COSEWIC
Assessment and Update Status Report

on the

Common Hoptree
Ptelea trifoliata

in Canada

THREATENED
2002

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:

Please note: Persons wishing to cite data in the report should refer to the report (and cite the author(s)); persons wishing to cite the COSEWIC status will refer to the assessment (and cite COSEWIC). A production note will be provided if additional information on the status report history is required.

COSEWIC 2002. COSEWIC assessment and update status report on the common hoptree *Ptelea trifoliata* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 14 pp.

Ambrose, J.D. 2002. Update COSEWIC status report on the common hoptree *Ptelea trifoliata* in Canada, *in* COSEWIC assessment and update status report on the common hoptree *Ptelea trifoliata* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. 1-14 pp.

Previous report:

Ambrose, J.D. 1984. COSEWIC status report on the hop tree *Ptelea trifoliata* in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. 31 pp.

Production note:
Common hoptree *Ptelea trifoliata* was formerly listed by COSEWIC as hop tree *Ptelea trifoliata.*

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Également disponible en français sous le titre Rapport du COSEPAC sur la situation du ptéléa trifolié (*Ptelea trifoliata*) au Canada – Mise à jour.

Cover illustration:
Common Hoptree — Illustration by Susan Laurie-Bourque courtesy of the Canadian Museum of Nature.

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COSEWIC
Assessment Summary

Assessment Summary – November 2002

Common name
Common Hoptree

Scientific name
Ptelea trifoliata

Status
Threatened

Reason for designation
A species of restricted range in Canada and small population size occurring primarily along sandy shoreline habitats. It has experienced substantial losses at some sites from cottage land development, damage to habitats by increasing numbers of nesting cormorants and other unknown factors. A newly recognized potential threat of unknown impact is posed by a recently discovered twig-boring beetle, which is causing damage to flowers and large portions of the tree crown.

Occurrence
Ontario

Status history
Designated Special Concern in April 1984. Status re-examined and uplisted to Threatened in November 2002. Last assessment based on an update status report.

COSEWIC
Executive Summary

Common Hoptree
Ptelea trifoliata

Species information

Common hoptree (*Ptelea trifoliata*) is a small tree in the rue family (Rutaceae). It has alternate trifoliate leaves which are aromatic; flowers occurs in early summer; they are borne in terminal clusters, cream coloured and with (4-) 5 petals. Fruit matures late in the season; it is dry, disk-shaped and bears 2-3 seeds.

Distribution

The typical subspecies occurs from the lower Great Lakes and eastern Pennsylvania to northern Florida and Texas. Other subspecies occur further south and west into Mexico.

Habitat

In Ontario it occurs almost entirely along or near the Lake Erie shoreline. It is often found in areas of natural disturbance where it forms part of the outer edge of shoreline vegetation.

Biology

Common hoptree is dioecious (male and female individuals) with insect pollinated flowers. The fruit is wind dispersed and seedlings establish in open or disturbed sites.

Population sizes and trends

Three populations on protected sites have 100 or more individuals each; careful documentation of one has shown a decline in reproductive individuals of 60% in 17 years. Three populations have been lost since the original report was prepared due mostly to human activity near their shoreline habitat. This makes a total of 4 known extirpated populations. Several other populations have shown declines, some are similar or larger than in 1982. Four new sites have been verified since 1982. Of those 17 sites with comparative counts, numbers of trees have declined from 391 to 221 (43% decline). It is estimated that there are an additional 300-450 trees at Pt. Pelee and other sites not precisely resurveyed in 2000-01, plus 350 counted at Pelee Island west shore and Middle Island but with no numbers to compare with 1982.

Limiting factors and threats

This species only rarely colonizes open inland habitats, being mostly limited to shoreline sites. Human activity along the Lake Erie shoreline appears to be the greatest threat. In addition, a twig-boring beetle has been observed causing significant damage to a few populations.

Special significance of the species

Common hoptree is a component of the stabilizing vegetation along sections of the Lake Erie shoreline. It is one of two native species on which the larvae of the rare Giant Swallowtail butterfly feeds. This species has had a long history of medicinal and economic usage, including by first nation people.

COSEWIC MANDATE

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

COSEWIC MEMBERSHIP

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

DEFINITIONS

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

* Formerly described as “Vulnerable” from 1990 to 1999, or “Rare” prior to 1990.
** Formerly described as “Not In Any Category”, or “No Designation Required.”
*** Formerly described as “Indeterminate” from 1994 to 1999 or “ISIBD” (insufficient scientific information on which to base a designation) prior to 1994.

The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) was created in 1977 as a result of a recommendation at the Federal-Provincial Wildlife Conference held in 1976. It arose from the need for a single, official, scientifically sound, national listing of wildlife species at risk. In 1978, COSEWIC designated its first species and produced its first list of Canadian species at risk. Species designated at meetings of the full committee are added to the list.

Environment Canada | Environnement Canada
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Canada

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

Update
COSEWIC Status Report

on the

Common Hoptree
Ptelea trifoliata

in Canada

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2002

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SPECIES INFORMATION

Name and Classification

Scientific Name: *Ptelea trifoliata* L
Common Names: common hoptree
Family Name: Rutaceae (rue family)
Major Plant Group: Angiosperm (dicot flowering plant)

Common hoptree is taxonomically distinct in its northern range, but occurs with other *Ptelea* species and subspecies in southwestern North America. Details of related species and named subspecific taxa are given in Bailey, 1962 and summarized in the original status report (Ambrose & Aboud, 1982).

Description

Common hoptree is a small tree or large shrub with smooth reddish-brown bark, alternate trifoliate aromatic leaves; flowers occur in early summer; they are fragrant, cream coloured with (4-)5 petals, borne in terminal clusters with each tree having all male or all female flowers (i.e., dioecious, but rarely an individual with male clusters and a few female flowers in the centre). The fruit is winged, disk-shaped, indehiscent and dry, containing 2(-3) seeds (Figure 1). For a full description see Ambrose & Aboud, 1982. Photographs are available at Environment Canada and ROM/OMNR species at risk web sites.

Figure 1. Common hoptree branch with leaves and ripe fruit (illustration by Susan Laurie-Bourque, courtesy of Canadian Museum of Nature).

DISTRIBUTION

Global Range

The typical subspecies of this species (*P. trifoliata* ssp. *trifoliata*) occurs naturally from the lower Great Lakes to Texas, eastward from eastern Pennsylvania to northern Florida. Other subspecies occur farther south into Florida and Mexico, and west to New Mexico and Arizona (Figure 2). Maps are given for the species in the status report by (Ambrose & Aboud, 1982) and for the subspecies in Ambrose (1984), reproduced on the ROM/OMNR web site with some modification.

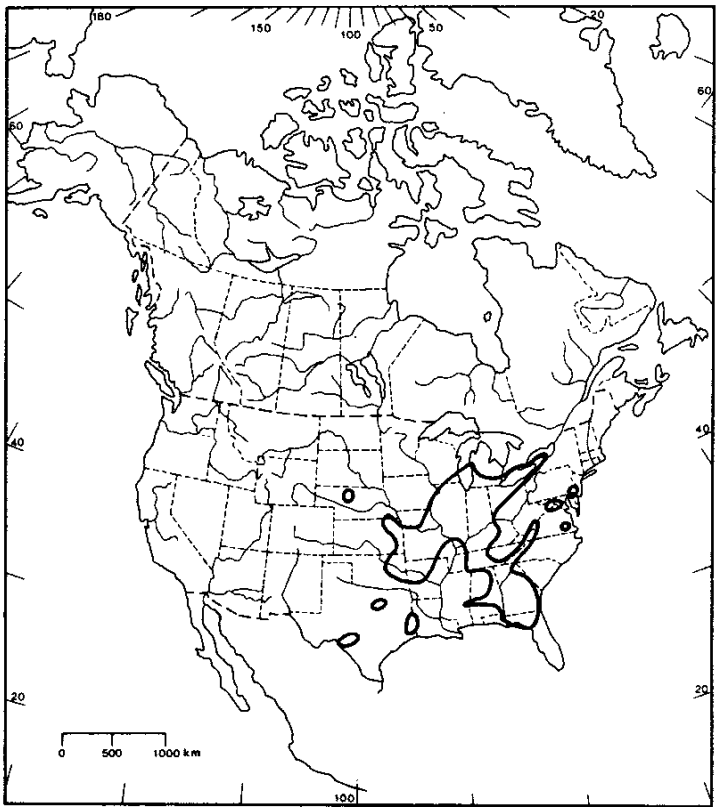

Figure 2. Distribution of *Ptelea trifoliata* ssp. *trifoliata* in North America north of Mexico (after Ambrose, 1984).

Canadian Range

In Canada it is limited to extreme southern Ontario, namely the Lake Erie shoreline and a few inland sites (Figure 3). Detailed maps are given in Ambrose & Aboud (1982), Ambrose (1984) and the ROM/MNR species at risk web site. It has been collected in Quebec, but it is considered introduced there (Rousseau, 1974).

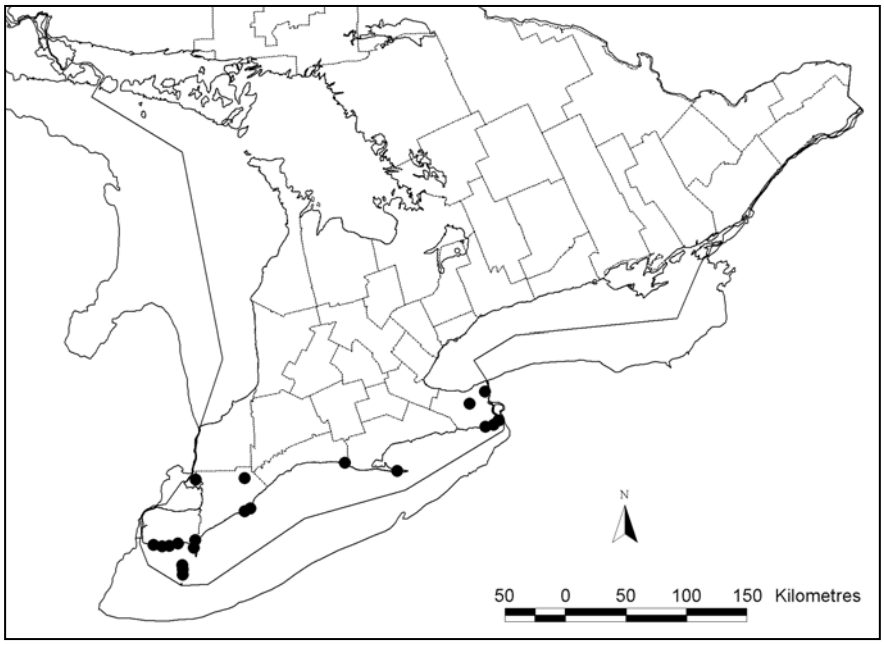

Figure 3. Distribution of *Ptelea trifoliata* in Canada (modified from Ambrose, 1984).

HABITAT

Habitat Requirements

In Canada, *Ptelea trifoliata* occurs almost entirely along or near the Lake Erie shoreline. It is often found in areas of high natural disturbance where it forms the outer edge of shoreline woody vegetation; on the Pt. Pelee and Fish Point sandspits it is common on the windward west shore but rare on the leeward side and inland. It most commonly is found growing on nutrient poor sand, but occasionally is found on other droughty substrates such as thin soil over limestone. This species shows little tolerance for deep shade, showing less vigour when taller trees begin to shade it. It occurs in areas of a long growing season and a climate moderated by Lake Erie. Seedlings readily establish in open or thinly vegetated sand.

Trends

Secure sites with large populations, such as Fish Point and Point Pelee, have shown a decline since surveyed in 1982 but it is not certain if these changes are a downward trend or represent a normal fluctuation in population sizes. On Middle Island the population is holding well and possibly expanding with the forest openings caused by the high population of nesting cormorants. Several secure sites with small populations have experienced a decline in population size (e.g., Hillman Marsh sand spit, Holiday Beach) while others have remained at the same level or increased (e.g., Rondeau and Port Burwell provincial parks, Cedar Beach Conservation Area). Private and municipal lands along beaches and roadsides have suffered significantly due to cottage development and intensive levels of native vegetation removal and beach grooming, in some cases leading

to the local extirpation of populations (e.g., Linden Beach, Seacliff, Erie Beach) or severe loss of numbers (e.g., Thamesville, Crescent Beach to Windmill Point).

Protection/Ownership

The large populations at Point Pelee National Park (including Middle Island) and Fish Point Provincial Nature Reserve are under federal and provincial ownership, respectively. Smaller populations occur on federal, provincial, conservation authority and local municipality public lands, but not necessarily managed for conservation of rare species (e.g., road verges and drainage ditches; beaches). Stone Road Alvar is a nature reserve with various parts owned by the Federation of Ontario Naturalists, the Nature Conservancy of Canada (NCC) and the Essex Region Conservation Authority.

BIOLOGY

General

Common hoptree is late to leaf out, with flowers appearing at the end of the new growth in late spring, typically during the first two weeks of June in its Ontario range. Fruit matures late in the summer, is wind dispersed during late fall to winter, and seedlings develop after winter stratification which breaks dormancy.

Seedlings develop in full sun to partial shade. Increasing shade appears to suppress flowering and in areas where a full forest canopy has developed this species rarely persists. It appears to be short lived, perhaps in part to its occurrence mostly on dynamic sites where specimens rarely reach a large size.

Reproduction

Flowers were observed with a large variety of insect visitors, primarily bees, flies and beetles. The species is dioecious with ratios skewed towards males (Ambrose et al., 1985). No evidence of clonal reproduction has been observed. The germination ecology has been examined by McLeod and Murphy (1977).

Survival

Individual plants are likely short-lived, due to their occurrence in dynamic habitats where vegetation is periodically up-rooted by winter storms and ice, or being shaded out in forests with closing canopies. However, seedlings readily establish in the open habitats, replacing lost vegetation.

Dispersal

Seeds are dispersed within the dry winged indehiscent fruit during the fall and winter. Individual fruit typically contain two seeds. Thus an individual dispersal event to

a distant site could produce a male and female seedling, allowing for continued reproduction.

Nutrition and Interspecific Interactions

Robust populations occur on sites of beach sand, likely of low nutrient levels, with nutrient inputs likely limited to wind blown debris and lake water. Pollinating insects are important for good seed development (Ambrose et al., 1985).

A twig-boring beetle (family Scolytidae, determined by Prof. Steve Marshall, University of Guelph; awaiting species determination from a specialist in Ottawa) was observed on several of the populations, causing losses of major parts of affected trees, including loss of flowering. The larvae of the Giant Swallowtail butterfly (*Papilio cresphontes*) feed on this species but do not cause major damage.

Adaptability

Most populations are on beach sand, including the inland population at Thamesville, but some populations also occur on other soils, such as on the Pelee Island alvars and along drainage ditches where soils are heavy lake bottom clays and clay-loams.

POPULATION SIZES AND TRENDS

Population numbers appear to be in a slight decline of about 12%, with the extirpation of three of the 26 populations known in 1982-4; these have been lost due to human activity near their shoreline habitat. Four new sites (plus population extensions) were recorded since 1984, but they may have been overlooked earlier rather than being new (recently established) populations; most are near known populations. Six populations have shown declines (# 3, 10, 11, 14, 24 and 28), 11 are stable or showing increases over 1982 (#2, 6, 8, 9, 15, 17, 20, 21, 22, 23, and 25); Pt. Pelee appears to be in a decline similar to Fish Pt., but there were no previous counts to compare with the present situation.

A larger decline in numbers of reproductive individuals, about 43%, was observed among those 17 populations with comparative data. Careful documentation of the Fish Point site shows a large decline of 60% in 17 years. However, this apparent trend seems less significant when the much larger populations without comparative data are included. The decline of several small populations and the loss of three is a concern and action should be taken to reduce the activity that causes their decline, but overall the decline of the Ontario population is likely somewhere between the above 43% and the estimated numbers at the end of the table below that suggest a low decline. It is estimated that there are an additional 300-450 trees not accounted for in Table 1 at Pt. Pelee and other sites not resurveyed in 2000-02 for a total of about 920-1025 reproductive trees. Three populations on protected sites have 100 to 300+ individuals each.

The surveyed sites are summarized in table 1.

Table 1. Subset of Ontario Populations of *Ptelea trifoliata* (primarily of sites with comparative data).

No.	County or Region	Population	Ambrose & Aboud, 1982	2000-02 survey
2.	Elgin Co.	Port Burwell Prov. Park	2 + 0 + 10 *	12 + 40 + 40 TH: IE
3.	Essex Co.	Colchester, public beach	1 + 0 + 0	0 + (1) + 0; TH: BG
6.		Fox Creek Cons. Area	0 + 2 + sev	1 + 0 + 1 TH: ID
8.		Cedar Beach Cons. Area	0 + 3 + 0	2 + 3 + 18 TH: BG
9.		W. of Comet	2 + 0 + sev	7 + 1 + 0
10.		Holiday Beach Cons. Area	4 + ~ 15 + 15	2 + 2 + 0 TH: BG
11.		Hillman Marsh sand spit	~20	1 + 0 + 0 TH: SE, TBB
12.		*Point Pelee National Park*	*Numerous*	*Numerous*
14.		Fish Point +	248+num+num	96 + 13 + 8 TH: TBB, IE
15.		Stone Rd. Alvar, roadside	5 + few + sev	10 + 4 + 0
17.		*West Shore roadside*	*Common*	*50 + 57 + 0*
20.		Lighthouse Pt. and quarry roadside	11 + ? + sev	55 + 20 + 0
21.		*Middle Island*	*num + num + ?*	*300 + 22 + 0 TH: CN*
22.	Kent. Co.	Rondeau Prov. Park	6 + 1 + sev	4 + 32 + 28 TH: DB
23.		Erieau Beach	6 + 4 + num	7 + 6 + num. TH: BG
24.		Thamesville, Glacial shoreline	22 + few + sev	6 + 5 + 0 TH: ID
25.	Lambton Co.	Walpole Island	1 + 0 + 0	2 + 0 + 0
28-32.	Niagara Region	Crescent Beach to Windmill Point	37 +14 + 0-num	16 + 9 + 0-few TH: BG
		EXTIRPATED		
7.	Essex Co.	Linden Beach	1 + 0 + sev.	Extirpated TH: BG
13.		*Seacliff*	*[1987: no abundance data]*	*Extirpated TH: BG*
27.	Niagara Region	Erie Beach	~25 + ? + ?	Extirpated TH: ID, BG
Total			391 + 39 + 25 **	221 + 136 + 95***

*Numbers: reproductive size trees + saplings + seedlings (few = ~3, sev + ~10, num = up to 100s); totals: only actual counts.
**An additional 600-700 trees were estimated to be present in 1982, for a total 1982 estimate of 990-1090.
***Total counts of trees + saplings + seedlings made during field seasons of 2000 to 2002 (This total excludes those for which no specific numbers were recorded during the 1982 field season, *indicated with italics,* at localities 12, 13, 17 and 21). The latter two increase the number known by 350, and it is estimated that there are an additional 300 to 450 trees at Pt. Pelee and other sites not surveyed in 2000-02, for a total of approximately 920-1025 reproductive trees.
+The Fish Point population was comprehensively inventoried in 1983 and again in 2000.
TH = Threats: BG, beach grooming; DB, deer browsing; ID, incompatible development; IE, invasive exotics; SE, storm erosion; TBB, twig boring beetle; CN, cormorant nesting.

LIMITING FACTORS AND THREATS

Three sites, Linden Beach, Seacliff, and Erie Beach, have been lost due to human activity. Other populations are under threat as cottage development and beach grooming continue to intensify.

Double Crested Cormorants have recently experienced a major expansion of their populations in the lower Great Lakes and are known to be nesting on some of the Erie Islands. They have significantly impacted the vegetation of East Sister Island and Middle Island. The species is still doing well on Middle Island and perhaps even expanding with the forest openings created by the cormorants.

SPECIAL SIGNIFICANCE OF THE SPECIES

In Canada, *Ptelea trifoliata* occurs almost entirely along the Lake Erie shoreline, where it is a component of the stabilizing vegetation. It is one of two native species on which the larvae of the rare Giant Swallowtail butterfly feeds.

This species, with its aromatic and bitter substances, has had a long history of medicinal and economic usage, reviewed by Bailey (1960). More recently, alkaloids with bactericidal and cytotoxic activity were isolated and identified from hop tree (Petit-Paly et al., 1989). There are four citations for the use of the root bark, for lung problems, making other medicines more potent, to a sacred medicine with multiple uses, on the Native American Ethnobotany Database web site.

Common hoptree is occasionally available in the specialty horticultural trade. It has long been appreciated in European gardens, since introduction from the American colonies in the 17th century. While admired in England for its “picturesque habit” (Clarke and Taylor, 1976) and “fragrant flowers equal to the best honeysuckles” (Hillier, 1972), it has been maligned by such notable North American horticulturists as Wyman (1965).

EVALUATION AND PROPOSED STATUS

Existing Protection or Other Status

The Nature Conservancy gives this species a global rank of G5; however there are five states where it is listed as imperiled (S1 or S2) and one state and Ontario where it is listed as vulnerable (S3), by the most recent listing of 2000, accessible through the NatureServe web site.

It is listed as a species of Special Concern by COSEWIC but is currently without formal protective status in Ontario.

Assessment of Status and Author's Recommendation

The comparison of current population counts of those with past estimates has shown what appears to be a significant decline, and as pressure to develop the Lake Erie shoreline, either for cottages or recreational beaches, this species will be under greater jeopardy. However, with better awareness and more sensitive land management, the jeopardy could be greatly reduced. This species appears to thrive on dynamic shore habitats; with minimal changes in practices its security could be increased.

Proposed Status: The species is best considered as threatened in Ontario in view of the following factors: limited geographical occurrence; few localities with any significant numbers of trees, some with only single or very few trees of this dioecious species; three recent losses of populations; a major decline (61% loss) of a population at Fish Point Nature Reserve.

TECHNICAL SUMMARY

Ptelea trifoliata
Common Hoptree Ptéléa trifolié
Range of Occurrence in Canada: southern Ontario, Lake Erie shoreline and inland

Extent and Area information	
• *Extent of occurrence (EO)(km²)*	117 km²
• *specify trend (decline, stable, increasing, unknown)*	Stable
• *are there extreme fluctuations in EO (> 1 order of magnitude)?*	No
• *Area of occupancy (AO) (km²)*	7.5 km²
• *specify trend (decline, stable, increasing, unknown)*	Slight decline
• *are there extreme fluctuations in AO (> 1 order magnitude)?*	No
• *Number of extant locations*	34
• *specify trend in # locations (decline, stable, increasing, unknown)*	Decline: 3 sites lost in recent years plus 1 loss in the 1970s; 4 new sites, mostly in same range.
• *are there extreme fluctuations in # locations (>1 order of magnitude)?*	No.
• *Habitat trend: specify declining, stable, increasing or unknown trend in area, extent or quality of habitat*	Declining; shoreline habitat being lost or degraded
Population information	
• *Generation time (average age of parents in the population) (indicate years, months, days, etc.)*	Likely 3-5 years
• *Number of mature individuals (capable of reproduction) in the Canadian population (or, specify a range of plausible values)*	920-1025
• *Total population trend: specify declining, stable, increasing or unknown trend in number of mature individuals*	Decline
• *if decline, % decline over the last/next 10 years or 3 generations, whichever is greater (or specify if for shorter time period)*	43% decline in 17 populations with comparative counts
• *are there extreme fluctuations in number of mature individuals (> 1 order of magnitude)?*	No
• *Is the total population severely fragmented (most individuals found within small and relatively isolated (geographically or otherwise) populations between which there is little exchange, i.e., ≤ 1 successful migrant / year)?*	Total s. Ontario population mostly fragmented between different shore-line sites and islands of Lake Erie.
• *list each population and the number of mature individuals in each*	1. Brantford 1 2. Port Burwell 12 3-6. Colchester 11 8. Cedar Beach 2 9-10. Malden 9 11. Hillman Marsh 28 12. Pt. Pelee ~350 14-20. Pelee Is. 245 21. Middle Island 300 22. Rondeau Prov. Pk. 8 23. Erieau Beach 7 24. Thamesville 6 25-26. Walpole Is. 2 28-32. Bertie 17 33-38. not verified, up to 100
• *specify trend in number of populations (decline, stable, increasing, unknown)*	slight decline, 3 recent losses
• *are there extreme fluctuations in number of populations (>1 order of magnitude)?*	No

Threats (actual or imminent threats to populations or habitats)	
-Land being developed for seasonal housing -intensive beach grooming -Cormorant nesting in Erie Islands -Twig boring beetle	
Rescue Effect (immigration from an outside source)	
• *does species exist elsewhere (in Canada or outside)?*	Canada: no. USA, yes.
• *status of the outside population(s)?*	In the USA, S1-S2 in 5 states, S3 in 1 state
• *is immigration known or possible?*	Not known but possible through fruit dispersal.
• *would immigrants be adapted to survive here?*	Likely if from northern source.
• *is there sufficient habitat for immigrants here?*	Yes, but problem is loss or degradation of habitat.
Quantitative Analysis	
3 populations lost in recent years, 6 in decline, 11 stable or increase, 4 new. Comparative count estimate, all populations: 1982:~990-1090; 2000-2002: ~920-1025 No formal estimate of probability of extinction is available.	

ACKNOWLEDGEMENTS

Mike Oldham provided the NHIC Element Occurrence reports. Gerry aldron provided information for a new site in Essex County. Ramsey Hart provided a detailed inventory of the population at Rondeau Provincial Park and Allen Woodliffe provided information on a new sighting there. Mathis Natvik piloted his boat through the Rondeau Bay to reach the population south of the park. Parks Canada provided support for a botanical inventory of Middle Island in 2002; Kevin Burgess assisted with that inventory. Steve Marshall of the University of Guelph provided the family determination of the twig-boring beetle. Cherry Ambrose helped with some of the field surveys. Funding provided by Canadian Wildlife Service, Environment Canada.

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Pertinent Web Sites

Environment Canada: Species at Risk in Canada. www.speciesatrisk.gc.ca/
Native American Ethnobotany Database, compiled by Daniel Moerman. www.umd.umich.edu/
NatureServe, Association for Biodiversity Information. www.natureserve.org Ontario Natural Heritage Information Centre (NHIC) www.natureserve.org
ROM/OMNR: Royal Ontario Museum/ Ontario Ministry of Natural Resources Species at Risk Module. http://www.mnr.gov.on.ca/MNR/nhic-f.html

THE AUTHOR

John Ambrose came to the University of Guelph Arboretum in 1974, after receiving a PhD in Botany from Cornell University. At the Arboretum, in addition to being the Curator, he developed a program based on the rare woody plants of the Carolinian Zone of southern Ontario, including field surveys, status reports and detailed studies of their population and reproductive biology. After 17 years there, he moved to the Toronto Zoo as Curator of Botany/ Manager of Horticulture. There he developed new natural habitat exhibits and a naturalization program for peripheral lands of the site, in addition to his exhibit responsibilities. These reflect his growing interest in restoration ecology. In 1999 he left the Zoo to teach a new course in restoration ecology at the University of Guelph. He currently is self-employed and continues to work with endangered species recovery planning, serving on three recovery teams for Carolinian trees.

AUTHORITIES CONSULTED

Mike Oldham of NHIC was contacted for information on file for this species. Allen Woodliffe of OMNR and Ramsey Hart of Rondeau Provincial Park were contacted for information on provincial park sites. The Essex Region Conservation Authority was contacted regarding sites in their conservation areas. Gerry Waldron provided information on a new site on private land in Essex County.

COLLECTIONS EXAMINED

With good data on collection and site records from the up-dated element occurrence reports of the Natural Heritage Information Centre (NHIC, 2000) and the COSEWIC status report (Ambrose & Aboud, 1982), researching time was concentrated on going to representative sites. Population densities, reproduction and observation of local threats were compared with those recorded earlier during 2000-2001. Middle Island was surveyed in the summer of 2002 for a Parks Canada project and the data are added here. About 71 person-hours were spent in the field for updating the status of this species.