COSEWIC
Assessment and Update Status Report

on the

White Prairie Gentian
Gentiana alba

in Canada

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ENDANGERED
2001

COSEWIC
COMMITTEE ON THE STATUS OF
ENDANGERED WILDLIFE
IN CANADA

COSEPAC
COMITÉ SUR LA SITUATION DES
ESPÈCES EN PÉRIL
AU CANADA

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COSEWIC
Assessment Summary

Assessment Summary – May 2001

Common name
White Prairie Gentian

Scientific name
Gentiana alba

Status
Endangered

Reason for designation
Highly impoverished population of fewer than 50 plants found in remnant prairie habitats localized in one small area of southwestern Ontario at risk from a variety of land use activities.

Occurrence
Ontario

Status history
Designated Endangered in April 1991. Status re-examined and confirmed in May 2001. Last assessment based on an update status report.

COSEWIC
Executive Summary

White Prairie Gentian
Gentiana alba

Species information

The white prairie gentian can grow to a height of 90 cm but generally flops onto adjacent vegetation. Plants produce up to a dozen or more stems with fleshy, yellowish-green, opposite leaves surmounted by a cluster of greenish-white to yellowish-white erect flowers. It is our only native gentian with the above characters. Besides flower and leaf colour, white prairie gentian can be distinguished from white forms of the closely related bottle gentian, *G. andrewsii*, by its keeled sepals. The sepals of the bottle gentian have no keels. The scientific name of the species is the subject of taxonomic dispute; some authorities support *Gentiana alba* and others *G. flavida*. Common names are white prairie gentian, white gentian, pale gentian, yellowish gentian and yellow gentian.

Distribution

The main range of the species is centred in the plains of the U.S. Midwest. In Canada, it was found in the late nineteenth century at Healy Falls, Northumberland County and near Amherstburg in Essex County, Ontario. These populations are believed to be extirpated. The extant population in Canada is restricted to Walpole Island in the delta of the St. Clair River, Lambton County, Ontario.

Habitat

The species is found in oak-hickory savannahs on Walpole Island. The soils here are rich in calcium, well drained and only partially shaded. *G. alba*'s associates are tall grass prairie species.

Biology

White prairie gentian is an herbaceous perennial. With maturity, it forms a clump of up to a dozen or more stems, some with flowers and others without. It belongs to the group of highly evolved gentians that have closed flowers structured to enhance cross-pollination. Bumblebees are the main pollinator. Flowering begins in mid-August and continues into late September. The seed capsules split open in October to liberate hundreds of small, light, winged seeds. These germinate readily after a few months of

cool, moist soil conditions. Seed reproduction has never been observed in the wild because the plants are very difficult to see until they are large enough to flower.

Population sizes and trends

The most recent survey (07 September 2000) inventoried a total of 45 individual plants in three sites on Walpole Island. This is an increase of 26 plants over the 19 inventoried in 1989. However, in 1989, one of the sites supported only two plants and these have been reduced to one. That single plant appears to be declining in vigour and is at risk from development.

Limiting factors and threats

Adjacent land uses continue to threaten the species. Quarrying of the sand pits is reduced but ongoing. In addition, within the last decade, a landfill has developed at the western end of the sand pits. Expansion of the cemetery will bring land clearing and soil disturbance to the site of the single plant remaining in the north. Agricultural expansion seems to have abated but nearby abandoned land may be brought back into production. Off-road traffic by ATV's poses a new threat. Home construction continues. Introgressive hybridization may pose a threat.

Special significance of the species

The name of the genus comes from Gentius, king of Illyricum, who is said to have discovered the tonic value (unspecified) of the plants. The Potawatomi have used an infusion of root as an alterative.

COSEWIC MANDATE

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) determines the national status of wild species, subspecies, varieties, and nationally significant populations that are considered to be at risk in Canada. Designations are made on all native species for the following taxonomic groups: mammals, birds, reptiles, amphibians, fish, lepidopterans, molluscs, vascular plants, lichens, and mosses.

COSEWIC MEMBERSHIP

COSEWIC comprises representatives from each provincial and territorial government wildlife agency, four federal agencies (Canadian Wildlife Service, Parks Canada Agency, Department of Fisheries and Oceans, and the Federal Biosystematic Partnership), three nonjurisdictional members and the co-chairs of the species specialist groups. The committee meets to consider status reports on candidate species.

DEFINITIONS

Species	Any indigenous species, subspecies, variety, or geographically defined population of wild fauna and flora.
Extinct (X)	A species that no longer exists.
Extirpated (XT)	A species no longer existing in the wild in Canada, but occurring elsewhere.
Endangered (E)	A species facing imminent extirpation or extinction.
Threatened (T)	A species likely to become endangered if limiting factors are not reversed.
Special Concern (SC)*	A species of special concern because of characteristics that make it particularly sensitive to human activities or natural events.
Not at Risk (NAR)**	A species that has been evaluated and found to be not at risk.
Data Deficient (DD)***	A species for which there is insufficient scientific information to support status designation.

* 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.

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.

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

Update
COSEWIC Status Report

on the

White Prairie Gentian
Gentiana alba

in Canada

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2001

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SPECIES INFORMATION

Name and classification

In 1990, the commonly accepted scientific name for this species was *Gentiana alba* Muhl. The species was long known as *Gentiana flavida* A. Gray but was revised to *G. alba* based on Pringle (1965). However, recent publications in Ontario (Morton and Venn 1990, Oldham 1996, Newmaster *et al.* 1998) have resumed the use of *G. flavida* following Wilbur's (1988) opinion that *G. alba*, although having precedent, was incorrectly published by Muhlenberg and therefore a *nomen illegit.* according to the International Code of Botanical Nomenclature (International Botanical Congress, Tokyo). Not all taxonomists agree with this interpretation (A.A. Reznicek pers. comm.,). Dr. J. Pringle (pers. comm.) suggests that even if the names published in Muhlenberg's *Catalogue* are invalid, *G. alba* is still a valid name because of its inclusion in T. Nuttall's *Genera of North American Plants* (1818) which is a source of validly published names and predates Gray's 1846 publication of *G. flavida.* In this case the name becomes *G. alba* Muhl. ex Nuttall.

The issue remains unresolved. Other aspects of the nomenclatural history and taxonomy are covered in detail in the 1990 report. *G. alba* is known by a variety of common names of which White Prairie Gentian has wide acceptance in Canada although the preferred name given in *Plants of Ontario* (Newmaster *et al*. 1988) is yellowish gentian with white prairie gentian listed as an alternative. In the adjacent state of Michigan it is called white gentian (Voss 1996). An additional name unmentioned in the 1990 report is yellow gentian (Wilbur 1988). *G. alba* is in the flowering plant family Gentianaceae, the Gentian family.

Description

Gentiana alba is one of the coarsest gentians. The stems are stout and emerge in clusters from the perennial rootstock. Height varies from 30-90 cm for flowering stems. The habit is often sprawling. Leaves are large, ovate, yellowish-green and somewhat fleshy. Flowers are produced in a dense cluster at the top of the stem, and in larger plants, from the axils below. Newly opened flowers are greenish-white in Ontario; some authors say yellowish-white. The flowers open only slightly towards the end of August. The fruit is a capsule that splits in two to release hundreds of tiny winged seeds in the fall.

DISTRIBUTION

Global Range

The species ranges from southern Michigan to central Minnesota, south to Kentucky, northwestern Arkansas and eastern Kansa with scattered populations east to southwestern Ontario, eastern Pennsylvania, West Virginia and North Carolina (Figure 1).

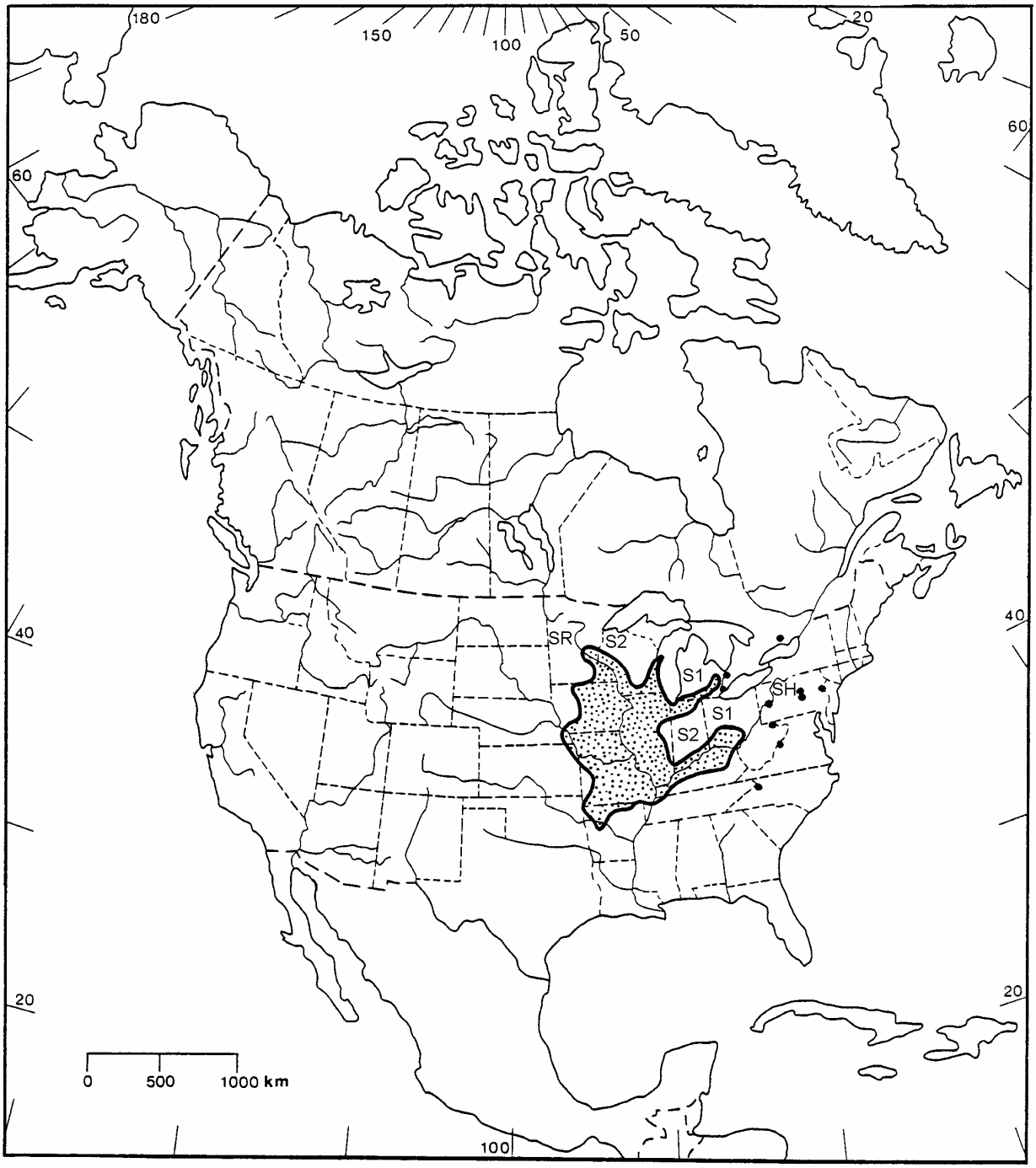

Figure 1. Distribution of *Gentiana alba* (after Pringle 1967) with current Natural Heritage Program status in each range state adjoining Canada.

Canadian Range

The known Canadian distribution remains unchanged from 1990 and is entirely restricted to the north portion of Walpole Island, Lambton County, Ontario (Figure 2). The remaining area of alvar adjacent to the Amherstburg quarries and a nearby area of gravel ballast that supports an assemblage of alvar species were examined by the author on 11 September 2000 but no plants of *G. alba* were observed. Since the publication of the 1990 report, some areas of intact savannah have been found near Healy Falls (Catling and Catling 1993). *G. alba* has not been observed in these Healy Falls savannahs but there is the possibility that with more surveying effort during the species' flowering season the species may be rediscovered there (P. Catling pers. comm.).

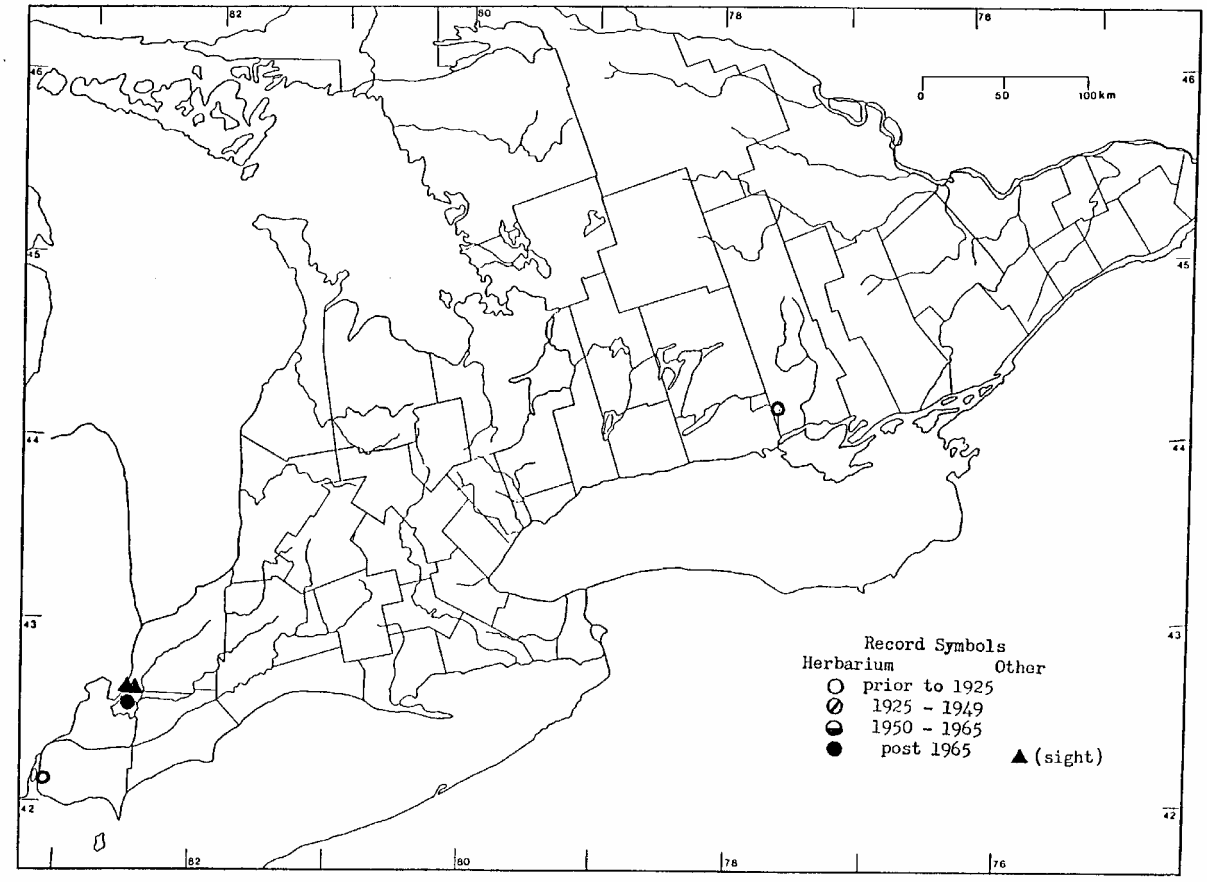

Figure 2. Distribution of *Gentiana alba* in Canada.

HABITAT

The habitat occupied by the Canadian population is unchanged from that described in the 1990 report. The habitat of the nearest Michigan population was examined on 6 October 2000. This differs from the Canadian habitat and suggests a

wider adaptation than might be assumed from observing only the Walpole Island site. The Michigan site is a narrow sand and gravel ridge above river terraces (Huron River, Washtenaw County). Plant growth on this site is sparse – there is little shade except from a thin growth of *Corylus americana* and a few saplings of *Quercus rubra* and *Q. alba*. The site appears to be less fertile, drier, more exposed and less species diverse than the Walpole site and this is apparently reflected in the growth of the plants of *G. alba* which are shorter, have fewer flowering stems per plant (0.77 flowering stems per plant vs. 2.4 per plant at Walpole) and fewer flowers per stem than those on Walpole Island. These plants had viable-appearing seeds. The Michigan site is dominated by Indian Grass, *Sorghastrum nutans*, Big Bluestem, *Andropogon gerardii*, and Bracken, *Pteridium aquilinum*.

BIOLOGY

General

Gentiana alba is essentially a species of prairies, meadows and open woods in the United States and, like a number of other prairie species, it is uncommon in Ontario. It is a calciphile (Pringle 1965); the two sites from which it is evidently extirpated in Ontario are both limestone alvars and the sands (Colwood Fine Sandy Loam) at Walpole, although neutral (pH 7) at the soil surface, are increasingly calcareous with greater depth. *G. alba*, on Walpole Island grows in mesic savannah communities that are maintained by fire.

A review of the literature since 1990 did not reveal any recent articles or papers on any aspects of the taxonomy, biology or distribution of this species.

Reproduction

White prairie gentian is a perennial herbaceous species with closed ‘bottle’ flowers that appear in late summer and early fall. Under Ontario conditions, seed dispersal begins in early October. The closed structure of the flower restricts its pollinators to bumblebees and perhaps lepidoptera. Although structurally adapted for cross-pollination, the flowers may set fertile seed when self-pollinated (Costelloe 1988). The flowering season overlaps with that of *G. andrewsii* and hybrids are evident at Walpole Island. An isolated plant in the prairie plant demonstration gardens at the Ojibway Nature Centre did not appear to have set viable seed when examined in early October 2000.

In 1989, seeds were collected from the Walpole Island plants, sown in pots (with commercial potting mix) in the fall of that year and stratified over the winter of ’89-‘90. These germinated in the spring of 1990 and the resulting seedlings were distributed and outplanted in 1991. One of these seedlings was given to the Ojibway Nature Centre, Windsor, Ontario and planted in the prairie plant demonstration gardens. This seedling has prospered and in 2000 had five flowering stems. This supports Pringle’s (1965) statement that the plant is easy to culture (although horticulturally neglected because of

its coarse appearance) and comments provided by Sollenberger in the 1990 Report (Section 10, page 14). Although the Walpole Island First Nation is not at present interested in propagating the species, it is evident that the propagation of the species is simple, culture is easy and that the species would be a good candidate for reintroduction or, on Walpole Island, dissemination beyond its present restricted occurrence.

POPULATION SIZES AND TRENDS

An inventory of the Walpole Island plants was conducted on 07 September 2000. Surveying effort is provided in Section 14. The 2000 inventory by site is given below:

Site A (The Sandpits). One plant with one flowering stem.
Site B (*Silphium* Prairie). Three plants, four flowering stems.
Site C (Natural Area #3). Forty-one plants, 97 flowering stems, six putative hybrids.

[Sites A and B are separated by only about 500 m and should perhaps be regarded as part of the same population.]

The results of the 2000 inventory and previous inventories are provided in Table 1.

Table 1. Number of plants(p) and flowering stems(fs) of *G. alba* inventoried by year.

Site	Year					
	1984	1985	1987	1989	1997	2000
A	2p	2p	-	0	1p	1p
B	-	-	-	1p	0	3p
C	-	-	19p	18p	41fs	41p 97fs

In the eleven years since the 1989 survey for the COSEWIC Report, the population of white prairie gentian on Walpole Island has apparently doubled. Survey effort cannot explain the increase in observed individual plants. The area occupied by plants of *G. alba* in 2000 has also increased from 1989. At Site B, the number of plants has increased from one to three. The three plants at Site B occupy approximately 1sq. m within a triangle of about 100 sq. m. At Site C, the two plants inventoried in 1989 in the north portion have increased to twenty-three whereas the seventeen in the south have only increased by one to eighteen. The northern plants are spreading to the south and if this expansion continues, the gap separating the two groups will be filled. In 2000, the plants at Site C occupied approximately 15 sq. m spread over an area of 8,000 sq. m. The area occupied at site C in 1989 was about 5,000 sq. m. The single plant at Site A occupies less than one square metre.

Based on an examination of the Ontario and Michigan habitat of *G. alba*, it would appear that all the remaining dry-mesic prairies and savannahs on Walpole Island and the adjacent islands of the St. Clair delta are suitable as habitat for the species. The total area of such appropriate habitat is unknown but could be calculated from aerial

photographs. The species could be a candidate for prairie and savannah restoration plantings and this has the potential to greatly expand the occupied habitat.

LIMITING FACTORS AND THREATS

With the exception of grazing by domestic animals, all the limiting factors covered in the 1990 report are still operative in 2000.

Gentiana alba is restricted to mesic and dry prairies and savannahs with calcareous soils. These types of communities have been much reduced in extent in Ontario and across North America. In 1992, the estimate for prairie and savannah remaining in Ontario was 2,100 ha or approximately 3% of the pre-European settlement figure (Bakowsky and Riley 1994). Obviously much potential habitat for the species has been lost.

Limiting factors and threats specific to the existing population are: seed predation; late spring and summer fires destructive to the new growth; shading by woody plant cover due to lack of fire; expansion of roads and trails; ATV traffic; expansion of agriculture, sand pits, landfill and cemetery; home construction; and, possibly, introgressive hybridization with *Gentiana andrewsii*.

All populations examined including Michigan and the single plant at the Ojibway Nature Centre have exhibited seed parasitization by an unidentified lepidopteran caterpillar. This parasite destroys the majority of the seed within adjacent capsules.

Since 1989, there has been considerable new home construction on Walpole Island. Some of these homes are sited within the savannahs of the north part of the Island along Chiefs Road above Austin Road. These homes and their associated landscaped grounds are removing potential habitat for the species but more importantly the pressure to control fires in order to protect property is increasing (M. Williams, pers. comm.). In spite of this, fires are still occurring and the effects of recent burns (dates unknown, participants unknown) are evident at Site B and Site C (charred and dead woody stems). Conversely, there do not appear to have been any recent fires at Site A and this is reflected in a thickening shrub canopy. The single plant at this site is heavily shaded and apparently declining in vigour. A more imminent threat to this plant is the eastward expansion of the cemetery which will bring this plant to within a few centimetres of the area to be cleared and leveled.

An abandoned and naturalizing farm field about 100 metres to the west of Site C may be put back into production in 2001.

An informal trail has developed along the sand ridge that supports the plants at Site C. The trail runs nearly through the middle of the *G. alba* population and some plants are at risk of trampling. Of greater concern is the use of this trail by ATV traffic that would greatly widen the trail and increase the amount of damage through crushing and soil compaction. Signs of this were visible in 2000.

In 1989, four putative *G. alba* X *G. andrewsii* hybrids were inventoried. In 2000, six hybrids were observed.

Land ownership is outlined in the 1990 report and remains unchanged in 2000.

SPECIAL SIGNIFICANCE OF THE SPECIES

The name of the genus comes from Gentius, king of Illyricum, who is said to have discovered the tonic value (unspecified) of the plants. The Potawatomi have used an infusion of root as an alterative (Smith 1933, as found in Dan Moerman's Native American Ethnobotany Database at http://www.umd.umich.edu/cgi-bin/herb/).

EVALUATION AND PROPOSED STATUS

Existing protection or other status

The following ranks were obtained from the Natural Heritage Information Centre, Peterborough, Ontario (M. Oldham, pers. comm.). International (Global) Rank: G4 (apparently secure). S ranks in U.S.A.: Arkansas (S?), Illinois (S?), Indiana (S2), Iowa (S3), Kansas (S1), Kentucky (S1S2), Maryland (SR), Michigan (S1), Minnesota (SR), Missouri (SR), Nebraska (S1), New Jersey (S?), North Carolina (SH), Ohio (S1), Oklahoma (S1), Pennsylvania (SH), West Virginia (SH), and Wisconsin (S2).

S Ranks are defined as follows:

SR – reported
S? – not yet ranked
SH – historical
S1 – critically imperiled
S2 – imperiled
S3 – vulnerable

As noted in the 1990 report, Rupert *et al.* in Argus *et al.* (1982 –87) reported *G. alba* as rare in Canada; possibly extirpated in West Virginia, threatened in Michigan and Ohio, and rare in Indiana, North Carolina, Pennsylvania and Wisconsin.

The nearest known population in the U.S. occurs near Ann Arbor, in Washtenaw County, Michigan. There were originally four separate populations in this area; only one population of 13 plants remains in 2000. The other three populations are believed to have declined because of shading by shrubs (A.A. Reznicek, pers. comm.). None of the four populations was managed by prescribed burning or had experienced an episode of wildfire in recent decades.

In Ontario, *G. alba* has a Rank of S1. It is not listed under the Ontario Endangered Species Act. COSEWIC designated the species Nationally Endangered in 1991.

The Walpole Island First Nation is concerned about the welfare of this species and personnel from the Heritage Centre participate in the field surveys and monitoring.

Assessment of status and author's recommendation

The COSEWIC status assigned to the species in 1991 was Endangered. Conforming to the current COSEWIC guidelines for the status assessment of species would result in retention of this status. The species fits the Endangered criterion D - Very Small or Restricted (Population) which is defined as less than 250 mature individuals. The most recent (07 September 2000) inventory of the Walpole I. sites enumerated a total of 45 mature individuals. Although this represents a doubling of the known population since 1989, most of the threats outlined in the 1990 report are still present and in the case of Site A are being realized.

TECHNICAL SUMMARY

Species Name: *Gentiana alba (*syn *G. flavida)*

Distribution

Extent of occurrence: about 0.8 ha
Area of occupancy: about 16 sq. m

Population Information

Total number of individuals in the Canadian population: 45
Number of mature reproducing individuals in the Canadian population: 45
Generation time: < 10 years
Total population trend: increasing
Number of known populations: 3 sites best recognized as 2 populations
Is the total population fragmented? Yes
number of individuals in smallest population: 1
number of individuals in largest population: 41
number of extant sites: 1
number of historic sites from which species has been extirpated: 2
Does the species undergo fluctuations in numbers? This is difficult to determine. Staff at the Walpole Island Heritage Centre have observed year to year fluctuations in the number of flowering stems.

Limiting Factors and Threats

Gentiana alba is restricted to mesic and dry prairies and savannahs with calcareous soils. These types of communities have been much reduced in extent in Ontario and across North America. Most of the habitat available to the species has been lost since European settlement.

Limiting factors and threats specific to the existing population are seed predation, late spring and summer fires destructive to the new growth, shading by woody plant cover due to lack of fire, expansion of roads and trails, ATV traffic, expansion of agriculture, sand pits, landfill and cemetery, home construction, and possibly introgressive hybridization with *Gentiana andrewsii*.

Rescue Potential

Does the species exist outside Canada? _X_ YES
Is immigration known or possible? _X_ NO
Would individuals from the nearest foreign population be adapted to survive in Canada? _X_ YES
Would sufficient suitable habitat be available for immigrants? _X_ YES

ACKNOWLEDGEMENTS

Mike Williams, Clint Jacobs, Al Woodliffe, John Ambrose and Deb Jacobs assisted in the field survey on Walpole Island and Scott Hughes helped with the Michigan fieldwork. Al Woodliffe also shared his field notes and observations from the last decade. Tony Reznicek provided the information on the Michigan populations and taxonomy. Jim Pringle provided additional information on the species' taxonomy. Lindsay Rodger offered helpful advice on the organization of the report. To all the above, thanks for generosity in time and effort. Funding provided by the Canadian Wildlife Service, Environment Canada.

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