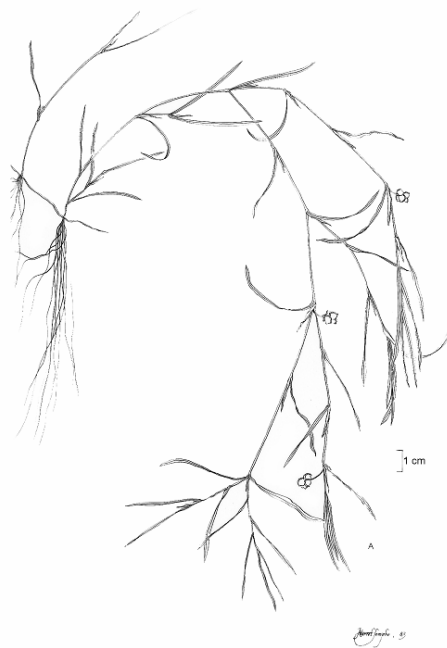


COSEWIC Assessment and Update Status Report

on the

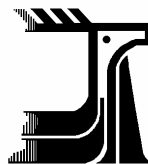
Hill's Pondweed *Potamogeton hillii*

in Canada



**SPECIAL CONCERN
2005**

COSEWIC
COMMITTEE ON THE STATUS OF
ENDANGERED WILDLIFE
IN CANADA



COSEPAC
COMITÉ SUR LA SITUATION
DES ESPÈCES EN PÉRIL
AU CANADA

COSEWIC status reports are working documents used in assigning the status of wildlife species suspected of being at risk. This report may be cited as follows:

COSEWIC 2005. COSEWIC assessment and update status report on the Hill's pondweed *Potamogeton hillii* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 19 pp. (www.sararegistry.gc.ca/status/status_e.cfm).

Previous report:

Brownell, V.R. 1986. COSEWIC status report on the Hill's Pondweed *Potamogeton hillii* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. 34 pp.

Production note:

COSEWIC would like to acknowledge Kristina Makkay for writing the update status report on the Hill's pondweed *Potamogeton hillii*. The report has been overseen and edited by Erich Haber, Co-chair (vascular plants) of the COSEWIC Plants and Lichens Species Specialist Subcommittee.

For additional copies contact:

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

Tel.: (819) 997-4991 / (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 Évaluation et Rapport de situation du COSEPAC sur le potamot de Hill (*Potamogeton hillii*) au Canada – Mise à jour.

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Hill's pondweed — Illustration courtesy of Agriculture and Agri-food Canada.

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COSEWIC Assessment Summary

Assessment Summary – May 2005

Common name

Hill's pondweed

Scientific name

Potamogeton hillii

Status

Special Concern

Reason for designation

An inconspicuous, rooted, aquatic plant currently known from fewer than 20 Canadian populations and occupying a very small total area of habitat. No imminent limiting factors have been identified that would have significant impacts on this globally rare species, but invasive exotic plants may be impacting some populations.

Occurrence

Ontario

Status history

Designated Special Concern in April 1986. Status re-examined and confirmed in May 2005. Last assessment based on an update status report.



COSEWIC
Executive Summary

Hill's Pondweed
Potamogeton hillii

Species information

Hill's pondweed (*Potamogeton hillii*) is an entirely submerged pondweed, 30-60 cm long with narrow, linear, bristle-tipped leaves 2-6 cm long and 1-2.5 mm wide. Fruit is brown, up to 4 mm long, and borne on a recurved stalk. Its overall appearance is similar to other linear-leaved pondweeds.

Distribution

In Canada, Hill's pondweed is found mostly on Manitoulin Island and the Bruce Peninsula, Ontario. Additional reports come from Elgin County, Wellington County, and Peel Regional Municipality. In the United States, it has been found in Michigan, Wisconsin, Ohio, New York, Pennsylvania, Connecticut, Massachusetts, and Vermont. Its extent of occurrence in Canada is about 1300 km².

Habitat

Hill's pondweed is found in cold, clear, calcareous streams, ponds and ditches with an alkalinity of 53.0 to 316.7 mg/l HCO₃, usually where there is dolomitic limestone. Habitat trends are unknown. Five of the 20 extant populations are in protected areas.

Biology

Reproduction occurs both by seed and vegetatively by winter buds. Flowering occurs in July, and seed set occurs August to September. Seeds are water or waterfowl dispersed. Little research has been done on the ecological role of Hill's pondweed, but it is likely to fill a role similar to that of other pondweeds.

Population sizes and trends

Hill's pondweed has been reported at 24 sites in Canada; at two of these the species is extirpated. Field visits were made to 20 sites. A species that resembled Hill's pondweed was found at 12 sites. At seven sites no fruit was found in 2003, which reduced the certainty of identification. A minimum area of occupancy, based only on the

sites where fruit was available for positive identification of the species, would total about 25 ha and consist of an estimated 55,000⁺ plants. If identification was correct in all cases, the area of occupancy would be about 27 ha, including supplementary data provided by the Ministry of Natural Resources, Ontario, and the population estimated to comprise approximately 119,600 individuals.

Limiting factors and threats

The main threats to Hill's pondweed are habitat destruction and degradation.

Special significance of the species

As in the case of other pondweeds, the species likely serves as food for waterfowl and possibly for some mammals. No Aboriginal uses have been recorded in the literature.

Existing protection or other status designations

Hill's pondweed was designated in 1986 as Special Concern by COSEWIC. In Ontario, the species is listed as Threatened under the recently approved Species at Risk list (see <http://www.ontarioparks.com/saro-list.pdf>). It is Endangered in Connecticut, Ohio and Pennsylvania, Threatened in Michigan, and of Special Concern in Massachusetts. NatureServe assigns it a global rank of vulnerable (G3).



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 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 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 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.

**Update
COSEWIC Status Report**

on the

Hill's Pondweed
Potamogeton hillii

in Canada

2005

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SPECIES INFORMATION

Name and classification

Scientific name: *Potamogeton hillii* Morong
Synonyms: *Potamogeton porteri* Fern.
Common names: Hill's pondweed; potamot de Hill
Family: Potamogetonaceae (Pondweed family)
Major plant group: Monocot flowering plant

The type specimen of *Potamogeton hillii* was collected by Rev. Ellsworth J. Hill in Manistee County, Michigan, August 5, 1880.

Potamogeton porteri was originally determined to be a separate species, distinguished from *P. hillii* by its broader leaves. Closer examination of both herbarium specimens and field collections by Haynes (1974) resulted in the conclusion that there was a large variation in leaf morphology of the species and that *P. porteri* is a morphological extreme of *P. hillii*. This view has been largely accepted in subsequent treatments.

Description

Hill's pondweed is a submerged aquatic with green to olive stems, 30-60 cm long, and 0.5-1.0 mm in diameter bearing linear, green to olive leaves. Leaves are 3 nerved, 2-6 cm long, 1-2.5 mm wide (sometimes up to 4 mm) and are bristle-tipped; 1-2 rows of air cells (lacunae) are present along the midrib. The leaf-like stipules are free, delicate, rarely shredding at the tip, 7-16 mm long. The clusters of flowers (spikes) are 4-7 mm long and held above the water surface on recurved stalks (peduncles) 0.6-1.4 cm long. Fruits are brown, 3-keeled, 2.3-4 mm long. A good line drawing is available in Crow and Hellquist (2000). Figure 1 is provided courtesy of Agriculture and Agri-Food Canada.

Sub-section *Pusilli* of the genus *Potamogeton* is comprised of the submerged linear-leaved species of pondweeds, and they are notoriously difficult to distinguish from one another due to their vegetative similarity and morphological plasticity (Haynes, 1974). Haynes concludes that flowers or fruit are necessary to distinguishing the species of the sub-section *Pusilli*, much as it is for species of *Aster* or *Solidago*.

Potamogeton hillii could be mistaken for *P. pusillus*, *P. foliosus*, *P. friesii*, *P. strictifolius*, or *P. ogdenii*, especially when not in fruit. *Potamogeton hillii*'s bristle-tipped leaves help distinguish it from *P. obtusifolius*, *P. pusillus*, and *P. foliosus*. *P. hillii* can also be distinguished from *P. foliosus* by its 3-keeled fruit and longer leaves. The similar, narrow-leaved pondweeds are best distinguished through the use of a key such as that in Crow and Hellquist (2000). No genetic markers for *Potamogeton hillii* have been documented.

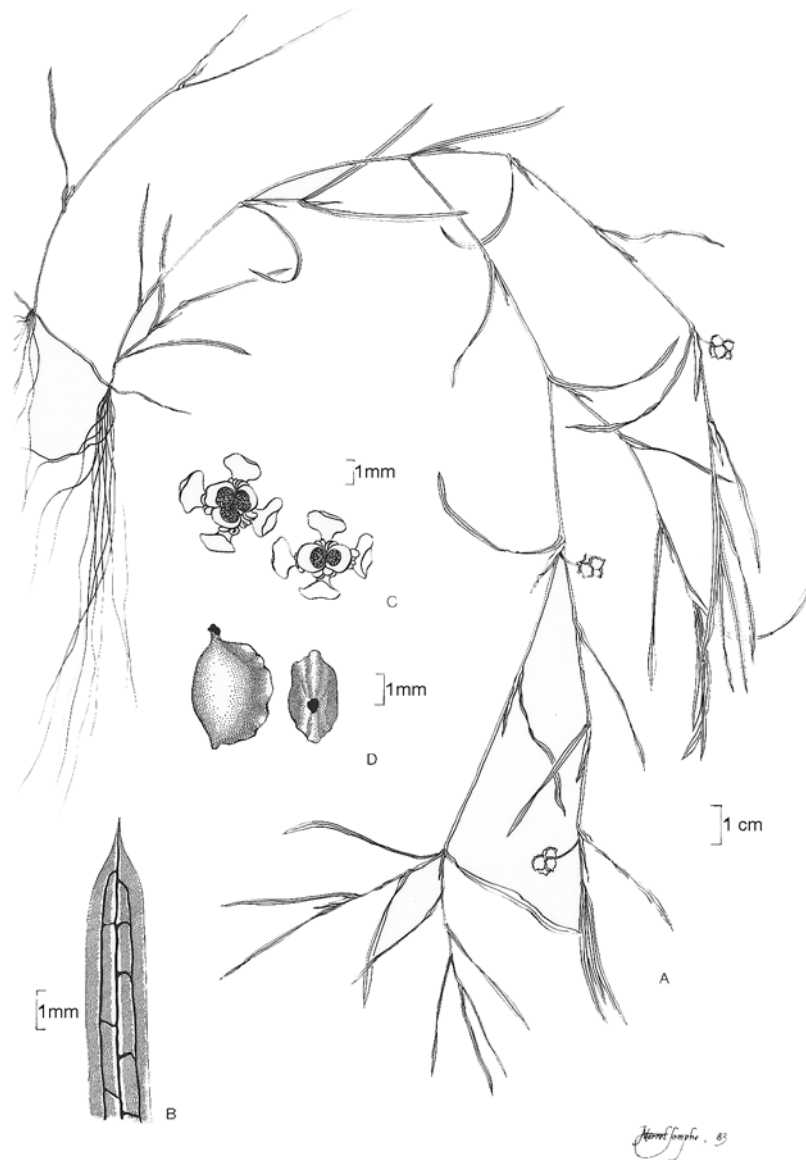


Figure 1. Overall habit of *Potamogeton hillii* and details of selected plant parts: A, habit; B, terminal portion of leaf; C, flowers seen from top; D, fruits (illustration courtesy of Agriculture and Agri-food Canada).

DISTRIBUTION

Global range

Hill's pondweed has been found in scattered streams, ditches, ponds, and wetlands in southern Ontario, Michigan, Wisconsin, Ohio, Pennsylvania, New York, Connecticut, Massachusetts, and Vermont (Figure 2).



Figure 2. North American distribution of Hill's pondweed (after Hellquist (1984) and state rare plant atlases).

Canadian range

In Canada, Hill's pondweed is found only in Ontario. The earliest collection recorded was made in 1901 (Appendix 1). The species is found mostly in a 400 km² area of Manitoulin Island and on about 700 km² of Bruce County with an additional

100 km² in each of Wellington County and Peel Region, for a very conservative total extent of occurrence of about 1300 km² (Figure 3). Most reports are from Bruce County and Manitoulin District. However, if all historic and known extant localities are included in two convex polygons, one for southern Ontario mainland and a second for Manitoulin Island, then the total extent of occurrence (EO), based on a GIS calculation, is in the order of < 20,000 km². If the extirpated site 3 is removed from the estimation, the EO is <10,000 km². This latter value is likely more representative of the potential extent of occurrence for this species (E. Haber, GIS calculations of EO).

Given its unremarkable appearance, it is likely that Hill's pondweed has been long overlooked, and could be more widespread than is currently reported. It is associated with dolomitic limestone (Hellquist, 1984) so potential habitat might be found along the Niagara Escarpment and the Precambrian contact line (Brownell, 1986). More surveys would be needed to determine the full extent of its distribution.

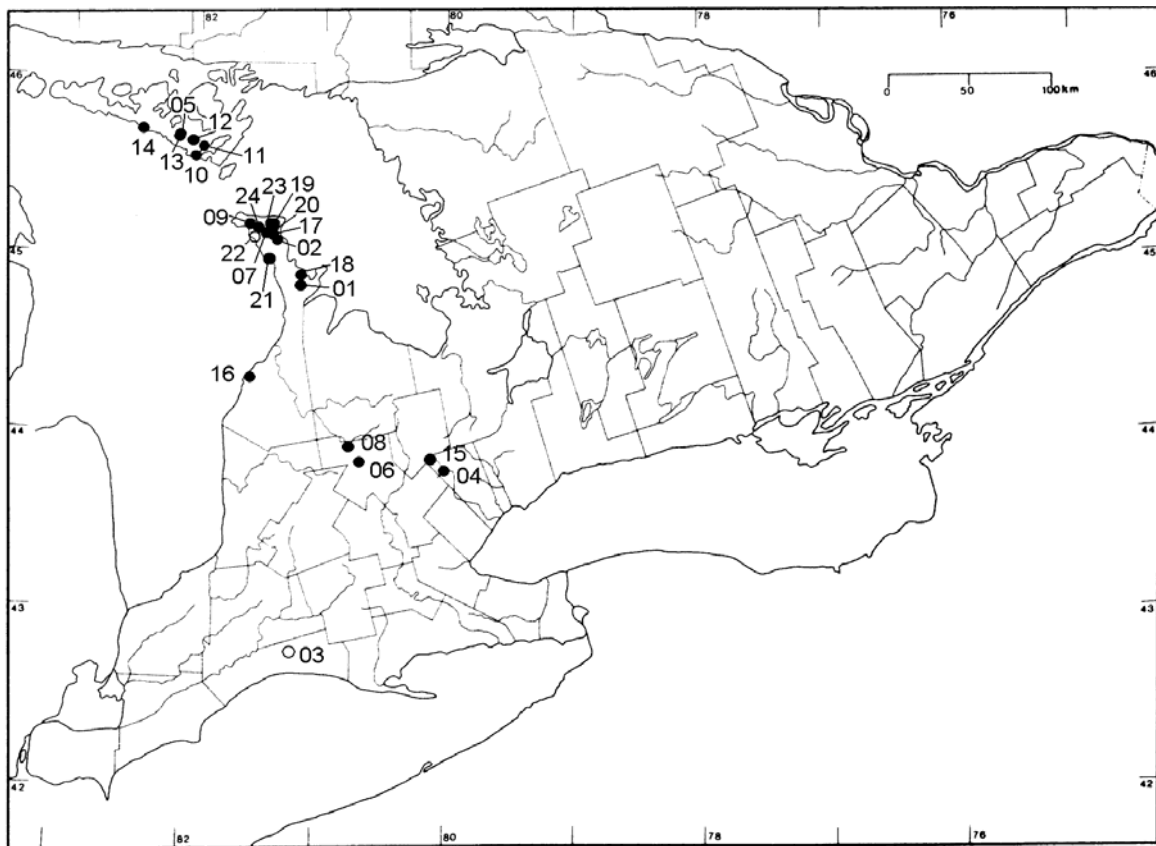


Figure 3. Distribution of Hill's pondweed in Canada. Solid dots represent extant or possibly extant populations; open circles, 03 & 22, represent known extirpated populations.

HABITAT

Habitat requirements

Hill's pondweed is found in cold, clear, slow-moving, calcareous streams, ditches, and ponds with a muddy substrate. Rarely is it in turbid or polluted waters, in open lakes (Hellquist, 1984), or fast moving streams (personal observation by the report writer). It is often found on the upstream side of road culverts, among stumps and fallen trees, or in shallow water among rushes and sedges (Hellquist, 1984). It was typically observed during field visits in shallow channels in open marshes dominated by grasses or sedges (most often *Phalaris arundinacea*) (Figure 4). Hill's pondweed is associated with *P. foliosus*, *P. natans*, *P. pusillus*, *P. amplifolius* and *P. gramineus* (Hellquist, 1984). It occurs in successional communities, and does not appear to persist in one locality over a long period (Mitchell and Sheviak, 1981 in Brownell, 1986).



Figure 4. Typical habitat of Hill's pondweed (photo by Kristina Makkay, Site 17).

Hill's pondweed is most closely associated with high alkalinity. It has been found in water with 53.0 to 316.7 mg/l HCO_3^- (Hellquist, 1980, 1984). About 79 % of known Hill's pondweed locations coincide with dolomitic limestone (Hellquist, 1984).

Trends

The parameters associated with the species' habitat have only recently become better understood, which makes it difficult to determine habitat trends. While it is known that Hill's pondweed occurs in calcareous alkaline waters, no information was found regarding changes in the number or quality of calcareous streams or wetlands in Ontario. Almost two-thirds of southern Ontario's wetlands have been lost, though this has had less of an impact on the Bruce Peninsula where most Hill's pondweed sites are found (Snell, 1988).

Protection/ownership

Five of the 22 extant sites reported in the Ontario Natural Heritage Information Centre (NHIC) database are on protected lands (national park) or in areas designated as comprising significant natural areas: two sites are in Bruce Peninsula National Park, and three in Areas of Natural and Scientific Interest (ANSI) at Cabot Head, Scott Point, and Caledon Lake Forest. Designation as an ANSI, however, does not confer protection unless the property is included under specific protective legislation. One other site is on Saugeen First Nations' Territories. All other populations are believed to be on private lands (NHIC database).

BIOLOGY

Reproduction

Hill's pondweed can reproduce both by seeds and vegetatively by winter buds. It flowers in late July and produces fruit in late August and September. Winter buds are produced in the fall. While Fernald (1932) claimed that winter buds were absent in Hill's pondweed, both Haynes (1974) and Hellquist (1984) report their presence. No studies regarding the viability of seeds and winter buds have been published.

Hill's pondweed can also form a rhizome-like structure if the stem becomes decumbent and subsequently covered in debris (Haynes, 1974). This results in rooting from the nodes; such newly rooted portions can become established as independent plants. Due to its manner of overwintering using winter buds and other asexual means of propagation, the species forms clonal patches (NatureServe, 2005).

Hill's pondweed can hybridize with *Potamogeton zosteriformis*. It has been suggested that *P. ogdenii* evolved from such a hybrid (Hellquist and Hilton, 1983).

Survival

Pondweeds are consumed as food by waterfowl and mammals, though no studies have been published regarding consumption of Hill's pondweed in particular. No information was found regarding offspring survival, population age structure and reproductive/recruitment rate.

Physiology

Hill's pondweed is most closely associated with alkaline calcareous waters ranging from 53.0 to 316.7 mg/l HCO_3^- (Hellquist, 1980, 1984). It appears to be intolerant of pollution and turbidity (Hellquist, 1984). No information was found regarding climatic or other tolerance limitations.

Movements/dispersal

Most species of *Potamogeton* are wind pollinated, and dispersed by water or waterfowl (Sculthorpe, 1967). Winter buds would also be dispersed by water, and possibly waterfowl. Seeds could be dispersed through the digestive tracts of waterfowl (Haynes, 1974).

A summary of information on Hill's pondweed in NatureServe (2005) indicates that "...seed dispersal to proper habitats is the critical reason for its apparent rarity".

Considering the species' endangered or threatened status in states adjoining Ontario and its overall rarity in the United States, it is unlikely that Ontario populations would be re-populated from propagules derived outside of Ontario.

Nutrition and interspecific interactions

Pondweeds, like other aquatic plants, provide habitat for aquatic invertebrates, food for waterfowl and mammals, and cover for amphibians and fish. No information has been published regarding the ecological role of Hill's pondweed in particular, although presumably it would serve a similar ecological function as other narrow-leaved pondweeds.

Behaviour/adaptability

No information was found regarding the susceptibility of Hill's pondweed to stress, disturbance, or other environmental changes.

POPULATION SIZES AND TRENDS

According to the Ontario Natural Heritage Information Centre, Hill's pondweed has been reported in 24 sites (Appendix 1), including nine new sites since the last status report (Brownell, 1986). It is believed to be extirpated from two sites: Little Eagle Harbour (site 22) on the Bruce Peninsula, and the St. Thomas site (site 03) in Elgin County. A field visit to Little Eagle Harbour confirmed the lack of suitable habitat in the area.

An erroneous report had come from Fish Lake in Lennox and Addington Counties. It was identified as *Potamogeton hillii* by M. Bristow in 1979, and was corrected to *P. pusillus* var. *pusillus* by Brownell and Catling in 1982 (Brownell, 1986).

Field visits were made to twenty of the sites reported in the NHIC database over a period of five field days from August 18th to 23rd, 2003. Sites were searched for a half hour to one hour depending on the size of the marsh or creek. A pondweed species that appeared to be *Potamogeton hillii* was found at 12 sites. Samples were collected in all cases, but eight did not bear fruit, which reduces the certainty of identification. Samples were examined by Dr. Paul Catling, Agriculture and Agri-Food Canada, Ottawa, and the fruit-bearing samples were deposited at the Agriculture and Agri-Food Canada vascular plant herbarium in Ottawa (official acronym, DAO).

Like many aquatic plants, Hill's pondweed grows in thick patches of intertwined individuals, making it exceedingly difficult to distinguish the number of individuals without destructive sampling. As indicated on the web site of NatureServe (2005) for this species,

“Populations may be difficult to monitor because of their aquatic habit, particularly if populations are large. Individual clones can cover surface areas of 0.5 meters in diameter and if such clones are numerous, distinguishing between individual clones may be difficult or impossible.”

Population numbers provided are, therefore, only rough estimates of the number of individuals, especially since only one *in situ* sample was possible at a small 10 x 10 cm patch, where 20 distinct individuals could be counted (site 06). Extrapolating this number yields 2000 individuals per 1 m² patch. At all other sites where the species was found, population size was calculated by estimating the area in m². Population estimates are crude figures, however, since there could be as much as a 30-50% plus or minus variation in density. Uncertainty in numbers also exists since this species also grows in association with other similar pondweeds that would be difficult to distinguish unless every rooted specimen were in fruit.

Given that fruit-bearing plants were not found at some of the sites, numbers are given separately for confirmed populations, where identification is certain, and suspected populations, where identification is uncertain due to a lack of fruit. There are an estimated 55,000 individuals of Hill's pondweed at four sites with confirmed identification (based on collections by Makkay) occupying an area of 17.7 ha, and 64,600 suspected individuals occupying an area of 2 ha. The total for all sites is 119,600 individuals occupying about 19.7 ha of marsh, stream and pond. For site-specific numbers, see Appendix 1. Supplementary information on site 04 became available subsequent to the completion of this report, based on a Ministry of Natural Resources, Ontario, staff visit on 2 October 2003; numerous fruiting plants were observed in the eastern portion of the lake but no specific attempt to document numbers was made. On the basis of this additional report, there are, therefore, 5 verified sites known as of the year 2003. The additional area at site 04 where Ministry staff had observed fruiting specimens would add an additional 7.5 ha to give a revised total area of occupancy of about 27 ha.

Out of the eight sites where the species was not found, at three sites (15, 20, 21) there was some uncertainty that the location searched was the location where the species was previously reported. At the other five sites (01, 05, 08, 12, 13), previous reports were all at least 20 years old. Reasons for decline or extirpation may include competition by other species, particularly *Elodea canadensis*, or loss or change in habitat. Since little is known about the biology of this species, factors that could impact the population are unknown.

General long-term population trends for Hill's pondweed are difficult to determine. The species has long been overlooked, as is the case for many aquatic plants, with most activity documenting its occurrence having taken place over the last several decades. Other than the Macoun collection of 1901, the next earliest record was from Elgin County in 1951 (site 03). Twenty-one locations have been discovered since 1974; few of these have been revisited regularly.

C.B. Hellquist undertook a systematic search for Hill's Pondweed in 1983 (specimens cited in Brownell, 1986), and found ten sites on the Bruce Peninsula and Manitoulin Island (01, 02, 04, 05, 07, 09, 10, 11, 12, 13). These sites were all visited in 2003. Hill's pondweed was confirmed at one site (10), and sterile samples collected from four more sites (02, 04, 07, 09). All sites except one had suitable habitat; the exception appeared to have been degraded by cattle (12).

Given the results of the field search, there is an evident decline in Hill's pondweed, in spite of little change in habitat. Aquatic species, however, tend to be dynamic in their distribution (unpublished data based on a five-year project monitoring permanent plots of aquatics in the Rideau River, Ottawa, by the writer and Dr. Lynn Gillespie, Canadian Museum of Nature). It is not certain if Hill's pondweed is inclined towards population fluctuations. Regular long-term monitoring would be needed to determine this.

Other sites that appeared to be suitable Hill's pondweed habitat were briefly searched, particularly along the Niagara Escarpment. Two collections were made of a species of *Potamogeton* that resembled *Potamogeton hillii*, but neither had fruit so identification could not be confirmed. These were from the Styx River east of Highway 6, and the Mallet River north of Highway 9.

LIMITING FACTORS AND THREATS

Potential threats to Hill's pondweed would come from destruction of habitat such as draining of ponds and wetlands, or loss in water quality including chemical and thermal pollution. Since little is known about the biology of Hill's pondweed, other limiting factors can only be speculated on. One site appeared to be degraded from cattle access. None of the other sites appeared to have any imminent threats.

Exotic plants may have had an impact on some populations. Curly pondweed (*Potamogeton crispus*), a widespread exotic species, was abundant at site 08 where

Hill's pondweed was not found and may have been instrumental, in part, in replacing it. Reed canary grass (*Phalaris arundinacea*), present in Ontario as both native and introduced variants, was dominant in the marshes at sites 02, 17 and 20 where it may have been introduced and modified the characteristics of the marshes.

SPECIAL SIGNIFICANCE OF THE SPECIES

No specific uses of Hill's pondweed have been documented, including traditional or Aboriginal uses. This may be in part due to the difficulties associated with distinguishing this species.

Hill's pondweed appears to be limited to northeastern North America around the Great Lakes basin, but the full distribution of the species may not yet have been delineated.

EXISTING PROTECTION OR OTHER STATUS DESIGNATIONS

Potamogeton hillii was designated as Special Concern in 1986 by COSEWIC and has a national rank of N2 (imperiled). It is considered Threatened by the Ontario Ministry of Natural Resources, and has a subnational (provincial) rank of S2 (imperiled) in Ontario. In the United States, it is designated as Endangered in Connecticut, Ohio, and Pennsylvania, Threatened in Michigan and New York, and listed as Special Concern in Massachusetts (USDA, NRCS, 2002). Nature Serve (2005) lists *Potamogeton hillii* as having a global rank of G3 (vulnerable), since it is uncommon throughout its range and susceptible to changes in water quality. The following subnational ranks for the United States are derived from NatureServe (2005): Connecticut (S1), Massachusetts (S3), Michigan (S2), New York (S2), Ohio (S1), Pennsylvania (S1), Vermont (S3), Virginia (S1), Wisconsin (S1).

TECHNICAL SUMMARY

Potamogeton hillii

Hill's pondweed

potamot de Hill

Range of Occurrence in Canada: Ontario

Extent and Area Information	
<ul style="list-style-type: none"> • <i>Extent of occurrence (EO)(km²)</i> [revised GIS estimate by E. Haber of polygons for southern Ontario mainland and Manitoulin Island] 	ca. 20,000 km ² including extirpated site 3; <10,000 km ² excluding site 3 [1300 km ² if EO includes only 3 restricted areas around the extant sites – est. by K. Makkay].
<ul style="list-style-type: none"> • <i>Specify trend in EO</i> 	unknown
<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 aquatic habitats at extant localities] 	<<1 km ² (19.7 ha)
<ul style="list-style-type: none"> • <i>Specify trend in AO</i> 	unknown, possible decline
<ul style="list-style-type: none"> • <i>Are there extreme fluctuations in AO?</i> 	unknown
<ul style="list-style-type: none"> • <i>Number of known or inferred current locations</i> 	12-18
<ul style="list-style-type: none"> • <i>Specify trend in #</i> 	unknown, possible decline
<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> 	unknown
Population Information	
<ul style="list-style-type: none"> • <i>Generation time (average age of parents in the population)</i> 	unknown
<ul style="list-style-type: none"> • <i>Number of mature individuals</i> [Note: The estimate is very crude due to the difficulties of obtaining estimates of abundance in an aquatic habitat in which destructive sampling would have to be undertaken to obtain more precise figures; plants are intertwined, moving or stagnant water conditions add to the difficulty of counting plants and other similar pondweeds are present. E. Haber] 	estimated at 55,000 at sites where verified by the occurrence of fruits plus 64,600 including sites where identification is based on vegetative characters only
<ul style="list-style-type: none"> • <i>Total population trend:</i> 	unknown, possible decline
<ul style="list-style-type: none"> • <i>% decline over the last/next 10 years or 3 generations.</i> 	unknown
<ul style="list-style-type: none"> • <i>Are there extreme fluctuations in number of mature individuals?</i> 	unknown
<ul style="list-style-type: none"> • <i>Is the total population severely fragmented?</i> 	somewhat fragmented
<ul style="list-style-type: none"> • <i>Specify trend in number of populations</i> 	unknown, possible decline
<ul style="list-style-type: none"> • <i>Are there extreme fluctuations in number of populations?</i> 	no
<ul style="list-style-type: none"> • <i>List populations with number of mature individuals in each:</i> 	See Appendix 1
Threats (actual or imminent threats to populations or habitats)	
Degradation of habitat observed at one site; overall, threats to habitat primarily potential.	

Rescue Effect (immigration from an outside source)	
<ul style="list-style-type: none"> • <i>Status of outside population(s)?</i> USA: ranks in adjacent states are - Michigan (S2), New York (S2), Ohio (S1), Pennsylvania (S1) 	
• <i>Is immigration known or possible?</i>	unlikely
• <i>Would immigrants be adapted to survive in Canada?</i>	yes
• <i>Is there sufficient habitat for immigrants in Canada?</i>	yes
• <i>Is rescue from outside populations likely?</i>	no
Quantitative Analysis [provide details on calculation, source(s) of data, models, etc.]	n/a
Current Status COSEWIC: Special Concern (May 2005)	

Status and Reasons for Designation

Status: Special Concern	Alpha-numeric code: N/A
<p>Reasons for Designation: An inconspicuous, rooted, aquatic plant currently known from fewer than 20 Canadian populations and occupying a very small total area of habitat. No imminent limiting factors have been identified that would have significant impacts on this globally rare species, but invasive exotic plants may be impacting some populations.</p>	
<p>Applicability of Criteria</p>	
<p>Criterion A (Declining Total Population): Insufficient data.</p> <p>Criterion B (Small Distribution, and Decline or Fluctuation): The larger, revised extent of occurrence takes into consideration that the species may be more widespread than is indicated by the extant populations documented; it is still, however, below the threshold level for threatened and the area of occupancy is below critical values for both endangered and threatened. The criterion is not met because there are > 10 locations and these are not considered severely fragmented due to the possibility of propagule dispersal by waterfowl or by natural dispersal within a given riparian system; the lack of monitoring has resulted in little information on decline of populations; some degradation of habitat has been noted and can be inferred to continue in the future. No extreme fluctuations are known.</p> <p>Criterion C (Small Total Population Size and Decline): Population size has been determined to be larger than 10,000 plants but uncertainties in the manner of extrapolation from a single small test sample, the likely presence of mixed populations of pondweeds of similar appearance, and the occurrence of asexual reproduction makes the data unreliable for determining population size of mature individuals and level of risk under this criterion.</p> <p>Criterion D (Very Small Population or Restricted Distribution): May meet threatened D2 based on an area of occupancy < 1 km² and there is some indication of habitat degradation but overall there appear to be limited or few threats documented to the 12-18 populations currently reported; the species may be regarded best as one of special concern. This species is difficult to distinguish from other similar species and may be present at additional sites if a more intensive survey were to be conducted. Fruiting specimens collected for this study were, however, verified for the report writer by a highly competent botanist.</p> <p>Criterion E (Quantitative Analysis): Not applicable.</p>	

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Authorities contacted

Frank G. Burrows, Resource Management Specialist, Bruce Peninsula National Park of Canada, Fathom Five National Marine Park of Canada, P.O. Box 189, 248 Big Tub Road, Tobermory, ON, N0H 2R0.

Joan and Walter Crowe, Bruce-Grey Plant Committee, Owen Sound Field Naturalists, Owen Sound.

Joe Johnson, Environmental Consultant, Warton, Ontario.

Michael Oldham, Botanist / Herpetologist, Natural Heritage Information Centre, Ministry of Natural Resources, P.O. Box 7000, 300 Water Street, Peterborough, Ontario, K9J 8M5.

Kelly Ramster, Botanist / Herpetologist Intern, Natural Heritage Information Centre (NHIC), 300 Water Street, Peterborough, Ontario K9J 8M5.

Darlene Upton, Parks Canada, Field Unit Office, 20 Centennial Drive PO Box 189, Tobermory, Ontario, Canada, N0H 2R0.

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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

Canadian Museum of Nature (CAN), Pink Road, Gatineau (Aylmer), Quebec.

Agriculture Canada Herbarium (DAO), Central Experimental Farm, Ottawa, Ontario.

Appendix 1. Results of *Potamogeton hillii* field surveys

EO num	Location	Date last seen	Estimated population ¹	Area of occupancy	Notes	Sample taken?
001	Albemarle Brook, Bruce County	1983			Species not found. Good habitat. Abundant <i>Elodea canadensis</i> . Extensive survey not possible due to cut-grass and stinging nettle.	
002	Miller Lake, Bruce Co.	Aug. 2003	4000	marsh ~1 ha	In channels of <i>Phalaris</i> -dominated wetland, also <i>Chara vulgaris</i> . Population estimate by Makkay.	sterile
003	St. Thomas, Elgin County	1951			Site not visited; population historic and assumed possibly extirpated	
004	Credit River / Green Lake, Peel Region	Aug. 2003 Oct. 2003	100		Small amount found in north end of Lake. Population estimate by Makkay. MNR, Ontario, staff reported plants in fruit spread throughout the eastern portion of lake (an area of about 500m X 150m (M.J. Oldham, pers. com., Feb 2005 to E. Haber; no population estimate provided)	sterile fruiting on 2 Oct.
005	Mindemoya, Manitoulin Is.	1983			Species not found. Mostly cattail marsh.	
006	Smoky Creek / Mallet R., Wellington County	Aug. 2003	4000	creek ~0.1 ha	In sluggish creek upstream of bridge. Population estimate by Makkay.	sterile
007	Crane River (Willow Cr.), Bruce Co.	Aug. 2003	32,000	creek / ditch ~0.1 ha	In ditch on NE side of Hwy 6. Population estimate by Makkay.	sterile
008	Bethel Creek, Wellington County	1978			Species not found. Abundant <i>Elodea canadensis</i> , <i>Potamogeton crispus</i> . The latter is an exotic species.	

EO num	Location	Date last seen	Estimated population ¹	Area of occupancy	Notes	Sample taken?
009	W of Cameron L., Bruce Co.	Aug. 2003	500	marsh ~ 0.6 ha	With <i>Chara vulgaris</i> and <i>Potamogeton natans</i> . Population estimate by Makkay.	sterile
010	South Baymouth, Manitoulin Is.	Aug. 2003	1000	pond ~ 0.1 ha	Pond west of small boat docking area with <i>P. natans</i> , <i>Utricularia vulgaris</i> , <i>Chara vulgaris</i> . Population estimate by Makkay.	yes – ID confirmed
011	South Bay, Manitoulin Is.	Aug. 2003	6000	shallow creek, ~ 0.1 ha	E side of bridge with <i>Elodea canadensis</i> , <i>Ceratophyllum demersum</i> and <i>Nuphar varigatum</i> . Population estimate by Makkay.	sterile
012	Black Creek, Manitoulin Is.	1983			Species not found. Water level very low and cloudy from cattle access.	
013	Providence Bay Road, Manitoulin Is.	1983			Species not found. Suitable habitat.	
014	Srigley Bay, Manitoulin Is.				Site not accessible. This record is based on a 1995 report to Ontario Ministry of Natural Resources by Nobel. No actual date for last seen is available in the records.	
015	Caledon Lake Forest ANSI, Peel Region	1986			Could not access site at lake. Species not found in stream.	
016	Scott Point, Bruce County	Aug. 2003	10,000	marsh ~ 0.1 ha	Downstream of culvert in stream. Population estimate by Makkay.	yes – ID confirmed
017	McVicar Swamp, Bruce County	Aug. 2003	4000	marsh ~ 5 ha	In creek in <i>Phalaris</i> dominated marsh, with <i>Potamogeton natans</i> , <i>Sparganium</i> . Population estimate by Makkay.	yes – ID confirmed
018	Hope Bay Forest ANSI, Bruce Co.	1992			Site not found	
019	Cabot Head, Bruce County	1991			Site not accessible	

EO num	Location	Date last seen	Estimated population ¹	Area of occupancy	Notes	Sample taken?
020	Crane Lake, Bruce County	Aug. 2003	40,000	marsh ~12.5 ha	In deep channels of <i>Phalaris</i> -dominated marsh, very abundant. Population estimate by Makkay.	yes – ID confirmed
021	Spring Creek Wetland, Bruce Co.	1990			Species not found. Habitat not suitable – water too fast, little aquatic vegetation. Not sure if proper site was found.	
022	Little Eagle Harbour, Bruce Co.	1901			Species not found. Few aquatic plants in the stream. Did not appear to be suitable habitat – water too fast. Likely extirpated.	
023	Shingle Marsh, Bruce Co.	Aug. 2003	2000		With <i>Utricularia vulgaris</i> , <i>Chara vulgaris</i> . Population estimate by Makkay.	sterile
024	McLander Marsh, Bruce Co.	Aug. 2003	16,000	marsh & pond ~ 0.1 ha	Downstream side of road growing with <i>P. natans</i> , <i>Chara vulgaris</i> and <i>Utricularia vulgaris</i> . Population estimate by Makkay.	in flower, fruit not mature