

**Ontario Species at Risk Evaluation Report for Pygmy
Pocket Moss (*Fissidens exilis*)**

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

Assessed by COSSARO as Data Deficient

December 2016

Fissident pygmée (*Fissidens exilis*)

Le fissident pygmée est une espèce de mousse indigène que l'on retrouve dans divers habitats, généralement là où le sol a subi une perturbation. Le stade où il est morphologiquement reconnaissable (présence de gamétophores) ne dure qu'une courte période, lorsque les conditions environnementales sont réunies. Durant le reste de son cycle végétatif, on le trouve à la surface ou à l'intérieur du sol, sous forme de protonéma, qu'on ne peut identifier sur le plan morphologique. Aucune menace directe ou indirecte n'a encore été observée. En Ontario, l'espèce n'a été enregistrée qu'à sept endroits, mais d'après les études réalisées, elle serait plus répandue dans la province; la répartition actuellement connue serait donc le fruit du caractère éphémère de la période de détection.

Pour ces raisons, le fissident pygmée est placé dans la catégorie « données insuffisantes ». Cette désignation n'est pas la même que celle attribuée par le COSEPAC (« non à risque »), en raison de l'incertitude entourant l'exhaustivité des données sur la répartition de l'espèce en Ontario.

Cette publication hautement spécialisée «COSSARO Candidate Species at Risk Evaluation for Pygmy Pocket Moss» 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 des renseignements en français, veuillez communiquer avec le ministère des Richesses naturelles et des Forêts au recovery.planning@ontario.ca.

Executive summary

Pygmy Pocket Moss is a native moss species that occurs in a variety of habitats, usually in sites where the soil has been disturbed. In its morphologically recognizable phase (gametophore), Pygmy Pocket Moss is only present during a short time period, when environmental conditions are suitable. During the rest of its lifecycle, it occurs in the soil or at its surface as a morphologically indistinct protonema. No direct or indirect threats are known. In Ontario, it is only documented from 7 known localities, but available literature suggests that it is more provincially abundant and widespread, and that the currently recorded distribution is actually a result of the ephemeral window for detection of this species.

Based on this information, Pygmy Pocket Moss is classified as Data Deficient. This designation differs from the COSEWIC designation, Not at Risk, as there was uncertainty in the completeness of the distribution data for Ontario.

1. Background information

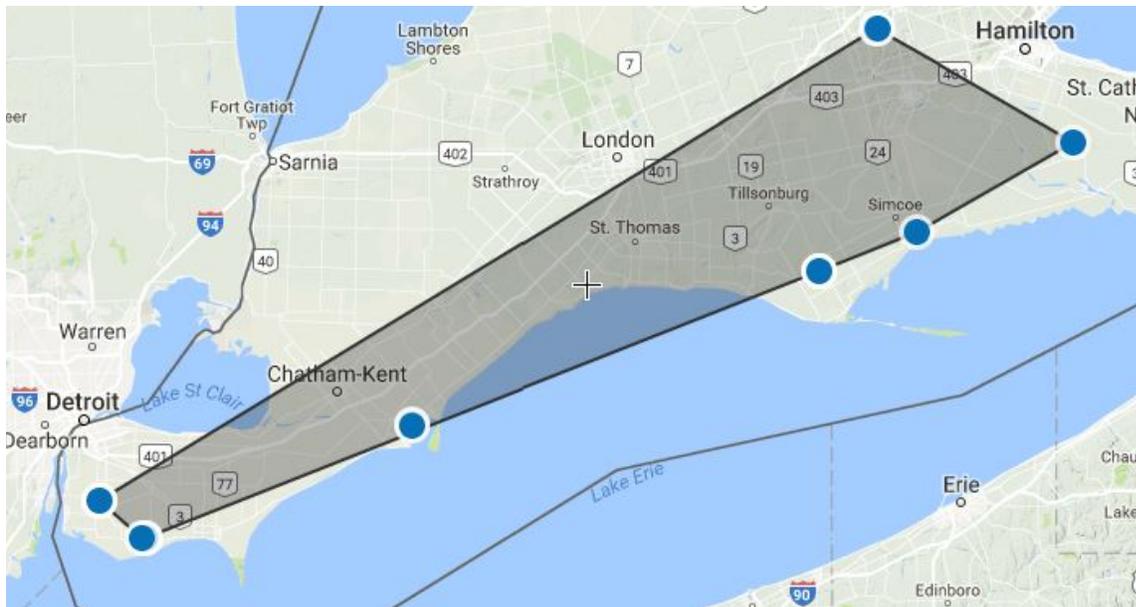
1.1. Current designations

- GRANK: G3G4 (NatureServe 2016)
- NRANK Canada: N1 (NatureServe 2016)
- COSEWIC: Not At Risk (April 2016)
- SARA: Special Concern (Schedule 1)
- ESA 2007: Special Concern (2008)
- SRANK: S2 (ranked in 2013)

1.2. Distribution in Ontario

Pygmy Pocket Moss has been recorded from seven localities in Ontario, with 17 Element Occurrences on file. These records were obtained largely through local survey efforts of the plant fauna of a specific site. COSEWIC (2016) reported that of the seven localities that were recorded, two were resampled in 2002 but no additional occurrences were found; no further search effort for Pygmy Pocket Moss has been made as the environmental conditions required to enable detection of this species are not clear.

Figure 1. All Ontario Pygmy Pocket Moss records from EO's were provided by the Natural Heritage Information Centre. Created for this report using GeoCAT [website accessed November 10, 2016].



1.3. Distribution and status outside Ontario

Pygmy Pocket Moss is not limited to North America, having been recorded from parts of Europe, Asia, Africa, New Zealand and the West Indies. In North America, it can be found in at least 15 states (mostly eastern), and four provinces (Ontario, Quebec, Nova

Scotia, and British Colombia).

1.4. Ontario conservation responsibility

Negligible. Ontario does not have a significant portion of the global population to suggest a stronger level of action is required.

1.5. Direct threats

No direct or indirect threats are known for Pygmy Pocket Moss. This species is usually encountered on disturbed soils suggesting that it does better in sites with low-to-medium perturbations.

1.6. Specialized life history or habitat use characteristics

The habitats where Pygmy Pocket Moss can be found are relatively varied but generally occurs in forested areas with clay or loam soils, and can be abundant where some level of disturbance have occurred. The conditions required for Pygmy Pocket Moss usually occur during the spring and fall, when environmental factors favor the soil to be damp over an extended period, but these conditions can occur throughout the year and can make development unpredictable.

2. Eligibility for Ontario status assessment

2.1. Eligibility conditions

2.1.1. Taxonomic distinctness

There are no data to dispute the recognition of Pygmy Pocket Moss as a distinct species. However, it is morphologically cryptic. During its sexual phase, Pygmy Pocket Moss is morphologically distinct only with the aid of microscopic characters, and therefore problematic to identify in field conditions. During its asexual phase, it is difficult to find and impossible to identify with confidence.

2.1.2. Designatable units

No designatable units below the species level are currently known.

2.1.3. Native status

The possibility that Pygmy Pocket Moss was historically introduced to North America has been suggested based on its relatively recent documentation (1947) on the continent, but no conclusive evidence is presently available to support this possibility (see COSEWIC 2016 for further discussion).

2.1.4. Occurrence

The seven recorded locations for Pygmy Pocket Moss in Ontario are in southwestern Ontario, and include recent records (COSEWIC 2016).

2.2. Eligibility results

Pygmy Pocket Moss (*Fissidens exilis*) 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

Insufficient information. Sampling effort for Pygmy Pocket Moss is not sufficient enough to suggest any change to the Ontario population.

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

Insufficient information. As data on Pygmy Pocket Moss is largely based on localized survey efforts, there are no data to suggest there is any fluctuation or decline in the Ontario population. Discussions on the EOO, IAO, or number of populations or mature individuals are problematic as this intermittently detectable moss is usually evident during a relatively brief window depending on environmental conditions. Without directed efforts under specific conditions in Ontario, estimates of locations and populations are not reliable.

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

Insufficient information. No data is available to suggest any changes in populations.

3.1.4. Criterion D – Very small or restricted total population

Insufficient information. While there are relatively few known localities of Pygmy Pocket Moss in Ontario, inferring the actual number of occurrences is confounded by the difficulty in encountering gametophytes and sporophytes, and may be significantly larger based on Risk's (2002) efforts to document the distribution of a related species in the northeast. Allen *et al.* (2004) also suggest that Pygmy Pocket Moss is likely to be more common than data may suggest. Regardless, the threshold of ≤ 5 locations has been exceeded in Ontario.

3.1.5. Criterion E – Quantitative analysis

Not applicable as a PVA has not been done for Pygmy Pocket Moss.

3.2. Application of Special Concern in Ontario

Insufficient information. Although there are only seven documented occurrences in Ontario, nearly qualifying it for Threatened status under Criterion D, the accuracy of this data is problematic. As noted previously, the number of element occurrences may under represent the actual number of occurrences, due to the low detectability of Pygmy Pocket Moss. Yet, consideration of a comparable moss genus *Ephemerum*, represented by four species in Ontario, suggests that the number of documented locations is a reflection of the relative abundance of the species. Ontario's *Ephemerum* species are even more minute and inconspicuous than Pygmy Pocket Moss, and occupy similar "temporary habitats" (Bryan 2007, Crum and Anderson 1981). Their respective provincial ranks range from S1 to S3 (NatureServe 2016). Given the similar life histories and Ontario distributions of these species, the most obvious explanation of the status range is a difference in actual occurrence numbers. This suggests that incidental documentation over a lengthy time period may not be completely uninformative with respect to estimating numbers of occurrences. In any case, if it is presumed that more occurrences will be documented with increased effort, it is not possible to say at present whether the increase will exceed that required to satisfy condition C for Special Concern status.

3.3. Status category modifiers

3.3.1. Ontario's conservation responsibility

Ontario's conservation responsibility is not significant in regards to Pygmy Pocket Moss's global range.

3.3.2. Rescue effect

Unknown. A Rescue Effect on the Ontario population is possible there is no data to indicate migration into Ontario is occurring from neighbouring populations.

3.4. Other status categories

3.4.1. Data deficient

The absence of sampling effort is significant enough to argue against support for ranking the Pygmy Pocket Moss as either Not At Risk or at risk based on any of the criteria. Estimates of EOO and IAO based on the current data, without further efforts to document the occurrence of Pygmy Pocket Moss in Ontario during periods of environmental suitability to the production of gametophytes and sporophytes, might artificially augment any possible threat that Ontario's Pygmy Pocket Moss population may be encountering. As the data are uncertain, and although current information on the range and locations of Pygmy Pocket Moss in Ontario could meet the threshold for Endangered, it is likely to be much more widespread and may not be at risk. At the present time, as the current data is uncertain that both Endangered and Not At Risk are

both plausible categories, “Data Deficient” is the only suitable assessment for this species.

3.4.2. Extinct or extirpated

Not applicable.

3.4.3. Not at risk

Insufficient information. COSEWIC (2016) classified Pygmy Pocket Moss as Not At Risk, but due to the uncertainty of the data for this species in Ontario, and the relatively small number of records, there was not sufficient support to apply this category. See the discussion under “Section 3.2 Application of Special Concern In Ontario” for further information.

4. Summary of Ontario status

Pygmy Pocket Moss (*Fissidens exilis*) is classified as Data Deficient in Ontario based on the data suggesting that it is much more widespread in Ontario, but has been overlooked due to the short time period when environmental conditions are suitable for the development of its recognizable life stage. This classification differs from those of COSEWIC (2016; Not At Risk), as the available data for Ontario is not sufficient to clearly classify this species under any Criteria or category, nor is there sufficient information to suggest that there is any threat to this species in Ontario.

5. Information sources

Allen, B.H., R.A. Pursell and C. Darigo. 2004. *Fissidens exilis* and a key to the species of *Fissidens* in Missouri. *Evansia*, 21: 111-115.

Bryan, V.S. 2007. Ephemeraeae Schimper *In* Flora of North American Volume 27. Mosses, Part 1. http://www.efloras.org/florataxon.aspx?flora_id=1&taxon_id=10314 [website accessed December 8 2016].

COSEWIC. 2016. COSEWIC assessment and status report on Pygmy Pocket Moss *Fissidens exilis* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xi+28 p.p.

Crum, H.A. and L.E. Anderson. 1981. Mosses of Eastern North America. Columbia University Press. 1330p.

Natureserve. 2016. NatureServe Explorer: An online encyclopedia of Life <http://explorer.natureserve.org/> [web application]. Version 7.0. NatureServe, Arlington, VA. U.S.A. [website accessed November 29 2016]

Risk, A.C. 2002. The distribution, commonness and habitat characteristics of *Fissidens hyalinus* in the United States. *The Bryologist*, 105: 43–47.

Appendix 1: Technical summary for Ontario

Species: Pygmy Pocket Moss (*Fissidens exilis*)

Demographic information

| Demographic attribute | Value |
|---|---|
| Generation time. Based on average age of breeding adult: age at first breeding = X year; average life span = Y years. | <1 year. May vary depending on environmental conditions suitable for the formation of gametophytes. |
| Is there an observed, inferred, or projected continuing decline in number of mature individuals? | Unknown |
| 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. | Unknown (dependent on targeted sampling) |
| 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. Unknown b. Unknown c. Unknown |
| Are there extreme fluctuations in number of mature individuals? | Unknown |

Extent and occupancy information in Ontario

| Extent and occupancy attributes | Value |
|---|--|
| Estimated extent of occurrence (EOO). <i>Data estimated from geocat.kew.org.</i> | ~9843.6 km ² based on NHIC EO data |
| Index of area of occupancy (IAO). <i>Data estimated from geocat.kew.org.</i> | 32 km ² based on NHIC EO data and cell width of 2km |

| | |
|--|--------------------------|
| Is the total population severely fragmented? i.e., is >50% of its total area of occupancy 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? | a. Unknown b. Unknown |
| Number of locations. | 7 known localities. |
| Number of NHIC Element Occurrences | 17 |
| Is there an observed, inferred, or projected continuing decline in extent of occurrence? | Unknown |
| Is there an observed, inferred, or projected continuing decline in index of area of occupancy? | Unknown |
| Is there an observed, inferred, or projected continuing decline in number of populations? | Unknown |
| Is there an observed, inferred, or projected continuing decline in number of locations? | Unknown |
| Is there an observed, inferred, or projected continuing decline in [area, extent and/or quality] of habitat? | No |
| Are there extreme fluctuations in number of populations? | Unknown |
| Are there extreme fluctuations in number of locations? | Unknown |
| Are there extreme fluctuations in extent of occurrence? | Unknown |
| Are there extreme fluctuations in index of area of occupancy? | Unknown |

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

Not known

Quantitative analysis (population viability analysis conducted)

Probability of extinction in the wild is unknown.

Threats

A threats calculator was done by COSEWIC (2016) and found no specific threats, high or low, to Pygmy Pocket Moss.

Rescue effect

| Rescue effect attribute | Value |
|--|--------------------------------------|
| Status of outside population(s) most likely to provide immigrants to Ontario | NY: S2; MI, OH and QC: SNA or SNR |

| | |
|--|------------|
| Is immigration of individuals and/or propagules between Ontario and outside populations known or possible? | Possibly |
| Would immigrants be adapted to survive in Ontario? | Yes |
| Is there sufficient suitable habitat for immigrants in Ontario? | Yes |
| Are conditions deteriorating in Ontario? | Unlikely |
| Is the species of conservation concern in bordering jurisdictions? | Yes, in NY |
| Is the Ontario population considered to be a sink? | Unknown |
| Is rescue from outside populations likely? | Possible |

Sensitive species

Pygmy Pocket Moss is not considered a data sensitive species.

Appendix 2: Adjoining jurisdiction status rank and decline

Information regarding rank and decline for Pygmy Pocket Moss (*Fissidens exilis*)

| Jurisdiction | Subnational rank | Population trend | Sources |
|--------------|------------------|------------------|------------------|
| Ontario | S2 | unknown | NatureServe 2016 |
| Quebec | SNA | Unknown | NatureServe 2016 |
| Manitoba | Not Present | Unknown | N/A |
| Michigan | SNR | Unknown | NatureServe 2016 |
| Minnesota | Not Present | Unknown | N/A |
| Nunavut | Not Present | Unknown | N/A |
| New York | S2 | Unknown | NatureServe 2016 |
| Ohio | SNR | Unknown | NatureServe 2016 |
| Pennsylvania | SNR | Unknown | NatureServe 2016 |
| Wisconsin | Not Present | Unknown | N/A |

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

NRANK: National conservation status assessment

SARA: Species at Risk Act

SNR: unranked

SRANK: subnational conservation status assessment

S1: Critically imperiled

S3: Vulnerable

S5: Secure

IUCN: International Union for Conservation of Nature and Natural Resources

CDSEPO: Le Comité de détermination du statut des espèces en péril en Ontario