brown coloration with hyalodermis	Rounded, tattered tip with no hyaline pores or fibers	Large hyaline pores positioned laterally and at apexes
<i>Sphagnum capillifolium</i>	Yellow- or red-green coloration with hyalodermis	Short and tapered with tattered tip. Hyaline pores and fibers present	Large hyaline pores positioned laterally and at apexes
<i>Sphagnum warnstorffii</i>	Green or yellow-green coloration with hyalodermis	Rounded, tattered tip with no hyaline pores or fibers	Small hyaline pores positioned laterally and at apexes
Cuspidata			
<i>Sphagnum angustifolium</i>	Yellow-green coloration without hyalodermis	Tapered to a point. Slightly longer than <i>S. capillifolium</i> with hyaline pores and fibers present	Single hyaline pores positioned outwardly only at cell ends
<i>Sphagnum riparium</i>	Green coloration without hyalodermis	Pointed with large tear along center	Single hyaline pores positioned outwardly only at cell ends

	General appearance	Leaves
True mosses		
<i>Polytrichum strictum</i>	Erect and stiff with or without white rhizomes on a dark brown stem	Stiff, pointed and spreading. Opaque due to longitudinal curling along centerline
<i>Aulacomnium palustre</i>	'Bushy' arrangement of leaves along erect stem	Long and blunt with 'vein' running entire length. Cells rounded with thick cell walls.
<i>Pohlia nutans</i>	'Vine-like' arrangement of leaves along red stem	Short and pointed with 'vein' running entire length and toothed in upper part. Cells rectangular.
<i>Dicranum undulatum</i>	'Bushy' arrangement of leaves along erect stem	Long and blunt with 'vein' running entire length. Wrinkled and wavy with short, irregular cells.
<i>Pleurozium schreberi</i>	Pinnately branched along a red stem	Oval-shaped with inrolled edges and long, thin cells.
<i>Tomenthypnum nitens</i>	Feathery branches along brown stem covered with reddish-brown tomentum	Long and tapered with 'vein' running entire length. Cells long and thin.

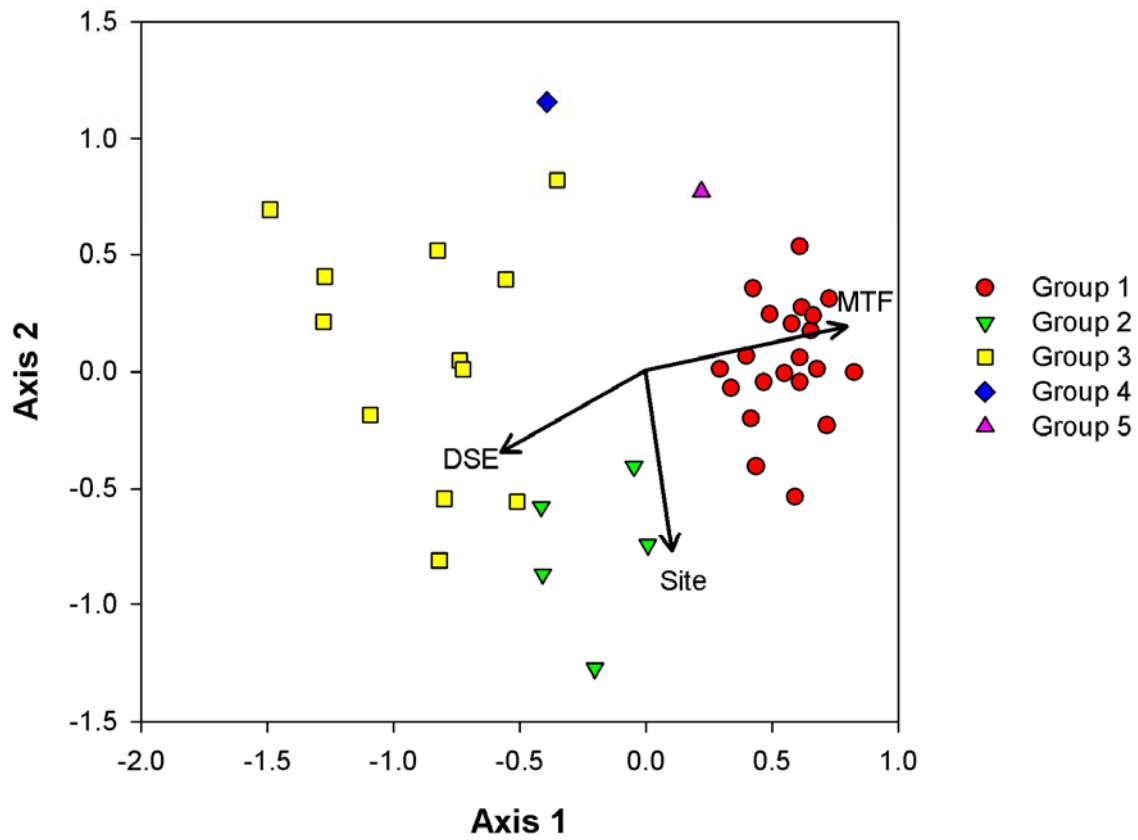
App. 1-5. Internet supplement to: Benscoter, B.W.; Kelman Wieder, R. & Vitt, D.H. 2005. Linking microtopography with post-fire succession in bogs *J. Veg. Sci.* 16: 453-460.

Appm 1b. Characteristics for classification of non-bryophyte macrofossil remains (morphology follows, in part, Lévesque et al. 1988).

Classification	Characteristics
Woody debris	
Bark	Rough, dark appearance lacking presence of wood on interior surface
Twigs	Woody elements with complete coverage by periderm.
Wood	Clumps or large pieces of secondary xylem with or without periderm
Roots	
Ericaceous	Small, elongate, brown to dark brown, nodular structures with or without branching
Herbaceous	Small, elongate, white to translucent structures possibly showing evidence of branching
Leaves/Needles	
Ericaceous	Vascular leaf structures that cannot be classified to species
<i>Ledum</i>	Oblong with inrolled edges and dense wooly hairs on underside
<i>Oxycoccus</i>	Egg-shaped with inrolled edges. Much smaller than <i>Ledum</i>
Sedge	Graminoid structure with long, parallel veins
<i>Pinus</i>	Long, triangular-shaped needles
<i>Picea</i>	Short, four-sided needles
<i>Larix</i>	Short, flattened needles
Other	
Lichen	Spongy, non-descript, white mass of material
Charcoal	Shiny, often jagged appearance. Easily crumbles under slight pressure.
Debris	Unidentifiable remains that cannot be classified under any other classification or sub-classification



App. 2. Dendrogram based on hierarchical cluster analysis for vegetation survey data for Athabasca and Sinkhole Lake hummocks and hollows. Boxed numbers on stems indicate group membership.



App. 3. NMDS ordination of vegetation cover data for 10 hummock and 10 hollow plots in Athabasca and Sinkhole Lake bogs (stress=0.1677) classified based on cluster analysis groupings (Fig. 2). Fitted vectors for site (Athabasca vs Sinkhole Lake), microtopographic feature (MTF; hummock vs hollow), and relative vertical relief (DSE) scaled relative to their correlation coefficient (Site, $r=0.7661$; MTF, $r=0.8432$; DSE, $r=0.6722$).

App. 4. Condensed community matrix for understory and ground layer vegetation survey data from 10 hummock (hum) and hollow (hol) plots in Athabasca (A) and Sinkhole Lake (S) bogs. Species abundances standardized by species maxima and classified into ten cover classes (1 through 10[X]) by defined upper abundance limits (0.1, 0.2, 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 1.0, respectively). Plots sorted in descending order by their scores on the relative vertical relief (DSE) vector. Species sorted by their weighted abundance average along the DSE vector. Absences represented by (-). Understory species indicated by asterisk (*).

	ssasaassssaaasasassssaaassssaassaaaaasaa hh oooooooooooooooooooouuuuuuuuuuuuuuuuuuuuuu 1111111111111111111111m.lmmmm.lmmmmmmmmmm.lmmmmmmmm 3121132589967684487239564916177518145123 0 0 0 0
<i>Andromeda polifolia</i> *	-----1---1-
<i>Lophozia incisa</i>	-----1-----1--
<i>Sphagnum capillifolium</i>	-1-----1-----1--11--1-2---1--111--1-16
<i>Letharia vulpina</i>	-----1-----1-----
<i>Sphagnum fuscum</i>	-----1-1---1---216798X17XX8X979X4X88XX85
<i>Oxycoccus microcarpus</i>	-1---1-1---1-112122-123212132234431221
<i>Mylia anomala</i>	-----11-----111---1-----1--
<i>Pohlia nutans</i>	-----1-----111-1-11-1-1111-1-
<i>Lophozia ventricosa</i>	-----1-----1-----1211--113---111---
<i>Sphagnum magellanicum</i>	-----1-----13111-11121--213-1--1-1
<i>Polytrichum strictum</i>	11-1-13111-1-11122112112111111111221121
<i>Vaccinium vitis-idaea</i> *	112311-12223316232-334244732852315236124
<i>Ledum groenlandicum</i> *	3213123313322636225584155675745716568566
<i>Eriophorum vaginatum</i> *	--1-1-----12-----1-----3
<i>Ribes triste</i> *	-----1-----1-----
<i>Cladina rangiferina</i>	-----1-----1-----
<i>Usnea lapponica</i>	11--1-111111-1-1-11111-1111111-1-1---1--
<i>Hypogymnia physodes</i>	11-----11111-111-11111-111-1-1-1-----1--
<i>Cladonia chlorophaea</i>	--11111--1111-1-1-----1-----1-----
<i>Cladonia scabriuscula</i>	-----1-----1-----1-----
<i>Usnea hirta</i>	-----1-----1-----
<i>Sphagnum angustifolium</i>	---1--12141--X4511211-1-111---111-----1
<i>Cetraria pinastri</i>	11111111111112111111111111111111111-1--
<i>Parmelia sulcata</i>	11111111111111111-11-111--1-1-1-111--11-
<i>Ribes hudsonianum</i> *	5--4--3231-1-311142131--1-----11---1---
<i>Cladonia cornuta</i>	1111--21-1111-111-1---1-----1-----
<i>Cladonia gracilis</i>	111-1111-1112-2---1-----1-----
<i>Cladonia botrytes</i>	1---1-----1-----1-----
<i>Cladonia crispata</i>	-----1-----1-----1-----
<i>Cladonia deformis</i>	--11-111-1-1---1-----1-----1-----
<i>Cladonia squamosa</i>	-----11-1---1---1---1-----1-----
<i>Cladina mitis</i>	15315711--3241313-1---1-----11-1--1-
<i>Cladonia bellidiflora</i>	--11--1---1---1-----1-----1-----
<i>Pleurozium schreberi</i>	8418-2--91674---3-----1-----
<i>Cladonia multififormis</i>	1111--4111-1--111-1-----1-----
<i>Dicranum undulatum</i>	1X-1-1-827-1-1-3--1-----1--1-----
<i>Cladonia cervicornis</i>	-----1-----1-----
<i>Cladonia coccifera</i>	---1-----1-----
<i>Cetraria islandica</i>	1-----1-----1-----

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App. 5. Diversity index calculations using the reciprocal of Simpson's index for reconstructed historical vegetation composition of cores collected from hummocks (Hum) and hollows (Hol) of Sinkhole Lake (S) and Athabasca (A) bogs sectioned and analyzed at 1-cm depth increments. Mean values with different letter symbols are significantly different based on Tukey's HSD *a-posteriori* comparisons by diversity type. No significant difference was found for mean α diversity.

Core	Depth (cm)	γ Diversity	Mean α Diversity	β Diversity
SHol1	15	1.82	1.16	1.58
SHol2	9	1.99	1.11	1.80
SHol3	17	2.64	1.11	2.37
SHol4	6	2.19	1.64	1.34
SHol5	22	2.96	1.43	2.07
SHol6	8	1.26	1.30	0.97
SHol7	16	2.73	1.12	2.44
SHol8	14	3.55	1.60	2.21
SHol9	19	2.94	1.16	2.53
SHol10	13	2.01	1.24	1.63
Mean		2.41±0.21 ^a	1.29±0.06	1.89±0.16 ^a
SHum1	26	1.41	1.35	1.05
SHum2	27	2.11	1.20	1.77
SHum3	25	3.08	1.63	1.89
SHum4	25	1.66	1.33	1.25
SHum5	32	1.32	1.32	1.00
SHum6	28	1.27	1.21	1.05
SHum7	29	1.59	1.25	1.27
SHum8	23	1.80	1.49	1.21
SHum10	26	1.75	1.18	1.48
Mean		1.78±0.18 ^{ab}	1.33±0.05	1.33±0.11 ^{bc}
AHol1	17	1.96	1.42	1.38
AHol2	9	1.38	1.00	1.38
AHol3	18	3.25	1.18	2.75
AHol4	8	1.26	1.26	1.00
AHol5	24	3.68	1.40	2.62
AHol6	8	1.47	1.40	1.05
AHol7	18	2.81	1.37	2.05
AHol8	6	1.54	1.06	1.45
AHol9	7	3.19	1.66	1.92
AHol10	16	2.23	1.07	2.07
Mean		2.28±0.28 ^a	1.28±0.07	1.77±0.19 ^{ab}
AHum1	26	1.29	1.26	1.03
AHum2	19	1.05	1.07	0.99
AHum3	19	1.50	1.28	1.17
AHum4	20	1.79	1.32	1.35
AHum5	23	1.20	1.05	1.14
AHum6	22	1.45	1.23	1.17
AHum7	23	1.62	1.18	1.38
AHum8	26	1.29	1.28	1.01
AHum9	11	1.11	1.12	0.99
AHum10	20	1.15	1.15	1.00
Mean		1.35±0.08 ^b	1.19±0.03	1.12±0.05 ^c

Note: Core 9 from Sinkhole Lake Hummock excluded due to insufficient charcoal horizon.

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