

**Ontario Species at Risk Evaluation Report for
Hairy Valerian
Valériane ciliée
(*Valeriana edulis ssp. ciliata*)**

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

Assessed by COSSARO as Threatened

November 2020

Valériane ciliée (*Valeriana edulis* ssp. *ciliata*)

La valériane ciliée est une herbacée vivace longévive endémique de la région des États des Grands Lacs et du sud de l'Ontario. Cette espèce est présente en trois sous-populations extantes dans le sud-ouest de l'Ontario, près de Goderich, de Brantford et de Paris (COSEPAC, 2018). L'habitat de prédilection de la valériane ciliée se trouve dans les prairies ouvertes et humides à mésiques et les tourbières minérotrophes à sols calcaires, mais l'espèce peut également tolérer les zones partiellement ombragées et des emplacements plus secs, comme des versants boisés et des escarpements arides. Elle se reproduit seulement à l'aide de graines, qui sont principalement dispersées par le vent.

La perte d'habitat due à l'établissement d'espèces envahissantes constitue en ce moment la menace la plus importante qui pèse sur les sous-populations canadiennes de valériane ciliée, même si le développement commercial et industriel menace également son habitat. Le statut de la valériane ciliée varie entre S1 (gravement en péril) et S3 (vulnérable) dans l'aire de répartition plus vaste pertinente sur le plan biologique constituée par le Minnesota, le Wisconsin, le Michigan, l'Ohio, l'Illinois, l'Iowa et l'Indiana. Elle est classée dans la catégorie des espèces en voie de disparition en Ohio et en Indiana, celle des espèces menacées au Michigan et au Minnesota, et celle des espèces préoccupantes au Wisconsin et en Illinois. NatureServe lui a attribué la cote G5T3 en 2020, alors que l'UICN ne l'a pas évaluée.

La valériane ciliée répond aux critères des espèces en voie de disparition en Ontario, compte tenu de la faible envergure de sa zone d'occurrence et de sa zone d'occupation. Son statut a toutefois été modifié pour celui d'espèce menacée en raison du plus faible statut de risque (espèce préoccupante ou espèce menacée) attribué au Wisconsin, en Illinois, au Michigan et au Minnesota. Ce statut ne concorde pas avec la désignation d'espèce en voie de disparition du COSEPAC (2018) en raison de la modification de son statut en Ontario pour tenir compte de sa condition à l'intérieur de l'aire de répartition plus vaste pertinente sur le plan biologique, imposée par les exigences de la *Loi sur les espèces en voie de disparition* (LEVD) de l'Ontario.

Cette publication hautement spécialisée «COSSARO Candidate Species at Risk Evaluation for Hairy Valerian» 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 l'Environnement, de la Protection de la nature et des Parcs au cossarosecretariat@ontario.ca.

Executive summary

Hairy Valerian (*Valeriana edulis* ssp. *ciliata*) is an herbaceous, long-lived perennial native to the Great Lakes states and Southern Ontario. The species occurs in three extant subpopulations in southwestern Ontario located near Goderich, Brantford, and Paris (COSEWIC 2018). The preferred habitat of Hairy Valerian is open, wet and mesic prairies and fens with calcareous soils, but the species can also tolerate partial shade and can be found on dry sites such as wooded hillsides and dry bluffs. It reproduces only by seeds, which are mainly wind dispersed.

Habitat loss due to the establishment of invasive species is currently the most significant threat facing Canadian subpopulations of Hairy Valerian, although habitat loss associated with commercial and industrial development also poses a threat. Although declines in the total number of mature individuals are inferred based on extirpation of several subpopulations, the total percent decline cannot currently be calculated based on available information for Ontario. The species has a small and declining extent of occurrence (< 5,000 km²) and area of occupancy (< 500 km²), and occurs in small number of locations (< 5) in Ontario.

The status of Hairy Valerian varies from S1 (critically imperiled) to S3 (vulnerable) across the broader biologically relevant range in Minnesota, Wisconsin, Michigan, Ohio, Illinois, Iowa, and Indiana. The species is listed as Endangered in Ohio and Indiana, Threatened in Michigan and Minnesota, and Special Concern in Wisconsin and Illinois. It is ranked as G5T3 (NatureServe 2020) but has not been assessed by the IUCN.

Hairy Valerian meets the criteria for listing as Endangered in Ontario based on its small extent of occurrence and area of occupancy. However, the status has been modified to Threatened based on its lower risk status (Special Concern or Threatened) in Wisconsin, Illinois, Michigan, and Minnesota. The status of this species is not consistent with the designation of Endangered by COSEWIC (2018) because of the modification to its status in Ontario based on its condition within the broader biologically relevant geographic range, as per the requirements of the Endangered Species Act (ESA) of Ontario.

1. Eligibility for Ontario status assessment

1.1. Eligibility conditions

1.1.1. Taxonomic distinctness

Hairy Valerian (*Valeriana edulis* ssp. *ciliata* (Torr. & A.Gray) F.G.Mey) is one of three recognized subspecies of *Valeriana edulis* native to North America (Meyer 1951). Subspecies *ciliata* is recognized as a distinct taxon on the basis of being geographically distinct from ssp. *procera* (Mexico) and ssp. *edulis* (western Canada, United States, and Mexico) (Meyer 1951; COSEWIC 2018).

1.1.2. Designatable units

Hairy Valerian (*Valeriana edulis* ssp. *ciliata*) is considered to represent a single designatable unit throughout its Canadian range (COSEWIC 2018).

1.1.3. Native status

Hairy Valerian is native to Ontario (COSEWIC 2018).

1.1.4. Occurrence

Hairy Valerian occurs in Ontario with numerous recent observations (COSEWIC 2018).

1.2. Eligibility results

Hairy Valerian (*Valeriana edulis* ssp. *ciliata*) is eligible for status assessment in Ontario.

2. Background information

2.1. Current designations

- GRANK: G5T3 (NatureServe 2000)
- IUCN: Status not assessed
- NRANK Canada: N1
- COSEWIC: Endangered (2018)
- SARA: No Schedule, No Status
- ESA 2007: No Status
- SRANK: S1 (ranked in 2015)

2.2. Distribution in Ontario

Hairy Valerian occurs in three extant subpopulations in southwestern Ontario (Figure 1) located near Goderich, Brantford, and Paris (COSEWIC 2018). The Brantford and Goderich populations are considered viable, but the viability of the Paris subpopulation is questionable as only one plant has been observed at that location. The species occurred historically at five additional locations in southwestern Ontario, but these subpopulations are now considered extirpated. The three extant subpopulations are considered by COSEWIC (2018) to represent three separate locations.

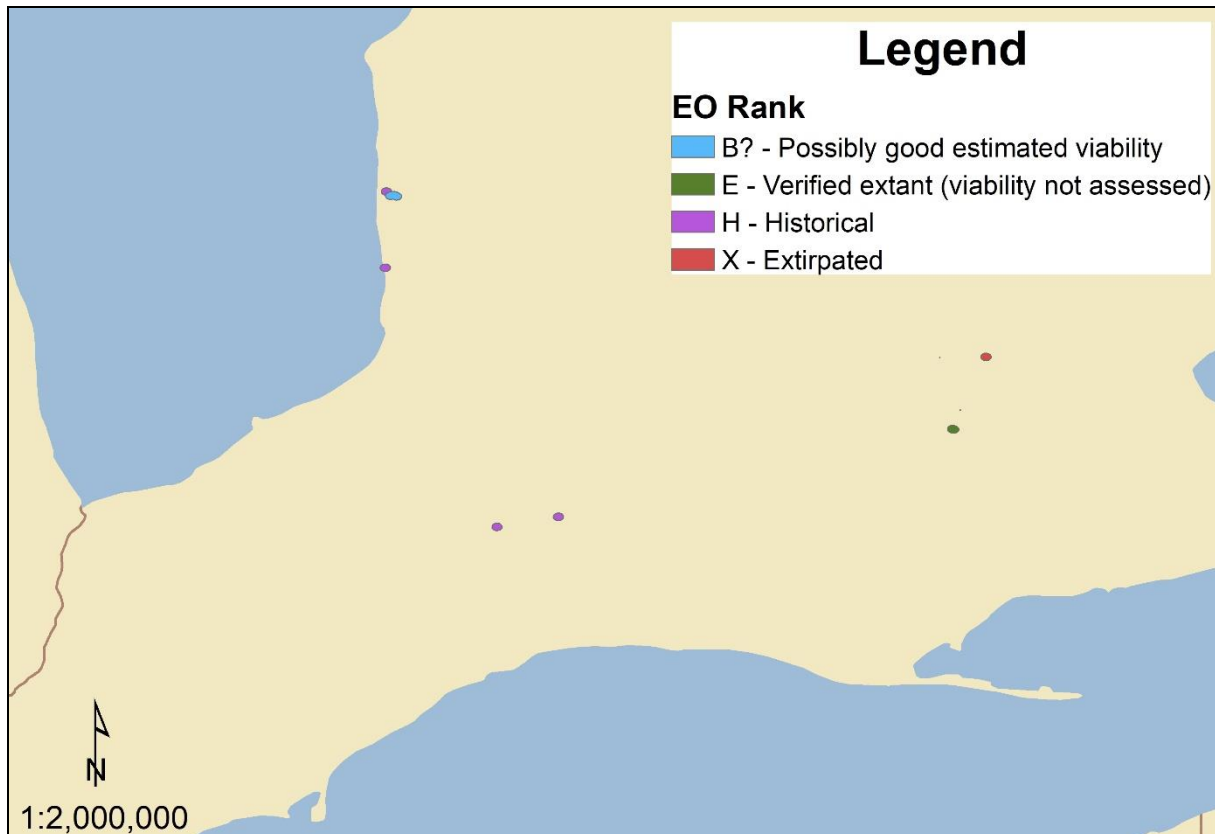


Figure 1. Range of Hairy Valerian in Ontario based on NHIC element occurrence records.

2.3. Distribution, status and the broader biologically relevant geographic range outside Ontario

Hairy Valerian occurs in the north-central United States and adjacent regions of Canada (Figure 2) where it is naturally uncommon due to its specialized habitat requirements (Meyer 1951; COSEWIC 2018; NatureServe 2020).

For the purpose of this report, the broader biologically relevant geographic range (BBGRR) for Hairy Valerian is defined as including populations from Ecoregion 8.1 including: Minnesota, Wisconsin, Michigan, Ohio, Illinois, Iowa, and Indiana (Table 1). The status of Hairy Valerian in these jurisdictions varies from S1 (critically imperiled) to

S3 (vulnerable). The species is listed as Endangered in Ohio and Indiana, Threatened in Michigan and Minnesota, and Special Concern in Wisconsin and Illinois. Hairy Valerian is ranked as G5T3 (NatureServe 2020) but has not been assessed by the IUCN.

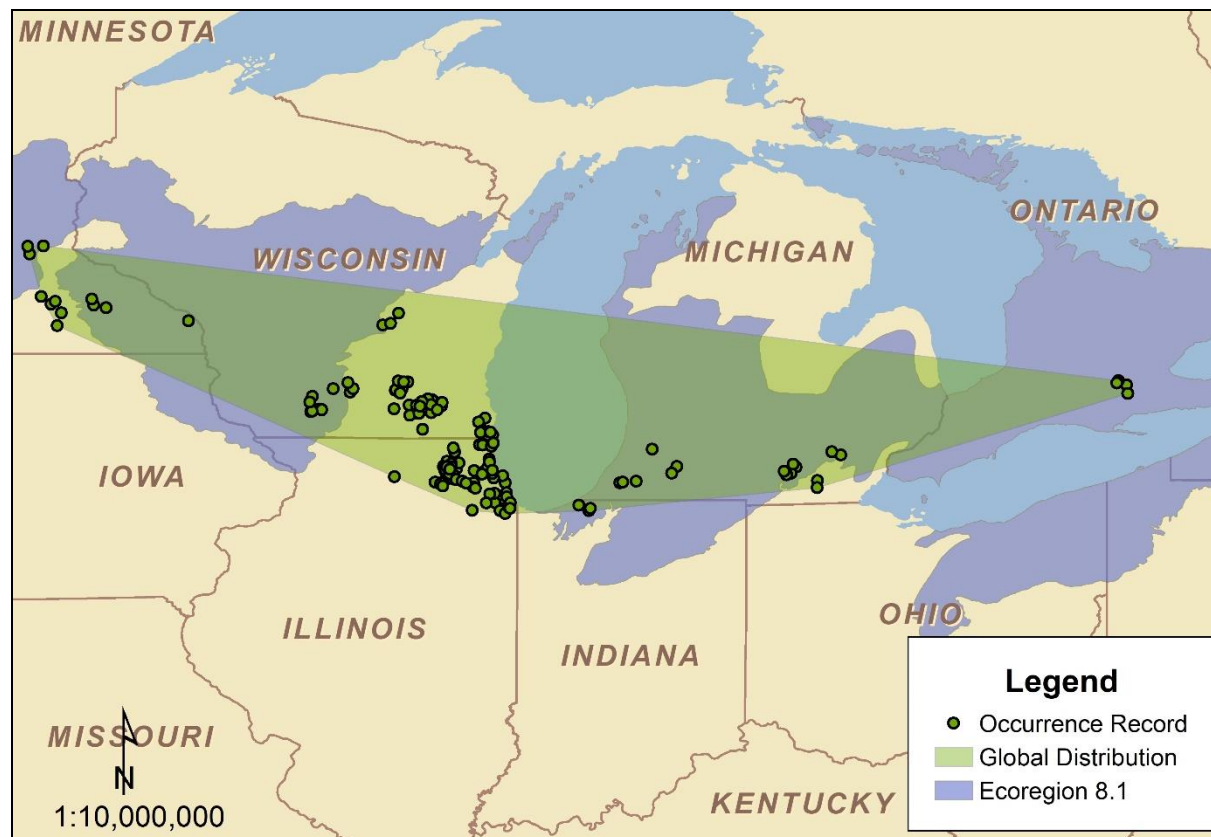


Figure 2. Global distribution of Hairy Valerian occurrences based on records from the GBIF and iNaturalist databases obtained using [GeoCAT](#) [website accessed November 20, 2020]. Geospatial data for Level II ecoregions obtained from the [CEC North American Environmental Atlas](#) [Accessed November 18, 2020]. **Note:** Occurrence points located outside of the known distribution of *ssp. ciliata* were removed for the purpose of this report.

Table 1. Condition of the Species in Adjacent Jurisdictions and Broader Biologically Relevant Geographic Range.

Adjacent Jurisdictions	Biologically Relevant to Ontario (n/a, yes, no)	Condition	Notes & Sources
Quebec	NA	NA	
Manitoba	NA	NA	
Michigan	Yes	S2, listed as threatened	(Michigan Department of Natural Resources 2020; NatureServe 2020)
Minnesota	Yes	S2, listed as	(Minnesota Department

Adjacent Jurisdictions	Biologically Relevant to Ontario (n/a, yes, no)	Condition	Notes & Sources
		threatened	of Natural Resources 2020; NatureServe 2020)
Nunavut	NA	NA	
New York	NA	NA	
Ohio	Yes	S1, listed as endangered	(Ohio Department of Natural Resources 2019; NatureServe 2020)
Pennsylvania	NA	NA	
Wisconsin	Yes	S3, listed as special concern	(NatureServe 2020; Wisconsin DNR 2020)
Illinois	Yes	S3, Not listed as at-risk	(Illinois Department of Natural Resources 2020; NatureServe 2020)
Indiana	Yes	S1, listed as endangered	(Indiana Department of Natural Resources 2019; NatureServe 2020)
Iowa	Yes	SNR, listed as special concern	(Iowa Department of Natural Resources 2017; NatureServe 2020)

2.4. Ontario conservation responsibility

No information available is available in the COSEWIC (2018) report on the percentage of the global range of Hairy Valerian that occurs in Ontario. For the purposes of this report, the percentage of the global range occurring in Ontario was estimated as 6.1%¹.

2.5. Direct threats

Habitat loss due to the establishment of invasive species is currently the most significant threat facing Canadian subpopulations of Hairy Valerian (COSEWIC 2018). Colonization of Reed Canary Grass and Tartarian Honeysuckle has been implicated in the decline or extirpation of several Canadian subpopulations. Habitat loss associated with commercial and industrial development is also considered a threat of potentially high impact to Hairy Valerian.

¹ The global range for *Valeriana edulis* ssp. *ciliata* was estimated based on the creation of a minimum convex hull polygon for GBIF and iNaturalist occurrence records obtained from [GeoCat](#) [accessed Nov 19, 2020]. Records from the western United States and Mexico were first removed from the dataset, as these represent ssp. *edulis* and ssp. *procera*.

Replacement of Hairy Valerian due to natural succession of native species is considered a medium impact threat at both the Goderich and Brantford sites (COSEWIC 2018). Approximately 30% of the Brantford subpopulation is becoming shaded by shrubs and poplars and shading from shrubs also appears to be an issue for the Goderich subpopulation. Herbicide use for controlling right-of-way vegetation is considered a medium to low impact threat for both the Goderich and Brantford subpopulations.

The three extant subpopulations of Hairy Valerian in Ontario are considered to represent three locations because it is unlikely that all subpopulations would be affected by a single event due to their separation distance, as well as differing ownership, land use, and habitat (COSEWIC 2018).

2.6. Specialized life history or habitat use characteristics

The preferred habitat of Hairy Valerian is wet and mesic prairies and fens, which are rare in southern Ontario (COSEWIC 2018). The species can also occur on other moist sites such as wooded valleys, floodplains, and wet meadows. Hairy Valerian may occur but is uncommon on dry sites such as wooded hillsides and dry bluffs. The species appears to prefer sites with calcareous soils and full sun but can tolerate partial shade (Meyer 1951). Hairy valerian is generally dioecious, with plants that bear either all pistillate or staminate flowers (Faivre and Windus 2002). Plants bearing perfect flowers may occur but are uncommon and produce significantly fewer fruits than pistillate flowers.

Hairy Valerian is long-lived, with a reproductive period spanning from three to 100 years and estimated generation time of 50 years (Soule 1981, cited in COSEWIC 2018). Likely pollinators include small bees, flies, and ants (Windus 1993, cited in COSEWIC 2018) and the majority of pollen is received from males within 10 m of female plants (Petry et al. 2016). Not all mature plants flower annually (Windus 1993, cited in COSEWIC 2018) and seed set is significantly influenced by the frequency of male plants (Petry et al. 2016). It is currently unknown whether Hairy Valerian is self-compatible (Faivre and Windus 2002).

Hairy Valerian disperses only by seeds (Petry et al. 2016). The plumose seeds are dispersed mainly by wind (Faivre and Windus 2002), but it is thought that water-dispersal may also aid in dispersal of seeds of plants growing in wet or riparian habitats (COSEWIC 2018).

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

Not applicable. Although declines in the total number of mature individuals are inferred based on extirpation of several Ontario subpopulations, the total % decline in the total

number of individuals cannot be calculated based on available information.

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

Meets criteria for endangered (B1a,bi+ii+biii+iv+v and B2a,bi+ii+biii+iv+v). The extent of occurrence is less than the threshold of 5,000 km² and the area of occupancy is less than 500 km². The number of locations is < 5 and there is an observed decline in the i) extent of occurrence, ii) area of occupancy, iii) area, extent and/or quality of habitat, iv) number of locations. A decline in the total number of individuals is inferred based on the previous factors.

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

Not applicable. Although the total number of mature individuals is < 2,500, criteria C1 and C2 are not met.

3.1.4. Criterion D – Very small or restricted total population

Meets criteria for threatened (D1), as the total number of mature individuals is < 250. Also meets the criteria for vulnerable (D2), as the AOO < 20 km² and the number of locations < 5.

3.1.5. Criterion E – Quantitative analysis

Not applicable. No population viability analysis has been completed for this taxon.

3.2. Application of Special Concern in Ontario

Not applicable.

3.3. Status category modifiers

3.3.1. Ontario's conservation responsibility

Not applicable. Less than 25% of the global range of Hairy Valerian occurs in Ontario.

3.3.2. Status modification based on rescue effect or level of risk in broader biologically relevant geographic range

Applicable. Populations in Minnesota, Wisconsin, Michigan and Illinois are at lower risk, as indicated by their status designation of Threatened or Special Concern in those states.

3.4. Other status categories

3.4.1. Data deficient

Not applicable.

3.4.2. Extinct or extirpated

Not applicable.

3.4.3. Not at risk

Not applicable.

4. Summary of Ontario status

Hairy Valerian (*Valeriana edulis* ssp. *ciliata*) is classified as Threatened in Ontario. Although the species meets the criteria for Endangered under B1 (a,bi+ii+biii+iv+v) and B2 (a,bi+ii+biii+iv+v), the status was modified to threatened based on its lower risk status (Special Concern or Threatened) in Wisconsin, Illinois, Michigan, and Minnesota.

The status of Hairy Valerian is not consistent with the designation of Endangered by COSEWIC (2018) because of the modification to its status in Ontario based on its condition within the broader biologically relevant geographic range, as per the requirements of the Endangered Species Act (ESA) of Ontario.

This status of this species is consistent with the definition of status under the Endangered Species Act, 2007.

5. Information sources

COSEWIC (2018) Assessment and Status Report Hairy Valerian *Valeriana edulis* ssp . *ciliata* in Canada. Ottawa, ON.

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Petry WK, Soule JD, Iler AM, et al (2016) Sex-specific responses to climate change in plants alter population sex ratio and performance. Science (80-) 353:69–71. doi: 10.1126/science.aaf2588.

Soule J (1981) Ecological consequences of dioecism in plants: a case study of sex differences, sex ratios, and population dynamics of *Valeriana edulis* Nutt. Michigan

State University.

Windus JL (1993) Reproductive ecology of a rare dioecious fen species in Ohio, *Valeriana ciliata* T. & G. Ohio State University.

Wisconsin DNR (2020) Hairy Valerian (*Valeriana edulis* var. *ciliata*).

<https://dnr.wi.gov/topic/EndangeredResources/Plants.asp?mode=detail&SpecCode=PDVAL03073>. Accessed 20 Nov 2020.

¹ A change in the classification of a species during reassessment by COSSARO may be for genuine or non-genuine reasons. Genuine reasons may include a reduction in threats to a species such that status of the species has improved, or the continuation of threats to the species such that the status of the species has further deteriorated. Non-genuine reasons may include new information on population size or threats that was not available during a previous assessment, the use of previous COSSARO criteria that may have yielded a different result or, taxonomic revisions that result in changes in range, population sizes or designatable units.

Appendix 1: Technical summary for Ontario

Species: Hairy Valerian (*Valeriana edulis ssp. ciliata*)

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.	>50 years
Is there an observed, inferred, or projected continuing decline in number of mature individuals?	Yes, inferred
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
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. Yes c. No
Are there extreme fluctuations in number of mature individuals?	No

Extent and occupancy information in Ontario

Extent and occupancy attributes	Value
Estimated extent of occurrence (EOO). <i>If value in COSEWIC status report is not applicable, then use geocat.kew.org. State source of estimate.</i>	125 km ²
Index of area of occupancy (IAO). <i>If value in COSEWIC status report is not applicable, then use geocat.kew.org. State source of estimate.</i>	8 km ²
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	a. No b. Yes

Extent and occupancy attributes	Value
larger than the species can be expected to disperse?	
Number of locations. <i>See Definitions and Abbreviations on COSEWIC and IUCN websites for more information on the term "location". Use plausible range to reflect uncertainty if appropriate.</i>	2-3
Number of NHIC Element Occurrences <i>Request data from MNRF.</i>	10 (3 extant, 5 historical, 2 extirpated)
Is there an observed, inferred, or projected continuing decline in extent of occurrence?	Yes, observed
Is there an observed, inferred, or projected continuing decline in index of area of occupancy?	Yes, observed
Is there an observed, inferred, or projected continuing decline in number of sub-populations or EOs?	Yes, observed
Is there an observed, inferred, or projected continuing decline in number of locations?	Yes, observed and inferred
Is there an observed, inferred, or projected continuing decline in [area, extent and/or quality] of habitat?	Yes, observed and inferred
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)

Sub-population (or total population)	Number of mature individuals
<i>Goderich, Maitland River (2017)</i>	<i>182 flowering, 96 non-flowering</i>
<i>Brantford (2017)</i>	<i>153 flowering, 177 non-flowering</i>
<i>Paris (2008)</i>	<i>1 flowering, 0 non-flowering</i>
<i>Total</i>	<i>336 flowering, 273 non-flowering</i>

Quantitative analysis (population viability analysis conducted)

Probability of extinction in the wild is unknown.

Threats

- i. Invasive Non-native Species (Impact: High)
- ii. Commercial and Industrial Areas (Impact: High)
- iii. Problematic Native Species (Impact: Medium)
- iv. Industrial Effluents (Impact: Medium-Low)
- v. Recreational Activities (Impact: Low)

vi. Other Ecosystem Modifications (Impact: Low)

Rescue effect

Rescue effect attribute	Value
Does the broader biologically relevant geographic range for this species extend beyond Ontario?	Yes
Status of outside population(s) most likely to provide immigrants to Ontario	Michigan (S2, declining), Ohio (S1, trend unknown)
Is immigration of individuals and/or propagules between Ontario and outside populations known or possible?	Unknown, but possible
Would immigrants be adapted to survive in Ontario?	Yes, probably
Is there sufficient suitable habitat for immigrants in Ontario?	Possibly
Are conditions deteriorating in Ontario?	Yes
Is the species of conservation concern in bordering jurisdictions?	Yes
Is the Ontario population considered to be a sink?	No
Is rescue from outside populations likely?	No

Sensitive species

Not applicable.

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

EO: Element occurrence (as defined by NHIC)

EOO: extent of occurrence

GRANK: global conservation status assessments

IAO: index of area of occupancy

IUCN: International Union for Conservation of Nature and Natural Resources

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

S2: Imperiled

S3: Vulnerable

S4: Apparently Secure

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