

**COSSARO Candidate Species at Risk Evaluation
for
Pale-bellied Frost Lichen (*Physconia subpallida*)**

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

November 2009

Cette publication hautement spécialisée « Pale-bellied Frost Lichen Evaluation » n'est disponible qu'en anglais conformément au Règlement 671/92, selon lequel il n'est pas obligatoire de la traduire en vertu de la Loi sur les services en français. Pour obtenir de l'aide en français, veuillez contacter le secrétariat de COSSARO par courrier électronique à l'adresse COSSAROsecretariat@ontario.ca.

PART 1 COSSARO candidate species at risk evaluation form

[November 2009]

Pale-bellied Frost Lichen (*Physconia subpallida*)

Current designations:

GRANK – [GNR – not yet ranked]

NRANK Canada – [NNR – not yet ranked]

COSEWIC – [no status]

SARA – [not listed]

General Status Canada – [not yet ranked]

ESA 2007– [no status]

SRANK– [S1; M. J. Oldham, pers. comm.; not yet on NHIC website]

General Status Ontario – [not yet ranked]

Distribution and status outside Ontario:

Eastern North American species, its distribution closely coinciding with the extent of the eastern deciduous forest region. Occurs from Massachusetts and New Hampshire west to southern Ontario, Michigan, eastern Iowa, south to central Illinois, Ohio, Virginia; also disjunct in Ozarks of eastern Oklahoma, northwestern Arkansas (COSEWIC, 2009).

Local with large gaps between occurrences throughout range. Only 4 populations currently known to be extant; thus, globally rare and apparently declining.

Eligibility criteria:

Native status

[yes] Known only from eastern North America; no evidence to suggest introduction into Ontario. Collected in Ontario as early as 1868 by John Macoun at Belleville (COSEWIC, 2009).

Taxonomic distinctness

[yes] Described as a distinct species in 1994; previously misidentified as various other species of *Physconia*, but the characters distinguishing it from related species have now been resolved (see COSEWIC, 2009). No genetic work completed yet.

Designatable units

Pale-bellied Frost Lichen should be considered as a single DU, since all Ontario populations are in a single ecozone.

Priority-setting criteria:

Recent arrival

[no] Existence and subsequent possible extirpation of several populations indicates that the species is not a recent arrival. Known in Ontario since 1868.

Non-resident

[no] Immobile.

Primary criteria (rarity and declines)

1. Global rank

[THR]. Not yet ranked globally by NatureServe, but Hinds and Hinds (2007) suggest a global rank of G3, which, if accepted, would lead to Thr under this criterion. There are only 27 known populations globally, only 4 of which are known to be extant (COSEWIC, 2009).

2. Global decline

[END]. Only 4 of 27 known populations appear to be extant, as represented by post-1972 collections and searches by knowledgeable lichenologists; represents a global decline of 85%.

3. Northeastern North America ranks

[END]. Not yet ranked in any northeastern jurisdiction other than Ontario; however, based on the number of known populations in northeastern North America, it is likely that the species would qualify as SH or S1 in all northeastern jurisdictions (see Appendix 1).

4. Northeastern North America decline

[END]. Only 3 of 25 known populations in the northeast appear to be extant, as represented by post-1972 collections and searches by knowledgeable lichenologists; 88% decline.

5. Ontario occurrences

[END]. Two extant occurrences in Ontario (COSEWIC, 2009).

6. Ontario decline

[THR]. 60-75% decline in number of populations in Ontario, depending on the number of populations that previously existed in the Ottawa area (1 to 4); only 2 extant populations remain, the others having been lost prior to the early 1970s (COSEWIC, 2009).

7. Ontario's conservation responsibility

[END]. Spatially, Ontario probably constitutes < 10% of the total range/area of occupancy; however, 2 of 4 extant populations globally occur in the province (50%).

Secondary criteria (threats and vulnerability)

1. Population sustainability

[Insufficient Information]. Reproductive structures present at both extant populations in Ontario; frequency of reproductive structures and size of thalli lower/smaller than on historical collections; this may represent collector bias rather than a real difference, or it may reflect known response to air pollution (COSEWIC, 2009); no PVA available.

2. Lack of regulatory protection for exploited wild populations

[Not in any category]. Not directly exploited; substrate (bark) may be removed during timber harvest through removal of suitable trees.

3. Direct threats

[END]. Forest harvesting and air pollution constitute threats; species persists at one site that has undergone forest harvesting ca. 10 years earlier; substantial forest cover loss within the range of the species has occurred since settlement; both extant sites in Ontario at risk of disappearance or decline through habitat loss (logging damage or removal of substrate trees) and air pollution.

4. Specialized life history or habitat-use characteristics

[Insufficient information]. Some suggestion of a tie to old-growth forests (COSEWIC, 2009); however, its occurrence on the bark of early successional trees such as Hop-hornbeam (*Ostrya virginiana*) suggests otherwise. Occurs in apparently common habitats; high bark pH and Ca content required; not enough known of life history and habitat needs to determine why the species is so restricted in occurrence (COSEWIC, 2009).

COSSARO criteria met (primary/secondary):

- **Endangered – [5/1]**
- Threatened – [2/0]
- Special concern – [0/0]

Summary

The Pale-bellied Frost Lichen (*Physconia subpallida*) is restricted to eastern North America, and grows on the bark of deciduous trees, or occasionally on rocks, where there is a relatively ample supply of calcium in the substrate. It is known from 27 populations globally, of which only 4 appear to be extant. Of the extant populations, 2 occur in Ontario. Habitat loss (through forest clearing for agriculture or settlement, logging and associated tree damage) and sulfur dioxide deposition are threats that appear to have led to the loss of most North American populations, and they continue to be threats at the extant sites in Ontario. Given the extreme rarity, small area of occupancy, history of declines, and ongoing threats, this species is recommended as Endangered.

Information sources

COSEWIC. 2009. COSEWIC status report on Pale-bellied Frost Lichen/Lichen de verglas, *Physconia subpallida*. Committee on the Status of Endangered Wildlife in Canada, Ottawa. Two-month Interim Report (Sept. 2009). 42 pp.

Hinds, J.W. and P.L. Hinds. 2007. Macrolichens of New England. New York Botanical Garden Press, Bronx, New York.

Appendix 1: Northeastern North America rank, status and decline

[unranked in most jurisdictions]

Location	Rank
CT	
DE	
IL	2 historical populations; considered SH for the purposes of this evaluation
IN	
IA	1 historical population; considered SH for the purposes of this evaluation
KY	
LB	
MA	2 historical populations; considered SH for the purposes of this evaluation
MB	
MD	
ME	
MI	1 historical population; considered SH for the purposes of this evaluation
MN	
NB	
NF	
NH	1 historical population; considered SH for the purposes of this evaluation
NJ	1 historical population; considered SH for the purposes of this evaluation
NS	
NY	2 historical populations; considered SH for the purposes of this evaluation
OH	3 historical populations; considered SH for the purposes of this evaluation
ON	S1 – 2 populations extant, of a previous 5 or 6
PA	1 extant population; considered S1 for the purposes of this evaluation
PE	
QC	
RI	
VA	2 historical populations; considered SH for the purposes of this evaluation
VT	3 historical populations; considered SH for the purposes of this evaluation
WI	
WV	

[the other two populations are/were located in Arkansas (historical) and Oklahoma (extant)]

Occurs (or occurred) as a native species in [12] northeastern jurisdictions

Srank or equivalent information available for [12] of [12] jurisdictions = (100%)

S1, S2, SH, or in [12] of [12] = (100%)

PART 2 Ontario evaluation using COSEWIC criteria

Regional (Ontario) COSEWIC criteria assessment

Criterion A – declining population

No (N/A). Declines occurred longer ago than 3 generations or 10 years, and perhaps over several decades, but there are too few records to determine precisely over which period the decline occurred.

Criterion B – Small distribution and decline or fluctuation

Yes (End – B1+2ab [i, ii, iii, iv, v]). Meets criterion B1 for Endangered, with EO < 5000 km², and B2 for Endangered, with IAO < 500 km²; meets subcriterion (a) known from ≤ 5 locations; meets subcriterion (b) for continuing decline inferred for (i) extent of occurrence, (ii) index of area of occupancy, (iii) area, extent and/or quality of habitat, (iv) number of locations or populations, and (v) number of mature individuals.

Criterion C – Small population size and decline

Yes (End – C2a[i]). Meets criterion C2 for Endangered, with < 2500 individuals, and a(i), no populations observed to contain > 250 mature individuals.

Criterion D – Very small or restricted

Yes (End – D1). Meets criterion D1 for Endangered (< 250 mature individuals).

Criterion E – Quantitative analysis

No (N/A). No quantitative analyses conducted.

Rescue effect

No. Highly unlikely; no nearby populations; spore dispersal distances unknown, but not likely to be long, given the forest habitat of the species.