COSEWIC Status Appraisal Summary

on the

Large Whorled Pogonia Isotria verticillata

in Canada

ENDANGERED 2011

COSEWIC Committee on the Status of Endangered Wildlife in Canada



COSEPAC Comité sur la situation des espèces en péril au Canada COSEWIC status appraisal summaries are working documents used in assigning the status of wildlife species suspected of being at risk in Canada. This document may be cited as follows:

COSEWIC. 2011. COSEWIC status appraisal summary on the Large Whorled Pogonia *Isotria verticillata* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. xi pp. (www.registrelep-sararegistry.gc.ca/default_e.cfm).

Production note:

COSEWIC would like to acknowledge Samuel R. Brinker for writing the status appraisal summary on Large Whorled Pogonia, *Isotria verticillata* in Canada, prepared under contract with Environment Canada. This status appraisal summary was overseen and edited by Jeannette Whitton, Co-chair of the COSEWIC Vascular Plants Specialist Subcommittee, with assistance from Bruce Bennett, Co-chair of the COSEWIC Vascular Plants Specialist Subcommittee, and Erich Haber, past Co-chair of the COSEWIC Vascular Plants Specialist Subcommittee.

For additional copies contact:

COSEWIC Secretariat c/o Canadian Wildlife Service Environment Canada Ottawa, ON K1A 0H3

Tel.: 819-953-3215 Fax: 819-994-3684 E-mail: COSEWIC/COSEPAC@ec.gc.ca http://www.cosewic.gc.ca

Également disponible en français sous le titre Sommaire du statut de l'espèce du COSEPAC sur l'Isotrie verticillée (*Isotria verticillata*) au Canada.

©Her Majesty the Queen in Right of Canada, 2012. Catalogue No. CW69-14/2-21-2012E-PDF ISBN 978-1-100-20246-4

Recycled paper



Assessment Summary – November 2011

Common name Large Whorled Pogonia

Scientific name Isotria verticillata

Status Endangered

Reason for designation

This orchid is known historically from only 3 sites in Ontario, but it has not been seen since 1996 despite searches at two of the three previously known sites. The species requires rich, deciduous or mixed, moist forest on sandy soil with abundant humus; this habitat continues to decline in quality due to trampling and exotic plants and earthworms. It is possible that this species may still be extant in Canada since many orchids are known to have long dormancy periods and often occur in very low numbers.

Occurrence

Ontario

Status history

Designated Endangered in April 1986. Status re-examined and confirmed Endangered in April 1998, May 2000, and November 2011.



Isotria verticillata Large Whorled Pogonia

Isotrie verticillée

Jurisdictions: Ontario

Current COSEWIC Assessment:



Date of last assessment: May 2000

Reason for designation at last assessment: Only three remaining populations, none seen since 1996.

New reason for designation (only if different from above):

This orchid is known historically from only 3 sites in Ontario, but it has not been seen since 1996 despite searches at two of the three previously known sites. The species requires rich, deciduous or mixed, moist forest on sandy soil with abundant humus; this habitat continues to decline in quality due to trampling and exotic plants and earthworms. It is possible that this species may still be extant in Canada since many orchids are known to have long dormancy periods and often occur in very low numbers.

Criteria applied at last assessment: A1c; B1+2abcde+3d; C2a; D1

If earlier version of criteria was applied¹, provide correspondence to current criteria: A2c; B1ab(i,ii,iii,iv,v)+2ab(i,ii,iii,iv,v); C2a(i); D1

If different criteria are proposed based on new information, provide explanation:

B1ab(iii)+2ab(iii); D1

Under criterion B, subcriteria i, ii, iv and v are no longer considered applicable as they require changes in EO, IAO, or numbers of individuals, populations or locations. None of these parameters has changed since the last assessment.

A criteria do not apply as there is no documented decline (numbers remain at zero). C2 does not apply as a continuing decline is not feasible with no known individuals.

If application of current specific criteria is not possible, provide explanation:

Recommendation: Update to the status report NOT required (wildlife species' status category remains unchanged)

Reason:

Sufficient information to conclude there has been no change in status category

not enough additional information available to warrant a fully updated status report

¹ An earlier version of the quantitative criteria was used by COSEWIC from October 1999 to May 2001 and is available on the COSEWIC website: http://www.cosewic.gc.ca/eng/sct0/original_criteria_e.cfm

Evidence (indicate as app	olicable):
---------------------------	------------

Wildlife species:	
Change in eligibility, taxonomy or designatable units:	yes 🗌 no 🛛
Explanation:	
No additional information since the last status assessment.	
Range:	
Change in Extent of Occurrence (EQ)	ves 🗆 no 🖂 unk 🗖
Change in Area of Occupancy (AO):	ves □ no ⊠ unk □
Change in number of known or inferred current locations:	ves □ no ⊠ unk □
Significant new survey information	yes □ no ⊠
Explanation:	
No individuals of this species have been observed in Canada since	1996 The documented range
includes just three sites in southwestern Ontario. The IAO is estimat	ed to be 12km^2 While some
surveys have been conducted for this species, no individuals have b	een detected.
Population Information:	
Change in number of mature individuals:	yes 🗋 no 🖂 unk 📋
Change in total population trend:	yes 🗋 no 🖾 unk 📋
Change in severity of population fragmentation:	yes 📋 no 🔯 unk 📋
Change in trend in area and/or quality of habitat:	yes 🛄 no 🖂 unk 📋
Significant new survey information	yes 🗌 no 🛛
Explanation:	
Recent surveys have not detected any individuals of this species. The	ne species has not been
observed in Ontario since 1996. There are three historically docume	nted sites for this species:
Backus Woods, Fowlers Pond, and Skunk's Misery, all in southwest	ern Ontario. The last observation
of the species in Canada was of a single individual at Skunk's Miser	v in 1996. Individuals were last
observed at Backus Woods in 1990, and at Fowlers Pond by 1996.	The Fowlers Pond site was
checked systematically from 2000-2005 by Ontario Ministry of Natur	al Resources staff (R. Gould
pers comm.) The Backus Woods population was visited in 2009 du	ring vegetation and species at
risk surveys. No individuals were detected though these could have	been overlooked due to late
survey timing (MMM Group 2009) No further information is available	e on the Skunk's Miserv site
(White 1998)	
	.

It is possible that a small number of individuals remain at one or more of these sites, but they are unlikely to be present in great enough numbers to alter the Endangered status.

Rescue Effect:

Evidence of rescue effect:

Threats:

Change in nature and/or severity of threats: Explanation:

This species occurs in rich, moist, relatively open, deciduous or mixed forest on sandy soil with thick leaf litter and abundant humus (Klinkenberg 1986). Habitat loss and degradation are probably the primary past and present threats to Large Whorled Pogonia (Jalava et al. 2010). The Fowlers Pond habitat has been flooded by Beaver (Castor canadensis) activity, likely rendering the habitat unsuitable. Soil compaction and excessive trampling at the Backus Woods population may have contributed to the loss of plants. The Skunk's Misery site was marked for logging in the late 1990s.

The impacts of exotic earthworms were not addressed in the previous assessment and have been identified in the recent draft recovery strategy as a medium-to-high threat, though the actual severity remains unknown because no attempt has been made to document the presence of exotic earthworms at any of the sites yet (Jalava et al. 2010). Exotic earthworms have been shown to reduce the duff and humus layers in northern temperate forests by increasing rates of litter decomposition as well as reducing fungal diversity in the soil, shifting decomposition from fungaldominated systems to faster, bacterial-dominated systems (Hendrix and Bohlen, 2002; Wardle, 2002; Bohlen et al., 2004; Hale et al., 2005). This is of particular concern considering Large Whorled Pogonia requires substrates with thick leaf litter accumulations and rich humus. As well, Large Whorled Pogonia, like most orchids (McCormick et al. 2004; Shefferson et al. 2005) relies on mycorrhizal associations with soil-inhabiting fungi for successful seedling establishment and overall fitness throughout all life stages. Thus, the survival of Large Whorled Pogonia is likely closely tied to the edaphic requirements of its mycorrhizal host(s). Impacts to the soil fungal community may render Large Whorled Pogonia plants more susceptible to drought or herbivory, as well as reducing seed germination. As well, air- and precipitation-borne nutrient loading (increases in available nitrogen) have been shown to negatively impact on fungal diversity (Arnolds, 1991), and are therefore additional potential threats to the mychorrhizal associations required by Large Whorled Pogonia. Garlic Mustard (Alliaria petiolata) also appears to be a newly identified threat, noted since the May 2000 COSEWIC assessment (Brownell pers. comm. 2011).

Protection:

Change in effective protection:

yes 🛛 no 🗌

Explanation:

Large Whorled Pogonia is listed as an endangered species under the Ontario Endangered Species Act 2007, Schedule 1 (ESA, 2007). A recovery strategy has also been drafted and focuses on knowledge gaps and habitat restoration that may favour re-establishment of Large Whorled Pogonia to self-sustaining levels in southern Ontario (Jalava et al. 2010).

Backus Woods is owned and managed by the Nature Conservancy of Canada (Michael Bradstreet, pers. comm. 2011). Fowlers Pond is a Provincial Wildlife Area managed by the Ontario Ministry of Natural Resources. The Skunk's Misery site is on private land, but the landowner is aware of the species and has supported conservation activities (Jalava et al. 2010).

yes 🗌 no 🖂

Explanation:

No additional information or change in rescue effect since previous assessment. The Canadian Large Whorled Pogonia population (if extant) is small, isolated and not contiguous with U.S. populations to the south, and it is unlikely that propagules from elsewhere would become established in Canada. However, orchid seeds are very small and wind-borne, thus, while establishment is highly unlikely. dispersal may still be possible.

Quantitative Analysis: Change in estimated probability of extirpation:

yes 🗌 no 🖾 unk 🗌

Details:

No quantitative analysis is available for this species.

Summary and Additional Considerations: [e.g., recovery efforts]

There have been no sightings of Large Whorled Pogonia in Canada since the previous assessment. The last observation was in 1996 at Skunk's Misery where a single vegetative individual was found (White 1998). The species has not been seen at Backus Woods since 1990 (White 1998). The Fowlers Pond population has also not been observed since 1990 and this site is likely no longer suitable due to beaver activity resulting in flooding (although the site could be restored, it is unknown whether dormant individuals could survive). Despite the lack of observations since 1996, there is uncertainty about whether the species may persist in Canada. Many orchid species are known to undergo prolonged dormancy, and often occur at low densities; thus it is possible that flowering individuals will be rediscovered in Canada. Exotic earthworms, which reduce the duff and humus layers as well as the fungal diversity, are identified as an additional threat to the species in the draft recovery strategy (Jalava *et al.* 2010). Large Whorled Pogonia re-establishment may require that this threat be mitigated.

List of authorities contacted to review the status appraisal:

- Michael Oldham, Botanist/Herpetologist, Natural Heritage Information Centre, Ontario Ministry of Natural Resources, Peterborough, Ontario.
- Ron Gould, Species at Risk Biologist, Ontario Ministry of Natural Resources, Aylmer, Ontario.

Sources of information:

- Arnolds, E. 1991. Decline of ectomycorrhizal fungi in Europe. Agriculture, Ecosystems and Environment 35: 209–244.
- Bohlen, P.J., S. Scheu, C.M. Hale, M.A. McLean, S. Migge, P.M. Groffman and D. Parkinson. 2004. Non-native invasive earthworms as agents of change in northern temperate forests. Frontiers in Ecology and the Environment 2(8): 427-435.
- Brownell, V.R. pers. comm. 2011. Email correspondence to B.A. Bennett. January 2011. Species at Risk Branch, Ontario Ministry of Natural Resources.
- Endangered Species Act, 2007. Website accessed April 9 2010. Available at <u>http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_07e06_e.htm</u>
- Hale, C.M., L.E. Frelich, and P.B. Reich. 2005. Exotic European earthworm invasion dynamics in northern hardwood forests of Minnesota, USA. Ecological Applications 15(3): 848-860.
- Hendrix, P.F., and P.T. Bohlen. 2002. Exotic Earthworm Invasions in North America: Ecological and Policy Implications. BioScience 52(9): 801-811.

- Jalava J.V., J. Jones and J.D. Ambrose. 2010. DRAFT recovery strategy for the Large Whorled Pogonia (*Isotria verticillata*) in Ontario. Ontario Recovery Strategy Series. Prepared for the Ontario Monistry of Natural Resources, Peterborough, Ontario. vi + 8 pp.
- Klinkenberg, R. 1986. Status report on the Large Whorled Pogonia (*Isotria verticillata*) in Canada. Committee on the Status of Endangered Wildlife in Canada. Canadian Wildlife Service. 40 pp.
- McCormick, M.K., D.F. Whigham, and J. O'Neill. 2004. Mycorrhizal diversity in photosynthetic terrestrial orchids. New Phytologist 163: 425-438.
- MMM Group. 2009. Ecological Inventory of Species at Risk, Vegetation, Insects, Breeding Birds in Backus Woods, Norfolk County Vegetation Survey. Prepared for Earth Tramper Consulting Inc., Long Point Region Conservation Authority, and Ontario Ministry of Natural Resources. 415 pp.
- Shefferson, R. P., M. Weiss, T. Kull and D. L. Taylor. 2005. High specificity generally characterizes mycorrhizal association in rare lady's slipper orchids, genus *Cypripedium*. Molecular Ecology 14, 613–626.
- Wardle, D. 2002. Communities and ecosystems: linking the above-ground and belowground components. Princeton University Press, Princeton, New Jersey.
- White, D.J. 1998. Update COSEWIC status report on the Large Whorled Pogonia *Isotria verticillata* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. 1-6 pp.

Author of status appraisal summary: Samuel R. Brinker

TECHNICAL SUMMARY

Isotria verticillata Large Whorled Pogonia Range of occurrence in Canada: ON

Isotrie verticillée

Demographic Information

Generation time	Unknown
Related species are known to be capable of prolonged dormancy	
(e.g. up to 20 years), but the dormancy of this species has not been	
examined.	
Is there an observed continuing decline in number of mature	No
individuals?	
No individuals have been observed in Canada since 1996, so no	
decline can be documented.	
Estimated percent of continuing decline in total number of mature	Unknown
individuals within 5 years or 2 generations	
Generation time is not known, so the decline cannot be estimated.	
Observed percent reduction or increase in total number of mature	Unknown
individuals over the last 10 years, or 3 generations.	
No observations since 1996, but dormancy and generation times	
are unknown.	
Projected percent increase in total number of mature individuals	Unknown
over the next 10 years.	
Inferred percent increase in total number of mature individuals over	Unknown
any 10 years, or 3 generations period, over a time period including	
both the past and the future.	
Are the causes of the decline clearly reversible and understood and	No
ceased?	
Causes of historical decline not fully understood, but probably have	
not ceased, and may not be reversible.	
Are there extreme fluctuations in number of mature individuals?	N/A

Extent and Occupancy Information

Estimated extent of occurrence	12 km ²
Index of area of occupancy (IAO)	12 km ²
Each of the three previously known sites occupied a single 2X2 km	
grid square. As these are not considered extirpated, the IAO is	
calculated as 12 km ² .	
Is the total population severely fragmented?	N/A
Number of "locations *"	3
No individuals are known to be present, but the best estimate of the	
number of locations is based on the three previously known	
populations, each of which is treated as a location.	
Is there an observed continuing decline in extent of occurrence?	No
Is there an observed and projected continuing decline in index of	No
area of occupancy?	
Is there an observed continuing decline in number of populations?	No
Is there an observed continuing decline in number of locations?	N/A
Is there an observed continuing decline in quality of habitat?	Yes
Are there extreme fluctuations in number of populations?	No
Are there extreme fluctuations in number of locations *?	No

^{*} See definition of location.

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 population)

Population	Number of Mature Individuals
Fowlers Pond	Unknown (none observed)
Backus Woods	Unknown (none observed)
Skunk's Misery	Unknown (none observed)
Total	Unknown
No individuals have been observed.	

Quantitative Analysis

Probability of extinction in the wild	N/A
Not done.	

Threats (actual or imminent, to populations or habitats)

This species has not been observed in Canada since 1996, and the reasons for declines are not well understood. Previously identified threats include habitat loss and degradation, exotic and invasive species, including the effects of exotic earthworms and the presence of Garlic Mustard, trampling and harvesting.

Rescue Effect (immigration from outside Canada)

Status of outside population(s)? Rare in jurisdictions closest to Ontario (e.g. S2 in MI, S3 in NY).	
Is immigration known or possible?	Possible
Would immigrants be adapted to survive in Canada?	Probably
Is there sufficient habitat for immigrants in Canada?	Probably
Is rescue from outside populations likely?	Unlikely

Current Status

COSEWIC: Endangered (November 2011)	

Status and Reasons for Designation

Status:	Alpha-numeric code:
ENDANGERED	B1ab(iii)+2ab(iii); D1

Reasons for designation:

This orchid is known historically from only 3 sites in Ontario, but it has not been seen since 1996 despite searches at two of the three previously known sites. The species requires rich, deciduous or mixed, moist forest on sandy soil with abundant humus; this habitat continues to decline in quality due to trampling and exotic plants and earthworms. It is possible that this species may still be extant in Canada since many orchids are known to have long dormancy periods and often occur in very low numbers.

Applicability of Criteria

Criterion A (Decline in Total Number of Mature Individuals):

Not applicable. No decline has been documented.

Criterion B (Small Distribution Range and Decline or Fluctuation):

Meets Endangered B1ab(iii)+2ab(iii), with a small EO and IAO falling below the thresholds for

Endangered. The species has only been known from 3 locations, and habitat continues to decline.

Criterion C (Small and Declining Number of Mature Individuals):

Not applicable. No decline has been documented.

Criterion D (Very Small or Restricted Total Population):

Meets Endangered D1, with fewer than 250 known individuals.

Criterion E (Quantitative Analysis):

Not done.



COSEWIC HISTORY

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) was created in 1977 as a result of a recommendation at the Federal-Provincial Wildlife Conference held in 1976. It arose from the need for a single, official, scientifically sound, national listing of wildlife species at risk. In 1978, COSEWIC designated its first species and produced its first list of Canadian species at risk. Species designated at meetings of the full committee are added to the list. On June 5, 2003, the *Species at Risk Act* (SARA) was proclaimed. SARA establishes COSEWIC as an advisory body ensuring that species will continue to be assessed under a rigorous and independent scientific process.

COSEWIC MANDATE

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) assesses the national status of wild species, subspecies, varieties, or other designatable units that are considered to be at risk in Canada. Designations are made on native species for the following taxonomic groups: mammals, birds, reptiles, amphibians, fishes, arthropods, molluscs, vascular plants, mosses, and lichens.

COSEWIC MEMBERSHIP

COSEWIC comprises members from each provincial and territorial government wildlife agency, four federal entities (Canadian Wildlife Service, Parks Canada Agency, Department of Fisheries and Oceans, and the Federal Biodiversity Information Partnership, chaired by the Canadian Museum of Nature), three non-government science members and the co-chairs of the species specialist subcommittees and the Aboriginal Traditional Knowledge subcommittee. The Committee meets to consider status reports on candidate species.

DEFINITIONS

(201	1)
(20)		

Wildlife Species	A species, subspecies, variety, or geographically or genetically distinct population of animal, plant or other organism, other than a bacterium or virus, that is wild by nature and is either native to Canada or has extended its range into Canada without human intervention and has been present in Canada for at least 50 years.
Extinct (X)	A wildlife species that no longer exists.
Extirpated (XT)	A wildlife species no longer existing in the wild in Canada, but occurring elsewhere.
Endangered (E)	A wildlife species facing imminent extirpation or extinction.
Threatened (T)	A wildlife species likely to become endangered if limiting factors are not reversed.
Special Concern (SC)*	A wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats.
Not at Risk (NAR)**	A wildlife species that has been evaluated and found to be not at risk of extinction given the current circumstances.
Data Deficient (DD)***	A category that applies when the available information is insufficient (a) to resolve a species' eligibility for assessment or (b) to permit an assessment of the species' risk of extinction.

- * Formerly described as "Vulnerable" from 1990 to 1999, or "Rare" prior to 1990.
- ** Formerly described as "Not In Any Category", or "No Designation Required."
- *** Formerly described as "Indeterminate" from 1994 to 1999 or "ISIBD" (insufficient scientific information on which to base a designation) prior to 1994. Definition of the (DD) category revised in 2006.

*	Environment Canada	Environnement Canada
	Canadian Wildlife Service	Service canadien de la faune



The Canadian Wildlife Service, Environment Canada, provides full administrative and financial support to the COSEWIC Secretariat.