

# Conservation Evaluation of Small-flowered *Lipocarpha*, *Lipocarpha micrantha* (Cyperaceae), in Canada

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In Canada, *Lipocarpha micrantha* has been documented at eight locations in Quebec, Ontario, and British Columbia. Four of these populations have apparently been extirpated. The remaining populations, ranging from 120 to approximately 40000 plants, are all northern disjuncts from the main range of this species. Threats to these populations include water level regulation and shoreline development. Considering the threats to the habitat of *Lipocarpha micrantha*, and the small size of most of the remaining populations, it has been designated an Endangered species in Canada.

Key Words: Small-flowered *Lipocarpha*, *Lipocarpha micrantha*, British Columbia, Ontario, Quebec, endangered, distribution, population size.

Small-flowered *Lipocarpha*, *Lipocarpha micrantha* (Vahl.) G. Tucker, is the only member of a mainly tropical genus to occur in Canada. While it appears under this name in the *Flora of North America* (Tucker 2002), some recent treatments place it in the genus *Hemicarpha* Nees (Gleason and Cronquist 1991). *Lipocarpha*, including *Hemicarpha*, is generally accepted as a distinct genus. However, taxonomic clarification of closely related genera in the Cyperaceae may require nomenclatural revisions, pending the outcome of ongoing research (Muasya et al. 2002).

*Lipocarpha micrantha* is a caespitose annual sedge, 2-20 cm tall with narrow (0.5 mm) leaves up to 10 cm long. The 1 to 3 subsessile flower spikes are borne at the top of the stem. The spikes are ovoid, 2-6 mm long, with numerous perfect flowers concealed behind spirally imbricate scales. The inflorescence is subtended by 2 to 3 leaf-like bracts, the lowest of which looks like a continuation of the stem (Figure 1: Hitchcock et al. 1969; Gleason and Cronquist 1991; Douglas and Ceska 2001; Tucker 2002).

The densely tufted plants resemble the seedlings of many other sedge species that occur in the same habitat. In Canada *Lipocarpha micrantha* is perhaps most similar in aspect to Awned Cyperus (*Cyperus squarrosus* L.), another small annual sedge. *Lipocarpha micrantha* is distinguished from this and all other *Cyperus* species by its spirally arranged flowers.

## Biology

*Lipocarpha micrantha* is only visible during a short period each year. It germinates in late summer, when dropping water levels expose the open sandy habitat

it requires. Flowering and fruiting occur in August and September. High water levels may prevent germination from occurring, with the population remaining dormant until appropriate conditions occur. We do not know how long dormant seeds may remain viable, but field observations suggest they can persist at least two years. Migrating waterfowl may be a vector for long-distance dispersal.

## Distribution

*Lipocarpha micrantha* ranges from Brazil to Canada. North of Mexico, the main range extends from Texas, north to northwestern Ontario, and east to the east coast of the United States. Disjunct populations have been recorded east and west of the main range, in Alabama, Arizona, British Columbia, California, Florida, Kentucky, Maine, New Mexico, New York, North Carolina, and Quebec (Tucker 2002).

In Canada, *Lipocarpha micrantha* occurs at Osoyoos Lake and Okanagan Lake in British Columbia (Figure 2), and at Rainy Lake and Lake of the Woods in northwestern Ontario (Figure 3). Populations along the Detroit River in southern Ontario and along the north shore of Lake Champlain in Quebec have been extirpated.

## Habitat

*Lipocarpha micrantha* grows on sandy beaches and intertidal swales that are subject to seasonal flooding, but are protected from high waves or strong currents. It is usually found in areas of very sparse vegetation, and apparently is intolerant of competition from other plant species. These habitat conditions are maintained by fluctuating water levels. While *Lipocarpha micrantha*

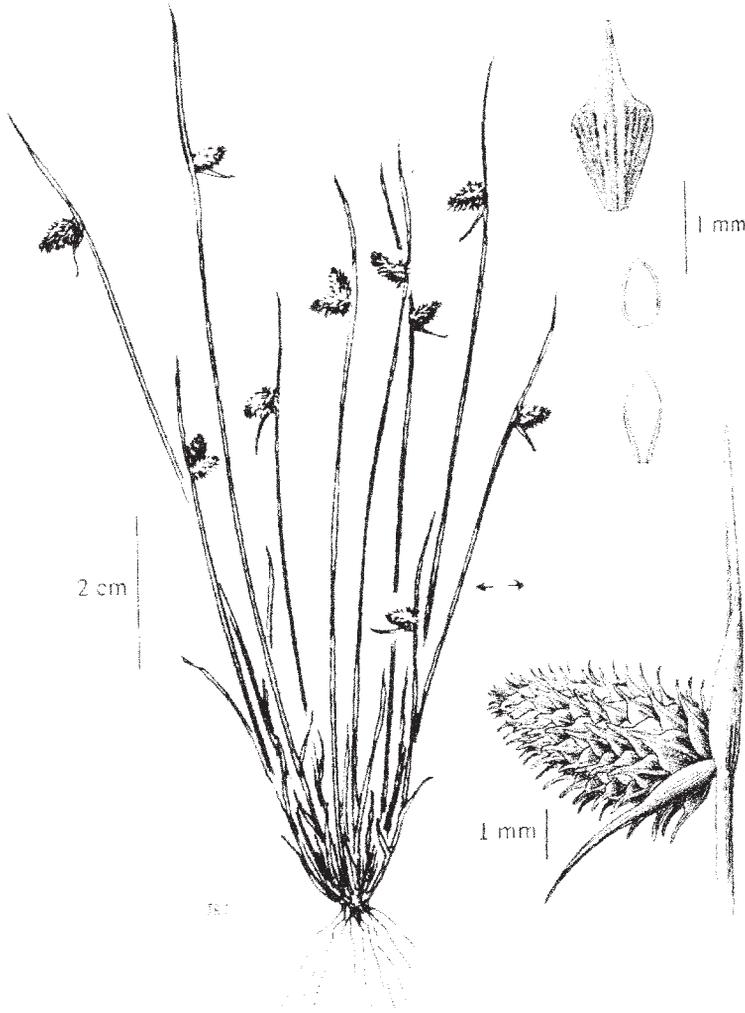


FIGURE 1. Illustration of *Lipocarpa micrantha* (Line drawing by permission from Hitchcock et al. 1969).

requires seasonal low water levels to germinate and flower, periodic high water is required to prevent more vigorous species from dominating its shoreline habitat (see Keddy and Reznicek 1986 for a discussion of the relationship between water level fluctuations and wetland vegetation).

Common associates of *Lipocarpa micrantha* include a variety of *Cyperus*, *Bidens*, and *Salix* species. *Cyperus squarrosus* has been noted as an associate at every station in Canada.

#### Population Trends and Limiting Factors

Of eight documented populations (Ceska and Ceska 1980; Oldham and Crins 1988; Sabourin et al. 1992\*; Oldham 1996; Harris et al. 2000\*; Oldham 2000; Smith

et al. 2002\*) of *Lipocarpa micrantha* in Canada, only four persist (Table 1).

The Lake Champlain population, in Missisquoi Bay, Quebec, was discovered in 1953 (Louis-Alphonse 3458, specimen at MT; herbarium acronyms follow Holmgren et al. 2003\*), and was documented throughout the 1950s. However, a search in 1989 failed to find any plants (Sabourin et al. 1992\*). Most recently, TWS searched the site in 2002 but did not find any plants despite the presence of appropriate habitat and moderate water levels. This site is adjacent to a campground and recreational activity may have contributed to the demise of this population. Water quality may also have been a factor, as a river flowing into Lake Champlain at this location smells strongly of raw sewage.

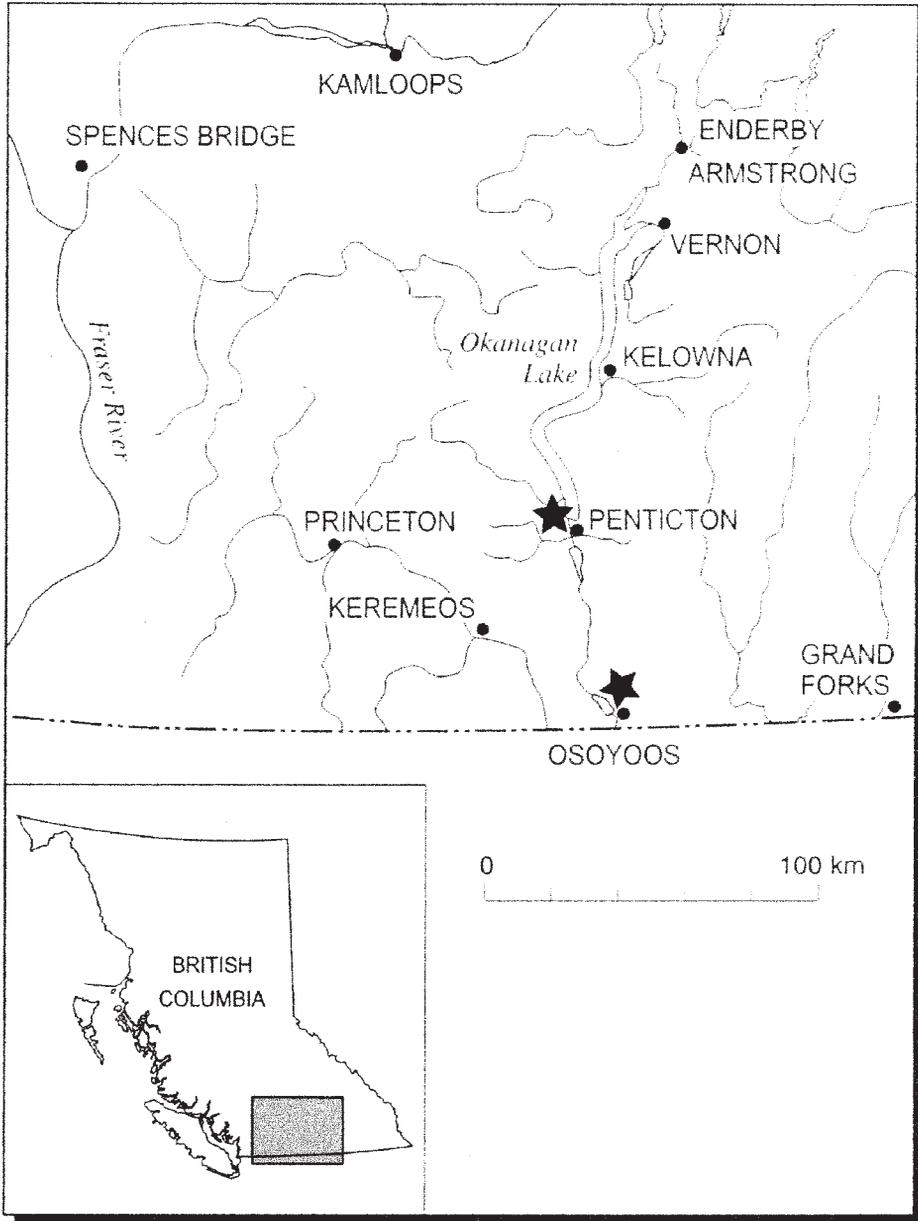


FIGURE 2. Distribution (stars) of *Lipocarpha micrantha* in British Columbia.

The oldest records of *Lipocarpha micrantha* in Canada are collections from the Detroit River shoreline, south of Windsor, Ontario, in 1892 (Macoun 28668, specimen at CAN) and 1901 (Macoun 7594, specimens at TRTE, GH). The populations represented by these collections have presumably been destroyed by shoreline development. The only recent records from this region are from the vicinity of Holiday Beach Con-

servation Area, near Amherstburg. This population was discovered in 1984, when 15 plants were observed (Oldham and Crins 1988). The population was still present in 1987 (Sabourin et al 1992\*), but no plants were found during two searches by TWS in 2001. The habitat at Holiday Beach has been seriously degraded: dense mats of algae covered the beach, except in areas where it had been cleared away by heavy machinery.

TABLE 1. Locations and Population Sizes for *Lipocarpha micrantha* in Canada.

Site	Last Observation	Observer (Last Searcher)	Population (number/area)
Osoyoos Lake (British Columbia)	1980	Ceska	Extirpated
Osoyoos Lake, Osoyoos Indian Reserve (British Columbia)	2001	Douglas	30 000-50 000/2.3ha
Okanagan Lake, Sun Oka Beach Provincial Park (British Columbia)	2002	Klinkenberg	120/2 m <sup>2</sup>
Sable Island (Ontario)	2001	Harris	1 800/0.4ha
Poundnet Bay (Ontario)	2000 (see text)	Harris	75/0.001ha
Holiday Beach (Ontario)	1987 (2001 )	Oldham (Smith)	Extirpated
Detroit River (Ontario)	1901	Macoun	Extirpated
Missisquoi Bay (Quebec)	1957 (2002 )	Louis-Alphonse (Smith)	Extirpated

The Lake of the Woods population, at Sable Island, Ontario, was discovered in 1995, and several thousand plants were noted at that time (Oldham, personal communication 2001). Surveys in 2001 documented approximately 1800 plants. The long sandspit island provides large areas of suitable habitat in Sable Island Provincial Nature Reserve.

As a consequence of the ephemeral nature of its habitat and its ability to remain dormant in unfavourable years, *Lipocarpha micrantha* may persist undetected at locations searched thoroughly by botanists. An unsuccessful search during highwater, when much potential habitat is temporarily unavailable, is therefore not justification for declaring a population extirpated. This was the case at Poundnet Bay on Rainy Lake, Ontario, in 2001, where water levels were well above average. No *Lipocarpha micrantha* plants were found there during 2001. A population of 75 plants was discovered at this location in 2000. When water levels return to average or below this area will provide habitat for *Lipocarpha micrantha*. It is known from several beaches on the Minnesota side of Rainy Lake.

*Lipocarpha micrantha* was first documented on Osoyoos Lake, British Columbia, by Ceska and Ceska (1980). Of the two populations noted, one has been eradicated by shoreline development. The British Columbia Conservation Data Centre has been monitoring the second population since 1991. In 2001 a total of between 30 000 and 50 000 plants were inventoried. This is the highest recorded population at that site, and it is the largest population in Canada. The high number is attributed to excellent growing conditions, and also to the higher search intensity in 2001. If conditions remain stable at this site the population should continue to thrive. However, local development plans at the site, including a casino and marina, would likely destroy about 50 to 60% of the remaining habitat. A third, small (20 plants over 2 m<sup>2</sup>) population was discovered on the shoreline of Okanagan Lake in 2002.

### Special Significance of the Species

*Lipocarpha micrantha* has very specific habitat requirements: open, sandy shorelines, protected from

strong waves, with limited competition from other plants. It is extremely sensitive to alteration of both water levels and shoreline structure. As such it may be an important indicator of wetland quality.

### Protection

*Lipocarpha micrantha* has a NatureServe (2002\*) global rank of G5 or "secure". In the United States, *Lipocarpha micrantha* is listed as Endangered in Connecticut, Maryland, New Jersey, New York, and Pennsylvania, and it is listed as Threatened in Maine and Ohio (United States Department of Agriculture, Natural Resources Conservation Service 2002\*). In Canada, *Lipocarpha micrantha* is ranked as N1 or "critically imperilled", and is listed as Threatened in Ontario (NHIC, 2003\*) and Endangered/Threatened in British Columbia (Douglas et al. 2002).

Both extant Ontario populations of *Lipocarpha micrantha* are in a Provincial Nature Reserve and a Provincial Conservation Reserve. As such they are protected from shoreline development, but are subject to water level regulation. The extant populations in British Columbia occur on an Indian Reserve (Osoyoos Lake Indian Reserve #1) and in a Provincial Park (Sun Oka Beach Provincial Park). There is currently no specific provincial rare species legislation in place for the protection of endangered/threatened vascular plants in British Columbia. At the federal level the Species at Risk Act protects COSEWIC-listed plants on federal lands (which includes Indian Reserves). It also empowers the federal government to protect habitat outside federal lands if the province fails to protect listed species or their habitat; these mechanisms are discretionary.

### Evaluation of Status

The status of *Lipocarpha micrantha* in Canada is precarious. The largest, apparently stable, population at Osoyoos Lake in British Columbia is threatened by planned development. Should this development proceed, approximately half of the remaining *Lipocarpha micrantha* plants in Canada will be physically destroyed, and the remaining habitat may no longer support the species. The two remaining Ontario populations are

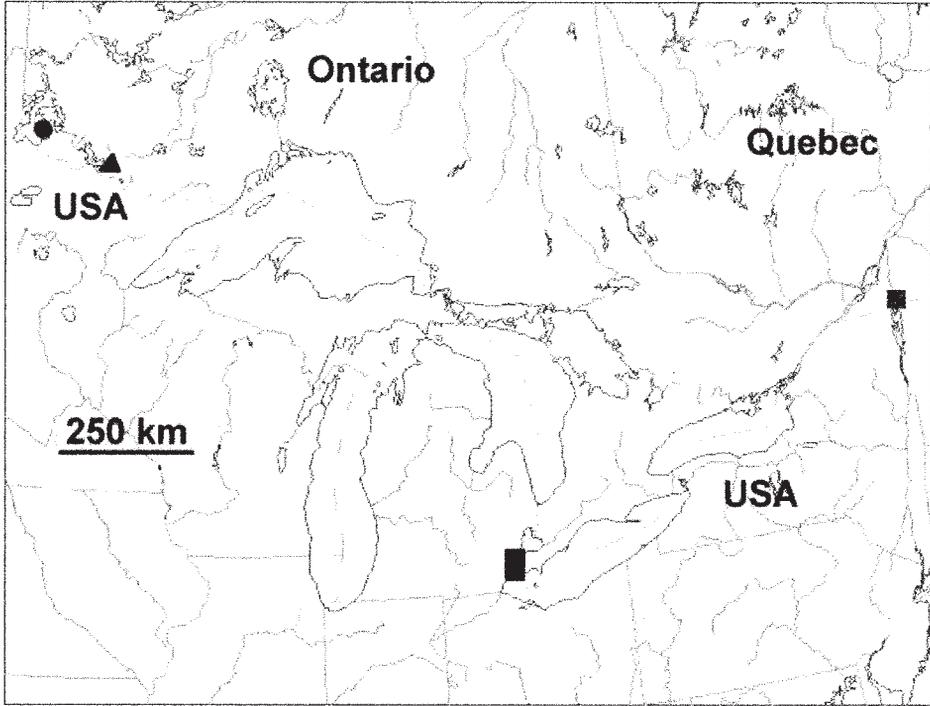


FIGURE 3. Distribution of *Lipocarpha micrantha* in Ontario and Quebec. Sable Island is shown as a circle, Poundnet Bay as a triangle. Squares denote extirpated populations.

relatively small, both in number and area, and therefore are vulnerable to environmental disturbance. If development at any of the remaining populations proceeds without consideration for this species it will very likely be extirpated from Canada. In particular, alteration of natural water level cycles could result in the destruction of the habitat required by *Lipocarpha micrantha*. The authors' recommendation that *Lipocarpha micrantha* be uplisted to Endangered was accepted by COSEWIC in November 2002.

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in Canada (COSEWIC), September 2001. The distribution map for Ontario and Quebec, Figure 3, was provided by COSEWIC. Funding was provided by COSEWIC, the George Cedric Metcalf Foundation, Royal Botanical Gardens, and the British Columbia Conservation Data Centre.

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