

A Reconnaissance Level Survey of Calciphilous Lichens in Selected Karst Topography in Nova Scotia with Notes on Incidental Bryophytes



Jamesville, Victoria County

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Introduction Karst topography and, in particular, gypsum outcrops, sinkholes and chimneys have long been known to be a habitat containing many rare or unique vascular plant species such as Rams Head Lady-slipper, *Cypripedium arietinum*, Yellow Lady-slipper, *C. parviflorum*, Gypsum buttercup, *Ranunculus gmelini*, Soapberry, *Shephardia canadensis*, and Leatherwood, *Dirca palustris*. These species are often referred to as gypsiphiles or calciphiles because of their preference for calcareous soils. Recent surveys for vascular plants in karst topography conducted for environmental assessments have identified a number of interesting calciphilous lichen species as well, some of which were not known previously to exist in the province. *Fuscopannaria pratermissima*, *Leptogium lichenoides*, *Placidium squamulosum* and *Solorina saccata* are just some of the lichen species of interest that have been newly recorded.

Karst topography can be found in eleven counties in the province. This widespread distribution, from the highlands of Cape Breton to the Shubenacadie River Basin, offers huge unexplored potential for conducting surveys for lichen species.

This project has been undertaken to develop an understanding of the potential of karst topography in the province of Nova Scotia to harbour many lichen species of interest.

Method Given the amount of karst topography in the province and field work time allotted for the project, reconnaissance level surveys were limited to ten sites. These sites were selected to allow surveys in three regions of the province; Cape Breton Island, Pictou Antigonish Highlands and the southside of Minas Basin. Sites were identified from the document "Gypsum and Anhydrite Resources in Nova Scotia" by G.C.Adams. In this document, forty gypsum occurrences are described in detail. The selected sites were visited over a period of five days. The lichen species of interest in this project are primarily ground-inhabiting and are observed primarily on exposed gypsum. Chosen sites that failed to provide this habitat were decided to be unacceptable for the purposes of this project and identified as such. None of the sites was surveyed comprehensively. The UTM's given in Adams' report led to the sites, where exposed gypsum was the focal point for the survey.

It quickly became apparent that, in addition to lichens, there are also a number of unique bryophytes in the habitat surveyed for this project and these species have also been noted in the results of this study.

Results The findings of this project are provided in the following descriptions and tables. It is important to note again that surveys were conducted at a reconnaissance level and are by no means a complete list of species at the sites. Species listed in the tables are either rare or new for the province according to the macrolichen assessment ranks designated by Nova Scotia Department of Natural Resources (NSDNR). Species identified only to genus are yet to be determined and will be sent to an expert for identification. S-ranks are based on information obtained from the Atlantic Canada Conservation Data Centre. A complete list of all lichens and bryophytes observed can be found in Appendix 1.

Harbour Centre, Antigonish County

Harbour Centre includes the Fairmont Ridge Trail, a park setting with a number of marked trails for hiking. Adams describes the area as “extensive well developed karst topography”. The site, just northeast of the trail system, contains numerous sinkholes, chimneys and exposed gypsum rock faces.

Lichens

Genus	Species	S Rank	DNR Rank
<i>Everniastrum</i>	<i>prunastri</i>	S2S3	Yellow
<i>Leptogium</i>	<i>lichenoides</i>	S1S2	Red
<i>Leptogium</i>	<i>intermedium</i>	SU	undeter
<i>Solorina</i>	<i>saccata</i>	S1	Red
<i>Collema</i>	<i>tenax</i>	n/a	n/a

Bryophytes

Genus	Species	S Rank	DNR Rank
<i>Bryhnia</i>	<i>graminicolor</i>	S4?	n/a
<i>Platydictya</i>	<i>jungermanniioides</i>	S2?	n/a



A number of old trails cross the site, probably used to remove gypsum. The exposed banks provide habitat for ground dwelling lichens.

Quarry St Ann's, Victoria County

Quarry St Ann's according to Adams was mined at various times from 1884 to 1917. Two large gypsum bluffs are present as well as a number of small caves in the moss-covered forest floor at the base of the bluffs. A large quarry pile remains from the original mining operations. An abandoned homestead also is nearby.

Lichens

Genus	Species	S Rank	DNR Rank
<i>Leptogium</i>	<i>subtile</i>	S1S3	Yellow
<i>Collema</i>	<i>tenax</i>	n/a	n/a
<i>Peltigera</i>	<i>lepidophora</i>	S1S2	Red

Bryophytes

Genus	Species	S Rank	DNR Rank
<i>Sphagnum</i>	<i>warnstorffii</i>	S2S3	n/a



Indications of mining activity that occurred at the beginning of the 20th century are still visible at the site. There are also numerous shallow caves in the area.

Jubilee, Victoria County

Adams' Jubilee site covers a fairly large area. This survey involved a small, mostly wooded sinkhole area at the coordinates given in the report. Time and accessibility precluded visits to exposed gypsum cliffs visible elsewhere from the road.

Lichens

Genus	Species	S Rank	DNR Rank
<i>Solorina</i>	<i>saccata</i>	S1	Red
<i>Collema</i>	<i>tenax</i>	n/a	n/a
<i>Leptogium</i>	<i>lichenoides</i>	S1S2	Red
<i>Leptogium</i>	<i>intermedium</i>	SU	Undeter

Bryophytes

Genus	Species	S Rank	DNR Rank
<i>Encalypta</i>	<i>procera</i>	S4S5	n/a
<i>Rhodobryum</i>	<i>ontariense</i>	S4S5	n/a



Sinkholes and chimneys are frequent at Jubilee providing excellent habitat for calciphilous lichens and bryophytes.

Jamesville, Victoria County



Massive exposed gypsum cliffs close to the paved road are obviously still being quarried on a small, probably private, scale. The road into the site leads past exposed mounds of rubble which are slowly being reclaimed by soil, mosses and lichens. The recent disturbance is at the far end of the site at the base of 15m high cliffs.

Lichens

Genus	Species	S Rank	DNR Rank
<i>Collema</i>	<i>cristatum</i>	SNR	undeter
<i>Leptogium</i>	<i>lichenoides</i>	S1S2	Red
<i>Leptogium</i>	<i>subtile</i>	S1S3	Yellow
<i>Leptogium</i>	<i>tenuissimum</i>	SU	n/a
<i>Placidium</i>	<i>squamulosum</i>	n/a	n/a
<i>Solorina</i>	<i>saccata</i>	S1	Red



Collema cristatum showing mineral build-up on the thallus. This condition is commonly observed on both calciphilous lichens and bryophytes.



Soloria saccata Both images are from the Jamesville site.

Iona, Victoria County

Located near a Bras d'Or Lake inlet, this site is frequented by campers and partygoers. The sinkholes in the wooded area adjacent to the parking place are covered by young spruce and fir.



Lichens

Genus	Species	S Rank	DNR Rank
<i>Collema</i>	<i>tenax</i>	n/a	n/a

Walton, Hants County

The Walton site consists of a large abandoned open pit quarry with several ponds. Sinkholes and chimneys are present. Some of the deepest chimneys observed during this study are located here. A small treed swamp was surveyed as well for sphagnum.



Lichens

Genus	Species	S Rank	DNR Rank
<i>Collema</i>	<i>tenax</i>	n/a	n/a
<i>Leptogium</i>	<i>subtile</i>	S1S3	Yellow
<i>Leptogium</i>	<i>lichenoides</i>	S1S2	Red
<i>Leptogium</i>	<i>tenuissimum</i>	SU	n/a
<i>Peltigera</i>	<i>lepidophora</i>	S1S2	Red

Bryophytes

Genus	Species	S Rank	DNR Rank
<i>Campylium</i>	<i>hispidulum</i>	S4S5	n/a
<i>Sphagnum</i>	<i>contortum</i>	SNR	n/a
<i>Sphagnum</i>	<i>warnstorffii</i>	S2S3	n/a

Tennycap, Hants County

The Tennycap site is located inland from the coast approximately 10 kilometres on property undergoing forestry operations. The karst topography consists of forested sinkholes, chimneys and exposed bluff. It is interesting to note that snow was observed at the bottom of several chimneys at the time of the survey, May 4. A small lake and black spruce bog were also surveyed particularly for sphagnum.

Lichens

Genus	Species	S Rank	DNR Rank
Leptogium	imbricatum	SNR	undeter
Leptogium	lichenoides	S1S2	Red
Leptogium	subtile	S1S3	Yellow
<i>Solorina</i>	<i>saccata</i>	S1	Red





Peltigera species are very common on soil in calcareous areas.

Pembroke, Hants County



This is the site of a former barite mine which was later also mined for copper, lead, silver and zinc. Reclamation work began in the late 1970's and was resumed in 2007(Lamb, pers. comm.). Though there was no exposed gypsum visible, the open, soil banks lining the tailings pond yielded an unusual variety of calciphilous lichens and bryophytes.

Lichens

Genus	Species	S Rank	DNR Rank
<i>Acarospora</i>	<i>moenium</i>	n/a	n/a
<i>Collema</i>	<i>tenax</i>	n/a	n/a
<i>Collema</i>	<i>limosum</i>	n/a	n/a
<i>Leptogium</i>	<i>lichenoides</i>	S1S2	Red
<i>Leptogium</i>	<i>intermedium</i>	n/a	n/a

Bryophytes

Genus	Species	S Rank	DNR Rank
<i>Campylium</i>	<i>polygamum</i>	SNR	n/a
<i>Weissia</i>	<i>hedwigii</i>	SNR	n/a
<i>Didymodon</i>	<i>tophaceus</i>	n/a	n/a
<i>Pohlia</i>	<i>wahlenbergii</i>	SNR	n/a

Didymodon tophaceus has not been previously recorded for the province. There are sites in Quebec and Ontario and western Canada for this species.

White Head, Hants County



The site at White Head consists of a single coastal gypsum bluff. Sinkholes are present but inaccessible.

Bryophytes

Genus	Species	S Rank	DNR Rank
<i>Atrichium</i>	<i>Crispum</i>	S4S5	n/a
<i>Fissidens</i>	<i>Exilis</i>	n/a	n/a

Fissidens exilis, commonly known as the Pygmy Pocket Moss, has been previously not recorded for the province of Nova Scotia. It is unique in having an ephemeral nature and it is found with other bryophyte species of a similar habit. In 2005, it was granted the status of Special Concern by the Committee for the Status of Endangered Wildlife in Canada. This diminutive species of approximately 2 millimetres in height is known from five localities in Ontario and two in Quebec. It is known from eleven eastern states in the United States. Three of the eleven Canadian sites were revisited in 2002 for the purpose of the status report and *Fissidens exilis* was not rediscovered in them. A new population however was discovered during the field work.

Discussion

Sites determined not to be acceptable for the purposes of this study were found at Forks Baddeck and Peter's Brook, Victoria County, Cape Breton. These sites lacked the exposed gypsum that provides habitat for calciphilic lichens.

Five lichen species and two bryophyte species, new records for the province, were found during this survey work. These are: *Aspicilia moenium*, *Catapyrenium cinereum*, *Collema cristatum*, *Collema limosum*, *Leptogium tenuissimum*, *Fissidens exilis*, and *Didymodon tophaceus*. It is very likely that additional new records would be made if more extensive surveys for lichens and bryophytes in the karst topography of the province were conducted. A thorough understanding of what species are present and their abundance would enhance the natural history of the province and provide important baseline data should these areas face development in the future.

References

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- Roland, A.E. 1982 Geological Background and Physiography of Nova Scotia. The Nova Scotian Institute of Science, Halifax, 311 pp.

Appendix 1

Lichens

Aspicilia moenium
Bryoria nadvornikiana
Catapyrenium cinereum
Cladonia cariosa
Cladonia cf. mitis
Cladonia cf. squamosa(thamn.acid version)
Cladonia gracilis ssp. Turbinate
Cladonia multififormis
Cladonia pocillum
Cladonia rei
Cladonia scabriuscula
Cladonia squamosa
Cladonia cf. terra-novae
Cladonia turgida
Cladonia verticillata
Collema cristatum
Collema limosum
Collema cf. subparvum
Collema sp.
Collema cristatum var marginale
Collema tenax
Collema tenax var. expansum
Collema tenax var. tenax
Icmadophila ericetorum
Cf. Lemmopsis sp.
Lepraria lobificans
Leptogium cyanescens
Leptogium imbricatum
Leptogium intermedium
Leptogium lichenoides
Leptogium subtile
Leptogium tenuissimum
Leptogium ssp.
Micarea sp.
Mycoblastus sanguinarius
Nephroma parile

Peltigera apthosa
Peltigera canina
Peltigera cf. didactyla
Peltigera cf. neopolydactyla
Peltigera didactyla
Peltigera elisabethae
Peltigera extenuate
Peltigera lepidophora
Peltigera leucophlebia
Peltigera membranacea
Peltigera neckeri
Peltigera polydactylon
Peltigera rufescens
Placidium squamulosum
Placynthiella icmalea
Placynthium nigrum
Protopannaria pezizoides
Solorina saccata
Stereocaulon tomentosum

Bryophytes

<i>Anomodon</i>	<i>Rostratus</i>
<i>Atrichium</i>	<i>Altecristatum</i>
<i>Atrichium</i>	<i>Crispum</i>
<i>Aulacomium</i>	<i>Androgynum</i>
<i>Barbula</i>	<i>Unquiculata</i>
<i>Barbula</i>	<i>Fallax</i>
<i>Barbula</i>	<i>Unquiculata</i>
<i>Barbula</i>	<i>Sp</i>
<i>Bartramia</i>	<i>Pomiformis</i>
<i>Brachythecium</i>	<i>Rutabulum</i>
<i>Bryhnia</i>	<i>Graminicolor</i>
<i>Bryhnia</i>	<i>novae-angliae</i>
<i>Bryum</i>	<i>Argenteum</i>
<i>Calliergonella</i>	<i>Cuspidate</i>
<i>Calypogeia</i>	<i>Fissa</i>
<i>Campylium</i>	<i>Chrysophyllum</i>
<i>Campylium</i>	<i>Hispidulum</i>
<i>Campylium</i>	<i>Stellatum</i>
<i>Campylium</i>	<i>Polygamum</i>

<i>Campylium</i>	<i>chrysophyllum</i> var. <i>brevifolium</i>
<i>Climacium</i>	<i>Dendroides</i>
<i>Desmatodon</i>	<i>Sp</i>
<i>Dicranum</i>	<i>Scoparium</i>
<i>Didymodon</i>	<i>Sp</i>
<i>Didymodon</i>	<i>Tophaceus</i>
<i>Drepanocladus</i>	<i>Fluitans</i>
<i>Drepanocladus</i>	<i>Aduncus</i>
<i>Encalypta</i>	<i>Procera</i>
<i>Fissidens</i>	<i>Cristatus</i>
<i>Fissidens</i>	<i>Exilis</i>
<i>Fontinalis</i>	<i>Dalecarlica</i>
<i>Fontinalis</i>	<i>novae-angliae</i>
<i>Hylocomium</i>	<i>Umbratum</i>
<i>Hymenostylium</i>	<i>Recurvirostrum</i>
<i>Lepidozia</i>	<i>Reptans</i>
<i>Leptobryum</i>	<i>Pyriforme</i>
<i>Myurella</i>	<i>Sibirica</i>
<i>Plagiomnium</i>	<i>Ciliare</i>
<i>Platydictya</i>	<i>Jungermanniioides</i>
<i>Pohlia</i>	<i>Wahlenbergii</i>
<i>Ptilium</i>	<i>crista-castrensis</i>
<i>Rhacomitrium</i>	<i>Canescens</i>
<i>Rhodobryum</i>	<i>Ontariense</i>
<i>Rhytidiadelphus</i>	<i>Triquetrus</i>
<i>Thuidium</i>	<i>Delicatulum</i>
<i>Thuidium</i>	<i>Abietinum</i>
<i>Tortella</i>	<i>Tortuosa</i>
<i>Weissia</i>	<i>Hedwigii</i>