Ontario Species at Risk Evaluation Report

for

Black-foam Lichen (*Anzia colpodes*)

Committee on the Status of Species at Risk in Ontario (COSSARO)

Assessed by COSSARO as DATA DEFICIENT

January 2016

Final

Anzie mousse-noire (*Anzia colpodes*)

L'anzie mousse-noire (*Anzia colpodes*) est un lichen foliacé qui forme des rosettes de feuilles qui peuvent atteindre jusqu'à 20 cm de diamètre. On en trouve sur le tronc des feuillus, dans des zones découvertes à l'intérieur des forêts matures ainsi que dans d'autres régions où les taux d'humidité et d'éclairement sont élevés. L'espèce, qui a été confirmée seulement à partir de l'Amérique du Nord, est dispersée sur de grandes distances dans le sud des États-Unis. Au Canada, les occurrences sont rares en Nouvelle-Écosse et elle a déjà été signalée à partir de l'Ontario, du Québec et du Nouveau-Brunswick. Dans l'ensemble du Canada, elle semble être en proie à une diminution qui est probablement attribuable principalement à la perte d'habitat causée par les récoltes forestières, aux aménagements et à la pollution atmosphérique.
En Ontario, l'anzie mousse-noire est connue seulement à partir de quatre registres du XIX^{e} siècle ou de spécimens dispersés sur de grandes distances dans l'est et le centre de l'Ontario. Comparativement à d'autres taxons, il y a eu relativement peu d'heures-personnes consacrées à des relevés ciblés ou généraux effectués par des observateurs d'expérience aux emplacements précédents. Même si l'anzie mousse-noire n'a pas été observée en Ontario depuis plus d'un siècle, il reste probablement des habitats adéquats qui n'ont pas fait l'objet de recherches. À l'heure actuelle, il est impossible de conclure avec confiance que l'anzie mousse-noire est disparue de l'Ontario. Pour ces raisons, les données sur l'anzie mousse-noire sont considérées insuffisantes en Ontario.

Le statut en Ontario diffère du statut national d'espèce menacée, car l'anzie mousse-noire est encore présente en Nouvelle-Écosse.

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Executive summary

The Black-foam Lichen is a relatively distinctive foliose lichen that grows in leafy rosettes up to 20 cm across. It is found on the trunks of deciduous trees, in openings within mature forests and other areas where both humidity and light levels are high. The species is confirmed only from North America, and is most common in the southern United States. In Canada, it occurs uncommonly in Nova Scotia, and has previously been reported from Ontario, Quebec, and New Brunswick. Throughout Canada, it appears to be declining, probably due mainly to habitat loss caused by forest harvest, development, and air pollution.

In Ontario, the Black-foam Lichen is known only from four 19th century records and/or specimens, distributed widely across eastern and central Ontario. Compared to other taxa, there have been relatively few person hours spent on targeted or general surveys by knowledgeable surveyors at previous locations. Although there have been no observations of the Black-foam Lichen from Ontario in over a century, there is probably still some suitable and unsearched habitat remaining. At this time, it is not possible to conclude with confidence that the Black-foam Lichen is extirpated from Ontario. For these reasons, the Black-foam Lichen is considered Data Deficient in Ontario.

The Ontario status differs from the national status of Threatened, because the Black-foam Lichen still occurs in Nova Scotia.

1. Background information

1.1. Current designations

- GRANK: G3G5 (NatureServe 2015)
- NRANK Canada: NNR (Not Ranked)
- COSEWIC: Threatened (May 2015)
- SARA: No schedule
- ESA 2007: N/A (first assessment)
- SRANK: SH

1.2. Distribution in Ontario

Black-foam Lichen is reported in Ontario from only four 19th century records, at localities across south-central Ontario (Figure 1). Records are from:

- Prescott, Grenville Co., 1861 (Macoun collection)
- Central Ontario Junction, Hastings County, 1893 (Billings collection)
- Owen Sound, 1871, (collection of Yale University Herbarium, det. W. Hale)
- Near Ottawa, 1902 (Macoun report).

The first two of these records are reported in COSEWIC (2015); the Owen Sound collection was recently discovered by Sam Brinker in the Yale University Herbarium collection. A fourth report by Macoun from a swamp near Ottawa is not supported by a specimen (S. Brinker, pers. comm. 2015).

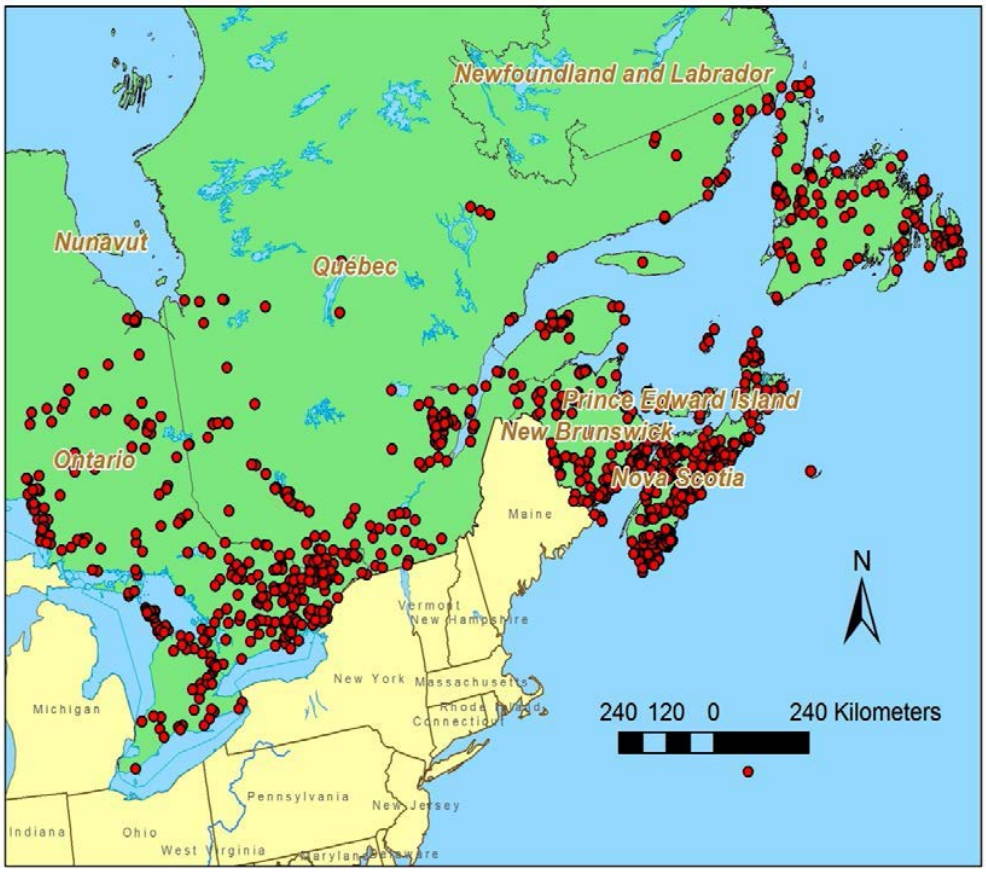
Two days of targeted searches in areas that are thought to correspond to the first two sites were unsuccessful in rediscovering the Black-foam Lichen (T. McMullin, pers. comm. 2015). The Owen Sound site has not been clearly identified or searched (S. Brinker, pers.comm. 2015). Suitable habitat in the Ottawa area has been relatively thoroughly searched for lichen over the past several decades; due to significant habitat alteration, this occurrence is most likely extirpated (I. Brodo, pers. comm. 2015). Searches in other areas of suitable habitat in eastern and central Ontario have not resulted in the rediscovery of Black-foam Lichen in Ontario (COSEWIC 2015; T. McMullin, pers.comm. 2015). Although searches for lichens in central and eastern Ontario have not been as comprehensive as for other taxa, there has been a reasonable amount of general survey for lichens of the same family (Figure 2).

Figure 1. Black-foam lichen records in Ontario. Source: OMNRF.

The NHIC considers the Black-foam Lichen to be “historical” in Ontario (SH). This is due in part to the recently discovered collection from Owen Sounds, hundreds of kilometres to the west of other sites, and the possibility that there are additional areas of unsurveyed potential habitat. Wong (1992) considers this lichen “very rare, [and] probably extinct in our region [i.e. southern Ontario].”

Although unlikely due to its historical rarity and widespread declines, it is possible that with increased survey effort in suitable habitat, Black-foam Lichen may be rediscovered in Ontario (S. Brinker, pers.comm. 2015).

Figure 2. Search and collecting activity (red dots) with respect to the lichen family Parmeliaceae, the family to which black-foam lichen belongs. Source: COSEWIC (2015).



1.3. Distribution and status outside Ontario

In Canada, the Black-foam Lichen is now found only in Nova Scotia, where it is widespread but not common. The entire extant Canadian population is estimated at 3700 individuals, distributed among a maximum of 88 extant occurrences. It is believed to be declining, as it has not been rediscovered at many previously occupied sites (COSEWIC 2015).

The Black-foam Lichen also occurred in Quebec and New Brunswick, with two and twelve historical occurrences respectively. Searches of several of these sites in 2013 and 2014 failed to rediscover any sites in either province.

Black-foam Lichen is considered a North American endemic, although there is a possible unconfirmed record from eastern Russia (COSEWIC 2015). In the United States, it is found in approximately 18 states, and appears to be declining in parts of its range, especially in the northeastern states where it occurs (COSEWIC 2015). It is most common in warmer states such as Tennessee and Arkansas, where declines have not been reported.

1.4. Ontario conservation responsibility

The percentage of the global range of the species that occurred in Ontario is probably less than 1%. The Black-foam Lichen has always been rare in Ontario, which is at the northwestern limit of its range.

1.5. Direct threats

The Black-foam Lichen is an epiphytic species of mature deciduous forests, and the primary threat throughout its Canadian range is wood harvesting, mainly for commercial forestry or for energy production. Other threats include herbicide use, grazing by native and introduced gastropods, habitat loss and fragmentation, air pollution, and climate change. Threats to the species across the Canadian range were assessed as `very high' using the COSEWIC threats calculator (COSEWIC 2015).

Threats at the two documented Ontario sites are not clear, because both collections are very old, and the original collection sites are vague. Although there is suitable habitat near Prescott, the area thought to be near the collection site is now surrounded by homes and road development, and the site may have been lost. There is suitable habitat near the Ontario Central Junction site in Hastings County, which was formerly a train station on the Central Ontario Railway, and is now a snowmobile trail. There are no obvious threats in this area, but 2013 searches were unsuccessful (COSEWIC 2015; T. McMullin, pers.comm. 2015).

1.6. Specialized life history or habitat use characteristics

Like many lichens, the Black-foam Lichen is both long-lived and slow-growing. The generation time (average age of parents in the population) for this species is estimated at 17 years, indicating that they require many years before reaching reproductive maturity (COSEWIC 2015).

Lichens are composite organisms that arise when algal spores (and/or cyanobacteria) establish within filaments of a fungus, in a symbiotic relationship (Brodo et al. 2001). Unlike many other lichens, Black-foam Lichen has no means of vegetative reproduction. Its establishment depends solely upon the release of spores, and the meeting of spores with a compatible green alga, on a suitable host tree, in suitable habitat (COSEWIC 2015).

From what is currently known of Black-foam Lichen's preferred habitat across its Canadian range, it appears that it prefers a specific forest life stage. It requires mature deciduous trees with moderately rough bark, and is most often found on Red Maple (*Acer rubrum*), but also Red Oak (*Quercus rubra*), White Ash (*Fraxinus americana*) and other species. It requires high levels of both high humidity and sunlight, and declines if the canopy becomes too dense, or if bark becomes too rough (COSEWIC 2015). All of these factors probably limit the distribution of the Black-foam Lichen in Canada.

2. Eligibility for Ontario status assessment

2.1. Eligibility conditions

2.1.1. Taxonomic distinctness

Yes. *Anzia colpodes* has been recognized as a distinct species since 1862 (Esslinger and Eagan 1995).

2.1.2. Designatable units

No. There is no evidence of phenotypic differences across the range of this species, and no molecular work has been completed (COSEWIC 2015). The Black-foam Lichen is assessed as a single Designatable Unit.

2.1.3. Native status

Yes. The Black-foam Lichen is recognized as one of three *Anzia* spp. native to Canada and the United States (Esslinger and Eagan 1995, Brodo et al. 2001).

2.1.4. Occurrence

There is no doubt that the Black-foam Lichen formerly occurred in Ontario, based on collections in recognized herbaria (COSEWIC 2015; S. Brinker, pers. comm. 2015). There have been no records of this species from Ontario since the 19th century. Its current status in the province is currently not known.

2.2. Eligibility results

Black-foam Lichen (*Anzia colpodes*) is eligible for status assessment in Ontario.

3. Ontario status assessment

3.1. Application of endangered/threatened status in Ontario

3.1.1. Criterion A – Decline in total number of mature individuals

Does not apply. No individuals have been observed in Ontario in over a century.

3.1.2. Criterion B – Small distribution range and decline or fluctuation

Does not apply. No individuals have been observed in Ontario in over a century.

3.1.3. Criterion C – Small and declining number of mature individuals

Does not apply. There are no individuals currently known in Ontario.

3.1.4. Criterion D – Very small or restricted total population

Does not apply. There are no individuals currently known in Ontario.

3.1.5. Criterion E – Quantitative analysis

Does not apply.

3.2. Application of Special Concern in Ontario

Does not apply. There are no known individuals in Ontario.

3.3. Status category modifiers

3.3.1. Ontario's conservation responsibility

Does not apply. Ontario's Conservation Responsibility for this species has therefore always been very low, with historically less than 1% of the global range and population occurring in the province.

3.3.2. Rescue effect

Does not apply. Rescue of Ontario populations from adjacent jurisdictions is possible, but very unlikely. The Black-foam Lichen is extirpated from adjacent Quebec and Ohio, and there is only one site in each of New York and Michigan (COSEWIC 2015). The dispersal distance is probably very limited; lichen ascospores are dispersed a distance of about one centimetre, and dispersal is dependent on climatic factors including wind and precipitation (COSEWIC 2015). Spores must also encounter a suitable alga on a suitable host tree within suitable habitat. Although sufficient habitat probably still exists in Ontario, the likelihood of successful establishment of a self-sustaining population is probably very low.

3.4. Other status categories

3.4.1. Data deficient

Because the occurrence of the Black-foam Lichen in Ontario cannot be confirmed or denied with confidence, this species is considered "data deficient."

Surveys to verify occurrences in Ontario have probably not been sufficiently intensive or widespread to conclude that it is extirpated from Ontario. Species-specific searches in suitable habitat in the vicinity of two of these records (two person days) were unsuccessful. Although general lichen surveys undertaken within eastern and central Ontario did not target Black-foam Lichen specifically (see Figure 1), this species is easily recognizable and well known to knowledgeable surveyors (T. McMullin, pers.comm. 2015). Compared to other taxa such as vascular plants, there have been relatively few person hours spent on targeted or general surveys by knowledgeable surveyors at previous locations. Historical locality information is also vague, and previously occupied habitat in Ontario is not well understood, making rediscovery difficult (S. Brinker, pers.comm. 2015).

Based on available information, it is very likely that at least two occurrences are extirpated. The former collection site in the Prescott area could well be entirely lost due to surrounding development (T. McMullin, pers.comm. 2015) Macoun's 1905 Ottawa record is unlikely to be extant, given urban development and habitat alteration in the area.

However, there is probably still some suitable and unsearched habitat in the Marmora and Owen Sound areas, the latter not having been searched in advance of the 2015 COSEWIC status report. The Owen Sound collection significantly enlarges the previously known occupied range of Black-foam Lichen. It is thought that there is additional suitable habitat in a few other areas of Ontario that has not been explored for this species (S. Brinker, pers.comm. 2015).

The Black-foam Lichen is considered "historical" (SH) in Ontario by the NHIC, rather than "extirpated" (SX), reflecting the possibility that with additional search effort, the Black-foam Lichen may be rediscovered in Ontario (NHIC 2015).

3.4.2. Extinct or extirpated

Does not apply. Although there have been no observations reported in Ontario in over a century, it is not possible to conclude with sufficient confidence that the Black-foam Lichen is extirpated from Ontario, for the reasons outlined above.

3.4.3. Not at risk

Does not apply.

4. Summary of Ontario status

Black-foam Lichen (*Anzia colpodes*) is classified as Data Deficient in Ontario.

The Ontario status of the Black-foam Lichen differs from the COSEWIC status of Threatened, because the species is still found in over 80 separate occurrences in Nova Scotia.

5. Information sources

Brinker, S. 2015. Personal communication. Botanist, Natural Heritage Information Centre, Peterborough, Ontario.

Brodo, I. 2015. Personal communication. Lichenologist emeritus, Canadian Museum of Nature.

Brodo, I.M., Sharnoff, S,D., and S. Sharnoff. 2001. Lichens of North America. Yale University Press, New Haven, 795pp.

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Esslinger, T.L. and R.S. Egan. 1995. A sixth checklist of the lichen-forming, lichenicolous and allied fungi of the Continental United States and Canada. Bryologist 98:467-549.

McMullin, R.T. 2015. Personal communication. Post-doctoral Fellow at University of Guelph.

NatureServe. 2015. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. [website accessed 17 November 2015].

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Appendix 1: Technical summary for Ontario

Species: Black-foam Lichen (*Anzia colpodes*)

Demographic information

Demographic attribute	Value
Generation time. The generation time is uncertain but is probably between 10 and 30 years, with 17 years the best estimate (COSEWIC 2015).	17 years
Is there an observed, inferred, or projected continuing decline in number of mature individuals?	No
Estimated percent of continuing decline in total number of mature individuals within 5 years or 2 generations.	Unknown
Observed, estimated, inferred, or suspected percent reduction or increase in total number of mature individuals over the last 10 years or 3 generations.	Unknown
Projected or suspected percent reduction or increase in total number of mature individuals over the next 10 years or 3 generations. *This species may be rediscovered in Ontario with additional survey effort and an extant population may be reported within the coming decades.*	Unknown
Observed, estimated, inferred, or suspected percent reduction or increase in total number of mature individuals over any 10 years, or 3 generations, over a time period including both the past and the future.	Unknown
Are the causes of the decline a. clearly reversible and b. understood and c. ceased?	a. No b. No c. No
Are there extreme fluctuations in number of mature individuals?	Probably not

Extent and occupancy information in Ontario

Extent and occupancy attributes	Value
Estimated extent of occurrence. *(Request value from MNRF or use http://geocat.kew.org/)*	0 km^2
Index of area of occupancy (IAO). *(Request value from MNRF or use http://geocat.kew.org/)*	0 km^2

Is the total population severely fragmented? (i.e. is >50% of its total area of occupancy is in habitat patches that are (a) smaller than would be required to support a viable population, and (b) separated from other habitat patches by a distance larger than the species can be expected to disperse?) *The former extant populations in Ontario may have been considered severely fragmented, but an extirpated population cannot be considered so.*	a. No b. No
Number of locations (*as defined by COSEWIC*).	None
Number of NHIC Element Occurrences (*Request data from MNRF)*	Three historical occurrences (SH)
Is there an observed, inferred, or projected continuing decline in extent of occurrence?	Yes
Is there an observed, inferred, or projected continuing decline in index of area of occupancy?	Yes
Is there an observed, inferred, or projected continuing decline in number of populations?	Not applicable
Is there an observed, inferred, or projected continuing decline in number of locations?	Not applicable
Is there an observed, inferred, or projected continuing decline in [area, extent and/or quality] of habitat? *Although locality information is vague, it is likely that habitat quality and quantity has declined in the vicinity of the Prescott occurrence.*	Not applicable
Are there extreme fluctuations in number of populations?	No
Are there extreme fluctuations in number of locations?	No
Are there extreme fluctuations in extent of occurrence?	No
Are there extreme fluctuations in index of area of occupancy?	No

Number of mature individuals in each sub-population or total population (if known)

None extant.

Quantitative Analysis (population viability analysis conducted)

Not done.

Rescue effect

Rescue effect attribute	Likelihood

Is immigration of individuals and/or propagules between Ontario and outside populations known or possible? Dispersal distance for lichens is also very low, perhaps less than one centimetre in the immediate vicinity. Low wind speeds within mature forests probably also limit spore dispersal to the immediate area (COSEWIC 2015).	Possible, but unlikely.
Would immigrants be adapted to survive in Ontario?	Potentially if there were suitable host trees
Is there sufficient suitable habitat for immigrants in Ontario?	Unknown.
Is the species of conservation concern in bordering jurisdictions? *Anzia colpodes* appears to be extirpated from Wisconsin and Ohio and very rare in other bordering US states	Yes. Declining or extirpated in two US states and Quebec. Very rare in other bordering states. A proposal for IUCN red listing of this species is in development due to range-wide declines (McMullin pers.comm. 2015).
Is rescue from outside populations reliant upon continued intensive recovery efforts?	No

Appendix 2: Adjoining jurisdiction status rank and decline

Information regarding rank and decline for Black-foam Lichen

Jurisdiction	Subnational rank	Population trend	Sources*
Ontario	SH	Declined to extirpated	NatureServe 2015
Quebec	SNR	Two historical records, but unranked provincially	NatureServe 2015
Manitoba	No records		
Michigan	SNR	COSEWIC (2015) considers it critically imperiled in Michigan	NatureServe 2015
Minnesota	No records	n/a	n/a
Nunavut	No records	n/a	n/a

New York	n/a	Unconfirmed – presence requires confirmation (Harris 2004 cited in COSEWIC 2015)	COSEWIC 2015
Ohio	n/a	Probably extirpated (COSEWIC 2015); no NatureServe Rank	COSEWIC 2015
Pennsylvania	SNR	n/a	NatureServe 2015
Wisconsin	SX	Presumed extirpated, COSEWIC (2015) considers it critically imperiled in Wisconsin	NatureServe 2015; COSEWIC 2015

**Note that rankings of lichens are incomplete in some jurisdictions owing to a lack of data; although there may be herbarium records from a jurisdiction, the species may not yet have been ranked at the subnational level.*

Acronyms

COSEWIC: Committee on the Status of Endangered Wildlife in Canada
COSSARO: Committee on the Status of Species at Risk in Ontario
ESA: Endangered Species Act
GRANK: global conservation status assessments
IAO: index of area of occupancy
MNRF: Ministry of Natural Resources and Forestry
NHIC: Natural Heritage Information Centre
NNR: Unranked
SARA: Species at Risk Act
SH: possibly extirpated
SNR: unranked
SRANK: subnational conservation status assessment
SX: presumed extirpated