

COSEWIC
Assessment and Status Report

on the

Dwarf Lake Iris
Iris lacustris

in Canada



THREATENED
2004

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 – November 2004

Common name
Dwarf Lake Iris

Scientific name
Iris lacustris

Status
Threatened

Reason for designation

This is a globally rare Great Lakes endemic plant, restricted in Canada to semi-shaded calcareous areas of Ontario's Bruce Peninsula and Manitoulin Island. It is currently known from about 40 Canadian sites and faces habitat loss and degradation at some sites. Several sites have been lost to development. Two of the largest populations are protected in a national and a provincial park.

Occurrence
Ontario

Status history
Designated Threatened in November 2004. Assessment based on a new status report.



COSEWIC
Executive Summary

Dwarf Lake Iris
Iris lacustris

Species information

Dwarf lake iris (*Iris lacustris*) is a small iris reaching a height of about 10 cm with broadly linear, curved leaves. Flowers are showy, 3-5 cm wide, usually blue. The plant spreads vegetatively by rhizomes, and can form very large colonies of interconnected stems.

Distribution

Dwarf lake iris is a Great Lakes endemic found on the northern shores of Lake Michigan and Lake Huron. In Canada it is found on the west side of the Bruce Peninsula and the south side of Manitoulin Island, Ontario.

Habitat

The species grows on sandy or gravelly beach ridges along Lake Huron or Michigan, in shallow calcareous soils under forests usually consisting of eastern white cedar (*Thuja occidentalis*) or balsam fir (*Abies balsamea*). It can tolerate a wide range of microclimate types but grows optimally in semi-shaded areas where the water table is just below the surface.

Biology

Dwarf lake iris is a perennial that reproduces mainly vegetatively from rhizomes, which partially accounts for its lack of genetic variation. Flowers bloom in early June and are insect pollinated. Plants are capable of self-pollination, but seed set is low. Seeds are ant-dispersed.

Much of the biology of this species remains unknown.

Population sizes and trends

The Ontario Natural Heritage Information Centre identified a total of 43 sites where dwarf lake iris had been reported. Field visits were made to 32 accessible sites. The species was found at 16 of these sites, plus at two new sites. Three sites that were not

visited likely also have extant populations. It was estimated that the total population contains approximately 1,000,000 individual shoots.

There have been no previous systematic surveys of dwarf lake iris, so trends are difficult to determine. There has been some decline during the last century in the number of sites where this iris has been found, but the extent of the decline is unknown.

Limiting factors and threats

Dwarf lake iris is sensitive to light and water table levels, which affect flower and fruit production. The main threat to the species comes from construction activities or landscaping associated with lakefront development.

Special significance of the species

The species is a Great Lakes endemic that is only found along part of the Lake Huron and Michigan shoreline. It is a small showy iris that is promoted by some nurseries as a perennial for woodland gardens.

Existing protection or other status designations

Dwarf lake iris is considered threatened in Michigan and Wisconsin, as well as federally in the United States. It is ranked G3 (vulnerable) by NatureServe.



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 5th 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 agencies (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 members and the co-chairs of the species specialist and the Aboriginal Traditional Knowledge subcommittees. The Committee meets to consider status reports on candidate species.

DEFINITIONS (NOVEMBER 2004)

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 it is either native to Canada or has extended its range into Canada without human intervention and has been present in Canada for atleast 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 wildlife species for which there is inadequate information to make a direct, or indirect, assessment of its 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.



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

COSEWIC Status Report

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Dwarf Lake Iris

Iris lacustris

in Canada

2004

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SPECIES INFORMATION

Name and classification

Scientific name: *Iris lacustris* Nutt.
Synonyms: *Iris cristata* Ait. ssp. *lacustris* (Nutt.) Iltis
Iris cristata Ait. var. *lacustris* (Nutt.) Dykes
Common names: dwarf lake iris, baby iris.
Family: Iridaceae (iris family)
Major plant group: Monocot flowering plant

Dwarf lake iris used to be considered a subspecies of dwarf crested iris (*Iris cristata*) (Dykes, 1913) but is now recognised as a distinct species based on morphology, habitat, range and chromosome number and configuration (Foster, 1937; Scoggan, 1978).

Description

Dwarf lake iris has been described as being similar to *Iris cristata*, but smaller. Leaves are linear, arching, 0.5 to 1.0 cm wide and about 6 cm long at flowering time, growing up to 18 cm long by the end of the season. Its main distinction from *Iris cristata* is a smaller perianth tube as well as its disjunct geographical range.

The plant grows by elongation of slender creeping rhizomes that give rise to enlarged nodes from which grow terminal sheaths of leaves. The result is a network of stems (ramets) that remain interconnected for many years. The flowers grow in the fork of the two terminal sheaths of leaves. Flowers are 3-5 cm wide with 3 showy petals, 3 petaloid sepals, and orange bearded crests lying partly beneath small petaloid style branches (Figure 1). Flowers grow to a height of 10 cm and are usually blue, but var. *albiflora* has white flowers (Cruise and Catling, 1972).



Figure 1. Flowering shoots of dwarf lake iris (photo by Erich Haber).

Dwarf lake iris is distinguishable from the common Blue flag (*Iris versicolor*) by its small size, the presence of rhizomes, and crested sepals. It also appears to be similar to false asphodel (*Tofieldia glutinosa*) when not in flower, but can be distinguished by the presence of rhizomes.

DISTRIBUTION

Global range

Dwarf lake iris is a Great Lakes endemic with its global range limited to the northern shores of Lake Michigan and Lake Huron, with occasional populations slightly inland (Figure 2). In the United States, it is known to be at 60 sites in Michigan and 15 in Wisconsin (U.S. Fish and Wildlife Service, 1988).

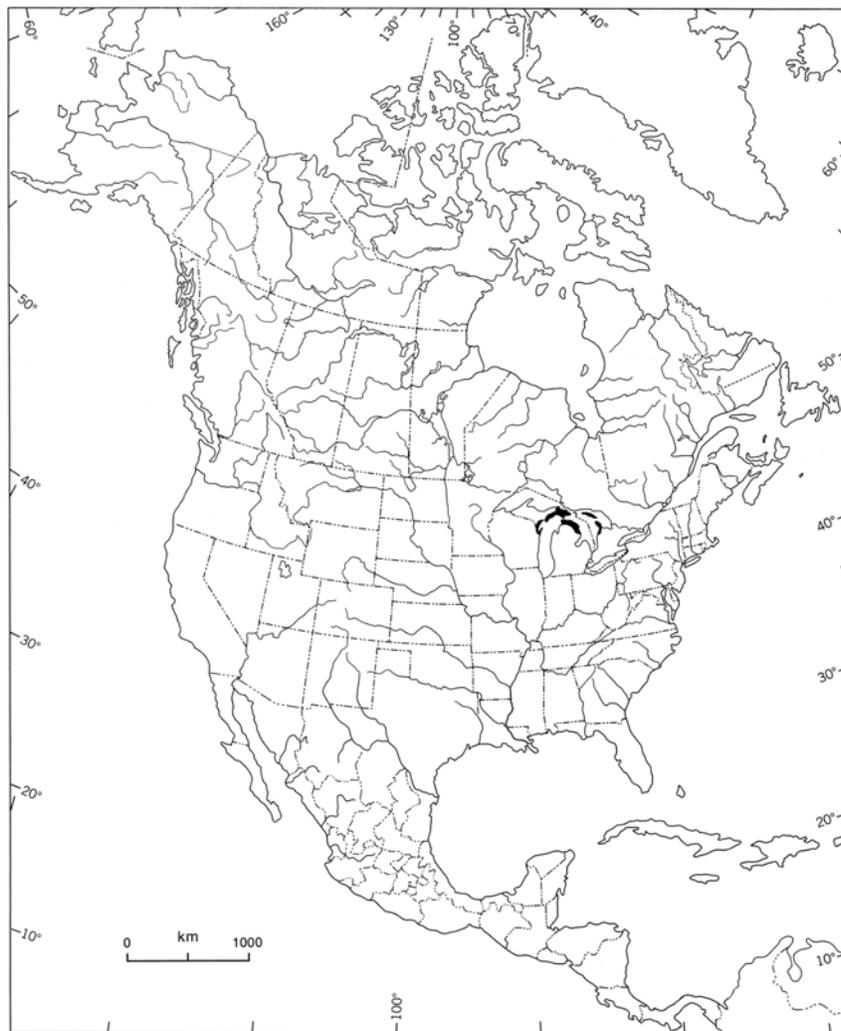


Figure 2. Global distribution of dwarf lake iris (*Iris lacustris*).

Canadian range

In Canada, dwarf lake iris is found on the west coast of the Bruce Peninsula, in Ontario, extending south along the Lake Huron shore to about Inverhuron (Argus *et al.*, 1982-1987) and on the south shore of Manitoulin Island, Ontario (Figure 3).

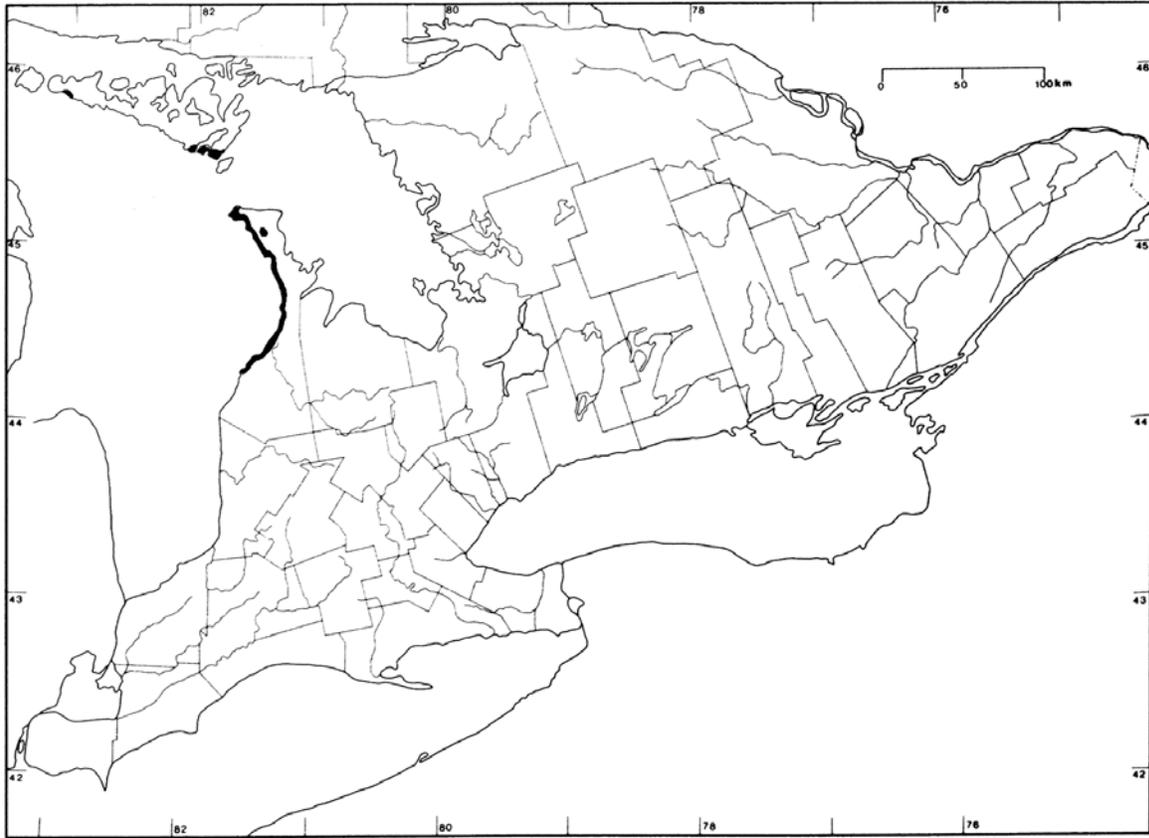


Figure 3. Canadian distribution of dwarf lake iris (*Iris lacustris*).

One specimen was collected at Sandwich by John Macoun in 1901. Porsild has since confirmed the identification (Guire and Voss, 1963), but there have been no subsequent reports of its presence at that site. Sandwich is now part of the City of Windsor; it is unlikely to still have habitat supporting the species.

There is also a report of a collection by Krotkov in 1933 from Big Bay, on the Georgian Bay side of the Bruce Peninsula. In the Atlas of the Rare Vascular Plants of Ontario, Keddy treated this as an error since the site was not mentioned in Krotkov's (1940) description of the peninsula (Argus *et al.*, 1982-1987). It is possible that he was referring to a different site known as Big Bay.

HABITAT

Habitat requirements

Dwarf lake iris grows along lakeshores on sandy or gravelly beach ridges in shallow calcareous soils at the beach-forest edge, where there are numerous small gaps in the forest canopy (Van Kley and Wujek, 1993). It tends to be abundant where it is found, growing in dense patches (Planisek, 1983), and even colonising disturbed sites (Trick and Fewless, 1984). It is usually found in forests dominated by eastern white cedar (*Thuja occidentalis*) or balsam fir (*Abies balsamea*), but has also been observed to grow under trembling aspen (*Populus tremuloides*), red pine (*Pinus resinosa*), white pine (*P. strobus*), and white spruce (*Picea glauca*). See Van Key and Wujek (1993).

It usually grows within close proximity to the Lake Huron shoreline, although it can be found inland on the shores of small lakes, ponds or wetlands several hundred metres from the Lake Huron shoreline (Van Kley and Wujek, 1993). These populations are possibly remnants from former glacial-lake shorelines. Most sites in Ontario were located within 500 metres of the Lake Huron shore. The exception is the site found at Highway 6 and Dorcas Bay Road, Bruce Peninsula.

The species can tolerate a wide range of microclimate types, soil types, and pH range (Van Kley and Wujek, 1993), but grows and reproduces optimally on thin, well-drained soils that are semi-shaded, a habitat also favoured by bearberry (*Arctostaphylos uva-ursi*). Light intensity appears to have the strongest effect on dwarf lake iris, with bloom to shoot ratio being highest at approximately 40900 Lux (3800 foot-candles). There is also a lower bloom to shoot ratio where the water table is within 25 cm of the surface (Van Kley and Wujek, 1993). No information was found with regards to optimal levels of nutrients.

In Canada, the species is only found on the west side of the Bruce Peninsula (with the one questionable exception at Big Bay) and the south side of Manitoulin Island. It is not certain whether it is a climatic or other characteristic that prevents dwarf lake iris from growing on the shores of Georgian Bay or the North Channel or simply the absence of suitable sandy habitats on the east side, where cobble beaches and rocky shorelines predominate in the northern section. At several of the sites where field observations were made, a cool fine mist could be seen blowing off Lake Huron by prevailing westerly winds. The author hypothesizes that this mist might be a component of dwarf lake iris habitat.

Trends

Macoun's record of dwarf lake iris from Sandwich indicates that the historical range of the species extended considerably farther south than it does now, although it might not have been very common since there have been no other reports of dwarf lake iris south of Inverhuron. The herbarium record contained little habitat information.

The development of cottages along the Lake Huron shoreline has an unknown effect on dwarf lake iris habitat. Construction activities involve disturbing ground, which would result in direct destruction of plants where the activities take place. Extensive grooming of lawns that involve vegetation removal and replacement with sod would also destroy iris plants. However, most cottagers leave their lots in a relatively natural state. Tree and brush removal to create open lawn space would reduce the canopy and actually encourage dwarf lake iris growth. It would also halt natural succession that leads to a closing of the canopy. Studies would need to be done to examine in greater detail the impact of cottage development on dwarf lake iris.

Protection/ownership

Two of the largest populations of dwarf lake iris were found at protected sites at Dorcas Bay Nature Reserve (Bruce Peninsula National Park) and MacGregor Point Provincial Park. The population at Johnson's Harbour Nature Reserve is also protected. This accounts for 34% of the known Canadian population.

BIOLOGY

General

Dwarf lake iris was believed to have evolved from dwarf crested iris since the last glaciations of the area 11,000 years ago (Hannan and Orick, 2000). Genetic studies have found the species to be genetically depauperate with no isozyme variation, indicating it evolved from a single founding population and was subjected to subsequent extinctions and bottlenecks (Hannan and Orick, 2000; Simonich and Morgan, 1994). The tendency towards vegetative reproduction further re-inforces its uniform morphology.

Reproduction

Dwarf lake iris mainly reproduces vegetatively with new plants being established from rhizomes resulting in colonies of genetically identical individuals. Natural fruit and seed set are low, and seeds only germinate sporadically after long periods of dormancy (Hannan and Orick, 2000; Makhholm, 1986).

Flowers bloom from mid-May to early June with flowers being open for about three days. Seed capsules ripen from mid-June to mid-August. Plants die back in autumn leaving the rhizome to over-winter (Planisek, 1983). Pollen is required for fruit set, and flowers are capable of self-pollinating. One experiment showed self-pollination was more common than cross-pollination, and self-pollinated flowers had a higher fruit set (Planisek, 1983). Flowers are insect-pollinated. Halictid bees (*Augochlorella striata*) have been observed pollinating dwarf lake iris (Larson, 1998). Since the bees have also been observed visiting other flower species, their relationship to *I. lacustris* is probably not highly specialized (Larson, 1998).

The number of flowers produced appears to be correlated to the number of growing tips, but fruit set is not a function of flower density. Seed set is about half that of available ovules. No information was found regarding plant longevity, generation time, and reproductive rate. Age at sexual maturity was estimated to be at least 7 years (Planisek, 1983). Bloom and fruit production was found to be highest at sites with intermediate light levels of about 40900 Lux (3800 foot-candles), young soils and a water table below the surface (Van Kley and Wujek, 1993).

Survival

No information was found regarding offspring survival, population age structure and reproductive/recruitment rate. Little information was found regarding herbivory affecting survival. Field observations showed little evidence of grazing upon this species. Insect larvae and chipmunks have been observed consuming the capsules (Makholm, 1986).

Physiology

Dwarf lake iris is a perennial that dies back to its rhizomes and goes dormant in winter. New growth from the rhizomes comes in the spring. The locations of past years' shoots can be detected from the swollen nodes on the rhizome.

No information was found regarding its climatic range and sensitivity.

The species can tolerate a large range in microclimate habitats. It is most sensitive to light with its optimal levels being semi-shade of about 3800 foot-candles (Van Kley and Wujek, 1993). It tolerates lower light levels, but will produce fewer flowers and fruit. The lack of tolerance to high levels of sunlight may be related to drought susceptibility. Dieback due to drought was observed during the particularly hot summer of 1988. It can also tolerate a wide range of soil types, including sand, gravel, and loess over limestone, and has also been observed growing in soil with pH ranging from 5.4 to 7.5 (Van Kley and Wujek, 1993).

Movements/dispersal

Dwarf lake iris seeds are ant-dispersed. More than one species of ant (and even a centipede) have been observed dispersing the seeds (Planisek, 1983). The distance of dispersal is unknown, although it appears that the ants are most likely to collect seeds close to their nest. Plants generally are not near the water's edge so it is unlikely that seeds could float to Ontario shores from the limited sites in the USA; few seeds are produced by the plants and their longevity in water is unknown.

Some dispersal of pollen on insects is likely, but the extent and distance of this dispersal, or its effect on the population, is unknown.

Nutrition and interspecific interactions

Pollen and seed dispersal are insect-dependent, but since reproduction is primarily vegetative, the well-being of dwarf lake iris is not entirely dependent on the presence of pollinators or seed-dispersing insects. No other facultative associations are known. There are no known inhibitory associations. There was also no information regarding its nutrient requirements.

Behaviour/adaptability

Dwarf lake iris has been successfully raised at the W.J. Beal Botanical Garden in Michigan, although seed set is not much more successful than under natural conditions (Chittenden, 1995). It is also a popular rock garden plant with several companies advertising seeds commercially via the Internet. It is unknown whether plants or seeds are being taken from the wild.

Van Kley and Wujek (1993) observed some dieback due to drought during the summer of 1988, and hypothesize that occasional water stress is the reason for not growing in full sunlight.

POPULATION SIZES AND TRENDS

There is approximately 160 km of shoreline on the west side of the Bruce Peninsula. Dwarf lake iris usually grows within 2 km of the shoreline with the exception of the Dyer Bay Road and Hwy 6 site, which is 7 km from the Lake Huron shore. The extent of occurrence is about 320 km² on the Bruce Peninsula, plus approximately another 2 km² around Dyer Bay Road. The species was reported on Bear's Rump Island (Brownell, 1984) and Cove Island (Morton and Venn, 1987). The two islands add another 10.5 km² to the extent of occurrence.

The extent of occurrence on Manitoulin Island is more difficult to determine since dwarf lake iris does not extend continuously along the shoreline. It is known to cover 11.5 ha at Belanger Bay, and about .25 ha at South Bay. Morton (1990) reported a community occupying 10 acres (4 ha) around Hungerford Point. There is 124 km of coastline between Hungerford Point and Belanger Bay. Using the same assumption of a maximum of 2 km inland from the coast, the extent of occurrence could be up to 240 km² on Manitoulin Island. However, given the lack of evidence of populations between South Bay and Belanger Bay, the extent of occurrence is probably more appropriately calculated using the 20 km of coastline from Hungerford Point to South Bay, and adding another 5 km of coastline along Belanger Bay and Girouvard Point, giving a total of 50 km². Combined with the extent of occurrence on the Bruce Peninsula, the overall extent of occurrence would be 382 km².

The Ontario Natural Heritage Information Centre identified a total of 43 sites where dwarf lake iris had been reported. Of these records, 26 were observations over 25-years-old. Four of these old sites are believed to no longer have dwarf lake iris due to

urbanisation of habitat or the lack of any recent reports: Sandwich (now Windsor), Mirimichi Bay, Fishing Islands, and Big Bay.

Fieldwork was conducted from May 26 to 30, 2003. Field visits were made to 32 accessible sites. At each site, patches of dwarf lake iris were sought and patch size in m^2 was estimated. Sites were abandoned if the species was not found within an hour. Each patch was assigned a level of shoot density: sparse (approximately 100 shoots/ m^2), medium (approximately 400 shoots/ m^2) and dense (approximately 1000 shoots/ m^2), which were then totalled. These numbers are consistent with the findings of Planisek (1983) who measured an average of 400.5 growing tips per m^2 .

Dwarf lake iris was found at 16 of these 32 sites, and two possibly new sites were found in addition. The area of occupancy was approximately 2470 m^2 , and the population was estimated at about 959,200 shoots.

The species was verified as present at only one of four sites visited on Manitoulin Island. M.J. Oldham found an additional site on Manitoulin in 2004. The other three were either historical sites where the last sighting was over 40 years ago and the plants are now extirpated, or they were rare at the sites originally; and could easily have been missed due to their sparse and scattered presence. On the Bruce Peninsula, dwarf lake iris was found at 15 of 28 sites searched. Since location information provided was sometimes imprecise (accurate within 1 to 10 km), it was difficult to determine if the species was no longer in the area or remained extant but was simply not found. Several sites have been developed for cottages, which impeded access. Five of these sites were historical with specimens last recorded over 30 years ago. Three sites appear to have been affected by development: a road in one case and residential development with landscaping at the other two.

Two possibly new sites were found in the approximate area of previously reported sites. Given the accuracy of the previous reports, it is uncertain if these are the same sites. Overall it appears that where dwarf lake iris is abundant and land use has not changed, populations can remain healthy over long periods of time. Systematic monitoring would be required to confirm this.

In addition to the sites surveyed, populations likely remain healthy at Belanger Bay, Hungerford Point, Cove Island, and Bear's Rump Island. Belanger Bay was reported from 2000 to have a population growing in an area of approximately 11.5 ha, while the Hungerford Point population covered about 4 ha. The percent of ground actually covered by dwarf lake iris is estimated to be about 0.1% based on the area of occupancy figures for Dorcas Bay, Bruce Peninsula National Park and MacGregor Point Provincial Park divided by the overall areas of these parks. Rough estimates for the area of occupancy at Belanger Bay and Hungerford Point would therefore be about 115 m^2 and 40 m^2 respectively or about 46,000 shoots and 16,000 shoots respectively. There are no population estimates available for Cove and Bear's Rump Islands. This would bring the total area of occupancy to 2625 m^2 and the total population estimate to somewhat over 1 million shoots.

There have been no previous systematic surveys of dwarf lake iris, so trends are difficult to determine. There has been some decline during the last century in the number of sites where dwarf lake iris is found, but the extent of the decline is unknown. It is also uncertain whether there have been any declines in dwarf lake iris for reasons other than loss of habitat.

LIMITING FACTORS AND THREATS

Since dwarf lake iris is most sensitive to light and water table levels, any changes to the canopy cover and hydrological regime could have an effect on this species. The main potential threat is cottage development, and the shoreline of Lake Huron is prime real estate. There has been considerable recent development in the area, and undeveloped areas frequently have signs advertising lots for sale.

In spite of this, dwarf lake iris seems to have some resilience to development if landscaping is kept to a minimum. Four patches were found on cottage lots, either near cedar hedges or on roadsides or along paths. Since dwarf lake iris occupies openings in the canopy, small-scale cottage development might even be beneficial in some circumstances. There is a tendency to maintain showy native plants (such as ones that resemble cultivated species) as part of the natural landscaping around cottages, especially if they are sheltered within canopy openings.

The extent of remaining dwarf lake iris on private property in the Bruce Peninsula is uncertain. To minimize threats, it would be appropriate to inform property owners of the significance of this species in order to discourage them from disturbing existing patches. Non-flowering patches might be especially vulnerable, since in vegetative condition the plants are not especially showy.

As dwarf lake iris has showy flowers, there might be some threat from horticultural harvesting; however the same qualities can also trigger public support for its preservation. It was designated as Michigan's state wildflower in 1998, which is also likely to result in more public support for efforts to conserve the plant.

The species is also genetically depauperate, which affects its ability to adapt as a population, and could make it especially vulnerable to disease or climate change.

SPECIAL SIGNIFICANCE OF THE SPECIES

Dwarf lake iris is endemic to the Great Lakes area. The populations in Ontario, Michigan and Wisconsin comprise the global population, although within this area it can be quite common.

No record of Aboriginal uses of dwarf lake iris were found; however, the closely related species *Iris cristata* was used for medicinal purposes (Hamel and Chiltosky, 1975).

The plant has sparked some interest among evolutionary biologists due to its endemism and lack of genetic variation. It is also a showy iris that is promoted by some nurseries as a suitable perennial for woodland gardens.

EXISTING PROTECTION OR OTHER STATUS DESIGNATIONS

About a third of the sites at which dwarf lake iris is found in Canada are in protected areas such as parks, conservation areas or Areas of Natural and Scientific Interest (ANSI). Two of the largest populations were found at Dorcas Bay Nature Reserve (Bruce Peninsula National Park) and MacGregor Point Provincial Park. In Michigan, at least seven large colonies are partially or wholly on state lands, while other colonies are protected in Nature Conservancy or Michigan Nature Association preserves.

About half of the Ontario sites are on private land. The remaining sites are either on First Nations' territories, or in areas where ownership is unknown.

In the United States, it is designated threatened federally as well as in the states of Michigan and Wisconsin. The species is not listed in the IUCN Red Book. NatureServe ranks this species as G3 (vulnerable), and the Ontario Natural Heritage Information Centre gives it a subnational rank of S3 (vulnerable). General threats for this species across its range as noted on the NatureServe web site are: "Shoreline development is clearly the most significant threat to the species. Off-road vehicle use, road widening, chemical spraying and salting, and natural plant succession are lesser threats."

TECHNICAL SUMMARY

Iris lacustris
Dwarf lake iris

iris lacustre

Range of Occurrence in Canada: Ontario

Extent and Area Information	
<ul style="list-style-type: none"> • <i>Extent of occurrence (EO)(km²)</i> (The sum of suitable habitats encompassing known sites from shoreline to mainly 2 km inland) 	382 km ²
<ul style="list-style-type: none"> • <i>Specify trend in EO</i> 	Stable
<ul style="list-style-type: none"> • <i>Are there extreme fluctuations in EO?</i> 	No
<ul style="list-style-type: none"> • <i>Area of occupancy (AO) (km²)</i> (Sum of areas occupied by localized colonies) 	<<1 km ² (2625 m ²)
<ul style="list-style-type: none"> • <i>Specify trend in AO</i> 	likely stable
<ul style="list-style-type: none"> • <i>Are there extreme fluctuations in AO?</i> 	No
<ul style="list-style-type: none"> • <i>Number of known or inferred current locations</i> 	About 40 sites have been documented with 18 verified, plus 4 relatively recently documented populations likely are also extant. In 2004, OMNR staff have also located a number of other sites not seen by the writer.
<ul style="list-style-type: none"> • <i>Specify trend in #</i> 	unknown
<ul style="list-style-type: none"> • <i>Are there extreme fluctuations in number of locations?</i> 	No
<ul style="list-style-type: none"> • <i>Specify trend in area, extent or quality of habitat</i> 	likely stable
Population Information	
<ul style="list-style-type: none"> • <i>Generation time (average age of parents in the population)</i> 	Unknown (several years)
<ul style="list-style-type: none"> • <i>Number of mature individuals</i> 	Just over 1 million shoots estimated but the species forms clonal patches representing an unknown number of distinct plants. Flower production varies from 0-35% of shoots. Most shoots can reproduce vegetatively.
<ul style="list-style-type: none"> • <i>Total population trend:</i> 	unknown, probably stable
<ul style="list-style-type: none"> • <i>% decline over the last/next 10 years or 3 generations.</i> 	N/A
<ul style="list-style-type: none"> • <i>Are there extreme fluctuations in number of mature individuals?</i> 	No
<ul style="list-style-type: none"> • <i>Is the total population severely fragmented?</i> 	No
<ul style="list-style-type: none"> • <i>Specify trend in number of populations</i> 	Unknown
<ul style="list-style-type: none"> • <i>Are there extreme fluctuations in number of populations?</i> 	No
List populations with number of mature individuals in each: See appendix 1	
Threats (actual or imminent threats to populations or habitats)	
<ul style="list-style-type: none"> - cottage development and landscaping - road building - lack of genetic variability 	

Rescue Effect (immigration from an outside source)	
<ul style="list-style-type: none"> • <i>Status of outside population(s)?</i> USA: stable 	
<ul style="list-style-type: none"> • <i>Is immigration known or possible?</i> 	Unlikely
<ul style="list-style-type: none"> • <i>Would immigrants be adapted to survive in Canada?</i> 	Likely
<ul style="list-style-type: none"> • <i>Is there sufficient habitat for immigrants in Canada?</i> 	Likely
<ul style="list-style-type: none"> • <i>Is rescue from outside populations likely?</i> 	Not likely since seed production is low and seed dispersal appears to be very localized.
Quantitative Analysis	Not applicable
Previous Status	
Previous COSEWIC Status: None	

Status and Reasons for Designation

Status: Threatened	Alpha-numeric code: D2
<p>Reasons for Designation: This is a globally rare Great Lakes endemic plant, restricted in Canada to semi-shaded calcareous areas of Ontario's Bruce Peninsula and Manitoulin Island. It is currently known from about 40 Canadian sites and faces habitat loss and degradation at some sites. Several sites have been lost to development. Two of the largest populations are protected in a national and a provincial park.</p>	
<p>Applicability of Criteria</p> <p>Criterion A (Declining Total Population): Not met (insufficient information)</p> <p>Criterion B (Small Distribution, and Decline or Fluctuation): The extant populations are too numerous and the populations on the west side of the Bruce Peninsula are not severely fragmented.</p> <p>Criterion C (Small Total Population Size and Decline): Not met. Although over 1 million shoots have been counted in this clonal species that forms large patches, the number of actual individuals represented by this figure is unknown.</p> <p>Criterion D (Very Small Population or Restricted Distribution): Meets Threatened under D2 based on an area of occupancy of <3 km² and the species' occurrence in a region of high cottage use and development with demonstrated losses based on road construction and housing development.</p> <p>Criterion E (Quantitative Analysis): Not met (insufficient information).</p>	

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John Smith, Manitoulin Nature Club.

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BIOGRAPHICAL SUMMARY OF REPORT WRITER

Kristina Makkay is an ecologist specializing in field botany. During her seven years of consulting experience she has undertaken a number of terrestrial and wetland vegetation surveys for government agencies, industry, and private landowners across Ontario. She also undertook extensive field surveys while working on the Rideau River Biodiversity Study at the Canadian Museum of Nature, and on a wetland biodiversity study at the University of Ottawa with Dr. Jeff Houlihan.

COLLECTIONS EXAMINED

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Appendix 1. Results of *Iris lacustris* field surveys.

EO #	EO Rank, date of previous report	Notes, Summary of findings
new site		Patch 6 m ² , ~1000 shoots, 200 flowers. Growing with cedar, tamarack, yellow birch, ninebark and bearberry. Also a patch beside the road 1 m ² , no flowers.
New site		South side of road: 266 m ² in 9 patches, ~153,700 shoots, over about 1 ha. This may be the same site as EO num 60. North side: 192 m ² in 6 patches, ~100,000 shoots over 1 ha.
003	E - 1998	3 patches found E of private cottage area. 11 m ² , ~9500 shoots.
005	H - 1979	Patch 1 m ² in private yard near cedar hedge. Much of the area is highly developed with groomed lawns.
006	H - 1956	Patch 0.5 m ² beside cedar hedge in front yard of house. Most of the shoreline area is developed with housing.
010	E - 1984	1 m ² patch.
011 (=60)	E - 1985	1 m ² patch, no flowers, ~400 shoots.
013	A - 1995	Dense patch, 1.5 m ² , ~1000 shoots, no flowers
015	H - 1971	240 m ² coverage, est. 26,000 shoots
016	AB? - 1997	Est. 630 m ² cover in 5 patches, about 97,200 shoots in area of about 2 ha; also a second area of 3 small patches comprising 4.5 m ² with ~1800 shoots.
017		Site owned by Parks Canada. Several patches growing along paths and in openings in the trees, and scattered individuals, in area of about 20 ha. 24 patches surveyed, total coverage ~464 m ² , ~275,600 shoots
022	H - 1961	1: Patch of 30 plants, no flowers, growing with grass and columbine 2: Patch 4 m ² , ~1000 shoots, 1 flower
027	H - 1932	26 m ² in 4 patches, ~9000 shoots, by the side of the road, on front lawn of a house / cottage. Also a 1 m ² patch on neighbour's lawn.
030	H - 1976	First Nation Territory. No apparent road access. Reported to have a large population by Morton (1990). Population likely is still there.
032	H - 1976	Found along footpath between cottage and L. Huron. Main patch 40 m ² , ~730 shoots, 115 flowers. Patch 7.5 m ² , ~200 shoots, 50 flowers. Patch 1 m ² , 100 shoots, 35 flowers.
034	H - 1969	Likely associated with Belanger Bay population.
038	B - 1980	Coverage 53 m ² , in 3 patches, ~8600 shoots. Near wetland. Can be found by following path east 100 metres from road, path begins across from house # 1004.
53		Scattered patches on alvar in openings where soil is relatively thick. Growing with bearberry and <i>Juniperus horizontalis</i> . Total coverage 50 m ² , ~6500 shoots
59	1997	27 m ² in 3 patches, ~4000 shoots
65		11 patches found around the northeast end of park; 118 m ² , ~46,000 shoots.
63	1989	Abundant throughout park. Main population along paths near lakeshore - 23 patches counted, 318 m ² , ~215,400 shoots, found in a 20 ha area. Also found along roadside in campground but population numbers not surveyed.
001		Species not found.
002	E - 1984	Species not found.
004	H - 1952	Species not found. Most of the area is now housing.

EO #	EO Rank, date of previous report	Notes, Summary of findings
007	E - 1997	Species not found. Area is residential; some surviving populations may exist in yards.
009 (=60)	1973	Species not found.
014	H - 1954	Species not found. Area is now mostly residential / cottages.
024	H - 1931	Species not found. Vegetation appears too dense to support species.
031	H - 1982	Species not found. Road and cottage development occurring around the bay.
033	H - 1959	Species not found. Most of the shoreline is cottage-residential.
037	H - 1971	Species not found. Forest cover appears too dense for species.
039	H - 1982	Species not found. Searched briefly but not much suitable habitat present. If in the park, not extensive.
047	H - 1948	Species not found. Most of the shoreline is cottage-residential.
60		Species not found - large fen in the area, too wet for species.
008	H - 1974	Site not found. New road is in the approximate area.
023	A - 1973	Site not found. Recent road and cottage development in the area impeded shoreline access. Most of the shoreline is under private ownership.
026		Site not accessible by road.
029	1984	Not accessible by land. Presence confirmed by Morton (1990). Threats unlikely.
035	H - 1983	Not accessible by land. Threats unlikely.
040		Site not easily accessible by road
041	H - 1982	Site not accessible by road.
042	B - 2000	Site not visited due to distance / time constraints. Last report from 2000 likely still accurate. Covers 11.5 ha.

EO ranks are as follows: A - Excellent predicted viability, B - Good predicted viability, E - Verified extant, H – Historical.